Clinton Creek Remediation Project

10% Design Phase – Alternative Designs
Project # VE52705G.460.1

Prepared for:

Government of Yukon-Energy, Mines and Resources
Assessment and Abandoned Mines

2C – 4114 4th Avenue, Whitehorse, Yukon, Y1A 4N7

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2C – 4114 4th Avenue, Whitehorse, Yukon, Y1A 4N7

Prepared by:

Wood Environment & Infrastructure Solutions
#600 – 4445 Lougheed Highway
Burnaby, BC V5C 0E4
Canada
T: 604-294-3811

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Table of Contents

Table of Contents (cont'd)

List of Tables

List of Appendices

List of Acronyms and Abbreviations

AACE	American Association of Cost Engineers
AAM	Assessment and Abandoned Mines (Yukon Government)
BCMOE	British Columbia Ministry of the Environment
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
CCRP	Clinton Creek Remediation Project
CDA	Canadian Dam Association
DBA	Dam Breach Assessment
DBM	Design Basis Memorandum
ERT	Electrical Resistivity Tomography
IDF	Inflow Design Flood
IPRP	Independent Project Review Panel
LCCA	Life Cycle Cost Analysis
masl	metres above sea level
PMF	Probable Maximum Flood
TH	Tr'ondëk Hwëch'in
WC	Wolverine Creek
Wood	Wood Environment & Infrastructure Solutions, a Division of Wood Canada
YG	Yukon Government

1.0 Introduction

1.1 Background and Scope of Work

Wood submitted a final report entitled "Clinton Creek Remediation Project 10% Design Phase Report November 2019" (Wood, 2019) and other associated reports to the Yukon Government (YG) targeting six options for reclamation of the Clinton Creek and Wolverine Creek mine areas. The designs for each of the six options were developed taking into consideration the design criteria for Closure – Passive Care under Canadian Dam Association (CDA) guidelines. During Passive Care, CDA notes that the design interval could extend for hundreds of years and there may not be regular monitoring or an opportunity to effectively respond to warning signs and emergencies. As a result of the conservative nature of design criteria for Passive Care, the designs were robust and commensurately expensive.

Following review of the design report and associated cost estimate report (Wood, 2019a), YG requested a follow-up assessment to study an alternate design approach that focused on meeting the design standards for Closure – Active Care under CDA guidelines and which may result in lower capital costs with the understanding that some costs would be passed on as operational expenses.

The underlying philosophy was to consider a design approach that can control risks to a reasonable degree and that is readily repairable within the limits imposed by uncertainty. These risks apply to both the construction and operational phases. This approach was underpinned by the relevant observation that, whilst both Clinton Creek Valley and Wolverine Creek Valley were impacted by slope failures in the 1970 and 1980s, there has been minimal long-term environmental impact to the downstream environment.

This document is intended for the reader with detailed knowledge of the 10% design phase work completed in November 2019 (Wood, 2019). Given the 6-week period available to execute this work, this report document is considered an executive summary of the analysis undertaken for the alternative designs and supporting information which is available to the reader in the 10% design phase has been excluded.

1.2 Design Basis for Alternatives

This scope of work was a study of the implications of adopting a more active approach to reclamation and, ultimately, closure. It required a shift in design philosophy to account for revised design criteria. This was done by changing the assumptions made around the phase of mine life.

The alternative design study would make the assumption that the mine would remain indefinitely in Active Care and that the CDA design criteria for Active Care be adopted. A key requirement of Active Care is that the owner normally has resources on site that are able to respond to problems and possible emergencies that may develop. Assuming Active Care, the design criteria required under CDA guidelines for both hydrotechnical and geotechnical elements of the design are significantly reduced from Passive Care.

Since the environmental loadings, for example seismic events or flooding, are unchanged, the long term conditions affecting the designs remain the same under both Active and Passive Care scenarios. The result is that some of the burden of reclamation cost is deferred by way of inspections, maintenance and replacement as well as potential clean-up costs if a site element fails. The shift is therefore to lower upfront capital expenditure (CAPEX) by passing some of the cost of reclamation to operational expenses (OPEX). Adoption of lower loading for seismic and flood events in turn put additional emphasis on the management of consequences. This is beyond the scope of Wood's present study.

Of the six options considered for Clinton Creek and Wolverine Creek in the 10% design phase (3 in each valley), the adoption of lower design criteria will most significantly affect CC1, CC2, CC3 and WC2. Wood therefore focussed efforts on reviewing those four schemes.

2.0 Option Descriptions

2.1 Original Scope Descriptions

The Project Partners' descriptions of the six candidate options specified in Yukon's original scope document (Yukon 2017) were as follows. Note that the references to LCCA (Life Cycle Cost Analyses) Options in these descriptions are taken from the option definitions applied in a 2014 estimating exercise completed for Yukon in 2014 (WorleyParsons 2014). The alternative option descriptions were unchanged from the original 10% design (known hereafter as the "Base Case").

Clinton Creek Side Closure Concepts:

a. **Water Passage and Catastrophic Failure Mitigation (LCCA Options D3, I2) (CC1 in Wood reports)** - Conduct sufficient work on the waste rock pile to mitigate a catastrophic failure of the pile and construct a water conveyance channel to provide water passage from Hudgeon Lake to Clinton Creek. Now called CC1 in Wood reports.

b. **Water Passage, Catastrophic Failure Mitigation and Lowering Lake (LCCA Option E3) (CC2 in Wood reports)** - Conduct sufficient work on the waste rock pile to mitigate a catastrophic failure, construct a water conveyance channel to provide water passage from Hudgeon Lake to Clinton Creek and lower Hudgeon Lake as part of that concept.

c. **Water Passage with Reduction of the Lake Level, Eliminating the Dam, and Mitigating Catastrophic Failure (LCCA Option F) (CC3 in Wood reports)** - Conduct sufficient work on the waste rock pile to prevent it from acting as a Dam (i.e., as defined by the Canadian Dam Association) on Clinton Creek and to mitigate a catastrophic failure of the waste rock pile. Construct a water conveyance channel to provide water passage through the site.

Wolverine Creek Side Closure Concepts:

a. **Sediment Control Only (Not in the LCCA) (WC1 in Wood reports)** - Construct a sediment control structure downstream of the rock-lined channel in Wolverine Creek - no work on the tailings pile or the channel is required.

b. **Water Passage and Stability Improvement (LCCA Options B, C, D, D2 - note that Option B does not have a remediation measure for the tailings) (WC2 in Wood reports)** - Conduct sufficient work at the base of the tailings pile to minimize the tailings movement and provide a semi-stable surface to construct a water conveyance channel.

c. **Isolate the Asbestos (LCCA Options E, E2) (WC3 in Wood reports)** - Stabilize tailings pile to allow a cover to be placed or relocate the tailings pile.

Throughout the text, Base Case scenarios are referenced, for example, as CC1 and the alternative case is referenced as CC1-A to allow differentiation.

3.0 Alternative Design Assumptions

3.1 Hudgeon Lake Drawdowns

Option CC1-A maintains the lake at current levels, assumed for the purpose of analysis to be 412 masl. A temporary drawdown of 5 m to 407 masl is assumed for 10% design purposes to be adequate for construction and temporary storage of inflows to Hudgeon Lake[1]. Option CC2-A assumes the lake at 401 masl for closure with 5 m of temporary drawdown to 396 masl during construction. Option CC3 assumes that Hudgeon Lake is drained and Clinton Creek is re-established on the original the valley bottom.

Many of the geotechnical designs require that the landslide wastes be allowed to drain or that the phreatic surfaces be lowered prior to construction. This includes allowing the slope into Hudgeon Lake to drain such that a rapid drawdown failure not be triggered into Hudgeon Lake. Note that the geotechnical analysis assumed a 400 masl drawdown level, whereas this was refined in the hydrotechnical work to 401 masl. The difference is insignificant at this stage of design.

Additional information is provided the geotechnical summary provided in Appendix A.

3.2 Geotechnical Design Assumptions

A summary of the geotechnical assumptions considered for the analysis of the Alternative Case stability is included in Appendix A. The following bullet list identifies the key geotechnical design assumptions of the alternative case:

- Seismic triggering of liquefaction – the Alternative Case assessment used a Low Risk Classification and Active Care seismic loading of 0.037g, which results in a Factor of Safety against liquefaction (FOS_{liq}) in of 3.4 at 0.037 g, and a factor of safety (FoS) of 1.5 against liquefaction assessed at a 1/360 year event.
- Static liquefaction during construction – static triggers for liquefaction can occur during excavation of steep slopes and/or in combination with initial instability due to rapid drawdown of piezometric levels behind a slope. Given the rapidity of the mechanism it is impractical to take an observational approach.
- Blast Densification – the Alternative Case design examined the potential to use blast densification as a means to increase the density of the waste pile in an attempt to achieve steeper slopes and minimize cuts. A FoS of ≥1.1 was considered to be an appropriate guideline for the Alternative Case design. The potential impact of densification of loose waste material was considered as an option for mitigation against static liquefaction only. The level of effort required for mitigation against static liquefaction during construction is not considered to be adequate to mitigate the potential for seismic liquefaction for a Long-Term Passive Care situation under the appropriate seismic loading, unless considerably increased blast densification is undertaken.
- Ice-Rich Permafrost – the presence of ice-rich permafrost in colluvial materials along the pre-construction slopes of the north and south slopes of the Clinton Creek valley was considered in the Base Case analysis; however, additional back analysis was completed and the strength of the material considered in the Alternative Case analysis was increased to a cohesion of 60 kPa from 50 kPa used in the Base Case.

1 Note the original 10% design assumed drawdown during construction was more conservative at 10 m. Actual drawdown requirements would need to be confirmed during preliminary design stage.

- Settlement of spillway due to ice-rich permafrost – The expected rate of thaw for CC2-A is higher than that for CC1-A, as there is less insulating material. It is expected that maintenance in the form of continuing replacement of granular fills and repairs of spillway components will be required for both cases with CC1-A requiring a longer time period .
- Slope Indicator Data – limited slope indicator (SI) was available for the Base Case analysis so for the Alternative Case analysis, available SI data up to September 2019 (essentially 1 year of data) was used to update assumptions used in the Base Case analysis. Creep movements have been confirmed in the ice-rich colluvium in BH18-03 and BH18-04 in the Clinton Creek valley. No other shear movements have been detected in the instruments in the Clinton Creek valley at this time, although general tilting of the wastes has been measured in many of the SIs. In the Wolverine Creek valley, a shear plane has been detected in the SI in BH18-17, in the upper most portion of the colluvium below the tailings. Back analyses have been completed for all of the impacted sections, as detailed in Appendix A.
- Deep alluvial silt and clay in the Clinton Creek valley – due to the collected SI data and updated back analyses, the silt to silty clay layer in the base of the Clinton Creek valley was assumed to be a normally consolidated clay with a mobilized s_{us}/σ'_v ratio of 0.22, which was assumed to be 0.14 in the Base Case analysis.
- Groundwater level control within wastes – the stability analyses for Clinton Creek required the drawdown of the water table consistent with the lake levels, as well as some drop in the phreatic surface downstream of the lake. These levels may be achieved by overall drainage to the lake and spillway but may also require local pumping to achieve.
- Alignment of CC1-A and CC2-A options – the Base Case assessment assumed Long-Term Passive Care; therefore, the alignment of CC1 and CC2 was shifted to the south to avoid undercutting the north slope of the Clinton Creek valley. As the Alternative Case design assumes active care, where possible the alignment of CC1-A and CC2-A were shifted north against the north slope of Clinton Creek, in order to minimize cut volumes as well as move the spillway locations away from the known ice-rich colluvium in BH18-03, as well as other problematic soils conditions.
- Based on the above assumptions, and the results of the slope stability modelling completed for the CC1-A and CC2-A options, it was determined that no Alternative Design basis for the CC3 option was available. The CC3 alignment cannot be moved north, as the creek needs to be placed on the original valley bottom in order to restore the original creek, and the results of the analyses for CC1-A and CC2-A did not lead to steeper slope cuts, unless additional improvement measures were invoked. Wood has not completed additional analysis for a CC3-A option.

3.3 Hydrotechnical Design Assumptions

Design criteria for hydrotechnical matters are defined in the CDA guidelines which take a risk-based approach. The previous work undertaken by Wood in a breach assessment for the Base Case design (Wood, 2019b) confirmed the “Significant” dam classification for CC1 (the classification previously assigned by both UMA and TetraTech) and recommended that a “Low” classification be assigned to CC2. The same classifications were adopted for CC1-A and CC2-A.

As discussed above, CDA sets different target levels for the inflow design flood (IDF) depending on the phase of life for the mine. Under the assumption of Active Care, the CDA recommends the following IDF design criteria for consideration and consultation between the owner and the regulator:

- For CC1-A option – between 1% annual exceedance probability (AEP) and 0.1% AEP;
- For CC2-A option - 1% AEP.

To assess the minimum reclamation cost that would be feasible under the CDA guidelines, Wood made the assumption that the minimum design standard IDF could be agreed with the regulators (1% AEP) for both CC1-A and CC2-A. The modified design criteria would result in IDFs for CC1-A and CC2-A of 62 m^3/s; compared to 357 m^3/s and 90 m^3/s respectively in the 10% design study.

Cost savings are related to the significant reduction in spillway and regime channel size and resulting reduction in rock riprap volumes. The spillway configuration and concept remained the same as for the Base Case.

4.0 Closure Option Alternative Designs – Clinton Creek

This section describes the alternative design development activity and outcomes for each of the three candidate options (CC1-A, CC2-A and WC2-A) where the change in design criteria would be beneficial in reducing overall cost of the scheme. The geotechnical and hydrotechnical components are described below and drawings for each option are provided in Appendix B.

4.1 Clinton Creek 1 (CC1-A) – Retention of Lake

This option involves conducting sufficient work on the waste dump to mitigate the potential for catastrophic failure and to construct a spillway to provide water passage from Hudgeon Lake. Under this option, the level of Hudgeon Lake will remain similar to the existing level (approximately 412 m) and a new spillway will be constructed as close as reasonably possible to the north valley wall. The horizontal alignment will follow the current drop structures for the first 200 m to 300 m before moving south away from the north valley wall for the lower portion of the spillway.

4.1.1 Alternative Design Elements

4.1.1.1 Geotechnical Components

Details of the stability analyses undertaken for the design cross-sections are presented in Appendix A. In general, the alternative design consists of a spillway located along the current alignment in the upper portion of the spillway, then shifting south, toward the location of the Base Case design. Based on the geotechnical stability analyses, two options were derived for the CC1-A case.

The first case utilizes slopes of 4H:1V along the spillway, but some of the sections require blast densification of the loose waste dump material, as a safety measure against static liquefaction. Wood considered a FoS of ≥1.1 for stability of these slopes.

Alternatively, if blast densification is cost prohibitive, slopes of 6H:1V will be required for stability against static liquefaction in the upper section of the spillway (i.e. at Design Section 4 and Design Section 1), with slopes of 4H:1V being acceptable downstream at section Design Section 2. Where the flatter slopes are required, the spillway alignment has been shifted north to the current spillway alignment, to minimize the volume of cut required. Where the steeper 4H:1V slopes are considered to be stable the channel has been moved south, similar to the Base Case channel location.

The Alternative Case CC1-A design does not require cutting back of the slopes facing Hudgeon Lake. The required cuts are limited to the slopes along the spillway channel.

Further design studies (i.e. 30% or greater design) could assess the compactness of the waste materials, which may result in reducing the requirement to blast densify the wastes in order to reduce the risk of static liquefaction. Additionally, the phreatic surface in the waste dumps will need to be lowered for the construction, the increase the FoS against static liquefaction during construction. Additional studies could improve the knowledge of the permeability of the waste dumps, which has significant impact on the potential drawdown rates and, consequently, the length of time required for drawdown and construction, which impacts costs.

4.1.1.2 Spillway Components

The spillway will consist of a broad rock lined channel with 12 drop structures, each with a vertical drop of approximately 3 m spaced generally 60 m apart with the drops constructed from vertical sheet piles. Each drop structure will have a plunge pool to prevent scour and to dissipate energy; designed following guidance in (Smith, 1995).

Similar to the Base Case, the spillway channel features a trapezoidal low flow channel 5.0 m wide and 0.6 m deep with a broad flood channel to convey flood flows up to the design flood (62 m^3/s).

The channel has been designed with rock riprap armouring underlain with geotextile to prevent the removal of fines from the underlying waste material.

The spillway will discharge to the natural channel upstream of the confluence with Wolverine Creek.

Similar to the Base Case, a rock armoured dyke will be constructed on the both banks on the upstream end of the spillway to protect the structure from outflanking in the event of a seiche flood caused by a landslide into Hudgeon Lake.

4.1.1.2.1 Alignment Profile and Details

The proposed spillway is shown on Drawings VE52705G.CC1-A.1 to VE52705E.CC1-A.5. Key features and components of the spillway are as follows:

- the west (lake) end inlet elevation is 412 m, which will increase the current lake elevation by approximately 0.4 m;
- the conveyance channel has a constant slope of 0.5% in between vertical drops of 3 m;
- the spillway alignment is kept as close to the north valley wall as possible to balance cut and fill as much as practical;
- the base flow channel has been designed to pass up to 5 m^3/s;
- the flood plain component of the channel (above low flow channel) will have sufficient space to create a driveable surface for maintenance activities; though the roads will be designed at the next stage; and
- the selected width for the channel allows for haul roads either side of the flow channel for access to perform maintenance and/or remedial activities. Required access ramps have not been worked out at this time.

4.2 Clinton Creek 2 (CC2-A) - Lower Hudgeon Lake

4.2.1 Alternative Design Elements

4.2.1.1 Geotechnical

Details of the stability analyses undertaken for the design cross-sections are presented in Appendix A. In general, the alternative design exists of a spillway located along the current alignment along the north slope of the Clinton Creek valley. Based on the geotechnical stability analyses, two options were derived for the CC2-A Alternative Design case.

The first case utilizes slopes of 4H:1V along the spillway, with all of the sections requiring blast densification of the loose waste dump material, as a safety measure against static liquefaction. Wood considered a FoS of ≥1.1 for stability of these slopes.

Alternatively, if blast densification is cost prohibitive, slopes of 6.5H:1V, the same as the Base Case, will be required for stability against static liquefaction. The entire spillway alignment has been shifted north to the current spillway alignment, to minimize the volume of cut required.

The Alternative Case CC2-A design requires cutting back of the slopes facing Hudgeon Lake to 5H:1V. The required cuts are limited to the slopes along the spillway channel.

Further design studies (i.e. 30% or greater design) could assess the compactness of the waste materials, which may result in reducing the requirement to blast densify the wastes in order to reduce the risk of static liquefaction. Additionally, the phreatic surface in the waste dumps will need to be lowered for the construction, the increase the FoS against static liquefaction during construction. Additional studies could improve the knowledge of the permeability of the waste dumps, which has significant impact on the potential drawdown rates and, consequently, the length of time required for drawdown and construction, which impacts costs.

4.2.1.2 Hydrotechnical

The alternative design philosophy for the CC2-A is that the components of the Base Case are maintained; specifically:

- The lake level is lowered (to 401 m).
- A stable channel with gradient mimicking as far as possible the original (pre-mine) channel is created.
- The channel must be able to cope with significant changes to the underlying permafrost.
- A further desirable trait is that this option could be developed with fish passage in mind.

Bearing in mind the objective of the exercise to conceive alternative designs that reduce capital cost, the emphasis on minimising materials movement resulted in a significantly different design concept to the Base Case. Rather than cutting down through the waste pile in a steady, slack gradient akin to a regime channel (roughly 2.5% in the Base Case), the alternative design minimises cut by reducing the gradient to 1% and incorporating a series of 1 m rock drops complete with energy dissipation and the potential to incorporate resting pools for fish in the ultimate design.

The rock drops effectively form a vertical drop (zero height) weir complete with a row of downstream stilling blocks to further reduce energy.

To minimise the risk of the rocks moving during a flood, the design is in the shape of an arch with a pre-cast concrete “octa-block” acting as an abutment against the waste pile. The “octa-block” will be buried in the channel banks so they will not be visible. A second stability precaution was taken by adding a cable along the upstream side of the arch with each boulder being fastened to the cable. Detailed design may find the cable to be unnecessary.

The low flow channel will be 1 m deep, 4 m base and 3H to 1 V side slopes. The IDF (62 m^3/s) would be conveyed by the floodplain which would be 11 m wide on each side of the low flow channel. The floodplain on each side would also be used as the maintenance road. During the IDF, the flow depth in the main channel would be 1.83 m and on the floodplain 0.83 m. The drop weirs would be drowned out and the channel would be flowing in subcritical flow at a velocity approximately 2.8 m/s.

4.2.1.2.1 Alignment Profile and Details

The proposed alternative design is shown on Drawings VE52705G.CC2-A.1 to VE52705G.CC2-A.3. Key features and components of the channel are as follows:

- the west (lake) end inlet elevation is 401 m, which will reduce the present lake level by approximately 11 m (i.e., from the current elevation of 412 m);
- the channel has an approach section approximately 8 m wide (low flow channel) tapering to 4 m after approximately 100 m;
- the channel alignment is as close to the north valley wall as possible, following the horizontal alignment of the existing channel;
- the proposed base, or low flow trapezoidal channel, is 1 m deep, has a top width of 10 m and is lined with riprap overlying a non-woven geotextile;
- the base flow channel has been designed to pass the 50% AEP (1 in 2-year) storm event; and
- the entire flow channel has been designed to pass the 1% AEP (1 in 100-year) storm event.

4.3 Clinton Creek 3 (CC3-A) - Removal of Hudgeon Lake

As static liquefaction cannot be ruled out as a potential construction issue, the CC3-A option for the Alternative Case was trending toward the same as the Base Case. Movement of the reclaimed creek for the CC3-A option is not possible, as the location of the creek in the Base Case CC3 design was as far north as possible to place the creek onto native, pre-construction materials. Due to these conditions and based on the analysis completed for the CC1-A and CC2-A Alternative Design options, the Alternative Case CC3-A option was dropped. Based on the information currently available to the design team, it is therefore concluded there is currently no safe alternative design for the removal of Hudgeon Lake.

5.0 Closure Option Alternative Designs – Wolverine Creek

5.1 Wolverine Creek 1 (WC1) - No Tailings Disturbance; Sediment Control Only

The Base Case design for WC1 was constrained by the space available to create a viable sediment control pond. The approach involved the design of a pond that could be as effective as possible in settling sediment transported from the Wolverine Creek basin but would also withstand flood events. Given that the design was based on an undefined set of criteria (i.e.: not related to requirements for CDA) and not on a prescribed performance measure, the philosophy for the alternative designed presented in this document does not apply.

As no stability analysis was completed and no work on the tailings was assumed for the Base Case design, there were no alternatives to assess for the Alternative Case design.

5.2 Wolverine Creek 2 (WC2-A) - In-Place Tails Stabilization and Surface Water Conveyance

5.2.1 Alternative Design Elements

5.2.1.1 Geotechnical

Details of the stability analyses undertaken for the design cross-sections are presented in Appendix A. The objective of the Base Case Option WC2 was to leave all tailings in Wolverine Creek valley. The Base Case WC2 recognized that the SI installed in BH18-17 was exhibiting about 14 mm/year of shear in a thin shear zone at the top of the colluvium and that the upper part of the tailings was near to failure. Based on available information from the 2016 and 2018 site investigations, the tailings are contractant, but may or may not be saturated at the contact with the colluvium. Based on the available moisture contents, the tailings are assumed to be approximately 85% saturated at the current time. However, it is possible that the tailings are currently saturated, as the granularity of the data is not sufficient to rule out that the tailings at the contact are saturated. Moreover, saturation could occur in the long term due to changing climate.

Overall, the slopes in the Wolverine Creek Valley are such that seismic triggering of liquefaction cannot be ruled out, even for a 1/100 year event. However, the Alternative Case analysis did not take into account seismic triggering, as the assumption is that the Clinton Creek Mine Site will be in Active Care, and repairs to the slopes will be required following a seismic event. This option is a modified approach to the LCCA-E Option proposed by Worley-Parson (2014). A significant difference is that the overall slope has been increased from original slope of 3.75H:1V to 3.25H:1V, and wherever possible, fill in excess of a cut/fill approach has been stored in the upland behind the slope in the area of the old plant site.

Further differentiation of this Alternative Case design to the Base Case design is that the elevation of the existing creek is left as it is currently, and the rock lined channel located downstream of the tailings pile, constructed on top of the tailings run-out, is not altered. As the pond in the middle of the tailings pile is eliminated and the pond upstream can likely be drained by channel improvements, impoundment of water is not a factor in the Alternative Design, as it was in the Base Case. As no water is impounded and no additional fill is placed at the toe, a downstream buttress dam is not required for this option.

This design assumes that the risk of static liquefaction is safely managed during construction by construction approach and drainage in areas requiring fill. Drainage measures may also not be effective in the long term due to inevitable plugging. The risk of seismic induced liquefaction is not addressed in this design alternative so, in the case of seismically trigger liquefaction, there is likely to be a failure of the tailings requiring repairs under Active Care.

5.2.1.2 Hydrotechnical

The hydrotechnical components for WC2 are vastly different for the alternative design because, in the absence of the buttress and buttress dam, the design comes down to reinstating the pre-mine conditions in the channel as far as practical and armouring the toe of the regraded tailings slopes so the creek doesn’t erode the tailings or the east valley wall.

5.3 Wolverine Creek 3 (WC3) - Isolate Tailings via Relocation

The basis of the Base Case design for WC3 was that all of the tailings be covered or removed to the Porcupine Pit. The design team concludes there is no alternative design that would result in significant cost savings.

5.4 Limitations of Alternative Designs

5.4.1 Clinton Creek 1 (CC1-A) - Retention of Hudgeon Lake

The alternative design proposed for the retention of Hudgeon Lake at roughly the current level (412 m) has some limitations. Some of these are related to data gaps which, should this option be selected for reclamation, could be designed out during the next phase

- As described above, the construction of spillway side slopes at 4H:1V requires blast densification and improvement of the loose wastes along the west most portion of the alignment. Without improvements, the basis of the design trends to the 6.5H:1V slopes of the Base Case design.
- The scheme requires 5 m drawdown of the lake for construction and some of the sections require the phreatic surface to be lowered in conjunction with the lake in order to achieve FoS ≥ 1.1 against static liquefaction of wastes below the water table. Other sections do not require as much drawdown as the spillway configuration requires raising the channel elevation at the section location, resulting in a phreatic surface below the base of the channel.
- Potential constraints on the rate of lake drawdown as identified in the Base case designs remains as a significant schedule consideration.
- The western portion of the spillway is shifted north from the Base Case design. The design of the 30 m wide channel base allows for a low flow channel, high flow channel and access roads to be constructed on both sides of the channel to allow for access for cleaning out colluvium and trees as a part of the required ongoing maintenance and/or remedial works. The presence of the access road along the toe of the north slope helps to intercept small debris flows and trees before they enter the channel. However ongoing thaw induced instability and other natural slope processes on the north slope are likely to result in trees and colluvium moving downslope, possibly onto the access road, requiring periodic maintenance.

Additional investigation at the next phase will help to reduce uncertainties and limitations in the design. This additional investigation will:

- Delineate the extent of ice-rich permafrost from a thaw settlement perspective.
- Characterize the waste materials will improve the understanding of liquefaction potential.
- Reduce uncertainty on the hydraulic conductivity of the waste materials therefore providing more robust assessment of the timing and extent of lake drawdown.
- Improve understanding of bedrock controls of stability on the north slope.

5.4.2 Clinton Creek 2 (CC2-A) - Lower Hudgeon Lake

The alternative design for CC2 also carries some limitations. These are:

- Similar to CC1, the steeper 4H:1V slopes for Option 1 requires blast densification and improvement of the loose wastes. Without improvements, the basis of the design trends to the 6.5H:1V slopes of the Base Case design.
- The scheme requires 15 m drawdown of the lake for construction (long term 12 m reduction in the lake elevation) and some of the sections require the phreatic surface to be lowered in conjunction with the lake in order to achieve FoS ≥ 1.1 against static liquefaction of wastes below the water table.

- The spillway is shifted north from the Base Case design, along the north slope of the pre-construction Clinton Creek valley. The design of the 30 m wide channel base allows for a low flow channel, high flow channel and access roads to be constructed on both sides of the channel to allow for access for cleaning out colluvium and trees as a part of the required ongoing maintenance.
- The 1 m vertical drops will need to incorporate measures for fish passage if this is a desirable feature for reclamation. Depending on the species of fish, some thoughtful placement of rocks and resting pools during construction could achieve this aim. Field fitting some of these drops depending on the materials available will enhance the performance and aesthetics of the drops.
- The revised channel is not intended to morph into a more natural channel over time.

Additional investigation at the next phase will help to reduce uncertainties and limitations in the design. This additional investigation will:

- Delineate the extent of ice-rich permafrost from a thaw settlement perspective.
- Characterize the waste materials will improve the understanding of liquefaction potential.
- Improve understanding of bedrock controls of stability on the north slope.
- Reduce uncertainty on the hydraulic conductivity of the waste materials therefore providing more robust assessment of the timing and extent of lake drawdown.

5.4.3 Wolverine Creek 2 (WC2-A) - In-Place Tails Stabilization and Surface Water Conveyance

The alternative design for WC2 is substantially different from the Base Case. No buttressing, no buttress dam and no conveyance channel and spillway to pass water across these structures. With these differences come limitations and these are:

- The design does not account for a seismic triggered liquefaction. If a design earthquake were to occur, the design is not likely to withstand and liquefaction of the base of the tailings is likely, if tailings are functionally saturated at the tailings original ground contact. If the tailings are essentially dry and well drained seismic, liquefaction would likely not occur. However, insufficient data are currently available to determine if the base of the tailings might be saturated or become saturated in the long term. In the case of a seismic event, a requirement for repairs is likely.
- Where possible, tailings have been cut and used to fill in the mid-slope as well as to re-slope the west facing slope toward the former mill site. A total of ~650,000 m^3 of material, representing about 10% of the total tailings volume will still need to be removed from the tailings area and disposed of in Porcupine Pit, or placed in the abandoned plant site area.. Since liquefaction is not being taken into account, slopes of 3.2H:1V should be sufficient in relocated tailings fills. Any fill placement would be limited to the formerly cleared mill site to avoid placing fill onto permafrost, which could result in instability issues.

6.0 Estimate Update

The 10% design phase estimates (Wood, 2019a) were supplemented with new estimates for the alternate options described in this document.

6.1 Methodology

The new estimates were prepared using the 10% design phase estimating workbook described and detailed in Wood (2019a) and the following adjustments/supplements to key estimating inputs:

- major civil material quantities for dump and tailings material movements and for spillway construction were calculated for the alternate options;
- assumptions for lake drawdown duration and the related impacts on total execution schedules were revised to reflect the materials movements associated with the new options;
- new estimates for the blast densification activity proposed for the two Clinton options were developed from in-house data and general contractor inquiries; and
- provisions were applied for the long term repair and remediation expenses that will be comparatively significant for the active care scenario upon which the new options are based.

The complete workbook for the estimate update is included in Appendix B.

6.2 Estimate Input and Assumption Changes

The key change or supplement in estimating input comes from the material volumes for the new options that are summarized in Table 1. Note that this table identifies major materials volumes for the new and previous options; there are a variety of less significant, ancillary quantity changes in the updated estimate that flow from these bulk volume changes. Note that the quantities in Table 1 are preliminary; slope selections during detailed design phases may be adjusted, among other reasons, to optimize cut and fill balances.

Other changes/supplements to estimating assumptions are as follows:

- lake drawdown durations for the Clinton options do not limit the materials movement execution schedules (i.e., volumes are low enough that schedules can be driven by materials management requirements; not geotechnical drawdown rate limits); it should be noted that this is a liberal assumption taken to highlight the potential cost benefits of these alternatives; this assumption will require additional investigative data and assessment to validate;
- excavated dump materials will be suitable as fill for completing the rough grade changes that are part of the new Clinton options (i.e., it has been assumed that these fills will be compacted dump spoils); and
- volume estimates for materials requiring blast densification are 300,000 m^3 for Alternative CC1-A and 900,000 m^3 for CC2-A.

Table 1 - Key Materials Movement Volumes for CCRP Closure Alternatives

Option	Creek	Estimated Waste Material or Tailings Removal Volume (m3)	Waste Material Relocation / Tailings Area	Haul Distance (one way) (km)	Average Current Haul/Work Slope (%)	Maximum Current Haul/Work Slope (%)	Maximum Digging Depth (m)	Design Slope (%)
CC1	Clinton	4,373,000	PPSS	0.4 to 1.2	25	30	40	17
CC1-A	Clinton	870,000	To Fill	0.2	25	30	40	17
CC1-B	Clinton	962,000	PPSS	0.2	25	30	40	17
CC2	Clinton	7,097,000	PPSS	0.4 to 1.2	25	30	40	17 to 50
CC2-A	Clinton	2,366,000	PPSS	0.4 to 1.2	25	30	40	17 to 50
CC2-B	Clinton	4,555,000	PPSS	0.4 to 1.2	25	30	40	17 to 50
CC3	Clinton	13,966,000	PPSS	0.4 to 1.2	25	30	70	17
WC1	Wolverine							
WC2	Wolverine	4,312,000			30	40		
WC2-A	Wolverine	2,225,000	Local Fill & PPSS	2.7	27	40	13	27
WC3	Wolverine	7,688,000	PPSS	2.7	27	40	13	27

6.3 Repair and Remediation Expenses

One of the central features of the new estimates for Alternate Options is the incorporation of provisions for repair and remediation of spillways and dump/tailings surfaces that can be expected as post closure requirements in an active care scenario. In the original options, these repair and remediation expenses were specifically excluded (Section 4.5 of Wood (2019a)) on the premise that the proposed passive care designs reduced the probability of these requirements below tolerable thresholds. In the updated estimates, these repair and remediation amounts are best viewed as provisions rather than estimates because useful predictions of the potential scales of repair and/or remediation requirements were beyond the scope of the current effort. These estimating provisions for each of the new options were developed and incorporated into the workbook as follows:

- provisions for spillway repairs and general remediation (e.g., restoration of locally failed slopes) are estimated as percentages of the original CAPEX costs for these scope elements;
- a figure for the assumed frequency (in years) for which these repairs/remediations will need to be repeated is used to convert these costs to equivalent annual amounts (using the general discount rate assumed for the estimate); and
- these annualized costs are then discounted to a net present value that can be added to the option CAPEX to estimate total LCCA costs.

This approach was applied to provide a first order indication of the potential economic implications of lowering the CAPEX/OPEX ratio in an active care scenario, and to identify OPEX thresholds that start to diminish the potential cost benefits of such a scenario. They are not intended to replace a more systematic consideration of the scopes and probabilities of different repair and remediation scenarios that could be assessed under a more robust cost risk assessment process.

6.4 Estimate Summaries

Table 2 combines estimate summaries for the alternate designs with those developed previously for the 10% design alternatives (Wood, 2019a).

6.5 Cost Sensitivities

Table 3 was prepared to characterize the sensitivity of estimate outcomes to variations in the assumed discount rates, and the potential scale and frequency of repair and remediation requirements. As noted above, the repair and remediation assumptions applied in the estimate are largely speculative provisions that could vary significantly.

The discount rate has a relatively significant influence on OPEX heavily LCCA outcomes, and the 2% figure assumed in the base estimates is considerably higher than the current real cost of capital (lower discount rates increase total LCCA costs). The rate used should be generally representative of conditions for the assessment period (to the extent this can be meaningfully anticipated) and a rate higher than current market conditions can be justified on that basis. However, Table 3 provides some indication of the sensitivity of estimates to the rate assumptions applied.

Table 2 - CCRP Cost Estimate Summary by Option

wood.

Option	Creek	Mob and Demob: Personnel	Mob and Demob: Equipment	TF&C: Camp	TF&C: Site Access: Roads	TF&C: Site Access: Bridges	TF&C: On-Site Haul Roads: Roads	TF&C: On-Site Haul Roads: Bridges	TF&C: Fuel/Power Supply: Fuel Storage and Delivery	TF&C: Fuel/Power Supply: General Site Power	TF&C: H&S Controls: General Site H&S	TF&C: H&S Controls: Asbestos Abatement Controls	TF&C: Incidental Temporary Facilities and Controls	TF&C: Monitoring
CC1	Clinton	$1,261,353	$77,097	$8,900,390	$3,068,851	$1,203,770	$996,180	$891,675	$2,534,389	$2,199,949	$308,654	$5,027,136	$6,261,660	$1,508,825
CC1-A	Clinton	$466,449	$63,080	$4,443,992	$1,221,084	$1,203,770	$198,188	$891,675	$1,571,878	$1,138,250	$119,958	$2,368,933	$2,580,905	$600,356
CC1-B	Clinton	$515,774	$63,080	$4,728,729	$1,350,210	$1,203,770	$219,146	$891,675	$1,594,744	$1,212,444	$132,643	$2,530,736	$2,521,510	$663,841
CC2	Clinton	$2,047,067	$77,097	$13,353,611	$4,980,480	$1,403,770	$1,616,714	$891,675	$2,953,100	$3,298,342	$500,919	$7,636,081	$4,003,804	$2,448,692
CC2-A	Clinton	$682,452	$77,097	$5,619,328	$1,660,394	$1,203,770	$538,981	$891,675	$2,104,957	$1,390,671	$166,997	$3,104,907	$3,015,431	$816,346
CC2-B	Clinton	$1,313,849	$77,097	$9,197,926	$3,196,574	$1,403,770	$1,037,640	$891,675	$2,448,771	$2,273,336	$321,500	$5,201,449	$3,596,127	$1,571,620
CC3	Clinton	$4,028,369	$77,097	$24,583,116	$9,800,955	$1,803,770	$3,181,489	$891,675	$4,008,948	$6,068,115	$985,746	$14,214,952	$5,979,584	$4,818,716
WC1	Wolverine	$239,714	$23,364	$1,204,500	$1,077,986				$87,370	$459,199	$92,040	$584,100	$1,051,797	$530,000
WC2	Wolverine	$3,139,345	$126,159	$18,653,260	$6,067,149	$1,403,770	$4,598,312	$891,675	$4,020,890	$3,922,725	$662,217	$11,604,390	$6,493,362	$2,982,961
WC2-A	Wolverine	$908,564	$126,159	$6,642,981	$1,755,906	$1,203,770	$4,598,312	$891,675	$2,366,968	$1,445,550	$191,654	$3,954,521	$2,676,515	$863,305
WC3	Wolverine	$3,139,345	$126,159	$18,653,260	$6,067,149	$1,403,770	$4,598,312	$891,675	$4,020,890	$3,922,725	$662,217	$11,604,390	$5,529,823	$2,982,961

Option	Civil Works: Materials Management: Earthmoving - Load & Haul	Civil Works: Materials Management: Support Equipment - Dozers	Civil Works: Materials Management: Support Equipment - Graders	Civil Works: Flow Conveyance and Erosion Control: Spillway	Civil Works: Flow Conveyance and Erosion Control: Ersosion Control	Civil Works: Flow Conveyance and Erosion Control: Sediment Pond	Mechanical Works: Ground Thawing	Mechanical Works: Lake Drawdowns	Mechanical Works: Blast Densification
CC1	$19,923,602	$8,585,013	$4,069,932	$35,592,092		$4,599,144	$77,705,000	$638,841	
CC1-A	$3,534,073	$5,482,379	$1,619,410	$12,835,376		$4,599,144		$592,498	$4,110,000
CC1-B	$3,907,791	$6,062,125	$1,790,658	$12,835,376		$4,599,144		$592,498	
CC2	$32,334,280	$13,932,732	$6,605,147	$12,399,214		$4,599,144		$682,515	
CC2-A	$10,779,612	$4,644,898	$2,202,026	$12,399,214		$4,599,144		$638,841	$12,600,000
CC2-B	$20,752,803	$8,942,313	$4,239,319	$12,399,214		$4,599,144		$638,841	
CC3	$63,629,781	$27,417,857	$12,998,095			$2,378,134		$696,795	
WC1		$766,500	$420,480			$4,599,144			
WC2	$108,657,228	$16,553,575	$8,046,295	$5,496,524		$4,599,144			
WC2-A	$21,775,499	$7,762,316	$8,046,295	$764,511		$4,599,144			
WC3	$67,163,988	$33,107,150	$8,046,295		$7,500,000	$4,599,144			

Option	Post Closure Care and Maintenance: Care & General Maintenance	Post Closure Care and Maintenance: Repair & Remediation	Post Closure Care and Maintenance: Monitoring	Post Closure Care and Maintenance: Partner Communications/Consultations	Post Closure Care and Maintenance: Owner's Project Management & Admin	Post Closure Care and Maintenance: Sediment Pond Cleanouts	Extraordinary Field Investigations	EPCM	Contingency	Total	Total (Rounded)
CC1	$13,360,489		$14,653,440	$1,077,459	$538,729		$9,450,000	$21,498,367.24	$61,483,010	**$307,415,050**	**$310,000,000**
CC1-A	$13,360,489	$9,339,561	$14,653,440	$1,077,459	$538,729		$9,450,000	$8,861,107.58	$26,730,546	**$133,652,729**	**$130,000,000**
CC1-B	$13,360,489	$9,525,836	$14,653,440	$1,077,459	$538,729		$9,450,000	$8,657,184.84	$26,169,758	**$130,848,792**	**$130,000,000**
CC2	$4,732,423		$15,014,097	$1,302,023	$651,012		$6,150,000	$13,746,394	$39,340,083	**$196,700,417**	**$197,000,000**
CC2-A	$4,732,423	$12,693,491	$15,014,097	$1,302,023	$651,012		$6,150,000	$10,352,979	$30,008,191	**$150,040,955**	**$150,000,000**
CC2-B	$4,732,423	$17,664,493	$15,014,097	$1,302,023	$651,012		$6,150,000	$12,346,702	$35,490,930	**$177,454,650**	**$180,000,000**
CC3	$3,396,374		$9,799,197	$871,040	$435,520	$3,233,731	$6,150,000	$20,529,906	$57,994,740	**$289,973,701**	**$290,000,000**
WC1	$8,188,687		$11,205,571	$1,077,459	$538,729	$3,965,048		$3,611,169	$9,930,714	**$49,653,572**	**$50,000,000**
WC2	$8,188,687		$5,861,376	$646,475	$323,238		$2,350,000	$22,293,876	$61,895,658	**$309,478,289**	**$310,000,000**
WC2-A	$8,188,687	$6,300,254	$5,861,376	$646,475	$323,238		$150,000	$9,189,367	$25,308,260	**$126,541,300**	**$130,000,000**
WC3	$2,081,649		$2,449,799	$871,040	$435,520			$18,985,726	$52,210,746	**$261,053,732**	**$260,000,000**

Table 3 - CCRP Cost Estimate Sensitivity Analysis

Option	Creek	Base Estimate (DR=2%; Spillway Repair 15%/15yrs; Remediation 20%/15 yrs)	Discount Rate Impact on Base Estimate			Repair & Remediation Impacy on Base Estimte			Repair & Remediation Impacy on Base Estimte w/ DR Redcution (0.5%)		
			1.0%	0.5%	-1.0%	Double Fequency	Double Cost	Double Freqeuncy & Cost	Double Fequency	Double Cost	Double Freqeuncy & Cost
CC1	Clinton	$307,415,050	$326,820,843	$341,926,161	$434,091,271	$307,415,050	$307,415,050	$307,415,050	$341,926,161	$341,926,161	$341,926,161
CC1-A		$133,652,729	$161,903,625	$182,661,840	$310,607,848	$150,122,105	$148,605,620	$178,092,896	$209,382,871	$208,661,256	$262,103,317
CC1-B		$130,848,792	$161,436,795	$182,315,659	$311,036,661	$149,810,650	$148,251,925	$178,351,305	$209,592,224	$208,850,212	$263,403,341
CC2		$196,700,417	$207,836,627	$216,403,172	$268,052,159	$196,700,417	$196,700,417	$196,700,417	$216,403,172	$216,403,172	$216,403,172
CC2-A		$150,040,955	$170,741,036	$187,146,275	$288,634,680	$170,032,332	$167,734,861	$208,284,115	$223,908,340	$222,809,245	$296,333,376
CC2-B		$177,454,650	$202,175,730	$221,800,671	$343,970,874	$205,613,453	$202,188,739	$259,072,845	$273,387,935	$271,744,525	$374,919,053
CC3		$289,973,701	$296,645,241	$301,674,673	$331,365,376	$289,973,701	$289,973,701	$289,973,701	$301,674,673	$301,674,673	$301,674,673
WC1	Wolverine	$49,653,572	$66,010,892	$78,743,302	$156,430,111	$49,653,572	$49,653,572	$49,653,572	$78,743,302	$78,743,302	$78,743,302
WC2		$309,478,289	$319,315,263	$326,972,285	$373,691,617	$309,478,289	$309,478,289	$309,478,289	$326,972,285	$326,972,285	$326,972,285
WC2-A		$126,541,300	$149,985,492	$164,394,380	$260,171,340	$146,430,914	$141,286,582	$169,420,714	$190,745,394	$187,853,652	$240,555,680
WC3		$261,053,732	$263,670,372	$265,667,199	$277,607,634	$261,053,732	$261,053,732	$261,053,732	$265,667,199	$265,667,199	$265,667,199

6.6 Summary Cost Comments and Observations

The following general comments and observations can be offered based on a review of Tables 2 and 3:

- CC1 Options (CC1 and CC1-A and B):
  - the estimates suggest that substantial economics are offered by the alternate CC1 options, largely because of the reductions in material volumes associated with these alternates, the reduced significance of lake drawdown durations and the reduction in execution schedules resulting from these factors;
  - the removal of the thawing and densification scope element generates a substantial reduction in cost;
  - at this level of project definition, there is little material cost difference between a concept with steeper slopes and blast densification, and one that uses shallower slopes without densification; and
  - the economic advantages of the alternate CC1 options are maintained even if post closure repair and remediation expenses are comparatively high, largely because of the much lower initial CAPEX of these alternatives.
- CC2 Options (CC2 and CC2-A and B)
  - the CC2 alternatives also offer some economies over the original CC2 concept, although these benefits are less significant given the still significant materials movements associated with the deeper CC2 alternate spillways;
  - this lower initial CAPEX benefit of the CC2 alternates is more sensitive to being undermined by comparatively high post closure repair and remediation expenses, and/or economic environments with low costs of capital (i.e., discount rates) over extended timeframes; and
  - there appears to be a more significant cost benefit potentially available from blast densification (relative to the CC1 alternative) as a measure to limit the material volumes associated with shallower slopes in the deeper CC2 channels.
- WC2 Options (WC2 and WC2-A)
  - the WC2 alternate concept offers substantial economies over the original, largely because it does not involve the large new structures and spillways that were central to the original concept; and
  - this cost benefit survives relatively large post closure repair and remediation expenses, again, simply because the initial CAPEX benefit is so large.

7.0 Concluding Remarks

This work was primarily a cost driven investigation into alternative designs for reclamation at Clinton Creek. As such the project team endeavoured to find solutions that met the design criteria as well as the meeting, as far as possible, the guiding principles for the project. The remote location, environmental factors such as permafrost, ease of construction and camp logistics were all taken into consideration.

This study was not intended to be an optimisation of the 10% design phase; but rather to form the basis for ongoing investigation and discussion on alternative designs that might be more acceptable from a cost perspective. The design basis for the study was CDA guidelines for Closure – Active Care. The report is intended to be read in conjunction with the original 10% design report and as such, detail referenced to the original study has not been replicated.

Alternative designs were conceived for options CC1-A, CC2-A and WC2-A. With the information currently available, the project team did not conceive a feasible, safe alternative design for CC3 due primarily to liquefaction risks during construction. The basis for the alternative designs, specifically the switch from Passive Care to Active Care, did not lend itself to alternate design for WC1 since the original design was based on maximising the potential for sediment control and was not related specifically to design criteria set out in CDA. Finally, no alternate design was conceived for WC3 since the scheme was for complete cover or relocation of the tailings pile; these criteria were not influenced by the switch to Active Care.

8.0 Closure

This report is for the use of the Government of Yukon, ("YG") and its authorized consultants, contractors, and representatives, First Nations, the federal government, and regulatory agencies.

The reports are made available for third party review for informational purposes only in relation to this Project or for the purposes upon which the report was requested. YG and Wood make no representation or warranty nor assume any liability with respect to any reliance by a third party on this report and the work referred to in this report. If site conditions or applicable standards change or if additional information becomes available, modifications to the findings and conclusions of this report may be necessary.

For and on behalf of:

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited

<u>Note:</u>

This document will be signed, stamped and reissued when the corporate office closures related to the 2020 COVID19 operating protocols are terminated.

Geotechnical	*Hydrotechnical*
Dr. E.C. McRoberts, Ph.D., P.Eng. Principal Geotechnical Engineer	Geoff Graham, P.Eng. Associate Water Resources Engineer & Project Manager
Karen Hincks, M.Sc., P.Geo. Senior Engineering Geologist	

Cost Estimates:

R. Brian Geddes, P.Eng.
Principal Engineer

ECM/GG/RBG/jm

9.0 References

Canadian Dam Association. 2014. *Application of Dam Safety Guidelines to Mining Dams*.

Government of Yukon (Yukon). 2017. *Scope of Work for the Continuation of Engineering Services Related to the Clinton Creek Remediation Project*. Assessment and Abandoned Mines. October 2017.

Smith, C.D. 1995. *Hydraulic Structures*. University of Saskatchewan.

Wood Environment & Infrastructure Solutions. 2019. *Clinton Creek Remediation Project 10% Design Phase Report.* Prepared for Government of Yukon, Department of Energy, Mines and Resources, Assessment and Abandoned Mines Branch. November 2019.

Wood Environment & Infrastructure Solutions. 2019a. *Clinton Creek Remediation Project, 10% Design Phase Cost Estimate*. Prepared for Government of Yukon, Department of Energy, Mines and Resources, Assessment and Abandoned Mines Branch. November 2019.

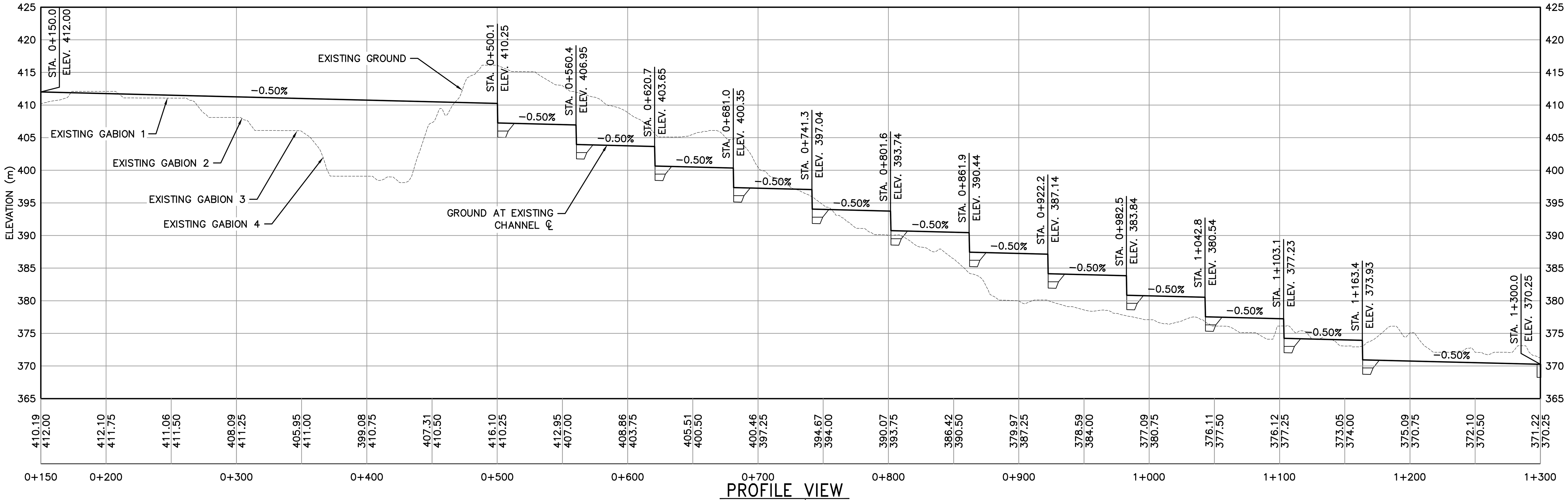
Wood Environment & Infrastructure Solutions. 2019b. *Clinton Creek Remediation Dam Breach Assessment.* Prepared for Government of Yukon, Department of Energy, Mines and Resources, Assessment and Abandoned Mines Branch. November 2019.

WorleyParsons Resources & Energy (WorleyParsons). 2014. *Clinton Creek Site, Lifecycle Cost Analysis for Remediation Options*. Submitted to Energy, Mines and Resources, Assessment and Abandoned Mines, Government of Yukon. Report #307071-00895-00-WW-REP-0001, March 31, 2014.

Drawings

CC1-A and B (Lake Retention with Spillway)

PLAN
1:2000



PROFILE VIEW
SCALE: H=1:2000 / V=1:400

NOTES:

1. THE TOPOGRAPHY BASED ON 2018 LIDAR DATA PROVIDED BY YUKON GOVERNMENT.
2. ALL DIMENSIONS AND COORDINATES ARE IN METERS. DATUM: NAD83, UTM ZONE 7.

LEGEND:

◈ BOREHOLES LOCATIONS

0m 4 8 12 16 20
1:400
0m 20 40 60 80 100
1:2000

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
A	13MAR20	ISSUED FOR REVIEW	PE	GG				

REF	NUMBER	TITLE
4	VE52705G.CC1A-B.5	CROSS SECTIONS - SHEET 3 OF 3
3	VE52705G.CC1A-B.4	CROSS SECTIONS - SHEET 2 OF 3
2	VE52705G.CC1A-B.3	CROSS SECTIONS - SHEET 1 OF 3
1	VE52705G.CC1A-B.2	SECTIONS & DETAILS

REFERENCES

NOT FOR CONSTRUCTION

APPROVED FOR ________

CLIENT PROJECT MGR | DEPARTMENT MGR | PROJECT MGR

PROJECT PHASE: 10% ALTERNATIVE DESIGN

PROJECT NO.: VE52705G

SCALE: AS SHOWN

	BY	DDMMMYY
DES	GG	13MAR20
DRN	PE	13MAR20
CHK	GG	13MAR20
APP		

Yukon

SUBJECT

CLINTON CREEK REMEDIATION PROJECT
OPTION CC1A (LAKE RETENTION)
OPTION 1 - PLAN AND PROFILE

wood.

AREA

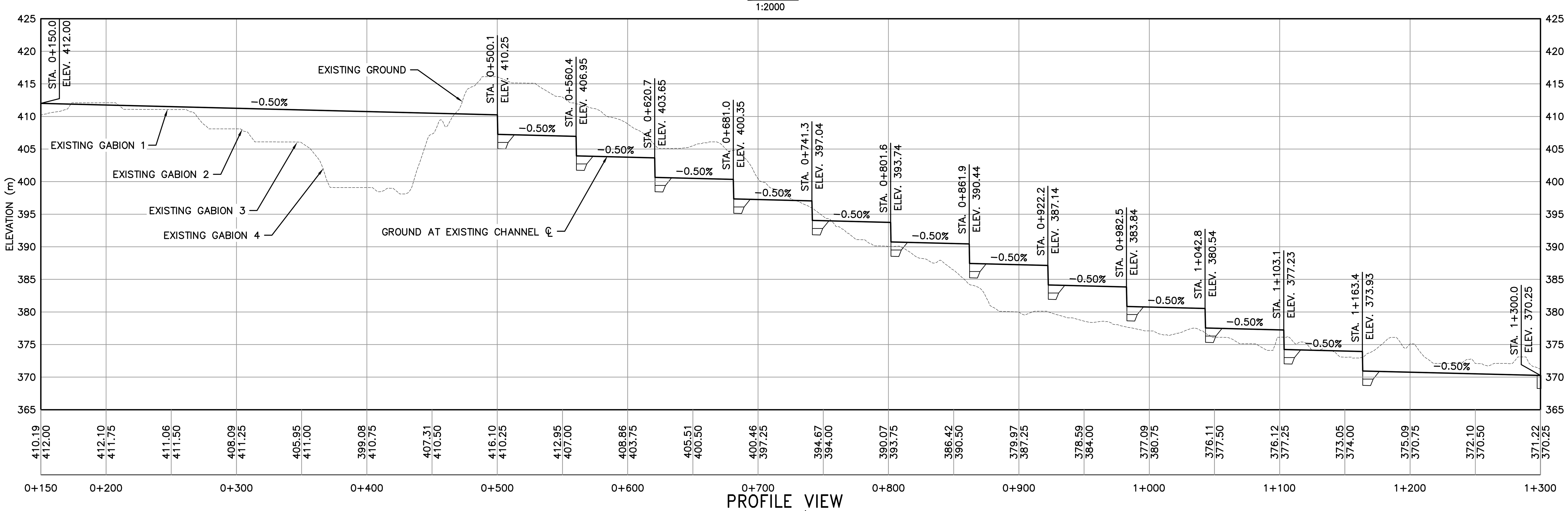
CLIENT DWG NO.

DRAWING NO.: VE52705G.CC1A 1.1

REV: A

SAVED: 12-Mar-20 3:00 PM PLOTTED: 13-Mar-20 9:50 AM USER: ENCARNACION, PERSY

PLAN
1:2000



PROFILE VIEW
SCALE: H=1:2000 / V=1:400

NOTES:

1. THE TOPOGRAPHY BASED ON 2018 LIDAR DATA PROVIDED BY YUKON GOVERNMENT.
2. ALL DIMENSIONS AND COORDINATES ARE IN METERS. DATUM: NAD83, UTM ZONE 7.

LEGEND:

◈ BOREHOLES LOCATIONS

0m 4 8 12 16 20 — 1:400

0m 20 40 60 80 100 — 1:2000

REF	NUMBER	TITLE
4	VE52705G.CC1A-B.5	CROSS SECTIONS - SHEET 3 OF 3
3	VE52705G.CC1A-B.4	CROSS SECTIONS - SHEET 2 OF 3
2	VE52705G.CC1A-B.3	CROSS SECTIONS - SHEET 1 OF 3
1	VE52705G.CC1A-B.2	SECTIONS & DETAILS

REFERENCES

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
A	13MAR20	ISSUED FOR REVIEW	PE	GG				

NOT FOR CONSTRUCTION

APPROVED FOR ________

CLIENT PROJECT MGR | DEPARTMENT MGR | PROJECT MGR

PROJECT PHASE: 10% ALTERNATIVE DESIGN

PROJECT NO.		BY	DDMMMYY
VE52705G	DES	GG	13MAR20
	DRN	PE	13MAR20
SCALE: AS SHOWN	CHK	GG	13MAR20
	APP		

Yukon

wood.

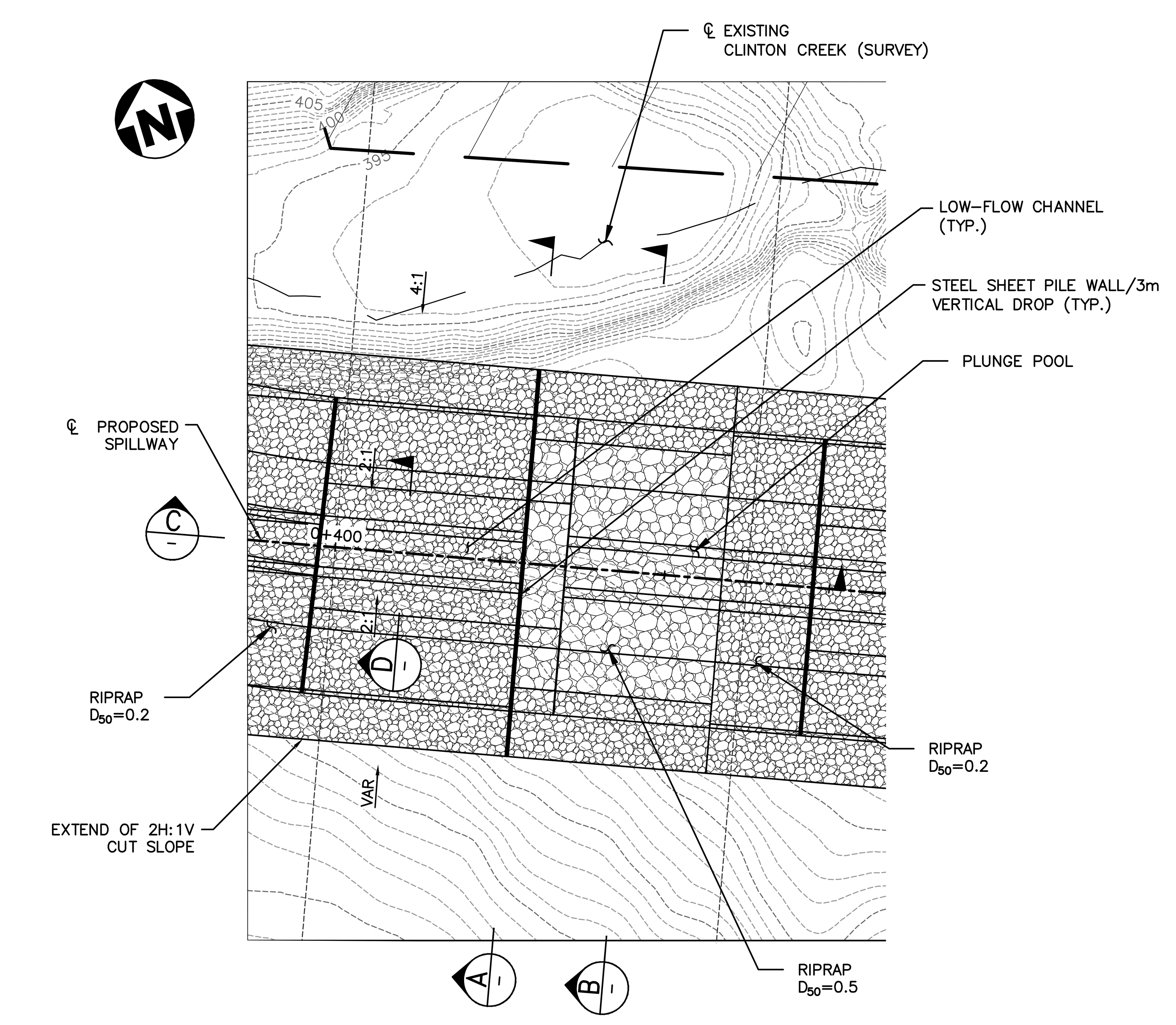
SUBJECT: CLINTON CREEK REMEDIATION PROJECT
OPTION CC1-B (LAKE RETENTION)
PLAN AND PROFILE

AREA

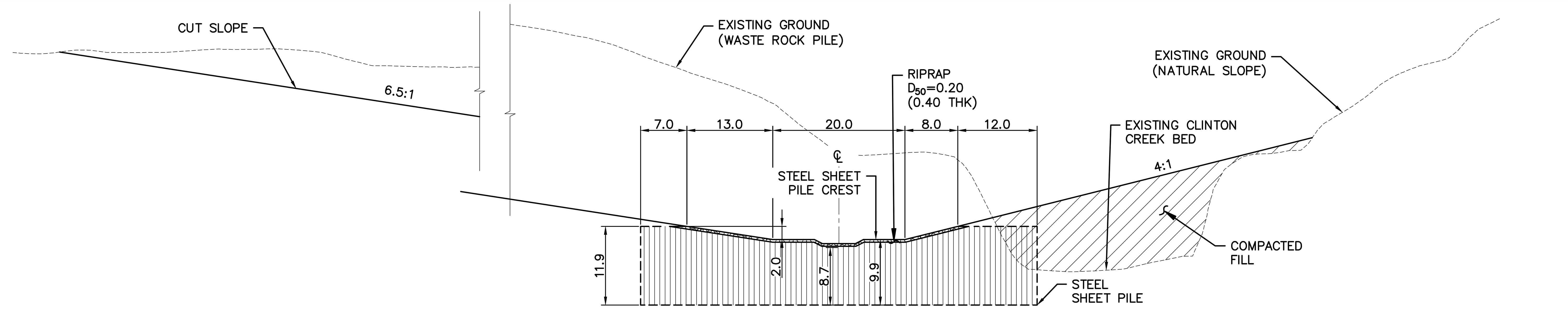
CLIENT DWG NO.

DRAWING NO. VE52705G.CC1B 1.2 — REV A

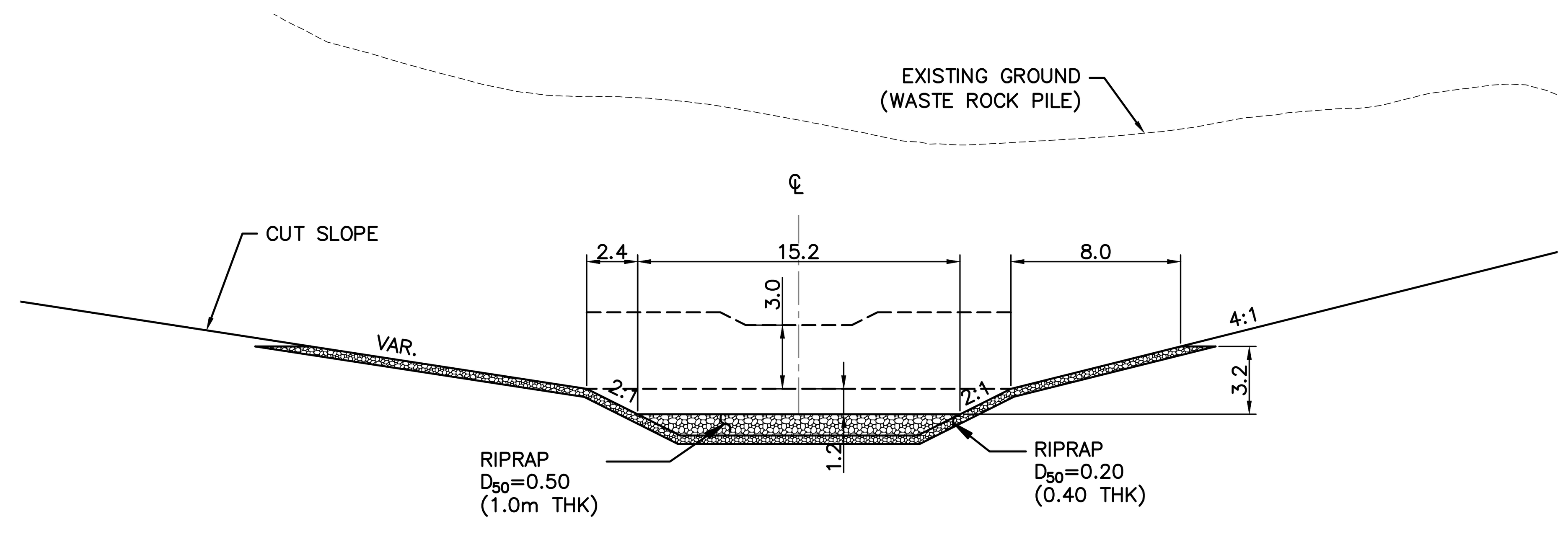
SAVED: 13-Mar-20 9:51 AM PLOTTED: 02-Apr-20 2:18 PM USER: ENCARNACION, PERSY



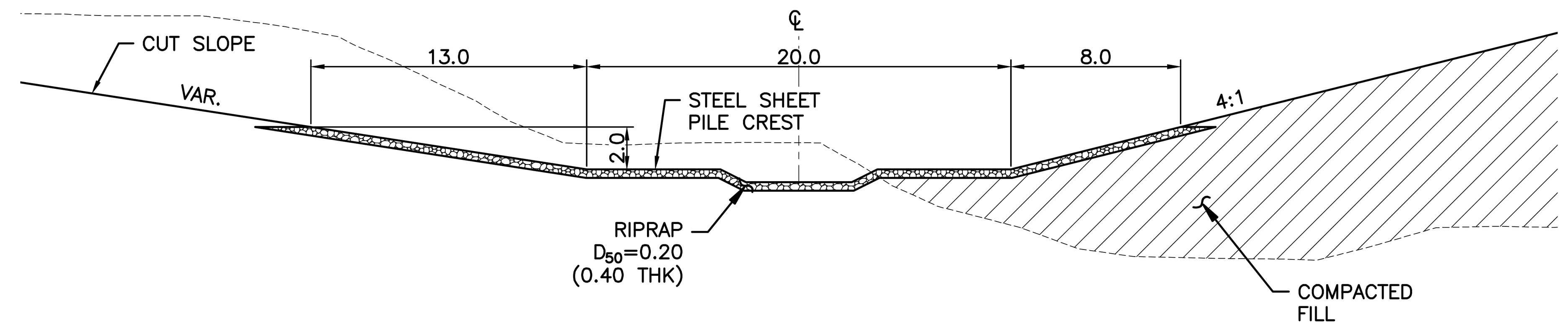
1 DETAIL – TYPICAL STEEL SHEET PILE DROP STRUCTURE
CC1A 1.1/CC1B 1.2 1:500



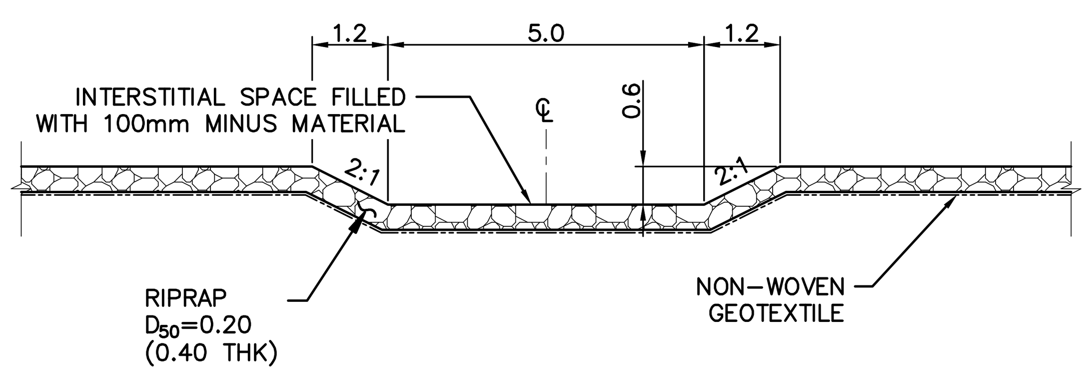
A TYPICAL SECTION THROUGH STEEL SHEET PILE
1:500



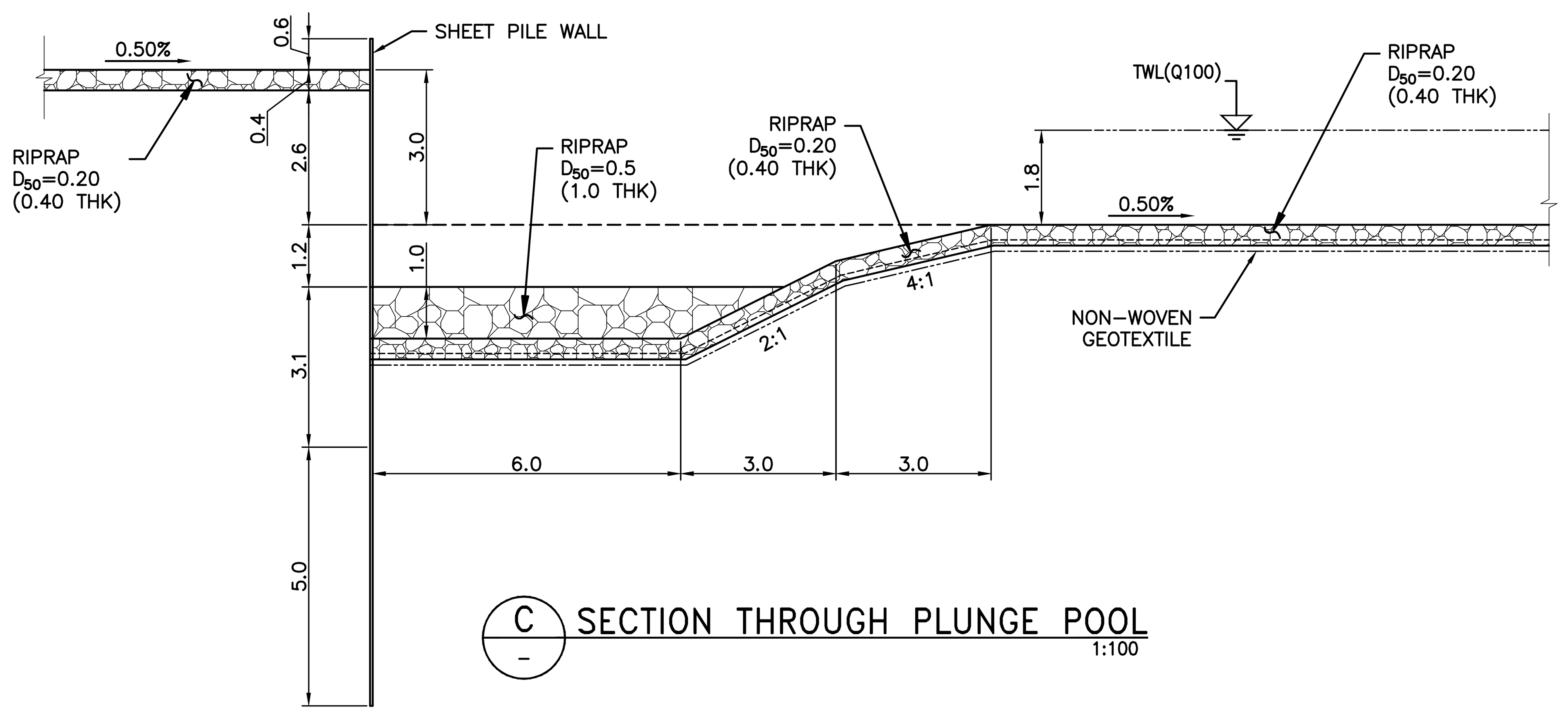
B TYPICAL SECTION THROUGH PLUNGE POOL
1:250



TYPICAL SECTION (STA 0+150)
1:250



D SECTION (LOW-FLOW CHANNEL)
1:100



C SECTION THROUGH PLUNGE POOL
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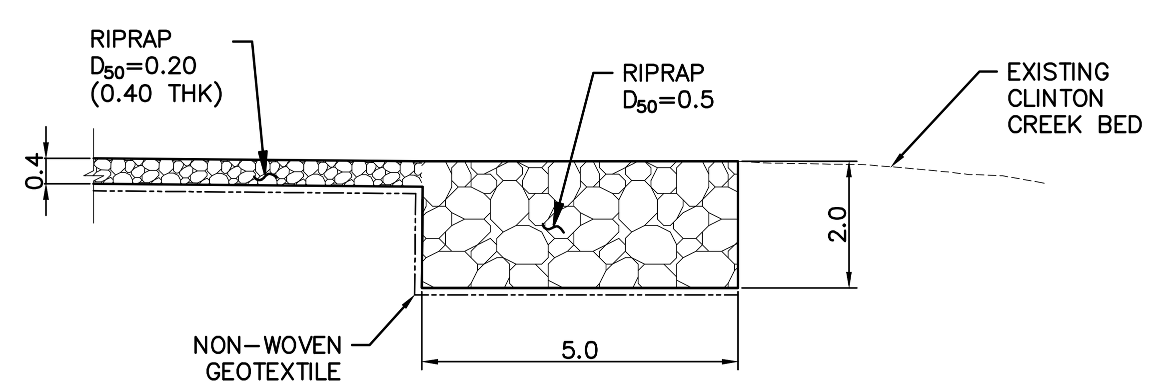

2 PROFILE THROUGH SPILLWAY TOE KEY IN TO BED
CC1A 1.1/CC1B 1.2 1:100

NOTES:

1. THE TOPOGRAPHY BASED ON 2018 LIDAR DATA PROVIDED BY YUKON GOVERNMENT.
2. ALL DIMENSIONS AND COORDINATES ARE IN METERS. DATUM: NAD83, UTM ZONE 7.

0m 1 2 3 4 5 — 1:100
0m 2.5 5 7.5 10 12.5 — 1:250
0m 5 10 15 20 25 — 1:500

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
A	13MAR20	ISSUED FOR REVIEW	PE	GG				

REF	NUMBER	TITLE
5	VE52705G.CC1A-B.5	CROSS SECTIONS - SHEET 3 OF 3
4	VE52705G.CC1A-B.4	CROSS SECTIONS - SHEET 2 OF 3
3	VE52705G.CC1A-B.3	CROSS SECTIONS - SHEET 1 OF 3
2	VE52705G.CC1B 1.2	PLAN AND PROFILE
1	VE52705G.CC1A 1.1	PLAN AND PROFILE

REFERENCES

NOT FOR CONSTRUCTION

APPROVED FOR ________

CLIENT PROJECT MGR | DEPARTMENT MGR | PROJECT MGR

PROJECT PHASE: 10% ALTERNATIVE DESIGN

PROJECT NO.: VE52705G

SCALE: AS SHOWN

	BY	DDMMMYY
DES	GG	13MAR20
DRN	PE	13MAR20
CHK	GG	13MAR20
APP		

SUBJECT: CLINTON CREEK REMEDIATION PROJECT
OPTION CC1A (LAKE RETENTION)
SECTIONS & DETAILS

AREA

CLIENT DWG NO.

DRAWING NO.: VE52705E.CC1A-B.2 REV A

CAD FILE: P:\CAD\CIVIL\VE52705E.CC1A-B.2.DWG

SAVED: 12-Mar-20 2:59 PM PLOTTED: 13-Mar-20 9:49 AM USER: ENCARNACION, PERSY

ISO A1-594x841

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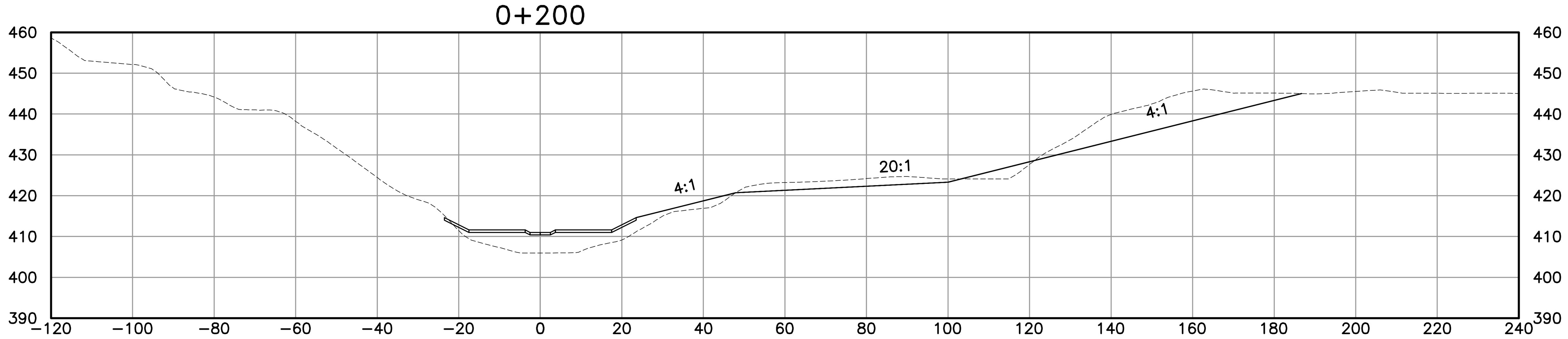

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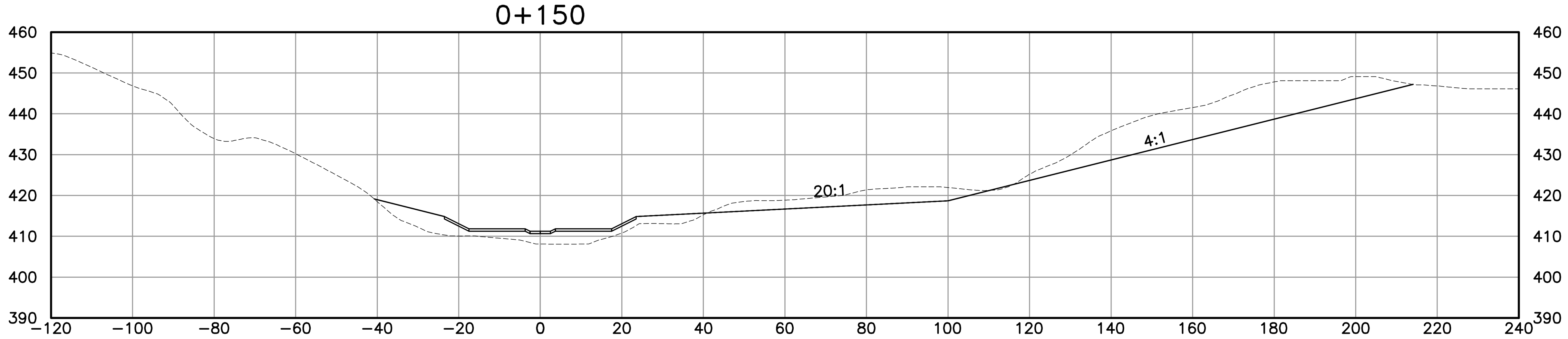

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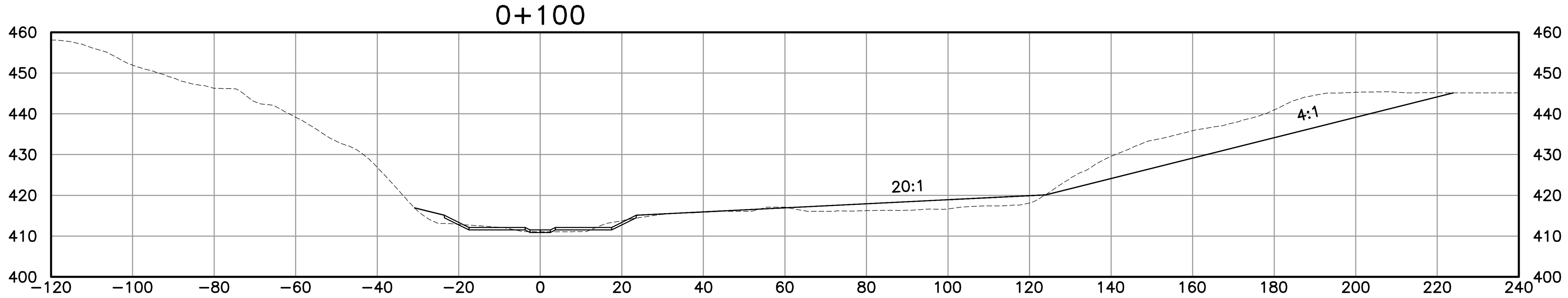

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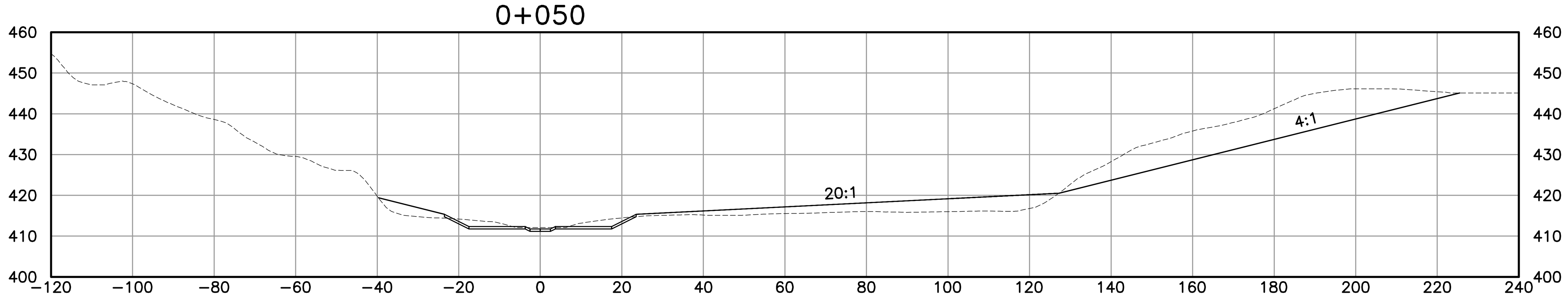

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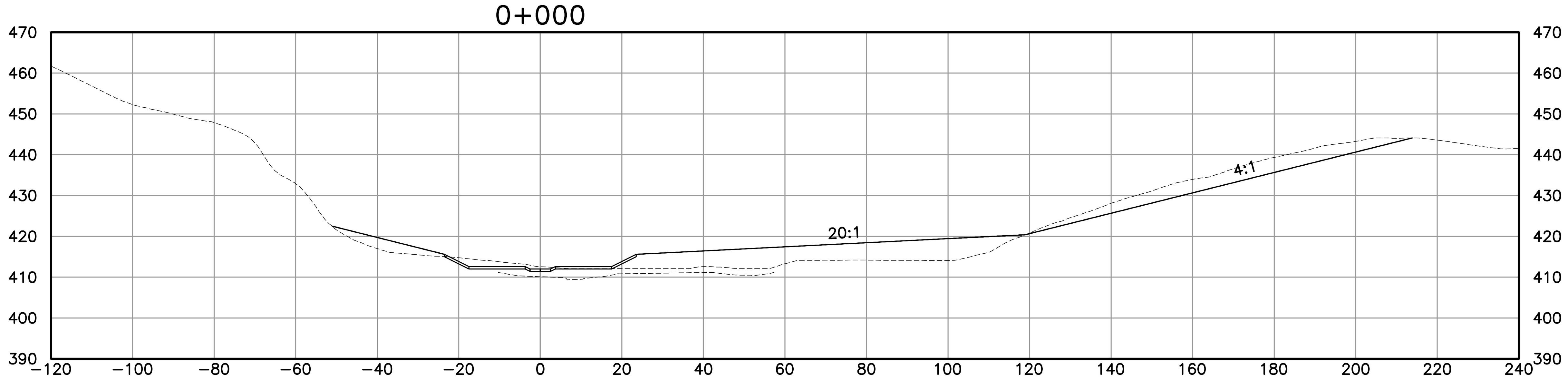

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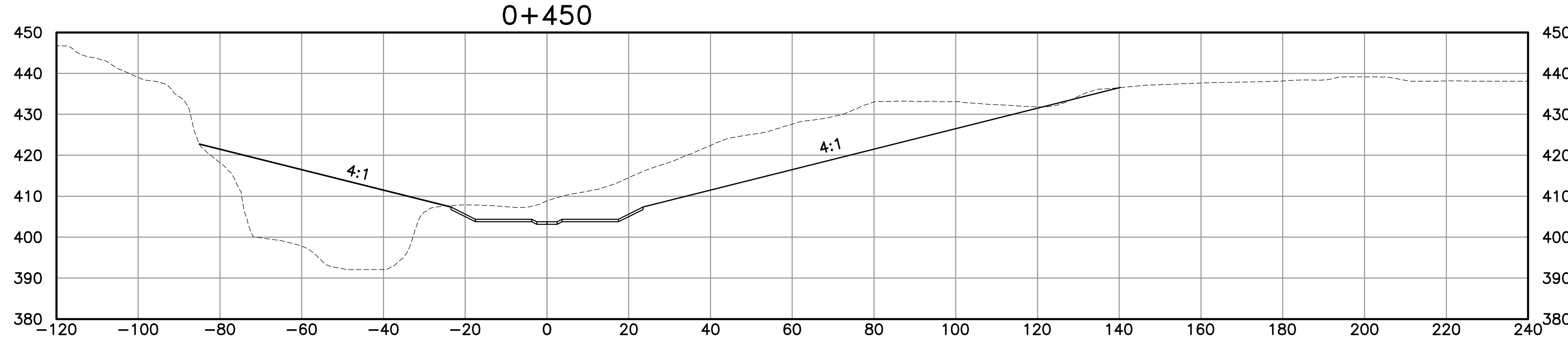

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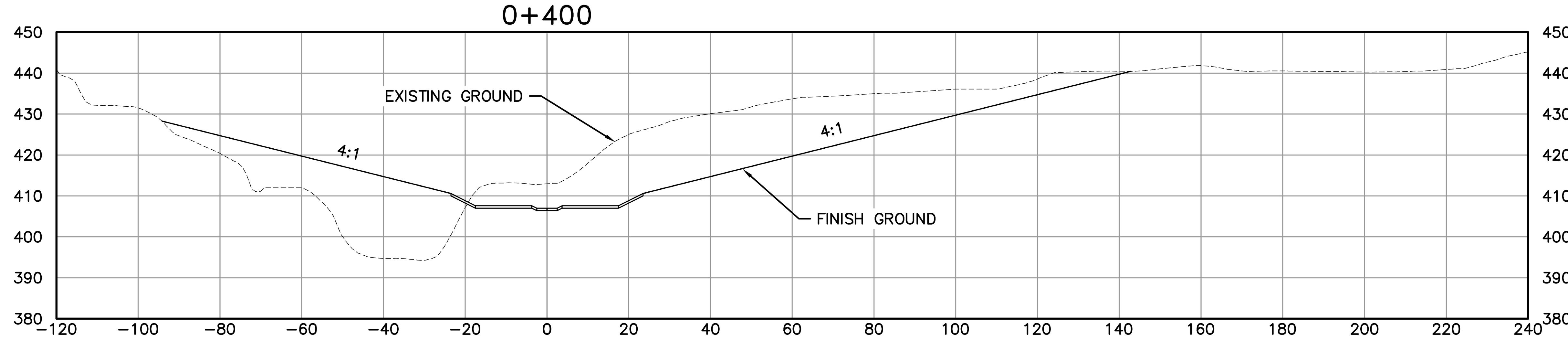

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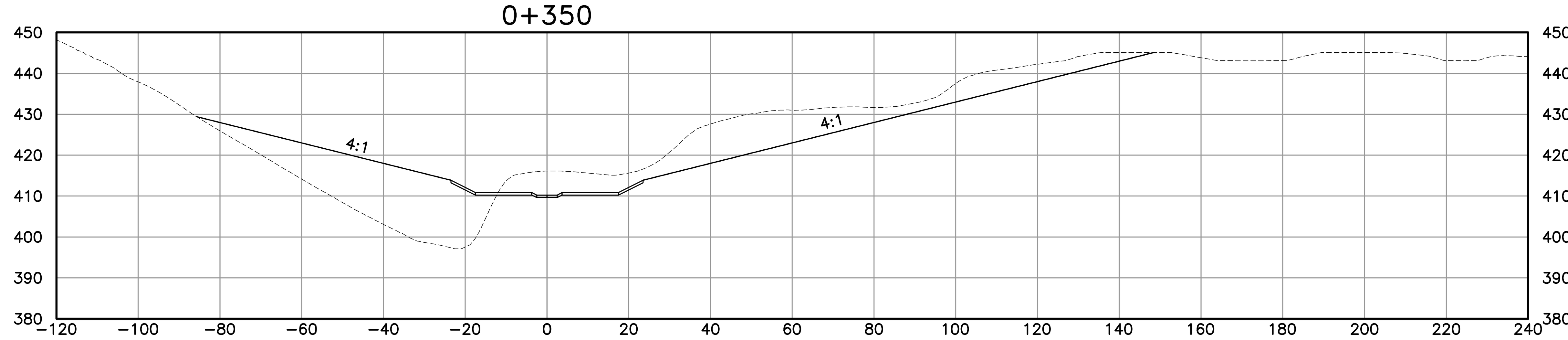

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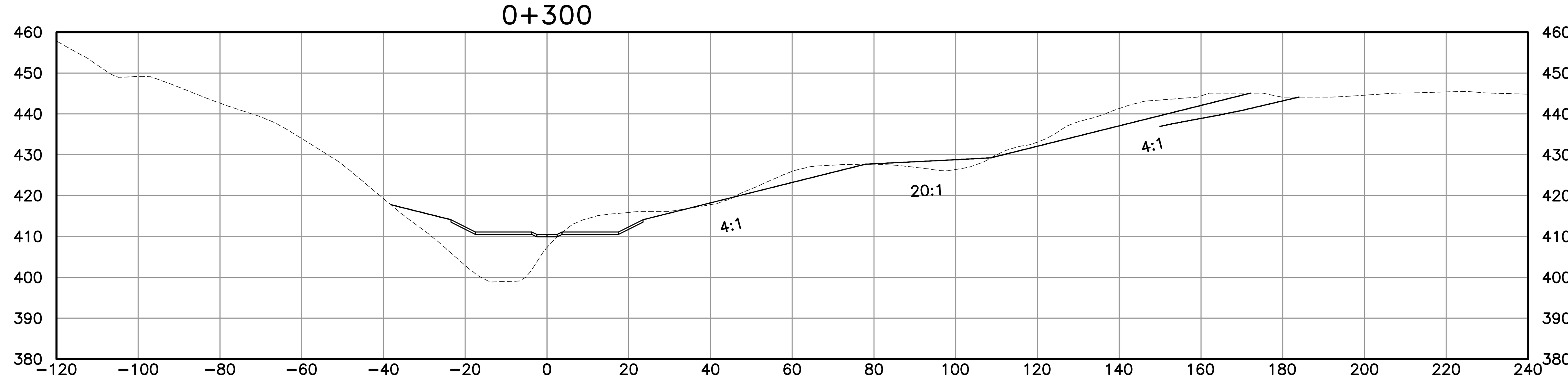

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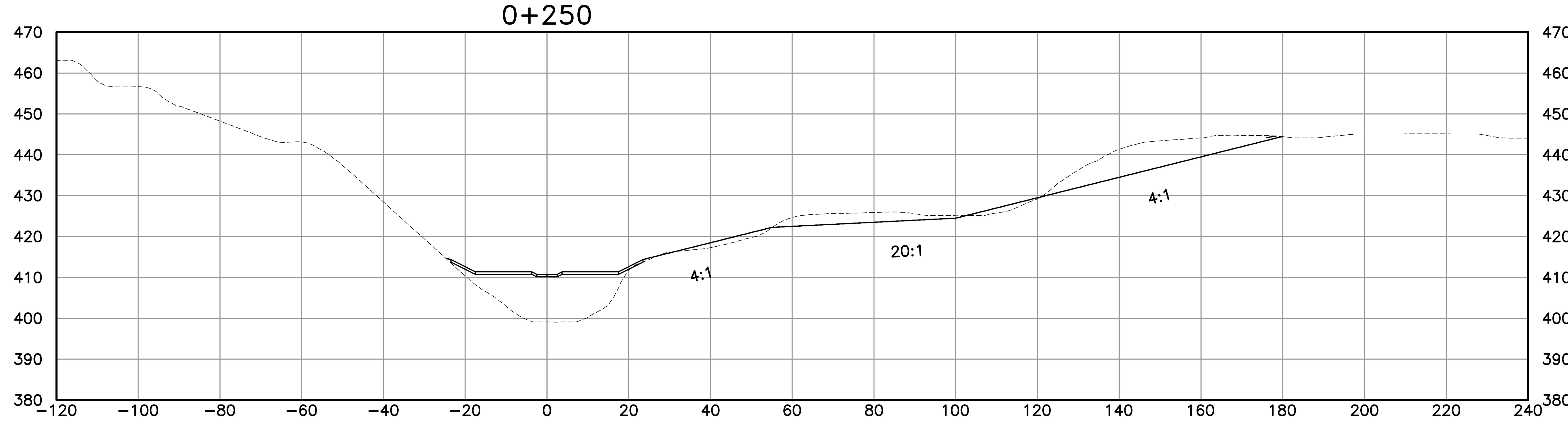

NOTES:

1. THE TOPOGRAPHY BASED ON 2018 LIDAR DATA PROVIDED BY YUKON GOVERNMENT.
2. ALL DIMENSIONS AND COORDINATES ARE IN METERS. DATUM: NAD83, UTM ZONE 7.

0m 10 20 30 40 50
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REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
A	13MAR20	ISSUED FOR REVIEW	PE	GG				

REF	NUMBER	TITLE
5	VE52705G.CC1A-B.5	CROSS SECTIONS - SHEET 3 OF 3
4	VE52705G.CC1A-B.4	CROSS SECTIONS - SHEET 2 OF 3
3	VE52705G.CC1A-B.2	SECTIONS & DETAILS
2	VE52705G.CC1B 1.2	PLAN AND PROFILE
1	VE52705G.CC1A 1.1	PLAN AND PROFILE

REFERENCES

NOT FOR CONSTRUCTION

APPROVED FOR ________

CLIENT PROJECT MGR | DEPARTMENT MGR | PROJECT MGR

PROJECT PHASE: 10% ALTERNATIVE DESIGN

PROJECT NO.: VE52705G

SCALE: AS SHOWN

	BY	DDMMMYY
DES	GG	13MAR20
DRN	PE	13MAR20
CHK	GG	13MAR20
APP		

Yukon

SUBJECT

CLINTON CREEK REMEDIATION PROJECT
OPTION CC1A (LAKE RETENTION)
CROSS SECTIONS - SHEET 1 OF 3

wood.

AREA

CLIENT DWG NO.

DRAWING NO.: VE52705G.CCA-B 3

REV: A

SAVED: 12-Mar-20 2:59 PM PLOTTED: 12-Mar-20 3:19 PM USER: ENCARNACION, PERSY

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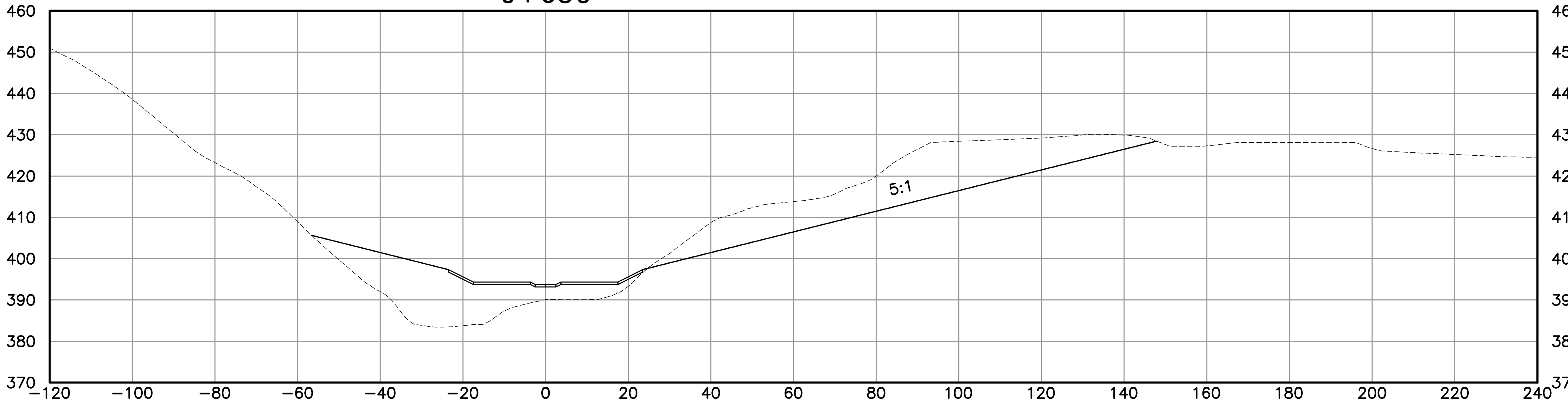

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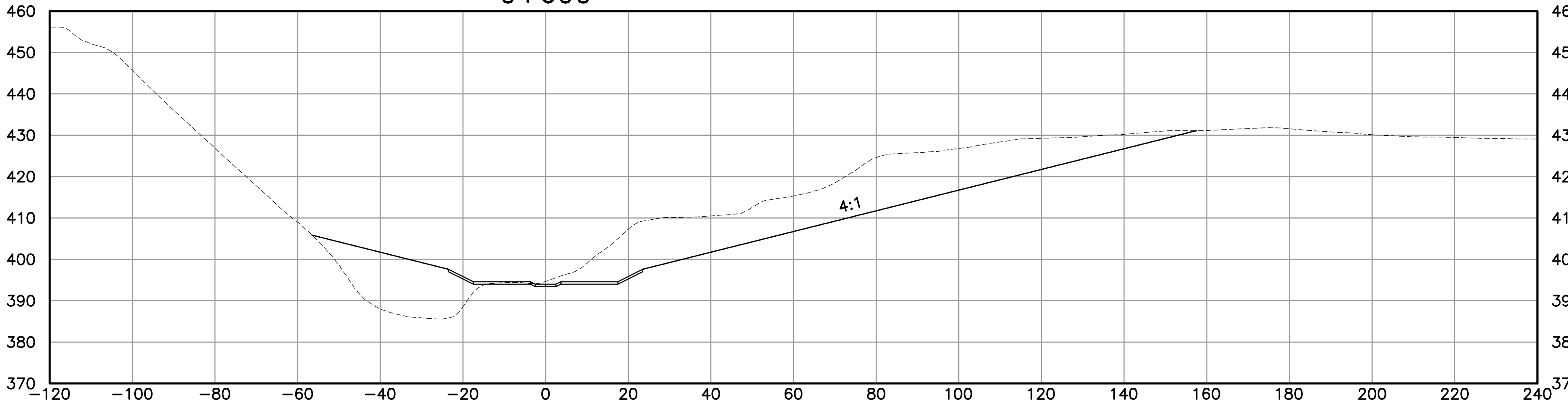

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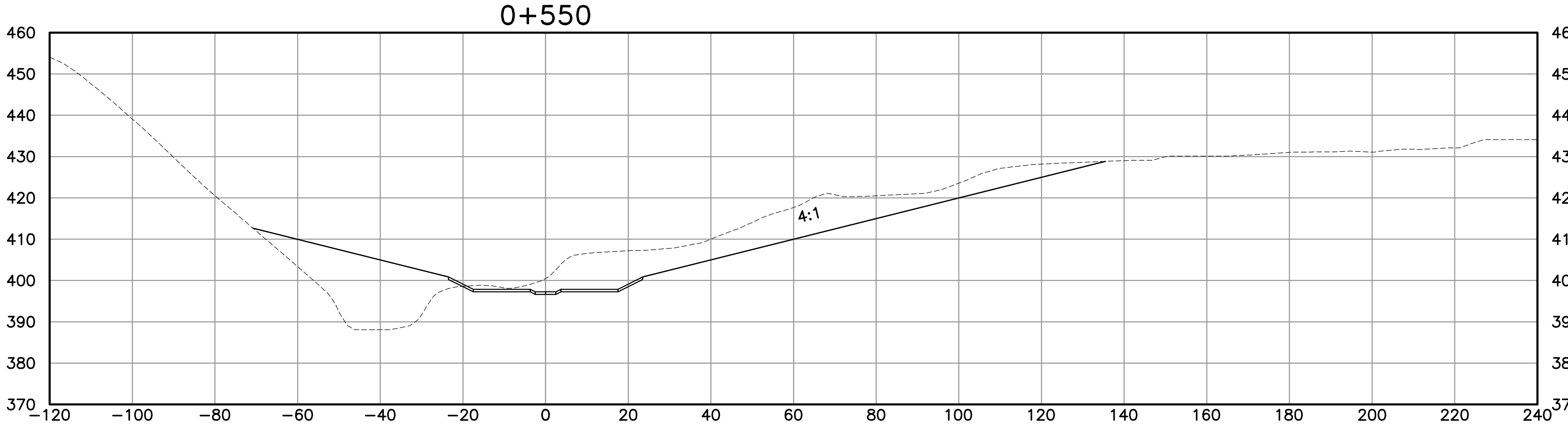

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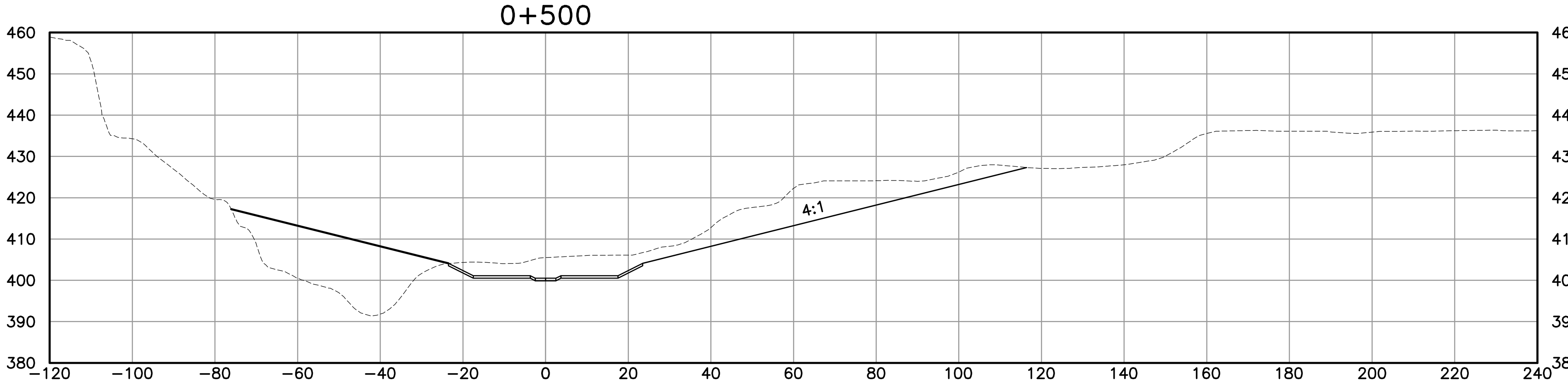

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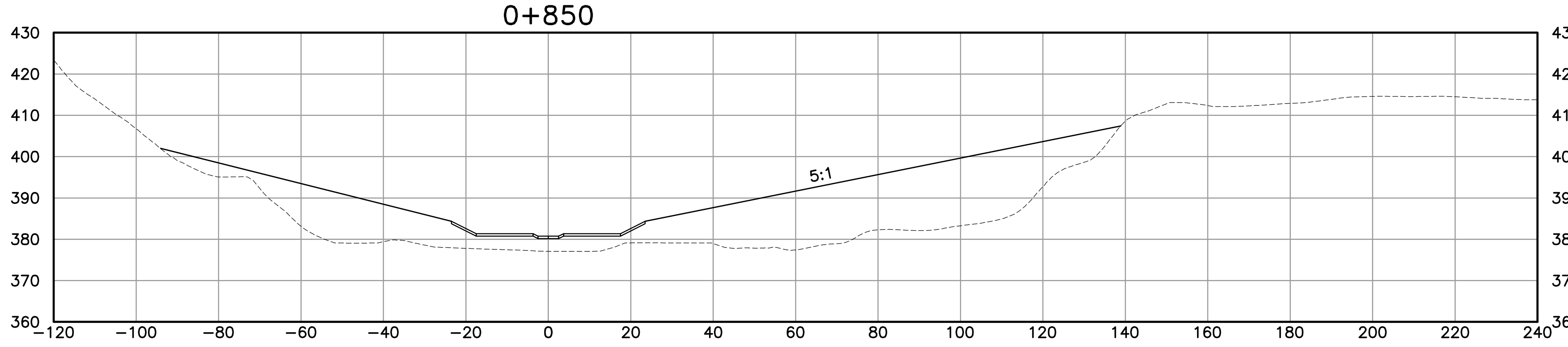

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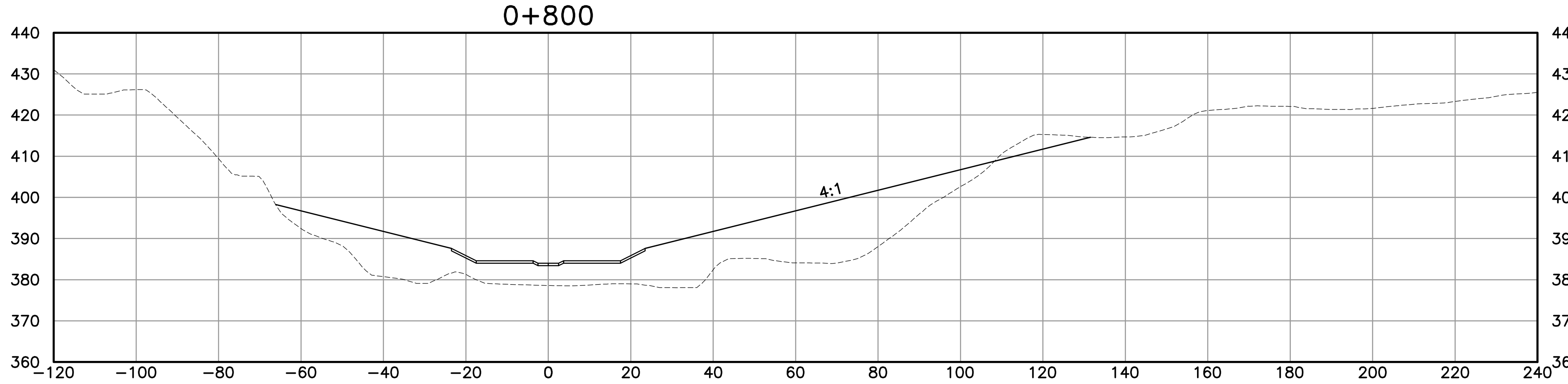

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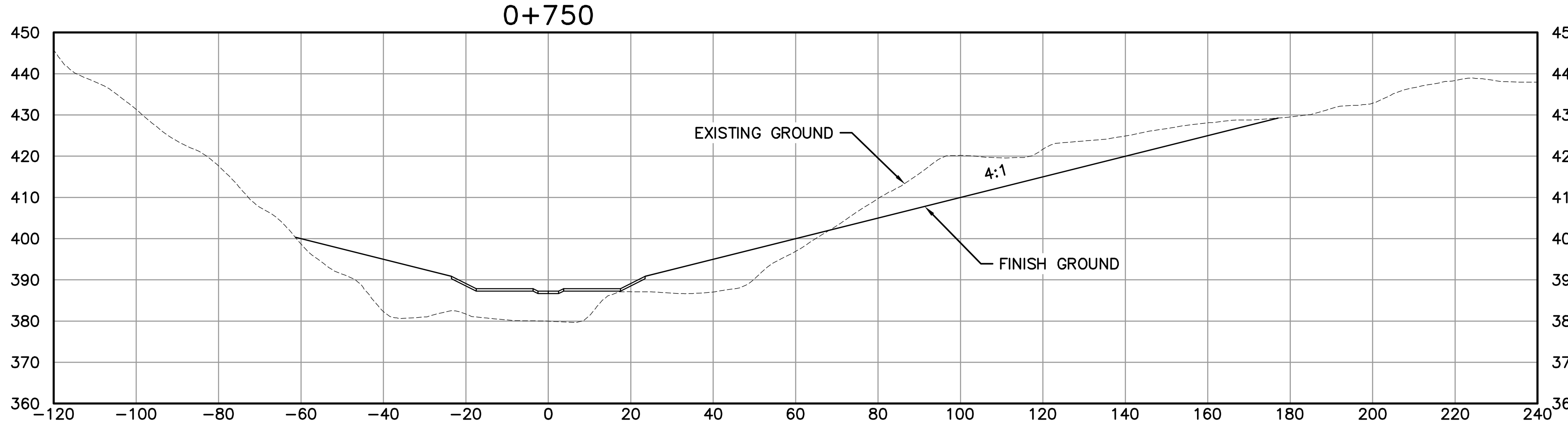

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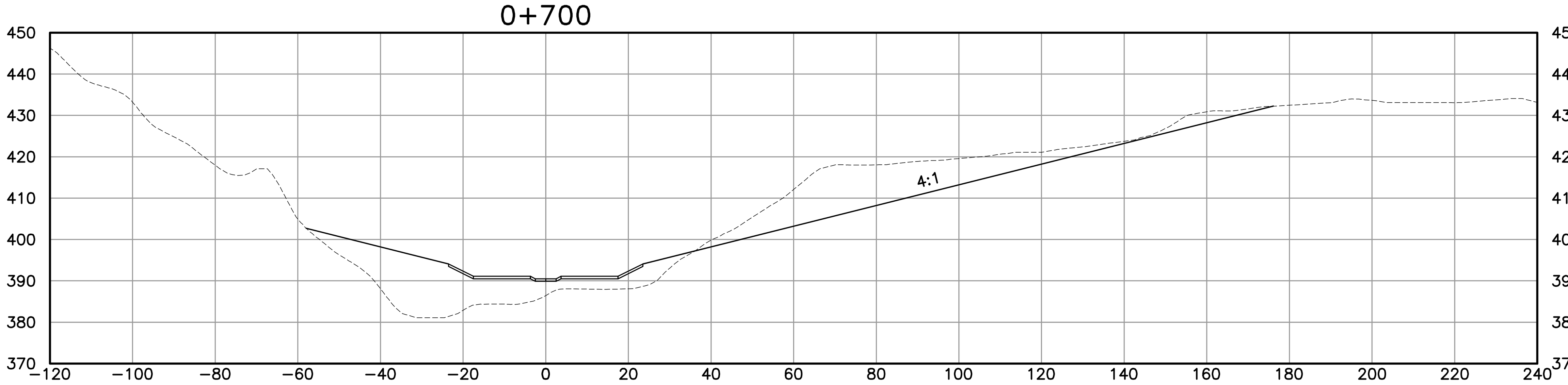

NOTES:

1. THE TOPOGRAPHY BASED ON 2018 LIDAR DATA PROVIDED BY YUKON GOVERNMENT.
2. ALL DIMENSIONS AND COORDINATES ARE IN METERS. DATUM: NAD83, UTM ZONE 7.

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REF	NUMBER	TITLE
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4	VE52705G.CC1A-B.3	CROSS SECTIONS - SHEET 1 OF 3
3	VE52705G.CC1A-B.2	SECTIONS & DETAILS
2	VE52705G.CC1B 1.2	PLAN AND PROFILE
1	VE52705G.CC1A 1.1	PLAN AND PROFILE

REFERENCES

NOT FOR CONSTRUCTION

APPROVED FOR __________

CLIENT PROJECT MGR | DEPARTMENT MGR | PROJECT MGR

PROJECT PHASE: 10% ALTERNATIVE DESIGN

PROJECT NO.: VE52705G

SCALE: AS SHOWN

	BY	DDMMMYY
DES	GG	13MAR20
DRN	PE	13MAR20
CHK	GG	13MAR20
APP		

SUBJECT

CLINTON CREEK REMEDIATION PROJECT
OPTION CC1A (LAKE RETENTION)
CROSS SECTIONS - SHEET 1 OF 3

AREA

CLIENT DWG NO.

DRAWING NO.: VE52705G.CCA-B 4 | REV: A

CAD FILE: P:\CAD\CIV\VE52705G.CCA-B 3-4-5.DWG

SAVED: 12-Mar-20 2:59 PM PLOTTED: 12-Mar-20 3:19 PM USER: ENCARNACION, PERSY

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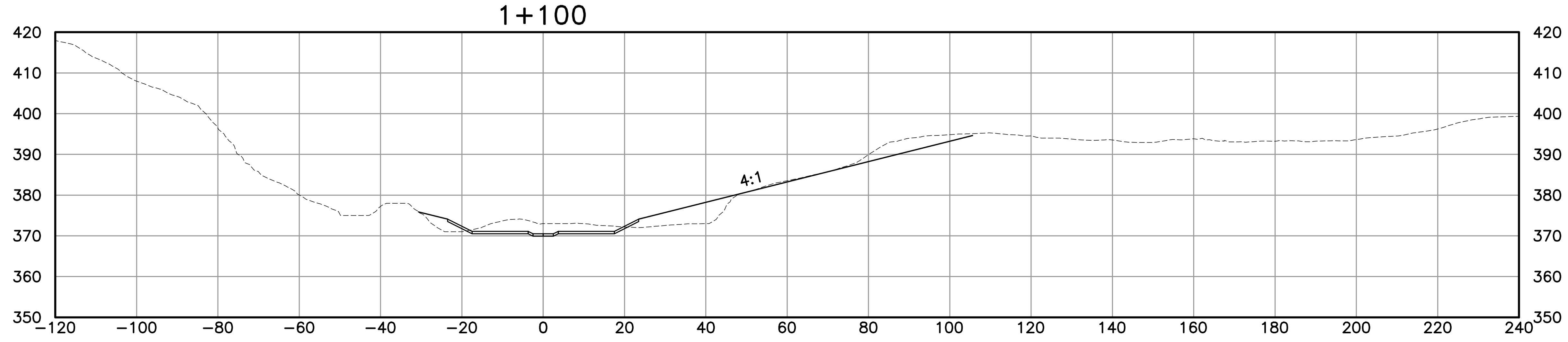

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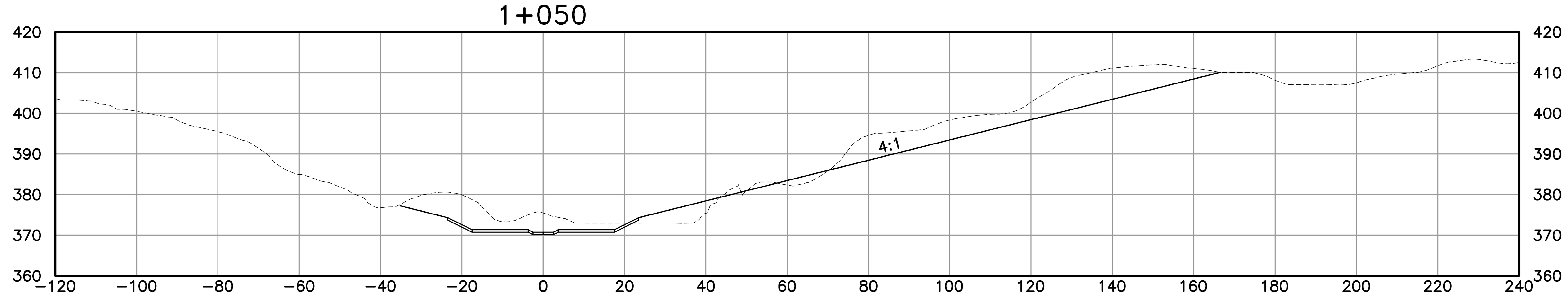

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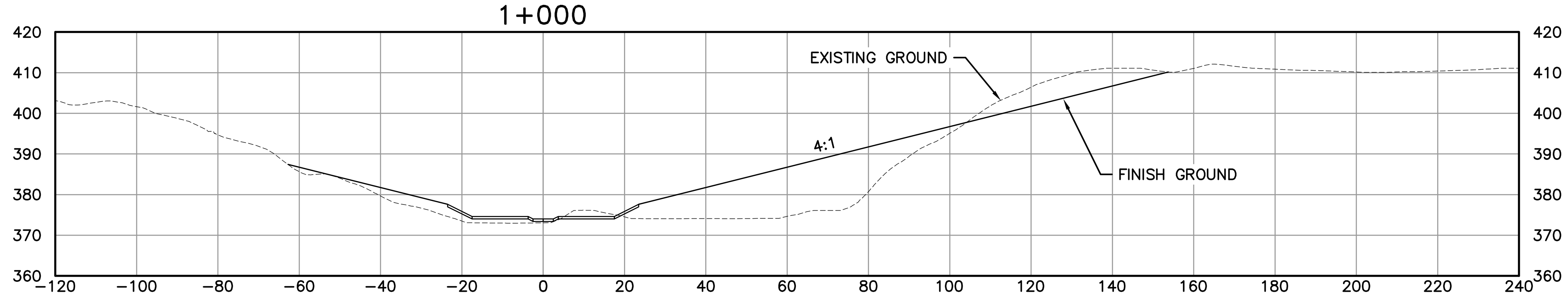

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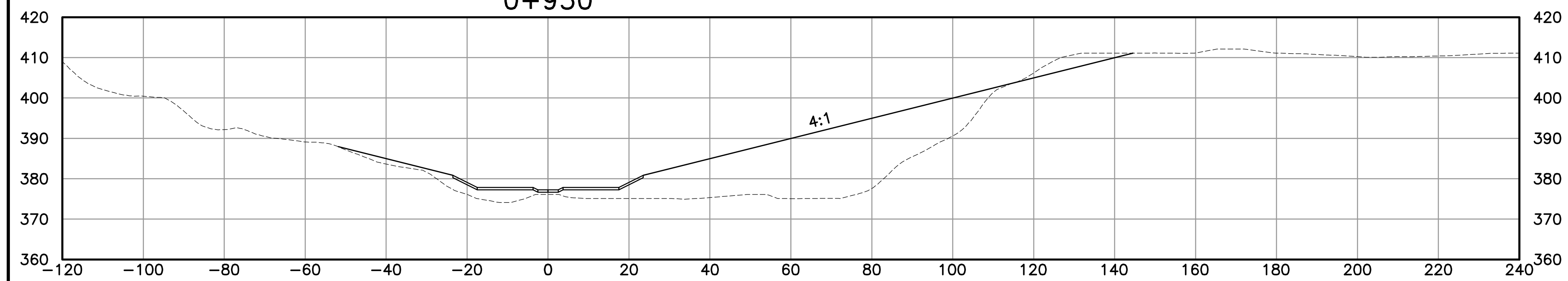

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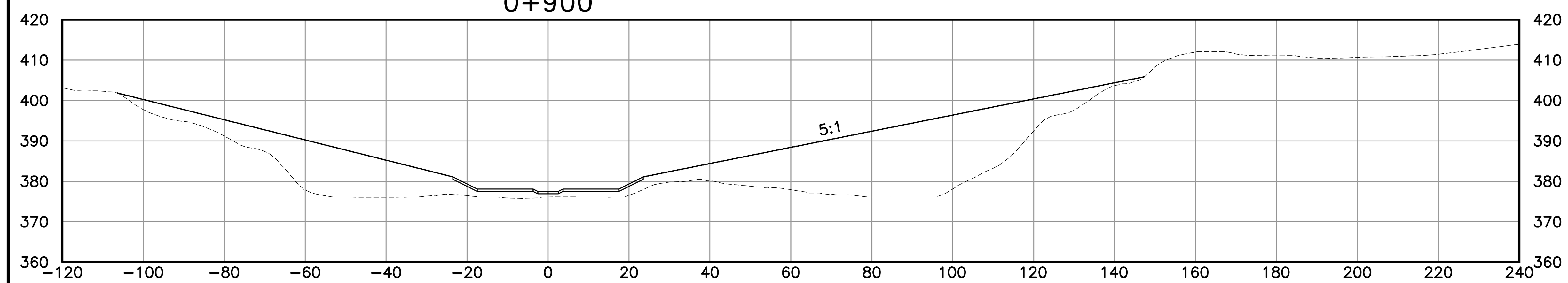

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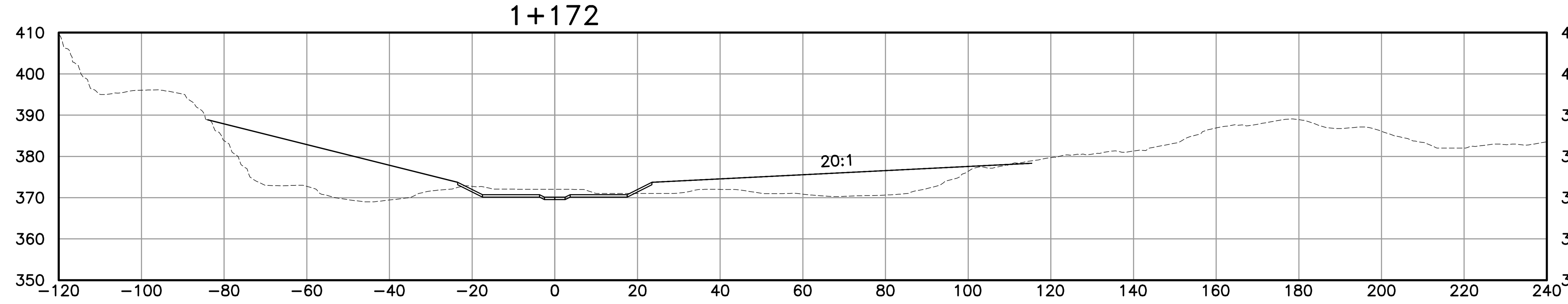

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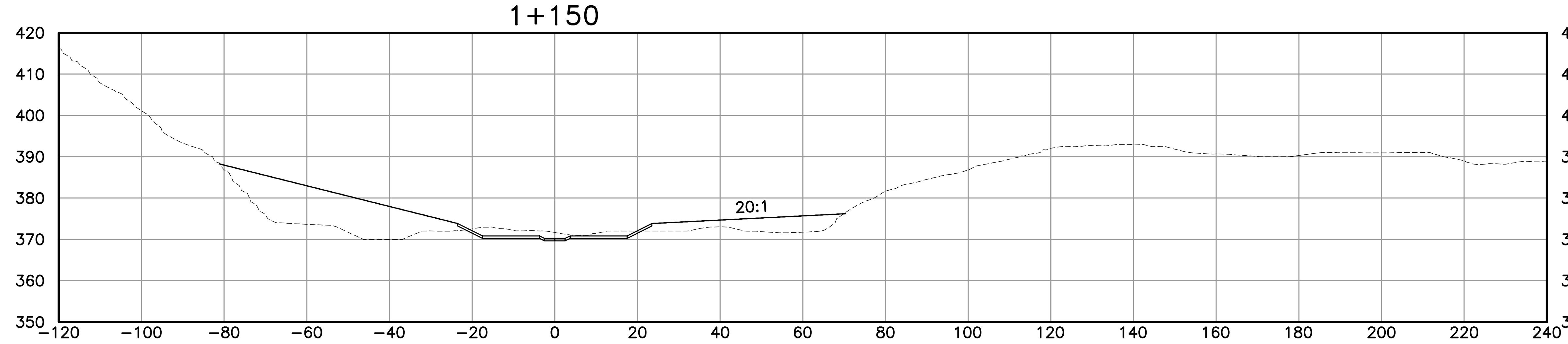


NOTES:

1. THE TOPOGRAPHY BASED ON 2018 LIDAR DATA PROVIDED BY YUKON GOVERNMENT.
2. ALL DIMENSIONS AND COORDINATES ARE IN METERS. DATUM: NAD83, UTM ZONE 7.

0m 10 20 30 40 50
1:1000

REF	NUMBER	TITLE
5	VE52705G.CC1A-B.4	CROSS SECTIONS - SHEET 2 OF 3
4	VE52705G.CC1A-B.3	CROSS SECTIONS - SHEET 1 OF 3
3	VE52705G.CC1A-B.2	SECTIONS & DETAILS
2	VE52705G.CC1B 1.2	PLAN AND PROFILE
1	VE52705G.CC1A 1.1	PLAN AND PROFILE

REFERENCES

NOT FOR CONSTRUCTION

APPROVED FOR __________

CLIENT PROJECT MGR | DEPARTMENT MGR | PROJECT MGR

PROJECT PHASE: 10% ALTERNATIVE DESIGN

PROJECT NO.: VE52705G

SCALE: AS SHOWN

	BY	DDMMMYY
DES	GG	13MAR20
DRN	PE	13MAR20
CHK	GG	13MAR20
APP		

SUBJECT

CLINTON CREEK REMEDIATION PROJECT
OPTION CC1A (LAKE RETENTION)
CROSS SECTIONS - SHEET 1 OF 3

AREA

CLIENT DWG NO.

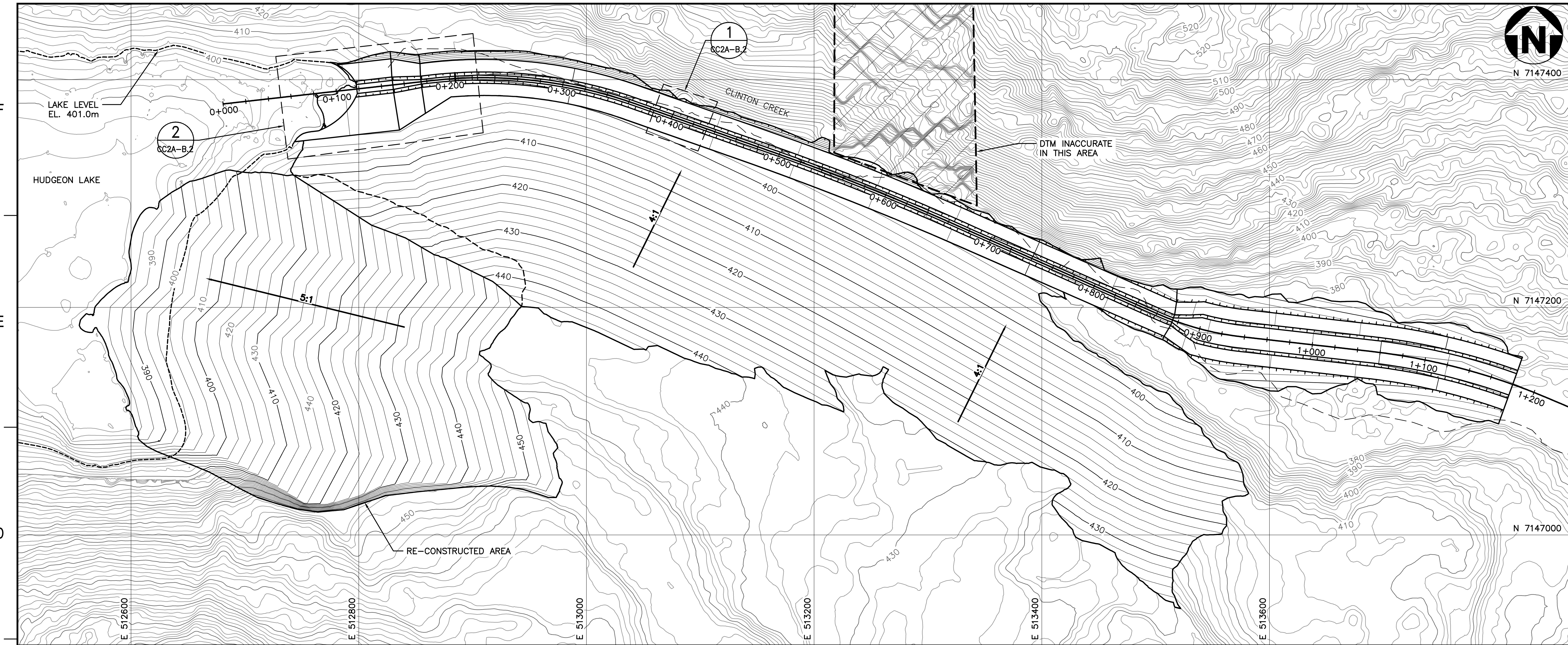
DRAWING NO.: VE52705G.CCA-B 5

REV: A

CAD FILE: P:\CAD\CIVI\VE52705G.CCA-B 3-4-5.DWG

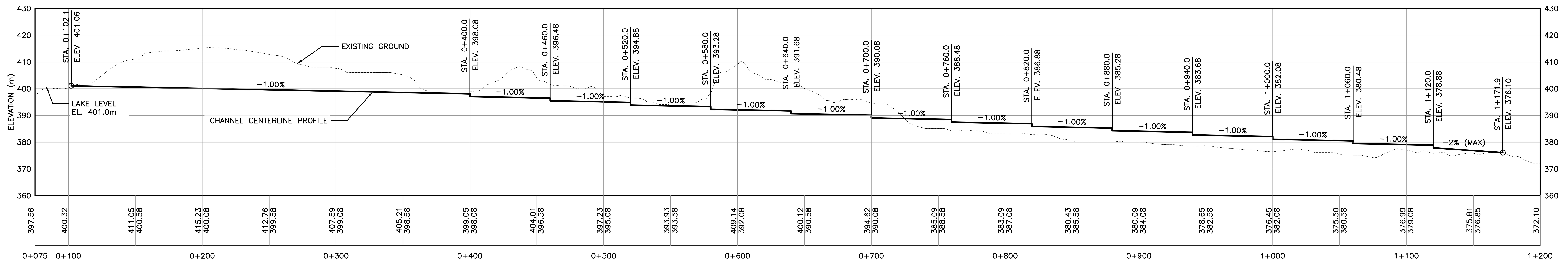
SAVED: 12-Mar-20 2:59 PM PLOTTED: 12-Mar-20 3:18 PM USER: ENCARNACION, PERSY

CC2-A and B (Lower Lake to 401 m)



PLAN

SCALE 1:2000



PROFILE

SCALE H=1:1500 / V=1:750

NOTES:

1. THE TOPOGRAPHY BASED ON 2018 LIDAR DATA PROVIDED BY YUKON GOVERNMENT.
2. ALL DIMENSIONS AND COORDINATES ARE IN METERS. DATUM: NAD83, UTM ZONE 7.

1:750 — 1:1500 — 1:2000

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
A	13MAR20	ISSUED FOR REVIEW	PE	GG				

REF	NUMBER	TITLE
1	VE52705G.CC2A-B 2	DETAILS
2	VE52705G.CC2A-B 3	CROSS SECTIONS

NOT FOR CONSTRUCTION

APPROVED FOR ________

CLIENT PROJECT MGR — DEPARTMENT MGR — PROJECT MGR

PROJECT PHASE: 10% ALTERNATIVE DESIGN

PROJECT NO.: VE52705G

SCALE: AS SHOWN

	BY	DDMMMYY
DES	GG	13MAR20
DRN	PE	13MAR20
CHK	GG	13MAR20
APP		

Yukon

SUBJECT: CLINTON CREEK REMEDIATION PROJECT OPTION CC2-A (LOWER LAKE CHANNEL) PLAN AND PROFILE

wood.

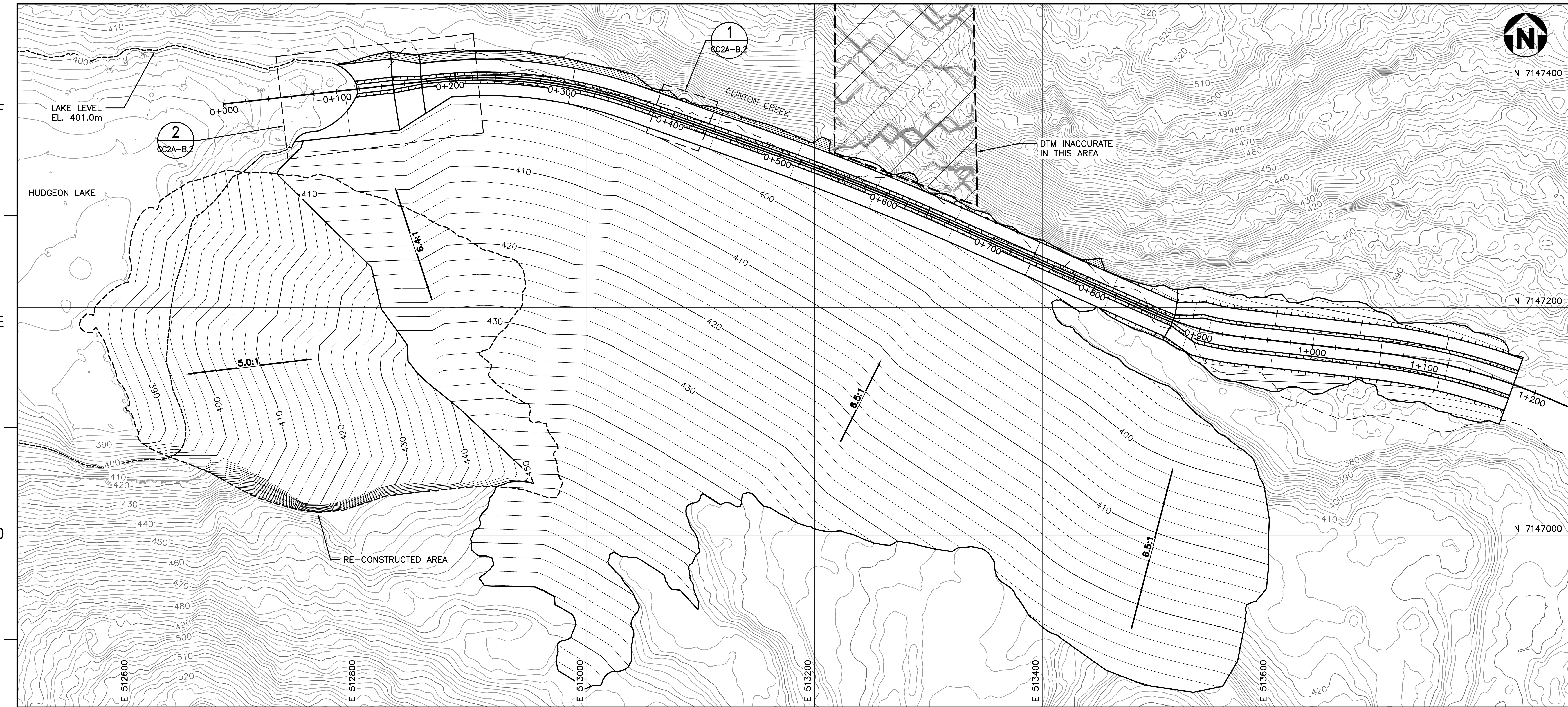
AREA

CLIENT DWG NO.

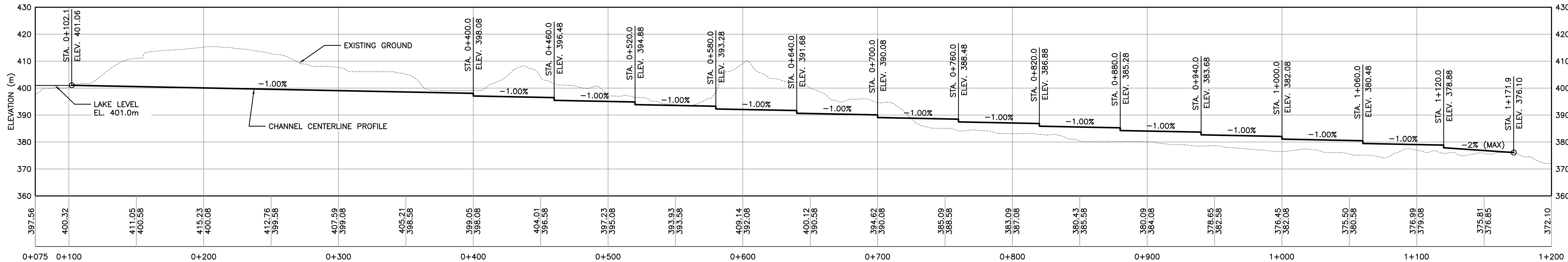
DRAWING NO.: VE52705G.CC2A 1.1 — REV A

CAD FILE: P:\CAD\CIVIL\VE52705G.CC2A 1.1.DWG

SAVED: 12-Mar-20 3:24 PM PLOTTED: 02-Apr-20 2:30 PM USER: ENCARNACION, PERSY



PLAN
SCALE 1:2000



PROFILE
SCALE H=1:1500 / V=1:750

NOTES:

1. THE TOPOGRAPHY BASED ON 2018 LIDAR DATA PROVIDED BY YUKON GOVERNMENT.
2. ALL DIMENSIONS AND COORDINATES ARE IN METERS. DATUM: NAD83, UTM ZONE 7.

REF	NUMBER	TITLE
1	VE52705G.CC2A-B.2	DETAILS
2	VE52705G.CC2A-B.3	CROSS SECTIONS

NOT FOR CONSTRUCTION

APPROVED FOR ______

CLIENT PROJECT MGR | DEPARTMENT MGR | PROJECT MGR

PROJECT PHASE: 10% ALTERNATIVE DESIGN

PROJECT NO.: VE52705G

SCALE: AS SHOWN

	BY	DDMMMYY
DES	GG	13MAR20
DRN	PE	13MAR20
CHK	GG	13MAR20
APP		

Yukon

wood.

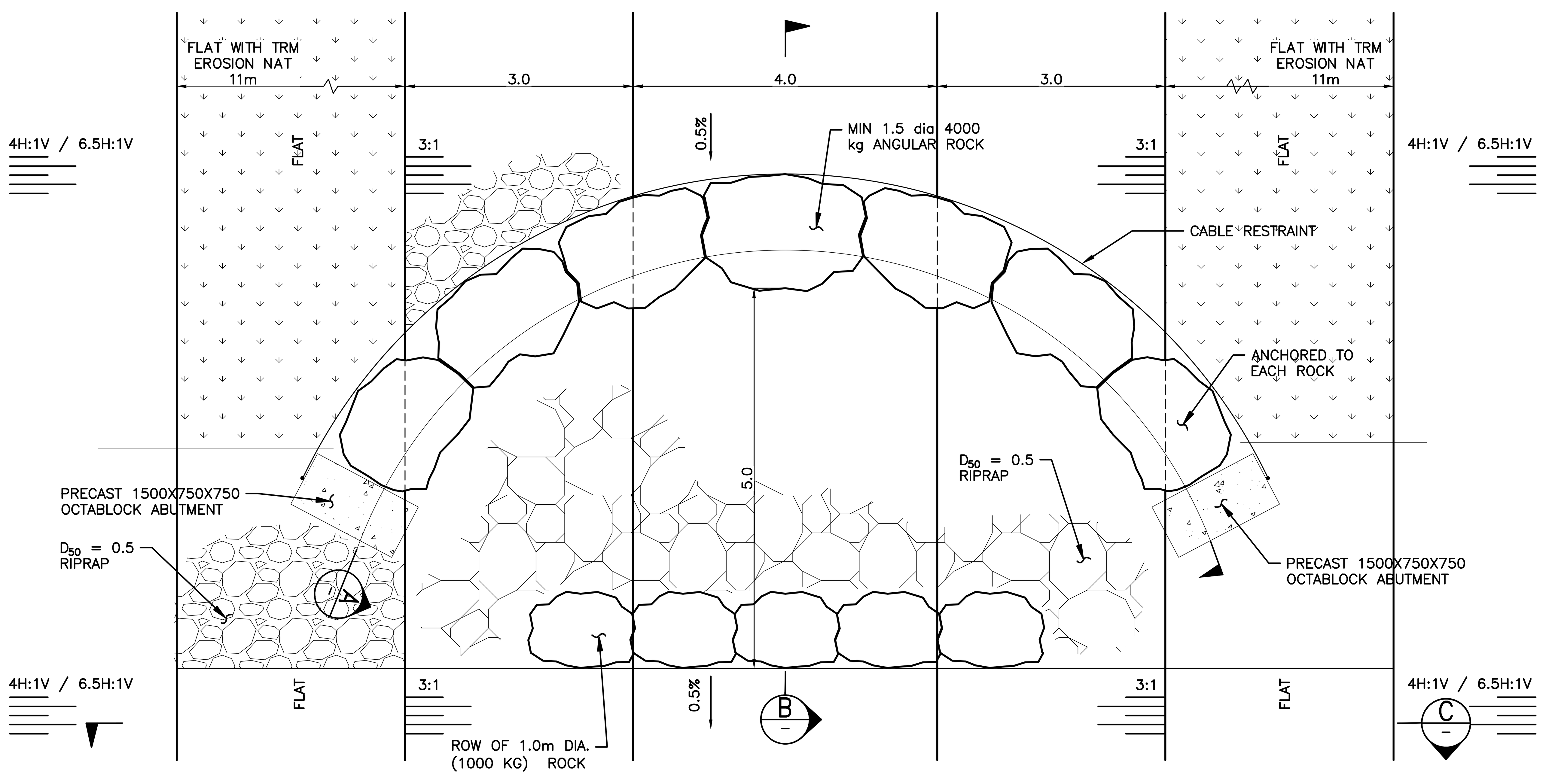
SUBJECT: CLINTON CREEK REMEDIATION PROJECT OPTION CC2-B (LOWER LAKE CHANNEL) PLAN AND PROFILE

AREA

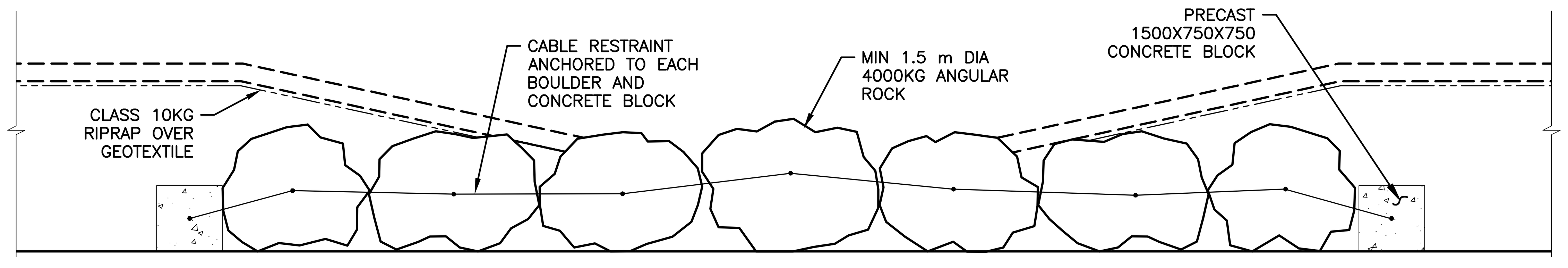
CLIENT DWG NO.

DRAWING NO.: VE52705G.CC2B 1.2 REV A

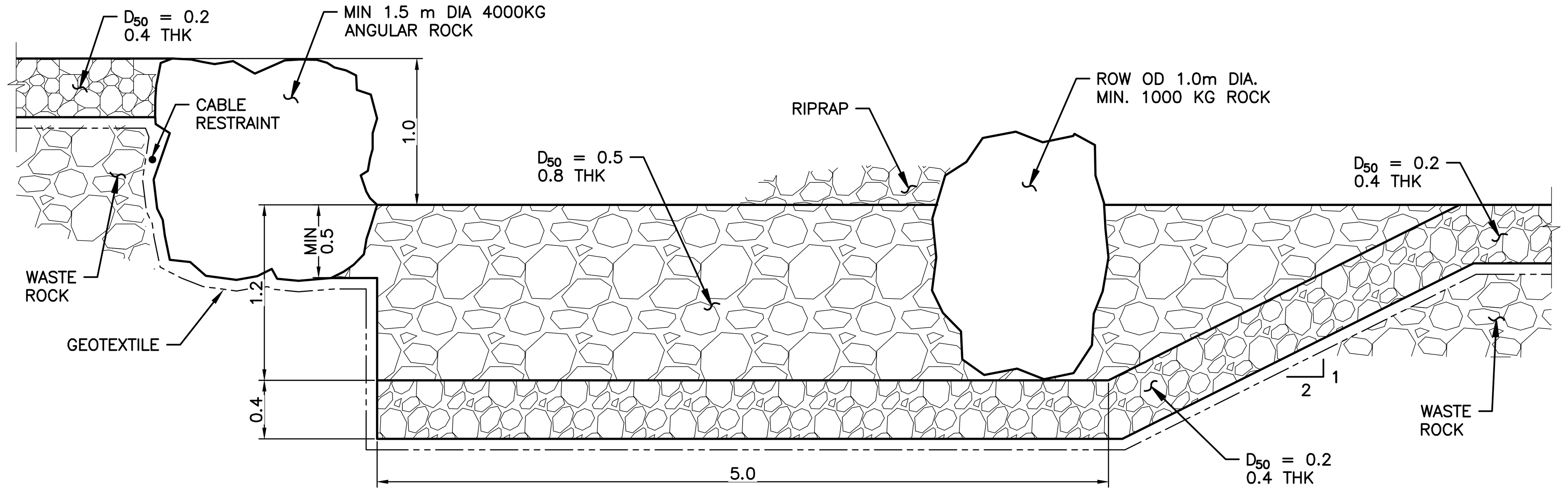
SAVED: 12-Mar-20 3:25 PM PLOTTED: 02-Apr-20 2:31 PM USER: ENCARNACION, PERSY



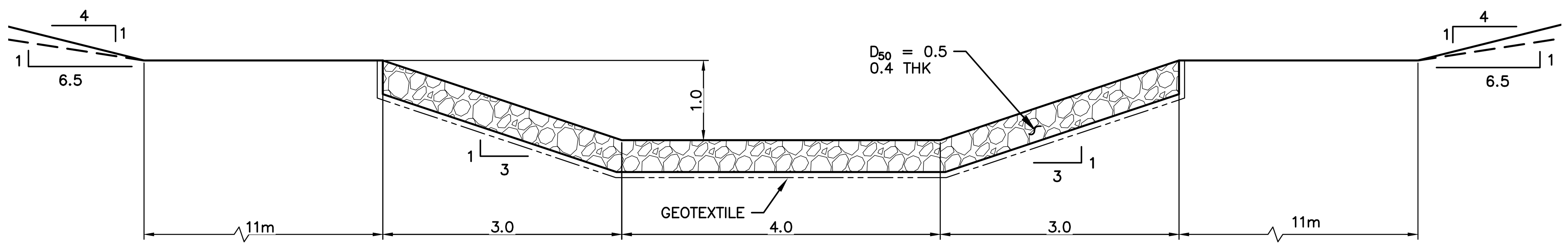
DETAIL 1 CC2A1.1 1 CC2B1.1 TYPICAL ROCK WEIR DROP
SCALE 1:50



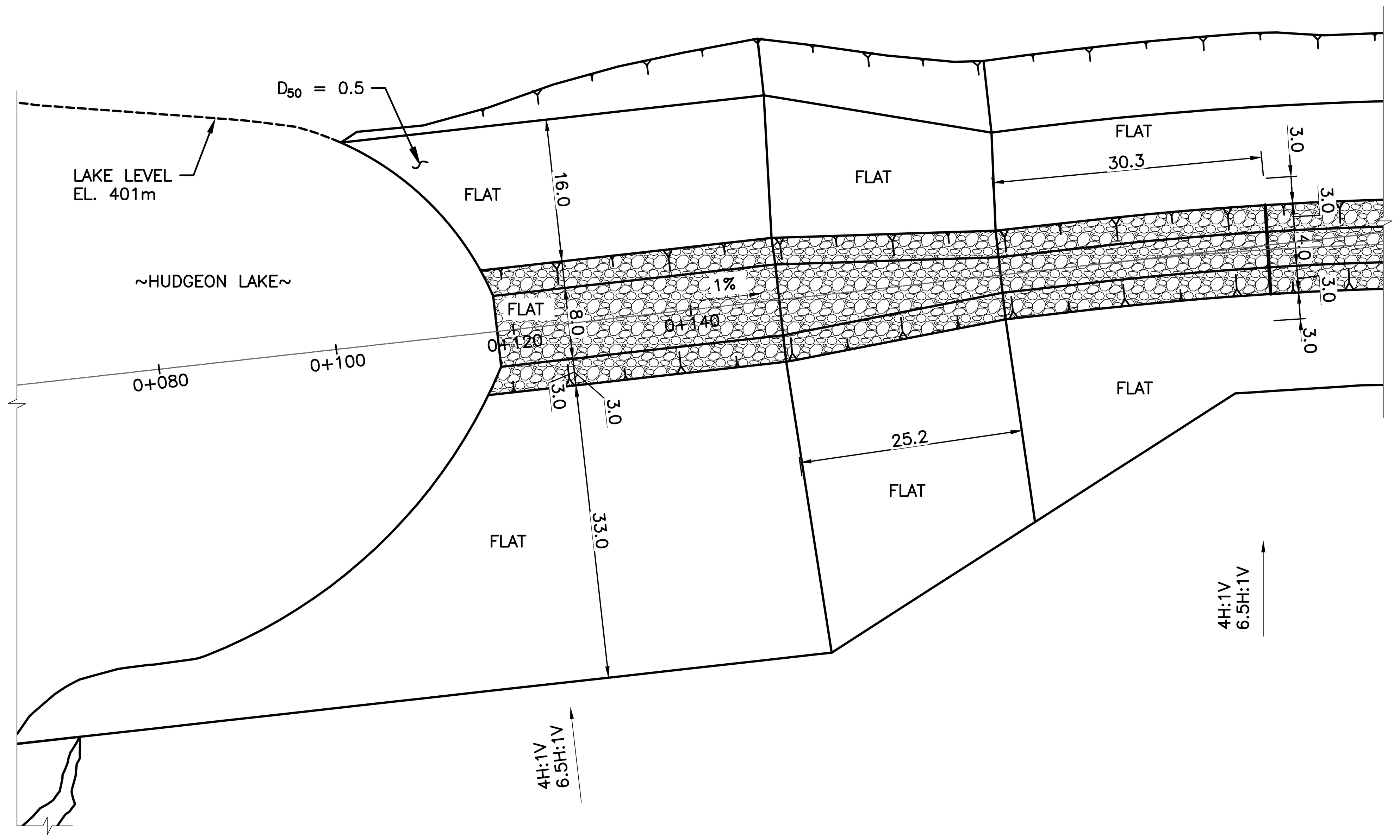
SECTION A – TYPICAL SECTION ALONG ROCK WEIR
SCALE 1:50



SECTION B – PROFILE THROUCH DROP STRUCTURE
SCALE 1:30



SECTION C – TYPICAL CHANNEL
SCALE 1:50



DETAIL 2 CC2A1.1 1 CC2B1.1 CHANNEL INLET
SCALE 1:500

NOTES:

1. THE TOPOGRAPHY BASED ON 2018 LIDAR DATA PROVIDED BY YUKON GOVERNMENT.
2. ALL DIMENSIONS AND COORDINATES ARE IN METERS. DATUM: NAD83, UTM ZONE 7.

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
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REF	NUMBER	TITLE
3	VE52705G.CC2A-B 3	CROSS SECTIONS
2	VE52705G.002 1.2	PLAN AND PROFILE
1	VE52705G.002 1.1	PLAN AND PROFILE
	REFERENCES	

NOT FOR CONSTRUCTION

APPROVED FOR ________

CLIENT PROJECT MGR | DEPARTMENT MGR | PROJECT MGR

PROJECT PHASE: 10% ALTERNATIVE DESIGN

PROJECT NO.		BY	DDMMMYY
VE52705G	DES	GG	13MAR20
	DRN	PE	13MAR20
SCALE: AS SHOWN	CHK	GG	13MAR20
	APP		

SUBJECT: CLINTON CREEK REMEDIATION PROJECT (LOWER LAKE CHANNEL) DETAILS

Yukon

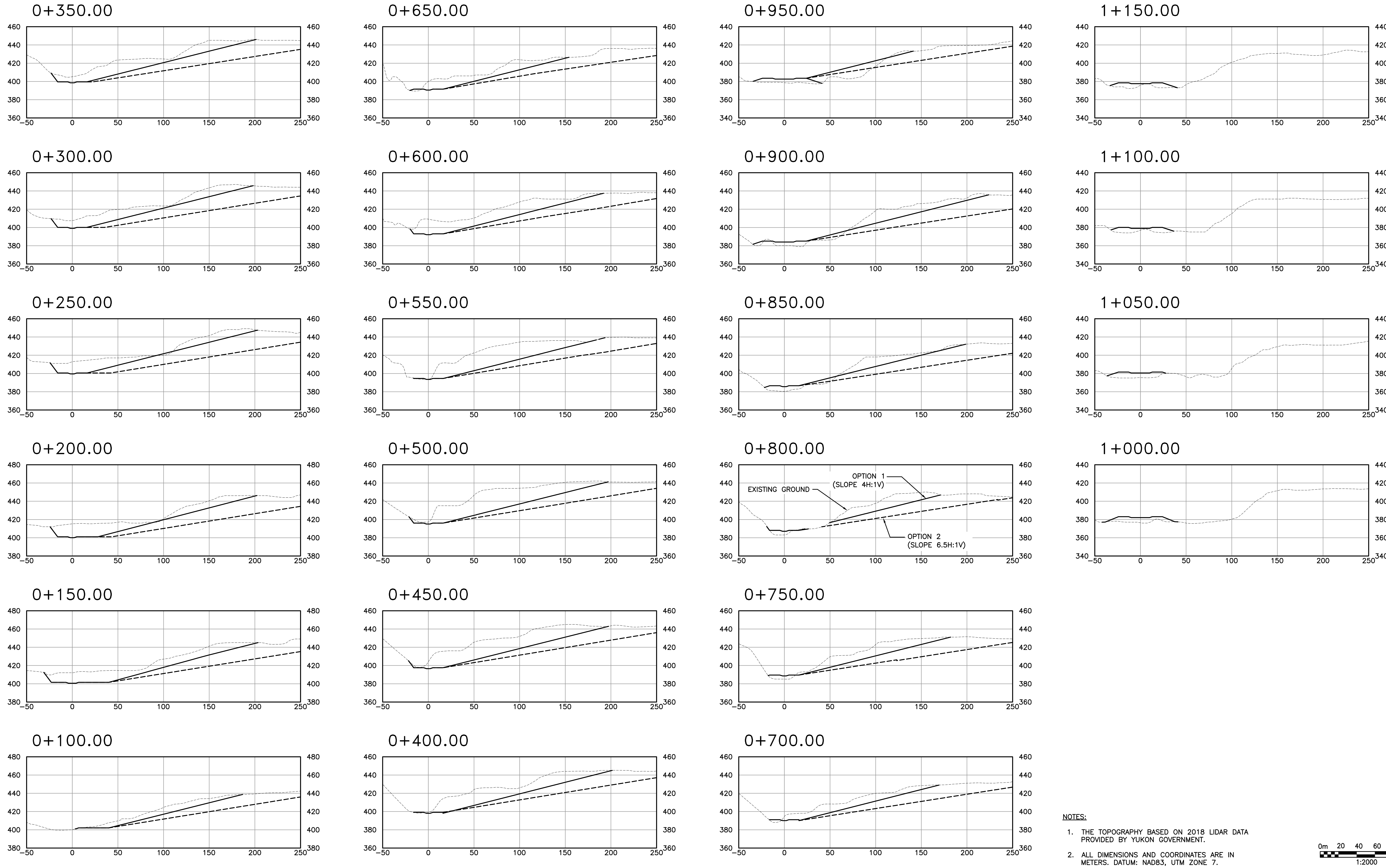
wood.

AREA

CLIENT DWG NO.

DRAWING NO. VE52705G.CC2A-B 2 | REV A

SAVED: 12-Mar-20 2:42 PM PLOTTED: 12-Mar-20 3:16 PM USER: ENCARNACION, PERSY



NOTES:

1. THE TOPOGRAPHY BASED ON 2018 LIDAR DATA PROVIDED BY YUKON GOVERNMENT.
2. ALL DIMENSIONS AND COORDINATES ARE IN METERS. DATUM: NAD83, UTM ZONE 7.

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A	13MAR20	ISSUED FOR REVIEW	PE	GG				

REFERENCES

REF	NUMBER	TITLE
1	VE52705G.002 1.1	PLAN AND PROFILE
2	VE52705G.002 1.2	PLAN AND PROFILE
3	VE52705G.CC2A-B 2	DETAILS

NOT FOR CONSTRUCTION

APPROVED FOR ________

CLIENT PROJECT MGR | DEPARTMENT MGR | PROJECT MGR

PROJECT PHASE: 10% ALTERNATIVE DESIGN

PROJECT NO.: VE52705G

SCALE: AS SHOWN

	BY	DDMMMYY
DES	GG	13MAR20
DRN	PE	13MAR20
CHK	GG	13MAR20
APP		

SUBJECT

CLINTON CREEK REMEDIATION PROJECT
OPTION CC2-A&B (LOWER LAKE CHANNEL)
CROSS SECTIONS

AREA

CLIENT DWG NO.

DRAWING NO.: VE52705G.CC2A-B 3 | REV: A

SAVED: 12-Mar-20 3:24 PM PLOTTED: 02-Apr-20 2:31 PM USER: ENCARNACION, PERSY

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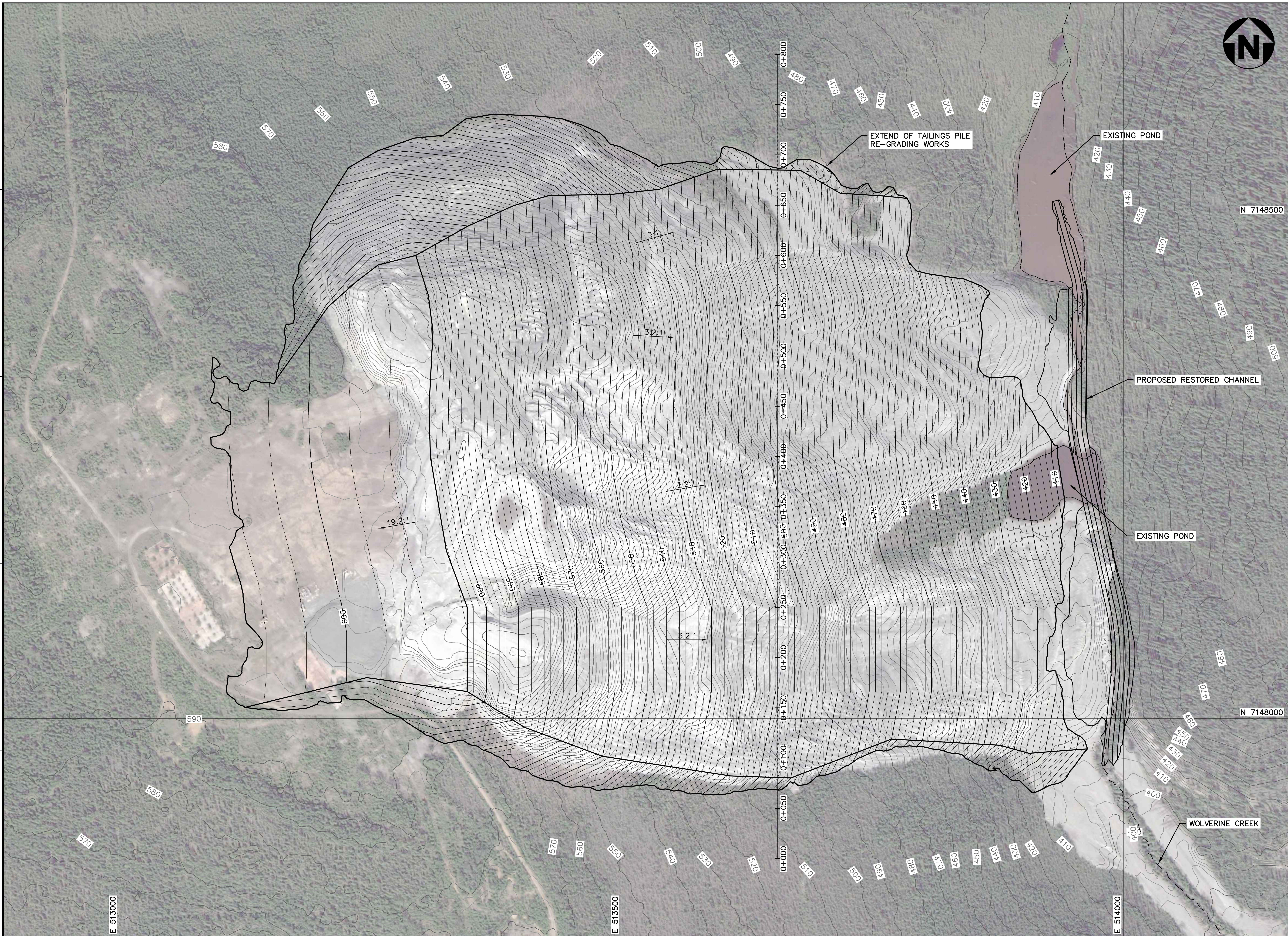
ISO A1-594x841

WC2-A (In-Place Stabilization)



NOTES:

1. THE TOPOGRAPHY BASED ON 2018 LIDAR DATA PROVIDED BY YUKON GOVERNMENT.
2. ALL DIMENSIONS AND COORDINATES ARE IN METERS. DATUM: NAD83, UTM ZONE 7.

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REF	NUMBER	TITLE
3	VE52705G.WC2A.4	CROSS SECTIONS
2	VE52705G.WC2A.3	PLAN, PROFILE AND TYPICAL SECTION
1	VE52705G.WC2A.2	GENL ARGT AND ILLUSTRATION OF CUT /FILL AREAS

REFERENCES

NOT FOR CONSTRUCTION

APPROVED FOR __________

CLIENT PROJECT MGR | DEPARTMENT MGR | PROJECT MGR

PROJECT PHASE: 10% ALTERNATIVE DESIGN

PROJECT NO.: VE52705G

SCALE: AS SHOWN

	BY	DDMMMYY
DES	GG	13MAR20
DRN	PE	13MAR20
CHK	GG	13MAR20
APP		

SUBJECT
CLINTON CREEK REMEDIATION PROJECT
OPTION WC2A (IN PLACE STABILIZATION)
GENERAL ARRANGEMENT
AND ILLUSTRATION OF CONCEPT

AREA

CLIENT DWG NO.

DRAWING NO.: VE52705G.WC2A.1

REV: A

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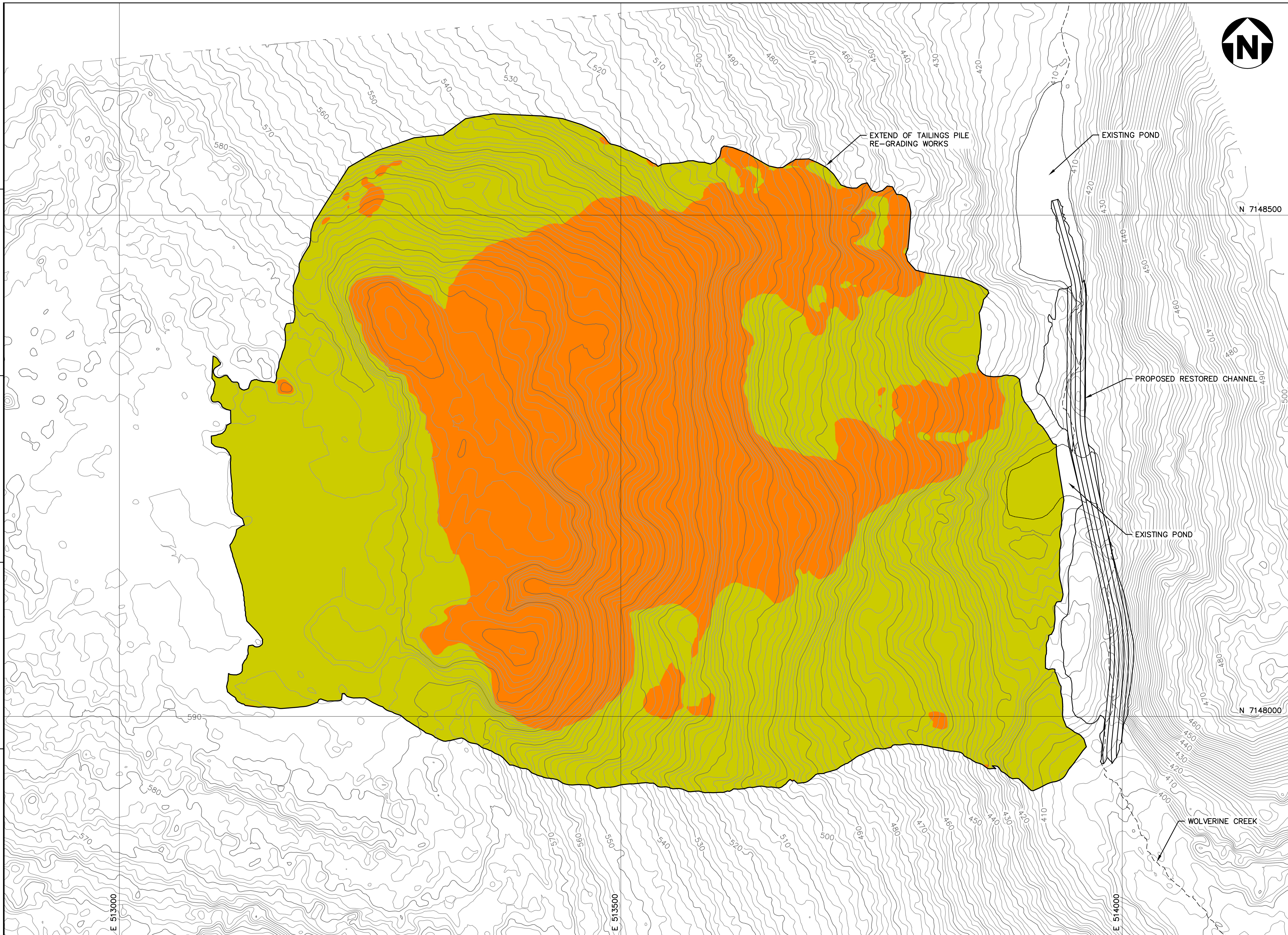

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2	VE52705G.WC2A.3	PLAN, PROFILE AND TYPICAL SECTION
1	VE52705G.WC2A.1	GENL ARGT AND ILLUSTRATION OF CONCEPT

REFERENCES

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
A	13MAR20	ISSUED FOR REVIEW	PE	GG				

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APPROVED FOR _________

CLIENT PROJECT MGR | DEPARTMENT MGR | PROJECT MGR

PROJECT PHASE: 10% ALTERNATIVE DESIGN

PROJECT NO.: VE52705G

SCALE: AS SHOWN

	BY	DDMMMYY
DES	GG	13MAR20
DRN	PE	13MAR20
CHK	GG	13MAR20
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SUBJECT
CLINTON CREEK REMEDIATION PROJECT
OPTION WC2A (IN PLACE STABILIZATION)
GENERAL ARRANGEMENT
AND ILLUSTRATION OF CUT/FILL AREAS

AREA

CLIENT DWG NO.

DRAWING NO.: VE52705G.WC2A.2

REV: A

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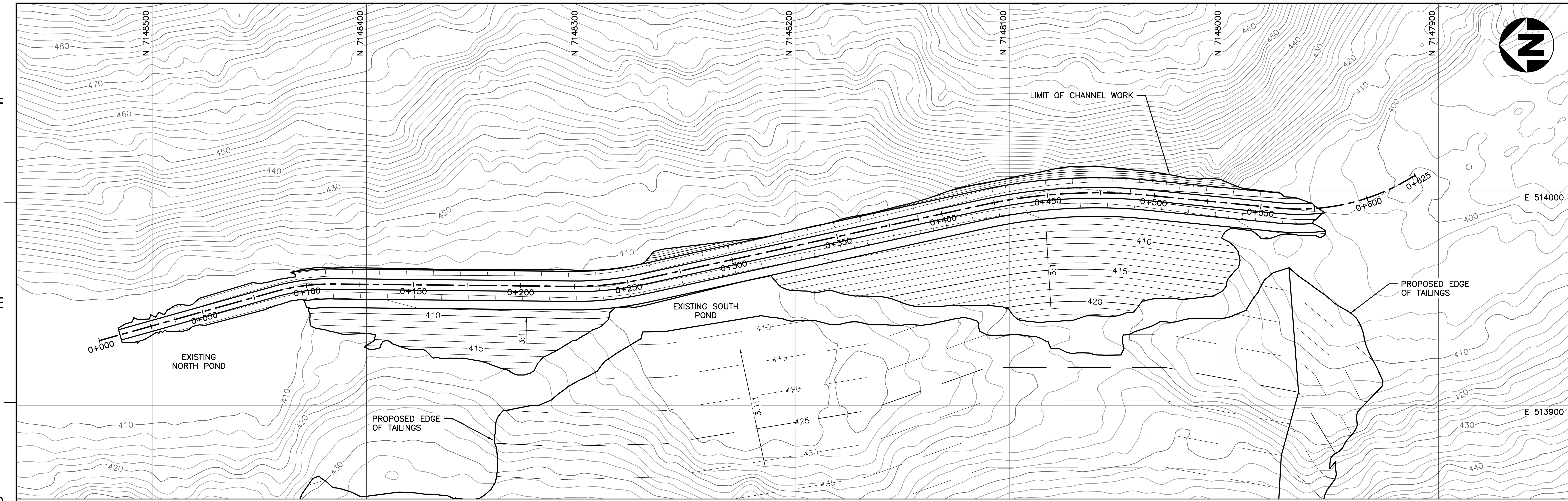
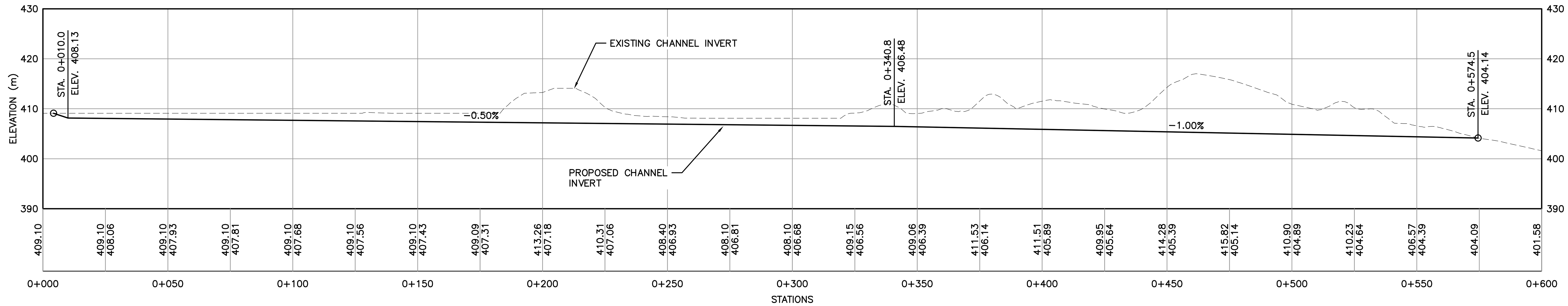


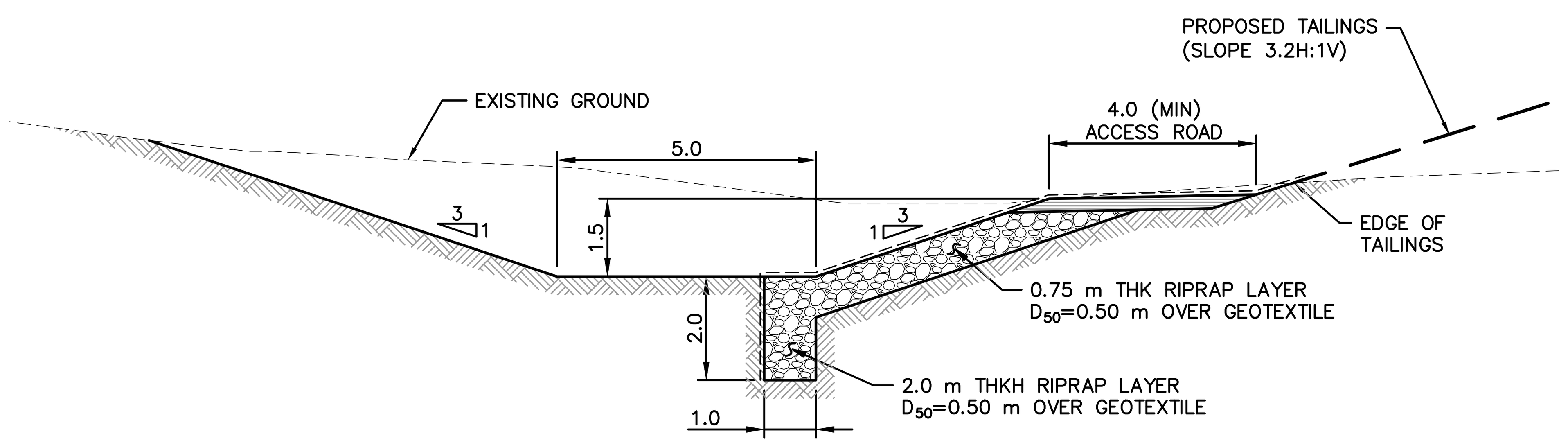
CLINTON CREEK CHANNEL – PLAN VIEW

SCALE 1:1000



CLINTON CREEK CHANNEL – PROFILE

SCALE H 1:1000 / V 1:500



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NOTES:

1. FOR GENERAL NOTES SEE WC2A.1.

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1	VE52705G.WC2A.1	GENL ARGT AND ILLUSTRATION OF CONCEPT

REFERENCES

REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP	APP	APP
A	13MAR20	ISSUED FOR REVIEW	PE	GG				

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APPROVED FOR ________

CLIENT PROJECT MGR | DEPARTMENT MGR | PROJECT MGR

PROJECT PHASE: 10% ALTERNATIVE DESIGN

PROJECT NO.: VE52705G

SCALE: AS SHOWN

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DRN	PE	13MAR20
CHK	GG	13MAR20
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Yukon

wood.

SUBJECT

CLINTON CREEK REMEDIATION PROJECT
OPTION WC2A (IN PLACE STABILIZATION)
WOLVERINE CREEK CHANNEL
PLAN, PROFILE AND TYPICAL SECTION

AREA

CLIENT DWG NO.

DRAWING NO. VE52705G.WC2A.3 REV A

SAVED: 13-Mar-20 9:07 AM PLOTTED: 13-Mar-20 9:33 AM USER: ENCARNACION, PERSY

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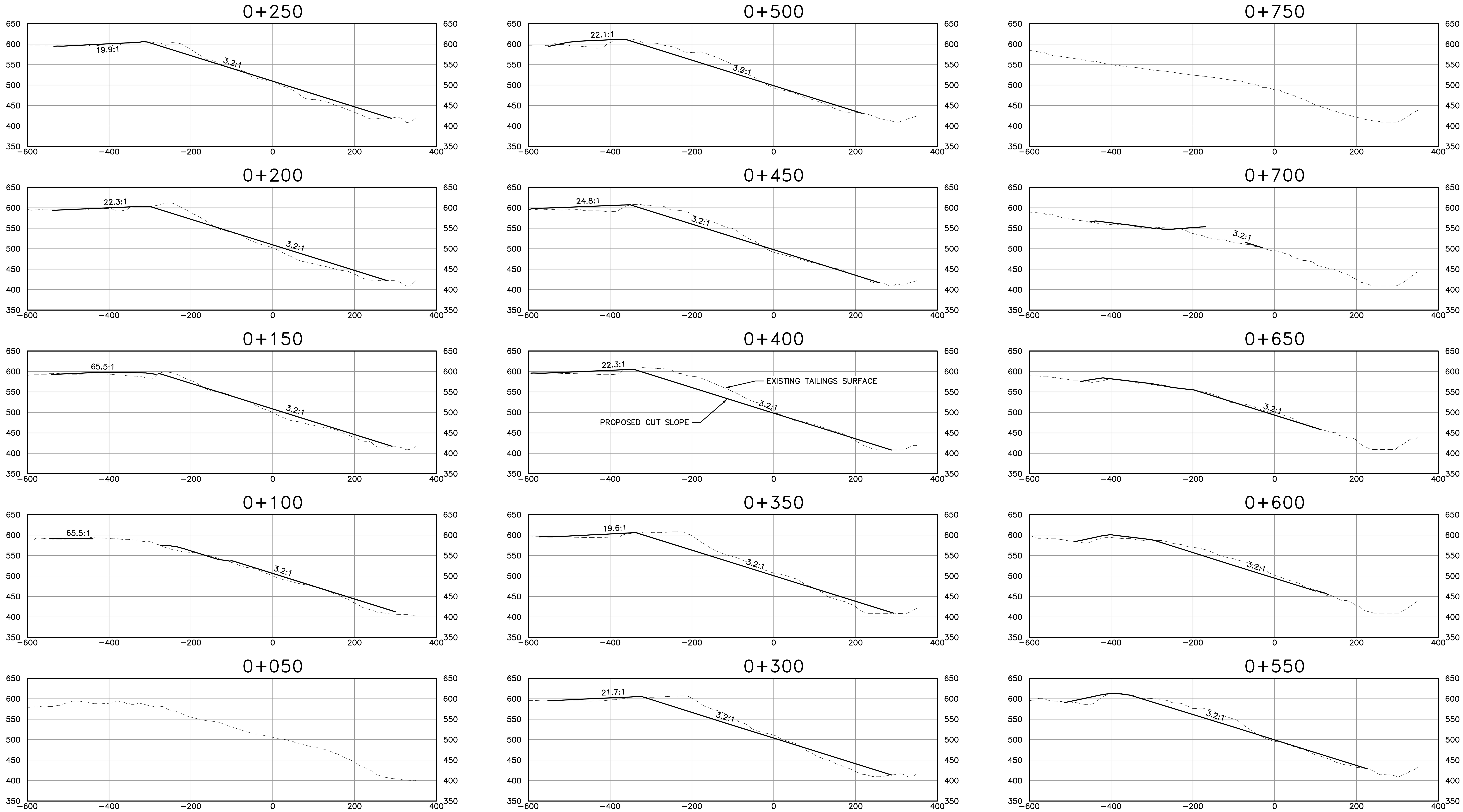

NOTES:

1. FOR GENERAL NOTES SEE WC2A.1.
2. THE SECTION'S STATIONS ARE LOCATED ON DRAWING WC2A.1.

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REV	DDMMMYY	REVISION / ISSUE DESCRIPTION	DRN	CHK	APP	APP
A	13MAR20	ISSUED FOR REVIEW	PE	GG		

REF	NUMBER	TITLE
3	VE52705G.WC2A.3	PLAN, PROFILE AND TYPICAL SECTION
2	VE52705G.WC2A.2	GENL ARGT AND ILLUSTRATION OF CUT /FILL AREAS
1	VE52705G.WC2A.1	GENL ARGT AND ILLUSTRATION OF CONCEPT

REFERENCES

NOT FOR CONSTRUCTION

APPROVED FOR __________

CLIENT PROJECT MGR | DEPARTMENT MGR | PROJECT MGR

PROJECT PHASE: 10% ALTERNATIVE DESIGN

PROJECT NO.: VE52705G

SCALE: AS SHOWN

	BY	DDMMMYY
DES	GG	13MAR20
DRN	PE	13MAR20
CHK	GG	13MAR20
APP		

SUBJECT
CLINTON CREEK REMEDIATION PROJECT
OPTION WC2A (IN PLACE STABILIZATION)

CROSS SECTIONS

AREA

CLIENT DWG NO.

DRAWING NO. VE52705G.WC2A.4 REV A

CAD FILE: P:\CAD\CIV\VE52705G.WC2A.4.DWG

Appendix A
Geotechnical Stability Update for Alternative 10% Design Options
Clinton Creek Remediation Project
Stability Analysis

Wood Environment & Infrastructure Solutions,
a Division of Wood Canada Limited
600 – 4445 Lougheed Highway
Burnaby, BC V5C 0E4
Canada
T: 604-294-3811

Memo

To: File VE52705G

From: Karen Hincks, M.Sc., P.Geo.
Ed McRoberts, Ph.D., P.Eng.

cc: **Wood File No.:** VE52705G

Date: 31 March 2020

Re: **Geotechnical Stability Update for Alternative 10% Design Options**
Clinton Creek Remediation Project

1.0 Introduction

1.1 Background

In 2019, Wood Environment & Infrastructure Solutions (Wood) prepared a 10% Design and Cost Estimate for three scenarios for Clinton Creek Waste Dump (Landslide Dam and Spillway) and the Wolverine Creek Tailings Facility respectively (Wood, 2019a). These scenarios were selected by the Project Partners based on previous assessments undertaken by others. The geotechnical design basis for the 10% design was based on Wood (2019b), based on the site characterization and model presented in Wood (2019c).

The primary drivers presented in the Wood (2019a, 2019b and 2019c) reports were:

1. A design that would maximize the potential for Canadian Dam Association (CDA) Passive Care for all three of the Clinton Creek options (CC1, CC2 and CC3) and two of three Wolverine options (WC2 and WC3), which is in turn was interpreted as tantamount to a "walk away" solution.
2. Identify and eliminate potential negative geotechnical surprises in the design which could be encountered during execution of work, such that a realistic and comprehensive cost estimates were established.
3. The Passive Care requirement resulted in a Significant Risk classification per Canadian Dam Association (CDA) guidelines, which in turn resulted in a seismic hazard at 1/2475 Annual Exceedance Probability (AEP) and a 0.27g Peak Ground Acceleration (PGA) per 2015 National Building Code of Canada (NBCC) criteria (NRC, 2015).
4. The geotechnical criteria used for stability analysis were guided by practice.

5. The level of site investigation was suitable for a 10% design; however, both the Clinton Creek Waste Dumps and the Wolverine Creek Tailings Area are complicated and suffer from a lack of as-built or historical records of events. Where appropriate, the selection of conservative design properties and extent of weak or critical foundation elements was adopted.
6. It was also determined that, whereas previous thinking (i.e., prior to Amec / Wood involvement) focused on the primacy of the importance of ice-rich permafrost at the site, this was not necessarily now the case. Insitu testing with both SPT/LPT and CPT (tailings only) demonstrated that there was a threat of both static and seismic triggering of liquefaction of both the Clinton Creek Waste Dump and the Wolverine Creek Tailings.
7. The Base Case design was not fully informed by the observations now forthcoming from slope indicator (SI) results.

1.2 Rationale for Alternative Approach

The basis of this approach is discussed in more detail in the main report. In summary the rationale is:

- Seek Alternatives to Base Case to reduce Capital Costs.
- Consider design approaches that can control Hazards and Consequences to a reasonable degree and that are readily repairable within the limits imposed by current uncertainty.
- Approach is considered underpinned by observation that both Clinton Creek Waste Dump and Wolverine Creek Tailings Dump have been previously impacted by failures, in the early 1970s and subsequently.
- Previous failures understood to have long-term environmental impacts which are tolerable or can be remediated.
- Lower CAPEX to OPEX ratio viewed by Partners as potentially more viable given operative project and stakeholder constraints.

2.0 Alternative Design Basis

Woods support for the Alternative Design Basis, as opposed to the design basis presented in Wood (2019a) is presented in the following sections.

2.1 Seismic Triggering of Liquefaction

CDA guidelines are based on five-part consequence classification (low to extreme), with a judgement driven determination of stochastic risk levels appropriate to the consequence level. For example, an extreme consequence event would warrant a Project Maximum Event, whereas a low consequence event would only require a 1/100 level. CDA also provide a further level of guidance with which to consider Active versus Passive Closure.

For the 10% Design Base Case completed by Wood (2019a) a Passive Care Design for a Significant Risk Classification resulted in a 0.27g seismic loading, based on the 2015 NBCC. For a Low Risk Classification and Active Care a 0.037g loading is derived.

Sub-appendix A assesses the potential for seismic liquefaction under a PGA 0.037g event, and concludes that the Factor of Safety against liquefaction, FoS_{liq}, is in the range of 2 to 4.5 for a 1/100 Annual Exceedance Probability (AEP). A FoS_{liq} of 1.5 would be consistent with an AEP range of 1/178 to 1/542. As previously discussed in Wood (2019b, Appendix E) the simplified method for arriving at the FoS_{liq} has a range of uncertainty for the “rd” term under a major slope. A variation of 0.5 to 1.0 approximately covers the possibilities. If an average of 0.75 is selected, the prediction is a FoS_{liq} of 3.4 or for a FoS_{liq} at an AEP of 1/360. Note that the methodology used also considers a Kα term which embraces the impact of existing static shear stresses. Detailed analytical analysis would be required to refine this simplified estimate.

In the Base Case design presented in Wood (2019a), the predicted FoS_{liq} was well below unity, resulting in the requirement to adopt a liquefied undrained strength ratio (s_{us}/σ'_v) of 0.10 for all Clinton Creek landslide wastes, and underlying alluvial soils below the current or anticipated water tables.

The tailings in the Wolverine Creek valley were also determined to mobilize low shear strength (s_{us}/σ'_v) if liquefied. However, the triggering of liquefaction in the tailings is complicated by two factors. Firstly, whether or not the tailings are effectively saturated at the tailings / native soil contact, or could become so in the future, is uncertain. The Base Case designs assumed a thin layer at the contact was saturated. A less conservative assumption, which was not adopted for the Base Case design, could be that the long term the net difference between infiltration of precipitation, ground water flow, and lateral drainage might possibly result in unsaturated tailings. Secondly the tailings are under considerable initial shear stress, and the margin between insitu driving stress and additional shear stresses from seismic action are most likely very low. Therefore, the tailings could be liquefied even by a low AEP. The actual topography of the original ground now under the tailings pile will also impact the scale of potential future failures, and could limit the size of any instability event. However, there was insufficiently accurate pre-development topographical data, and insufficient drilling to account for this possibility.

The Base Case designs were therefore governed by adoption of seismic triggering, which basically over-rode other failure modes, except for slopes interacting with icy permafrost.

If seismic liquefaction could then be set aside by site controls that eliminate risk to life by access limitations, other modes must be now considered. The methodology followed is overviewed in the following sections and discussed in more detail for the design cross-sections currently established. These are discussed in the following sections.

2.2 Static Liquefaction

Static liquefaction is an "Implementation/Construction Phase" concern and has the same result as seismic liquefaction, that is a low mobilized shear strength (s_{us}/σ'_v) can potentially be triggered. While the trigger for seismic (or dynamic) liquefaction is potentially much stronger than static liquefaction, the net result for a soil element is essentially the same in respect to the undrained strength post-triggering. Static triggers can occur during excavation of steep slopes and/or in combination with initial instability due to rapid drawdown of piezometric levels behind a slope. Given the relative rapidity of the mechanism it is impractical to take an observational approach.

Development of top-down excavation methodology by dragline and rigorous dewatering would potentially allow for a safer approach than the bottom-up alternative. Moreover, the constrained or confined nature of excavations along the spillway canal for CC1 and to a lesser extent for CC2 limits mobility post triggering. Nevertheless, residual risks remain and a safety threat would remain. It is then necessary to either adopt slopes approximating the Base Case or consider insitu densification of slope panels to increase operational safety during construction. Additional detailed site investigation beyond the reconnaissance-level current data base might relax this significant constraint possibly only on a local basis.

Drawing down the water table within the landslide waste dumps in the vicinity of slopes subject to static liquefaction threat prior to completion of any excavation is mandatory and will all assist in managing this risk and reducing the scale of remedial measures.

Slope stability analyses reported herein consider the slope angles that could be achieved if liquefaction could be eliminated with identification of more favorable insitu conditions. These analyses approach the range of slope angles proposed in previous studies by others before Wood (2019b), and which did not consider liquefaction. The analysis reported herein was done to demonstrate the impact of eliminating static liquefaction considerations.

Analyses for the cross-sections consider that the impact of downcutting of the current channel with current water levels could have caused static liquefaction. By back analysis of existing slopes, mobilized undrained strength ratios that might have been mobilized were obtained. It was found that while the mobilized parameters could somewhat exceed the original design number it was not sufficient to eliminate concerns. Analysis then established the slope configurations required for the four design sections with consideration of static liquefaction during the construction or design implementation phase.

In addition, analyses considered the stabilizing effect of a zone of densified wastes and/or foundations. This was considered to be most economically achieved by blast densification (explosive compaction). This was undertaken to provide a cost comparison between flatter slopes versus steeper slopes with blast densification. The analyses demonstrate the impact on achieved factor of safety with varying dimensions of the densified zone.

2.3 Long Term Passive Care with Densification

If densification is determined to be cost effective versus slope flattening for control of construction related static liquefaction, this raises the question if densification may also be cost effective for long term seismic triggered events. The following considerations are presented:

1. The scale of liquefaction triggering for a seismic event is more than likely much greater than for static liquefaction.
2. The consequences of static liquefaction can be less severe as, depending on the brittleness of the soil elements, retrogressive failures are more likely with static liquefaction.
3. For long term passive care (Base Case design) the design objective is to arrive at configurations not requiring major remedial intervention. This includes controlling deformation of design elements in the spillway configurations.

At this stage of design, a paradigm for arriving at the difference between static and seismic liquefaction is considering the impact of the scale of blast densification on the factor of safety achieved post-triggered liquefaction. In order to achieve safe conditions for construction operations a FoS ≥ 1.1 is considered an appropriate guideline at this point. In order to control deformations during and after a seismic loading consistent with the Base Case design motions a FoS ≥ 1.4 is considered an appropriate guideline.

Application of these guidelines would significantly increase the overall volume of densification required, for consideration of strengthening the design against seismic liquefaction. Required densification depths might also extend beyond the limitations of the method.

2.4 Ice Rich Permafrost

Available borehole data, supported by InSar settlement observations (Wood, 2019b), indicate that significant ice rich permafrost is limited to colluvial slopes within the mining disturbed footprints. If ice rich permafrost was initially present in the Clinton Creek alluvial sediments it has not been located in current boreholes and is assumed to be now have thawed. Of particular significance to design is the presence of ice rich permafrost in the headwater region of any practical location for the CC1 and CC2 spillway channels which overly the north valley slope. The Base Case premise for the distribution of this permafrost is delineated in Figure 5-1 of the Wood (2019a) 10% Design Phase Report. This distribution was obtained by assuming that ice rich permafrost extended to near to adjacent 2018 series sonic cores (i.e., BH18-07). A more limited distribution was considered for the Alternative Cases using both 2016 and 2018 data sets. In any event, it is anticipated that in the next phase of design, additional site investigation would be required to delineate the extent of ice rich permafrost based on currently known locations as well as refine the granularity of the available data assuming the absence of ice rich permafrost (i.e., the evidence of absence is not the absence of evidence).

Back analysis of cross section DS4 through the ice rich permafrost zone found in BH18-03 indicated a mobilized strength of about 60 kPa at a FoS of near unity in the presumptive permafrost zone. This was greater than the 50 kPa previously used in the Base Case analysis. Additional context is provided in Section 2.3.

2.5 Deep Alluvial Silt and Clay Layer

An approximately 2 m thick silt to silty clay layer, generally referred to as the silt-clay layer, was encountered in some boreholes, overlying bedrock. This layer is assumed to be a now normally consolidated clay with a mobilized s_{us}/σ'_v ratio of 0.22. In the Base Case analysis and reports this layer was assigned a strength ratio s_{us}/σ'_v of 0.14, based on back analysis of the slope into Hudgeon Lake, assuming that the overall slope had a factor of safety (FoS) near unity, based on visible cracking. However, additional SI data collected after the previous analysis has indicated that the previous assumption was likely too conservative as no shearing has been detected in the SI.

2.6 Slope Indicator Data Update

During the completion of the Base Case, the only SI data that was available were baseline readings from installation, Since the completion of the Base Case analysis, one year of readings are available. Sub-appendix B provides an update based on available readings. Honoring current data, the following conclusions are made in support of the Alternative Cases.

2.6.1 Clinton Creek Waste Dump

SIs in BH18-03 and BH18-04 demonstrate time dependent creep movements in the ice-rich permafrost zones. The movements appear quite linear, and no acceleration or deceleration of the movements based on the seasons were noted in the data. There is currently only one year of data, additional data will demonstrate if this trend continues.

SIs in BH18-01, BH18-02 and BH18-06 show no evidence of shearing movement in the instruments but the instruments are measuring general tilting or downslope tilting within the waste material, with between 10 and 15 mm of slope tilt movement in the downslope direction in these boreholes. The SIs in BH18-07, BH18-09 and BH18-10 have no confirmed shear zones; however, some of the readings indicate that some movements might be developing. In the SI in BH18-07, two small potential movement zones have been measured, one in the mixed waste and one in the colluvium layer immediately above the alluvium, with approximately 3 to 3.5 mm of movement. This SI is also showing downslope tilting through the waste material, with cumulative movement of approximately 30 mm. BH18-09 has had poor quality readings to date, but a potential shear zone at approximately 20 m depth and a potential shear zone or settlement zone in the peat/frozen layer at the native/waste boundary have been identified in the data, with less than 4 mm in both zones. In BH18-10 a potential settlement zone with 7.5 mm of movement is present between 27.8 and 32.3 m depth, but with no net movement above the zone, indicating it is not a developing shear zone, but more likely settlement or creep at depth.

At this time, it is concluded that deep seated shearing movements are not being observed in the instruments on any cross section. The movement of many surface monuments and interpretation of the InSar data, might therefore be attributable to general tilting and settlement, consistent with the SI data.

2.6.2 Wolverine Creek

One SI, BH18-17, reports a shear zone in colluvial slope deposits just below the tailings / colluvium contact. Temperature data indicate the temperature in this shear zone is just above zero, so, by definition, is not permafrost. Water contents as ice (W/C (ice)) data indicate samples were not frozen but a maximum W/C (ice) of 24% in a sample from below the shear zone could indicate low ice content permafrost.

The remaining two SIs within the Wolverine Creek Tailings Dump, BH18-11 and BH18-13 have not measured any shearing. Some general downslope tilting has been detected. It should be noted that the location of BH18-13 may be slightly too far upslope to detect a shear zone in the north lobe; the location of the drilling of this borehole was limited in the field due to access and safety of personnel during the site investigation program.

The shear zone in BH18-17 can be attributed to the loading exerted by the steep upper slope of the south lobe.

2.7 Hudgeon Lake Drawdown

Option CC1 maintains the lake at current levels, assumed for the purpose of analysis to be 412 masl. A temporary drawdown of 5 m to 407 masl is required for construction and temporary storage of inflows to Hudgeon Lake.

Option CC2 assumes the lake at 400 masl for closure with 5 m of temporary drawdown to 395 masl during construction. Many of the geotechnical designs require that the waste dump be allowed to drain or that the phreatic surfaces be lowered prior to construction. Additional information is provided in the following sections for each design.

Option CC3 assumes that Hudgeon Lake is drained and Clinton Creek is re-established on the original the valley bottom.

2.8 Ground water level control within Wastes

The stability analysis for each cross-section *requires* the drawdown of the water table consistent with the lake levels. In addition, the design assumes some incremental drop in piezometric levels downstream of the lake empirically adjusted based on current elevation changes. These levels may be achieved by overall drainage to the lake and spillway but may also require local pumping assist to achieve required levels are indicated on the relevant stability calculations.

The phreatic levels associated with stability analysis are presented in Tables 3 to 8 in Section 3.0.

2.9 Alignment of CC1 and CC2

The Base Case alignments of CC1 and CC2 provided offset between the north slope of the Clinton Creek valley and the spillway channel. This was done to assist in controlling maintenance requirements along the north valley slope. Current erosion of the valley wall indicates that in the middle and lower sections of the spillway the exposed slopes appear to be dominated by relatively thin veneers of colluvial debris over highly variable bedrock. At lower elevations in the upper section, as represented by DS4, the ice rich colluvial material exists at elevations below the proposed vertical alignment of CC1 and CC2.

In order to reduce overall cut slope volumes, the Alternative Case CC1 and CC2 alignments have been shifted north and located tight to the north slope, for at least parts of the alignment. It is assumed that in the next phase of design, recommendations for local scaling and possible bedrock slope flattening would be considered. The consequences of this would be to contemplate an increase in the maintenance requirements during initial phase of closure.

The vertical alignments of the spillways for Alternative Case CC1 and CC2 have been determined by hydrotechnical requirements. In order to provide access for maintenance activities, the spillway channels allow for an access road along raised berms on both sides of the main spillway channel. The stability analysis undertaken assumes that the base of the excavation is across the full cut, and the modest positive effect of road berms on stability is not considered

2.10 Impact of Ice Rich Permafrost on Spillway

The upstream portion of the Alternative Case CC1 and CC2 spillway channels will be impacted by thawing permafrost. The significant boundary condition driving the rate of thawing is the temperature in the spillway due to summer solar heating of the upper zone of Hudgeon Lake, and a modest geothermal gradient below the permafrost. In addition, there will be convective heat flow out of Hudgeon Lake.

The rate of thaw will be greater for CC2 than for CC1 as with as design lake at 400 masl there is little insulating effect of even granular overburden. It is expected that maintenance in the form of continuing replacement of granular fills, and repairs of spillway components will be required.

2.11 No Alternative Design for CC3

In consideration of the several factors discussed in the preceding sections, development of an alternative design for CC3 is not considered viable and the Wood (2019a) recommendations are considered appropriate at the 10% design level.

3.0 Clinton Creek Cross-Sections

The Alternative Designs are based on consideration of the four cross sections, as previously analyzed in Wood (2019b), in the order DS3 (section along the Clinton Creek Waste Dump), DS4, DS1, and DS2 (from west to east). This order is useful as it allows a logical development of issues and extends from Hudgeon Lake east down the landslide waste dumps. The considerations for Options CC1 and CC2 are discussed for each cross-section.

3.1 Section DS3 (Into Hudgeon Lake)

Analyses for section DS3 are presented in Sub-appendix C. The interpreted geological cross-section for analysis and discussed in this section is presented on Page 4 of Sub-appendix C, and a summary of the completed analysis is presented on Page 5 of Sub-appendix C.

The two SIs on this section closest to Hudgeon Lake, installed in BH18-01 and BH18-02, are not showing any shear deformations after one year of readings. Inspection of sonic cores in BH18-01 and BH18-02 did not reveal any sheared material. Therefore, the situation that was considered in the Base Case, a FoS at or just above unity at the top of the slope (i.e., at or around BH18-02), has been set aside for the Alternative Design case. For the Base Case design, a liquefaction case governed with an operative undrained strength ratio (USR) of 0.10 was adopted based on LPT/SPT data.

The slope morphology and historical information strongly suggest that there was relatively deep-seated movement in the past. The mechanism of previous movements is speculative but could include thawing of permafrost that is no longer present, thawing of frozen fills leading to internal instability and downslope settlement, or local static liquefaction of loose fill. There is a possible weak layer of silt-clay at about El 375-378 m, which has been assumed to be continuous. This may relate to a very early stage in the development of the valley. Previous analysis of DS3, prior to 1 year of SI data, assumed this silt-clay layer was at a FoS of unity to the location of BH185-02, in which case the mobilized USR was back calculated to be 0.14 or less. For current analysis it is assumed that an undrained strength ratio of 0.22 as a default strength for a normally consolidated silt-clay . No ice-rich permafrost was encountered in the boreholes along Section DS3.

A summary of the required slopes and analyzed FoS for the Alternative Design for CC1 and CC2 are presented in the following sections.

3.1.1 Alternative Case CC1

The stability runs completed for the Alternative Case CC1 design are presented on Pages 7-13 in Sub-appendix C. Using the existing geometry with the Alternative Design parameters, a FoS greater than 1 can be achieved for the long-term case; however, for construction a 5 m drawdown of the lake will be required for construction safety. Taking into consideration the required 5 m drawdown, the FoS for the current slope drops below 1 until the phreatic surface equilibrates to the lake level, meaning that slope dewatering may be required to prevent a failure of the existing slope during lake lowering. The requirement for additional dewatering could further assessed in subsequent site investigations using pumping tests or other means to gather additional insitu information on the hydraulic conductivity of the dump.

A summary of the provided FoS is presented in Table 1.

Table 1: DS3 CC1 Stability Modelling Results

Option	Lake Elevation (m)	Slope	Phreatic Surface Elevation (m)	Failure Mode	FoS	Slide #
CC1 (long-term)	412	Existing Geometry	412	Overall	1.3	7
		Existing Geometry	412	Toe	1.1	8
CC1 (short-term)	407	Existing Geometry	407	Overall	1.3	10
		Existing Geometry	412	Overall	1.2	11
		Existing Geometry	407	Toe	>1.0	12
		Existing Geometry	412	Toe	<1.0	13

Based on achieving equilibrated water levels, the current slope is considered safe for the Alternative Case CC1 design.

3.1.2 Alternative Case CC2

For the Alternative Case CC2 option, the FoS for the current slope geometry drops below 1 for both the case where the phreatic surface lowers with the lake as well as the case where there is an elevated phreatic surface following draw down of the lake. If the waste dump does not drain concurrent with the lake, the analysis indicates that the slope will need to be cut back to a slope flatter than 6H:1V. A summary of the analyses is presented in Table 2.

Table 2: DS3 CC3 Option Stability Modelling Results

Option	Lake Elevation (m)	Slope	Phreatic Surface Elevation (m)	Failure Mode	FoS	Slide #
CC2	400	Existing Geometry	400	Toe	>1.0	15
		5H:1V slope	412	Toe	1.1	18

It is possible to refine this option in subsequent design phases, based on updated hydraulic conductivity information or, alternatively, by optimizing the sloping.

3.2 Section DS4

Analyses for section DS4 are presented in Sub-appendix D. The interpreted geological cross-section for analysis and discussed in this section is presented on Page 6 of Sub-appendix D, and a summary of the completed analysis is presented on Page 7 of Sub-appendix D.

This section is dominated by the presence of ice rich permafrost approximately 8 m thick (vertical thickness) in BH18-03. This unit was not encountered in any of the other boreholes on the north side of the pre-construction Clinton Creek valley, so a significant unknown is the aerial extent of this deposit. A worst case distribution would be indicated by the adjacent boreholes that surround this location, i.e., the aerial extent would be considered to extend under the creek to the pre-construction north slope, as far east as BH18-07, as far south as BH18-02 and as far west as Hudgeon Lake. While the Base Case design did not assume this full aerial distribution, a reasonably worst case (RWC) aerial extent was taken into consideration for costing in the Base Case design (the blue line case presented in Wood, 2019a). The Alternative Design has taking into consideration a most likely case (MLC) condition where the extent of the ice-rich zone extends approximately halfway between BH18-03 and 16-BH08 and does not extend below 16-BH11.

SI data from BH18-03 exhibits creep at about 67 mm/year towards the spillway canal. This creep would appear to be driven by the approximately 26 m high 23° fill slope directly north of the instrument (the instrument is based on a low bench south of the spillway).

For the Alternative Design, the silt-clay layer in the bottom of the pre-construction valley was assigned a USR of 0.22, based on the back analysis completed for Section DS3. Back analysis of the current slope was completed (Pages 9-12 in Sub-appendix D) and, based on the results, the Frozen Colluvium layer was assigned a cohesion of 60 kPa, increased from the 60 kPa that was used for the Base Case analysis.

Although the requirement to consider seismic liquefaction for the Alternative Design case has been eliminated, the possibility of triggering static liquefaction during construction needs to be taken into consideration. As with the Base Case analysis, a mobilized liquified strength c/p' of 0.1 is considered the RWC value. For the analyses completed for DS4, if all of the waste below the water table had current mobilized liquified strength, the liquified strength would have to be greater than 0.18 to get the FoS for this section above unity (Page 12, Sub-appendix D). The indication of this back analysis is that the waste below the water table at this current slope configuration has either not been triggered, or the mobilized liquified strength at this location is greater than the design assumption.

3.2.1 Alternative Case CC1

The stability runs completed for the Alternative Case CC1 design are presented on Pages 15-32 in Sub-appendix D. A summary of the provided FoS is presented in Table 3. Stability analyses were completed for the case where there was no liquefaction considered, liquefaction assuming c/p' of 0.1 and an assumed c/p' of 0.14 (based on back analysis on sections DS1 and DS2.

The preliminary spillway design is presented on Page 13 of Sub-appendix D. The vertical alignment is considered as fixed, but the lateral alignment of the spillway was considered in the stability analysis at both the location it is shown in plan view (south channel option) as well as at an alternative location shifted to the north (north channel option). For all of the analysis the base of the channel is located at El. 411.5 m. The impact of lowering of the phreatic surface and the impact on the stability analysis for static liquification has been analyzed.

Slope cuts along this section allow for the gently sloping bench that is currently present to remain, with slope cuts limited to the slope above BH18-03 and adjacent to the channel only. The south channel option would also require the specified cuts on the north slope while the north slope option assumes that the north slope is defined by the existing northern bedrock slope.

Table 3: DS4 CC1 Stability Modelling Results

Cut Slope	Channel	Failure	Liquified strength (c/p')	Phreatic Surface (m)	FoS	Improvements	Slide #
4H:1V	South	Mid-slope	N/A	411.5	1.4	None	16
4H:1V	South	Mid-slope	0.1	402.7	0.9	None	21
4H:1V	North	Mid-slope	N/A	411.5	2.5	None	17
4H:1V	North	Overall	N/A	411.5	1.45	None	18
4H:1V	North	Mid-slope	0.1	407.7	0.9	None	22
4H:1V	North	Mid-slope	0.1	402.7	<1	None	25
4H:1V	North	Mid-slope	0.14	407.7	1.0		24
4H:1V	North	Mid-slope	0.14	402.7	1.2		26
4H:1V	North	Mid-slope	0.1	407.7	1.2	30 m wide densified zone	27
4H:1V	North	Mid-slope	0.14	402.7	1.25	18 m wide densified zone	29
6H:1V	North	Mid-slope	0.1	407.7	<1	None	30
6H:1V	North	Mid-slope	0.14	407.7	1.2	None	31

Based on the stability analysis, two options could be considered for the CC1 Alternative Case design, but both require a shift of the channel to the north. The north shift was not considered in the Base Case, as the design attempted to provide some buttressing along the north slope for long term stability purposes. As the Alternative Case is an active care scenario, roads will be built such that access along the north side of the channel will be provided in order to access the channel and clean up and debris, rock slide material or other material that is expected to continue to slide into the channel from the north slope of the Clinton Creek valley.

Option one (CC1-A) would be to consider a 4H:1V slope cut on the south side of the channel, leaving the existing bench in place. This option will require some improvements to the loose waste dump materials below the phreatic surface, such as blast densification. Alternatively, if additional studies are completed that show that the waste dump material is not as loose as has been determined in the existing studies, it may be possible to rule out static liquefaction as a triggering mechanism and use these slopes. Either additional investigation needs to be completed or densification of a portion of the material will need to be completed, based on the currently available information.

Option two (CC1-B) is to retain the 6.5H1V slopes that were used in the Base Case design; however, the movement of the channel to the north under Active Care, in addition to the re-configuration of the spillway, is likely to reduce the required volume of excavation for this option.

3.2.2 Alternative Case CC2

The stability runs completed for the Alternative Case CC2 design are presented on Pages 33-49 in Sub-appendix D. A summary of the provided FoS is presented in Table 4. Stability analyses were completed for the case where there was no liquefaction considered, liquefaction assuming c/p′ of 0.1 and an assumed c/p′ of 0.14 (based on back analysis on sections DS1 and DS2. Only one channel location was evaluated, a channel located at essentially the same location as the existing channel along the north valley wall, but widened to approximately 30 m wide, to allow for a low flow channel, high flow channel and access roads on both sides of the constructed channel.

Table 4: DS4 CC2 Stability Modelling Results

Cut Slope	Channel	Failure	Liquified strength (c/p′)	Phreatic Surface (m)	FoS	Improvements	Slide #
4H:1V	North	Mid-slope	N/A	399	1.1	N/A	35
4H:1V	North	Overall	N/A	399	1.2	N/A	36
6H:1V	North	Mid-slope	N/A	399	1.5	N/A	37
6H:1V	North	Overall	N/A	399	1.1	N/A	38
6H:1V	North	Overall	N/A	399	1.3	Unload upslope	39
4H:1V	North	Mid-slope	0.1	399	0.7	N/A	41
4H:1V	North	Mid-slope	0.1	394	0.85	N/A	43
4H:1V	North	Mid-slope	0.14	394	0.9	N/A	44
4H:1V	North	Mid-slope	0.1	399	1.2	130 m wide densified zone	45
4H:1V	North	Mid-slope	0.1	394	1.2	70 m wide densified zone	46
6H:1V	North	Toe	0.1	399	0.8	N/A	47
6H:1V	North	Mid-slope	0.1	394	1.2	N/A	48

Based on the stability analysis, two options could be considered for the CC2 Alternative Case design, both of which only consider a channel located along the north slope of the Clinton Creek valley. The north channel shift was not considered in the Base Case. As the Alternative Case is an active care scenario, roads will be built such that access along the north side of the channel will be provided in order to access the channel and clean up and debris, rock slide material or other material that would be expected to continue to slide into the channel from the north slope of the Clinton Creek valley, until a stabilized condition develops.

Option one (CC2-A) would be to consider a 4H:1V slope cut on the south side of the channel which will require some improvements to the loose waste dump materials below the phreatic surface, such as blast densification. Alternatively, if additional studies are completed that show that the waste dump material is not as loose as has been determined in the existing studies, it may be possible to rule out static liquefaction as a triggering mechanism and use these slopes. Either additional investigation needs to be completed or densification of a portion of the material will need to be completed, based on the currently available information.

Option two (CC2-B) is to retain the 6.5H1V slopes that were used in the Base Case design; however, the movement of the channel to the north under Active Care, in addition to the re-configuration of the spillway, is likely to reduce the required volume of excavation for this option.

3.3 Section DS1

Analyses for section DS1 are presented in Sub-appendix E. The interpreted geological cross-section for analysis and discussed in this section is presented on Page 4 of Sub-appendix E, and a summary of the completed analysis is presented on Page 5 of Sub-appendix E.

This section generally has a thin layer of alluvium under the centre to north side of the pre-construction Clinton Creek valley, with a thin layer of silt and clay encountered in BH18-07, at the far north side of the pre-construction valley. A layer of colluvium was encountered in BH18-05, BH18-06 and BH18-07 overlying either bedrock (BH18-05) or the alluvium/silt and clay.

SI data from BH18-06 exhibits tilt toward BH18-07 of about 13 mm. SI data from BH18-07 is exhibiting tilt toward the northwest (toward Hudgeon Lake) of 30 mm. Two zones in BH18-07 are exhibiting potential indications of settlement, one zone between 17.2 and 19.2 m depth and one zone between 41.3 and 45.3 m depth, corresponding to the mixed waste and colluvium layer. No distinctive sheer zones have been identified in the SI data.

For the Alternative Design, the silt-clay layer in the bottom of the pre-construction valley was assigned a USR of 0.22, based on the back analysis completed for Section DS3. Back analysis of the current slope was completed (Pages 7-10 in Sub-appendix E) and indicate that the overall stability of this section is acceptable for a case with no liquefaction.

Although the requirement to consider seismic liquefaction for the Alternative Design case has been eliminated, the possibility of triggering static liquefaction during construction needs to be taken into consideration. As with the Base Case analysis, a mobilized liquified strength c/p' of 0.1 is considered the RWC value. Based on sensitivity analyses completed for each of the sections, sensitivity runs using a mobilized liquified strength of 0.14 (based on a blended value from all of the sections) was investigated. For the analyses completed for DS1, if all of the waste below the water table had current mobilized liquified strength, the liquified strength would have to be greater than 0.13 to get the FoS for this section above unity (Page 10, Sub-appendix E). There is no visual indication that the downcutting of the channel initiated a static liquefaction event.

3.3.1 Alternative Case CC1

The stability runs completed for the Alternative Case CC1 design are presented on Pages 12-28 in Sub-appendix E. A summary of the provided FoS is presented in Table 5. Stability analyses were completed for the case where there was no liquefaction considered, liquefaction assuming c/p' of 0.1 and an assumed c/p' of 0.14 (based on back analysis on sections DS1 and DS2).

The preliminary spillway design is presented on Page 11 of Sub-appendix E. The vertical alignment is considered as fixed, but the lateral alignment of the spillway was considered in the stability analysis was located at an alternative location shifted to the north, with the north slope of the channel confined by the existing bedrock slope located on the north side of the channel. For all of the analysis the base of the channel is located at El 410.5 m. The impact of lowering of the phreatic surface and the impact on the stability analysis for static liquification has been analyzed.

Table 5: DS1 CC1 Stability Modelling Results

Cut Slope	Channel	Failure	Liquified strength (c/p′)	Phreatic Surface (m)	FoS	Improvements	Slide #
4H:1V	North	Mid-slope	N/A	410.5	1.7	N/A	13
4H:1V	North	Overall	N/A	410.5	2.4	N/A	15
4H:1V	North	Mid-slope	0.1	401	0.95	N/A	17
4H:1V	North	Mid-slope	0.14	401	1.1	N/A	19
4H:1V	North	Mid-slope	0.1	398	1.1	N/A	20
4H:1V	North	Overall	0.14	398	1.4	N/A	21
4H:1V	North	Overall	0.1	401	1.2	30 m wide densified zone	22
6H:1V	North	Overall	0.1	401	0.9	N/A	24
6H:1V	North	Overall	0.1	398	1.05	Reduced liquified zone	25
6H:1V	North	Overall	0.14	401	1.2	N/A	27
6H:1V	North	Overall	0.14	398	1.2	N/A	27

Based on the stability analysis, two options could be considered for the CC1 Alternative Case design, but both require a shift of the channel to the north to reduce cut volumes. As the Alternative Case is an active care scenario, roads will be built such that access along the north side of the channel will be provided in order to access the channel and clean up and debris, rock slide material or other material that is expected to continue to slide into the channel from the north slope of the Clinton Creek valley.

Option one (CC1-A) would be to consider a 4H:1V slope cut on the south side of the channel, with required improvements to the loose waste dump materials below the phreatic surface, such as blast densification. Alternatively, if additional studies are completed that show that the waste dump material is not as loose as has been determined in the existing studies, it may be possible to rule out static liquefaction as a triggering mechanism and use these slopes. Either additional investigation needs to be completed or densification of a portion of the material will need to be completed, based on the currently available information.

Option two (CC1-B) is to retain the 6.5H1V slopes that were used in the Base Case design; however, the movement of the channel to the north under Active Care, in addition to the re-configuration of the spillway, is likely to reduce the required volume of excavation for this option.

3.3.2 Alternative Case CC2

The stability runs completed for the Alternative Case CC2 design are presented on Pages 30-52 in Sub-appendix E. A summary of the provided FoS is presented in Table 6. Stability analyses were completed for the case where there was no liquefaction considered, liquefaction assuming c/p′ of 0.1 and an assumed c/p′ of 0.14 (based on back analysis on sections DS1 and DS2). Two channel locations were evaluated, a south channel option located approximately 50 m south of the current channel location and the north channel option, a channel located at essentially the same location as the existing channel along the north valley wall. Both channel options considered an approximately 30 m wide channel base, to allow for a low flow channel, high flow channel and access roads on both sides of the constructed channel.

Table 6: DS1 CC2 Stability Modelling Results

Cut Slope	Channel	Failure	Liquified strength (c/p′)	Phreatic Surface (m)	FoS	Improvements	Slide #
4H:1V	South	Mid-slope	N/A	398	1.3	N/A	31
4H:1V	South	Overall	N/A	398	1.9	N/A	32
4H:1V	North	Mid-slope	N/A	401	1.3	N/A	34
4H:1V	North	Overall	N/A	398	2.1	N/A	35
6H:1V	North	Mid-slope	N/A	398	1.7	N/A	36
7H:1V	North	Mid-slope	N/A	398	1.9	N/A	37
4H:1V	South	Mid-slope	0.1	398	0.65	N/A	39
4H:1V	South	Mid-slope	0.1	395	0.73	N/A	41
4H:1V	South	Mid-slope	0.14	395	0.9	N/A	42
4H:1V	North	Mid-slope	0.1	398	0.7	N/A	43
4H:1V	North	Mid-slope	0.1	395	0.8	N/A	44
4H:1V	North	Mid-slope	0.14	395	1.0	N/A	45
4H:1V	North	Mid-slope	0.1	395	1.2	130 m wide densified zone	46
6H:1V	North	Mid-slope	0.1	398	0.8	N/A	47
6H:1V	North	Mid-slope	0.1	395	0.9	N/A	48
6H:1V	North	Mid-slope	0.14	395	1.15	N/A	49
7H:1V	North	Mid-slope	0.1	398	0.9	N/A	50
7H:1V	North	Mid-slope	0.1	395	1.0	N/A	51
7H:1V	North	Mid-slope	0.14	395	1.3	N/A	52

Based on the stability analysis, two options could be considered for the CC2 Alternative Case design, both of which only consider a channel located along the north slope of the Clinton Creek valley. As the Alternative Case is an active care scenario, roads will be built such that access along the north side of the channel will be provided in order to access the channel and clean up and debris, rock slide material or other material that is expected to continue to slide into the channel from the north slope of the Clinton Creek valley.

Option one (CC2-A) would be to consider a 4H:1V slope cut on the south side of the channel which will require some improvements to the loose waste dump materials below the phreatic surface, such as blast densification. Alternatively, if additional studies are completed that show that the waste dump material is not as loose as has been determined in the existing studies, it may be possible to rule out static liquefaction as a triggering mechanism and use these slopes. Either additional investigation needs to be completed or densification of a portion of the material will need to be completed, based on the currently available information.

Option two (CC2-B) is to retain the 6.5H1V slopes that were used in the Base Case design; however, the movement of the channel to the north under Active Care, in addition to the re-configuration of the spillway, is likely to reduce the required volume of excavation for this option.

3.4 Section DS2

Analyses for section DS2 are presented in Sub-appendix E. The interpreted geological cross-section for analysis and discussed in this section is presented on Page 4 of Sub-appendix E, and a summary of the completed analysis is presented on Page 5 of Sub-appendix E. This section encountered ice rich permafrost along the south slope of the pre-construction Clinton Creek valley in BH18-04. Other boreholes on this section, BH18-09, 16-BH09 and BH18-10 are also located along this cross-section.

SI data from BH18-04 exhibits creep at about 15 mm/year towards the Hudgeon Lake. The SI in BH18-09 is not measuring any movements, while the SI in BH18-10 is demonstrating approximately 7.5 mm of movement which may be due to settlement near the base of the waste material. Thermistor data indicates that temperatures of around 3°C have been measured within the waste material, while temperatures of up to 6°C are measured in the bedrock. Data from vibrating wire piezometers on this section indicate that the piezometric elevations fluctuate. This data may be interpreted to be indicative of seepage of warm water from Hudgeon Lake and the Clinton Creek channel into the waste material or, alternatively, the presence of warm springs.

Back analyses completed for this section are presented on pages 7-11 of Sub-appendix E. Based on the analysis, the FoS at the toe falls below 1.0 for the case where the silt-clay layer in the bottom of the pre-construction valley was assigned a USR of 0.22, based on the back analyses completed for the cross-sections. This is consistent with the observation in the field that there is some cracking of the south slope of the existing creek.

The Frozen Colluvium layer was assigned a cohesion of 60 kPa, increased from the 50 kPa that was used for the Base Case analysis, per back analysis completed on Section DS4.

Although the requirement to consider seismic liquefaction for the Alternative Design case has been eliminated, the possibility of triggering static liquefaction during construction needs to be taken into consideration. As with the Base Case analysis, a mobilized liquified strength c/p' of 0.1 is considered the RWC value. The back analysis completed indicate that even if all of the waste below the current water table were the liquify, even using the RWC value, the overall slope FoS is 1.35, indicating that this section of the dump would remain overall stable (page 10, Sub-appendix E). However, N1(60) values of 6, 7.5 and 10 were measured in 16-BH09

3.4.1 Alternative Case CC1

The stability runs completed for the Alternative Case CC1 design are presented on Pages 12-25 in Sub-appendix F. A summary of the provided FoS is presented in Table 7. Stability analyses were completed for the case where there was no liquefaction considered, liquefaction assuming c/p' of 0.1 and an assumed c/p' of 0.14 (based on back analysis on various sections).

The preliminary spillway design is presented on Page 12 of Sub-appendix F. The vertical and lateral alignments presented in this figure were used in the analyses, and no northern alignment was considered. For all of the analyses the base of the channel is located at El 410.5 m, and an approximately 30 m wide channel was considered, to allow for the construction of a low flow channel, high flow channel and access roads on both sides of the channel, for ongoing maintenance. The impacts of lowering of the phreatic surface, the impact of static liquification and the impact of potential blast densification of wastes have been analyzed.

Table 7: DS2 CC1 Stability Modelling Results

Cut Slope	Channel	Failure	Liquified strength (c/p’)	Phreatic Surface (m)	FoS	Improvements	Slide #
3H:1V	South	Mid-slope	N/A	400.5	1.5	N/A	14
4H:1V	South	Mid-slope	N/A	400.5	1.6	N/A	15
4H:1V	South	Overall	N/A	400.5	1.85	N/A	16
4H:1V	South	Mid-slope	0.1	387	1.1	N/A	20
4H:1V	South	Mid-slope	0.1	384	1.35	N/A	23
4H:1V	South	Overall	0.1	387	2.0	N/A	21
4H:1V	South	Mid-slope	0.14	387	1.3	N/A	22

Based on the stability analysis, a 4H:1V slope provides a FoS greater than 1.1 for the worst case analyzed, a liquefied strength c/p’ of 0.1 and phreatic surface at the current elevation. If the phreatic surface is lowered by 3 m, the FoS increases to greater than 1.3. Alternatively, if a higher c/p’ of 0.14 is applied to the waste material below the water table, the FoS is 1.3.

The other two design sections, DS1 and DS4 may require shallower slopes, so one design option is to retain the 6.5H1V slopes that were used in the Base Case design.

3.4.2 Alternative Case CC2

The stability runs completed for the Alternative Case CC2 design are presented on Pages 28-49 in Sub-appendix F. A summary of the provided FoS is presented in Table 8. Stability analyses were completed for the case where there was no liquefaction considered, liquefaction assuming c/p’ of 0.1 and an assumed c/p’ of 0.14 (based on back analyses). Two channel locations were evaluated, a south channel option located approximately 50 m south of the current channel location and the north channel option, a channel located at essentially the same location as the existing channel along the north valley wall. Both channel options considered an approximately 30 m wide channel base, to allow for a low flow channel, high flow channel and access roads on both sides of the constructed channel.

Table 8: DS2 CC2 Stability Modelling Results

Cut Slope	Channel	Failure	Liquified strength (c/p′)	Phreatic Surface (m)	FoS	Improvements	Slide #
4H:1V	South	Mid-slope	N/A	390	1.3	N/A	28
4H:1V	South	Overall	N/A	390	1.5	N/A	29
4H:1V	North	Mid-slope	N/A	390	1.3	N/A	30
4H:1V	North	Overall	N/A	390	1.8	N/A	31
4H:1V	South	Mid-slope	0.1	387	0.7	N/A	33
4H:1V	South	Mid-slope	0.1	384	0.9	N/A	35
4H:1V	South	Overall	0.14	387	0.9	N/A	37
4H:1V	South	Overall	0.14	384	1.1	N/A	38
4H:1V	North	Mid-slope	0.1	387	0.8	N/A	39
4H:1V	North	Mid-slope	0.1	384	<1.0	N/A	41
4H:1V	North	Mid-slope	0.14	384	1.2	N/A	43
4H:1V	North	Mid-slope	0.1	384	1.3	130 m wide densified zone	44
4H:1V	North	Overall	0.1	384	1.1	130 m wide densified zone	45
6H:1V	South	Overall	0.1	387	0.7	N/A	46
6H:1V	South	Overall	0.14	384	1.0	N/A	47
6H:1V	North	Overall	0.1	387	0.7	N/A	48
6H:1V	North	Overall	0.1	384	1.1	N/A	49

Based on the stability analysis, two options could be considered for the CC2 Alternative Case design, both of which require a channel located along the north slope of the Clinton Creek valley. As the Alternative Case is an active care scenario, roads will be built such that access along the north side of the channel will be provided in order to access the channel and clean up and debris, rock slide material or other material that is expected to continue to slide into the channel from the north slope of the Clinton Creek valley.

Option one (CC2-A) would be to consider a 4H:1V slope cut on the south side of the channel which will require some improvements to the loose waste dump materials below the phreatic surface, such as blast densification. Alternatively, if additional studies are completed that show that the waste dump material is not as loose as has been determined in the existing studies, it may be possible to rule out static liquefaction as a triggering mechanism and use these slopes. Either additional investigation needs to be completed or densification of a portion of the material will need to be completed, based on the currently available information.

Option two (CC2-B) is to retain the 6.5H1V slopes that were used in the Base Case design; however, the movement of the channel to the north under Active Care, in addition to the re-configuration of the spillway, is likely to reduce the required volume of excavation for this option.

4.0 Wolverine Creek

In the Base Case design, three options were presented for the Wolverine Creek Tailings Dump. Option WC1 consisted of minor regrading of the tailings pile and the addition of a sedimentation pond. Option WC3 consisted of complete tailings removal to Porcupine Pit. Neither of these options has been re-examined as a part of the Alternative Design case.

The objective of the Base Case Option WC2 was to leave all tailings in Wolverine Creek valley. The Base Case WC2 recognized that the SI installed in BH18-17 was exhibiting about 14 mm/year of shear in a thin shear zone at the top of the colluvium and that the upper part of the tailings was near to failure. Based on available information from the 2016 and 2018 site investigations, the tailings are contractant, but may or may not be saturated at the contact with the colluvium. Based on the available moisture contents, the tailings are assumed to be approximately 85% saturated at the current time. However, it is possible that the tailings are currently saturated, as the granularity of the data is not sufficient to rule out that the tailings at the contact are saturated.

The Alternative Case analysis did not take into account seismic triggering, as the assumption is that the Clinton Creek Mine Site will be in Active Care, and repairs to the slopes will be required following a seismic event. The LCCA-E slope is considered vulnerable to seismic loading at almost any PGA given the steepness of the slope and if the base of the tailings is functionally at or near saturation,

A summary of the analysis completed for the Alternative Case WC2 (WC2-A) are presented in Sub-appendix G. This option is a modified approach to the LCCA-E Option proposed by Worley-Parsons (2014). A significant difference is that the overall slope has been increased from original slope of 3.75H:1V to 3.25H:1V, and fill in excess of a cut/fill approach has been stored in the upland behind the slope in the area of the old plant site.

4.1 Back Analysis

Prior to any additional analysis, back analyses were completed for the cross-section TS1, TS2 and TS3. The back analyses were completed to get the models to reflect the data from the SI in BH18-17, that is, to have a shear plane at the top of the colluvium. In order to achieve the model matching the SI data, a thin (2 m) layer of "upper colluvium" was added into the model, with the phreatic surface remaining at the colluvium / tailings boundary. In order to get the FoS to near unity with the lower FoS through the upper layer, the frictional strength of the upper colluvium was reduced to 15°. A summary of the completed back analysis is presented on pages 2-7 of Sub-appendix G.

4.2 Alternative Case WC2

A summary of the analysis completed for Alternative Case WC2 (WC2-A) is presented on pages 8-11 of Sub-appendix G. Based on the analysis of TS1, an overall slope of 3.2H:1V with no increase in fill at the toe results in a FoS of greater than 1.2, using the thin layer of upper colluvium based on the back analysis. Section TS2 had a FoS greater than 1.3 for a slope of 2.9H:1V.

Based on the analyses, it was decided that the Alternative Case WC2 design would use an overall slope of 3.2H:1V for all slopes, including the side slopes along the north and south slopes of the tailings pile. The design assumed that any tailings cuts could be placed downslope to create 3.2H:1V slopes, and any additional cut material could be built up toward the east, into the former mill area, as long as no fill was placed on previously undisturbed ground.

As no additional fill is being placed within 8 m of the existing creek and rock lined channel, the Alternative Case WC2 design does not require a buttress dam. The design also assumes that any of the tailings that have already been transported down the creek are left in place, so as to not disturb the existing rock lined channel.

5.0 References

Natural Resources Canada (NRC) 2015. National Building Code of Canada, Canadian Commission on Building and Fire Codes.

Wood. 2019a. *DRAFT Clinton Creek Remediation Project 10% Design Phase Report.* Project VE52705E.100.2. 29 August 2019.

Wood. 2019b. *Geotechnical Summary, Clinton Creek Remediation Project, Clinton Creek, Yukon*. Project #VE52705D. 26 August 2019.

Wood. 2019c. *Geological & Geotechnical Site Characterization and Model, Clinton Creek Remediation Project, Clinton Creek, Yukon.* Project #VE52705C. 30 August 2019.

6.0 Closure

Note:

This document will be signed, stamped and reissued when the corporate office closures related to the 2020 COVID19 operating protocols are terminated.

Sincerely,

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited

Prepared by:

Dr. E.C. McRoberts, Ph.D., P.Eng.
Principal Geotechnical Engineer

Karen Hincks, M.Sc., P.Geo.
Senior Engineering Geologist

Sub-appendix A

Seismic Triggering Analysis

Wood Environment & Infrastructure Solutions,
a Division of Wood Canada Limited
600 – 4445 Lougheed Highway
Burnaby, BC V5C 0E4
Canada
T: 604-294-3811

Memo

To: Ed McRoberts

From: Jason Chen

Reviewer Makram Sabbagh

Wood File No.: VE52705G

Date: 21 February 2020

Re: **Clinton Creek Remediation Project - Seismic Liquefaction Triggering Assessment**

1.0 Introduction

This memo summarizes the methods and results of a seismic liquefaction triggering assessment for the Clinton Creek Remediation Project.

The Yukon Government and the Project Partners asked that Wood review the potential for the Clinton Creek Waste Dump facility to be maintained in active care and maintenance, which would result in a Low consequence classification according to CDA dam safety guidelines and technical bulletins (CDA 2013, 2014). As a result, the design seismic ground motion for this facility would be reduced accordingly. This liquefaction triggering assessment is an update to the previous assessment presented in Appendix E of Wood (2019).

2.0 Liquefaction Triggering Analyses

2.1 Cyclic Stress Method

Triggering of liquefaction can occur due to the dynamic effect of cyclic ground motions due to earthquakes. The liquefaction factor of safety (FS_{liq}) is calculated as the ratio of cyclic resistance ratio (CRR) to cyclic stress ratio (CSR) based on the method by Idriss and Boulanger (2008, 2014).

The FS_{liq} was calculated for the Clinton Creek waste dump. A sensitivity analysis was carried out to determine the peak ground acceleration required to achieve a FS_{liq} of 1.5.

Analyses have been undertaken using the following parameters and assumptions based on Wood (2019) and Idriss and Boulanger (2008, 2014):

- Design Earthquake Magnitude of 6.2.
- Selected design PGA of 0.037 g at probability of exceedance of 40% in 50 years (1/100 year return period).
- A potentially low bound CRR at magnitude of 7.5 of 0.095 corresponding to a SPT $(N_1)_{60\ cs}$ of 5 (Figure 75 of Idriss and Boulanger, 2008).
- A CRR at a magnitude of 6.2 is scaled from the CRR at magnitude of 7.5, using the following factors:
  - Magnitude scaling factor (MSF) of 1.1.
  - Overburden correction factor (K_σ) of 0.8.
  - Static shear stress correction factor (K_α) of 0.9.

- A CSR is defined as 65% of the peak cyclic stress, which is a function of design maximum horizontal acceleration (a_{max}), total and effective overburden stresses, and shear stress reduction coefficient (r_d). The CSR was calculated with the following parameters:
  - The a_{max} was assumed the same as the design PGA of 0.037 g.
  - The r_d was a variable, estimated in a range of 0.5 to 1 depending on ground sloping and overburden.
  - Considering a target layer beneath a selected typical waste dump height of 60 m with a total stress of 1,203 kPa and an effective stress of 861 kPa.

2.2 Results

Using the determined parameters and assumptions, the following results were obtained:

- A CSR of $0.245r_d$ was calculated, which is in a potential range of 0.0168 to 0.0336.
- A CRR at magnitude of 6.2 was calculated to be 0.075.
- A FS_{liq} is therefore in a range of 2.2 to 4.5 with an average of 3.4, and seismic liquefaction is unlikely.
- To achieve a FS_{liq} of 1.5, the PGA would be required in a range of 0.055 g to 0.110 g depending on the r_d value.

Based on 2015 National Building Code of Canada (NBCC) seismic hazard calculation results for the project site, the probability of exceedance per annum for seismic hazard were correlated with PGA values in logarithmic scales (Figure 1). The corresponding probability per annum for the PGA of 0.055 g to 0.110 g was estimated in a range of 0.0018 to 0.0056, ie a return period of 178 to 542 years (360 years in average).

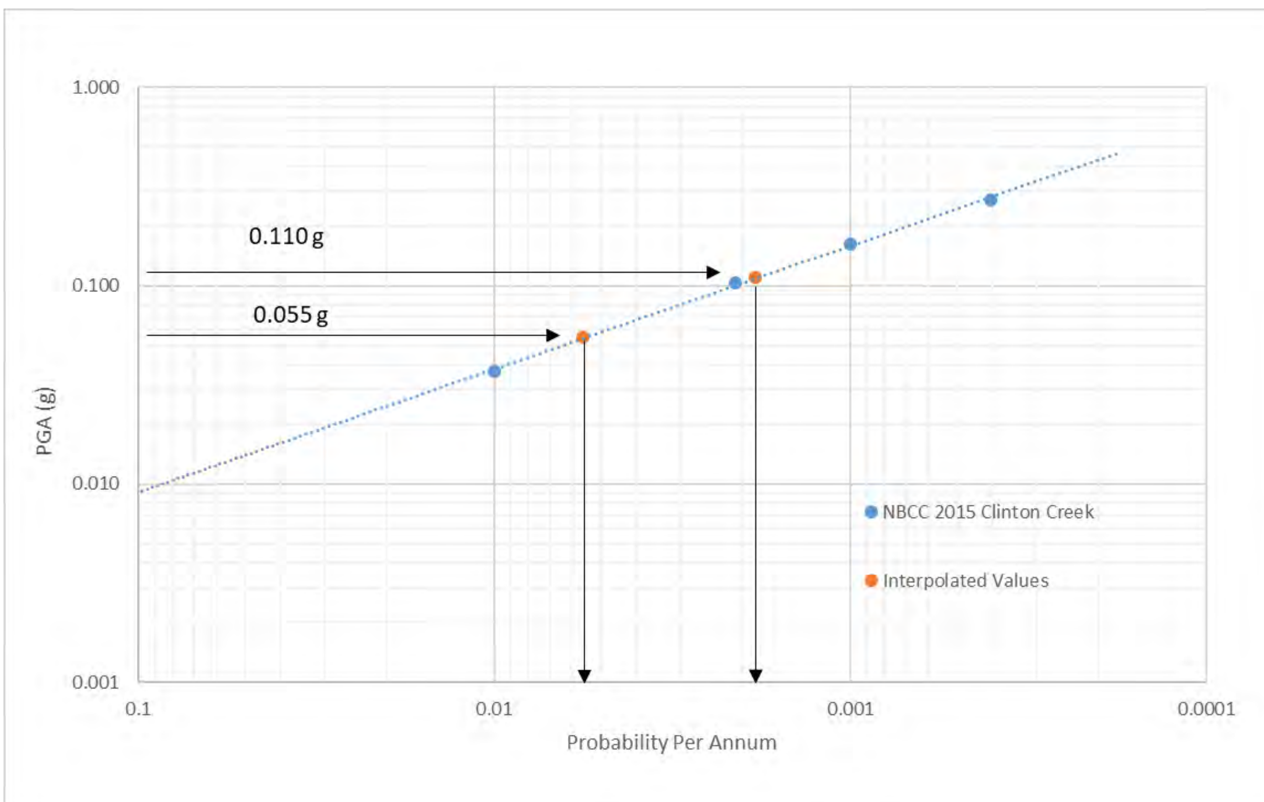


Figure 1: Annual Probability of Seismic Hazard at Clinton Creek

3.0 Conclusions

The following conclusions were drawn for the seismic liquefaction triggering assessment on Clinton Creek waste dump:

- With a design peak ground acceleration of 0.037 g and design earthquake magnitude of 6.2, a liquefaction factor of safety is calculated to be 3.4 in average, and seismic liquefaction is unlikely.
- To achieve a liquefaction factor of safety of 1.5, the corresponding probability per annum was estimated to be in a range of 0.0018 to 0.0056, or a return period of 360 years in average.

4.0 References

CDA. 2013. *Dam Safety Guidelines* 2007 (Revised 2013). Canadian Dam Association.

CDA. 2014. *Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams*.

Idriss I.M. and Boulanger R.W. (2014). *CPT and SPT Liquefaction Triggering Procedures*. Report UCD/CGN-14/01. University of California at Davis.

Idriss I.M. and Boulanger R.W. (2008). *Soil Liquefaction During Earthquakes. PT and SPT Liquefaction Triggering Procedures*. Monograph MNO-12, Earthquake Engineering Research Institute, Oakland, CA, 261 pp.

Wood. (2019). *Geotechnical Summary, Clinton Creek Remediation Project, Clinton Creek, Yukon*. Wood Project # VE52705D. December 2019.

Sub-appendix B

Slope Indicator Readings

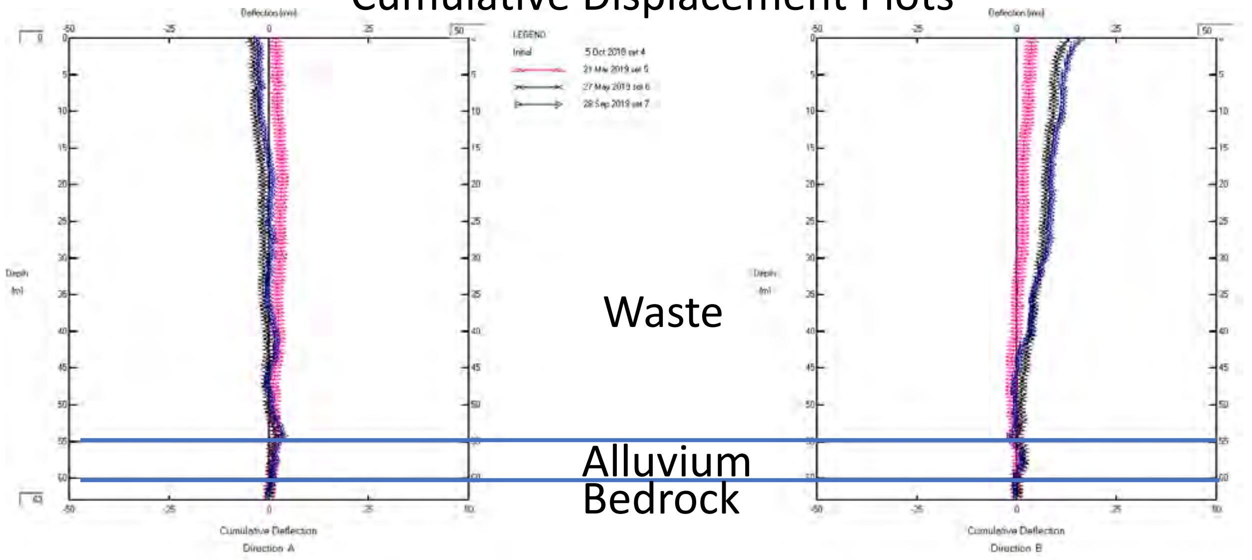
SI Readings

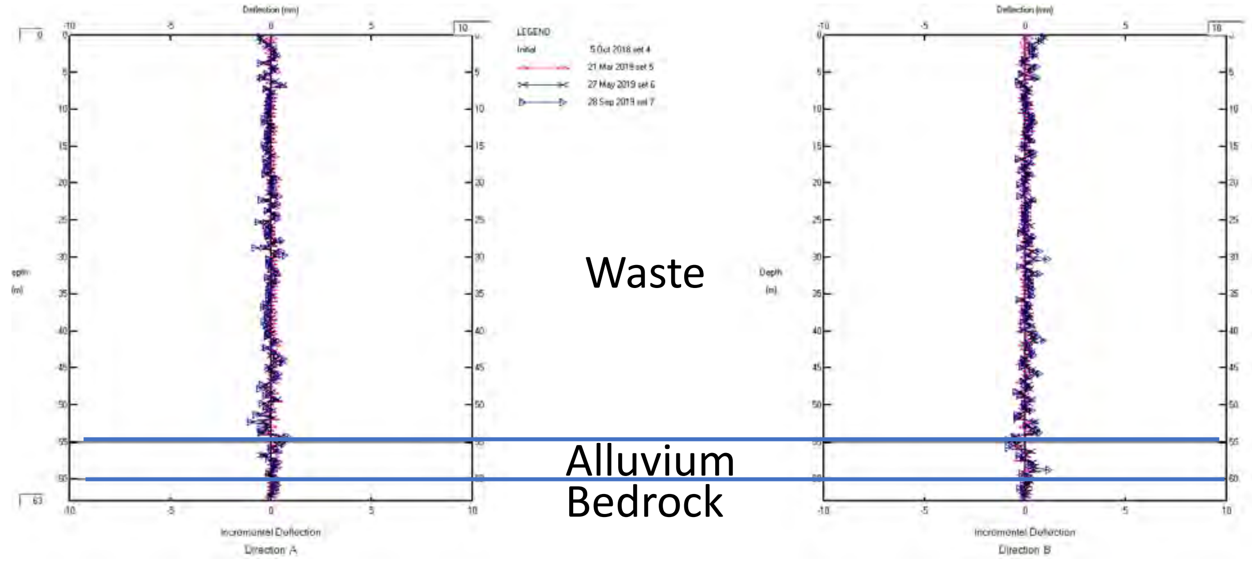
Updated to September 2019

Clinton Creek Waste Dump

SI18-01

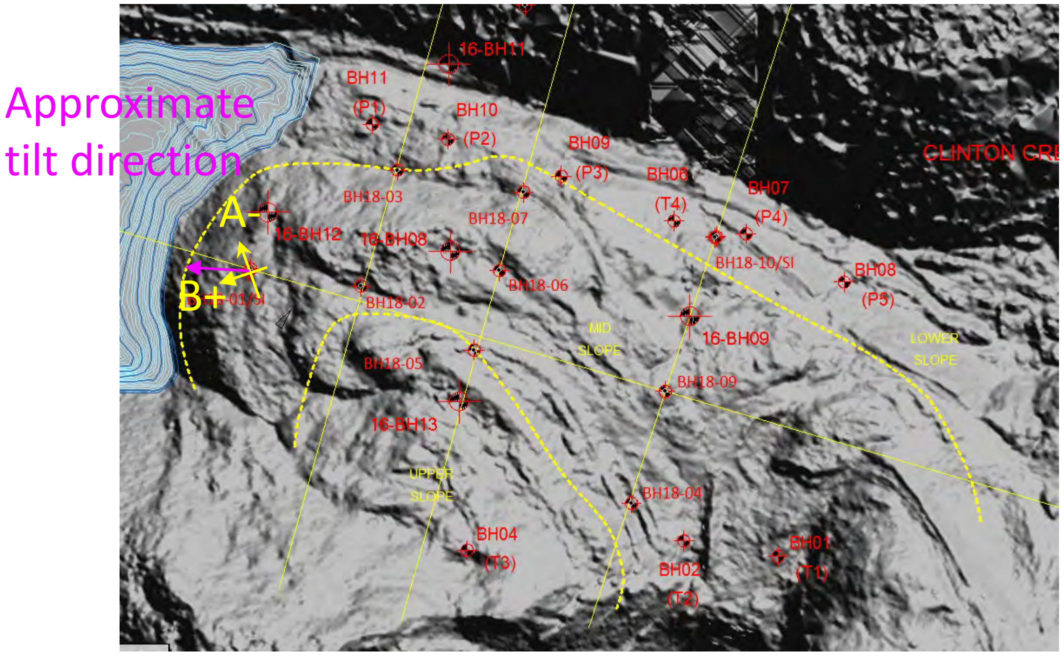
Cumulative Displacement Plots





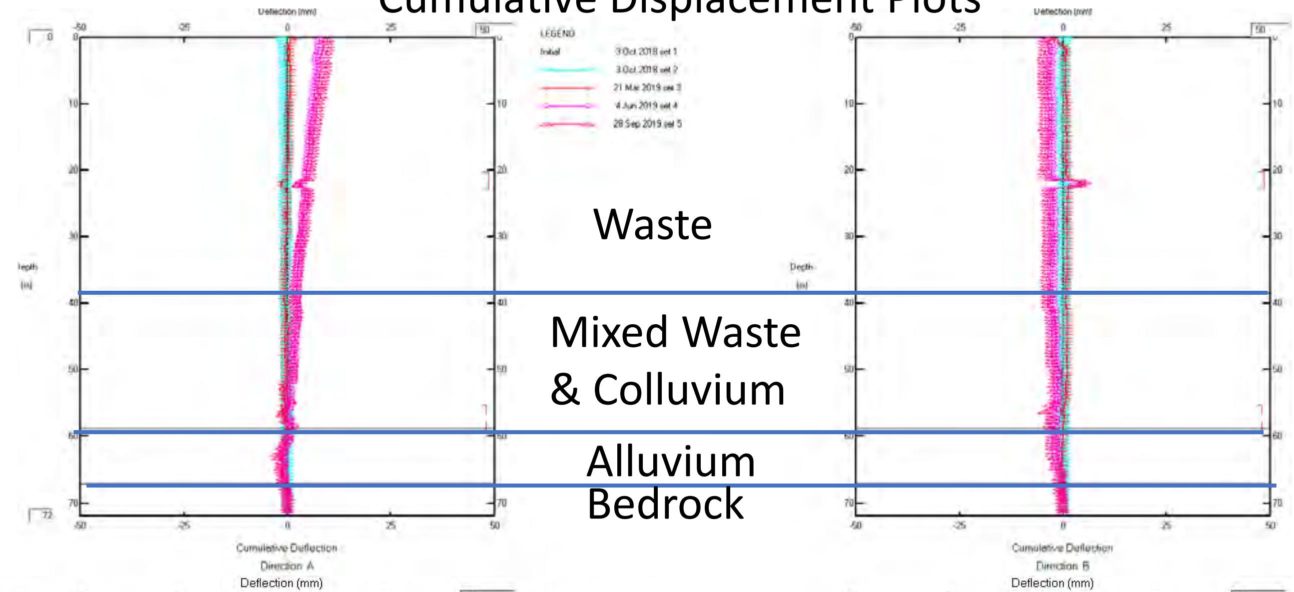
Incremental Displacement Plots

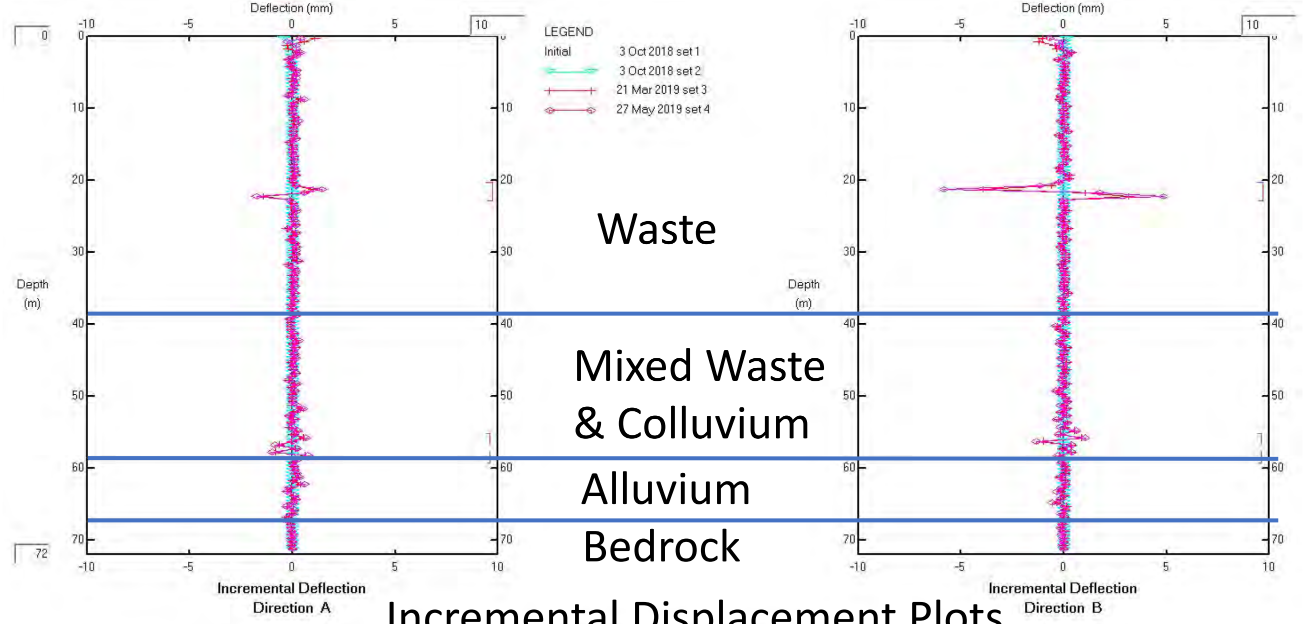
- Some indication of settlement at the alluvium / waste boundary
- Downslope tilt within the waste dump materials with a cumulative movement of ~17 mm, mostly in the +B direction with minor movement in the –A direction
- Cumulative movement toward Hudgeon Lake



SI18-02

Cumulative Displacement Plots

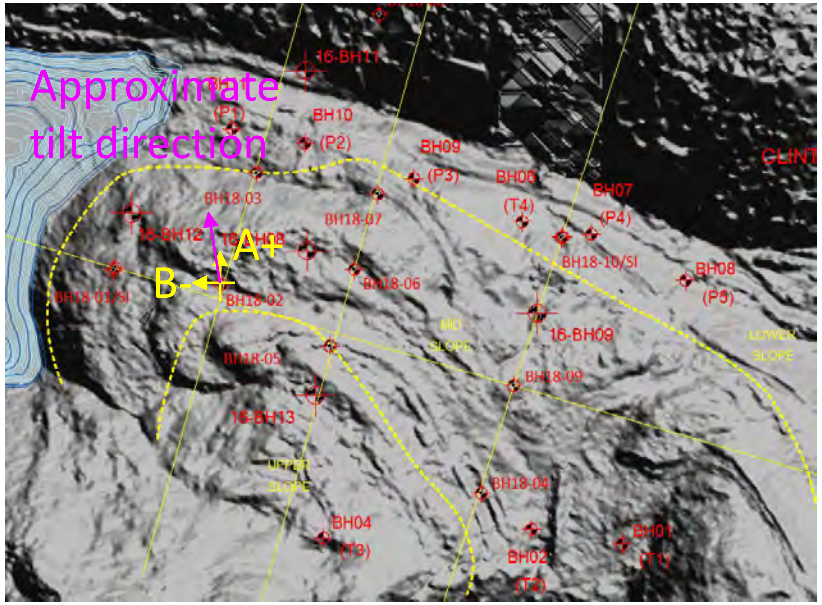




Incremental Displacement Plots

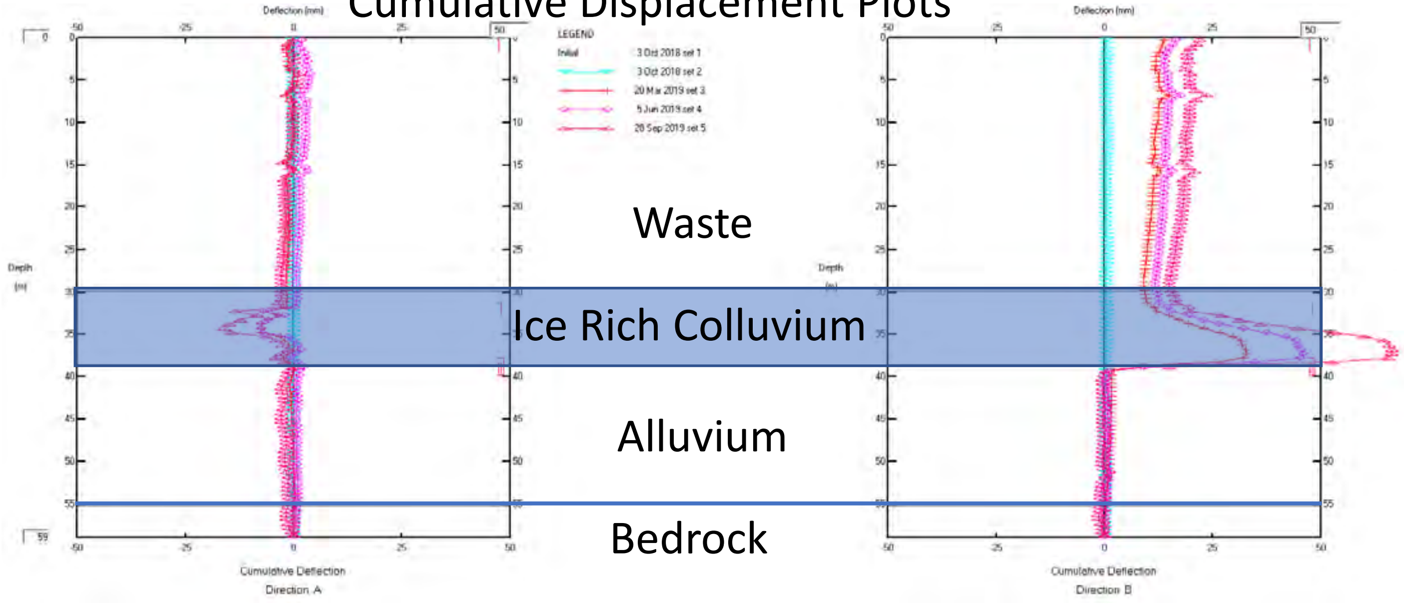
CLINTON CREEK, Inclinometer BH18-02

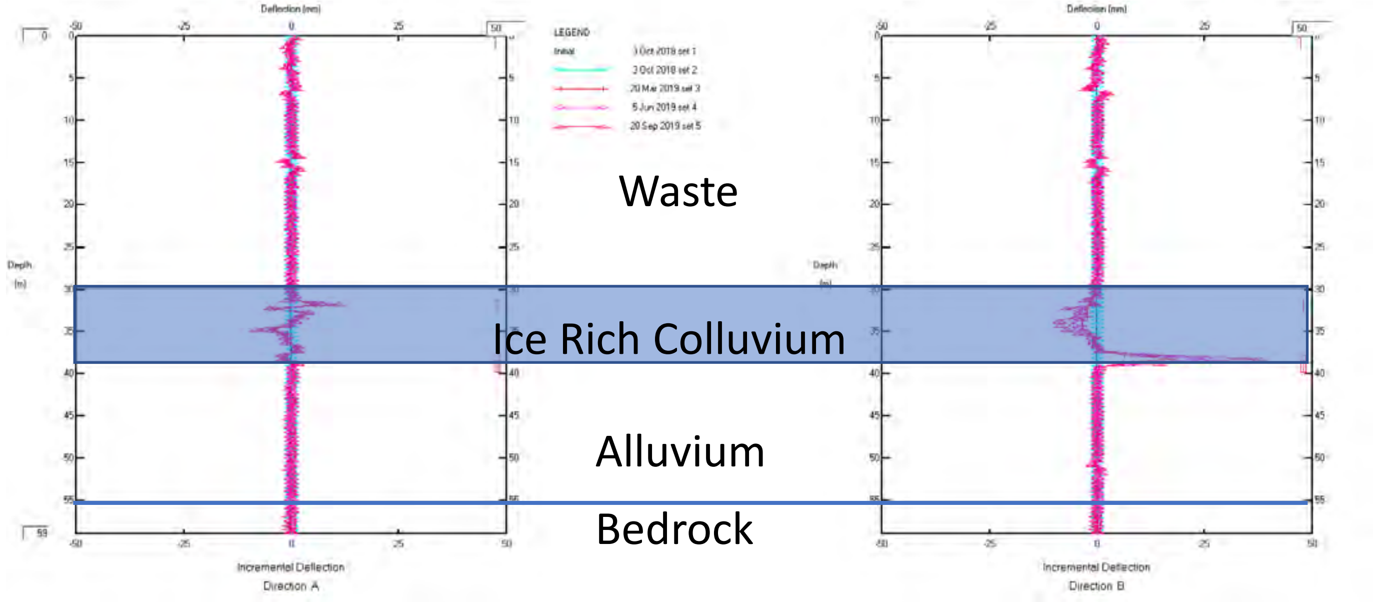
- Potential start of movement between 20.2 and 22.8 m depth (1.1 mm).
- Another zone of potential movement between 55 and 59 m (< 0.5 mm)
- Tilting movement between 59 m depth and ground surface, mainly in +A direction (9.7 mm)



SI18-03

Cumulative Displacement Plots

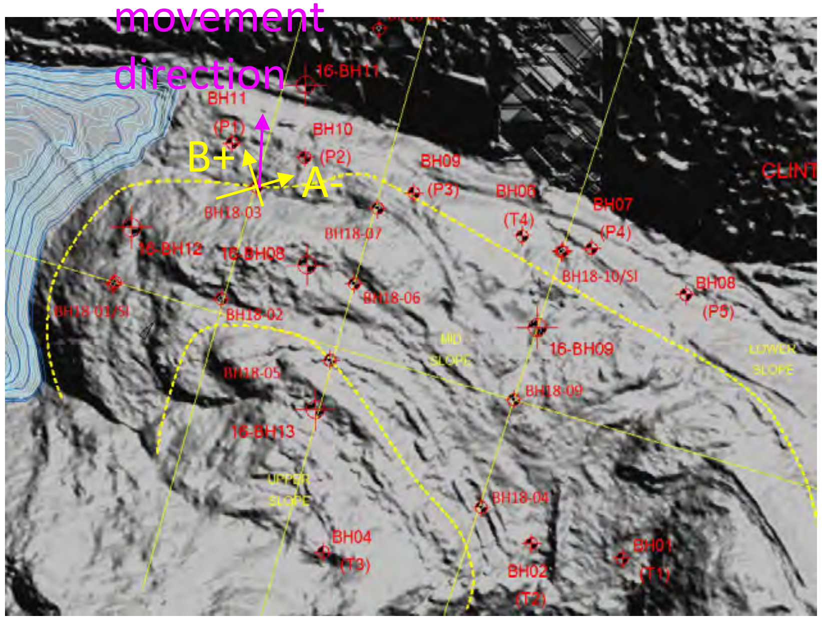




Incremental Displacement Plots

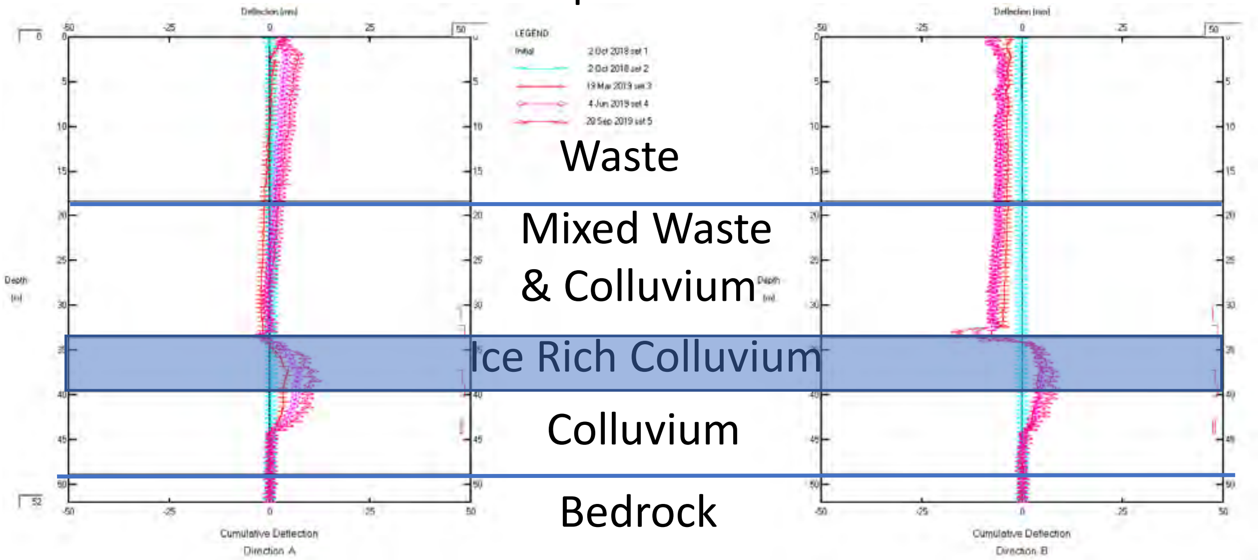
- Initialized in October 2018
- Deformation in the ice rich colluvium zone.
  - Movement between 37.8 and 39.8 m is 65.8 mm, rate of 67 mm/year
    - Compares to 30.5 mm, and rate of 66.4 mm/yr in March readings
  - Cumulative movement from surface to 39.8 m depth is 22.3 mm, rate of 22.6 mm/year

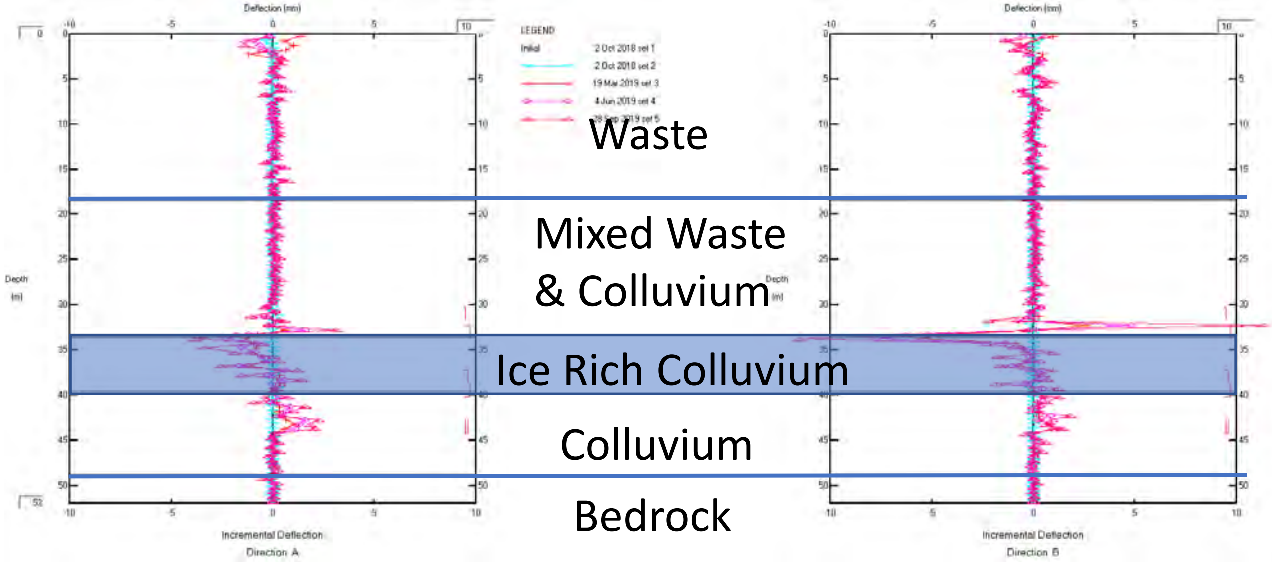
Approximate movement direction



SI18-04

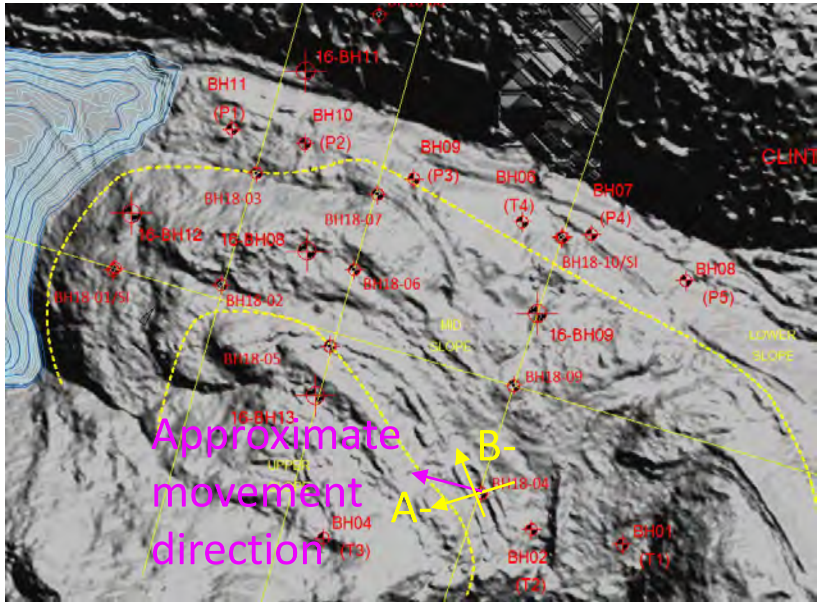
Cumulative Displacement Plots





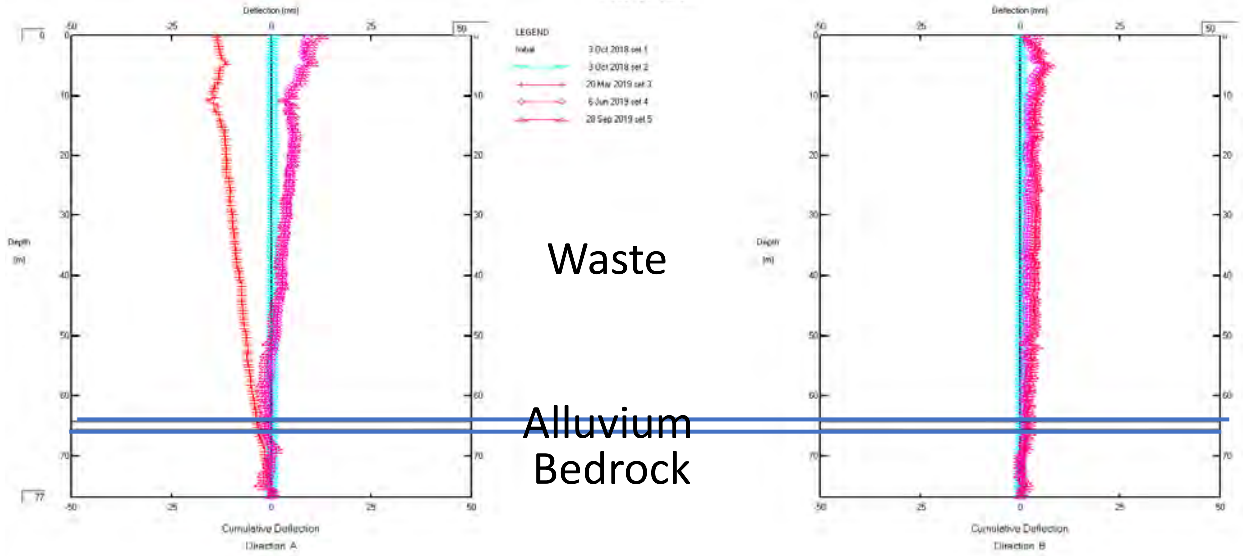
Incremental Displacement Plots

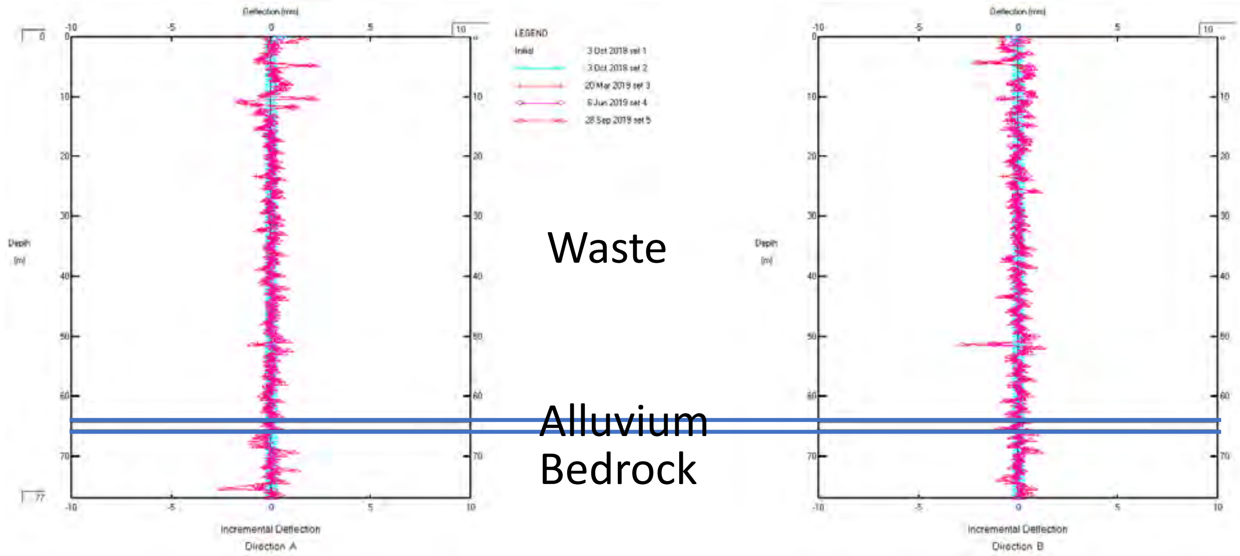
- Initialized in October 2018
- Movement between 32.3 and 40.2 m depth – about 15 mm cumulative movement
  - Rate has been slowing since first reading in March indicating that movements rates could potentially be associated with the spring freshet.
- Ice rich colluvium is present between 33.5 and 39.6 m depth



SI18-06

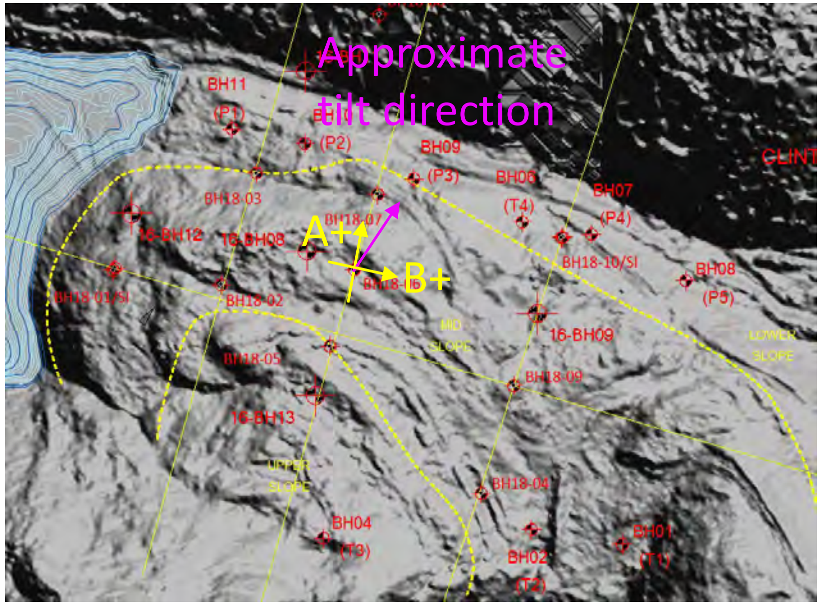
Cumulative Displacement Plots





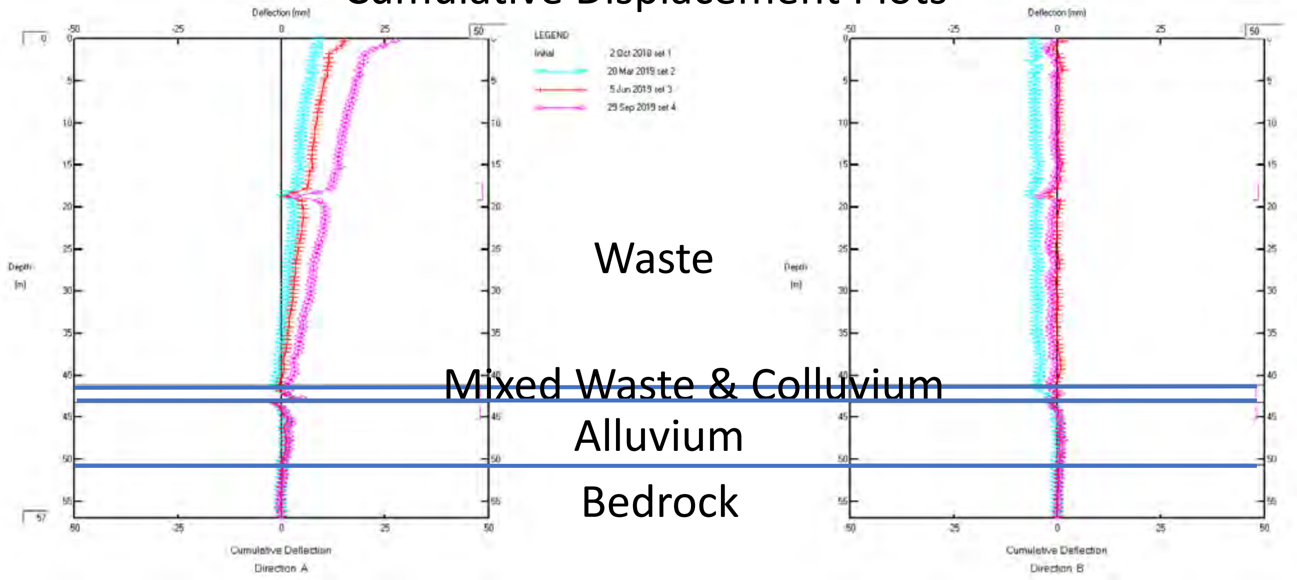
Incremental Displacement Plots

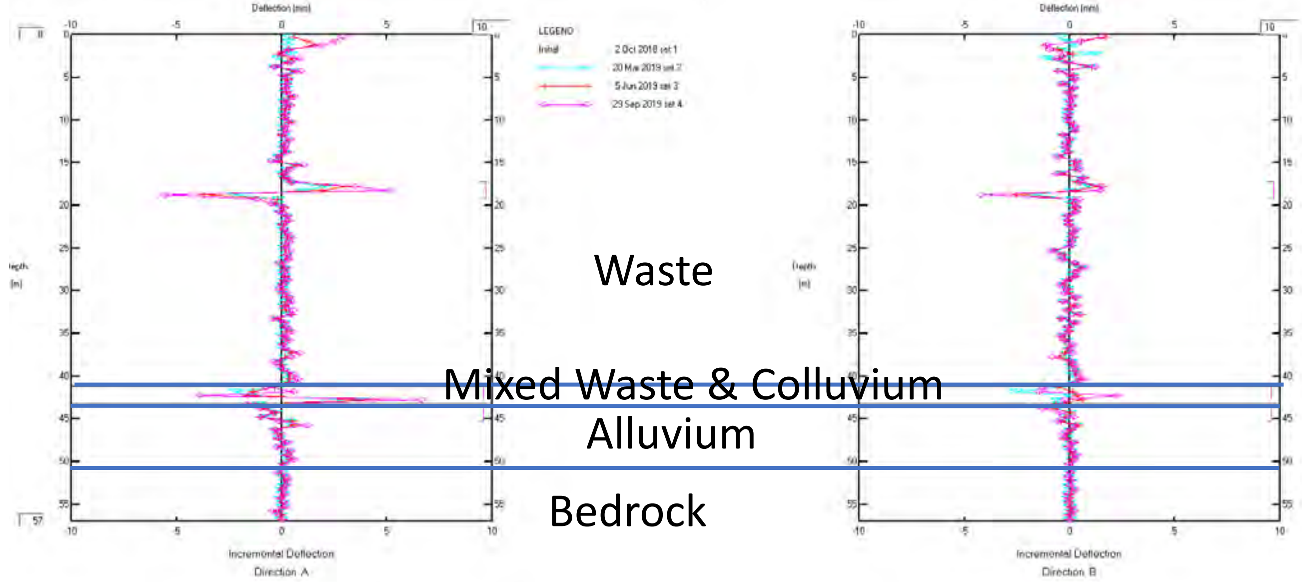
- Initialized in October 2018
- Poor quality readings in March 2019
- No confirmed movements
- Might be something developing between 50.8 and 51.8 m depth, within the waste material.
- Overall tilt of about 13 mm



SI18-07

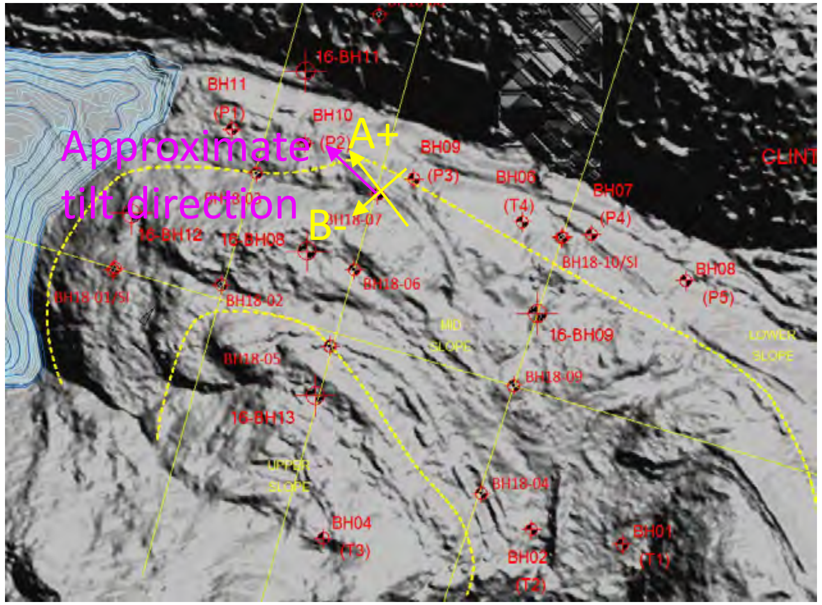
Cumulative Displacement Plots





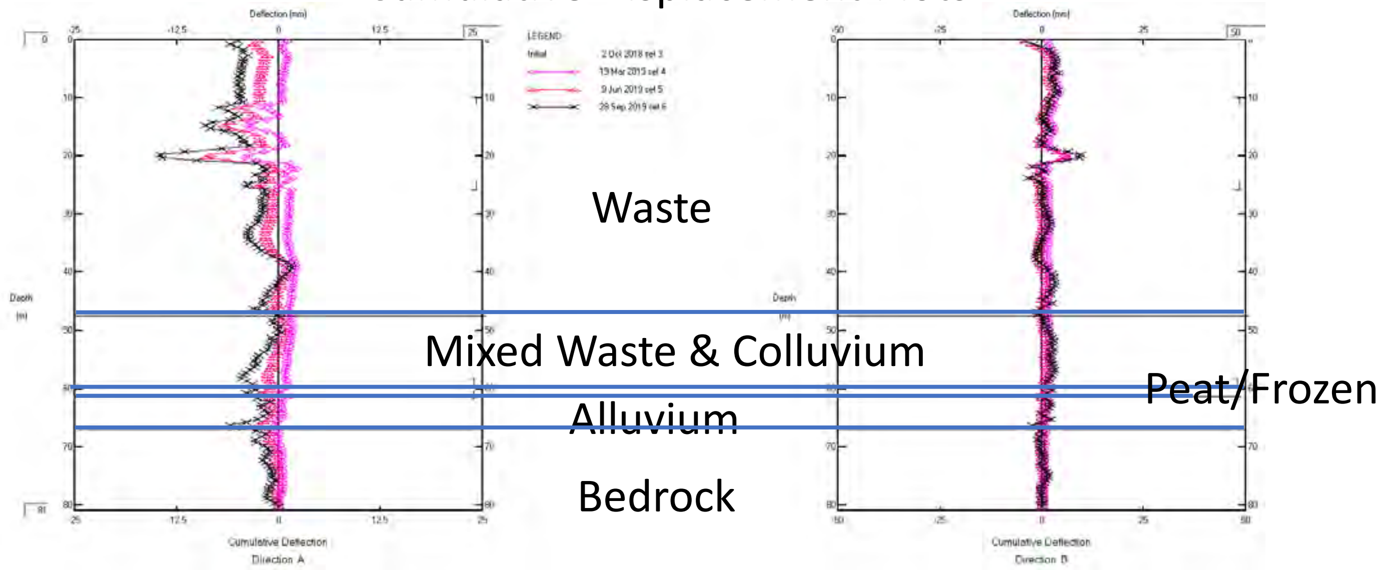
Incremental Displacement Plots

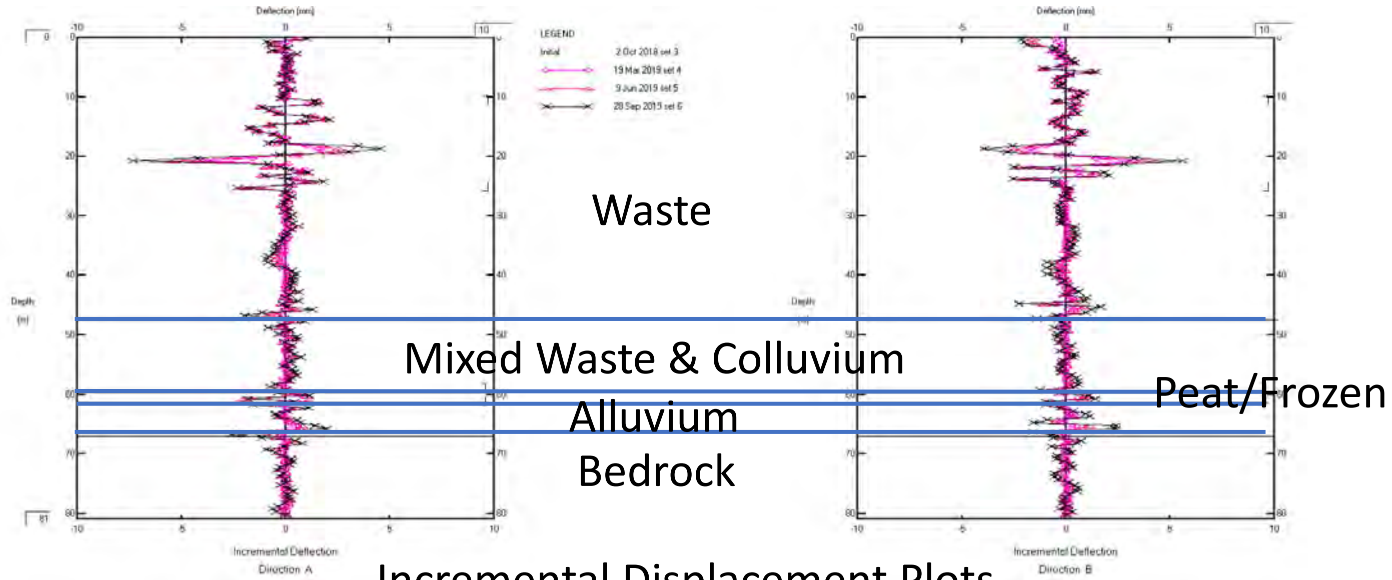
- Two potential movement zones
  - 17.2 to 19.2 m depth – as of Sept 2019 3.5 mm
  - 41.3 to 45.3 m depth – corresponds to “mixed waste and colluvium” layer – movement rate of 3 mm
    - Might have spring thaw related effects.
- Overall downslope tilting between 0 and 43.2 m of 30 mm showing an accelerating rate of movement through the 1 year of readings.



SI18-09

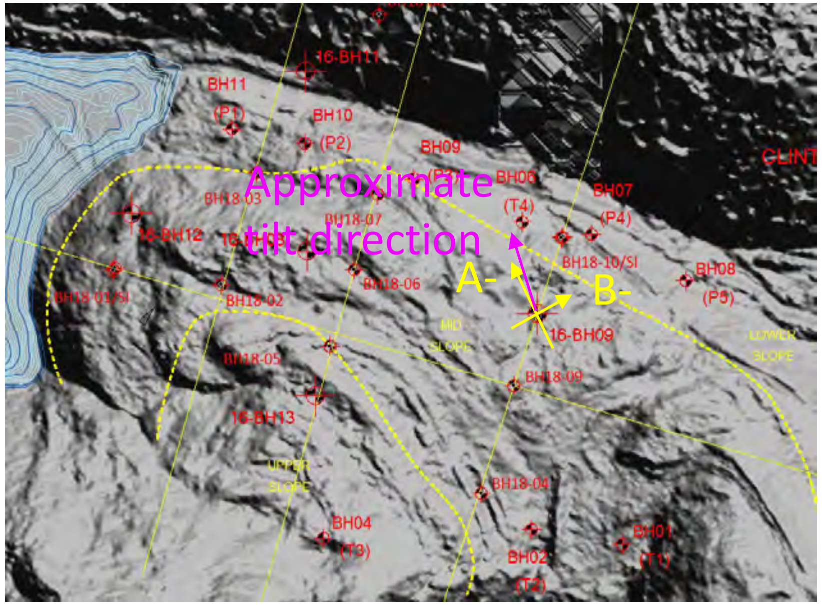
Cumulative Displacement Plots





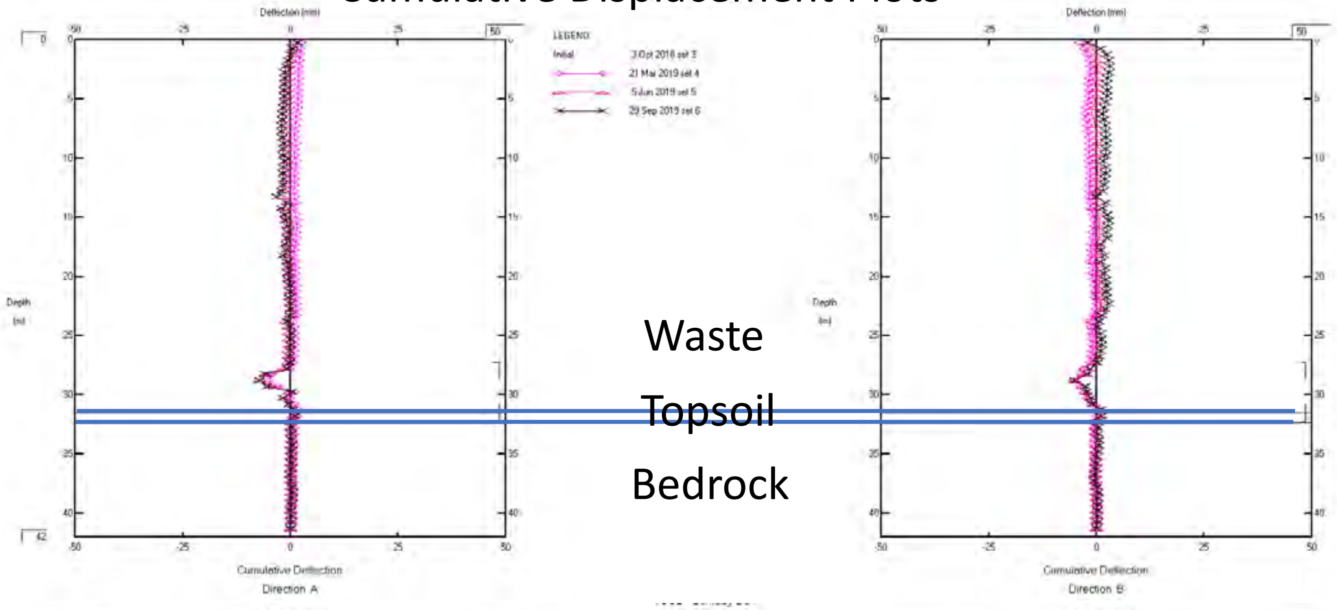
Incremental Displacement Plots

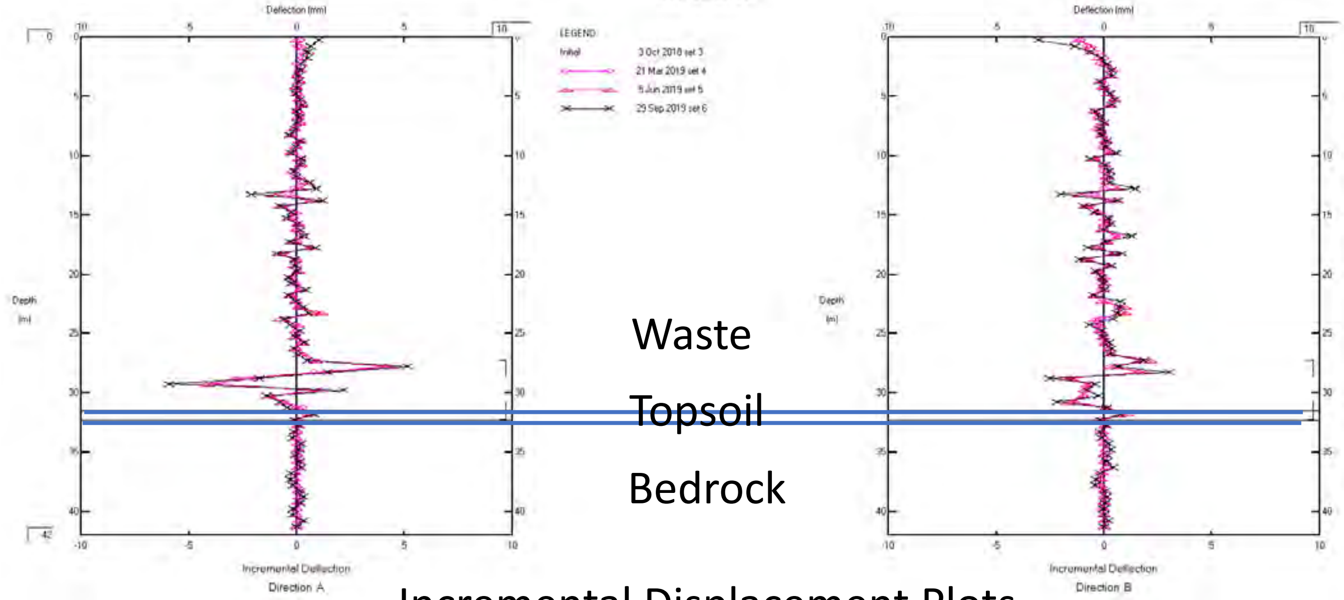
- Two areas identified where there might be settlement or movements:
  - 9.8 to 25.8 m (~4 mm)
  - 58.2 to 61.8 m (~2 mm) corresponding to the peat/frozen layer at top of native
- Overall tilt from the top of the bedrock (67.2 m depth) to the surface is 4 mm



SI18-10

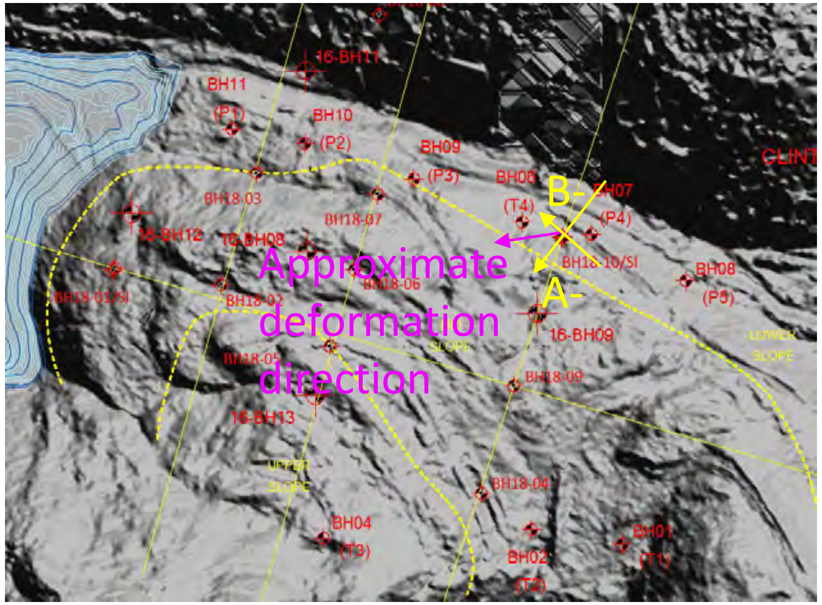
Cumulative Displacement Plots





Incremental Displacement Plots

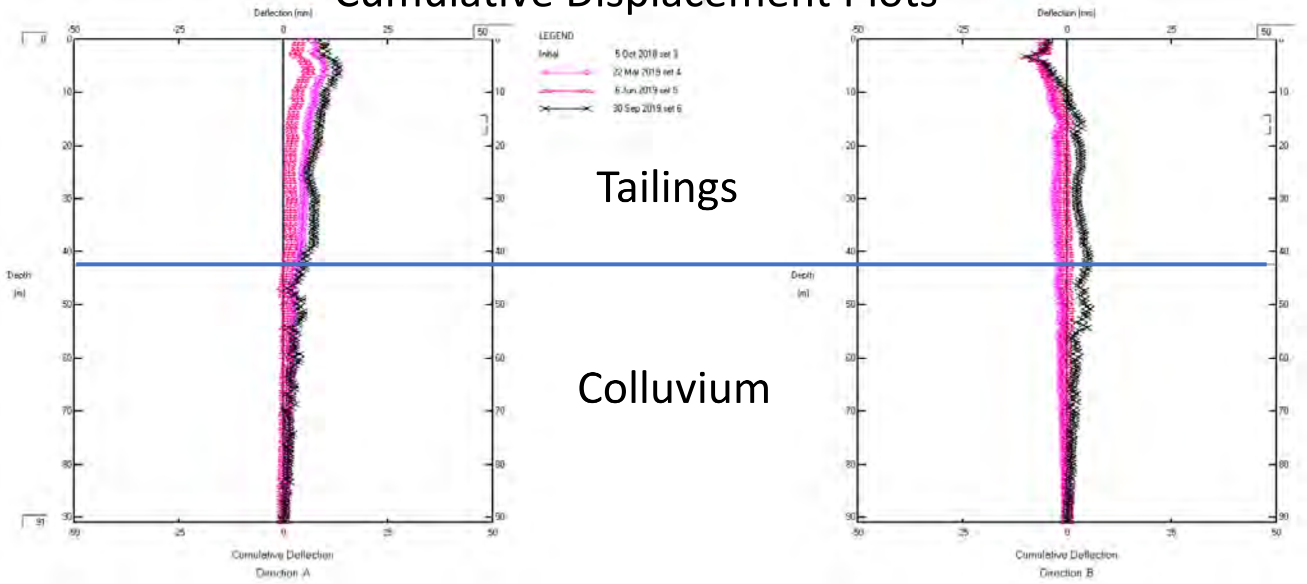
- Movement between 27.8 and 32.3 m
  - No net movement above and below
  - Differential movement about 7.5 mm (between 27.8 and 28.8m)

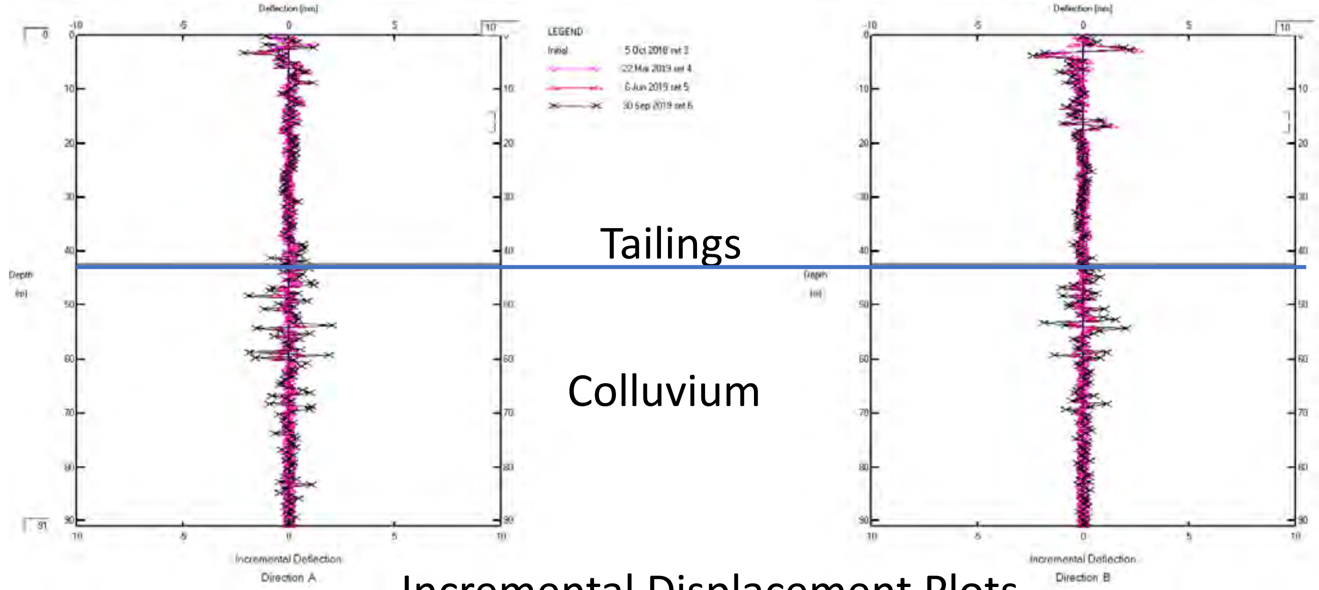


Wolverine Tailings Dump

SI18-11

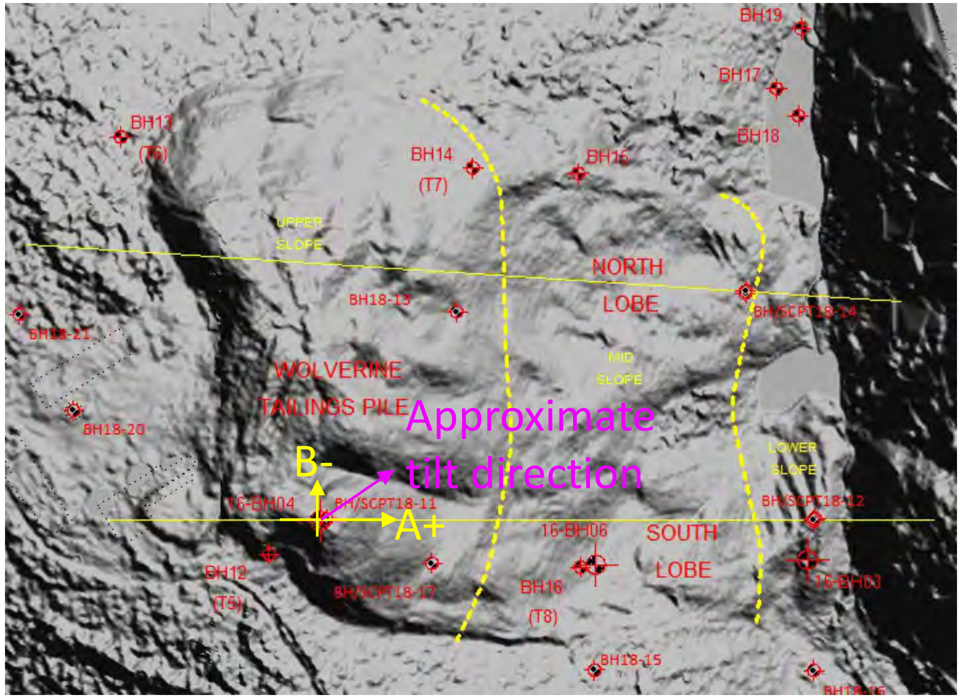
Cumulative Displacement Plots





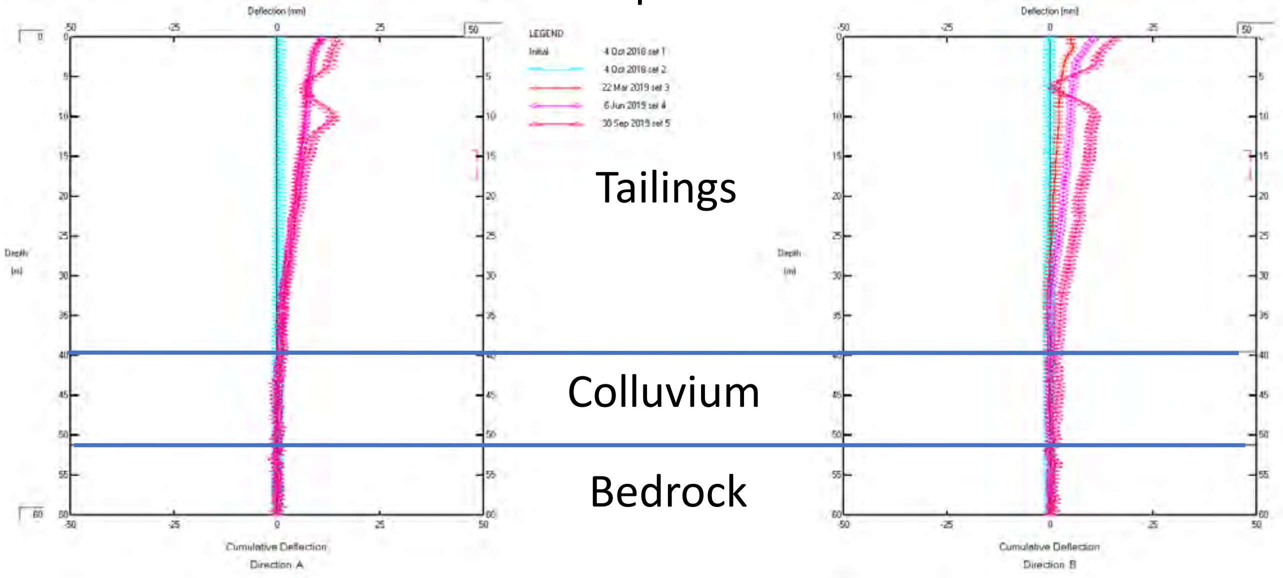
Incremental Displacement Plots

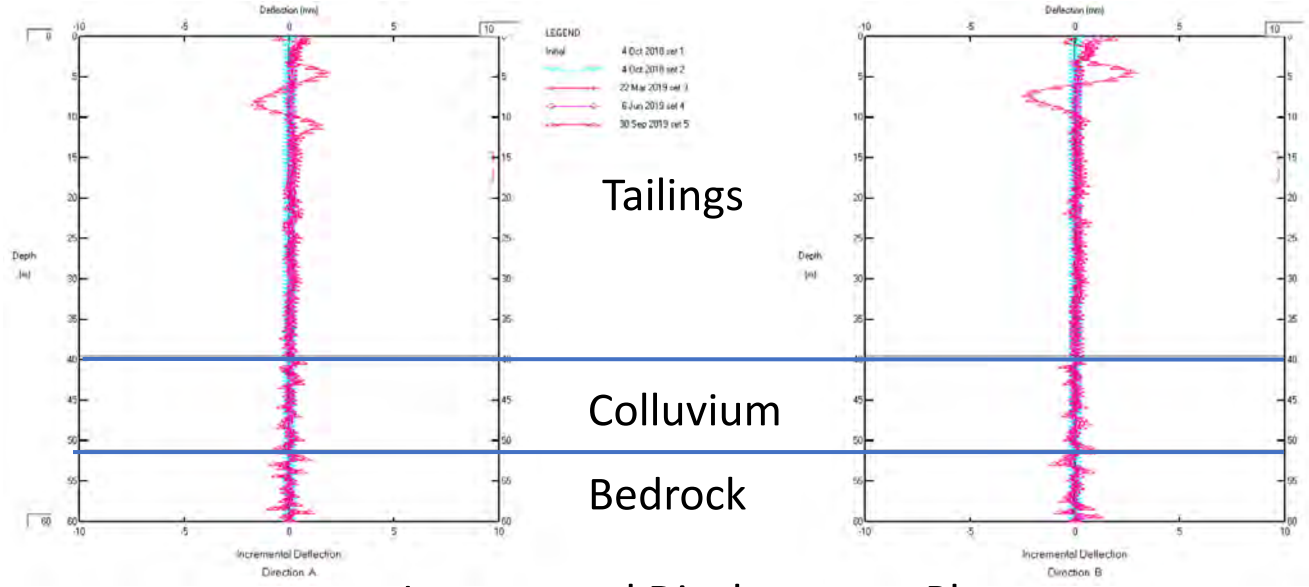
- Potential movement between 14.2 and 17.8 m in the B- direction < 1 mm of movement
- Indication of tilt between surface and 46.8 m depth with 11 mm cumulative movement



SI18-13

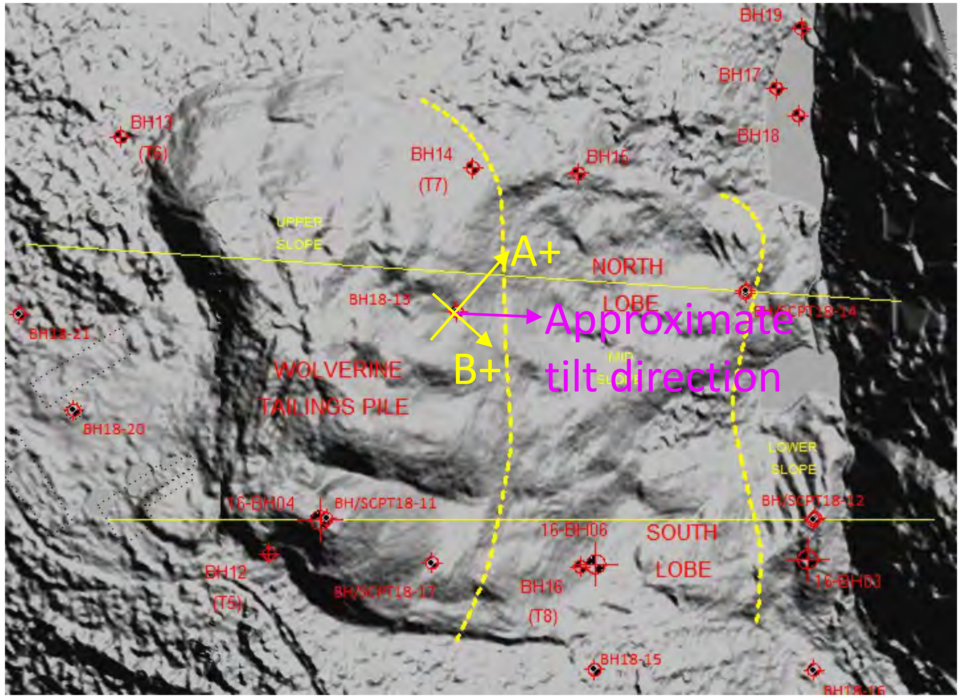
Cumulative Displacement Plots





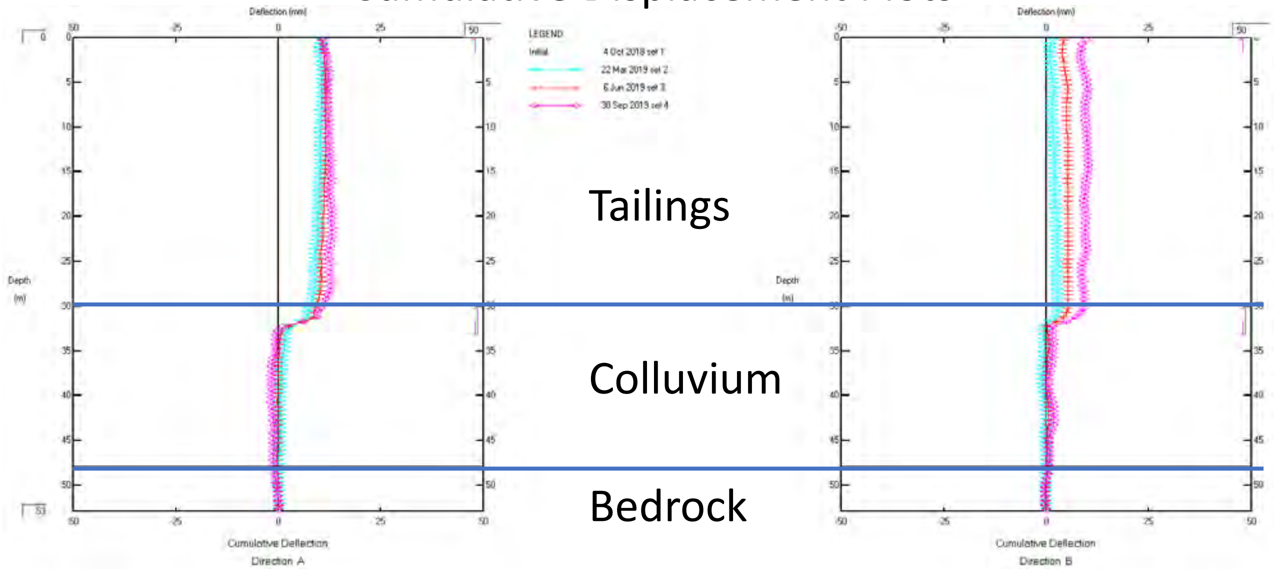
Incremental Displacement Plots

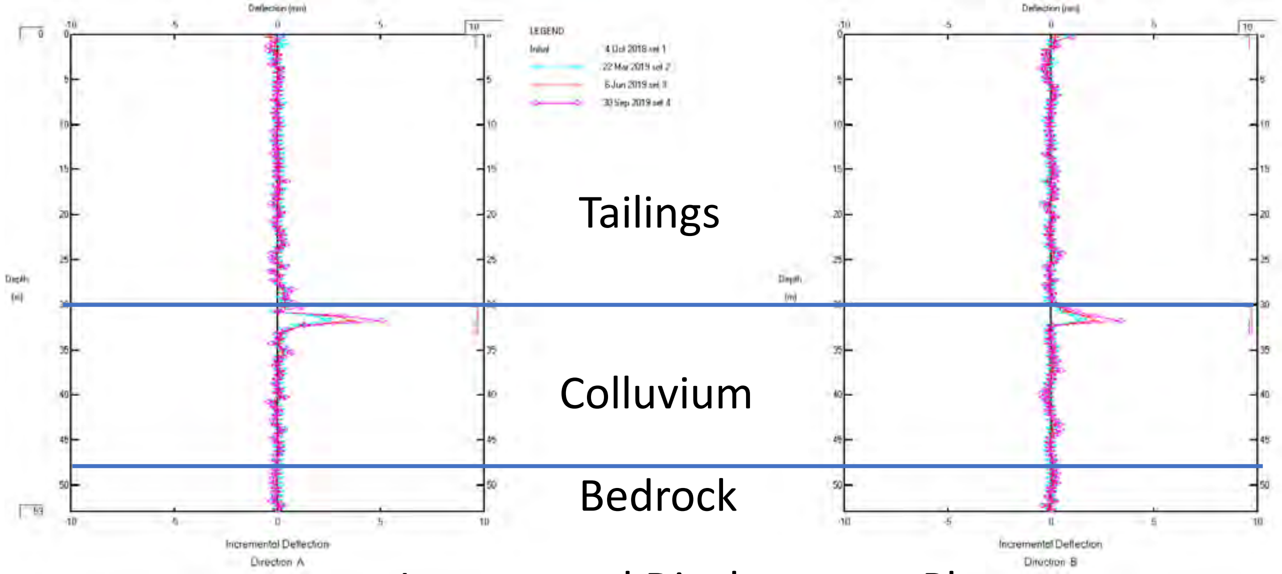
- No movement showing, with the exception of some surface creep in the upper 30 m
- September 2019 readings may indicate some settlement in the upper 10 m.
- Cumulative tilt between grade and 51.2 m (bedrock surface) is 16 mm



SI18-17

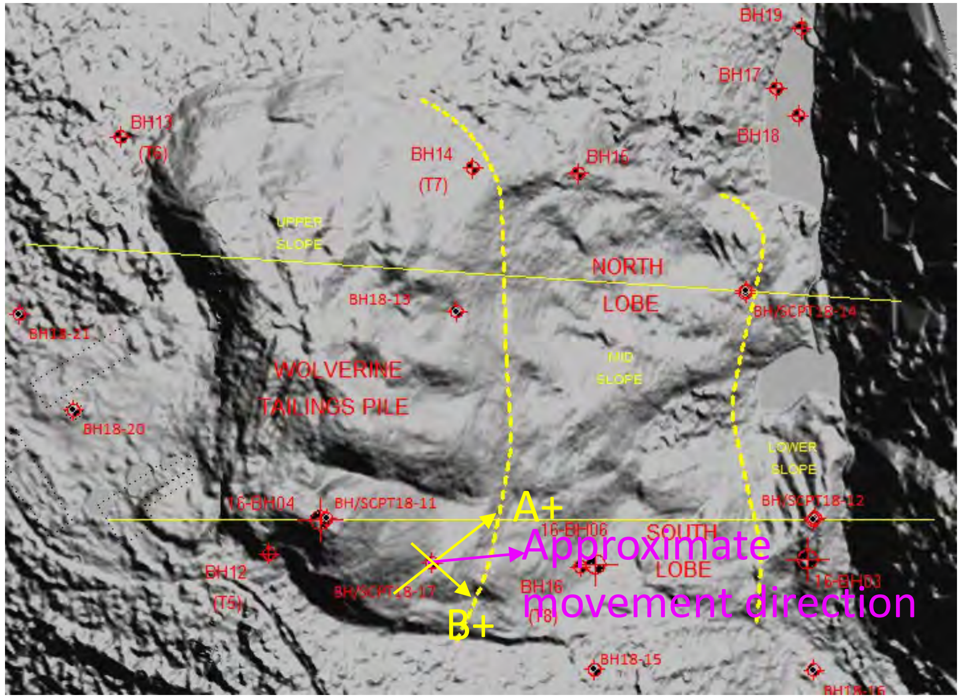
Cumulative Displacement Plots





Incremental Displacement Plots

- Movement between 30.2 and 33.2 m in the upper colluvium – movement rate of about 13.5 mm/year with total movement rate of 14 mm/year above 33.2 m depth
- Absolute position plot indicates that there is about 50 cm of inclination in the borehole



Sub-appendix C

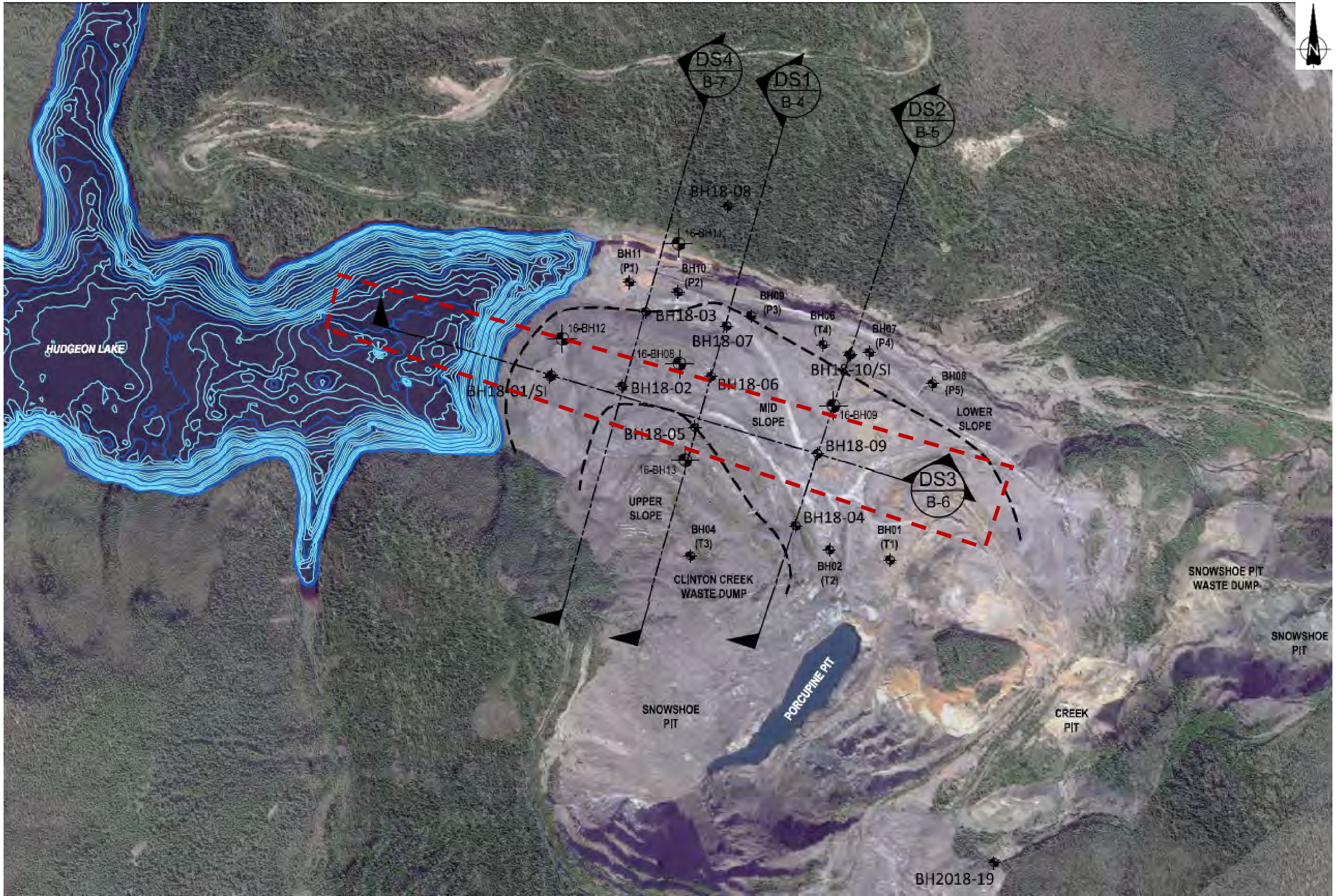
Section DS3

Clinton Creek Closure Option Design Stability Analyses Section DS3 Lake Drawdown Sensitivity

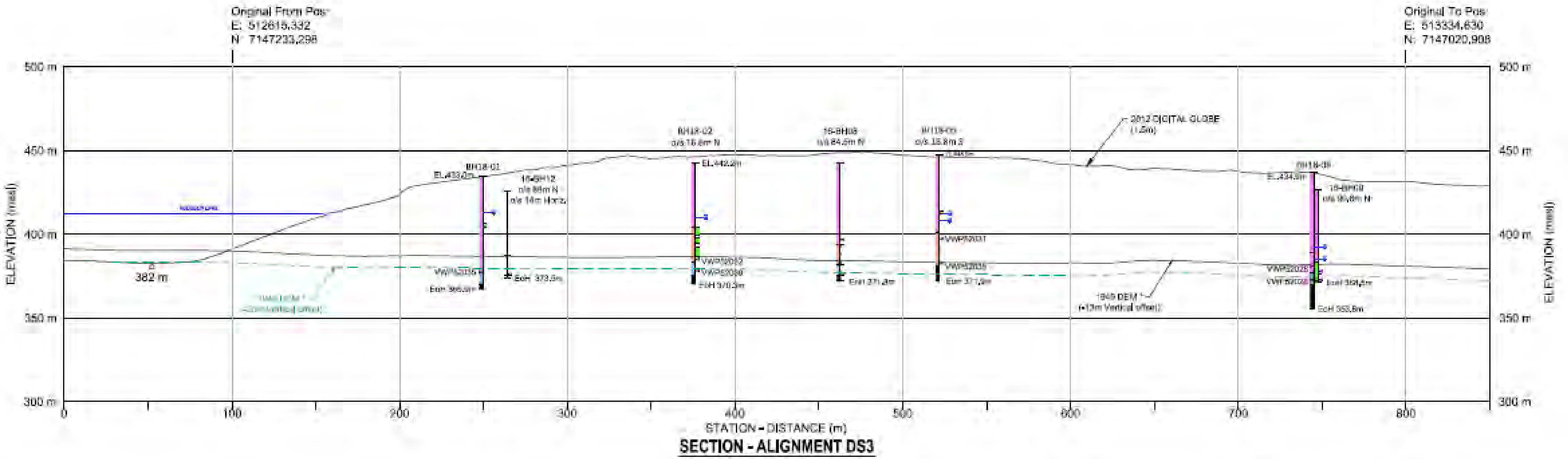
Clinton Creek Remediation Project

19 February 2020

Clinton Creek Mine Site Plan



Section DS3

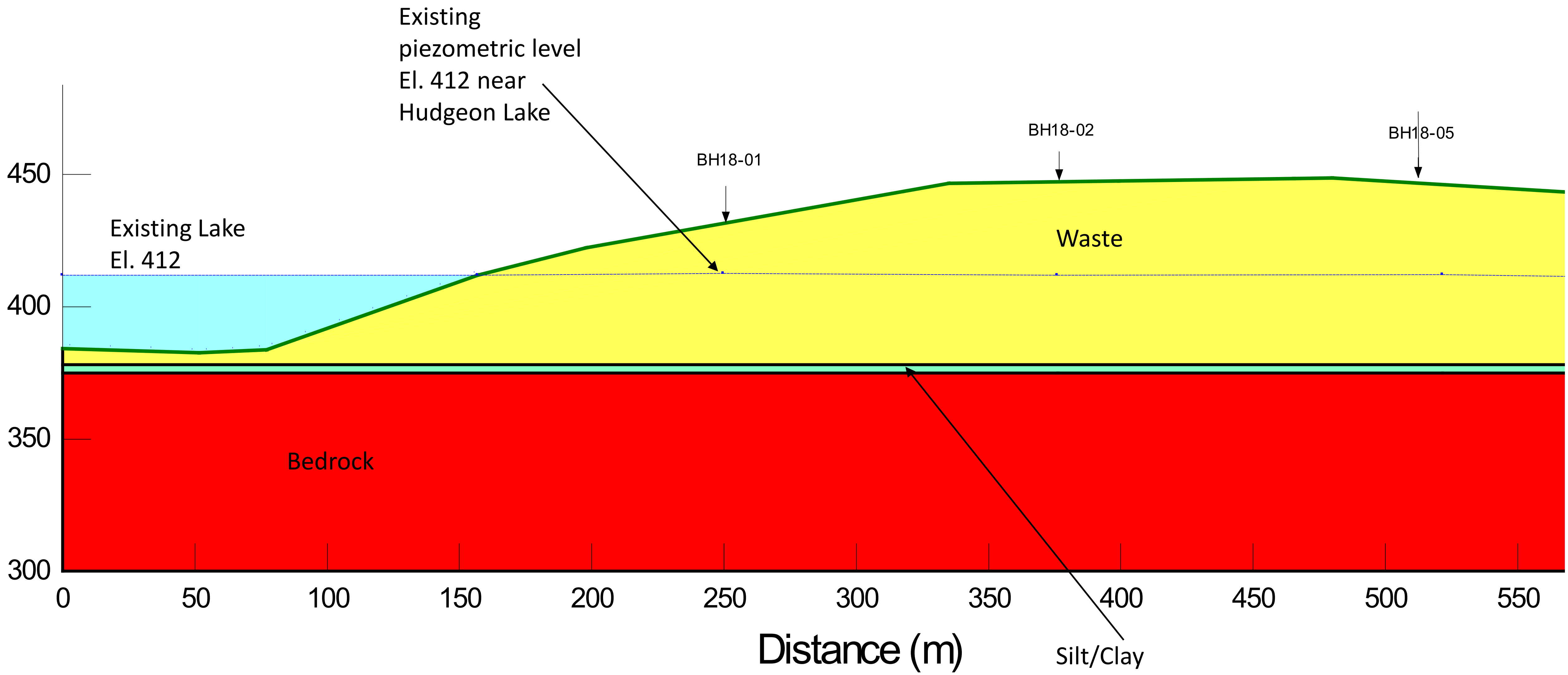


LEGEND

○	THERMISTOR NODES
◁	VIBRATING WIRE PIEZOMETER (VWP) TIP LOCATION

	FILL		MIXED COLLUVIUM / WASTE ROCK
	ORGANICS		FROZEN SOIL
	WASTE		BEDROCK
	ALLUVIUM		WATER TABLE
	COLLUVIUM		

Section DS3 Existing Condition



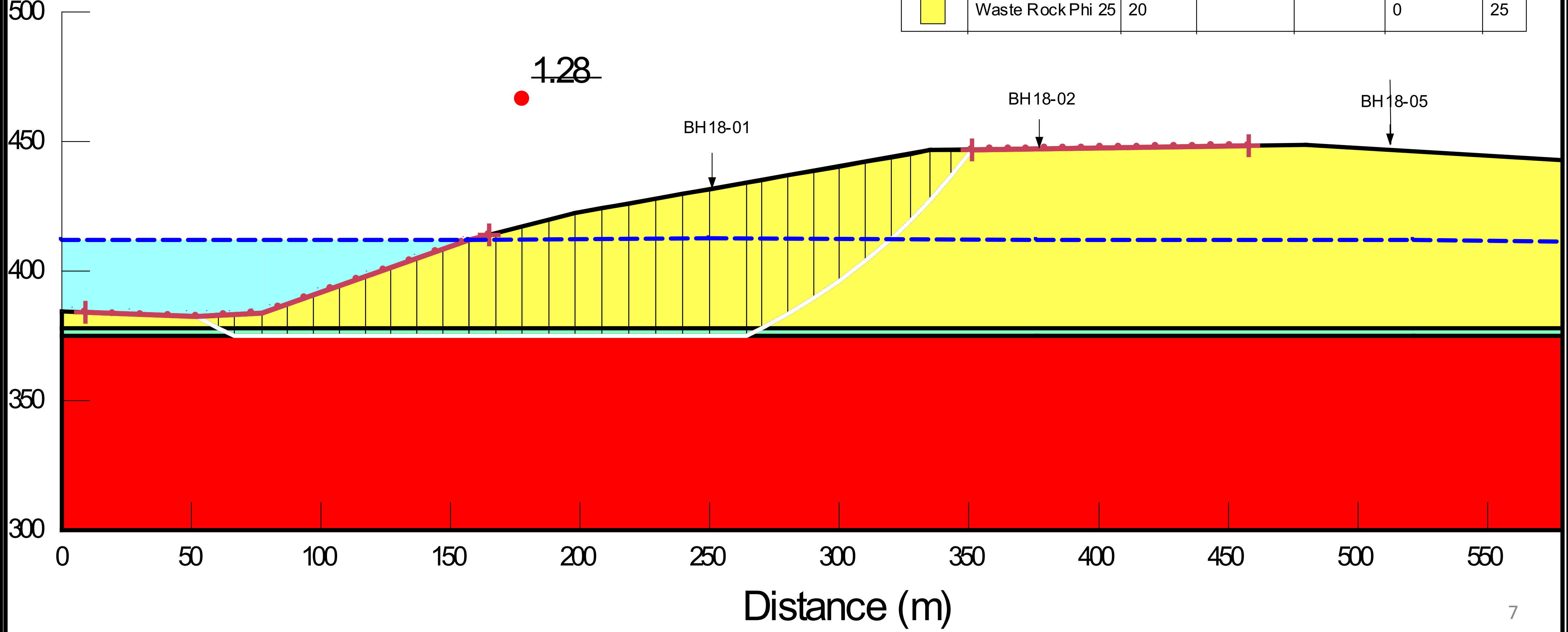
DS3 Stability FoS Summary

Section DS3 - Stability Factor of Safety Summary						
Options	Lake Level	Failure Mode	Slope	Rapid Drawdown	FoS	Minimum Required FoS
CC1	El. 412	Overall	Existing - Back analysis	N/A	1.28	1.2
		Toe	Existing - Back analysis	N/A	1.08	1.0
CC2	El. 400	Toe	Existing	No	0.98	1.0
		Toe	Existing	Yes	0.85	1.0
		Toe	Re-slope to 4H:1V	Yes	0.95	1.0
		Toe	Re-slope to 5H:1V	Yes	1.09	1.0
CC3	No Lake	Toe	Existing	No	1.03	1.0
		Toe	Existing	Yes	0.65	1.0
		Toe	Re-slope to 6H:1V	Yes	0.99	1.0
Temporary Dewatering	El. 407	Overall	Existing	No	1.3	1.2
		Overall	Existing	Yes	1.22	1.2
		Toe	Existing	No	1.03	1.0
		Toe	Existing	Yes	0.95	1.0

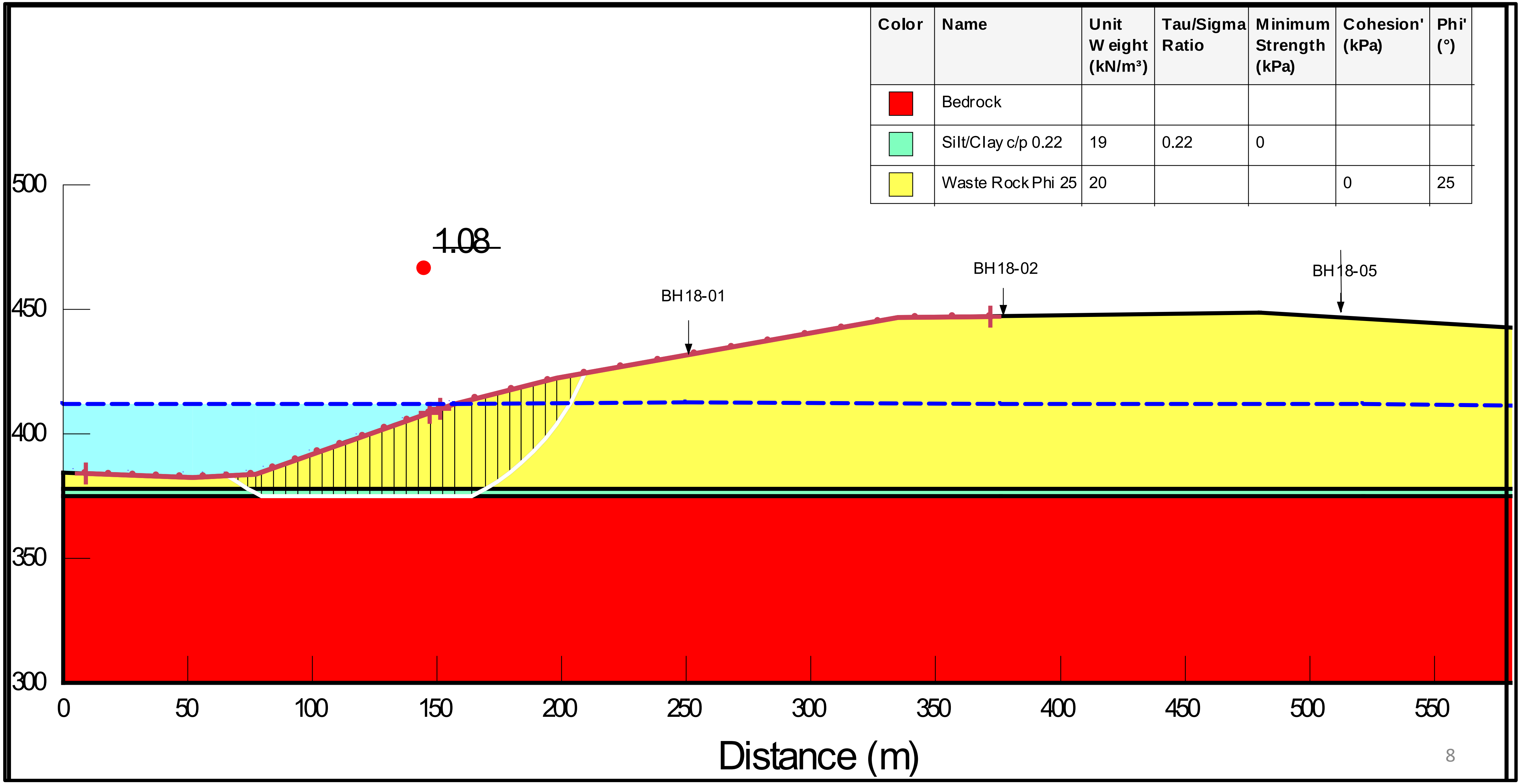
CC1 – Lake At El. 412 m

DS3 Stability –Lake 412 Overall

Color	Name	Unit Weight (kN/m³)	Tau/Sigma Ratio	Minimum Strength (kPa)	Cohesion' (kPa)	Phi' (°)
	Bedrock					
	Silt/Clay c/p 0.22	19	0.22	0		
	Waste Rock Phi 25	20			0	25



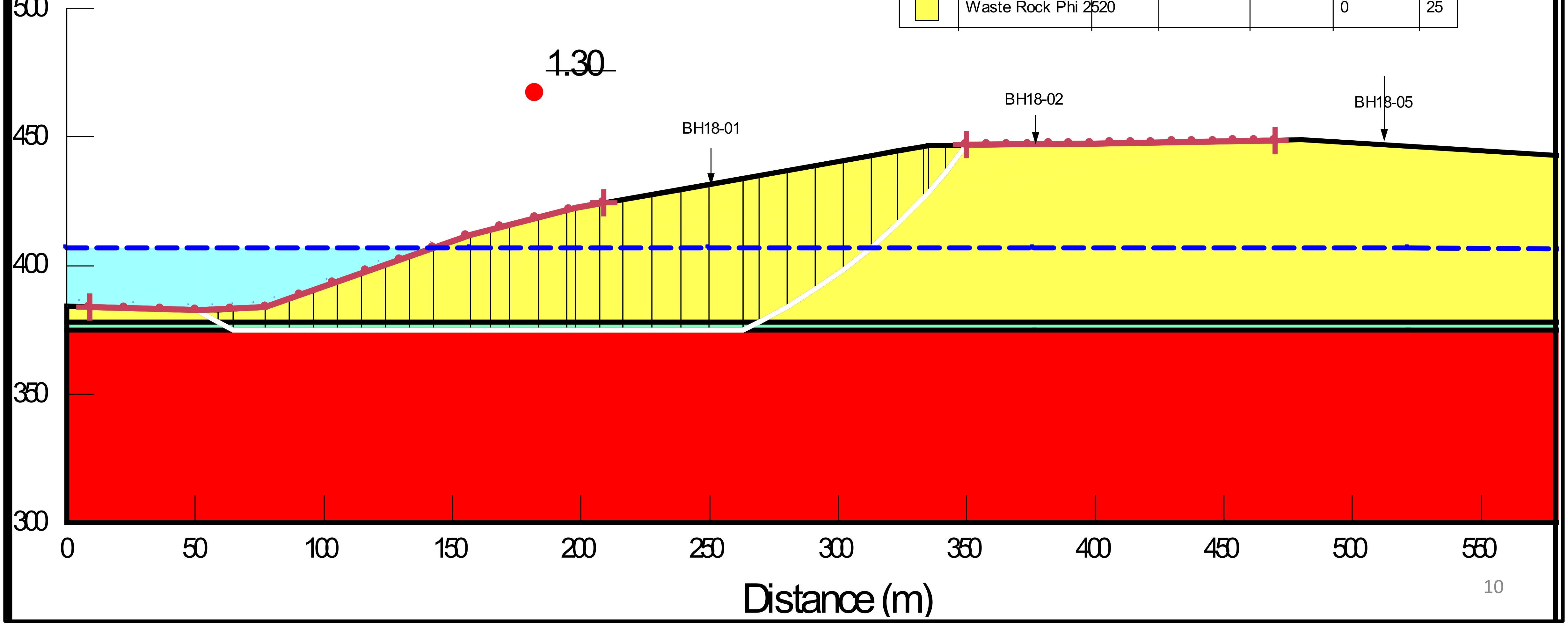
DS3 Stability –Lake 412 toe



CC1 – Temporary Lake Drawdown

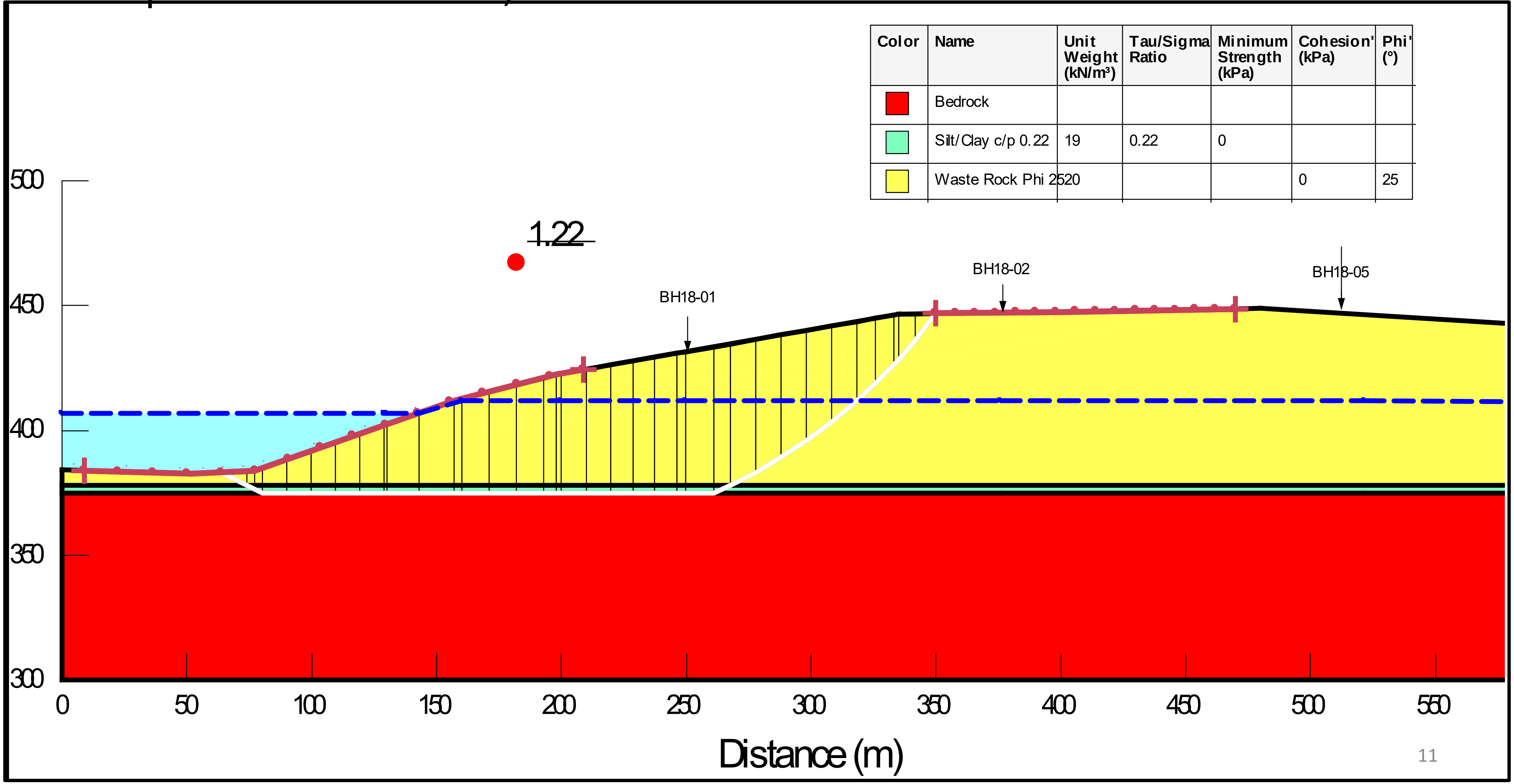
- Temporary draw down of the lake to El. 407 m for construction safety

DS3 Stability –Temporary Lake Dewatering to El. 407
No Rapid Drawdown



Color	Name	Unit Weight (kN/m³)	Tau/Sigma Ratio	Minimum Strength (kPa)	Cohesion' (kPa)	Phi' (°)
	Bedrock					
	Silt/Clay c/p 0.22	19	0.22	0		
	Waste Rock Phi 25	20			0	25

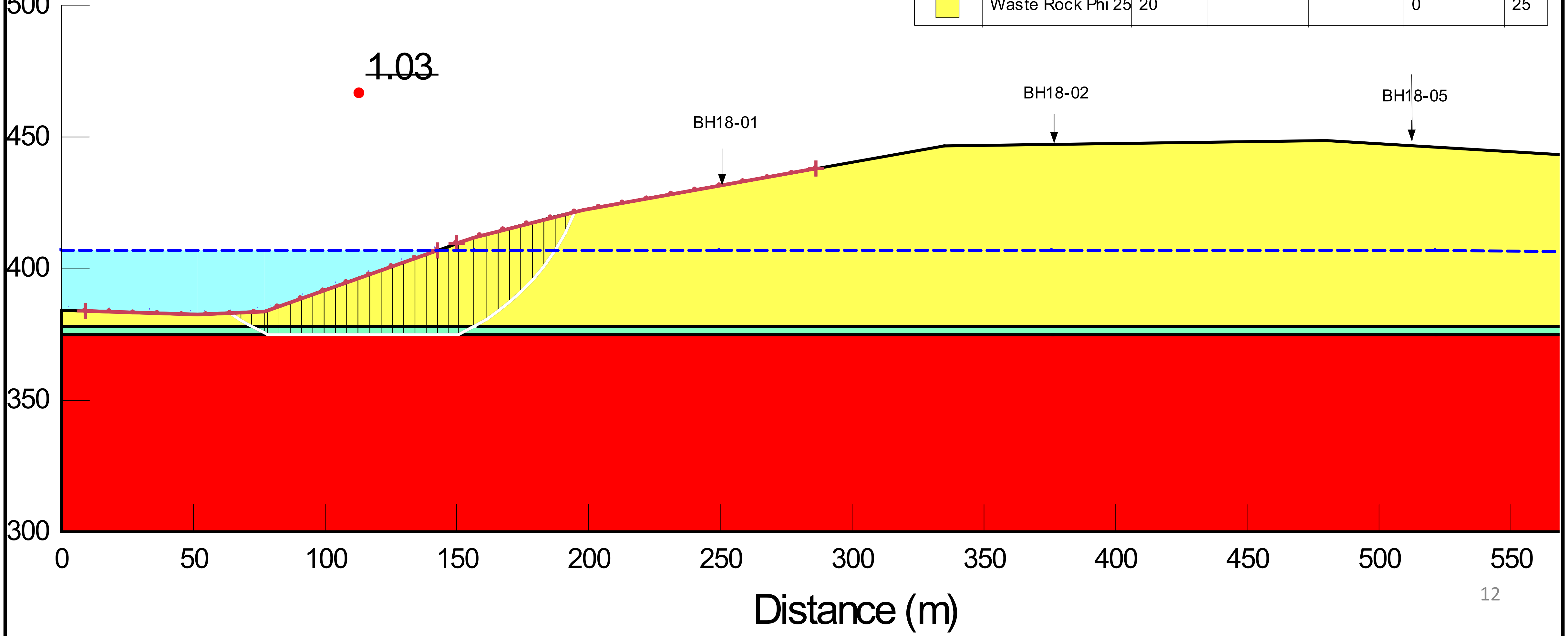
DS3 Stability –Temporary Lake Dewatering to El. 407 Rapid Drawdown, Overall



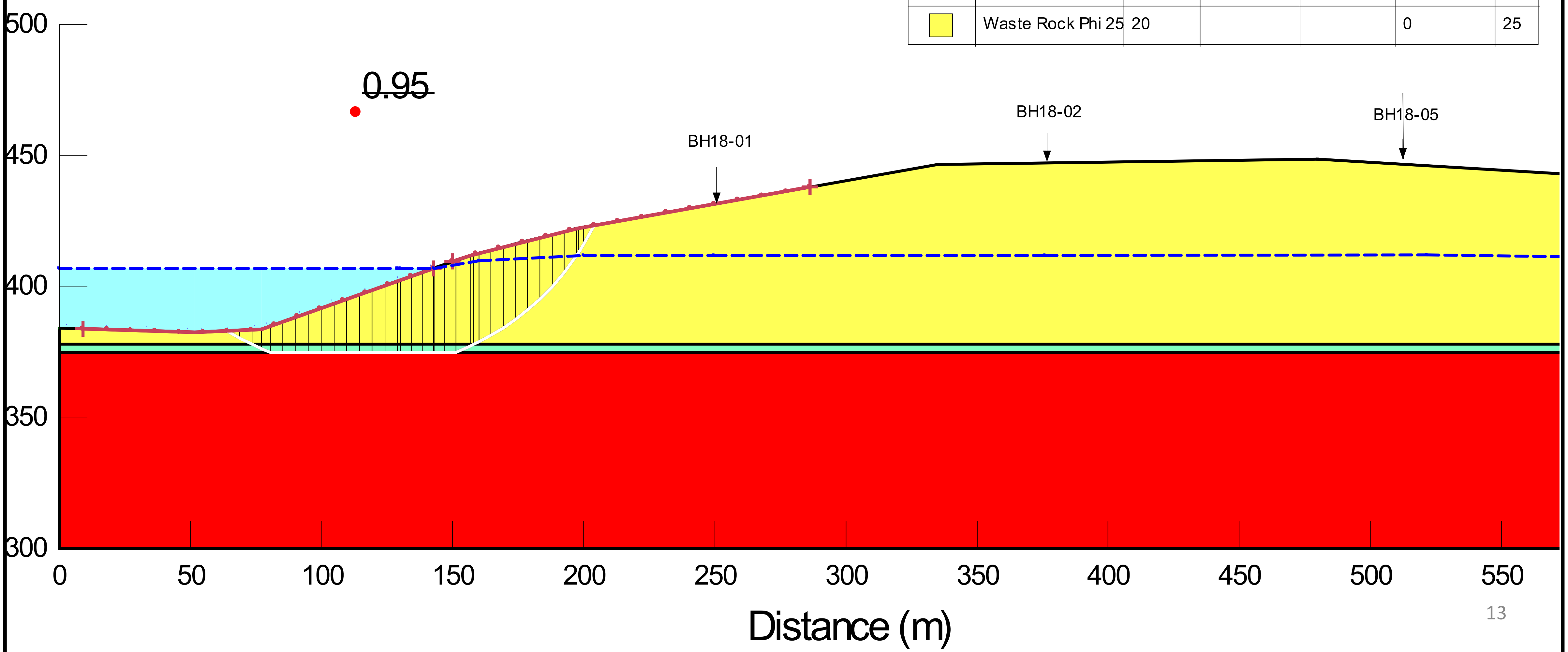
Color	Name	Unit Weight (kN/m³)	Tau/Sigma Ratio	Minimum Strength (kPa)	Cohesion' (kPa)	Phi' (°)
	Bedrock					
	Silt/Clay c/p 0.22	19	0.22	0		
	Waste Rock Phi 25	20			0	25

DS3 Stability –Temporary Lake Dewatering to El. 407 No Rapid Drawdown, Toe

Color	Nam e	Unit Weight (kN/m³)	Tau/Sigm a Ratio	Minim um Strength (kPa)	Cohesion' (kPa)	Phi' (°)
	Bedrock					
	Silt/Clay c/p 0.22	19	0.22	0		
	Waste Rock Phi 25	20			0	25



DS3 Stability –Temporary Lake Dewatering to El. 407 Rapid Drawdown, Toe

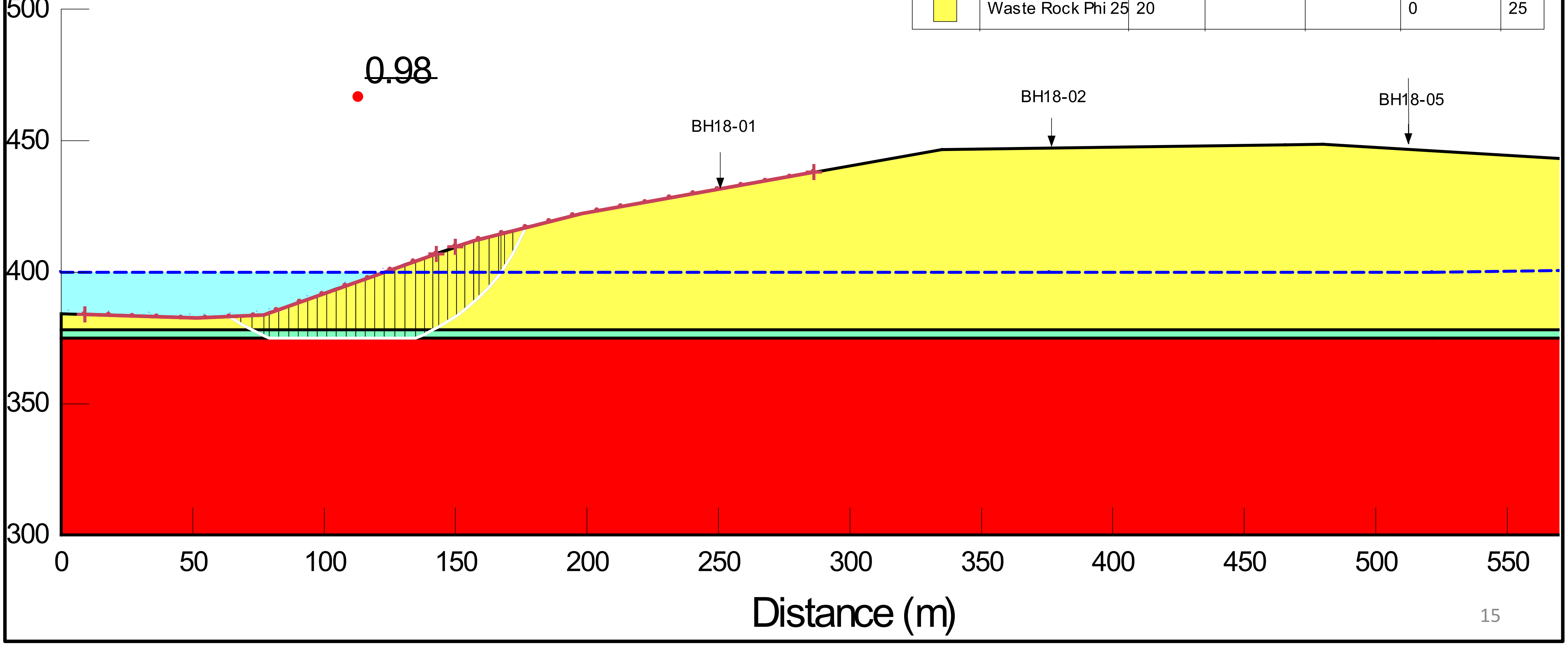


Color	Name	Unit Weight (kN/m³)	Tau/Sigma Ratio	Minimum Strength (kPa)	Cohesion' (kPa)	Phi' (°)
	Bedrock					
	Silt/Clay c/p 0.22	19	0.22	0		
	Waste Rock Phi 25	20			0	25

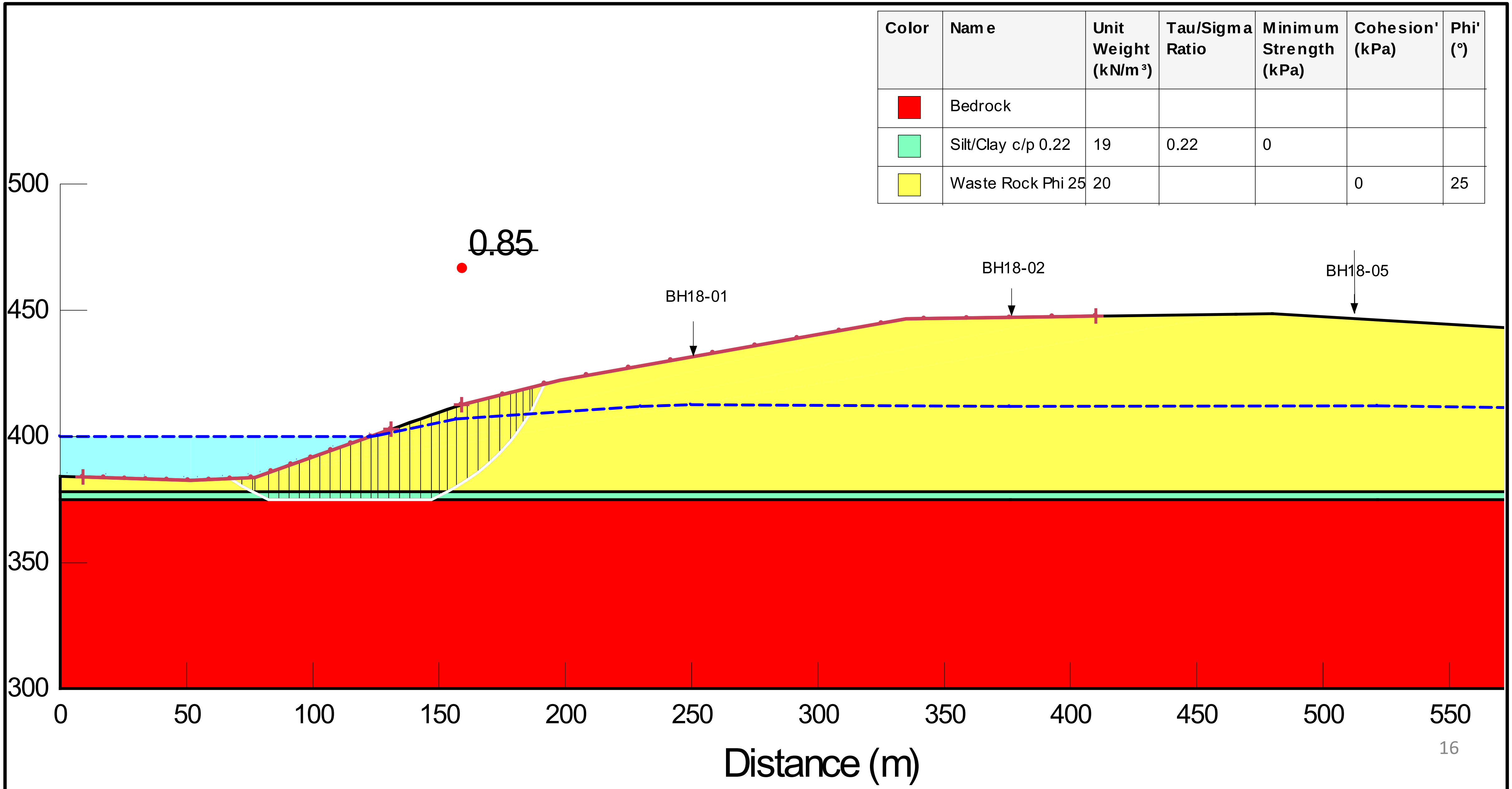
CC2 – Lake at El. 400 m

DS3 Stability –Lake 400 toe, No Rapid Drawdown

Color	Name	Unit Weight (kN/m³)	Tau/Sigma Ratio	Minimum Strength (kPa)	Cohesion' (kPa)	Phi' (°)
	Bedrock					
	Silt/Clay c/p 0.22	19	0.22	0		
	Waste Rock Phi 25	20			0	25

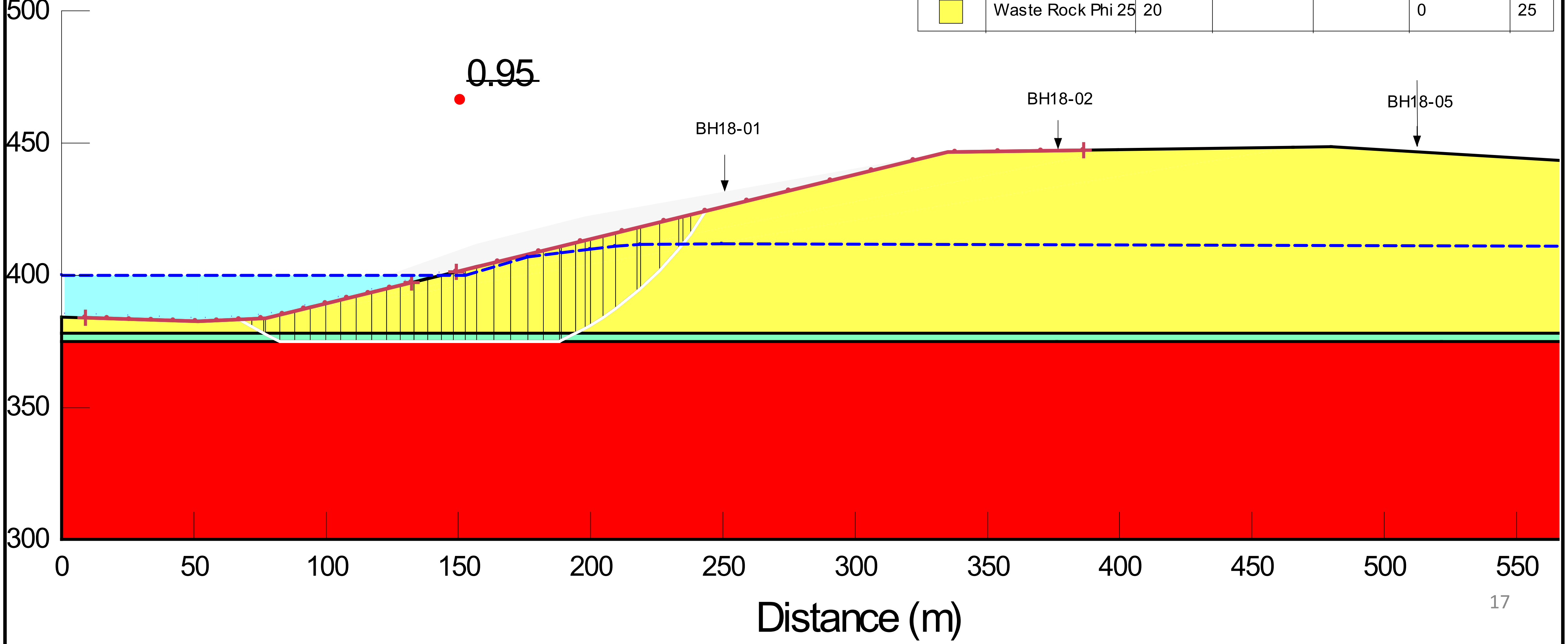


DS3 Stability –Lake 400 Rapid Drawdown

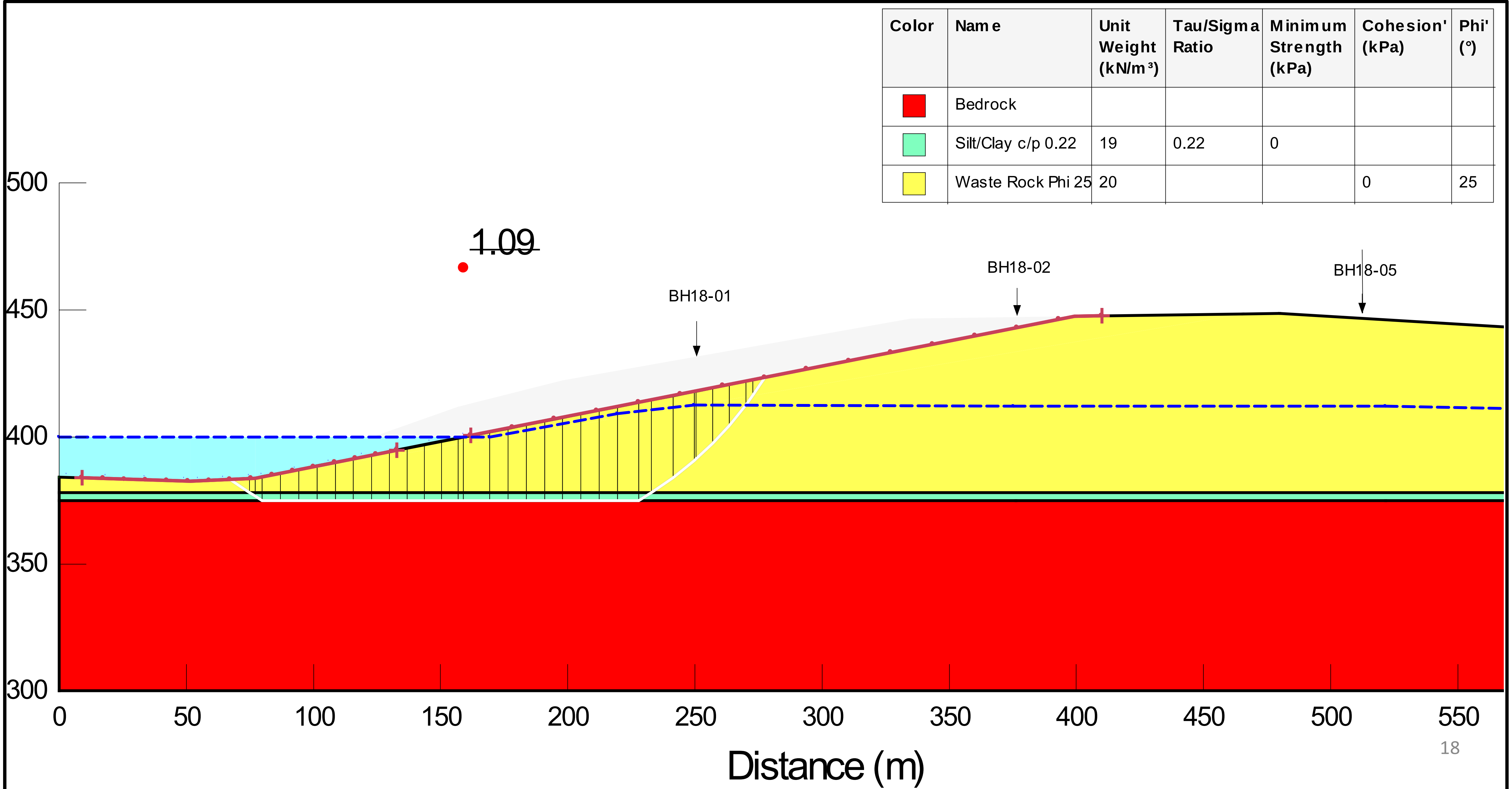


DS3 Stability –Lake 400 Rapid Drawdown Mitigation re-slope to 4H:1V

Color	Name	Unit Weight (kN/m³)	Tau/Sigma Ratio	Minimum Strength (kPa)	Cohesion' (kPa)	Phi' (°)
	Bedrock					
	Silt/Clay c/p 0.22	19	0.22	0		
	Waste Rock Phi 25	20			0	25

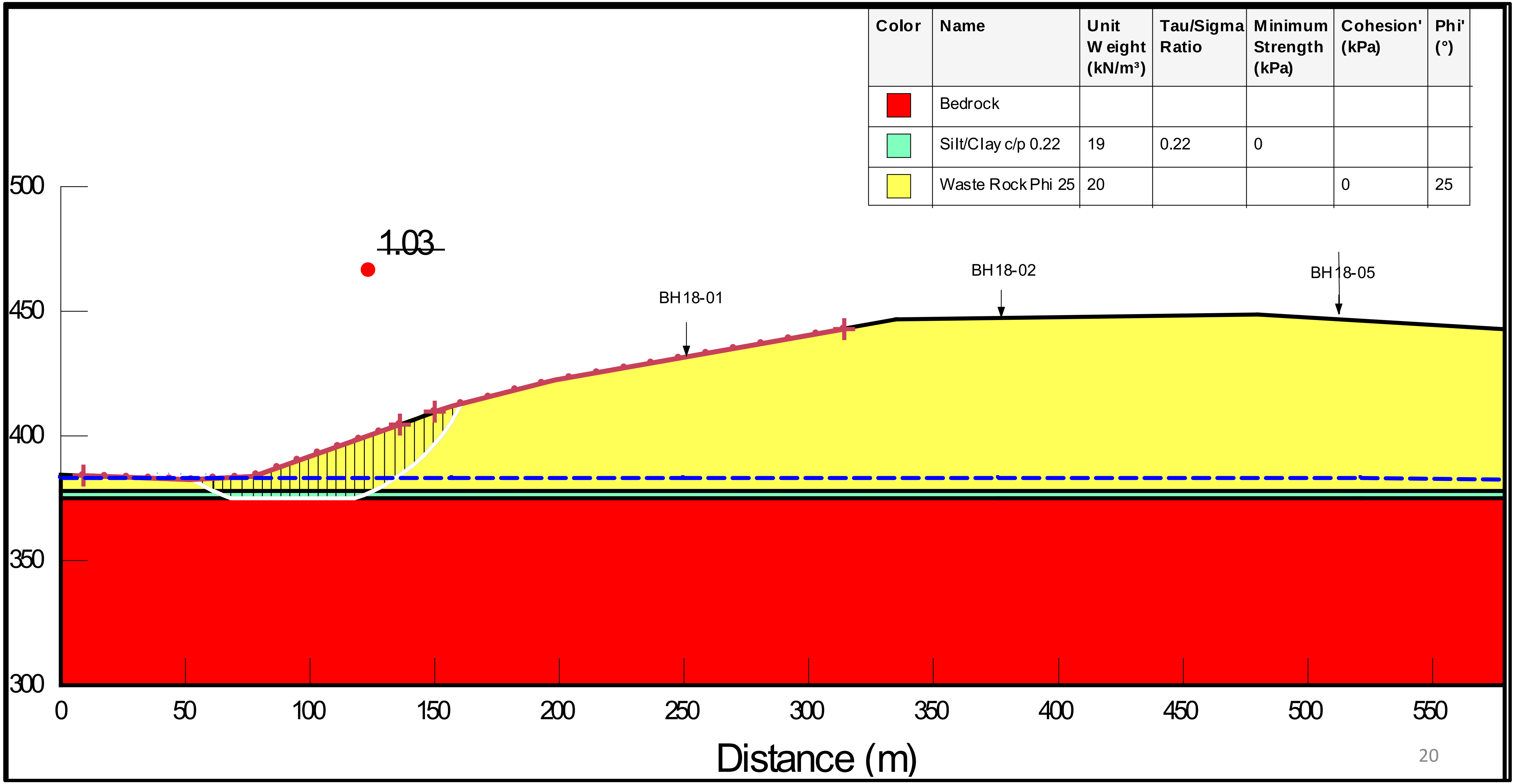


DS3 Stability –Lake 400 Rapid Drawdown Mitigation re-slope to 5H:1V



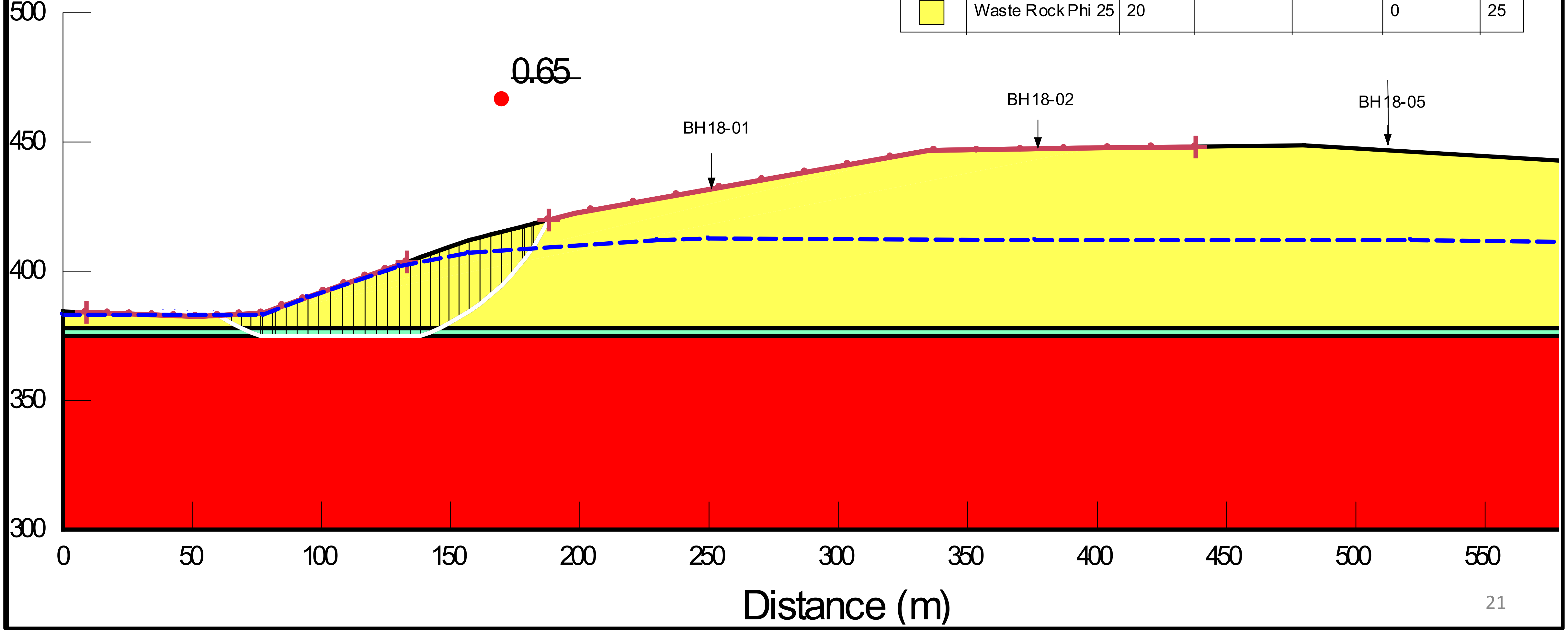
CC3 – No Lake

DS3 Stability –No Lake, No Rapid Drawdown

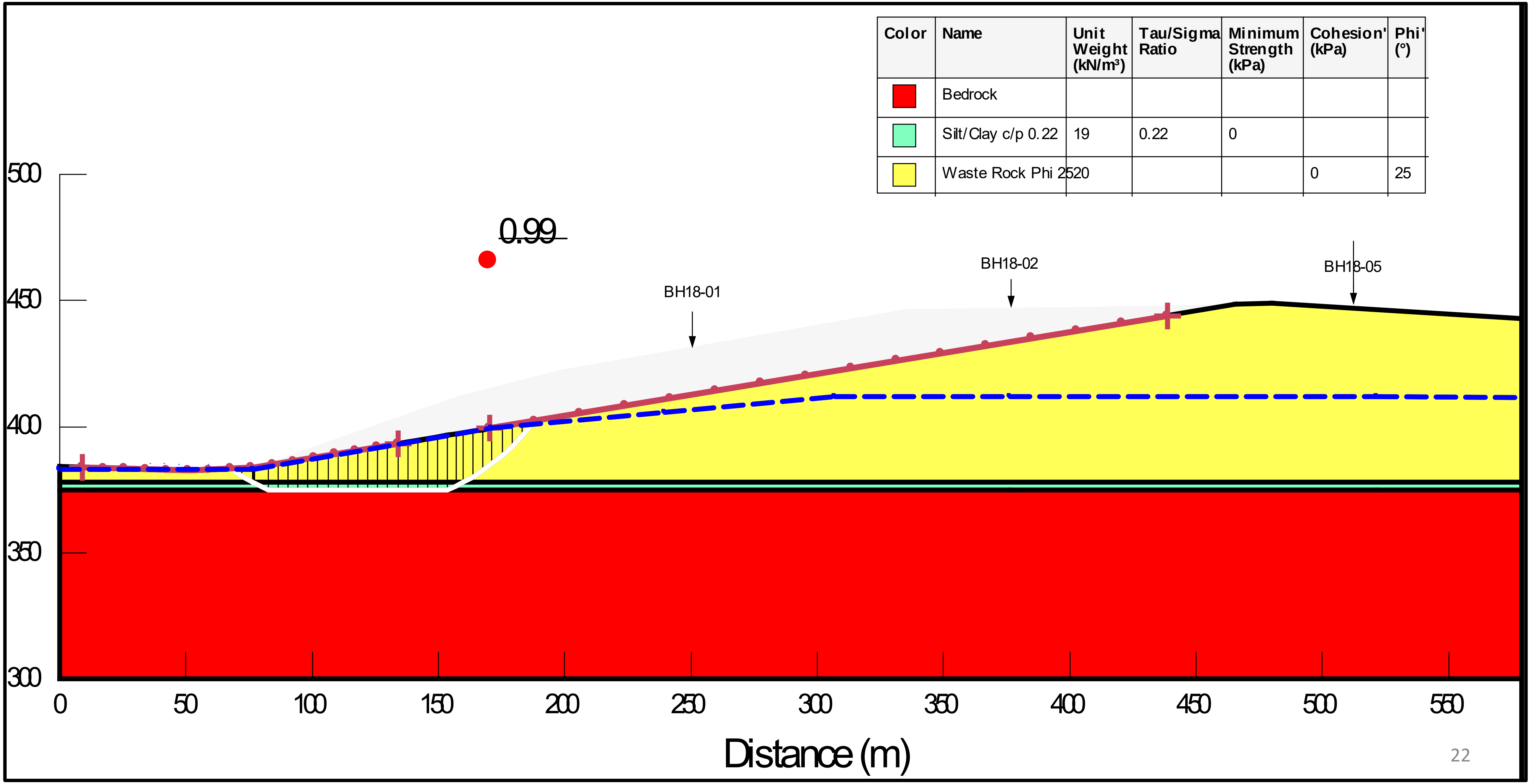


DS3 Stability –No Lake, Rapid Drawdown

Color	Name	Unit Weight (kN/m³)	Tau/Sigma Ratio	Minimum Strength (kPa)	Cohesion' (kPa)	Phi' (°)
	Bedrock					
	Silt/Clay c/p 0.22	19	0.22	0		
	Waste Rock Phi 25	20			0	25



DS3 Stability –No Lake, Rapid Drawdown Mitigation re-slope to 6H:1V



Sub-appendix D

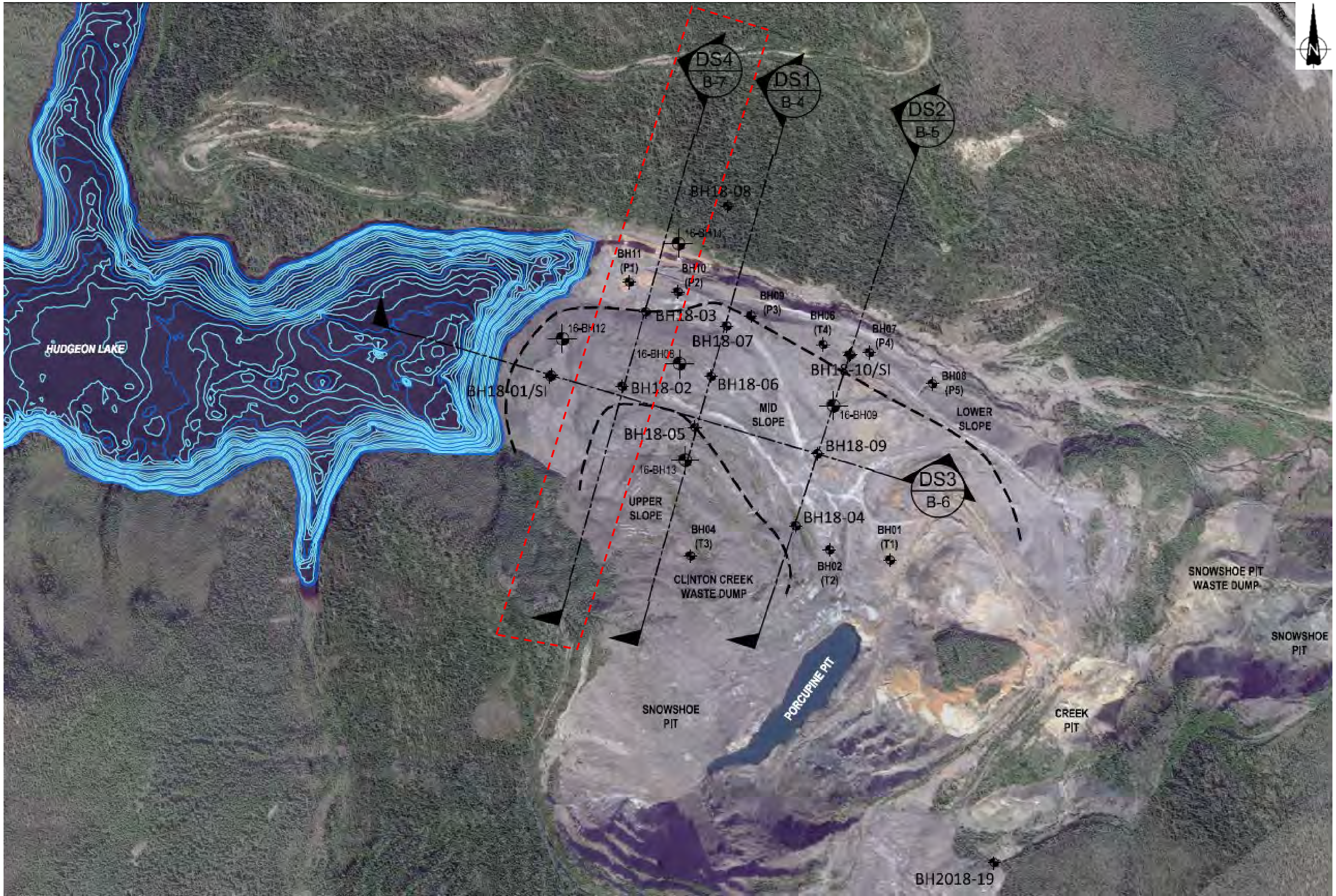
Section DS4

Clinton Creek Closure Option Design Stability Analyses Section DS4

Clinton Creek Remediation Project

19 February 2020

Clinton Creek Mine Site Plan



Section DS4

- Ice rich permafrost encountered at BH18-03.
- Refined permafrost zoning.
- Updated permafrost undrained shear strength to 60 kPa.
- Slope inclinometer (SI) data show movement in ice-rich permafrost in BH18-03.
- Eliminated seismic liquefaction potential concern for alluvial silt/clay zone.
- Current water table based on available piezometer readings in 2019.

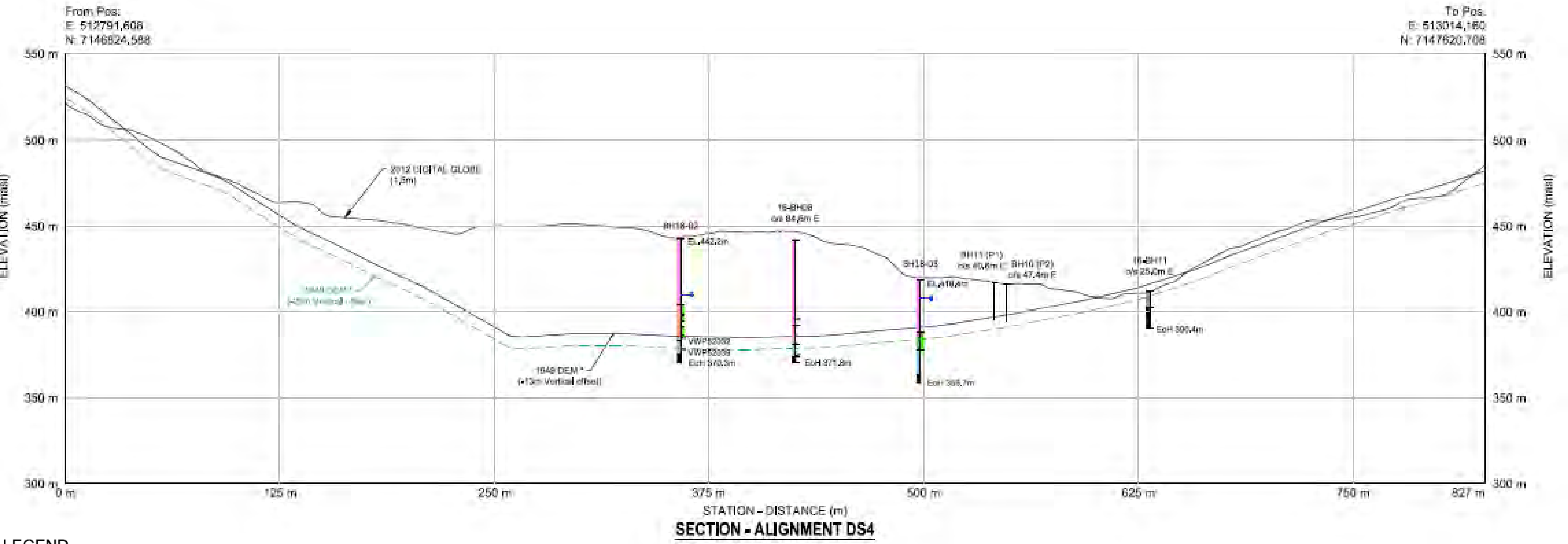
Section DS4 Location on aerial photo

1985

Water El.
411.5m

35

Section DS4



LEGEND

○ THERMISTOR NODES

◁ VIBRATING WIRE PIEZOMETER (VWP) TIP LOCATION

FILL

ORGANICS

WASTE

ALLUVIUM

COLLUVIUM

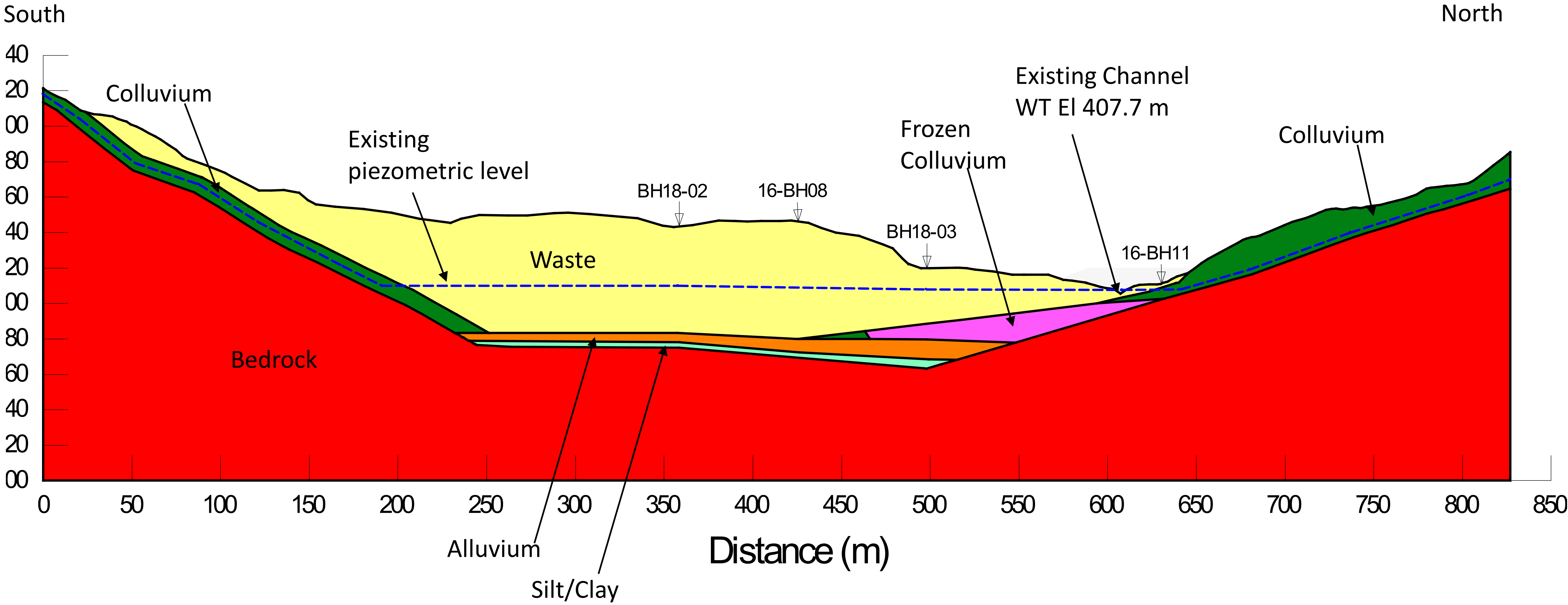
MIXED COLLUVIUM / WASTE ROCK

FROZEN SOIL

BEDROCK

WATER TABLE

Section DS4 Existing Condition (Base Case)



DS4 Stability FoS Summary

Section DS4 - Stability Factor of Safety Summary

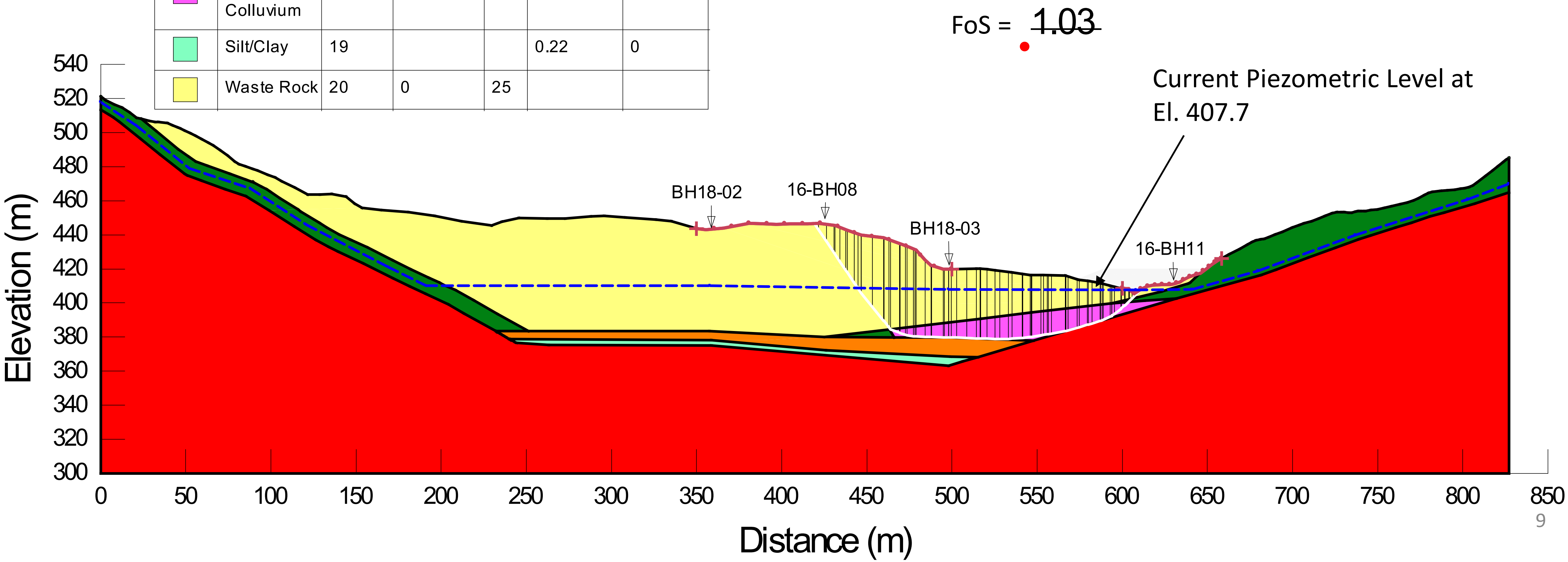
Options	Scenarios	Channel location	Spillway Cut Slope (South)	Condition Description	Waste Strength	Water Table	FoS	Minimum Required FoS
Base Case	Back Analysis	Existing condition	NA	Near channel slip surface	drained, ϕ' of 25 deg	Measured	1.03	1.2
		Existing condition	NA	overall stability (frozen colluvium at back slope)	drained, ϕ' of 25 deg	Measured	1.38	
		Existing condition	NA	Liquefied Waste	c/p' of 0.1	Measured	*0.63*	1.0
		Existing condition	NA	Liquefied Waste sensitvity	c/p' of 0.18	Measured	0.99	
Option CC1 Lake at El. 412; Channel Base El. 411.5	Design No Liquefaction	Preliminary channel location	3H:1V	Near channel slip surface	drained, ϕ' of 25 deg	Assumed design	1.18	1.2
		Preliminary channel location	4H:1V	Near channel slip surface	drained, ϕ' of 25 deg	Assumed design	1.39	
		Adjusted channel location	4H:1V	Near channel slip surface	drained, ϕ' of 25 deg	Assumed design	2.50	
		Adjusted channel location	4H:1V	Overall stability	drained, ϕ' of 25 deg	Assumed design	1.45	
	Construction static Liquefaction	Preliminary channel location	4H:1V	Liquefied Waste	c/p' of 0.1	Measured	*0.76*	1.0
		Preliminary channel location	4H:1V	Liquefied Waste, lower water table	c/p' of 0.1	5 m lower	*0.91*	
		Adjusted channel location	4H:1V	Liquefied Waste	c/p' of 0.1	Measured	*0.89*	
		Adjusted channel location	4H:1V	Liquefied Waste (Toe failure)	c/p' of 0.1	Measured	1.19	
		Adjusted channel location	4H:1V	Liquefied Waste with reasonable strength	c/p' of 0.14	Measured	1.04	
		Adjusted channel location	4H:1V	Liquefied Waste, lower water table	c/p' of 0.1	5 m lower	0.99	
		Adjusted channel location	4H:1V	Liquefied Waste with reasonable strength, lower water table	c/p' of 0.14	5 m lower	1.23	
		Adjusted channel location	4H:1V	Blast Densification 30 m width	c/p' of 0.1	Measured	1.18	
		Adjusted channel location	4H:1V	Blast Densification 78 m width	c/p' of 0.1	Measured	1.40	
		Adjusted channel location	4H:1V	Blast Densification 18 m width, lower water table	c/p' of 0.1	5 m lower	1.25	
		Adjusted channel location	6H:1V	Liquefied Waste	c/p' of 0.1	Measured	0.97	
		Adjusted channel location	6H:1V	Liquefied Waste with reasonable strength, lower water table	c/p' of 0.14	Measured	1.22	
Option CC2 Lake at El. 400; Channel Base El. 399	Design No Liquefaction	Preliminary channel location	4H:1V	Near channel slip surface	drained, ϕ' of 25 deg	Assumed design	*1.06*	1.2
		Adjusted channel location	4H:1V	overall stability (frozen colluvium at back slope)	drained, ϕ' of 25 deg	Assumed design	1.18	
		Adjusted channel location	6H:1V	Near channel slip surface	drained, ϕ' of 25 deg	Assumed design	1.48	
		Adjusted channel location	6H:1V	overall stability (frozen colluvium at back slope)	drained, ϕ' of 25 deg	Assumed design	*1.07*	
		Adjusted channel location	6H:1V	overall stability (frozen colluvium at back slope with unloading)	drained, ϕ' of 25 deg	Assumed design	1.34	
	Construction static Liquefaction	Preliminary channel location	4H:1V	Liquefied Waste	c/p' of 0.1	Assumed design	*0.70*	1.0
		Preliminary channel location	4H:1V	Liquefied Waste (Toe failure)	c/p' of 0.1	Assumed design	*0.62*	
		Preliminary channel location	4H:1V	Liquefied Waste	c/p' of 0.1	5 m lower	*0.85*	
		Preliminary channel location	4H:1V	Liquefied Waste with reasonable strength	c/p' of 0.14	5 m lower	*0.90*	
		Adjusted channel location	4H:1V	Blast Densification 130 m width	c/p' of 0.1	Assumed design	1.17	
		Adjusted channel location	4H:1V	Blast Densification 70 m width	c/p' of 0.1	5 m lower	1.18	
		Adjusted channel location	6H:1V	Liquefied Waste	c/p' of 0.1	Assumed design	*0.76*	
		Adjusted channel location	6H:1V	Liquefied Waste	c/p' of 0.1	5 m lower	1.19	
		Adjusted channel location	6H:1V	Liquefied Waste, overall	c/p' of 0.1	5 m lower	1.06	

Back Analysis on Existing Condition (Base Case)

DS4 Base Case Stability

- Critical slip surface through ice rich permafrost with assumed cohesion of 60 kPa
- Silt/clay layer assumed undrained strength ratio c/p’ of 0.22

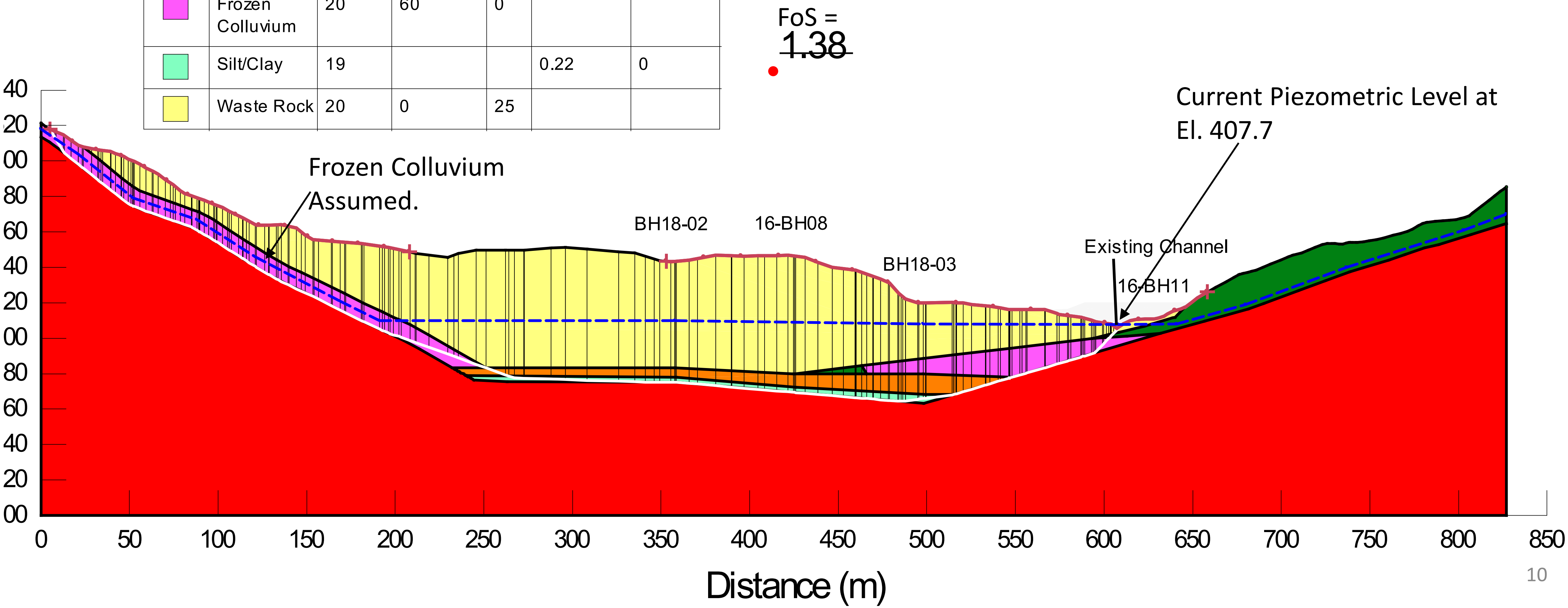
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		



DS4 Base Case Overall Stability

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		

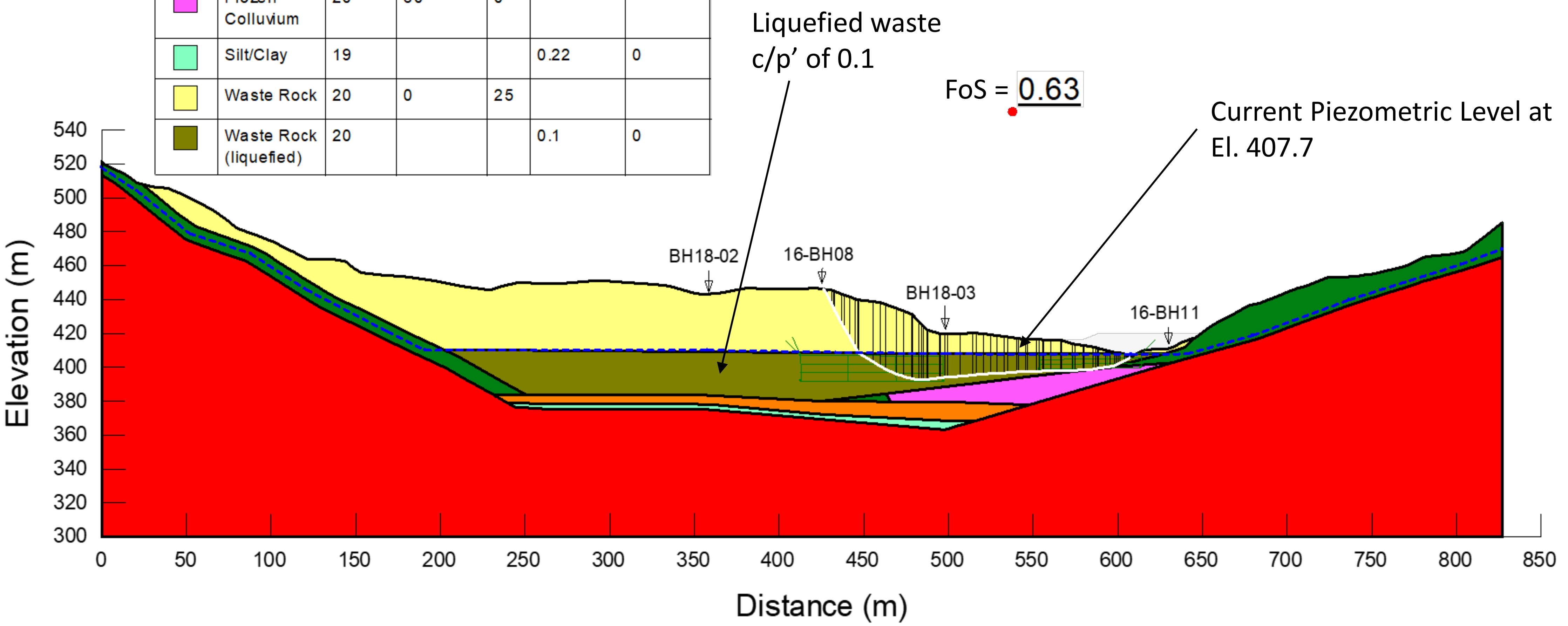
- Critical slip surface through ice rich permafrost and Silt/clay layer
- Frozen colluvium on south back slope assumed.



DS4 Base Case Stability – Saturated Waste Static Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

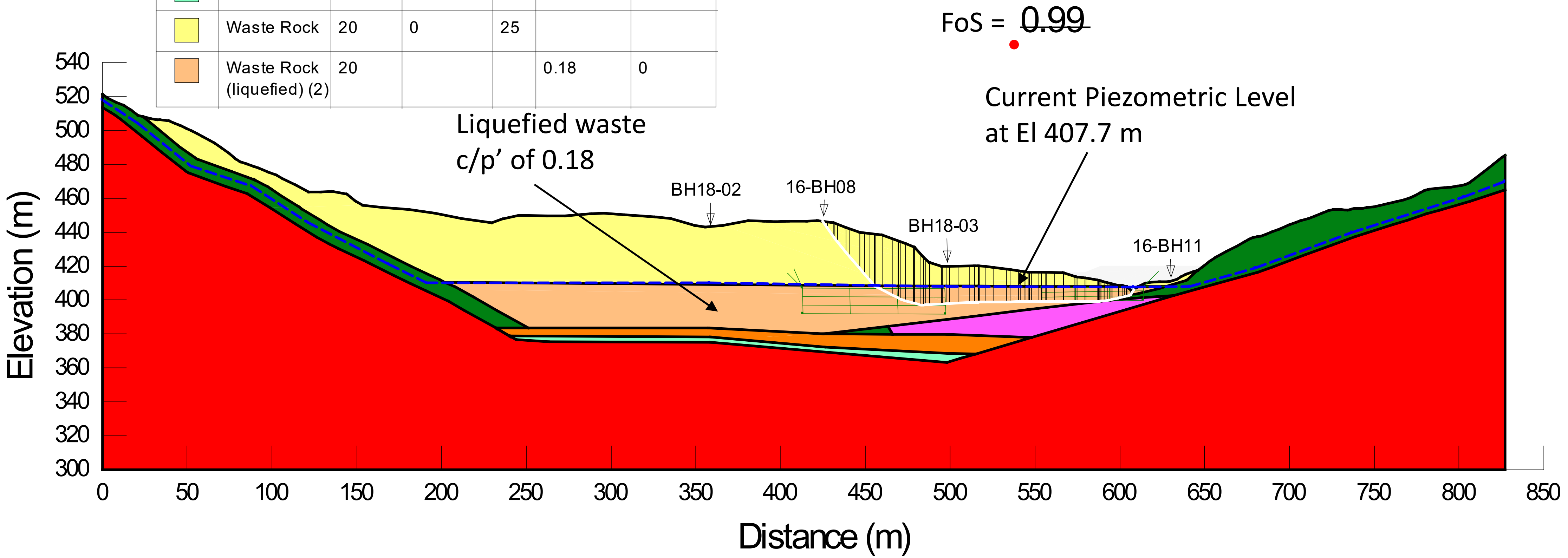
- Assumed static liquefaction for saturated waste c/p' of 0.1



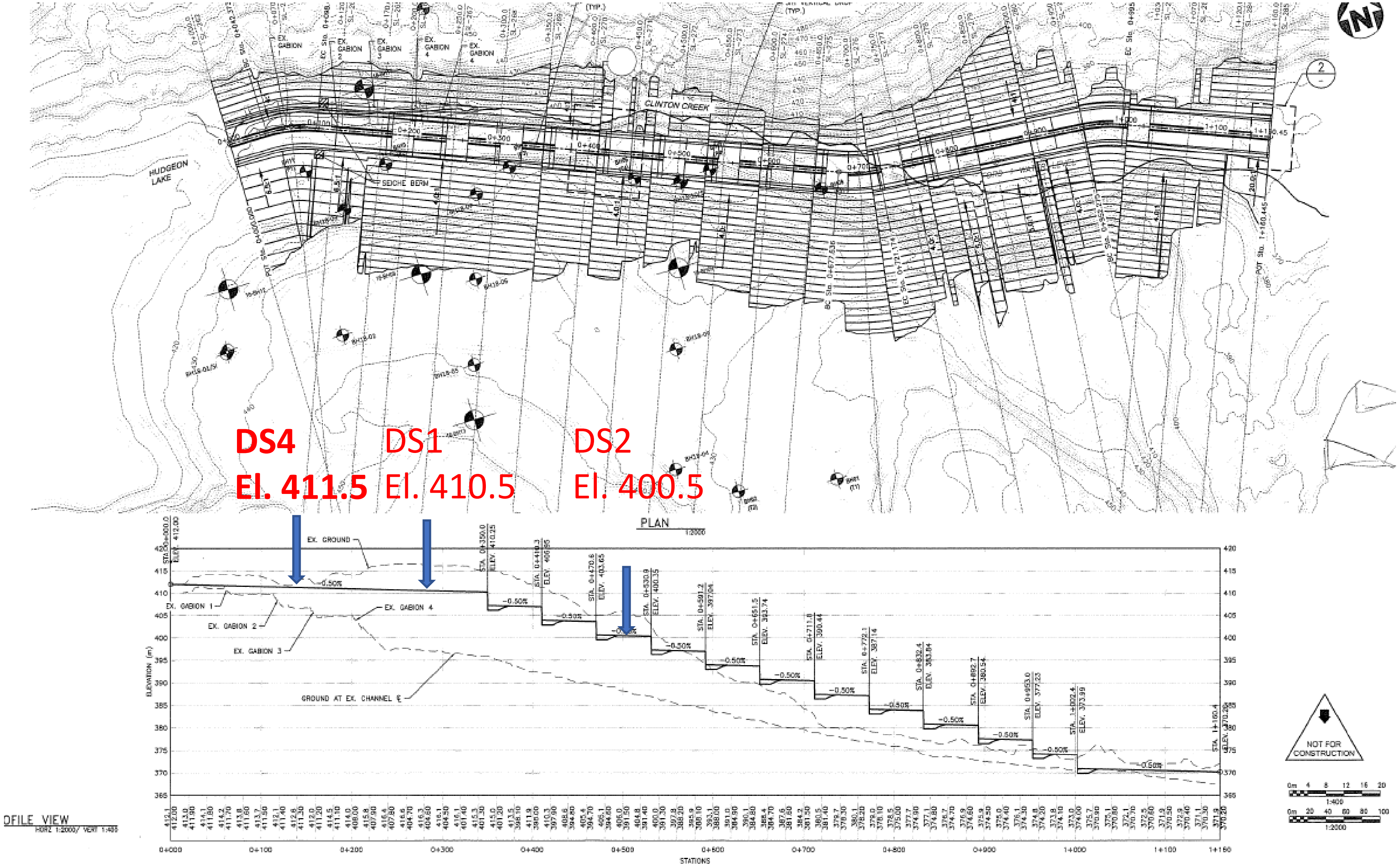
DS4 Base Case Stability – Saturated Waste Static Liquefaction Sensitivity

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied) (2)	20			0.18	0

- FoS of about unity with liquefied waste strength, c/p’ of 0.18
- With DS1 and DS2, back analyzed liquefied strength c/p’ of 0.14



Option CC1 - Lake at El. 412 m Preliminary Spillway Channel Design

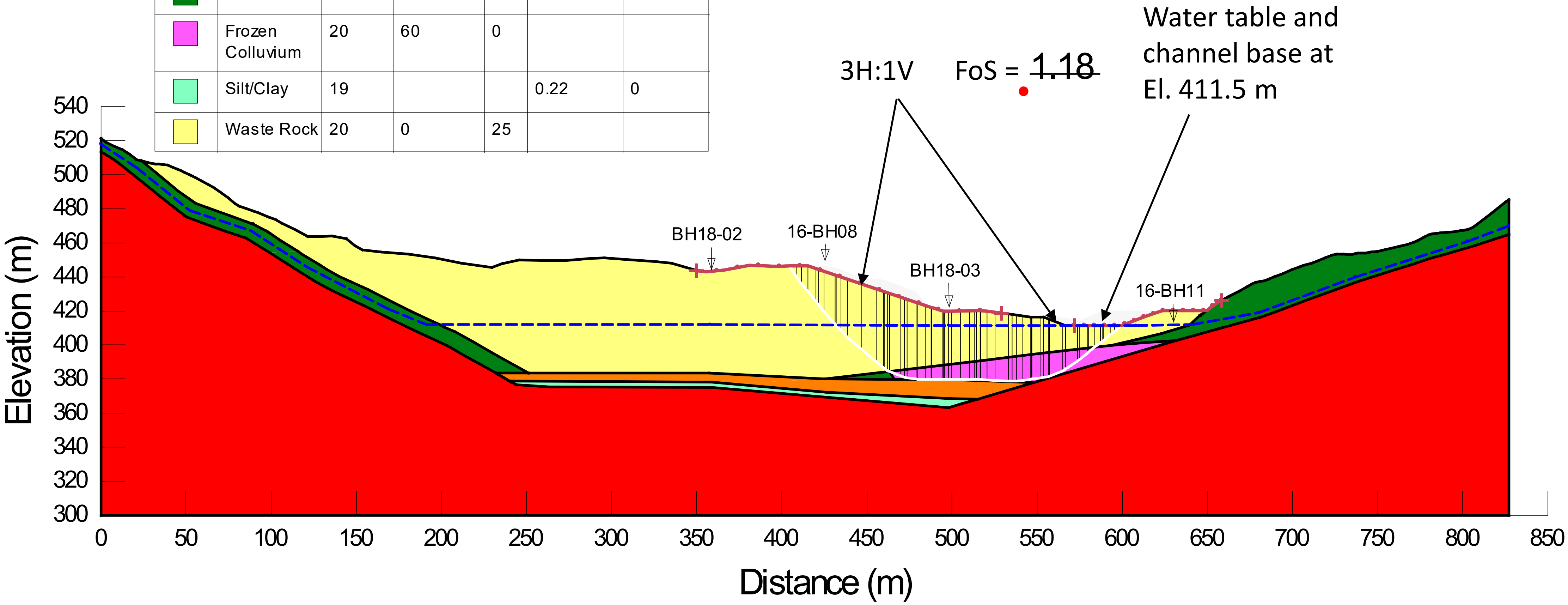


Option CC1 - Lake at El. 412 m
Spillway Design Case – No liquefaction (seismic and static)

CC1 - DS4 Stability, South Channel Option, No Liquefaction
3H:1V slope cut, Channel Base El. 411.5, width of ~32 m

- South channel option as preliminary design (slide 13)
- 3H:1V cut slopes with existing bench retained

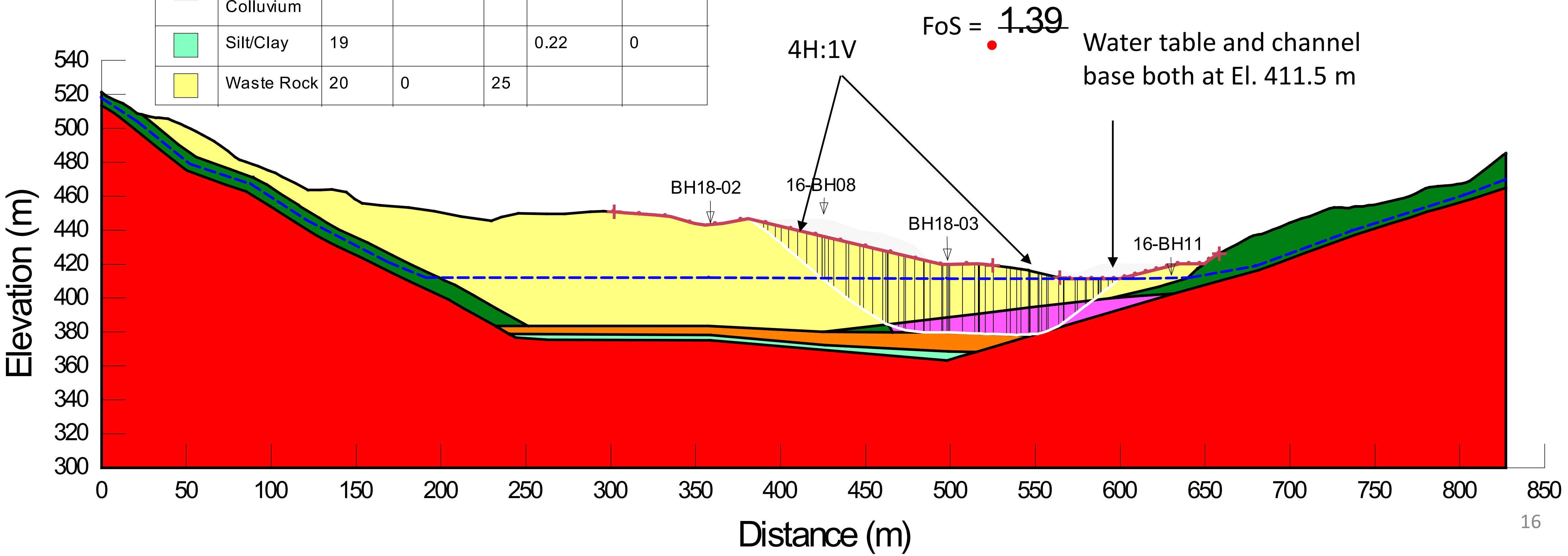
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		



CC1 - DS4 Stability, South Channel Option, No Liquefaction
4H:1V slope cut, and Channel Base El. 411.5, width of ~32 m

- 4H:1V cut slopes with existing bench retained

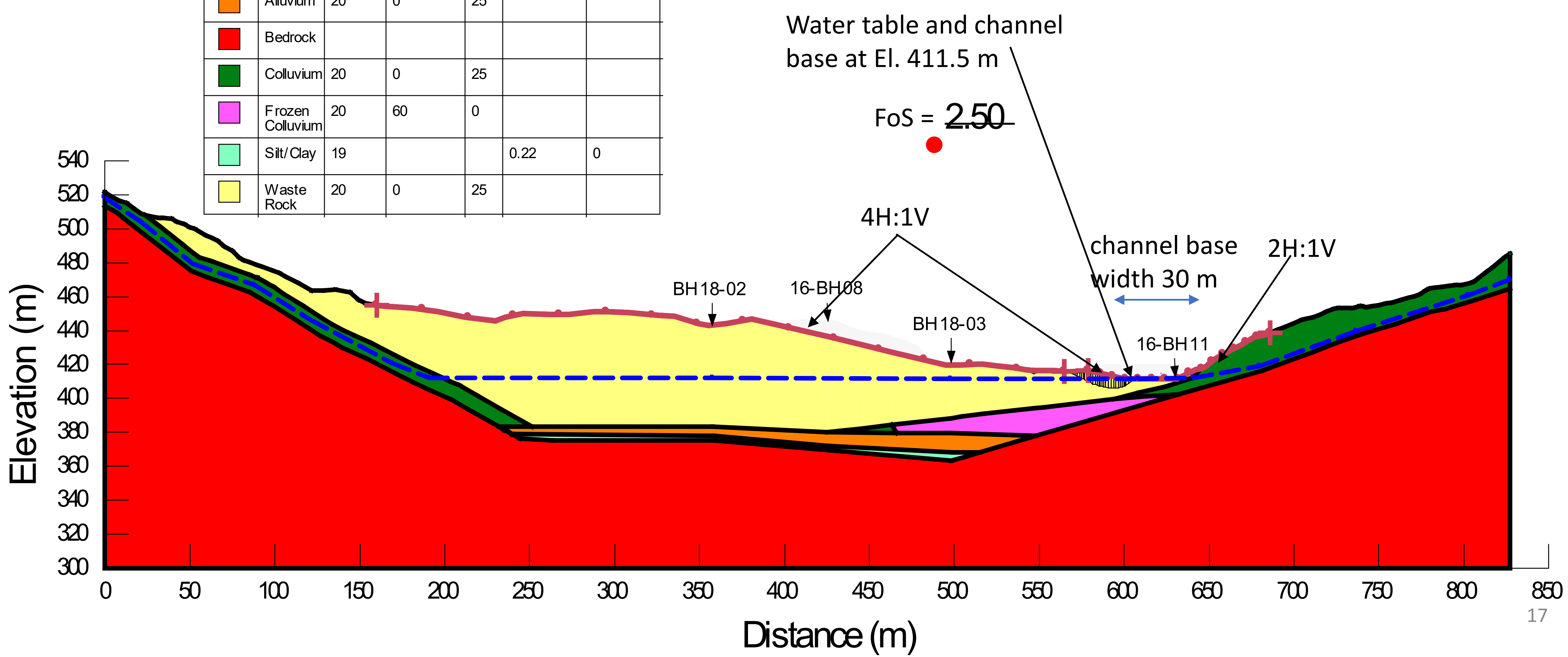
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		



CC1 - DS4 Stability, North Channel Option, No Liquefaction 4H:1V slope cut, and Channel Base El. 411.5, width of ~32 m

- 4H:1V cut slopes with existing bench retained
- Channel slope failure

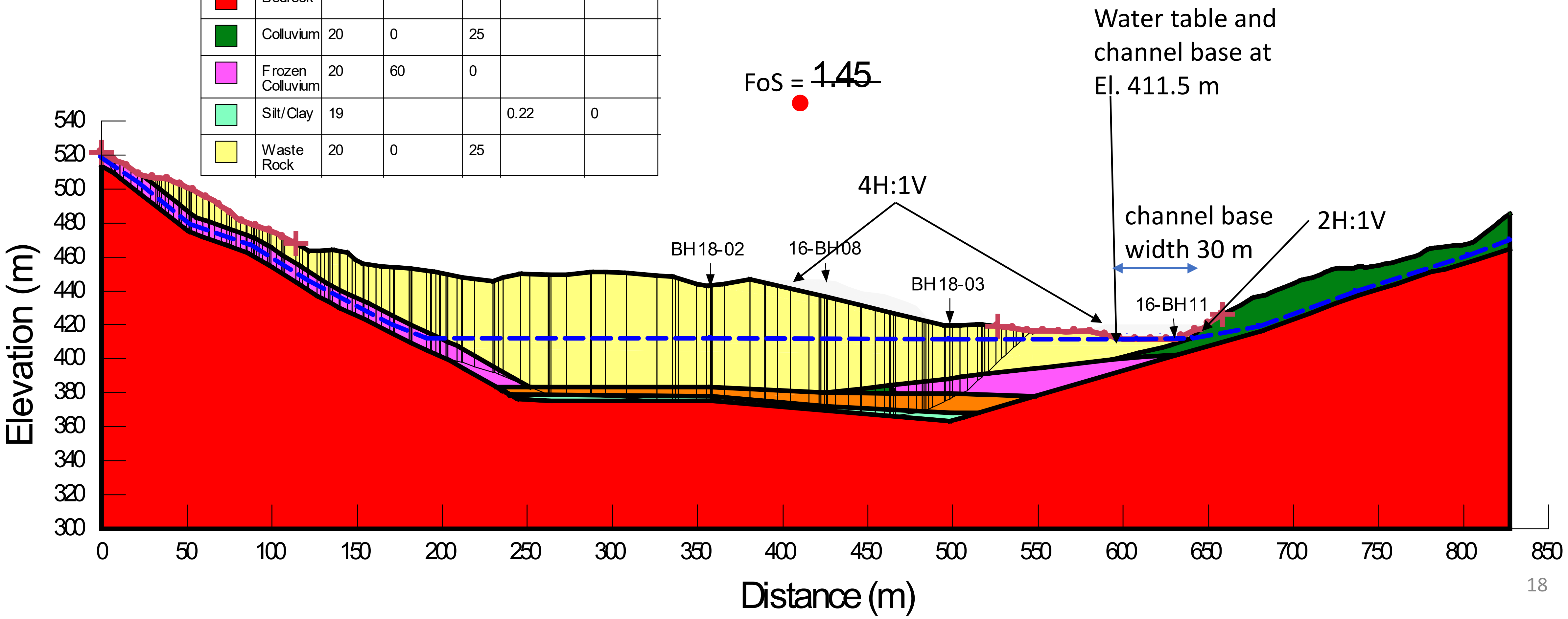
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		



CC1 - DS4 Stability, North Channel Option, No Liquefaction 4H:1V slope cut, and Channel Base El. 411.5, width of ~32 m

- 4H:1V cut slopes with existing bench retained
- Overall slope failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		

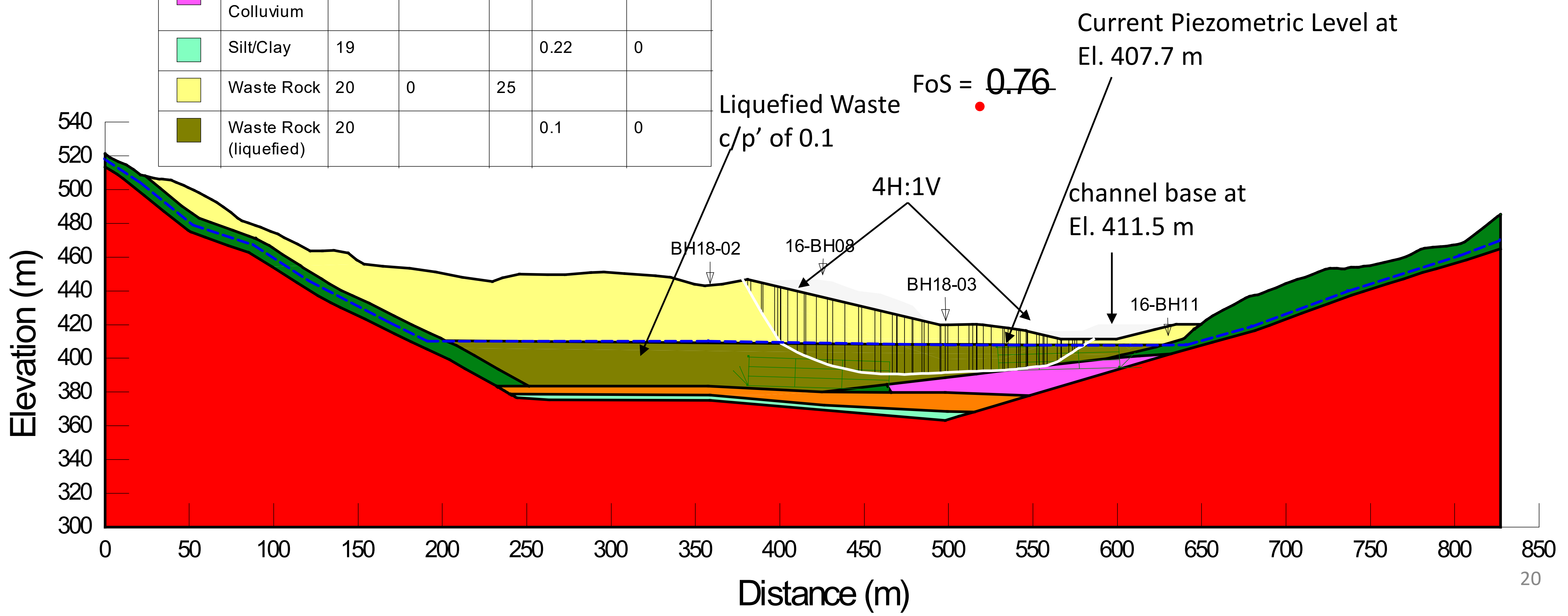


Option CC1 - Lake at El. 412 m
Spillway Design Construction – Static liquefaction
4H:1V south side Spillway Channel slope

CC1 - DS4 Stability, South Channel Option
4H:1V slope cut, Construction Static Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
(orange)	Alluvium	20	0	25		
(red)	Bedrock					
(green)	Colluvium	20	0	25		
(magenta)	Frozen Colluvium	20	60	0		
(light green)	Silt/Clay	19			0.22	0
(yellow)	Waste Rock	20	0	25		
(olive)	Waste Rock (liquefied)	20			0.1	0

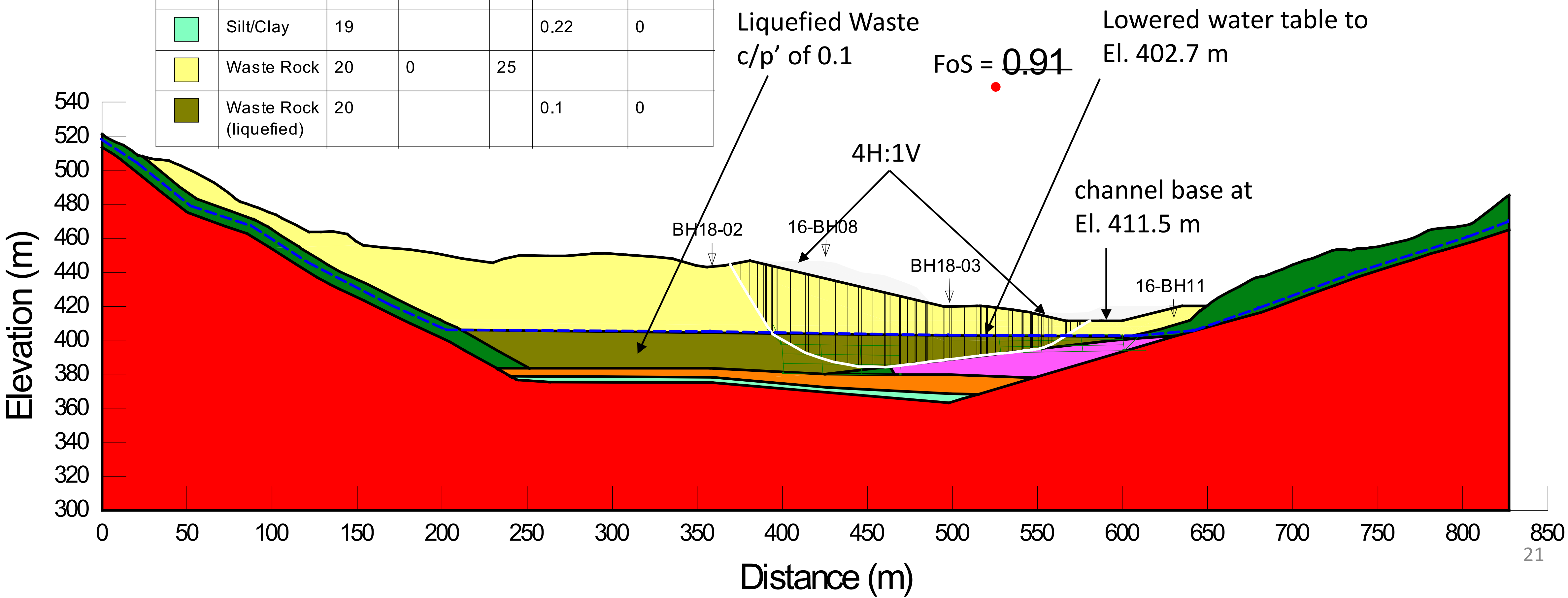
- 4H:1V cut slopes with existing bench retained
- Phreatic surface at El. 407.7 m (current elevation)
- Mid-slope failure



CC1 - DS4 Stability, South Channel Option
4H:1V slope cut, Construction Static Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

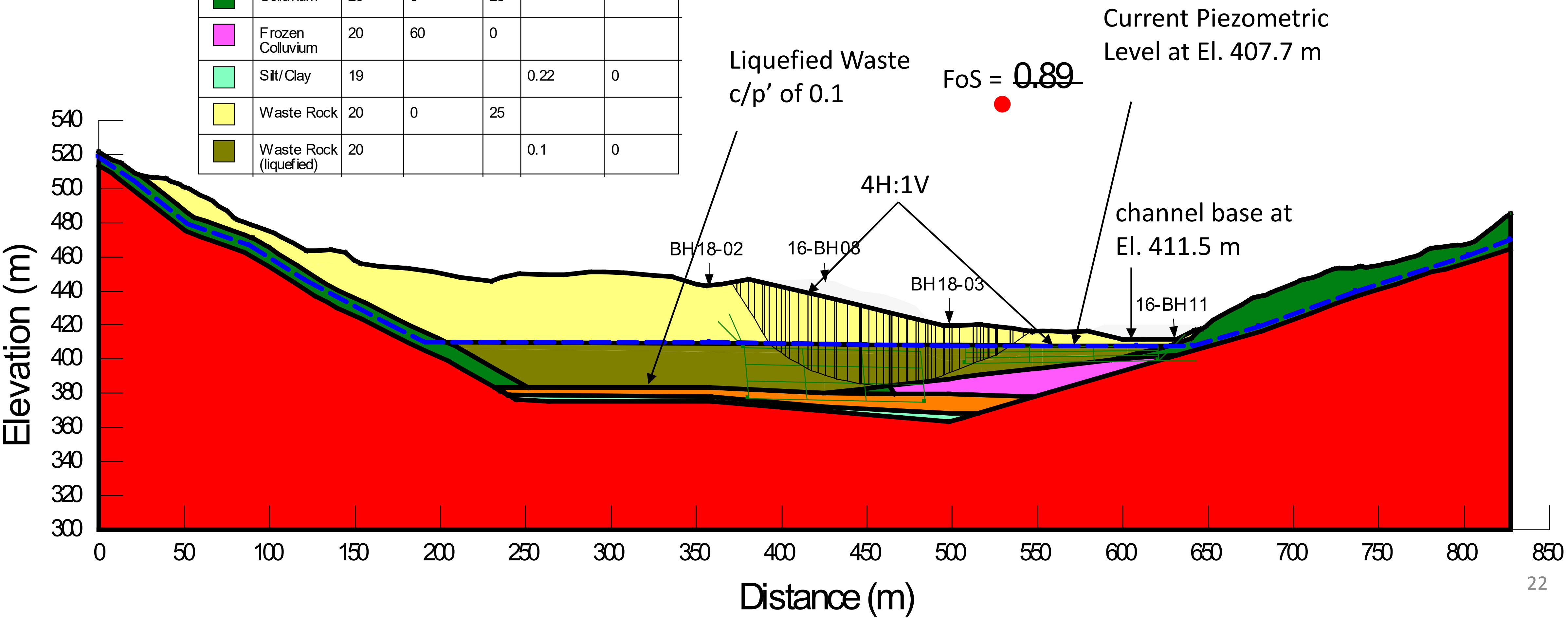
- 4H:1V cut slopes with existing bench retained
- Phreatic surface at El. 402.7 m (5 m lower than current)
- Mid-slope slope failure



CC1 - DS4 Stability, North Channel Option
4H:1V slope cut, Construction Static Liquefaction

- 4H:1V cut slopes with existing bench retained
- Phreatic surface at El. 407.7 m (current)
- Mid-slope failure

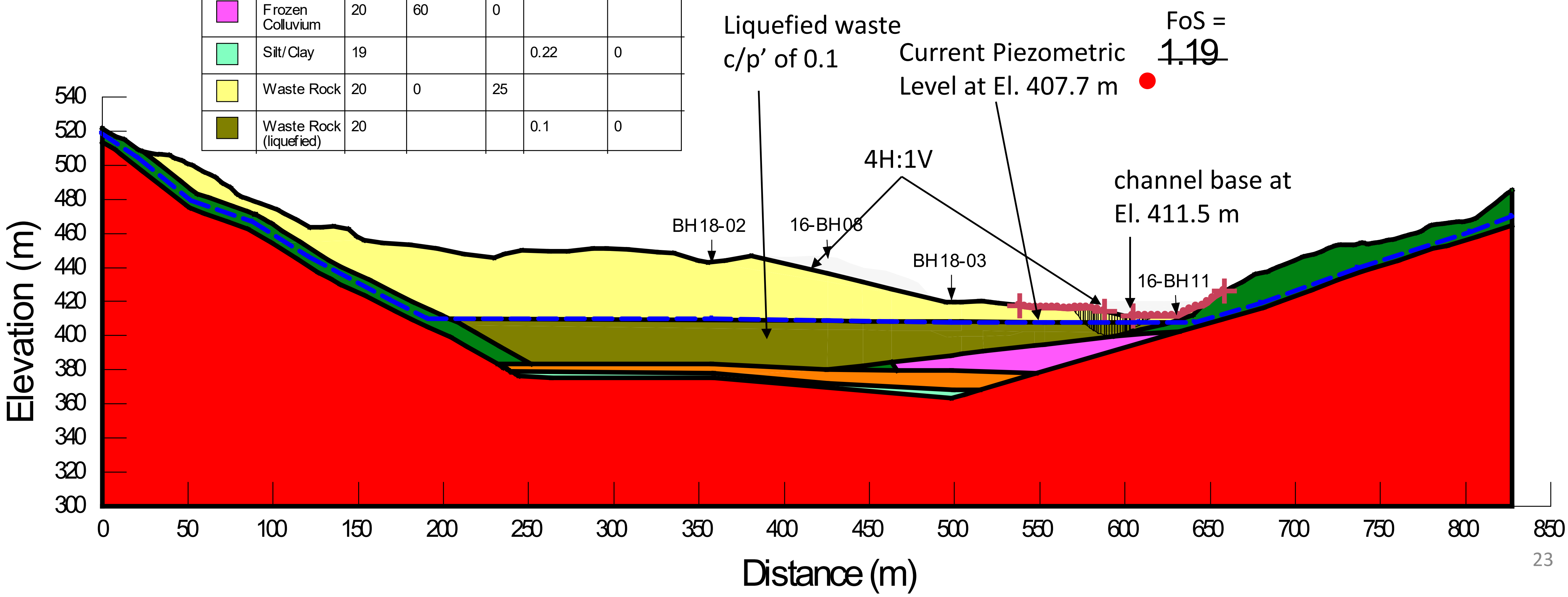
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0



CC1 - DS4 Stability, North Channel Option
4H:1V slope cut, Construction Static Liquefaction

- 4H:1V cut slopes with existing bench retained
- Phreatic surface at El. 407.7 m (current)
- Toe failure

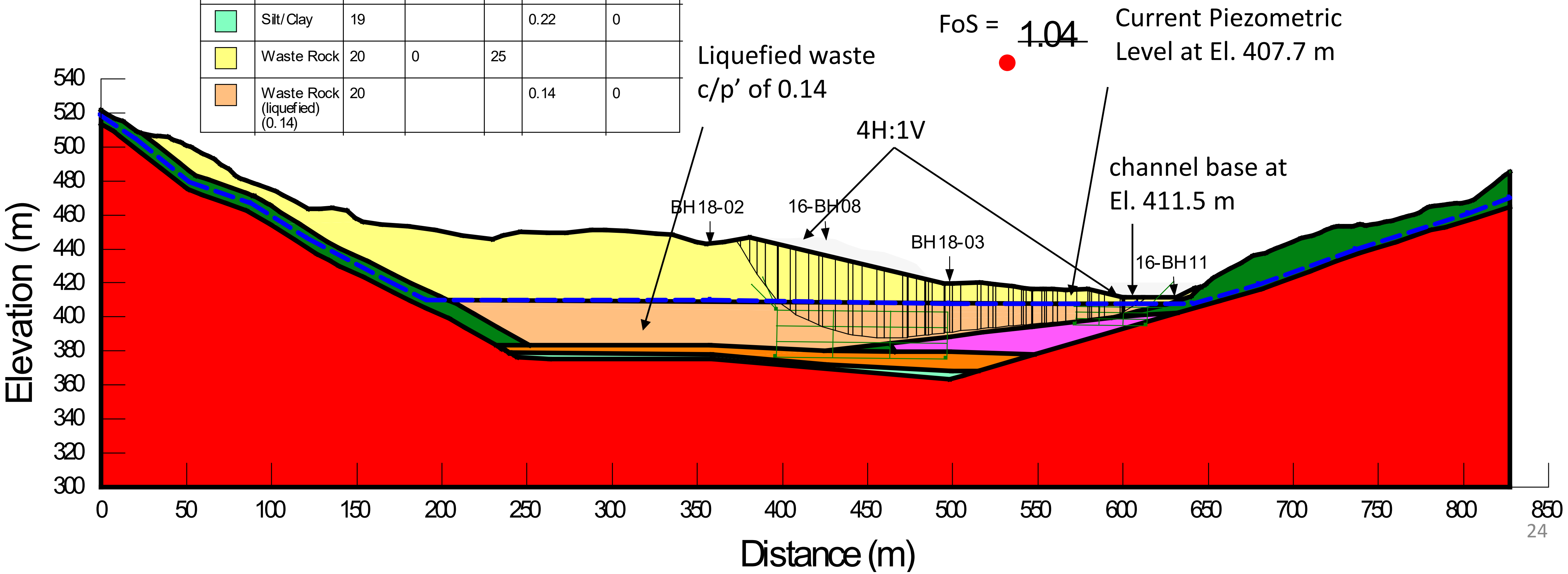
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0



CC1 - DS4 Stability, North Channel Option
4H:1V slope cut, Construction Static Liquefaction

- 4H:1V cut slopes with existing bench retained
- Phreatic surface at El. 407.7 m (current)
- Mid-slope failure
- Back analyzed liquified strength from DS1 and DS2, c/p’ of 0.14

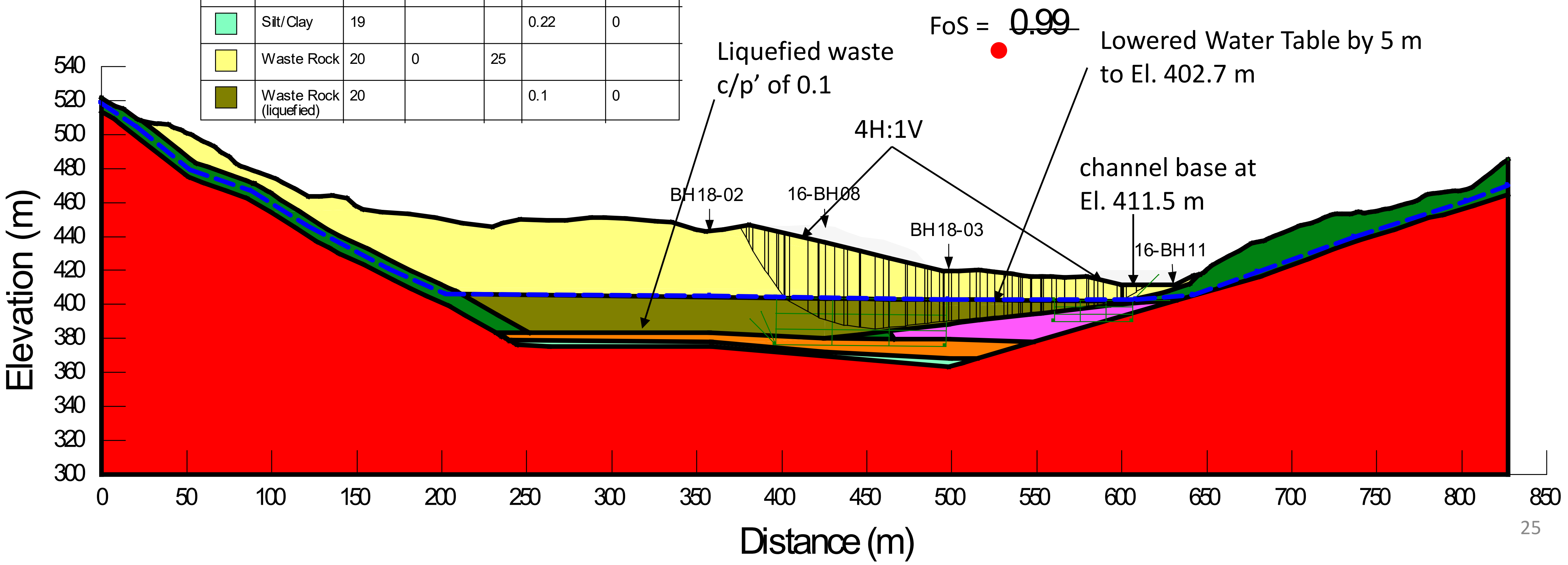
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied) (0.14)	20			0.14	0



CC1 - DS4 Stability, North Channel Option
4H:1V slope cut, Construction Static Liquefaction

- 4H:1V cut slopes with existing bench retained
- Phreatic surface at El. 402.7 m (5 m lower than current)
- Mid-slope failure

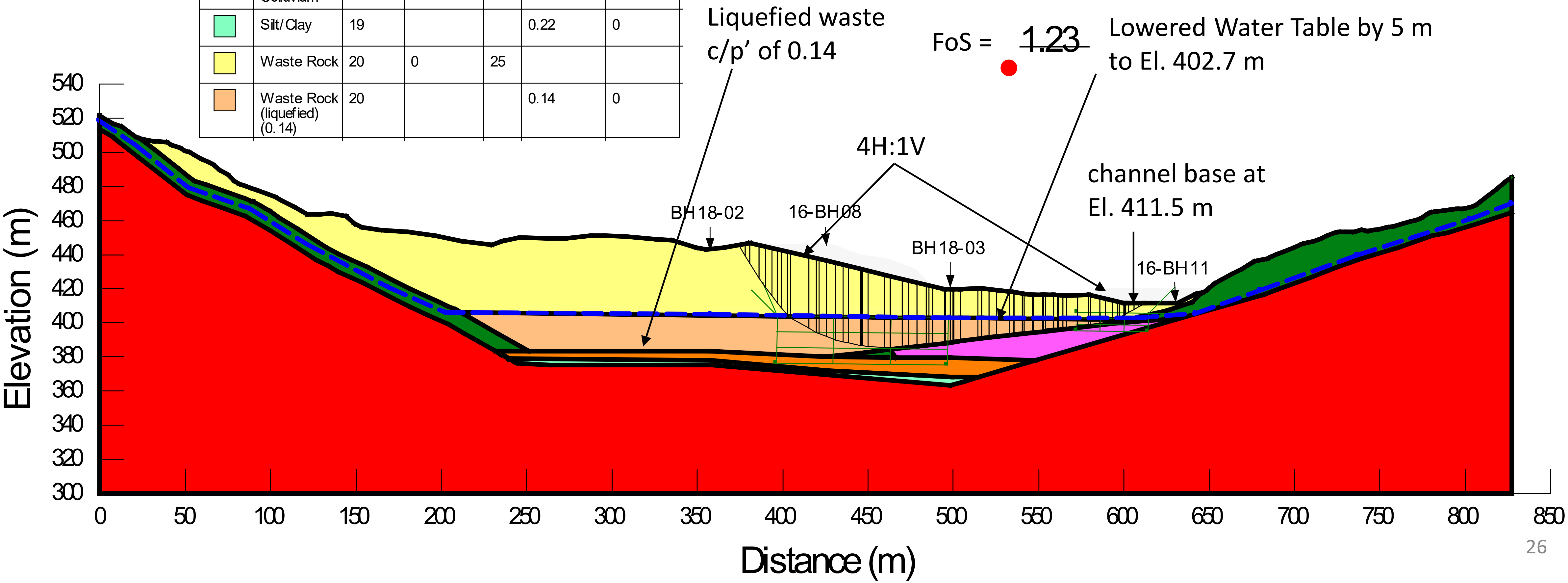
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0



CC1 - DS4 Stability, North Channel Option 4H:1V slope cut, Construction Static Liquefaction

- 4H:1V cut slopes with existing bench retained
- Phreatic surface at El. 402.7 m (5 m lower than current)
- Mid-slope failure
- Back analyzed liquified strength from DS1 and DS2, c/p’ of 0.14

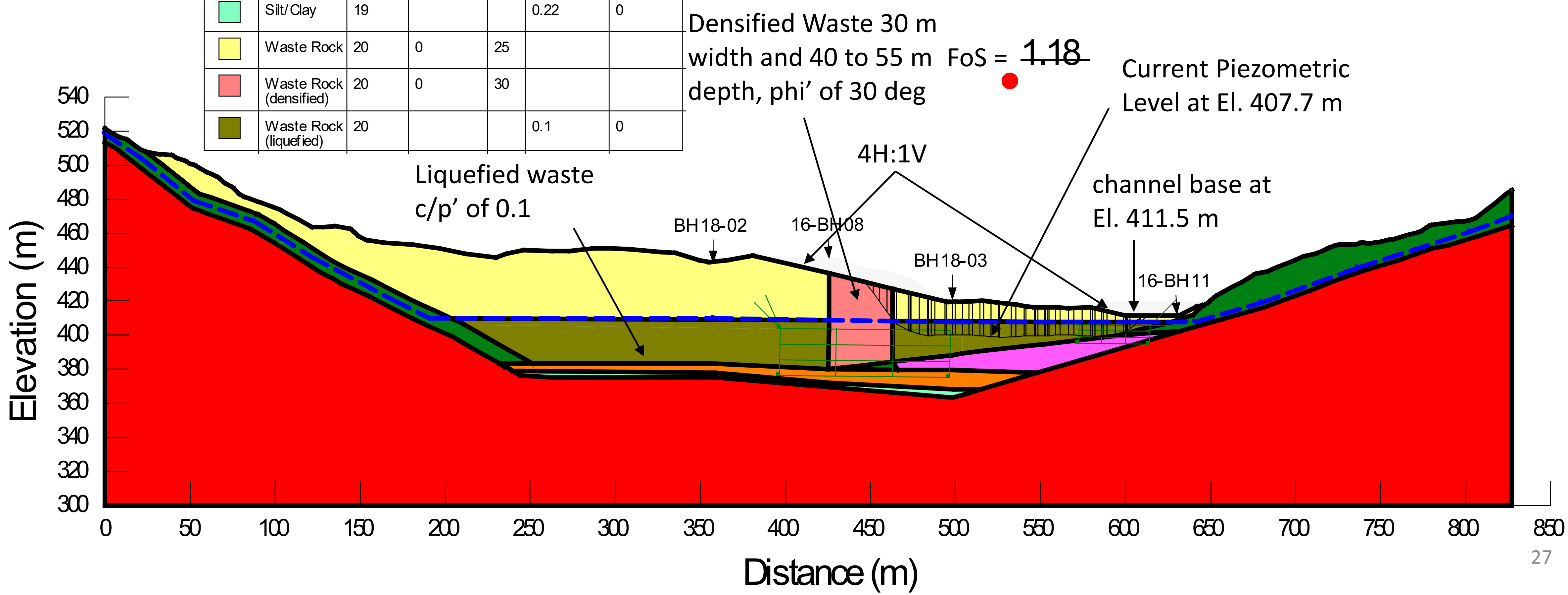
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied) (0.14)	20			0.14	0



CC1 - DS4 Stability, North Channel Option 4H:1V slope cut, Construction Static Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (densified)	20	0	30		
	Waste Rock (liquefied)	20			0.1	0

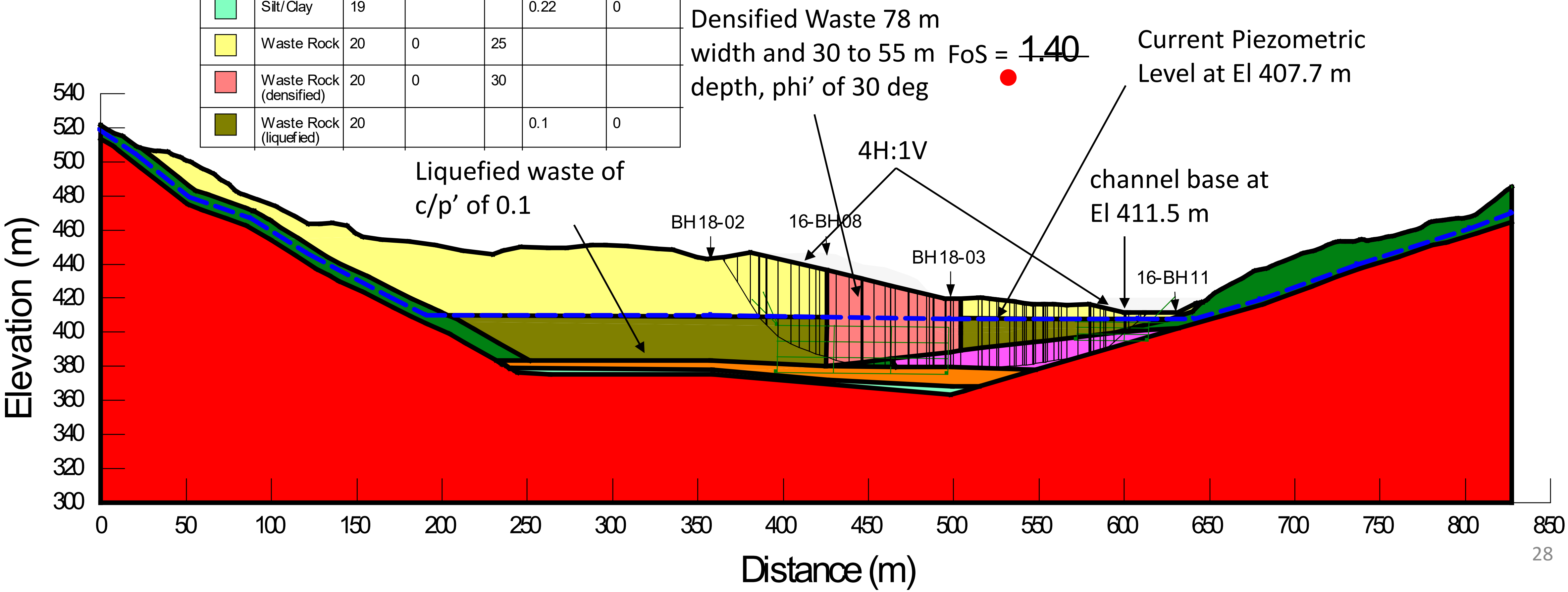
- 4H:1V cut slopes with existing bench retained
- Phreatic surface at El. 407.7 m (current)
- Mid-slope failure
- Densified 30 m wide zone of waste



CC1 - DS4 Stability, North Channel Option 4H:1V slope cut, Construction Static Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (densified)	20	0	30		
	Waste Rock (liquefied)	20			0.1	0

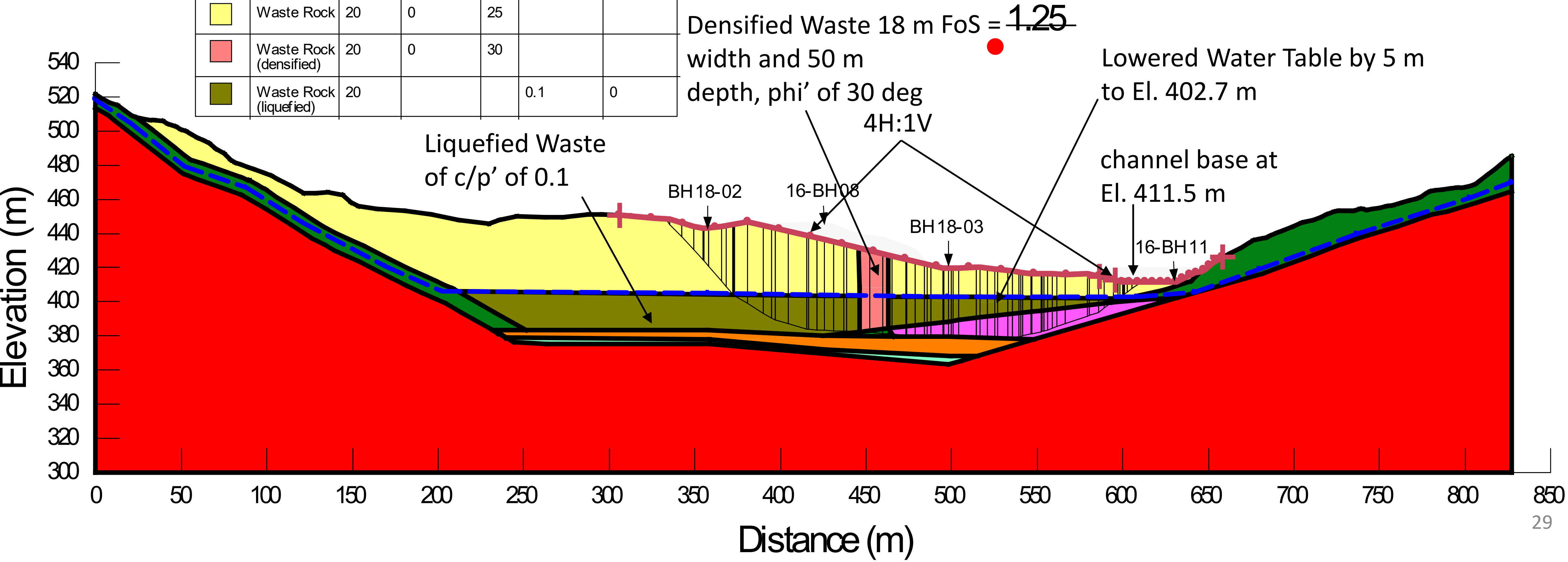
- 4H:1V cut slopes with existing bench retained
- Phreatic surface at El. 407.7 m (current)
- Mid-slope failure
- Densified 78 m wide zone of waste



CC1 - DS4 Stability, North Channel Option
4H:1V slope cut, Construction Static Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (densified)	20	0	30		
	Waste Rock (liquefied)	20			0.1	0

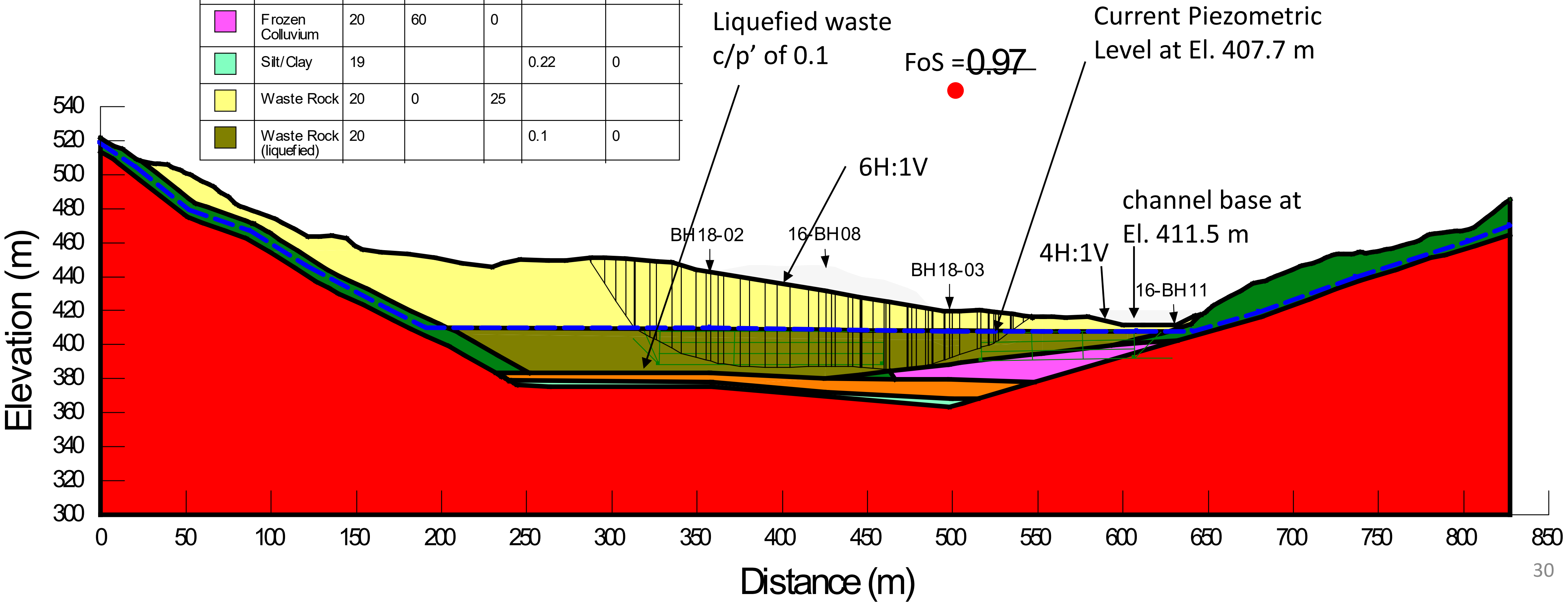
- 4H:1V cut slopes with existing bench retained
- Phreatic surface at El. 402.7 m (lowered 5 m)
- Mid-slope failure
- Densified 18 m wide zone of waste



CC1 - DS4 Stability, North Channel Option
6H:1V slope cut, Construction Static Liquefaction

- 6H:1V cut slope with existing bench retained (4H:1V channel slope)
- Phreatic surface at El. 407.7 m (current)
- Mid-slope failure

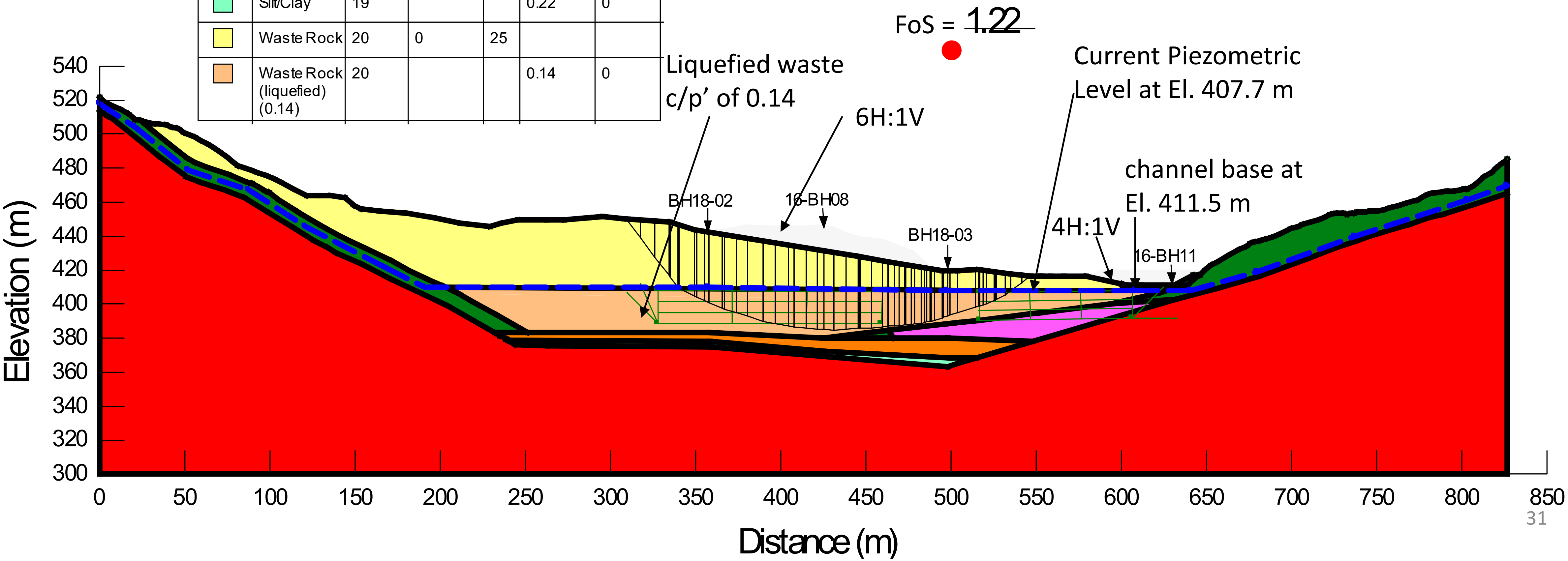
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0



CC1 - DS4 Stability, North Channel Option 6H:1V slope cut, Construction Static Liquefaction

Color	Name	Unit Weight (kN/m^3)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied) (0.14)	20			0.14	0

- 6H:1V cut slopes with existing bench retained
- Phreatic surface at El. 407.7 m (current)
- Mid-slope failure
- Back analyzed liquified strength from DS1 and DS2, c/p’ of 0.14



DS4 Summary (CC1-Lake at El 412 m)

- Without considering static liquefaction, a 3H:1V to 4H:1V cut slope is sufficient for channel stability.
- Locating spillway channel closer to north slope would improve stability and reduce material excavation.
- Lowering water table before construction would reduce zoning of potential static liquefaction and improve stability.
- Densification of Waste would prevent static liquefaction and improve stability.
- Considering potential risk of static liquefaction, the following one or more options are available:
    - Move spillway channel closer to north slope.
    - Lower water table by 5 m before construction
    - Densify Waste using method such as blasting.
    - Flatten slope to 6H:1V or less steep.

Option CC2 - Lake at El. 400 m
Preliminary Spillway Channel Design

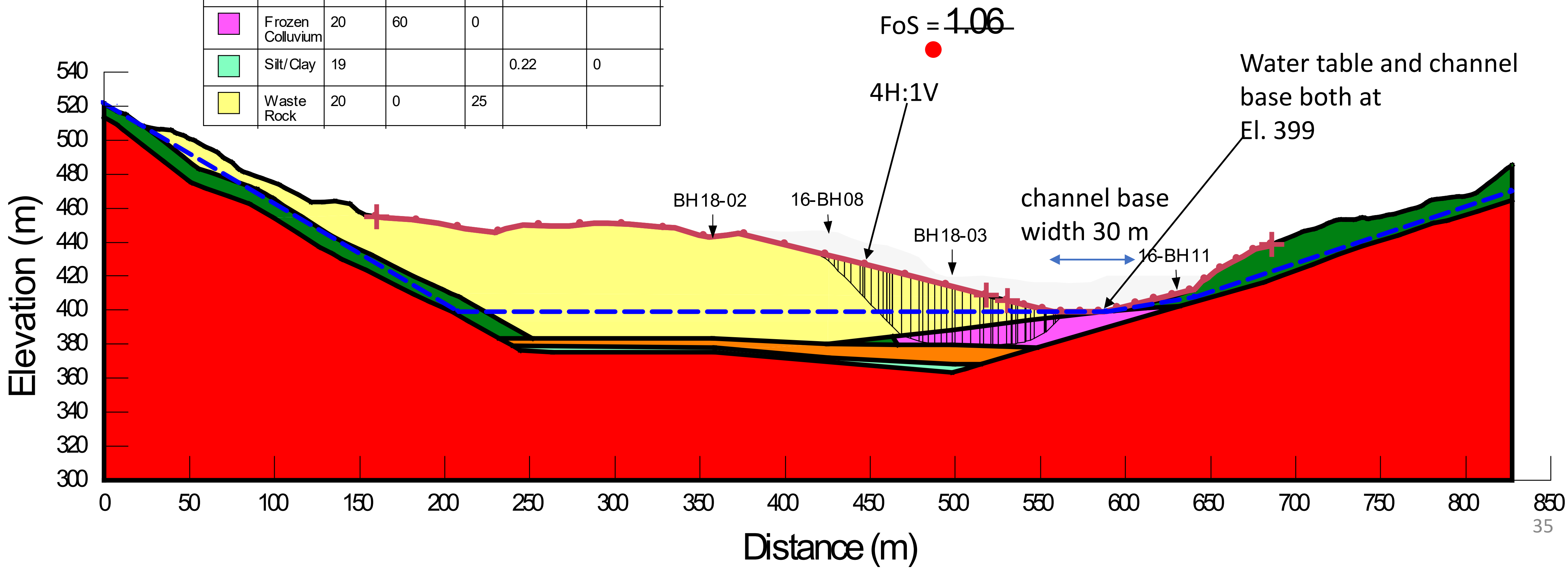
- Approximate spillway invert elevations from hydrotechnical design sections
  - **DS4 - El. 399 m**
  - DS1 - El. 398 m
  - DS2 - El. 390 m

Option CC2 - Lake at El. 400 m
Spillway Design Case – No liquefaction (seismic and static)

CC2 - DS4 Stability, North Channel 4H:1V slope cut, No Liquefaction

- Channel base at El 399m, 30 m wide, against north valley wall
- Phreatic surface at El. 399 m (currently at 407.7 m)
- Mid-slope failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		

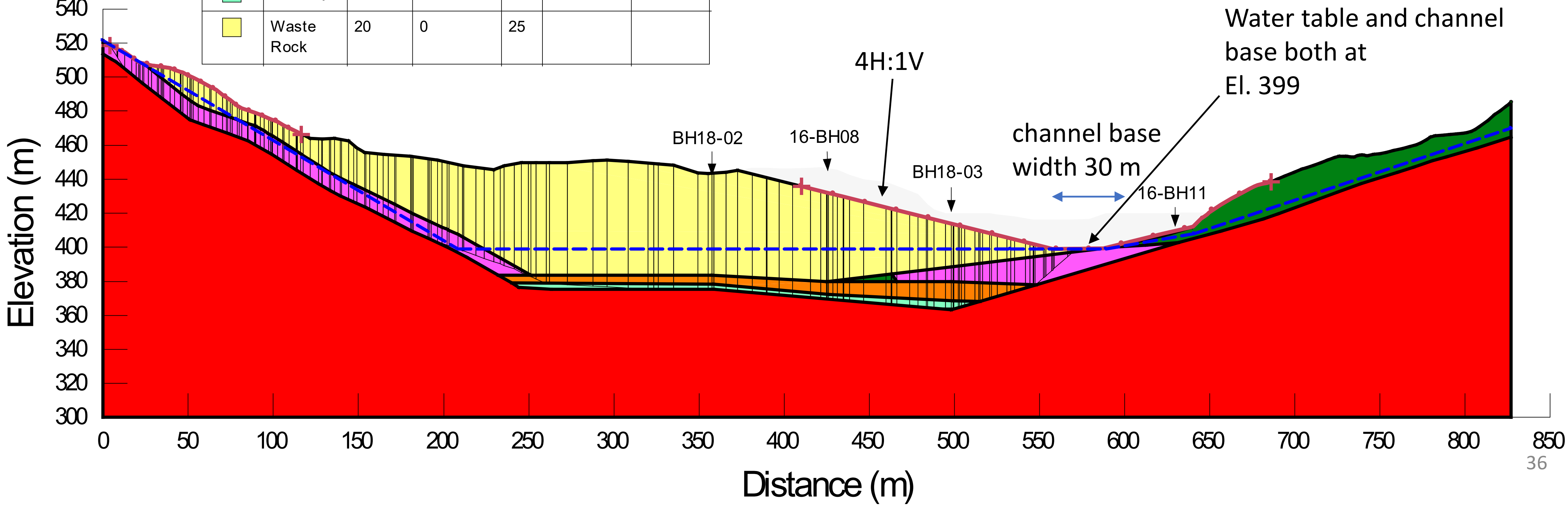


CC2 - DS4 Stability, North Channel 4H:1V slope cut, No Liquefaction

- Channel base at El 399m, 30 m wide
- Phreatic surface at El. 399 m (currently at 407.7 m)
- Overall failure, including assuming the south slope has ice-rich colluvium

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		

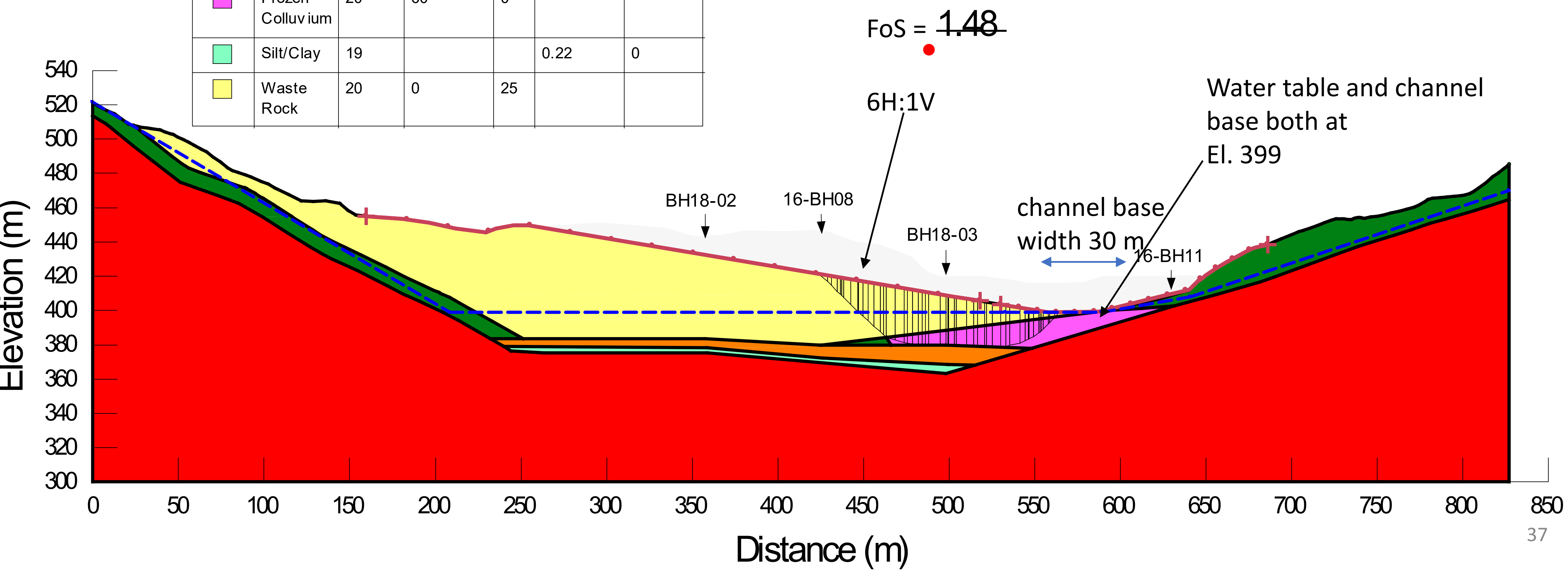
FoS = ~~1.18~~



CC2 - DS4 Stability, North Channel 6H:1V slope cut, No Liquefaction

- Channel base at El 399m, 30 m wide
- Phreatic surface at El. 399 m (currently at 407.7 m)
- Mid-slope failure

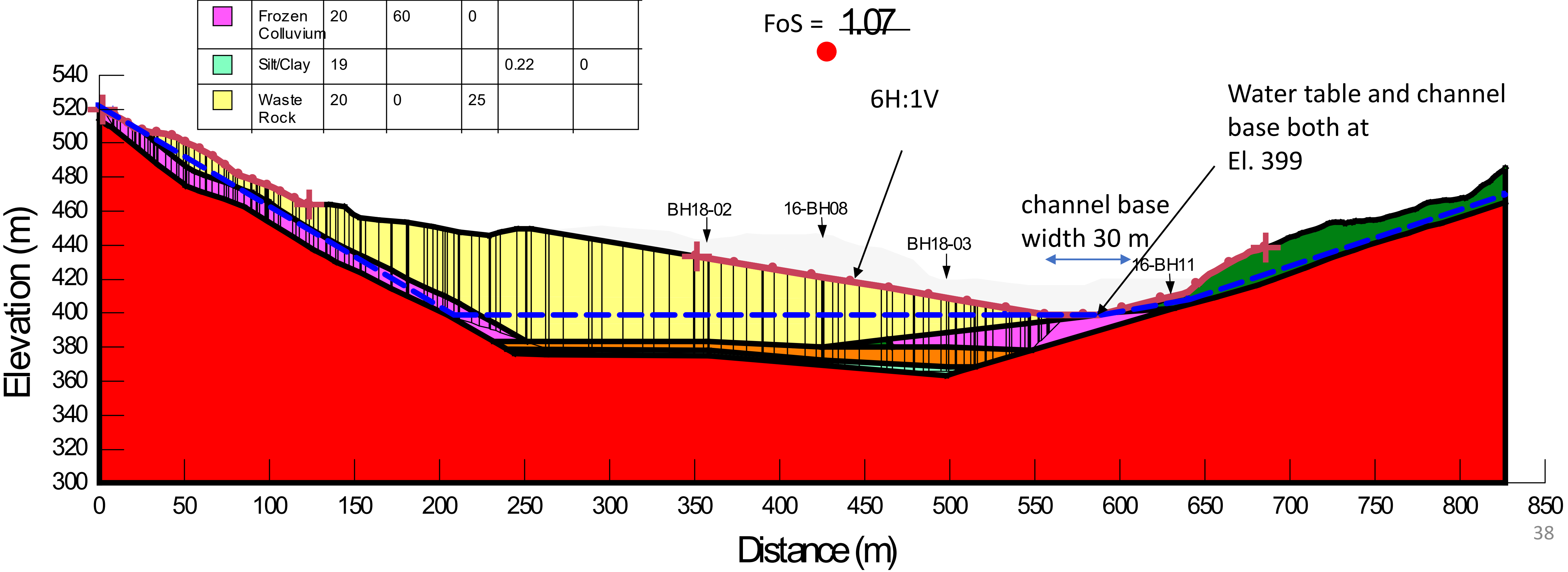
Color	Name	Unit Weight (kN/m^3)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		



CC2 - DS4 Stability, North Channel 6H:1V slope cut, No Liquefaction

- Channel base at El 399m, 30 m wide
- Phreatic surface at El. 399 m (currently at 407.7 m)
- Overall failure, including assuming the south slope has ice-rich colluvium

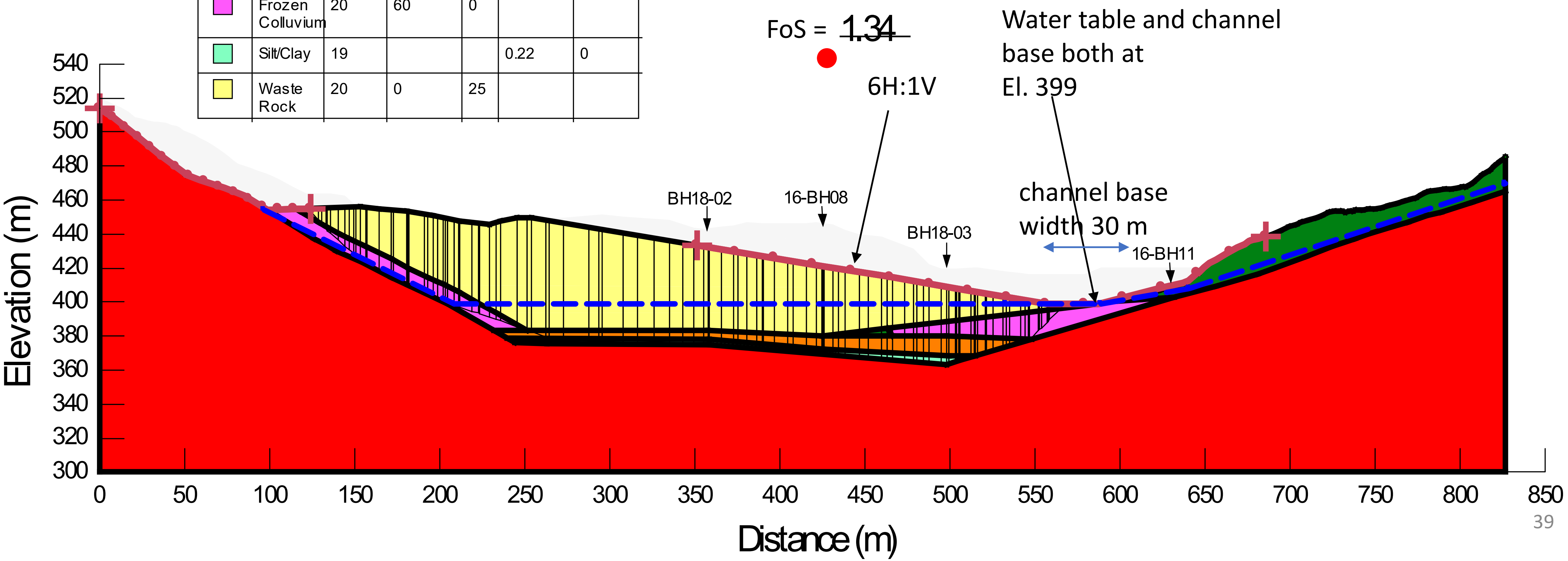
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		



CC2 - DS4 Stability, North Channel 6H:1V slope cut, No Liquefaction

- Channel base at El 399m, 30 m wide
- Phreatic surface at El. 399 m (currently at 407.7 m)
- Overall failure, including assuming the south slope has ice-rich colluvium
- Unload the backslope

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		

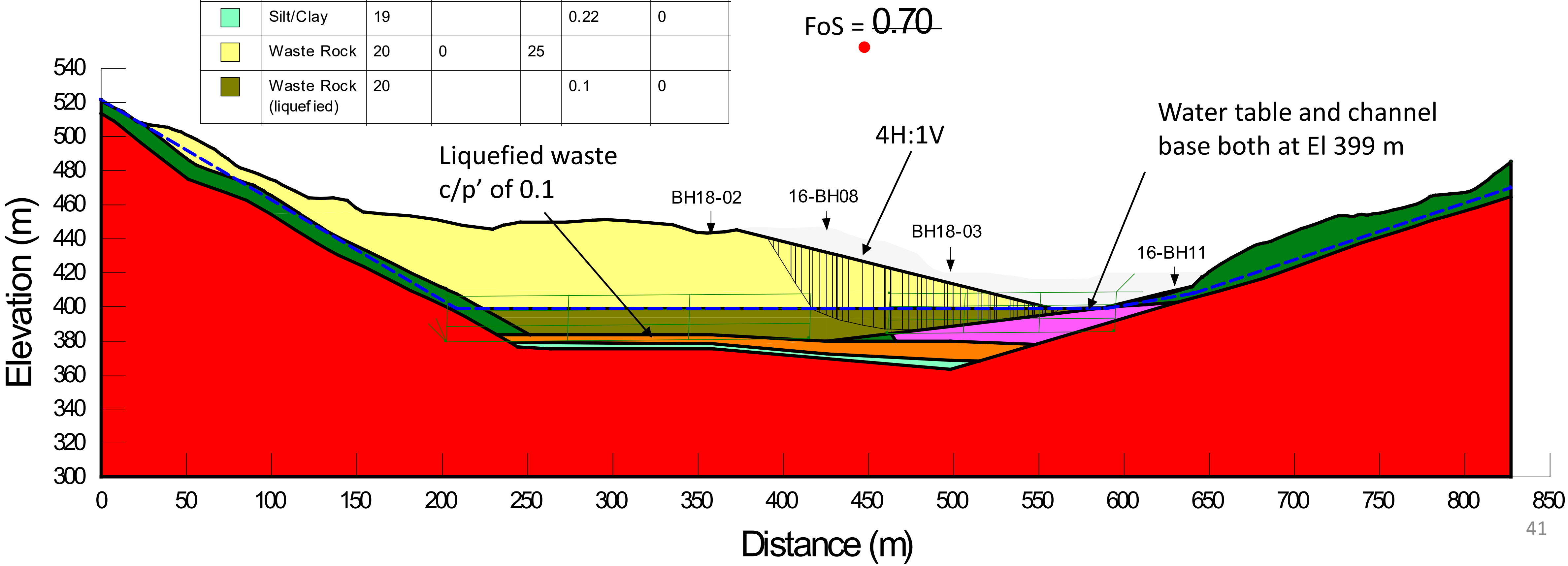


Option CC2 - Lake at El. 400 m
Spillway Design Construction – Static liquefaction

CC2 - DS4 Stability, North Channel
4H:1V slope cut, Static Construction Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

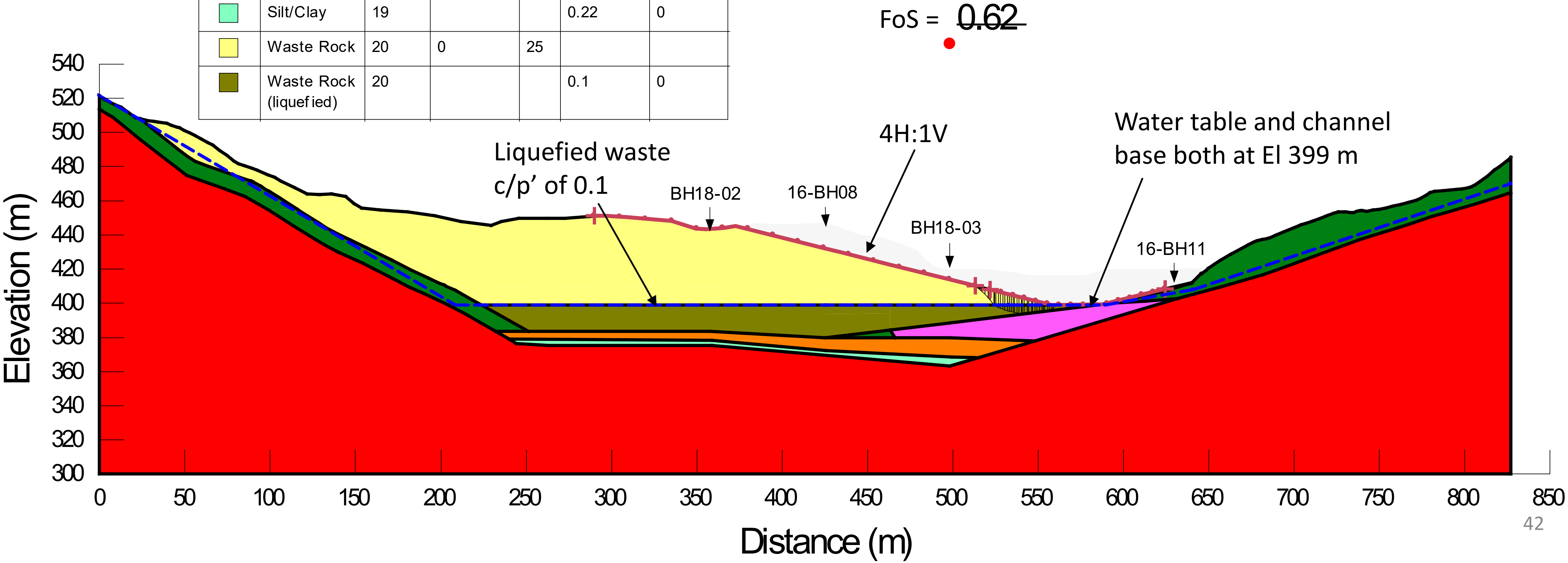
- Channel base at El 399m, 30 m wide
- Phreatic surface at El. 399 m (currently at 407.7 m)
- Mid-slope failure



CC2 - DS4 Stability, North Channel
4H:1V slope cut, Static Construction Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

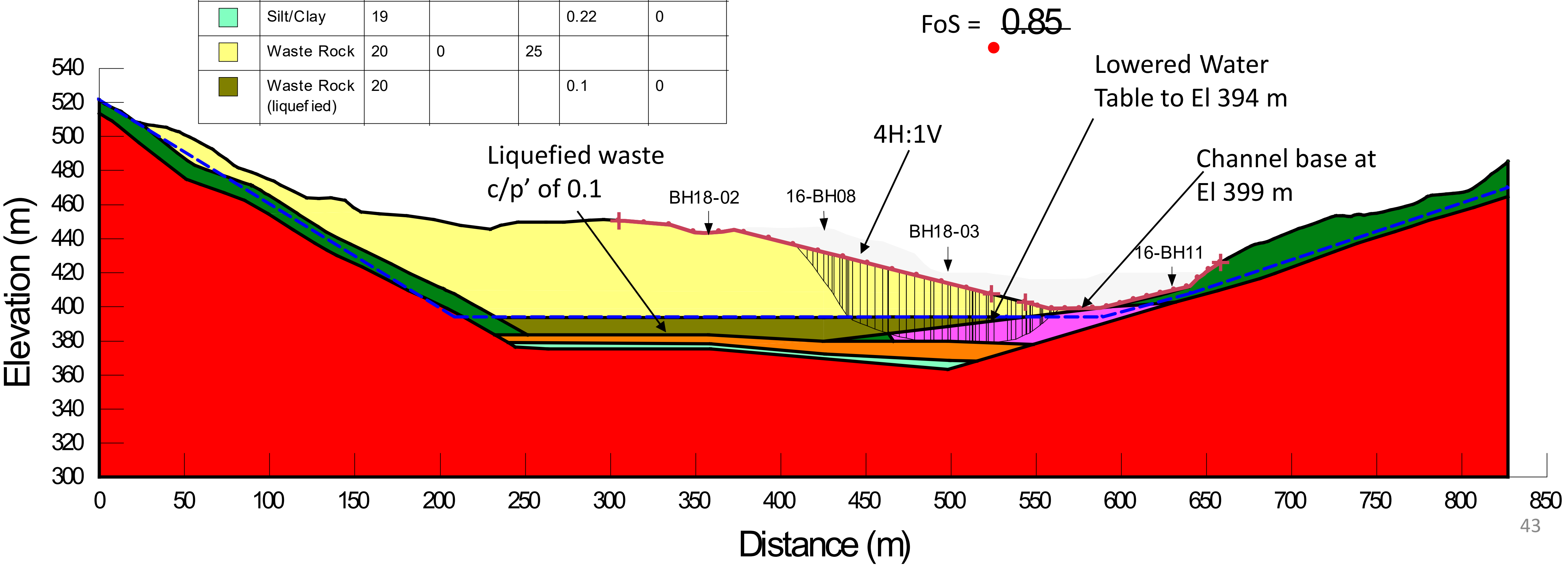
- Channel base at El 399m, 30 m wide
- Phreatic surface at El. 399 m (currently at 407.7 m)
- Toe failure



CC2 - DS4 Stability, North Channel
4H:1V slope cut, Static Construction Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

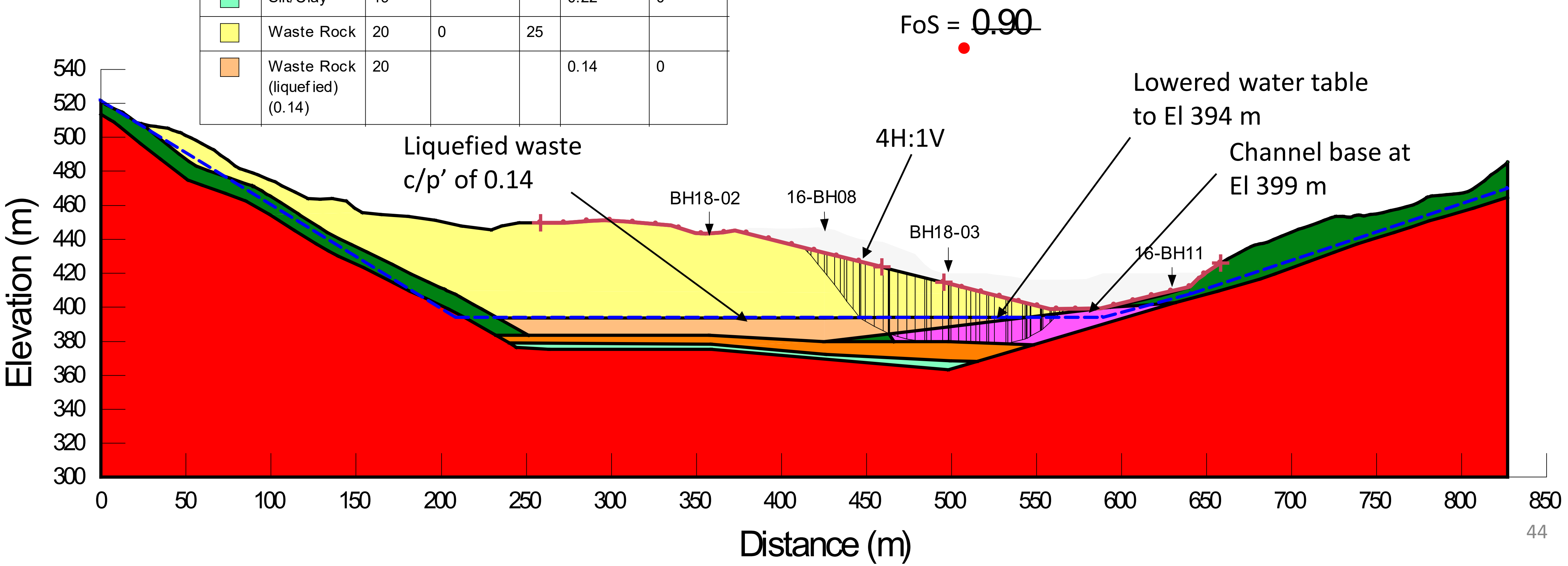
- Channel base at El 399m, 30 m wide
- Phreatic surface at El. 394 m (5 m below base of channel)
- Mid-slope failure



CC2 - DS4 Stability, North Channel
4H:1V slope cut, Static Construction Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied) (0.14)	20			0.14	0

- Channel base at El 399m, 30 m wide
- Phreatic surface at El. 394 m (5 m below base of channel)
- Mid-slope failure
- Back analyzed liquified strength from DS1 and DS2, c/p' of 0.14

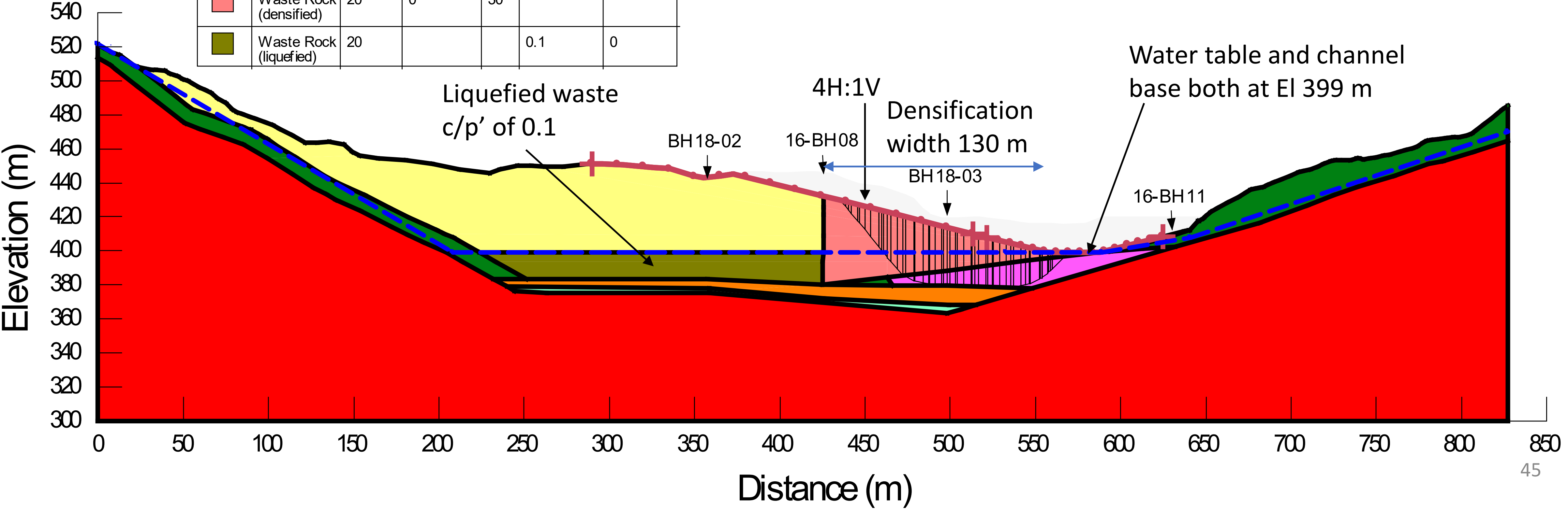


CC2 - DS4 Stability, North Channel
4H:1V slope cut, Static Construction Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (densified)	20	0	30		
	Waste Rock (liquefied)	20			0.1	0

- Channel base at El 399m, 30 m wide
- Phreatic surface at El. 399 m (at base of channel)
- Mid-slope failure
- Densified 130 m wide zone of waste

FoS = 1.17

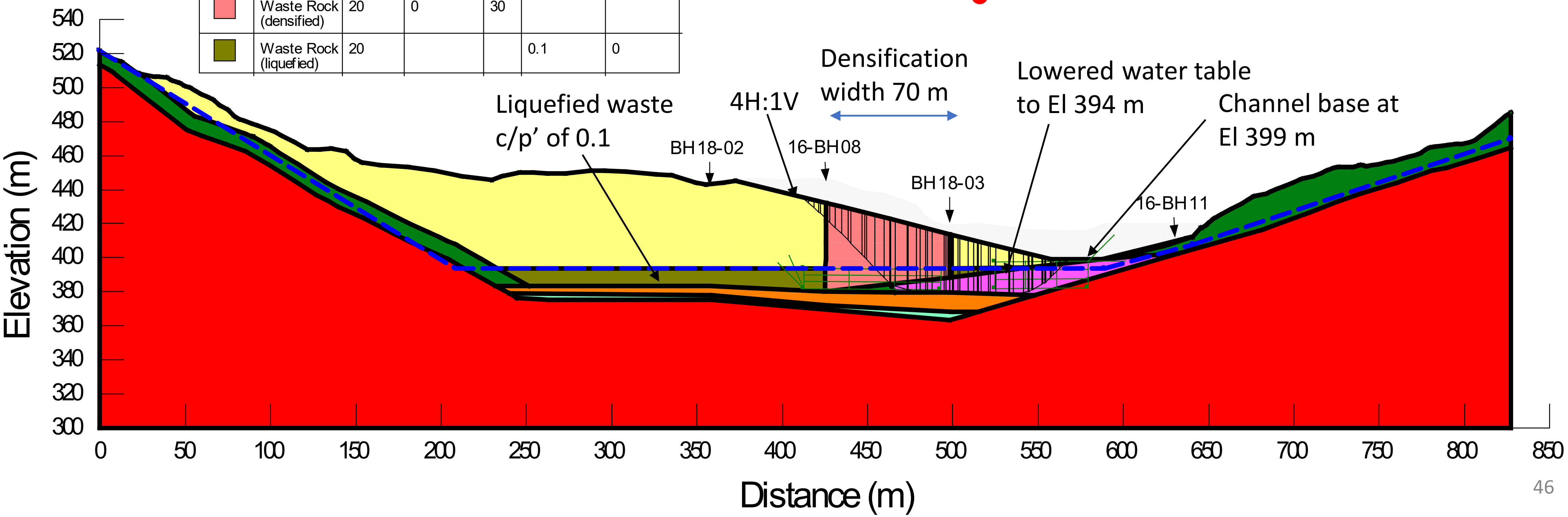


CC2 - DS4 Stability, North Channel
4H:1V slope cut, Static Construction Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (densified)	20	0	30		
	Waste Rock (liquefied)	20			0.1	0

- Channel base at El 399m, 30 m wide
- Phreatic surface at El. 394 m (5 m below base of channel)
- Mid-slope failure
- Densified 70 m wide zone of waste

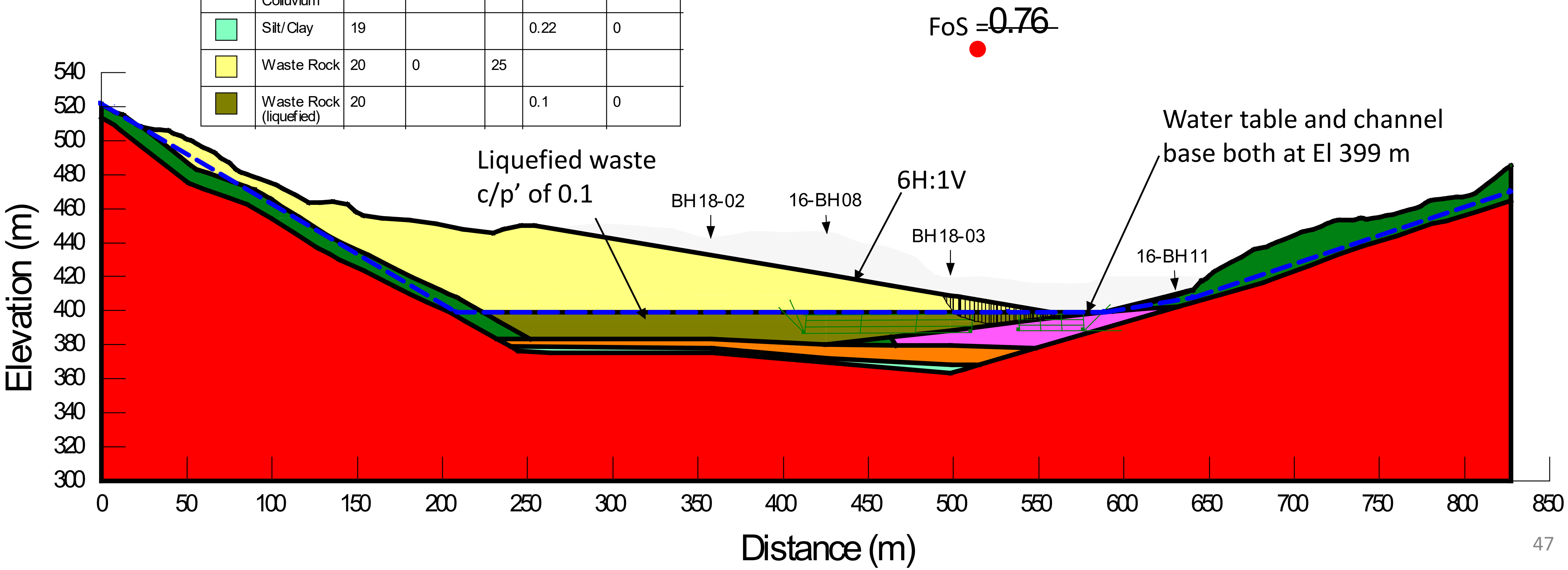
FoS = ~~1.18~~



CC2 - DS4 Stability, North Channel 6H:1V slope cut, Static Construction Liquefaction

- Channel base at El 399m, 30 m wide
- Phreatic surface at El. 399 m (currently at 407.7 m)
- Toe failure

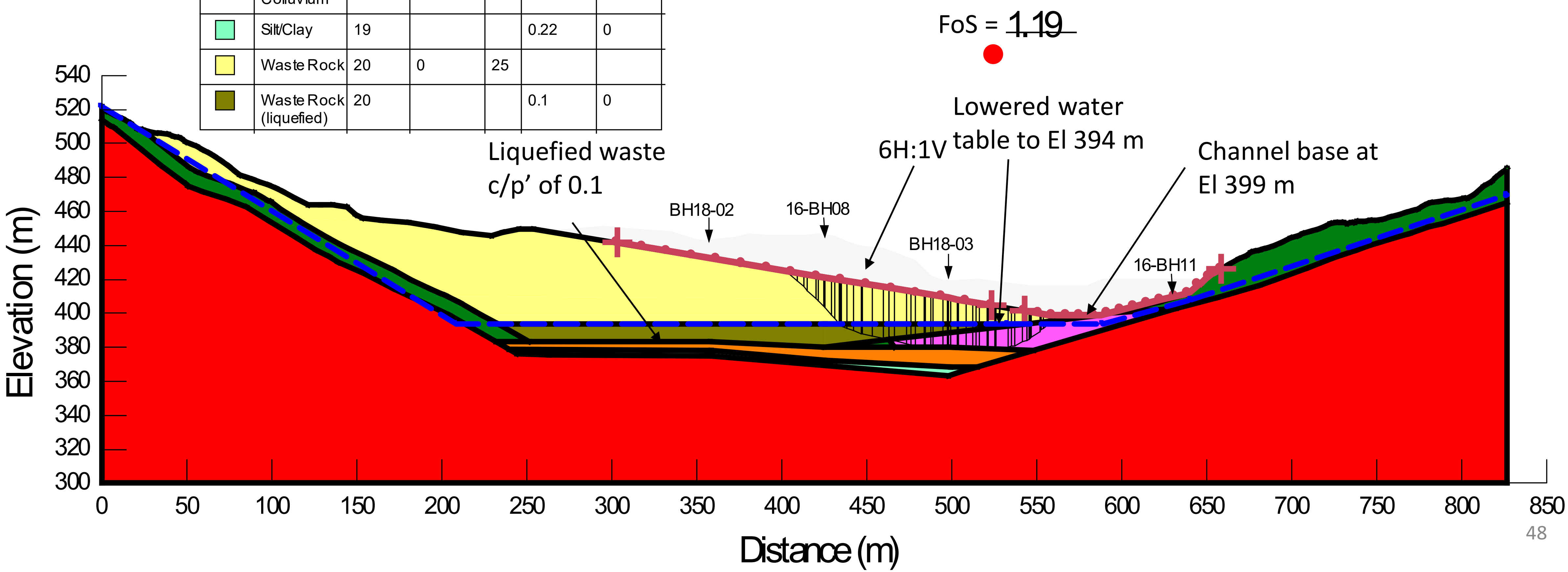
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0



CC2 - DS4 Stability, North Channel
6H:1V slope cut, Static Construction Liquefaction

- Channel base at El 399m, 30 m wide
- Phreatic surface at El. 394 m (5 m below base of channel)
- Mid-slope failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

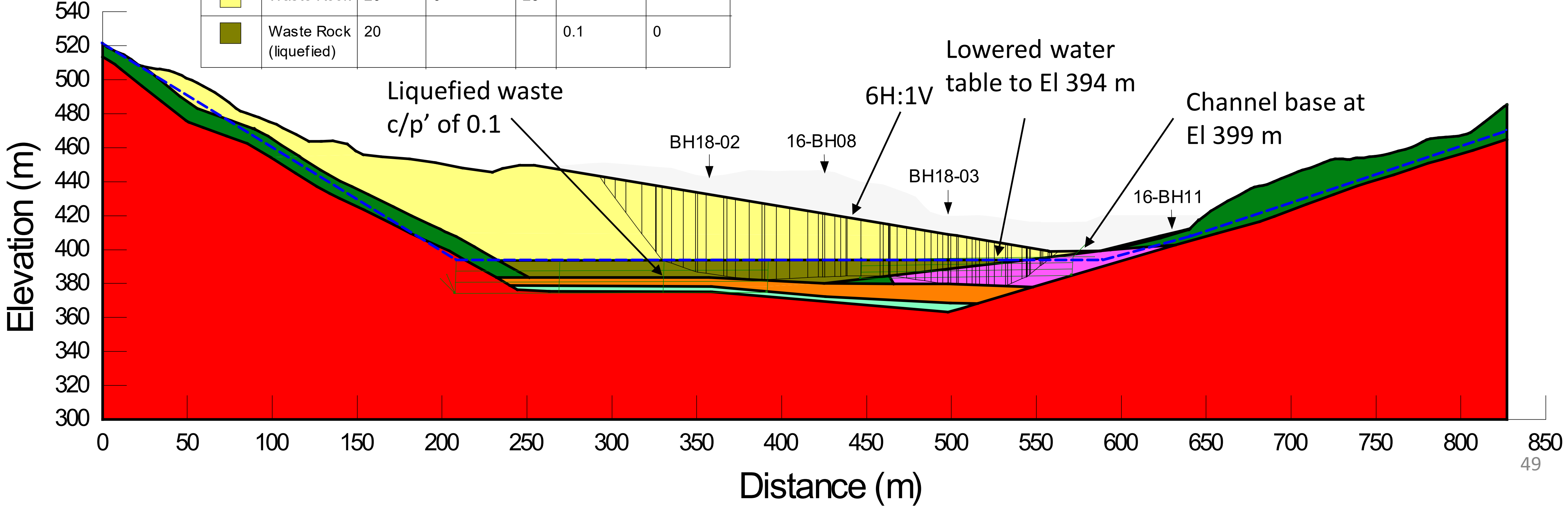


CC2 - DS4 Stability, North Channel
6H:1V slope cut, Static Construction Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

- Channel base at El 399m, 30 m wide
- Phreatic surface at El. 394 m (5 m below base of channel)
- Mid-slope failure

FoS = 1.06



Sub-appendix E

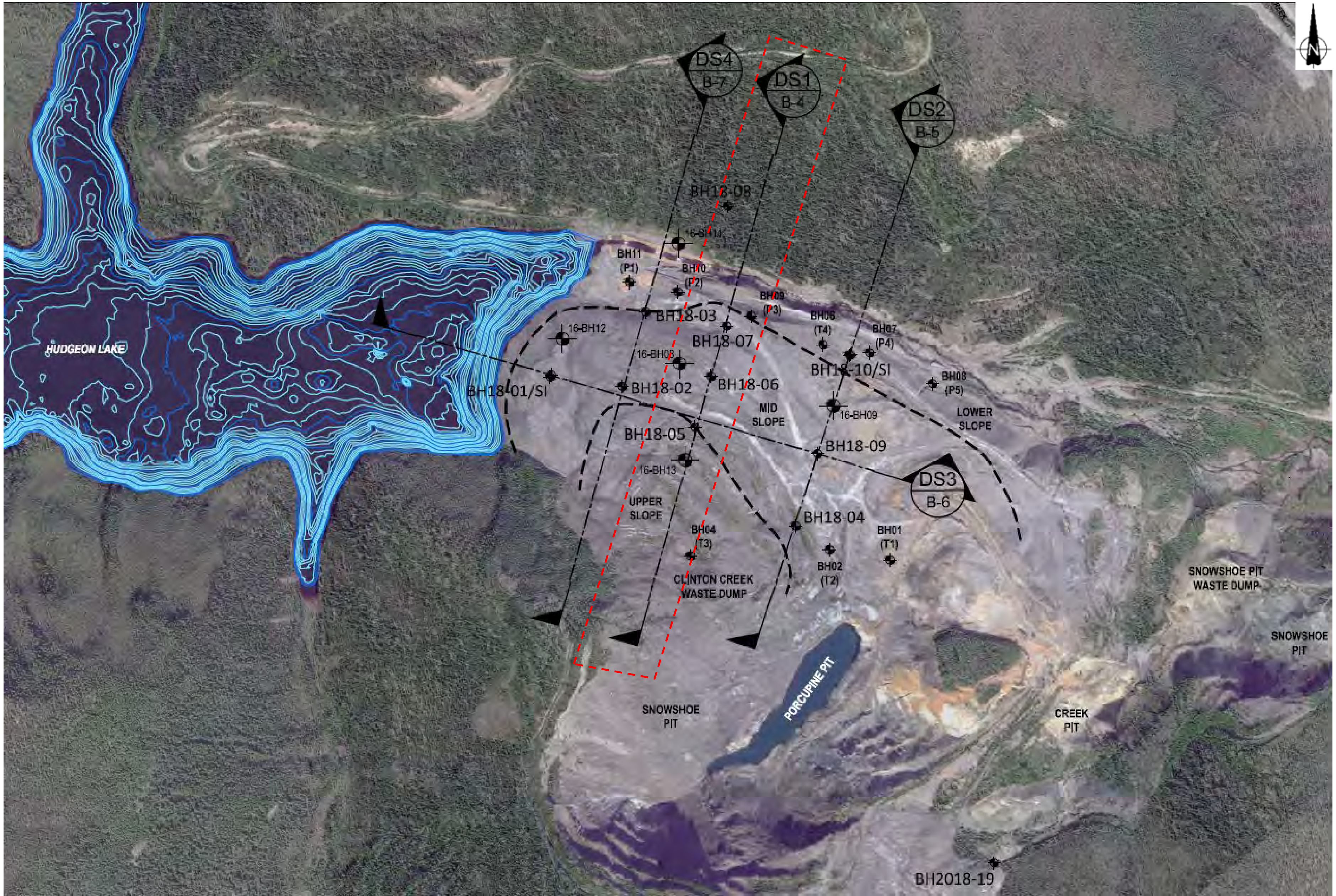
Section DS1

Clinton Creek Closure Option Design Stability Analyses Section DS1

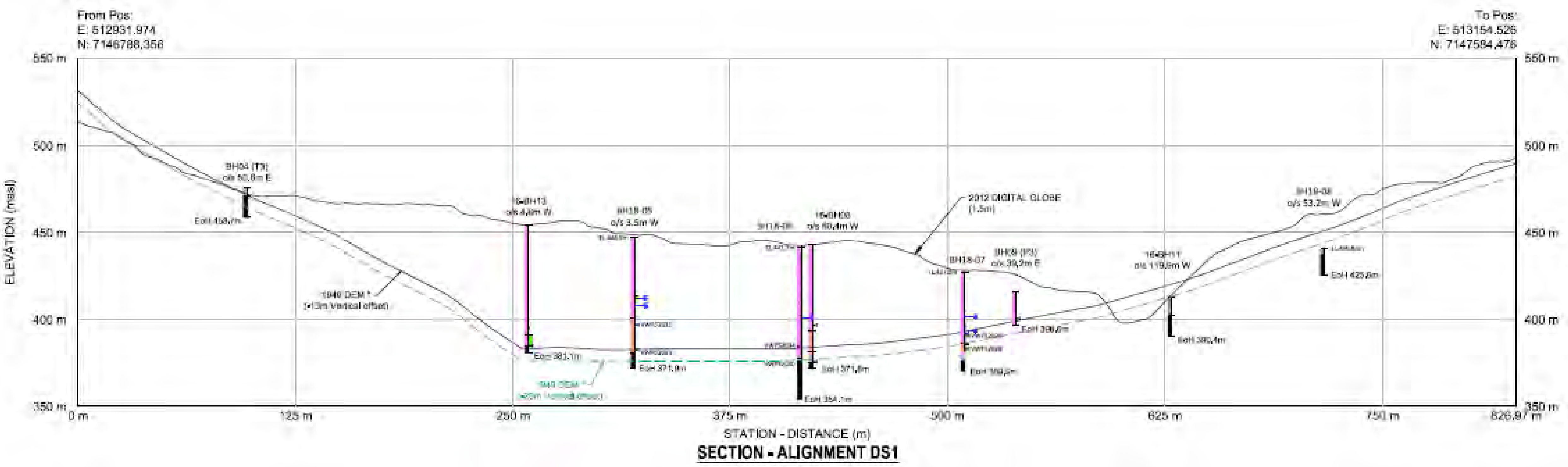
Clinton Creek Remediation Project

19 February 2020

Clinton Creek Mine Site Plan



Section DS1

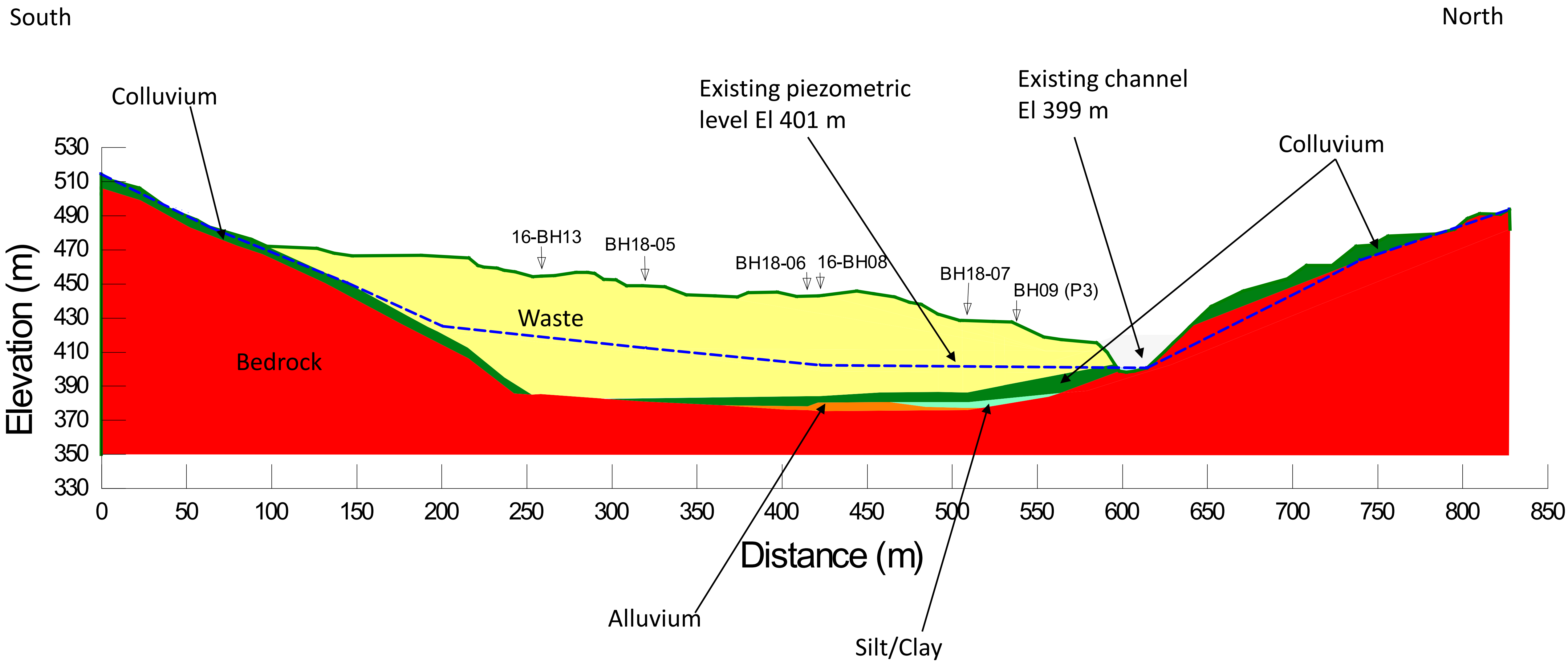


LEGEND

○	THERMISTOR NODES
◁	VIBRATING WIRE PIEZOMETER (VWP) TIP LOCATION

	FILL		MIXED COLLUVIUM / WASTE ROCK
	ORGANICS		FROZEN SOIL
	WASTE		BEDROCK
	ALLUVIUM		WATER TABLE
	COLLUVIUM		

Section DS1 Existing Condition (Base Case)



DS1 Stability FoS Summary

Section DS1 - Stability Factor of Safety Summary

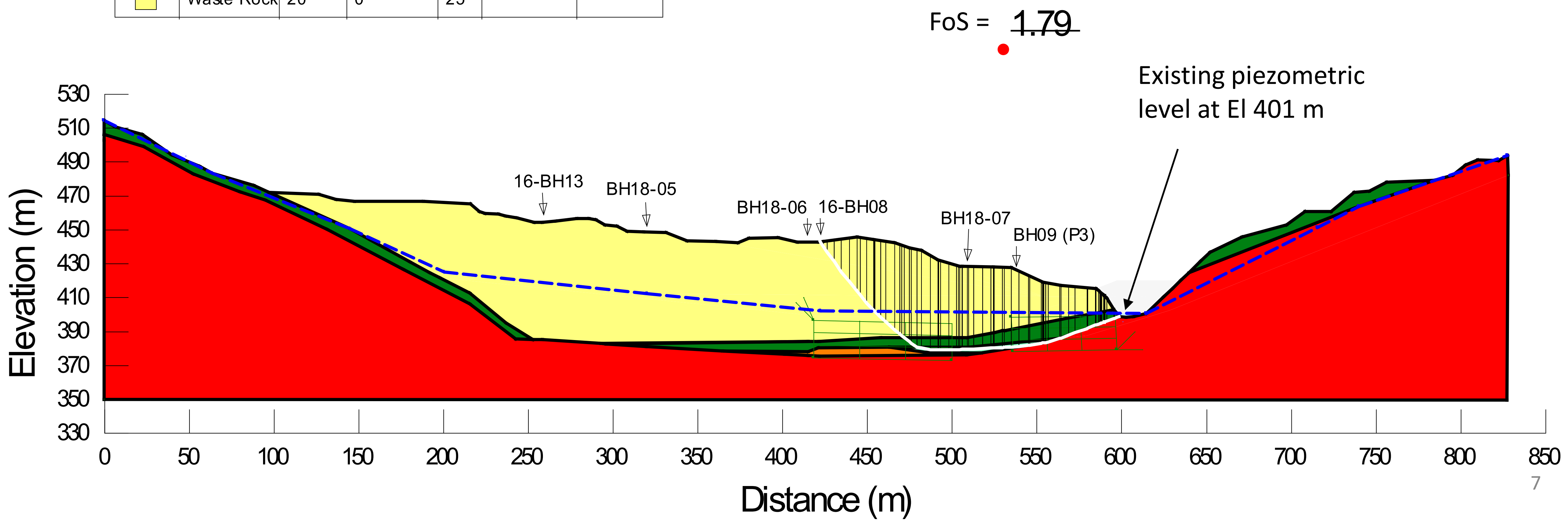
Options	Scenarios	Channel location	Spillway Cut Slope (South)	Condition Description	Waste Strength	Water Table	FoS	Minimum Required FoS
Base Case	Back Analysis	Existing condition	NA	Near channel slip surface	drained, ϕ' of 25 deg	Measured	1.79	1.2
		Existing condition	NA	overall stability (frozen colluvium at back slope)	drained, ϕ' of 25 deg	Measured	2.40	
		Existing condition	NA	Liquefied Waste	c/p' of 0.1	Measured	0.88	1.0
		Existing condition	NA	Liquefied Waste sensitvity	c/p' of 0.13	Measured	1.02	
Option CC1 Lake at El. 412; Channel Base El. 410.5	Design No Liquefaction	Adjusted channel location	4H:1V	Near channel slip surface	drained, ϕ' of 25 deg	Assumed design	1.66	1.2
		Adjusted channel location	4H:1V	Near channel slip surface, extended silt/clay layer	drained, ϕ' of 25 deg	Assumed design	1.66	
		Adjusted channel location	4H:1V	overall stability (frozen colluvium at back slope)	drained, ϕ' of 25 deg	Assumed design	2.37	
	Construction static Liquefaction	Adjusted channel location	4H:1V	Liquefied Waste	c/p' of 0.1	Measured	0.95	1.0
		Adjusted channel location	4H:1V	Liquefied Waste (Overall stability)	c/p' of 0.1	Measured	0.96	
		Adjusted channel location	4H:1V	Liquefied Waste with reasonable strength	c/p' of 0.14	Measured	1.13	
		Adjusted channel location	4H:1V	Liquefied Waste, lower water table	c/p' of 0.1	3 m lower	1.09	
		Adjusted channel location	4H:1V	Liquefied Waste with reasonable strength, lower water table	c/p' of 0.14	3 m lower	1.36	
		Adjusted channel location	4H:1V	Blast Densification 30 m width	c/p' of 0.1	Measured	1.20	
		Adjusted channel location	6H:1V	Near channel slip surface	c/p' of 0.1	Measured	0.89	
		Adjusted channel location	6H:1V	Near channel slip surface, Reduced liquefaction zoning near back slope	c/p' of 0.1	Measured	1.05	
		Adjusted channel location	6H:1V	Liquefied Waste, lower water table	c/p' of 0.1	3 m lower	0.96	
		Adjusted channel location	6H:1V	Liquefied Waste with reasonable strength	c/p' of 0.14	Measured	1.24	
		Adjusted channel location	6H:1V	Liquefied Waste with reasonable strength, lower water table	c/p' of 0.14	3 m lower	1.25	
Option CC2 Lake at El. 400; Channel Base El. 398	Design No Liquefaction	Preliminary channel location	4H:1V	Near channel slip surface	drained, ϕ' of 25 deg	Assumed design	1.34	1.2
		Preliminary channel location	4H:1V	overall stability (frozen colluvium at back slope)	drained, ϕ' of 25 deg	Assumed design	1.94	
		Adjusted channel location	4H:1V	Near channel slip surface	drained, ϕ' of 25 deg	Assumed design	1.31	
		Adjusted channel location	4H:1V	Near channel slip surface, existing WT	drained, ϕ' of 25 deg	Measured	1.29	
		Adjusted channel location	4H:1V	overall stability (frozen colluvium at back slope)	drained, ϕ' of 25 deg	Assumed design	2.07	
		Adjusted channel location	6H:1V	Near channel slip surface	drained, ϕ' of 25 deg	Assumed design	1.74	
		Adjusted channel location	7H:1V	overall stability (frozen colluvium at back slope)	drained, ϕ' of 25 deg	Assumed design	1.90	
	Construction static Liquefaction	Preliminary channel location	4H:1V	Liquefied Waste	c/p' of 0.1	Assumed design	0.65	1.0
		Preliminary channel location	4H:1V	Liquefied Waste (Toe failure)	c/p' of 0.1	Assumed design	0.56	
		Preliminary channel location	4H:1V	Liquefied Waste, lower water table	c/p' of 0.1	3 m lower	0.73	
		Preliminary channel location	4H:1V	Liquefied Waste with reasonable strength, lower water table	c/p' of 0.14	3 m lower	0.91	
		Adjusted channel location	4H:1V	Liquefied Waste	c/p' of 0.1	Assumed design	0.70	
		Adjusted channel location	4H:1V	Liquefied Waste, lower water table	c/p' of 0.1	3 m lower	0.84	
		Adjusted channel location	4H:1V	Liquefied Waste with reasonable strength, lower water table	c/p' of 0.14	3 m lower	1.01	
		Adjusted channel location	4H:1V	Blast Densification 30 m width	c/p' of 0.1	Assumed design	1.19	
		Adjusted channel location	6H:1V	Liquefied Waste	c/p' of 0.1	Assumed design	0.82	
		Adjusted channel location	6H:1V	Liquefied Waste, lower water table	c/p' of 0.1	3 m lower	0.91	
		Adjusted channel location	6H:1V	Liquefied Waste with reasonable strength, lower water table	c/p' of 0.14	3 m lower	1.15	
		Adjusted channel location	7H:1V	Liquefied Waste	c/p' of 0.1	Assumed design	0.87	
		Adjusted channel location	7H:1V	Liquefied Waste, lower water table	c/p' of 0.1	3 m lower	1.00	
		Adjusted channel location	7H:1V	Liquefied Waste with reasonable strength, lower water table	c/p' of 0.14	3 m lower	1.30	

Back Analysis on Existing Condition (Base Case)

DS1 Base Case Stability

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		

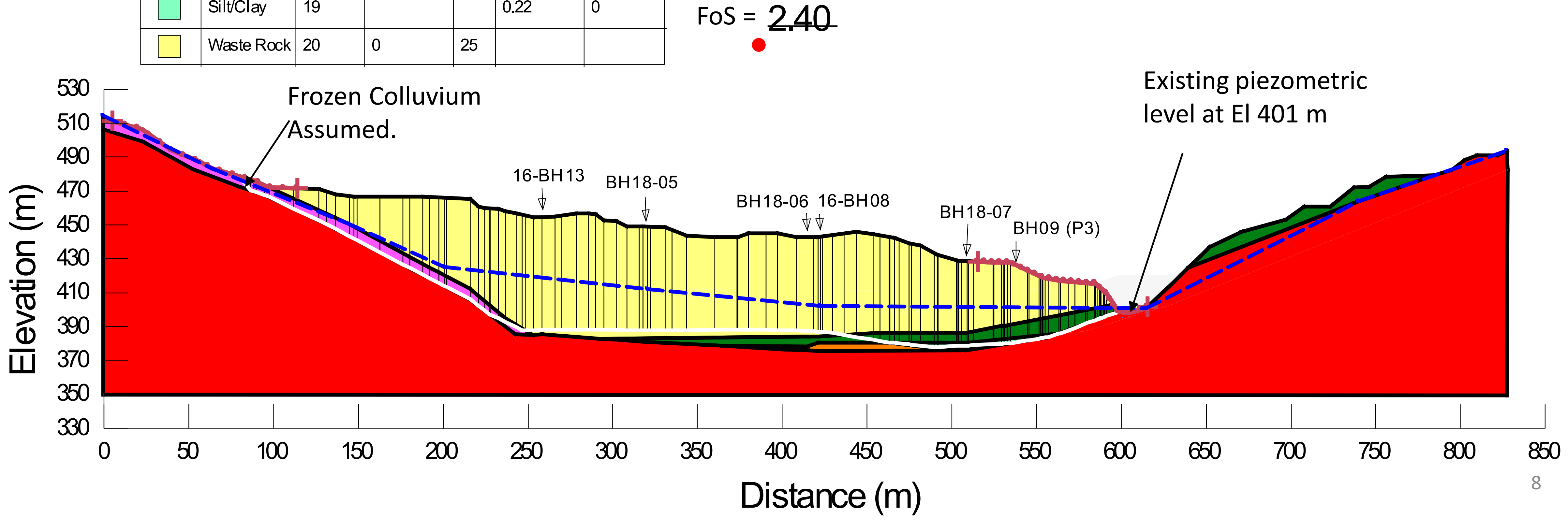
- Silt/clay layer assumed undrained strength ratio c/p' of 0.22



DS1 Base Case Overall Stability

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		

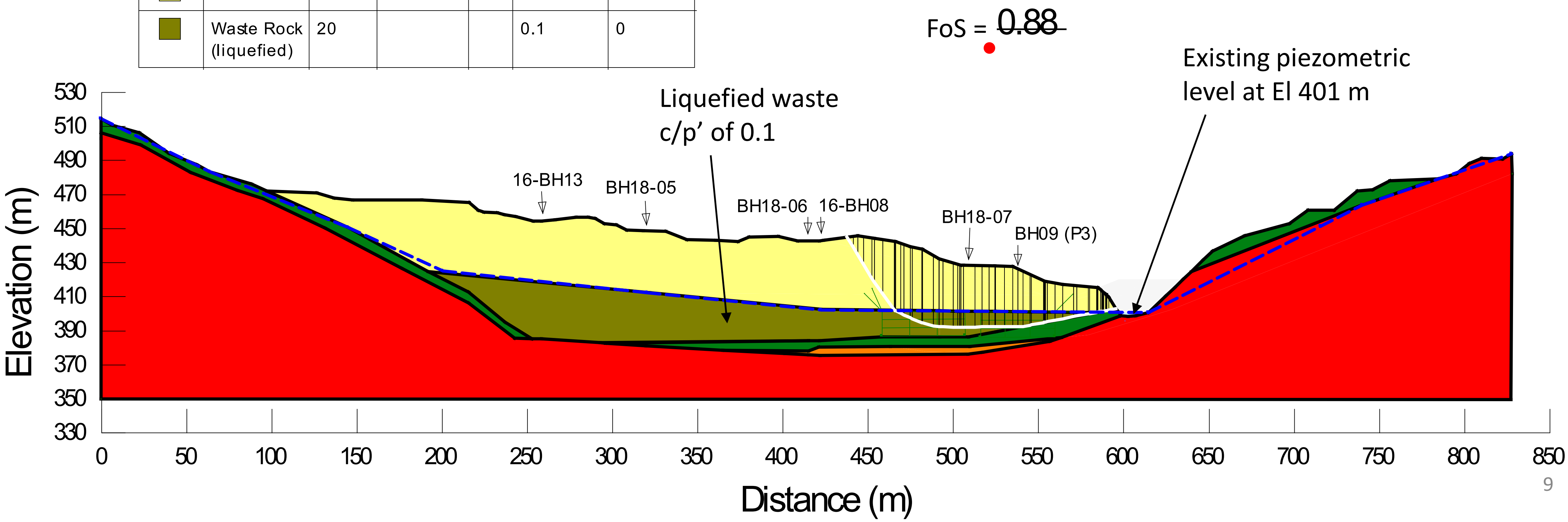
- Silt/clay layer assumed undrained strength ratio c/p' of 0.22
- Frozen colluvium on south back slope assumed.



DS1 Base Case Stability – Saturated Waste Static Liquefaction

- Assumed static liquefaction for saturated waste c/p’ of 0.1

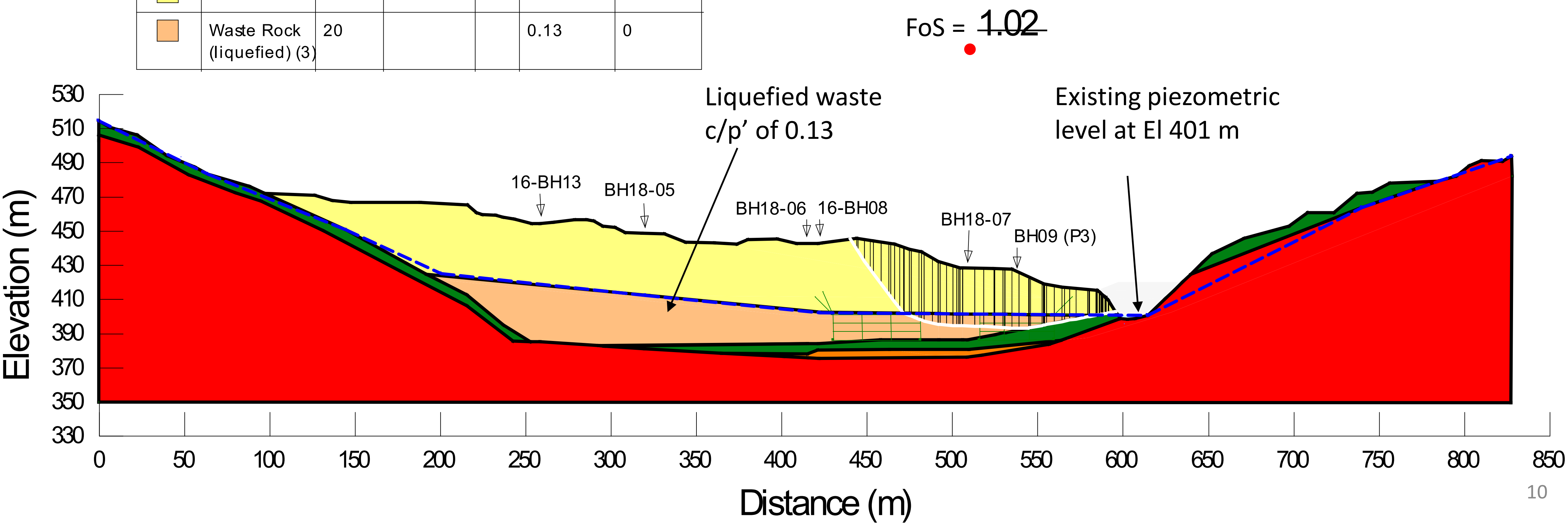
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0



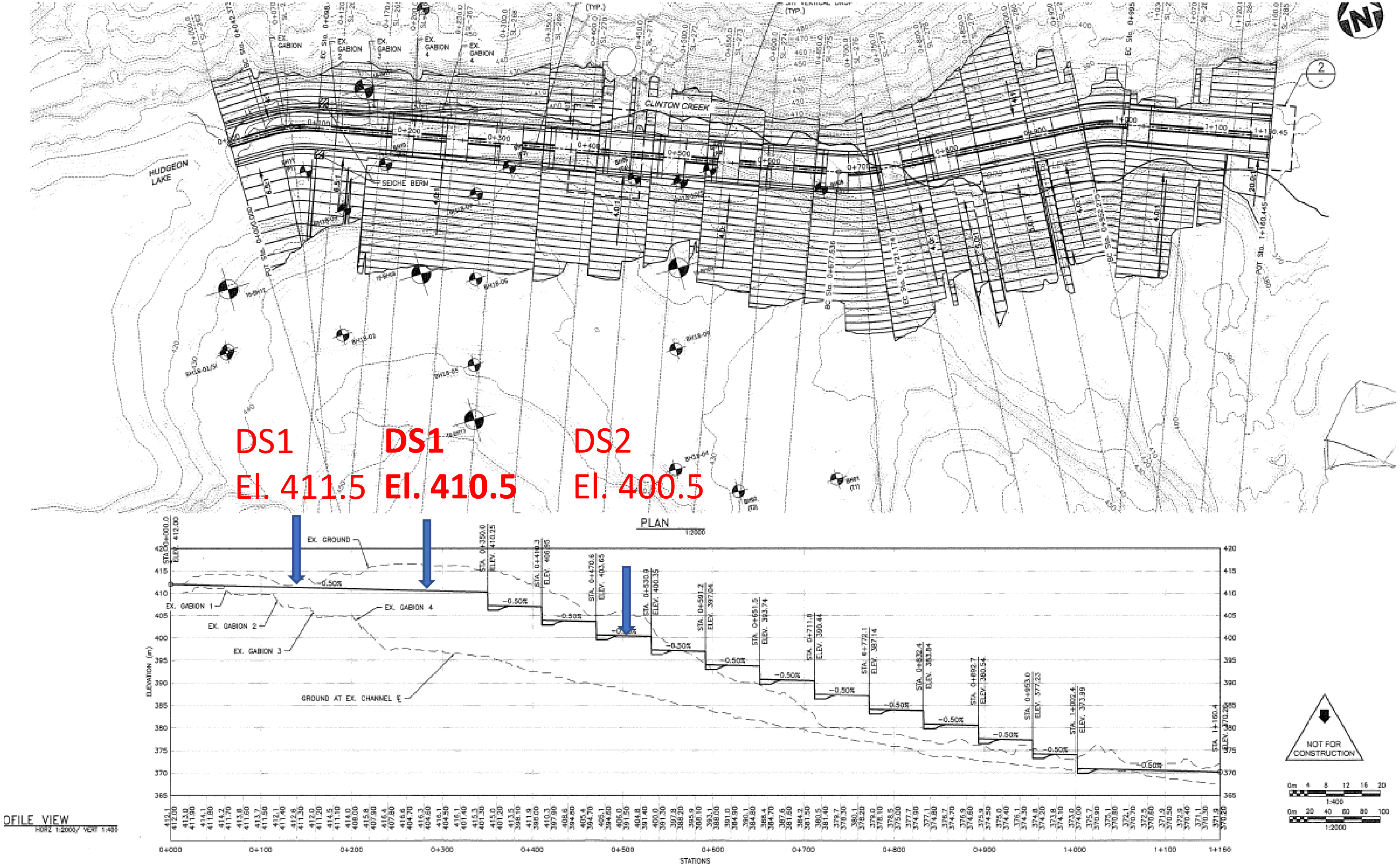
DS4 Base Case Stability – Saturated Waste Static Liquefaction Sensitivity

- FoS of about unity with liquefied waste strength, c/p’ of 0.13
- With DS4 and DS2, back analyzed liquefied strength c/p’ of 0.14

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Waste Rock	20	0	25		
	Waste Rock (liquefied) (3)	20			0.13	0



Option CC1 - Lake at El. 412 m
Preliminary Spillway Channel Design



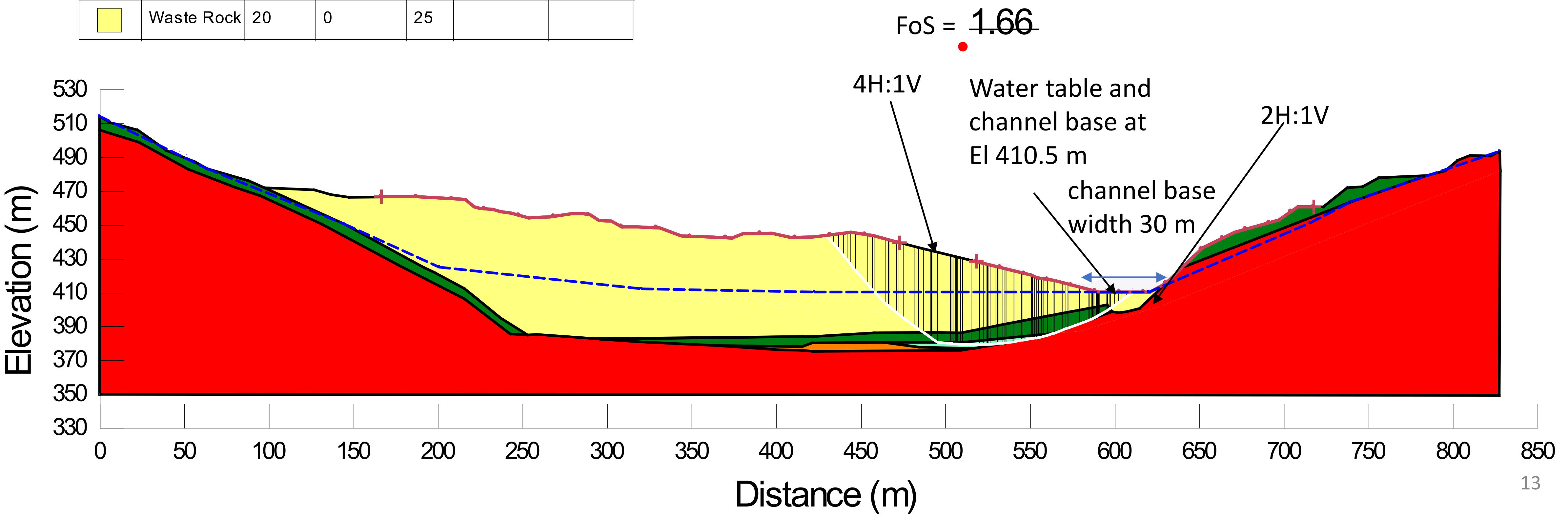
Scenario CC1 - Lake at El. 412 m
Spillway Design Case – No liquefaction (seismic and static)

- Adjusted from preliminary design, Spillway channel location moved closer to north slope (north slope option)

CC1 - DS1 Stability No Liquefaction
4H:1V slope cut, Base El. 410.5 m, width of ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		

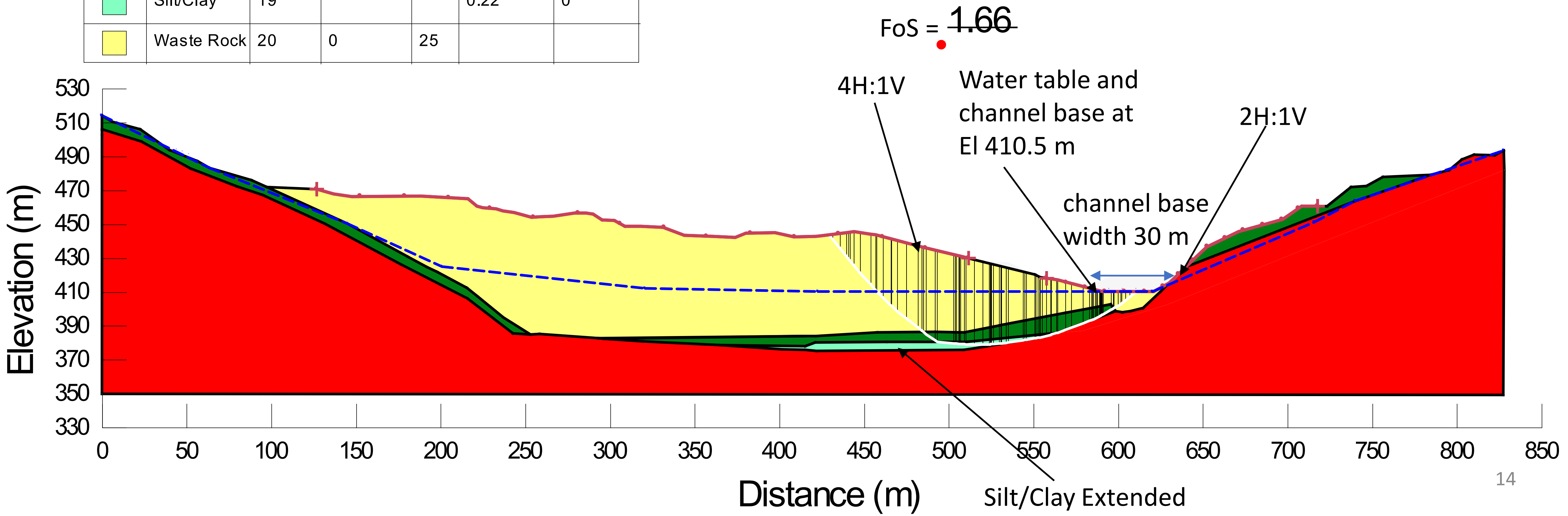
- 4H:1V cut slopes
- Phreatic surface at El. 410.5 m (currently at 401 m)
- Mid-slope failure



CC1 - DS1 Stability No Liquefaction
4H:1V slope cut, Base El. 410.5 m, width of ~30 m

- 4H:1V cut slopes
- Phreatic surface at El. 410.5 m (currently at 401 m)
- Extended silt and clay layer through alluvium
- Mid-slope failure

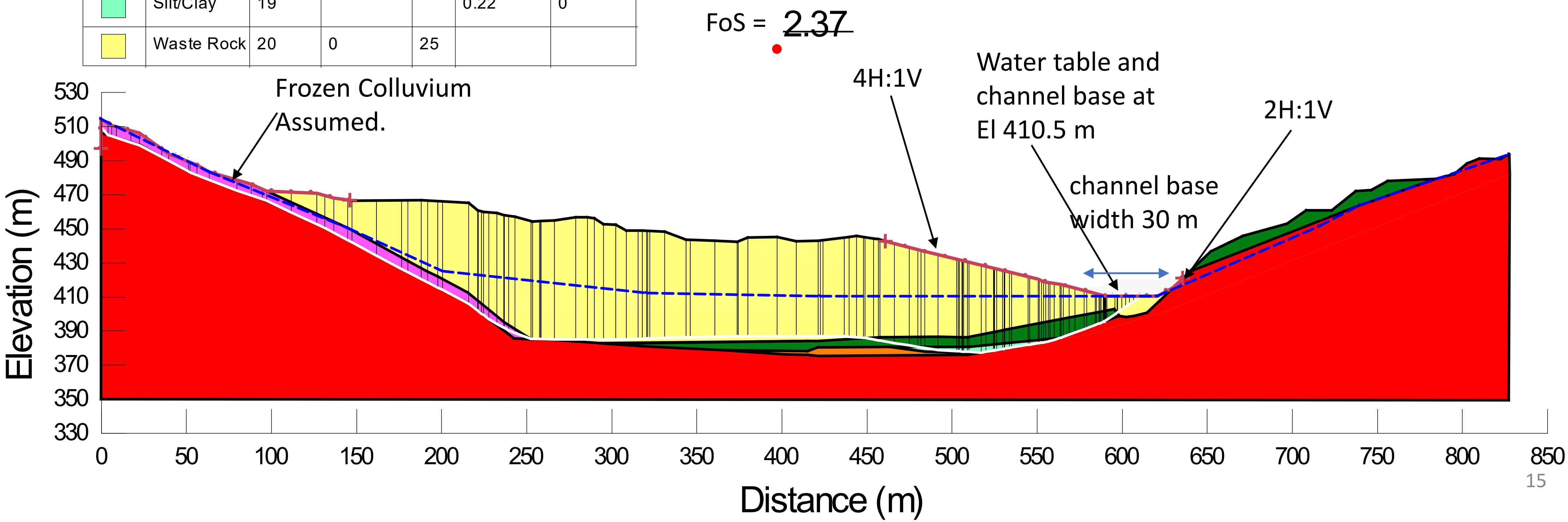
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		



CC1 - DS1 Stability No Liquefaction
4H:1V slope cut, Base El. 410.5 m, width of ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		

- 4H:1V cut slopes
- Phreatic surface at El. 410.5 m (currently at 401 m)
- Overall failure, including frozen colluvium on south slope of pre-construction Clinton Creek valley



Scenario CC1 - Lake at El. 412 m
Spillway Design Construction – Static liquefaction
4H:1V South Side Spillway Channel Slope

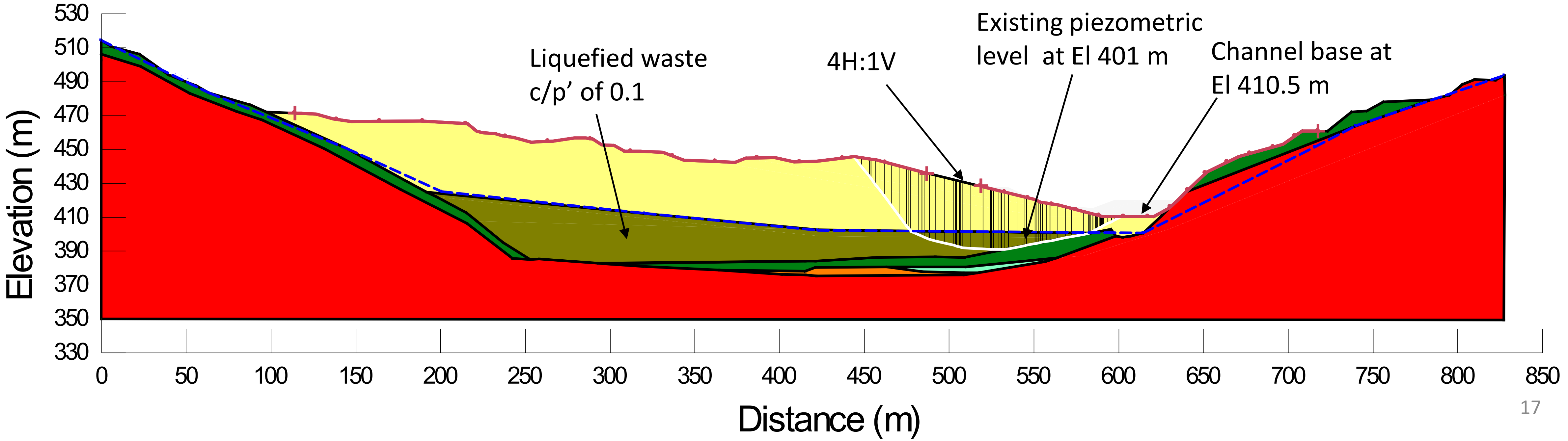
- Adjusted from preliminary design, Spillway channel location moved closer to north slope (north slope option)

CC1 - DS1 Stability, Construction Liquefaction
4H:1V slope cut, Base El. 410.5 m, width of ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

- 4H:1V cut slopes
- Phreatic surface at El. 401 m (current elevation)
- Mid-slope failure

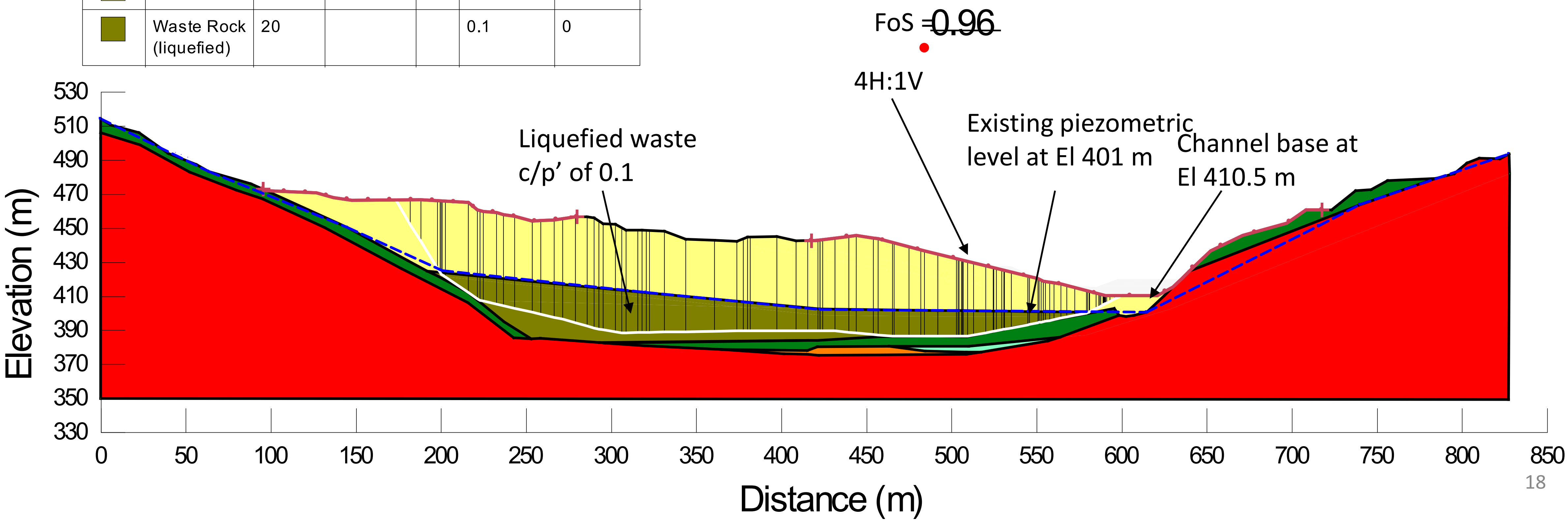
FoS = 0.95



CC1 - DS1 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 410.5 m, width of ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

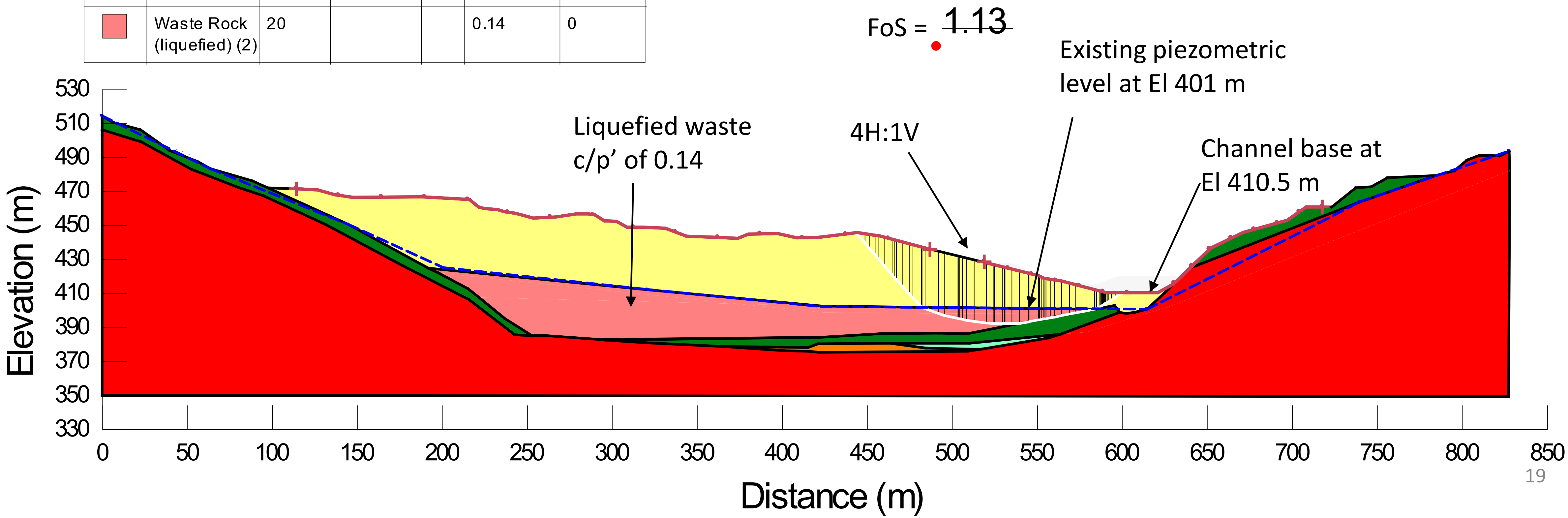
- 4H:1V cut slopes
- Phreatic surface at El. 401 m (current elevation)
- Overall failure



CC1 - DS1 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 410.5 m, width of ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied) (2)	20			0.14	0

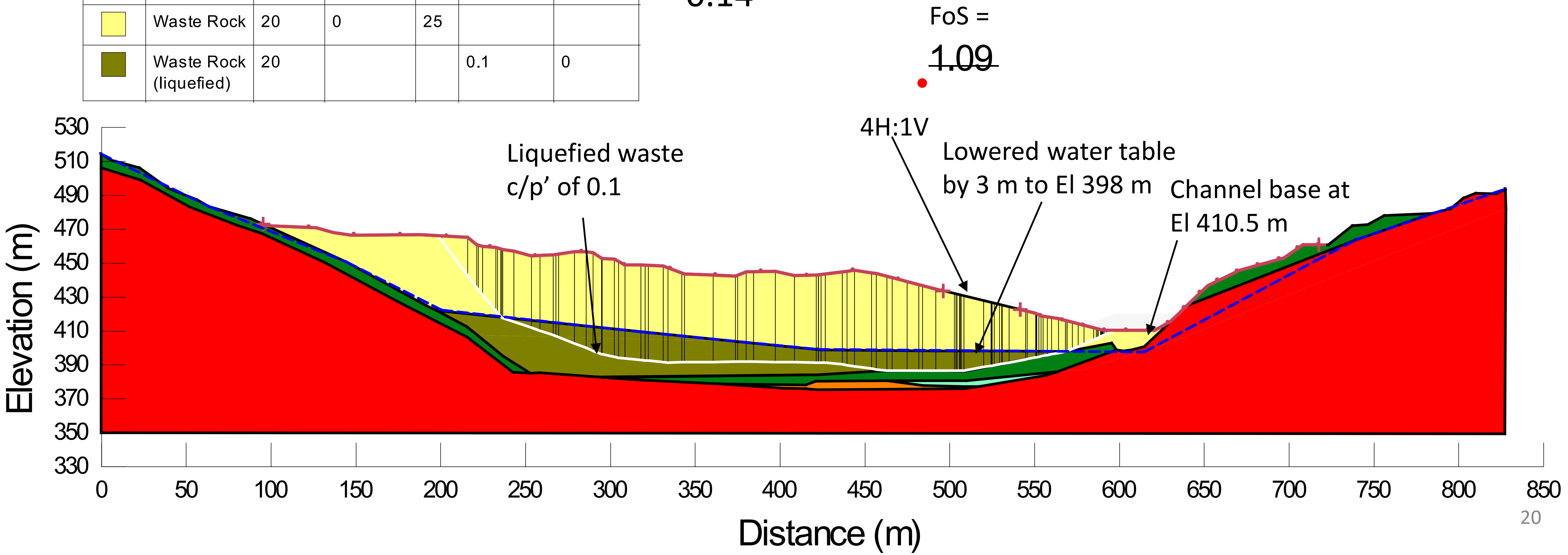
- 4H:1V cut slopes
- Phreatic surface at El. 401 m (current elevation)
- Mid-slope failure
- Back analyzed liquified strength from DS1 and DS2, c/p' of 0.14



CC1 - DS1 Stability, Construction Liquefaction
4H:1V slope cut, Base El. 410.5 m, width of ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

- 4H:1V cut slopes
- Phreatic surface at El. 398 m (3 m lower than current elevation)
- Mid-slope failure
- Back analyzed liquified strength from DS1 and DS2, c/p' of 0.14



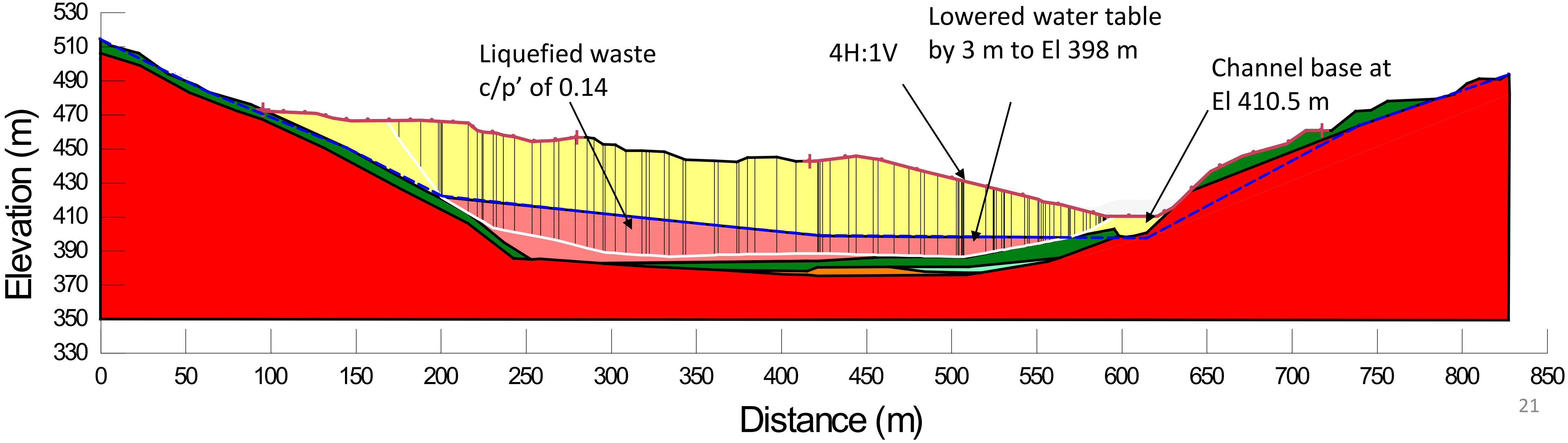
CC1 - DS1 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 410.5 m, width of ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied) (2)	20			0.14	0

- 4H:1V cut slopes
- Phreatic surface at El. 398 m (3 m lower than current elevation)
- Overall failure
- Back analyzed liquified strength from DS1 and DS2, c/p' of 0.14

FoS =

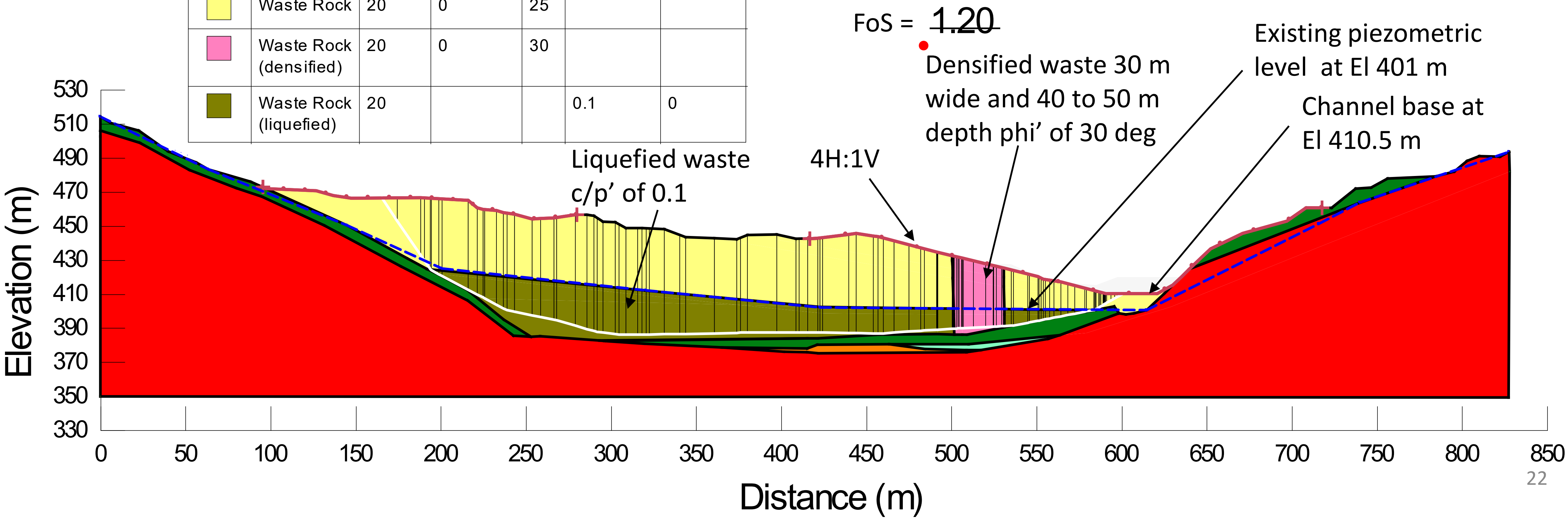
1.36



CC1 - DS1 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 410.5 m, width of ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (densified)	20	0	30		
	Waste Rock (liquefied)	20			0.1	0

- 4H:1V cut slopes
- Phreatic surface at El. 401 m (current elevation)
- Overall failure
- Densified 30 m wide zone of waste



Scenario CC1 - Lake at El. 412 m
Spillway Design Construction – Static liquefaction
6H:1V South Side Spillway Channel Slope

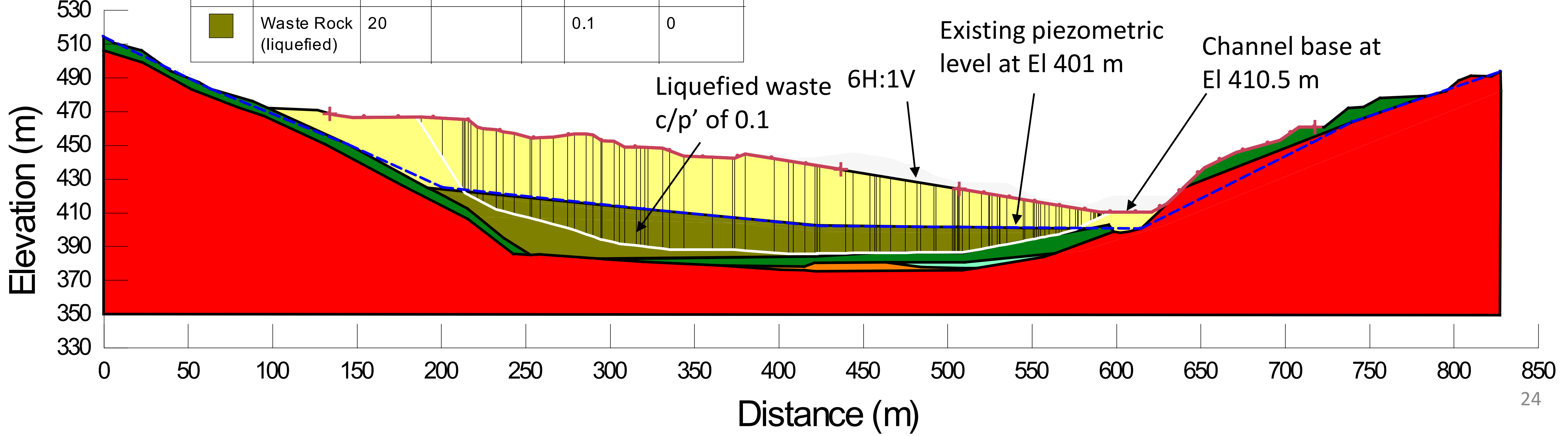
- Adjusted from preliminary design, Spillway channel location moved closer to north slope

CC1 - DS1 Stability, Construction Liquefaction
6H:1V slope cut, Base El. 410.5 m, width of ~30 m

- 6H:1V cut slopes
- Phreatic surface at El. 401 m (current elevation)
- Overall/mid-slope failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
(orange)	Alluvium	20	0	25		
(red)	Bedrock					
(green)	Colluvium	20	0	25		
(light green)	Silt/Clay	19			0.22	0
(yellow)	Waste Rock	20	0	25		
(olive)	Waste Rock (liquefied)	20			0.1	0

FoS = 0.89

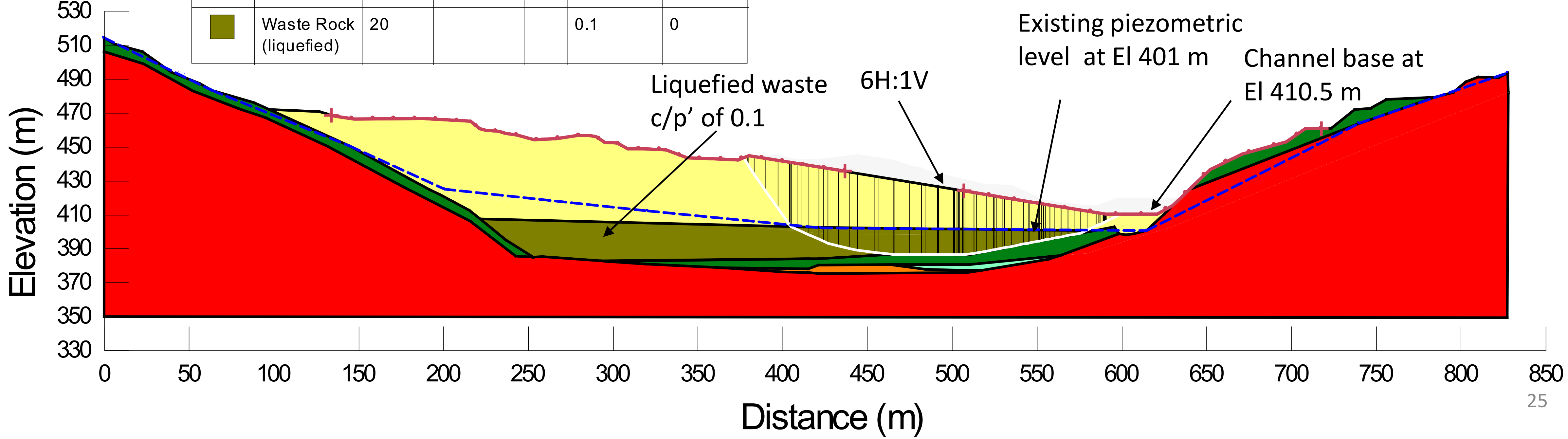


CC1 - DS1 Stability, Construction Liquefaction
6H:1V slope cut, Base El. 410.5 m, width of ~30 m

- 6H:1V cut slopes
- Phreatic surface at El. 401 m (current elevation)
- Reduced backslope liquified area
- Overall/mid-slope failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

FoS = 1.05

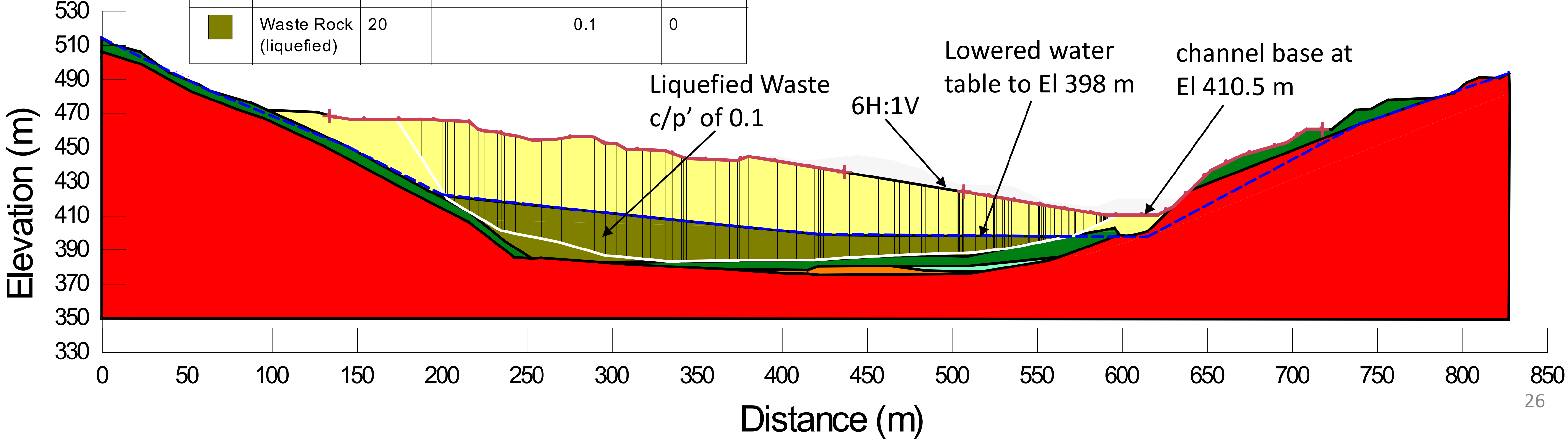


CC1 - DS1 Stability, Construction Liquefaction 6H:1V slope cut, Base El. 410.5 m, width of ~30 m

- 6H:1V cut slopes
- Phreatic surface at El. 398 m (3 m below current elevation)
- Lake assumed dewatered to El. 407 m
- Overall/mid-slope failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

FoS = 0.96

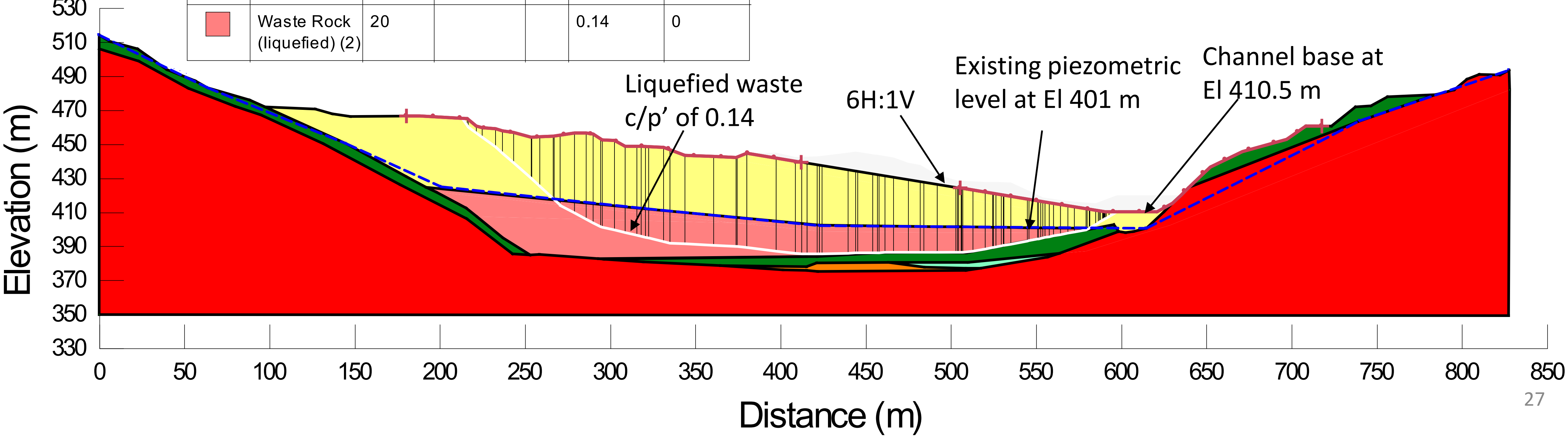


CC1 - DS1 Stability, Construction Liquefaction
6H:1V slope cut, Base El. 410.5 m, width of ~30 m

- 6H:1V cut slopes
- Phreatic surface at El. 401 m (current elevation)
- Overall/mid-slope failure
- Back analyzed liquified strength from DS1 and DS2, c/p' of 0.14

FoS = 1.24

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied) (2)	20			0.14	0

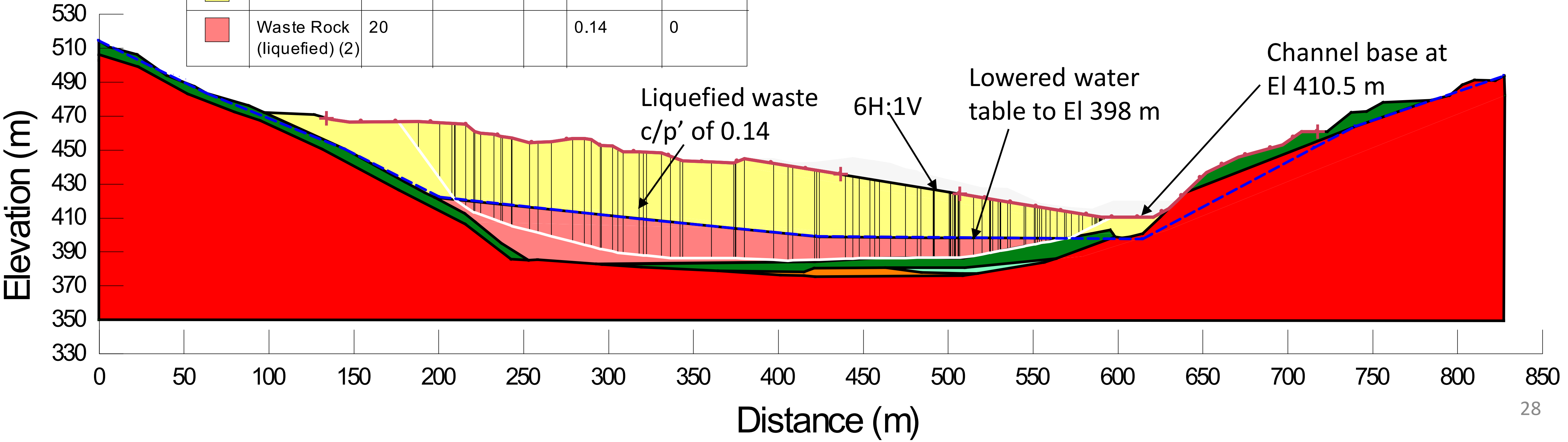


CC1 - DS1 Stability, Construction Liquefaction 6H:1V slope cut, Base El. 410.5 m, width of ~30 m

- 6H:1V cut slopes
- Phreatic surface at El. 398 m (3 m below current elevation)
- Overall/mid-slope failure
- Back analyzed liquified strength from DS1 and DS2, c/p' of 0.14

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied) (2)	20			0.14	0

FoS = 1.25



Option CC2 - Lake at El. 400 m
Preliminary Spillway Channel Design

- Approximate spillway invert elevations
  - DS4 - El. 399 m
  - **DS1 - El. 398 m**
  - DS2 - El. 390 m

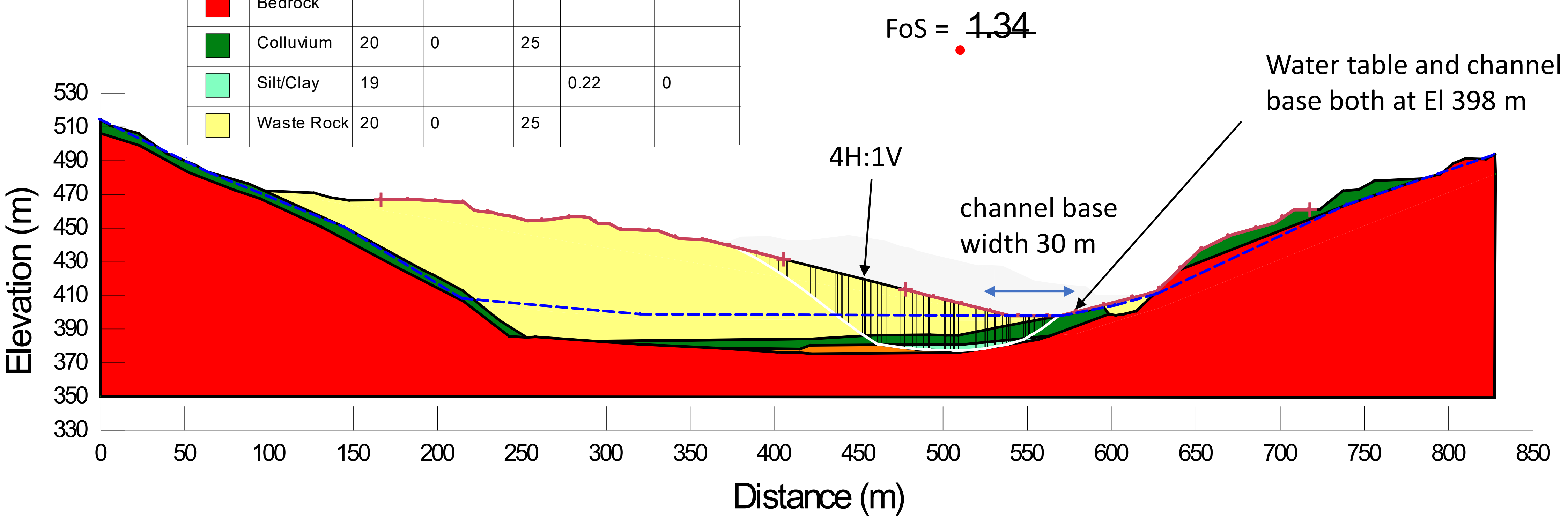
Option CC2 - Lake at El 400 m
Spillway Design Case – No liquefaction (seismic or static)

- Adjusted from preliminary design, Spillway channel location moved closer to north slope

CC2 - DS1 Stability, No Liquefaction, South Channel 4H:1V slope cut, Base El. 398 m, width of ~30 m

- 4H:1V cut slopes
- Phreatic surface at El 398 m (currently at 401 m)
- Mid-slope failure

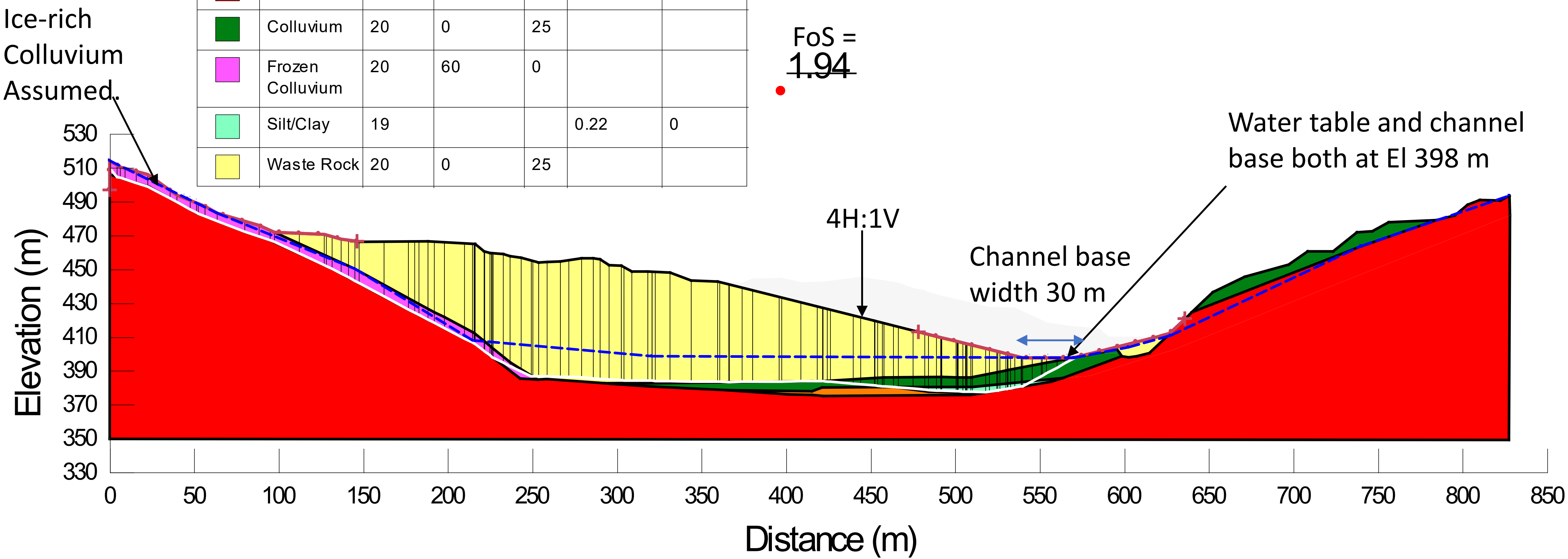
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		



CC2 - DS1 Stability, No Liquefaction, South Channel 4H:1V slope cut, Base El. 398 m, width of ~30 m

- 4H:1V cut slopes
- Phreatic surface at El 398 m (currently at 401 m)
- Overall failure

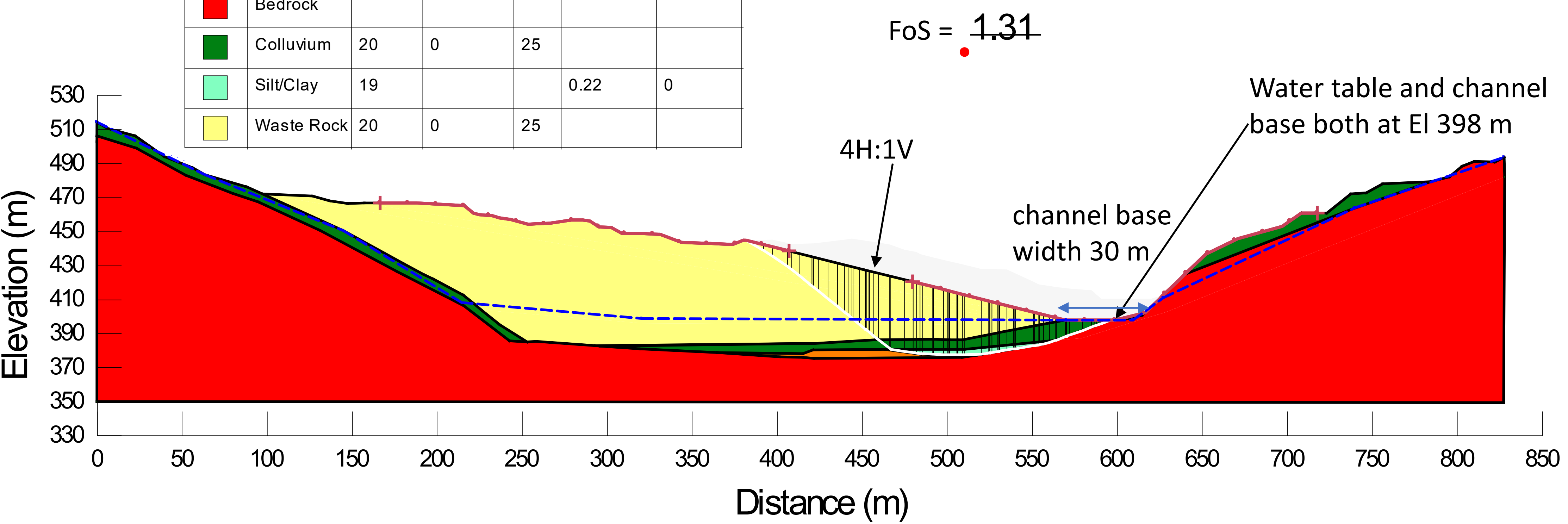
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		



CC2 - DS1 Stability, No Liquefaction, North Channel 4H:1V slope cut, Base El. 398 m, width of ~30 m

- 4H:1V cut slopes
- Phreatic surface at El 398 m (currently at 401 m)
- Mid-slope failure

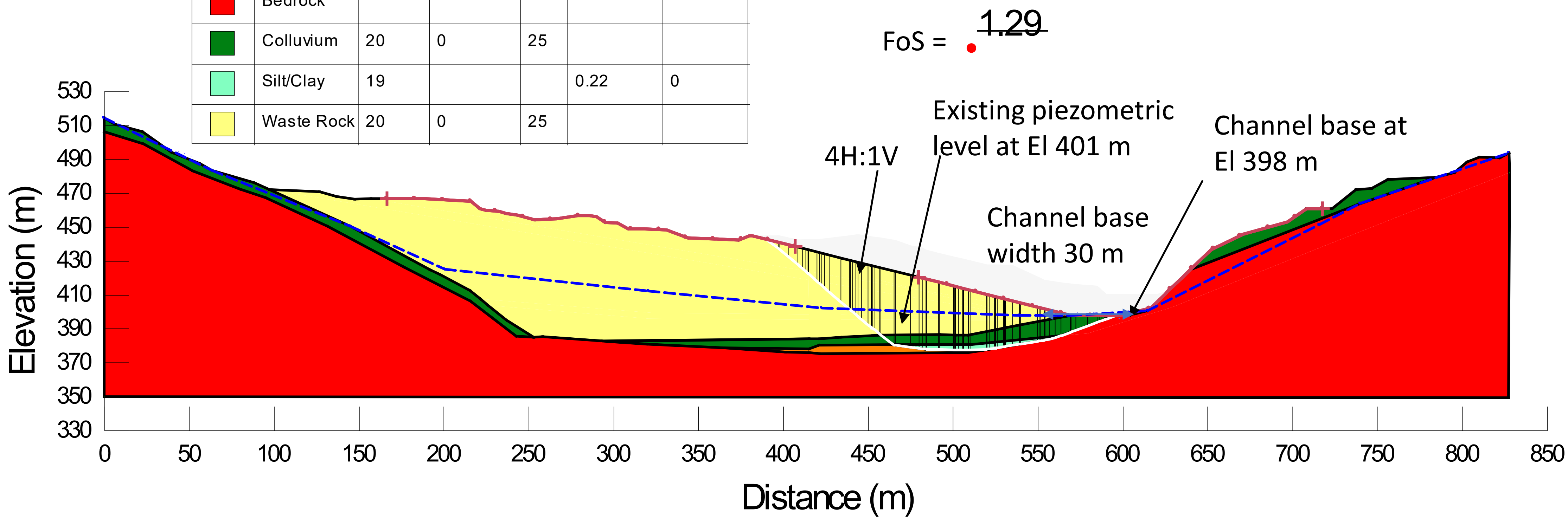
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		



CC2 - DS1 Stability, No Liquefaction, North Channel 4H:1V slope cut, Base El. 398 m, width of ~30 m

- 4H:1V cut slopes
- Phreatic surface at El 401 m (currently elevation)
- Mid-slope failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		

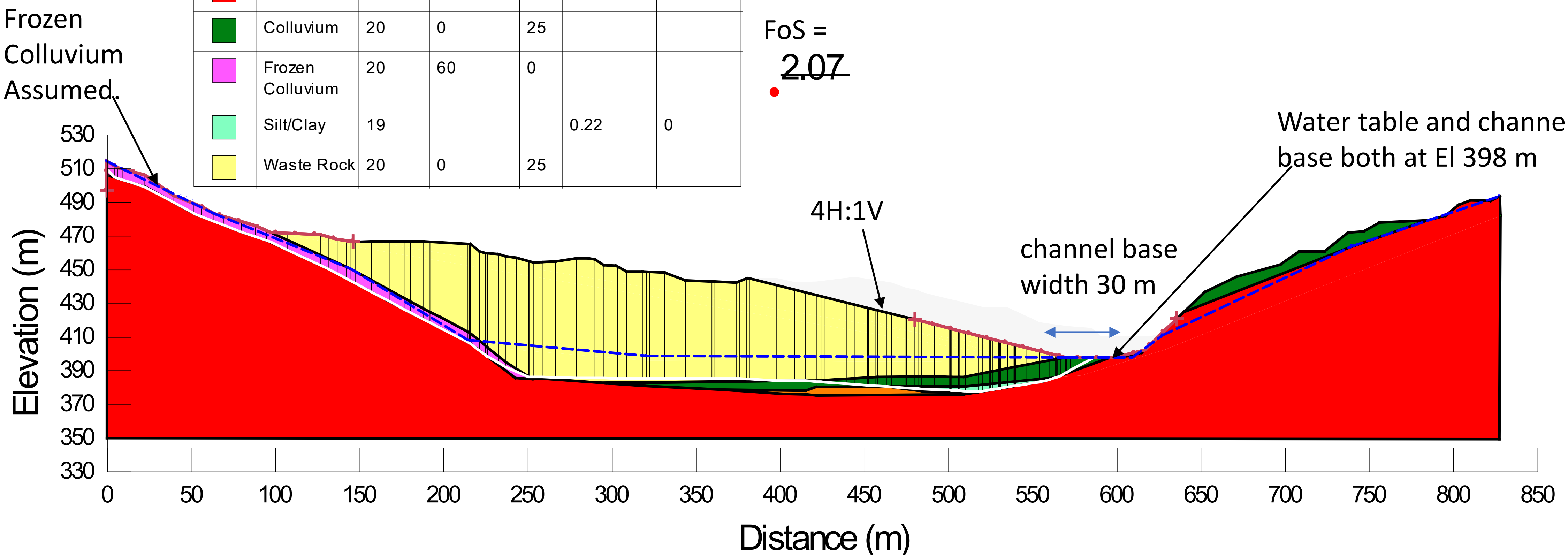


CC2 - DS1 Stability, No Liquefaction, North Channel 4H:1V slope cut, Base El. 398 m, width of ~30 m

- 4H:1V cut slopes
- Phreatic surface at El 398 m (currently at 401 m)
- Overall failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Frozen Colluvium	20	60	0		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		

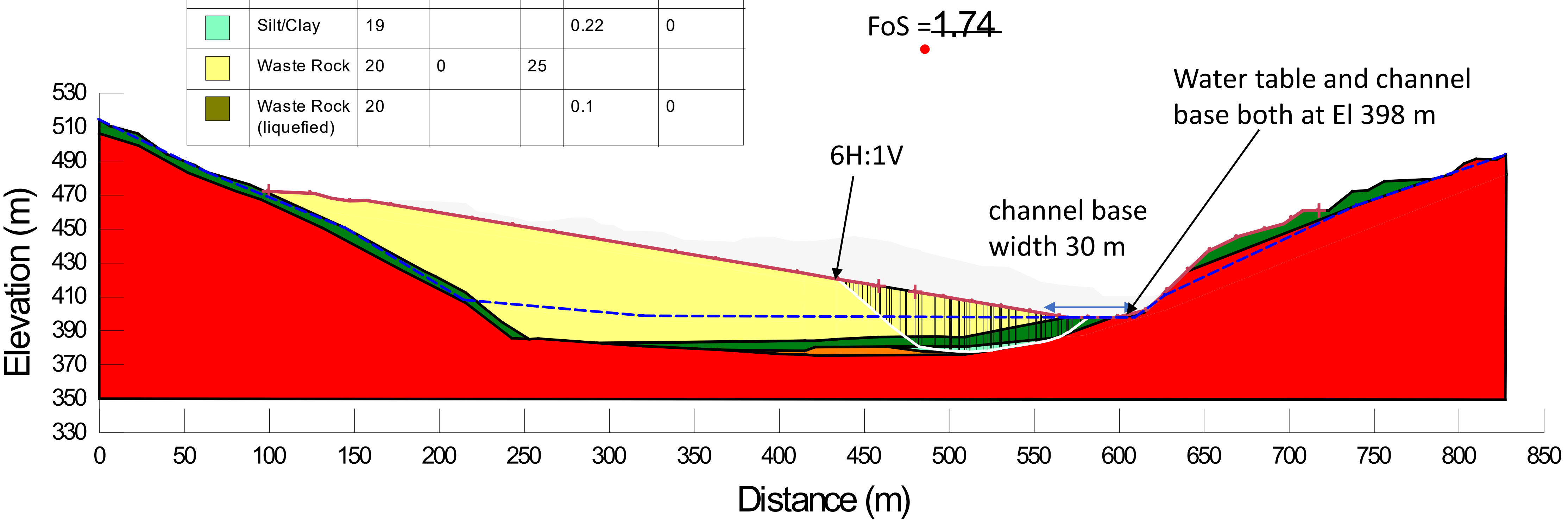
FoS = 2.07



CC2 - DS1 Stability, No Liquefaction, North Channel 6H:1V slope cut, Base El. 398 m, width of ~30 m

- 6H:1V cut slopes
- Phreatic surface at El 398 m (currently at 401 m)
- Mid-slope failure

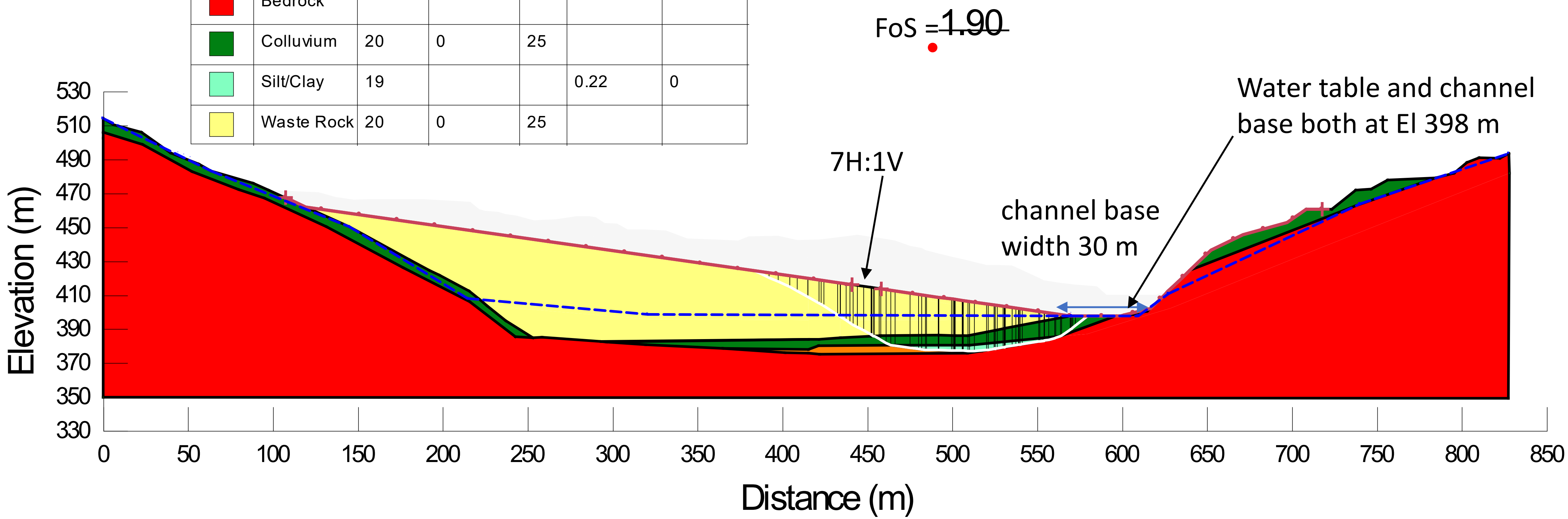
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0



CC2 - DS1 Stability, No Liquefaction, North Channel H:1V slope cut, Base El. 398 m, width of ~30 m

- 7H:1V cut slopes
- Phreatic surface at El 398 m (currently at 401 m)
- Mid-slope failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		

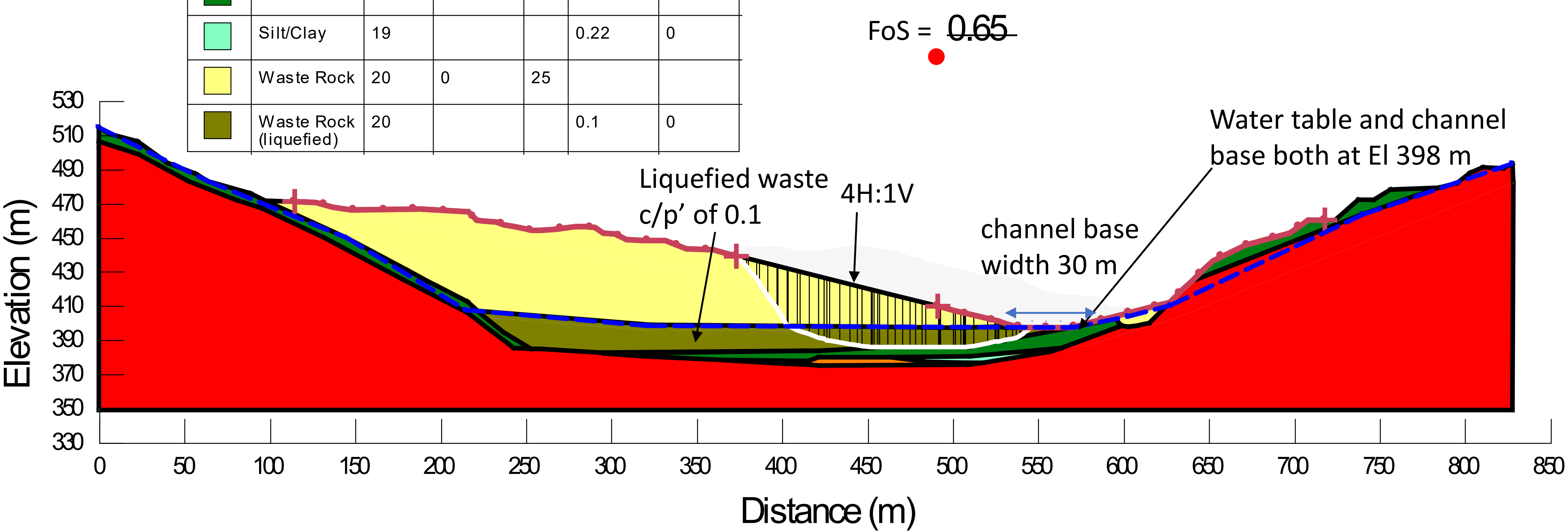


Option CC2 - Lake at El. 400 m
Spillway Design Construction – Static liquefaction

CC2 - DS1 Stability, South Channel
4H:1V slope cut, Construction Liquefaction

- Channel base at El 398 m, 30 m wide
- Phreatic surface at El 398 m (currently at 401 m)
- Mid-slope failure

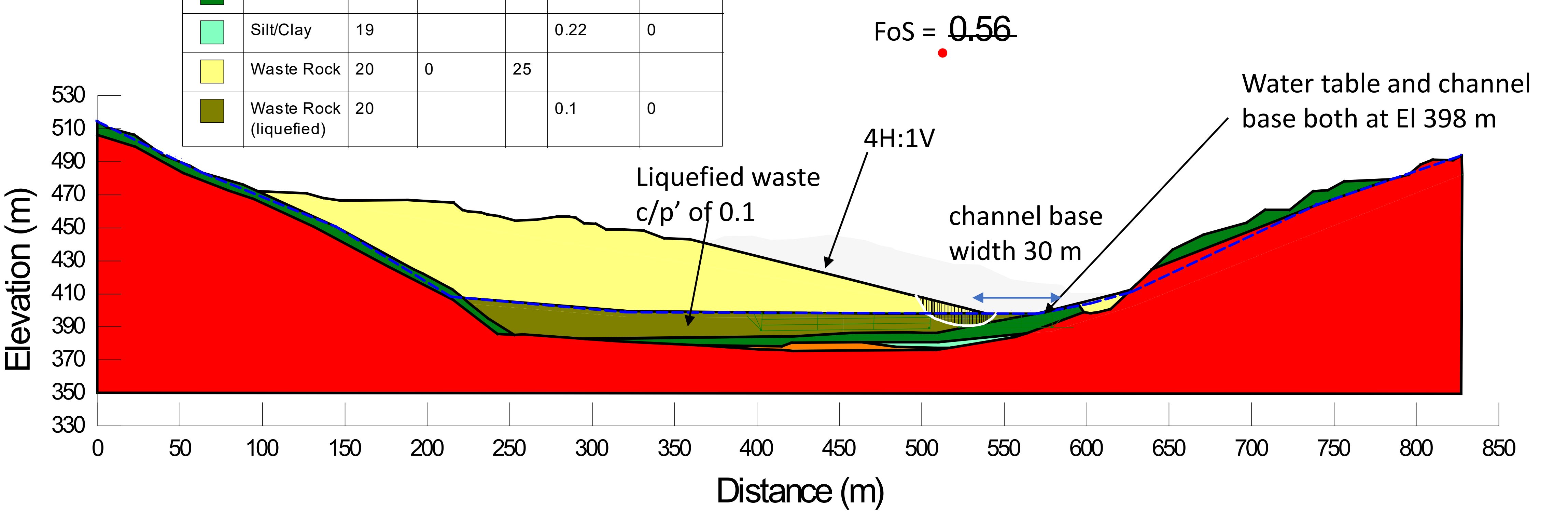
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0



CC2 - DS1 Stability, South Channel
4H:1V slope cut, Construction Liquefaction

- Channel base at El 398 m, 30 m wide
- Phreatic surface at El 398 m (currently at 401 m)
- Toe failure

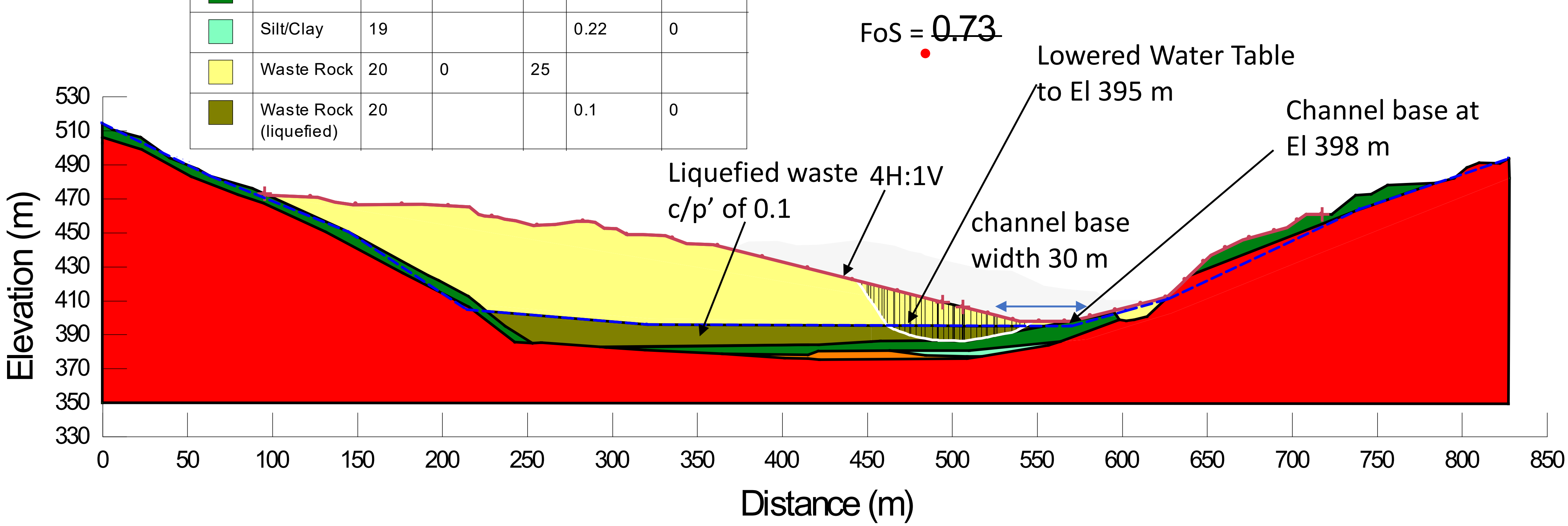
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0



CC2 - DS1 Stability, South Channel
4H:1V slope cut, Construction Liquefaction

- Channel base at El 398 m, 30 m wide
- Phreatic surface at El 395 m (3 m below base of channel)
- Mid-slope failure

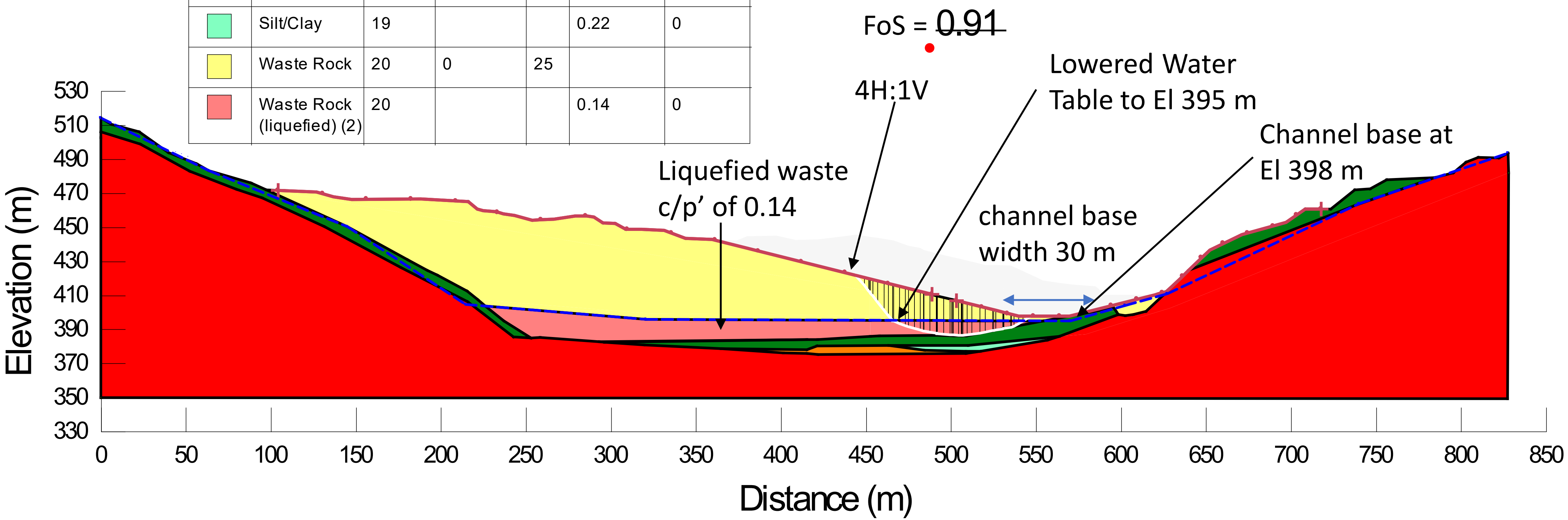
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0



CC2 - DS1 Stability, South Channel
4H:1V slope cut, Construction Liquefaction

- Channel base at El 398 m, 30 m wide
- Phreatic surface at El 395 m (3 m below base of channel)
- Mid-slope failure
- Back analyzed liquified strength from DS1 and DS2, c/p' of 0.14

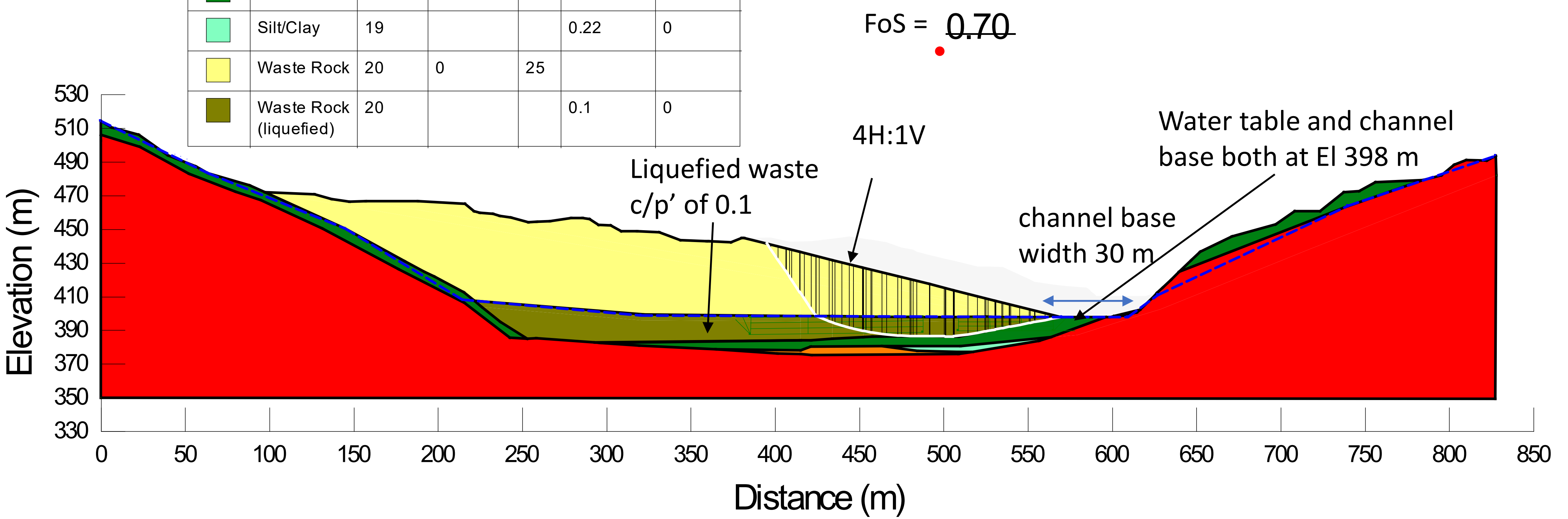
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied) (2)	20			0.14	0



CC2 - DS1 Stability, North Channel
4H:1V slope cut, Construction Liquefaction

- Channel base at El 398 m, 30 m wide
- Phreatic surface at El 398 m (currently at 401 m)
- Mid-slope failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

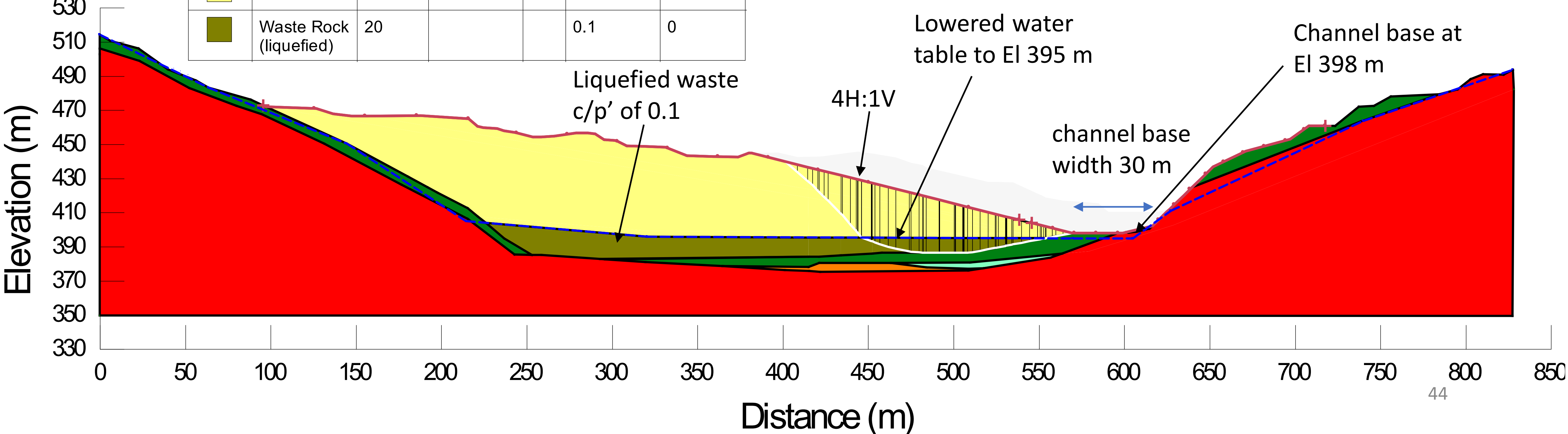


CC2 - DS1 Stability, North Channel
4H:1V slope cut, Construction Liquefaction

- Channel base at El 398 m, 30 m wide
- Phreatic surface at El 395 m (3 m below base of channel)
- Mid-slope failure

FoS = 0.84

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

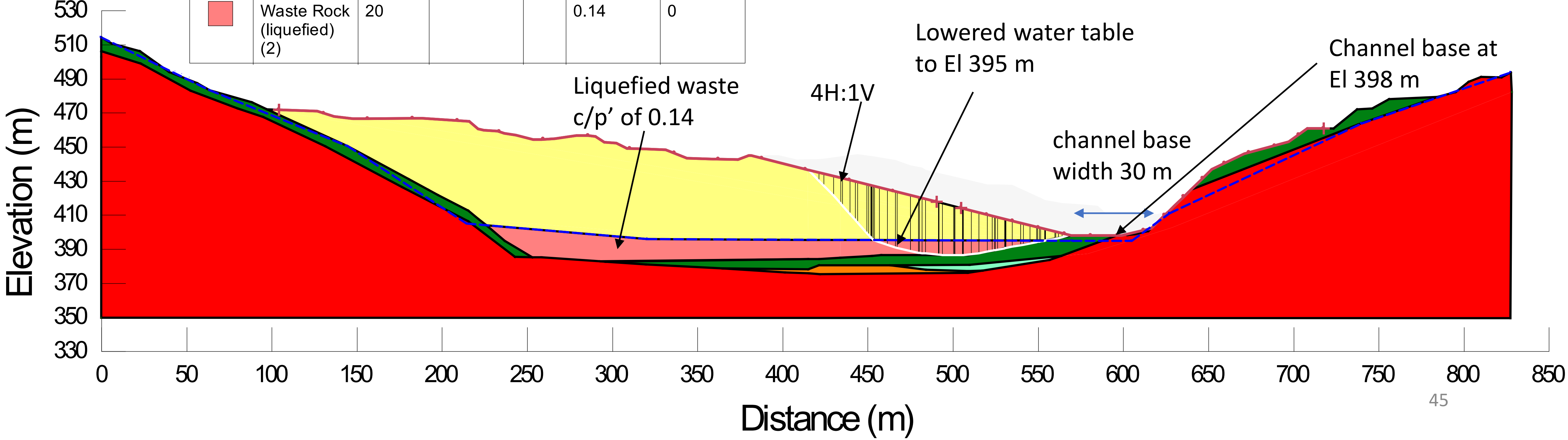


CC2 - DS1 Stability, North Channel
4H:1V slope cut, Construction Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied) (2)	20			0.14	0

- Channel base at El 398 m, 30 m wide
- Phreatic surface at El 395 m (3 m below base of channel)
- Mid-slope failure
- Back analyzed liquified strength from DS1 and DS2, c/p' of 0.14

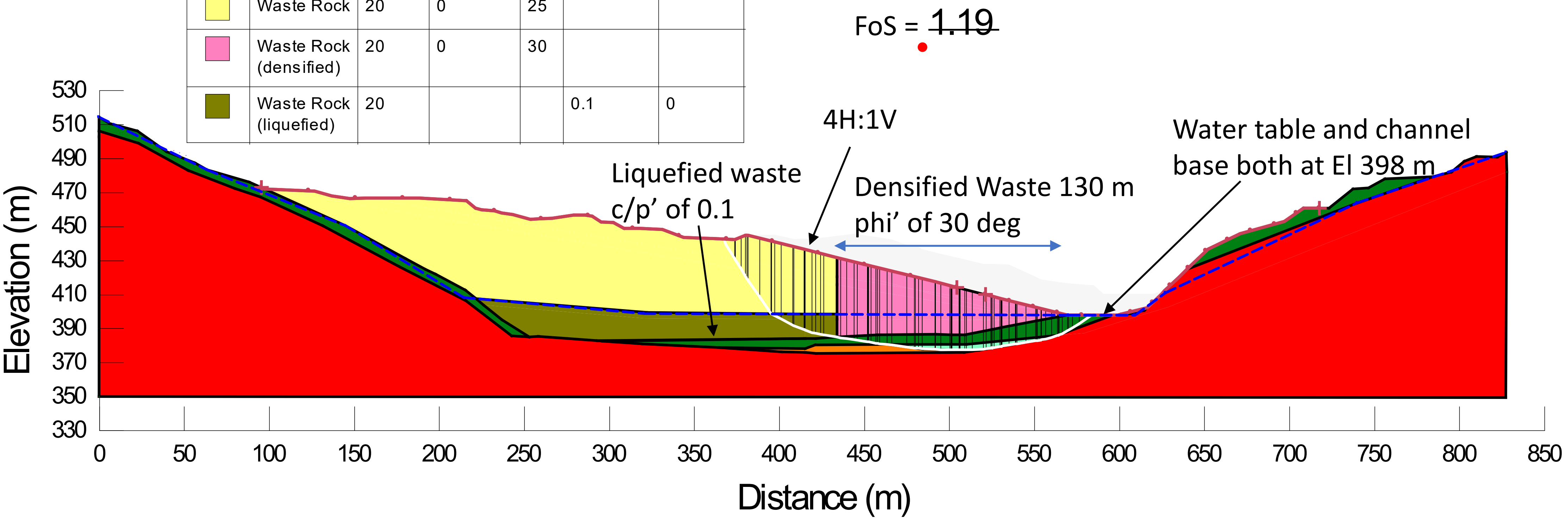
FoS = 1.01



CC2 - DS1 Stability, North Channel
4H:1V slope cut, Construction Liquefaction

- Channel base at El 398 m, 30 m wide
- Phreatic surface at El 395 m (3 m below base of channel)
- Mid-slope failure
- Densified 130 m wide zone of waste

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (densified)	20	0	30		
	Waste Rock (liquefied)	20			0.1	0

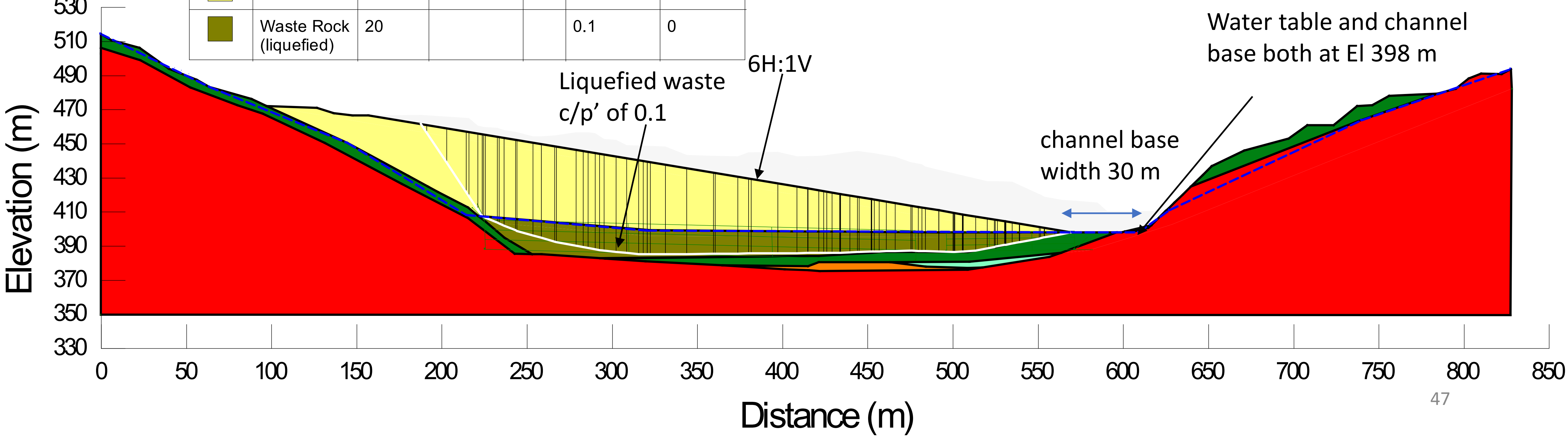


CC2 - DS1 Stability, North Channel
6H:1V slope cut, Construction Liquefaction

- Channel base at El 398 m, 30 m wide
- Phreatic surface at El 398 m (currently at 401 m)
- Mid-slope failure

FoS = 0.82

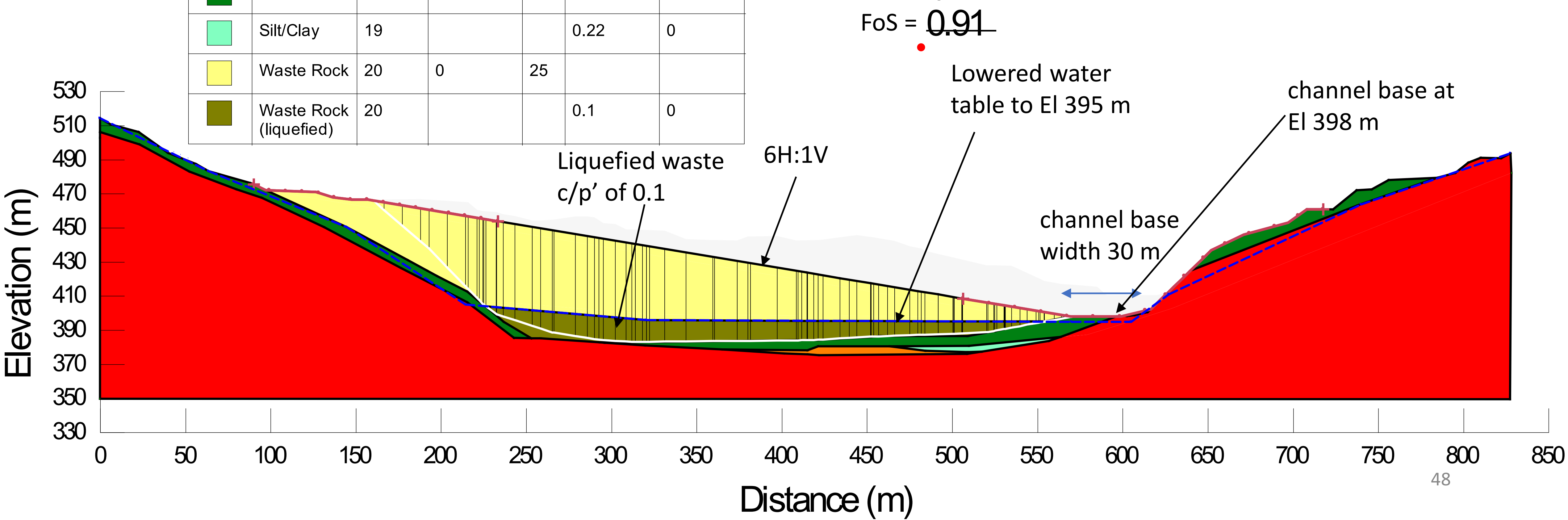
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0



CC2 - DS1 Stability, North Channel
6H:1V slope cut, Construction Liquefaction

- Channel base at El 398 m, 30 m wide
- Phreatic surface at El 395 m (3 m below base of channel)
- Mid-slope failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

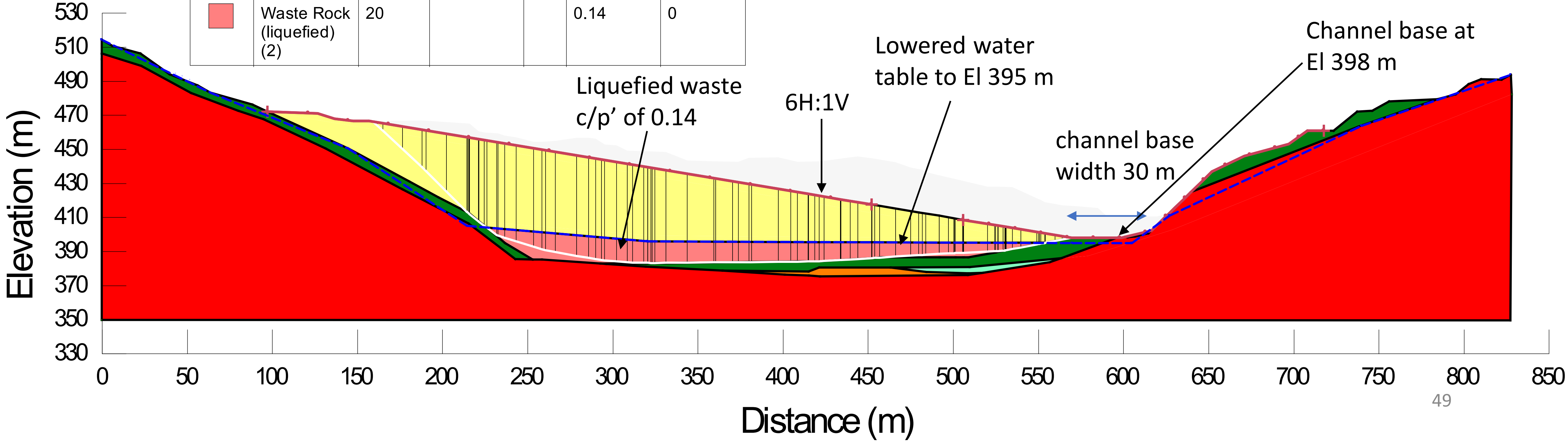


CC2 - DS1 Stability, North Channel
6H:1V slope cut, Construction Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied) (2)	20			0.14	0

- Channel base at El 398 m, 30 m wide
- Phreatic surface at El 395 m (3 m below base of channel)
- Mid-slope failure
- Back analyzed liquified strength from DS1 and DS2, c/p' of 0.14

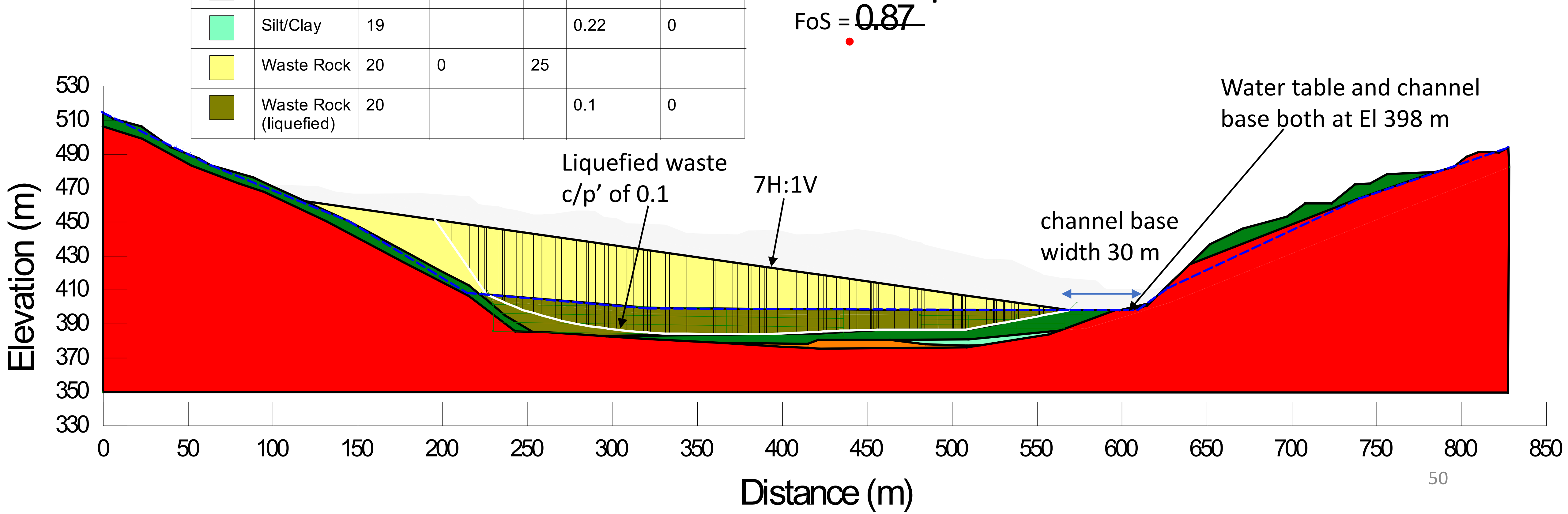
FoS = 1.15



CC2 - DS1 Stability, North Channel
7H:1V slope cut, Construction Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

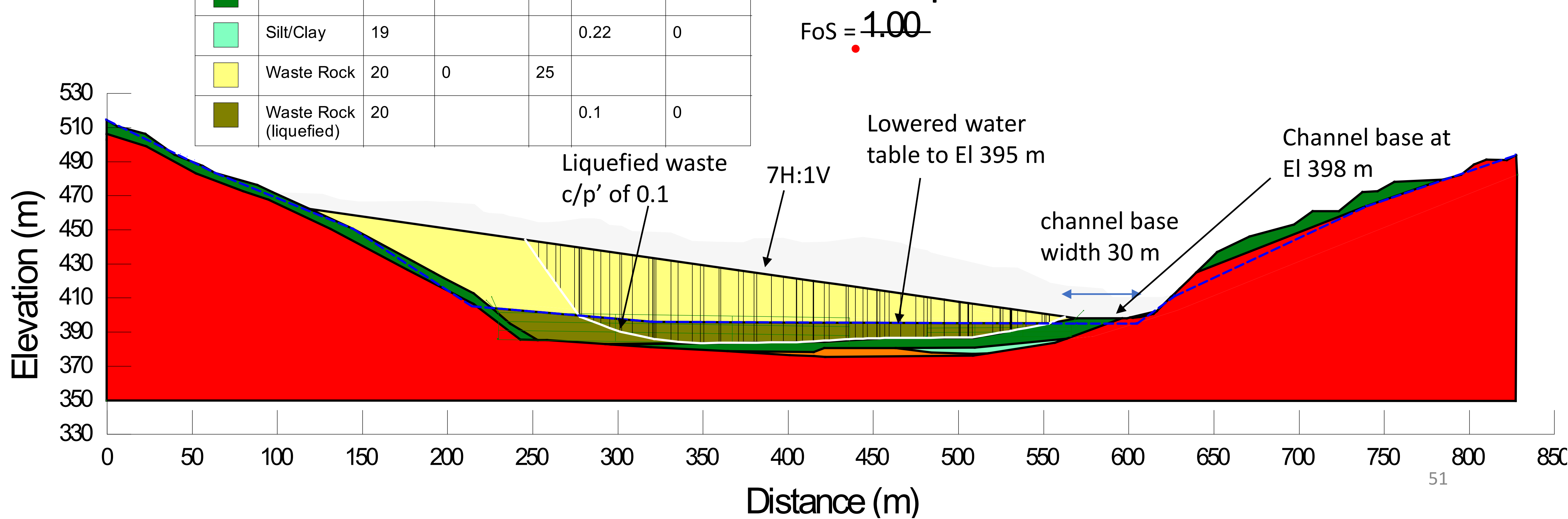
- Channel base at El 398 m, 30 m wide
- Phreatic surface at El 398 m (currently at 401 m)
- Mid-slope failure



CC2 - DS1 Stability, North Channel
7H:1V slope cut, Construction Liquefaction

- Channel base at El 398 m, 30 m wide
- Phreatic surface at El 395 m (3 m below base of channel)
- Mid-slope failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied)	20			0.1	0

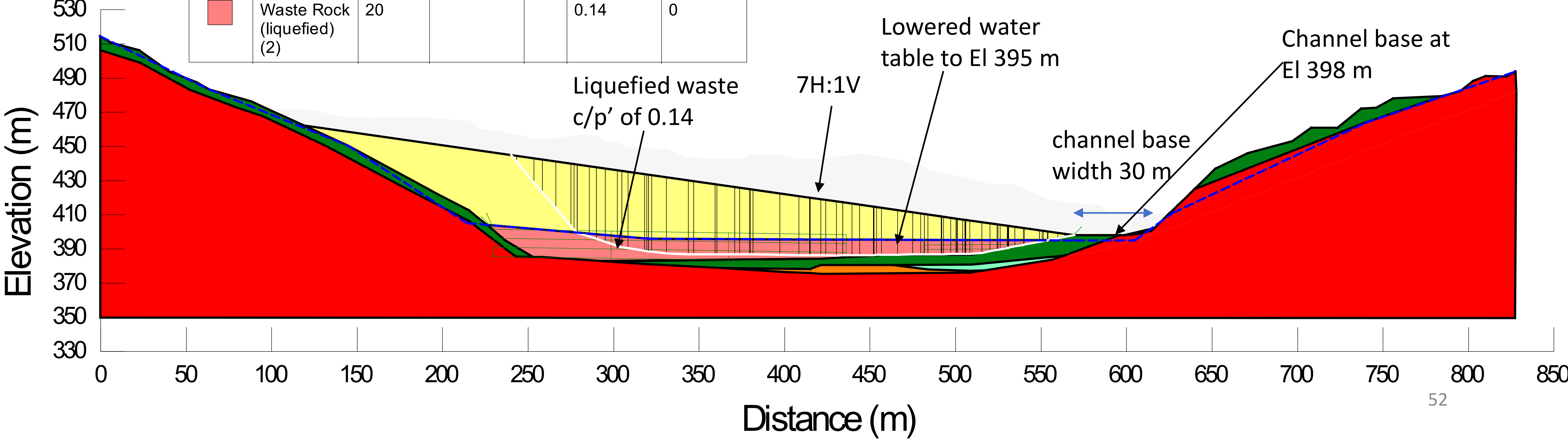


CC2 - DS1 Stability, North Channel
7H:1V slope cut, Construction Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio	Minimum Strength (kPa)
	Alluvium	20	0	25		
	Bedrock					
	Colluvium	20	0	25		
	Silt/Clay	19			0.22	0
	Waste Rock	20	0	25		
	Waste Rock (liquefied) (2)	20			0.14	0

- Channel base at El 398 m, 30 m wide
- Phreatic surface at El 395 m (3 m below base of channel)
- Mid-slope failure
- Back analyzed liquified strength from DS1 and DS2, c/p’ of 0.14

FoS = 1.30



Sub-appendix F

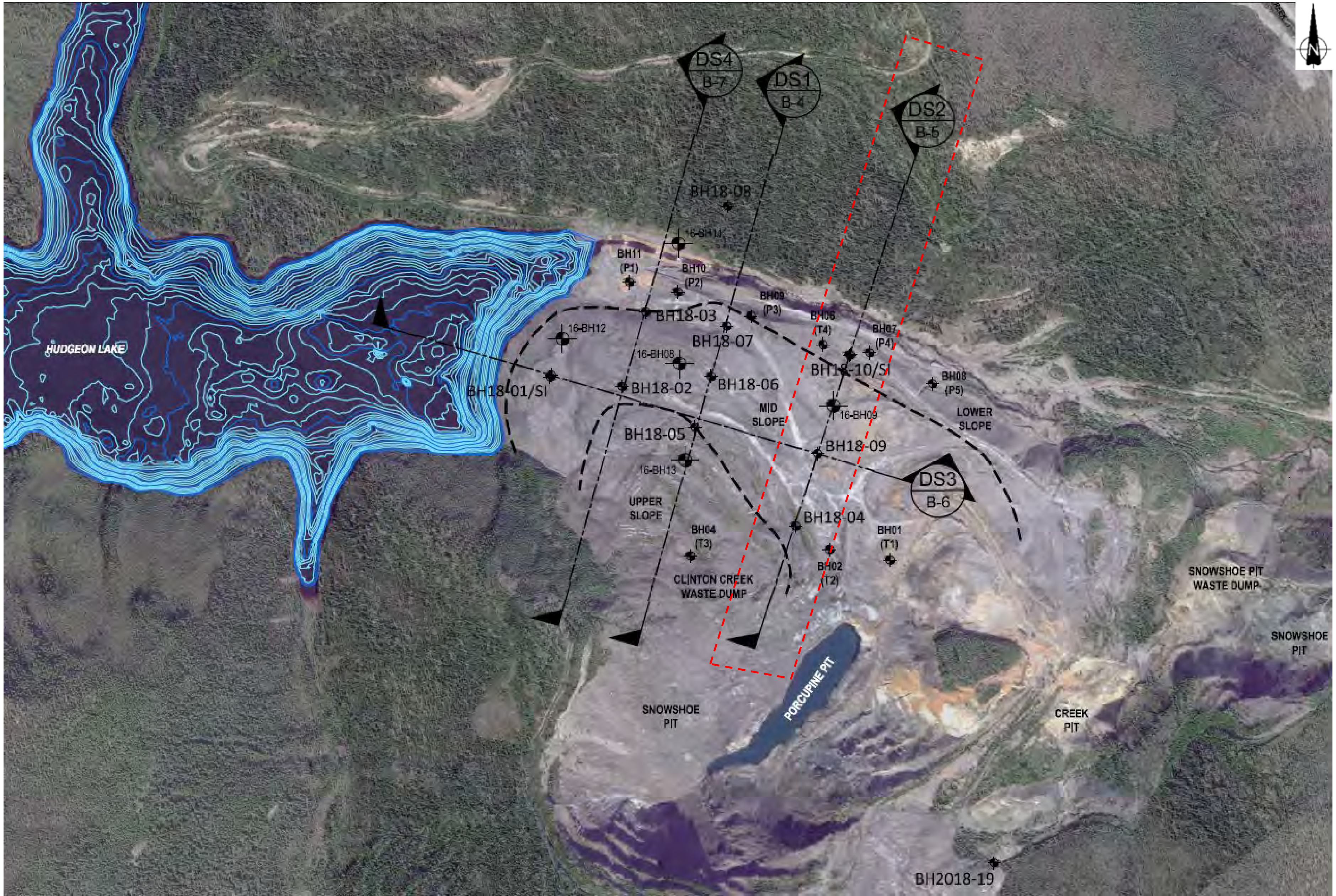
Section DS2

Clinton Creek Closure Option Design Stability Analyses Section DS2

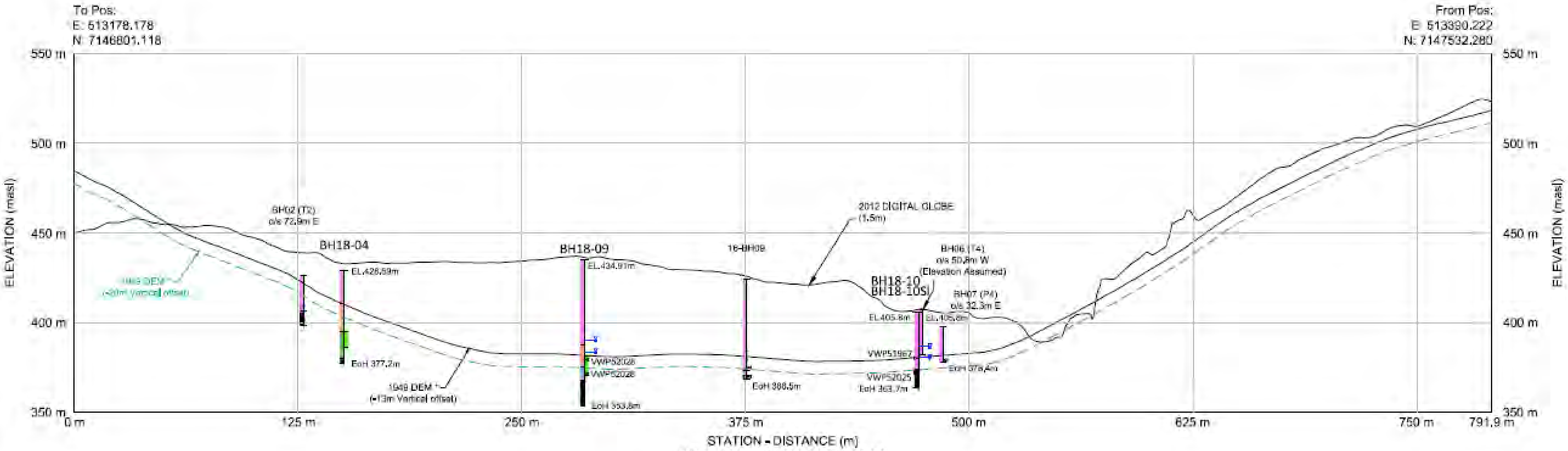
Clinton Creek Remediation Project

19 February 2020

Clinton Creek Mine Site Plan



Section DS2



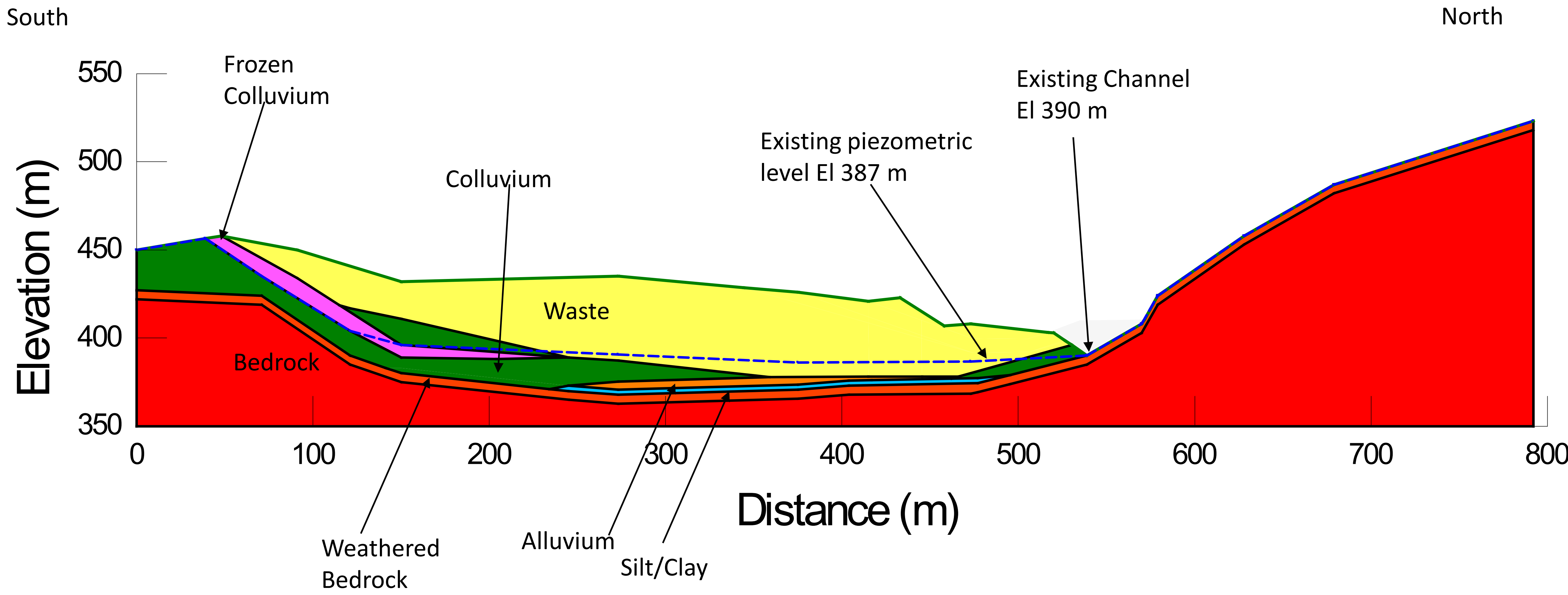
SECTION - ALIGNMENT DS2

LEGEND

- ○ THERMISTOR NODES
- ◁ VIBRATING WIRE PIEZOMETER (VWP) TIP LOCATION

- FILL
- ORGANICS
- WASTE
- ALLUVIUM
- COLLUVIUM
- MIXED COLLUVIUM / WASTE ROCK
- FROZEN SOIL
- BEDROCK
- WATER TABLE

Section DS2 Existing Condition (Base Case)



DS2 Stability FoS Summary

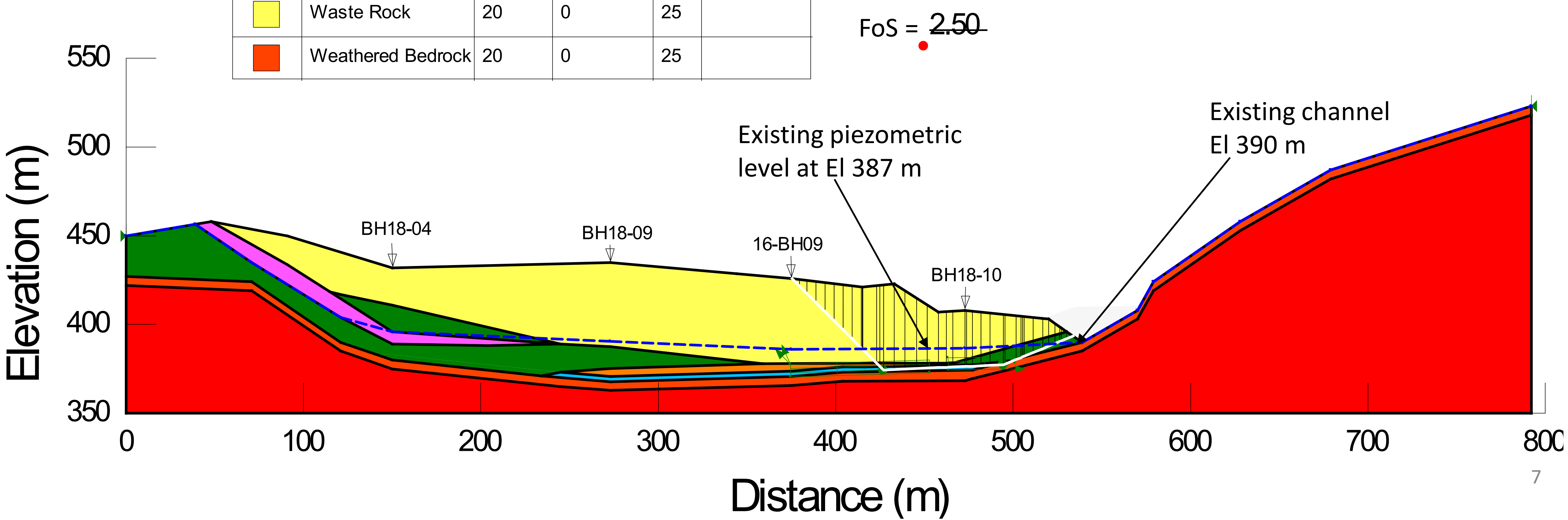
Section DS2 - Stability Factor of Safety Summary								
Options	Scenarios	Channel location	Spillway Cut Slope (South)	Condition Description	Waste Strength	Water Table	FoS	Minimum Required FoS
Base Case	Back Analysis	Existing condition	NA	Near channel slip surface	drained, ϕ' of 25 deg	Measured	2.5	1.2
		Existing condition	NA	Toe failure	drained, ϕ' of 25 deg	Measured	*0.98*	
		Existing condition	NA	overall stability (frozen colluvium at back slope)	drained, ϕ' of 25 deg	Measured	2.06	
		Existing condition	NA	Liquefied Waste	c/p’ of 0.1	Measured	1.35	1.0
		Existing condition	NA	Liquefied Waste sensitvity	c/p’ of 0.14	Measured	1.65	
Option CC1 Lake at El. 412; Channel Base El. 400.5	Design No Liquefaction	Preliminary channel location	3H:1V	Near channel slip surface	drained, ϕ' of 25 deg	Assumed design	1.51	1.2
		Preliminary channel location	4H:1V	Near channel slip surface	drained, ϕ' of 25 deg	Assumed design	1.58	
		Preliminary channel location	4H:1V	Overall stability	drained, ϕ' of 25 deg	Assumed design	1.85	
	Construction static Liquefaction	Preliminary channel location	4H:1V	Liquefied silt/clay with c/p’ of 0.1	drained, ϕ' of 25 deg	Measured	1.61	1.0
		Preliminary channel location	4H:1V	Liquefied silt/clay with c/p’ of 0.1	drained, ϕ' of 25 deg	Assumed design	1.26	
		Preliminary channel location	4H:1V	Liquefied Waste	c/p’ of 0.14	Measured	1.32	
		Preliminary channel location	4H:1V	Liquefied Waste (Overall stability)	c/p’ of 0.1	Measured	2.02	
		Preliminary channel location	4H:1V	Liquefied Waste with reasonable strength	c/p’ of 0.14	Measured	1.32	
		Preliminary channel location	4H:1V	Liquefied Waste, lower water table	c/p’ of 0.1	3 m lower	1.35	
		Preliminary channel location	4H:1V	Liquefied Waste with reasonable strength, lower water table	c/p’ of 0.14	3 m lower	1.51	
		Preliminary channel location	4H:1V	Blast Densification 30 m width	c/p’ of 0.1	Measured	1.46	
Option CC2 Lake at El. 400; Channel Base El. 390	Design No Liquefaction	Preliminary channel location	4H:1V	Near channel slip surface	drained, ϕ' of 25 deg	Assumed design	1.33	1.2
		Preliminary channel location	4H:1V	overall stability (frozen colluvium at back slope)	drained, ϕ' of 25 deg	Assumed design	1.54	
		Adjusted channel location	6H:1V	Near channel slip surface	drained, ϕ' of 25 deg	Assumed design	1.34	
		Adjusted channel location	6H:1V	overall stability (frozen colluvium at back slope)	drained, ϕ' of 25 deg	Assumed design	1.77	
	Construction static Liquefaction	Preliminary channel location	4H:1V	Liquefied Waste	c/p’ of 0.1	Measured	*0.74*	1.0
		Preliminary channel location	4H:1V	Liquefied Waste (Overall stability)	c/p’ of 0.1	Measured	*0.71*	
		Preliminary channel location	4H:1V	Liquefied Waste	c/p’ of 0.1	3 m lower	*0.93*	
		Preliminary channel location	4H:1V	Liquefied Waste (Overall stability)	c/p’ of 0.1	3 m lower	0.99	
		Preliminary channel location	4H:1V	Liquefied Waste with reasonable strength	c/p’ of 0.14	Measured	*0.87*	
		Preliminary channel location	4H:1V	Liquefied Waste with reasonable strength, lower water table	c/p’ of 0.14	3 m lower	1.13	
		Preliminary channel location	6H:1V	Liquefied Waste	c/p’ of 0.1	Measured	*0.67*	
		Preliminary channel location	6H:1V	Liquefied Waste, lower water table	c/p’ of 0.14	3 m lower	1.02	
		Adjusted channel location	4H:1V	Liquefied Waste	c/p’ of 0.1	Measured	*0.81*	
		Adjusted channel location	4H:1V	Liquefied Waste (Overall stability)	c/p’ of 0.1	Measured	*0.81*	
		Adjusted channel location	4H:1V	Liquefied Waste, lower water table	c/p’ of 0.1	3 m lower	0.98	
		Adjusted channel location	4H:1V	Liquefied Waste (Overall stability)	c/p’ of 0.1	3 m lower	1.11	
		Adjusted channel location	4H:1V	Liquefied Waste with reasonable strength, lower water table	c/p’ of 0.14	3 m lower	1.18	
		Adjusted channel location	4H:1V	Blast Densification 130 m width (Overall stability)	c/p’ of 0.1	Measured	1.30	
		Adjusted channel location	4H:1V	Blast Densification 130 m width (Overall stability)	c/p’ of 0.1	Measured	1.09	
		Adjusted channel location	6H:1V	Liquefied Waste	c/p’ of 0.1	Measured	*0.74*	
		Adjusted channel location	6H:1V	Liquefied Waste, lower water table	c/p’ of 0.1	3 m lower	1.07	

Back Analysis on Existing Condition (Base Case)

DS2 Base Case Stability

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Weathered Bedrock	20	0	25	

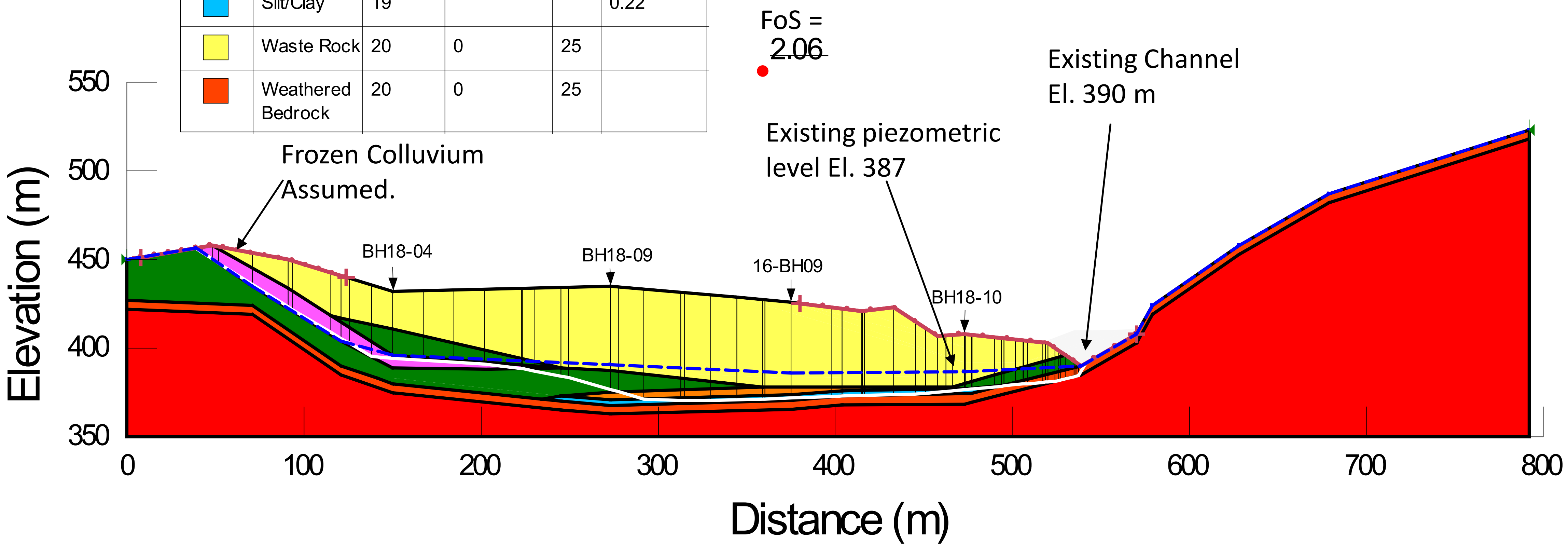
- Silt/clay layer assumed of undrained strength ratio c/p' of 0.22



DS2 Base Case Overall Stability

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Weathered Bedrock	20	0	25	

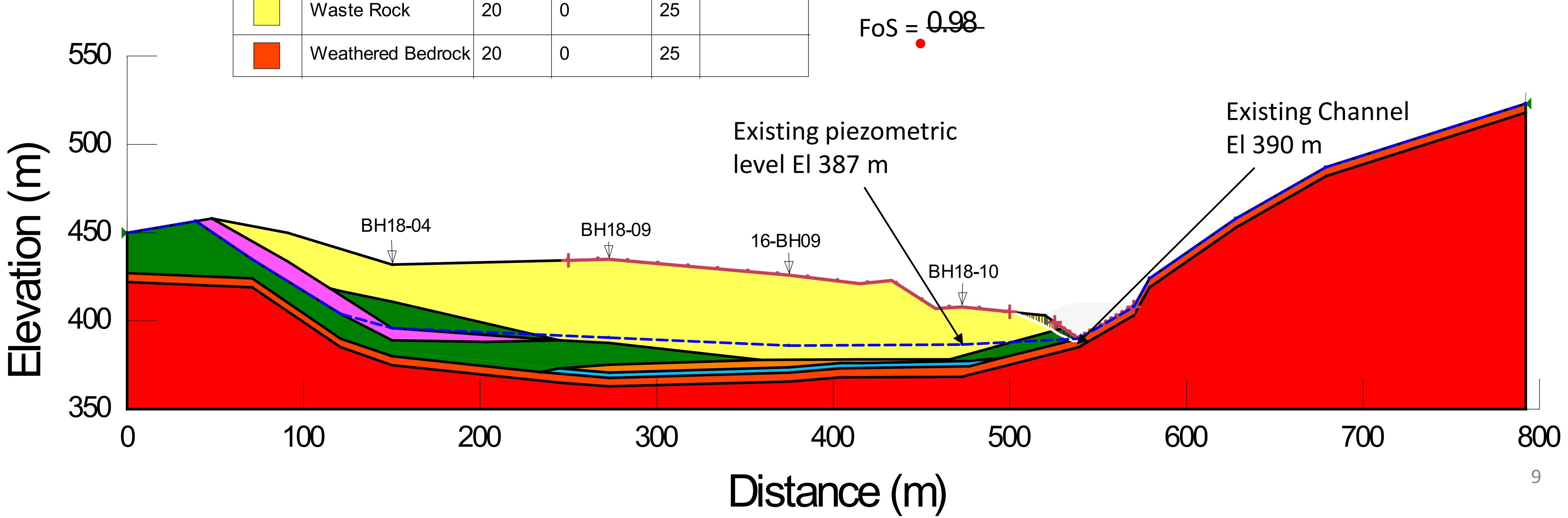
- Silt/clay layer assumed undrained strength ratio c/p’ of 0.22
- Frozen colluvium on south back slope assumed based on drilling data



DS2 Base Case Stability Toe Failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Weathered Bedrock	20	0	25	

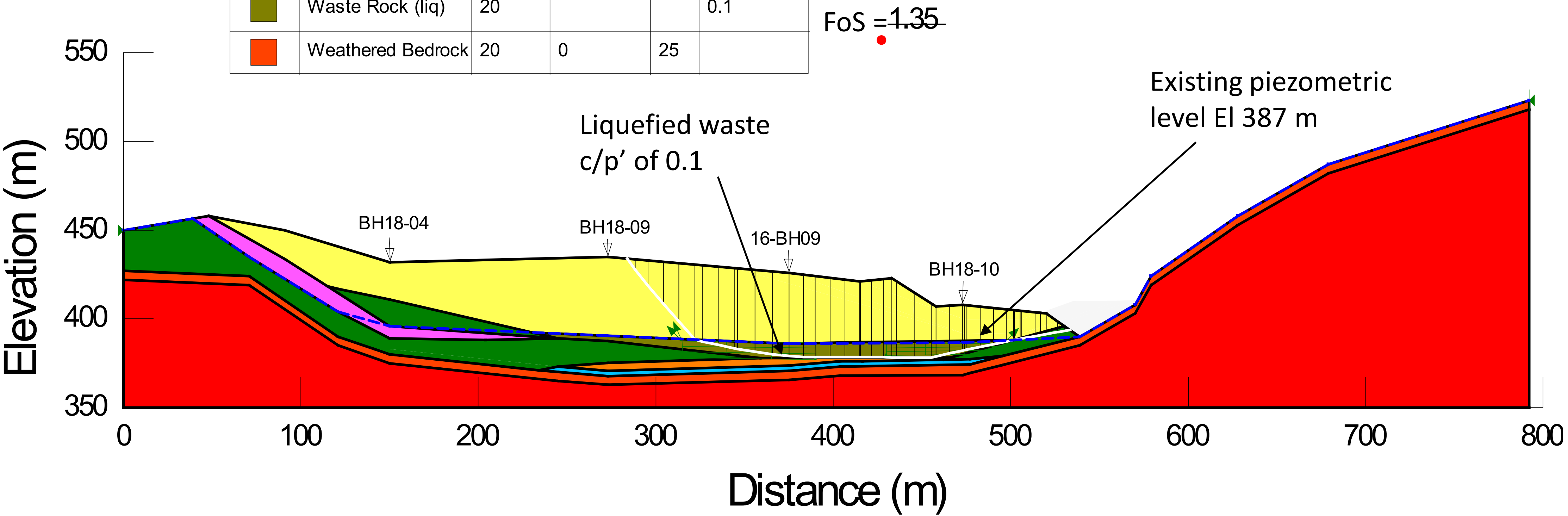
- Silt/clay layer assumed undrained strength ratio c/p' of 0.22



DS2 Base Case Stability – Saturated Waste Static Liquefaction

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	

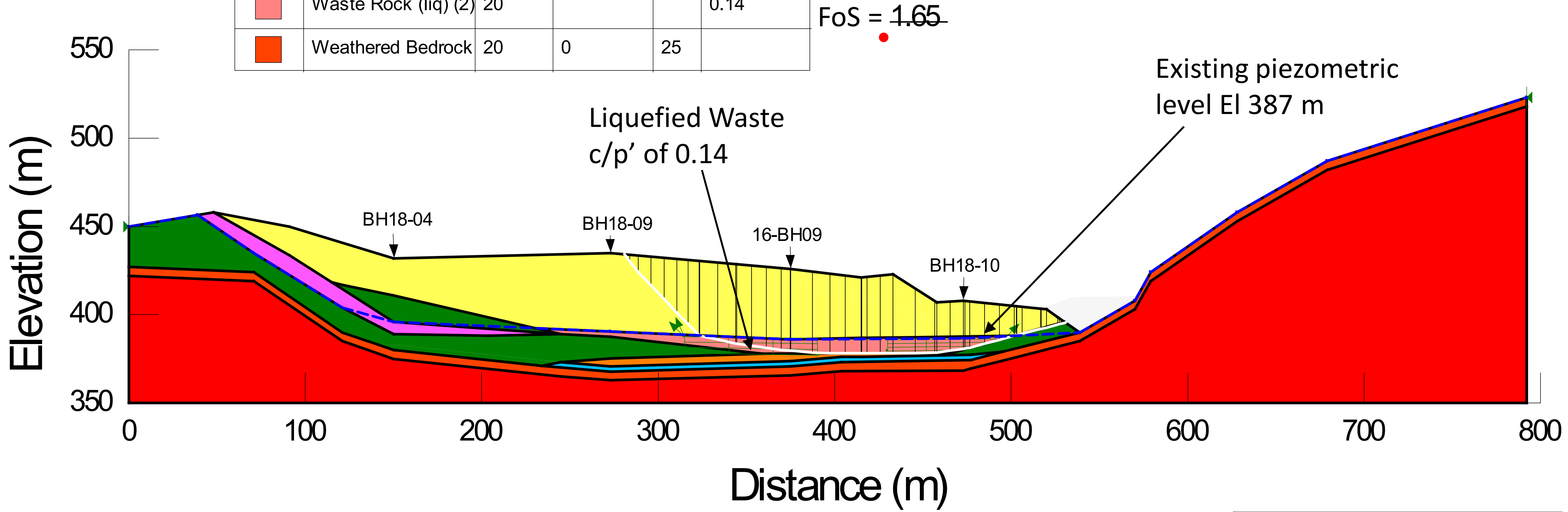
- Assumed static liquefaction for saturated waste c/p’ of 0.1



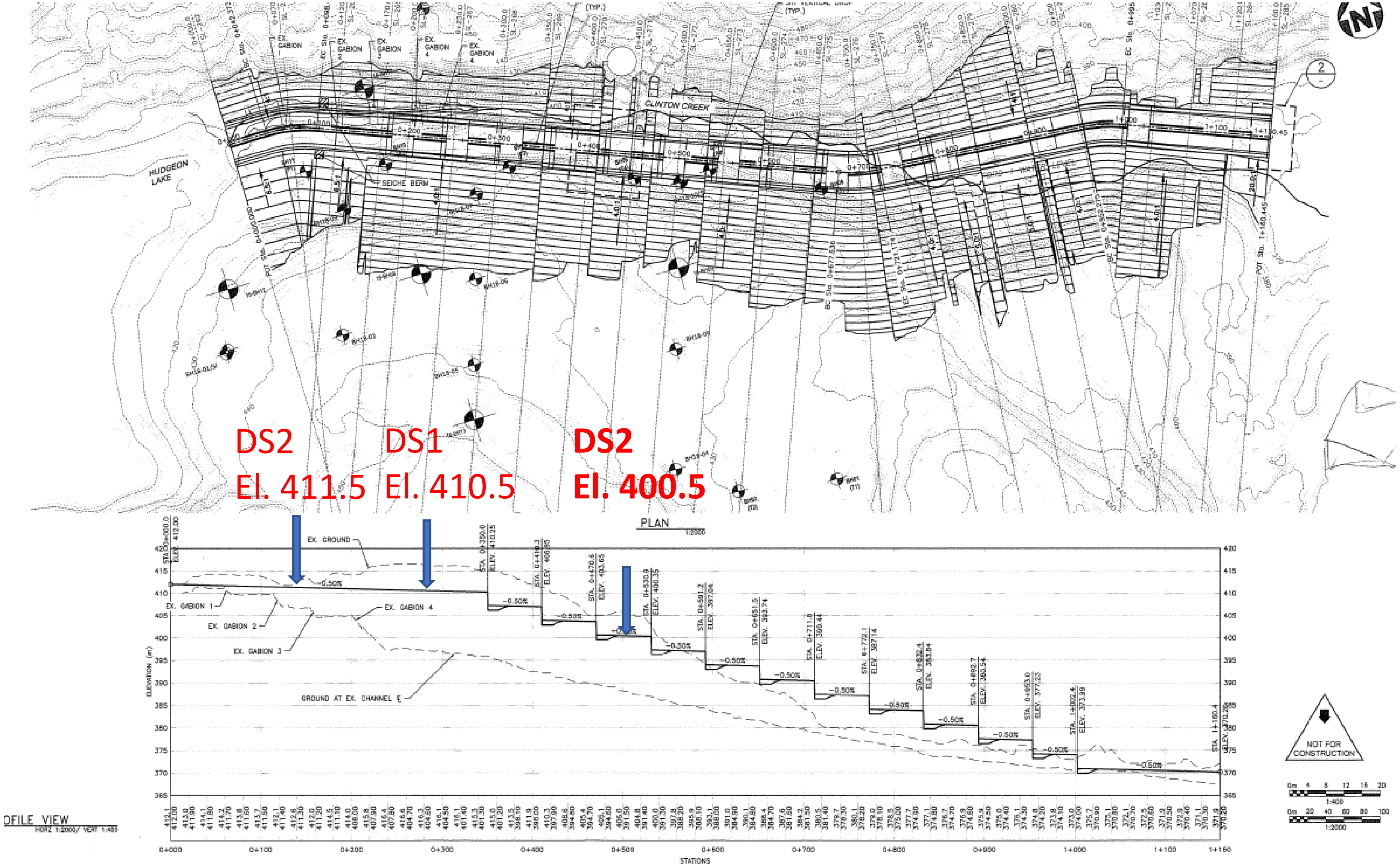
DS2 Base Case Stability – Saturated Waste Static Liquefaction Sensitivity

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq) (2)	20			0.14
	Weathered Bedrock	20	0	25	

- With DS4 back analyzed liquefied strength c/p' of 0.14



Option CC1 - Lake at El. 412 m
Preliminary Spillway Channel Design

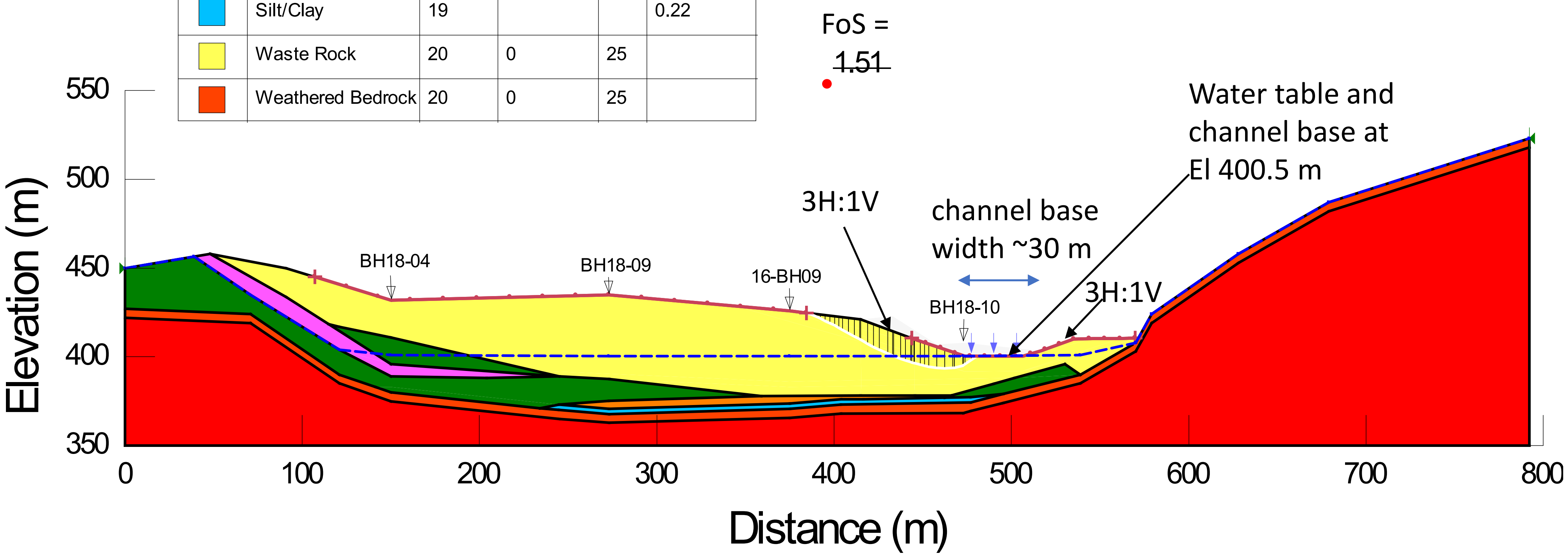


Scenario CC1 - Lake at El. 412 m
Spillway Design Case – No liquefaction (seismic and static)

CC1 - DS2 Stability No Liquefaction 3H:1V slope cut, Base El. 400.5 m, width of ~30 m

- Lateral location per original design (south channel option)
- 3H:1V cut slopes
- Phreatic surface at El. 400.5 m (currently at 387m)
- Mid-slope failure

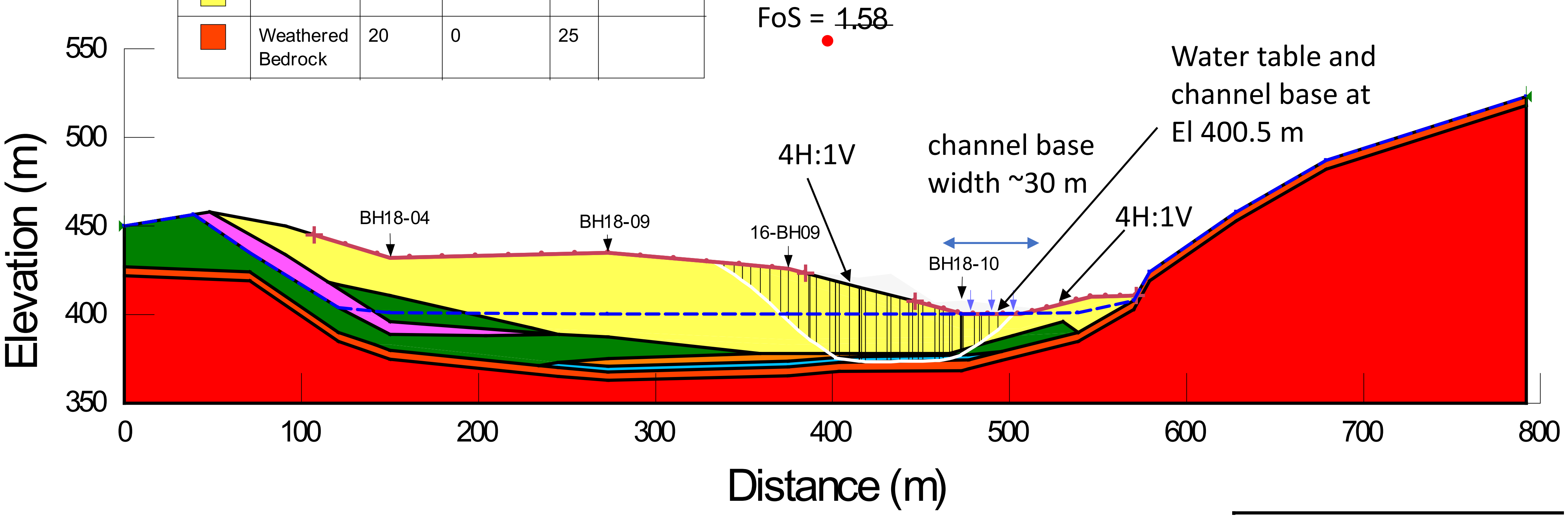
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Weathered Bedrock	20	0	25	



CC1 - DS2 Stability No Liquefaction
4H:1V slope cut, Base El. 400.5 m, width of ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Weathered Bedrock	20	0	25	

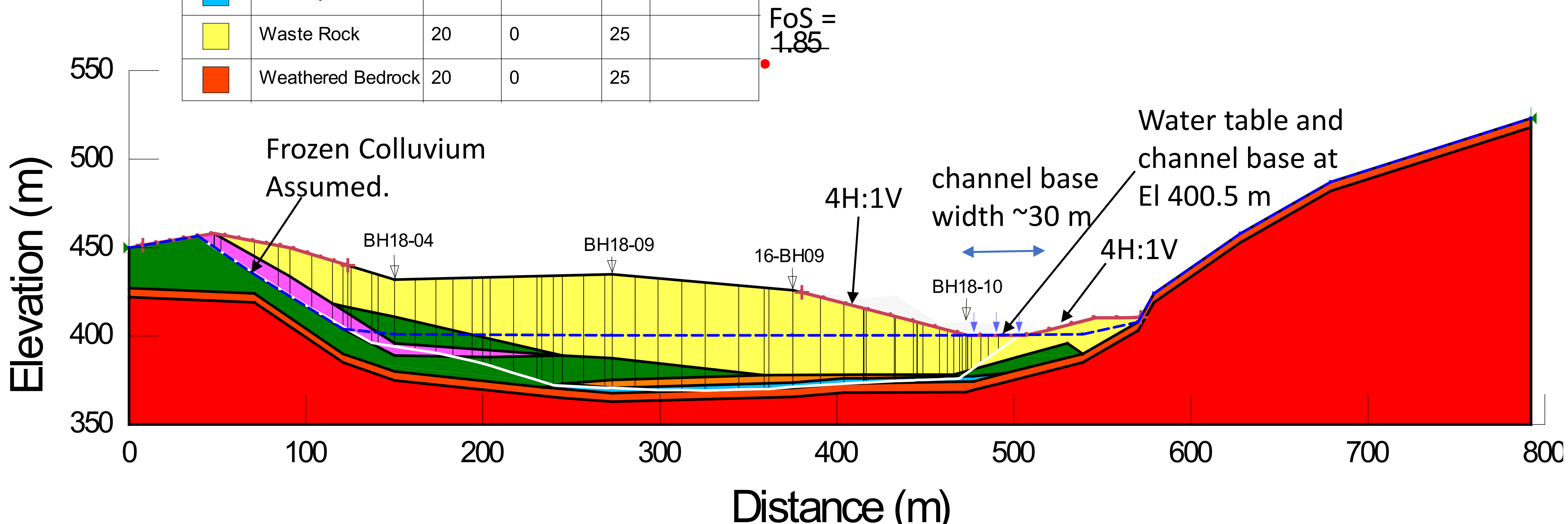
- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 400.5 m (currently at 387m)
- Mid-slope failure



CC1 - DS2 Stability No Liquefaction
4H:1V slope cut, Base El. 400.5 m, width of ~30 m

- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 400.5 m (currently at 387m)
- Overall failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Weathered Bedrock	20	0	25	



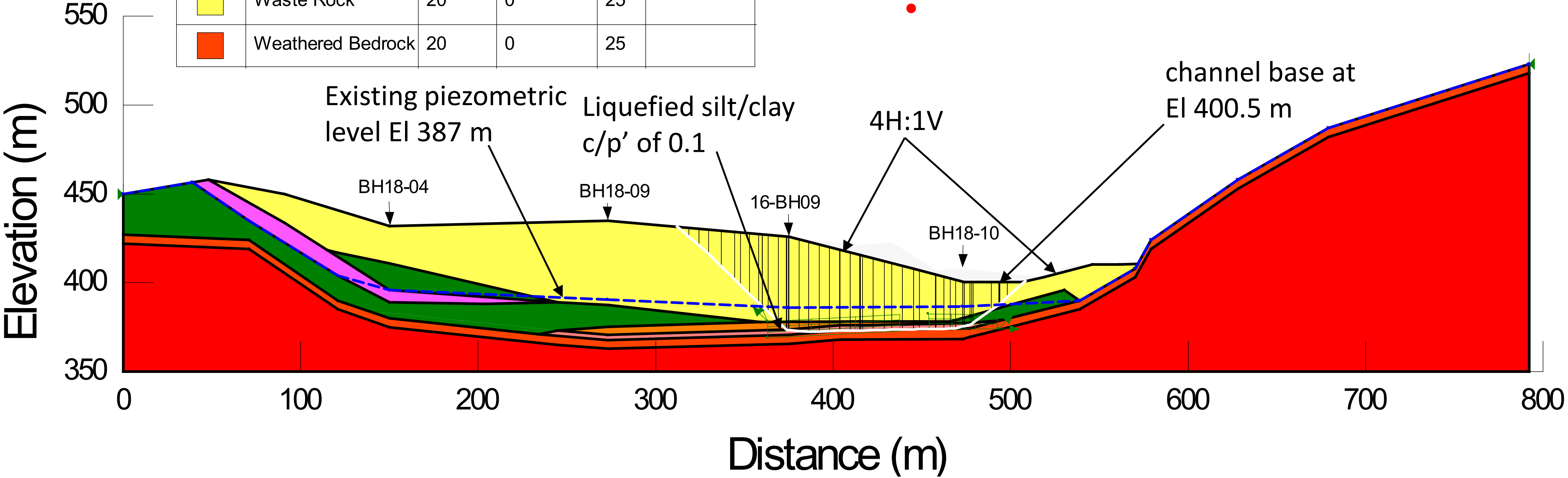
Scenario CC1 - Lake at El. 412 m
Spillway Design Construction – Static liquefaction
4H:1V South Side Spillway Channel Slope

CC1 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 400.5 m, width ~30 m

- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 387 m (current elevation)
- Mid-slope failure
- Assume that the silt/clay layer mobilizes liquified strength c/p' of 0.1

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay (liq)	19			0.1
	Waste Rock	20	0	25	
	Weathered Bedrock	20	0	25	

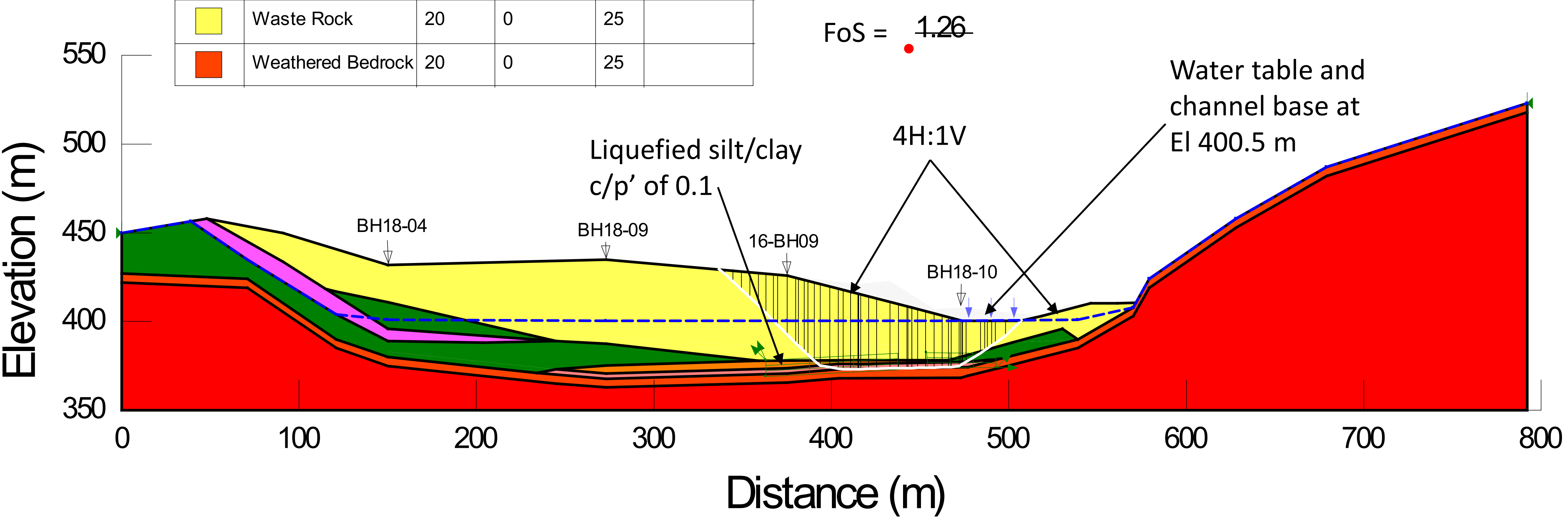
FoS = 1.61



CC1 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 400.5 m, width ~30 m

- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 400.5 m (current elevation 387 m)
- Mid-slope failure
- Assume that the silt/clay layer mobilizes liquified strength c/p' of 0.1

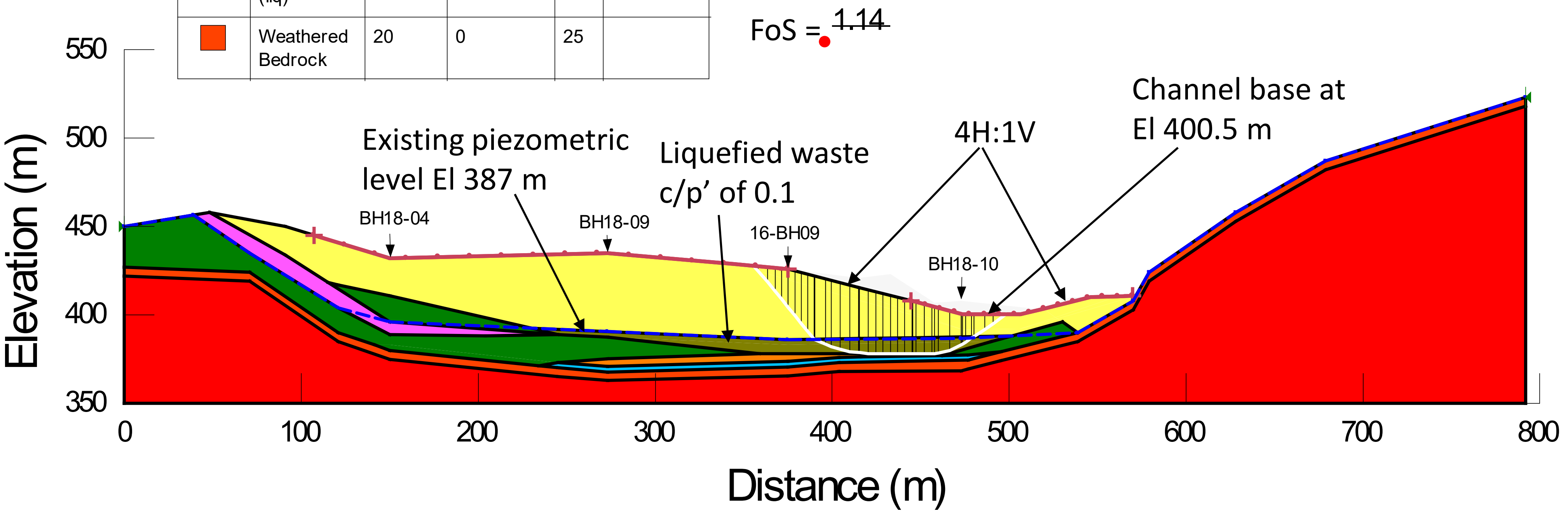
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay (liq)	19			0.1
	Waste Rock	20	0	25	
	Weathered Bedrock	20	0	25	



CC1 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 400.5 m, width ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	

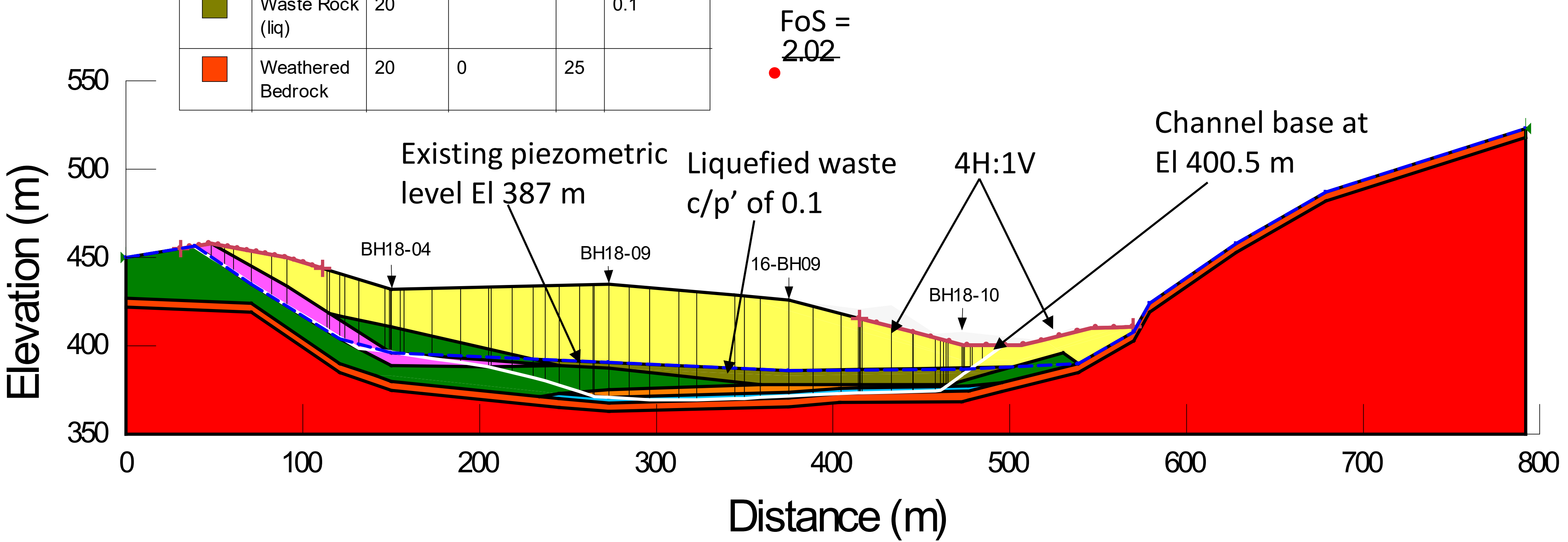
- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 387 m (current elevation)
- Mid-slope failure
- Assume that waste below the water table mobilizes liquified strength c/p' of 0.1



CC1 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 400.5 m, width ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	

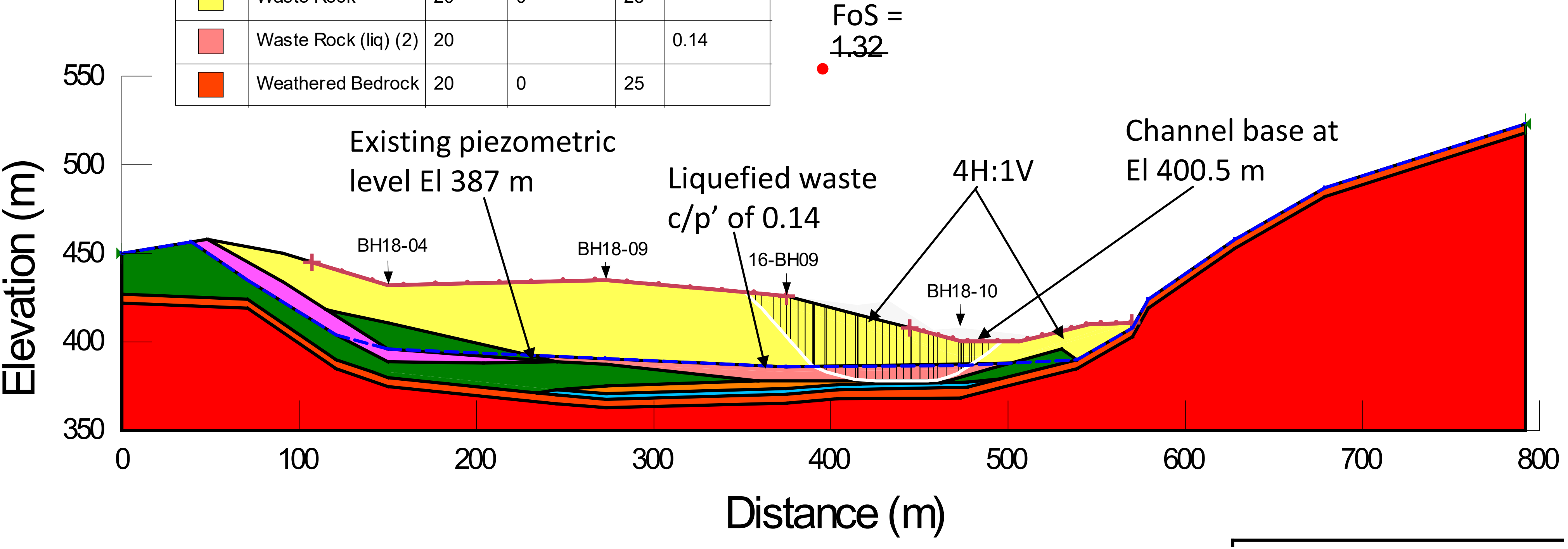
- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 387 m (current elevation)
- Overall failure
- Assume that waste below the water table mobilizes liquified strength c/p’ of 0.1



CC1 - DS2 Stability, Construction Liquefaction
4H:1V slope cut, Base El. 400.5 m, width ~30 m

- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 387 m (current elevation)
- Mid-slope failure
- Back analyzed liquified strength from DS1 and DS2, c/p’ of 0.14

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq) (2)	20			0.14
	Weathered Bedrock	20	0	25	

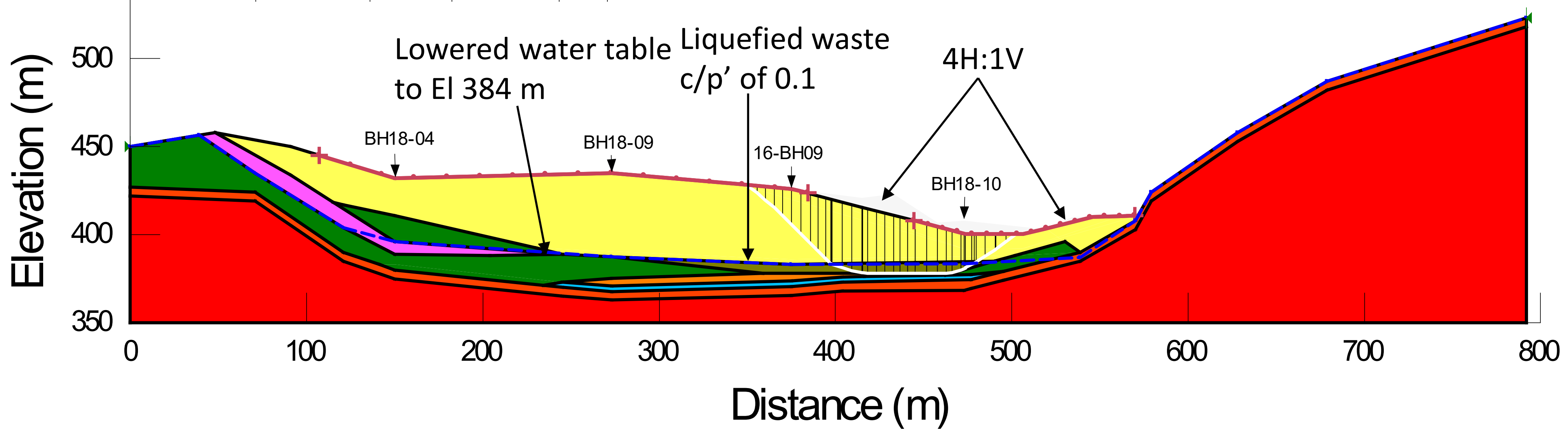


CC1 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 400.5 m, width ~30 m

- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 384 m (3 m below current elevation)
- Mid-slope failure
- Assume that waste below the water table mobilizes liquified strength c/p’ of 0.1

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	

FoS = 1.35

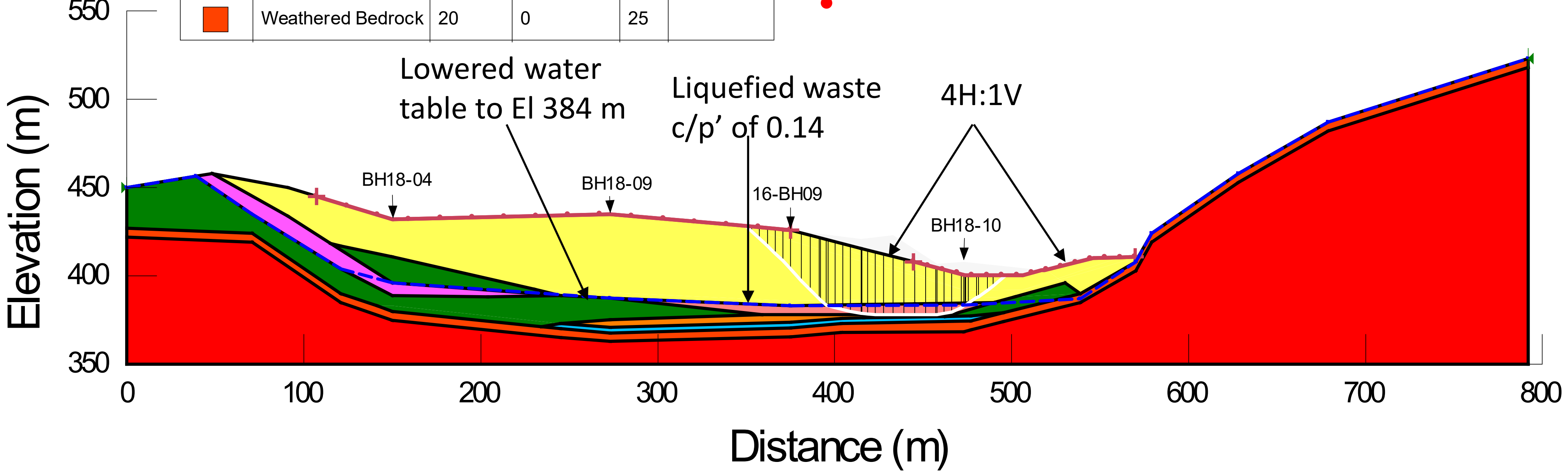


CC1 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 400.5 m, width ~30 m

- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 384 m (3 m lower than current elevation)
- Mid-slope failure
- Back analyzed liquified strength from DS1 and DS2, c/p' of 0.14

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq) (2)	20			0.14
	Weathered Bedrock	20	0	25	

FoS =
1.51

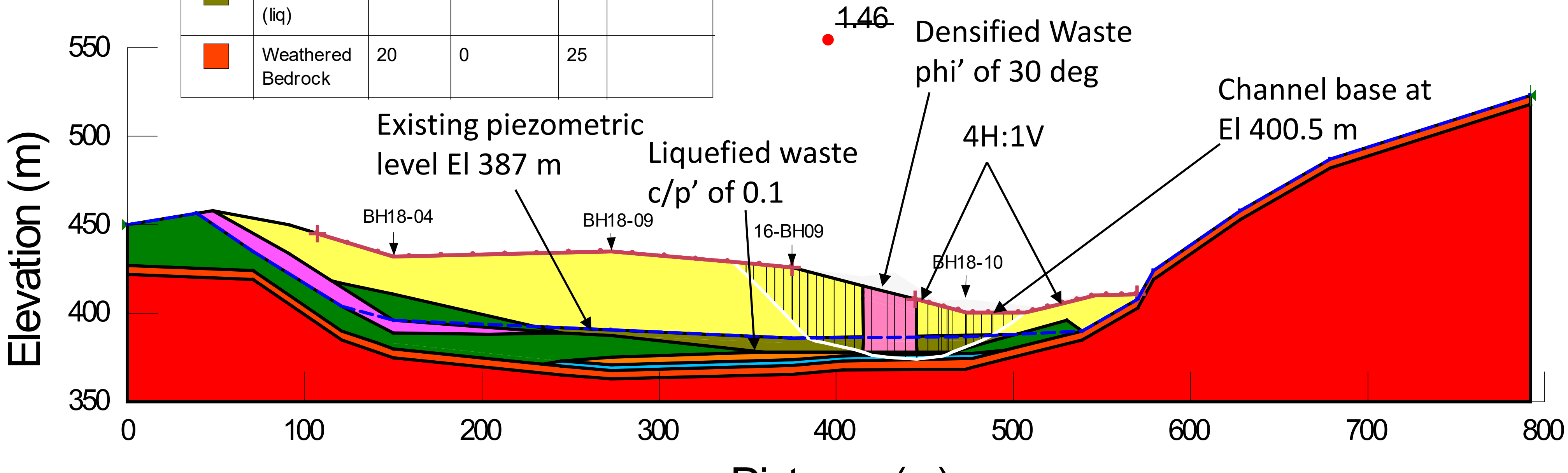


CC1 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 400.5 m, width ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (densified)	20	0	30	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	

- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 387 m (current elevation)
- Mid-slope failure
- Densified 30 m wide zone of waste

FoS =



Option CC2 - Lake at El. 400 m
Preliminary Spillway Channel Design

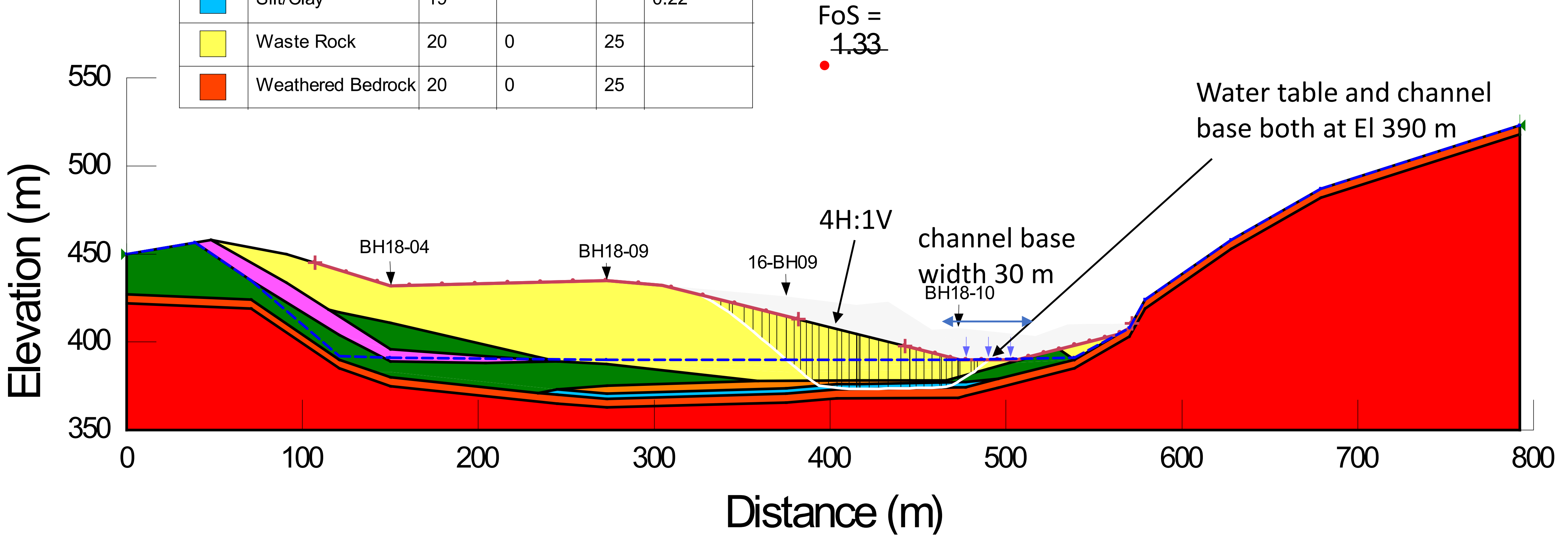
- Approximate spillway invert elevations
  - DS4 - El. 399 m
  - DS1 - El. 398 m
  - **DS2 - El. 390 m**

Option CC2 - Lake at El. 400 m
Spillway Design Case – No liquefaction (seismic and static)

CC2 - DS2 Stability, No Liquefaction
4H:1V slope cut, Base El. 390 m, width ~30 m

- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 390 m (387 m current elevation)
- Mid-slope failure

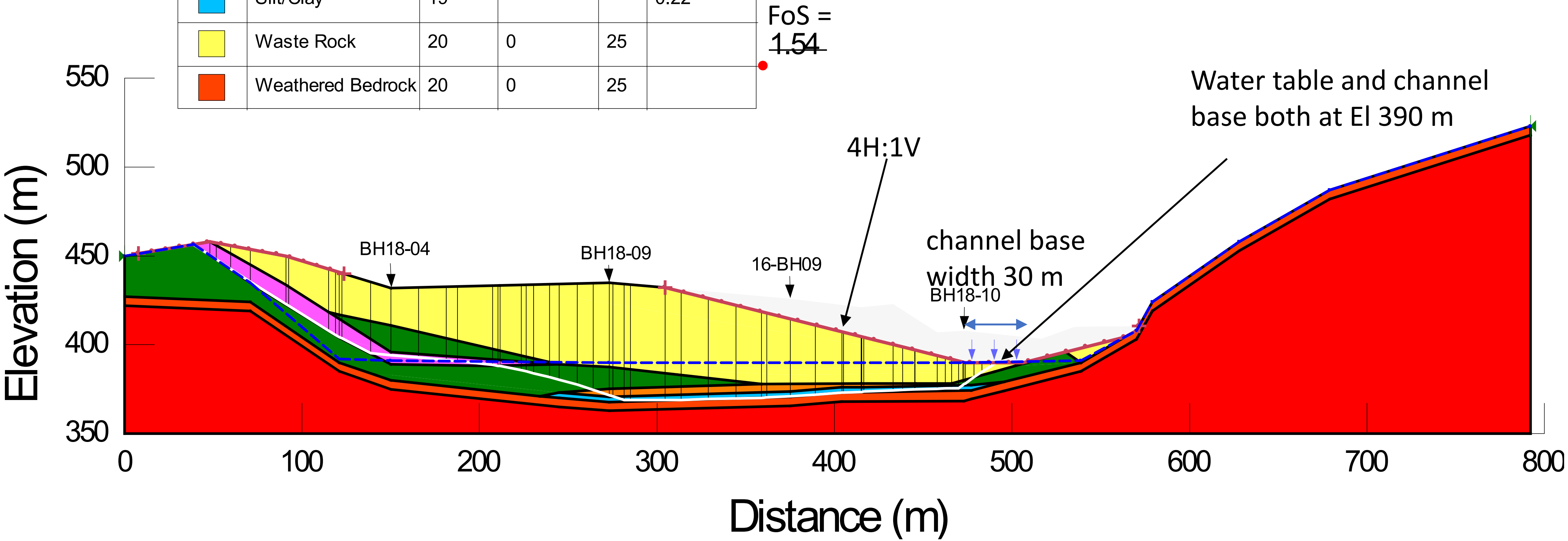
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Weathered Bedrock	20	0	25	



CC2 - DS2 Stability, No Liquefaction
4H:1V slope cut, Base El. 390 m, width ~30 m

- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 390 m (387 m current elevation)
- Overall failure

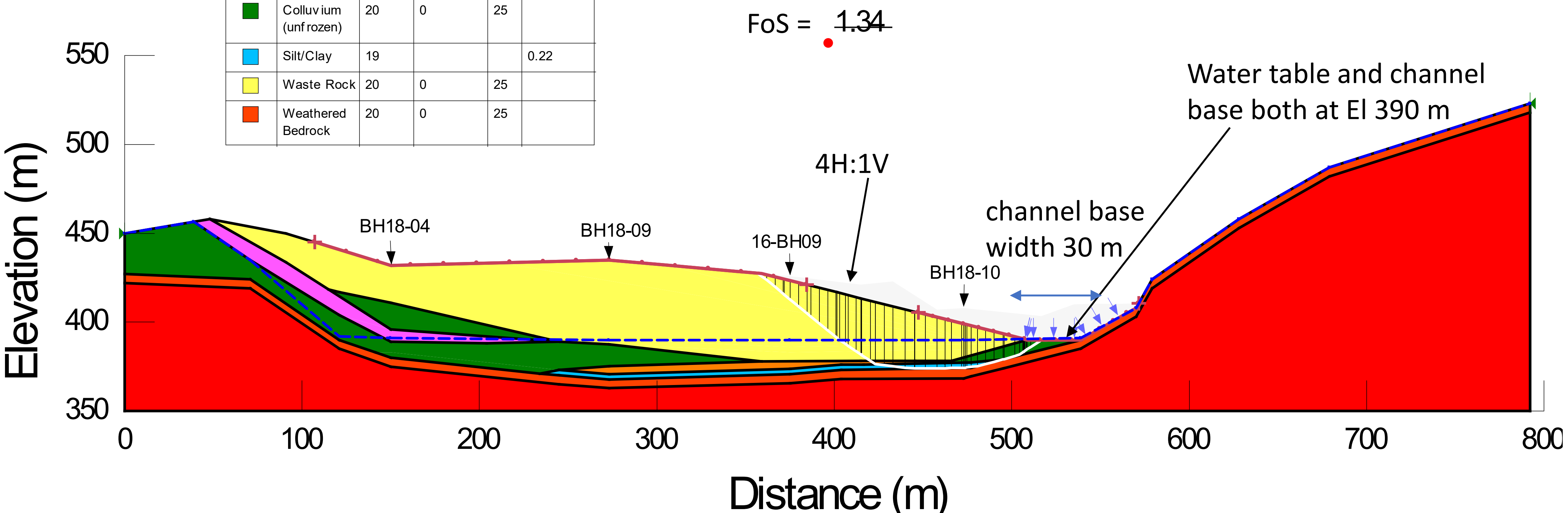
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Weathered Bedrock	20	0	25	



CC2 - DS2 Stability, No Liquefaction
4H:1V slope cut, Base El. 390 m, width ~30 m

- North channel option
- 4H:1V cut slopes
- Phreatic surface at El. 390 m (387 m current elevation)
- Mid-slope failure

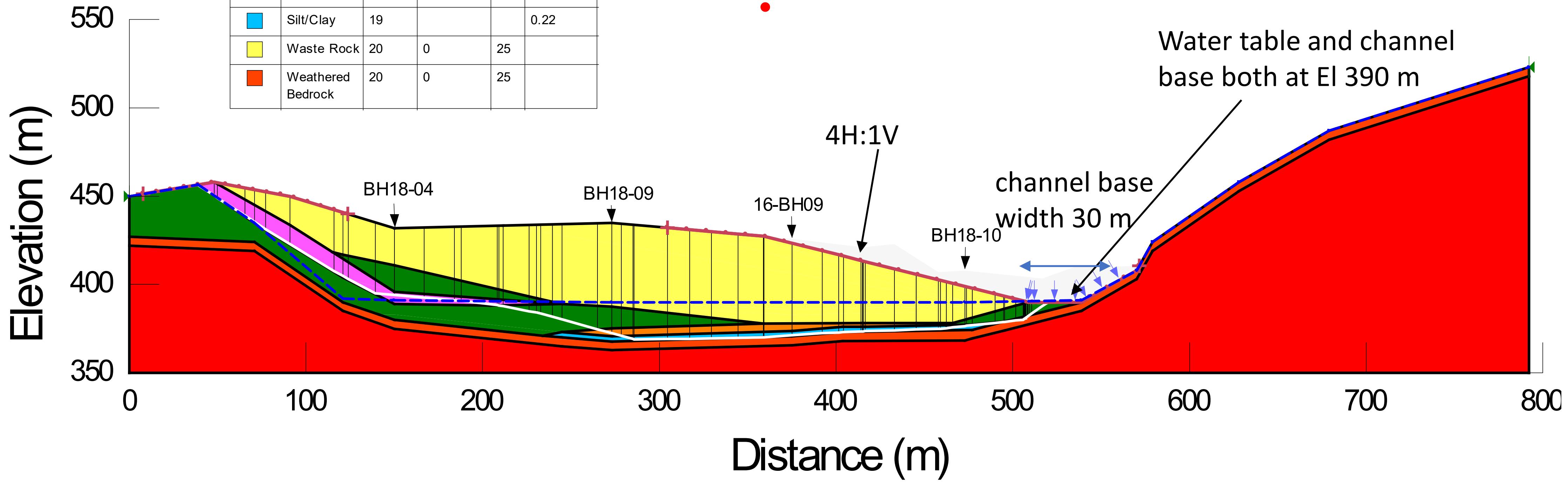
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Weathered Bedrock	20	0	25	



CC2 - DS2 Stability, No Liquefaction
4H:1V slope cut, Base El. 390 m, width ~30 m

- North channel option
- 4H:1V cut slopes
- Phreatic surface at El. 390 m (387 m current elevation)
- Overall failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Weathered Bedrock	20	0	25	

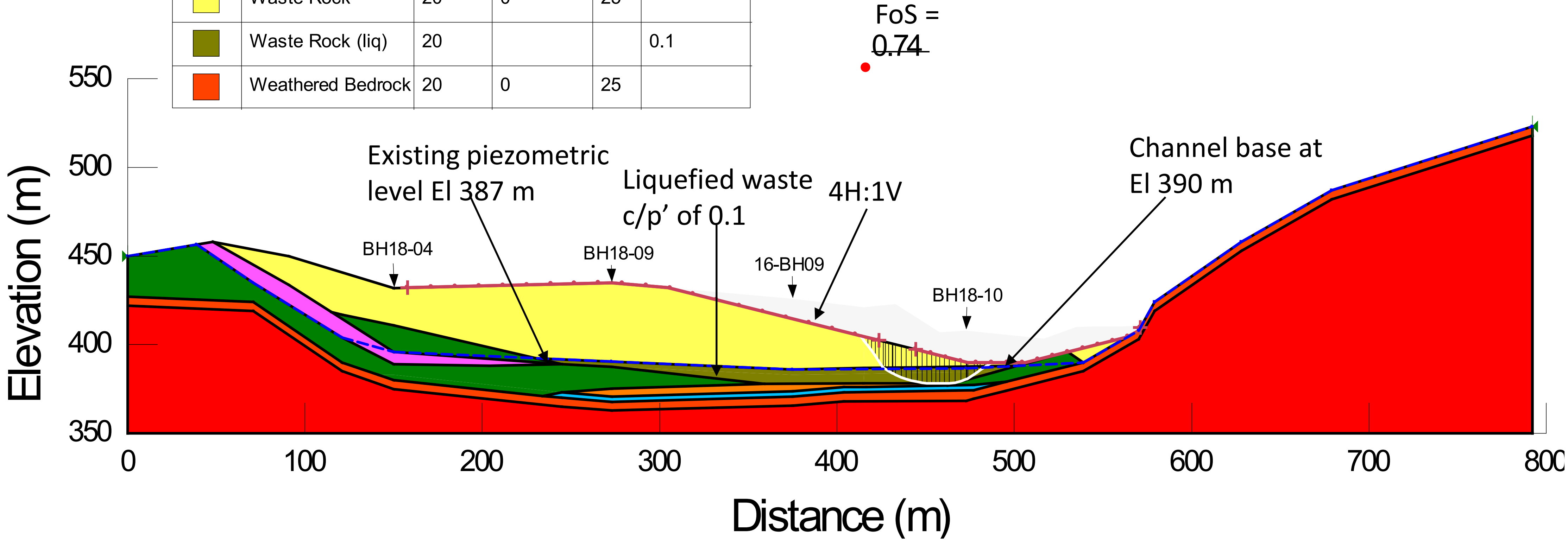


Option CC2 - Lake at El. 400 m
Spillway Design Construction – Static liquefaction

CC2 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 390 m, width ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	

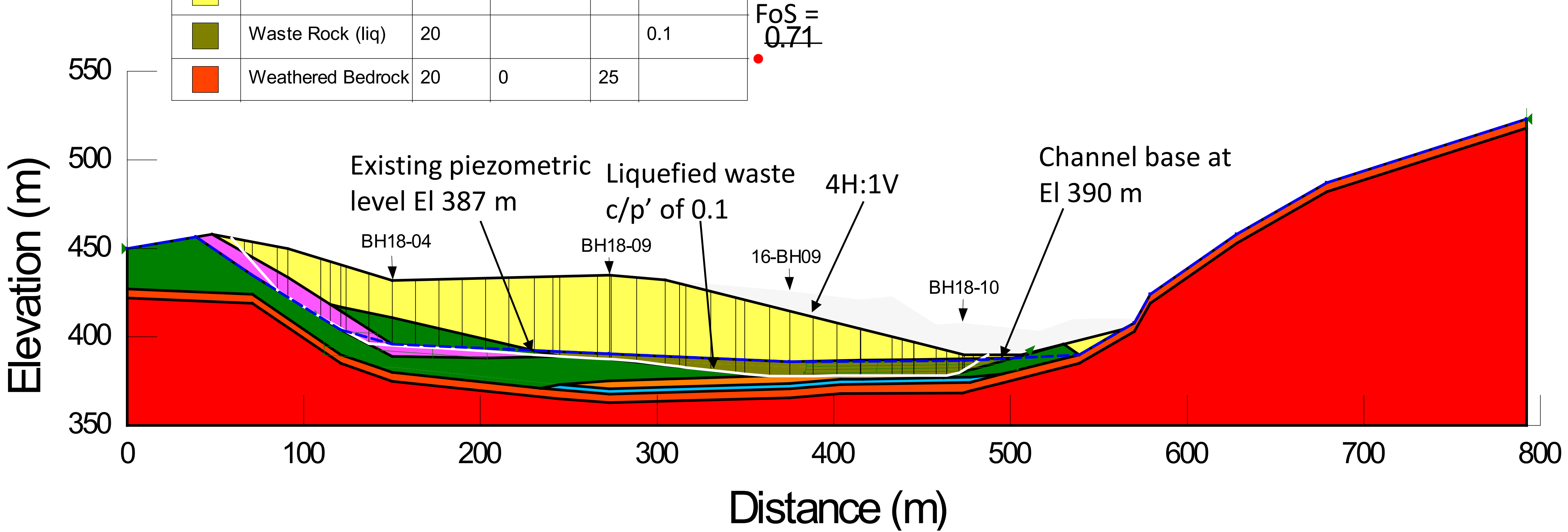
- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 387 m (current elevation)
- Mid-slope failure



CC2 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 390 m, width ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	

- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 387 m (current elevation)
- Overall failure

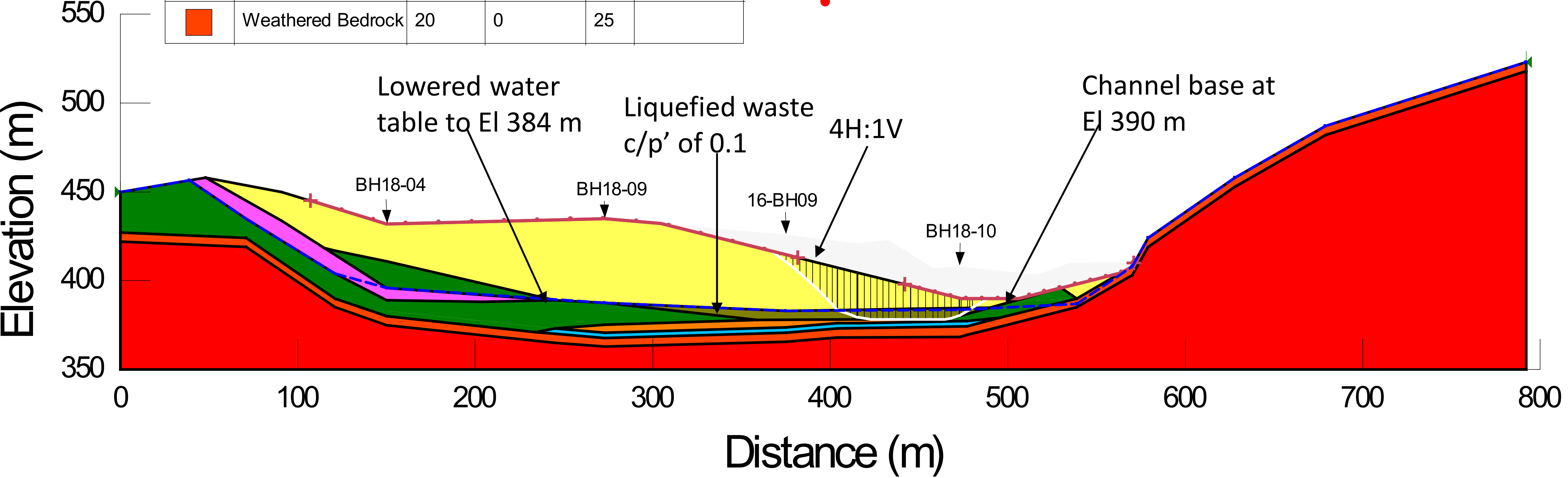


CC2 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 390 m, width ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	

- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 384 m (3 m below current elevation)
- Mid-slope failure

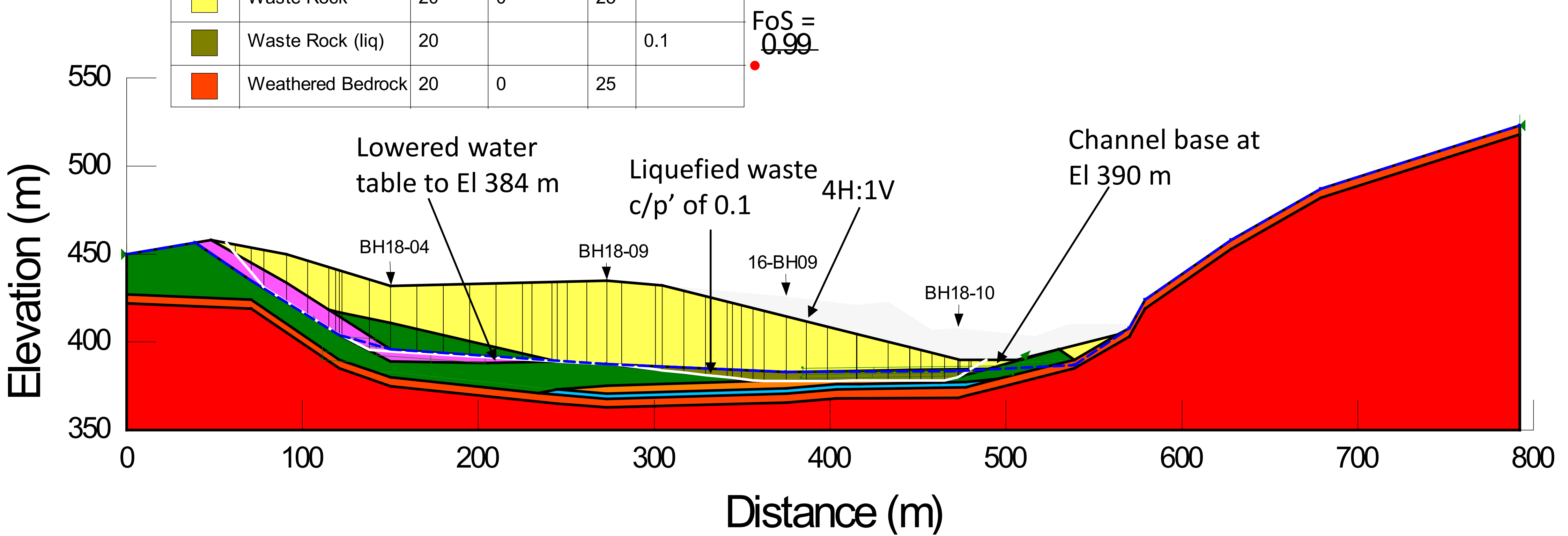
FoS = 0.93



CC2 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 390 m, width ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	

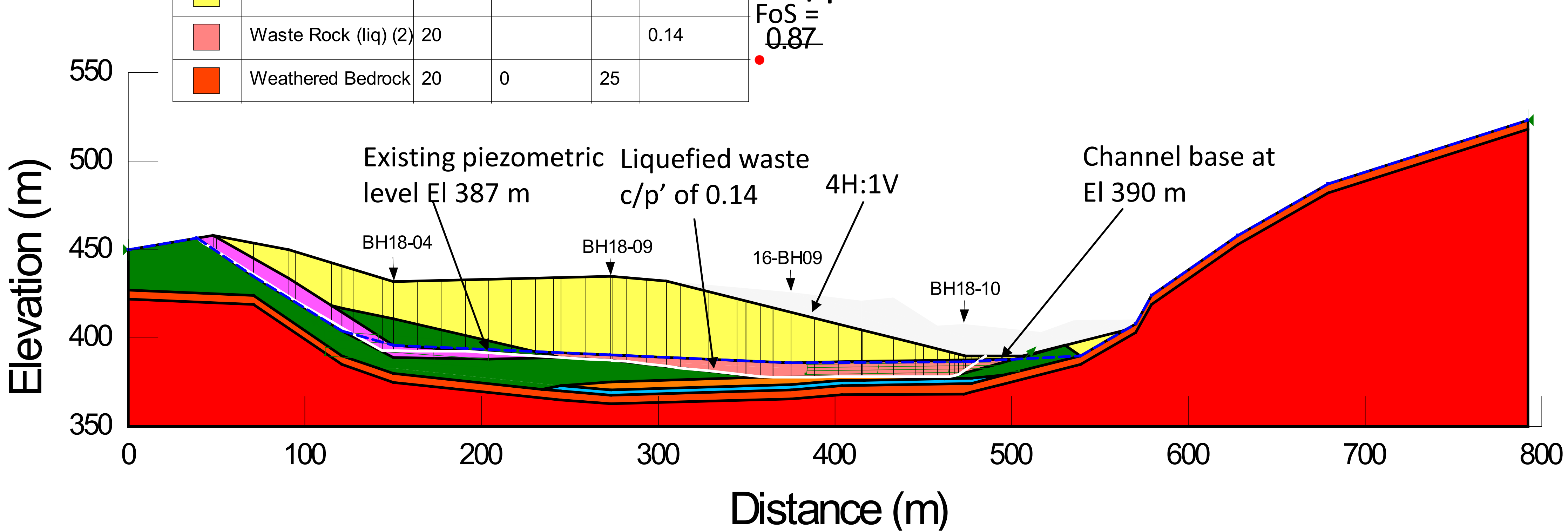
- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 384 m (3 m below current elevation)
- Overall failure



CC2 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 390 m, width ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq) (2)	20			0.14
	Weathered Bedrock	20	0	25	

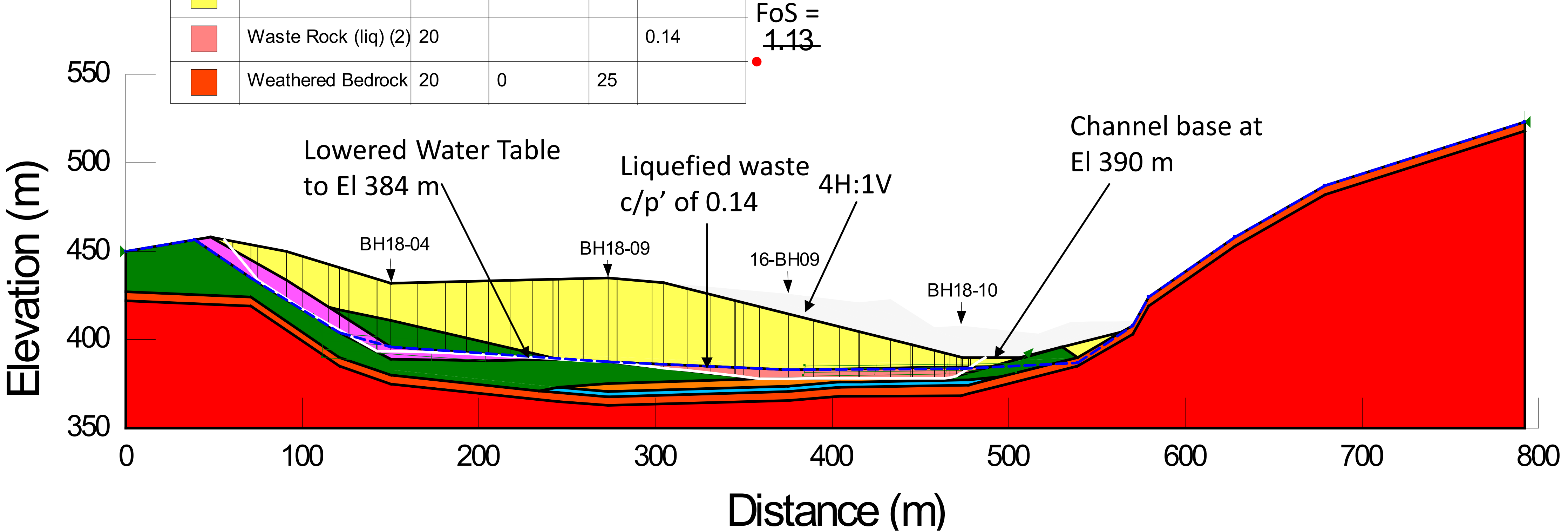
- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 387 m (current elevation)
- Overall failure
- Back analyzed liquified strength from DS1 and DS2, c/p’ of 0.14



CC2 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 390 m, width ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq) (2)	20			0.14
	Weathered Bedrock	20	0	25	

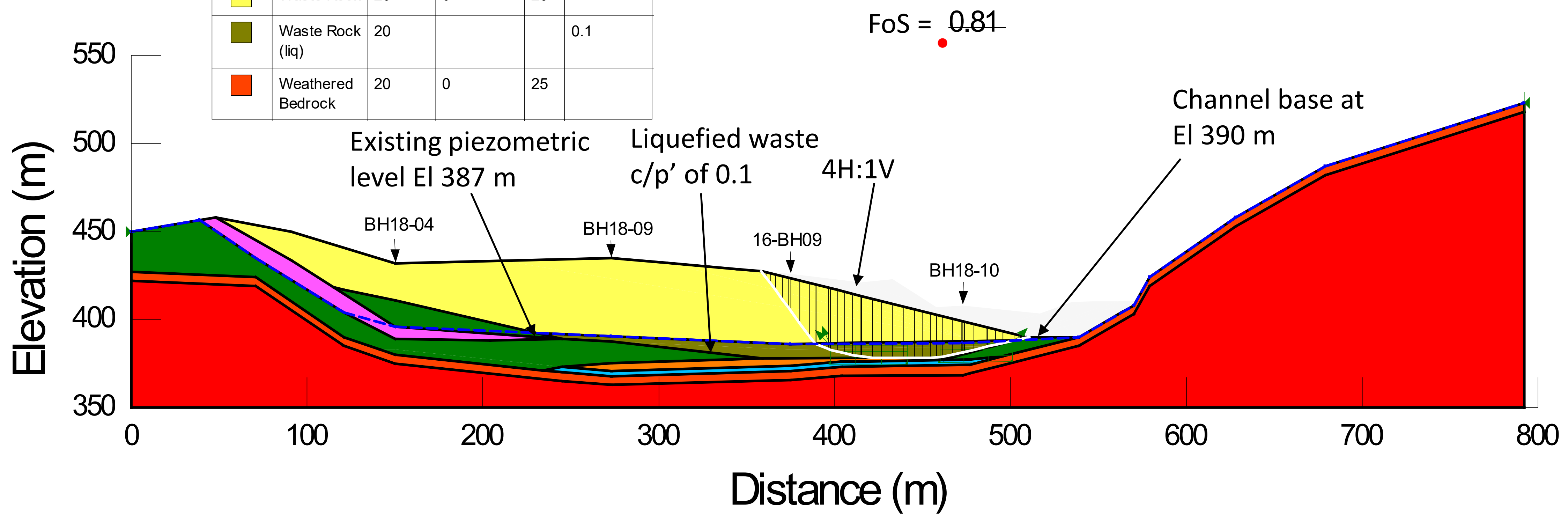
- Lateral location per original design (south channel option)
- 4H:1V cut slopes
- Phreatic surface at El. 384 m (3 m below current elevation)
- Overall failure
- Back analyzed liquified strength from DS1 and DS2, c/p' of 0.14



CC2 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 390 m, width ~30 m

- North channel option
- 4H:1V cut slopes
- Phreatic surface at El. 387 m (current elevation)
- Mid-slope failure

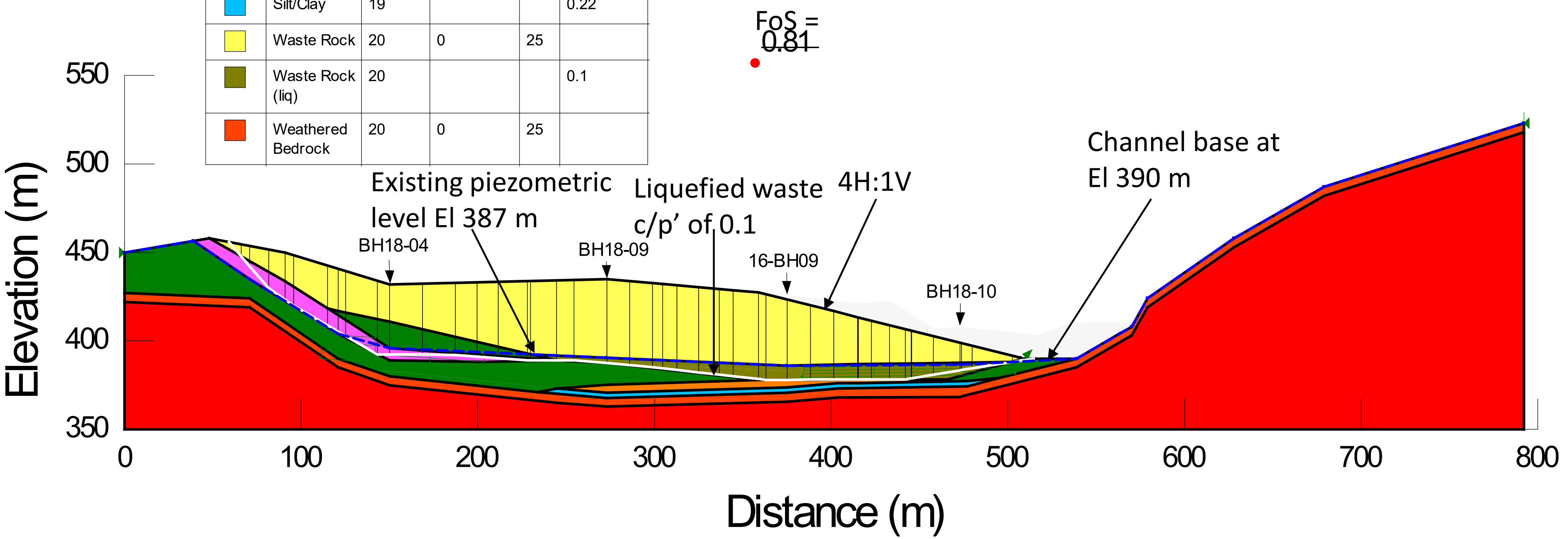
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	



CC2 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 390 m, width ~30 m

- North channel option
- 4H:1V cut slopes
- Phreatic surface at El. 387 m (current elevation)
- Overall failure

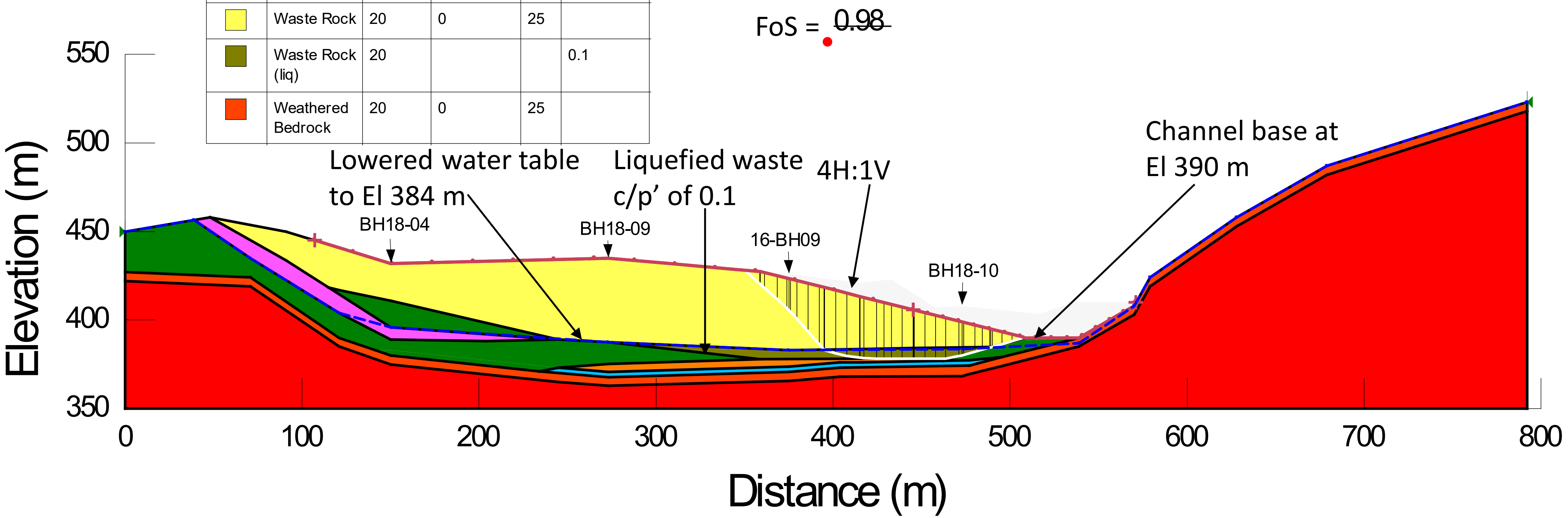
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	



CC2 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 390 m, width ~30 m

- North channel option
- 4H:1V cut slopes
- Phreatic surface at El. 384 m (3 m lower than current elevation)
- Mid-slope failure

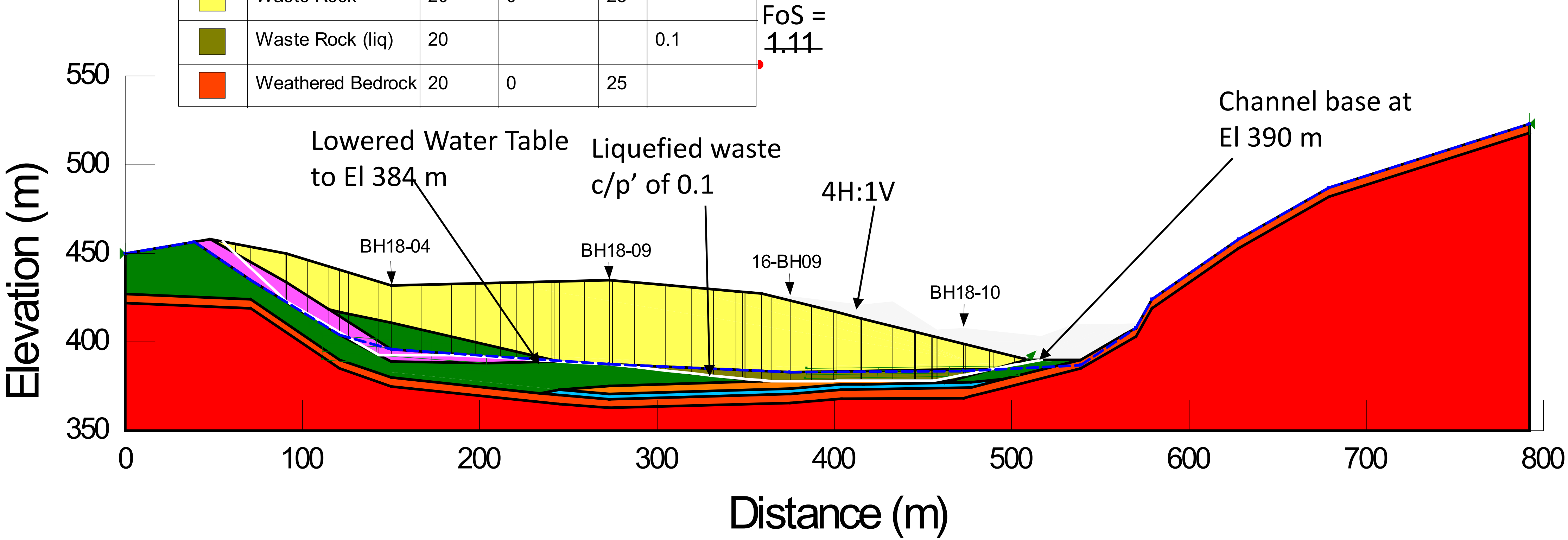
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	



CC2 - DS2 Stability, Construction Liquefaction
4H:1V slope cut, Base El. 390 m, width ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	

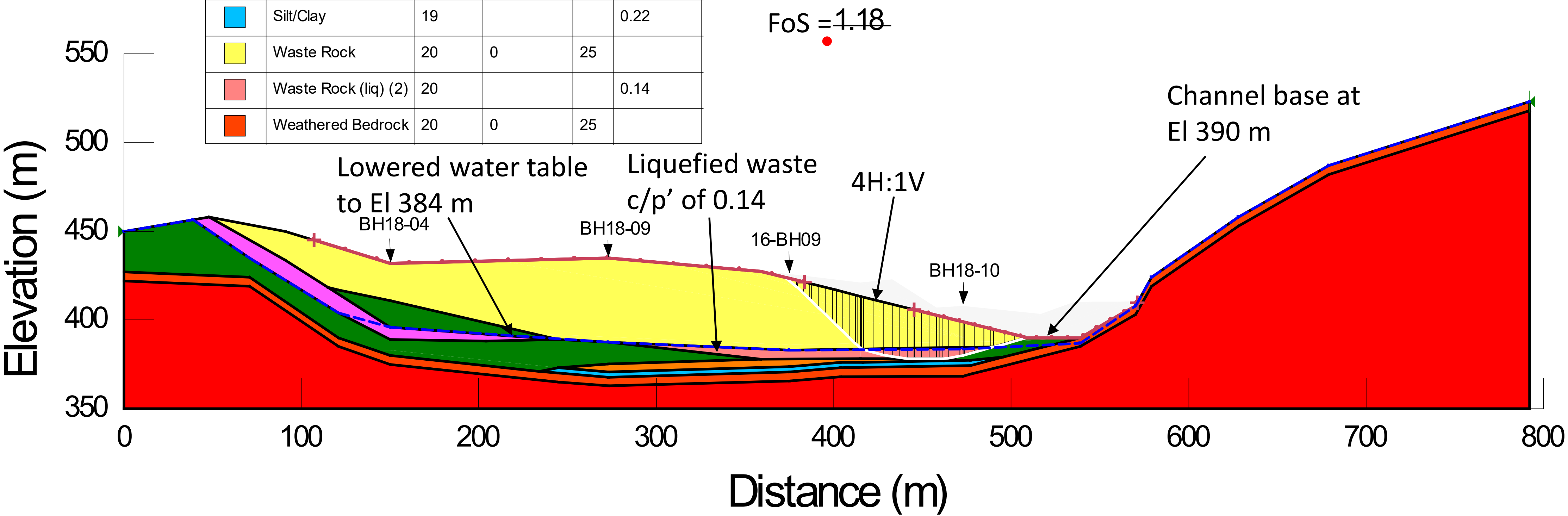
- North channel option
- 4H:1V cut slopes
- Phreatic surface at El. 384 m (3 m lower than current elevation)
- Overall failure



CC2 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 390 m, width ~30 m

- North channel option
- 4H:1V cut slopes
- Phreatic surface at El. 384 m (3 m lower than current elevation)
- Mid-slope failure
- Back analyzed liquified strength from DS1 and DS2, c/p’ of 0.14

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq) (2)	20			0.14
	Weathered Bedrock	20	0	25	

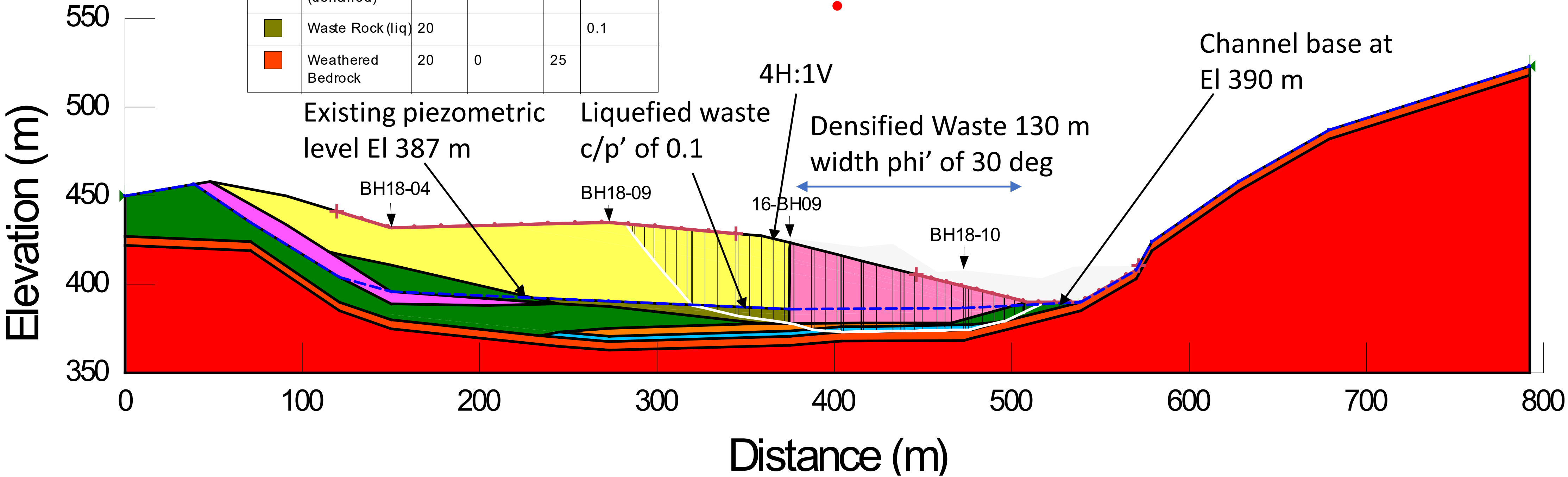


CC2 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 390 m, width ~30 m

- North channel option
- 4H:1V cut slopes
- Phreatic surface at El. 384 m (3 m lower than current elevation)
- Mid-slope failure
- Densified 130 m wide zone of waste

FoS = ~~1.30~~

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (densified)	20	0	30	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	

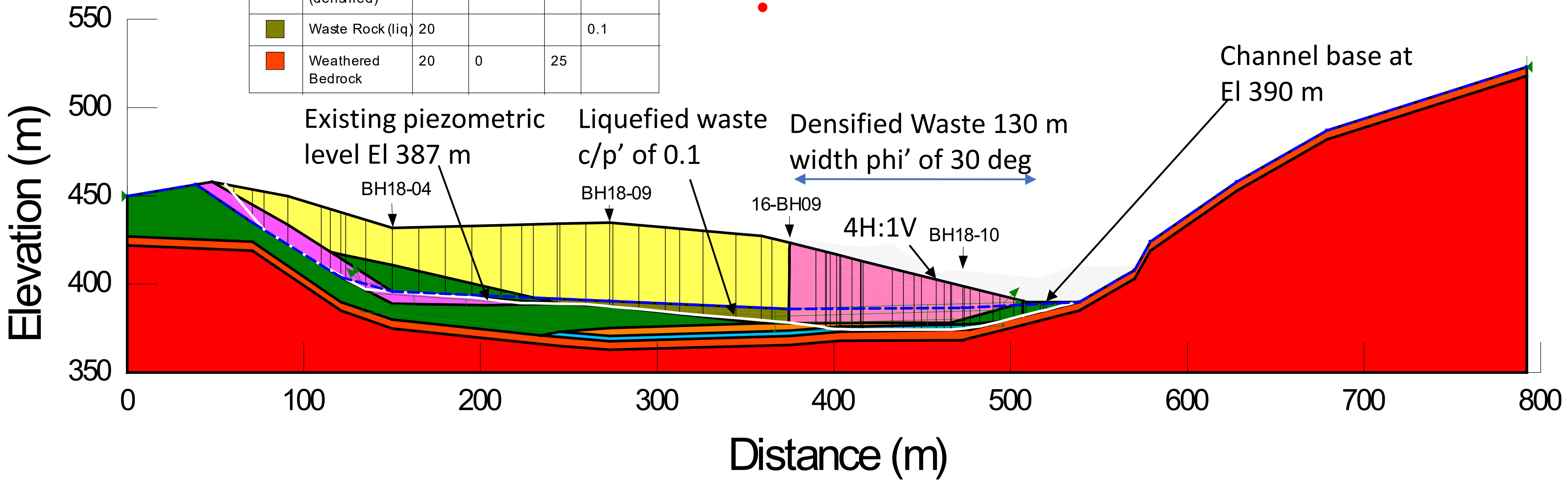


CC2 - DS2 Stability, Construction Liquefaction 4H:1V slope cut, Base El. 390 m, width ~30 m

- North channel option
- 4H:1V cut slopes
- Phreatic surface at El. 384 m (3 m lower than current elevation)
- Overall failure
- Densified 130 m wide zone of waste

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
Orange	Alluvium	20	0	25	
Red	Bedrock				
Magenta	Colluvium (frozen)	20	60	0	
Green	Colluvium (unfrozen)	20	0	25	
Cyan	Silt/Clay	19			0.22
Yellow	Waste Rock	20	0	25	
Pink	Waste Rock (densified)	20	0	30	
Olive	Waste Rock (liq)	20			0.1
Red-orange	Weathered Bedrock	20	0	25	

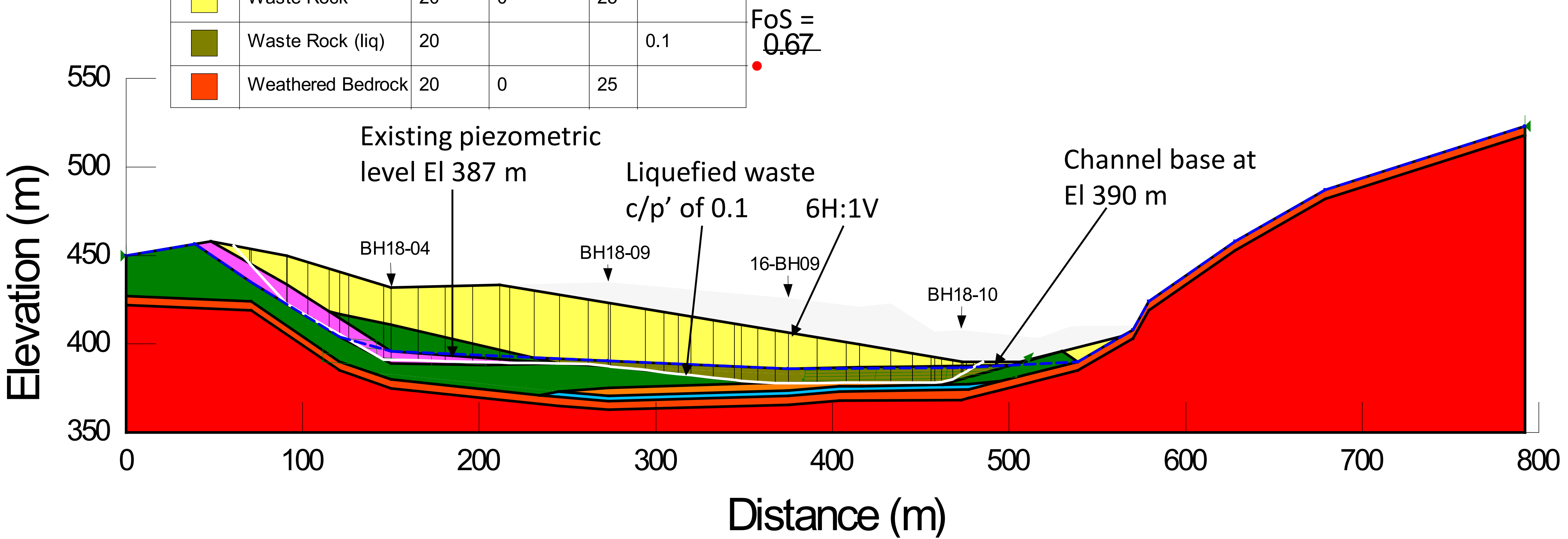
FoS = 1.09



CC2 - DS2 Stability, Construction Liquefaction
6H:1V slope cut, Base El. 390 m, width ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	

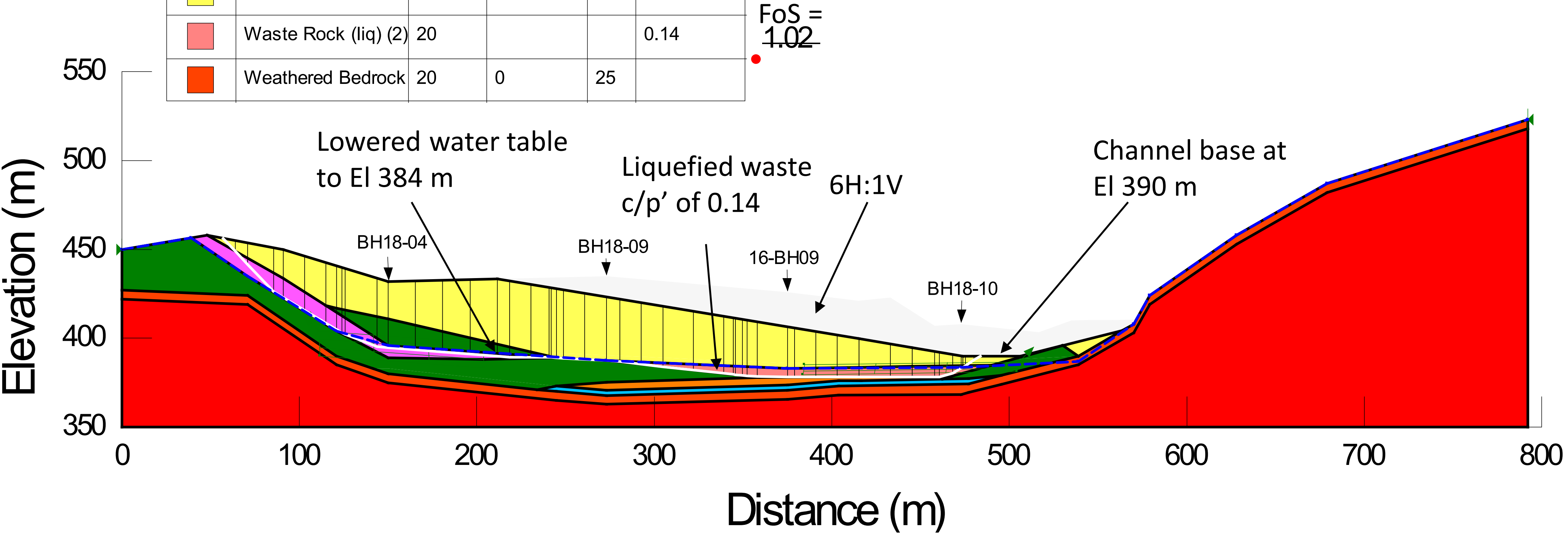
- Lateral location per original design (south channel option)
- 6H:1V cut slopes
- Phreatic surface at El. 387 m (current elevation)
- Overall failure



CC2 - DS2 Stability, Construction Liquefaction 6H:1V slope cut, Base El. 390 m, width ~30 m

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq) (2)	20			0.14
	Weathered Bedrock	20	0	25	

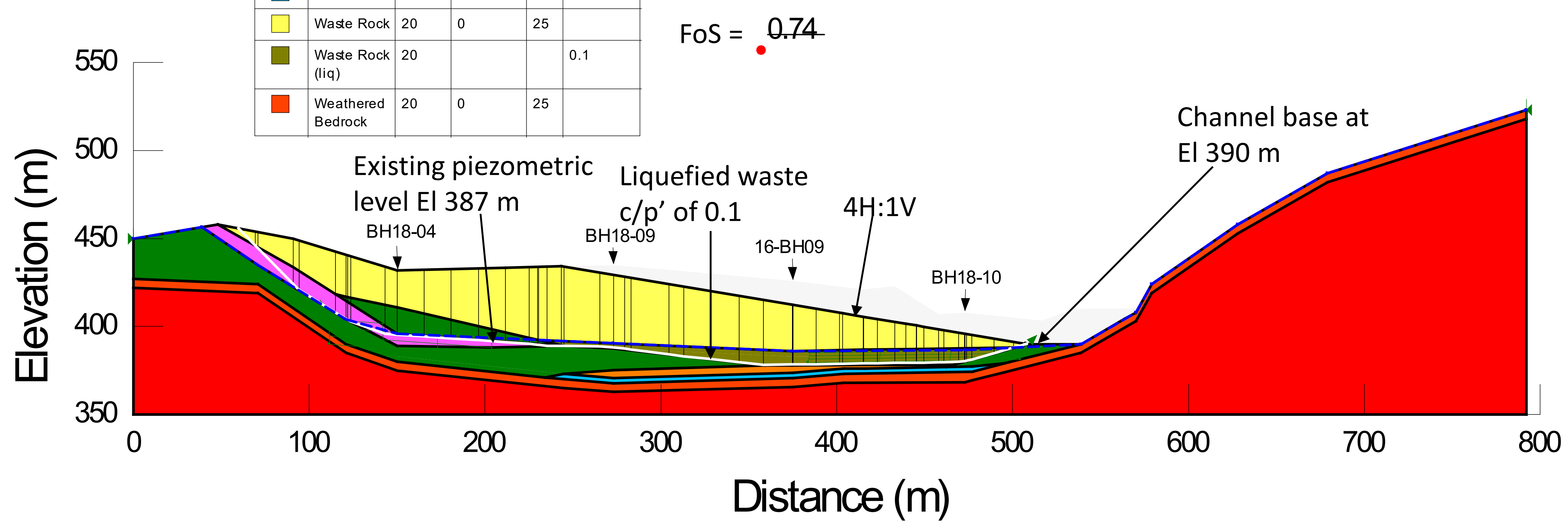
- Lateral location per original design (south channel option)
- 6H:1V cut slopes
- Phreatic surface at El. 384 m (3 m lower than current elevation)
- Overall failure



CC2 - DS2 Stability, Construction Liquefaction 6H:1V slope cut, Base El. 390 m, width ~30 m

- North channel option
- 6H:1V cut slopes
- Phreatic surface at El. 387 m (current elevation)
- Overall failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	

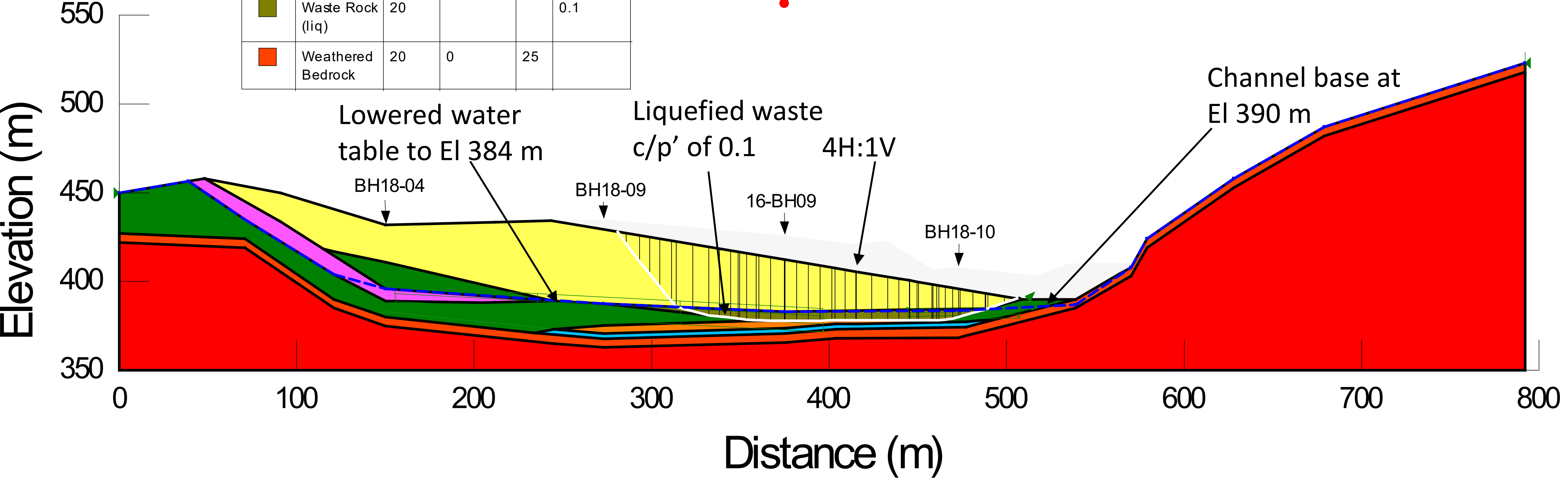


CC2 - DS2 Stability, Construction Liquefaction 6H:1V slope cut, Base El. 390 m, width ~30 m

- North channel option
- 6H:1V cut slopes
- Phreatic surface at El. 384 m (3 m below current elevation)
- Mid-slope failure

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Tau/Sigma Ratio
	Alluvium	20	0	25	
	Bedrock				
	Colluvium (frozen)	20	60	0	
	Colluvium (unfrozen)	20	0	25	
	Silt/Clay	19			0.22
	Waste Rock	20	0	25	
	Waste Rock (liq)	20			0.1
	Weathered Bedrock	20	0	25	

FoS = 1.07



Sub-appendix G

Wolverine Creek

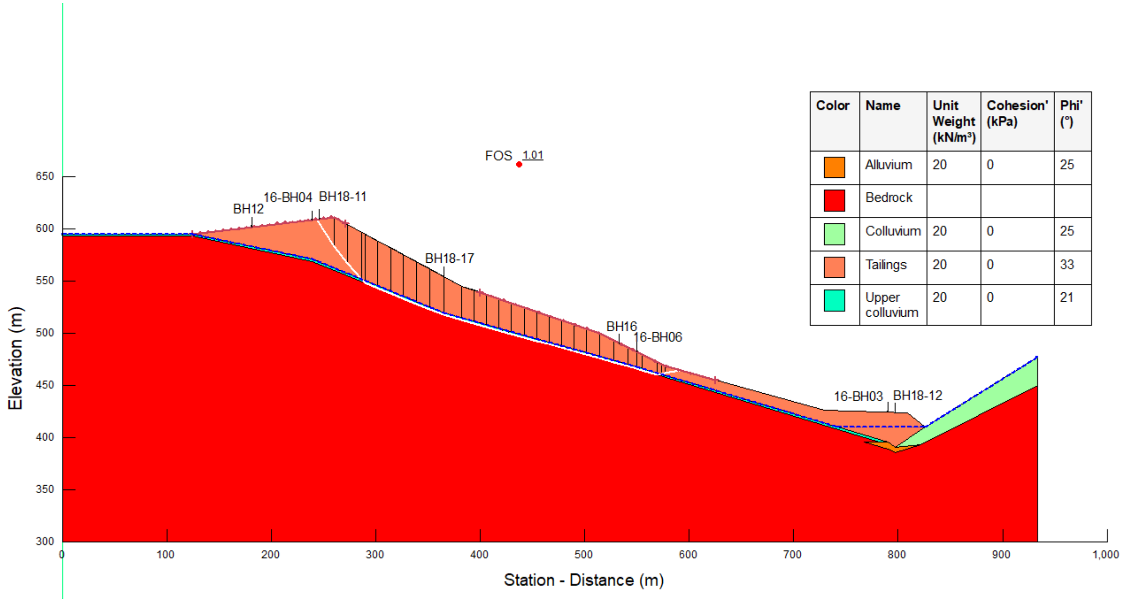
Wolverine Creek – Alternative Case WC2

- No liquefaction considered
- Look for static FoS of >1.2 given the same parameters used previously
- FoS for 3.7H:1V slopes was >>1.2
- Goal:
  - balance a FoS of >1.2 with minimization of movement of tailings
  - Try to minimize amount of fill placed into the valley bottom in order to minimize the required downstream dam

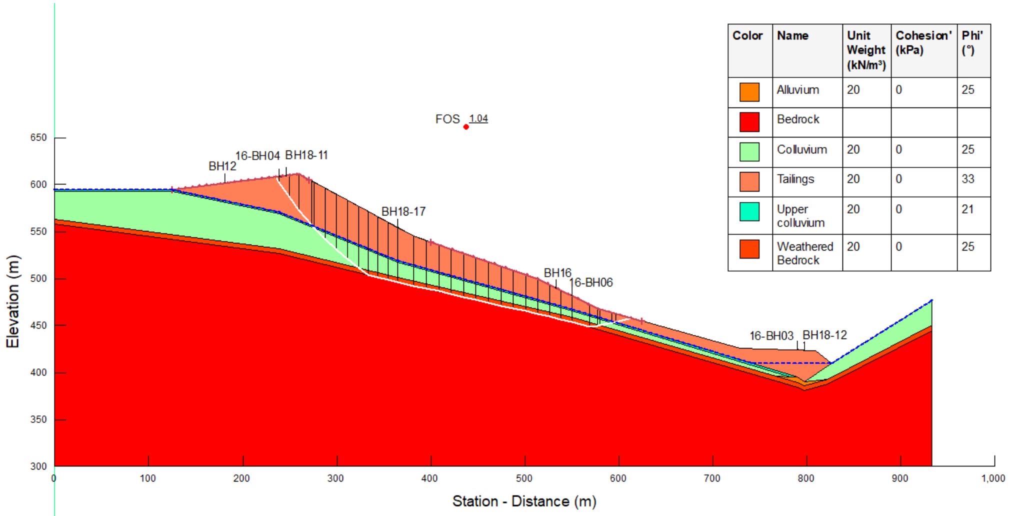
Back Analysis

- Completed a back analysis on section TS1 based on available 2018 and 2019 Slope Indicator Data
- SI data indicates that shear movement is in the upper colluvium layer, just below the tailings surface.
- Previous models put the movement plane through the base of the colluvium, so a thin layer with a slightly lower strength was added to the upper colluvium to force the failure model to match the instrument data
- Applied thin layer to sections TS2 and TS3 as well

TS1 – Back Analysis

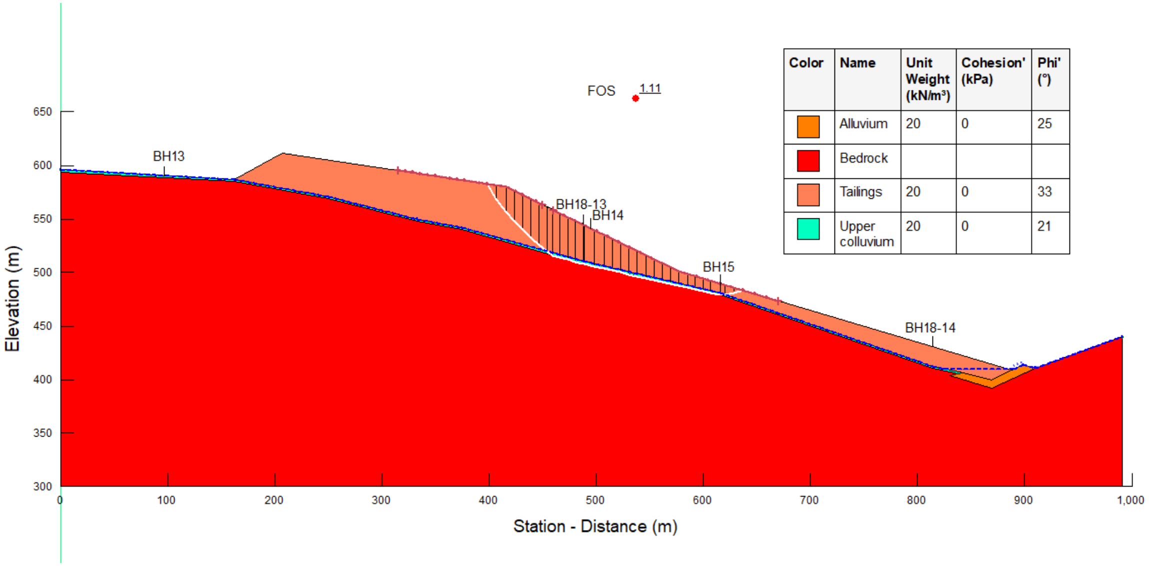


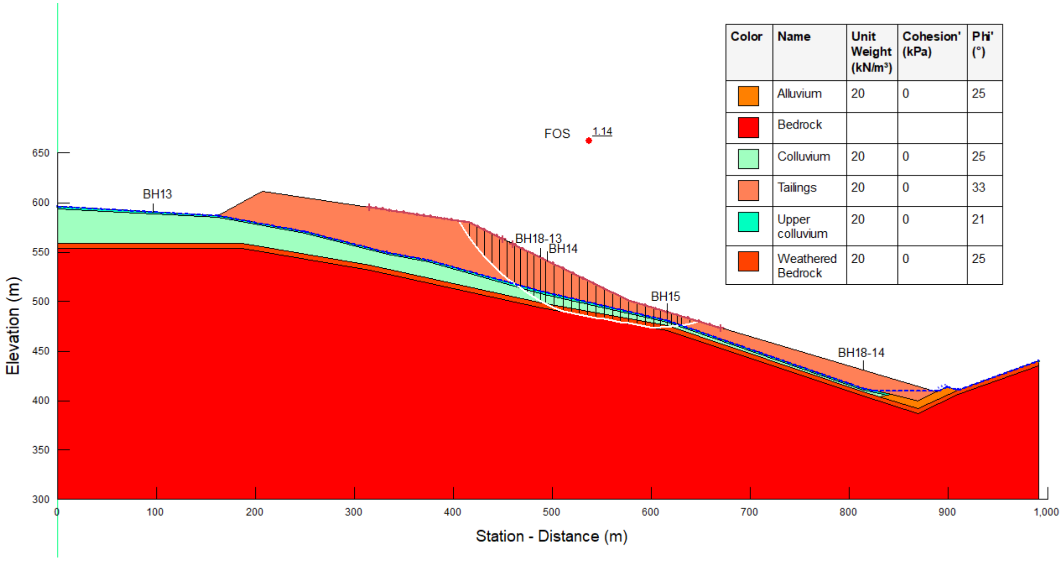
- Revised model to force failure surface through upper colluvium to match with SI data in BH18-17
- Entry and exit model results
- Needed to make other until impenetrable to force failure though upper layer



- Minimum factor of safety is through the upper layer, using $\phi = 21^{o}$
- If any higher friction angle is used, the FoS at the contact is higher than lower down

TS2 – Back Analysis

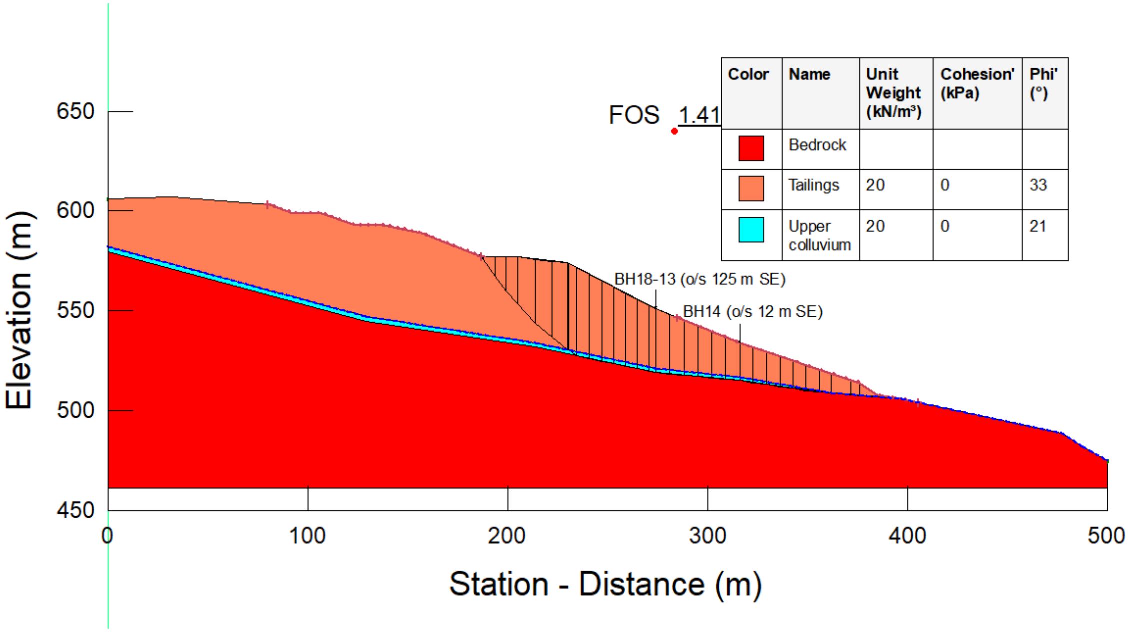


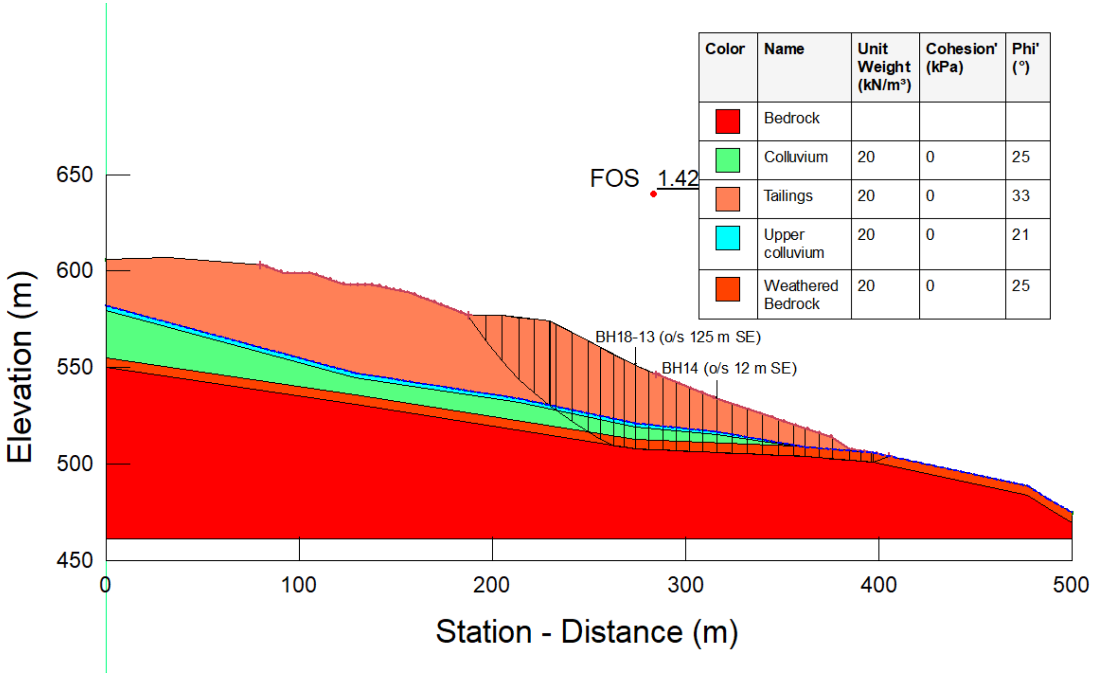


- Revised model to force failure surface through upper colluvium to match with TS1 based on data in SI18-17
- Entry and exit model results
- Needed to make other until impenetrable to force failure though upper layer

- Minimum factor of safety is through the upper layer, using ϕ = 21º
- FoS = 1.1 for current conditions

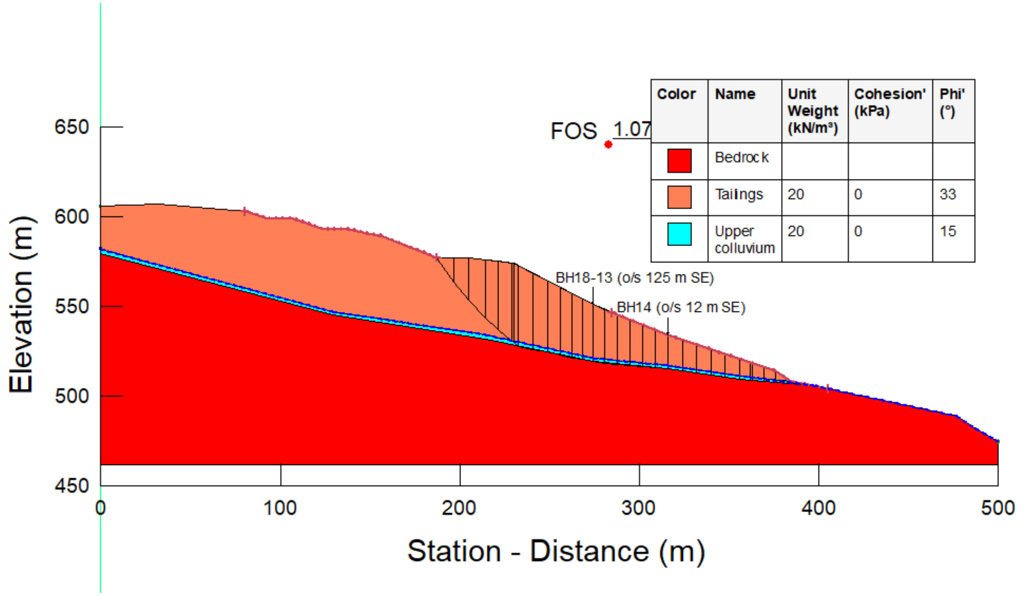
TS3 – Back Analysis

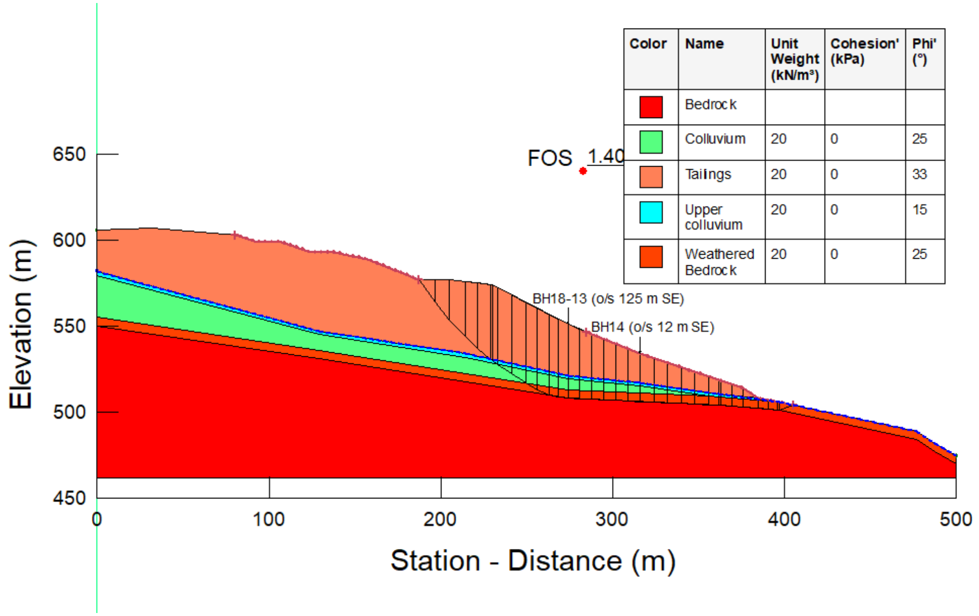




- Without consideration of liquefaction, this cross-section has a FoS>1.3 for the current configuration.

TS3 – Back analyze strength for FoS ~1.05





- In order to get a FoS close to 1.05, the upper colluvium layer needs to have ϕ = 15°

Summary of Back analysis

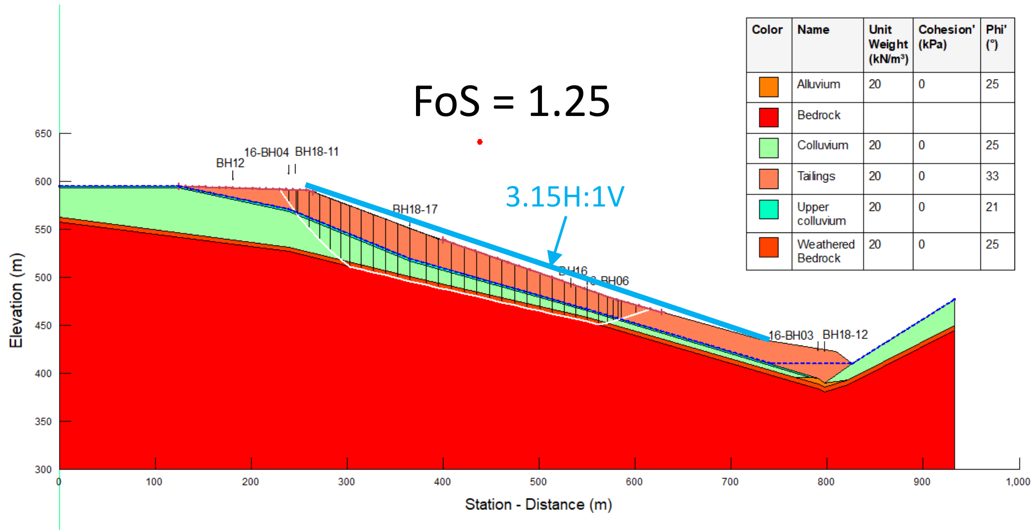
- The updated model for TS1 requires a thin layer with $\phi = 21^o$ to get the failure surface to run at the tailings/colluvium boundary.
- Phreatic surface remains at the tailings/colluvium boundary
- Due to uncertainty in the stratigraphy, the weak layer may be in the tailings or colluvium

- Path Forward:
  - Reduce the slope gradually to increase the FoS to > 1.2 for this section.

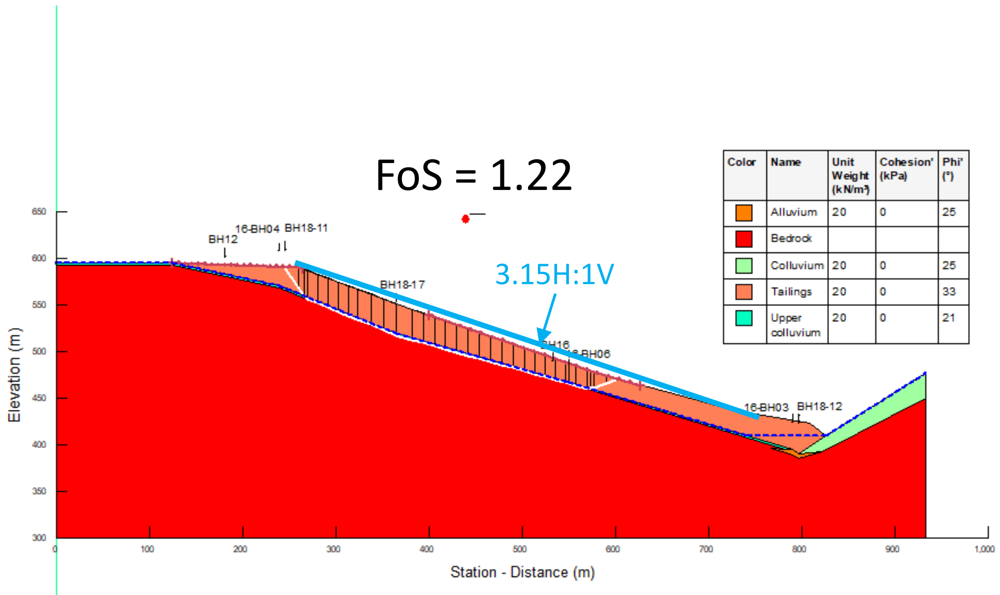
Alternative Case WC2

- No liquefaction considered
- No additional fill placed at the toe of the slope – no increase in the elevation of Wolverine Creek
- Material cut from the top of the steep slope and used to infill the middle of the slope, where the tailings are generally quite thin

TS1 – Final Configuration



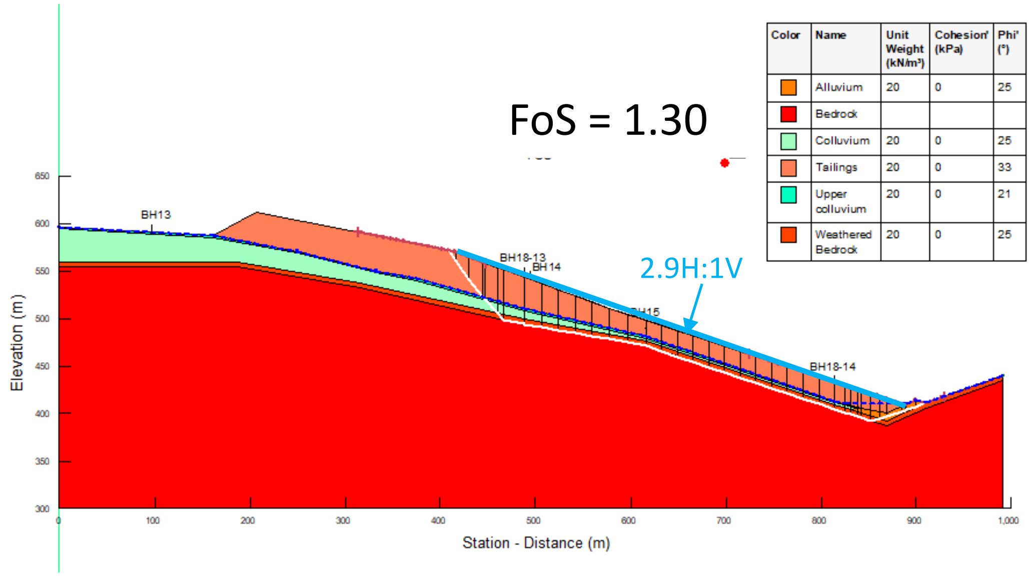
Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)
	Alluvium	20	0	25
	Bedrock			
	Colluvium	20	0	25
	Tailings	20	0	33
	Upper colluvium	20	0	21
	Weathered Bedrock	20	0	25

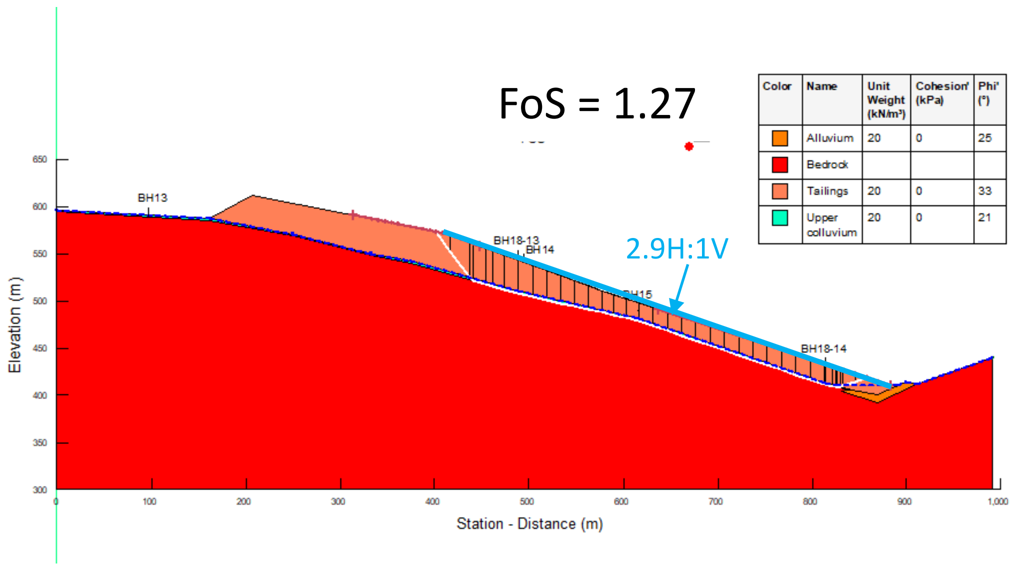


Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)
	Alluvium	20	0	25
	Bedrock			
	Colluvium	20	0	25
	Tailings	20	0	33
	Upper colluvium	20	0	21

- Lower the crest by 20 m, increase fill along the lower slope by 10 m
- Overall slope is 3.2H:1V with no increase in the current creek invert
- Checked overall and thin weak layers

TS2 – Final Configuration





- Lower the crest by 10 m, increase fill along the lower slope by 10 m
- Critical slope is 2.9H:1V, overall slope is 3.4H:1V
- No increase in the current creek invert
- Checked overall and thin weak layers

Alternative Case WC2

- Design using an overall 3.2H:1V slope overall
- Keep away from the existing toe and creek – no change in the creek invert elevation – minimum offset of 8 m at the south end
- Use the pre-disturbed area in the old plant site to store some of the excess cut material

Appendix B
Estimate Update Workbook

Estimate Navigator

Clinton Creek Remediation Project - 10% Design Development Cost Estimate

Date: March 31, 2020

wood.

Navigation Dashboard (note: use buttons at right to access estimate content)

Estimate Summaries				*CCRP Cost Estimate Table W-2: Cost Summary by Option*
				Table W-3: Cost Summary by Activity
Estimate Detail				*CCRP Cost Estimate Table W-4: 2019 CC1 Estimate Detail*
				CCRP Cost Estimate Table W-4a: 2019 CC1-A Estimate Detail
				CCRP Cost Estimate Table W-4b: 2019 CC1-B Estimate Detail
				CCRP Cost Estimate Table W-5: 2019 CC2 Estimate Detail
				CCRP Cost Estimate Table W-5a: 2019 CC2-A Estimate Detail
				CCRP Cost Estimate Table W-5b: 2019 CC2-B Estimate Detail
				CCRP Cost Estimate Table W-6: 2019 CC3 Estimate Detail
				CCRP Cost Estimate Table W-7: 2019 WC1 Estimate Detail
				CCRP Cost Estimate Table W-8: 2019 WC2 Estimate Detail
				CCRP Cost Estimate Table W-8a: 2019 WC2-A Estimate Detail
				CCRP Cost Estimate Table W-9: 2019 WC3 Estimate Detail
				CCRP Cost Estimate Table W-10: 2019 Consolidated Estimate Detail
Volume & Equipment Metrics				*CCRP Cost Estimate Table W-11: 2019 Remediation Options - Earthmoving Metrics*
				CCRP Cost Estimate Table W-12: Key Equipment and Field Personnel Metrics
Equipment Specificiations & Unit Rates				*CCRP Cost Estimate Table W-13: Loading Equipment Specifications and Rates*
				CCRP Cost Estimate Table W-14: Hauling Equipment Specifications and Rates
				CCRP Cost Estimate Table W-15: Yukon Government Third Party Equipment Rental Rates
				CCRP Cost Estimate Table W-16: 2019 NWT Equipment Rates
Estimate Inputs	*Mobilization and Demobilization*			*CCRP Cost Estimate Table W-17: Mobilization and Demobilization of Equipment and Field Personnel*
	Temporary Facilities and Controls	*Camp*		*CCRP Cost Estimate Table W-18: Worker Camp Cost Estimate*
		Site Access / On-site Haul Roads	*Roads*	*CCRP Cost Estimate Table W-19: Access Road Improvement and Maintenance Estimate*
			Bridges	*CCRP Cost Estimate Table W-20: Water Crossing Cost Estimate*
		Fuel Power/Supply	*Fuel Storage and Delivery*	*CCRP Cost Estimate Table W-21: Fuel Storage Cost Estimate*
			General Site Power	*CCRP Cost Estimate Table W-22: Site Electrical Power Estimate*
		H&S Control	*General Site H&S*	*CCRP Cost Estimate Table W-23: Conventional Health & Safety Estimate*
			Asbestos Abatement Controls	*CCRP Cost Estimate Table W-24: Asbestos Abatement Estimate*
		Incidental Temporary Facilities and Controls		*CCRP Cost Estimate Table W-45: 2019 Estimate Factors and Assumptions*
		Monitoring		*CCRP Cost Estimate Table W-43: Annual Post Closure Costs*
	Civil Works	*Materials Management*	*Earthmoving - Load & Haul*	*CCRP Cost Estimate Table W-25: Earth Moving Estimate - Option CC1*
				CCRP Cost Estimate Table W-26: Earth Moving Estimate - Option CC2
				CCRP Cost Estimate Table W-27: Earth Moving Estimate - Option CC3
				CCRP Cost Estimate Table W-28: WC2 Material Volumes and Disposition
				CCRP Cost Estimate Table W-29: Earth Moving Estimate - Option WC3
				CCRP Cost Estimate Table W-30: Haul Road Construction Estimate - Option WC3
				CCRP Cost Estimate Table W-31: Aggregate Load and Haul from Site 11 Estimate
				CCRP Cost Estimate Table W-32: Riprap Load and Haul from Km 63 Quarry Estimate
				CCRP Cost Estimate Table W-33: Haul Road Construction - Options CC1, CC2, and CC3
			Support Equipment - Dozers	*CCRP Cost Estimate Table W-34: Dozing Equipment Estimate*
			Support Equipment - Graders	*CCRP Cost Estimate Table W-35: Grading and Road Maintenance Equipment*
		Flow Conveyance	*Aggregate*	*CCRP Cost Estimate Table W-36: Engineered Sands, Gravels, and Riprap Estimate*
			Spillway / Erosion Control	*CCRP Cost Estimate Table W-37: Flow Conveyance and Erosion Control Cost Estimates*
			Sediment Pond	*CCRP Cost Estimate Table W-38: Sediment Pond Cost Estimate*
				CCRP Cost Estimate Table W-39: Option CC3 Sediment Pond Cost Estimate
	Mechanical Works	*Ground Thawing*		*CCRP Cost Estimate Table W-40: Ground Thawing Cost Estimate*
		Lake Drawdown		*CCRP Cost Estimate Table W-41: Hudgeon Lake Drawdown Cost Estimate*
	Post Closure Care & Maintenance			*CCRP Cost Estimate Table W-43: Annual Post Closure Costs*
	Investigations			*CCRP Cost Estimate Table W-44: CCRP - Major, Supplementary Investigative Costs by Option*
Estimate Factors, Assumptions, and Indices				*CCRP Cost Estimate Table W-45: 2019 Estimate Factors and Assumptions*
				CCRP Cost Estimate Table W-46: Statistics Canada Price Indexes
				CCRP Cost Estimate Table W-47: Statistics Canada Average Hourly Earnings
				CCRP Cost Estimate Table W-48: Yukon Government Fair Wage Schedule

Estimate Summaries

CCRP Cost Estimate Table W-2: Cost Summary by Option

	Mob and Demob		Temporary Facilities and Controls (TF&C)											Civil Works						Mechanical Works			Post Closure Care and Maintenance									
				Site Access		On-Site Haul Roads		Fuel/Power Supply		H&S Controls				Materials Management			Flow Conveyance and Erosion Control															
Option	Personnel	Equipment	Camp	Roads	Bridges	Roads	Bridges	Fuel Storage and Delivery	General Site Power	General Site H&S	Asbestos Abatement Controls	Incidental Temporary Facilities and Controls	Monitoring	Earthmoving Load & Haul	Support Equipment - Dozers	Support Equipment - Graders	Spillway	Erosion Control	Sediment Pond	Ground Thawing	Lake Drawdowns	Blast Densification	Care & General Maintenance	Repair & Remediation	Monitoring	Partner Communications/Consultations	Owner's Project Management & Admin	Sediment Pond Cleanouts	Extraordinary Field Investigations	EPCM	Contingency	Total
CC1	$1,261,353	$77,097	$8,900,390	$3,068,851	$1,203,770	$996,180	$891,675	$2,534,389	$2,199,949	$308,654	$5,027,136	$6,261,660	$1,508,825	$19,923,602	$8,585,013	$4,069,932	$35,592,092		$4,599,144	$77,705,000	$638,841		$13,360,489		$14,653,440	$1,077,459	$538,729		$9,450,000	$21,498,367.24	$61,483,010	**$307,415,050**
CC1-A	$466,449	$63,080	$4,443,992	$1,221,084	$1,203,770	$198,188	$891,675	$1,571,878	$1,138,250	$119,958	$2,368,933	$2,580,905	$600,356	$3,534,073	$5,482,379	$1,619,410	$12,835,376		$4,599,144		$592,498	$4,110,000	$13,360,489	$9,339,561	$14,653,440	$1,077,459	$538,729		$9,450,000	$8,861,107.58	$26,730,546	**$133,652,729**
CC1-B	$515,774	$63,080	$4,728,729	$1,350,210	$1,203,770	$219,146	$891,675	$1,594,744	$1,212,444	$132,643	$2,530,736	$2,521,510	$663,841	$3,907,791	$6,062,125	$1,790,658	$12,835,376		$4,599,144		$592,498		$13,360,489	$9,525,836	$14,653,440	$1,077,459	$538,729		$9,450,000	$8,657,184.84	$26,169,758	**$130,848,792**
CC2	$2,047,067	$77,097	$13,353,611	$4,980,480	$1,403,770	$1,616,714	$891,675	$2,953,100	$3,298,342	$500,919	$7,636,081	$4,003,804	$2,448,692	$32,334,280	$13,932,732	$6,605,147	$12,399,214		$4,599,144		$682,515		$4,732,423		$15,014,097	$1,302,023	$651,012		$6,150,000	$13,746,394	$39,340,083	**$196,700,417**
CC2-A	$682,452	$77,097	$5,619,328	$1,660,394	$1,203,770	$538,981	$891,675	$2,104,957	$1,390,671	$166,997	$3,104,907	$3,015,431	$816,346	$10,779,612	$4,644,898	$2,202,026	$12,399,214		$4,599,144		$638,841	$12,600,000	$4,732,423	$12,693,491	$15,014,097	$1,302,023	$651,012		$6,150,000	$10,352,979	$30,008,191	**$150,040,955**
CC2-B	$1,313,849	$77,097	$9,197,926	$3,196,574	$1,403,770	$1,037,640	$891,675	$2,448,771	$2,273,336	$321,500	$5,201,449	$3,596,127	$1,571,620	$20,752,803	$8,942,313	$4,239,319	$12,399,214		$4,599,144		$638,841		$4,732,423	$17,664,493	$15,014,097	$1,302,023	$651,012		$6,150,000	$12,346,702	$35,490,930	**$177,454,650**
CC3	$4,028,369	$77,097	$24,583,116	$9,800,955	$1,803,770	$3,181,489	$891,675	$4,008,948	$6,068,115	$985,746	$14,214,952	$5,979,584	$4,818,716	$63,629,781	$27,417,857	$12,998,095			$2,378,134		$696,795		$3,396,374		$9,799,197	$871,040	$435,520	$3,233,731	$6,150,000	$20,529,906	$57,994,740	**$289,973,701**
WC1	$239,714	$23,364	$1,204,500	$1,077,986				$87,370	$459,199	$92,040	$584,100	$1,051,797	$530,000		$766,500	$420,480			$4,599,144				$8,188,687		$11,205,571	$1,077,459	$538,729	$3,965,048		$3,611,169	$9,930,714	**$49,653,572**
WC2	$3,139,345	$126,159	$18,653,260	$6,067,149	$1,403,770	$4,598,312	$891,675	$4,020,890	$3,922,725	$662,217	$11,604,390	$6,493,362	$2,982,961	$108,657,228	$16,553,575	$8,046,295	$5,496,524		$4,599,144				$8,188,687		$5,861,376	$646,475	$323,238		$2,350,000	$22,293,876	$61,895,658	**$309,478,289**
WC2-A	$908,564	$126,159	$6,642,981	$1,755,906	$1,203,770	$4,598,312	$891,675	$2,366,968	$1,445,550	$191,654	$3,954,521	$2,676,515	$863,305	$21,775,499	$7,762,316	$8,046,295	$764,511		$4,599,144				$8,188,687	$6,300,254	$5,861,376	$646,475	$323,238		$150,000	$9,189,367	$25,308,260	**$126,541,300**
WC3	$3,139,345	$126,159	$18,653,260	$6,067,149	$1,403,770	$4,598,312	$891,675	$4,020,890	$3,922,725	$662,217	$11,604,390	$5,529,823	$2,982,961	$67,163,988	$33,107,150	$8,046,295		$7,500,000	$4,599,144				$2,081,649		$2,449,799	$871,040	$435,520			$18,985,726	$52,210,746	**$261,053,732**

Clinton Creek Remediation Project - 10% Design Development Cost Estimate

Table W-3: Cost Summary by Activity

Activity	Task	Item	Cost: CC1	CC1-A	CC1-B	CC2	CC2-A	CC2-B	CC3	WC1	WC2	WC2-A	WC3
Mobilization and Demobilization	Personnel	N/A	$1,261,353	$466,449	$515,774	$2,047,067	$682,452	$1,313,849	$4,028,369	$239,714	$3,139,345	$908,564	$3,139,345
Mobilization and Demobilization	Equipment	N/A	$77,096	$63,079	$63,079	$77,096	$77,096	$77,096	$77,096	$23,363	$126,158	$126,158	$126,158
Temporary Facilities and Controls (TF&C)	Camp	N/A	$8,900,390	$4,443,992	$4,728,729	$13,353,611	$5,619,328	$9,197,926	$24,583,116	$1,204,500	$18,653,260	$6,642,981	$18,653,260
Temporary Facilities and Controls (TF&C)	Site Access	Roads	$3,068,851	$1,221,084	$1,350,210	$4,980,480	$1,660,394	$3,196,574	$9,800,955	$1,077,986	$6,067,149	$1,755,906	$6,067,149
Temporary Facilities and Controls (TF&C)	Site Access	Bridges	$1,203,770	$1,003,770	$1,003,770	$1,403,770	$1,003,770	$1,203,770	$1,803,770		$1,403,770	$1,003,770	$1,403,770
Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	$996,180	$198,188	$219,146	$1,616,714	$538,981	$1,037,640	$3,181,489		$4,598,312	$4,598,312	$4,598,312
Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	$891,675	$891,675	$891,675	$891,675	$891,675	$891,675	$891,675		$891,675	$891,675	$891,675
Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	$2,534,389	$1,571,878	$1,594,744	$2,953,100	$2,104,957	$2,448,771	$4,008,948	$87,370	$4,020,890	$2,366,968	$4,020,890
Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	$2,199,949	$1,138,250	$1,212,444	$3,298,342	$1,390,671	$2,273,336	$6,068,115	$459,199	$3,922,725	$1,445,550	$3,922,725
Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	$308,654	$119,958	$132,643	$500,919	$166,997	$321,500	$985,746	$92,040	$662,217	$191,654	$662,217
Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	$5,027,136	$2,368,933	$2,530,736	$7,636,081	$3,104,907	$5,201,449	$14,214,952	$584,100	$11,604,390	$3,954,521	$11,604,390
Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	$6,261,660	$2,574,905	$2,515,510	$4,003,804	$3,009,431	$3,590,127	$5,979,584	$1,051,797	$6,493,362	$2,670,515	$5,529,823
Temporary Facilities and Controls (TF&C)	Monitoring	N/A	$1,508,825	$600,356	$663,841	$2,448,692	$816,346	$1,571,620	$4,818,716	$530,000	$2,982,961	$863,305	$2,982,961
Civil Works	Materials Management	Earthmoving - Load & Haul	$19,923,602	$3,534,073	$3,907,791	$32,334,280	$10,779,612	$20,752,803	$63,629,781		$108,657,228	$21,775,499	$67,163,988
Civil Works	Materials Management	Support Equipment - Dozers	$8,585,013	$5,482,379	$6,062,125	$13,932,732	$4,644,898	$8,942,313	$27,417,857	$766,500	$16,553,575	$7,762,316	$33,107,150
Civil Works	Materials Management	Support Equipment - Graders	$4,069,932	$1,619,410	$1,790,658	$6,605,147	$2,202,026	$4,239,319	$12,998,095	$420,480	$8,046,295	$8,046,295	$8,046,295
Civil Works	Flow Conveyance	Spillway	$35,592,092	$12,835,376	$12,835,376	$12,399,214	$12,399,214	$12,399,214			$5,496,524	$764,511	
Civil Works	Flow Conveyance	Erosion Control											$7,500,000
Civil Works	Flow Conveyance	Sediment Pond	$4,599,144	$4,599,144	$4,599,144	$4,599,144	$4,599,144	$4,599,144	$2,378,134	$4,599,144	$4,599,144	$4,599,144	$4,599,144
Mechanical Works	Ground Thawing	N/A	$77,705,000										
Mechanical Works	Lake Drawdowns	N/A	$638,841	$592,498	$592,498	$682,515	$638,841	$638,841	$696,795				
Mechanical Works	Blast Densification	N/A		$4,110,000			$12,600,000						
Post Closure Care and Maintenance	Care & General Maintenance	N/A	$13,360,489	$13,360,489	$13,360,489	$4,732,423	$4,732,423	$4,732,423	$3,396,374	$8,188,687	$8,188,687	$8,188,687	$2,081,649
Post Closure Care and Maintenance	Repair & Remediation	N/A		$9,339,561	$9,525,836		$12,693,491	$17,664,493				$6,300,254	
Post Closure Care and Maintenance	Monitoring	N/A	$14,653,440	$14,653,440	$14,653,440	$15,014,097	$15,014,097	$15,014,097	$9,799,197	$11,205,571	$5,861,376	$5,861,376	$2,449,799
Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	$1,077,459	$1,077,459	$1,077,459	$1,302,023	$1,302,023	$1,302,023	$871,040	$1,077,459	$646,475	$646,475	$871,040
Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	$538,729	$538,729	$538,729	$651,012	$651,012	$651,012	$435,520	$538,729	$323,238	$323,238	$435,520
Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A							$3,233,731	$3,965,048			
Extraordinary Field Investigations	N/A	N/A	$9,450,000	$9,450,000	$9,450,000	$6,150,000	$6,150,000	$6,150,000	$6,150,000		$2,350,000	$150,000	
Factors	**EPCM**	**N/A**	**$21,498,367**	**$8,840,507**	**$8,636,585**	**$13,746,394**	**$10,332,378**	**$12,326,102**	**$20,529,905**	**$3,611,169**	**$22,293,875**	**$9,168,767**	**$18,985,726**
Factors	**Contingency**	**N/A**	**$61,483,010**	**$26,673,896**	**$26,113,108**	**$39,340,083**	**$29,951,541**	**$35,434,280**	**$57,994,740**	**$9,930,714**	**$61,895,658**	**$25,251,610**	**$52,210,746**
		(Sub)Total	**$307,415,048**	**$133,369,478**	**$130,565,540**	**$196,700,415**	**$149,757,704**	**$177,171,399**	**$289,973,699**	**$49,653,571**	**$309,478,288**	**$126,258,049**	**$261,053,731**

Estimate Detail

CCRP Cost Estimate Table W-4: 2019 CC1 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		year		1.42	$ 800,000	$ 1,138,736
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		year		1.42	$ 160,000	$ 227,747
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		year		1.42	$ 100,000	$ 142,342
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		17.08	$ 12,500	$ 213,513
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		17.08	$ 100	$ 1,708
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		17.08	$ 4,270	$ 72,936
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		17.08	$ 1,200	$ 20,497
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		1,041.94	$ 2,000	$ 2,083,886
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		1,041.94	$ 600	$ 625,166
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 8,900,390	$ 1,780,078
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00	$ 538,006	$ 538,006
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		1.00	$ 50,000	$ 50,000
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		1.00	$ 4,673	$ 4,673
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		17.08	$ 1,000	$ 17,081
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		272,584.26	$ 1.39	$ 378,892
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		2.00	$ 100,000	$ 200,000
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		3.00	$ 4,673	$ 14,018
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		34.16	$ 1,000	$ 34,162
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		800,052.50	$ 1.39	$ 1,112,073
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		6.00	$ 10,000	$ 60,000
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		6.00	$ 1,324	$ 7,943
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		102.49	$ 500	$ 51,243
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		122,204.65	$ 1.39	$ 169,864
Clinton	CC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		31.15	$ 300	$ 9,345
Clinton	CC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		109.03	$ 300	$ 32,708
Clinton	CC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		31.15	$ 300	$ 9,345
Clinton	CC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		15.58	$ 300	$ 4,673
Clinton	CC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		31.15	$ 300	$ 9,345
Clinton	CC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		31.15	$ 150	$ 4,673
Clinton	CC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		46.73	$ 150	$ 7,009
Clinton	CC1	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawson City	person*shifts		2,263.75	$ 400	$ 905,498
Clinton	CC1	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	17.08	$ 20,833	$ 355,855
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		1.00	$ 674,550	$ 674,550
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		1.00	$ 713,628	$ 713,628
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		1.00	$ 363,191	$ 363,191
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		17.08	$ 52,555	$ 897,688
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		31,692.43	$ 123	$ 3,882,371
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		519.55	$ 4,560	$ 2,368,963
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		17.08	$ 179,664	$ 3,068,851
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	75.00	$ 4,756	$ 356,670

CCRP Cost Estimate Table W-4: 2019 CC1 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	750.00	$ 863	$ 647,100
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	year	1.00	1.00	$ 200,000	$ 200,000
Clinton	CC1	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction		m3		218,650.00	$ 4.56	$ 996,180
Clinton	CC1	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Clinton Creek Options	m2	1.2	1.00	$ 891,675	$ 891,675
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 1,862,207	$ 1,862,207
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		day		519.55	$ 1,293.78	$ 672,182
Clinton	CC1	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Loading		tonnes		##########	$ 0.55	$ 4,804,961
Clinton	CC1	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Hauling		tonnes		##########	$ 1.73	$ 15,118,642
Clinton	CC1	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		21,197.56	$ 320	$ 6,783,220
Clinton	CC1	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		10,598.78	$ 170	$ 1,801,793
Clinton	CC1	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	2	21,197.56	$ 192	$ 4,069,932
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=500mm	m3	1.0	19,000.00	$ 228.93	$ 4,349,683
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=300mm	m3	1.0	33,000.00	$ 228.93	$ 7,554,713
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Supply Coletanche Elastomeric Bitumen Liner ES3	m2	1.0	14,374.00	$ 23.33	$ 335,393
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Supply Non-Woven Geotextile	m2	1.0	64,416.00	$ 2.00	$ 128,832
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Install Coletanche Elastomeric Bitumen Liner ES3	m2	1.0	14,374.00	$ 6.00	$ 86,244
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Install Non-Woven Geotextile	m2	1.0	64,416.00	$ 1.50	$ 96,624
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Spillway Cut	m3	1.2	-	$ 5.47	$ -
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Spillway Fill	m3	1.2	-	$ 5.47	$ -
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Steel Sheet Pile Wall	m2	1.2	17,280.00	$ 846.99	$ 14,636,065
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Mob/Demob of Specialized Ground Densification Rig/Equipment	each	1.0	1.00	$ 200,000.00	$ 200,000
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Densification operations	m3	1.0	230,000.00	$ 10.00	$ 2,300,000
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Select Granular Supply for Densifications	m3	1.0	115,000.00	$ 51.34	$ 5,904,537
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Turf reinforced mat (assumed LP-P20 Polypropylene)	m2	1.0	-	$ -	$ -
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water and Erosion Sediment Control during Construction	ls	1.0	-	$ -	$ -
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	50,000.00	$ 0.89	$ 44,313
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	25,000.00	$ 4.56	$ 113,901
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	37,000.00	$ 10.00	$ 370,000
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	440.00	$ 24.00	$ 10,560
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	3,150.00	$ 24.00	$ 75,600
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	8,200.00	$ 51.34	$ 421,019
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	9,500.00	$ 228.93	$ 2,174,842
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	2.00	$ 5,000.00	$ 10,000
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	3.00	$ 5,000.00	$ 15,000
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast chamber	each	1.0	3.00	$ 2,500.00	$ 7,500
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install manholes	each	1.0	8.00	$ 2,500.00	$ 20,000
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	50,000.00	$ 6.00	$ 300,000
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Channel Excavation	m3	1.0	12,500.00	$ 12.65	$ 158,125
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Riprap for diversion channel armouring	m3	1.0	2,950.00	$ 228.93	$ 675,346
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Geotextile	m2	1.2	7,000.00	$ 6.00	$ 42,000
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	1.0	1,200.00	$ 12.65	$ 15,180

CCRP Cost Estimate Table W-4: 2019 CC1 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Riprap for diversion channel armouring	m3	1.0	600.00	$ 228.93	$ 137,358
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Geotextile	m2	1.2	1,400.00	$ 6.00	$ 8,400
Clinton	CC1	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	Monthly Rent for 42" Floating Pump	months	1.0	1.00	$ 221,760.00	$ 221,760
Clinton	CC1	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	DELIVERY FREIGHT COST	each	1.0	1.00	$ 20,091.72	$ 20,092
Clinton	CC1	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	RETURN FREIGHT COST	each	1.0	1.00	$ 16,552.80	$ 16,553
Clinton	CC1	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	PIPING AND ACCESSORIES	each	1.0	1.00	$ 269,091.90	$ 269,092
Clinton	CC1	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	50,000 L Envirotank Mob/demob	km	1.0	3,162.00	$ 5.90	$ 18,656
Clinton	CC1	Mechanical Works	Lake Drawdowns	N/A	Fuel Consumption	Fuel - Delivered to Site	litres	1.0	66,682.85	$ 1.39	$ 92,689
Clinton	CC1	Mobilization and Demobilization	TF&C	N/A	N/A		-		-	$ -	$ -
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fin Tube Installations	Heating Elements	heaters		1,600.00	$ 540	$ 864,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fin Tube Installations	Casing Installations	test holes		1,600.00	$ 20,000	$ 32,000,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fin Tube Installations	Control Panel	lump sum		1.00	$ 46,000	$ 46,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Generator Purchase	generators		4.00	$ 1,800,000	$ 7,200,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Field Installation	lump sum		1.00	$ 1,000,000	$ 1,000,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Enclosures	lump sum		1.00	$ 100,000	$ 100,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Power Supply Testing & Commisioning	lump sum		1.00	$ 1,100,000	$ 1,100,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Power Supply Shipment	lump sum		1.00	$ 575,000	$ 575,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Spare Parts	lump sum		1.00	$ 270,000	$ 270,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Transformer	lump sum		1.00	$ 2,800,000	$ 2,800,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Electrical Distribution Hardware	lump sum		1.00	$ 2,200,000	$ 2,200,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Diesel Storage Tanks	Tanks		3.00	$ 1,170,000	$ 3,510,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Insulation	Lump Sum		1.00	$ 1,000,000	$ 1,000,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Fuel Supply Testing & Commisioning	Lump Sum		1.00	$ 1,500,000	$ 1,500,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Shipment	Lump Sum		1.00	$ 400,000	$ 400,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Fuel Distribution Piping and Controls	Lump Sum		1.00	$ 900,000	$ 900,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Diesel	Liters		##########	$ 1.39	$ 22,240,000
Clinton	CC1	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 9,050,654	$ 9,050,654
Clinton	CC1	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Clinton	CC1	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 8,619,670	$ 8,619,670
Clinton	CC1	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 1,723,934	$ 1,723,934
Clinton	CC1	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Clinton	CC1	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 1,077,459	$ 1,077,459
Clinton	CC1	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 538,729	$ 538,729
Clinton	CC1	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 208,722,011	$ 6,261,660
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		1.00	$ 50,000	$ 50,000
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		300.00	$ 200	$ 60,000
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		200.00	$ 200	$ 40,000
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		50.00	$ 110,000	$ 5,500,000
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		30.00	$ 110,000	$ 3,300,000
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		25.00	$ 20,000	$ 500,000
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		-	$ 110,000	$ -
Clinton	CC1	Factors	EPCM	N/A			%		10%		$ 21,498,367
Clinton	CC1	Factors	Contingency	N/A			%		25%		$ 61,483,010

Subtotal	**$224,433,671**
EPCM	**$21,498,367**
Contingency	**$61,483,010**
Option Total	**$307,415,048**

CCRP Cost Estimate Table W-4a: 2019 CC1-A Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		year		0.57	$ 800,000	$ 453,099
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		year		0.57	$ 160,000	$ 90,620
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		year		0.57	$ 100,000	$ 56,637
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		6.80	$ 12,500	$ 84,956
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		6.80	$ 100	$ 680
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		6.80	$ 3,850	$ 26,166
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		6.80	$ 1,200	$ 8,156
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		373.81	$ 2,000	$ 747,613
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		373.81	$ 600	$ 224,284
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 4,443,992	$ 888,798
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00	$ 508,239	$ 508,239
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		1.00	$ 50,000	$ 50,000
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		1.00	$ 4,673	$ 4,673
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		6.80	$ 1,000	$ 6,796
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		108,460.24	$ 1.39	$ 150,760
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		2.00	$ 100,000	$ 200,000
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		3.00	$ 4,673	$ 14,018
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		13.59	$ 1,000	$ 13,593
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		318,337.84	$ 1.39	$ 442,490
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		6.00	$ 10,000	$ 60,000
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		6.00	$ 1,324	$ 7,943
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		40.78	$ 500	$ 20,389
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		48,624.76	$ 1.39	$ 67,588
Wolverine	CC1-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		15.58	$ 300	$ 4,673
Wolverine	CC1-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		46.73	$ 300	$ 14,018
Wolverine	CC1-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		46.73	$ 300	$ 14,018
Wolverine	CC1-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		31.15	$ 300	$ 9,345
Wolverine	CC1-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		31.15	$ 300	$ 9,345
Wolverine	CC1-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		31.15	$ 150	$ 4,673
Wolverine	CC1-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		46.73	$ 150	$ 7,009
Wolverine	CC1-A	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawson City	person*shifts		812.14	$ 400	$ 324,855
Wolverine	CC1-A	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	6.80	$ 20,833	$ 141,593
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		1.00	$ 674,550	$ 674,550
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		1.00	$ 713,628	$ 713,628
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		1.00	$ 363,191	$ 363,191
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		6.80	$ 52,555	$ 357,186
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		11,369.94	$ 123	$ 1,392,835
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		206.73	$ 4,560	$ 942,601
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		6.80	$ 179,664	$ 1,221,084
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	75.00	$ 4,756	$ 356,670
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	750.00	$ 863	$ 647,100
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	year	1.00	-	$ 200,000	$ -

CCRP Cost Estimate Table W-4a: 2019 CC1-A Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction		m3		43,500.00	$ 4.56	$ 198,188
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Clinton Creek Options	m2	1.2	1.00	$ 891,675	$ 891,675
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 1,355,643	$ 1,355,643
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		day		206.73	$ 1,046.00	$ 216,236
Wolverine	CC1-A	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Loading		tonnes		##########	$ 0.55	$ 955,938
Wolverine	CC1-A	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Hauling		tonnes		##########	$ 1.48	$ 2,578,136
Wolverine	CC1-A	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		12,651.64	$ 320	$ 4,048,526
Wolverine	CC1-A	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		8,434.43	$ 170	$ 1,433,853
Wolverine	CC1-A	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	2	8,434.43	$ 192	$ 1,619,410
Wolverine	CC1-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=500mm	m3	1.0	2,120.00	$ 228.93	$ 485,333
Wolverine	CC1-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=300mm	m3	1.0	21,500.00	$ 228.93	$ 4,922,010
Wolverine	CC1-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Supply Coletanche Elastomeric Bitumen Liner ES3	m2	1.0	-	$ 23.33	$ -
Wolverine	CC1-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Supply Non-Woven Geotextile	m2	1.0	55,000.00	$ 2.00	$ 110,000
Wolverine	CC1-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Install Coletanche Elastomeric Bitumen Liner ES3	m2	1.0	-	$ 6.00	$ -
Wolverine	CC1-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Install Non-Woven Geotextile	m2	1.0	-	$ 1.50	$ -
Wolverine	CC1-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Spillway Cut	m3	1.2	-	$ 5.47	$ -
Wolverine	CC1-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Spillway Fill	m3	1.2	-	$ 5.47	$ -
Wolverine	CC1-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Steel Sheet Pile Wall	m2	1.2	8,640.00	$ 846.99	$ 7,318,032
Wolverine	CC1-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Mob/Demob of Specialized Ground Densification Rig/Equipment	each	1.0	-	$ 200,000.00	$ -
Wolverine	CC1-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Densification operations	m3	1.0	-	$ 10.00	$ -
Wolverine	CC1-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Select Granular Supply for Densifications	m3	1.0	-	$ 51.34	$ -
Wolverine	CC1-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Turf reinforced mat (assumed LP-P20 Polypropylene)	m2	1.0	-	$ -	$ -
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water and Erosion Sediment Control during Construction	ls	1.0	-	$ -	$ -
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	50,000.00	$ 0.89	$ 44,313
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	25,000.00	$ 4.56	$ 113,901
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	37,000.00	$ 10.00	$ 370,000
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	440.00	$ 24.00	$ 10,560
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	3,150.00	$ 24.00	$ 75,600
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	8,200.00	$ 51.34	$ 421,019
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	9,500.00	$ 228.93	$ 2,174,842
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	2.00	$ 5,000.00	$ 10,000
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	3.00	$ 5,000.00	$ 15,000
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast chamber	each	1.0	3.00	$ 2,500.00	$ 7,500
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install manholes	each	1.0	8.00	$ 2,500.00	$ 20,000
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	50,000.00	$ 6.00	$ 300,000
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Channel Excavation	m3	1.0	12,500.00	$ 12.65	$ 158,125
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Riprap for diversion channel armouring	m3	1.0	2,950.00	$ 228.93	$ 675,346
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Geotextile	m2	1.2	7,000.00	$ 6.00	$ 42,000
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	1.0	1,200.00	$ 12.65	$ 15,180
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Riprap for diversion channel armouring	m3	1.0	600.00	$ 228.93	$ 137,358
Wolverine	CC1-A	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Geotextile	m2	1.2	1,400.00	$ 6.00	$ 8,400
Wolverine	CC1-A	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	Monthly Rent for 42" Floating Pump	months	1.0	1.00	$ 221,760.00	$ 221,760
Wolverine	CC1-A	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	DELIVERY FREIGHT COST	each	1.0	1.00	$ 20,091.72	$ 20,092
Wolverine	CC1-A	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	RETURN FREIGHT COST	each	1.0	1.00	$ 16,552.80	$ 16,553
Wolverine	CC1-A	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	PIPING AND ACCESSORIES	each	1.0	1.00	$ 269,091.90	$ 269,092

CCRP Cost Estimate Table W-4a: 2019 CC1-A Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	CC1-A	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	50,000 L Envirotank Mob/demob	km	1.0	3,162.00	$ 5.90	$ 18,656
Wolverine	CC1-A	Mechanical Works	Lake Drawdowns	N/A	Fuel Consumption	Fuel - Delivered to Site	litres	1.0	33,342.00	$ 1.39	$ 46,345
Wolverine	CC1-A	Mobilization and Demobilization	TF&C	N/A	N/A		-		-	$ -	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Fin Tube Installations	Heating Elements	heaters		-	$ 540	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Fin Tube Installations	Casing Installations	test holes		-	$ 20,000	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Fin Tube Installations	Control Panel	lump sum		-	$ 46,000	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Power Supply	Generator Purchase	generators		-	$ 1,800,000	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Power Supply	Field Installation	lump sum		-	$ 1,000,000	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Power Supply	Enclosures	lump sum		-	$ 100,000	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Power Supply	Power Supply Testing & Commisioning	lump sum		-	$ 1,100,000	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Power Supply	Power Supply Shipment	lump sum		-	$ 575,000	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Power Supply	Spare Parts	lump sum		-	$ 270,000	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Power Supply	Transformer	lump sum		-	$ 2,800,000	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Power Supply	Electrical Distribution Hardware	lump sum		-	$ 2,200,000	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Diesel Storage Tanks	Tanks		-	$ 1,170,000	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Insulation	Lump Sum		-	$ 1,000,000	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Fuel Supply Testing & Commisioning	Lump Sum		-	$ 1,500,000	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Shipment	Lump Sum		-	$ 400,000	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Fuel Distribution Piping and Controls	Lump Sum		-	$ 900,000	$ -
Wolverine	CC1-A	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Diesel	Liters		-	$ 1.39	$ -
Wolverine	CC1-A	Mechanical Works	Blast Densification	N/A	Camp	N/A	person days		420.00	$ 300.00	$ 126,000
Wolverine	CC1-A	Mechanical Works	Blast Densification	N/A	H&S Protocols	N/A	person days		420.00	$ 100.00	$ 42,000
Wolverine	CC1-A	Mechanical Works	Blast Densification	N/A	PPE	N/A	person days		420.00	$ 100.00	$ 42,000
Wolverine	CC1-A	Mechanical Works	Blast Densification	N/A	Drilling, loading & detonating	N/A	m3		300,000.00	$ 13.00	$ 3,900,000
Wolverine	CC1-A	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 9,050,654	$ 9,050,654
Wolverine	CC1-A	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Wolverine	CC1-A	Post Closure Care and Maintenance	Repair & Remediation	N/A	Repair Costs	Present Value			1.00	$ 7,578,050	$ 7,578,050
Wolverine	CC1-A	Post Closure Care and Maintenance	Repair & Remediation	N/A	Remediation Costs	Present Value			1.00	$ 1,761,511	$ 1,761,511
Wolverine	CC1-A	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 8,619,670	$ 8,619,670
Wolverine	CC1-A	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 1,723,934	$ 1,723,934
Wolverine	CC1-A	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Wolverine	CC1-A	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 1,077,459	$ 1,077,459
Wolverine	CC1-A	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 538,729	$ 538,729
Wolverine	CC1-A	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Wolverine	CC1-A	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 85,830,170	$ 2,574,905
Wolverine	CC1-A	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		1.00	$ 50,000	$ 50,000
Wolverine	CC1-A	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		300.00	$ 200	$ 60,000
Wolverine	CC1-A	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		200.00	$ 200	$ 40,000
Wolverine	CC1-A	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		50.00	$ 110,000	$ 5,500,000
Wolverine	CC1-A	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Wolverine	CC1-A	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		30.00	$ 110,000	$ 3,300,000
Wolverine	CC1-A	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		25.00	$ 20,000	$ 500,000
Wolverine	CC1-A	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		-	$ 110,000	$ -
Wolverine	CC1-A	Factors	EPCM	N/A			%		10%		$ 8,840,507
Wolverine	CC1-A	Factors	Contingency	N/A			%		25%		$ 26,673,896

Subtotal	**$97,855,075**
EPCM	**$8,840,507**
Contingency	**$26,673,896**
Option Total	**$133,369,478**

CCRP Cost Estimate Table W-4b: 2019 CC1-B Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		year		0.63	$ 800,000	$ 501,012
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		year		0.63	$ 160,000	$ 100,202
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		year		0.63	$ 100,000	$ 62,627
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		7.52	$ 12,500	$ 93,940
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		7.52	$ 100	$ 752
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		7.52	$ 3,850	$ 28,933
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		7.52	$ 1,200	$ 9,018
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		413.34	$ 2,000	$ 826,670
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		413.34	$ 600	$ 248,001
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 4,728,729	$ 945,746
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00	$ 510,319	$ 510,319
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		1.00	$ 50,000	$ 50,000
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		1.00	$ 4,673	$ 4,673
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		7.52	$ 1,000	$ 7,515
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		119,929.59	$ 1.39	$ 166,702
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		2.00	$ 100,000	$ 200,000
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		3.00	$ 4,673	$ 14,018
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		15.03	$ 1,000	$ 15,030
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		352,001.15	$ 1.39	$ 489,282
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		6.00	$ 10,000	$ 60,000
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		6.00	$ 1,324	$ 7,943
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		45.09	$ 500	$ 22,546
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		53,766.69	$ 1.39	$ 74,736
Wolverine	CC1-B	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		15.58	$ 300	$ 4,673
Wolverine	CC1-B	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		46.73	$ 300	$ 14,018
Wolverine	CC1-B	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		46.73	$ 300	$ 14,018
Wolverine	CC1-B	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		31.15	$ 300	$ 9,345
Wolverine	CC1-B	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		31.15	$ 300	$ 9,345
Wolverine	CC1-B	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		31.15	$ 150	$ 4,673
Wolverine	CC1-B	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		46.73	$ 150	$ 7,009
Wolverine	CC1-B	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawson City	person*shifts		898.02	$ 400	$ 359,208
Wolverine	CC1-B	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	7.52	$ 20,833	$ 156,566
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		1.00	$ 674,550	$ 674,550
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		1.00	$ 713,628	$ 713,628
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		1.00	$ 363,191	$ 363,191
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		7.52	$ 52,555	$ 394,958
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		12,572.28	$ 123	$ 1,540,123
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		228.59	$ 4,560	$ 1,042,279
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		7.52	$ 179,664	$ 1,350,210
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	75.00	$ 4,756	$ 356,670
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	750.00	$ 863	$ 647,100
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	year	1.00	-	$ 200,000	$ -

CCRP Cost Estimate Table W-4b: 2019 CC1-B Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction		m3		48,100.00	$ 4.56	$ 219,146
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Clinton Creek Options	m2	1.2	1.00	$ 891,675	$ 891,675
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 1,355,643	$ 1,355,643
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		day		228.59	$ 1,046.00	$ 239,102
Wolverine	CC1-B	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Loading		tonnes		##########	$ 0.55	$ 1,057,025
Wolverine	CC1-B	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Hauling		tonnes		##########	$ 1.48	$ 2,850,766
Wolverine	CC1-B	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		13,989.52	$ 320	$ 4,476,646
Wolverine	CC1-B	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		9,326.35	$ 170	$ 1,585,479
Wolverine	CC1-B	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	2	9,326.35	$ 192	$ 1,790,658
Wolverine	CC1-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=500mm	m3	1.0	2,120.00	$ 228.93	$ 485,333
Wolverine	CC1-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=300mm	m3	1.0	21,500.00	$ 228.93	$ 4,922,010
Wolverine	CC1-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Supply Coletanche Elastomeric Bitumen Liner ES3	m2	1.0	-	$ 23.33	$ -
Wolverine	CC1-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Supply Non-Woven Geotextile	m2	1.0	55,000.00	$ 2.00	$ 110,000
Wolverine	CC1-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Install Coletanche Elastomeric Bitumen Liner ES3	m2	1.0	-	$ 6.00	$ -
Wolverine	CC1-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Install Non-Woven Geotextile	m2	1.0	-	$ 1.50	$ -
Wolverine	CC1-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Spillway Cut	m3	1.2	-	$ 4.87	$ -
Wolverine	CC1-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Spillway Fill	m3	1.2	-	$ 4.87	$ -
Wolverine	CC1-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Steel Sheet Pile Wall	m2	1.2	8,640.00	$ 846.99	$ 7,318,032
Wolverine	CC1-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Mob/Demob of Specialized Ground Densification Rig/Equipment	each	1.0	-	$ 200,000.00	$ -
Wolverine	CC1-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Densification operations	m3	1.0	-	$ 10.00	$ -
Wolverine	CC1-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Select Granular Supply for Densifications	m3	1.0	-	$ 51.34	$ -
Wolverine	CC1-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Turf reinforced mat (assumed LP-P20 Polypropylene)	m2	1.0	-	$ -	$ -
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water and Erosion Sediment Control during Construction	ls	1.0	-	$ -	$ -
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	50,000.00	$ 0.89	$ 44,313
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	25,000.00	$ 4.56	$ 113,901
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	37,000.00	$ 10.00	$ 370,000
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	440.00	$ 24.00	$ 10,560
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	3,150.00	$ 24.00	$ 75,600
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	8,200.00	$ 51.34	$ 421,019
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	9,500.00	$ 228.93	$ 2,174,842
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	2.00	$ 5,000.00	$ 10,000
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	3.00	$ 5,000.00	$ 15,000
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast chamber	each	1.0	3.00	$ 2,500.00	$ 7,500
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install manholes	each	1.0	8.00	$ 2,500.00	$ 20,000
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	50,000.00	$ 6.00	$ 300,000
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Channel Excavation	m3	1.0	12,500.00	$ 12.65	$ 158,125
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Riprap for diversion channel armouring	m3	1.0	2,950.00	$ 228.93	$ 675,346
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Geotextile	m2	1.2	7,000.00	$ 6.00	$ 42,000
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	1.0	1,200.00	$ 12.65	$ 15,180
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Riprap for diversion channel armouring	m3	1.0	600.00	$ 228.93	$ 137,358
Wolverine	CC1-B	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Geotextile	m2	1.2	1,400.00	$ 6.00	$ 8,400
Wolverine	CC1-B	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	Monthly Rent for 42" Floating Pump	months	1.0	1.00	$ 221,760.00	$ 221,760
Wolverine	CC1-B	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	DELIVERY FREIGHT COST	each	1.0	1.00	$ 20,091.72	$ 20,092
Wolverine	CC1-B	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	RETURN FREIGHT COST	each	1.0	1.00	$ 16,552.80	$ 16,553
Wolverine	CC1-B	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	PIPING AND ACCESSORIES	each	1.0	1.00	$ 269,091.90	$ 269,092

CCRP Cost Estimate Table W-4b: 2019 CC1-B Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	CC1-B	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	50,000 L Envirotank Mob/demob	km	1.0	3,162.00	$ 5.90	$ 18,656
Wolverine	CC1-B	Mechanical Works	Lake Drawdowns	N/A	Fuel Consumption	Fuel - Delivered to Site	litres	1.0	33,342.00	$ 1.39	$ 46,345
Wolverine	CC1-B	Mobilization and Demobilization	TF&C	N/A	N/A		-		-	$ -	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Fin Tube Installations	Heating Elements	heaters		-	$ 540	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Fin Tube Installations	Casing Installations	test holes		-	$ 20,000	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Fin Tube Installations	Control Panel	lump sum		-	$ 46,000	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Power Supply	Generator Purchase	generators		-	$ 1,800,000	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Power Supply	Field Installation	lump sum		-	$ 1,000,000	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Power Supply	Enclosures	lump sum		-	$ 100,000	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Power Supply	Power Supply Testing & Commisioning	lump sum		-	$ 1,100,000	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Power Supply	Power Supply Shipment	lump sum		-	$ 575,000	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Power Supply	Spare Parts	lump sum		-	$ 270,000	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Power Supply	Transformer	lump sum		-	$ 2,800,000	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Power Supply	Electrical Distribution Hardware	lump sum		-	$ 2,200,000	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Diesel Storage Tanks	Tanks		-	$ 1,170,000	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Insulation	Lump Sum		-	$ 1,000,000	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Fuel Supply Testing & Commisioning	Lump Sum		-	$ 1,500,000	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Shipment	Lump Sum		-	$ 400,000	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Fuel Distribution Piping and Controls	Lump Sum		-	$ 900,000	$ -
Wolverine	CC1-B	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Diesel	Liters		-	$ 1.39	$ -
Wolverine	CC1-B	Mechanical Works	Blast Densification	N/A	Camp	N/A	person days		-	$ -	$ -
Wolverine	CC1-B	Mechanical Works	Blast Densification	N/A	H&S Protocols	N/A	person days		-	$ -	$ -
Wolverine	CC1-B	Mechanical Works	Blast Densification	N/A	PPE	N/A	person days		-	$ -	$ -
Wolverine	CC1-B	Mechanical Works	Blast Densification	N/A	Drilling, loading & detonating	N/A	m3		-	$ -	$ -
Wolverine	CC1-B	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 9,050,654	$ 9,050,654
Wolverine	CC1-B	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Wolverine	CC1-B	Post Closure Care and Maintenance	Repair & Remediation	N/A	Repair Costs	Present Value			1.00	$ 7,578,050	$ 7,578,050
Wolverine	CC1-B	Post Closure Care and Maintenance	Repair & Remediation	N/A	Remediation Costs	Present Value			1.00	$ 1,947,786	$ 1,947,786
Wolverine	CC1-B	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 8,619,670	$ 8,619,670
Wolverine	CC1-B	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 1,723,934	$ 1,723,934
Wolverine	CC1-B	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Wolverine	CC1-B	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 1,077,459	$ 1,077,459
Wolverine	CC1-B	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 538,729	$ 538,729
Wolverine	CC1-B	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Wolverine	CC1-B	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 83,850,337	$ 2,515,510
Wolverine	CC1-B	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		1.00	$ 50,000	$ 50,000
Wolverine	CC1-B	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		300.00	$ 200	$ 60,000
Wolverine	CC1-B	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		200.00	$ 200	$ 40,000
Wolverine	CC1-B	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		50.00	$ 110,000	$ 5,500,000
Wolverine	CC1-B	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Wolverine	CC1-B	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		30.00	$ 110,000	$ 3,300,000
Wolverine	CC1-B	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		25.00	$ 20,000	$ 500,000
Wolverine	CC1-B	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		-	$ 110,000	$ -
Wolverine	CC1-B	Factors	EPCM	N/A			%		10%		$ 8,636,585
Wolverine	CC1-B	Factors	Contingency	N/A			%		25%		$ 26,113,108

Subtotal	**$95,815,847**
EPCM	**$8,636,585**
Contingency	**$26,113,108**
Option Total	**$130,565,540**

CCRP Cost Estimate Table W-5: 2019 CC2 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		year		2.31	$ 800,000	$ 1,848,069
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		year		2.31	$ 160,000	$ 369,614
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		year		2.31	$ 100,000	$ 231,009
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		27.72	$ 12,500	$ 346,513
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		27.72	$ 100	$ 2,772
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		27.72	$ 4,270	$ 118,369
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		27.72	$ 1,200	$ 33,265
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		1,690.98	$ 2,000	$ 3,381,967
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		1,690.98	$ 600	$ 1,014,590
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 13,353,611	$ 2,670,722
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00	$ 568,803	$ 568,803
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		1.00	$ 50,000	$ 50,000
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		1.00	$ 4,673	$ 4,673
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		27.72	$ 1,000	$ 27,721
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		442,380.63	$ 1.39	$ 614,909
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		2.00	$ 100,000	$ 200,000
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		3.00	$ 4,673	$ 14,018
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		55.44	$ 1,000	$ 55,442
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		##########	$ 1.39	$ 1,804,798
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		6.00	$ 10,000	$ 60,000
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		6.00	$ 1,324	$ 7,943
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		166.33	$ 500	$ 83,163
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		198,327.55	$ 1.39	$ 275,675
Clinton	CC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		31.15	$ 300	$ 9,345
Clinton	CC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		109.03	$ 300	$ 32,708
Clinton	CC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		31.15	$ 300	$ 9,345
Clinton	CC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		15.58	$ 300	$ 4,673
Clinton	CC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		31.15	$ 300	$ 9,345
Clinton	CC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		31.15	$ 150	$ 4,673
Clinton	CC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		46.73	$ 150	$ 7,009
Clinton	CC2	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawson City	person*shifts		3,673.86	$ 400	$ 1,469,545
Clinton	CC2	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	27.72	$ 20,833	$ 577,522
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		1.00	$ 674,550	$ 674,550
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		1.00	$ 713,628	$ 713,628
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		1.00	$ 363,191	$ 363,191
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		27.72	$ 52,555	$ 1,456,869
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		51,434.07	$ 123	$ 6,300,751
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		843.18	$ 4,560	$ 3,844,621
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		27.72	$ 179,664	$ 4,980,480
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	75.00	$ 4,756	$ 356,670

wood.

CCRP Cost Estimate Table W-5: 2019 CC2 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	750.00	$ 863	$ 647,100
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	year	1.00	2.00	$ 200,000	$ 400,000
Clinton	CC2	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction		m3		354,850.00	$ 4.56	$ 1,616,714
Clinton	CC2	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Clinton Creek Options	m2	1.2	1.00	$ 891,675	$ 891,675
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 1,862,207	$ 1,862,207
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		day		843.18	$ 1,293.78	$ 1,090,894
Clinton	CC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Loading		tonnes		##########	$ 0.55	$ 7,798,035
Clinton	CC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Hauling		tonnes		##########	$ 1.73	$ 24,536,245
Clinton	CC2	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		34,401.81	$ 320	$ 11,008,578
Clinton	CC2	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		17,200.90	$ 170	$ 2,924,154
Clinton	CC2	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	2	34,401.81	$ 192	$ 6,605,147
Clinton	CC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=500mm	m3	1.0	37,020.00	$ 228.93	$ 8,475,015
Clinton	CC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=300mm	m3	1.0	10,200.00	$ 228.93	$ 2,335,093
Clinton	CC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=175mm	m3	1.0	4,670.00	$ 228.93	$ 1,069,106
Clinton	CC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Turf reinforced mat (assumed LP-P20 Polypropylene). Excluding delivery and installation	m2	1.0	26,000.00	$ 20.00	$ 520,000
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water and Erosion Sediment Control during Construction	ls	1.0	-	$ -	$ -
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	50,000.00	$ 0.89	$ 44,313
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	25,000.00	$ 4.56	$ 113,901
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	37,000.00	$ 10.00	$ 370,000
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	440.00	$ 24.00	$ 10,560
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	3,150.00	$ 24.00	$ 75,600
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	8,200.00	$ 51.34	$ 421,019
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	9,500.00	$ 228.93	$ 2,174,842
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	2.00	$ 5,000.00	$ 10,000
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	3.00	$ 5,000.00	$ 15,000
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast chamber	each	1.0	3.00	$ 2,500.00	$ 7,500
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install manholes	each	1.0	8.00	$ 2,500.00	$ 20,000
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	50,000.00	$ 6.00	$ 300,000
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Channel Excavation	m3	1.0	12,500.00	$ 12.65	$ 158,125
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Riprap for diversion channel armouring	m3	1.0	2,950.00	$ 228.93	$ 675,346
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Geotextile	m2	1.2	7,000.00	$ 6.00	$ 42,000
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	1.0	1,200.00	$ 12.65	$ 15,180
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Riprap for diversion channel armouring	m3	1.0	600.00	$ 228.93	$ 137,358
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Geotextile	m2	1.2	1,400.00	$ 6.00	$ 8,400
Clinton	CC2	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	Monthly Rent for 42" Floating Pump	months	1.0	1.00	$ 221,760.00	$ 221,760
Clinton	CC2	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	DELIVERY FREIGHT COST	each	1.0	1.00	$ 20,091.72	$ 20,092
Clinton	CC2	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	RETURN FREIGHT COST	each	1.0	1.00	$ 16,552.80	$ 16,553
Clinton	CC2	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	PIPING AND ACCESSORIES	each	1.0	1.00	$ 269,091.90	$ 269,092
Clinton	CC2	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	50,000 L Envirotank Mob/demob	km	1.0	3,162.00	$ 5.90	$ 18,656
Clinton	CC2	Mechanical Works	Lake Drawdowns	N/A	Fuel Consumption	Fuel - Delivered to Site	litres	1.0	98,102.59	$ 1.39	$ 136,363
Clinton	CC2	Mobilization and Demobilization	TF&C	N/A	N/A		-		-	$ -	$ -
Clinton	CC2	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 3,205,835	$ 3,205,835
Clinton	CC2	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 1,526,588	$ 1,526,588

CCRP Cost Estimate Table W-5: 2019 CC2 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC2	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 12,212,704	$ 12,212,704
Clinton	CC2	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 1,723,934	$ 1,723,934
Clinton	CC2	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ 1,077,459	$ 1,077,459
Clinton	CC2	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 1,302,023	$ 1,302,023
Clinton	CC2	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 651,012	$ 651,012
Clinton	CC2	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 133,460,134	$ 4,003,804
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		1.00	$ 50,000	$ 50,000
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		300.00	$ 200	$ 60,000
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		200.00	$ 200	$ 40,000
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		50.00	$ 110,000	$ 5,500,000
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		-	$ 110,000	$ -
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		25.00	$ 20,000	$ 500,000
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		-	$ 110,000	$ -
Clinton	CC2	Factors	EPCM	N/A			%		10%		$ 13,746,394
Clinton	CC2	Factors	Contingency	N/A			%		25%		$ 39,340,083

Subtotal	**$143,613,939**
EPCM	**$13,746,394**
Contingency	**$39,340,083**
Option Total	**$196,700,415**

CCRP Cost Estimate Table W-5a: 2019 CC2-A Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		year		0.77	$ 800,000	$ 616,110
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		year		0.77	$ 160,000	$ 123,222
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		year		0.77	$ 100,000	$ 77,014
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		9.24	$ 12,500	$ 115,521
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		9.24	$ 100	$ 924
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		9.24	$ 4,270	$ 39,462
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		9.24	$ 1,200	$ 11,090
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		563.74	$ 2,000	$ 1,127,481
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		563.74	$ 600	$ 338,244
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 5,619,328	$ 1,123,866
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00	$ 515,316	$ 515,316
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		1.00	$ 50,000	$ 50,000
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		1.00	$ 4,673	$ 4,673
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		9.24	$ 1,000	$ 9,242
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		147,480.99	$ 1.39	$ 204,999
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		2.00	$ 100,000	$ 200,000
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		3.00	$ 4,673	$ 14,018
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		18.48	$ 1,000	$ 18,483
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		432,866.27	$ 1.39	$ 601,684
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		6.00	$ 10,000	$ 60,000
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		6.00	$ 1,324	$ 7,943
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		55.45	$ 500	$ 27,725
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		66,118.50	$ 1.39	$ 91,905
Wolverine	CC2-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		31.15	$ 300	$ 9,345
Wolverine	CC2-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		109.03	$ 300	$ 32,708
Wolverine	CC2-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		31.15	$ 300	$ 9,345
Wolverine	CC2-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		15.58	$ 300	$ 4,673
Wolverine	CC2-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		31.15	$ 300	$ 9,345
Wolverine	CC2-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		31.15	$ 150	$ 4,673
Wolverine	CC2-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		46.73	$ 150	$ 7,009
Wolverine	CC2-A	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawson City	person*shifts		1,224.79	$ 400	$ 489,917
Wolverine	CC2-A	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	9.24	$ 20,833	$ 192,534
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		1.00	$ 674,550	$ 674,550
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		1.00	$ 713,628	$ 713,628
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		1.00	$ 363,191	$ 363,191
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		9.24	$ 52,555	$ 485,691
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		17,147.11	$ 123	$ 2,100,546
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		281.10	$ 4,560	$ 1,281,721
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		9.24	$ 179,664	$ 1,660,394
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	75.00	$ 4,756	$ 356,670

wood.

CCRP Cost Estimate Table W-5a: 2019 CC2-A Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	750.00	$ 863	$ 647,100
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	year	1.00	-	$ 200,000	$ -
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction		m3		118,300.00	$ 4.56	$ 538,981
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Clinton Creek Options	m2	1.2	1.00	$ 891,675	$ 891,675
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 1,733,343	$ 1,733,343
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		day		281.10	$ 1,322.00	$ 371,614
Wolverine	CC2-A	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Loading		tonnes		##########	$ 0.55	$ 2,599,711
Wolverine	CC2-A	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Hauling		tonnes		##########	$ 1.73	$ 8,179,901
Wolverine	CC2-A	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		11,468.88	$ 320	$ 3,670,043
Wolverine	CC2-A	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		5,734.44	$ 170	$ 974,855
Wolverine	CC2-A	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	2	11,468.88	$ 192	$ 2,202,026
Wolverine	CC2-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=500mm	m3	1.0	37,020.00	$ 228.93	$ 8,475,015
Wolverine	CC2-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=300mm	m3	1.0	10,200.00	$ 228.93	$ 2,335,093
Wolverine	CC2-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=175mm	m3	1.0	4,670.00	$ 228.93	$ 1,069,106
Wolverine	CC2-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Turf reinforced mat (assumed LP-P20 Polypropylene). Excluding delivery and installation	m2	1.0	26,000.00	$ 20.00	$ 520,000
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water and Erosion Sediment Control during Construction	ls	1.0	-	$ -	$ -
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	50,000.00	$ 0.89	$ 44,313
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	25,000.00	$ 4.56	$ 113,901
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	37,000.00	$ 10.00	$ 370,000
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	440.00	$ 24.00	$ 10,560
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	3,150.00	$ 24.00	$ 75,600
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	8,200.00	$ 51.34	$ 421,019
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	9,500.00	$ 228.93	$ 2,174,842
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	2.00	$ 5,000.00	$ 10,000
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	3.00	$ 5,000.00	$ 15,000
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast chamber	each	1.0	3.00	$ 2,500.00	$ 7,500
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install manholes	each	1.0	8.00	$ 2,500.00	$ 20,000
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	50,000.00	$ 6.00	$ 300,000
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Channel Excavation	m3	1.0	12,500.00	$ 12.65	$ 158,125
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Riprap for diversion channel armouring	m3	1.0	2,950.00	$ 228.93	$ 675,346
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Geotextile	m2	1.2	7,000.00	$ 6.00	$ 42,000
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	1.0	1,200.00	$ 12.65	$ 15,180
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Riprap for diversion channel armouring	m3	1.0	600.00	$ 228.93	$ 137,358
Wolverine	CC2-A	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Geotextile	m2	1.2	1,400.00	$ 6.00	$ 8,400
Wolverine	CC2-A	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	Monthly Rent for 42" Floating Pump	months	1.0	1.00	$ 221,760.00	$ 221,760
Wolverine	CC2-A	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	DELIVERY FREIGHT COST	each	1.0	1.00	$ 20,091.72	$ 20,092
Wolverine	CC2-A	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	RETURN FREIGHT COST	each	1.0	1.00	$ 16,552.80	$ 16,553
Wolverine	CC2-A	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	PIPING AND ACCESSORIES	each	1.0	1.00	$ 269,091.90	$ 269,092
Wolverine	CC2-A	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	50,000 L Envirotank Mob/demob	km	1.0	3,162.00	$ 5.90	$ 18,656
Wolverine	CC2-A	Mechanical Works	Lake Drawdowns	N/A	Fuel Consumption	Fuel - Delivered to Site	litres	1.0	66,682.85	$ 1.39	$ 92,689
Wolverine	CC2-A	Mechanical Works	Blast Densification	N/A	Camp	N/A	person days		1,800.00	$ 300.00	$ 540,000
Wolverine	CC2-A	Mechanical Works	Blast Densification	N/A	H&S Protocols	N/A	person days		1,800.00	$ 100.00	$ 180,000
Wolverine	CC2-A	Mechanical Works	Blast Densification	N/A	PPE	N/A	person days		1,800.00	$ 100.00	$ 180,000
Wolverine	CC2-A	Mechanical Works	Blast Densification	N/A	Drilling, loading & detonating	N/A	m3		900,000.00	$ 13.00	$ 11,700,000

CCRP Cost Estimate Table W-5a: 2019 CC2-A Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	CC2-A	Mobilization and Demobilization	TF&C	N/A	N/A	N/A	-		-	$ -	$ -
Wolverine	CC2-A	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 3,205,835	$ 3,205,835
Wolverine	CC2-A	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 1,526,588	$ 1,526,588
Wolverine	CC2-A	Post Closure Care and Maintenance	Repair & Remediation	N/A	Repair Costs	Present Value	-		1.00	$ 7,320,538	$ 7,320,538
Wolverine	CC2-A	Post Closure Care and Maintenance	Repair & Remediation	N/A	Remediation Costs	Present Value	-		1.00	$ 5,372,952	$ 5,372,952
Wolverine	CC2-A	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 12,212,704	$ 12,212,704
Wolverine	CC2-A	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 1,723,934	$ 1,723,934
Wolverine	CC2-A	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ 1,077,459	$ 1,077,459
Wolverine	CC2-A	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 1,302,023	$ 1,302,023
Wolverine	CC2-A	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 651,012	$ 651,012
Wolverine	CC2-A	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Wolverine	CC2-A	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 100,314,354	$ 3,009,431
Wolverine	CC2-A	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		1.00	$ 50,000	$ 50,000
Wolverine	CC2-A	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		300.00	$ 200	$ 60,000
Wolverine	CC2-A	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		200.00	$ 200	$ 40,000
Wolverine	CC2-A	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		50.00	$ 110,000	$ 5,500,000
Wolverine	CC2-A	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Wolverine	CC2-A	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		-	$ 110,000	$ -
Wolverine	CC2-A	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		25.00	$ 20,000	$ 500,000
Wolverine	CC2-A	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		-	$ 110,000	$ -
Wolverine	CC2-A	Factors	EPCM	N/A			%		10%		$ 10,332,378
Wolverine	CC2-A	Factors	Contingency	N/A			%		25%		$ 29,951,541

Subtotal	**$109,473,785**
EPCM	**$10,332,378**
Contingency	**$29,951,541**
Option Total	**$149,757,704**

wood.

CCRP Cost Estimate Table W-5b: 2019 CC2-B Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		year		1.48	$ 800,000	$ 1,186,129
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		year		1.48	$ 160,000	$ 237,226
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		year		1.48	$ 100,000	$ 148,266
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		17.79	$ 12,500	$ 222,399
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		17.79	$ 100	$ 1,779
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		17.79	$ 4,270	$ 75,972
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		17.79	$ 1,200	$ 21,350
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		1,085.31	$ 2,000	$ 2,170,615
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		1,085.31	$ 600	$ 651,185
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 9,197,926	$ 1,839,585
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00	$ 540,064	$ 540,064
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		1.00	$ 50,000	$ 50,000
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		1.00	$ 4,673	$ 4,673
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		17.79	$ 1,000	$ 17,792
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		283,928.95	$ 1.39	$ 394,661
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		2.00	$ 100,000	$ 200,000
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		3.00	$ 4,673	$ 14,018
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		35.58	$ 1,000	$ 35,584
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		833,349.91	$ 1.39	$ 1,158,356
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		6.00	$ 10,000	$ 60,000
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		6.00	$ 1,324	$ 7,943
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		106.75	$ 500	$ 53,376
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		127,290.69	$ 1.39	$ 176,934
Wolverine	CC2-B	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		31.15	$ 300	$ 9,345
Wolverine	CC2-B	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		109.03	$ 300	$ 32,708
Wolverine	CC2-B	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		31.15	$ 300	$ 9,345
Wolverine	CC2-B	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		15.58	$ 300	$ 4,673
Wolverine	CC2-B	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		31.15	$ 300	$ 9,345
Wolverine	CC2-B	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		31.15	$ 150	$ 4,673
Wolverine	CC2-B	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		46.73	$ 150	$ 7,009
Wolverine	CC2-B	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawson City	person*shifts		2,357.96	$ 400	$ 943,184
Wolverine	CC2-B	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	17.79	$ 20,833	$ 370,665
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		1.00	$ 674,550	$ 674,550
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		1.00	$ 713,628	$ 713,628
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		1.00	$ 363,191	$ 363,191
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		17.79	$ 52,555	$ 935,048
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		33,011.44	$ 123	$ 4,043,951
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		541.17	$ 4,560	$ 2,467,557
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		17.79	$ 179,664	$ 3,196,574
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	75.00	$ 4,756	$ 356,670

![wood.]

CCRP Cost Estimate Table W-5b: 2019 CC2-B Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	750.00	$ 863	$ 647,100
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	year	1.00	1.00	$ 200,000	$ 200,000
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction		m3		227,750.00	$ 4.56	$ 1,037,640
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Clinton Creek Options	m2	1.2	1.00	$ 891,675	$ 891,675
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 1,733,343	$ 1,733,343
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		day		541.17	$ 1,322.00	$ 715,428
Wolverine	CC2-B	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Loading		tonnes		##########	$ 0.55	$ 5,004,938
Wolverine	CC2-B	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Hauling		tonnes		##########	$ 1.73	$ 15,747,865
Wolverine	CC2-B	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		22,079.78	$ 320	$ 7,065,531
Wolverine	CC2-B	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		11,039.89	$ 170	$ 1,876,782
Wolverine	CC2-B	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	2	22,079.78	$ 192	$ 4,239,319
Wolverine	CC2-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=500mm	m3	1.0	37,020.00	$ 228.93	$ 8,475,015
Wolverine	CC2-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=300mm	m3	1.0	10,200.00	$ 228.93	$ 2,335,093
Wolverine	CC2-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=175mm	m3	1.0	4,670.00	$ 228.93	$ 1,069,106
Wolverine	CC2-B	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Turf reinforced mat (assumed LP-P20 Polypropylene). Excluding delivery and installation	m2	1.0	26,000.00	$ 20.00	$ 520,000
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water and Erosion Sediment Control during Construction	ls	1.0	-	$ -	$ -
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	50,000.00	$ 0.89	$ 44,313
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	25,000.00	$ 4.56	$ 113,901
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	37,000.00	$ 10.00	$ 370,000
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	440.00	$ 24.00	$ 10,560
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	3,150.00	$ 24.00	$ 75,600
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	8,200.00	$ 51.34	$ 421,019
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	9,500.00	$ 228.93	$ 2,174,842
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	2.00	$ 5,000.00	$ 10,000
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	3.00	$ 5,000.00	$ 15,000
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast chamber	each	1.0	3.00	$ 2,500.00	$ 7,500
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install manholes	each	1.0	8.00	$ 2,500.00	$ 20,000
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	50,000.00	$ 6.00	$ 300,000
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Channel Excavation	m3	1.0	12,500.00	$ 12.65	$ 158,125
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Riprap for diversion channel armouring	m3	1.0	2,950.00	$ 228.93	$ 675,346
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Geotextile	m2	1.2	7,000.00	$ 6.00	$ 42,000
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	1.0	1,200.00	$ 12.65	$ 15,180
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Riprap for diversion channel armouring	m3	1.0	600.00	$ 228.93	$ 137,358
Wolverine	CC2-B	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Geotextile	m2	1.2	1,400.00	$ 6.00	$ 8,400
Wolverine	CC2-B	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	Monthly Rent for 42" Floating Pump	months	1.0	1.00	$ 221,760.00	$ 221,760
Wolverine	CC2-B	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	DELIVERY FREIGHT COST	each	1.0	1.00	$ 20,091.72	$ 20,092
Wolverine	CC2-B	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	RETURN FREIGHT COST	each	1.0	1.00	$ 16,552.80	$ 16,553
Wolverine	CC2-B	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	PIPING AND ACCESSORIES	each	1.0	1.00	$ 269,091.90	$ 269,092
Wolverine	CC2-B	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	50,000 L Envirotank Mob/demob	km	1.0	3,162.00	$ 5.90	$ 18,656
Wolverine	CC2-B	Mechanical Works	Lake Drawdowns	N/A	Fuel Consumption	Fuel - Delivered to Site	litres	1.0	66,682.85	$ 1.39	$ 92,689
Wolverine	CC2-B	Mechanical Works	Blast Densification	N/A	Camp	N/A	person days		-	$ -	$ -
Wolverine	CC2-B	Mechanical Works	Blast Densification	N/A	H&S Protocols	N/A	person days		-	$ -	$ -
Wolverine	CC2-B	Mechanical Works	Blast Densification	N/A	PPE	N/A	person days		-	$ -	$ -
Wolverine	CC2-B	Mechanical Works	Blast Densification	N/A	Drilling, loading & detonating	N/A	m3		-	$ -	$ -

CCRP Cost Estimate Table W-5b: 2019 CC2-B Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	CC2-B	Mobilization and Demobilization	TF&C	N/A	N/A	N/A	-		-	$ -	$ -
Wolverine	CC2-B	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 3,205,835	$ 3,205,835
Wolverine	CC2-B	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 1,526,588	$ 1,526,588
Wolverine	CC2-B	Post Closure Care and Maintenance	Repair & Remediation	N/A	Repair Costs	Present Value	-		1.00	$ 7,320,538	$ 7,320,538
Wolverine	CC2-B	Post Closure Care and Maintenance	Repair & Remediation	N/A	Remediation Costs	Present Value	-		1.00	$ 10,343,955	$ 10,343,955
Wolverine	CC2-B	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 12,212,704	$ 12,212,704
Wolverine	CC2-B	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 1,723,934	$ 1,723,934
Wolverine	CC2-B	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ 1,077,459	$ 1,077,459
Wolverine	CC2-B	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 1,302,023	$ 1,302,023
Wolverine	CC2-B	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 651,012	$ 651,012
Wolverine	CC2-B	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Wolverine	CC2-B	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 119,670,891	$ 3,590,127
Wolverine	CC2-B	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		1.00	$ 50,000	$ 50,000
Wolverine	CC2-B	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		300.00	$ 200	$ 60,000
Wolverine	CC2-B	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		200.00	$ 200	$ 40,000
Wolverine	CC2-B	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		50.00	$ 110,000	$ 5,500,000
Wolverine	CC2-B	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Wolverine	CC2-B	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		-	$ 110,000	$ -
Wolverine	CC2-B	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		25.00	$ 20,000	$ 500,000
Wolverine	CC2-B	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		-	$ 110,000	$ -
Wolverine	CC2-B	Factors	EPCM	N/A			%		10%		$ 12,326,102
Wolverine	CC2-B	Factors	Contingency	N/A			%		25%		$ 35,434,280

Subtotal	**$129,411,017**
EPCM	**$12,326,102**
Contingency	**$35,434,280**
Option Total	**$177,171,399**

CCRP Cost Estimate Table W-6: 2019 CC3 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		year		4.55	$ 800,000	$ 3,636,767
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		year		4.55	$ 160,000	$ 727,353
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		year		4.55	$ 100,000	$ 454,596
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		54.55	$ 12,500	$ 681,894
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		54.55	$ 100	$ 5,455
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		54.55	$ 4,270	$ 232,935
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		54.55	$ 1,200	$ 65,462
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		3,327.64	$ 2,000	$ 6,655,283
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		3,327.64	$ 600	$ 1,996,585
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 24,583,116	$ 4,916,623
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00	$ 646,461	$ 646,461
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		1.00	$ 50,000	$ 50,000
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		1.00	$ 4,673	$ 4,673
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		54.55	$ 1,000	$ 54,552
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		870,549.23	$ 1.39	$ 1,210,063
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		2.00	$ 100,000	$ 200,000
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		3.00	$ 4,673	$ 14,018
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		109.10	$ 1,000	$ 109,103
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		##########	$ 1.39	$ 3,551,615
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		6.00	$ 10,000	$ 60,000
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		6.00	$ 1,324	$ 7,943
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		327.31	$ 500	$ 163,655
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		390,283.59	$ 1.39	$ 542,494
Clinton	CC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		31.15	$ 300	$ 9,345
Clinton	CC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		109.03	$ 300	$ 32,708
Clinton	CC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		31.15	$ 300	$ 9,345
Clinton	CC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		15.58	$ 300	$ 4,673
Clinton	CC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		31.15	$ 300	$ 9,345
Clinton	CC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		31.15	$ 150	$ 4,673
Clinton	CC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		46.73	$ 150	$ 7,009
Clinton	CC3	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawson City	person*shifts		7,229.70	$ 400	$ 2,891,879
Clinton	CC3	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	54.55	$ 20,833	$ 1,136,490
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		1.00	$ 674,550	$ 674,550
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		1.00	$ 713,628	$ 713,628
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		1.00	$ 363,191	$ 363,191
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		54.55	$ 52,555	$ 2,866,935
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		101,215.76	$ 123	$ 12,399,083
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		1,659.27	$ 4,560	$ 7,565,729
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		54.55	$ 179,664	$ 9,800,955
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	75.00	$ 4,756	$ 356,670

CCRP Cost Estimate Table W-6: 2019 CC3 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	750.00	$ 863	$ 647,100
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	year	1.00	4.00	$ 200,000	$ 800,000
Clinton	CC3	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction		m3		698,300.00	$ 4.56	$ 3,181,489
Clinton	CC3	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Clinton Creek Options	m2	1.2	1.00	$ 891,675	$ 891,675
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 1,862,207	$ 1,862,207
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		day		1,659.27	$ 1,293.78	$ 2,146,741
Clinton	CC3	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Loading		tonnes		##########	$ 0.55	$ 15,345,548
Clinton	CC3	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Hauling		tonnes		##########	$ 1.73	$ 48,284,233
Clinton	CC3	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		67,698.41	$ 320	$ 21,663,492
Clinton	CC3	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		33,849.21	$ 170	$ 5,754,365
Clinton	CC3	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	2	67,698.41	$ 192	$ 12,998,095
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water	ls	1.0	-	$ -	$ -
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	General	Site Prep/Access Roads	ls	1.0	-	$ -	$ -
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	35,000.00	$ 0.89	$ 31,019
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	17,500.00	$ 4.56	$ 79,731
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	27,000.00	$ 10.00	$ 270,000
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	560.00	$ 24.00	$ 13,440
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	2,640.00	$ 24.00	$ 63,360
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	5,700.00	$ 51.34	$ 292,660
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	6,150.00	$ 228.93	$ 1,407,924
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	1.00	$ 5,000.00	$ 5,000
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	1.00	$ 5,000.00	$ 5,000
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	35,000.00	$ 6.00	$ 210,000
Clinton	CC3	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	Monthly Rent for 42" Floating Pump	months	1.0	1.00	$ 221,760.00	$ 221,760
Clinton	CC3	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	DELIVERY FREIGHT COST	each	1.0	1.00	$ 20,091.72	$ 20,092
Clinton	CC3	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	RETURN FREIGHT COST	each	1.0	1.00	$ 16,552.80	$ 16,553
Clinton	CC3	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	PIPING AND ACCESSORIES	each	1.0	1.00	$ 269,091.90	$ 269,092
Clinton	CC3	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	50,000 L Envirotank Mob/demob	km	1.0	3,162.00	$ 5.90	$ 18,656
Clinton	CC3	Mechanical Works	Lake Drawdowns	N/A	Fuel Consumption	Fuel - Delivered to Site	litres	1.0	108,376.28	$ 1.39	$ 150,643
Clinton	CC3	Mobilization and Demobilization	TF&C	N/A	N/A		-		-	$ -	$ -
Clinton	CC3	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 2,300,770	$ 2,300,770
Clinton	CC3	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 1,095,605	$ 1,095,605
Clinton	CC3	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 8,764,836	$ 8,764,836
Clinton	CC3	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 1,034,360	$ 1,034,360
Clinton	CC3	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Clinton	CC3	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 871,040	$ 871,040
Clinton	CC3	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 435,520	$ 435,520
Clinton	CC3	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 3,233,731	$ 3,233,731
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 199,319,470	$ 5,979,584
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		1.00	$ 50,000	$ 50,000
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		300.00	$ 200	$ 60,000
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		200.00	$ 200	$ 40,000
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		50.00	$ 110,000	$ 5,500,000
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		-	$ 110,000	$ -
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		25.00	$ 20,000	$ 500,000

CCRP Cost Estimate Table W-6: 2019 CC3 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		-	$ 110,000	$ -
Clinton	CC3	Factors	EPCM	N/A			%		10%		$ 20,529,905
Clinton	CC3	Factors	Contingency	N/A			%		25%		$ 57,994,740

Subtotal	**$211,449,054**
EPCM	**$20,529,905**
Contingency	**$57,994,740**
Option Total	**$289,973,699**

CCRP Cost Estimate Table W-7: 2019 WC1 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		year		0.50	$ 800,000	$ 400,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		year		0.50	$ 160,000	$ 80,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		year		0.50	$ 100,000	$ 50,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		6.00	$ 12,500	$ 75,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		6.00	$ 100	$ 600
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		6.00	$ 1,540	$ 9,240
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		6.00	$ 1,200	$ 7,200
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		132.00	$ 2,000	$ 264,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		132.00	$ 600	$ 79,200
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 1,204,500	$ 240,900
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00		$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		-	$ 50,000	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		-	$ 4,673	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		-	$ 1,000	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		-	$ 1.39	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		2.00	$ 4,673	$ 9,345
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		6.00	$ 1,000	$ 6,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		140,515.94	$ 1.39	$ 195,317
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		2.00	$ 10,000	$ 20,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		2.00	$ 1,324	$ 2,648
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		12.00	$ 500	$ 6,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		14,308.81	$ 1.39	$ 19,889
Wolverine	WC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		15.58	$ 300	$ 4,673
Wolverine	WC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		15.58	$ 300	$ 4,673
Wolverine	WC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		15.58	$ 300	$ 4,673
Wolverine	WC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		-	$ 300	$ -
Wolverine	WC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		15.58	$ 300	$ 4,673
Wolverine	WC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		15.58	$ 150	$ 2,336
Wolverine	WC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		15.58	$ 150	$ 2,336
Wolverine	WC1	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawson City	person*shifts		286.79	$ 400	$ 114,714
Wolverine	WC1	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	6.00	$ 20,833	$ 125,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		-	$ -	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		-	$ 713,628	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		-	$ 363,191	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		-	$ 52,555	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		4,015.00	$ 300	$ 1,204,500
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		-	$ 4,560	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		6.00	$ 179,664	$ 1,077,986
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	-	$ 4,756	$ -

CCRP Cost Estimate Table W-7: 2019 WC1 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	-	$ 863	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	year	1.00	-	$ 200,000	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction		m3		-	$ 150	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Wolverine to Porcupine Option	m2	1.2	-	$ -	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 87,370	$ 87,370
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		day		-	$ 138.00	$ -
Wolverine	WC1	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Loading		tonnes		-	$ -	$ -
Wolverine	WC1	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Hauling		tonnes		-	$ -	$ -
Wolverine	WC1	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		2,190.00	$ 350	$ 766,500
Wolverine	WC1	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		-	$ -	$ -
Wolverine	WC1	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	1	2,190.00	$ 192	$ 420,480
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water and Erosion Sediment Control during Construction	ls	1.0	-	$ -	$ -
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	50,000.00	$ 0.89	$ 44,313
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	25,000.00	$ 4.56	$ 113,901
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	37,000.00	$ 10.00	$ 370,000
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	440.00	$ 24.00	$ 10,560
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	3,150.00	$ 24.00	$ 75,600
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	8,200.00	$ 51.34	$ 421,019
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	9,500.00	$ 228.93	$ 2,174,842
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	2.00	$ 5,000.00	$ 10,000
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	3.00	$ 5,000.00	$ 15,000
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast chamber	each	1.0	3.00	$ 2,500.00	$ 7,500
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install manholes	each	1.0	8.00	$ 2,500.00	$ 20,000
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	50,000.00	$ 6.00	$ 300,000
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Channel Excavation	m3	1.0	12,500.00	$ 12.65	$ 158,125
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Riprap for diversion channel armouring	m3	1.0	2,950.00	$ 228.93	$ 675,346
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Geotextile	m2	1.2	7,000.00	$ 6.00	$ 42,000
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	1.0	1,200.00	$ 12.65	$ 15,180
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Riprap for diversion channel armouring	m3	1.0	600.00	$ 228.93	$ 137,358
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Geotextile	m2	1.2	1,400.00	$ 6.00	$ 8,400
Wolverine	WC1	Mobilization and Demobilization	TF&C	N/A	N/A		-		-	$ -	$ -
Wolverine	WC1	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 3,878,852	$ 3,878,852
Wolverine	WC1	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Wolverine	WC1	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 2,154,918	$ 2,154,918
Wolverine	WC1	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 430,984	$ 430,984
Wolverine	WC1	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ 8,619,670	$ 8,619,670
Wolverine	WC1	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 1,077,459	$ 1,077,459
Wolverine	WC1	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 538,729	$ 538,729
Wolverine	WC1	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 3,965,048	$ 3,965,048
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 35,059,891	$ 1,051,797
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		-	$ 50,000	$ -
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		-	$ 200	$ -
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		-	$ 200	$ -

CCRP Cost Estimate Table W-7: 2019 WC1 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		-	$ 110,000	$ -
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		-	$ 110,000	$ -
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		-	$ 20,000	$ -
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		-	$ 110,000	$ -
Wolverine	WC1	Factors	EPCM	N/A			%		10%		$ 3,611,169
Wolverine	WC1	Factors	Contingency	N/A			%		25%		$ 9,930,714

Subtotal	**$36,111,688**
EPCM	**$3,611,169**
Contingency	**$9,930,714**
Option Total	**$49,653,571**

CCRP Cost Estimate Table W-8: 2019 WC2 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		year		2.81	$ 800,000	$ 2,251,291
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		year		2.81	$ 160,000	$ 450,258
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		year		2.81	$ 100,000	$ 281,411
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		33.77	$ 12,500	$ 422,117
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		33.77	$ 100	$ 3,377
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		33.77	$ 5,810	$ 196,200
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		33.77	$ 1,200	$ 40,523
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		2,802.86	$ 2,000	$ 5,605,715
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		2,802.86	$ 600	$ 1,681,714
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 18,653,260	$ 3,730,652
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00	$ 586,309	$ 586,309
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		1.00	$ 50,000	$ 50,000
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		1.00	$ 4,673	$ 4,673
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		33.77	$ 1,000	$ 33,769
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		538,901.69	$ 1.39	$ 749,073
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		2.00	$ 100,000	$ 200,000
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		3.00	$ 4,673	$ 14,018
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		67.54	$ 1,000	$ 67,539
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		##########	$ 1.39	$ 2,198,579
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		6.00	$ 10,000	$ 60,000
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		6.00	$ 1,324	$ 7,943
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		202.62	$ 500	$ 101,308
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		241,599.76	$ 1.39	$ 335,824
Wolverine	WC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		31.15	$ 300	$ 9,345
Wolverine	WC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		249.20	$ 300	$ 74,760
Wolverine	WC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		46.73	$ 300	$ 14,018
Wolverine	WC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		15.58	$ 300	$ 4,673
Wolverine	WC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		31.15	$ 300	$ 9,345
Wolverine	WC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		46.73	$ 150	$ 7,009
Wolverine	WC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		46.73	$ 150	$ 7,009
Wolverine	WC2	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawson City	person*shifts		6,089.54	$ 400	$ 2,435,817
Wolverine	WC2	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	33.77	$ 20,833	$ 703,528
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		1.00	$ 674,550	$ 674,550
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		1.00	$ 713,628	$ 713,628
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		1.00	$ 363,191	$ 363,191
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		33.77	$ 52,555	$ 1,774,737
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		85,253.58	$ 123	$ 10,443,692
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		1,027.15	$ 4,560	$ 4,683,462
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		33.77	$ 179,664	$ 6,067,149
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	75.00	$ 4,756	$ 356,670

CCRP Cost Estimate Table W-8: 2019 WC2 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	750.00	$ 863	$ 647,100
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	year	1.00	2.00	$ 200,000	$ 400,000
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction	Loading Cost	tonnes		##########	$ 0.55	$ 837,270
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction	Hauling Cost	tonnes		##########	$ 2.47	$ 3,761,042
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Wolverine to Porcupine Option	m2	1.2	1.00	$ 891,675	$ 891,675
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 2,346,428	$ 2,346,428
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		day		1,027.15	$ 1,630.20	$ 1,674,462
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Tailings Dump	Overall Tailings Volume	-		##########	$ 9.00	$ 21,320,473
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Tailings Dump	Main Buttress Fill Volume (4.5H:1V)	-		##########	$ 4.44	$ 7,032,851
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Tailings Dump	Excavated tailing (7H:1V)	-		121,000.00	$ 9.00	$ 1,088,514
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Tailings Dump	Sub-Excavation Volume Perimeter Berm (2H:1V)	-		550,000.00	$ 51.34	$ 28,239,090
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Tailings Dump	Compacted Granular Fill (Berm)	-		358,000.00	$ 4.44	$ 1,589,495
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Buttress Fill Dam	1 m Capping over all tailings	-		169,000.00	$ 9.00	$ 1,520,321
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Buttress Fill Dam	Excavated Tailings and Ice Rich Colluvium Volume	-		738,000.00	$ 51.34	$ 37,891,724
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Buttress Fill Dam	Select Rockfill Shell and Backfill Volume	-		192,000.00	$ 51.34	$ 9,858,009
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Buttress Fill Dam	Chimney and Basal Drain Volume	-	1.2	400.00	$ 166.79	$ 66,715
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Buttress Fill Dam	8 inch Perforated pipes	-	1.2	300.00	$ 166.79	$ 50,036
Wolverine	WC2	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		31,430.84	$ 470	$ 14,772,494
Wolverine	WC2	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		10,476.95	$ 170	$ 1,781,081
Wolverine	WC2	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	2	41,907.78	$ 192	$ 8,046,295
Wolverine	WC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=200mm	m3		2,085.00	$ 228.93	$ 477,321
Wolverine	WC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=300mm	m3		2,270.00	$ 228.93	$ 519,673
Wolverine	WC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=450mm	m3		2,470.00	$ 228.93	$ 565,459
Wolverine	WC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=800mm	m3		11,640.00	$ 228.93	$ 2,664,753
Wolverine	WC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=1000mm	m3		5,290.00	$ 228.93	$ 1,211,043
Wolverine	WC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Bedding Gravel	m3		1,135.00	$ 51.34	$ 58,275
Wolverine	WC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Geotextile Fabric	m2		27,600.00	$ -	$ -
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water and Erosion Sediment Control during Construction	ls	1.0	-	$ -	$ -
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	50,000.00	$ 0.89	$ 44,313
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	25,000.00	$ 4.56	$ 113,901
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	37,000.00	$ 10.00	$ 370,000
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	440.00	$ 24.00	$ 10,560
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	3,150.00	$ 24.00	$ 75,600
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	8,200.00	$ 51.34	$ 421,019
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	9,500.00	$ 228.93	$ 2,174,842
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	2.00	$ 5,000.00	$ 10,000
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	3.00	$ 5,000.00	$ 15,000
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast chamber	each	1.0	3.00	$ 2,500.00	$ 7,500
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install manholes	each	1.0	8.00	$ 2,500.00	$ 20,000
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	50,000.00	$ 6.00	$ 300,000
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Channel Excavation	m3	1.0	12,500.00	$ 12.65	$ 158,125
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Riprap for diversion channel armouring	m3	1.0	2,950.00	$ 228.93	$ 675,346
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Geotextile	m2	1.2	7,000.00	$ 6.00	$ 42,000
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	1.0	1,200.00	$ 12.65	$ 15,180

CCRP Cost Estimate Table W-8: 2019 WC2 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Riprap for diversion channel armouring	m3	1.0	600.00	$ 228.93	$ 137,358
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Geotextile	m2	1.2	1,400.00	$ 6.00	$ 8,400
Wolverine	WC2	Mobilization and Demobilization	TF&C	N/A	N/A		-		-	$ -	$ -
Wolverine	WC2	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 3,878,852	$ 3,878,852
Wolverine	WC2	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Wolverine	WC2	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 1,292,951	$ 1,292,951
Wolverine	WC2	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 258,590	$ 258,590
Wolverine	WC2	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Wolverine	WC2	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 646,475	$ 646,475
Wolverine	WC2	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 323,238	$ 323,238
Wolverine	WC2	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 216,445,393	$ 6,493,362
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		1.00	$ 50,000	$ 50,000
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		300.00	$ 200	$ 60,000
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		200.00	$ 200	$ 40,000
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		-	$ 110,000	$ -
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		-	$ 110,000	$ -
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		-	$ 20,000	$ -
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		20.00	$ 110,000	$ 2,200,000
Wolverine	WC2	Factors	EPCM	N/A			%		10%		$ 22,293,875
Wolverine	WC2	Factors	Contingency	N/A			%		25%		$ 61,895,658

Subtotal	**$225,288,755**
EPCM	**$22,293,875**
Contingency	**$61,895,658**
Option Total	**$309,478,288**

CCRP Cost Estimate Table W-8a: 2019 WC2-A Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		year		0.81	$ 800,000	$ 651,551
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		year		0.81	$ 160,000	$ 130,310
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		year		0.81	$ 100,000	$ 81,444
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		9.77	$ 12,500	$ 122,166
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		9.77	$ 100	$ 977
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		9.77	$ 5,810	$ 56,783
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		9.77	$ 1,200	$ 11,728
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		811.18	$ 2,000	$ 1,622,362
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		811.18	$ 600	$ 486,708
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 6,642,981	$ 1,328,596
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00	$ 516,855	$ 516,855
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		1.00	$ 50,000	$ 50,000
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		1.00	$ 4,673	$ 4,673
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		9.77	$ 1,000	$ 9,773
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		155,964.65	$ 1.39	$ 216,791
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		2.00	$ 100,000	$ 200,000
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		3.00	$ 4,673	$ 14,018
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		19.55	$ 1,000	$ 19,547
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		457,766.39	$ 1.39	$ 636,295
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		6.00	$ 10,000	$ 60,000
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		6.00	$ 1,324	$ 7,943
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		58.64	$ 500	$ 29,320
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		69,921.89	$ 1.39	$ 97,191
Wolverine	WC2-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		31.15	$ 300	$ 9,345
Wolverine	WC2-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		249.20	$ 300	$ 74,760
Wolverine	WC2-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		31.15	$ 300	$ 9,345
Wolverine	WC2-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		31.15	$ 300	$ 9,345
Wolverine	WC2-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		31.15	$ 300	$ 9,345
Wolverine	WC2-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		46.73	$ 150	$ 7,009
Wolverine	WC2-A	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		46.73	$ 150	$ 7,009
Wolverine	WC2-A	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawson City	person*shifts		1,762.39	$ 400	$ 704,955
Wolverine	WC2-A	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	9.77	$ 20,833	$ 203,610
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		1.00	$ 674,550	$ 674,550
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		1.00	$ 713,628	$ 713,628
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		1.00	$ 363,191	$ 363,191
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		9.77	$ 52,555	$ 513,630
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		24,673.42	$ 123	$ 3,022,530
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		297.27	$ 4,560	$ 1,355,450
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		9.77	$ 179,664	$ 1,755,906
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	75.00	$ 4,756	$ 356,670

CCRP Cost Estimate Table W-8a: 2019 WC2-A Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	750.00	$ 863	$ 647,100
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	year	1.00	-	$ 200,000	$ -
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction	Loading Cost	tonnes		##########	$ 0.55	$ 837,270
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction	Hauling Cost	tonnes		##########	$ 2.47	$ 3,761,042
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Wolverine to Porcupine Option	m2	1.2	1.00	$ 891,675	$ 891,675
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 1,909,173	$ 1,909,173
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		day		297.27	$ 1,540.00	$ 457,796
Wolverine	WC2-A	Civil Works	Materials Management	Earthmoving - Load & Haul	Tailings Dump	Overall Tailings Volume	-		-	$ -	$ -
Wolverine	WC2-A	Civil Works	Materials Management	Earthmoving - Load & Haul	Tailings Dump	Excavated Tailings to local fill	-		##########	$ 9.00	$ 14,123,689
Wolverine	WC2-A	Civil Works	Materials Management	Earthmoving - Load & Haul	Tailings Dump	Excavated tailings to PPSS	-		655,000.00	$ 9.00	$ 5,892,367
Wolverine	WC2-A	Civil Works	Materials Management	Earthmoving - Load & Haul	Tailings Dump	Compacted Granular Fill (Berm)	-		3,310.00	$ 51.34	$ 169,948
Wolverine	WC2-A	Civil Works	Materials Management	Earthmoving - Load & Haul	Tailings Dump	Compacted Granular Fill (Berm)	-		358,000.00	$ 4.44	$ 1,589,495
Wolverine	WC2-A	Civil Works	Materials Management	Earthmoving - Load & Haul	Buttress Fill Dam	1 m Capping over all tailings	-		-	$ -	$ -
Wolverine	WC2-A	Civil Works	Materials Management	Earthmoving - Load & Haul	Buttress Fill Dam	Excavated Tailings and Ice Rich Colluvium Volume	-		-	$ -	$ -
Wolverine	WC2-A	Civil Works	Materials Management	Earthmoving - Load & Haul	Buttress Fill Dam	Select Rockfill Shell and Backfill Volume	-		-	$ -	$ -
Wolverine	WC2-A	Civil Works	Materials Management	Earthmoving - Load & Haul	Buttress Fill Dam	Chimney and Basal Drain Volume	-	1.2	-	$ -	$ -
Wolverine	WC2-A	Civil Works	Materials Management	Earthmoving - Load & Haul	Buttress Fill Dam	8 inch Perforated pipes	-	1.2	-	$ -	$ -
Wolverine	WC2-A	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		12,128.62	$ 470	$ 5,700,451
Wolverine	WC2-A	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		12,128.62	$ 170	$ 2,061,865
Wolverine	WC2-A	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	2	41,907.78	$ 192	$ 8,046,295
Wolverine	WC2-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=200mm	m3		-	$ 228.93	$ -
Wolverine	WC2-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=300mm	m3		-	$ 228.93	$ -
Wolverine	WC2-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=450mm	m3		3,310.00	$ 228.93	$ 757,761
Wolverine	WC2-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=800mm	m3		-	$ 228.93	$ -
Wolverine	WC2-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=1000mm	m3		-	$ 228.93	$ -
Wolverine	WC2-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Bedding Gravel	m3		-	$ 51.34	$ -
Wolverine	WC2-A	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Geotextile Fabric	m2		4,500.00	$ 1.50	$ 6,750
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water and Erosion Sediment Control during Construction	ls	1.0	-	$ -	$ -
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	50,000.00	$ 0.89	$ 44,313
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	25,000.00	$ 4.56	$ 113,901
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	37,000.00	$ 10.00	$ 370,000
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	440.00	$ 24.00	$ 10,560
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	3,150.00	$ 24.00	$ 75,600
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	8,200.00	$ 51.34	$ 421,019
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	9,500.00	$ 228.93	$ 2,174,842
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	2.00	$ 5,000.00	$ 10,000
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	3.00	$ 5,000.00	$ 15,000
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast chamber	each	1.0	3.00	$ 2,500.00	$ 7,500
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install manholes	each	1.0	8.00	$ 2,500.00	$ 20,000
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	50,000.00	$ 6.00	$ 300,000
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Channel Excavation	m3	1.0	12,500.00	$ 12.65	$ 158,125
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Riprap for diversion channel armouring	m3	1.0	2,950.00	$ 228.93	$ 675,346
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Geotextile	m2	1.2	7,000.00	$ 6.00	$ 42,000
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	1.0	1,200.00	$ 12.65	$ 15,180

CCRP Cost Estimate Table W-8a: 2019 WC2-A Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Riprap for diversion channel armouring	m3	1.0	600.00	$ 228.93	$ 137,358
Wolverine	WC2-A	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Geotextile	m2	1.2	1,400.00	$ 6.00	$ 8,400
Wolverine	WC2-A	Mobilization and Demobilization	TF&C	N/A	N/A		-		-	$ -	$ -
Wolverine	WC2-A	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 3,878,852	$ 3,878,852
Wolverine	WC2-A	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Wolverine	WC2-A	Post Closure Care and Maintenance	Repair & Remediation	N/A	Repair Costs	Present Value	-		1.00	$ 752,283	$ 752,283
Wolverine	WC2-A	Post Closure Care and Maintenance	Repair & Remediation	N/A	Remediation Costs	Present Value	-		1.00	$ 5,547,971	$ 5,547,971
Wolverine	WC2-A	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 1,292,951	$ 1,292,951
Wolverine	WC2-A	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 258,590	$ 258,590
Wolverine	WC2-A	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Wolverine	WC2-A	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 646,475	$ 646,475
Wolverine	WC2-A	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 323,238	$ 323,238
Wolverine	WC2-A	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Wolverine	WC2-A	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 89,017,157	$ 2,670,515
Wolverine	WC2-A	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		1.00	$ 50,000	$ 50,000
Wolverine	WC2-A	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		300.00	$ 200	$ 60,000
Wolverine	WC2-A	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		200.00	$ 200	$ 40,000
Wolverine	WC2-A	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		-	$ 110,000	$ -
Wolverine	WC2-A	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Wolverine	WC2-A	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		-	$ 110,000	$ -
Wolverine	WC2-A	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		-	$ 20,000	$ -
Wolverine	WC2-A	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		-	$ 110,000	$ -
Wolverine	WC2-A	Factors	EPCM	N/A			%		10%		$ 9,168,767
Wolverine	WC2-A	Factors	Contingency	N/A			%		25%		$ 25,251,610

Subtotal	**$91,837,672**
EPCM	**$9,168,767**
Contingency	**$25,251,610**
Option Total	**$126,258,049**

CCRP Cost Estimate Table W-9: 2019 WC3 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		year		2.81	$ 800,000	$ 2,251,291
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		year		2.81	$ 160,000	$ 450,258
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		year		2.81	$ 100,000	$ 281,411
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		33.77	$ 12,500	$ 422,117
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		33.77	$ 100	$ 3,377
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		33.77	$ 5,810	$ 196,200
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		33.77	$ 1,200	$ 40,523
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		2,802.86	$ 2,000	$ 5,605,715
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		2,802.86	$ 600	$ 1,681,714
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 18,653,260	$ 3,730,652
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00	$ 586,309	$ 586,309
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		1.00	$ 50,000	$ 50,000
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		1.00	$ 4,673	$ 4,673
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		33.77	$ 1,000	$ 33,769
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		538,901.69	$ 1.39	$ 749,073
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		2.00	$ 100,000	$ 200,000
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		3.00	$ 4,673	$ 14,018
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		67.54	$ 1,000	$ 67,539
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		##########	$ 1.39	$ 2,198,579
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		6.00	$ 10,000	$ 60,000
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		6.00	$ 1,324	$ 7,943
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		202.62	$ 500	$ 101,308
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		241,599.76	$ 1.39	$ 335,824
Wolverine	WC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		31.15	$ 300	$ 9,345
Wolverine	WC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		249.20	$ 300	$ 74,760
Wolverine	WC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		46.73	$ 300	$ 14,018
Wolverine	WC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		15.58	$ 300	$ 4,673
Wolverine	WC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		31.15	$ 300	$ 9,345
Wolverine	WC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		46.73	$ 150	$ 7,009
Wolverine	WC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		46.73	$ 150	$ 7,009
Wolverine	WC3	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawson City	person*shifts		6,089.54	$ 400	$ 2,435,817
Wolverine	WC3	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	33.77	$ 20,833	$ 703,528
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		1.00	$ 674,550	$ 674,550
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		1.00	$ 713,628	$ 713,628
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		1.00	$ 363,191	$ 363,191
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		33.77	$ 52,555	$ 1,774,737
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		85,253.58	$ 123	$ 10,443,692
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		1,027.15	$ 4,560	$ 4,683,462
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		33.77	$ 179,664	$ 6,067,149
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	75.00	$ 4,756	$ 356,670

CCRP Cost Estimate Table W-9: 2019 WC3 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	750.00	$ 863	$ 647,100
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	year	1.00	2.00	$ 200,000	$ 400,000
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction	Loading Cost	tonnes		##########	$ 0.55	$ 837,270
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction	Hauling Cost	tonnes		##########	$ 2.47	$ 3,761,042
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Wolverine to Porcupine Option	m2	1.2	1.00	$ 891,675	$ 891,675
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 2,346,428	$ 2,346,428
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		day		1,027.15	$ 1,630.20	$ 1,674,462
Wolverine	WC3	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Loading	8 inch Solid pipe length	tonnes		##########	$ 0.55	$ 8,203,484
Wolverine	WC3	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Hauling		tonnes		##########	$ 3.95	$ 58,960,503
Wolverine	WC3	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		62,861.68	$ 470	$ 29,544,988
Wolverine	WC3	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		20,953.89	$ 170	$ 3,562,162
Wolverine	WC3	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	2	41,907.78	$ 192	$ 8,046,295
Wolverine	WC3	Civil Works	Flow Conveyance	Erosion Control	Spillway and Channel Construction	Equipment time and the use of imported select granular material for targeted ditching and swale development on exposed valley surface following tails removal.	ha		50.00	$ 150,000.00	$ 7,500,000
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water and Erosion Sediment Control during Construction	ls	1.0	-	$ -	$ -
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	50,000.00	$ 0.89	$ 44,313
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	25,000.00	$ 4.56	$ 113,901
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	37,000.00	$ 10.00	$ 370,000
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	440.00	$ 24.00	$ 10,560
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	3,150.00	$ 24.00	$ 75,600
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	8,200.00	$ 51.34	$ 421,019
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	9,500.00	$ 228.93	$ 2,174,842
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	2.00	$ 5,000.00	$ 10,000
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	3.00	$ 5,000.00	$ 15,000
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast chamber	each	1.0	3.00	$ 2,500.00	$ 7,500
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install manholes	each	1.0	8.00	$ 2,500.00	$ 20,000
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	50,000.00	$ 6.00	$ 300,000
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Channel Excavation	m3	1.0	12,500.00	$ 12.65	$ 158,125
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Riprap for diversion channel armouring	m3	1.0	2,950.00	$ 228.93	$ 675,346
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Geotextile	m2	1.2	7,000.00	$ 6.00	$ 42,000
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	1.0	1,200.00	$ 12.65	$ 15,180
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Riprap for diversion channel armouring	m3	1.0	600.00	$ 228.93	$ 137,358
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Geotextile	m2	1.2	1,400.00	$ 6.00	$ 8,400
Wolverine	WC3	Mobilization and Demobilization	TF&C	N/A	N/A		-		-	$ -	$ -
Wolverine	WC3	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 986,044	$ 986,044
Wolverine	WC3	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 1,095,605	$ 1,095,605
Wolverine	WC3	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 2,191,209	$ 2,191,209
Wolverine	WC3	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 258,590	$ 258,590
Wolverine	WC3	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Wolverine	WC3	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 871,040	$ 871,040
Wolverine	WC3	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 435,520	$ 435,520

CCRP Cost Estimate Table W-9: 2019 WC3 Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	WC3	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 184,327,436	$ 5,529,823
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		-	$ 50,000	$ -
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		-	$ 200	$ -
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		-	$ 200	$ -
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		-	$ 110,000	$ -
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		-	$ 110,000	$ -
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		-	$ 20,000	$ -
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		-	$ 110,000	$ -
Wolverine	WC3	Factors	EPCM	N/A			%		10%		$ 18,985,726
Wolverine	WC3	Factors	Contingency	N/A			%		25%		$ 52,210,746

Subtotal	**$189,857,259**
EPCM	**$18,985,726**
Contingency	**$52,210,746**
Option Total	**$261,053,731**

CCRP Cost Estimate Table W-10: 2019 Consolidated Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		years		1.42	$ 800,000	$ 1,138,736
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		years		1.42	$ 160,000	$ 227,747
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		years		1.42	$ 100,000	$ 142,342
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		years		2.31	$ 800,000	$ 1,848,069
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		years		2.31	$ 160,000	$ 369,614
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		years		2.31	$ 100,000	$ 231,009
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		years		4.55	$ 800,000	$ 3,636,767
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		years		4.55	$ 160,000	$ 727,353
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		years		4.55	$ 100,000	$ 454,596
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		years		0.50	$ 800,000	$ 400,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		years		0.50	$ 160,000	$ 80,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		years		0.50	$ 100,000	$ 50,000
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		years		2.81	$ 800,000	$ 2,251,291
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		years		2.81	$ 160,000	$ 450,258
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		years		2.81	$ 100,000	$ 281,411
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Water Quality		years		2.81	$ 800,000	$ 2,251,291
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Hydrotechnics		years		2.81	$ 160,000	$ 450,258
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Monitoring	N/A	Geotechnics		years		2.81	$ 100,000	$ 281,411
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		17.08	$ 12,500	$ 213,513
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		17.08	$ 100	$ 1,708
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		months		17.08	$ 4,270	$ 72,936
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		17.08	$ 1,200	$ 20,497
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		27.72	$ 12,500	$ 346,513
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		27.72	$ 100	$ 2,772
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		27.72	$ 4,270	$ 118,369
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		27.72	$ 1,200	$ 33,265
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		54.55	$ 12,500	$ 681,894
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		54.55	$ 100	$ 5,455
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		54.55	$ 4,270	$ 232,935
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		54.55	$ 1,200	$ 65,462
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		6.00	$ 12,500	$ 75,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		6.00	$ 100	$ 600
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		6.00	$ 1,540	$ 9,240
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		6.00	$ 1,200	$ 7,200
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		33.77	$ 12,500	$ 422,117
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		33.77	$ 100	$ 3,377
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		33.77	$ 5,810	$ 196,200
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		33.77	$ 1,200	$ 40,523
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	On-Site Medic		months		33.77	$ 12,500	$ 422,117
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Field Supplies		months		33.77	$ 100	$ 3,377
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Meetings		person/months		33.77	$ 5,810	$ 196,200
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	General Site H&S	Monthly Safety Reporting		months		33.77	$ 1,200	$ 40,523
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		1,041.94	$ 2,000	$ 2,083,886
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		1,041.94	$ 600	$ 625,166
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -

CCRP Cost Estimate Table W-10: 2019 Consolidated Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 8,900,390	$ 1,780,078
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Clinton	CC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00	$ 538,006	$ 538,006
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		1,690.98	$ 2,000	$ 3,381,967
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		1,690.98	$ 600	$ 1,014,590
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 13,353,611	$ 2,670,722
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Clinton	CC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00	$ 568,803	$ 568,803
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		3,327.64	$ 2,000	$ 6,655,283
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		3,327.64	$ 600	$ 1,996,585
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 24,583,116	$ 4,916,623
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Clinton	CC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00	$ 646,461	$ 646,461
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		132.00	$ 2,000	$ 264,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		132.00	$ 600	$ 79,200
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 1,204,500	$ 240,900
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00		$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		2,802.86	$ 2,000	$ 5,605,715
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		2,802.86	$ 600	$ 1,681,714
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 18,653,260	$ 3,730,652
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00	$ 586,309	$ 586,309
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Tyvek Overalls, Respirators, and Standard PPE		months		2,802.86	$ 2,000	$ 5,605,715
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Air Quality Monitoring		months		2,802.86	$ 600	$ 1,681,714
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Equipment Filters		months		-	$ -	$ -
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Change and Wash Facility Supply and Maintenance		%		20%	$ 18,653,260	$ 3,730,652
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Controlled Work Perimeter		months		-	$ -	$ -
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	H&S Controls	Asbestos Abatement Controls	Vehicle Washdown Building and Pressure Washers		lump sum		1.00	$ 586,309	$ 586,309
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		1.00	$ 50,000	$ 50,000
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		1.00	$ 4,673	$ 4,673
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		17.08	$ 1,000	$ 17,081
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		272,584.26	$ 1.39	$ 378,892
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		2.00	$ 100,000	$ 200,000
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000

wood.

CCRP Cost Estimate Table W-10: 2019 Consolidated Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		3.00	$ 4,673	$ 14,018
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		34.16	$ 1,000	$ 34,162
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		800,052.50	$ 1.39	$ 1,112,073
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		6.00	$ 10,000	$ 60,000
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		6.00	$ 1,324	$ 7,943
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		102.49	$ 500	$ 51,243
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		122,204.65	$ 1.39	$ 169,864
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		1.00	$ 50,000	$ 50,000
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		1.00	$ 4,673	$ 4,673
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		27.72	$ 1,000	$ 27,721
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		442,380.63	$ 1.39	$ 614,909
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		2.00	$ 100,000	$ 200,000
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		3.00	$ 4,673	$ 14,018
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		55.44	$ 1,000	$ 55,442
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		1,298,415.87	$ 1.39	$ 1,804,798
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		6.00	$ 10,000	$ 60,000
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		6.00	$ 1,324	$ 7,943
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		166.33	$ 500	$ 83,163
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		198,327.55	$ 1.39	$ 275,675
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		1.00	$ 50,000	$ 50,000
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		1.00	$ 4,673	$ 4,673
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		54.55	$ 1,000	$ 54,552
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		870,549.23	$ 1.39	$ 1,210,063
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		2.00	$ 100,000	$ 200,000
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		3.00	$ 4,673	$ 14,018
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		109.10	$ 1,000	$ 109,103
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		2,555,118.51	$ 1.39	$ 3,551,615
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		6.00	$ 10,000	$ 60,000
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		6.00	$ 1,324	$ 7,943
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		327.31	$ 500	$ 163,655
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		390,283.59	$ 1.39	$ 542,494
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		-	$ 50,000	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		-	$ 4,673	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		-	$ 1,000	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		-	$ 1.39	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		2.00	$ 4,673	$ 9,345
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		6.00	$ 1,000	$ 6,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		140,515.94	$ 1.39	$ 195,317

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		2.00	$ 10,000	$ 20,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		2.00	$ 1,324	$ 2,648
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		12.00	$ 500	$ 6,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		14,308.81	$ 1.39	$ 19,889
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		1.00	$ 50,000	$ 50,000
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		1.00	$ 4,673	$ 4,673
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		33.77	$ 1,000	$ 33,769
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		538,901.69	$ 1.39	$ 749,073
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		2.00	$ 100,000	$ 200,000
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		3.00	$ 4,673	$ 14,018
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		67.54	$ 1,000	$ 67,539
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		1,581,711.46	$ 1.39	$ 2,198,579
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		6.00	$ 10,000	$ 60,000
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		6.00	$ 1,324	$ 7,943
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		202.62	$ 500	$ 101,308
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		241,599.76	$ 1.39	$ 335,824
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 200KW	each		1.00	$ 50,000	$ 50,000
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 200KW	each		-	$ 50,000	$ -
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 200KW	each		1.00	$ 4,673	$ 4,673
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 200KW	months		33.77	$ 1,000	$ 33,769
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 200KW	litres		538,901.69	$ 1.39	$ 749,073
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Aggreko - 300KW	each		2.00	$ 100,000	$ 200,000
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Aggreko - 300KW	each		1.00	$ 100,000	$ 100,000
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Aggreko - 300KW	each		3.00	$ 4,673	$ 14,018
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Aggreko - 300KW	months		67.54	$ 1,000	$ 67,539
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Aggreko - 300KW	litres		1,581,711.46	$ 1.39	$ 2,198,579
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase	Portable Light Tower	each		6.00	$ 10,000	$ 60,000
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Equipment Purchase - Standby	Portable Light Tower	each		-	$ 10,000	$ -
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator - Mob/Demob	Portable Light Tower	each		6.00	$ 1,324	$ 7,943
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Generator Maintenance	Portable Light Tower	months		202.62	$ 500	$ 101,308
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	General Site Power	Fuel Consumption	Portable Light Tower	litres		241,599.76	$ 1.39	$ 335,824
Clinton	CC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		31.15	$ 300	$ 9,345
Clinton	CC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		109.03	$ 300	$ 32,708
Clinton	CC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		31.15	$ 300	$ 9,345
Clinton	CC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		15.58	$ 300	$ 4,673
Clinton	CC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		31.15	$ 300	$ 9,345
Clinton	CC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		31.15	$ 150	$ 4,673
Clinton	CC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		46.73	$ 150	$ 7,009
Clinton	CC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		31.15	$ 300	$ 9,345
Clinton	CC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		109.03	$ 300	$ 32,708
Clinton	CC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		31.15	$ 300	$ 9,345
Clinton	CC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		15.58	$ 300	$ 4,673
Clinton	CC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		31.15	$ 300	$ 9,345
Clinton	CC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		31.15	$ 150	$ 4,673

CCRP Cost Estimate Table W-10: 2019 Consolidated Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		46.73	$ 150	$ 7,009
Clinton	CC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		31.15	$ 300	$ 9,345
Clinton	CC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		109.03	$ 300	$ 32,708
Clinton	CC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		31.15	$ 300	$ 9,345
Clinton	CC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		15.58	$ 300	$ 4,673
Clinton	CC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		31.15	$ 300	$ 9,345
Clinton	CC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		31.15	$ 150	$ 4,673
Clinton	CC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		46.73	$ 150	$ 7,009
Wolverine	WC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		15.58	$ 300	$ 4,673
Wolverine	WC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		15.58	$ 300	$ 4,673
Wolverine	WC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		15.58	$ 300	$ 4,673
Wolverine	WC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		-	$ 300	$ -
Wolverine	WC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		15.58	$ 300	$ 4,673
Wolverine	WC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		15.58	$ 150	$ 2,336
Wolverine	WC1	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		15.58	$ 150	$ 2,336
Wolverine	WC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		31.15	$ 300	$ 9,345
Wolverine	WC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		249.20	$ 300	$ 74,760
Wolverine	WC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		46.73	$ 300	$ 14,018
Wolverine	WC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		15.58	$ 300	$ 4,673
Wolverine	WC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		31.15	$ 300	$ 9,345
Wolverine	WC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		46.73	$ 150	$ 7,009
Wolverine	WC2	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		46.73	$ 150	$ 7,009
Wolverine	WC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Excavators	hours		31.15	$ 300	$ 9,345
Wolverine	WC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Haul Trucks	hours		249.20	$ 300	$ 74,760
Wolverine	WC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Dozers	hours		46.73	$ 300	$ 14,018
Wolverine	WC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Compactors	hours		15.58	$ 300	$ 4,673
Wolverine	WC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Graders	hours		31.15	$ 300	$ 9,345
Wolverine	WC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Water Trucks	hours		46.73	$ 150	$ 7,009
Wolverine	WC3	Mobilization and Demobilization	Equipment	N/A	Mob / Demob	Support Trucks	hours		46.73	$ 150	$ 7,009
Clinton	CC1	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawnson City	person*shifts		2,263.75	$ 400	$ 905,498
Clinton	CC1	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	17.08	$ 20,833	$ 355,855
Clinton	CC2	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawnson City	person*shifts		3,673.86	$ 400	$ 1,469,545
Clinton	CC2	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	27.72	$ 20,833	$ 577,522
Clinton	CC3	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawnson City	person*shifts		7,229.70	$ 400	$ 2,891,879
Clinton	CC3	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	54.55	$ 20,833	$ 1,136,490
Wolverine	WC1	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawnson City	person*shifts		286.79	$ 400	$ 114,714
Wolverine	WC1	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	6.00	$ 20,833	$ 125,000
Wolverine	WC2	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawnson City	person*shifts		6,089.54	$ 400	$ 2,435,817
Wolverine	WC2	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	33.77	$ 20,833	$ 703,528
Wolverine	WC3	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Airfare - Edmonton to Dawnson City	person*shifts		6,089.54	$ 400	$ 2,435,817
Wolverine	WC3	Mobilization and Demobilization	Personnel	N/A	Mob / Demob	Bus Transportation - Dawson City to Site	months	1.25	33.77	$ 20,833	$ 703,528
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		1.00	$ 674,550	$ 674,550
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		1.00	$ 713,628	$ 713,628
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		1.00	$ 363,191	$ 363,191
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		17.08	$ 52,555	$ 897,688

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		31,692.43	$ 123	$ 3,882,371
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		519.55	$ 4,560	$ 2,368,963
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		1.00	$ 674,550	$ 674,550
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		1.00	$ 713,628	$ 713,628
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		1.00	$ 363,191	$ 363,191
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		27.72	$ 52,555	$ 1,456,869
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		51,434.07	$ 123	$ 6,300,751
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		843.18	$ 4,560	$ 3,844,621
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		1.00	$ 674,550	$ 674,550
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		1.00	$ 713,628	$ 713,628
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		1.00	$ 363,191	$ 363,191
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		54.55	$ 52,555	$ 2,866,935
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		101,215.76	$ 123	$ 12,399,083
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		1,659.27	$ 4,560	$ 7,565,729
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		-	$ -	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		-	$ 713,628	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		-	$ 363,191	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		-	$ 52,555	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		4,015.00	$ 300	$ 1,204,500
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		-	$ 4,560	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		1.00	$ 674,550	$ 674,550
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		1.00	$ 713,628	$ 713,628
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		1.00	$ 363,191	$ 363,191
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		33.77	$ 52,555	$ 1,774,737
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		85,253.58	$ 123	$ 10,443,692
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		1,027.15	$ 4,560	$ 4,683,462
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Site Preparation	Clearing & Surface Prep	each		1.00	$ 674,550	$ 674,550
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Mobilization	Mob Costs	lump sum		1.00	$ 713,628	$ 713,628
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Demobilization	Demob Costs	lump sum		1.00	$ 363,191	$ 363,191
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Rental	Camp Rental Costs	months		33.77	$ 52,555	$ 1,774,737
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Occupancy	Camp Occupancy Costs	person*days		85,253.58	$ 123	$ 10,443,692
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Camp	N/A	Camp Utilities	Utilities - Total Costs	days		1,027.15	$ 4,560	$ 4,683,462
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		17.08	$ 179,664	$ 3,068,851
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		27.72	$ 179,664	$ 4,980,480
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		54.55	$ 179,664	$ 9,800,955
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		6.00	$ 179,664	$ 1,077,986
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		33.77	$ 179,664	$ 6,067,149
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Site Access	Roads	Access Road Improvement and Maintenance		months		33.77	$ 179,664	$ 6,067,149
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	75.00	$ 4,756	$ 356,670
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	750.00	$ 863	$ 647,100
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	years	1.00	1.00	$ 200,000	$ 200,000
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	75.00	$ 4,756	$ 356,670
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	750.00	$ 863	$ 647,100
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -

CCRP Cost Estimate Table W-10: 2019 Consolidated Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	years	1.00	2.00	$ 200,000	$ 400,000
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	75.00	$ 4,756	$ 356,670
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	750.00	$ 863	$ 647,100
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	years	1.00	4.00	$ 200,000	$ 800,000
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	-	$ 4,756	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	-	$ 863	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	years	1.00	-	$ 200,000	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	75.00	$ 4,756	$ 356,670
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	750.00	$ 863	$ 647,100
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	years	1.00	2.00	$ 200,000	$ 400,000
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Former Clinton Creek Townsite	m2	1.2	75.00	$ 4,756	$ 356,670
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Fortymile River	m2	1.2	750.00	$ 863	$ 647,100
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Dawson City	each	0.25	-	$ 50,000	$ -
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Site Access	Bridges	Water Crossing	Ice Bridge	years	1.00	2.00	$ 200,000	$ 400,000
Clinton	CC1	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction		m3		218,650.00	$ 4.56	$ 996,180
Clinton	CC2	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction		m3		354,850.00	$ 4.56	$ 1,616,714
Clinton	CC3	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction		m3		698,300.00	$ 4.56	$ 3,181,489
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction		m3		-	$ 150	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction	Loading Cost	tonnes		1,524,000.00	$ 0.55	$ 837,270
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction	Hauling Cost	tonnes		1,524,000.00	$ 2.47	$ 3,761,042
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction	Loading Cost	tonnes		1,524,000.00	$ 0.55	$ 837,270
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Roads	Haul Road Construction	Hauling Cost	tonnes		1,524,000.00	$ 2.47	$ 3,761,042
Clinton	CC1	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Clinton Creek Options	m2	1.2	1.00	$ 891,675	$ 891,675
Clinton	CC2	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Clinton Creek Options	m2	1.2	1.00	$ 891,675	$ 891,675
Clinton	CC3	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Clinton Creek Options	m2	1.2	1.00	$ 891,675	$ 891,675
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Wolverine to Porcupine Option	m2	1.2	-	$ -	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Wolverine to Porcupine Option	m2	1.2	1.00	$ 891,675	$ 891,675
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	On-Site Haul Roads	Bridges	Water Crossing	Wolverine to Porcupine Option	m2	1.2	1.00	$ 891,675	$ 891,675
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 1,862,207	$ 1,862,207
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		days		519.55	$ 1,293.78	$ 672,182
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 1,862,207	$ 1,862,207
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		days		843.18	$ 1,293.78	$ 1,090,894
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 1,862,207	$ 1,862,207
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		days		1,659.27	$ 1,293.78	$ 2,146,741
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 87,370	$ 87,370
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		days		-	$ 138.00	$ -
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 2,346,428	$ 2,346,428
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		days		1,027.15	$ 1,630.20	$ 1,674,462
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Setup		each		1.00	$ 2,346,428	$ 2,346,428
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Fuel/Power Supply	Fuel Storage and Delivery	Fuel Storage - Rental		days		1,027.15	$ 1,630.20	$ 1,674,462
Clinton	CC1	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Loading		tonnes		8,746,000.00	$ 0.55	$ 4,804,961
Clinton	CC1	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Hauling		tonnes		8,746,000.00	$ 1.73	$ 15,118,642
Clinton	CC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Loading		tonnes		14,194,000.00	$ 0.55	$ 7,798,035
Clinton	CC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Hauling		tonnes		14,194,000.00	$ 1.73	$ 24,536,245
Clinton	CC3	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Loading		tonnes		27,932,000.00	$ 0.55	$ 15,345,548

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CCRP Cost Estimate Table W-10: 2019 Consolidated Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC3	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Hauling		tonnes		27,932,000.00	$ 1.73	$ 48,284,233
Wolverine	WC1	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Loading		tonnes		-	$ -	$ -
Wolverine	WC1	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Hauling		tonnes		-	$ -	$ -
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Tailings Dump	Overall Tailings Volume	-		2,370,000.00	$ 9.00	$ 21,320,473
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Tailings Dump	Main Buttress Fill Volume (4.5H:1V)	-		1,584,000.00	$ 4.44	$ 7,032,851
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Tailings Dump	Excavated tailing (7H:1V)	-		121,000.00	$ 9.00	$ 1,088,514
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Tailings Dump	Sub-Excavation Volume Perimeter Berm (2H:1V)	-		550,000.00	$ 51.34	$ 28,239,090
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Tailings Dump	Compacted Granular Fill (Berm)	-		358,000.00	$ 4.44	$ 1,589,495
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Buttress Fill Dam	1 m Capping over all tailings	-		169,000.00	$ 9.00	$ 1,520,321
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Buttress Fill Dam	Excavated Tailings and Ice Rich Colluvium Volume	-		738,000.00	$ 51.34	$ 37,891,724
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Buttress Fill Dam	Select Rockfill Shell and Backfill Volume	-		192,000.00	$ 51.34	$ 9,858,009
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Buttress Fill Dam	Chimney and Basal Drain Volume	-	1.2	400.00	$ 166.79	$ 66,715
Wolverine	WC2	Civil Works	Materials Management	Earthmoving - Load & Haul	Buttress Fill Dam	8 inch Perforated pipes	-	1.2	300.00	$ 166.79	$ 50,036
Wolverine	WC3	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Loading	8 inch Solid pipe length	tonnes		14,932,000.00	$ 0.55	$ 8,203,484
Wolverine	WC3	Civil Works	Materials Management	Earthmoving - Load & Haul	Earthmoving - Hauling		tonnes		14,932,000.00	$ 3.95	$ 58,960,503
Clinton	CC1	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		21,197.56	$ 320	$ 6,783,220
Clinton	CC1	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		10,598.78	$ 170	$ 1,801,793
Clinton	CC2	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		34,401.81	$ 320	$ 11,008,578
Clinton	CC2	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		17,200.90	$ 170	$ 2,924,154
Clinton	CC3	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		67,698.41	$ 320	$ 21,663,492
Clinton	CC3	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		33,849.21	$ 170	$ 5,754,365
Wolverine	WC1	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		2,190.00	$ 350	$ 766,500
Wolverine	WC1	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		-	$ -	$ -
Wolverine	WC2	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		31,430.84	$ 470	$ 14,772,494
Wolverine	WC2	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		10,476.95	$ 170	$ 1,781,081
Wolverine	WC3	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Dozing		months		62,861.68	$ 470	$ 29,544,988
Wolverine	WC3	Civil Works	Materials Management	Support Equipment - Dozers	Earthmoving - Compaction		months		20,953.89	$ 170	$ 3,562,162
Clinton	CC1	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	2	21,197.56	$ 192	$ 4,069,932
Clinton	CC2	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	2	34,401.81	$ 192	$ 6,605,147
Clinton	CC3	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	2	67,698.41	$ 192	$ 12,998,095
Wolverine	WC1	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	1	2,190.00	$ 192	$ 420,480
Wolverine	WC2	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	2	41,907.78	$ 192	$ 8,046,295
Wolverine	WC3	Civil Works	Materials Management	Support Equipment - Graders	Earthmoving - Grading		hours	2	41,907.78	$ 192	$ 8,046,295
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=500mm	m3	1.0	19,000.00	$ 228.93	$ 4,349,683
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=300mm	m3	1.0	33,000.00	$ 228.93	$ 7,554,713
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Supply Coletanche Elastomeric Bitumen Liner ES3	m2	1.0	14,374.00	$ 23.33	$ 335,393
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Supply Non-Woven Geotextile	m2	1.0	64,416.00	$ 2.00	$ 128,832
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Install Coletanche Elastomeric Bitumen Liner ES3	m2	1.0	14,374.00	$ 6.00	$ 86,244
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Install Non-Woven Geotextile	m2	1.0	64,416.00	$ 1.50	$ 96,624
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Spillway Cut	m3	1.2	-	$ 5.47	$ -
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Spillway Fill	m3	1.2	-	$ 5.47	$ -
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Steel Sheet Pile Wall	m2	1.2	17,280.00	$ 846.99	$ 14,636,065
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Mob/Demob of Specialized Ground Densification Rig/Equipment	each	1.0	1.00	$ 200,000.00	$ 200,000
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Densification operations	m3	1.0	230,000.00	$ 10.00	$ 2,300,000
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Select Granular Supply for Densifications	m3	1.0	115,000.00	$ 51.34	$ 5,904,537

CCRP Cost Estimate Table W-10: 2019 Consolidated Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC1	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Turf reinforced mat (assumed LP-P20 Polypropylene)	m2	1.0	-	$ -	$ -
Clinton	CC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=500mm	m3	1.0	37,020.00	$ 228.93	$ 8,475,015
Clinton	CC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=300mm	m3	1.0	10,200.00	$ 228.93	$ 2,335,093
Clinton	CC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=175mm	m3	1.0	4,670.00	$ 228.93	$ 1,069,106
Clinton	CC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Turf reinforced mat (assumed LP-P20 Polypropylene). Excluding delivery and installation	m2	1.0	26,000.00	$ 20.00	$ 520,000
Wolverine	WC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=200mm	m3		2,085.00	$ 228.93	$ 477,321
Wolverine	WC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=300mm	m3		2,270.00	$ 228.93	$ 519,673
Wolverine	WC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=450mm	m3		2,470.00	$ 228.93	$ 565,459
Wolverine	WC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=800mm	m3		11,640.00	$ 228.93	$ 2,664,753
Wolverine	WC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Riprap d50=1000mm	m3		5,290.00	$ 228.93	$ 1,211,043
Wolverine	WC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Bedding Gravel	m3		1,135.00	$ 51.34	$ 58,275
Wolverine	WC2	Civil Works	Flow Conveyance	Spillway	Spillway and Channel Construction	Geotextile Fabric	m2		27,600.00	$ -	$ -
Wolverine	WC3	Civil Works	Flow Conveyance	Erosion Control	Spillway and Channel Construction	Equipment time and the use of imported select granular material for targeted ditching and swale development on exposed valley surface following tails removal.	ha		50.00	$ 150,000.00	$ 7,500,000
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water and Erosion Sediment Control during Construction	ls	1.0	-	$ -	$ -
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	50,000.00	$ 0.89	$ 44,313
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	25,000.00	$ 4.56	$ 113,901
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	37,000.00	$ 10.00	$ 370,000
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	440.00	$ 24.00	$ 10,560
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	3,150.00	$ 24.00	$ 75,600
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	8,200.00	$ 51.34	$ 421,019
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	9,500.00	$ 228.93	$ 2,174,842
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	2.00	$ 5,000.00	$ 10,000
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	3.00	$ 5,000.00	$ 15,000
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast chamber	each	1.0	3.00	$ 2,500.00	$ 7,500
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install manholes	each	1.0	8.00	$ 2,500.00	$ 20,000
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	50,000.00	$ 6.00	$ 300,000
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Channel Excavation	m3	1.0	12,500.00	$ 12.65	$ 158,125
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Riprap for diversion channel armouring	m3	1.0	2,950.00	$ 228.93	$ 675,346
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Geotextile	m2	1.2	7,000.00	$ 6.00	$ 42,000
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	1.0	1,200.00	$ 12.65	$ 15,180
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Riprap for diversion channel armouring	m3	1.0	600.00	$ 228.93	$ 137,358
Clinton	CC1	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Geotextile	m2	1.2	1,400.00	$ 6.00	$ 8,400
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water and Erosion Sediment Control during Construction	ls	1.0	-	$ -	$ -
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	50,000.00	$ 0.89	$ 44,313
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	25,000.00	$ 4.56	$ 113,901
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	37,000.00	$ 10.00	$ 370,000
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	440.00	$ 24.00	$ 10,560

CCRP Cost Estimate Table W-10: 2019 Consolidated Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	3,150.00	$ 24.00	$ 75,600
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	8,200.00	$ 51.34	$ 421,019
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	9,500.00	$ 228.93	$ 2,174,842
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	2.00	$ 5,000.00	$ 10,000
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	3.00	$ 5,000.00	$ 15,000
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast chamber	each	1.0	3.00	$ 2,500.00	$ 7,500
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install manholes	each	1.0	8.00	$ 2,500.00	$ 20,000
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	50,000.00	$ 6.00	$ 300,000
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Channel Excavation	m3	1.0	12,500.00	$ 12.65	$ 158,125
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Riprap for diversion channel armouring	m3	1.0	2,950.00	$ 228.93	$ 675,346
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Geotextile	m2	1.2	7,000.00	$ 6.00	$ 42,000
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	1.0	1,200.00	$ 12.65	$ 15,180
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Riprap for diversion channel armouring	m3	1.0	600.00	$ 228.93	$ 137,358
Clinton	CC2	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Geotextile	m2	1.2	1,400.00	$ 6.00	$ 8,400
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water	ls	1.0	-	$ -	$ -
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	General	Site Prep/Access Roads	ls	1.0	-	$ -	$ -
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	35,000.00	$ 0.89	$ 31,019
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	17,500.00	$ 4.56	$ 79,731
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	27,000.00	$ 10.00	$ 270,000
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	560.00	$ 24.00	$ 13,440
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	2,640.00	$ 24.00	$ 63,360
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	5,700.00	$ 51.34	$ 292,660
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	6,150.00	$ 228.93	$ 1,407,924
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	1.00	$ 5,000.00	$ 5,000
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	1.00	$ 5,000.00	$ 5,000
Clinton	CC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	35,000.00	$ 6.00	$ 210,000
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water and Erosion Sediment Control during Construction	ls	1.0	-	$ -	$ -
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	50,000.00	$ 0.89	$ 44,313
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	25,000.00	$ 4.56	$ 113,901
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	37,000.00	$ 10.00	$ 370,000
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	440.00	$ 24.00	$ 10,560
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	3,150.00	$ 24.00	$ 75,600
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	8,200.00	$ 51.34	$ 421,019
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	9,500.00	$ 228.93	$ 2,174,842
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	2.00	$ 5,000.00	$ 10,000
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	3.00	$ 5,000.00	$ 15,000
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast chamber	each	1.0	3.00	$ 2,500.00	$ 7,500
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install manholes	each	1.0	8.00	$ 2,500.00	$ 20,000
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	50,000.00	$ 6.00	$ 300,000
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Channel Excavation	m3	1.0	12,500.00	$ 12.65	$ 158,125
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Riprap for diversion channel armouring	m3	1.0	2,950.00	$ 228.93	$ 675,346
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Geotextile	m2	1.2	7,000.00	$ 6.00	$ 42,000
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	1.0	1,200.00	$ 12.65	$ 15,180

CCRP Cost Estimate Table W-10: 2019 Consolidated Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Riprap for diversion channel armouring	m3	1.0	600.00	$ 228.93	$ 137,358
Wolverine	WC1	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Geotextile	m2	1.2	1,400.00	$ 6.00	$ 8,400
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water and Erosion Sediment Control during Construction	ls	1.0	-	$ -	$ -
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	50,000.00	$ 0.89	$ 44,313
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	25,000.00	$ 4.56	$ 113,901
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	37,000.00	$ 10.00	$ 370,000
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	440.00	$ 24.00	$ 10,560
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	3,150.00	$ 24.00	$ 75,600
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	8,200.00	$ 51.34	$ 421,019
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	9,500.00	$ 228.93	$ 2,174,842
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	2.00	$ 5,000.00	$ 10,000
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	3.00	$ 5,000.00	$ 15,000
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast chamber	each	1.0	3.00	$ 2,500.00	$ 7,500
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install manholes	each	1.0	8.00	$ 2,500.00	$ 20,000
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	50,000.00	$ 6.00	$ 300,000
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Channel Excavation	m3	1.0	12,500.00	$ 12.65	$ 158,125
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Riprap for diversion channel armouring	m3	1.0	2,950.00	$ 228.93	$ 675,346
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Geotextile	m2	1.2	7,000.00	$ 6.00	$ 42,000
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	1.0	1,200.00	$ 12.65	$ 15,180
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Riprap for diversion channel armouring	m3	1.0	600.00	$ 228.93	$ 137,358
Wolverine	WC2	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Geotextile	m2	1.2	1,400.00	$ 6.00	$ 8,400
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	General	Mobilization/Demobilization	ls	1.0	-	$ -	$ -
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	General	Care of Water and Erosion Sediment Control during Construction	ls	1.0	-	$ -	$ -
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	1.0	50,000.00	$ 0.89	$ 44,313
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Common Excavation	m3	1.0	25,000.00	$ 4.56	$ 113,901
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Dike construction, backfill	m3	1.0	37,000.00	$ 10.00	$ 370,000
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	200 mm PVC drainpipe (cleanouts)	m	1.2	440.00	$ 24.00	$ 10,560
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	150mm socked PVC perforated pipe	m	1.2	3,150.00	$ 24.00	$ 75,600
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Bedding gravel	m3	1.0	8,200.00	$ 51.34	$ 421,019
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Rip Rap Pond Dikes inside and outside Placed	m3	1.0	9,500.00	$ 228.93	$ 2,174,842
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast outlet headwall	each	1.0	2.00	$ 5,000.00	$ 10,000
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast inlet headwall	each	1.0	3.00	$ 5,000.00	$ 15,000
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install precast chamber	each	1.0	3.00	$ 2,500.00	$ 7,500
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Supply and install manholes	each	1.0	8.00	$ 2,500.00	$ 20,000
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Sediment Pond Earthworks	Non woven geotextile	m2	1.2	50,000.00	$ 6.00	$ 300,000
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Channel Excavation	m3	1.0	12,500.00	$ 12.65	$ 158,125
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Riprap for diversion channel armouring	m3	1.0	2,950.00	$ 228.93	$ 675,346
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Clinton Creek Diversion	Clinton Geotextile	m2	1.2	7,000.00	$ 6.00	$ 42,000
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	1.0	1,200.00	$ 12.65	$ 15,180
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Riprap for diversion channel armouring	m3	1.0	600.00	$ 228.93	$ 137,358
Wolverine	WC3	Civil Works	Flow Conveyance	Sediment Pond	Wolverine Creek Diversion	Wolverine Geotextile	m2	1.2	1,400.00	$ 6.00	$ 8,400
Clinton	CC1	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	Monthly Rent for 42" Floating Pump	months	1.0	1.00	$ 221,760.00	$ 221,760

CCRP Cost Estimate Table W-10: 2019 Consolidated Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC1	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	DELIVERY FREIGHT COST	each	1.0	1.00	$ 20,091.72	$ 20,092
Clinton	CC1	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	RETURN FREIGHT COST	each	1.0	1.00	$ 16,552.80	$ 16,553
Clinton	CC1	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	PIPING AND ACCESSORIES	each	1.0	1.00	$ 269,091.90	$ 269,092
Clinton	CC1	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	50,000 L Envirotank Mob/demob	km	1.0	3,162.00	$ 5.90	$ 18,656
Clinton	CC1	Mechanical Works	Lake Drawdowns	N/A	Fuel Consumption	Fuel - Delivered to Site	litres	1.0	66,682.85	$ 1.39	$ 92,689
Clinton	CC2	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	Monthly Rent for 42" Floating Pump	months	1.0	1.00	$ 221,760.00	$ 221,760
Clinton	CC2	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	DELIVERY FREIGHT COST	each	1.0	1.00	$ 20,091.72	$ 20,092
Clinton	CC2	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	RETURN FREIGHT COST	each	1.0	1.00	$ 16,552.80	$ 16,553
Clinton	CC2	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	PIPING AND ACCESSORIES	each	1.0	1.00	$ 269,091.90	$ 269,092
Clinton	CC2	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	50,000 L Envirotank Mob/demob	km	1.0	3,162.00	$ 5.90	$ 18,656
Clinton	CC2	Mechanical Works	Lake Drawdowns	N/A	Fuel Consumption	Fuel - Delivered to Site	litres	1.0	98,102.59	$ 1.39	$ 136,363
Clinton	CC3	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	Monthly Rent for 42" Floating Pump	months	1.0	1.00	$ 221,760.00	$ 221,760
Clinton	CC3	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	DELIVERY FREIGHT COST	each	1.0	1.00	$ 20,091.72	$ 20,092
Clinton	CC3	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	RETURN FREIGHT COST	each	1.0	1.00	$ 16,552.80	$ 16,553
Clinton	CC3	Mechanical Works	Lake Drawdowns	N/A	Equipment Purchase	PIPING AND ACCESSORIES	each	1.0	1.00	$ 269,091.90	$ 269,092
Clinton	CC3	Mechanical Works	Lake Drawdowns	N/A	Mob / Demob	50,000 L Envirotank Mob/demob	km	1.0	3,162.00	$ 5.90	$ 18,656
Clinton	CC3	Mechanical Works	Lake Drawdowns	N/A	Fuel Consumption	Fuel - Delivered to Site	litres	1.0	108,376.28	$ 1.39	$ 150,643
Clinton	CC1	Mobilization and Demobilization	TF&C	N/A	N/A		-		-	$ -	$ -
Clinton	CC2	Mobilization and Demobilization	TF&C	N/A	N/A		-		-	$ -	$ -
Clinton	CC3	Mobilization and Demobilization	TF&C	N/A	N/A		-		-	$ -	$ -
Wolverine	WC1	Mobilization and Demobilization	TF&C	N/A	N/A		-		-	$ -	$ -
Wolverine	WC2	Mobilization and Demobilization	TF&C	N/A	N/A		-		-	$ -	$ -
Wolverine	WC3	Mobilization and Demobilization	TF&C	N/A	N/A		-		-	$ -	$ -
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fin Tube Installations	Heating Elements	heaters		1,600.00	$ 540	$ 864,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fin Tube Installations	Casing Installations	test holes		1,600.00	$ 20,000	$ 32,000,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fin Tube Installations	Control Panel	lump sum		1.00	$ 46,000	$ 46,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Generator Purchase	generators		4.00	$ 1,800,000	$ 7,200,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Field Installation	lump sum		1.00	$ 1,000,000	$ 1,000,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Enclosures	lump sum		1.00	$ 100,000	$ 100,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Power Supply Testing & Commisioning	lump sum		1.00	$ 1,100,000	$ 1,100,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Power Supply Shipment	lump sum		1.00	$ 575,000	$ 575,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Spare Parts	lump sum		1.00	$ 270,000	$ 270,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Transformer	lump sum		1.00	$ 2,800,000	$ 2,800,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Power Supply	Electrical Distribution Hardware	lump sum		1.00	$ 2,200,000	$ 2,200,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Diesel Storage Tanks	Tanks		3.00	$ 1,170,000	$ 3,510,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Insulation	Lump Sum		1.00	$ 1,000,000	$ 1,000,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Fuel Supply Testing & Commisioning	Lump Sum		1.00	$ 1,500,000	$ 1,500,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Shipment	Lump Sum		1.00	$ 400,000	$ 400,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Fuel Distribution Piping and Controls	Lump Sum		1.00	$ 900,000	$ 900,000
Clinton	CC1	Mechanical Works	Ground Thawing	N/A	Fuel Supply	Diesel	litres		16,000,000.00	$ 1.39	$ 22,240,000
Clinton	CC1	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 9,050,654	$ 9,050,654
Clinton	CC1	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Clinton	CC1	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 8,619,670	$ 8,619,670
Clinton	CC1	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 1,723,934	$ 1,723,934
Clinton	CC1	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Clinton	CC1	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 1,077,459	$ 1,077,459
Clinton	CC1	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 538,729	$ 538,729
Clinton	CC1	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Clinton	CC2	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 3,205,835	$ 3,205,835
Clinton	CC2	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 1,526,588	$ 1,526,588
Clinton	CC2	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 12,212,704	$ 12,212,704
Clinton	CC2	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 1,723,934	$ 1,723,934
Clinton	CC2	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ 1,077,459	$ 1,077,459
Clinton	CC2	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 1,302,023	$ 1,302,023

CCRP Cost Estimate Table W-10: 2019 Consolidated Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC2	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 651,012	$ 651,012
Clinton	CC2	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Clinton	CC3	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 2,300,770	$ 2,300,770
Clinton	CC3	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 1,095,605	$ 1,095,605
Clinton	CC3	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 8,764,836	$ 8,764,836
Clinton	CC3	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 1,034,360	$ 1,034,360
Clinton	CC3	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Clinton	CC3	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 871,040	$ 871,040
Clinton	CC3	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 435,520	$ 435,520
Clinton	CC3	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 3,233,731	$ 3,233,731
Wolverine	WC1	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 3,878,852	$ 3,878,852
Wolverine	WC1	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Wolverine	WC1	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 2,154,918	$ 2,154,918
Wolverine	WC1	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 430,984	$ 430,984
Wolverine	WC1	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ 8,619,670	$ 8,619,670
Wolverine	WC1	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 1,077,459	$ 1,077,459
Wolverine	WC1	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 538,729	$ 538,729
Wolverine	WC1	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 3,965,048	$ 3,965,048
Wolverine	WC2	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 3,878,852	$ 3,878,852
Wolverine	WC2	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Wolverine	WC2	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 1,292,951	$ 1,292,951
Wolverine	WC2	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 258,590	$ 258,590
Wolverine	WC2	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ 4,309,835	$ 4,309,835
Wolverine	WC2	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 646,475	$ 646,475
Wolverine	WC2	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 323,238	$ 323,238
Wolverine	WC2	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Wolverine	WC3	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Inspections	Baseline and Time Limited Premiums	-		1.00	$ 986,044	$ 986,044
Wolverine	WC3	Post Closure Care and Maintenance	Care & General Maintenance	N/A	Access	Baseline and Time Limited Premiums	-		1.00	$ 1,095,605	$ 1,095,605
Wolverine	WC3	Post Closure Care and Maintenance	Monitoring	N/A	Water Quality	Baseline and Time Limited Premiums	-		1.00	$ 2,191,209	$ 2,191,209
Wolverine	WC3	Post Closure Care and Maintenance	Monitoring	N/A	Hydrotechnics	Baseline and Time Limited Premiums	-		1.00	$ 258,590	$ 258,590
Wolverine	WC3	Post Closure Care and Maintenance	Monitoring	N/A	Geotechnics	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Wolverine	WC3	Post Closure Care and Maintenance	Partner Communications/Consultations	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 871,040	$ 871,040
Wolverine	WC3	Post Closure Care and Maintenance	Owner's Project Management & Admin	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ 435,520	$ 435,520
Wolverine	WC3	Post Closure Care and Maintenance	Sediment Pond Cleanouts	N/A	N/A	Baseline and Time Limited Premiums	-		1.00	$ -	$ -
Clinton	CC1	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 208,722,011	$ 6,261,660
Clinton	CC2	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 133,460,134	$ 4,003,804
Clinton	CC3	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 199,319,470	$ 5,979,584
Wolverine	WC1	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 35,059,891	$ 1,051,797
Wolverine	WC2	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 216,445,393	$ 6,493,362
Wolverine	WC3	Temporary Facilities and Controls (TF&C)	Incidental Temporary Facilities and Controls	N/A	N/A		%		3%	$ 184,327,436	$ 5,529,823
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		1.00	$ 50,000	$ 50,000
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		300.00	$ 200	$ 60,000
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		200.00	$ 200	$ 40,000
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		50.00	$ 110,000	$ 5,500,000

CCRP Cost Estimate Table W-10: 2019 Consolidated Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		30.00	$ 110,000	$ 3,300,000
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		25.00	$ 20,000	$ 500,000
Clinton	CC1	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		-	$ 110,000	$ -
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		1.00	$ 50,000	$ 50,000
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		300.00	$ 200	$ 60,000
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		200.00	$ 200	$ 40,000
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		50.00	$ 110,000	$ 5,500,000
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		-	$ 110,000	$ -
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		25.00	$ 20,000	$ 500,000
Clinton	CC2	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		-	$ 110,000	$ -
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		1.00	$ 50,000	$ 50,000
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		300.00	$ 200	$ 60,000
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		200.00	$ 200	$ 40,000
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		50.00	$ 110,000	$ 5,500,000
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		-	$ 110,000	$ -
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		25.00	$ 20,000	$ 500,000
Clinton	CC3	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		-	$ 110,000	$ -
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		-	$ 50,000	$ -
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		-	$ 200	$ -
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		-	$ 200	$ -
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		-	$ 110,000	$ -
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		-	$ 110,000	$ -
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		-	$ 20,000	$ -
Wolverine	WC1	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		-	$ 110,000	$ -
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		1.00	$ 50,000	$ 50,000
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		300.00	$ 200	$ 60,000
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		200.00	$ 200	$ 40,000
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		-	$ 110,000	$ -
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		-	$ 110,000	$ -
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		-	$ 20,000	$ -
Wolverine	WC2	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		20.00	$ 110,000	$ 2,200,000
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	Equipment Purchase		lump sum		-	$ 50,000	$ -
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	Field Time		hours		-	$ 200	$ -
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	Interpretation / Reporting Time		hours		-	$ 200	$ -
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	Dump Foundation Characterization		test holes		-	$ 110,000	$ -
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	Ice Rich PF Delineation		test holes		-	$ -	$ -
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	CC1 Spillway Bedrock Data		test holes		-	$ 110,000	$ -
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	Pump Tests		test holes		-	$ 20,000	$ -
Wolverine	WC3	Extraordinary Field Investigations	N/A	N/A	WC2 Buttress / Dam Investigation		test holes		-	$ 110,000	$ -
Clinton	CC1	Factors	EPCM	N/A			%		10%		$ 21,498,367
Clinton	CC2	Factors	EPCM	N/A			%		10%		$ 13,746,394
Clinton	CC3	Factors	EPCM	N/A			%		10%		$ 20,529,905
Wolverine	WC1	Factors	EPCM	N/A			%		10%		$ 3,611,169

CCRP Cost Estimate Table W-10: 2019 Consolidated Estimate Detail

Creek	Option	Activity	Task	Subtask	Item	Description	Unit	Factor (Geographic / Escalation)	Total Qty	Unit Price	Cost
Wolverine	WC2	Factors	EPCM	N/A			%		10%		$ 22,293,875
Wolverine	WC3	Factors	EPCM	N/A			%		10%		$ 18,985,726
Clinton	CC1	Factors	Contingency	N/A			%		25%		$ 61,483,010
Clinton	CC2	Factors	Contingency	N/A			%		25%		$ 39,340,083
Clinton	CC3	Factors	Contingency	N/A			%		25%		$ 57,994,740
Wolverine	WC1	Factors	Contingency	N/A			%		25%		$ 9,930,714
Wolverine	WC2	Factors	Contingency	N/A			%		25%		$ 61,895,658
Wolverine	WC3	Factors	Contingency	N/A			%		25%		$ 52,210,746

Estimate Inputs

CCRP Cost Estimate Table W-11: 2019 Remediation Options - Earthmoving Metrics

Option	Creek	Estimated Waste Material or Tailings Removal Volume (m3)1	Waste Material Relocation / Tailings Area	Haul Distance (one way) (km)	Image 1	Image 2	Average Current Haul/Work Slope (%)	Maximum Current Haul/Work Slope (%)	Maximum Digging Depth (m)	Design Slope (%)
CC1	Clinton	4,373,000	PPSS	0.4 to 1.2	Image	Image	25	30	40	17
CC1-A	Clinton	870,000	To Fill	0.2			25	30	40	17
CC1-B	Clinton	962,000	PPSS	0.2			25	30	40	17
CC2	Clinton	7,097,000	PPSS	0.4 to 1.2	Image	Image	25	30	40	17 to 50
CC2-A	Clinton	2,366,000	PPSS	0.4 to 1.2			25	30	40	17 to 50
CC2-B	Clinton	4,555,000	PPSS	0.4 to 1.2			25	30	40	17 to 50
CC3	Clinton	13,966,000	PPSS	0.4 to 1.2	Image	Image	25	30	70	17
WC1	Wolverine				Image					
WC2	Wolverine	4,312,000			Image		30	40		
WC2-A	Wolverine	2,225,000	Local Fill & PPSS	2.7			27	40	13	27
WC3	Wolverine	7,688,000	PPSS	2.7	Image		27	40	13	27

[1]Wood. 5 April 2019. Clinton Creek - Storage and Excavation Volumes.

CCRP Cost Estimate Table W-12: Key Equipment and Field Personnel Metrics

Creek	Option	Tailings Volume (m3)	Material Volume (m3)	Number of Excavators	Number of Haul Trucks	Number of Dozers	Number of Compactors	Number of Graders	Number of Water Trucks	Number of Support Trucks	Total Equipment Operators	Total Support Personnel	Owners Team	Shifts per Day	Total Crew Count	Project Duration (Years)
Clinton	CC1		4,373,000	2	7	2	1	2	2	3	19	10	3	2	61	1.42
	CC1-A		870,000	1	3	3	2	2	2	3	16	10	3	2	55	0.57
	CC1-B		962,000	1	3	3	2	2	2	3	16	10	3	2	55	0.63
	CC2		7,097,000	2	7	2	1	2	2	3	19	10	3	2	61	2.31
	CC2-A		2,366,000	2	7	2	1	2	2	3	19	10	3	2	61	0.77
	CC2-B		4,555,000	2	7	2	1	2	2	3	19	10	3	2	61	1.48
	CC3		#########	2	7	2	1	2	2	3	19	10	3	2	61	4.55
Wolverine	WC1			1	1	1		1	1	1	6	4	2	2	22	0.50
	WC2	2,370,000	1,942,000	2	16	3	1	2	3	3	30	10	3	2	83	2.81
	WC2-A	2,225,000		2	16	2	2	2	3	3	30	10	3	2	83	0.81
	WC3	7,688,000	-	2	16	3	1	2	3	3	30	10	3	2	83	2.81

Equipment Mobilization

Distance from Edmonton to Dawson City:	2,521	km
Distance from Dawson City to Fortymile R. Bridge:	91	km
Distance from Fortymile R. Bridge to Site:	9	km
Total Mobilization + Demobilization Distance:	**5,224**	km

The George Black Ferry:	This ferry service crosses the Yukon River and provides access to the Top of the World Highway from the North Klondike Highway for motorists passing through Dawson City.
Yukon River Ice Bridge:	Yukon gov't gives up on attempt to build ice bridge in Dawson City. https://www.cbc.ca/news/canada/north/gov-halts-dawson-city-ice-bridge-1.5001387. https://yukon.ca/sites/yukon.ca/files/hpw/final_nrc_report_dawson_ice_bridge_2018_final.pdf
Fortymile River Bridge:	Weight restrictions not available. Built in 1966.

CCRP Cost Estimate Table W-13: Loading Equipment Specifications and Rates

Loaders	Manufacturer	Model	Bucket Capacity (m^3)	Rated Payload (tonnes)	Configuration	Machine Working Weight (t)	Tires	Gross Power (kW)	Fuel Consumption	Digging Force (KN)	Maximum Dumping Height (m)	Maximum Height of Cut (m)	Optimal Working Bench Height (m)	Comments	Rate/hr	Rate Source
Caterpillar 330F	Caterpillar	330F	1.5	2.8	Excavator		track								$ 228	ARHCA x 1.2
Caterpillar 385C	Caterpillar	385C	4.6	8.3	Excavator	84	track	390.0	68		8.1	12.5	9		$ 358	ARHCA x 1.2
Caterpillar 390F GP	Caterpillar	390F GP	4.6	9.7	Excavator	84	track	390.0			8.1	12.5	9		$ 560	ARHCA x 1.2
Caterpillar 6015 FS	Caterpillar	6015 FS	7.0	12.6	Hydr.Shovel	105	track	522.0	91	490	8.8	11.0	8	Also available as Excavator		
Caterpillar 6018 FS	Caterpillar	6018 FS	10.0	18.0	Hydr.Shovel	172	track	858.0	150	730	10.1	13.2	9	Also available as Excavator		
Caterpillar 6030 FS	Caterpillar	6030 FS	16.5	29.7	Hydr.Shovel	287	track	1,140.0	200	920	10.7	13.9	10	Also available as Excavator		
Caterpillar 6040 FS	Caterpillar	6040 FS	22.0	39.6	Hydr.Shovel	397	track	1,516.0	265	1,270	10.9	14.4	10	Also available as Excavator		
Caterpillar 6050 FS	Caterpillar	6050 FS	26.0	46.8	Hydr.Shovel	525	track	1,880.0	329	1,500	11.8	15.3	11	Also available as Excavator		
Caterpillar 6060 FS	Caterpillar	6060 FS	34.0	61.2	Hydr.Shovel	562	track	2,240.0	392	1,640	11.6	15.5	11	Also available as Excavator		
Caterpillar 6090 FS	Caterpillar	6090 FS	52.0	93.6	Hydr.Shovel	980	track	3,360.0	588	2,400	14.5	20.2	15	NOT available as Excavator		
Caterpillar 7395	Caterpillar	7395	35.0	63.5	Cable Shovel	1,179	track	3,106.0			10.0	16.7	15			
Caterpillar 7495 HD	Caterpillar	7495 HD	50.0	81.8	Cable Shovel	1,306	track	3,330.0			10.6	17.3	17			
Caterpillar 7495	Caterpillar	7495	56.0	100.0	Cable Shovel	1,382	track	3,706.0			10.1	17.8	17			
Caterpillar 7495 HF	Caterpillar	7495 HF	56.0	100.0	Cable Shovel	1,442	track	3,778.0			10.9	17.8	17	Oil sands model		
Caterpillar 988H	Caterpillar	988H	6.4	11.3	Loader	50	35/65R33	414.0		451	3.5	7.7	6	High Lift adds 0.4 m height	$ 389	ARHCA x 1.2
Caterpillar 990H	Caterpillar	990H	8.4	15.0	Loader	78	45/65-39	512.0		583	4.0	8.1	6	High Lift adds 0.6 m height	$ 485	ARHCA x 1.2
Caterpillar 992K	Caterpillar	992K	10.7	18.7	Loader	100	45/65-45	676.0		568	4.6	9.3	7	High Lift adds 0.6 m height	$ 485	ARHCA x 1.2
Caterpillar 993K	Caterpillar	993K	12.5	27.2	Loader	134	50/65-51	782.0		709	4.7	9.8	7	High Lift adds 0.6 m height		
Caterpillar 994K High lift	Caterpillar	994K High lift	19.0	35.0	Loader	194	53.5/85-57	1,176.0		989	5.6	10.9	8			
Caterpillar 994 STD	Caterpillar	994 STD	21.2	38.1	Loader											
Caterpillar 994High lift	Caterpillar	994High lift	18.0	32.0	Loader	197	53.5/85-57	1,176.0		1,020	6.0	11.0	8			
Caterpillar 994EXT lift	Caterpillar	994EXT lift	17.0	32.0	Loader	200	58/85-57	1,176.0		1,020	7.0	11.0	8			
Caterpillar 994Super lift	Caterpillar	994Super lift	36.0	32.0	Loader	212	53.5/85-57	1,176.0		693	7.3	16.4	12	Coal Only		
Hitachi EX1200-6	Hitachi	EX1200-6	5.9	10.6	Hydr.Shovel	114	track	567.0	99	577	8.8	12.4	9	Also available as Excavator		
Hitachi EX1900-6	Hitachi	EX1900-6	11.0	20.7	Hydr.Shovel	191	track	810.0	142	660	10.4	14.6	10	Also available as Excavator		
Hitachi EX2600-6	Hitachi	EX2600-6	15.0	27.0	Hydr.Shovel	252	track	1,119.0	196	907	10.4	15.0	11	Also available as Excavator		
Hitachi EX3600-6	Hitachi	EX3600-6	21.0	37.8	Hydr.Shovel	361	track	1,450.0	254	1,130	10.9	16.3	12	Also available as Excavator		
Hitachi EX5600-6	Hitachi	EX5600-6	29.0	52.2	Hydr.Shovel	533	track	2,238.0	392	1,570	13.1	18.9	14	Also available as Excavator		
Hitachi EX8000-6	Hitachi	EX8000-6	42.0	75.6	Hydr.Shovel	811	track	2,900.0	508	2,230	13.8	20.5	15	NOT available as Excavator		
Komatsu WA1200-6 std	Komatsu	WA1200-6 std	20.0	36.0	Loader	216	60/80 R57	1,411.0	178	1,275	6.3	12.2	9			
Komatsu WA1200-6 Hlift	Komatsu	WA1200-6 Hlift	18.0	32.4	Loader	218	60/80 R57	1,411.0	178	1,236	7.1	12.8	9			
Komatsu PC800	Komatsu	PC800	4.5	8.1	Excavator											
Komatsu PC1250LC-8	Komatsu	PC1250LC-8	5.0	9.0	Excavator	107	track	502.0	88			10.4	7			
Komatsu PC2000	Komatsu	PC2000	11.0	19.8	Hydr.Shovel	195	track	728.0	127	721	9.7	14.4	10	Also available as Excavator		
Komatsu PC3000	Komatsu	PC3000	15.0	27.0	Hydr.Shovel	252	track	940.0	165	1,000	10.2	15.1	11	Also available as Excavator		
Komatsu PC4000	Komatsu	PC4000	22.0	39.6	Hydr.Shovel	385	track	1,400.0	245	1,250	12.0	17.2	12	Also available as Excavator		
Komatsu PC5500	Komatsu	PC5500	29.0	52.2	Hydr.Shovel	533	track	1,880.0	329	1,865	13.3	19.5	14	Also available as Excavator		
Komatsu PC8000	Komatsu	PC8000	42.0	75.6	Hydr.Shovel	700	track	3,000.0	525	2,320	13.9	19.6	14	NOT available as Excavator		
LeTourneau L950	LeTourneau	L950	13.8	24.5	Loader	107	45/65-45	783.0		712	4.6	9.2	7			
LeTourneau L950 Hi Lift	LeTourneau	L950 Hi Lift	12.0	21.8	Loader	110	45/65-45	783.0		734	5.3	9.7	7			
LeTourneau L1150	LeTourneau	L1150	19.1	34.5	Loader	141	50/65-51	899.0		975	5.6	10.5	8			
LeTourneau L1150 Hi Lift	LeTourneau	L1150 Hi Lift	17.6	31.8	Loader	142	50/65-51	899.0		889	6.3	11.0	8			
LeTourneau L1350	LeTourneau	L1350	22.9	40.8	Loader	184	60/80 R57	1,193.0		961	6.4	11.4	8			
LeTourneau L1350 Hi Lift	LeTourneau	L1350 Hi Lift	21.4	38.1	Loader	186	60/80 R57	1,193.0		987	7.1	11.7	8			
LeTourneau L1850	LeTourneau	L1850	30.6	54.4	Loader	243	58/85-57	1,491.0	157	1,228	6.8	12.6	9			
LeTourneau L1850 Hi Lift	LeTourneau	L1850 Hi Lift	28.3	49.9	Loader	246	58/85-57	1,492.0	157	1,248	7.4	12.9	9			

CCRP Cost Estimate Table W-13: Loading Equipment Specifications and Rates

Loaders	Manufacturer	Model	Bucket Capacity (m^3)	Rated Payload (tonnes)	Configuration	Machine Working Weight (t)	Tires	Gross Power (kW)	Fuel Consumption	Digging Force (KN)	Maximum Dumping Height (m)	Maximum Height of Cut (m)	Optimal Working Bench Height (m)	Comments	Rate/hr	Rate Source
LeTourneau L2350	LeTourneau	L2350	40.5	72.6	Loader	262	70/70-57	1,715.0		1,273	7.0	13.4	10			
LeTourneau L2350 Hi Lift	LeTourneau	L2350 Hi Lift	38.2	68.0	Loader	272	70/70-57	1,715.0		1,290	8.0	13.9	10			
Liebherr R9100	Liebherr	R9100	7.0	12.6	Hydr.Shovel	114	track	565.0		544	8.1	10.3	7	Also available as Excavator		
Liebherr R984C	Liebherr	R984C	7.0	12.6	Hydr.Shovel	125	track	523.0		550	8.9	11.4	8	Also available as Excavator		
Liebherr R9250	Liebherr	R9250	15.0	27.0	Hydr.Shovel	254	track	960.0		935	11.0	15.2	11	Also available as Excavator		
Liebherr R9350	Liebherr	R9350	18.0	32.4	Hydr.Shovel	310	track	1,120.0		1,060	11.2	15.7	11	Also available as Excavator		
Liebherr R9400	Liebherr	R9400	22.0	39.6	Hydr.Shovel	353	track	1,250.0		1,290	11.2	16.0	11	Also available as Excavator		
Liebherr R995	Liebherr	R995	26.5	47.7	Hydr.Shovel	450	track	1,600.0		1,400	12.8	17.7	13	Also available as Excavator		
Liebherr R996B	Liebherr	R996B	34.0	61.2	Hydr.Shovel	676	track	2,240.0		1,905	12.9	18.0	13	Also available as Excavator		
Liebherr R9800	Liebherr	R9800	42.0	75.6	Hydr.Shovel	810	track	2,984.0		2,400	13.0	19.2	14	Also available as Excavator		
P&H 2300XPC	P&H	2300XPC	28.1	45.4	Cable Shovel	775	track	2,387.0			8.5	13.5	12			
P&H 2800XPC	P&H	2800XPC	36.6	59.0	Cable Shovel	1,078	track	3,089.0			9.1	16.6	17			
P&H 4100C	P&H	4100C	50.8	81.7	Cable Shovel	1,243	track	3,886.0			9.1	15.8	17			
P&H 4100XPC AC	P&H	4100XPC AC	67.6	108.9	Cable Shovel	1,532	track	5,113.0			9.5	16.8	17			
P&H 4100C BOSS	P&H	4100C BOSS	52.3	90.7	Cable Shovel	1,354	track	3,886.0			9.5	16.9	17	Oil sands model		

CCRP Cost Estimate Table W-14: Hauling Equipment Specifications and Rates

Trucks	Manufacturer	Model	Target Payload (tonnes)	Capacity Heaped (2:1) (m^3)	Overall Width (m)	Loading Height (m)	Gross Vehicle Weight (t)	Tires	Gross Power (kW)	Haul Road	Body	Rate/hr	Rate Source
Belaz 75137NA	Belaz	75137NA	136.0	80.0	7.00	4.80	244	33.00R51	1,194	24.5	rigid		
Belaz 75302NA	Belaz	75302NA	220.0	138.0	8.40	5.92	376	40.00R57	2,347	29.4	rigid		
Caterpillar 735B	Caterpillar	735B	32.7	19.7	4.20	2.98	65	26.5R25	337	14.7	articulated	$ 282	ARHCA x 1.2
Caterpillar 740B EJ	Caterpillar	740B EJ	38.0	24.0	4.20	3.20	74	29.5R25	365	14.7	articulated	$ 312	ARHCA x 1.2
Caterpillar 745C	Caterpillar	745C	41.0	73.8	4.20	3.20	74	29.5R25	365	14.7	articulated	$ 323	ARHCA x 1.2
Caterpillar 770G	Caterpillar	770G	35.0	25.1	4.78	3.23	71	18.00R33	381	16.7	rigid	$ 389	ARHCA x 1.2
Caterpillar 772G	Caterpillar	772G	43.8	31.3	4.78	3.64	82	21.00R33	446	16.7	rigid	$ 389	ARHCA x 1.2
Caterpillar 773G	Caterpillar	773G	52.8	35.2	5.67	3.77	103	24.00R35	578	19.8	rigid	$ 461	ARHCA x 1.2
Caterpillar 775G	Caterpillar	775G	61.7	41.7	5.67	3.97	112	24.00R35	615	19.8	rigid	$ 481	ARHCA x 1.2
Caterpillar 777G	Caterpillar	777G	91.0	60.2	6.10	4.39	165	27.00R49	765	21.4	rigid	$ 656	ARHCA x 1.2
Caterpillar 785D	Caterpillar	785D	132.9	78.0	7.06	4.97	249	33.00-R51	1,082	24.7	rigid		
Caterpillar 789C	Caterpillar	789C	180.7	105.0	7.67	5.21	317	37.00R57	1,417	26.8	rigid		
Caterpillar 793F	Caterpillar	793F	226.0	134.0	8.30	6.50	386	40.00-R57	1,976	29.1	rigid		
Caterpillar 795F AC	Caterpillar	795F AC	313.0	213.0	8.97	7.04	570	56/80 R63	2,535	31.4	rigid		
Caterpillar 797F	Caterpillar	797F	350.0	240.0	9.75	7.00	624	59/80 R63	2,983	34.1	rigid		
Hitachi EH1100-3	Hitachi	EH1100-3	59.0	38.7	4.44	3.76	111	24.00R35	567	15.5	rigid		
Hitachi EH1700-3	Hitachi	EH1700-3	95.2	60.4	6.25	4.26	163	27.00R49	783	21.9	rigid		
Hitachi EH3500ACII	Hitachi	EH3500ACII	185.0	111.0	8.01	5.63	325	37.00R57	1,491	28.0	rigid		
Hitachi EH4000ACII	Hitachi	EH4000ACII	222.0	134.0	9.54	5.71	384	46/90 R57	1,864	33.4	rigid		
Hitachi EH5000ACII	Hitachi	EH5000ACII	290.0	206.0	9.28	7.12	500	53/80 R63	2,014	32.5	rigid		
Komatsu HM400	Komatsu	HM400	36.5	22.3	3.45	2.97	74	29.50R25	338	12.1	articulated	$ 250	ARHCA x 1.2
Komatsu HD785-7	Komatsu	HD785-7	91.0	60.0	6.89	4.29	166	27.00R49	895	24.1	rigid	$ 656	ARHCA x 1.2
Komatsu HD1500-7	Komatsu	HD1500-7	144.1	78.0	6.09	4.97	249	33.00-R51	1,109	21.3	rigid		
Komatsu 730E	Komatsu	730E	183.7	111.0	7.54	5.61	324	37.00R57	1,492	26.4	rigid		
Komatsu 830E AC	Komatsu	830E AC	221.2	147.0	7.32	6.71	386	40.00-R57	1,865	25.6	rigid		
Komatsu 860E-1K	Komatsu	860E-1K	254.0	169.0	8.33	6.39	454	50/80 R57	2,014	29.2	rigid		
Komatsu 930E-4	Komatsu	930E-4	291.8	211.0	8.69	7.06	502	53/80 R63	2,014	30.4	rigid		
Komatsu 960E-2K	Komatsu	960E-2K	326.6	214.0	9.19	7.39	576	56/80 R63	2,610	32.2	rigid		
Liebherr T282C	Liebherr	T282C	363.0	220.0	9.68	7.43	600	56/80 R63	2,800	33.9	rigid		
Unit Rig MT3300	Unit Rig	MT3300	136.0				252	33.00-R51	1,193	-	rigid		
Unit Rig MT3700AC	Unit Rig	MT3700AC	186.0	123.0	7.30	6.20	336	40.00-R57	1,492	25.6	rigid		
Unit Rig MT4400AC	Unit Rig	MT4400AC	221.0	144.0	8.00	6.10	392	50/80 R57	2,014	28.0	rigid		
Unit Rig MT5500AC	Unit Rig	MT5500AC	326.0	218.0	9.45	6.86	543	56/80 R63	2,014	33.1	rigid		
Unit Rig MT6300AC	Unit Rig	MT6300AC	363.0	215.0	9.70	7.39	603	59/80 R63	2,796	34.0	rigid		
Caterpillar 730C2	Caterpillar	730C2	30.0									$ 285	YG
Komatsu HM350	Komatsu	HM350	35.0									$ 285	YG
Caterpillar 730E	Caterpillar	730E	30.0								articulated	$ 325	YG
Terex TA30	Terex	TA30	30.0								articulated	$ 295	YG
Volvo A30D	Volvo	A30D	30.0									$ 300	YG

CCRP Cost Estimate Table W-15: Yukon Government Third Party Equipment Rental Rates

Data Source: http://www.geology.gov.yk.ca/pdf/third-party-rental-book-2019.pdf

wood.

Type	Area	Priority (Distance from Dawson)	Company	No.	Year	Description	Fluctuation	Wet	Mob/Demob	Dry	Standby
Dump Truck	Whitehorse	11	Lane's Yukon Yardworks INC Quality North Services Ltd.	9 2	-- --	International - 4700/4900 - 8 yds - 4700-SA 12'box/ 4900 SA - Single Axle 12' box, Single Axle Kenworth - W900 - tandem - - 15' Box	No No	$100.00 $115.00	$100.00 $105.00	$100.00 $0.00	$65.00 $74.75
Dump Truck	Whitehorse	11	Solution Excavating Ltd.	3	--	Kenworth - T800B TA & T600 TA - 12 Yard - - Pup	Yes	$115	$0	$0	$75
Dump Truck	Whitehorse	11	Lane's Yukon Yardworks INC	21	--	GMC - Topkick - 16 yds - - 15' Dump Tandem axle	No	$120	$120	$100	$65
Dump Truck	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	15	--	Freightliner - - 16 yd - - Air Tarp for Box	Yes	$125	$125	$120	$78
Dump Truck	Whitehorse	11	536402 Yukon Inc DBA/ Northern Construciton	7	--	Kenworth & Western Star - Tandem - 12 yds - 2 Available - Tarp, Hylift	Yes	$125	$125	$0	$81
Dump Truck	Whitehorse	11	Arctic Backhoe Services Ltd.	28	--	Kenworth - Tandem Axle - 12 Yd - 3 available	Yes	$125	$180	$0	$81
Dump Truck	Whitehorse	11	Coates Services Yukon Ltd.	11	--	Kenworth - T800 - 12 yds - 4 available - Tarp, Chipped Hook	No	$125	$125	$0	$81
Dump Truck	Whitehorse	11	VanGorda Enterprises	4	--	Ford - F350 - 3 cubic yards - - Dump Trailer 14'	Yes	$125	$125	$115	$75
Dump Truck	Whitehorse	11	White Lightening Truck Services	1	--	Kenworth - C-500 - 15' box - Tandem - Air Tarp	No	$125	$250	$100	$65
Dump Truck	Whitehorse	11	Yukon Equipment Services Ltd.	9	--	Kenworth - T800 - 12 yd - 16 ft box - High Lift Gate	No	$125	$125	$125	$81
Dump Truck	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	8	--	Ford - 9000 - 16 yd - - High Lift Gate	Yes	$130	$130	$120	$78
Dump Truck	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	20	--	Kenworth - T800 - - 4 Available - 16' Dump Box	Yes	$130	$200	$0	$85
Dump Truck	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	7	--	Kenworth - T800 - 16' Box - 4 Available	Yes	$130	$200	$0	$85
Dump Truck	Whitehorse	11	Getaway Construction Inc.	6	--	Western Star - 4800 - 10 Yd - Gravel truck	No	$130	$130	$0	$85
Dump Truck	Whitehorse	11	Rabbit Creek Transport Inc.	9	--	Kenworth - Tandem - 10 yard - 3 available with Trucks	Yes	$130	$100	$120	$78
Dump Truck	Whitehorse	11	McClintock Contracting	4	--	Western Star - - 12 yd box - Tandem Axle. 2 Available	Yes	$133	$133	$0	$86
Dump Truck	Whitehorse	11	16142 YT Inc. Northern Enviro Services	11	--	Kenworth - W900 - Tandem - 12 Yd - 5 Available - Gravel trucks	Yes	$135	$135	$0	$88
Dump Truck	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) Ralph Hotte Contracting Ltd.	77 10	2017 --	Kenworth - T800 - 12yd³ legal - Tandem. 7 Available - Tarp, Vibrator, Teflon Non Stick Liner Freightliner, Louisville - FLD 120, L9000 - 14 yd - 2 available - Dump Box 14 yd	No Yes	$135.00 $135.00	$135.00 $135.00	$135.00 $120.00	$87.75 $78.00
Dump Truck	Whitehorse	11	Goal Done Contracting Ltd. Arctic Backhoe Services Ltd.	5 30	-- --	Kenworth/Fraitliner - T800 - 16 yd - tandem- 2 avail -1 high lift tail gate 1 not high lift g - High Lift Gate WesternStar - Tandem Axle - 20 Yd - c/w Pup trailer - Tandem Axle Pup Trailer	No Yes	$138.00 $145.00	$138.00 $180.00	$0.00 $0.00	$89.70 $94.25
Dump Truck	Whitehorse	11	Carey On Construction Gear Worx Contracting	4 3	-- --	GMC/ Ford - - 10 ton - GMC 12 yd box/ Ford 18 yard cross gate trailer - Box 12 yd, 18 yd Cross Gate Trailer Kenworth - W900 Tandem - 10 yd - - Pup Trailer	Yes Yes	$150.00 $150.00	$150.00 $150.00	$160.00 $0.00	$104.00 $97.50
Dump Truck	Whitehorse	11	Carey On Construction Gear Worx Contracting	4	--	Kenworth - T800 Tandem - 10 yd - - Pup Trailer	Yes	$150	$150	$0	$98
Dump Truck	Whitehorse	11	Graceland Construction	1	--	Kenworth - T800 - - - Dump Box 14 yd	Yes	$150	$150	$140	$91
Dump Truck	Whitehorse	11	Boreal Engineering Ltd	3	--	Mack - Tri Drive - - - 21' Box, High Lift Gate	No	$160	$160	$120	$78
Dump Truck	Whitehorse	11	Boreal Engineering Ltd	13	--	Kenworth - Tandem - - - 16' Dump Box, High Lift Gate	No	$160	$160	$120	$78
Dump Truck	Whitehorse	11	Cobalt Construction Inc.	11	--	Ford Louisville - TA - 12 yd³ -	No	$160	$150	$0	$104
Dump Truck	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	15	--	Kenworth - T800 - 15 ton - 6 available	No	$160	$0	$0	$104
Dump Truck	Whitehorse	11	536402 Yukon Inc DBA/ Northern Construciton	10	--	Western Star - - - with pup trailer - Tandem Pup	Yes	$165	$165	$0	$107
Dump Truck	Whitehorse	11	Arctic Backhoe Services Ltd.	29	--	Western Star - Tridem - 16 Yd -	Yes	$165	$180	$0	$107
Dump Truck	Whitehorse	11	Goal Done Contracting Ltd.	8	--	- W900 Tri drive - 20 yds - - 20 yd box with Pintle Hitch	No	$168	$168	$0	$109
Dump Truck	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) 16142 YT Inc. Northern Enviro Services	72 57	2010 --	Kenworth - T800 - 24 yd³ Legal with Pup - Tandem - Teflon Non Stick Liner, Tarp, Tridem Pup - - - Garbage Bin Roll Off Truck - 20 YD Bin, 30YD Bin x2	No Yes	$185.00 $200.00	$185.00 $200.00	$185.00 $0.00	$120.25 $130.00
Dump Truck	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) 16142 YT Inc. Northern Enviro Services	3	--	Kenworth - Tandem - 16 yds boxes - 2 Available	Yes	$220	$220	$0	$143
Dump Truck	Whitehorse	11	Cobalt Construction Inc.	45	--	Volvo - A40 F - 40 ton - Rock truck (ADT). 3 Available	No	$270	$300	$0	$176
Dump Truck	Whitehorse	11	Cobalt Construction Inc.	46	2014	John Deere - 410 E - 40 ton - Rock truck (ADT). 4 available	No	$270	$300	$0	$176
Hiab	Whitehorse	11	Graceland Construction	2	--	Ford - L800 - 10 ton - - 16 Ft Flat Deck-Dump Deck	Yes	$160	$160	$150	$98
Hiab	Whitehorse	11	16142 YT Inc. Northern Enviro Services Cobalt Construction Inc.	25 31	-- --	Sterling/Ford - - 3 Ton - Has 5th Wheel can pull a highboy trailer - 12000 Lb. Hiab, 5th Wheel, Deck 16' GMC Top Kick & International - - 5 Ton - GMC Top Kick & International. Hiab w/	Yes No	$180.00 $180.00	$180.00 $200.00	$0.00 $0.00	$117.00 $117.00
Hiab	Whitehorse	11	16142 YT Inc. Northern Enviro Services	9	--	Flatdeck - Flat Deck Peterbuilt - Tilt Deck - 18,000 lbs - 20ft Tandem Tilt Deck, Truck 18000 lb Hiab	Yes	$220	$220	$0	$143
Hiab	Whitehorse	11	16142 YT Inc. Northern Enviro Services	13	--	Picker - Deck 20' GMC - Tandem - 14000 lb - Service Truck - Hiab on Truck - 2 available -	Yes	$220	$220	$0	$143
Rock Truck	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	32	2006	Komatsu - HM350 - 35 ton - 2 available	No	$250	$1100	$250	$163
Rock Truck	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) Cobalt Construction Inc.	80 12	2018 2006	CAT - 730C2 - 30 ton - 2 Available John Deere - 350D - 35 Ton - 2 Available	No No	$250.00 $250.00	$1,100.00 $300.00	$250.00 $0.00	$162.50 $162.50

CCRP Cost Estimate Table W-15: Yukon Government Third Party Equipment Rental Rates

Data Source: http://www.geology.gov.yk.ca/pdf/third-party-rental-book-2019.pdf

Type	Area	Priority (Distance from Dawson)	Company	No.	Year	Description	Fluctuation	Wet	Mob/Demob	Dry	Standby
Rock Truck	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) Cobalt Construction Inc.	13	--	John Deere - 400 D - 40 Ton - 4 Available - Rock Truck (ADT)	No	$270	$300	$0	$176
Rock Truck	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	21	--	Volvo - A30D - 30 ton - - Heated Box	Yes	$280	$400	$0	$182
Rock Truck	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	9	--	Volvo - A 30 D - 30 Ton - - Heated Box	Yes	$280	$400	$0	$182
Rock Truck	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	4	--	Terex - TA30 - 30 Ton - Articulating 11 Available	No	$295	$0	$0	$192
Rock Truck	Whitehorse	11	16142 YT Inc. Northern Enviro Services	45	--	Cat 730 - Articulating 6 Wheel Drive - 730 E - 3 Available	Yes	$325	$500	$0	$211
Tractor	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse) Deadman Creek Enterprises Inc. (Teslin)	29 39	-- --	Kenworth - T800-W900L-T800B - - Tandem Axle 3 Available T800 W900L T800B Kenworth - Tandem Axle - - 3 Available -T800; W900L; T800B	Yes Yes	$125.00 $125.00	$125.00 $125.00	$0.00 $0.00	$81.25 $81.25
Tractor	Whitehorse	11	Graceland Construction	9	--	Mack - - 500HP - - Tractor Trailer 40' Deck 40Ton	Yes	$150	$150	$140	$91
Tractor	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	23 24	-- --	Kenworth - T800 - - Tandem Axle - Belly Dumps, Scissor Neck 53', End Dump 30', 28' Deck, Lo-Boy 40', Step Deck 53' Kenworth - T800 - - Tandem Axle - Belly Dumps, Scissor Neck 53', End Dump	Yes Yes	$155.00 $155.00	$155.00 $155.00	$150.00 $150.00	$97.50 $97.50
Tractor	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	25	--	30', 28' Deck, Lo-Boy 40', Step Deck 53' Western star - - - Tandem Axle - Belly Dumps, Scissor Neck 53', End Dump	Yes	$155	$155	$150	$98
Tractor	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	26	--	30', 28' Deck, Lo-Boy 40', Step Deck 53' Volvo - - - Tandem Axle - Belly Dumps, Scissor Neck 53', 28' Deck, End Dump	Yes	$155	$155	$150	$98
Tractor	Whitehorse	11	Ralph Hotte Contracting Ltd.	12	--	30', Lo-Boy 40', Step Deck 53' Kenworth & Peterbilt - W900 & 377 - - 2 available - Lo-Boy 9' Wide	Yes	$155	$250	$0	$101
Tractor	Whitehorse	11	Son Rise General Contracting P S Sidhu Trucking Ltd (Whse)	2 23	-- --	Freightliners - Tandem - - 2 available - lowboy 40 ton x 2, Belly dump x2, 30 ft - 5000 Gal Tanker, oil field float, 48 ft hiboy, 48 ft Dry Van Kenworth - T800 - 63500 kg - 20 available	Yes No	$180.00 $185.00	$170.00 $0.00	$0.00 $0.00	$117.00 $120.25
Tractor/Winch Truck	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services) 16142 YT Inc. Northern Enviro Services	7 48	-- --	Kenworth - - 40 ton - - 53' tri axle scissor neck, Belly Dump, 30' end dump high lift gate, 48' tri axle hi boy, 48' tri axle step deck Mack - Steam Truck - 2000 gal tank - 3000 PSI - 2 available - Landa Steamer	Yes Yes	$180.00 $195.00	$165.00 $195.00	$160.00 $0.00	$104.00 $126.75
Tractor/Winch Truck	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services) 16142 YT Inc. Northern Enviro Services	50	--	Kenworth - T800 - - 500 lirte fuel tank oil/lube - 2 Available	Yes	$195	$195	$0	$127
Tractor/Winch Truck	Whitehorse	11	Boreal Engineering Ltd Carey On Construction	12 6	-- --	Kenworth - - 40 ton winch - 3 available - Scissor Neck, Belly Dump, HI-Boy, Lo- Boy Ford/ GMC - 9000W/9000/Cenreal - 10 ton - 3 available -40 ton low bed/hi boy	Yes Yes	$200.00 $200.00	$200.00 $200.00	$150.00 $210.00	$97.50 $136.50
Tractor/Winch Truck	Whitehorse	11	Yukon Equipment Services Ltd.	8	--	Kenworth - T800 - 40 Ton Winch - - Scissor Neck	No	$200	$200	$0	$130
Tractor/Winch Truck	Whitehorse	11	16142 YT Inc. Northern Enviro Services	64	--	- - - Winch Tractor. 3 Available tri axle trailers - Scissor Neck, High Boy	Yes	$225	$225	$0	$146
Tractor/Winch Truck	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	65 21	-- --	- Tandam - 14,000 lb - - Winch Deck Truck, Fold Up Picker, Tri Axle, Towing Capabilities, Tri Drive Kenworth - T800 - 30 ton - 4 available - Tri Axle, Scissor Neck	Yes No	$225.00 $240.00	$225.00 $0.00	$0.00 $0.00	$146.25 $156.00
Tractor/Winch Truck	Whitehorse	11	Coates Services Yukon Ltd.	26	--	- Tridem - - Live roll tridem	No	$250	$250	$0	$163
Tractor/Winch Truck	Whitehorse	11	Cobalt Construction Inc.	39	2012	Kenworth - - - 2 Available. 35T Winch. - Scissor Neck	No	$250	$250	$0	$163
Tractor/Winch Truck	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	12	--	Kenworth - T800 - 30 ton -	Yes	$250	$250	$0	$163
Water Truck w/pump	Whitehorse	11	Lane's Yukon Yardworks INC	13	--	- Ram 5500 - - - Pump 2", Pump 3", 1000 gal Water Tank	No	$120	$120	$0	$78
Water Truck w/pump	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	22	--	Kenworth - W900 - 2500 Gallon Tank - - Spray Bar	Yes	$130	$200	$0	$85
Water Truck w/pump	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	5	--	Kenworth - W900 - 2500 Gal - - Spray Bar	Yes	$130	$200	$0	$85
Water Truck w/pump	Whitehorse	11	Yukon Equipment Services Ltd. 16142 YT Inc. Northern Enviro Services	5 10	-- --	Kenworth - T800 - 16 cu m tank - Tractor - Discharge pump and hose reel fire nozzel, Spray Bar, Pump Kenworth - W 900 - 2500 Gal - 2 Available - Pump 4"	No Yes	$130.00 $135.00	$140.00 $135.00	$140.00 $0.00	$91.00 $87.75
Water Truck w/pump	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	19	--	Ford - 9000 - 4000 gal - - 3" Pump	Yes	$135	$135	$120	$78
Water Truck w/pump	Whitehorse	11	Arctic Backhoe Services Ltd.	9	--	Kenworth - T/A - 3000 Gal - Water Tanker - Spray Bar	Yes	$145	$180	$0	$94
Water Truck w/pump	Whitehorse	11	Berdoe Enterprises	9	--	Kenworth - T800 Dump Truck - 3000 Gal - - Slip In Tank	No	$145	$145	$145	$94
Water Truck w/pump	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	2 3	1977 1995	Pacific - Tandem - 4000 G - - Suction & Discharge Pump/Hose Mack - CH613 - 4000 G - Tandem - Suction & Discharge Pump/Hose	No No	$150.00 $150.00	$150.00 $150.00	$150.00 $150.00	$97.50 $97.50
Water Truck w/pump	Whitehorse	11	Ralph Hotte Contracting Ltd.	13	--	Louisville - - 3000 Gallon - - Water Tank 3000 Gal	Yes	$150	$150	$140	$91
Water Truck w/pump	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) P S Sidhu Trucking Ltd (Whse)	1 17	-- --	Willock - Tandem - 5000 G - Trailer - Kenworth Tractor, Suction & Discharge Pump/Hose, Mack Tractor, Peterbilt Tractor Kenworth - T800 - 2500 gal - 4 available - Pump	No No	$160.00 $165.00	$160.00 $0.00	$160.00 $0.00	$104.00 $107.25
Water Truck w/pump	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	86	1997	International - - 4000G - 6 wheel drive off road - 6x6 Drive, Suction & Discharge Pump/Hose	No	$175	$175	$175	$114
Backhoe (rubber tire)	Whitehorse	11	16142 YT Inc. Northern Enviro Services	21	--	Case - 580D - - Loader Backhoe	Yes	$110	$250	$0	$72
Backhoe (rubber tire)	Whitehorse	11	Ralph Hotte Contracting Ltd. Arctic Backhoe Services Ltd.	4 15	-- --	John Deere - 410 C - - - Bucket 1-1/2 yd, Hoe Bucket 1/3 yd, Extended reach 20' Cat - 420 D - 1/4 Yd - 4x4 Extera A Hoe - Clean Up Bucket, Digging Bucket	Yes Yes	$110.00 $130.00	$250.00 $180.00	$100.00 $0.00	$65.00 $84.50
Backhoe (rubber tire)	Whitehorse	11	Ralph Hotte Contracting Ltd. Arctic Backhoe Services Ltd.	16	--	Cat - 420 - 1/4 Yd - 4x4 Extera Hoe - Frost Bucket, Rock Bucket	Yes	$145	$180	$0	$94
Backhoe (rubber tire)	Whitehorse	11	Rabbit Creek Transport Inc. P S Sidhu Trucking Ltd (Whse)	5 35	2006 --	Case - 509 & 580 Super M - - Hoe - Snow Blade, Forks, Quick Change, Blade, Grapples, Clean Up Bucket, Thumb, Digging Bucket, Frost Bucket, 4 Way Front Bucket, Extenda hoe CAT - 425 E - 3 yard - 3 available - Clean Up Bucket, Digging Bucket	No No	$150.00 $195.00	$100.00 $0.00	$120.00 $0.00	$78.00 $126.75
Brush Cutting Equipment	Whitehorse	11	Lane's Yukon Yardworks INC	2	--	Kubota - L3301 Tractor - 35 HP - - Rotary Mower 6', Flail Mower 6' w/side shift	No	$110	$110	$0	$72

CCRP Cost Estimate Table W-15: Yukon Government Third Party Equipment Rental Rates

Data Source: http://www.geology.gov.yk.ca/pdf/third-party-rental-book-2019.pdf

Type	Area	Priority (Distance from Dawson)	Company	No.	Year	Description	Fluctuation	Wet	Mob/Demob	Dry	Standby
Brush Cutting Equipment	Whitehorse	11	Lane's Yukon Yardworks INC	5 8	-- --	Case - SV300 - 90 HP - Wheeled, steel track over kit option - 72" Blue Diamond extreme duty can mow/mulch 8" mat Fermec - TLK 760 - 11 ton - - 24" Digging bucket, extend a hoe, Clean up	No No	$110.00 $110.00	$110.00 $125.00	$110.00 $80.00	$71.50 $52.00
Brush Cutting Equipment	Whitehorse	11	Lane's Yukon Yardworks INC	10	--	bucket 42", clambshell bucket Case - TR 320 - 90HP - tracked - 72" Blue Diamond extreme duty can	No	$110	$110	$110	$72
Brush Cutting Equipment	Whitehorse	11	B L Building	2	--	mow/mulch 8" mat Kubota - SVL75 - 75 HP - Skid Steer - 72" Blue Diamond Extreme brush cutter	No	$125	$100	$0	$81
Brush Cutting Equipment	Whitehorse	11	Solution Excavating Ltd.	1	--	Bobcat - 080 - - - rotary head	Yes	$140	$0	$0	$91
Brush Cutting Equipment	Whitehorse	11	Cross Fall Contracting Lane's Yukon Yardworks INC	5 15	-- --	Kubota - SVL-75 w/ 72" Brushcutter - 72" - - 72" Blue Diamond Front Mounted Brush Head Case - 970 - 110 HP - Farm tractor boom mower - Tiger Boom mower	Yes No	$145.00 $150.00	$125.00 $150.00	$135.00 $80.00	$87.75 $52.00
Brush Cutting Equipment	Whitehorse	11	Cross Fall Contracting Lane's Yukon Yardworks INC	16 17	-- --	Case - 970 - 110HP - Farm tractor boom mower - 15' woods batwing mower, handy hitch side shift Case - CX57c - 50" - excavator - 50" Blue diamond mower/mulcher 8" capacity	No No	$150.00 $150.00	$300.00 $150.00	$80.00 $80.00	$52.00 $52.00
Brush Cutting Equipment	Whitehorse	11	VanGorda Enterprises	3	--	Bobcat - e42 - 9,700 lbs - Excavator - Flail Mower 30"	No	$150	$125	$140	$91
Brush Cutting Equipment	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	16	--	Kubota - SVL 90 - - - 72" Mower	Yes	$155	$200	$0	$101
Brush Cutting Equipment	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	14	--	Kubota - SVL 90 - - - 72" Mower	Yes	$155	$200	$0	$101
Brush Cutting Equipment	Whitehorse	11	Goal Done Contracting Ltd.	2	--	Bobcat - 205S - - - 72" Mower, Metal over the tier tracks, Rubber Tires	No	$155	$130	$0	$101
Brush Cutting Equipment	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	84 85	-- --	CAT - 289 - 72" - Track Skid Steer. 2 Available - Blue Diamond Brush Mower - KX80 - 30" - Promac LDM30	No No	$175.00 $175.00	$500.00 $500.00	$175.00 $175.00	$113.75 $113.75
Brush Cutting Equipment	Whitehorse	11	Cobalt Construction Inc.	42	--	Kubota - 080 - 8 ton - Excavator - Mulcher Head	No	$175	$0	$0	$114
Brush Cutting Equipment	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	43 17	-- --	Caterpillar / Case - 279C & TV380 - - Cat 279C & Case TV380. Skid Steer - Mulcher Head CASE - 7120 - - - 60" Side Booom	No Yes	$175.00 $175.00	$0.00 $300.00	$0.00 $0.00	$113.75 $113.75
Brush Cutting Equipment	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	18	--	Kubota - 080 - 8 ton - - 36" Fae Mower	Yes	$175	$300	$0	$114
Brush Cutting Equipment	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	11	--	Kubota - 080 - 8 Ton - - 36" Fae Mower	Yes	$175	$300	$0	$114
Brush Cutting Equipment	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	13	--	Case - 7120 Sideboom - - - 60" Side Booom	Yes	$175	$300	$0	$114
Brush Cutting Equipment	Whitehorse	11	Gear Worx Contracting	5	--	Bobcat - T200 - 8000 lb - 72" Rotary Brusher - Mower, Reclaimer, Brusher	Yes	$175	$200	$0	$114
Brush Cutting Equipment	Whitehorse	11	Lane's Yukon Yardworks INC	6 14	-- --	Case - SV300 - 90 HP - wheeled, steel track over kit option - 66" Fecon mulching head Case - TR320 - 90 HP - wheeled, tracked - 66" Fecon mulching head	No No	$175.00 $175.00	$110.00 $110.00	$110.00 $110.00	$71.50 $71.50
Brush Cutting Equipment	Whitehorse	11	Yukon Equipment Services Ltd.	7	--	Kubota - 080 - 8.5 ton - Excavator with Fecon Mulcher head	No	$175	$300	$175	$114
Brush Cutting Equipment	Whitehorse	11	Goal Done Contracting Ltd.	3	--	Kabota - KX 080 Hoe - 9000 kg - - 36" Torrent Mulcher Head	No	$185	$180	$0	$120
Brush Cutting Equipment	Whitehorse	11	ORC Tree Service	2	--	Bobcat - T590 - - - Brush Mower	No	$190	$190	$0	$124
Brush Cutting Equipment	Whitehorse	11	ORC Tree Service	3	--	Kubota - SVL - 11000 lbs - - Brush Mower, Stump Binder	No	$190	$190	$0	$124
Brush Cutting Equipment	Whitehorse	11	Meldon Construction Inc.	6	--	Komatsu - - PC120 - - 36" Pro Mag Brush Cutter	Yes	$200	$190	$0	$130
Brush Cutting Equipment	Whitehorse	11	Whitestone Ventures	2	--	Kubota - 126MX Tractor - 125 HP - - 15' Schulte Batwing Mower with Flex Arm	No	$200	$275	$0	$130
Brush Cutting Equipment	Whitehorse	11	Goal Done Contracting Ltd. Deadman Creek Enterprises Inc (Whitehorse)	9 19	-- --	Kobelco - ED195 - 20,000 kg - Blade runner - 6 Way Blade, 48" Mulcher head Fecon Volvo - EC210 BLC - - available - 52" Promac	No Yes	$210.00 $225.00	$250.00 $400.00	$0.00 $0.00	$136.50 $146.25
Brush Cutting Equipment	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	12	--	Volvo - EC 210 BLC - - 2 Available - 52" Promac	Yes	$225	$400	$0	$146
Brush Cutting Equipment	Whitehorse	11	ORC Tree Service	1	--	Brush Bandit - 12 " Chipper - - to behind Crew Cab 3500 4x4	No	$225	$225	$0	$146
Brush Cutting Equipment	Whitehorse	11	16142 YT Inc. Northern Enviro Services	56	--	Kobota - SV95 - - Tracked Hyd Mulcher - Mulcher	Yes	$250	$300	$0	$163
Brush Cutting Equipment	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	16 71	-- --	Linkbelt - 240 - - 2 available - Promac 52CMPII Brush Cutter, Cage for Cab Tub Grinder - - 10' Tub - Will need to rent an excavator with Tub Grinder	No No	$250.00 $250.00	$700.00 $500.00	$250.00 $250.00	$162.50 $162.50
Brush Cutting Equipment	Whitehorse	11	Big Foot Construction	1	--	Ford - 6640 Side Boom Mower - 6640 - - 60" Cutter Head Hydo-Axe	No	$265	$265	$0	$172
Brush Cutting Equipment	Whitehorse	11	Cobalt Construction Inc.	34	--	Cat - D5H - - Track Skidder - 6 Way Blade, Grapples	No	$265	$250	$0	$172
Brush Cutting Equipment	Whitehorse	11	Cobalt Construction Inc.	19	--	John Deere - Excavator 270 LC - - - Hydro Axe	No	$280	$250	$0	$182
Brush Cutting Equipment	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	3	--	- 225 Doosan Hoe - 52" - - Pro Mac, Mulcher, Hydro Axe	Yes	$285	$165	$260	$169
Brush Cutting Equipment	Whitehorse	11	Cobalt Construction Inc.	44	--	Caterpillar - 336 EL - - - Hydro Axe	No	$295	$250	$0	$192
Brush Cutting Equipment	Whitehorse	11	Lane's Yukon Yardworks INC	4	--	Gyro - track GT-13 Mulcher - 125 HP - - Mulching Head 7'	No	$300	$200	$0	$195
Brush Cutting Equipment	Whitehorse	11	Ace Vegetation Control Service Ltd Goal Done Contracting Ltd.	2 12	-- --	HydorAx - 621E / 721E - - 32" Rubber Tire - 8' Rotary Cutter Head cuts up to 6" trees Fecon - FTX 140 - - Forestry Mulcher - Fecon Bull Hog 1.88m cutting head,	No No	$315.00 $325.00	$215.00 $180.00	$0.00 $0.00	$204.75 $211.25
Brush Cutting Equipment	Whitehorse	11	Meldon Construction Inc.	2	--	12,500 lb hydraulic worn winch Hydro Ax - - 521A, 511Ex, 721E - 3 available - 8ft mower deck	Yes	$330	$190	$0	$215
Brush Cutting Equipment	Whitehorse	11	Lane's Yukon Yardworks INC	22	--	Bandit - - 9" - 9" wood chipper - Truck	No	$350	$350	$0	$228
Brush Cutting Equipment	Whitehorse	11	Yukon Equipment Services Ltd.	1	--	CMI Hurricane - C250 - 300 HP / 107" cut width - Mulcher - Rear Winch	No	$350	$360	$350	$228
Brush Cutting Equipment	Whitehorse	11	Big Foot Construction	2	--	SamSung Hoe Track - 210 - - - 60" Cutter Head Hydo-Axe	No	$365	$265	$0	$237
Brush Cutting Equipment	Whitehorse	11	ORC Tree Service	4	--	Brush Bandit - 12" Drum chipper - -	Yes	$375	$375	$0	$244
Brush Cutting Equipment	Whitehorse	11	Ace Vegetation Control Service Ltd Deadman Creek Enterprises Inc (Whitehorse)	1 15	-- --	Hurricane - CMI 250 - 275 HP - Mulcher - Steel Tracks - 8' FAE Mulcher Head cuts up to 20" trees LAMTRAC - 8290 - 300 HP - - Mulcher Head	No Yes	$385.00 $400.00	$215.00 $400.00	$0.00 $0.00	$250.25 $260.00
Brush Cutting Equipment	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	10	--	Lamtrac - 8290 Q - 300 HP - - Mulcher Head	Yes	$400	$400	$0	$260

CCRP Cost Estimate Table W-15: Yukon Government Third Party Equipment Rental Rates

wood.

Data Source: http://www.geology.gov.yk.ca/pdf/third-party-rental-book-2019.pdf

Type	Area	Priority (Distance from Dawson)	Company	No.	Year	Description	Fluctuation	Wet	Mob/Demob	Dry	Standby
Crawler D6 & Up	Whitehorse	11	Son Rise General Contracting	3	--	Cat - D6C - - 2 available - U Blade, Winch	Yes	$160	$185	$0	$104
Crawler D6 & Up	Whitehorse	11	Arctic Backhoe Services Ltd.	33	--	Crawler - D6N LGP - - - Ripper, Pilot, Blade	Yes	$175	$250	$0	$114
Crawler D6 & Up	Whitehorse	11	Gear Worx Contracting	1	--	- D7G - - - Angle Blade, Winch, Brush Rake	Yes	$175	$200	$0	$114
Crawler D6 & Up	Whitehorse	11	Graceland Construction	8	--	Caterpillar - D7G - - - Tilt Blade, Angle Blade, Ripper	Yes	$175	$150	$165	$107
Crawler D6 & Up	Whitehorse	11	Coates Services Yukon Ltd.	2 3	-- --	Cat - D6H LGP - - Pilot car required / included in mob/demob price - Tilt Blade, U Blade, Angle Blade Cat - D7H - - Pilot car required / included in Mob/demob price - Tilt Blade, U	No No	$180.00 $180.00	$275.00 $275.00	$0.00 $0.00	$117.00 $117.00
Crawler D6 & Up	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	4	--	Blade, Angle Blade CAT - D6T - 54000 lb - - 6 Way Blade, Winch	Yes	$180	$400	$0	$117
Crawler D6 & Up	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	27	--	Cat - D6T - 54000 lbs - - 6 Way Blade, Winch	Yes	$180	$400	$0	$117
Crawler D6 & Up	Whitehorse	11	McCabe Creek Farm	1	--	Cat - D7E - - - Ripper, Brush Blade	Yes	$180	$400	$150	$98
Crawler D6 & Up	Whitehorse	11	Boreal Engineering Ltd	9	--	Caterpillar - D6D - - - Winch, Angle Blade	No	$185	$300	$139	$90
Crawler D6 & Up	Whitehorse	11	Yukon Equipment Services Ltd.	17	--	Cat - D6N - 45,000 lbs - - Winch, 6 Way Blade	No	$185	$350	$185	$120
Crawler D6 & Up	Whitehorse	11	Graceland Construction	7	--	Caterpillar - D8K - - - Angle Blade, Tilt Blade, Ripper	Yes	$190	$150	$180	$117
Crawler D6 & Up	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	18 79	2014 2017	CAT - D6T XL - D6 - - Angle Blade, Tripple Ripper - D6K2 LGP - D6 - - 6 Way Blade, Tripple Ripper	No No	$200.00 $200.00	$700.00 $700.00	$200.00 $200.00	$130.00 $130.00
Crawler D6 & Up	Whitehorse	11	Whitestone Ventures Cobalt Construction Inc.	1 14	-- --	Caterpillar - D6H - - C Frame Angle Dozer & Winch - Angle Dozer Blade 12'6", Brush Rake 10'6" Cat - D6M & D6R - - Cat LGP & Cat. Ripper - 3 Available - Winch, Ripper, 6	Yes No	$200.00 $220.00	$275.00 $250.00	$180.00 $0.00	$117.00 $143.00
Crawler D6 & Up	Whitehorse	11	Boreal Engineering Ltd	15	--	Way Dozer Caterpillar - D6R - - - 6 Way Blade, Ripper	No	$225	$300	$169	$110
Crawler D6 & Up	Whitehorse	11	Gear Worx Contracting	2	--	Caterpillar - D8K - D8 - - Angle Blade, Ripper, Brush Rake	Yes	$225	$200	$0	$146
Crawler D6 & Up	Whitehorse	11	16142 YT Inc. Northern Enviro Services	71	--	CAT - D6T - - Dozer - 2 Available - Hydraulic Tilt, Winch	Yes	$230	$280	$0	$150
Crawler D6 & Up	Whitehorse	11	16142 YT Inc. Northern Enviro Services	30	--	Cat - D6M LGP - - 2 Available - 6 Way Blade, Winch, Wide Pad	Yes	$235	$400	$220	$143
Crawler D6 & Up	Whitehorse	11	16142 YT Inc. Northern Enviro Services	54	--	Cat - D6MTXL - D6M - 2 Available - Angle Dozer, Winch	Yes	$235	$400	$220	$143
Crawler D6 & Up	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) P S Sidhu Trucking Ltd (Whse)	49 12	2006 --	CAT - D7R XR - D7 - - Straight Blade, Brush Rake, Ripper, U Blade, S Blade CAT - D6NXL - 180 HP - 3 available - Tilt Angle Blade, Winch, Wide Pad	No No	$250.00 $265.00	$700.00 $0.00	$250.00 $0.00	$162.50 $172.25
Crawler D6 & Up	Whitehorse	11	McCabe Creek Farm	2	--	CAT - D8K - - - Ripper	Yes	$285	$400	$250	$163
Crawler D6 & Up	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	13	--	CAT - D7R - 180 HP - 3 available - Ripper, S Blade	No	$285	$0	$0	$185
Crawler D6 & Up	Whitehorse	11	16142 YT Inc. Northern Enviro Services	44	--	Cat - D7R Series 2 - D7R - 2 Available - Ripper, Angle Blade	Yes	$300	$450	$295	$192
Crawler D6 & Up	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	1	--	CAT - D8N - 84000 lbs - - Angle Blade, Ripper	Yes	$300	$500	$0	$195
Crawler D6 & Up	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	25	--	Cat - D8N - 84000 lbs - - Angle Blade, Ripper	Yes	$300	$500	$0	$195
Crawler D6 & Up	Whitehorse	11	16142 YT Inc. Northern Enviro Services	28	--	- D8K Hyd - - Crawler Dozer - Ripper, Brush Rake, Tilt Angle Blade	Yes	$325	$500	$310	$202
Crawler D6 & Up	Whitehorse	11	Boreal Engineering Ltd	1	--	CAT - D8R - - - Angle Blade, Ripper	No	$325	$300	$244	$158
Crawler D6 & Up	Whitehorse	11	16142 YT Inc. Northern Enviro Services	55	--	Cat - D8T - D8T - - tilt angle, Ripper, Dozer Hyd Ripper	Yes	$340	$450	$0	$221
Crawler D6 & Up	Whitehorse	11	Cobalt Construction Inc.	15	--	Cat - D8N - - 3 Available - Ripper	No	$350	$300	$0	$228
Crawler D6 & Up	Whitehorse	11	Cobalt Construction Inc.	16	--	Caterpillar - D8R & D8T - - - Ripper	No	$370	$300	$0	$241
Crawler D6 & Up	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	14	--	CAT - 8N - 380 HP - 1 available - S Blade, Ripper	No	$385	$0	$0	$250
Crawler D6 & Up	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	29	--	Cat - 8R - 380HP - - S Blade, Ripper, U Blade	No	$385	$0	$0	$250
Crawler D6 & Up	Whitehorse	11	Carey On Construction	5	--	- D-9 G - 50 ton - - U Blade, two barrel, Ripper	Yes	$400	$700	$440	$286
Crawler D6 & Up	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	30	--	Cat - 9N - 400HP - - S Blade, U Blade, Ripper	No	$410	$0	$0	$267
Crawler D6 & Up	Whitehorse	11	Cobalt Construction Inc.	32	--	Caterpillar - D9R - - - Ripper	No	$415	$350	$0	$270
Crawler D6 & Up	Whitehorse	11	16142 YT Inc. Northern Enviro Services	29	--	Cat - D9R - - Dozer - Ripper, U Dozer Tilt	Yes	$455	$700	$420	$273
Crawler D6 & Up	Whitehorse	11	Cobalt Construction Inc.	33	--	Caterpillar - D9L & D10T - - - Ripper	No	$455	$400	$0	$296
Crawler D6 & Up	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	27	--	CAT - 10N - 480 HP - 2 available - S Blade, Ripper, U Blade	No	$485	$0	$0	$315
Crawler: D5 & Down	Whitehorse	11	Coates Services Yukon Ltd.	1	--	Cat - D4C - - - S Blade, 6 Way Blade, Tilt Blade, Angle Blade	No	$120	$125	$0	$78
Crawler: D5 & Down	Whitehorse	11	Ralph Hotte Contracting Ltd.	8	--	John Deere - 550 - - - Blade 9'	Yes	$120	$250	$115	$75
Crawler: D5 & Down	Whitehorse	11	Getaway Construction Inc.	3	--	Cat - D4 - D4 - - 6 Way Blade	No	$125	$250	$0	$81
Crawler: D5 & Down	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	14	--	CAT - D3 - - - 6 Way Blade, Brush Rake, Winch	Yes	$130	$165	$130	$85
Crawler: D5 & Down	Whitehorse	11	McClintock Contracting	5	--	John Deere - 650G LGP - 15,000 lb - - 6 Way Blade	Yes	$133	$133	$120	$78
Crawler: D5 & Down	Whitehorse	11	Ralph Hotte Contracting Ltd.	15	--	CAT - D5 - - - 6 Way Blade, Wide Pad 14'	Yes	$155	$350	$145	$94
Crawler: D5 & Down	Whitehorse	11	Yukon Equipment Services Ltd.	10	--	Caterpillar - D5H LPG - 35000 lbs - - 6 Way Blade, Winch	No	$165	$350	$165	$107

CCRP Cost Estimate Table W-15: Yukon Government Third Party Equipment Rental Rates

Data Source: http://www.geology.gov.yk.ca/pdf/third-party-rental-book-2019.pdf

Type	Area	Priority (Distance from Dawson)	Company	No.	Year	Description	Fluctuation	Wet	Mob/Demob	Dry	Standby
Crawler: D5 & Down	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) Deadman Creek Enterprises Inc (Whitehorse)	17 3	-- --	CAT - D5K-2 - D5 - Dozer - Straight Blade, Scarifier, 6 Way Blade CAT - D5G - - - 6 Way Blade, Winch	No Yes	$175.00 $175.00	$500.00 $300.00	$175.00 $0.00	$113.75 $113.75
Crawler: D5 & Down	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	26	--	Cat - D5G - - - 6 Way Blade, Winch	Yes	$175	$300	$0	$114
Crawler: D5 & Down	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) Boreal Engineering Ltd	83 2	-- --	CAT - D5K - D5 - 2 available. Dozer 2012 with GPS - Straight Blade, Trimble GPS Auto Grade, Scarifier, 6 Way Blade CAT - D5H LGP - - - 6 Way Blade, Wide Tracks, Winch	No No	$200.00 $210.00	$500.00 $300.00	$200.00 $158.00	$130.00 $102.70
Crawler: D5 & Down	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	11	--	CAT - 5MG - 160 HP - - Tilt Angle Blade, Winch, Wide Pad	No	$225	$0	$0	$146
Excavator (tracked) 200 &	Whitehorse	11	Ralph Hotte Contracting Ltd.	6	--	Cat - 315CL - - - Digging Bucket 36", Clean Up Bucket 60", Hydraulic Thumb	Yes	$150	$250	$140	$91
Excavator (tracked) 200 &	Whitehorse	11	Cobalt Construction Inc.	20	--	Hitachi - Ex200-5 - - - Digging Bucket, Clean Up Bucket	No	$160	$250	$0	$104
Excavator (tracked) 200 &	Whitehorse	11	Arctic Backhoe Services Ltd.	23	--	Cat - 315 DL - 1 Yd - - Frost Bucket	Yes	$165	$180	$0	$107
Excavator (tracked) 200 &	Whitehorse	11	Coates Services Yukon Ltd.	5	--	Hitachi - EX200 - - - Clean Up Bucket, Hydraulic Thumb, Digging Bucket	No	$165	$180	$0	$107
Excavator (tracked) 200 &	Whitehorse	11	Van Bibber Trucking	7	--	Linkbelt - 210 - - - Clean Up Bucket, Digging Bucket, Hydraulic Thumb	No	$165	$170	$150	$98
Excavator (tracked) 200 &	Whitehorse	11	Arctic Backhoe Services Ltd.	22	--	Cat - 320D - 2.5yd - - Clean Up Bucket, Hydraulic Thumb, Digging Bucket	Yes	$175	$180	$0	$114
Excavator (tracked) 200 &	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse) Deadman Creek Enterprises Inc. (Teslin)	6 23	-- --	Volvo - EC220 ECC & EC 200 BLC - 50,000 lbs - 2 available - 60" Bucket, Rake, Thumb, 36" Bucket Volvo - EC 210 & EC 200 BLC - 50000 lbs - 2 available - 36" Bucket, Rake,	Yes Yes	$175.00 $175.00	$400.00 $400.00	$0.00 $0.00	$113.75 $113.75
Excavator (tracked) 200 &	Whitehorse	11	Gear Worx Contracting	6	--	Thumb, 60" Bucket Hitachi - EX200LC - - - Digging Bucket, Brush Rake, Thumb, Clean Up Bucket	Yes	$175	$200	$0	$114
Excavator (tracked) 200 &	Whitehorse	11	Graceland Construction	6	--	Caterpillar - 320CL - - - Clean Up Bucket, Digging Bucket	Yes	$175	$150	$165	$107
Excavator (tracked) 200 &	Whitehorse	11	16142 YT Inc. Northern Enviro Services	22	--	Cat - 320E - 1 Yd - - Digging Bucket, Thumb, Clean Up Bucket	Yes	$180	$300	$0	$117
Excavator (tracked) 200 &	Whitehorse	11	16142 YT Inc. Northern Enviro Services	23	--	Case - 9030 B - 1 Yd - - Thumb, Digging Bucket, Clean Up Bucket	Yes	$180	$300	$0	$117
Excavator (tracked) 200 &	Whitehorse	11	16142 YT Inc. Northern Enviro Services	62	--	- 320 E - 1 yd - - Digging Bucket, Thumb, Clean Up Bucket	Yes	$180	$300	$0	$117
Excavator (tracked) 200 &	Whitehorse	11	Balsam Backhoe Services	3	--	Link - Belt Hoe 210 - - - 36" Digging bucket, Thumb, Clean Up Bucket 60"	Yes	$180	$180	$150	$98
Excavator (tracked) 200 &	Whitehorse	11	Cobalt Construction Inc.	21 36	-- --	John Deere & Volvo - 270G & EC 290B - - John Deere 270G & Volvo EC 290B - Digging Bucket, Thumb, Brush Rake, Hoe Daul, Clean Up Bucket Caterpillar & Hitachi - 329 EL & 270 LC - - Cat (x2) & Hitachi. Hoe Dual -	No No	$180.00 $180.00	$250.00 $250.00	$0.00 $0.00	$117.00 $117.00
Excavator (tracked) 200 &	Whitehorse	11	Arctic Backhoe Services Ltd.	24	--	Digging Bucket, Thumb, Clean Up Bucket, Brush Rake Cat - 320D - 2.5 Yd - - Frost Bucket, Ripper	Yes	$185	$180	$0	$120
Excavator (tracked) 200 &	Whitehorse	11	Coates Services Yukon Ltd.	6	--	Cat - L320 - - - Clean Up Bucket, Digging Bucket	No	$185	$180	$0	$120
Excavator (tracked) 200 &	Whitehorse	11	536402 Yukon Inc DBA/ Northern Construciton	6	--	Doosan - 225 - 23 Ton - - Digging Bucket, Clean Up Bucket	Yes	$190	$180	$0	$124
Excavator (tracked) 200 &	Whitehorse	11	Graceland Construction	5	--	Caterpillar - 235C - - - Clean Up Bucket, Digging Bucket	Yes	$190	$150	$180	$117
Excavator (tracked) 200 &	Whitehorse	11	Van Bibber Trucking	4	--	John Deere - 270 - - - Clean Up Bucket, Pilot Vehicle, Thumb, Digging Bucket	No	$195	$275	$185	$120
Excavator (tracked) 200 &	Whitehorse	11	Yukon Equipment Services Ltd. Arctic Backhoe Services Ltd.	13 13	2012 --	John Deere - 250G - 25 ton - - Thumb, Brush Rake, Frost Bucket, Ripper, Clean Up Bucket Cat 329F - - 2yd & 3yd - - 2 cubic yd bucket, Pilot Vehicle, 3 cubic yd clean up	No Yes	$195.00 $200.00	$400.00 $250.00	$195.00 $0.00	$126.75 $130.00
Excavator (tracked) 200 &	Whitehorse	11	Castle Rock Enterprises Limited Partnership	25	2011	bucket Linkbelt - LX240 - 34' Reach - - Hydraulic Thumb, Cage for Cab, Digging	No	$200	$700	$200	$130
Excavator (tracked) 200 &	Whitehorse	11	(14899)	73	2017	Bucket 40", Clean Up Bucket 72" CAT - 323F - 34' Reach - 2 Available - Hydraulic Thumb, Cage for Cab, Digging	No	$200	$700	$200	$130
Excavator (tracked) 200 &	Whitehorse	11	Getaway Construction Inc.	4	--	Bucket 40", Clean Up Bucket 72" Cat - 322 BL - - - Clean Up Bucket, Thumb, Digging Bucket	No	$204	$300	$0	$133
Excavator (tracked) 200 &	Whitehorse	11	Getaway Construction Inc.	2	--	Cat - 325BL - 325 - - Clean Up Bucket, Thumb, Digging Bucket	No	$205	$300	$0	$133
Excavator (tracked) 200 &	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	66 78	2012 2015	Linkbelt - LX300 - 35' Reach - 3 Available - Hydraulic Thumb, Cage for Cab, Ripper, Digging Bucket 42", Clean Up Bucket 72" CAT - 329F - 35' Reach - - Digging Bucket 42", Clean Up Bucket 72", Hydraulic	No No	$210.00 $210.00	$700.00 $700.00	$210.00 $210.00	$136.50 $136.50
Excavator (tracked) 200 &	Whitehorse	11	16142 YT Inc. Northern Enviro Services	39	--	Thumb Case - 9030 B - - - Digging Bucket, Clean Up Bucket, Bucket 1 yd, Thumb,	Yes	$220	$400	$0	$143
Excavator (tracked) 200 &	Whitehorse	11	16142 YT Inc. Northern Enviro Services	53	--	Kenworth T800, Lo-Boy - 9040 - 30 Ton - Tracked - Hydraulic Thumb, Digging Bucket, Clean Up Bucket	Yes	$220	$300	$0	$143
Excavator (tracked) 200 &	Whitehorse	11	McCabe Creek Farm	6	--	Hitachi - 270 - - - 48" - 60" bucket	Yes	$220	$400	$200	$130
Excavator (tracked) 200 &	Whitehorse	11	16142 YT Inc. Northern Enviro Services	61	--	Cat - 324 E - 1.5 yd - - Digging Bucket, Thumb, Clean Up Bucket	Yes	$225	$300	$0	$146
Excavator (tracked) 200 &	Whitehorse	11	16142 YT Inc. Northern Enviro Services	63	--	Cat - 329E - 1.5 yd - - Digging Bucket, Thumb, Clean Up Bucket	Yes	$225	$300	$0	$146
Excavator (tracked) 200 &	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services) Boreal Engineering Ltd	17 6	-- --	Doosan - 225 - - - Clean Up Bucket 72", Hydraulic Thumb, Quick Change, Digging Bucket CAT - 324D LC - - - Clean Out Bucket, Brush Guards, Digging Bucket, Thumb	Yes No	$225.00 $225.00	$225.00 $300.00	$220.00 $169.00	$143.00 $109.85
Excavator (tracked) 200 &	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	7	--	Link Belt - 210 LC - 2 yard - 6 available - Hydraulic Thumb, Digging Bucket, Clean Up Bucket	No	$225	$0	$0	$146
Excavator (tracked) 200 &	Whitehorse	11	Boreal Engineering Ltd	16 18	2007 2008	Caterpillar - 330F LC - - Winch Truck 6 Axle - Digging Bucket, Brush Guards, Thumb, Clean Up Bucket Caterpillar - 330D LC - - - Clean Out Bucket, Brush Guards, Ripper Tooth,	No No	$230.00 $240.00	$300.00 $300.00	$173.00 $180.00	$112.45 $117.00
Excavator (tracked) 200 &	Whitehorse	11	Castle Rock Enterprises Limited Partnership	52	2014	Thumb, Digging Bucket CAT - 336EL - 36 ton & 35' Reach - - Quick Change, Hydraulic Thumb, Ripper,	No	$250	$1100	$250	$163
Excavator (tracked) 200 &	Whitehorse	11	(14899)	75	2017	Digging Bucket, Clean Up Bucket CAT - 336F - 36 ton & 39' Reach - - Quick Change, Digging Bucket, Clean Up	No	$250	$1100	$250	$163

wood.

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Type	Area	Priority (Distance from Dawson)	Company	No.	Year	Description	Fluctuation	Wet	Mob/Demob	Dry	Standby
Excavator (tracked) 200 &	Whitehorse	11	Cobalt Construction Inc.	22	--	Bucket Hitachi - EX 330 - - - Digging Bucket, Screening Bucket, Ripper, Clean Up	No	$250	$250	$0	$163
Excavator (tracked) 200 &	Whitehorse	11	Cobalt Construction Inc.	23	--	Bucket John Deere / Hitachi - 350 G JD & 350 Hitachi (x2) - - 3 Available, 2 x JD &	No	$250	$250	$0	$163
Excavator (tracked) 200 &	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	37 8	-- --	Caterpillar - 336 EL - - - Digging Bucket, Screening Bucket, Ripper, Clean Up Bucket Volvo - EC360 - 85,000 lbs - - Digging Bucket 48", Thumb, Clean Up Bucket	No Yes	$250.00 $250.00	$250.00 $400.00	$0.00 $0.00	$162.50 $162.50
Excavator (tracked) 200 &	Whitehorse	11	Carey On Construction	2	--	72" Volvo - 290 B - 28 ton - - Clean up bucket 1 cu m, Digging Bucket	Yes	$260	$200	$250	$163
Excavator (tracked) 200 &	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) 16142 YT Inc. Northern Enviro Services	70 14	2014 --	CAT - 336EL - 36 ton - - Trimble GPS Auto Grade, Hydraulic Thumb, Ripper, Digging Bucket, Clean Up Bucket, Quick Change - EX 400 - - 2 Available - Hydraulic Excavator - Hydraulic Thumb, Bucket, Frost	No Yes	$275.00 $295.00	$1,100.00 $500.00	$275.00 $0.00	$178.75 $191.75
Excavator (tracked) 200 &	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	8	--	Bucket, Digging Bucket, Clean Up Bucket Link Belt - 330 LC - 3 yard - 14 available - Clean Up Bucket, Hydraulic Thumb,	No	$295	$0	$0	$192
Excavator (tracked) 200 &	Whitehorse	11	16142 YT Inc. Northern Enviro Services	52	--	Digging Bucket Volvo - 460CL - 2.5 yd/ 4yd - - Clean Up Bucket 4 yd, Thumb, Digging Bucket	Yes	$300	$500	$0	$195
Excavator (tracked) 200 &	Whitehorse	11	Arctic Backhoe Services Ltd.	21	--	2-1/2 yd Case - 9040 - 2 Yd - - Clean Up Bucket, Pilot Vehicle, Hydraulic Hammer	Yes	$300	$285	$0	$195
Excavator (tracked) 200 &	Whitehorse	11	Cobalt Construction Inc. 16142 YT Inc. Northern Enviro Services	41 1	-- --	Hitachi / John Deere - 450 H & 470 G - - 2008 Hitachi 450 H (x2) & 2012 JD 470 G - Digging Bucket, Ripper, Clean Up Bucket JD - 450C & 450D - - 2 Available - Trench Bucket, Clean Up Bucket	No Yes	$300.00 $325.00	$300.00 $500.00	$0.00 $0.00	$195.00 $211.25
Excavator (tracked) 200 &	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	9 32	-- --	Hitachi - 350 LC - 3 yard - 2 available - Clean Up Bucket, Digging Bucket, Hydraulic Thumb Linkbelt - 250 LC - 54" - 2 Available - Brush Cutter	No No	$325.00 $350.00	$0.00 $0.00	$0.00 $0.00	$211.25 $227.50
Excavator (tracked) 200 &	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	10	--	Link Belt - 470 LC - 3 yard - 2 available - Clean Up Bucket, Hydraulic Thumb, Digging Bucket	No	$410	$0	$0	$267
Excavator (tracked) Lower	Whitehorse	11	60 Below Snow Management Stewart Basin Exploration	3 2	-- --	Kubota - 161-3 - K161 - Concrete hammer / breaker - Clean Up Bucket, Trench Bucket, Digging Bucket Kubota - KH41 - 3500 lb - Transportable by helicopter & fixed wing - Reach 6.5	No No	$110.00 $110.00	$125.00 $110.00	$0.00 $0.00	$71.50 $71.50
Excavator (tracked) Lower	Whitehorse	11	60 Below Snow Management Stewart Basin Exploration	4	--	Kubota - KX41-3 - 3650 lb - Transportable by fixed wing - Rock Bucket 14", Reach 7.5 ft, Rubber Tracks, Manual Thumb, U Blade, Clean Up Bucket 22"	No	$110	$110	$0	$72
Excavator (tracked) Lower	Whitehorse	11	Arctic Backhoe Services Ltd. 535902 Yukon Inc (Allan's Backyard Services)	20 2	-- --	Cat - 305D Trackhoe(mini) - 1/3 Yd - Rubber Track - Clean Up Bucket, Hydraulic Thumb, Tilt Angle Blade, Digging Bucket Komatsu - PC 28 mini - PC 28 - - Clean Up Bucket, Frost Bucket	Yes Yes	$115.00 $120.00	$100.00 $120.00	$0.00 $115.00	$74.75 $74.75
Excavator (tracked) Lower	Whitehorse	11	Arctic Backhoe Services Ltd. Carey On Construction	18 1	-- --	Kubota - 121 Trackhoe (mini) - 1/3 yd - - Clean Up Bucket, Hydraulic Thumb, Tilt Angle Blade, Digging Bucket Kubota - 161-3 - 5 ton - - Blade, Hydraulic Thumb, Digging Bucket 1/4 yd,	Yes Yes	$120.00 $120.00	$100.00 $200.00	$0.00 $130.00	$78.00 $84.50
Excavator (tracked) Lower	Whitehorse	11	16142 YT Inc. Northern Enviro Services	2	--	Clean Up Bucket 1/3 yd Kubota - KX1213SS - - - Digging Bucket, Front Dozer Blade, Clean Up Bucket	Yes	$125	$250	$0	$81
Excavator (tracked) Lower	Whitehorse	11	536402 Yukon Inc DBA/ Northern Construciton	9	--	Bobcat - E60 - 6 ton - - Clean Up Bucket, Auger, Ripper, Digging Bucket	Yes	$125	$125	$0	$81
Excavator (tracked) Lower	Whitehorse	11	60 Below Snow Management	8	--	Kubota - 080 Kx - - - Digging Bucket, Clean Up Bucket	No	$125	$125	$0	$81
Excavator (tracked) Lower	Whitehorse	11	Balsam Backhoe Services Cross Fall Contracting	1 2	-- --	kabota hoe - 121 - - - Thumb, Digging Bucket 22", Clean Up Bucket 40", Clean up Bucket 28" Kubota - KX-057 Excavator - 12,650 lbs - - Clean Up Bucket 36", Trenching	Yes Yes	$125.00 $125.00	$125.00 $125.00	$100.00 $115.00	$65.00 $74.75
Excavator (tracked) Lower	Whitehorse	11	Lane's Yukon Yardworks INC	18	--	Case - CX57c - 6.5 ton - excavator - Digging Bucket 24", Clean up bucket 42"	No	$125	$125	$80	$52
Excavator (tracked) Lower	Whitehorse	11	VanGorda Enterprises 535902 Yukon Inc (Allan's Backyard Services)	1 18	-- --	bobcat - E42 - 9,700 lbs - - Digging Bucket, Single Shank Ice Ripper 24", Clean Up Bucket 36" Hitachi - Ex120 - 120 - 2 frost buckets - 29' and 46' - Clean Up Bucket, Frost	No Yes	$125.00 $130.00	$125.00 $165.00	$115.00 $130.00	$74.75 $84.50
Excavator (tracked) Lower	Whitehorse	11	Arctic Backhoe Services Ltd.	19	--	Bucket Kubota - 121 Trackhoe (mini) - 1/3 Yd - - Frost Bucket	Yes	$130	$100	$0	$85
Excavator (tracked) Lower	Whitehorse	11	B L Building Castle Rock Enterprises Limited Partnership	3 19	-- 2008	Kubota - 040 - 9400lb - - Rubber Tracks, 20" tooth bucket, Clean up bucket 30 inch, Cab, 6 Way Blade, Hydraulic Thumb CAT - 305C - 5 ton - Rubber Track - Clean Up Bucket, Blade, Digging Bucket	No No	$130.00 $130.00	$100.00 $500.00	$0.00 $130.00	$84.50 $84.50
Excavator (tracked) Lower	Whitehorse	11	(14899)	20	2012	Kubota - KX057-4 - 5.7 ton - Steel Track - Clean Up Bucket, Wrist a Twist,	No	$130	$500	$130	$85
Excavator (tracked) Lower	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	7	--	Blade, Digging Bucket Kubota - 057 - 5 Ton - - Digging Bucket, Thumb, Clean Up Bucket	Yes	$130	$200	$0	$85
Excavator (tracked) Lower	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	29	--	Kubota - 057 - 5 ton - - Digging Bucket, Thumb, Clean Up Bucket	Yes	$130	$200	$0	$85
Excavator (tracked) Lower	Whitehorse	11	McClintock Contracting Deadman Creek Enterprises Inc (Whitehorse)	3 10	-- --	Komatsu - PC75-UU2 - 15,000 lb - - Thumb, Brush Rake 36", Rubber Tracks, Push Blade, Clean Up Bucket 40", 24" Digging bucket Kubota - 080 - 8 ton - - Thumb, Clean Up Bucket, Digging Bucket, Rake	Yes Yes	$132.50 $135.00	$132.50 $250.00	$110.00 $0.00	$71.50 $87.75
Excavator (tracked) Lower	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	30	--	Kubota - 080 - ton - - Rake, Clean Up Bucket, Digging Bucket, Thumb	Yes	$135	$250	$0	$88
Excavator (tracked) Lower	Whitehorse	11	Snag Contracting	12	--	Hitachi - Ex 60 URG - 6.5 ton - Log loader - Off Set Boom, Digging	No	$140	$140	$140	$91
Excavator (tracked) Lower	Whitehorse	11	Solution Excavating Ltd.	2	--	Bobcat - 080 - - - Thumb, Clean Up Bucket, Digging Bucket, rotary head, Rake	Yes	$140	$0	$0	$91
Excavator (tracked) Lower	Whitehorse	11	Son Rise General Contracting Yukon Equipment Services Ltd.	7 14	-- --	Hitachi/Kabota - 200/191 - 200/ 6 ton - 2 available - Bucket, Processor Head, Digging Bucket, Clean Up Bucket, Rake, Thumb Kubota - 080 - 8.5 Ton - - Digging Bucket, Thumb, Front Blade, Clean Up	Yes No	$140.00 $140.00	$160.00 $350.00	$0.00 $140.00	$91.00 $91.00
Excavator (tracked) Lower	Whitehorse	11	Goal Done Contracting Ltd.	4	--	Bucket, Ripper Kabota - Hoe KX-080 - 9000 kg - - Clean Up Bucket 32", Roller packer, Twist a	No	$145	$180	$0	$94
Excavator (tracked) Lower	Whitehorse	11	Castle Rock Enterprises Limited Partnership	21	2012	rist bucket, Plate Packer, Ripper, Rock Hammer, Tooth Bucket 28", Tooth Bucket 18", 8' push blade Kubota - KX080 - 8 ton - Rubber Track - Clean Up Bucket, Blade, Digging	No	$150	$500	$150	$98

CCRP Cost Estimate Table W-15: Yukon Government Third Party Equipment Rental Rates

wood.

Data Source: http://www.geology.gov.yk.ca/pdf/third-party-rental-book-2019.pdf

Type	Area	Priority (Distance from Dawson)	Company	No.	Year	Description	Fluctuation	Wet	Mob/Demob	Dry	Standby
Excavator (tracked) Lower	Whitehorse	11	(14899)	22	2009	Bucket Kubota - KX080 - 8 ton - Rubber Track - Clean Up Bucket, Blade, Digging	No	$150	$500	$150	$98
Excavator (tracked) Lower	Whitehorse	11	536402 Yukon Inc DBA/ Northern Construciton	8	--	Bucket John Deere - 13.5 d - 14 ton - - Push Blade, Thumb, Clean Up Bucket, Digging	Yes	$160	$170	$0	$104
Excavator (tracked) Lower	Whitehorse	11	Arctic Backhoe Services Ltd.	32	--	Bucket Komatsu / Cat - 315 DL & 150 - 2 yd - 2 available. Cat 315 DL. Komatsu 150 -	Yes	$160	$180	$0	$104
Excavator (tracked) Lower	Whitehorse	11	Boreal Engineering Ltd	17	2017	Clean Up Bucket, Hydraulic Thumb, Digging Bucket Caterpillar - 304E LCR - - - Clean Out Bucket, Thumb, Digging Bucket	Yes	$160	$300	$120	$78
Excavator (tracked) Lower	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	23 24	2009 2005	Linkbelt - LX210 - 32' Reach - 2 Available - Hydraulic Thumb, Cage for Cab, Ripper, Digging Bucket 36", Clean Up Bucket 60" CASE - CX210 - 32' Reach - - Hydraulic Thumb, Cage for Cab, Ripper, Digging	No No	$195.00 $195.00	$500.00 $500.00	$195.00 $195.00	$126.75 $126.75
Excavator (tracked) Lower	Whitehorse	11	Goal Done Contracting Ltd.	16	--	Bucket 36", Clean Up Bucket 60" Kobelco - ED195 - 20,000 kg - Runner - Clean Up Bucket, 6 way push blade,	No	$195	$250	$0	$127
Excavator (tracked) Lower	Whitehorse	11	Meldon Construction Inc.	3	--	Swivel Bucket, Thumb, Trench Bucket Komatsu - - PC120 - - Clean Up Bucket 1 yd, Thumb, Digging Bucket 3/4 yd	Yes	$200	$190	$0	$130
Grader	Whitehorse	11	Cross Fall Contracting	4	--	Kubota - SVL 75 - 9000 lb - Bobcat 8' grader blade attachment w/ manual lasers	Yes	$125	$125	$125	$81
Grader	Whitehorse	11	Boreal Engineering Ltd	5	--	Caterpillar - 14G - - - Blade 16', Ripper	Yes	$140	$300	$180	$117
Grader	Whitehorse	11	Coates Services Yukon Ltd.	8	--	Champion - 730 - -	No	$150	$185	$0	$98
Grader	Whitehorse	11	Ralph Hotte Contracting Ltd.	9	--	John Deere - 772 CH - - - 14' Moldboard, 6 Wheel Drive	Yes	$150	$350	$145	$94
Grader	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	5	--	Champion - 730 - 730A - - Snow Wing, 16't Moldboard, Scarifier	Yes	$160	$165	$125	$81
Grader	Whitehorse	11	Arctic Backhoe Services Ltd.	27	--	Champion - 740 - -	Yes	$160	$180	$0	$104
Grader	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) Coates Services Yukon Ltd.	50 7	2013 --	Noram - 65E - 12' Blade - - Scarifier, Tire Chains, Snow Blade Cat - 14G - - - Ripper	No No	$165.00 $170.00	$165.00 $190.00	$165.00 $0.00	$107.25 $110.50
Grader	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	28	--	Cat - 140G - 14' Blade - 2 Available - Ripper, Blade 14'	Yes	$175	$400	$0	$114
Grader	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	21	--	Cat - 140 G - 14 foot Blade - 2 Available - Ripper, Blade 14'	Yes	$175	$400	$0	$114
Grader	Whitehorse	11	Yukon Equipment Services Ltd.	12	--	John Deere - 770 BH - 14 ft moldboard - 14 ft blade	No	$175	$300	$175	$114
Grader	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) 16142 YT Inc. Northern Enviro Services	68 18	2006 --	CAT - 140H - 14' Blade - - Trimble GPS Auto Grade, Snow Blade, Tire Chains, Scarifier, Winter Tires - 14G - - - Ripper, Snow Wing	No Yes	$210.00 $225.00	$210.00 $400.00	$210.00 $0.00	$136.50 $146.25
Grader	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) 16142 YT Inc. Northern Enviro Services	51	--	Champion - 740A Series S - - Motor Grader - Snow Wing, Ripper	Yes	$225	$300	$0	$146
Grader	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) Cobalt Construction Inc.	51 17	2006 --	CAT - 140H - 14' Blade - Trimble GPS auto grade - Winter Tires, Snow Blade, Tire Chains, Scarifier Cat - 14H & 14G - - 14H (2 Avail). 14G - - Ripper	No No	$235.00 $240.00	$235.00 $250.00	$235.00 $0.00	$152.75 $156.00
Grader	Whitehorse	11	16142 YT Inc. Northern Enviro Services	58	--	Volvo - 990 - 227 HP -	Yes	$250	$300	$0	$163
Grader	Whitehorse	11	Cobalt Construction Inc.	35	--	Cat - 14 M - - - Ripper	No	$290	$250	$0	$189
Grader	Whitehorse	11	Cobalt Construction Inc.	18	--	Cat - 166 - - - Ripper	No	$300	$300	$0	$195
Grader	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	5	--	CAT - 14H - 16 ft - 5 available - Ripper, Blade	No	$300	$0	$0	$195
Grader	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	6	--	CAT - 16G - 16 ft - 2 available - Ripper, Blade	No	$350	$0	$0	$228
Loader	Whitehorse	11	Anderson Loader Enterprises McClintock Contracting	2 2	-- --	John Deere - 544k - 544k - - Forks, Clean Up Bucket, Bucket with Teeth 3.5 Yd, Angle Blade 12' Cat - IT38 - - Implement Transfer - Rubber Tires, Forks, Bucket 3 yd	No Yes	$120.00 $132.50	$120.00 $132.50	$0.00 $120.00	$78.00 $78.00
Loader	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	4	--	CAT - 950 - - - Forks, Smooth Bucket	Yes	$135	$165	$110	$72
Loader	Whitehorse	11	Goal Done Contracting Ltd.	11	--	John Deere - 444 - - - Forks, Clean up bucket 3 yds, Snow blade 16' 6 way	No	$138	$180	$0	$90
Loader	Whitehorse	11	536402 Yukon Inc DBA/ Northern Construciton	2	--	Cat - 928 G - 28000 lb - - Bucket	Yes	$140	$175	$0	$91
Loader	Whitehorse	11	Ralph Hotte Contracting Ltd. 16142 YT Inc. Northern Enviro Services	14 24	-- --	John Deere & Cat - 624G & 938F - - 2 avaialble - Bucket 3.5 Yd, Snow Bucket 5 yd, Snow Blade Cat - IT 28G - 2 Yd - - Bucket, Jib, Forks	Yes Yes	$140.00 $145.00	$250.00 $300.00	$135.00 $0.00	$87.75 $94.25
Loader	Whitehorse	11	Coates Services Yukon Ltd.	25	--	CAT - 950B - - - Digging Bucket, Forks, Clean Up Bucket	No	$145	$185	$0	$94
Loader	Whitehorse	11	Boreal Engineering Ltd	7	--	CAT - 936 - - - Bucket, Forks	No	$150	$300	$113	$73
Loader	Whitehorse	11	Getaway Construction Inc.	5	--	Cat - 936 - 3.5 yd - Rubber Track - Tooth Bucket	No	$150	$250	$0	$98
Loader	Whitehorse	11	16142 YT Inc. Northern Enviro Services Arctic Backhoe Services Ltd.	12 12	-- --	John Deere - 644D - 3.5 Yd - - Quick Attach, Snow Plow, Grapples, Forks, Digging Bucket, Clean Up Bucket CAT - 938G wheel loader - 3 Yd - 2 available	Yes Yes	$160.00 $160.00	$300.00 $180.00	$0.00 $0.00	$104.00 $104.00
Loader	Whitehorse	11	Carey On Construction	3	--	Terex - 71-51-B - 17 ton - - Clean Up Bucket 4 yd	Yes	$160	$180	$170	$111
Loader	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	27 28	2006 2012	CAT - 938G - 4 yd³ Bucket - - Clean Up Bucket, Forks, Digging Bucket CAT - 938H - 4 yd³ Bucket - 2 Available - Clean Up Bucket, Forks, Digging	No No	$160.00 $160.00	$160.00 $160.00	$160.00 $160.00	$104.00 $104.00
Loader	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	74	2017	Bucket CAT - 938K - 4 yd³ Bucket - - Clean Up Bucket, Forks, Digging Bucket	No	$160	$160	$160	$104
Loader	Whitehorse	11	Son Rise General Contracting	1	--	Case/CAT - 922/950 - - 2 available - Bucket, side load bucket, Forks	Yes	$160	$185	$0	$104

CCRP Cost Estimate Table W-15: Yukon Government Third Party Equipment Rental Rates

Data Source: http://www.geology.gov.yk.ca/pdf/third-party-rental-book-2019.pdf

Type	Area	Priority (Distance from Dawson)	Company	No.	Year	Description	Fluctuation	Wet	Mob/Demob	Dry	Standby
Loader	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	16	--	CAT - 966 - - - Smooth Bucket, Forks	Yes	$165	$165	$130	$85
Loader	Whitehorse	11	Cobalt Construction Inc.	24	--	Cat - 966 D - - - Digging Bucket, Forks	No	$165	$200	$0	$107
Loader	Whitehorse	11	Graceland Construction	4	--	Caterpillar - 966 C - - - Digging Bucket	Yes	$165	$150	$155	$101
Loader	Whitehorse	11	16142 YT Inc. Northern Enviro Services Arctic Backhoe Services Ltd.	33 14	-- --	Komatsu - 380 - 4 Yd - Front End Loader - Clean Up Bucket, Snow Plow, Grapples, Digging Bucket Cat - 950 G - 4 Yd. - Wheel Loader	Yes Yes	$170.00 $170.00	$400.00 $180.00	$0.00 $0.00	$110.50 $110.50
Loader	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	29 30	2008 1984	CAT - 950H - 4 yd³ & 5.5 yd³ Buckets - - Clean Up Bucket, Jib, Forks, Spade Digging Bucket CAT - 966D - 4 yd³ Bucket - - Clean Up Bucket, Digging Bucket	No No	$175.00 $175.00	$175.00 $175.00	$175.00 $175.00	$113.75 $113.75
Loader	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	9	--	Volvo - 150E - 5 yd³ - - Bucket	Yes	$175	$400	$0	$114
Loader	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	27	--	Volvo - L90B - 4 yd³ - - Bucket, Snow Blade, Forks	Yes	$175	$400	$0	$114
Loader	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	19	--	Volvo - L 90 E - 4 cu yd - - Bucket, Snow Blade, Forks	Yes	$175	$400	$0	$114
Loader	Whitehorse	11	Coates Services Yukon Ltd.	9	--	Cat - 966D - - - Digging Bucket	No	$180	$185	$0	$117
Loader	Whitehorse	11	Coates Services Yukon Ltd.	10	--	Cat - 966E - - - Digging Bucket	No	$180	$185	$0	$117
Loader	Whitehorse	11	Cobalt Construction Inc.	26	--	Cat - 966 G & 966 H - - - Forks, Clean Up Bucket	No	$185	$200	$0	$120
Loader	Whitehorse	11	Yukon Equipment Services Ltd.	2	--	Cat - 966G - 5 yd - - Bucket 5 yd	No	$185	$400	$185	$120
Loader	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	25	--	CAT - 966C - 4 yard -	No	$200	$0	$0	$130
Loader	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	1	--	Volvo - L110 - 4 yard - 4 available - Clean Up Bucket	No	$210	$0	$0	$137
Loader	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	26	--	Komasu - WA-380-5 - 4 yard -	No	$210	$0	$0	$137
Loader	Whitehorse	11	16142 YT Inc. Northern Enviro Services	43	--	Cat - 966D - 5 Yd - - Bucket 5 yd	Yes	$225	$450	$0	$146
Loader	Whitehorse	11	16142 YT Inc. Northern Enviro Services	59	--	Cat - 966F - 5 yd - - Bucket	Yes	$225	$450	$0	$146
Loader	Whitehorse	11	16142 YT Inc. Northern Enviro Services	60	--	Cat - 966F - 5 yd - 2 available - Bucket	Yes	$225	$450	$0	$146
Loader	Whitehorse	11	Boreal Engineering Ltd	10	--	Caterpillar - 980F - - Service Truck - Bucket	No	$230	$300	$173	$112
Loader	Whitehorse	11	Cobalt Construction Inc.	27	--	Volvo - L220E & L250G - - - Digging Bucket	No	$230	$300	$0	$150
Loader	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	2	--	Volvo - L220E - 7 yard - 1 available. 7 yard bucket - Bucket	No	$325	$0	$0	$211
Logging Equipment	Whitehorse	11	Lane's Yukon Yardworks INC	7	--	International - 4900 - - - 20' dump deck with log bunks	No	$120	$120	$0	$78
Logging Equipment	Whitehorse	11	Snag Contracting	11	--	Hitachi - Ex 60 URG - 6.5 ton - Excavator / Log loader - Off Set Boom Blade, Hydraulic Thumb, Clean Out Bucket 48", Steel Tracks, Blade, Brush Rake	No	$140	$140	$140	$91
Logging Equipment	Whitehorse	11	Lane's Yukon Yardworks INC	16 1	-- --	Pacific - Self Loading - 20' - Log Truck - Deck 20', Log Bunks, Barko 160A Log Loader Tandem Case - CX 57C - - excavator - Naarva s23c stroke Processor	No No	$140.00 $150.00	$140.00 $150.00	$140.00 $0.00	$91.00 $97.50
Logging Equipment	Whitehorse	11	Snag Contracting Rabbit Creek Transport Inc.	9 4	-- --	Bobcat - T650 - - On tracks - Brush & Root Rake, Pallet Forks, Snow & Digging Buckes (3) 84"-96" Wide, Deck Push, Auger, Log Grapple Peerless - Tandem 7 Axle - - 3 Available - Tandem Pole logging	No Yes	$150.00 $175.00	$130.00 $100.00	$130.00 $140.00	$84.50 $91.00
Logging Equipment	Whitehorse	11	Snag Contracting	13	--	Clark - 667C - 10 ton - Line Skidder - Blade	No	$200	$200	$0	$130
Logging Equipment	Whitehorse	11	Snag Contracting	17	--	- - 1270 - Timber Jack Harvester - 6 Wheel - Eco Tracks, FMG 762 B Head	No	$200	$200	$200	$130
Logging Equipment	Whitehorse	11	16142 YT Inc. Northern Enviro Services	37	--	Log Truck - - 28 Ton - 5 Available, Trailer - Peerless Log Trailers	Yes	$205	$205	$0	$133
Logging Equipment	Whitehorse	11	16142 YT Inc. Northern Enviro Services	40	--	Clark - 668D Grapple Skidder - 668D - - Tire Chains, Winch, Log Grapple	Yes	$240	$450	$200	$130
Logging Equipment	Whitehorse	11	Cobalt Construction Inc. 16142 YT Inc. Northern Enviro Services	40 15	-- --	Caterpillar - 227, 215, D5H - - Cat Processor 227, Cat Feller Buncher 215, Cat D5H - 6 Way Blade, Processor Head, Ripper, Grapples Cat - 320 C Log Processer - - - Brush Head, Hydraulic Thumb, Brush Cutter	No Yes	$250.00 $300.00	$250.00 $400.00	$0.00 $0.00	$162.50 $195.00
Logging Equipment	Whitehorse	11	Cobalt Construction Inc. 16142 YT Inc. Northern Enviro Services	34	--	Timberjack - 850 Feller Buncher - 28" Head - - 28" Head, Hydraulic Thumb, Grapples, Brush Head, Brush Cutter	Yes	$300	$500	$275	$179
Packer	Whitehorse	11	536402 Yukon Inc DBA/ Northern Construciton	1	--	Ingersoll Rand - Drum Packer - 10000 lb - 55" -	Yes	$95	$100	$0	$62
Packer	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	47 48	2010 1992	Amman - ASC 50HD - 55" - - Open Cab, Single Drum Super Pac - 540 - 54" - - Open Cab, Single Drum	No No	$95.00 $95.00	$500.00 $500.00	$95.00 $95.00	$61.75 $61.75
Packer	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	82	2017	CAT - CS34 - 54" - - Open Cab, Single Drum	No	$95	$500	$95	$62
Packer	Whitehorse	11	Rabbit Creek Transport Inc.	13	--	Saki Vibratory - - - 54 inch drum	No	$110	$75	$0	$72
Packer	Whitehorse	11	Ralph Hotte Contracting Ltd.	1	--	Dynapac - A40 - -	Yes	$115	$150	$0	$75
Packer	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	21	--	Dyna Pac - - 54" - Packer Drum - Sheeps foot Drum	Yes	$120	$165	$110	$72
Packer	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	46 44	2010 2010	Amman - ASC 70HD - 66" - - Closed Cab, Single Drum Amman - ASC 110HD - 86" - - Closed Cab, Single Drum	No No	$125.00 $140.00	$500.00 $500.00	$125.00 $140.00	$81.25 $91.00
Packer	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	45	1998	Dynapac - CA302D - 84" - - Open Cab, Single Drum	No	$140	$500	$140	$91
Packer	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	81	--	CAT - CS54B - 84" - - Closed Cab, Single Drum	No	$140	$500	$140	$91
Packer	Whitehorse	11	16142 YT Inc. Northern Enviro Services 535902 Yukon Inc (Allan's Backyard Services)	19 22	-- --	John Deer - 328 Skid Steer - - 2 Available - Vibrating Rolling Packer, Auger, Forks, Buckets CASE - - 70" - - Smooth Drum	Yes Yes	$160.00 $160.00	$300.00 $165.00	$0.00 $140.00	$104.00 $91.00
Packer	Whitehorse	11	Cobalt Construction Inc.	28	--	Intensus - CV120 & SD100 - - - Smooth Drum 84", Pad Foot Kit	No	$170	$200	$0	$111

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Type	Area	Priority (Distance from Dawson)	Company	No.	Year	Description	Fluctuation	Wet	Mob/Demob	Dry	Standby
Packer	Whitehorse	11	Boreal Engineering Ltd	4	1995	Ingersoll Rand - SD100D - 84 inch - - Vibratory Drum 84"	Yes	$175	$225	$131	$85
Packer	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	14	--	Ingersol Rand - SD 110 - 84" - - Smooth Drum 84"	Yes	$175	$400	$0	$114
Packer	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	15	--	Ingersol Rand - SD110 - 84 Inch - - Smooth Drum 84"	Yes	$175	$400	$0	$114
Packer	Whitehorse	11	16142 YT Inc. Northern Enviro Services	17	--	- CS 563 E - 84" - 2 Available - Smooth Drum 84"	Yes	$185	$300	$0	$120
Packer	Whitehorse	11	Cobalt Construction Inc.	29	2009	Volvo - SD160 - - 3 Available - Smooth Drum 84"	No	$190	$200	$0	$124
Packer	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	3	--	CAT - 563E - 28,000 lbs - 14 available	No	$200	$0	$0	$130
Scraper	Whitehorse	11	Cobalt Construction Inc.	25	--	Caterpillar - 631 G - - 3 available	No	$350	$400		$228
Scraper	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	31	--	CAT - 621F - 30 Ton - 3 Available	No	$350	$0		$228
Scraper	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	28	--	CAT - 631E - 40 ton - 3 available	No	$475	$0		$309
Skid Steer	Whitehorse	11	60 Below Snow Management	7	--	Bobcat - S70 - - plow - Angle Broom, Clean Up Bucket	No	$70	$110	$0	$46
Skid Steer	Whitehorse	11	Lane's Yukon Yardworks INC	1 3	-- --	Case - 440 - 2200 lbs Lift - - Colletion Broom, Clean Up Bucket, Digging Bucket, Grapples, Auger, Forks, Post Hole Auger Bobcat - mt52 - walk behind - - 36" Bucket, 48" snow blade, 36" snowblower,	No No	$80.00 $80.00	$125.00 $80.00	$0.00 $80.00	$52.00 $52.00
Skid Steer	Whitehorse	11	Dirty Deeds Eq. Cont.	2	--	36" Trencher, 48" sweeped Bobcat - S570 - - - Snow Bucket, Scraping Bucket, Cutting Bucket, Hay Spear,	Yes	$85	$90	$0	$55
Skid Steer	Whitehorse	11	Ralph Hotte Contracting Ltd.	2	--	Forks, Auger Drill John Deere - 240, 318E - - 2 available Rubber Tire - Bucket 66", Auger 12",	Yes	$90	$170	$85	$55
Skid Steer	Whitehorse	11	536402 Yukon Inc DBA/ Northern Construciton	3	--	Auger 6", Snow Bucket 8' Bobcat - T595 - - - Tracks, Snow Bucket, Forks, Pick Up Broom, Auger	Yes	$95	$95	$0	$62
Skid Steer	Whitehorse	11	536402 Yukon Inc DBA/ Northern Construciton	4	--	Cat - 246 C - - - Snow Bucket	Yes	$95	$95	$0	$62
Skid Steer	Whitehorse	11	536402 Yukon Inc DBA/ Northern Construciton	5	--	Terex - PT 3a - - - Tracks	Yes	$95	$95	$0	$62
Skid Steer	Whitehorse	11	Alsek Valley Cont & Cons (41618 Yukon Inc)	2	--	Caterpillar - 246 B - - - Tooth Bucket, Broom, 9" Auger, Forks, Smooth Bucket	Yes	$100	$100	$0	$65
Skid Steer	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	33 34	2012 2012	Bobcat - S100 - - - Clean Up Bucket 46" CAT - 236B - - - Digging Bucket 66", Forks, Fence Post Auger, Clean Up	No No	$100.00 $100.00	$500.00 $500.00	$100.00 $100.00	$65.00 $65.00
Skid Steer	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	35	2012	Bucket 66" Bobcat - S205 - - - Digging Bucket 66", Forks, Fence Post Auger, Clean Up	No	$100	$500	$100	$65
Skid Steer	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	36	2007	Bucket 66" CAT - 246C - - - Clean Up Bucket 72", Forks, Digging Bucket 72"	No	$100	$500	$100	$65
Skid Steer	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	37	2012	Bobcat - S750 - - - Clean Up Bucket 72", Forks, Digging Bucket 72"	No	$100	$500	$100	$65
Skid Steer	Whitehorse	11	Goal Done Contracting Ltd.	6	--	Bobcat - S205 - 4ft cap - 2000pds - - Clean Up Bucket, Metal Tracks, Rubber Tires, Roller packer, 84" Snow Bucket, Snow Blade 8', Tooth Bucket	No	$100	$130	$0	$65
Skid Steer	Whitehorse	11	Lane's Yukon Yardworks INC	19	--	Case - SV300 - 90 HP - wheeled, steel track over option - Forks, Root rakes, Trencher, Auger w/ 6", 9", 12", 18" bits, Collection broom 6', Speed wing blade 15', Angle Broom 7', Material bucket 7', Tooth bucket 7', Material bucket 8', Dozer blade 8', Grapple Bucket, Grapples	No	$100	$110	$110	$72
Skid Steer	Whitehorse	11	Lane's Yukon Yardworks INC	20	--	Case - TR320 Tracked - 90 HP - - Dozer blade 8', Grapple Bucket, Grapples, Root rakes, Forks, Trencher Bar, Auger w/ 6", 9", 12", 18" bits, Collection broom 6', Speed wing blade 15', Angle Broom 7', Material	No	$100	$110	$110	$72
Skid Steer	Whitehorse	11	McClintock Contracting Truckways Transport (1977) Ltd.	1 5	-- --	Bobcat - S250 - - - 72" Smooth Bucket, 72" Grapples, 68" Dozer Blade, 72" Roller Packer, 96" sno blade, 72" Tooth Bucket, 72" Brush Rake Bobcat - S175/S590 - - 2 available - Snow Bucket, Seed Spreader, Sander,	Yes Yes	$105.00 $105.00	$105.00 $105.00	$90.00 $0.00	$58.50 $68.25
Skid Steer	Whitehorse	11	B L Building	1	--	Forks, Finish Bucket, Tooth Bucket, Auger, Digging Bucket Kubota - SVL 75 - 4000lb - - Forks, 72" snow blower, Angle Snow Blade, Jib,	No	$110	$100	$0	$72
Skid Steer	Whitehorse	11	Yukon Equipment Services Ltd.	11	--	Smooth Edge Bucket Bobcat - T590 - - Tracked - Rubber Tracks, Forks, Bucket	No	$110	$200	$120	$78
Skid Steer	Whitehorse	11	Cobalt Construction Inc.	30	--	Case - 450 - - - Clean Up Bucket 72", Forks 48", Digging Bucket 60"	No	$115	$150	$0	$75
Skid Steer	Whitehorse	11	Arctic Backhoe Services Ltd. Son Rise General Contracting	17 6	-- --	Bobcat - S185 - - - Clean Up Bucket, Trencher Bar, Packer, Asphalt Cutter, Post Hole Auger, Forks, Snow Bucket Bobcat - 5590/843/185 - - 3 available - Bucket, Digging Bucket, Post Hole	Yes Yes	$120.00 $120.00	$100.00 $110.00	$0.00 $0.00	$78.00 $78.00
Skid Steer	Whitehorse	11	Balsam Backhoe Services	2	--	Auger, Blade, Brush Mower, Forks Bob Cat - 770 track - - - Forks, Clean up bucket 82"	Yes	$125	$125	$100	$65
Skid Steer	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) Cross Fall Contracting	38 1	2013 --	CAT - 289C - - Track Skid Steer - Clean Up Bucket, Digging Bucket Kubota - SVL-75 - 9000 lbs. - Bobcut 8' grader blade attachment - Tilt plate, Log	No Yes	$125.00 $125.00	$500.00 $125.00	$125.00 $125.00	$81.25 $81.25
Skid Steer	Whitehorse	11	VanGorda Enterprises	9	2016	Grapple, Rock Grapples, Hydraulic Boom, Buckets x 3, Hydraulic Drill with Various Augers, Forks, Tracked Compact Loader Thomas - Protough 2200 - 7,300 lbs - tracked - 1.5m³ Digging Bucket, Pallet	No	$125	$125	$115	$75
Skid Steer	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	13	--	Forks Kubota - SVL 90 - - - Bucket, Bucket 82", Blade, Auger Drill, Forks	Yes	$130	$200	$0	$85
Skid Steer	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	16	--	Kubota - SVL 90 - - - Bucket, Auger Drill, Blade, Forks	Yes	$130	$200	$0	$85
Skid Steer	Whitehorse	11	Getaway Construction Inc.	1	--	Cat - 277 - - Rubber Track - Snow Bucket, GP Bucket	No	$130	$90	$0	$85
Skid Steer	Whitehorse	11	16142 YT Inc. Northern Enviro Services	20	--	JD - 328 - - 2 Available - Digging Bucket, Post Hole Auger, Forks, Snow Bucket	Yes	$135	$300	$0	$88

CCRP Cost Estimate Table W-15: Yukon Government Third Party Equipment Rental Rates

Data Source: http://www.geology.gov.yk.ca/pdf/third-party-rental-book-2019.pdf

Type	Area	Priority (Distance from Dawson)	Company	No.	Year	Description	Fluctuation	Wet	Mob/Demob	Dry	Standby
Skid Steer	Whitehorse	11	Boreal Engineering Ltd	11	--	CAT - 226B - - - Bucket, Snow Blade, Grapples, Forks	No	$140	$175	$124	$81
Skid Steer	Whitehorse	11	Snag Contracting Castle Rock Enterprises Limited Partnership	10 39	-- --	Bobcat - T650 - - - Brush & Root Rake, Pallet Forks, Snow & Digging Buckes (3) 84"-96" Wide, Deck Push, Auger, Log Grapple CAT - 246C - - - Pickup Broom 83"	No No	$150.00 $175.00	$130.00 $500.00	$130.00 $175.00	$84.50 $113.75
Skid Steer	Whitehorse	11	(14899)	40	--	Bobcat - S750 - - - Pickup Broom 83"	No	$175	$500	$175	$114
Skid Steer	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	33	--	CAT - 299 D - 2 yd - Bucket. 3 Available - Brush Cutter, Bucket, Packer, Forks	No	$195	$0	$0	$127
Belly Dump	Whitehorse	11	Arctic Backhoe Services Ltd.	1	--	Brute - - 20 Yd. - - Peterbilt Winch Tractor, International Truck Tractor	Yes	$160	$180	$0	$104
Belly Dump	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services) 16142 YT Inc. Northern Enviro Services	12 27	-- --	Midland - - 22 yd - Belly dump clam - 2 available - Kenworth T800, Volvo, Western Star Tractor - Tandem Trailer - 20 Yd - 3 Available - Kenworth Tractor	Yes Yes	$165.00 $175.00	$165.00 $175.00	$145.00 $0.00	$94.25 $113.75
Belly Dump	Whitehorse	11	Cobalt Construction Inc.	1	--	- Tridem - 24 yd^3 - Trailer, 6 Available - Kenworth T800	No	$175	$195	$0	$114
Belly Dump	Whitehorse	11	Cobalt Construction Inc.	2	--	- Tandem - 24 yd^3 - Trailer, 7 Available - Kenworth T800	No	$175	$195	$0	$114
Belly Dump	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	23	--	Midland - Tri-Axle - - 3 Available - Clam Dump	Yes	$195	$195	$0	$127
Belly Dump	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	35	--	Midland - Tri Axle - - 3 Available - Tandem Kenworth Truck	Yes	$195	$195	$0	$127
Belly Dump	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	18	--	Kenworth / Loadline - T800 - 30 ton - Tri axle. 20 available - Kenworth Tractor	No	$210	$0	$0	$137
Belly Dump	Whitehorse	11	Cobalt Construction Inc.	4	--	Midland - B-Trains - 42 yd^3 - 11 Available, - Kenworth Tractor	No	$260	$195	$0	$169
Belly Dump- Clam	Whitehorse	11	Rabbit Creek Transport Inc.	6	--	Decap - Tandem Axle - 25 Tonne - 6 available - Clam Dump, Push	Yes	$165	$100	$145	$94
Belly Dump- Clam	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) Rabbit Creek Transport Inc.	12 7	2012 --	Decap - - 24 yd^3 Legal - Tridem, 3 available - Kenworth / Peterbuilt Tandem Tractor - Tridem Axle - 30 Tonne - 6 Available	No Yes	$170.00 $170.00	$170.00 $0.00	$170.00 $145.00	$110.50 $94.25
Belly Dump- Clam	Whitehorse	11	Berdoe Enterprises Coates Services Yukon Ltd.	11 13	-- --	Midland & Peerless - Tandem - 20 Yds - 5 Available - 4 Midland-1 Peerless, - Kenworth T800 x 5 Derrick, McCoy, Arnes - Tandem - 22 cu. yd - Trailer. Available - 2 of each -	No No	$175.00 $175.00	$175.00 $175.00	$175.00 $0.00	$113.75 $113.75
Belly Dump- Clam	Whitehorse	11	Berdoe Enterprises Coates Services Yukon Ltd.	17	--	Freightliner x 3, Peterbilt x 2, Kenworth Tractor Midland & R-way - Tridem - - Trailer. 3 Available - Kenworth x 1, Peterbilt x 2,	No	$185	$185	$0	$120
Belly Dump- Clam	Whitehorse	11	Yukon Equipment Services Ltd.	4	--	Freightliner x 3 Midland - Tridem - 34 ft - 3 Available	No	$185	$185	$0	$120
Belly Dump- Clam	Whitehorse	11	Rabbit Creek Transport Inc.	1	--	- Super B - 43 Tonne - 4 Available with Trucks	Yes	$200	$105	$155	$101
Belly Dump- Clam	Whitehorse	11	16142 YT Inc. Northern Enviro Services	42	--	Midland - Tridem - 22 Yd - 2 Available, Trailer - Kenworth Tractor	Yes	$220	$220	$0	$143
Belly Dump- Clam	Whitehorse	11	16142 YT Inc. Northern Enviro Services	5	--	Midland - Super Train - 40 Yd - 2 Available - Kenworth Tractor	Yes	$270	$270	$0	$176
Belly Dump- Cross	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	13	1996	Arnes - - 24 yd^3 Legal - - Kenworth / Peterbuilt Tandem Tractor	No	$170	$170	$170	$111
End Dump	Whitehorse	11	Arctic Backhoe Services Ltd. 535902 Yukon Inc (Allan's Backyard Services)	4 6	-- --	Midland - Tri-Axle - 26 Yd. - 2 Available - Peterbilt Winch Tractor, International Truck Tractor Loadline - - 30' - - Kenworth T800, Volvo, Western Star Tractor	Yes Yes	$160.00 $165.00	$180.00 $165.00	$0.00 $145.00	$104.00 $94.25
End Dump	Whitehorse	11	Arctic Backhoe Services Ltd.	6	--	Midland - Tri-Axle - 26 Yd. - 2 Avaialble - Kenworth Tri-Axle, Truck Tractor	Yes	$170	$180	$0	$111
End Dump	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	9 10	2008 2008	Canuck - - 24 yd^3 Legal - Tridem - Kenworth / Peterbuilt Tandem Tractor Doepker - - 24 yd^3 Legal - Tridem - Kenworth / Peterbuilt Tandem Tractor	No No	$170.00 $170.00	$170.00 $170.00	$170.00 $170.00	$110.50 $110.50
End Dump	Whitehorse	11	Coates Services Yukon Ltd.	11 24	2015 --	Canuck - - 24 yd^3 Legal - Tridem - Kenworth / Peterbuilt Tandem Tractor, Locking Gate for Contaminated Waste Arnes - Tandem - 25 yds - Trailer - Freightliner x 1, Peterbilt x 1, Kenworth x 2	No No	$170.00 $170.00	$170.00 $170.00	$170.00 $0.00	$110.50 $110.50
End Dump	Whitehorse	11	Cobalt Construction Inc.	3	--	- Tridem - 24 yd^3 - Trailer, 3 Available, - Kenworth T800	No	$175	$195	$0	$114
End Dump	Whitehorse	11	Goal Done Contracting Ltd. Rabbit Creek Transport Inc.	7 3	-- --	Kenworth - T800 - 30 yds - - Dump Truck, 16 yd box on Dump Truck, Haul 2 different products at same time, Wagon, 20 yd on wagon Arnies Tridem - - 30 Tonne - 2 Avaialable - High Lift Gate, Side Dump with End	No Yes	$180.00 $180.00	$180.00 $100.00	$0.00 $145.00	$117.00 $94.25
End Dump	Whitehorse	11	Coates Services Yukon Ltd.	14	--	Dump Pup Arnes & Loadline - Tridem - 25 yds - Trailer. 2 each of Arnes Tandem &	No	$185	$185	$0	$120
End Dump	Whitehorse	11	Yukon Equipment Services Ltd.	3	--	Loadline Tandem - Freightliner Tractor, Peterbilt Tractor, Kenworth x 2 Doepler - Tridem - 34 ft - Tractor. Trailer	No	$185	$185	$185	$120
End Dump	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	33	--	Arnes - - 28' - Tandem Axle 28 ft. - End Dump	Yes	$195	$195	$0	$127
End Dump	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	3	--	Arnes - - 28' - Tandem Axle 28 ft. - Tandem Axle	Yes	$195	$195	$0	$127
End Dump	Whitehorse	11	16142 YT Inc. Northern Enviro Services	35	--	Midland - Tandem - - 2 Available - Kenworth Tractor	Yes	$230	$230		$150
End Dump	Whitehorse	11	Goal Done Contracting Ltd. 16142 YT Inc. Northern Enviro Services	10 36	-- --	Kenworth - 900 Tri Drive - 58,500kgs - - Capable of hauling 2 different products & spreadin, Tri drive Dump Truck & wagon, 40 yd box Midland - Tridem - 16 m^3 - 3 Available - Kenworth Tractor	No Yes	$245.00 $250.00	$245.00 $250.00		$159.25 $162.50
Hi-Boy	Whitehorse	11	Cobalt Construction Inc.	5	--	Trailmobile - TA - - - Kenworth T800	No	$160	$180	$0	$104
Hi-Boy	Whitehorse	11	Rabbit Creek Transport Inc.	12	--	Loadline - Tridem - 50Ft - 3 available	Yes	$160	$100	$125	$81
Hi-Boy	Whitehorse	11	Coates Services Yukon Ltd.	18	1998	Lode King - Tridem - - - Freightliner x 3, Peterbilt x 2, Kenworth x 2	No	$180	$180	$0	$117
Hi-Boy	Whitehorse	11	Goal Done Contracting Ltd. 16142 YT Inc. Northern Enviro Services	1 31	-- --	Trail Teck - 32' Flat Deck - 35,000 kg - Hi-boy - 32 ft Flat Deck Trailer w/ Flip Down Ramps, Pulled by Dump Truck - Tri-Axle - 30 Ton - 2 Available - Kenworth W900 Tandem	No Yes	$180.00 $195.00	$180.00 $195.00	$0.00 $0.00	$117.00 $126.75
Hi-Boy	Whitehorse	11	Goal Done Contracting Ltd. 16142 YT Inc. Northern Enviro Services	68	--	- - - Tri Axle Scissor High Boy trailer. 3 Available - Kenworth Tractor	Yes	$225	$225	$0	$146
Lo-Boy	Whitehorse	11	Arctic Backhoe Services Ltd. 535902 Yukon Inc (Allan's Backyard Services)	2 1	-- --	Deloupe - Tri- Axle - - Low Bed - Peterbilt Winch Tractor, International Truck Tractor - - 40' - - Kenworth T800, Volvo, Western Star Tractor	Yes Yes	$160.00 $165.00	$180.00 $165.00	$0.00 $145.00	$104.00 $94.25
Lo-Boy	Whitehorse	11	Arctic Backhoe Services Ltd.	7	--	Deloupe - Tri-Axle Low-bed - - - Kenworth Tri-Axle, Truck Tractor	Yes	$170	$180	$0	$111

CCRP Cost Estimate Table W-15: Yukon Government Third Party Equipment Rental Rates

wood.

Data Source: http://www.geology.gov.yk.ca/pdf/third-party-rental-book-2019.pdf

Type	Area	Priority (Distance from Dawson)	Company	No.	Year	Description	Fluctuation	Wet	Mob/Demob	Dry	Standby
Lo-Boy	Whitehorse	11	Coates Services Yukon Ltd.	15 16	-- --	Arnes - Tandem - - Trailer. Lowbed 9' wide beaver tail - Freightliner x 3, Peterbilt x 2, Kenworth x 2 Frehuef - Tandem - - Trailer. Lowbed 9' - Freightliner x 3, Peterbilt x 2,	No No	$180.00 $180.00	$180.00 $180.00	$0.00 $0.00	$117.00 $117.00
Lo-Boy	Whitehorse	11	Coates Services Yukon Ltd.	19	1998	Kenworth x 2 K-Line - Tridem - - Trailer - Freightliner x 3, Peterbilt x 2, Kenworth x 2	No	$180	$180	$0	$117
Lo-Boy	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	4 5	1996 1974	Aspen - - 10' Wide - Tridem - Kenworth / Peterbuilt Tandem Tractor Fruehauf - - 9' Wide - Tandem - Kenworth / Peterbuilt Tandem Tractor	No No	$185.00 $185.00	$185.00 $185.00	$185.00 $185.00	$120.25 $120.25
Lo-Boy	Whitehorse	11	16142 YT Inc. Northern Enviro Services	32	--	- Tri-Axel - 40 Ton - - Kenworth T800 Tandem	Yes	$195	$195	$0	$127
Lo-Boy	Whitehorse	11	Cobalt Construction Inc. P S Sidhu Trucking Ltd (Whse)	8 24	-- --	Aspen - 7 Axle - 45 Ton - Trailer. Tri Axle - Kenworth T800 Tandem, Booster, Jeep Kenworth / Jerry - T800 - 23 ton - 5 axle - Kenworth T800	No No	$210.00 $210.00	$210.00 $0.00	$0.00 $0.00	$136.50 $136.50
Lo-Boy	Whitehorse	11	16142 YT Inc. Northern Enviro Services	7	--	Arrow - T800 - 60 Ton - 6 Axle Unit, Tri-Axle - Kenworth T800	Yes	$220	$220	$0	$143
Lo-Boy	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	26	2014	Knight - Tri-Axle Hyd Neck - 55 Ton -	Yes	$250	$250	$0	$163
Lo-Boy	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	31	--	- Tri Axle - 50 ton - 2 Avail. Scissor Neck and Lo-Boy Hyd sliding Axle	Yes	$250	$250	$0	$163
Lo-Boy	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	1	--	Knight - Tri Axle - 55 Ton - Triaxle Hyd.Neck	Yes	$250	$250	$0	$163
Lo-Boy	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	2	--	ETS - Tri-Axle - 50 ton - 2 available - 1 lo-boy Hyd slinging Axle, 1 Scissor Neck	Yes	$250	$250	$0	$163
Lo-Boy	Whitehorse	11	16142 YT Inc. Northern Enviro Services	38	--	Arrow Low Bed - Tandem Jeep - 60 - 8 Axle lowbed unit - Kenworth T800	Yes	$275	$275	$0	$179
Lo-Boy	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	22	--	Kenworth / Jerry - T800 - 40 ton - 8 axle & Jeep & Booster - Kenworth Tractor	No	$300	$0	$0	$195
Lo-Boy	Whitehorse	11	Cobalt Construction Inc.	9	--	Aspen - 9 Axle - 55 Ton - Tri Axle. 2014 Kenworth - Kenworth T800 Tandem, Booster	No	$310	$300	$0	$202
Scissor Neck	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	9	--	- - 53' - Scissor Neck Tri - Kenworth T800, Volvo, Western Star Tractor	Yes	$165	$165	$145	$94
Scissor Neck	Whitehorse	11	16142 YT Inc. Northern Enviro Services	69	--	- Tri-Axle - - Tri Axle scissor neck trailer. 3 Available - Kenworth Tractor	Yes	$225	$225	$0	$146
Side Dump	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) Deadman Creek Enterprises Inc (Whitehorse)	15 25	2006 --	Arnes - - 24 yd³ Legal - - Kenworth / Peterbuilt Tandem Tractor - - 36' - Tri-Axle Side Dump 36'	No Yes	$170.00 $195.00	$170.00 $195.00	$170.00 $0.00	$110.50 $126.75
Side Dump	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	4	--	Sidump r - Tri Axle - 36' -	Yes	$195	$195	$0	$127
Side Dump	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	19	--	- T800 - 30 ton - 10 available, Tri axle - Kenworth Tractor	No	$210	$0	$0	$137
Side Dump	Whitehorse	11	16142 YT Inc. Northern Enviro Services	16	--	Neufeld - Tri-Axle - - 4 Available, Trailer - Kenworth Tractor	Yes	$225	$225	$0	$146
Side Dump	Whitehorse	11	16142 YT Inc. Northern Enviro Services	70	--	Midland - - 30 ton - Side Dump Trailer. 4 Available - Kenworth Tractor	Yes	$225	$225	$0	$146
Side Dump	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	20	--	- T800 - 40 ton - Super B, 14 available, 8 axle - Kenworth Tractor	No	$275	$0	$0	$179
Step Deck	Whitehorse	11	Arctic Backhoe Services Ltd.	5	--	Transcroft - - - - Peterbilt Winch Tractor, International Truck Tractor	Yes	$160	$180	$0	$104
Step Deck	Whitehorse	11	Cobalt Construction Inc.	6	--	Manac - Tri-Axle - - - Kenworth T800	No	$160	$180	$0	$104
Step Deck	Whitehorse	11	Rabbit Creek Transport Inc.	10	--	- Tridem - 53 Ft. - 3 Available	Yes	$160	$100	$125	$81
Step Deck	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	13	--	- - 48' - Step deck tri - Kenworth T800, Volvo, Western Star Tractor	Yes	$165	$165	$145	$94
Step Deck	Whitehorse	11	Arctic Backhoe Services Ltd.	8	--	Transcroft - - - - Kenworth Tri-Axle, Truck Tractor	Yes	$170	$180	$0	$111
Step Deck	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899)	6 7	-- 1999	Manic - - 8'6" Wide - Tridem - Kenworth / Peterbuilt Tandem Tractor Lode King - - 8'6" Wide - Tridem - Kenworth / Peterbuilt Tandem Tractor	No No	$185.00 $185.00	$185.00 $185.00	$185.00 $185.00	$120.25 $120.25
Step Deck	Whitehorse	11	Coates Services Yukon Ltd.	21 22	-- --	Trailmobile - Tridem - 48 Ft. - Trailer - Freightliner x 3, Peterbilt x 2, Kenworth x 2 Transcraft - Tridem - 52 Ft. - Trailer - Freightliner x 3, Peterbilt x 2, Kenworth x 2	No No	$185.00 $185.00	$185.00 $185.00	$0.00 $0.00	$120.25 $120.25
Trailer	Whitehorse	11	VanGorda Enterprises	7	--	southland - sl280 dump - - with 1 ton pick up	No	$125	$125	$115	$75
Trailer	Whitehorse	11	Quality North Services Ltd. Arctic Backhoe Services Ltd.	3 3	-- --	Pintle - Hi Tech Tandem - 15 Ton Pay Load - - Tandem Dump Truck, 28' Deck, Ramps Tilt Trailer - - 25 Ton - - Peterbilt Winch Tractor, International Truck Tractor	No Yes	$135.00 $160.00	$135.00 $180.00	$0.00 $0.00	$87.75 $104.00
Trailer	Whitehorse	11	Cobalt Construction Inc.	7	--	Trail King / Manac - TA Trombone - - 2 available - Kenworth T800	No	$160	$180	$0	$104
Trailer	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	27	--	- - 28' - Eq Trailer Pinto Hitch - Kenworth T800, Volvo, Western Star Tractor	Yes	$165	$165	$145	$94
Trailer	Whitehorse	11	16142 YT Inc. Northern Enviro Services	67	--	- Tandem - - Dump Trailer - 4 Available - Tandem Dump Truck	Yes	$185	$185	$0	$120
Trailer	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) Rabbit Creek Transport Inc.	8 8	2011 --	Double A - - - Tandem Pinto Hitch - Kenworth / Peterbuilt Tandem Tractor, Kenworth / Peterbuilt Tridem Dump Truck, Kenworth / Peterbuilt Tandem Dump Truck - Super B - Hay Rack - 6 Bunks per lead/6per pub	No Yes	$185.00 $190.00	$185.00 $100.00	$185.00 $140.00	$120.25 $91.00
Trailer	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	24	--	FruHauf - Water Tank - 5000 gal - Water Tank - tandem axle	Yes	$195	$195	$0	$127
Trailer	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	32	--	Fruhauf - - - 2 available- 53 ft tri-axle and 48ft Tandem Axle	Yes	$195	$195	$0	$127
Trailer	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	6	--	Fruhauf - - - 2 Avail - hi-boy 53' Tri Axle; Step Deck 48' Tandem Axle	Yes	$195	$195	$0	$127
Trailer	Whitehorse	11	Rabbit Creek Transport Inc. 16142 YT Inc. Northern Enviro Services	2 66	-- --	Wes tanks - Super B Tanker - 12000 gal - 5 Available - for Water, fuel or Fire Suppressant - Tridem - - Tridem Dump Trailer - 4 available - Tandem Dump Truck, Tridem	Yes Yes	$195.00 $200.00	$100.00 $200.00	$150.00 $0.00	$97.50 $130.00
Trailer	Whitehorse	11	Arctic Backhoe Services Ltd.	31	--	Pup Deloupe - Tri-Axle - - - Tractor Truck, Pilot Vehicle (Wide Load)	Yes	$240	$285	$0	$156
Water Tanker	Whitehorse	11	Rabbit Creek Transport Inc. Cobalt Construction Inc.	11 10	-- --	Westank - Tandem - 5000 gal - 2 Available Tandem Truck, Tandem Tank Trailers - Spray Bar - - 6000 Gal - 3 Available, - Kenworth T800	Yes No	$135.00 $160.00	$70.00 $160.00	$100.00 $0.00	$65.00 $104.00
Water Tanker	Whitehorse	11	Berdoe Enterprises	8	--	Kenworth - T800 - 7200 Gal -	No	$175	$175	$175	$114
Water Tanker	Whitehorse	11	16142 YT Inc. Northern Enviro Services	8	--	- - 6000 Gal - 2 Available - Kenworth Tractor, Water Pump	Yes	$185	$185	$0	$120

CCRP Cost Estimate Table W-15: Yukon Government Third Party Equipment Rental Rates

wood.

Data Source: http://www.geology.gov.yk.ca/pdf/third-party-rental-book-2019.pdf

Type	Area	Priority (Distance from Dawson)	Company	No.	Year	Description	Fluctuation	Wet	Mob/Demob	Dry	Standby
Water Tanker	Whitehorse	11	Coates Services Yukon Ltd.	23	--	Freuhauf - - 7000 Gal - Trailer - Freightliner x 3, Peterbilt x 2, Kenworth x 2	No	$185	$185	$0	$120
Water Tanker	Whitehorse	11	P S Sidhu Trucking Ltd (Whse)	16	--	Kenworth - T800 - 4000 gal - 4 Available. Tanker - Kenworth Tractor	No	$200	$0	$0	$130
Concrete Mobile Batcher	Whitehorse	11	16142 YT Inc. Northern Enviro Services	4	--	Reimer - R12 L - 9 Meters - Onsite Readymix concrete - Materials at Market price - Western Star Tractor	Yes	$290	$290		$189
Emergency Transport	Whitehorse	11	Truckways Transport (1977) Ltd. Boreal Engineering Ltd	4 14	1979 --	Chev - - 1 Ton - - Radio, Slints, Bandages, Stretcher, Basket stretcher, Back Board, Emergency Jump Kits x2, Water, Oxygen, road signs Dodge - - - ETV Fully equipped - Certified EMR Level 3 Attendant, Flagger	Yes Yes	$100.00 $125.00	$100.00 $150.00	$0.00 $94.00	$65.00 $61.10
Emergency Transport	Whitehorse	11	16142 YT Inc. Northern Enviro Services	46	--	Signs, road signs, Radio - MTV - - level 3 operator Safety Units MTV - Flagging equipment	Yes	$135	$135	$0	$88
Emergency Transport	Whitehorse	11	16142 YT Inc. Northern Enviro Services	47	--	Safety Unit - MTV - - Safety Unit MTV - 2 available - Level 3 Operator	Yes	$195	$195	$0	$127
Pilot Vehicle	Whitehorse	11	Goal Done Contracting Ltd.	14	--	- - - un man traffic control lights - Traffic Control Signs, Pylons	No	$60	$150	$0	$39
Pilot Vehicle	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	10	--	GMC - - 1/2 ton - - Tidy Tank	Yes	$80	$80	$75	$49
Pilot Vehicle	Whitehorse	11	535902 Yukon Inc (Allan's Backyard Services)	11	--	Dodge - - 3/4 ton - - Tidy Tank	Yes	$80	$80	$75	$49
Pilot Vehicle	Whitehorse	11	Quality North Services Ltd.	1	--	Dodge - - 1/2 ton - Quad cab - Safety Equipment, Pilot Sign	No	$80	$80	$0	$52
Pilot Vehicle	Whitehorse	11	Truckways Transport (1977) Ltd. Arctic Backhoe Services Ltd.	2 34	-- --	Chev - 1/2 Ton - - 2 Available - Radios x 2, Pylons x 2, Pilot signs x 2, Road Signs x 2 Ford & Dodge - C/C Pickup - 1/2 Ton - 2 available - Operator, Pilot Sign, Radio's	Yes Yes	$80.00 $85.00	$80.00 $90.00	$0.00 $0.00	$52.00 $55.25
Pilot Vehicle	Whitehorse	11	Boreal Engineering Ltd	8	--	Dodge - Ram Diesel 4x4 - - - Tidy Tank	Yes	$90	$100	$68	$44
Pilot Vehicle	Whitehorse	11	Castle Rock Enterprises Limited Partnership (14899) Carey On Construction	43 8	-- --	Ford/Chevy/Dodge - - - 3 available - Pilot Car Sign Ford - F350 - 1 ton - - Radio's, Light, Ball Hitch, Fuel Tank	No Yes	$95.00 $100.00	$95.00 $100.00	$95.00 $100.00	$61.75 $65.00
Pilot Vehicle	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	35	--	Dodge - 3500 - - Crew Cab - Pilot Car Sign	Yes	$100	$100	$0	$65
Pilot Vehicle	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	36	--	Dodge - 3500 Crew Cab - - - Pilot Car Sign	Yes	$100	$100	$0	$65
Pilot Vehicle	Whitehorse	11	Son Rise General Contracting 16142 YT Inc. Northern Enviro Services	5 6	-- --	Ford/Dodge - - 1 ton - 5 available - 30 ft gooseneck x 2, Pump, Tidy Tank, 24 ft car/equipment hauler, equip x 3, 20 ft. car hauler - F250 - - 3 Available - Pilot Trucks Pick Ups	Yes Yes	$110.00 $120.00	$0.00 $120.00	$0.00 $0.00	$71.50 $78.00
Pilot Vehicle	Whitehorse	11	Cobalt Construction Inc.	38	--	GMC - 2500 4x4 - - - Pilot Car Sign	No	$185	$185	$0	$120
Pickup Truck	Whitehorse	11	Deadman Creek Enterprises Inc (Whitehorse)	30	--	Dodge - 3500 4x4 Crew Cab - - 4 Available	Yes	$85	$85	$0	$55
Pickup Truck	Whitehorse	11	Deadman Creek Enterprises Inc. (Teslin)	40	--	Dodge - 3500 Crew Cab 4X4 - - 4 available	Yes	$85	$85	$0	$55
Pickup Truck	Whitehorse	11	Truckways Transport (1977) Ltd. Dirty Deeds Eq. Cont.	1 1	-- --	Chev - - 1\2 ton - 2 available - Radios x 2, Pilot signs x 2, Pylons x 2, Road Signs x 2 Ford - F450/550 - - 2 available - 33" Goose neck 30000 lbs, 18' Ramp load	Yes No	$85.00 $90.00	$80.00 $90.00	$0.00 $0.00	$55.25 $58.50
Pickup Truck	Whitehorse	11	Alsek Valley Cont & Cons (41618 Yukon Inc)	1	--	trailer, Horse Trailer, 4 yd Dump Trailer Dodge/GMC - 3500 & 2500 - 1 Ton/3/4 ton - with beacons - Safety Gear, 16'	Yes	$100	$100	$0	$65
Pickup Truck	Whitehorse	11	Lane's Yukon Yardworks INC	12	--	Trailer (14000 lbs), Radio's Ford, Chevy - F250/F350/Chevy 2500 - - 3 available - Crew cab Flat deck, Ext	No	$100	$100	$0	$65
Pickup Truck	Whitehorse	11	60 Below Snow Management	5	--	cab long box x 2 Dodge - 5500 - 2 ton - Flatdeck - Triple Axle Trailer 20,000lbs, Tandem Dump	No	$110	$110	$0	$72
Pickup Truck	Whitehorse	11	Son Rise General Contracting	4	--	Trailer 10,000lbs Ford/Dodge - - 1 ton - 5 available - 30 ft gooseneck x 2, Pump, Tidy Tank, 24 ft	Yes	$110	$0	$0	$72
Pickup Truck	Whitehorse	11	Lane's Yukon Yardworks INC	11	--	car/equipment hauler, equip x 3, 20 ft. car hauler Ram - 5500 - - - Crew Cab, 5th Wheel Hitch, Flat Deck	No	$120	$120	$0	$78
Pickup Truck	Whitehorse	11	Cross Fall Contracting	3	--	Ford - F-550 - - - Dump Box, 14,000 Lb. Tilt Deck Equipment Trailer	Yes	$125	$0	$90	$59
Pickup Truck	Whitehorse	11	VanGorda Enterprises	5	--	Dodge, Chevy - 3500, F350 - 1 Ton - 2 available - Dump Box	No	$125	$125	$115	$75
Pickup Truck	Whitehorse	11	Goal Done Contracting Ltd.	13	--	Chev - Duramax - 3500, 1 ton - - Tidy Tank, Wide Load Sign, 5th Wheel Hitch	No	$130	$130	$0	$85

Company	Type	Type	Equipment	Rate	Rate Includes Operator?	Rate (including Operator
Company A	VAC Truck	**VAC TRUCKS (Complete w/ Operator)**	Tandem Axle	$175	Yes	$175
Company A	VAC Truck	**VAC TRUCKS (Complete w/ Operator)**	Hydro Vac (Swamper Included)	$365	Yes	$365
Company A	VAC Truck	**VAC TRUCKS (Complete w/ Operator)**	Delta III	$335	Yes	$335
Company A	Water Truck	**WATER TRUCKS (Complete w/ Operator)**	Tandem 100BBL Water Truck	$160	Yes	$160
Company A	Water Truck	**WATER TRUCKS (Complete w/ Operator)**	Tandem 100BBL Potable Water	$160	Yes	$160
Company A	Water Truck	**WATER TRUCKS (Complete w/ Operator)**	Tandem 92BBL Sour Seal Certified	$195	Yes	$195
Company A	Water Truck	**WATER TRUCKS (Complete w/ Operator)**	Foremost Delta III 80BBL Water	$335	Yes	$335
Company A	Water Truck	**WATER TRUCKS (Complete w/ Operator)**	Tandem 100BBL Combo Steamer	$275	Yes	$275
Company A	Water Truck	**WATER TRUCKS (Complete w/ Operator)**	Steam Truck	$275	Yes	$275
Company A	Water Truck	**WATER TRUCKS (Complete w/ Operator)**	Tandem	$190	Yes	$190
Company A	Trailer	**TRAILERS**	Scissor Neck	$70	Not Applicable	Not Applicable
Company A	Trailer	**TRAILERS**	End Dump Tandem Trailer	$55	Not Applicable	Not Applicable
Company A	Trailer	**TRAILERS**	End Dump Tri Trailer	$65	Not Applicable	Not Applicable
Company A	Trailer	**TRAILERS**	Tri-Hi Trailer	$65	Not Applicable	Not Applicable
Company A	Trailer	**TRAILERS**	25' Flat Deck Utility Trailer	$24	Not Applicable	Not Applicable
Company A	Truck	**GRAVEL TRUCKS (Complete w/ Operator)**	Tandem	$160	Yes	$160
Company A	Truck	**GRAVEL TRUCKS (Complete w/ Operator)**	Tractor with end dump trailer	$255	Yes	$255
Company A	Truck	**BED TRUCKS (Complete w/ Operator & Swamper)**	Bed Truck 365"	$410	Yes	$410
Company A	Truck	**BED TRUCKS (Complete w/ Operator & Swamper)**	Bed Truck 400"	$430	Yes	$430
Company A	Service Truck	**SERVICE TRUCK**	Service Truck (w/ Mechanic)	$310	Yes	$310
Company A	Service Truck	**SERVICE TRUCK**	Shop Rate	$150	Not Applicable	Not Applicable
Company A	Excavator	**HEAVY EQUIPMENT w/ Operator**	Excavator - Small (7T Class)	$145	Yes	$145
Company A	Other	**HEAVY EQUIPMENT w/ Operator**	*Ripper/Frost Bucket Teeth	$29	Yes	Not Applicable
Company A	Excavator	**HEAVY EQUIPMENT w/ Operator**	Excavator - Medium (25-29T Class)	$235	Yes	$235
Company A	Other	**HEAVY EQUIPMENT w/ Operator**	*Ripper/Frost Bucket Teeth	$47	Yes	Not Applicable
Company A	Excavator	**HEAVY EQUIPMENT w/ Operator**	Excavator - Large (36T Class)	$265	Yes	$265
Company A	Other	**HEAVY EQUIPMENT w/ Operator**	*Ripper/Frost Bucket Teeth	$53	Yes	Not Applicable
Company A	Excavator	**HEAVY EQUIPMENT w/ Operator**	Mulcher Attachment Small Excavator	$50	Yes	$50
Company A	Excavator	**HEAVY EQUIPMENT w/ Operator**	Mulcher Attachment Medium Excavator	$70	Yes	$70
Company A	Loader	**HEAVY EQUIPMENT w/ Operator**	Loader - Small (IT28)	$160	Yes	$160
Company A	Loader	**HEAVY EQUIPMENT w/ Operator**	Loader - Medium (IT38)	$180	Yes	$180
Company A	Loader	**HEAVY EQUIPMENT w/ Operator**	Loader - Large (950K)	$195	Yes	$195
Company A	Dozer	**HEAVY EQUIPMENT w/ Operator**	Dozer - Small (D4K LGP)	$175	Yes	$175
Company A	Dozer	**HEAVY EQUIPMENT w/ Operator**	Dozer - Medium (D6N LGP)	$220	Yes	$220
Company A	Dozer	**HEAVY EQUIPMENT w/ Operator**	Dozer - Large (D8T)	$300	Yes	$300
Company A	Dozer	**HEAVY EQUIPMENT w/ Operator**	**Dozer Rear Mounted Ripper	$75	Yes	$75
Company A	Dozer	**HEAVY EQUIPMENT w/ Operator**	Dozer Side Boom - D5H LGP	$235	Yes	$235
Company A	Snocat	**HEAVY EQUIPMENT w/ Operator**	Snow Cat	$245	Yes	$245
Company A	Grader	**HEAVY EQUIPMENT w/ Operator**	Grader 6x6 - 143H w/wing	$185	Yes	$185
Company A	Loader	**HEAVY EQUIPMENT w/ Operator**	Compact Track Loader - 299D2XHP	$150	Yes	$150
Company A	Loader	**HEAVY EQUIPMENT w/ Operator**	***Compact Track Loader w/mulcher - 299D2XHP	$300	Yes	$300
Company A	Service Truck	**MISC**	F350 4x4 Pickup Truck (Day Rate)	$250	Not Applicable	Not Applicable
Company A	Other	**MISC**	Swamper	$75	Not Applicable	Not Applicable
Company A	Other	**MISC**	Operator	$85	Not Applicable	Not Applicable
Company A	Other	**MISC**	Supervision (w/ Pickup - Day Rate)	$1,800	Yes	$1,800
Company A	Other	**MISC**	Stat Holidays (Additional on Top of Rate)	$75	Not Applicable	Not Applicable
Company A	Other	**MISC**	Pilot Car (Hourly Rate)	$120	Yes	$120
Company A	Other	**MISC**	Subsistence	$300	Not Applicable	Not Applicable
Company A	Other	**MISC**	Rig Mats 20' (Day Rate)	$25	Not Applicable	Not Applicable
Company A	Other	**MISC**	Rig Mats 40' (Day Rate)	$45	Not Applicable	Not Applicable
Company A	Other	**MISC**	Light Tower (Fuel In) (Day Rate)	$300	Not Applicable	Not Applicable
Company A	Other	**MISC**	Typhoon Pump (Day Rate)	$100	Not Applicable	Not Applicable
Company A	Other	**MISC**	Auger For Compact Track Loader	$25	Not Applicable	Not Applicable
Company A	Other	**MISC**	Gas Welder (Day Rate)	$100	Not Applicable	Not Applicable
Company A	Other	**MISC**	Trash Pump (Day Rate)	$100	Not Applicable	Not Applicable
Company A	Other	**MISC**	Tamper (Day Rate)	$100	Not Applicable	Not Applicable

CCRP Cost Estimate Table W-16: 2019 NWT Equipment Rates

Company	Type	Type	Equipment	Rate	Rate Includes Operator?	Rate (including Operator
Company A	Other	**MISC**	Chainsaw (Day Rate)	$75	Not Applicable	Not Applicable
Company A	Other	**MISC**	Slip Tank (Day Rate)	$50	Not Applicable	Not Applicable
Company B	Articulated Truck	ARTICULATED TRUCKS	Rock truck - 730 Articulated	$190	Not Applicable	Not Applicable
Company B	Articulated Truck	ARTICULATED TRUCKS	Rock truck - 730 Articulated	$190	No	$260
Company B	Excavator	EXCAVATORS	Excavator - 325B w/ 2 Buckets, Thumb, Promac Hydro Axe Mower	$135	No	$205
Company B	Other	EXCAVATORS	Hydro Axe	$50	Not Applicable	Not Applicable
Company B	Other	EXCAVATORS	Mudbuster	$65	Not Applicable	Not Applicable
Company B	Other	EXCAVATORS	Tamper	$30	Not Applicable	Not Applicable
Company B	Other	EXCAVATORS	Breaker	$45	Not Applicable	Not Applicable
Company B	Excavator	EXCAVATORS	Excavator- 329E w/ 2 Buckets	$185	No	$255
Company B	Excavator	EXCAVATORS	Excavator - 426 w/ 2 Buckets	$80	No	$150
Company B	Other	EXCAVATORS	Tamper	$25	Not Applicable	Not Applicable
Company B	Other	EXCAVATORS	Hammer	$25	Not Applicable	Not Applicable
Company B	Excavator	EXCAVATORS	Excavator - 330C w/ HD Rock Bucket, Narrow Bucket, Ripper	$185	No	$255
Company B	Excavator	EXCAVATORS	Excavator - 225 w/ 2 Buckets, Thumb	$110	No	$180
Company B	Excavator	EXCAVATORS	Excavator - 330C LC w/ 2 Buckets, Thumb, Ripper	$185	No	$255
Company B	Other	EXCAVATORS	Twister B6 HD Mudbuster Bucket Attachment	$65	Not Applicable	Not Applicable
Company B	Excavator	EXCAVATORS	Excavator - 330DL w/ 2 Buckets, Thumb	$185	No	$255
Company B	Excavator	EXCAVATORS	Excavator - 270D LC w/ 2 Buckets, Thumb, Twister B6 HD Mudbuster Bucket Attachment	$140	No	$210
Company B	Other	EXCAVATORS	Twister B6 HD Mudbuster Bucket Attachment	$65	Not Applicable	Not Applicable
Company B	Excavator	EXCAVATORS	Excavator - PC300LC-6 w/ 66" Clean Out Bucket, 36" Dig Bucket	$175	No	$245
Company B	Other	EXCAVATORS	Ripper	$30	Not Applicable	Not Applicable
Company B	Excavator	EXCAVATORS	Excavator - PC300LC-6 w/ 63" Clean Out Bucket, 36" Dig Bucket	$175	No	$245
Company B	Other	EXCAVATORS	Ripper	$30	Not Applicable	Not Applicable
Company B	Excavator	EXCAVATORS	Excavator - 345DL w/ 2 Buckets	$225	No	$295
Company B	Other	EXCAVATORS	Hammer Attachment	$50	Not Applicable	Not Applicable
Company B	Loader	LOADERS	Loader - 980H	$175	No	$245
Company B	Loader	LOADERS	Loader - 950B	$85	No	$155
Company B	Loader	LOADERS	Loader - 950F	$85	No	$155
Company B	Loader	LOADERS	Loader - 980C	$150	No	$220
Company B	Loader	LOADERS	Loader - 544J	$90	No	$160
Company B	Loader	LOADERS	Loader - 544K	$90	No	$160
Company B	Loader	LOADERS	Loader - 644K W/ 144" Angle Blade, Extra Long Forks	$115	No	$185
Company B	Loader	LOADERS	Loader - WA 250	$90	No	$160
Company B	Loader	LOADERS	Loader - WA320-3 w/ Bucket, Forks, Blade 121 Kw, QA Pipe Grappler, 3.5 CY Rock Bucket	$100	No	$170
Company B	Loader	LOADERS	Loader - WA320-3 w/ Bucket, Forks, Blade, NET 121 kw, QA Pipe Grappler	$100	No	$170
Company B	Loader	LOADERS	Loader - WA320-5 w/ Bucket, Forks, Pipe Grappler, NET 121 Kw	$98	No	$168
Company B	Loader	LOADERS	Blade 8 - way	$100	No	$170
Company B	Loader	LOADERS	Loader - WA 250PZ-6 w/ Bucket and Forks	$90	No	$160
Company B	Loader	LOADERS	Loader - IT28	$85	No	$155
Company B	Loader	LOADERS	Skid Steer - 262B	$45	No	$115
Company B	Loader	LOADERS	Skid Steer - 262B w/ Flood Pump	$130	No	$200
Company B	Loader	LOADERS	Skid Steer - 1845C	$45	No	$115
Company B	Loader	LOADERS	Skid Steer - 1845C w/ Flood Pump	$130	No	$200
Company B	Loader	LOADERS	Skid Steer - 1845C	$45	No	$115
Company B	Loader	LOADERS	Skid Steer - 1845C w/ Flood Pump	$130	No	$200
Company B	Loader	LOADERS	Skid Steer - 75 XT w/ Forks and 72" Bucket	$45	No	$115
Company B	Loader	LOADERS	Skid Steer - 75 XT w/ Forks and 72" Bucket w/ Flood Pump	$130	No	$200
Company B	Loader	LOADERS	Skidsteer - 262B c/w Snow Bucket, Stinger Att	$45	No	$115
Company B	Loader	LOADERS	Skidsteer - 262B c/w Snow Bucket, Stinger Att w/ Flood Pump	$130	No	$200
Company B	Dozer	DOZERS	Dozer - D155 w/ Ripper 302 Kw	$190	No	$260
Company B	Other	DOZERS	Ripper (When Ripping)	$30	Not Applicable	Not Applicable
Company B	Dozer	DOZERS	Dozer - D8R	$190	No	$260
Company B	Dozer	DOZERS	Dozer - D8K	$170	No	$240
Company B	Dozer	DOZERS	Dozer - D7H w/ Ripper	$130	No	$200
Company B	Other	DOZERS	Ripper (When Ripping)	$30	Not Applicable	Not Applicable
Company B	Dozer	DOZERS	Dozer - D7G	$130	No	$200
Company B	Dozer	DOZERS	Dozer - D7G w/ Winch 149 Kw	$130	No	$200
Company B	Dozer	DOZERS	Dozer - D7G w/ Winch 149 Kw	$130	No	$200
Company B	Dozer	DOZERS	Dozer - D7G w/ Winch 149 Kw	$130	No	$200

CCRP Cost Estimate Table W-16: 2019 NWT Equipment Rates

Company	Type	Type	Equipment	Rate	Rate Includes Operator?	Rate (including Operator
Company B	Dozer	DOZERS	Dozer - D7G w/ Winch 149 Kw	$130	No	$200
Company B	Dozer	DOZERS	Dozer - D6D	$125	No	$195
Company B	Dozer	DOZERS	Dozer - D6R	$125	No	$195
Company B	Dozer	DOZERS	Dozer - D6N LGP w/ Tow Winch	$125	No	$195
Company B	Dozer	DOZERS	Dozer - D6M	$125	No	$195
Company B	Dozer	DOZERS	Dozer - D8N w/ Ripper	$190	No	$260
Company B	Other	DOZERS	Ripper (When Ripping)	$30	Not Applicable	Not Applicable
Company B	Dozer	DOZERS	Dozer - D8R w/ Ripper	$190	No	$260
Company B	Other	DOZERS	Ripper (When Ripping)	$30	Not Applicable	Not Applicable
Company B	Dozer	DOZERS	Dozer - 550G	$75	No	$145
Company B	Dozer	DOZERS	Dozer - D4H	$75	No	$145
Company B	Dozer	DOZERS	Dozer - D5C	$75	No	$145
Company B	Dozer	DOZERS	Dozer - D5C w/ Winch 74 Kw	$75	No	$145
Company B	Dozer	DOZERS	Dozer - D5K LGP	$85	No	$155
Company B	Grader	GRADERS	Grader - 140H	$125	No	$195
Company B	Grader	GRADERS	Grader - 160H w/ Ripper and Wing	$140	No	$210
Company B	Grader	GRADERS	Grader - 140G w/ Snow Wing 112 kW	$100	No	$170
Company B	Grader	GRADERS	Grader - 140G w/ Snow Wing 112 kW	$100	No	$170
Company B	Grader	GRADERS	Grader - 740	$100	No	$170
Company B	Grader	GRADERS	Grader - 740A	$100	No	$170
Company B	Grader	GRADERS	Grader - 140G w/ Snow Wing 112 Kw	$100	No	$170
Company B	Grader	GRADERS	Grader - 14M	$165	No	$235
Company B	Grader	PACKERS	Packer - CS563C	$100	No	$170
Company B	Grader	PACKERS	Packer - CS563C	$100	No	$170
Company B	Grader	PACKERS	Packer - Smoot Drum SD122DX TF w/ Cab	$100	No	$170
Company B	Picker truck	PICKER TRUCKS	38 Ton Picker	$200	No	$270
Company B	Other	PICKER TRUCKS	Pile Driving leads	$125	Not Applicable	Not Applicable
Company B	Picker truck	PICKER TRUCKS	30 Ton Picker	$175	No	$245
Company B	Picker truck	PICKER TRUCKS	50 Ton Picker	$225	No	$295
Company B	Service Truck	SERVICE UNITS	Mechanic Truck - F450	$55	No	$125
Company B	Service Truck	SERVICE UNITS	Mechanic Truck - F450	$55	No	$125
Company B	Service Truck	SERVICE UNITS	Mechanic Truck - F350	$55	No	$125
Company B	Service Truck	SERVICE UNITS	Mechanic Truck - F550	$55	No	$125
Company B	Support Truck	SUPPORT TRUCKS	9000 Winch Tractor	$95	No	$165
Company B	Tractor	SUPPORT TRUCKS	Tractor	$95	No	$165
Company B	Tractor	SUPPORT TRUCKS	Winch Tractor	$95	No	$165
Company B	Tractor	SUPPORT TRUCKS	Winch Tractor	$95	No	$165
Company B	Tractor	SUPPORT TRUCKS	Winch Tractor	$95	No	$165
Company B	Tractor	SUPPORT TRUCKS	Winch Tractor	$95	No	$165
Company B	Tractor	SUPPORT TRUCKS	Winch Tractor	$95	No	$165
Company B	Tractor	SUPPORT TRUCKS	Winch Tractor	$95	No	$165
Company B	Truck	SUPPORT TRUCKS	360 Bed	$200	No	$270
Company B	Truck	SUPPORT TRUCKS	360 Bed	$200	No	$270
Company B	Truck	SUPPORT TRUCKS	360 Bed	$200	No	$270
Company B	Truck	SUPPORT TRUCKS	400 Bed	$225	No	$295
Company B	Truck	SUPPORT TRUCKS	400 Bed	$225	No	$295
Company B	Truck	SUPPORT TRUCKS	400 Bed	$225	No	$295
Company B	Support Truck	SUPPORT TRUCKS	Winch Truck	$95	No	$165
Company B	Truck	SUPPORT TRUCKS	Dump Truck - Triaxle	$115	No	$185
Company B	Truck	SUPPORT TRUCKS	Dump Truck - Triaxle	$115	No	$185
Company B	Truck	SUPPORT TRUCKS	Dump Truck - Triaxle	$115	No	$185
Company B	Support Truck	SUPPORT TRUCKS	T800 Fuel Truck	$116	No	$186
Company B	Support Truck	SUPPORT TRUCKS	Flat Deck - F550	$47	No	$117
Company B	VAC Truck	SUPPORT TRUCKS	Vacuum Truck	$125	No	$195
Company B	VAC Truck	SUPPORT TRUCKS	Hydrovac Truck	$200	No	$270
Company B	VAC Truck	SUPPORT TRUCKS	Steam Truck 800	$100	No	$170
Company B	Water Truck	SUPPORT TRUCKS	Water Truck	$90	No	$160
Company B	Water Truck	SUPPORT TRUCKS	Water Truck - 100 Barrel (Bear River)	$90	No	$160
Company B	Water Truck	SUPPORT TRUCKS	Water Truck	$90	No	$160
Company B	Water Truck	SUPPORT TRUCKS	Water Truck - LT9500 - 100 Barrel (Bear River)	$90	No	$160
Company B	Water Truck	SUPPORT TRUCKS	Water Truck - LT9500 - 100 Barrel (Tulita Water)	$90	No	$160
Company B	Tractor	SUPPORT TRUCKS	Tractor w/ fifth wheel	$95	No	$165

CCRP Cost Estimate Table W-16: 2019 NWT Equipment Rates

Company	Type	Type	Equipment	Rate	Rate Includes Operator?	Rate (including Operator
Company B	Water Truck	SUPPORT TRUCKS	Water Truck	$90	No	$160
Company B	Water Truck	SUPPORT TRUCKS	Water Truck - 100 Barrel (Bear River)	$90	No	$160
Company B	Water Truck	SUPPORT TRUCKS	Water Truck - LT9500 - 100 Barrel (Tulita Water)	$90	No	$160
Company B	Water Truck	SUPPORT TRUCKS	Water Truck	$90	No	$160
Company B	Water Truck	SUPPORT TRUCKS	Water Truck	$90	No	$160
Company B	Support Truck	SUPPORT TRUCKS	Winch Truck - LW924	$95	No	$165
Company B	Support Truck	SUPPORT TRUCKS	Winch truck - Tandem	$95	No	$165
Company B	Support Truck	SUPPORT TRUCKS	Winch Truck	$95	No	$165
Company B	Support Truck	SUPPORT TRUCKS	Winch Truck	$95	No	$165
Company B	Trailer	TRAILERS	Trailer - Lowboy 16 Wheel - scissor neck	$75	No	$145
Company B	Trailer	TRAILERS	End Dump	$50	No	$120
Company B	Trailer	TRAILERS	End Dump	$50	No	$120
Company B	Trailer	TRAILERS	End Dump	$50	No	$120
Company B	Trailer	TRAILERS	Tri End Dump	$55	No	$125
Company B	Trailer	TRAILERS	Tri End Dump	$55	No	$125
Company B	Trailer	TRAILERS	Scissor Neck	$55	No	$125
Company B	Trailer	TRAILERS	Scissor Neck	$55	No	$125
Company B	Trailer	TRAILERS	Scissor Neck	$55	No	$125
Company B	Trailer	TRAILERS	Scissor Neck	$55	No	$125
Company B	Trailer	TRAILERS	Scissor Neck	$55	No	$125
Company B	Trailer	TRAILERS	Tri-High	$55	No	$125
Company B	Trailer	TRAILERS	Tri-High	$55	No	$125
Company B	Trailer	TRAILERS	Tri-High	$55	No	$125
Company B	Trailer	TRAILERS	Tri-Low	$55	No	$125
Company B	Trailer	TRAILERS	Tri-Low	$55	No	$125
Company B	Trailer	TRAILERS	Tandem-high	$50	No	$120
Company B	Trailer	TRAILERS	Trailer - Tri-axle Cross Clam Belly Trailer	$55	No	$125
Company B	Trailer	TRAILERS	Trailer - Tri-axle Belly Dump Trailer	$55	No	$125
Company B	Trailer	TRAILERS	Trailer - Tri-axle Belly Dump Trailer	$55	No	$125
Company B	Trailer	TRAILERS	Trailer - Tri-axle Belly Dump Trailer	$55	No	$125
Company B	Trailer	TRAILERS	Trailer - Tri-axle Belly Dump Trailer	$55	No	$125
Company B	Trailer	TRAILERS	Trailer - End Dump	$45	No	$115
Company B	Trailer	TRAILERS	Trailer - End Dump	$45	No	$115
Company B	Trailer	TRAILERS	Trailer - Scissor Tridem	$55	No	$125
Company B	Trailer	TRAILERS	Trailer - Center Dump	$50	No	$120
Company B	Trailer	TRAILERS	Trailer - 48' Van	$50	No	$120
Company B	Trailer	TRAILERS	Trailer - 29' T/A End Dump	$45	No	$115
Company B	Trailer	TRAILERS	Trailer - Highboy Tandem	$50	No	$120
Company B	Trailer	TRAILERS	Trailer - Lowboy 16 Wheel	$75	No	$145
Company B	Trailer	TRAILERS	Trailer - 28' TA End Dump	$50	No	$120
Company B	Trailer	TRAILERS	Trailer - T/A Edn Dump	$50	No	$120
Company B	Trailer	TRAILERS	Trailer - T/A Edn Dump	$50	No	$120
Company B	Trailer	TRAILERS	Trailer - Scissor Deck Tridem	$55	No	$125
Company B	Support Truck	WINTER ROAD UNITS	Plow Truck - T-800	$100	No	$170
Company B	Support Truck	WINTER ROAD UNITS	Plow Truck - T-800 w/ Sander	$125	No	$195
Company B	Snocat	WINTER ROAD UNITS	Snocat - BR-2000	$190	No	$260
Company B	Snocat	WINTER ROAD UNITS	Snocat - BR-2000	$190	No	$260
Company B	Snocat	WINTER ROAD UNITS	Snocat - BR-2000	$190	No	$260
Company B	Snocat	WINTER ROAD UNITS	Snocat - BR-275	$180	No	$250
Company B	Snocat	WINTER ROAD UNITS	Snocat - BR-350	$200	No	$270
Company B	Snocat	WINTER ROAD UNITS	Snocat - BR-350	$200	No	$270
Company B	Water Truck	WINTER ROAD UNITS	Water Truck - Maurader	$225	No	$295
Company B	Water Truck	WINTER ROAD UNITS	Water Truck - Maurader	$225	No	$295
Company B	Water Truck	WINTER ROAD UNITS	Water Truck - Delta 3	$225	No	$295
Company B	Water Truck	WINTER ROAD UNITS	Water Truck - Delta 3	$225	No	$295
Company B	Support Truck	WINTER ROAD UNITS	Fuel Truck - Delta 3	$225	No	$295
Company B	Support Truck	WINTER ROAD UNITS	Fuel Truck - Delta 3	$225	No	$295
Company B	Support Truck	WINTER ROAD UNITS	Personnel Carrier - 110C	$200	No	$270
Company B	Snocat	WINTER ROAD UNITS	Snowmaker - Super Yukon	$500	No	$570
Company B	Drill	SPECIALIZED UNITS	Drill	$140	No	$210
Company B	Drill	SPECIALIZED UNITS	Drill	$140	No	$210
Company B	Other	PROCESSING PLANT(1): CRUSHER (Fuel Excluded)	Cone Plant - XC 1400		Not Applicable	Not Applicable

CCRP Cost Estimate Table W-16: 2019 NWT Equipment Rates

Company	Type	Type	Equipment	Rate	Rate Includes Operator?	Rate (including Operator
Company B	Other	PROCESSING PLANT(1): CRUSHER (Fuel Excluded)	Screen Plant		Not Applicable	Not Applicable
Company B	Other	PROCESSING PLANT(1): CRUSHER (Fuel Excluded)	Conveyor - 80'		Not Applicable	Not Applicable
Company B	Other	PROCESSING PLANT(1): CRUSHER (Fuel Excluded)	Conveyor - 120' (Fold up)		Not Applicable	Not Applicable
Company B	Other	PROCESSING PLANT(1): CRUSHER (Fuel Excluded)	Control Room w/ tower one unit		Not Applicable	Not Applicable
Company B	Other	PROCESSING PLANT(1): CRUSHER (Fuel Excluded)	Bin Wall		Not Applicable	Not Applicable
Company B	Other	PROCESSING PLANT(1): CRUSHER (Fuel Excluded)	Hopper		Not Applicable	Not Applicable
Company B	Other	PROCESSING PLANT(1): CRUSHER (Fuel Excluded)	Conveyor/Feeder		Not Applicable	Not Applicable
Company B	Other	PROCESSING PLANT(1): CRUSHER (Fuel Excluded)	Conveyor Attachment		Not Applicable	Not Applicable
Company B	Other	Misc. Suport Equipment - Rate List (excludes fuel on applicable units)	Description	Monthly	Not Applicable	Not Applicable
Company B	Other	Misc. Suport Equipment - Rate List (excludes fuel on applicable units)	Light Towers - 6Kw	$3,500	Not Applicable	Not Applicable
Company B	Other	Misc. Suport Equipment - Rate List (excludes fuel on applicable units)	Light Towers - 8Kw	$4,000	Not Applicable	Not Applicable
Company B	Other	Misc. Suport Equipment - Rate List (excludes fuel on applicable units)	400 BBL tank c/w skid, fall arrest, lined and sloped	$1,000	Not Applicable	Not Applicable
Company B	Other	Misc. Suport Equipment - Rate List (excludes fuel on applicable units)	Rig Mats (8x40)	$1,000	Not Applicable	Not Applicable
Company B	Other	Misc. Suport Equipment - Rate List (excludes fuel on applicable units)	Swamp Mats - Oak (8x14)	$700	Not Applicable	Not Applicable
Company B	Other	Misc. Suport Equipment - Rate List (excludes fuel on applicable units)	30,000 Liter Enviro-tank	$4,500	Not Applicable	Not Applicable
Company B	Other	Misc. Suport Equipment - Rate List (excludes fuel on applicable units)	7,500 Liter Enviro-tank	$2,800	Not Applicable	Not Applicable
Company B	Other	Misc. Suport Equipment - Rate List (excludes fuel on applicable units)	Open Top Tanks - 20'	$700	Not Applicable	Not Applicable
Company B	Other	Misc. Suport Equipment - Rate List (excludes fuel on applicable units)	Open Top Tanks - 40'	$1,000	Not Applicable	Not Applicable
Company B	Other	Misc. Suport Equipment - Rate List (excludes fuel on applicable units)	Shale Bins - 40'	$1,100	Not Applicable	Not Applicable
Company B	Other	Misc. Suport Equipment - Rate List (excludes fuel on applicable units)	Enviro-Garbage Bin	$2,800	Not Applicable	Not Applicable
Company B	Other	Misc. Suport Equipment - Rate List (excludes fuel on applicable units)	Industrial Fire Extinguishers	$1,500	Not Applicable	Not Applicable
Company B	Other	Misc. Suport Equipment - Rate List (excludes fuel on applicable units)	1000 BBL Tanks - Water	$2,500	Not Applicable	Not Applicable
Company B	Other	Misc. Suport Equipment - Rate List (excludes fuel on applicable units)	4,500 Liter Envrio-Tank	$3,000	Not Applicable	Not Applicable
Company C	Excavator	EXCAVATORS	EX330	$140	No	$210
Company C	Excavator	EXCAVATORS	EX670	$230	No	$300
Company C	Excavator	EXCAVATORS	EX870	$290	No	$360
Company C	Excavator	EXCAVATORS	EX1200	$475	No	$545
Company C	Excavator	EXCAVATORS	EX2500	$800	No	$870
Company C	Excavator	EXCAVATORS	PC5500	$1,500	No	$1,570
Company C	Articulated Truck	Trucks	Articulated 30T	$165	No	$235
Company C	Articulated Truck	Trucks	Articulated 35T	$180	No	$250
Company C	Articulated Truck	Trucks	Articulated 40T	$200	No	$270
Company C	Truck	Truck	CAT 770	$190	No	$260
Company C	Truck	Truck	CAT 773	$230	No	$300
Company C	Truck	Truck	CAT 777	$330	No	$400
Company C	Truck	Truck	CAT 785	$450	No	$520
Company C	Truck	Truck	CAT 793	$650	No	$720
Company C	Truck	Truck	EH 5000	$750	No	$820
Company C	Dozer	Dozers	D5 (Up to Size)	$140	No	$210
Company C	Dozer	Dozers	D6	$175	No	$245
Company C	Dozer	Dozers	D7	$200	No	$270
Company C	Dozer	Dozers	D8	$250	No	$320
Company C	Dozer	Dozers	D9	$280	No	$350
Company C	Dozer	Dozers	D10	$400	No	$470
Company C	Dozer	Dozers	D11	$550	No	$620
Company C	Dozer	Dozers	Wheel Dozer	$270	No	$340

CCRP Cost Estimate Table W-17: Mobilization and Demobilization of Equipment and Field Personnel

wood.

Quantity

Creek	Option	Number of Excavators	Number of Haul Trucks	Number of Dozers	Number of Compactors	Number of Graders	Number of Water Trucks	Number of Support Trucks	Camp Personnel	Total Equipment Operators	Total Support Personnel	Owners Team	Shifts per Day	Total Crew Count	Project Duration (Years)	Project Duration (Person.Days)
Clinton	CC1	2	7	2	1	2	2	3	Included in the camp estimate	19	10	3	2	61	1.4	31,692
	CC1-A	1	3	3	2	2	2	3		16	10	3	2	55	0.6	11,370
	CC1-B	1	3	3	2	2	2	3		16	10	3	2	55	0.6	12,572
	CC2	2	7	2	1	2	2	3		19	10	3	2	61	2.3	51,434
	CC2-A	2	7	2	1	2	2	3		19	10	3	2	61	0.8	17,147
	CC2-B	2	7	2	1	2	2	3		19	10	3	2	61	1.5	33,011
	CC3	2	7	2	1	2	2	3		19	10	3	2	61	4.5	101,216
Wolverine	WC1	1	1	1	0	1	1	1		6	4	2	2	22	0.5	4,015
	WC2	2	16	3	1	2	3	3		30	10	3	2	83	2.8	85,254
	WC2-A	2	16	2	2	2	3	3		30	10	3	2	83	0.8	24,673
	WC3	2	16	3	1	2	3	3		30	10	3	2	83	2.8	85,254

Equipment Mobilization (km)

Distance from Whitehorse to Dawson City:	532
Distance from Dawson City to Fortymile R. Bridge:	91
Distance from Fortymile R. Bridge to Site:	9
Total Mob + Demob Distance:	**1,246**

The George Black Ferry:	This ferry service crosses the Yukon River and provides access to the Top of the World Highway from the North Klondike Highway for motorists passing through Dawson City.
Yukon River Ice Bridge:	Yukon gov't gives up on attempt to build ice bridge in Dawson City. https://www.cbc.ca/news/canada/north/gov-halts-dawson-city-ice-bridge-1.5001387. https://yukon.ca/sites/yukon.ca/files/hpw/final_nrc_report_dawson_ice_bridge_2018_final.pdf
Fortymile River Bridge:	Weight restrictions not available. Built in 1966.

Unit Price

Equipment Mob/Demob	$/t.km	
Equipment Mob/Demob km/hr	80	
Equipment Mob/Demob - hours	16	
Equipment Mob + Demob Distance (km)	2492	

Equipment Mobilize and Demobilize Costs

Creek	Option	Excavators Mob/Demob	Haul Trucks Mob/Demob	Dozers Mob/Demob	Compactors Mob/Demob	Graders Mob/Demob	Water Trucks Mob/Demob	Support Trucks Mob/Demob	Factor	Total Mob + Demob
	Mob/Demob Rate/hr:	$ 300	$ 300	$ 300	$ 300	$ 300	$ 150	$ 150		
Clinton	CC1	$ 9,345	$ 32,708	$ 9,345	$ 4,673	$ 9,345	$ 4,673	$ 7,009	1	$ 77,097
	CC1-A	$ 4,673	$ 14,018	$ 14,018	$ 9,345	$ 9,345	$ 4,673	$ 7,009	1	$ 63,080
	CC1-B	$ 4,673	$ 14,018	$ 14,018	$ 9,345	$ 9,345	$ 4,673	$ 7,009	1	$ 63,080
	CC2	$ 9,345	$ 32,708	$ 9,345	$ 4,673	$ 9,345	$ 4,673	$ 7,009	1	$ 77,097
	CC2-A	$ 9,345	$ 32,708	$ 9,345	$ 4,673	$ 9,345	$ 4,673	$ 7,009	1	$ 77,097
	CC2-B	$ 9,345	$ 32,708	$ 9,345	$ 4,673	$ 9,345	$ 4,673	$ 7,009	1	$ 77,097
	CC3	$ 9,345	$ 32,708	$ 9,345	$ 4,673	$ 9,345	$ 4,673	$ 7,009	1	$ 77,097
Wolverine	WC1	$ 4,673	$ 4,673	$ 4,673	$ -	$ 4,673	$ 2,336	$ 2,336	1	$ 23,364
	WC2	$ 9,345	$ 74,760	$ 14,018	$ 4,673	$ 9,345	$ 7,009	$ 7,009	1	$ 126,159
	WC2-A	$ 9,345	$ 74,760	$ 9,345	$ 9,345	$ 9,345	$ 7,009	$ 7,009	1	$ 126,159
	WC3	$ 9,345	$ 74,760	$ 14,018	$ 4,673	$ 9,345	$ 7,009	$ 7,009	1	$ 126,159

Mobilize and Demobilize Workers by Air to Dawson City and by Bus to Site

Airfare Whitehorse to Dawson City	Each Return	Air North	$ 400

Creek	Option	Project Duration (Years)	Bus Operating Cost/Year	Worker Airfare	Total
Clinton	CC1	1.4	$ 250,000	$ 905,498	$ 1,261,353
	CC1-A	0.6	$ 250,000	$ 324,855	$ 466,449
	CC1-B	0.6	$ 250,000	$ 359,208	$ 515,774
	CC2	2.3	$ 250,000	$ 1,469,545	$ 2,047,067
	CC2-A	0.8	$ 250,000	$ 489,917	$ 682,452
	CC2-B	1.5	$ 250,000	$ 943,184	$ 1,313,849
	CC3	4.5	$ 250,000	$ 2,891,879	$ 4,028,369
Wolverine	WC1	0.5	$ 250,000	$ 114,714	$ 239,714
	WC2	2.8	$ 250,000	$ 2,435,817	$ 3,139,345
	WC2-A	0.8	$ 250,000	$ 704,955	$ 908,564
	WC3	2.8	$ 250,000	$ 2,435,817	$ 3,139,345

Note: Bus operating cost includes driver and assumes 60 km/day on average with purchase of V6 diesel 30 passenger. Based on bus cost model prepared by the U.S. Department of Transportation.
Assumes that ice bridge over the Yukon River is available.

CCRP Cost Estimate Table W-18: Worker Camp Cost Estimate

Fixed Duration Estimate

Description	Camp Duration (Years)	Number of People	Quantity	Unit	Unit Price	Unit Price Geographic Correction Factor	Total Base Cost	Reference
Camp Site Preparation - Clearing			2	Ha	$ 8,863	1.2	$ 21,270	Alberta Transportation 2019
Camp Site Preparation - Surface Preparation			20000	m2	$ 27	1.2	$ 653,280	Alberta Transportation 2019

Item	Camp Size	Quality	Unit	Half Full	Full
Mob Costs	60 Person	Better	LS	$ 713,628	$ 713,628
Demob Costs	60 Person	Better	LS	$ 363,191	$ 363,191
Camp Rental Costs	60 Person	Better	$/Month	$ 52,555	$ 52,555
Camp Occupancy Costs	60 Person	Better	$/Day	$ 5,020	$ 7,350
Utilities - Diesel	60 Person	Better	$/Day	$ 888.95	$ 1,777.89
Utilities - Propane	60 Person	Better	$/Day	$ 199.80	$ 399.60
Utilities - Water	60 Person	Better	$/Day	$ 378.00	$ 756.00
Utilities - Sewer	60 Person	Better	$/Day	$ 354.09	$ 708.17
Utilities - Garbage	60 Person	Better	$/Day	$ 111.00	$ 222.00
Utilities - Telecom	60 Person	Better	$/Day	$ 696.00	$ 696.00
Utilities - Total Costs	60 Person	Better	$/Day	$ 2,628	$ 4,560

60 Person Better Camp Costs Applied to the estimate.

Variable duration estimate based on budgetary pricing tables and project durations.

Option	Workers	Project Duration (years)	Occupancy Range (No. of Guests)	Site Prep	Mob	Demob	Camp Rental	Camp Occupancy	Utilities	Total
CC1	61	1.42	Full 60	$ 674,550	$ 713,628	$ 363,191	$ 897,688	$ 3,882,371	$ 2,368,963	$ 8,900,390
CC1-A	55	0.57	Full 60	$ 674,550	$ 713,628	$ 363,191	$ 357,186	$ 1,392,835	$ 942,601	$ 4,443,992
CC1-B	55	0.63	Full 60	$ 674,550	$ 713,628	$ 363,191	$ 394,958	$ 1,540,123	$ 1,042,279	$ 4,728,729
CC2	61	2.31	Full 60	$ 674,550	$ 713,628	$ 363,191	$ 1,456,869	$ 6,300,751	$ 3,844,621	$13,353,611
CC2-A	61	0.77	Full 60	$ 674,550	$ 713,628	$ 363,191	$ 485,691	$ 2,100,546	$ 1,281,721	$ 5,619,328
CC2-B	61	1.48	Full 60	$ 674,550	$ 713,628	$ 363,191	$ 935,048	$ 4,043,951	$ 2,467,557	$ 9,197,926
CC3	61	4.55	Full 60	$ 674,550	$ 713,628	$ 363,191	$ 2,866,935	$ 12,399,083	$ 7,565,729	$24,583,116
WC1	22	0.50						$ 1,204,500		$ 1,204,500
WC2	83	2.81	Full 60	$ 674,550	$ 713,628	$ 363,191	$ 1,774,737	$ 10,443,692	$ 4,683,462	$18,653,260
WC2-A	83	0.81	Full 60	$ 674,550	$ 713,628	$ 363,191	$ 513,630	$ 3,022,530	$ 1,355,450	$ 6,642,981
WC3	83	2.81	Full 60	$ 674,550	$ 713,628	$ 363,191	$ 1,774,737	$ 10,443,692	$ 4,683,462	$18,653,260

Based on ATCO Frontec. 20 September, 2019

Budgetary prices above are based on the following proposed services:

SCOPE	SERVICE
CAMP EQUIPMENT	- Transport & Installation - Camp equipment rentals - Site Service rentals - Dismantle and demobilization
GENERAL OVERVIEW	- Catering - Housekeeping service - Janitorial service - Camp maintenance – Call Out Basis Only - Laundry of linens/bedding/towels - Drug and alcohol-free camp. Non-smoking rooms.
SPECIFIC - LODGE MANAGEMENT	- Combined Chef-Manager to run the camp
SPECIFIC - PERSONNEL AND TRAINING	- Lodge management personnel (non-union) - Front desk personnel (non-union) - Food service personnel (non-union) - Housekeeping & janitorial personnel (non-union) - Maintenance & grounds keeping personnel (non-union) - All required training for personnel - Catering & housekeeping services for ATCO staff - Personnel transportation to/from site
SPECIFIC - SUPPLY & REPLACEMENT	- Housekeeping & janitorial equipment, tools, and consumables - Small kitchen equipment & tools - Food, paper & consumables for catering services - All office furniture for Lodge Management
SPECIFIC - FOOD SERVICES	- Two hot meals per day as follows: 1 hour for breakfast and bagged lunch 1.5 hours for supper - Hours can be set by client - Catering Permit
SPECIFIC - HOUSEKEEPING & JANITORIAL	- Cleaning of call camp rooms & washrooms - Weekly linen change - Daily cleaning of all camp common facilities - Residents not allowed to wear boots in the lodge
SPECIFIC - LAUNDRY	- Weekly Laundry of linens/bedding/towels - Laundry of personnel clothing - Towel change service every second day
SPECIFIC – UTILITIES	- Natural gas - Propane - Water supply - Waste water & sewage hauling
SPECIFIC - MAINTENANCE	- Snow clearing from stairs and walkways - Monthly call-outs for preventative & corrective maintenance - Replacement of spare parts
SPECIFIC - ROOM MANAGEMENT	- Bedroom allocation and occupancy reporting - Check ins, check outs, and key management - Board count reports - Occupancy reports for emergency evacuation purposes - Room management software
SPECIFIC – HSE & QA/QC	- Project specific HSE plan - Project specific ERP plan - Project specific Crisis Management plan - Food safety management & QA/QC Program per Food Services Management Guide - On-site HSE coverage provided by lodge management

CCRP Cost Estimate Table W-19: Access Road Improvement and Maintenance Estimate

Road Improvement and Maintenance Cost Allocations

Road Segment	Length (km)	Total Annual Cost	Comment
Clinton Creek Camp to Mine Site	9	$ 107,432	Graders
Site 11 Pit to Clinton Creek Road	0	$ -	
Mike 63 Quarry to Clinton Creek Road	4	$ 47,747	Graders
On-Site	10	$ 810,568.42	Graders + Dozer
Dawson City to Fortymile Bridge	91	$ 1,086,253	The road is closed from mid-September until mid-May. Yukon Government. 2018. Top of the World Highway Draft Interpretive Plan. Snow clearing is required during these months for crew mobilization and demobilization.
		$ 2,052,000	

Road Segment	Task	Road Area (m2)	Gravel Volume	Gravel Cost	Annual Total
Clinton Creek Camp to Mine Site - (3 inches of annual gravel placement)	Gravel	27000	2025	$ 51.34	$ 103,971

Total Annual Cost **$ 2,155,971**

Road Improvement and Maintenance Total Cost

Option	Project Duration (Years)	Total
CC1	1.42	**$ 3,068,851**
CC1-A	0.57	**$ 1,221,084**
CC1-B	0.63	**$ 1,350,210**
CC2	2.31	**$ 4,980,480**
CC2-A	0.77	**$ 1,660,394**
CC2-B	1.48	**$ 3,196,574**
CC3	4.55	**$ 9,800,955**
WC1	0.50	**$ 1,077,986**
WC2	2.81	**$ 6,067,149**
WC2-A	0.81	**$ 1,755,906**
WC3	2.81	**$ 6,067,149**

Road Improvement and Maintenance Annual Cost

Grader Allocation	Task	Unit Price/hr	Annual Months	Anuual Hours	Annual Total
Cat 12H	Maintenance	$ 210	12	4320	$ 907,200
Cat 12H	Maintenance	$ 210	6	2160	$ 453,600
					$ 1,360,800

Dozer Allocation					
Caterpillar - D8K Angle Blade, Tilt Blade, Ripper	Maintenance	$ 320	6	2160	$ 691,200

CCRP Cost Estimate Table W-20: Water Crossing Cost Estimate

Crossing	Location	Purpose	Existing Bridge?	Crossing Length (m)	Crossing Width (m)	Crossing Area (m2)	Proposed Use	Unit Price	Unit	Task	Unit Price Geographic Correction Factor	Reference	Total Cost
Clinton Creek	**Former Clinton Creek Townsite**	Site Access	No	15	5	75	Worker camp access/egress.	$ 3,963	m2	Construct	1.2	Alberta Transportation Bridge Cost Data - Site 78210.	$ 356,670
Clinton Creek	**Wolverine Haul Road**	On-Site	No	15	12.5	187.5	Haul road from Wolverine to Porcupine.	$ 3,963	m2	Construct	1.2	Alberta Transportation Bridge Cost Data - Site 78210.	$ 891,675
Clinton Creek	**West End of Site**	On-Site	No	15	12.5	187.5	Crossing for Clinton Creek Options	$ 3,963	m2	Construct	1.2	Alberta Transportation Bridge Cost Data - Site 78210.	$ 891,675
Fortymile River	**Fortymile River**	Site Access	Yes	150	5	750	Equipment Mobilization and demobilization.	$ 719	m2	Repair	1.2	Alberta Transportation Bridge Cost Data - rehab data - Bridge 74222.	$ 647,100
Yukon River	**Dawson City**	Site Access	Yes	400			Equipment mobilization. Seasonal ferry or winter road (when feasible).	$ 200,000	Each	Construct	1	Yukon Government communications , Highways and Public Works. 10/12/2018	$ 200,000

Assumes project pays entire cost of ice bridge.

Is haul road bridge required?

Location	CC1	CC1-A	CC1-B	CC2	CC2-A	CC2-B	CC3	WC1	WC2	WC2-A	WC3
Former Clinton Creek Townsite											
Wolverine Haul Road	No	No	No	No	No	No	No	No	Yes	Yes	Yes
West End of Site	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Fortymile River											
Dawson City											

Is site access bridge required?

Location	CC1	CC1-A	CC1-B	CC2	CC2-A	CC2-B	CC3	WC1	WC2	WC2-A	WC3
Former Clinton Creek Townsite	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Wolverine Haul Road											
West End of Site											
Fortymile River	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Dawson City	See "Years of Participation in Ice Bridge Cost" below.										

Years of Participation in Ice Bridge Cost

Option	Years
CC1	**1.00**
CC1-A	**1.00**
CC1-B	**1.00**
CC2	**2.00**
CC2-A	**1.00**
CC2-B	**2.00**
CC3	**4.00**
WC1	**0.00**
WC2	**2.00**
WC2-A	**1.00**
WC3	**2.00**

Cost Estimate for Haul Road Bridges

Option	Haul Road Bridges	Access Road Bridges	Ice Bridge Construction Participation	Total
CC1	**$ 891,675**	**$ 1,003,770**	**$ 200,000**	**$2,095,445**
CC1-A	**$ 891,675**	**$ 1,003,770**	**$ 200,000**	**$2,095,445**
CC1-B	**$ 891,675**	**$ 1,003,770**	**$ 200,000**	**$2,095,445**
CC2	**$ 891,675**	**$ 1,003,770**	**$ 400,000**	**$2,295,445**
CC2-A	**$ 891,675**	**$ 1,003,770**	**$ 200,000**	**$2,095,445**
CC2-B	**$ 891,675**	**$ 1,003,770**	**$ 400,000**	**$2,295,445**
CC3	**$ 891,675**	**$ 1,003,770**	**$ 800,000**	**$2,695,445**
WC1	**$ -**	**$ -**	**$ -**	**$ -**
WC2	**$ 891,675**	**$ 1,003,770**	**$ 400,000**	**$2,295,445**
WC2-A	**$ 891,675**	**$ 1,003,770**	**$ 200,000**	**$2,095,445**
WC3	**$ 891,675**	**$ 1,003,770**	**$ 400,000**	**$2,295,445**

CCRP Cost Estimate Table W-21: Fuel Storage Cost Estimate

Quantity

Creek	Option	Number of Excavators	Number of Haul Trucks	Number of Dozers	Number of Graders	Number of Water Trucks	Number of Support Trucks	Shifts per Day	Project Duration (Years)
Clinton	CC1	2	7	2	2	2	3	2	1.4
	CC1-A	1	3	3	2	2	3	2	0.6
	CC1-B	1	3	3	2	2	3	2	0.6
	CC2	2	7	2	2	2	3	2	2.3
	CC2-A	2	7	2	2	2	3	2	0.8
	CC2-B	2	7	2	2	2	3	2	1.5
	CC3	2	7	2	2	2	3	2	4.5
Wolverine	WC1	1	1	1	1	1	1	2	0.5
	WC2	2	16	3	2	3	3	2	2.8
	WC2-A	2	16	2	2	3	3	2	0.8
	WC3	2	16	3	2	3	3	2	2.8

Fuel Consumption (L/hr)

	Litres/Hour	Hours/Day	Litres/Day	
Excavator	67	20	1340	07 - CAT Handbook edition 48.pdf
Truck	27	20	540	07 - CAT Handbook edition 48.pdf
Dozer	39	20	780	07 - CAT Handbook edition 48.pdf
Grader	16	20	320	07 - CAT Handbook edition 48.pdf
Water Truck (12,500 L)	13	20	260	http://www.ezyquip.com.au/DownloadAttachment.ashx?AttachmentId=181385
Support Truck	5	20	100	assumed
Generators	20	20	400	

Emergency Stock (days)	180	George Black Ferry at Dawson City is open mid-May to mid-October, when it shuts down for the season. Ice bridge across the Yukon River has failed over the past few years. Assumed fuel storage required when the ferry is not operating.
Lead-Time for Supply (days)	6	
Total Storage Capacity (days)	**186**	

Fuel Consumption (L/Day)

Option	Excavators	Trucks	Dozers	Graders	Water Trucks	Support Trucks	Generators	Pumps
CC1	2680	3780	1560	640	520	300	1808	2353
CC1-A	1340	1620	2340	640	520	300	1808	2353
CC1-B	1340	1620	2340	640	520	300	1808	2353
CC2	2680	3780	1560	640	520	300	1808	2353
CC2-A	2680	3780	1560	640	520	300	1808	2353
CC2-B	2680	3780	1560	640	520	300	1808	2353
CC3	2680	3780	1560	640	520	300	1808	2353
WC1	1340	540	780	320	260	100	1108	
WC2	2680	8640	2340	640	780	300	1808	
WC2-A	2680	8640	1560	640	780	300	1808	
WC3	2680	8640	2340	640	780	300	1808	

Fuel Storage Estimate

http://totaloilfield.ca/wp-content/uploads/2016/06/400BBL-Tanks-Storage-TOR-Water-Management.pdf

CCRP Cost Estimate Table W-21: Fuel Storage Cost Estimate

Total Oilfield services tank quote Aug 2, 2019.pdf

Costs for fuel storage capacity of 1660 bbl (254,380 L) and 4000 bbl (635,950 L) provided by Total Oilfield Rentals

254,380 L Tank Farm Estimate

Rental Item	Qty	Rate/Day	Total/Day
400 bbl Sloped Bottom, Lined and Sour Service Tank	4	$ 20	$ 80
8' x 40' Rig Mat	3	$ 10	$ 30
Berm Block	28	$ 1	$ 28
Berm Crossing Stair	1	Included	Included
Tank Grounding Package	4	Included	Included
		Total	**$ 138**

Mob/Demob and Set-up

Mobilization and set-up	$ 93,425
Demobilization	$ 93,425
Permit	Cost + 10%
Yukon Power Lift (if required)	Cost + 10%
Cleaning, servicing, repairs & fluid/solid disposal charges are extra	Extra
Total	**$ 186,850**

Purchase Items

Secondary Containment Liner	**$ 2,000**

50,000 L Enviro Tank

50,000 L Enviro Tank Rental (Provided by Dall Contracting Ltd.)	**$ -**	No Charge (Dall Contracting Quote)
50,000 L Enviro Tank Mobilization - Estimated by Wood	**$ 23,356**	Assumed same as Total
50,000 L Enviro Tank Demobilization - Estimated by Wood	**$ 23,356**	Assumed same as Total

635,950 L Tank Farm Estimate

Rental Item	Qty	Rate/Day	Total/Day
400 bbl Sloped Bottom, Lined and Sour Service Tank	10	$ 20	$ 200
8' x 40' Rig Mat	8	$ 10	$ 80
Berm Block	36	$ 1	$ 36
Berm Crossing Stair	2	Included	Included
Tank Grounding Package	4	Included	Included
		Total	**$ 316**

Mob/Demob and Set-up

Mobilization and set-up	$ 183,345
Demobilization	$ 183,345
Permit	Cost + 10%
Yukon Power Lift (if required)	Cost + 10%
Cleaning, servicing, repairs & fluid/solid disposal charges are extra	Extra
Total	**$ 366,690**

Purchase Items

Secondary Containment Liner	**$ 4,500**

Fuel Storage Capacity Estimate

Option	Fuel (L) Storage Estimated Requirement	Storage Cost (Setup)	Storage Cost Daily Rental	Storage Cost Total Rental over Project Duration	Storage Cost Total	Storage Scenario Capacity (L)
CC1	**2,537,211**	**$ 1,862,207**	**$ 1,294**	**$ 672,182**	**$ 2,534,389**	**2,543,800**
CC1-A	**2,031,291**	**$ 1,355,643**	**$ 1,046**	**$ 216,236**	**$ 1,571,878**	**2,035,040**
CC1-B	**2,031,291**	**$ 1,355,643**	**$ 1,046**	**$ 239,102**	**$ 1,594,744**	**2,035,040**
CC2	**2,537,211**	**$ 1,862,207**	**$ 1,294**	**$ 1,090,894**	**$ 2,953,100**	**2,543,800**
CC2-A	**2,537,211**	**$ 1,733,343**	**$ 1,322**	**$ 371,614**	**$ 2,104,957**	**2,543,800**
CC2-B	**2,537,211**	**$ 1,733,343**	**$ 1,322**	**$ 715,428**	**$ 2,448,771**	**2,543,800**
CC3	**2,537,211**	**$ 1,862,207**	**$ 1,294**	**$ 2,146,741**	**$ 4,008,948**	**2,543,800**

CCRP Cost Estimate Table W-21: Fuel Storage Cost Estimate

WC1	**827,396**	**$**	**87,370**	**$**	**138**			**$**	**87,370**	**890,330**
WC2	**3,196,951**	**$**	**2,346,428**	**$**	**1,630**	**$**	**1,674,462**	**$**	**4,020,890**	**3,306,940**
WC2-A	**3,051,871**	**$**	**1,909,173**	**$**	**1,540**	**$**	**457,796**	**$**	**2,366,968**	**3,052,560**
WC3	**3,196,951**	**$**	**2,346,428**	**$**	**1,630**	**$**	**1,674,462**	**$**	**4,020,890**	**3,306,940**

63,595 L Tank Farm Estimate - Wood Extrapolation of Total and Dal Estimates

Rental Item	Qty	Rate/Day	Total/Day
400 bbl Sloped Bottom, Lined and Sour	1	$ 20	$ 20
8' x 40' Rig Mat	1	$ 10	$ 10
Berm Block	7	$ 1	$ 7
Berm Crossing Stair	1	Included	Included
Tank Grounding Package	1	Included	Included
		Total	**$ 37**

Mob/Demob and Set-up

Mobilization and set-up	$ 23,356
Demobilization	$ 23,356
Permit	Cost + 10%
Yukon Power Lift (if required)	Cost + 10%
Cleaning, servicing, repairs & fluid/solid disposal charges are extra	Extra
Total	**$ 46,713**

Purchase Items

Secondary Containment Liner	**$ 2,000**

50,000 L Enviro Tank

50,000 L Enviro Tank Rental (Provided by Dall Contracting Ltd.)	**$ -**	No Charge (Dall Contracting Quote)
50,000 L Enviro Tank Mobilization - Estimated by Wood	**$ 23,356**	Assumed same as Total
50,000 L Enviro Tank Demobilization - Estimated by Wood	**$ 23,356**	Assumed same as Total

CCRP Cost Estimate Table W-22: Site Electrical Power Estimate

Creek	Option	Asset	Asset Type	Model / Description	Project Duration (months)	Operating Units	Standby Units	Purchase Price	Purchase Cost (Includes 1 Additional Primary)	Monthly Maintenance Cost	Maintenance Cost over Project Duration	Fuel Consumption (At Half Load & 18 hours daily)						Mob / Demob			Total Cost
												gal / hr	L / hr	hours	Litres	$ / L	Cost	Unit	Price	Cost	
Clinton	CC1	Aggreko - 200KW	Diesel Generator	200	17.1	1	-	$ 50,000.00	$ 50,000.00	$ 1,000	$ 17,081	7.70	29.15	9,352	272,584	$ 1.39	$ 378,892	1	$ 4,673	$ 4,673	$ 450,646
Clinton	CC1	Aggreko - 300KW	Diesel Generator	300	17.1	2	1	$100,000.00	$ 300,000.00	$ 1,000	$ 34,162	11.30	42.78	18,704	800,053	$ 1.39	$ 1,112,073	3	$ 4,673	$ 14,018	$ 1,460,253
Clinton	CC1	Portable Light Tower	Towable Light Tower	N/A	17.1	6	-	$ 10,000.00	$ 60,000.00	$ 500	$ 51,243	0.90	3.41	35,870	122,205	$ 1.39	$ 169,864	6	$ 1,324	$ 7,943	$ 289,051
Clinton	CC1-A	Aggreko - 200KW	Diesel Generator	200	6.8	1	-	$ 50,000.00	$ 50,000.00	$ 1,000	$ 6,796	7.70	29.15	3,721	108,460	$ 1.39	$ 150,760	1	$ 4,673	$ 4,673	$ 212,229
Clinton	CC1-A	Aggreko - 300KW	Diesel Generator	300	6.8	2	1	$100,000.00	$ 300,000.00	$ 1,000	$ 13,593	11.30	42.78	7,442	318,338	$ 1.39	$ 442,490	3	$ 4,673	$ 14,018	$ 770,100
Clinton	CC1-A	Portable Light Tower	Towable Light Tower	N/A	6.8	6	-	$ 10,000.00	$ 60,000.00	$ 500	$ 20,389	0.90	3.41	14,273	48,625	$ 1.39	$ 67,588	6	$ 1,324	$ 7,943	$ 155,921
Clinton	CC1-B	Aggreko - 200KW	Diesel Generator	200	7.5	1	-	$ 50,000.00	$ 50,000.00	$ 1,000	$ 7,515	7.70	29.15	4,115	119,930	$ 1.39	$ 166,702	1	$ 4,673	$ 4,673	$ 228,890
Clinton	CC1-B	Aggreko - 300KW	Diesel Generator	300	7.5	2	1	$100,000.00	$ 300,000.00	$ 1,000	$ 15,030	11.30	42.78	8,229	352,001	$ 1.39	$ 489,282	3	$ 4,673	$ 14,018	$ 818,329
Clinton	CC1-B	Portable Light Tower	Towable Light Tower	N/A	7.5	6	-	$ 10,000.00	$ 60,000.00	$ 500	$ 22,546	0.90	3.41	15,782	53,767	$ 1.39	$ 74,736	6	$ 1,324	$ 7,943	$ 165,225
Clinton	CC2	Aggreko - 200KW	Diesel Generator	200	27.7	1	-	$ 50,000.00	$ 50,000.00	$ 1,000	$ 27,721	7.70	29.15	15,177	442,381	$ 1.39	$ 614,909	1	$ 4,673	$ 4,673	$ 697,303
Clinton	CC2	Aggreko - 300KW	Diesel Generator	300	27.7	2	1	$100,000.00	$ 300,000.00	$ 1,000	$ 55,442	11.30	42.78	30,355	1,298,416	$ 1.39	$ 1,804,798	3	$ 4,673	$ 14,018	$ 2,174,258
Clinton	CC2	Portable Light Tower	Towable Light Tower	N/A	27.7	6	-	$ 10,000.00	$ 60,000.00	$ 500	$ 83,163	0.90	3.41	58,214	198,328	$ 1.39	$ 275,675	6	$ 1,324	$ 7,943	$ 426,782
Clinton	CC2-A	Aggreko - 200KW	Diesel Generator	200	9.2	1	-	$ 50,000.00	$ 50,000.00	$ 1,000	$ 9,242	7.70	29.15	5,060	147,481	$ 1.39	$ 204,999	1	$ 4,673	$ 4,673	$ 268,913
Clinton	CC2-A	Aggreko - 300KW	Diesel Generator	300	9.2	2	1	$100,000.00	$ 300,000.00	$ 1,000	$ 18,483	11.30	42.78	10,120	432,866	$ 1.39	$ 601,684	3	$ 4,673	$ 14,018	$ 934,185
Clinton	CC2-A	Portable Light Tower	Towable Light Tower	N/A	9.2	6	-	$ 10,000.00	$ 60,000.00	$ 500	$ 27,725	0.90	3.41	19,407	66,118	$ 1.39	$ 91,905	6	$ 1,324	$ 7,943	$ 187,573
Clinton	CC2-B	Aggreko - 200KW	Diesel Generator	200	17.8	1	-	$ 50,000.00	$ 50,000.00	$ 1,000	$ 17,792	7.70	29.15	9,741	283,929	$ 1.39	$ 394,661	1	$ 4,673	$ 4,673	$ 467,126
Clinton	CC2-B	Aggreko - 300KW	Diesel Generator	300	17.8	2	1	$100,000.00	$ 300,000.00	$ 1,000	$ 35,584	11.30	42.78	19,482	833,350	$ 1.39	$ 1,158,356	3	$ 4,673	$ 14,018	$ 1,507,958
Clinton	CC2-B	Portable Light Tower	Towable Light Tower	N/A	17.8	6	-	$ 10,000.00	$ 60,000.00	$ 500	$ 53,376	0.90	3.41	37,363	127,291	$ 1.39	$ 176,934	6	$ 1,324	$ 7,943	$ 298,253
Clinton	CC3	Aggreko - 200KW	Diesel Generator	200	54.6	1	-	$ 50,000.00	$ 50,000.00	$ 1,000	$ 54,552	7.70	29.15	29,867	870,549	$ 1.39	$ 1,210,063	1	$ 4,673	$ 4,673	$ 1,319,287
Clinton	CC3	Aggreko - 300KW	Diesel Generator	300	54.6	2	1	$100,000.00	$ 300,000.00	$ 1,000	$ 109,103	11.30	42.78	59,734	2,555,119	$ 1.39	$ 3,551,615	3	$ 4,673	$ 14,018	$ 3,974,735
Clinton	CC3	Portable Light Tower	Towable Light Tower	N/A	54.6	6	-	$ 10,000.00	$ 60,000.00	$ 500	$ 163,655	0.90	3.41	114,558	390,284	$ 1.39	$ 542,494	6	$ 1,324	$ 7,943	$ 774,092
Wolverine	WC1	Aggreko - 300KW	Diesel Generator	300	6.0	1	1	$100,000.00	$ 200,000.00	$ 1,000	$ 6,000	11.30	42.78	3,285	140,516	$ 1.39	$ 195,317	2	$ 4,673	$ 9,345	$ 410,662
Wolverine	WC1	Portable Light Tower	Towable Light Tower	N/A	6.0	2	-	$ 10,000.00	$ 20,000.00	$ 500	$ 6,000	0.90	3.41	4,200	14,309	$ 1.39	$ 19,889	2	$ 1,324	$ 2,648	$ 48,537
Wolverine	WC2	Aggreko - 200KW	Diesel Generator	200	33.8	1	-	$ 50,000.00	$ 50,000.00	$ 1,000	$ 33,769	7.70	29.15	18,489	538,902	$ 1.39	$ 749,073	1	$ 4,673	$ 4,673	$ 837,515
Wolverine	WC2	Aggreko - 300KW	Diesel Generator	300	33.8	2	1	$100,000.00	$ 300,000.00	$ 1,000	$ 67,539	11.30	42.78	36,977	1,581,711	$ 1.39	$ 2,198,579	3	$ 4,673	$ 14,018	$ 2,580,135
Wolverine	WC2	Portable Light Tower	Towable Light Tower	N/A	33.8	6	-	$ 10,000.00	$ 60,000.00	$ 500	$ 101,308	0.90	3.41	70,916	241,600	$ 1.39	$ 335,824	6	$ 1,324	$ 7,943	$ 505,075
Wolverine	WC2-A	Aggreko - 200KW	Diesel Generator	200	9.8	1	-	$ 50,000.00	$ 50,000.00	$ 1,000	$ 9,773	7.70	29.15	5,351	155,965	$ 1.39	$ 216,791	1	$ 4,673	$ 4,673	$ 281,237
Wolverine	WC2-A	Aggreko - 300KW	Diesel Generator	300	9.8	2	1	$100,000.00	$ 300,000.00	$ 1,000	$ 19,547	11.30	42.78	10,702	457,766	$ 1.39	$ 636,295	3	$ 4,673	$ 14,018	$ 969,859
Wolverine	WC2-A	Portable Light Tower	Towable Light Tower	N/A	9.8	6	-	$ 10,000.00	$ 60,000.00	$ 500	$ 29,320	0.90	3.41	20,524	69,922	$ 1.39	$ 97,191	6	$ 1,324	$ 7,943	$ 194,454
Wolverine	WC3	Aggreko - 200KW	Diesel Generator	200	33.8	1	-	$ 50,000.00	$ 50,000.00	$ 1,000	$ 33,769	7.70	29.15	18,489	538,902	$ 1.39	$ 749,073	1	$ 4,673	$ 4,673	$ 837,515
Wolverine	WC3	Aggreko - 300KW	Diesel Generator	300	33.8	2	1	$100,000.00	$ 300,000.00	$ 1,000	$ 67,539	11.30	42.78	36,977	1,581,711	$ 1.39	$ 2,198,579	3	$ 4,673	$ 14,018	$ 2,580,135
Wolverine	WC3	Portable Light Tower	Towable Light Tower	N/A	33.8	6	-	$ 10,000.00	$ 60,000.00	$ 500	$ 101,308	0.90	3.41	70,916	241,600	$ 1.39	$ 335,824	6	$ 1,324	$ 7,943	$ 505,075

CCRP Cost Estimate Table W-23: Conventional Health & Safety Estimate

Creek	Option	Monthly Safety Reporting			On-Site Medic			Field Supplies			Monthly Safety Meetings			Total Cost	Reference / Assumptions
		Qty (months)	Unit Price	Cost	Qty (months)	Unit Price	Cost	Qty (months)	Unit Price	Cost	Qty (months)	Unit Price	Cost		
Clinton	CC1	17.1	$ 1,200	$ 20,497	17.1	$ 12,500	$ 213,513	17.1	$ 100	$ 1,708	17.1	$ 4,270	$ 72,936	**$ 308,654**	Assumes project duration based on haul years (from CC1) plus 2 months on either end of hauling. On-Site medic costs assumed at $150k per year with 20% additional fees from the service provider. http://neuvoo.ca/salary/?job=Field%20Medic https://simplerlife.com/collections/medical-kits-supplies-and-equipment/products/25-patient-deluxe-medical-kit-797-pieces Assumes on-site staff will attend monthly safety meetings to review plans, procedures, safe work practices, incidents etc.
	CC1-A	6.8	$ 1,200	$ 8,156	6.8	$ 12,500	$ 84,956	6.8	$ 100	$ 680	6.8	$ 3,850	$ 26,166	**$ 119,958**	
	CC1-B	7.5	$ 1,200	$ 9,018	7.5	$ 12,500	$ 93,940	7.5	$ 100	$ 752	7.5	$ 3,850	$ 28,933	**$ 132,643**	
	CC2	27.7	$ 1,200	$ 33,265	27.7	$ 12,500	$ 346,513	27.7	$ 100	$ 2,772	27.7	$ 4,270	$118,369	**$ 500,919**	
	CC2-A	9.2	$ 1,200	$ 11,090	9.2	$ 12,500	$ 115,521	9.2	$ 100	$ 924	9.2	$ 4,270	$ 39,462	**$ 166,997**	
	CC2-B	17.8	$ 1,200	$ 21,350	17.8	$ 12,500	$ 222,399	17.8	$ 100	$ 1,779	17.8	$ 4,270	$ 75,972	**$ 321,500**	
	CC3	54.6	$ 1,200	$ 65,462	54.6	$ 12,500	$ 681,894	54.6	$ 100	$ 5,455	54.6	$ 4,270	$232,935	**$ 985,746**	
Wolverine	WC1	6.0	$ 1,200	$ 7,200	6.0	$ 12,500	$ 75,000	6.0	$ 100	$ 600	6.0	$ 1,540	$ 9,240	**$ 92,040**	
	WC2	33.8	$ 1,200	$ 40,523	33.8	$ 12,500	$ 422,117	33.8	$ 100	$ 3,377	33.8	$ 5,810	$196,200	**$ 662,217**	
	WC2-A	9.8	$ 1,200	$ 11,728	9.8	$ 12,500	$ 122,166	9.8	$ 100	$ 977	9.8	$ 5,810	$ 56,783	**$ 191,654**	
	WC3	33.8	$ 1,200	$ 40,523	33.8	$ 12,500	$ 422,117	33.8	$ 100	$ 3,377	33.8	$ 5,810	$196,200	**$ 662,217**	

![wood.]

CCRP Cost Estimate Table W-24: Asbestos Abatement Estimate

				CC1	CC1-A	CC1-B	CC2	CC2-A	CC2-B	CC3	WC1	WC2	WC2-A	WC3
Tyvek Overalls, Respirators and Standard PPE	Project Duration	Months		17.1	6.8	7.5	27.7	9.2	17.8	54.6	6.0	33.8	9.8	33.8
	Quantity	Workers		61	55	55	61	61	61	61	22	83	83	83
	Unit Price	$/worker/month		$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
			SubTotal	**$ 2,083,886**	**$ 747,613**	**$ 826,670**	**$ 3,381,967**	**$ 1,127,481**	**$ 2,170,615**	**$ 6,655,283**	**$ 264,000**	**$ 5,605,715**	**$ 1,622,362**	**$ 5,605,715**
Air Quality Monitoring	Project Duration	Months		17.1	6.8	7.5	27.7	9.2	17.8	54.6	6.0	33.8	9.8	33.8
	Quantity	Workers		61	55	55	61	61	61	61	22	83	83	83
	Unit Price	$/worker/month		$ 600	$ 600	$ 600	$ 600	$ 600	$ 600	$ 600	$ 600	$ 600	$ 600	$ 600
			SubTotal	**$ 625,166**	**$ 224,284**	**$ 248,001**	**$ 1,014,590**	**$ 338,244**	**$ 651,185**	**$ 1,996,585**	**$ 79,200**	**$ 1,681,714**	**$ 486,708**	**$ 1,681,714**
Equipment Filter	Project Duration	Vehicle.months		171	68	75	277	92	178	546	24	338	98	338
	Unit Price		No significant cost impact beyond regular H&S	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
			SubTotal	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Change and Wash Facility Supply and Maintenance	Project Duration	Months		17.1	6.8	7.5	27.7	9.2	17.8	54.6	6.0	33.8	9.8	33.8
	Cost	Camp cost	Camp cost	$ 8,900,390	$ 4,443,992	$ 4,728,729	$ 13,353,611	$ 5,619,328	$ 9,197,926	$ 24,583,116	$ 1,204,500	$ 18,653,260	$ 6,642,981	$ 18,653,260
	Unit Price	Percent of camp cost	20%	$ 1,780,078	$ 888,798	$ 945,746	$ 2,670,722	$ 1,123,866	$ 1,839,585	$ 4,916,623	$ 240,900	$ 3,730,652	$ 1,328,596	$ 3,730,652
			SubTotal	**$ 1,780,078**	**$ 888,798**	**$ 945,746**	**$ 2,670,722**	**$ 1,123,866**	**$ 1,839,585**	**$ 4,916,623**	**$ 240,900**	**$ 3,730,652**	**$ 1,328,596**	**$ 3,730,652**
Controlled Work Perimeter	Project Duration	Months		17.1	6.8	7.5	27.7	9.2	17.8	54.6	6.0	33.8	9.8	33.8
	Unit Price		No significant cost impact beyond regular H&S	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
			SubTotal	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Vehicle Washdown Building and Pressure Washers	Quantity	Months		17.1	6.8	7.5	27.7	9.2	17.8	54.6	6.0	33.8	9.8	33.8
	Cost	Washdown Building	Escalated from WorleyParsons 2014: 1ea - 80'x120' temprorary building , 300mm SOG, 4ea - 4.5 GPM pressure washers w/ 600Gal tanks,.	$ 464,771	$ 464,771	$ 464,771	$ 464,771	$ 464,771	$ 464,771	$ 464,771	Not Applicable	$ 464,771	$ 464,771	$ 464,771
	Cost	Pressure Washers	Escalated from WorleyParsons 2014	$ 23,796	$ 23,796	$ 23,796	$ 23,796	$ 23,796	$ 23,796	$ 23,796	Not Applicable	$ 23,796	$ 23,796	$ 23,796
	Cost	Maintenance	4man hours / day	$ 49,439	$ 19,672	$ 21,752	$ 80,236	$ 26,749	$ 51,497	$ 157,894		$ 97,742	$ 28,288	$ 97,742
			SubTotal	**$ 538,006**	**$ 508,239**	**$ 510,319**	**$ 568,803**	**$ 515,316**	**$ 540,064**	**$ 646,461**	**Not Applicable**	**$ 586,309**	**$ 516,855**	**$ 586,309**
			Total	**$ 5,027,136**	**$ 2,368,933**	**$ 2,530,736**	**$ 7,636,081**	**$ 3,104,907**	**$ 5,201,449**	**$ 14,214,952**	**$ 584,100**	**$ 11,604,390**	**$ 3,954,521**	**$ 11,604,390**

CCRP Cost Estimate Table W-25: Earth Moving Estimate - Option CC1

		Load and Haul	Load	Haul
Load and Haul Cost	$	19,923,602	$ 4,804,961	$ 15,118,642
Rate/tonne	$	2.28	$ 0.55	$ 1.73
Rate/m^3	$	4.56	$ 1.10	$ 3.46

Note: Reductions in base materials management productivities that are related to asbestos abatement have been applied to this estimate (equipment utilization reduced by 10% to calculate net operating hours).

Production Target	Tonnes/year =	6,144,359		
Caterpillar 385C	Loaders Required =	2.00	2.00	
Caterpillar 745C	Trucks Required =	6.80	7.00	
	Duration of Remediation =	1.42	years	

Waste Material Volume (In Bank) m^3	In-Situ Buk Density t/m^3	Waste Material Tonnage t
4,373,000	2.00	8,746,000

LOADER HOURS

Calendar Time				
	Days	365		
	Shifts per day	2		
	Shift Length	12		
Calendar Time (h/year)		**8,760**		
Available Time	= Calendar Time - Down Time			
	Availability	85.0%		
	Down Time (h/year)	1,314		
Available Time (h/year)		**7,446**	0.85	
Gross Operating Time	= Available Time - Operating Standby			
Operating Standby				
	Internal (h/shift)		min/day	
	Lunch & Breaks	1.00	120	
	Meeting	0.04	5	
	Shift Change	0.17	20	
No Blast =>	Blast Delay		-	
	Fueling	0.25	30	
	Operator Inspection		-	
	External (h/year)			
	Industrial		-	
	Weather	120	20	
	No Power		-	
Operating Standby (h/year)		1,007	195	
Gross Operating Hours (h/year)		**6,439**		
Net Operating Time	Gross Operating Time - Operating Delay			
	Utilization	73%		
	Operating Delay (h/year)	1719	282.61	
Net Operating Hours (h/year)		**4,720**		
Adjustment Factors			min/cycle	
	Truck availability to shovel	75%	0.68	
	Shovel Wait for Truck	1180		
Adjusted Net Operating Hours (h/year)		**3,540**		

		Metric
Loading Productivities and Truck Match		
Loader		Caterpillar 385C
Truck		Caterpillar 745C
Bucket Capacity	m^3	4.6
Bucket Capacity	tonne	8.3
Truck Capacity	m^3	73.8
Truck Capacity	tonne	41.0
Insitu Bulk Density	t/m^3	2.00
Bulk Factor		1.30
Loose Density	t/m^3	1.54
Moisture	%	5.0%
Fill Factor		0.84
Effective Bucket Capacity	m^3	3.85
Wet/Loose Density	t/m^3	1.62
Tonnes/Pass	tonne	6.2
Theoretical Passes (Volume)		19.14
Theoretical Passes (Weight)		6.57
Actual Passes		5
Truck Load	m^3	19.3
Truck Load	tonne	31.2
Truck Fill % (Volume)		26%
Truck Fill % (Weight)		76%
Loader Cycle Time	seconds	22
Loader Spot Time	seconds	35
Load Time per Truck	seconds	123
Maximum Truck Loads per hour		29.27
Maximum Productivity	(wet t/adj. NOH)	914
Maximum Productivity	(wet t/NOH)	685
Maximum Productivity	(wet t/GOH)	502
Maximum Productivity	**(dry t/GOH)**	**477**
Maximum Productivity	(wt/yr)	3,233,873
Maximum Productivity	(wt/day)	8,860
Maximum Productivity	**(dt/year)**	**3,072,179**
Maximum Productivity	**(dt/day)**	**8,417**

TRUCK HOURS

Calendar Time			
	Days	365	
	Shifts per day	2	
	Shift Length	12	
Calendar Time (h/year)		8,760	
Available Time			
	Availability	85%	
	Down Time (h/year)	1,314	
Available Time (h/year)		**7,446**	
Gross Operating Time			
Operating Standby			
	Internal (h/shift)		
	Lunch & Breaks	1.00	120
	Meeting	0.04	5
	Shift Change	0.17	20
No Blast =>	Blast Delay		-
	Fueling	0.25	30
	Operator Inspection		-
	External (h/year)		
	Industrial		-
	Weather	120	20
	No Power		-
Operating Standby (h/year)		1,007	
Gross Operating Hours (h/year)		**6,439**	86%
Net Operating Time			
	Utilization	73%	
	Operating Delay (h/year)	1739	
Net Operating Hours (h/year)		**4,701**	

Truck Capacity	tonne	31.2
Travel Distance one way	km	0.80
Loaded	km/h	12.00
Empty Return	km/h	40.00
Truck haul cycle time	min	5.20
Load Time	minutes	2.05
Queue Time	minutes	1.00
Dump Time	minutes	1.00
Total Cycle Time	minutes	9.25
Maximum Truck Loads per hour		6.49
Maximum Productivity	(wet t/NOH)	202
Maximum Productivity	(wet t/GOH)	148
Maximum Productivity	**(dry t/GOH)**	**140**
Maximum Productivity	(wt/year)	951,684
Maximum Productivity	(wt/day)	2,607
Maximum Productivity	**(dt/year)**	**904,100**
Maximum Productivity	**(dt/day)**	**2,477**

CCRP Cost Estimate Table W-25a: Earth Moving Estimate - Option CC1

		Load and Haul		Load		Haul
Load and Haul Cost	$	3,534,073	$	955,938	$	2,578,136
Rate/tonne	$	2.03	$	0.55	$	1.48
Rate/m^3	$	4.06	$	1.10	$	2.96

Note: Reductions in base materials management productivities that are related to asbestos abatement have been applied to this estimate (equipment utilization reduced by 10% to calculate net operating hours).

Production Target	Tonnes/year =	3,072,179	
Caterpillar 385C	Loaders Required =	1.00	1.00
Caterpillar 745C	Trucks Required =	2.20	3.00
	Duration of Remediation =	0.57	years

Waste Material Volume (In Bank) m^3	In-Situ Buk Density t/m^3	Waste Material Tonnage t
870,000	2.00	1,740,000

LOADER HOURS

Calendar Time			
	Days	365	
	Shifts per day	2	
	Shift Length	12	
Calendar Time (h/year)		**8,760**	
Available Time	= Calendar Time - Down Time		
	Availability	85.0%	
	Down Time (h/year)	1,314	
Available Time (h/year)		**7,446**	0.85
Gross Operating Time	= Available Time - Operating Standby		
Operating Standby			
	Internal (h/shift)		min/day
	Lunch & Breaks	1.00	120
	Meeting	0.04	5
	Shift Change	0.17	20
No Blast =>	Blast Delay		-
	Fueling	0.25	30
	Operator Inspection		-
	External (h/year)		
	Industrial		-
	Weather	120	20
	No Power		-
Operating Standby (h/year)		1,007	195
Gross Operating Hours (h/year)		**6,439**	
Net Operating Time	Gross Operating Time - Operating Delay		
	Utilization	73%	
	Operating Delay (h/year)	1719	282.61
Net Operating Hours (h/year)		**4,720**	
Adjustment Factors			min/cycle
	Truck availability to shovel	75%	0.68
	Shovel Wait for Truck	1180	
Adjusted Net Operating Hours (h/year)		**3,540**	

Loading Productivities and Truck Match

		Metric
Loader		Caterpillar 385C
Truck		Caterpillar 745C
Bucket Capacity	m^3	4.6
Bucket Capacity	tonne	8.3
Truck Capacity	m^3	73.8
Truck Capacity	tonne	41.0
Insitu Bulk Density	t/m^3	2.00
Bulk Factor		1.30
Loose Density	t/m^3	1.54
Moisture	%	5.0%
Fill Factor		0.84
Effective Bucket Capacity	m^3	3.85
Wet/Loose Density	t/m^3	1.62
Tonnes/Pass	tonne	6.2
Theoretical Passes (Volume)		19.14
Theoretical Passes (Weight)		6.57
Actual Passes		5
Truck Load	m^3	19.3
Truck Load	tonne	31.2
Truck Fill % (Volume)		26%
Truck Fill % (Weight)		76%
Loader Cycle Time	seconds	22
Loader Spot Time	seconds	35
Load Time per Truck	seconds	123
Maximum Truck Loads per hour		29.27
Maximum Productivity	(wet t/adj. NOH)	914
Maximum Productivity	(wet t/NOH)	685
Maximum Productivity	(wet t/GOH)	502
Maximum Productivity	**(dry t/GOH)**	**477**
Maximum Productivity	(wt/yr)	3,233,873
Maximum Productivity	(wt/day)	8,860
Maximum Productivity	**(dt/year)**	**3,072,179**
Maximum Productivity	**(dt/day)**	**8,417**

TRUCK HOURS

Calendar Time			
	Days	365	
	Shifts per day	2	
	Shift Length	12	
Calendar Time (h/year)		8,760	
Available Time			
	Availability	85%	
	Down Time (h/year)	1,314	
Available Time (h/year)		**7,446**	
Gross Operating Time			
Operating Standby			
	Internal (h/shift)		
	Lunch & Breaks	1.00	120
	Meeting	0.04	5
	Shift Change	0.17	20
No Blast =>	Blast Delay		-
	Fueling	0.25	30
	Operator Inspection		-
	External (h/year)		
	Industrial		-
	Weather	120	20
	No Power		-
Operating Standby (h/year)		1,007	
Gross Operating Hours (h/year)		**6,439**	86%
Net Operating Time			
	Utilization	73%	
	Operating Delay (h/year)	1739	
Net Operating Hours (h/year)		**4,701**	

Truck Capacity	tonne	31.2
Travel Distance one way	km	0.30
Loaded	km/h	12.00
Empty Return	km/h	40.00
Truck haul cycle time	min	1.95
Load Time	minutes	2.05
Queue Time	minutes	1.00
Dump Time	minutes	1.00
Total Cycle Time	minutes	6.00
Maximum Truck Loads per hour		10.00
Maximum Productivity	(wet t/NOH)	312
Maximum Productivity	(wet t/GOH)	228
Maximum Productivity	**(dry t/GOH)**	**216**
Maximum Productivity	(wt/year)	1,467,179
Maximum Productivity	(wt/day)	4,020
Maximum Productivity	**(dt/year)**	**1,393,820**
Maximum Productivity	**(dt/day)**	**3,819**

CCRP Cost Estimate Table W-25b: Earth Moving Estimate - Option CC1

		Load and Haul	Load	Haul
Load and Haul Cost	$	3,907,791	$ 1,057,025	$ 2,850,766
Rate/tonne	$	2.03	$ 0.55	$ 1.48
Rate/m^3	$	4.06	$ 1.10	$ 2.96

Note: Reductions in base materials management productivities that are related to asbestos abatement have been applied to this estimate (equipment utilization reduced by 10% to calculate net operating hours).

Production Target	Tonnes/year =	3,072,179	
Caterpillar 385C	Loaders Required =	1.00	1.00
Caterpillar 745C	Trucks Required =	2.20	3.00
	Duration of Remediation =	0.63	years

Waste Material Volume (In Bank) m^3	In-Situ Buk Density t/m^3	Waste Material Tonnage t
962,000	2.00	1,924,000

LOADER HOURS

Calendar Time			
Days	365		
Shifts per day	2		
Shift Length	12		
Calendar Time (h/year)	**8,760**		
Available Time	= Calendar Time - Down Time		
Availability	85.0%		
Down Time (h/year)	1,314		
Available Time (h/year)	**7,446**	0.85	
Gross Operating Time	= Available Time - Operating Standby		
Operating Standby			
Internal (h/shift)		min/day	
Lunch & Breaks	1.00	120	
Meeting	0.04	5	
Shift Change	0.17	20	
No Blast => Blast Delay		-	
Fueling	0.25	30	
Operator Inspection		-	
External (h/year)			
Industrial		-	
Weather	120	20	
No Power		-	
Operating Standby (h/year)	1,007	195	
Gross Operating Hours (h/year)	**6,439**		
Net Operating Time	Gross Operating Time - Operating Delay		
Utilization	73%		
Operating Delay (h/year)	1719	282.61	
Net Operating Hours (h/year)	**4,720**		
Adjustment Factors		min/cycle	
Truck availability to shovel	75%	0.68	
Shovel Wait for Truck	1180		
Adjusted Net Operating Hours (h/year)	**3,540**		

Loading Productivities and Truck Match

		Metric
Loader		Caterpillar 385C
Truck		Caterpillar 745C
Bucket Capacity	m^3	4.6
Bucket Capacity	tonne	8.3
Truck Capacity	m^3	73.8
Truck Capacity	tonne	41.0
Insitu Bulk Density	t/m^3	2.00
Bulk Factor		1.30
Loose Density	t/m^3	1.54
Moisture	%	5.0%
Fill Factor		0.84
Effective Bucket Capacity	m^3	3.85
Wet/Loose Density	t/m^3	1.62
Tonnes/Pass	tonne	6.2
Theoretical Passes (Volume)		19.14
Theoretical Passes (Weight)		6.57
Actual Passes		5
Truck Load	m^3	19.3
Truck Load	tonne	31.2
Truck Fill % (Volume)		26%
Truck Fill % (Weight)		76%
Loader Cycle Time	seconds	22
Loader Spot Time	seconds	35
Load Time per Truck	seconds	123
Maximum Truck Loads per hour		29.27
Maximum Productivity	(wet t/adj. NOH)	914
Maximum Productivity	(wet t/NOH)	685
Maximum Productivity	(wet t/GOH)	502
Maximum Productivity	**(dry t/GOH)**	**477**
Maximum Productivity	(wt/yr)	3,233,873
Maximum Productivity	(wt/day)	8,860
Maximum Productivity	**(dt/year)**	**3,072,179**
Maximum Productivity	**(dt/day)**	**8,417**

TRUCK HOURS

Calendar Time			
Days	365		
Shifts per day	2		
Shift Length	12		
Calendar Time (h/year)	8,760		
Available Time			
Availability	85%		
Down Time (h/year)	1,314		
Available Time (h/year)	**7,446**		
Gross Operating Time			
Operating Standby			
Internal (h/shift)			
Lunch & Breaks	1.00	120	
Meeting	0.04	5	
Shift Change	0.17	20	
No Blast => Blast Delay		-	
Fueling	0.25	30	
Operator Inspection		-	
External (h/year)			
Industrial		-	
Weather	120	20	
No Power		-	
Operating Standby (h/year)	1,007		
Gross Operating Hours (h/year)	**6,439**	86%	
Net Operating Time			
Utilization	73%		
Operating Delay (h/year)	1739		
Net Operating Hours (h/year)	**4,701**		

Truck Capacity	tonne	31.2
Travel Distance one way	km	0.30
Loaded	km/h	12.00
Empty Return	km/h	40.00
Truck haul cycle time	min	1.95
Load Time	minutes	2.05
Queue Time	minutes	1.00
Dump Time	minutes	1.00
Total Cycle Time	minutes	6.00
Maximum Truck Loads per hour		10.00
Maximum Productivity	(wet t/NOH)	312
Maximum Productivity	(wet t/GOH)	228
Maximum Productivity	**(dry t/GOH)**	**216**
Maximum Productivity	(wt/year)	1,467,179
Maximum Productivity	(wt/day)	4,020
Maximum Productivity	**(dt/year)**	**1,393,820**
Maximum Productivity	**(dt/day)**	**3,819**

wood.

CCRP Cost Estimate Table W-26: Earth Moving Estimate - Option CC2

		Load and Haul	Load	Haul
Load and Haul Cost	$	32,334,280	$ 7,798,035	$ 24,536,245
Rate/tonne	$	2.28	$ 0.55	$ 1.73
Rate/m^3	$	4.56	$ 1.10	$ 3.46

Note: Reductions in base materials management productivities that are related to asbestos abatement have been applied to this estimate (equipment utilization reduced by 10% to calculate net operating hours).

Production Target	Tonnes/year =	6,144,359	
Caterpillar 385C	Loaders Required =	2.00	2.00
Caterpillar 745C	Trucks Required =	6.80	7.00
	Duration of Remediation =	2.31 years	

Waste Material Volume (In Bank) m^3	In-Situ Bulk Density t/m^3	Waste Material Tonnage t
7,097,000	2.00	14,194,000

LOADER HOURS

Calendar Time			
	Days	365	
	Shifts per day	2	
	Shift Length	12	
Calendar Time (h/year)		8,760	
Available Time	= Calendar Time - Down Time		
	Availability	85.0%	
	Down Time (h/year)	1,314	
Available Time (h/year)		7,446	
Gross Operating Time	= Available Time - Operating Standby		
Operating Standby			
	Internal (h/shift)		min/day
	Lunch & Breaks	1.00	120
	Meeting	0.04	5
	Shift Change	0.17	20
No Blast =>	Blast Delay		-
	Fueling	0.25	30
	Operator Inspection		-
	External (h/year)		
	Industrial		-
	Weather	120	20
	No Power		-
Operating Standby (h/year)		1,007	195
Gross Operating Hours (h/year)		**6,439**	
Net Operating Time	Gross Operating Time - Operating Delay		
	Utilization	73%	
	Operating Delay (h/year)	1719	282.61
Net Operating Hours (h/year)		**4,720**	
Adjustment Factors			min/cycle
	Truck availability to shovel	75%	0.68
	Shovel Wait for Truck	1180	
Adjusted Net Operating Hours (h/year)		**3,540**	

Loading Productivities and Truck Match		Metric
Loader		Caterpillar 385C
Truck		Caterpillar 745C
Bucket Capacity	m^3	4.6
Bucket Capacity	tonne	8.3
Truck Capacity	m^3	73.8
Truck Capacity	tonne	41.0
Insitu Bulk Density	t/m^3	2.00
Bulk Factor		1.30
Loose Density	t/m^3	1.54
Moisture	%	5.0%
Fill Factor		0.84
Effective Bucket Capacity	m^3	3.85
Wet/Loose Density	t/m^3	1.62
Tonnes/Pass	tonne	6.2
Theoretical Passes (Volume)		19.14
Theoretical Passes (Weight)		6.57
Actual Passes		5
Truck Load	m^3	19.3
Truck Load	tonne	31.2
Truck Fill % (Volume)		26%
Truck Fill % (Weight)		76%
Loader Cycle Time	seconds	22
Loader Spot Time	seconds	35
Load Time per Truck	seconds	123
Maximum Truck Loads per hour		29.27
Maximum Productivity	(wet t/adj. NOH)	914
Maximum Productivity	(wet t/NOH)	685
Maximum Productivity	(wet t/GOH)	502
Maximum Productivity	**(dry t/GOH)**	**477**
Maximum Productivity	(wt/yr)	3,233,873
Maximum Productivity	(wt/day)	8,860
Maximum Productivity	**(dt/year)**	**3,072,179**
Maximum Productivity	**(dt/day)**	**8,417**

TRUCK HOURS

Calendar Time			
	Days	365	
	Shifts per day	2	
	Shift Length	12	
Calendar Time (h/year)		8,760	
Available Time			
	Availability	85%	
	Down Time (h/year)	1,314	
Available Time (h/year)		7,446	
Gross Operating Time			
Operating Standby			
	Internal (h/shift)		
	Lunch & Breaks	1.00	120
	Meeting	0.04	5
	Shift Change	0.17	20
No Blast =>	Blast Delay		-
	Fueling	0.25	30
	Operator Inspection		-
	External (h/year)		
	Industrial		-
	Weather	120	20
	No Power		-
Operating Standby (h/year)		1,007	
Gross Operating Hours (h/year)		**6,439**	86%
Net Operating Time			
	Utilization	73%	
	Operating Delay (h/year)	1739	
Net Operating Hours (h/year)		**4,701**	

Truck Capacity	tonne	31.2
Travel Distance one way	km	0.80
Loaded	km/h	12.00
Empty Return	km/h	40.00
Truck haul cycle time	min	5.20
Load Time	minutes	2.05
Queue Time	minutes	1.00
Dump Time	minutes	1.00
Total Cycle Time	minutes	9.25
Maximum Truck Loads per hour		6.49
Maximum Productivity	(wet t/NOH)	202
Maximum Productivity	(wet t/GOH)	148
Maximum Productivity	**(dry t/GOH)**	**140**
Maximum Productivity	(wt/year)	951,684
Maximum Productivity	(wt/day)	2,607
Maximum Productivity	**(dt/year)**	**904,100**
Maximum Productivity	**(dt/day)**	**2,477**

wood.

CCRP Cost Estimate Table W-26a: Earth Moving Estimate - Option CC2

		Load and Haul		Load		Haul
Load and Haul Cost	$	10,779,612	$	2,599,711	$	8,179,901
Rate/tonne	$	2.28	$	0.55	$	1.73
Rate/m^3	$	4.56	$	1.10	$	3.46

Note: Reductions in base materials management productivities that are related to asbestos abatement have been applied to this estimate (equipment utilization reduced by 10% to calculate net operating hours).

Production Target	Tonnes/year =	6,144,359	
Caterpillar 385C	Loaders Required =	2.00	2.00
Caterpillar 745C	Trucks Required =	6.80	7.00
	Duration of Remediation =	0.77 years	

Waste Material Volume (In Bank) m^3	In-Situ Bulk Density t/m^3	Waste Material Tonnage t
2,366,000	2.00	4,732,000

LOADER HOURS

Calendar Time			
	Days	365	
	Shifts per day	2	
	Shift Length	12	
Calendar Time (h/year)		8,760	
Available Time	= Calendar Time - Down Time		
	Availability	85.0%	
	Down Time (h/year)	1,314	
Available Time (h/year)		7,446	
Gross Operating Time	= Available Time - Operating Standby		
Operating Standby			
	Internal (h/shift)		min/day
	Lunch & Breaks	1.00	120
	Meeting	0.04	5
	Shift Change	0.17	20
No Blast =>	Blast Delay		-
	Fueling	0.25	30
	Operator Inspection		-
	External (h/year)		
	Industrial		-
	Weather	120	20
	No Power		-
Operating Standby (h/year)		1,007	195
Gross Operating Hours (h/year)		**6,439**	
Net Operating Time	Gross Operating Time - Operating Delay		
	Utilization	73%	
	Operating Delay (h/year)	1719	282.61
Net Operating Hours (h/year)		**4,720**	
Adjustment Factors			min/cycle
	Truck availability to shovel	75%	0.68
	Shovel Wait for Truck	1180	
Adjusted Net Operating Hours (h/year)		**3,540**	

Loading Productivities and Truck Match		Metric
Loader		Caterpillar 385C
Truck		Caterpillar 745C
Bucket Capacity	m^3	4.6
Bucket Capacity	tonne	8.3
Truck Capacity	m^3	73.8
Truck Capacity	tonne	41.0
Insitu Bulk Density	t/m^3	2.00
Bulk Factor		1.30
Loose Density	t/m^3	1.54
Moisture	%	5.0%
Fill Factor		0.84
Effective Bucket Capacity	m^3	3.85
Wet/Loose Density	t/m^3	1.62
Tonnes/Pass	tonne	6.2
Theoretical Passes (Volume)		19.14
Theoretical Passes (Weight)		6.57
Actual Passes		5
Truck Load	m^3	19.3
Truck Load	tonne	31.2
Truck Fill % (Volume)		26%
Truck Fill % (Weight)		76%
Loader Cycle Time	seconds	22
Loader Spot Time	seconds	35
Load Time per Truck	seconds	123
Maximum Truck Loads per hour		29.27
Maximum Productivity	(wet t/adj. NOH)	914
Maximum Productivity	(wet t/NOH)	685
Maximum Productivity	(wet t/GOH)	502
Maximum Productivity	**(dry t/GOH)**	**477**
Maximum Productivity	(wt/yr)	3,233,873
Maximum Productivity	(wt/day)	8,860
Maximum Productivity	**(dt/year)**	**3,072,179**
Maximum Productivity	**(dt/day)**	**8,417**

TRUCK HOURS

Calendar Time			
	Days	365	
	Shifts per day	2	
	Shift Length	12	
Calendar Time (h/year)		8,760	
Available Time			
	Availability	85%	
	Down Time (h/year)	1,314	
Available Time (h/year)		7,446	
Gross Operating Time			
Operating Standby			
	Internal (h/shift)		
	Lunch & Breaks	1.00	120
	Meeting	0.04	5
	Shift Change	0.17	20
No Blast =>	Blast Delay		-
	Fueling	0.25	30
	Operator Inspection		-
	External (h/year)		
	Industrial		-
	Weather	120	20
	No Power		-
Operating Standby (h/year)		1,007	
Gross Operating Hours (h/year)		**6,439**	86%
Net Operating Time			
	Utilization	73%	
	Operating Delay (h/year)	1739	
Net Operating Hours (h/year)		**4,701**	

Truck Capacity	tonne	31.2
Travel Distance one way	km	0.80
Loaded	km/h	12.00
Empty Return	km/h	40.00
Truck haul cycle time	min	5.20
Load Time	minutes	2.05
Queue Time	minutes	1.00
Dump Time	minutes	1.00
Total Cycle Time	minutes	9.25
Maximum Truck Loads per hour		6.49
Maximum Productivity	(wet t/NOH)	202
Maximum Productivity	(wet t/GOH)	148
Maximum Productivity	**(dry t/GOH)**	**140**
Maximum Productivity	(wt/year)	951,684
Maximum Productivity	(wt/day)	2,607
Maximum Productivity	**(dt/year)**	**904,100**
Maximum Productivity	**(dt/day)**	**2,477**

CCRP Cost Estimate Table W-26b: Earth Moving Estimate - Option CC2

		Load and Haul	Load	Haul
Load and Haul Cost	$	20,752,803	$ 5,004,938	$ 15,747,865
Rate/tonne	$	2.28	$ 0.55	$ 1.73
Rate/m^3	$	4.56	$ 1.10	$ 3.46

Note: Reductions in base materials management productivities that are related to asbestos abatement have been applied to this estimate (equipment utilization reduced by 10% to calculate net operating hours).

Production Target	Tonnes/year =	6,144,359	
Caterpillar 385C	Loaders Required =	2.00	2.00
Caterpillar 745C	Trucks Required =	6.80	7.00
	Duration of Remediation =	1.48 years	

Waste Material Volume (In Bank) m^3	In-Situ Bulk Density t/m^3	Waste Material Tonnage t
4,555,000	2.00	9,110,000

LOADER HOURS

Calendar Time			
	Days	365	
	Shifts per day	2	
	Shift Length	12	
Calendar Time (h/year)		**8,760**	
Available Time	= Calendar Time - Down Time		
	Availability	85.0%	
	Down Time (h/year)	1,314	
Available Time (h/year)		**7,446**	
Gross Operating Time	= Available Time - Operating Standby		
Operating Standby			
	Internal (h/shift)		min/day
	Lunch & Breaks	1.00	120
	Meeting	0.04	5
	Shift Change	0.17	20
No Blast =>	Blast Delay		-
	Fueling	0.25	30
	Operator Inspection		-
	External (h/year)		
	Industrial		-
	Weather	120	20
	No Power		-
Operating Standby (h/year)		1,007	195
Gross Operating Hours (h/year)		**6,439**	
Net Operating Time	Gross Operating Time - Operating Delay		
	Utilization	73%	
	Operating Delay (h/year)	1719	282.61
Net Operating Hours (h/year)		**4,720**	
Adjustment Factors			min/cycle
	Truck availability to shovel	75%	0.68
	Shovel Wait for Truck	1180	
Adjusted Net Operating Hours (h/year)		**3,540**	

Loading Productivities and Truck Match

		Metric
Loader		Caterpillar 385C
Truck		Caterpillar 745C
Bucket Capacity	m^3	4.6
Bucket Capacity	tonne	8.3
Truck Capacity	m^3	73.8
Truck Capacity	tonne	41.0
Insitu Bulk Density	t/m^3	2.00
Bulk Factor		1.30
Loose Density	t/m^3	1.54
Moisture	%	5.0%
Fill Factor		0.84
Effective Bucket Capacity	m^3	3.85
Wet/Loose Density	t/m^3	1.62
Tonnes/Pass	tonne	6.2
Theoretical Passes (Volume)		19.14
Theoretical Passes (Weight)		6.57
Actual Passes		5
Truck Load	m^3	19.3
Truck Load	tonne	31.2
Truck Fill % (Volume)		26%
Truck Fill % (Weight)		76%
Loader Cycle Time	seconds	22
Loader Spot Time	seconds	35
Load Time per Truck	seconds	123
Maximum Truck Loads per hour		29.27
Maximum Productivity	(wet t/adj. NOH)	914
Maximum Productivity	(wet t/NOH)	685
Maximum Productivity	(wet t/GOH)	502
Maximum Productivity	**(dry t/GOH)**	**477**
Maximum Productivity	(wt/yr)	3,233,873
Maximum Productivity	(wt/day)	8,860
Maximum Productivity	**(dt/year)**	**3,072,179**
Maximum Productivity	**(dt/day)**	**8,417**

TRUCK HOURS

Calendar Time			
	Days	365	
	Shifts per day	2	
	Shift Length	12	
Calendar Time (h/year)		8,760	
Available Time			
	Availability	85%	
	Down Time (h/year)	1,314	
Available Time (h/year)		**7,446**	
Gross Operating Time			
Operating Standby			
	Internal (h/shift)		
	Lunch & Breaks	1.00	120
	Meeting	0.04	5
	Shift Change	0.17	20
No Blast =>	Blast Delay		-
	Fueling	0.25	30
	Operator Inspection		-
	External (h/year)		
	Industrial		-
	Weather	120	20
	No Power		-
Operating Standby (h/year)		1,007	
Gross Operating Hours (h/year)		**6,439**	86%
Net Operating Time			
	Utilization	73%	
	Operating Delay (h/year)	1739	
Net Operating Hours (h/year)		**4,701**	

Truck Capacity	tonne	31.2
Travel Distance one way	km	0.80
Loaded	km/h	12.00
Empty Return	km/h	40.00
Truck haul cycle time	min	5.20
Load Time	minutes	2.05
Queue Time	minutes	1.00
Dump Time	minutes	1.00
Total Cycle Time	minutes	9.25
Maximum Truck Loads per hour		6.49
Maximum Productivity	(wet t/NOH)	202
Maximum Productivity	(wet t/GOH)	148
Maximum Productivity	**(dry t/GOH)**	**140**
Maximum Productivity	(wt/year)	951,684
Maximum Productivity	(wt/day)	2,607
Maximum Productivity	**(dt/year)**	**904,100**
Maximum Productivity	**(dt/day)**	**2,477**

wood.

CCRP Cost Estimate Table W-27: Earth Moving Estimate - Option CC3

		Load and Haul		Load	Haul
Load and Haul Cost	$	63,629,781	$	15,345,548	$ 48,284,233
Rate/tonne	$	2.28	$	0.55	$ 1.73
Rate/m^3	$	4.56	$	1.10	$ 3.46

Note: Reductions in base materials management productivities that are related to asbestos abatement have been applied to this estimate (equipment utilization reduced by 10% to calculate net operating hours).

Production Target	Tonnes/year =	6,144,359	
Caterpillar 385C	Loaders Required =	2.00	2.00
Caterpillar 745C	Trucks Required =	6.80	7.00
	Duration of Remediation =	4.55 years	

Waste Material Volume (In Bank) m^3	In-Situ Bulk Density t/m^3	Waste Material Tonnage t
13,966,000	2.00	27,932,000

LOADER HOURS

Calendar Time			
Days	365		
Shifts per day	2		
Shift Length	12		
Calendar Time (h/year)	**8,760**		
Available Time = Calendar Time - Down Time			
Availability	85.0%		
Down Time (h/year)	1,314		
Available Time (h/year)	**7,446**		
Gross Operating Time = Available Time - Operating Standby			
Operating Standby			
Internal (h/shift)		min/day	
Lunch & Breaks	1.00	120	
Meeting	0.04	5	
Shift Change	0.17	20	
No Blast => Blast Delay		-	
Fueling	0.25	30	
Operator Inspection		-	
External (h/year)			
Industrial		-	
Weather	120	20	
No Power		-	
Operating Standby (h/year)	1,007	195	
Gross Operating Hours (h/year)	**6,439**		
Net Operating Time Gross Operating Time - Operating Delay			
Utilization	73%		
Operating Delay (h/year)	1719	282.61	
Net Operating Hours (h/year)	**4,720**		
Adjustment Factors		min/cycle	
Truck availability to shovel	75%	0.68	
Shovel Wait for Truck	1180		
Adjusted Net Operating Hours (h/year)	**3,540**		

Loading Productivities and Truck Match		Metric
Loader		Caterpillar 385C
Truck		Caterpillar 745C
Bucket Capacity	m^3	4.6
Bucket Capacity	tonne	8.3
Truck Capacity	m^3	73.8
Truck Capacity	tonne	41.0
Insitu Bulk Density	t/m^3	2.00
Bulk Factor		1.30
Loose Density	t/m^3	1.54
Moisture	%	5.0%
Fill Factor		0.84
Effective Bucket Capacity	m^3	3.85
Wet/Loose Density	t/m^3	1.62
Tonnes/Pass	tonne	6.2
Theoretical Passes (Volume)		19.14
Theoretical Passes (Weight)		6.57
Actual Passes		5
Truck Load	m^3	19.3
Truck Load	tonne	31.2
Truck Fill % (Volume)		26%
Truck Fill % (Weight)		76%
Loader Cycle Time	seconds	22
Loader Spot Time	seconds	35
Load Time per Truck	seconds	123
Maximum Truck Loads per hour		29.27
Maximum Productivity	(wet t/adj. NOH)	914
Maximum Productivity	(wet t/NOH)	685
Maximum Productivity	(wet t/GOH)	502
Maximum Productivity	**(dry t/GOH)**	**477**
Maximum Productivity	(wt/yr)	3,233,873
Maximum Productivity	(wt/day)	8,860
Maximum Productivity	**(dt/year)**	**3,072,179**
Maximum Productivity	**(dt/day)**	**8,417**

TRUCK HOURS

Calendar Time			
Days	365		
Shifts per day	2		
Shift Length	12		
Calendar Time (h/year)	8,760		
Available Time			
Availability	85%		
Down Time (h/year)	1,314		
Available Time (h/year)	**7,446**		
Gross Operating Time			
Operating Standby			
Internal (h/shift)			
Lunch & Breaks	1.00	120	
Meeting	0.04	5	
Shift Change	0.17	20	
No Blast => Blast Delay		-	
Fueling	0.25	30	
Operator Inspection		-	
External (h/year)			
Industrial		-	
Weather	120	20	
No Power		-	
Operating Standby (h/year)	1,007		
Gross Operating Hours (h/year)	**6,439**	86%	
Net Operating Time			
Utilization	73%		
Operating Delay (h/year)	1739		
Net Operating Hours (h/year)	**4,701**		

Truck Capacity	tonne	31.2
Travel Distance one way	km	0.80
Loaded	km/h	12.00
Empty Return	km/h	40.00
Truck haul cycle time	min	5.20
Load Time	minutes	2.05
Queue Time	minutes	1.00
Dump Time	minutes	1.00
Total Cycle Time	minutes	9.25
Maximum Truck Loads per hour		6.49
Maximum Productivity	(wet t/NOH)	202
Maximum Productivity	(wet t/GOH)	148
Maximum Productivity	**(dry t/GOH)**	**140**
Maximum Productivity	(wt/year)	951,684
Maximum Productivity	(wt/day)	2,607
Maximum Productivity	**(dt/year)**	**904,100**
Maximum Productivity	**(dt/day)**	**2,477**

CCRP Cost Estimate Table W-28: WC2 Material Volumes and Disposition

Option WC3 Earth Moving Rate/m3	$	9.00
Option CC2 Earth Moving Rate/m^3	$	4.56

Note: Reductions in base materials management productivities that are related to asbestos abatement have been applied to this estimate.

Components	Length (m)	Surface Area (m^2)	Volume (m^3)	Fill Sources & Spoil Dispositions	Fill Volumes (m3)			Cost	Cost Reference
					Tails	Dump Spoil	Imported		
TAILINGS DUMP									
Overall Tailings Volume	-	**448,000**	**7,688,000**						
Main Buttress Fill Volume (4.5H:1V)	-	190,000	3,954,000	From excavated tails/Clinton Waste Dump spoil	2,370,000	1,584,000		$ 28,353,324	CC2 for tails, WC3 for spoil
Excavated tailing (7H:1V)	-	168,000	2,370,000	To buttress fill					Included above
Sub-Excavation Volume Perimeter Berm (2H:1V)	-	24,000	121,000	Spoil to PCSS				$ 1,088,514	Option W3B Earth Moving
Compacted Granular Fill (Berm)	-	50,000	550,000	Imported, select material			550,000	$ 28,239,090	CCRP Cost Estimate Table W-19 - Engineered Sands, Gravels, and Riprap Estimate
1 m Capping over all tailings	-	358,000	358,000	From Clinton Waste Dump spoil		358,000		$ 1,589,495	Option W3B Earth Moving
				SubTotal	**2,370,000**	**1,942,000**	**550,000**	**$ 59,270,422**	
BUTTRESS FILL DAM									
Excavated Tailings and Ice Rich Colluvium Volume	-	29,000	169,000	Spoil to PCSS				$ 1,520,321	Option W3B Earth Moving
Select Rockfill Shell and Backfill Volume	-	53,000	738,000	Imported, select material			738,000	$ 37,891,724	CCRP Cost Estimate Table W-19 - Engineered Sands, Gravels, and Riprap Estimate
Chimney and Basal Drain Volume	-	52,000	192,000	Imported, select material			192,000	$ 9,858,009	CCRP Cost Estimate Table W-19 - Engineered Sands, Gravels, and Riprap Estimate
8 inch Perforated pipes	400	-	-					$ 66,715	Alberta Transportation Unit Price Average 2019. Item D615 * 1.2
8 inch Solid pipe length	300	-	-					$ 50,036	
				SubTotal	**0**	**0**	**930,000**	**$ 49,386,806**	
							Total	**$ 108,657,228**	

CCRP Cost Estimate Table W-28a: WC2 Material Volumes and Disposition

Option WC3 Earth Moving Rate/m3	$	9.00
Option CC2 Earth Moving Rate/m^3	$	4.56

Note: Reductions in base materials management productivities that are related to asbestos abatement have been applied to this estimate.

Components	Length (m)	Surface Area (m^2)	Volume (m^3)	Fill Sources & Spoil Dispositions	Fill Volumes (m3)			Cost	Cost Reference
					Tails	Dump Spoil	Imported		
TAILINGS DUMP									
Overall Tailings Volume	-	**448,000**	**7,688,000**						
WC2_A Excavtion Vol	-		2,225,000					$ -	CC2 for tails, WC3 for spoil
Excavated tailings to local fill	-		1,570,000	Placed & compacted locally	1,570,000			$ 14,123,689	Included above
Excavated tailings to PPSS	-		655,000	Spoil to PCSS				$ 5,892,367	Option W3B Earth Moving
Compacted Granular Fill (Berm)	-			Imported, select material			3,310	$ 169,948	CCRP Cost Estimate Table W-19 - Engineered Sands, Gravels, and Riprap Estimate
1 m Capping over all tailings	-	358,000	358,000	From Clinton Waste Dump spoil		358,000		$ 1,589,495	Option W3B Earth Moving
				SubTotal	**1,570,000**	**358,000**	**3,310**	**$ 21,775,499**	
BUTTRESS FILL DAM									
Excavated Tailings and Ice Rich Colluvium Volume				Spoil to PCSS					Option W3B Earth Moving
Select Rockfill Shell and Backfill Volume				Imported, select material				$ -	CCRP Cost Estimate Table W-19 - Engineered Sands, Gravels, and Riprap Estimate
Chimney and Basal Drain Volume				Imported, select material				$ -	CCRP Cost Estimate Table W-19 - Engineered Sands, Gravels, and Riprap Estimate
8 inch Perforated pipes			-						Alberta Transportation Unit Price Average 2019. Item D615 * 1.2
8 inch Solid pipe length		-	-						
				SubTotal	**0**	**0**	**0**	**$ -**	
							Total	**$ 21,775,499**	

CCRP Cost Estimate Table W-29: Earth Moving Estimate - Option WC3

		Load and Haul	Load	Haul
Load and Haul Cost	$	67,163,988	$ 8,203,484	$ 58,960,503
Rate/tonne	$	4.50	$ 0.55	$ 3.95
Rate/m^3	$	9.00	$ 1.10	$ 7.90

Note: Reductions in base materials management productivities that are related to asbestos abatement have been applied to this estimate (equipment utilization reduced by 20% to calculate net operating hours).

Production Target	Tonnes/year =	5,306,111	
Caterpillar 385C	Loaders Required =	2.00	2.00
Caterpillar 745C	Trucks Required =	15.64	16.00
	Duration of Remediation =	2.81	years

Waste Material Volume (In Bank) m^3	In-Situ Bulk Density t/m^3	Waste Material Tonnage t
7,466,000	2.00	14,932,000

LOADER HOURS

Calendar Time			
	Days	365	
	Shifts per day	2	
	Shift Length	12	
Calendar Time (h/year)		**8,760**	
Available Time	= Calendar Time - Down Time		
	Availability	85.0%	
	Down Time (h/year)	1,314	
Available Time (h/year)		**7,446**	
Gross Operating Time	= Available Time - Operating Standby		
Operating Standby			
	Internal (h/shift)		min/day
	Lunch & Breaks	1.00	120
	Meeting	0.04	5
	Shift Change	0.17	20
No Blast =>	Blast Delay		-
	Fueling	0.25	30
	Operator Inspection		-
	External (h/year)		
	Industrial		-
	Weather	120	20
	No Power		-
Operating Standby (h/year)		1,007	195
Gross Operating Hours (h/year)		**6,439**	
Net Operating Time	Gross Operating Time - Operating Delay		
	Utilization	63%	
	Operating Delay (h/year)	2363	388.46
Net Operating Hours (h/year)		**4,076**	
Adjustment Factors			min/cycle
	Truck availability to shovel	75%	0.68
	Shovel Wait for Truck	1019	
Adjusted Net Operating Hours (h/year)		**3,057**	

Loading Productivities and Truck Match		Metric
Loader		Caterpillar 385C
Truck		Caterpillar 745C
Bucket Capacity	m^3	4.6
Bucket Capacity	tonne	8.3
Truck Capacity	m^3	73.8
Truck Capacity	tonne	41.0
Insitu Bulk Density	t/m^3	2.00
Bulk Factor		1.30
Loose Density	t/m^3	1.54
Moisture	%	5.0%
Fill Factor		0.84
Effective Bucket Capacity	m^3	3.85
Wet/Loose Density	t/m^3	1.62
Tonnes/Pass	tonne	6.2
Theoretical Passes (Volume)		19.14
Theoretical Passes (Weight)		6.57
Actual Passes		5
Truck Load	m^3	19.3
Truck Load	tonne	31.2
Truck Fill % (Volume)		26%
Truck Fill % (Weight)		76%
Loader Cycle Time	seconds	22
Loader Spot Time	seconds	35
Load Time per Truck	seconds	123
Maximum Truck Loads per hour		29.27
Maximum Productivity	(wet t/adj. NOH)	914
Maximum Productivity	(wet t/NOH)	685
Maximum Productivity	(wet t/GOH)	434
Maximum Productivity	**(dry t/GOH)**	**412**
Maximum Productivity	(wt/yr)	2,792,690
Maximum Productivity	(wt/day)	7,651
Maximum Productivity	**(dt/year)**	**2,653,055**
Maximum Productivity	**(dt/day)**	**7,269**

TRUCK HOURS

Calendar Time		
	Days	365
	Shifts per day	2
	Shift Length	12
Calendar Time (h/year)		8,760
Available Time		
	Availability	85%
	Down Time (h/year)	1,314

Truck Capacity	tonne	31.2
Travel Distance one way	km	2.65
Loaded	km/h	12.00
Empty Return	km/h	40.00
Truck haul cycle time	min	17.23

Available Time (h/year)		**7,446**	
Gross Operating Time			
Operating Standby			
	Internal (h/shift)		
	Lunch & Breaks	1.00	120
	Meeting	0.04	5
	Shift Change	0.17	20
No Blast =>	Blast Delay		-
	Fueling	0.25	30
	Operator Inspection		-
	External (h/year)		
	Industrial		-
	Weather	120	20
	No Power		-
Operating Standby (h/year)		1,007	
Gross Operating Hours (h/year)		**6,439**	86%
Net Operating Time			
	Utilization	63%	
	Operating Delay (h/year)	2382	
Net Operating Hours (h/year)		**4,057**	

Load Time	minutes	2.05
Queue Time	minutes	1.00
Dump Time	minutes	1.00
Total Cycle Time	minutes	21.28
Maximum Truck Loads per hour		2.82
Maximum Productivity	(wet t/NOH)	88
Maximum Productivity	(wet t/GOH)	55
Maximum Productivity	**(dry t/GOH)**	**53**
Maximum Productivity	(wt/year)	357,094
Maximum Productivity	(wt/day)	978
Maximum Productivity	**(dt/year)**	**339,239**
Maximum Productivity	**(dt/day)**	**929**

CCRP Cost Estimate Table W-30: Haul Road Construction Estimate - Option WC3

		Load and Haul		Load		Haul
Load and Haul Cost	$	4,598,312	$	837,270	$	3,761,042
Rate/tonne	$	3.02	$	0.55	$	2.47
Rate/m^3	$	6.03	$	1.10	$	4.94

Note: Reductions in base materials management productivities that are related to asbestos abatement have been applied to this estimate (equipment utilization reduced by 20% to calculate net operating hours).

Production Target	Tonnes/year =	5,306,111	
Caterpillar 385C	Loaders Required =	2.00	2.00
Caterpillar 745C	Trucks Required =	9.67	10.00
	Duration of Remediation =	0.29	years

Waste Material Volume (In Bank) m^3	In-Situ Bulk Density t/m^3	Waste Material Tonnage t
762,000	2.00	1,524,000

LOADER HOURS

Calendar Time				
	Days	365		
	Shifts per day	2		
	Shift Length	12		
Calendar Time (h/year)		**8,760**		
Available Time	= Calendar Time - Down Time			
	Availability	85.0%		
	Down Time (h/year)	1,314		
Available Time (h/year)		**7,446**		
Gross Operating Time	= Available Time - Operating Standby			
Operating Standby				
	Internal (h/shift)		min/day	
	Lunch & Breaks	1.00	120	
	Meeting	0.04	5	
	Shift Change	0.17	20	
No Blast =>	Blast Delay		-	
	Fueling	0.25	30	
	Operator Inspection		-	
	External (h/year)			
	Industrial		-	
	Weather	120	20	
	No Power		-	
Operating Standby (h/year)		1,007	195	
Gross Operating Hours (h/year)		**6,439**		
Net Operating Time	Gross Operating Time - Operating Delay			
	Utilization	63%		
	Operating Delay (h/year)	2363	388.46	
Net Operating Hours (h/year)		**4,076**		
Adjustment Factors			min/cycle	
	Truck availability to shovel	75%	0.68	
	Shovel Wait for Truck	1019		
Adjusted Net Operating Hours (h/year)		**3,057**		

Loading Productivities and Truck Match		Metric
Loader		Caterpillar 385C
Truck		Caterpillar 745C
Bucket Capacity	m^3	4.6
Bucket Capacity	tonne	8.3
Truck Capacity	m^3	73.8
Truck Capacity	tonne	41.0
Insitu Bulk Density	t/m^3	2.00
Bulk Factor		1.30
Loose Density	t/m^3	1.54
Moisture	%	5.0%
Fill Factor		0.84
Effective Bucket Capacity	m^3	3.85
Wet/Loose Density	t/m^3	1.62
Tonnes/Pass	tonne	6.2
Theoretical Passes (Volume)		19.14
Theoretical Passes (Weight)		6.57
Actual Passes		5
Truck Load	m^3	19.3
Truck Load	tonne	31.2
Truck Fill % (Volume)		26%
Truck Fill % (Weight)		76%
Loader Cycle Time	seconds	22
Loader Spot Time	seconds	35
Load Time per Truck	seconds	123
Maximum Truck Loads per hour		29.27
Maximum Productivity	(wet t/adj. NOH)	914
Maximum Productivity	(wet t/NOH)	685
Maximum Productivity	(wet t/GOH)	434
Maximum Productivity	**(dry t/GOH)**	**412**
Maximum Productivity	(wt/yr)	2,792,690
Maximum Productivity	(wt/day)	7,651
Maximum Productivity	**(dt/year)**	**2,653,055**
Maximum Productivity	**(dt/day)**	**7,269**

TRUCK HOURS

Calendar Time		
	Days	365
	Shifts per day	2
	Shift Length	12
Calendar Time (h/year)		8,760
Available Time		
	Availability	85%
	Down Time (h/year)	1,314

Truck Capacity	tonne	31.2
Travel Distance one way	km	1.40
Loaded	km/h	12.00
Empty Return	km/h	40.00
Truck haul cycle time	min	9.10

Available Time (h/year)		**7,446**	
Gross Operating Time			
Operating Standby			
	Internal (h/shift)		
	Lunch & Breaks	1.00	120
	Meeting	0.04	5
	Shift Change	0.17	20
No Blast =>	Blast Delay		-
	Fueling	0.25	30
	Operator Inspection		-
	External (h/year)		
	Industrial		-
	Weather	120	20
	No Power		-
Operating Standby (h/year)		1,007	
Gross Operating Hours (h/year)		**6,439**	86%
Net Operating Time			
	Utilization	63%	
	Operating Delay (h/year)	2382	
Net Operating Hours (h/year)		**4,057**	

Load Time	minutes	2.05
Queue Time	minutes	1.00
Dump Time	minutes	1.00
Total Cycle Time	minutes	13.15
Maximum Truck Loads per hour		4.56
Maximum Productivity	(wet t/NOH)	142
Maximum Productivity	(wet t/GOH)	90
Maximum Productivity	**(dry t/GOH)**	**85**
Maximum Productivity	(wt/year)	577,732
Maximum Productivity	(wt/day)	1,583
Maximum Productivity	**(dt/year)**	**548,845**
Maximum Productivity	**(dt/day)**	**1,504**

Load and Haul Cost	$	5,268,760
Rate/tonne	$	15.97
Rate/m^3	$	26.34

Production Target	Tonnes/year =	246,841	
Caterpillar 330F	Loaders Required =	1.00	1.00
International - tandem 9900 - 14 YD - - Dump Box	Trucks Required =	7.99	8.00
	Duration of Remediation =	1.34	years

Gravel Volume	In-Situ Bulk Density	Gravel Tonnage
m^3	t/m^3	t
200,000	1.65	330,000

LOADER HOURS

Calendar Time			
	Days	365	
	Shifts per day	1	
	Shift Length	12	
Calendar Time (h/year)		4,380	
Available Time	= Calendar Time - Down Time		
	Availability	85.0%	
	Down Time (h/year)	657	
Available Time (h/year)		3,723	
Gross Operating Time	= Available Time - Operating Standby		
Operating Standby			
	Internal (h/shift)		min/day
	Lunch & Breaks	1.00	60
	Meeting	0.04	3
	Shift Change	0.17	10
No Blast =>	Blast Delay		-
	Fueling	0.25	15
	Operator Inspection		-
	External (h/year)		
	Industrial		-
	Weather	120	20
	No Power		-
Operating Standby (h/year)		554	107
Gross Operating Hours (h/year)		**3,169**	
Net Operating Time	Gross Operating Time - Operating Delay		
	Utilization	65%	
	Operating Delay (h/year)	1109	182.30
Net Operating Hours (h/year)		**2,060**	
Adjustment Factors		min/cycle	
	Truck availability to shovel	50%	2.05
	Shovel Wait for Truck	1030	
Adjusted Net Operating Hours (h/year)		**1,030**	

Loading Productivities and Truck Match		Metric
Loader		Caterpillar 330F
Truck		International - tandem 9900 - 14 YD - - Dump Box
Bucket Capacity	m^3	1.5
Bucket Capacity	tonne	2.8
Truck Capacity	m^3	14.0
Truck Capacity	tonne	23.1
Insitu Bulk Density	t/m^3	1.65
Bulk Factor		1.30
Loose Density	t/m^3	1.27
Moisture	%	5.0%
Fill Factor		0.84
Effective Bucket Capacity	m^3	1.29
Wet/Loose Density	t/m^3	1.34
Tonnes/Pass	tonne	1.7
Theoretical Passes (Volume)		10.85
Theoretical Passes (Weight)		13.40
Actual Passes		5
Truck Load	m^3	6.5
Truck Load	tonne	8.6
Truck Fill % (Volume)		46%
Truck Fill % (Weight)		37%
Loader Cycle Time	seconds	22
Loader Spot Time	seconds	35
Load Time per Truck	seconds	123
Maximum Truck Loads per hour		29.27
Maximum Productivity	(wet t/adj. NOH)	252
Maximum Productivity	(wet t/NOH)	126
Maximum Productivity	(wet t/GOH)	82
Maximum Productivity	**(dry t/GOH)**	**78**
Maximum Productivity	(wt/yr)	259,832
Maximum Productivity	(wt/day)	712
Maximum Productivity	**(dt/year)**	**246,841**
Maximum Productivity	**(dt/day)**	**676**

TRUCK HOURS

Calendar Time		
	Days	365
	Shifts per day	1
	Shift Length	12
Calendar Time (h/year)		4,380
Available Time		
	Availability	85%

Truck Capacity	tonne	8.6
Travel Distance one way	km	14.00
Loaded	km/h	40.00
Empty Return	km/h	50.00
Truck haul cycle time	min	37.80

	Down Time (h/year)	657	
Available Time (h/year)		**3,723**	
Gross Operating Time			
Operating Standby			
	Internal (h/shift)		
	Lunch & Breaks	1.00	60
	Meeting	0.04	3
	Shift Change	0.17	10
No Blast =>	Blast Delay		-
	Fueling	0.25	15
	Operator Inspection		-
	External (h/year)		
	Industrial		-
	Weather	120	20
	No Power		-
Operating Standby (h/year)		554	
Gross Operating Hours (h/year)		**3,169**	85%
Net Operating Time			
	Utilization	83%	
	Operating Delay (h/year)	539	
Net Operating Hours (h/year)		**2,630**	

Load Time	minutes	2.05
Queue Time	minutes	1.00
Dump Time	minutes	1.00
Total Cycle Time	minutes	41.85
Maximum Truck Loads per hour		1.43
Maximum Productivity	(wet t/NOH)	12
Maximum Productivity	(wet t/GOH)	10
Maximum Productivity	**(dry t/GOH)**	**10**
Maximum Productivity	(wt/year)	32,505
Maximum Productivity	(wt/day)	89
Maximum Productivity	**(dt/year)**	**30,879**
Maximum Productivity	**(dt/day)**	**85**

CCRP Cost Estimate Table W-32: Riprap Load and Haul from Km 63 Quarry Estimate

Load and Haul Cost	$	15,517,381
Rate/tonne	$	38.79
Rate/m^3	$	77.59

Production Target	Tonnes/year =	1,066,488	
Caterpillar 385C	Loaders Required =	2.00	2
Caterpillar 745C	Trucks Required =	46.93	47
	Duration of Remediation =	0.38	years

RipRap Volume m^3	In-Situ Bulk Density t/m^3	RipRap Tonnage t
200,000	2.00	400,000

LOADER HOURS

Calendar Time			
	Days	365	
	Shifts per day	1	
	Shift Length	12	
Calendar Time (h/year)		**4,380**	
Available Time	= Calendar Time - Down Time		
	Availability	85.0%	
	Down Time (h/year)	657	
Available Time (h/year)		**3,723**	
Gross Operating Time	= Available Time - Operating Standby		
Operating Standby			
	Internal (h/shift)		min/day
	Lunch & Breaks	1.00	60
	Meeting	0.04	3
	Shift Change	0.17	10
No Blast =>	Blast Delay		-
	Fueling	0.25	15
	Operator Inspection		-
	External (h/year)		
	Industrial		-
	Weather	120	20
	No Power		-
Operating Standby (h/year)		554	107
Gross Operating Hours (h/year)		**3,169**	
Net Operating Time	Gross Operating Time - Operating Delay		
	Utilization	65%	
	Operating Delay (h/year)	1109	182.30
Net Operating Hours (h/year)		**2,060**	
Adjustment Factors			min/cycle
	Truck availability to shovel	50%	2.05
	Shovel Wait for Truck	1030	
Adjusted Net Operating Hours (h/year)		**1,030**	

Loading Productivities and Truck Match		Metric
Loader		Caterpillar 385C
Truck		Caterpillar 745C
Bucket Capacity	m^3	4.6
Bucket Capacity	tonne	8.3
Truck Capacity	m^3	73.8
Truck Capacity	tonne	41.0
Insitu Bulk Density	t/m^3	2.00
Bulk Factor		1.30
Loose Density	t/m^3	1.54
Moisture	%	5.0%
Fill Factor		0.50
Effective Bucket Capacity	m^3	2.30
Wet/Loose Density	t/m^3	1.62
Tonnes/Pass	tonne	3.7
Theoretical Passes (Volume)		32.09
Theoretical Passes (Weight)		11.01
Actual Passes		5
Truck Load	m^3	11.5
Truck Load	tonne	18.6
Truck Fill % (Volume)		16%
Truck Fill % (Weight)		45%
Loader Cycle Time	seconds	22
Loader Spot Time	seconds	35
Load Time per Truck	seconds	123
Maximum Truck Loads per hour		29.27
Maximum Productivity	(wet t/adj. NOH)	545
Maximum Productivity	(wet t/NOH)	273
Maximum Productivity	(wet t/GOH)	177
Maximum Productivity	**(dry t/GOH)**	**168**
Maximum Productivity	(wt/yr)	561,310
Maximum Productivity	(wt/day)	1,538
Maximum Productivity	**(dt/year)**	**533,244**
Maximum Productivity	**(dt/day)**	**1,461**

TRUCK HOURS

Calendar Time		
	Days	365
	Shifts per day	1
	Shift Length	12
Calendar Time (h/year)		4,380
Available Time		
	Availability	85%
	Down Time (h/year)	657
Available Time (h/year)		**3,723**

Truck Capacity	tonne	18.6
Travel Distance one way	km	44.00
Loaded	km/h	40.00
Empty Return	km/h	50.00
Truck haul cycle time	min	118.80
Load Time	minutes	2.05

				Queue Time	minutes	1.00
Gross Operating Time				Dump Time	minutes	1.00
Operating Standby				Total Cycle Time	minutes	122.85
	Internal (h/shift)					
	Lunch & Breaks	1.00	60	Maximum Truck Loads per hour		0.49
	Meeting	0.04	3	Maximum Productivity	(wet t/NOH)	9
	Shift Change	0.17	10	Maximum Productivity	(wet t/GOH)	8
No Blast =>	Blast Delay		-	**Maximum Productivity**	**(dry t/GOH)**	**7**
	Fueling	0.25	15			
	Operator Inspection		-	Maximum Productivity	(wt/year)	23,921
	External (h/year)			Maximum Productivity	(wt/day)	66
	Industrial		-			
	Weather	120	20	**Maximum Productivity**	**(dt/year)**	**22,725**
	No Power		-	**Maximum Productivity**	**(dt/day)**	**62**
Operating Standby (h/year)		554				
Gross Operating Hours (h/year)		**3,169**	85%			
Net Operating Time						
	Utilization	83%				
	Operating Delay (h/year)	539				
Net Operating Hours (h/year)		**2,630**				

CCRP Cost Estimate Table W-33: Haul Road Construction - Options CC1, CC2, and CC3

Option CC1 Earth Moving Rate/m^3	$	4.56

Option	Total Volume (m^3)	Percent	Allowance Volume (m^3)	Cost Estimate	Comment
CC1	4,373,000	5%	218,650	$ 996,180	Judgement based provision for miscellaneous, local works to facilitate movements on the dump during excavations.
CC1-A	870,000	5%	43,500	$ 198,188	
CC1-B	962,000	5%	48,100	$ 219,146	
CC2	7,097,000	5%	354,850	$ 1,616,714	Judgement based provision for miscellaneous, local works to facilitate movements on the dump during excavations.
CC2-A	2,366,000	5%	118,300	$ 538,981	
CC2-B	4,555,000	5%	227,750	$ 1,037,640	
CC3	13,966,000	5%	698,300	$ 3,181,489	Judgement based provision for miscellaneous, local works to facilitate movements on the dump during excavations.

CCRP Cost Estimate Table W-34: Dozing Equipment Estimate

2019 Option	Creek	Estimated Waste Material Removal Volume (m3)	Shovel Support	Placement Support	Compaction Support	Shovel Support Volume (m3)	Placing Volume (m3)	Selected Dozer	Dozer Count	Total Hours	Compactor Rate/hr	Dozer Rate/hr	Total Cost
CC1	Clinton	4,373,000	1	1	1	4,373,000	4,373,000	Caterpillar - D8K Angle Blade, Tilt Blade, Ripper	2	10,599	$ 170	$ 320	$ 8,585,013
CC1-A	Clinton	870,000	1	1	2	870,000	870,000	Caterpillar - D8K Angle Blade, Tilt Blade, Ripper	3	4,217	$ 170	$ 320	$ 5,482,379
CC1-B	Clinton	962,000	1	1	2	962,000	962,000	Caterpillar - D8K Angle Blade, Tilt Blade, Ripper	3	4,663	$ 170	$ 320	$ 6,062,125
CC2	Clinton	7,097,000	1	1	1	7,097,000	7,097,000	Caterpillar - D8K Angle Blade, Tilt Blade, Ripper	2	17,201	$ 170	$ 320	$ 13,932,732
CC2-A	Clinton	2,366,000	1	1	1	2,366,000	2,366,000	Caterpillar - D8K Angle Blade, Tilt Blade, Ripper	2	5,734	$ 170	$ 320	$ 4,644,898
CC2-B	Clinton	4,555,000	1	1	1	4,555,000	4,555,000	Caterpillar - D8K Angle Blade, Tilt Blade, Ripper	2	11,040	$ 170	$ 320	$ 8,942,313
CC3	Clinton	13,966,000	1	1	1	13,966,000	13,966,000	Caterpillar - D8K Angle Blade, Tilt Blade, Ripper	2	33,849	$ 170	$ 320	$ 27,417,857
WC1	Wolverine	NA		1				Caterpillar - D8K Angle Blade, Tilt Blade, Ripper	1	2,190		$ 350	$ 766,500
WC2	Wolverine	4,312,000	1	2	1	2,660,000	8,624,000	Caterpillar - D10	3	10,477	$ 170	$ 470	$ 16,553,575
WC2-A	Wolverine	2,225,000	1	1	2	2,225,000	2,225,000	Caterpillar - D10	2	6,064	$ 170	$ 470	$ 7,762,316
WC3	Wolverine	7,688,000	1	2	1	7,688,000	7,688,000	Caterpillar - D10	3	20,954	$ 170	$ 470	$ 33,107,150

CCRP Cost Estimate Table W-35: Grading and Road Maintenance Equipment

Option	Creek	Estimated Waste Material Removal Volume (m3)	Selected Grader	Grader Count	Total Hours	Rate/hr	Total Cost
CC1	Clinton	4,373,000	Cat 12H	2	10599	$ 192	$ 4,069,932
CC1-A	Clinton	870,000	Cat 12H	2	4217	$ 192	$ 1,619,410
CC1-B	Clinton	962,000	Cat 12H	2	4663	$ 192	$ 1,790,658
CC2	Clinton	7,097,000	Cat 12H	2	17201	$ 192	$ 6,605,147
CC2-A	Clinton	2,366,000	Cat 12H	2	5734	$ 192	$ 2,202,026
CC2-B	Clinton	4,555,000	Cat 12H	2	11040	$ 192	$ 4,239,319
CC3	Clinton	13,966,000	Cat 12H	2	33849	$ 192	$ 12,998,095
WC1	Wolverine	NA	Cat 12H	1	2190	$ 192	$ 420,480
WC2	Wolverine	4,312,000	Cat 12H	2	20954	$ 192	$ 8,046,295
WC2-A	Wolverine	2,225,000	Cat 12H	2	20954	$ 192	$ 8,046,295
WC3	Wolverine	7,688,000	Cat 12H	2	20954	$ 192	$ 8,046,295

CCRP Cost Estimate Table W-36: Engineered Sands, Gravels, and Riprap Estimate

Engineered sands and gravels will be sourced from Site 11, located 14 km from the mine site entrance on the Clinton Creek road.

RipRap will be sourced from a site located at Mile 63 on the Top-of-the-World highway. The site is located 44 km from the Clinton Creek mine.

Quarry	Material	Quantity	Unit	Price	Reference	Price/m3
Cost to Produce Aggregate						
Site 11	Sand and Gravel	1	t	$ 15.15	Da Daghay Development Corporation. April 28, 2016 Business Plan for the Development of the C-30B Whitehorse Gravel Resource.	
			m3	$ 25.00		$ 25.00
Cost to Transport Aggregate						
Site 11	Load and haul 1 m3 gravel from quarry to site.	14	km	$ 26.34	CCRP Cost Estimate Table W-31: Aggregate Load and Haul from Site 11 Estimate	$ 26.34
					Cost to Produce and Transport Gravel from Site 11 to the Clinton Creek Site ($/m3)	**$ 51**
Cost to Produce Riprap						
Mile 63	Riprap	1	t	$ 25	Judgement based provision.	
			m3	$ 50	Assumed 2 t/m3	$ 50
Cost to Transport Riprap						
Mile 63	Load and haul 1 m3 riprap from quarry to site.	44	km	$ 77.59	CCRP Cost Estimate Table W-32: Riprap Load and Haul from Km 63 Quarry Estimate	$ 77.59
					Cost to Produce and Transport Riprap from Mile 63 to the Clinton Creek Site ($/m3)	**$ 128**
Cost to Place Riprap						
Mile 63	Riprap	1	t	$ 25	Judgement based provision.	**$ 25**
			m3	$ 50	Assumed 2 t/m3	**$ 50**
					Cost to Produce, Transport and Place Riprap from Mile 63 to the Clinton Creek Site ($/m3)	**$ 229**

CCRP Cost Estimate Table W-37: Flow Conveyance and Erosion Control Cost Estimates

Option	Material	Quantity	Unit	Unit Price	Reference		Unit Price Geographic Correction Factor	Total Cost
CC1	Riprap d50=500mm	19,000	m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ 4,349,683
CC1	Riprap d50=300mm	33,000	m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ 7,554,713
CC1	Supply Coletanche Elastomeric Bitumen Liner ES3	14,374	m2	$ 23	Layfield Group - Juy 15, 2019.		1	$ 335,393
CC1	Supply Non-Woven Geotextile	64,416	m2	$ 2.00	Layfield Group - Juy 15, 2019.		1	$ 128,832
CC1	Install Coletanche Elastomeric Bitumen Liner ES3	14,374	m2	$ 6.00	Layfield Group - Juy 15, 2019.		1	$ 86,244
CC1	Install Non-Woven Geotextile	64,416	m2	$ 1.50	Layfield Group - Juy 15, 2019.		1	$ 96,624
CC1	Spillway Cut	-	m3	$ 4.56	CCRP Cost Estimate Table W-25: Earth Moving Estima	G225	1.2	$ -
CC1	Spillway Fill	-	m3	$ 4.56	CCRP Cost Estimate Table W-25: Earth Moving Estima	G225	1.2	$ -
CC1	Steel Sheet Pile Wall	17,280	m2	$ 706	http://www.isheetpile.com/articles/cost?units=m		1.2	$ 14,636,065
CC1	Ground Thawing							
CC1	Mob/Demob of Specialized Ground Densification Rig/Equipment	1		$ 200,000			1	$ 200,000
CC1	Densification operations	230000	m3	$ 10			1	$ 2,300,000
CC1	Select Granular Supply for Densifications	115000	m3	$ 51	CCRP Cost Estimate Table W-36: Engineered Sands, Gravels, and Riprap Estimate		1	$ 5,904,537
CC1	Turf reinforced mat (assumed LP-P20 Polypropylene).	-	m2				1	$ -
CC1-A	Riprap d50=500mm	2,120	m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ 485,333
CC1-A	Riprap d50=300mm	21,500	m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ 4,922,010
CC1-A	Supply Coletanche Elastomeric Bitumen Liner ES3		m2	$ 23	Layfield Group - Juy 15, 2019.		1	$ -
CC1-A	Supply Non-Woven Geotextile	55,000	m2	$ 2.00	Layfield Group - Juy 15, 2019.		1	$ 110,000
CC1-A	Install Coletanche Elastomeric Bitumen Liner ES3		m2	$ 6.00	Layfield Group - Juy 15, 2019.		1	$ -
CC1-A	Install Non-Woven Geotextile		m2	$ 1.50	Layfield Group - Juy 15, 2019.		1	$ -
CC1-A	Spillway Cut		m3	$ 4.06	CCRP Cost Estimate Table W-25: Earth Moving Estima	G225	1.2	$ -
CC1-A	Spillway Fill		m3	$ 4.06	CCRP Cost Estimate Table W-25: Earth Moving Estima	G225	1.2	$ -
CC1-A	Steel Sheet Pile Wall	8,640	m2	$ 706	http://www.isheetpile.com/articles/cost?units=m		1.2	$ 7,318,032
CC1-A	Ground Thawing							
CC1-A	Mob/Demob of Specialized Ground Densification Rig/Equipment			$ 200,000			1	$ -
CC1-A	Densification operations		m3	$ 10			1	$ -
CC1-A	Select Granular Supply for Densifications		m3	$ 51	CCRP Cost Estimate Table W-36: Engineered Sands, Gravels, and Riprap Estimate		1	$ -
CC1-A	Turf reinforced mat (assumed LP-P20 Polypropylene).	-	m2				1	$ -
CC1-B	Riprap d50=500mm	2,120	m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ 485,333
CC1-B	Riprap d50=300mm	21,500	m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ 4,922,010
CC1-B	Supply Coletanche Elastomeric Bitumen Liner ES3		m2	$ 23	Layfield Group - Juy 15, 2019.		1	$ -
CC1-B	Supply Non-Woven Geotextile	55,000	m2	$ 2.00	Layfield Group - Juy 15, 2019.		1	$ 110,000
CC1-B	Install Coletanche Elastomeric Bitumen Liner ES3		m2	$ 6.00	Layfield Group - Juy 15, 2019.		1	$ -
CC1-B	Install Non-Woven Geotextile		m2	$ 1.50	Layfield Group - Juy 15, 2019.		1	$ -
CC1-B	Spillway Cut	-	m3	$ 4.06	CCRP Cost Estimate Table W-25: Earth Moving Estima	G225	1.2	$ -
CC1-B	Spillway Fill	-	m3	$ 4.06	CCRP Cost Estimate Table W-25: Earth Moving Estima	G225	1.2	$ -
CC1-B	Steel Sheet Pile Wall	8,640	m2	$ 706	http://www.isheetpile.com/articles/cost?units=m		1.2	$ 7,318,032
CC1-B	Ground Thawing							
CC1-B	Mob/Demob of Specialized Ground Densification Rig/Equipment			$ 200,000			1	$ -
CC1-B	Densification operations		m3	$ 10			1	$ -
CC1-B	Select Granular Supply for Densifications		m3	$ 51	CCRP Cost Estimate Table W-36: Engineered Sands, Gravels, and Riprap Estimate		1	$ -
CC1-B	Turf reinforced mat (assumed LP-P20 Polypropylene).	-	m2				1	$ -
CC2	Riprap d50=500mm	37,020	m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ 8,475,015
CC2	Riprap d50=300mm	10,200	m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ 2,335,093
CC2	Riprap d50=175mm	4,670	m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ 1,069,106
CC2	Supply Coletanche Elastomeric Bitumen Liner ES3		m2	$ 23	Layfield Group - Juy 15, 2019.		1	$ -
CC2	Supply Non-Woven Geotextile		m2	$ 2.00	Layfield Group - Juy 15, 2019.		1	$ -
CC2	Install Coletanche Elastomeric Bitumen Liner ES3		m2	$ 6.00	Layfield Group - Juy 15, 2019.		1	$ -
CC2	Install Non-Woven Geotextile		m2	$ 1.50	Layfield Group - Juy 15, 2019.		1	$ -
CC2	Spillway Cut		m3	$ 4.56	CCRP Cost Estimate Table W-26: Earth Moving Estima	G225	1.2	$ -
CC2	Spillway Fill		m3	$ 4.56	CCRP Cost Estimate Table W-26: Earth Moving Estima	G225	1.2	$ -
CC2	Steel Sheet Pile Wall	-	m2	$ 706	http://www.isheetpile.com/articles/cost?units=m		1.2	$ -
CC2	Ground Thawing							
CC2	Turf reinforced mat (assumed LP-P20 Polypropylene). Excluding delivery and installation	26,000	m2	$ 20	Layfield Group Aug 22, 2019 email - $9/m2 excluding delivery and installation.		1	$ 520,000
CC2-A	Riprap d50=500mm	37,020	m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ 8,475,015
CC2-A	Riprap d50=300mm	10,200	m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ 2,335,093
CC2-A	Riprap d50=175mm	4,670	m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ 1,069,106
CC2-A	Supply Coletanche Elastomeric Bitumen Liner ES3		m2	$ 23	Layfield Group - Juy 15, 2019.		1	$ -
CC2-A	Supply Non-Woven Geotextile		m2	$ 2.00	Layfield Group - Juy 15, 2019.		1	$ -
CC2-A	Install Coletanche Elastomeric Bitumen Liner ES3		m2	$ 6.00	Layfield Group - Juy 15, 2019.		1	$ -
CC2-A	Install Non-Woven Geotextile		m2	$ 1.50	Layfield Group - Juy 15, 2019.		1	$ -
CC2-A	Spillway Cut		m3	$ 4.56	0	G225	1.2	$ -
CC2-A	Spillway Fill		m3	$ 4.56	0	G225	1.2	$ -
CC2-A	Steel Sheet Pile Wall	-	m2	$ 706	http://www.isheetpile.com/articles/cost?units=m		1.2	$ -
CC2-A	Ground Thawing							

wood.

CCRP Cost Estimate Table W-37: Flow Conveyance and Erosion Control Cost Estimates

Option	Material	Quantity	Unit	Unit Price	Reference		Unit Price Geographic Correction Factor	Total Cost
CC2-A	Turf reinforced mat (assumed LP-P20 Polypropylene). Excluding delivery and installation	26,000	m2	$ 20	Layfield Group Aug 22, 2019 email - $9/m2 excluding delivery and installation.		1	$ 520,000
CC2-B	Riprap d50=500mm	37,020	m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ 8,475,015
CC2-B	Riprap d50=300mm	10,200	m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ 2,335,093
CC2-B	Riprap d50=175mm	4,670	m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ 1,069,106
CC2-B	Supply Coletanche Elastomeric Bitumen Liner ES3		m2	$ 23	Layfield Group - Juy 15, 2019.		1	$ -
CC2-B	Supply Non-Woven Geotextile		m2	$ 2.00	Layfield Group - Juy 15, 2019.		1	$ -
CC2-B	Install Coletanche Elastomeric Bitumen Liner ES3		m2	$ 6.00	Layfield Group - Juy 15, 2019.		1	$ -
CC2-B	Install Non-Woven Geotextile		m2	$ 1.50	Layfield Group - Juy 15, 2019.		1	$ -
CC2-B	Spillway Cut		m3	$ 4.56	0	G225	1.2	$ -
CC2-B	Spillway Fill		m3	$ 4.56	0	G225	1.2	$ -
CC2-B	Steel Sheet Pile Wall	-	m2	$ 706	http://www.isheetpile.com/articles/cost?units=m		1.2	$ -
CC2-B	Ground Thawing							
CC2-B	Turf reinforced mat (assumed LP-P20 Polypropylene). Excluding delivery and installation	26,000	m2	$ 20	Layfield Group Aug 22, 2019 email - $9/m2 excluding delivery and installation.		1	$ 520,000
CC3	Riprap d50=500mm		m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ -
CC3	Riprap d50=300mm		m3	$ 229	Top-of-the-World Highway source at km 63.		1	$ -
CC3	Supply Coletanche Elastomeric Bitumen Liner ES3		m2	$ 23	Layfield Group - Juy 15, 2019.		1	$ -
CC3	Supply Non-Woven Geotextile		m2	$ 2.00	Layfield Group - Juy 15, 2019.		1	$ -
CC3	Install Coletanche Elastomeric Bitumen Liner ES3		m2	$ 6.00	Layfield Group - Juy 15, 2019.		1	$ -
CC3	Install Non-Woven Geotextile		m2	$ 1.50	Layfield Group - Juy 15, 2019.		1	$ -
CC3	Spillway Cut		m3	$ 4.56	CCRP Cost Estimate Table W-27: Earth Moving Estima	G225	1.2	$ -
CC3	Spillway Fill		m3	$ 4.56	CCRP Cost Estimate Table W-27: Earth Moving Estima	G225	1.2	$ -
CC3	Steel Sheet Pile Wall		m2	$ 706	http://www.isheetpile.com/articles/cost?units=m		1.2	$ -
CC3	Ground Thawing							
CC3	Turf reinforced mat (assumed LP-P20 Polypropylene). Excluding delivery and installation		m2				1	$ -
CC3			km					
WC2	Riprap d50=200mm	2085	m3	$ 229			1	$ 477,321
WC2	Riprap d50=300mm	2270	m3	$ 229			1	$ 519,673
WC2	Riprap d50=450mm	2470	m3	$ 229			1	$ 565,459
WC2	Riprap d50=800mm	11640	m3	$ 229			1	$ 2,664,753
WC2	Riprap d50=1000mm	5290	m3	$ 229			1	$ 1,211,043
WC2	Bedding Gravel	1135	m3	$ 51			1	$ 58,275
WC2	Geotextile Fabric	27600	m2				1	$ -
WC2-A	Riprap d50=200mm		m3	$ 229			1	$ -
WC2-A	Riprap d50=300mm		m3	$ 229			1	$ -
WC2-A	Riprap d50=450mm	3310	m3	$ 229			1	$ 757,761
WC2-A	Riprap d50=800mm		m3	$ 229			1	$ -
WC2-A	Riprap d50=1000mm		m3	$ 229			1	$ -
WC2-A	Bedding Gravel		m3	$ 51			1	$ -
WC2-A	Geotextile Fabric	4500	m2	$ 2			1	$ 6,750
Erosion Control								
WC3	Equipment time and the use of imported select granular material for targeted ditching and swale development on exposed valley surface following tails removal.	50	ha	$ 150,000	Wood judgement based estimate		1	$ 7,500,000

Notes:

CC1 - Geotextile Length (m) for entire system	1,160
CC1 - Number of sheet pile walls	12
CC1 - Sheet pile wall area (m2)	1,440

CLASS 1 - 200-450mm. CLASS 2 - 300-500mm. CLASS 3 - 500-800mm. CLASS 4 - 800mm +. 80mm

Approximate cost for sheet pile wall is based on 2009 RSMeans pricing for the US and extrapolated from the 2009 NASSPA Retaining Wall Comparison Technical Report,

Unit prices include labour.

Reference: Wood Drawing No. Spillway - Model2018-Jun24-2 Rev A

CCRP Cost Estimate Table W-38: Sediment Pond Cost Estimate

Item		Description	Unit	Unit Price	Unit Price Geographic Correction Factor	Reference	Quantity		Total Cost
							Quantity	Note	
1	General	Mobilization/Demobilization	ls			Captured under TF&C			$0
2		Care of Water and Erosion Sediment Control during Construction	ls			Captured under TF&C			$0
3	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	$ 0.89		Alberta Transportation 2019 Unit Price Averages	50,000	Surface area of sed pond	$44,313
4		Common Excavation	m3	$ 4.56		Table W-10: Earth Moving Estimate - Option CC1	25,000	Surface area of sed pond assumed 0.5 m deep	$113,901
5		Dike construction, backfill	m3	$ 10.00			37,000	3:1 side slopes assumed 2.5 m high average, 900m in total length	$370,000
6		200 mm PVC drainpipe (cleanouts)	m	$ 20.00	1.2		440	4 runs across sed pond @ 110m each	$10,560
7		150mm socked PVC perforated pipe	m	$ 20.00	1.2		3,150	7 runs length of sed pond (450m)	$75,600
8		Bedding gravel	m3	$ 51.34		Wood Judgement	8,200	bedding material for perforated pipes, 150mm	$421,019
9		Rip Rap Pond Dikes inside and outside Placed	m3	$ 228.93		Table W-21: Engineered Sands, Gravels, and Riprap Estimate	9,500	Class 25kg riprap 450mm thick covering outside face and crest of dike	$2,174,842
10		Supply and install precast outlet headwall	each	$ 5,000.00		Wood Judgement	2		$10,000
11		Supply and install precast inlet headwall	each	$ 5,000.00		Wood Judgement	3		$15,000
12		Supply and install precast chamber	each	$ 2,500.00		Wood Judgement	3		$7,500
13		Supply and install manholes	each	$ 2,500.00		Wood Judgement	8		$20,000
14		Non woven geotextile	m2	$ 5.00	1.2	Alberta Transportation 2019 Unit Price Averages	50,000		$300,000
15	Clinton Creek Diversion	Clinton Channel Excavation	m3	$ 12.65		Alberta Transportation 2019 Unit Price Averages	12,500	500 m linear 25m2 channel cross section for excavation	$158,125
16		Clinton Riprap for diversion channel armouring	m3	$ 228.93			2,950	Class 25kg riprap 450mm thick lining 500m diversion	$675,346
17		Clinton Geotextile	m2	$ 5.00	1.2	Alberta Transportation 2019 Unit Price Averages	7,000	500 m linear length 14 m wide	$42,000
18	Wolverine Creek Diversion	Wolverine Channel Excavation	m3	$ 12.65		Alberta Transportation 2019 Unit Price Averages	1,200	200 m linear 5.2m2 channel cross section	$15,180
19		Wolverine Riprap for diversion channel armouring	m3	$ 228.93			600	Class 25kg riprap 450mm thick lining 200m diversion length	$137,358
20		Wolverine Geotextile	m2	$ 5.00	1.2	Alberta Transportation 2019 Unit Price Averages	1,400	200 m linear length 7 m wide	$8,400
						Subtotal			**$4,599,144**

CCRP Cost Estimate Table W-39: Option CC3 Sediment Pond Cost Estimate

Item	Activity	Description	Unit	Unit Price	Unit Price Geographic Correction Factor	Reference	Quantity		Total Cost
							Quantity	Note	
1	General	Mobilization/Demobilization	ls			Captured under TF&C			$0
2		Care of Water	ls			Captured under TF&C			$0
3		Site Prep/Access Roads	ls			Captured under TF&C			$0
4	Sediment Pond Earthworks	Clearing and stripping, removing and stockpiling overburden	m2	$ 0.89	1.0	Alberta Transportation 2019 Unit Price Averages	35000	Surface area of sed pond assumed 0.5 m deep	$31,019
5		Common Excavation	m3	$ 4.56	1.0	Table W-10: Earth Moving Estimate - Option CC1	17500	Surface area of sed pond assumed 0.5 m deep	$79,731
6		Dike construction, backfill	m3	$ 10.00	1.0		27000	3:1 side slopes assumed 2.5 m high average, 900m in total	$270,000
7		200 mm PVC drainpipe (cleanouts)	m	$ 20.00	1.2		560	4 runs across sed pond @ 140m each	$13,440
8		150mm socked PVC perforated pipe	m	$ 20.00	1.2		2640	11 runs length of sed pond (240m)	$63,360
9		Bedding gravel	m3	$ 51.34	1.0		5700	bedding material for perforated pipes, 150mm cover over sed	$292,660
10		Rip Rap Pond Dikes inside and outside Placed	m3	$ 228.93	1.0	Table W-21: Engineered Sands, Gravels, and Riprap Estimate	6150	Class 25kg riprap 450mm thick covering outside face and crest	$1,407,924
11		Supply and install precast outlet headwall	each	$ 5,000.00	1.0	Wood Judgement	1		$5,000
12		Supply and install precast inlet headwall	each	$ 5,000.00	1.0	Wood Judgement	1		$5,000
13		Non woven geotextile	m2	$ 5.00	1.2	Alberta Transportation 2019 Unit Price Averages	35000		$210,000
								Total	**$2,378,134**

CCRP Cost Estimate Table W-40: Ground Thawing Cost Estimate

Option	Activity	Component	Quantity Derivation	Quantity	Unit	Unit Price	Pricing Derivation	Unit Price Geographic Correction Factor	Total Cost	
CC1	Fin Tube Installations	Heating Elements	6m x 6m grid over 60 ha	1,600	heaters	$ 540.00	Wood Estimate	1	$ 864,000	
CC1		Casing Installations	6m x 6m grid over 60 ha	1,600	test holes	$ 20,000.00	Wood Judgement	1	$ 32,000,000	
CC1		Control Panel		1	lump sum	$ 46,000.00	Wood Estimate	1	$ 46,000	**$32,910,000**
CC1	Power Supply	Generator Purchase	4 - 2MW stationary diesel generators; demand per estimate in Design Report	4	generators	$ 1,800,000.00	Caterpillar	1	$ 7,200,000	
CC1		Field Installation		1	lump sum	$ 1,000,000.00	Wood Estimate	1	$ 1,000,000	
CC1		Enclosures		1	lump sum	$ 100,000.00	Wood Estimate	1	$ 100,000	
CC1		Power Supply Testing & Commisioning		1	lump sum	$ 1,100,000.00	Wood Estimate	1	$ 1,100,000	
CC1		Power Supply Shipment		1	lump sum	$ 575,000.00	Wood Estimate	1	$ 575,000	
CC1		Spare Parts		1	lump sum	$ 270,000.00	Wood Estimate	1	$ 270,000	
CC1		Transformer		1	lump sum	$ 2,800,000.00	Wood Estimate	1	$ 2,800,000	
CC1		Electrical Distribution Hardware		1	lump sum	$ 2,200,000.00	Wood Estimate	1	$ 2,200,000	**$15,245,000**
CC1	Fuel Supply	Diesel Storage Tanks	3 - 380,000 L tanks; provides for 3.5 days running time	3	Tanks	$ 1,170,000.00		1	$ 3,510,000	
CC1		Insulation		1	Lump Sum	$ 1,000,000.00		1	$ 1,000,000	
CC1		Fuel Supply Testing & Commisioning		1	Lump Sum	$ 1,500,000.00		1	$ 1,500,000	
CC1		Shipment		1	Lump Sum	$ 400,000.00		1	$ 400,000	
CC1		Fuel Distribution Piping and Controls		1	Lump Sum	$ 900,000.00		1	$ 900,000	
CC1		Diesel	Each 2MW generator consumes 11,000 L/day on continuous operation; 6m x 6m	16,000,000	Liters	$ 1.39		1	$ 22,240,000	**$29,550,000**
CC1-A	Fin Tube Installations	Heating Elements	6m x 6m grid over 60 ha		heaters	$ 540.00	Wood Estimate	1	$ -	

wood.

CCRP Cost Estimate Table W-41: Hudgeon Lake Drawdown Cost Estimate

Option	Material	Quantity	Unit	Unit Price	Reference	Unit Price Geographic Correction Factor	Total Cost
CC1	Monthly Rent for 42" Floating Pump	1	Pump	$ 33,000	Etec Quote No. 3071 DVA. July 4, 2019. Pump purchase offer.	1	$ 221,760
CC1-A	Monthly Rent for 42" Floating Pump	1	Pump	$ 33,000	Etec Quote No. 3071 DVA. July 4, 2019. Pump purchase offer.	1	$ 221,760
CC1-B	Monthly Rent for 42" Floating Pump	1	Pump	$ 33,000	Etec Quote No. 3071 DVA. July 4, 2019. Pump purchase offer.	1	$ 221,760
CC2	Monthly Rent for 42" Floating Pump	1	Pump	$ 33,000	Etec Quote No. 3071 DVA. July 4, 2019. Pump purchase offer.	1	$ 221,760
CC2-A	Monthly Rent for 42" Floating Pump	1	Pump	$ 33,000	Etec Quote No. 3071 DVA. July 4, 2019. Pump purchase offer.	1	$ 221,760
CC2-B	Monthly Rent for 42" Floating Pump	1	Pump	$ 33,000	Etec Quote No. 3071 DVA. July 4, 2019. Pump purchase offer.	1	$ 221,760
CC3	Monthly Rent for 42" Floating Pump	1	Pump	$ 33,000	Etec Quote No. 3071 DVA. July 4, 2019. Pump purchase offer.	1	$ 221,760
CC1, CC1-A, CC1-B, CC2, CC2-A, CC2-B, CC3	DELIVERY FREIGHT COST FOR 42" FLOATING PUMP 1x40 FR AND 1X40HC	1	Each	$ 20,092	Etec Quote No. 3071 DVA. July 4, 2019.	1	$ 20,092
CC1, CC1-A, CC1-B, CC2, CC2-A, CC2-B, CC3	RETURN FREIGHT COST FOR 42" FLOATING PUMP 1x40 FR AND 1X40HC	1	Each	$ 16,553	Etec Quote No. 3071 DVA. July 4, 2019.	1	$ 16,553
CC1, CC1-A, CC1-B, CC2, CC2-A, CC2-B, CC3	PIPING AND ACCESSORIES	1	Each	$ 269,092	Etec Quote No. 3071 DVA. July 4, 2019.	1	$ 269,092
CC1, CC1-A, CC1-B, CC2, CC2-A, CC2-B, CC3	50,000 L Envirotank Mobilization and demobilization. Dall Contracting provides tank rental free of charge (July 30, 2019 email from Dall Contracting). Assumes mob/demob from Nelson, BC (1581 km from site)	3162	$Mob/Demob/km	$ 5.90	Dall Contracting Ltd. 110 Galena Rd. Whitehorse, YT Y1A 2W6 867-667-2468 July 30, 2019	1	$ 18,656
CC1	CC1 – Fuel - delivered to site	66,683	Litres	$ 1.39	Dall Contracting Ltd. July 30, 2019 email	1	$ 92,689
CC1-A	CC1-A – Fuel - delivered to site	33,342	Litres	$ 1.39	Dall Contracting Ltd. July 30, 2019 email	1	$ 46,345
CC1-B	CC1-B – Fuel - delivered to site	33,342	Litres	$ 1.39	Dall Contracting Ltd. July 30, 2019 email	1	$ 46,345
CC2	CC2 – Fuel - delivered to site	98,103	Litres	$ 1.39	Dall Contracting Ltd. July 30, 2019 email	1	$ 136,363
CC2-A	CC2-A – Fuel - delivered to site	66,683	Litres	$ 1.39	Dall Contracting Ltd. July 30, 2019 email	1	$ 92,689
CC2-B	CC2-B – Fuel - delivered to site	66,683	Litres	$ 1.39	Dall Contracting Ltd. July 30, 2019 email	1	$ 92,689
CC3	CC3 – Fuel - delivered to site	108,376	Litres	$ 1.39	Dall Contracting Ltd. July 30, 2019 email	1	$ 150,643
						CC1 Total	**$ 638,841**
						CC1-A Total	**$ 592,498**
						CC1-B Total	**$ 592,498**
						CC2 Total	**$ 682,515**
						CC2-A Total	**$ 638,841**
						CC2-B Total	**$ 638,841**
						CC3 Total	**$ 696,795**

Detail for Above Items

Hudgeon Lake Water Quantity Estimate

Option	Quantity	Unit	Precipitation Adjustment[1]	Water Quantity Reference	Total pumping hours at full capacity[2]
CC1 – Drawdown to 10 m to El: 402 m (10 m below the spillway inlet level)	6,924,533	m3	1,910,550	Wood. Hudgeon Lake Drawdown. 9 July 2019.	680
CC1-A – Drawdown to 10 m to El: 402 m (5 m below the spillway inlet level)	3,462,267	m3	1,910,550		414
CC1-B – Drawdown to 10 m to El: 402 m (5 m below the spillway inlet level)	3,462,267	m3	1,910,550		414
CC2 – Drawdown 22 m to El: 390 m (10 m below the new lake outlet level of 400 m)	11,087,462	m3	1,910,550	Wood. Hudgeon Lake Drawdown. 9 July 2019.	1,001
CC2-A – Drawdown 22 m to El: 390 m (10 m below the new lake outlet level of 400 m)	6,924,533	m3	1,910,550		680
CC2-B – Drawdown 22 m to El: 390 m (10 m below the new lake outlet level of 400 m)	6,924,533	m3	1,910,550		680
CC3 – Complete removal of the lake	12,448,665	m3	1,910,550	Wood. Hudgeon Lake Drawdown. 9 July 2019.	1,105

1 Adjusted according to the Drawdown Plan (5 m drawdown per year)

2 Includes volume of daily inflow over the duration realized if pumping at full capacity.

Pump Metrics

Source: Etec. 4 July 2019. Cot. 3071 DVA - WOOD PLC - BF 42 BBS - Canada.pdf

Available pumping hours per day	24	hours
Average flow	12990	m3/hour

Volumes of water to drawdown from the Hudgeon Lake (considering no precipitation)

Phase	Initial Depth (m)	Target Depth (m)	Target Volume Extracted (m3)	Initial Volume (m3)	Volume remaining (m3)	Minimum days required to reach target depth	Hours required based on average pump flow	Extra hours of pumping expected due to precipitation
Phase 1	34.4	29.4	3,782,330	12,478,899	8,696,569	20	291	147
Phase 2	29.4	24.4	3,142,203	8,696,569	5,554,366	20	242	147
Phase 3	24.4	19.4	2,446,268	5,554,366	3,108,098	20	188	147
Phase 4	19.4	14.4	1,716,661	3,108,098	1,391,437	10	132	74
Phase 5	14.4	9.4	983,296	1,391,437	408,141	10	76	74
Phase 6	9.4	4.4	377,907	408,141	30,234	10	29	74

Volumes of water expected during the drawdown due to precipitation

	Catchment Area (km^2)	Runoff Coefficient	Monthly Precip Assumed (mm)	Extreme storm rainfall (mm/day)	Volume expected per month	Volume expected per day	Total Volume (m3)	Extra days of pumping expected due to precipitation
Monthly (May)								
Runoff	115	0.7	15.86		1,276,730			
Direct Precipitation	0.8	1	15.86		12,688		1,289,418	6
1 in 2 years								
Runoff	115	0.7		19		1,529,500		
Direct Precipitation	0.8	1		19		15,200		
							1,544,700	7
1 in 5 years								

Rainfall Runoff	115	0.7		23.5		1,891,750		
Direct Precipitation	0.8	1		23.5		18,800		
							1,910,550	9

Pump Fuel Requirement

Fuel Economy Off-highway diesel engines. John Deere. PowerTech Plus 13.5L Engine - 100% Load. 13.5L Class @ 395 kW (530 hp).JohnDeere.com/fuelsavings

25.9	Gallon/hour
98.0	Litres/hour

Fuel Price

Dall Contracting Ltd. July 30, 2019 email	$	1.39	per Litre

Etec Quote No. 3071 DVA. July 4, 2019.

The minimum rental time will be for 6 months INCLUDES:
Certified personnel for setup, installation and training for operation.
Maintenance materials for every 250 hours of operation. NOT INCLUDED: Diesel for engine operation.
Quote in USD - converted to CAD by Wood using September 10, 2019 published rates. 1.32

ITEM	Description	Quantity	Source	
1	Floating 42'' Pump, with 3.60 mts³ / sec with flotation chambers in fiber glass	1	Etec Quote No. 3071 DVA. July 4, 2019.	
	-Two stage		Etec Quote No. 3071 DVA. July 4, 2019.	
	-John Deere 6135HF485 (electr.) with 500 h.p. at 1800 rpm Diesel Engine		Etec Quote No. 3071 DVA. July 4, 2019.	
	-Heat Exchanger for Diesel Engine		Etec Quote No. 3071 DVA. July 4, 2019.	
	-Heat Exchanger for aftercooler of Diesel Engine		Etec Quote No. 3071 DVA. July 4, 2019.	
	-ZF 350-1 R5.458 Transmission		Etec Quote No. 3071 DVA. July 4, 2019.	
	-Flexible coupling between pump and pipe		Etec Quote No. 3071 DVA. July 4, 2019.	
	-Level control tank for diesel		Etec Quote No. 3071 DVA. July 4, 2019.	
	-Thermal Protection for industrial engine		Etec Quote No. 3071 DVA. July 4, 2019.	
	-ANSI standarized bolt pattern in outlet flange from flexible coupling.		Etec Quote No. 3071 DVA. July 4, 2019.	
	-Shaft spacer for servicing seal without pump removal		Etec Quote No. 3071 DVA. July 4, 2019.	
	-Aftercooler piping in stainless steel 316 with additional structural protection		Etec Quote No. 3071 DVA. July 4, 2019.	
	-Fuel lines adequate for low sulfur diesel/biodiesel		Etec Quote No. 3071 DVA. July 4, 2019.	
	-Water hose input to lubricate seal and bearing when testing on ground		Etec Quote No. 3071 DVA. July 4, 2019.	
2	Heavy duty bilge pump (15 feet of head)	1	Etec Quote No. 3071 DVA. July 4, 2019.	
	-to be used as secondary in compartment subject to oil spills		Etec Quote No. 3071 DVA. July 4, 2019.	
3	Electronic engagement for ZF Transmission	1	Etec Quote No. 3071 DVA. July 4, 2019.	
4	(LED) Motor compartment working lights and on deck working lights on a	1	Etec Quote No. 3071 DVA. July 4, 2019.	
5	Collapsible handrail	1	Etec Quote No. 3071 DVA. July 4, 2019.	
6	Assy Duramax Shaft Seal Assembly	1	Etec Quote No. 3071 DVA. July 4, 2019.	
7	Murphy ML 2000 4X Panel, ready for automatic operation	1	Etec Quote No. 3071 DVA. July 4, 2019.	
8	Coolant for refrigeration system included (galons)	64	Etec Quote No. 3071 DVA. July 4, 2019.	
9	Racor fuel filter	1	Etec Quote No. 3071 DVA. July 4, 2019.	
10	Additional 42" flexible coupling with ANSI bolt pattern	1	Etec Quote No. 3071 DVA. July 4, 2019.	
11	Plastic floating element for 42" pipe	2	Etec Quote No. 3071 DVA. July 4, 2019.	
			Monthly Rent Fee (taxes not included)	**$ 33,000**

DELIVERY FREIGHT COST FOR 42" FLOATING PUMP 1x40 FR AND 1X40HC

Shipping costs (Includes Transportation packing loading, port expenses,	1	Each	Etec Quote No. 3071 DVA. July 4, 2019.	$ 8,758
Freight Cartagena - Vancouver	1	Each	Etec Quote No. 3071 DVA. July 4, 2019.	$ 11,080
Insurance	1	Each	Etec Quote No. 3071 DVA. July 4, 2019.	$ 253
			TOTAL FREIGHT COST, CIF VANCOUVER	**$ 20,092**

RETURN FREIGHT COST FOR 42" FLOATING PUMP 1x40 FR AND 1X40HC

Shipping costs (Includes Transportation packing loading, port	1	Each	Etec Quote No. 3071 DVA. July 4, 2019.	$ 4,435
Freight Vancouver-Cartagena	1	Each	Etec Quote No. 3071 DVA. July 4, 2019.	$ 11,880
Insurance	1	Each	Etec Quote No. 3071 DVA. July 4, 2019.	$ 238
			TOTAL FREIGHT COST, CIF VANCOUVER	**$ 16,553**

PIPING AND ACCESSORIES

250 meters HDPE Pipeline from 42-48"	1	Each	Etec Quote No. 3071 DVA. July 4, 2019.	$ 277,629
Unions and accessories for pipeline and discharge flap gate	1	Each	Etec Quote No. 3071 DVA. July 4, 2019.	$ 81,160
The pipeline can be re-bought from ETEC to WOOD PLC at a 25% of the total pipelines cost.	1	Each	Etec Quote No. 3071 DVA. July 4, 2019.	-$ 89,697
			TOTAL PIPELINE AND ACCESORIES	**$ 269,092**

CCRP Cost Estimate Table W-42: Blast Densification

Option	Activity	Component	Quantity Derivation	Quantity	Unit	Unit Price	Pricing Derivation	Unit Price Geographic Correction Factor	Total Cost
CC1-A	Staff Costs	Camp	person days	420	person days	$ 300.00	Wood Estimate	1	$ 126,000
CC1-A		H&S Protocols	person days	420	person days	$ 100.00	Wood Estimate	1	$ 42,000
CC1-A		PPE	person days	420	person days	$ 100.00	Wood Estimate	1	$ 42,000
CC1-A	Blast Densification	Drilling, loading & detonating	Geotech Summary	300,000	m3	$ 13.00	Wood Estimate	1	$ 3,900,000
CC2-A	Staff Costs	Camp	person days	1,800	person days	$ 300.00	Wood Estimate	1	$ 540,000
CC2-A		H&S Protocols	person days	1,800	person days	$ 100.00	Wood Estimate	1	$ 180,000
CC2-A		PPE	person days	1,800	person days	$ 100.00	Wood Estimate	1	$ 180,000
CC2-A	Blast Densification	Drilling, loading & detonating	Geotech Summary	900,000	m3	$ 13.00	Wood Estimate	1	$ 11,700,000

wood.

CCRP Cost Estimate Table W-43: Annual Post Closure Costs

Current Costs C&M Costs			Assumed Partitioning			
			Clinton		Wolverine	
			%	Cost	%	Cost
Care & General Maintenance	Inspections	$300,000	70%	$210,000	30%	$90,000
	Access	$200,000	50%	$100,000	50%	$100,000
Monitoring	Water Quality	$1,000,000	80%	$800,000	20%	$200,000
	Hydrotechnics	$200,000	80%	$160,000	20%	$40,000
	Geotechnics (a)	$200,000	50%	$100,000	50%	$100,000
Partner Communications/Consultations		$200,000	50%	$100,000	50%	$100,000
Owner's Project Management & Admin		$100,000	50%	$50,000	50%	$50,000
	Total	**$2,200,000**		**$1,520,000**		**$680,000**

a Includes costs for inclinometer monitoring and InSar analyses that are largely incremental to current expenditures

Monitoring Cost over Project Duration

Option	Duration	Cost
CC1	1.42	$ 1,508,825
CC1-A	0.57	$ 600,356
CC1-B	0.63	$ 663,841
CC2	2.31	$ 2,448,692
CC2-A	0.77	$ 816,346
CC2-B	1.48	$ 1,571,620
CC3	4.55	$ 4,818,716
WC1	0.50	$ 530,000
WC2	2.81	$ 2,982,961
WC2-A	0.81	$ 863,305
WC3	2.81	$ 2,982,961

Sediment Pond Cleanout Costs	CC3	WC1	Comments
Cleanout Volume (m3)	90000	23000	Assume 1.5m sediment over pond settling area requires removal every 5 years.
Mob/Demob	$50,000	$50,000	
Excavation, Haul and Place @20$/m3	$1,800,000	$460,000	
Annualized Cost Over 5 Years	$360,000	$92,000	This cost will be annualized to simplify the discounted present value calculations. This process will overestimate the present value but not to a degree that will materially influence

Post Closure Provisions		CC1 % Current	CC1 Cost	CC1 Comments/Rationales	CC1-A % Current	CC1-A Cost	CC1-A Comments/Rationales	CC1-B % Current	CC1-B Cost	CC1-B Comments/Rationales
Baseline										
Care & General Maintenance	Inspections	100%	$210,000	Maintenance of dam requires ongoing inspections.	100%	$210,000	Maintenance of dam requires ongoing inspections.	100%	$210,000	Maintenance of dam requires ongoing inspections.
	Access	100%	$100,000	Maintenance of dam requires ongoing inspections.	100%	$100,000	Maintenance of dam requires ongoing inspections.	100%	$100,000	Maintenance of dam requires ongoing inspections.
Monitoring	Water Quality	25%	$200,000	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.	25%	$200,000	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.	25%	$200,000	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.
	Hydrotechnics	25%	$40,000	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.	25%	$40,000	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.	25%	$40,000	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.
	Geotechnics	100%	$100,000	Maintenance of dam requires ongoing inspections.	100%	$100,000	Maintenance of dam requires ongoing inspections.	100%	$100,000	Maintenance of dam requires ongoing inspections.
Partner Communications/Consultations		25%	$25,000	Ongoing demands will decline as post closure protocols become routine.	25%	$25,000	Ongoing demands will decline as post closure protocols become routine.	25%	$25,000	Ongoing demands will decline as post closure protocols become routine.
Owner's Project Management & Admin		25%	$12,500	Ongoing demands will decline as post closure protocols become routine.	25%	$12,500	Ongoing demands will decline as post closure protocols become routine.	25%	$12,500	Ongoing demands will decline as post closure protocols become routine.
Sediment Pond Cleanouts										
Totals			$687,500			$687,500			$687,500	
Totals (Rounded)			**$690,000**			**$690,000**			**$690,000**	
Time Limited Premiums (i.e. for the 10 years following completion of closure activity)										
Care & General Maintenance	Inspections									
	Access									
Monitoring	Water Quality									
	Hydrotechnics									
Partner Communications/Consultations										
Owner's Project Management & Admin										
Sediment Pond Cleanouts										
Totals			**$0**							
Totals (Rounded)			**$0**							

Post Closure Provisions		CC2 % Current	CC2 Cost	CC2 Comments/Rationales	CC2-A % Current	CC2-A Cost	CC2-A Comments/Rationales	CC2-B % Current	CC2-B Cost	CC2-B Comments/Rationales
Baseline										
Care & General Maintenance	Inspections	25%	$52,500	Avoids dam classification; lower inspection liability.	25%	$52,500	Avoids dam classification; lower inspection liability.	25%	$52,500	Avoids dam classification; lower inspection liability.
	Access	25%	$25,000	Avoids dam classification; lower inspection liability.	25%	$25,000	Avoids dam classification; lower inspection liability.	25%	$25,000	Avoids dam classification; lower inspection liability.
Monitoring	Water Quality	25%	$200,000	Per CC1.	25%	$200,000	Per CC1.	25%	$200,000	Per CC1.
	Hydrotechnics	25%	$40,000	Per CC1.	25%	$40,000	Per CC1.	25%	$40,000	Per CC1.
	Geotechnics	25%	$25,000	Avoids dam classification; lower inspection liability.	25%	$25,000	Avoids dam classification; lower inspection liability.	25%	$25,000	Avoids dam classification; lower inspection liability.
Partner Communications/Consultations		25%	$25,000	Per CC1.	25%	$25,000	Per CC1.	25%	$25,000	Per CC1.
Owner's Project Management & Admin		25%	$12,500	Per CC1.	25%	$12,500	Per CC1.	25%	$12,500	Per CC1.
Sediment Pond Cleanouts										
Totals			$380,000			$380,000			$380,000	
Totals (Rounded)			**$380,000**			**$380,000**			**$380,000**	
Time Limited Premiums (i.e. for the 10 years following completion of closure activity)										
Care & General Maintenance	Inspections	50%	$105,000	Will require inspections of valley restoration results/progress (assume required for 10 years)	50%	$105,000	Will require inspections of valley restoration results/progress (assume required for 10 years)	50%	$105,000	Will require inspections of valley restoration results/progress (assume required for 10 years)
	Access	50%	$50,000	Will require inspections of valley restoration results/progress (assume required for 10 years)	50%	$50,000	Will require inspections of valley restoration results/progress (assume required for 10 years)	50%	$50,000	Will require inspections of valley restoration results/progress (assume required for 10 years)
Monitoring	Water Quality	50%	$400,000	Will require additional montoring as valley restoration is in progress (assume required for 10 years)	50%	$400,000	Will require additional montoring as valley restoration is in progress (assume required for 10 years)	50%	$400,000	Will require additional montoring as valley restoration is in progress (assume required for 10 years)
	Hydrotechnics									
Partner Communications/Consultations		25%	$25,000	Will require additional consultations as valley restoration is in progress (assume required for 10 years)	25%	$25,000	Will require additional consultations as valley restoration is in progress (assume required for 10 years)	25%	$25,000	Will require additional consultations as valley restoration is in progress (assume required for 10 years)
Owner's Project Management & Admin		25%	$12,500	Will require additional mangement as valley restoration is in progress (assume required for 10 years)	25%	$12,500	Will require additional mangement as valley restoration is in progress (assume required for 10 years)	25%	$12,500	Will require additional mangement as valley restoration is in progress (assume required for 10 years)
Sediment Pond Cleanouts										
Totals			**$592,500**			**$592,500**			**$592,500**	
Totals (Rounded)			**$590,000**			**$590,000**			**$590,000**	

Post Closure Provisions		CC3 % Current	CC3 Cost	CC3 Comments/Rationales	WC1 % Current	WC1 Cost	WC1 Comments/Rationales
Baseline							
Care & General Maintenance	Inspections	15%	$31,500	No lake; lowest inspection liability.	100%	$90,000	Maintenance of unstable slope requires ongoing inspections.
	Access	15%	$15,000	No lake; lowest inspection liability.	100%	$100,000	Maintenance of unstable slope requires ongoing inspections.
Monitoring	Water Quality	15%	$120,000	Per CC1 but no lake reduces requirement.	25%	$50,000	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.
	Hydrotechnics	15%	$24,000	Per CC1 but no lake reduces requirement.	25%	$10,000	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.
	Geotechnics	0%	$0	No lake; lowest inspection liability.	200%	$200,000	Maintenance of unstable slope requires expanded inspection regeime.
Partner Communications/Consultations		15%	$15,000	Per CC1 but no lake reduces requirement.	25%	$25,000	Ongoing demands will decline as post closure protocols become routine.
Owner's Project Management & Admin		15%	$7,500	Per CC1 but no lake reduces requirement.	25%	$12,500	Ongoing demands will decline as post closure protocols become routine.
Sediment Pond Cleanouts						$92,000	Assumes this pond cleanout liability will be extend indefinitely.
Totals			$213,000			$579,500	
Totals (Rounded)			**$210,000**			**$580,000**	
Time Limited Premiums (i.e. for the 10 years following completion of closure activity)							
Care & General Maintenance	Inspections	50%	$105,000	Per CC2			
	Access	50%	$50,000	Per CC2			
Monitoring	Water Quality	50%	$400,000	Per CC2			
	Hydrotechnics						
Partner Communications/Consultations		25%	$25,000	Per CC2			
Owner's Project Management & Admin		25%	$12,500	Per CC2			
Sediment Pond Cleanouts			$360,000	Assumes sediment pond will be required for 10 years following closure as Clinton Creek Valley undergoes			
Totals			**$952,500**				
Totals (Rounded)			**$950,000**				

Post Closure Provisions		WC2 % Current	WC2 Cost	WC2 Comments/ Rationales	WC2-A % Current	WC2-A Cost	WC2-A Comments/ Rationales	WC3 % Current	WC3 Cost	WC3 Comments/Rationales
Baseline										
Care & General Maintenance	Inspections	100%	$90,000	Per CC1	100%	$90,000	Per CC1	15%	$13,500	No imponded water; lowest inspection liability.
	Access	100%	$100,000	Per CC1	100%	$100,000	Per CC1	15%	$15,000	No imponded water; lowest inspection liability.
Monitoring	Water Quality	15%	$30,000	Per WC1 but lower because tails covered.	15%	$30,000	Per WC1 but lower because tails covered.	15%	$30,000	Per WC1 but lower because no tails remaing in valley.
	Hydrotechnics	15%	$6,000	Per WC1 but lower because tails covered.	15%	$6,000	Per WC1 but lower because tails covered.	15%	$6,000	Per WC1 but lower because no tails remaing in valley.
	Geotechnics	100%	$100,000	Maintenance of dam requires ongoing inspections.	100%	$100,000	Maintenance of dam requires ongoing inspections.	0%	$0	No imponded water; lowest inspection liability.
Partner Communications/Consultations		15%	$15,000	Per WC1 but lower because tails covered.	15%	$15,000	Per WC1 but lower because tails covered.	15%	$15,000	Per WC1 but lower because no tails remaing in valley.
Owner's Project Management & Admin		15%	$7,500	Per WC1 but lower because tails covered.	15%	$7,500	Per WC1 but lower because tails covered.	15%	$7,500	Per WC1 but lower because no tails remaing in valley.
Sediment Pond Cleanouts										
Totals			$348,500			$348,500			$87,000	
Totals (Rounded)			**$300,000**			**$300,000**			**$100,000**	
Time Limited Premiums (i.e. for the 10 years following completion of closure activity)										
Care & General Maintenance	Inspections							50%	$45,000	Per CC2.
	Access							50%	$50,000	Per CC2.
Monitoring	Water Quality							50%	$100,000	Per CC2.
	Hydrotechnics								$0	
Partner Communications/Consultations								25%	$25,000	Per CC2.
Owner's Project Management & Admin								25%	$12,500	Per CC2.
Sediment Pond Cleanouts										
Totals									**$232,500**	
Totals (Rounded)									**$230,000**	

CCRP Cost Estimate Table W-43: Annual Post Closure Costs

Current Costs C&M Costs			Assumed Partitioning			
			Clinton		Wolverine	
			%	Cost	%	Cost
Care & General Maintenance	Inspections	$300,000	70%	$210,000	30%	$90,000
	Access	$200,000	50%	$100,000	50%	$100,000
Monitoring	Water Quality	$1,000,000	80%	$800,000	20%	$200,000
	Hydrotechnics	$200,000	80%	$160,000	20%	$40,000
	Geotechnics (a)	$200,000	50%	$100,000	50%	$100,000
Partner Communications/Consultations		$200,000	50%	$100,000	50%	$100,000
Owner's Project Management & Admin		$100,000	50%	$50,000	50%	$50,000
	Total	**$2,200,000**		**$1,520,000**		**$680,000**

a Includes costs for inclinometer monitoring and InSar analyses that are largely incremental to current expenditures

Monitoring Cost over Project Duration

Option	Duration	Cost
CC1	1.42	$ 1,508,825
CC1-A	0.57	$ 600,356
CC1-B	0.63	$ 663,841
CC2	2.31	$ 2,448,692
CC2-A	0.77	$ 816,346
CC2-B	1.48	$ 1,571,620
CC3	4.55	$ 4,818,716
WC1	0.50	$ 530,000
WC2	2.81	$ 2,982,961
WC2-A	0.81	$ 863,305
WC3	2.81	$ 2,982,961

Sediment Pond Cleanout Costs	CC3	WC1	Comments
Cleanout Volume (m3)	90000	23000	Assume 1.5m sediment over pond settling area requires removal every 5 years.
Mob/Demob	$50,000	$50,000	
Excavation, Haul and Place @20$/m3	$1,800,000	$460,000	
Annualized Cost Over 5 Years	$360,000	$92,000	This cost will be annualized to simplify the discounted present value calculations. This process will overestimate the present value but not to a degree that will materially influence

Post Closure Provisions (NPV)		CC1			CC1-A			CC1-B		
		% Current	Cost	Comments/Rationales	% Current	Cost	Comments/Rationales	% Current	Cost	Comments/Rationales
Baseline										
Care & General Maintenance	Inspections	100%	$9,050,654	Maintenance of dam requires ongoing inspections.	100%	$9,050,654	Maintenance of dam requires ongoing inspections	100%	$9,050,654	Maintenance of dam requires ongoing inspections
	Access	100%	$4,309,835	Maintenance of dam requires ongoing inspections.	100%	$4,309,835	Maintenance of dam requires ongoing inspections	100%	$4,309,835	Maintenance of dam requires ongoing inspections
Monitoring	Water Quality	25%	$8,619,670	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.	25%	$8,619,670	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.	25%	$8,619,670	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.
	Hydrotechnics	25%	$1,723,934	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.	25%	$1,723,934	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.	25%	$1,723,934	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.
	Geotechnics	100%	$4,309,835	Maintenance of dam requires ongoing inspections.	100%	$4,309,835	Maintenance of dam requires ongoing inspections	100%	$4,309,835	Maintenance of dam requires ongoing inspections
Partner Communications/Consultations		25%	$1,077,459	Ongoing demands will decline as post closure protocols become routine.	25%	$1,077,459	Ongoing demands will decline as post closure protocols become routine	25%	$1,077,459	Ongoing demands will decline as post closure protocols become routine
Owner's Project Management & Admin		25%	$538,729	Ongoing demands will decline as post closure protocols become routine.	25%	$538,729	Ongoing demands will decline as post closure protocols become routine	25%	$538,729	Ongoing demands will decline as post closure protocols become routine
Sediment Pond Cleanouts			$0			$0			$0	
Totals			$29,630,117			$29,630,117			$29,630,117	
Totals (Rounded)			**$29,630,000**			**$29,630,000**			**$29,630,000**	
Time Limited Premiums (i.e. for the 10 years following completion of closure activity)										
Care & General Maintenance	Inspections		$0							
	Access		$0							
Monitoring	Water Quality		$0							
	Hydrotechnics		$0							
Partner Communications/Consultations			$0							
Owner's Project Management & Admin			$0							
Sediment Pond Cleanouts			$0							
Totals			**$0**							
Totals (Rounded)			**$0**							

Post Closure Provisions (NPV)		CC2			CC2-A			CC2-B		
		% Current	Cost	Comments/Rationales	% Current	Cost	Comments/Rationales	% Current	Cost	Comments/Rationales
Baseline										
Care & General Maintenance	Inspections	25%	$2,262,663	Avoids dam classification; lower inspection liability.	25%	$2,262,663	Avoids dam classification; lower inspection liability.	25%	$2,262,663	Avoids dam classification; lower inspection liability.
	Access	25%	$1,077,459	Avoids dam classification; lower inspection liability.	25%	$1,077,459	Avoids dam classification; lower inspection liability.	25%	$1,077,459	Avoids dam classification; lower inspection liability.
Monitoring	Water Quality	25%	$8,619,670	Per CC1.	25%	$8,619,670	Per CC1.	25%	$8,619,670	Per CC1.
	Hydrotechnics	25%	$1,723,934	Per CC1.	25%	$1,723,934	Per CC1.	25%	$1,723,934	Per CC1.
	Geotechnics	25%	$1,077,459	Avoids dam classification; lower inspection liability.	25%	$1,077,459	Avoids dam classification; lower inspection liability.	25%	$1,077,459	Avoids dam classification; lower inspection liability.
Partner Communications/Consultations		25%	$1,077,459	Per CC1.	25%	$1,077,459	Per CC1.	25%	$1,077,459	Per CC1.
Owner's Project Management & Admin		25%	$538,729	Per CC1.	25%	$538,729	Per CC1.	25%	$538,729	Per CC1.
Sediment Pond Cleanouts			$0			$0			$0	
Totals			$16,377,374			$16,377,374			$16,377,374	
Totals (Rounded)			**$16,380,000**			**$16,380,000**			**$16,380,000**	
Time Limited Premiums (i.e. for the 10 years following completion of closure activity)										
Care & General Maintenance	Inspections	50%	$943,171	Will require inspections of valley restoration results/progress (assume required for 10 years)	50%	$943,171	Will require inspections of valley restoration results/progress (assume required for 10 years)	50%	$943,171	Will require inspections of valley restoration results/progress (assume required for 10 years)
	Access	50%	$449,129	Will require inspections of valley restoration results/progress (assume required for 10 years)	50%	$449,129	Will require inspections of valley restoration results/progress (assume required for 10 years)	50%	$449,129	Will require inspections of valley restoration results/progress (assume required for 10 years)
Monitoring	Water Quality	50%	$3,593,034	Will require additional montoring as valley restoration is in progress (assume required for 10 years)	50%	$3,593,034	Will require additional montoring as valley restoration is in progress (assume required for 10 years)	50%	$3,593,034	Will require additional montoring as valley restoration is in progress (assume required for 10 years)
	Hydrotechnics		$0			$0			$0	
Partner Communications/Consultations		25%	$224,565	Will require additional consultations as valley restoration is in progress (assume required for 10 years)	25%	$224,565	Will require additional consultations as valley restoration is in progress (assume required for 10 years)	25%	$224,565	Will require additional consultations as valley restoration is in progress (assume required for 10 years)
Owner's Project Management & Admin		25%	$112,282	Will require additional mangement as valley restoration is in progress (assume required for 10 years)	25%	$112,282	Will require additional mangement as valley restoration is in progress (assume required for 10 years)	25%	$112,282	Will require additional mangement as valley restoration is in progress (assume required for 10 years)
Sediment Pond Cleanouts			$0			$0			$0	
Totals			**$5,322,182**			**$5,322,182**			**$5,322,182**	
Totals (Rounded)			**$5,320,000**			**$5,320,000**			**$5,320,000**	

Post Closure Provisions (NPV)		CC3			WC1		
		% Current	Cost	Comments/Rationales	% Current	Cost	Comments/Rationales
Baseline							
Care & General Maintenance	Inspections	15%	$1,357,598	No lake; lowest inspection liability.	100%	$3,878,852	Maintenance of unstable slope requires ongoing inspections.
	Access	15%	$646,475	No lake; lowest inspection liability.	100%	$4,309,835	Maintenance of unstable slope requires ongoing inspections.
Monitoring	Water Quality	15%	$5,171,802	Per CC1 but no lake reduces requirement.	25%	$2,154,918	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.
	Hydrotechnics	15%	$1,034,360	Per CC1 but no lake reduces requirement.	25%	$430,984	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.
	Geotechnics	0%	$0	No lake; lowest inspection liability.	200%	$8,619,670	Maintenance of unstable slope requires expanded inspection regeime.
Partner Communications/Consultations		15%	$646,475	Per CC1 but no lake reduces requirement.	25%	$1,077,459	Ongoing demands will decline as post closure protocols become routine.
Owner's Project Management & Admin		15%	$323,238	Per CC1 but no lake reduces requirement.	25%	$538,729	Ongoing demands will decline as post closure protocols become routine.
Sediment Pond Cleanouts			$0			$3,965,048	Assumes this pond cleanout liability will be extend indefinitely.
Totals			$9,179,949			$24,975,495	
Totals (Rounded)			**$9,180,000**			**$24,980,000**	
Time Limited Premiums (i.e. for the 10 years following completion of closure activity)							
Care & General Maintenance	Inspections	50%	$943,171	Per CC2		$0	
	Access	50%	$449,129	Per CC2		$0	
Monitoring	Water Quality	50%	$3,593,034	Per CC2		$0	
	Hydrotechnics		$0			$0	
Partner Communications/Consultations		25%	$224,565	Per CC2		$0	
Owner's Project Management & Admin		25%	$112,282	Per CC2		$0	
Sediment Pond Cleanouts			$3,233,731	Assumes sediment pond will be required for 10 years following closure as Clinton Creek Valley undergoes		$0	
Totals			**$8,555,912**				
Totals (Rounded)			**$8,560,000**				

Post Closure Provisions (NPV)		WC2			WC2-A			WC3		
		% Current	Cost	Comments/ Rationales	% Current	Cost	Comments/ Rationales	% Current	Cost	Comments/Rationales
Baseline										
Care & General Maintenance	Inspections	100%	$3,878,852	Per CC1	100%	$3,878,852	Per CC1	15%	$581,828	No imponded water; lowest inspection liability.
	Access	100%	$4,309,835	Per CC1	100%	$4,309,835	Per CC1	15%	$646,475	No imponded water; lowest inspection liability.
Monitoring	Water Quality	15%	$1,292,951	Per WC1 but lower because tails covered.	15%	$1,292,951	Per WC1 but lower because tails covered.	15%	$1,292,951	Per WC1 but lower because no tails remaing in valley.
	Hydrotechnics	15%	$258,590	Per WC1 but lower because tails covered.	15%	$258,590	Per WC1 but lower because tails covered.	15%	$258,590	Per WC1 but lower because no tails remaing in valley.
	Geotechnics	100%	$4,309,835	Maintenance of dam requires ongoing inspections	100%	$4,309,835	Maintenance of dam requires ongoing inspections	0%	$0	No imponded water; lowest inspection liability.
Partner Communications/Consultations		15%	$646,475	Per WC1 but lower because tails covered.	15%	$646,475	Per WC1 but lower because tails covered.	15%	$646,475	Per WC1 but lower because no tails remaing in valley.
Owner's Project Management & Admin		15%	$323,238	Per WC1 but lower because tails covered.	15%	$323,238	Per WC1 but lower because tails covered.	15%	$323,238	Per WC1 but lower because no tails remaing in valley.
Sediment Pond Cleanouts			$0			$0			$0	
Totals			$15,019,776			$15,019,776			$3,749,557	
Totals (Rounded)			**$15,000,000**			**$15,000,000**			**$3,700,000**	
Time Limited Premiums (i.e. for the 10 years following completion of closure activity)										
Care & General Maintenance	Inspections		$0			$0		50%	$404,216	Per CC2.
	Access		$0			$0		50%	$449,129	Per CC2.
Monitoring	Water Quality		$0			$0		50%	$898,259	Per CC2.
	Hydrotechnics		$0			$0			$0	
Partner Communications/Consultations			$0			$0		25%	$224,565	Per CC2.
Owner's Project Management & Admin			$0			$0		25%	$112,282	Per CC2.
Sediment Pond Cleanouts			$0			$0			$0	
Totals									**$2,088,451**	
Totals (Rounded)									**$2,090,000**	

Post Closure Provisions (NPV)		CC1			CC1-A			CC1-B		
		% Current	Cost	Comments/Rationales	% Current	Cost	Comments/Rationales	% Current	Cost	Comments/Rationales
Baseline And										
Care & General Maintenance	Inspections	100%	$9,050,654	Maintenance of dam requires ongoing inspections.	100%	$9,050,654	Maintenance of dam requires ongoing inspections	100%	$9,050,654	Maintenance of dam requires ongoing inspections
	Access	100%	$4,309,835	Maintenance of dam requires ongoing inspections.	100%	$4,309,835	Maintenance of dam requires ongoing inspections	100%	$4,309,835	Maintenance of dam requires ongoing inspections
Monitoring	Water Quality	25%	$8,619,670	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.	25%	$8,619,670	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.	25%	$8,619,670	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.
	Hydrotechnics	25%	$1,723,934	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.	25%	$1,723,934	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.	25%	$1,723,934	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.
	Geotechnics	100%	$4,309,835	Maintenance of dam requires ongoing inspections.	100%	$4,309,835	Maintenance of dam requires ongoing inspections	100%	$4,309,835	Maintenance of dam requires ongoing inspections
Partner Communications/Consultations		25%	$1,077,459	Ongoing demands will decline as post closure protocols become routine.	25%	$1,077,459	Ongoing demands will decline as post closure protocols become routine	25%	$1,077,459	Ongoing demands will decline as post closure protocols become routine
Owner's Project Management & Admin		25%	$538,729	Ongoing demands will decline as post closure protocols become routine.	25%	$538,729	Ongoing demands will decline as post closure protocols become routine	25%	$538,729	Ongoing demands will decline as post closure protocols become routine
Sediment Pond Cleanouts			$0			$0			$0	
Totals			$29,630,117			$29,630,117			$29,630,117	
Totals (Rounded)			**$29,630,000**			**$29,630,000**			**$29,630,000**	

Post Closure Provisions (NPV)		CC2			CC2-A			CC2-B		
		% Current	Cost	Comments/Rationales	% Current	Cost	Comments/Rationales	% Current	Cost	Comments/Rationales
Baseline And										
Care & General Maintenance	Inspections	25%	$3,205,835	Avoids dam classification; lower inspection liability.	25%	$3,205,835	Avoids dam classification; lower inspection liability.	25%	$3,205,835	Avoids dam classification; lower inspection liability.
	Access	25%	$1,526,588	Avoids dam classification; lower inspection liability.	25%	$1,526,588	Avoids dam classification; lower inspection liability.	25%	$1,526,588	Avoids dam classification; lower inspection liability.
Monitoring	Water Quality	25%	$12,212,704	Per CC1.	25%	$12,212,704	Per CC1.	25%	$12,212,704	Per CC1.
	Hydrotechnics	25%	$1,723,934	Per CC1.	25%	$1,723,934	Per CC1.	25%	$1,723,934	Per CC1.
	Geotechnics	25%	$1,077,459	Avoids dam classification; lower inspection liability.	25%	$1,077,459	Avoids dam classification; lower inspection liability.	25%	$1,077,459	Avoids dam classification; lower inspection liability.
Partner Communications/Consultations		25%	$1,302,023	Per CC1.	25%	$1,302,023	Per CC1.	25%	$1,302,023	Per CC1.
Owner's Project Management & Admin		25%	$651,012	Per CC1.	25%	$651,012	Per CC1.	25%	$651,012	Per CC1.
Sediment Pond Cleanouts			$0			$0			$0	
Totals			$21,699,555			$21,699,555			$21,699,555	
Totals (Rounded)			**$21,700,000**			**$21,700,000**			**$21,700,000**	

Post Closure Provisions (NPV)		CC3			WC1		
		% Current	Cost	Comments/Rationales	% Current	Cost	Comments/Rationales
Baseline And							
Care & General Maintenance	Inspections	15%	$2,300,770	No lake; lowest inspection liability.	100%	$3,878,852	Maintenance of unstable slope requires ongoing inspections.
	Access	15%	$1,095,605	No lake; lowest inspection liability.	100%	$4,309,835	Maintenance of unstable slope requires ongoing inspections.
Monitoring	Water Quality	15%	$8,764,836	Per CC1 but no lake reduces requirement.	25%	$2,154,918	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.
	Hydrotechnics	15%	$1,034,360	Per CC1 but no lake reduces requirement.	25%	$430,984	Ongoing monitoring to validate performance; a fraction of design development and permitting data requirements.
	Geotechnics	0%	$0	No lake; lowest inspection liability.	200%	$8,619,670	Maintenance of unstable slope requires expanded inspection regeime.
Partner Communications/Consultations		15%	$871,040	Per CC1 but no lake reduces requirement.	25%	$1,077,459	Ongoing demands will decline as post closure protocols become routine.
Owner's Project Management & Admin		15%	$435,520	Per CC1 but no lake reduces requirement.	25%	$538,729	Ongoing demands will decline as post closure protocols become routine.
Sediment Pond Cleanouts			$3,233,731			$3,965,048	Assumes this pond cleanout liability will be extend indefinitely.
Totals			$17,735,861			$24,975,495	
Totals (Rounded)			**$17,740,000**			**$24,980,000**	

Post Closure Provisions (NPV)		WC2			WC2-A			WC3		
		% Current	Cost	Comments/ Rationales	% Current	Cost	Comments/ Rationales	% Current	Cost	Comments/Rationales
Baseline And										
Care & General Maintenance	Inspections	100%	$3,878,852	Per CC1	100%	$3,878,852	Per CC1	15%	$986,044	No imponded water; lowest inspection liability.
	Access	100%	$4,309,835	Per CC1	100%	$4,309,835	Per CC1	15%	$1,095,605	No imponded water; lowest inspection liability.
Monitoring	Water Quality	15%	$1,292,951	Per WC1 but lower because tails covered.	15%	$1,292,951	Per WC1 but lower because tails covered.	15%	$2,191,209	Per WC1 but lower because no tails remaing in valley.
	Hydrotechnics	15%	$258,590	Per WC1 but lower because tails covered.	15%	$258,590	Per WC1 but lower because tails covered.	15%	$258,590	Per WC1 but lower because no tails remaing in valley.
	Geotechnics	100%	$4,309,835	Maintenance of dam requires ongoing inspections	100%	$4,309,835	Maintenance of dam requires ongoing inspections	0%	$0	No imponded water; lowest inspection liability.
Partner Communications/Consultations		15%	$646,475	Per WC1 but lower because tails covered.	15%	$646,475	Per WC1 but lower because tails covered.	15%	$871,040	Per WC1 but lower because no tails remaing in valley.
Owner's Project Management & Admin		15%	$323,238	Per WC1 but lower because tails covered.	15%	$323,238	Per WC1 but lower because tails covered.	15%	$435,520	Per WC1 but lower because no tails remaing in valley.
Sediment Pond Cleanouts			$0			$0			$0	
Totals			$15,019,776			$15,019,776			$5,838,008	
Totals (Rounded)			**$15,000,000**			**$15,000,000**			**$5,800,000**	

CCRP Cost Estimate Table W-43a: Repair & Remediation

Option	Spillway Repair Costs		Required Repair Frequency (years)	Annualized Repair Cost ($/yr)	Assumed Duration of Repair Liability (yrs)	Present Value of Repair Costs ($)	General Remediation Costs		Required Remediation Frequency (years)	Annualized Remediation Cost ($/yr)	Assumed Duration of Remediation Liability (yrs)	Present Value of Remediation Costs ($)
	(% of Initial CAPEX)	($)					(% of Bulk Materials Movement CAPEX)	($)				
CC1												
CC1-A	15%	$ 1,925,306	10	$175,832	100	$7,578,050	20%	$ 706,815	15	$40,872	100	$1,761,511
CC1-B	15%	$ 1,925,306	10	$175,832	100	$7,578,050	20%	$ 781,558	15	$45,194	100	$1,947,786
CC2												
CC2-A	15%	$ 1,859,882	10	$169,857	100	$7,320,538	20%	$ 2,155,922	15	$124,667	100	$5,372,952
CC2-B	15%	$ 1,859,882	10	$169,857	100	$7,320,538	20%	$ 4,150,561	15	$240,008	100	$10,343,955
CC3												
WC1												
WC2												
WC2-A	25%	$ 191,128	10	$17,455	100	$752,283	50%	$ 10,887,750	50	$128,728	100	$5,547,971
WC3												

CCRP Cost Estimate Table W-44: CCRP - Major, Supplementary Investigative Costs by Option

Investigative Requirement	Hrs/Test Holes	Unit Cost ($/Hr or TH)	Cost	CC1	CC1-A	CC1-B	CC2	CC2-A	CC2-B	CC3	WC1	WC2	WC2-A	WC3
ERT														
Equipment Purchase			$50,000											
Field Time	300	200	$60,000											
Interpretation / Reporting Time	200	200	$40,000											
		Total	**$150,000**	**$150,000**	**$150,000**	**$150,000**	**$150,000**	**$150,000**	**$150,000**	**$150,000**		**$150,000**	**$150,000**	
Dump Foundation Characterization	50	$110,000	$5,500,000	$5,500,000	$5,500,000	$5,500,000	$5,500,000	$5,500,000	$5,500,000	$5,500,000				
Ice Rich PF Delineation														
CC1 Spillway Bedrock Data	30	$110,000	$3,300,000	$3,300,000	$3,300,000	$3,300,000								
Pump Tests	25	$20,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000				
WC2 Buttress / Dam Investigation	20	$110,000	$2,200,000									$2,200,000		
			Totals	**$9,450,000**	**$9,450,000**	**$9,450,000**	**$6,150,000**	**$6,150,000**	**$6,150,000**	**$6,150,000**	**$0**	**$2,350,000**	**$150,000**	**$0**

Derived from 2018 Investigative Costs

Drilling/Sub Costs (i.e. TA 10)	$1,615,000
Wood Super Costs (i.e. TA 11)	$700,000
Total Cost	$2,315,000
Test Holes Completed	21
Unit Cost /TH	$110,238

CCRP Cost Estimate Table W-45: 2019 Estimate Factors and Assumptions

Soil Density

Material	Density (t/m3)	Reference
Waste Dump	2	Wood. June 11, 2019 email correspondence.
Tailings	2	Wood. June 11, 2019 email correspondence.

EPCM and Contingency

EPCM	Contingency	Incidental Temporary Facilities and Controls
10%	25%	3%

General

Financial Item	Value	Reference
Discount Rate	2.00%	Bank of Canada. 2019. Yield Curves for Zero-Coupon Bonds. Downloaded on May 16, 2019 from https://bankofcanada.ca/rates/interest-rates/bond-yield-curves/.
Life Cycle Duration (years)	100	Post Closure Activities following completion of closure activity.
Life Cycle Duration (years)	10	Post Closure Activity Time Limited Premiums (i.e. for the 10 years following completion of closure activity).
Base Year Applied for Discount Rate	January 1, 2019	Wood. May 2019. Estimate Basis Memorandum.
Currency	Q2 2019 Canadian dollars	Wood. May 2019. Estimate Basis Memorandum.
Land rights-of-way have been established for construction		Wood. May 2019. Estimate Basis Memorandum.
All major works will be performed by a workforce from Whitehorse.		Wood. May 2019. Estimate Basis Memorandum.
A camp will be established at the Clinton Creek site to accommodate all on-site personnel. All camp facilities will be brought in from Edmonton, AB		Wood. May 2019. Estimate Basis Memorandum.
Sufficient site preparations (clearing, grubbing, topsoil stripping and subgrade preparation) will have been completed previously at the Clinton Creek site to accommodate camp and site facilities		Wood. May 2019. Estimate Basis Memorandum.
All on-site personnel will be on a “two weeks on, two weeks off” rotation schedule		Wood. May 2019. Estimate Basis Memorandum.
One grader will be allocated full-time for road maintenance during construction in the summer (May to September)		Wood. May 2019. Estimate Basis Memorandum.
Two graders and one dozer will be allocated full-time for snow removal and road maintenance during construction in the winter (October to April)		Wood. May 2019. Estimate Basis Memorandum.
diesel fuel costs $1.36/L plus the cost of transportation from Dawson City to site		Wood. May 2019. Estimate Basis Memorandum.
All heavy equipment, camps, facilities and materials will be compatible with transport across: - the Yukon River via the existing ferry or ice bridge; and ♦ the Fortymile River via the existing bridge.		Wood. May 2019. Estimate Basis Memorandum.

Statistics Canada. Table 18-10-0058-01 Machinery and equipment price index, by industry of purchase, quarterly. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810005801

Survey or program details:

Mines, quarries and oil wells. Construction.

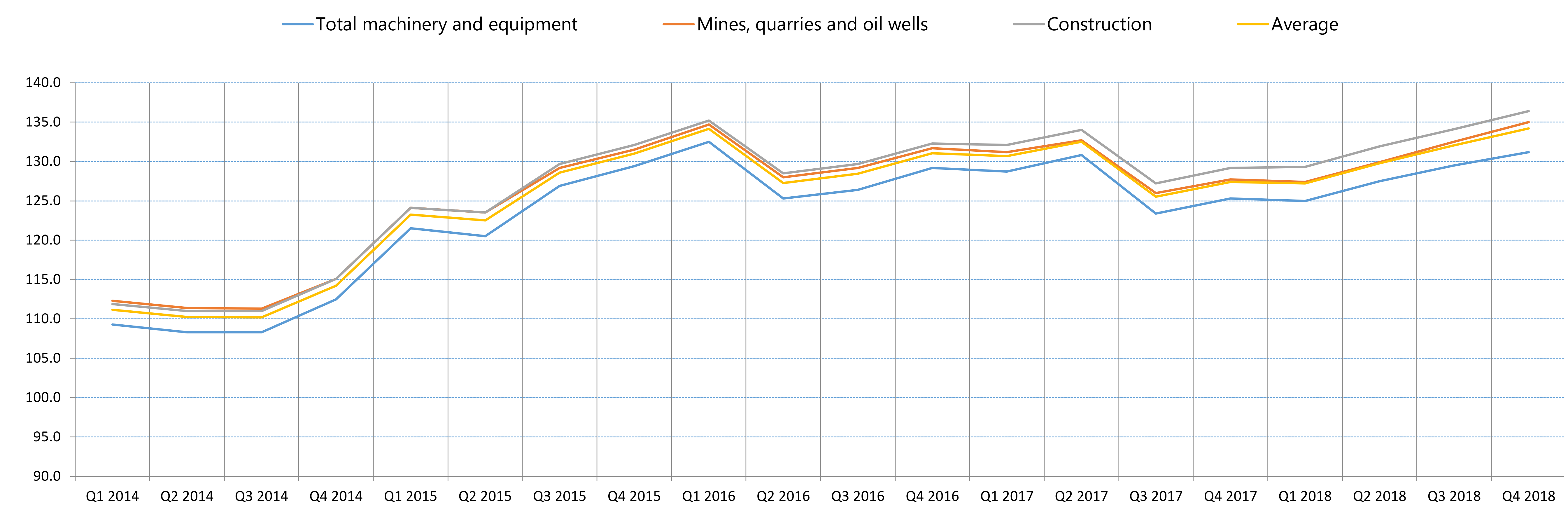
Geography:

Canada

Quarter and Year	Q1 2014	Q2 2014	Q3 2014	Q4 2014	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018
Total machinery and equipment	109.3	108.3	108.3	112.5	121.5	120.5	126.9	129.4	132.5	125.3	126.4	129.2	128.7	130.8	123.4	125.3	125.0	127.5	129.5	131.2
Mines, quarries and oil wells	112.3	111.4	111.3	115.1	124.1	123.5	129.2	131.5	134.7	128.0	129.2	131.7	131.2	132.7	126.0	127.7	127.4	129.9	132.5	135.0
Construction	111.9	111.0	111.0	115.1	124.1	123.5	129.7	132.1	135.2	128.5	129.7	132.3	132.1	134.0	127.2	129.2	129.3	131.9	134.1	136.4
Average	**111.2**	**110.2**	**110.2**	**114.2**	**123.2**	**122.5**	**128.6**	**131.0**	**134.1**	**127.3**	**128.4**	**131.1**	**130.7**	**132.5**	**125.5**	**127.4**	**127.2**	**129.8**	**132.0**	**134.2**

Statistics Canada

Percent change for Q1 2014 to Q4 2018.	20.72



Footnotes:

1. This quarterly CANSIM table replaces CANSIM table 327-0042 which has been archived. This CANSIM table contains quarterly data starting from the first quarter 1997.
2. With the release of second quarter 2015, all data for 2014 has been revised.
3. The classification structure by industry in the 2010-based Machinery and Equipment Price Index (MEPI) series is based on the 2009 Input Output Final Demand Classification (IOFDC). By using the 2009 IOFDC, some historical series can no longer be calculated. Where possible, the historical series are published and consist of all data for the quarters prior to the first quarter 2010. The historical series were obtained by linking together indexes from the 2010-based MEPI series and the corresponding 1997-based MEPI series. Also, these historical series were obtained by rebasing the 1997-based MEPI series using, as the rebasing factor, the ratio of 100 to the annual average index of 2010.

https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810005801&pickMembers%5B0%5D=3.2

Average hourly earnings for employees paid by the hour, by industry, annual [1 2 3 4]
Annual
Table: null (formerly CANSIM 281-0030)
Geography: Canada, Province or territory

	Canada					Yukon					Northwest Territories [5 6]				
	Including overtime					Including overtime					Including overtime				
North American Industry Classification System (NAICS)[4]	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
Industrial aggregate excluding unclassified businesses 7 8	$ 23.26	$ 23.57	$ 23.85	$ 24.26	$ 25.06	$ 26.09	$ 25.31	$ 26.55	$ 27.41	$ 27.73	$ 30.80	$ 30.98	$ 31.27	$ 30.37	$ 31.81
Mining, quarrying, and oil and gas extraction	$ 41.08	$ 39.44	$ 38.98	$ 38.40	$ 41.52	..	..	..	..	..	..	..	..	..	..
Construction	$ 30.72	$ 30.95	$ 31.70	$ 32.22	$ 32.82	..	..	..	..	..	36.18B	$ 35.40	$ 36.59	$ 39.53	$ 37.88

A : data quality: excellent (All "A" at time of download)
.. : not available for a specific reference period
B : data quality: very good
Current dollars

Footnotes:

1 Data quality indicators are based on the coefficient of variation (CV). Quality indicators indicate the following: A - Excellent (CV from 0% to 4.99%); B - Very good (CV from 5% to 9.99%); C - Good (CV from 10% to 14.99%); D - Acceptable (CV from 15% to 24.99%); E - Use with caution (CV from 25% to 34.99%); F - Too unreliable to publish (CV greater than or equal to 35% or sample size is too small to produce reliable estimates).

2 The introduction of administrative data in 2001 and the associated change in methodology resulted in level shifts for some series. This affects the comparability of pre- and post-2001 estimates.

3 Earnings data are based on gross payroll before source deductions.

4 Industry estimates in this table are based on the 2017 North American Industry Classification System (NAICS) Version 3.0.

5 Although the creation of Nunavut officially took place in April 1999, the Survey of Employment, Payrolls and Hours (SEPH) was only able to begin publishing separate estimates for Northwest Territories and Nunavut with the release of the January 2001 data. Efforts were undertaken to estimate the employment for Nunavut back to April 1999. These are available upon request by contacting Client Services (toll-free: 1-866-873-8788; statcan.labour-travail.statcan@canada.ca), Labour Statistics Division.

6 Since January 2001, the Survey of Employment, Payrolls and Hours (SEPH) program no longer combines Northwest Territories and Nunavut. They are produced as two separate territories.

7 Industrial aggregate covers all industrial sectors except those primarily involved in agriculture, fishing and trapping, private household services, religious organisations and the military personnel of the defence services.

8 Unclassified businesses (00) are businesses for which the industrial classification (North American Industry Classification System [NAICS] 2017 Version 3.0) has yet to be determined.

How to cite: Statistics Canada. Table null Average hourly earnings for employees paid by the hour, by industry, annual
https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410020601

CCRP Cost Estimate Table W-48: Yukon Government Fair Wage Schedule

FAIR WAGE SCHEDULE CATEGORY RATE CHANGES[1]				Percent Change
Effective April 1, 2014		Effective April 1, 2018		
Category A Class	**$31.13**	Category A Class	**$33.43**	**6.9**
Boilermaker (erection & repair) (metal framing & walls, drywall application, drywall, contact & suspended ceilings, acoustical & metal, linear ceiling, demountable partition, shaft wall and access floor systems, plenum barriers, fireproofing & plasters)	Interior Systems Mechanic	Boilermaker (erection & repair) (metal framing & walls, drywall application, drywall, contact & suspended ceilings, acoustical & metal, linear ceiling, demountable partition, shaft wall and access floor systems, plenum barriers, fireproofing & plasters)	Interior Systems Mechanic	
Bricklayer & Stone Mason	Linesperson (electric)	Bricklayer & Stone Mason	Linesperson (electric)	
Carpenter	Mechanical Systems Insulator	Carpenter	Mechanical Systems Insulator	
Crane Operator	Millwright	Crane Operator	Millwright	
(overhead, climbing, skyway or equivalent)		(overhead, climbing, skyway or equivalent)		
Diver	Plumber, Steamfitter and Welder (pipe)	Diver	Plumber, Steamfitter and Welder (pipe)	
Electrician	Refrigeration Mechanic	Electrician	Refrigeration Mechanic	
Elevator Mechanic	Sheet Metal Mechanic	Elevator Mechanic	Sheet Metal Mechanic	
Glass & Metal Installer	Sprinkler System Installer	Glass & Metal Installer	Sprinkler System Installer	
Head Cook Camp (over 100 persons)	Structural Steel Erector (includes reinforcing ironwork)	Head Cook Camp (over 100 persons)	Structural Steel Erector (includes reinforcing ironwork)	
Heavy Equipment Mechanic	Surveyor	Heavy Equipment Mechanic	Surveyor	
Heavy Equipment Operator	Tile Setter	Heavy Equipment Operator	Tile Setter	
(dragline, gradall, pile driver, shovel, mobile crane)		(dragline, gradall, pile driver, shovel, mobile crane)		
Welder-General (acetylene & electric)		Welder-General (acetylene & electric)		
Category B Class	**$27.91**	Category B Class	**$29.97**	**6.9**
Asphalt or Concrete Spreader Operator	Head Cook (1-100 persons)	Asphalt or Concrete Spreader Operator	Head Cook (1-100 persons)	
Batchperson (operator of asphalt or concrete plant)	Heavy Equipment Operator (rubber tire backhoe, tracked backhoe, bulldozer, front-end loaders, graders, scrapers or equivalent)	Batch Person (operator of asphalt or concrete plant)	Heavy Equipment Operator (rubber tire backhoe, tracked backhoe, bulldozer, front-end loaders, graders, scrapers or equivalent)	
Blaster	Heavy Equipment Servicer	Blaster	Heavy Equipment Servicer	
Cement Finisher	Hoist Operator	Cement Finisher	Hoist Operator	
Compressor Operator	Ornamental & Miscellaneous Metal Erector	Compressor Operator	Ornamental & Miscellaneous Metal Erector	
Concrete Mixer Operator	Painter & Paper Hanger	Concrete Mixer Operator	Painter & Paper Hanger	
Driller	Pipe layer	Driller	Pipe layer	
Float Driver	Roofer	Float Driver	Roofer	
Floor Covering Installer (includes carpet & resilient tile)	Truck Driver (heavy - 10 Ton G.V.W. & up)	Floor Covering Installer (includes carpet & resilient tile)	Truck Driver (heavy - 10 Ton G.V.W. & up)	
Category C Class	**$24.75**	Category C Class	**$26.58**	**6.9**
Blaster's Helper	Surveyor's Helper	Blaster's Helper	Surveyor's Helper	
Concrete Floatperson (puddleperson, screedperson)	Truck Driver (G.V.W. - 3 to 10 Tons)	Concrete Float Person (puddleperson, screedperson)	Truck Driver (G.V.W. - 3 to 10 Tons)	
Second Cook/Baker, Camp		Second Cook/Baker, Camp		
Category D Class	**$22.47**	Category D Class	**$24.12**	**6.8**
Asphalt Raker	Labourer	Asphalt Raker	Labourer	
Camp/Kitchen Helper	Mortar Person	Camp/Kitchen Helper	Mortar Person	
Driller's Helper	Pump Tender	Driller's Helper	Pump Tender	
First Aid Attendant	Roller Operator (roller, packer, or compactor)	First Aid Attendant	Roller Operator (roller, packer, or compactor)	
Flagperson	Roofer's Helper	Flag Person	Roofer's Helper	
Jackhammer Operator	Watchperson or Security Guard	Jackhammer Operator	Watchperson or Security Guard	

[1] http://www.community.gov.yk.ca/pdf/Fair-Wage-Schedule_2018.pdf

The Fair Wage Schedule (O.I.C. 2005/193) sets the wage rates (by category, class and job title) that can be paid to persons working on a contract for a public work of the Yukon.

Annual adjustments to the Fair Wage Schedule come into effect every year on April 1st, and are based on the previous year's Consumer Price Index (CPI). These adjustments must be paid to all employees working on existing and upcoming construction contracts with the government.