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VOID BACKFILLING WORK SUMMARY

Giant Mine B1-18 Stope Complex

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REPORT

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1.0 INTRODUCTION

Golder Associates Ltd. (Golder) is pleased to provide this report to Public Works and Government Services Canada (PWGSC) as part of the Quality Assurance (QA) effort carried out during paste backfilling of underground voids in the B1-18 stope complex area at the Giant Mine Remediation Project carried out between early October and mid-December, 2013. This report provides a summary of the work completed in 2013 by the backfilling contractor. Comments on the work relative to the criteria laid out in the *Underground Stabilisation Work Plan* (AANDC, 2013a and 2013b) and in subsequent collective decisions by various project stakeholders are also provided.

2.0 BACKGROUND

The B1-18 stope complex is comprised of a series of interconnected partially backfilled voids below ground surface between the B1 and B2 open pits at the Giant Mine site (see Figures 1 and 2 attached at end of report). The *Underground Stabilisation Work Plan* included backfilling portions of the B1-18 stope complex that underlie Baker Creek in order to reduce risks associated with a crown pillar failure and subsequent flooding of the mine.

The B1-18 stope complex was mined previously using cut-and-fill mining methods. Multiple voids in the area will be backfilled to mitigate hazards associated with crown-pillar instability under Baker Creek. The largest voids and the target of the backfilling represent the last rounds of cut-and-fill mining in this complex, associated stope development accesses, and nearby long-term mine access development.

Areas of the B1-18 stope complex previously identified as posing a stability concern included areas of relatively thin crown pillar under Baker Creek and those in proximity to a surface depression (i.e., sinkhole) that had developed on the south rim of the B1 open pit in May of 2012. The four areas of concern are shown on the mine plan in Figure 3. A screen-capture of the digital 3D Mine Model of the area also highlights the four areas of concern on Figure 4. Contours of crown pillar thickness (rock only, no overburden) are shown in Figure 5.

Since the geometry of the underground area was not fully characterised at the onset of the project the work plan changed several times. Efforts by the Care and Maintenance contractor to gradually develop safe access to some of the various voids eventually allowed engineering inspection and surveying efforts to improve the mine geometry picture even as drilling and backfilling was initiated and ongoing. As a result the void volume estimate used in early planning proved to be higher than was eventually measured through surveying and the volume of the area was ultimately estimated at approximately 19,000 cubic meters (m^3).

A comprehensive drawing package for the B1-18 area has been delivered to PWGSC under separate cover (Golder MSS document #066, 2013) from which the Figures in this report were derived.

3.0 VOID BACKFILL COMPLETION CRITERIA AND VERIFICATION METHODOLOGY

The *Underground Stabilisation Work Plan*, specifically Attachment C of the response to review comments of the work plan (AANDC, 2013b), outlined the following completion criteria for the backfilling work:

- To be considered complete the individual stope voids will be filled to within a minimum vertical distance (minimum vertical measurement from back of stope to paste backfill level) equivalent to less than or equal to 1/20 of the crown pillar thickness. Therefore, according to this criterion, the paste backfill does not necessarily need to completely fill the void (e.g., backfill tight to the roof / back). For example if the crown pillar was 10 m thick, the backfill would need to be placed within 0.5 m of the roof of the stope to meet the criteria.
- Stope voids to be backfilled with paste with a minimum 28 day uniaxial compressive strength (UCS) of 100 kPa containing a minimum of 1% (by weight) of normal Portland cement, and/or clean-rock fill (sourced from offsite).
- Fill fences (barricades) will be designed to withstand the load placed upon them by paste after initial placement and for 24 hours.

The generic value of remaining void height stated in the first criterion was intended to limit the risk of surface subsidence due to crown pillar collapse. However, small amounts of ground movement could allow natural fracture dilation and leakage of some water into the underground. Therefore subsequent to the submission of the *Underground Stabilisation Work Plan*, the project technical team (Golder, PWGSC, and AANDC consultants) decided that where practically possible, the maximum amount of high slump paste should be injected into the target voids that are situated directly under Baker Creek. This would reduce the potential for leakage of water into the underground if any crown pillar collapse initiated. This was to be accomplished by pumping as much high slump paste into the void, particularly when the void was nearly full, to maximise the amount of tight filling.

Paste backfill quality assurance and verification methods stated in Attachment C of the *Underground Stabilisation Work Plan* included:

- Visual confirmation that the void is filled to meet design criteria will be achieved through the use of volumetric assessment checks, camera monitoring surveys and void laser scans as practically possible.
- Slump paste testing to check that operational parameters for viscosity for any one particular pour are met.
- Unconfined Compressive Strength testing of paste for each pour to check that minimum backfill strength design criteria are being met.
- As required by Schedule 1, Item 1(o), “As-Built Statement of Risk Mitigation” letters stamped by a professional engineer that confirm that the mitigation objectives have been met for each void backfilled in the Underground Stabilization Work Area will be submitted to the MVLWB as part of the semi-annual reports. This as-built record will include the assumptions and methodology for determination of the closure criteria and include the records of paste tailings testing carried out during the work and documentation of the verification that the stope was filled to the required level.

Additional practical methods to check the geometry (level and profile) of the paste in individual voids include:

- Direct underground visual inspection of the paste from safely accessible areas.
- Paste delivery boreholes filled with paste above the elevation of the intersection with the void. Since the holes were targeted to intersect the high points in the voids, this indicates the void is at least partly full.
- An increase in pressure during pumping of paste down a borehole indicates the void may be filling up.
- Where voids of constrained volume are present, a volumetric assessment of paste injected vs. the void size could be compared to check for fullness.
- Fixed remote cameras placed in strategic positions can show targeted voids filling up.
- Checks of paste level and profile and elevation using borehole cameras in observation holes and paste delivery holes.
- Checks of the paste level and profile using optical laser scanning methods (cavity monitoring scanners).

As discussed later in this report, a combination of the various methods noted above was used to assess the level and profile of the paste in the various voids.

A paste testing laboratory was setup in Yellowknife to collect the required quality control information on the paste. This laboratory was first located at Golder's Yellowknife office but was later moved to the Mobile Equipment Garage (MEG) Building at the Giant Mine site due to concerns with silica and arsenic dust. The MEG Building has a ventilation system that provided a better working environment.

This document focusses on providing verification of the physical position and shape or profile of the paste stack in the voids upon the cessation of backfilling activities in mid-December 2013. General comments on the slump and strength of the paste injected into the voids are provided herein, but detailed paste quality control data is included in Golder 2013a.

4.0 BACKFILL IMPLEMENTATION PLAN

The *Underground Stabilisation Work Plan* described filling the voids using cemented paste tailings backfill (paste) delivered underground via. boreholes drilled from surface. The paste was to be constrained in the targeted void areas using fill fences (also known as barricades) constructed at safely accessible locations. As no personnel were to be underground during backfilling for safety reasons live monitoring of the work was carried out using fixed underground cameras and portable borehole cameras.

Due to the interconnected nature of the underground voids in the area it was known at the start of the work that some additional backfill volume was going to be required to fill the target areas. Due to the lack of safe access for inspection and the presence of partially backfilled (i.e., leaky) voids the volume was poorly constrained but was estimated to be approximately up to 22,000 m^3. Later surveying revealed that the early volume estimates were high and the void volume of various stope in the area shown in Figure 6, was approximately 19,000 m^3.

Connections between voids that were partially backfilled with waste rock were anticipated to exhibit leakage and in some cases additional boreholes were drilled close to these areas (e.g., north end of B1-18 EA stope void as seen in Figure 6). The strategy was to inject high cement, moderate slump (4 to 6 inch) material that in some cases contained aggregate to try and plug the leaks.

Drilling of observation and paste delivery boreholes, construction of fill fences, and some placement of paste backfill began before characterisation of the geometry of the underground in the area could be completed. The drilling took longer than anticipated and some planned borehole cavity monitoring scans were not available until mid-way through the program. Paste production rates were lower than anticipated during planning phases and highly variable. Some areas expected to exhibit excessive leakage plugged up quickly, others never did.

Therefore the work planning process was dynamic and multiple implementation plans were developed. These plans were used for discussion with the engineering staff and the drilling and paste production contractors to describe the approach to the work and provide direction to the contract managers. Many changes to the approach were made in the field to deal with conditions encountered that day. Appendix A includes the B1-18 void backfilling underground implementation plan, revision 8, dated November 19, 2013. Because the elevation of the voids in the south is higher than the north, backfilling progressed from the lowest reaches of the area (north) to the highest (south).

The most challenging aspect of planning the work was due to the uncertainty related to the tightness of backfill placed between interconnected voids during active mining. Leakage from most of the targeted voids was anticipated but estimation of the volume of additional paste required to fill the partially backfilled voids where leaks would flow to was difficult. Additional boreholes were drilled close to obvious leakage points so that relatively low slump “leak plugging” paste (e.g., 100 mm to 125 mm (4” to 5)” slump) could be injected directly into the leakage area. In some cases leaks plugged up quickly, in other they did not. Photograph 1 shows one such example of a leakage point in the B1-18 Upper North extension that was eventually plugged with the addition of approximately 200 m^3 of additional paste.

Photograph 1: Partially backfilled connection between voids – example of leakage point that was plugged

Photograph 2 shows an example leakage point at the northern end of B1-18 EA void that was not plugged by the end of the paste production period.

Photograph 2: Partially backfilled connection between voids – example of leakage point that was not plugged.

Plugging the leak shown in Photograph 2 would allow paste to fill an area that would not be anticipated to impact Baker Creek and was therefore not deemed critical to the project in 2013.

Additional details on boreholes, fill fences (barricades) and the underground camera monitoring system relevant to this completion report are outlined in the following sections.

4.1 Boreholes

A total of 485 m of drilling was carried out to enable the backfilling of the B1-18 stope complex. The boreholes drilled to deliver paste underground, either directly into the stope voids or via. underground pipeline (slickline) and to observe movement of paste and the level and profile of paste in the voids, are shown in Figure 7. Three categories of holes were drilled:

- Paste Delivery (e.g., P_Deliv_118_#) boreholes (200 mm diameter) for delivery of bulk high slump paste fill either directly into the void or to deliver paste to an underground slickline.
- Plug Delivery (e.g., Plug_Deliv_118_#) boreholes (200 mm diameter) for delivery of medium to low slump, high cement content paste for construction of remote barricades.
- Observation (e.g., Obs_118_#) boreholes (96 mm diameter) for inspection and cavity monitoring scanning of inaccessible areas, observation of paste movement during backfilling, and assessment of paste level and profile for completion checks.

Table 1 lists the boreholes drilled for paste delivery and implementation of the B1-18 stope backfilling project and the original intended purpose of the borehole.

Table 1: Boreholes Drilled to Implement the B1-18 Stope Complex Backfilling Project

Borehole	Purpose
P_Deliv_118_01	Delivery of bulk paste fill to B1-18 Upper Void – note that the steel casing extended 1.2 m from the back into the void making it inappropriate for the final tight backfilling. Additional holes were required to accomplish this – see P_Deliv_118_14.
P_Deliv_118_02	Delivery of bulk paste fill to upper B1-01 shrink stope void under B1 pit sinkhole.
P_Deliv_118_03	Delivery of bulk paste fill to B1-18 EB and EA voids.
Plug_Deliv_118_04	Delivery of remote barricade paste to stop bulk fill from entering B1 ventilation shaft.
Plug_Deliv_118_05	Delivery of bulk paste and leak plugging paste to fill up area above barricade 1 and plug leaks through fill to areas below.
P_Deliv_118_06	Delivery of remote barricade paste to stop bulk fill from leaking from B1-18 Upper to lower areas of the mine.
Plug_Deliv_118_07	Contingency bulk paste fill delivery borehole if leaks inside barricade 1 could not be filled.
P_Deliv_118_08	Delivery of bulk fill via. underground slickline to areas that could not be accessed for drilling from surface due to topography and environmental constraints.
Plug_Deliv_118_09	Delivery of remote barricade paste or expanding foam to keep bulk paste fill from leaking out of the B1-18 EA North area via. the B2-05 raise system that connects to lower levels of the mine. This was not attempted.
P_Deliv_118_10	Drilled but borehole intersected backfill and was not useable for paste delivery or observation.
P_Deliv_118_11	Delivery of leak plugging paste fill to block bulk fill delivered via. P_Deliv_118_03 from leaking out to the B1-18 bypass void area.
P_Deliv_118_12	Delivery of bulk paste fill to upper B1-01 shrink stope void under B1 pit sinkhole.
P_Deliv_118_13	Contingency borehole never drilled.
P_Deliv_118_14	Delivery of bulk paste fill to B1-18 Upper void – required because the casing for P_Deliv_118_01 was installed below the breakthrough point.
P_Deliv_118_15	Delivery of bulk paste fill to B1-18 Upper – North extension under Baker Creek.
Obs_118_02	Observation hole for delivery of bulk paste fill into B1-18 EA and EB and secondary fill hole if required.
Obs_118_03	Observation hole for delivery of bulk paste fill into void above barricade 1.
Obs_118_04	Observation of remote borehole paste or expanding foam to plug the B2-05 raise, if attempted.
Obs_118_05	Observation borehole to monitor that paste was not flowing into the B ventilation shaft which is critical mine infrastructure.
Obs_118_06	Observation of bulk paste fill delivery into B1-01 shrink stope under the B1 pit sinkhole.
Obs_118_07	Observation of remote barricade construction via. Plug_deliv_118_04 and whether paste is flowing out of the B1-18 Upper.
Boreholes Previously Drilled for Geotechnical Assessment in 2012/2013 but useful for the Work	
BKGT_12_14	Drilled into B#1 Longhole stope void.
BKGT_12_15	Drilled into B1-18 Lower stope void.
BKGT_12_16	Drilled to assess crown pillar of B1-18 Lower, but intersected rib close to fill so was not useable for the project.

Meters drilled for the three categories included: P_Deliv – 195 m; Plug_Deliv – 125 m; Obs – 165 m. Some observation holes were used for paste delivery during the project.

Additionally, two geotechnical investigation boreholes (diameter 96 mm) drilled in early 2013 were also used for observation and placement of paste in the voids (shown in Figure 7).

Appendix B shows a table with detailed information on the boreholes drilled including some performance information.

The paste delivery and plug delivery holes were meant to be fully lined with steel to allow paste to be delivered reliably (e.g., no loss of paste or plugging due to irregular borehole walls) with pressure. Not all holes were fully lined as issues with casing placement were encountered. Surface casings were prepared so that various paste production equipment could be attached directly to them and paste delivered under pressure.

Drilling accuracy was beyond the specification (1% deviation tolerance) but with the exception of one hole the boreholes met the required objectives.

Not all of the targeted voids could be drilled directly into from surface due to lack of access. An underground slickline was constructed to move paste from an underground borehole intersection to the target void as shown in Figure 7. A detailed drawing of the "as-constructed" underground slickline is included in Appendix C.

4.2 Fill Fences (Barricades)

Non-engineered fill fences were used to contain the paste backfill and keep it from exiting the voids via the stope access development. The fill fences were not intended to withstand a high head of liquid paste and were be constructed in such a manner that any one particular lift of liquid, non-cured paste could be no higher than approximately 1.5 to 1.8 m (e.g., excess paste will spill). Once a lift of paste had been poured behind a barricade it was left to cure for at least one day (or less if samples collected during paste production had cured), the ports were closed and the next or final lift(s) placed on the fill fences.

These fill fences were constructed from various materials including combinations of waste rock, timber, and/or geo-fabric, etc. Paste barricades constructed to contain the paste are shown in Attachment 1 – page 9 in green. Contingency barricades required for scheduling reasons or to contain paste in areas where unexpected leakage occurred are noted in red.

Appendix D includes drawings describing the geometry of the various barricades constructed. Note that barricade 7 (Appendix D) was never constructed and contingency barricades CB7 and CB8 were only partially constructed.

The paste filling operation was executed at a relatively low rate (50-400 m^3/day) and the level of paste at the fill fences rarely rose rapidly. The level of paste backfill at the fill fence sites was monitored using fixed underground and borehole cameras that could be monitored remotely (e.g., not underground). In some cases backfilling in a particular borehole was stopped when the maximum lift height was reached and backfilling progressed in another area. If no options for alternative backfilling were available, work had to stand down until the barricade could be inspected and the ports closed.

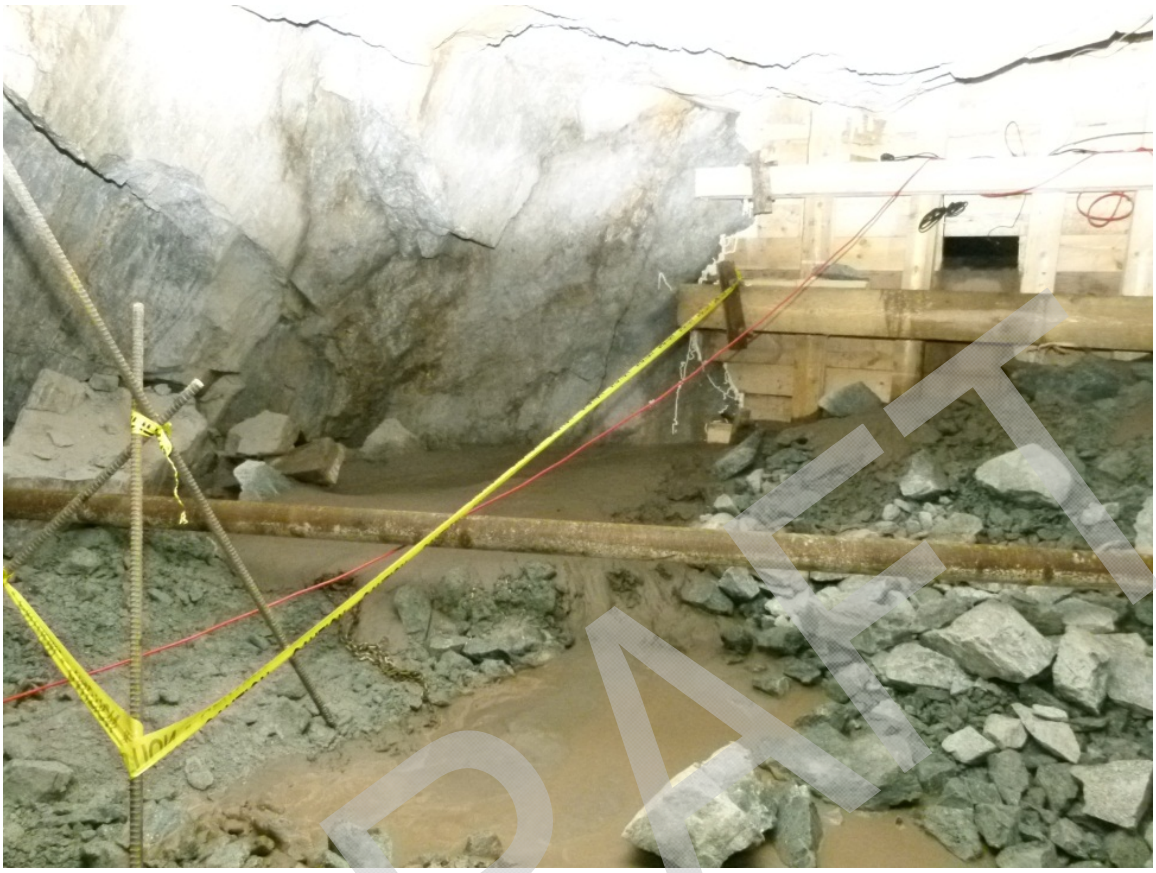
Administrative controls were put in place that stated that 'no personnel should be present in underground workings connected to a particular stope void in the process of being backfilled'. Specifically, no personnel were to be under or adjacent to avoid being filled with non-cured cemented paste tailings unless they were in openings with no physical connection to the area being filled. Samples of cemented paste tailings were collected on surface during filling to assess when the paste was cured. It was found that the paste generally cured within 8 to 48 hours after it was batched.

Paste barricades constructed to contain the paste are shown in Figure 8 in green. Contingency paste barricades required for scheduling reasons or to contain paste in areas where unexpected leakage occurred are noted in Figure 8 in red. Available photographs of the paste barricades are included in Figure 9.

The rock fill and timber barricades generally performed the best, with few leaks noted. These barricades were constructed with a base of waste rock fill topped by a timber seal. Barricade 6 which was constructed only with rock fill leaked during delivery of paste behind it. A "rammer-jammer" attachment used with the mine loader was ineffective in packing the fill tight to the back, particularly in the vicinity of the paste slickline.

Photograph 3 shows Barricade 1 prior to paste delivery and Photograph 4 shows the area after the paste level had risen to the first spill point. This was noted in the underground cameras. Paste pumping was stopped and personnel re-entered the mine 24 hours later to inspect the barricade. Photograph 5, taken through one of the ports in Barricade 1 shows the flat profile of the paste.

Photograph 3: Constructed fill fence (barricade 1) showing ports for paste spillage prior to backfilling



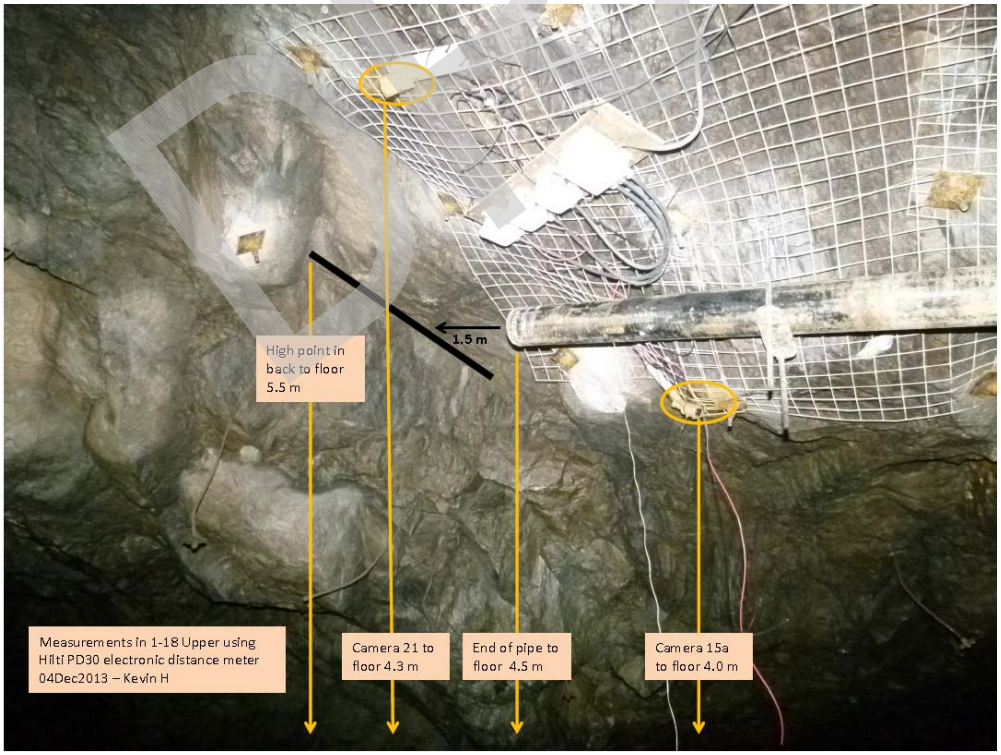
Photograph 4: Constructed fill fence (barricade 1) showing paste spillage from ports

Photograph 5: Paste behind barricade 2 (taken through ports) showing flat paste profile

4.3 Underground and Borehole Monitoring Cameras

The locations of fixed underground cameras installed to monitor the backfilling work are shown in Figure 10. Note that not all cameras were in place at the same time as once areas were filled cameras became redundant they were reused in other locations if possible. Other cameras were destroyed when they were consumed by the backfill due to lack of safe access for camera recovery. Some cameras were setup on saw-horses to expedite getting them in place quickly others were affixed to the back (roof) as shown in Photographs 6 and 7 respectively.

Photograph 6: Saw-Horse mounted camera



Photograph 7: Cameras fixed to the back in B1-18 Upper, note end of paste delivery slickline

Digital feed from all the remote cameras was monitored and recorded at a terminal situated outside the UBC portal. Data was collected over the project duration and can be provided upon request.

Daily underground camera highlights were compiled for sharing with project staff and proved useful in short term planning activities. An example of a daily camera survey highlight presentation is located in Figure 11.

Some cameras recorded paste rising over them and their destruction was recorded. This in itself is a check on the level of paste in the stope void as the level of the camera was known. Photograph 8 shows an example of such an event.

Photograph 8: Camera 8, November 20, 2014, paste covers bottom half of lens

5.0 PASTE DELIVERY

The paste production at the B1-18 stope complex was described in Golder 2014b. Highlights from this report relevant to the description of the completion of backfilling the voids are repeated here.

The first paste was delivered underground on October 21, 2014 and the last paste was delivered on December 10, 2013 which represents the date when paste production operations were halted due to the cold (end of season). Approximately 10,667 m^3 was delivered to the underground at variable rates as shown in Chart 1 below.

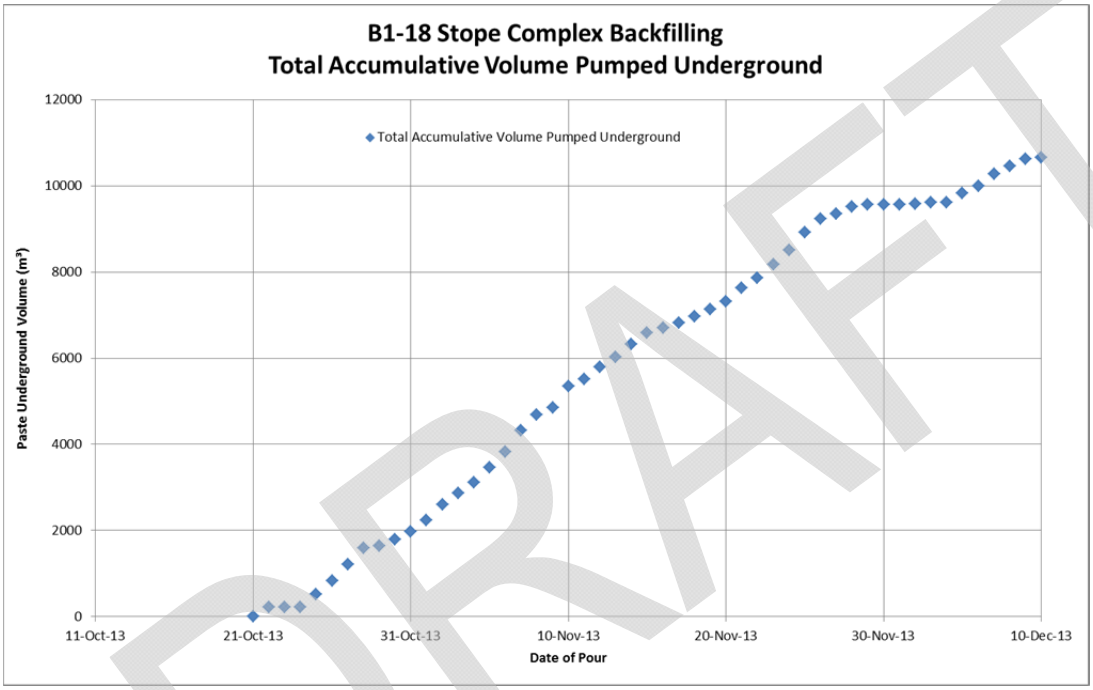


Chart 1: Cumulative paste production – B1-18 backfilling project

The most common paste mix recipe was 250mm (10”) slump) with 2% binder content (by weight, Normal Portland Cement).

The lowest cement content of the paste mix achievable with the equipment mobilised to site was 2% (by weight). Thus all paste poured met the minimum criteria. Cement contents as high as 15% (by weight) were used in conjunction with 13 mm minus (1/2” minus) sized aggregate when remote barricade construction was executed. Various paste slumps were produced with the majority being high viscosity 250 mm (10”) slump material. This material was found to move the furthest from the delivery boreholes and provide the flattest paste stack profile which is desired to fill the void up as high as possible.

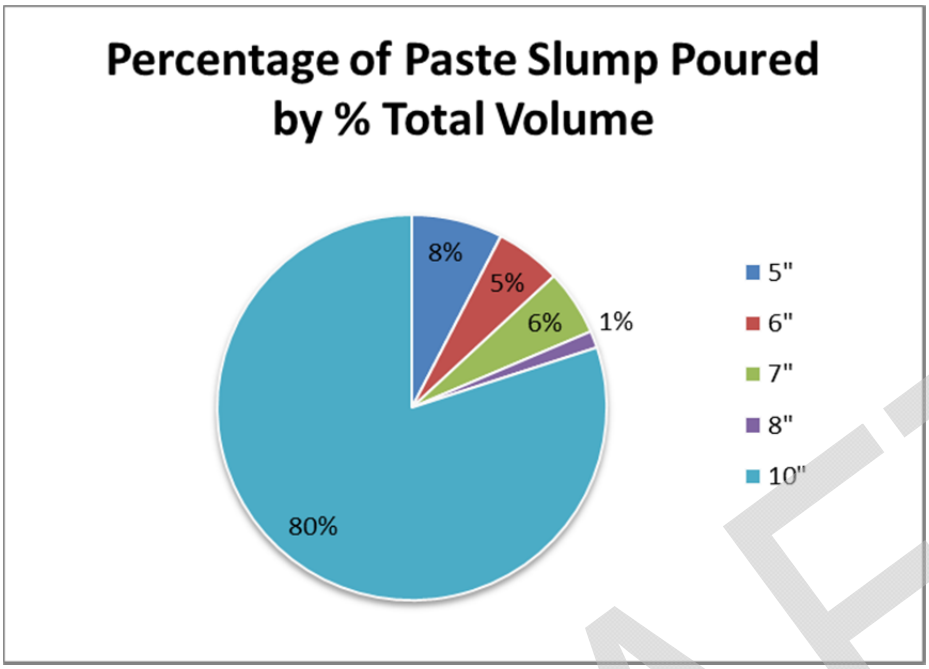


Chart 2: Distribution on paste slump poured by % volume.

Photograph 9 below shows 10” slump paste material produced at Giant Mine.

Photograph 9: 250 mm (10”) slump paste with 2% (by weight) Normal Portland Cement binder

The lower slump material (relative to 250 mm (10") slump) was used for construction of remote barricades (paste poured via. borehole) or in an attempt to plug leaky areas.

Of the 250 mm (10") slump poured, the majority of it was of the lowest cement content possible (2% by weight) as shown below in chart 3.

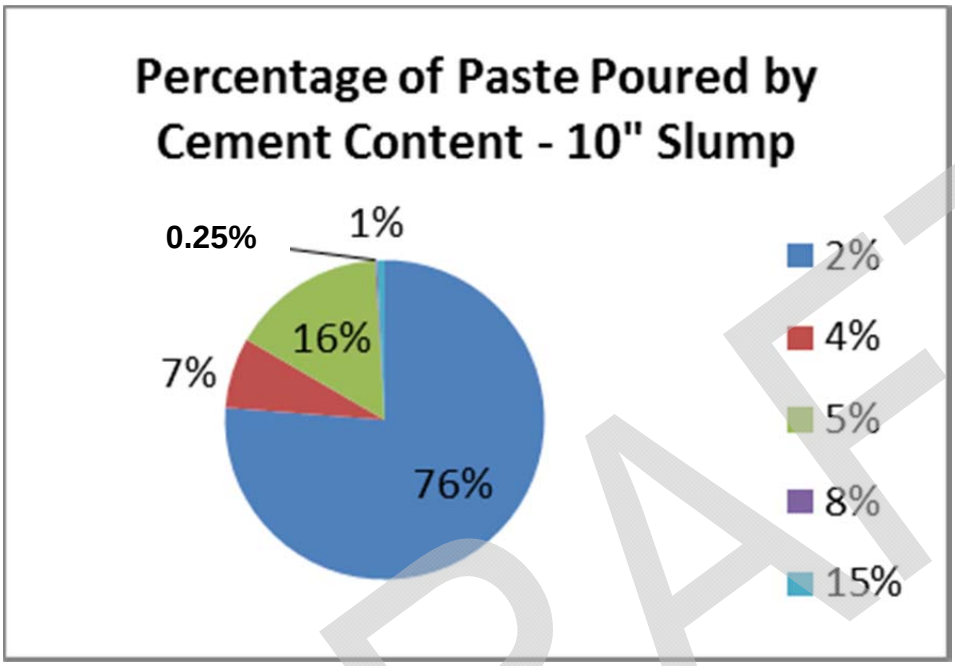


Chart 3: Distribution on cement content of 250mm (10") slump poured

Small amount of very high cement contents, 8% cement (0.25% of total poured) and 15% cement (0.75% of total poured), was produce to build remote fill fences and plug leaks.

The average paste produced per day was 193 m^3 and the average amount of water sourced from the polishing pond used per day was 36 m^3. The average ratio of water / tailings by volume was 0.19.

The paste pump(s) worked on average 3.4 hours per day. Much of the project made use of one paste pump and therefore the estimated paste production per unit was 50-70 m^3/hour.

The amount of 250 mm (10") slump material used is important as this paste mix provides a very flat paste profile. This means that as the level of paste in a particular void rises it does so evenly over the area of the void. Since boreholes were generally targeted to intersect the high point of the void once the borehole is full of paste this is a strong indicator of the void being tightly filled. Photographs 10-12 show examples of flat paste profiles in various voids in the B1-18 stope complex.

Photograph 10: Flat paste profile south of B1-18 EA void

Photograph 11: Flat paste profile in the North extension of the B1-18 Upper North stope

Photograph 12: Flat paste profile in B1-18 EB void below B1 pit sinkhole

Additional evidence of the relatively flat profile of the paste includes laser cavity monitoring scans carried out prior to backfilling, and after some paste had been pumped into the void. Figure 12 shows laser scans carried out remotely through paste delivery boreholes after paste delivery to underground voids. The flat paste profile is evident.

The strength of the paste cylinders cast daily as quality control checks are documented in Golder 2013a. All tests exhibited 28 day uniaxial compressive strengths in excess of the minimum criteria of 100 kPa. Some tests exhibited 100 kPa within 1 to 3 days.

6.0 BOREHOLE STATUS AT END OF PROJECT

As discussed previously one of the clearest pieces of evidence that a void is near full of paste is when the borehole, or specifically the casing installed in the borehole, is partly filled with paste above the breakthrough point. This is particularly valid if the borehole intersected the high point of the void and the majority of paste pumped into a particular borehole was 250mm (10") slump which exhibits a flat profile.

By the time paste production was shut down for the season on December 10, 2013, a total of about 10,667 m^3 of paste was pumped underground. Ultimately, 13 boreholes were used to backfill the 1-18 stope. Table 2 shows the status of the boreholes at the time the paste production was halted for the season.

Table 2: Borehole Status including Remaining Freeboard

Borehole	Status	Approximate Amount of Freeboard between Breakthrough and Floor of Void
P_Deliv_118_01	Plugged	Hole plugged – No freeboard remains
P_Deliv_118_02	Plugged	Hole plugged – No freeboard remains
P_Deliv_118_03	Plugged	Hole plugged – No freeboard remains
Plug_Deliv_118_04	Open, no need to fill	Not in an important filling area
Plug_Deliv_118_05	Plugged	Hole plugged – No freeboard remains
P_Deliv_118_06	Plugged	Hole plugged – No freeboard remains
Plug_Deliv_118_07	Open, no need to fill	Not in an important filling area
P_Deliv_118_08	Open	Hole connected to slickline. Hole open.
Plug_Deliv_118_09	Open, no need to fill	2.9 m freeboard. No paste present
P_Deliv_118_10	Partial breakthrough (abandoned)	Hole abandoned
P_Deliv_118_11	Open	1.7 m freeboard to paste
P_Deliv_118_12	Plugged	Hole plugged – No freeboard remains
P_Deliv_118_14	Plugged	Hole plugged – No freeboard remains
P_Deliv_118_15	Open	Pig blocking view at breakthrough
Obs_118_02	Open	0.9 m freeboard to paste
Obs_118_03	Plugged	Hole plugged – No freeboard remains
Obs_118_04	Open, no need to fill	3.8 m freeboard. No paste present.
Obs_118_05	Open, no need to fill	Not in an important filling area
Obs_118_06	Plugged	Hole plugged – No freeboard remains
Obs_118_07	Plugged	Hole plugged – No freeboard remains
BKGT-12-14	Plugged	Hole plugged – No freeboard remains
BKGT-12-15	Plugged	Hole plugged – No freeboard remains
BKGT_12_16	Unavailable – no access to collar	Hole abandoned

The borehole status is also shown graphically in Figure 13.

7.0 BACKFILL COMPLETENESS OF FOUR (4) CRITICAL AREAS

A qualitative assessment of the level of backfill in the various voids in the B1-18 stope complex is summarised in Figure 14. Specific information regarding the level and profile of paste backfill in the four critical areas shown in Figures 3, 4, and 5 is outlined in this section. Should some rock crown failure, cracking, or block movement occur in one of these four areas under Baker Creek water could enter the mine at an unknown flow rate. These areas are:

1) North extension of B1-18 Upper stope.

2) Voids under the B1 open pit sinkhole.

3) B1-18 Lower stope.

4) North branch of B1-18 Upper access drift.

Crown pillar thickness was used to define an acceptable level of backfilling within the underground excavation in the water licence submittals. If the remaining void height is no more than 5% of the crown pillar thickness, then the excavation meets those minimum criteria. However, in these critical areas it was determined that the paste should be raised to as close to the back as practically possible.

The information used to confirm that the underground excavations have been filled to this acceptable level are based on observations made both underground and remotely from surface. They include measurement of the level of paste in boreholes, borehole camera surveys, fixed underground camera monitoring, Cavity Monitoring Surveys (CMS) of the voids carried out through boreholes, underground inspections, and comparison of initial estimated void volume to the volume of paste delivered. The last method is problematic for the B1-18 stope complex due to the interconnected nature of the voids and the mobility of the most common paste mix chosen.

The first three of the four critical areas noted in the list above were filled or partially filled and no backfill was placed in the fourth critical void (North branch of B1-18 Upper access drift). Additional detail on the backfill completeness verification evidence for these three areas is provided in the Tables 3-5.

Table 3: Backfill Completeness Verification Summary Table – North Extension of B1-18 Upper Stope

Area:	**1-18 Upper North extension**			
Filling objective:	To fill the Northern extension of the 1-18 Upper			
Performance Criteria	**Target value**		**Final value**	
Criteria #1: Crown Pillar thickness		**Final fill level**		
Thickness (m):	9-15			
1/20 target value (m):	0.6	Freeboard remaining (m):	1.4	
Criteria #2: Plug drillholes intersecting Upper stope and Paste delivery pipe entering Upper				
Elevation of paste in drillholes	Deliv_15	Paste Pipe from Deliv_06		
	Not yet plugged	1-18 Upper North extension is not yet filled to the target value		
Criteria #3: Strength of the paste				
Minimum Strength of the paste at 28 days	100 kPa			
Control of the completness	**Y/N**	**Details**	**Date**	**Results**
Borehole filling	N	Not yet filled to target value	30th Dec 2013	
Initial volumetric calculation m^3	Y	Initial estiamte: 768	7th Dec 2013	841 poured
Last lift survey	N	No acces to perform survey available.		
In-place or borehole cameras	Y	A camera survey of hole P_Deliv_118_15 was taken but is blocked by a pig		
Confirmatory hole	N	No Confirmatory hole is planned		
Paste in-situ samples	N	No In-situ paste samples have been taken		
In-person inspection	N	In person inspection is not possible		

Table 4: Backfill Completeness Verification Summary Table – Voids Under B1 Pit Sinkhole

Area:	**1-18 Shrink stope**				
Filling objective:	To fill the shrink stope below the "sink hole"				
Performance Criteria	**Target value**			**Final value**	
Criteria #1: Crown Pillar thickness		**Final fill level**			
Thickness (m):	9				
1/20 target value (m):	0.45	Freeboard remaining (m):		0	
Criteria #2: Plug drillholes intersecting Shrink stope					
Elevation of paste in drillholes	P_Deliv_118_12	P_Deliv_118_02	BKGT 12-14	* During final pour through P_Deliv_118_12 paste flowed out of P_Deliv_118_02 and BKGT 12-14 indicating that the area has been filled.	
	Hole Full	Hole Full	1.3m below breakthrough		
Verificaiton Control	**Y/N**	**Details**		**Date**	**Results**
Borehole filling	Y	Paste in Deliv_02 and Deliv_12		28-Nov-13	Hole topped up with paste, hole full.
Initial volumetric calculation	N	No access for prelim survey			
Last lift survey	N	Paste delivery holes full of paste and no underground access			
In-place or borehole cameras	Y	Deliv_02, Deliv_12, BKGT 12-14		14-Nov-13	Videos available
Confirmatory hole	N	No confirmatory hole planned			
Paste in-situ samples	N	Only possible downhole, no underground access available			
In-person inspection	N	Not possible. No underground access available			

Table 5: Backfill Completeness Verification Summary Table – B1-18 Lower Stope

Area:	1-18 Lower				
Filling objective:	To fill the 1-18 lower to within ~1m of the back				
Performance Criteria	**Value**		**Final value**		
Criteria #1: Crown Pillar thickness		**Final fill level**			
Thickness (m):	15				
1/20 target value (m):	0.75	Freeboard remaining (m):	0		
Criteria #2: Plug drillholes intersecting 1-18 Longhole stope					
Elevation of paste in drillholes*	Deliv_118_01	BKGT_12_15	* Hole Deliv_118_01 has casing protruding from the breakthrough by approximately 1m. Camera surveys of this hole are not considered an accurate measure of completeness.		
	Hole filled, 5-Dec-13	Hole Filled, 29-Nov-13			
Control of the completness	**Y/N**	**Details**		**Date**	**Results**
Borehole filling	Y	Paste in Deliv_01 and BKGT_12_15		14-Nov-13	Paste had settled the following day
Initial volumetric calculation	N	No access for prelim survey			
Last lift survey	N	No access to perform final survey			
In-place or borehole cameras	Y	Deliv_118_01, BKGT 12-15		29-Nov-13	Videos available
Confirmatory hole	N	No confirmatory hole planned			
Paste in-situ samples	N	No access available, in-situ sample only possible downhole			
In-person inspection	N	Not possible, no access available.			

An overview of completion status for each zone is provided in Table 6.

Table 6: Backfill Completion Information for Four Critical Voids under Baker Creek in B1-18 Stope Complex Area

Critical Area	Approximate Range of Rock Crown Pillar Thickness (m)	Completion Status w.r.t. Water License Criteria	Paste Delivery Boreholes Connected to Void	Backfill Completeness Verification Evidence
1 - North extension of 1-18 Upper stope	9-15m	Fill 1.4 m from back vs. target of 0.6 m	P_Deliv_118_15 P_Deliv_118_08	▪ CMS in 118_15 compare to pre-fill scan ▪ UG Cameras 14, 15a, 15b, 21 ▪ 118_15 borehole video
2 - Voids under the B1 open pit sinkhole	5-20m	100% (Tight Fill)	P_Deliv_118_03 P_Deliv_118_12	▪ P_Deliv_118_02, P_Deliv_118_12 and ▪ BKGT 12-14 filled with paste ▪ UG Cameras 9, 10 ▪ CMS in OBS_118_02 ▪ 118_03 ▪ OBS _118_02 borehole video
3 - 1-18 Lower stope	20-25	100% (Tight Fill)	P_Deliv_118_01 BKGT 12-15	▪ P_Deliv_118_14 plugged ▪ P_Deliv_118_01 paste rise – photo of paste on ground ▪ UG Cameras 13a, 13b
4 - North branch of 1-18 Upper access drift	4-8	0% (contingency plan to fill with muck)		

Due to the complex interconnected nature of the partially backfilled voids and the dynamic environment of the paste placement work, additional narrative and description of the backfilling of the three voids described in Tables 2 through 5 is required and this is provided in the following section.

7.1 Narrative of Backfill Completeness Evidence for Critical Voids

Additional description of the information summarised in Tables 3, 4, 5, and 6 is provided in the following sections.

7.1.1 Northern Extension of B1-18 Upper Stope

The original plan called for backfilling the B1-18 Upper stope (including the northern extension) by pumping paste through borehole P_Deliv_118_08 and the attached underground pipeline. This work could only occur after the entire B1-18 Upper area was isolated by filling the 1-18 Lower stope and constructing Barricades 5 and 6 (B5 and B6). Extended delays in delivery of materials for the pipeline prompted the need for an alternative plan to isolate the northern extension of B1-18 Upper. Contingency Barricade 7 (CB7) was constructed and a new borehole (P_Deliv_118_15) was drilled. A total of 608 m^3 of paste was pumped through this hole on November 24 and 25. The pipeline was ultimately completed, CB7 removed and B6 constructed by December 5. An additional 416 m^3 of paste was pumped through P_Deliv_118_15 on three days from December 5 to 7.

The paste pumped into this area was low viscosity with average slumps ranging from 8 inch to 11.25 inch. Underground inspections following the first two days of pumping recorded that the paste flowed away from the point of injection and maintained a nearly flat profile throughout the area behind CB7. There was no access for inspection following construction of B6, but it can be assumed that paste with similar viscosity and slump will fill all available voids and maintain a similar flat profile. The volume of the north extension was estimated at 768 m^3 prior to filling which compares well to the 608 m^3 paste volume deposited behind CB7. The additional 416 m^3 pumped through P_Deliv_118_15 after removal of CB7 raised the paste level in the northern extension and also flowed beyond the CB7 location and appeared on cameras 15a and 21 in the main body of B1-18 Upper.

After completion of B6 and the pipeline, an additional volume of 323 m^3 of paste was delivered through P_Deliv_118_08 and the pipeline on three days from December 8 to 10. Again, this paste was very low viscosity with slumps from 230-250mm (9 -10”) and was designed to flow away from its injection point. Fixed underground camera 15a (aimed at the wet side of B6) recorded the level of paste at the brow of the access drift. This indicates that the paste in the northern extension of B1-18 Upper is within 1.4 m of the highest point in the back. Figures illustrating this point are included in the detail presented in Appendix E.

This risk associated with water inflow to the underground in this area due to crown pillar collapse has been significantly reduced by placement of paste backfill in it. However, the area requires additional backfill to complete the work as described in Section 9.0.

7.1.2 Area below the B1 Sinkhole (B1-01 Shrink Stope, B1-18 Long-hole Stope and B1-18 EB Stope)

The area of the B1-18 Stope complex deemed second in importance for filling is the area below the B1 Sinkhole as the sinkhole has the potential to allow water inrush into the underground workings during spring run-off. This area is comprised of the B1-01 shrink stope, the #1 long-hole stope and the B1-18 EB stope. These zones are interconnected and as such were treated as a single area to be filled. This area was filled through two boreholes, P_Deliv_118_03 and P_Deliv_118_12. Borehole P_Deliv_118_03 was used to partially fill the top of the EB stope and block the drawpoints of both the B1-01 shrink stope and #1 long-hole stope with a paste barricade. Once the drawpoints had been blocked by paste the B1-01 shrink stope and #1 long-hole stope were filled through borehole P_Deliv_118_12.

A large volume of paste (~3400 m^3) was pumped into this area beginning on October 27. Much of the paste leaked out of this area and was reported elsewhere as recorded on the fixed underground cameras and during physical inspections of the underground. The primary aim was to fill the area immediately beneath the sinkhole. November 11 was the last day that the paste pumped into this hole was recorded flowing elsewhere. After this date it appears that the paste pumped into P_Deliv_118_12 (458 m^3 on Nov. 12 to 14) remained in the B1-01 shrink stope/ #1 long-hole stope and began to fill toward the borehole breakthrough point. Complete filling of this area occurred on the November 14 when paste pumped into P_Deliv_118_12 reported back to surface through boreholes P_Deliv_118_02 and BKGT_12_14. This could only occur if no paste was leaking to other areas underground. Paste at 8 to 10 inch slump was injected during the final 5 days of pumping through this borehole making it unlikely that paste has simply built up in a pile to block the borehole. Figures illustrating the evidence for complete filling of this area are presented along with other details in Appendix E.

7.1.3 B1-18 Lower Stope

The B1-18 Lower stope is considered the lowest priority of the four critical areas in the B1-18 stope complex. This stope was primarily filled through hole P_Deliv_118_01 with the majority of the paste pumped into it being highly viscous high slump paste. Again the filling of this stope included a large proportion of the paste leaking from the numerous connecting drives and backfilled areas. Each time the paste was recorded flowing out of B1-18 Lower, pumping was stopped to allow it to set in an attempt to seal the leaks. The first paste pour in this area was on November 6 and by November 14 paste was no longer recorded leaking from the B1-18 Lower stope area. A total of 1218 m^3 was pumped on 7 days during this period. The remainder of the stope was filled with high slump, low viscosity paste until December 5 when P_Deliv_118_01 filled to 20 cm below the collar. An additional 796 m^3 of paste was pumped on 5 days during this period.

The evidence that the B1-18 Lower stope is full comes from the fact that during the pumping of the final lift into P_Deliv_118_01, paste was observed coming out of borehole BKGT_12_15. As the underground leak points from the B1-18 Lower had been sealed, the only avenue for the air/paste to escape from the B1-18 Lower was back to surface through BKGT_12_15. It was also observed that during the pumping, paste came out of the ground between the surface conductor casing and the full length hole casing on P_Deliv_118_01. Due to the very low viscosity of the paste pumped and the fact that the paste inside the full length hole casing settled at the same level as the paste inside the surface conductor casing it can be concluded that all of the air around the breakthrough of the borehole has been forced out and the void is completely filled. This is illustrated below in Plate 1.

Additional detail demonstrating that this area is filled is presented in Appendix E.

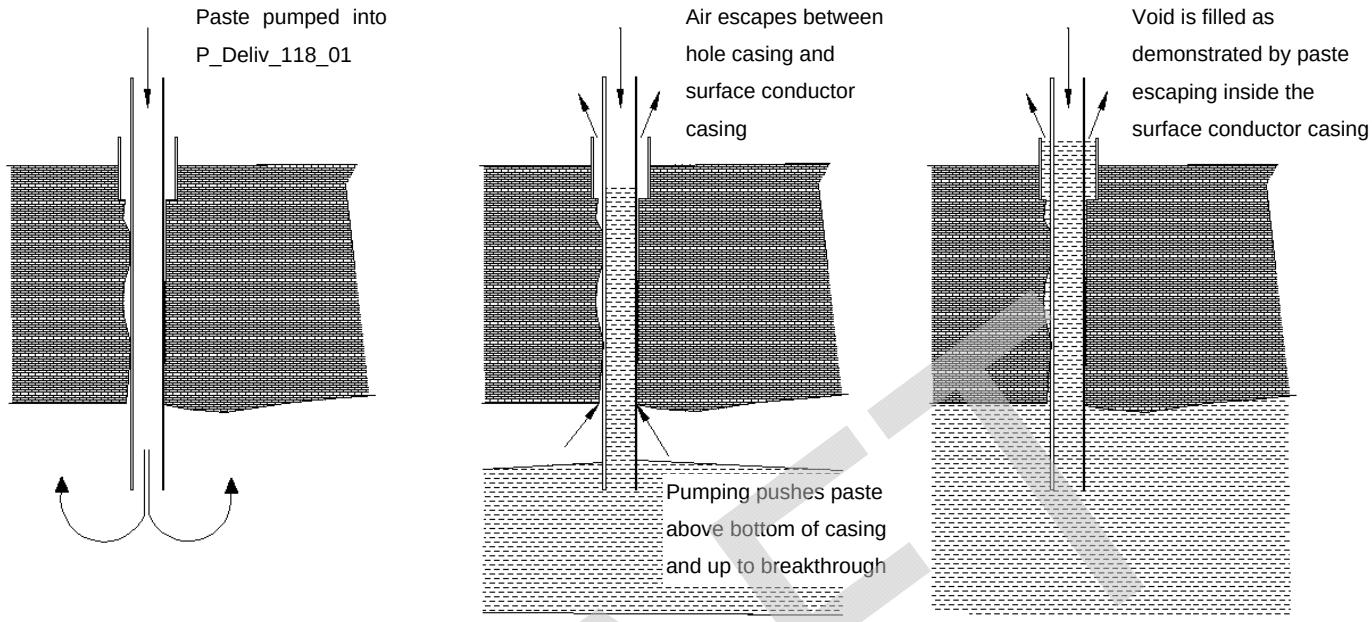


Plate 1: Schematic of final filling of P_Deliv_118_01

7.1.4 North Branch of B1-18 Upper Access Drift

The fourth area of importance in the 2013 filling schedule is the branch off the B1-18 Upper access drive which extends directly under Baker Creek. This drive contains the breakthrough of borehole P_Deliv_118_08 which is connected to the underground pipeline (slickline) used to fill the 1-18 Upper stope. The planned sequence was to complete filling of B1-18 Upper stope, disconnect the pipeline, construct Barricade 7 and then fill the B1-18 Upper access drift and branch by pumping through P_Deliv_118_08. Cold weather shut down paste production before this plan could be completed and as a result there is no backfill in the North branch of the B1-18 Upper access drift.

This critical area needs to be backfilled as discussed in Section 9.0.

8.0 CONCLUSIONS FOR CRITICAL AREAS UNDER BAKER CREEK

Comments on the work completed relative to the success criteria noted above are summarised below. Some comments on the potential long-term efficacy of the work for potential future discussion points on post-closure land use are also provided.

8.1 Paste Cement Content and Uniaxial Compressive Strength

The lowest cement content of the paste mix achievable with the equipment mobilised to site was 2% (by weight). Thus all paste poured met the minimum cement content criteria.

All uniaxial compressive strength tests on cast paste cylinders exhibited 28 day uniaxial compressive strengths in excess of the minimum criteria of 100 kPa. Thus all the paste produced met the minimum uniaxial compressive strength criteria.

The potential that some local minor segregation of the paste distal from the delivery borehole occurred in the underground exists. We anticipate that this local segregation may be most prevalent where bleed-water drainage channels developed but the majority of the paste backfill placed is likely similar to what was produced on surface. Some testing of samples collected in-situ from the underground should be carried out to verify that this is not an issue for future work.

8.2 Paste Geometry

Two of the four critical voids under Baker Creek in the B1-18 stope complex are likely filled nearly tight to the back with paste, including the voids in the 1-18 Lower stope and the voids under the B1 pit sinkhole. The risk associated with crown pillar failure, cracking has been greatly reduced in these areas.

The B1-18 Upper north extension has been backfilled to within approximately 1.4 m of the back but given that the rock crown pillar is between 9 m and 15 m thick the stope needs to be filled to within 45-75 centimeters of the back to meet the criteria. Additional paste fill is required for this area to meet the criteria but the risk associated with crown pillar movement has been significantly reduced.

The North branch of 1-18 Upper access drift has the thinnest crown pillar in the area and there is no backfill present in it at this time. The area needs to be backfilled to reduce the risk of water entering the mine due to crown pillar failure.

9.0 REMAINING WORK TO BE COMPLETED IN CRITICAL AREAS

Additional paste backfill is required to tight backfill two critical areas: the North extension of the B1-18 Upper stope and the North Branch of the B1-18 Upper access drift. Figure 15 shows where the remaining work is required. It is estimated that between 2000 and 3000 m^3 of paste backfill injected into borehole P_Deliv_14 and P_Deliv_08 (slickline) will complete the tight backfilling work. The volume is not well constrained as paste may leak into the B1-18 Lower stope area and report to Barricade 5. The paste will be constrained at Barricade 5, but additional volumes will be needed. Building Barricade 7 is the last piece of infrastructure required to be constructed prior to completion of the work in the critical areas as all borehole required completing the work are in place.

Recommendations on work required to complete the backfilling of the critical areas of the B1-18 stope complex under Baker Creek will be provided to PWGSC under separate cover.

10.0 RECOMMENDED CONFIRMATORY WORK

Cores of cured in-situ paste should be collected from safely accessible underground areas in the B1-18 stope complex area and laboratory uniaxial compressive strength tests should be carried out. This will allow comment on the comparison of the strength of paste produced on surface and the in-situ strength of paste in the voids.

The placement of backfill in the B1-18 stope complex area will likely change the local non-saturated groundwater movement regime the area. Careful inspection during freshet, possibly involving borehole camera inspection in boreholes that remain open should be carried out to assess the potential for any water to pond up. This could pose a safety hazard and a mutual assessment protocol should be developed with the Care and Maintenance contractor.

We recommend drilling of two confirmatory drillholes to show that areas away from paste backfill boreholes were filled relatively tight to the back.

11.0 BACKFILL COMPLETENESS IN NON-CRITICAL AREAS

Voids adjacent to those that were identified as critical for short-term mitigation remain partly backfilled (e.g., B1-18 EA North void). Backfilling in non-critical voids in the B1-18 stope complex area should be completed during the overall remediation of the site to enhance the stability to the west wall of the B1 open pit. No detailed backfill plan for this future remedial work has been developed at this time.

12.0 CLOSURE

We trust that this report summarises the status of backfill completeness of the B1-18 stope complex at the Giant Mine Remediation Project. Should you have any questions please don't hesitate to contact the undersigned.

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PMcC/KH/DTK/rs/jlj/md

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AANDC 2013b, Giant Mine Underground Stabilisation Work Plan, Fall 2013 and Winter / Spring 2014 Program, Water License MV2012L8-0010 – Response to Review Comments – Underground Stabilisation Water License Submittal Package, September 9, 2013.

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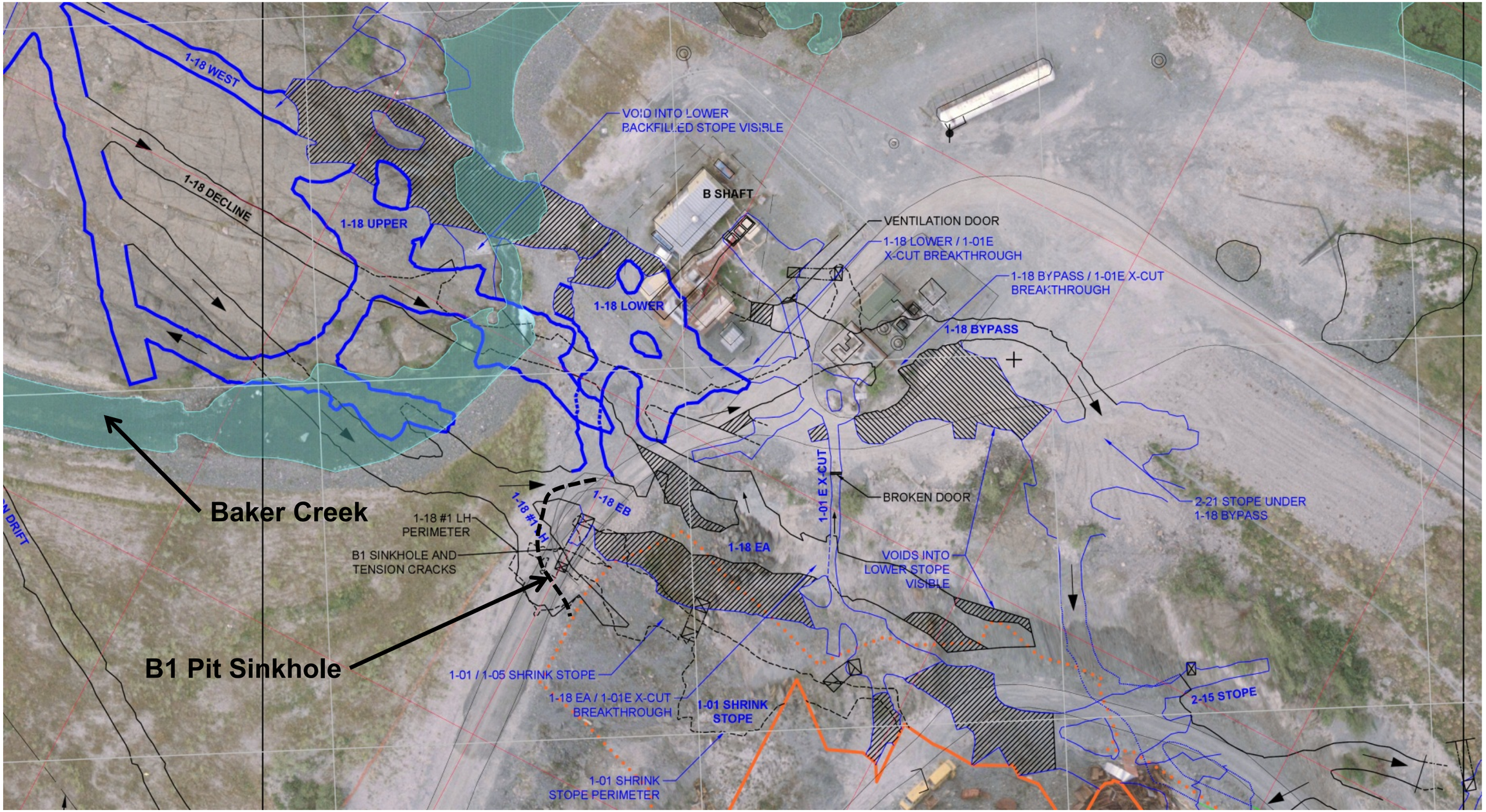

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Level Plan – Excavation Geometry
With Surface Air-Photo

Golder Associates

PROJECT No.	13-1426-0010		PHASE No.	5000	
DESIGN	PM	22FEB14	SCALE	N.T.S.	REV. 0
CADD	PM	22FEB14			
CHECK	DTK	10MAR14			
REVIEW					

Figure 1

DRAFT

For full scale drawing refer to Golder Doc. 066 – Figure 3, Drawing :RPT-066_CF11-R1- B1-18 – 1ST LEVEL - AERIAL

File:O:\Active_2013\1426\13-1426-0010 Giant Mining Support Services\07 Deliverables\Outgoing\O-120 B1-18 Stope Backfilling Completion Report\Completion document March 12 dtk.pptx

1-18 WEST

1-18 DECLINE

1-18 UPPER

1-18 LOWER

VOID INTO LOWER
BACKFILLED STOPE VISIBLE

B SHAFT

VENTILATION DOOR

1-18 LOWER / 1-01E
X-CUT BREAKTHROUGH

1-18 BYPASS / 1-01E X-CUT
BREAKTHROUGH

1-18 BYPASS

1-01 E X-CUT

BROKEN DOOR

2-21 STOPE UNDER
1-18 BYPASS

Baker Creek

DRIFT

1-18 #1 LH
PERIMETER

1-18 #1 LH

1-18 EB

1-18 EA

B1 SINKHOLE AND
TENSION CRACKS

VOIDS INTO
LOWER STOPE
VISIBLE

B1 Pit Sinkhole

1-01 / 1-05 SHRINK STOPE

1-18 EA / 1-01E X-CUT
BREAKTHROUGH

1-01 SHRINK
STOPE

1-01 SHRINK
STOPE PERIMETER

2-15 STOPE

Open sub-vertical raise to lower levels, not safely accessible

DRAFT

For full scale drawing refer to Golder Doc. 066 – Figure 1, Drawing :RPT-066_CF11-R1- B1-18 – 1ST LEVEL

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Level Plan – Excavation Geometry

Golder Associates

PROJECT No.	13-1426-0010		PHASE No.	5000	
DESIGN	PM	22FEB14	SCALE	N.T.S.	REV. 0
CADD	PM	22FEB14			
CHECK	DTK	10MAR14			
REVIEW					

Figure 2

File:O:\Active_2013\1426\13-1426-0010 Giant Mining Support Services\07 Deliverables\Outgoing\O-120 B1-18 Stope Backfilling Completion Report\Completion document March 12 dtk.pptx

Areas of Concern:

1. North extension of 1-18 Upper stope
2. B1 Sinkhole Area
3. 1-18 Lower stope
4. North branch of 1-18 Upper access drift

1-18 WEST
1-18 DECLINE
1-18 UPPER
1-18 LOWER
VOID INTO LOWER BACKFILLED STOPE VISIBLE
B SHAFT
X-CUT BREAKTHROUGH
1-18 BYPASS / 1-01E X-CUT BREAKTHROUGH
1-18 BYPASS
#1
#2
#3
#4
Baker Creek
B1 Pit Sinkhole
1-18 #1 LH PERIMETER
B1 SINKHOLE AND TENSION CRACKS
1-18 EB
1-18 EA
1-01 E X-CUT
BROKEN DOOR
2-21 STOPE UNDER 1-18 BYPASS
VOIDS INTO LOWER STOPE VISIBLE
1-01 / 1-05 SHRINK STOPE
1-18 EA / 1-01E X-CUT BREAKTHROUGH
1-01 SHRINK STOPE
1-01 SHRINK STOPE PERIMETER
2-15 STOPE

DRAFT

For full scale drawing refer to Golder Doc. 066 – Figure 1, Drawing :RPT-066_CF11-R1- B1-18 – 1ST LEVEL

PROJECT: PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE: B1-18 Stope
Main Areas of Concern

Golder Associates

PROJECT No.	13-1426-0010		PHASE No.	5000	
DESIGN	PM	22FEB14	SCALE	N.T.S.	REV. 0
CADD	PM	22FEB14	Figure 3		
CHECK	DTK	10MAR14			
REVIEW					

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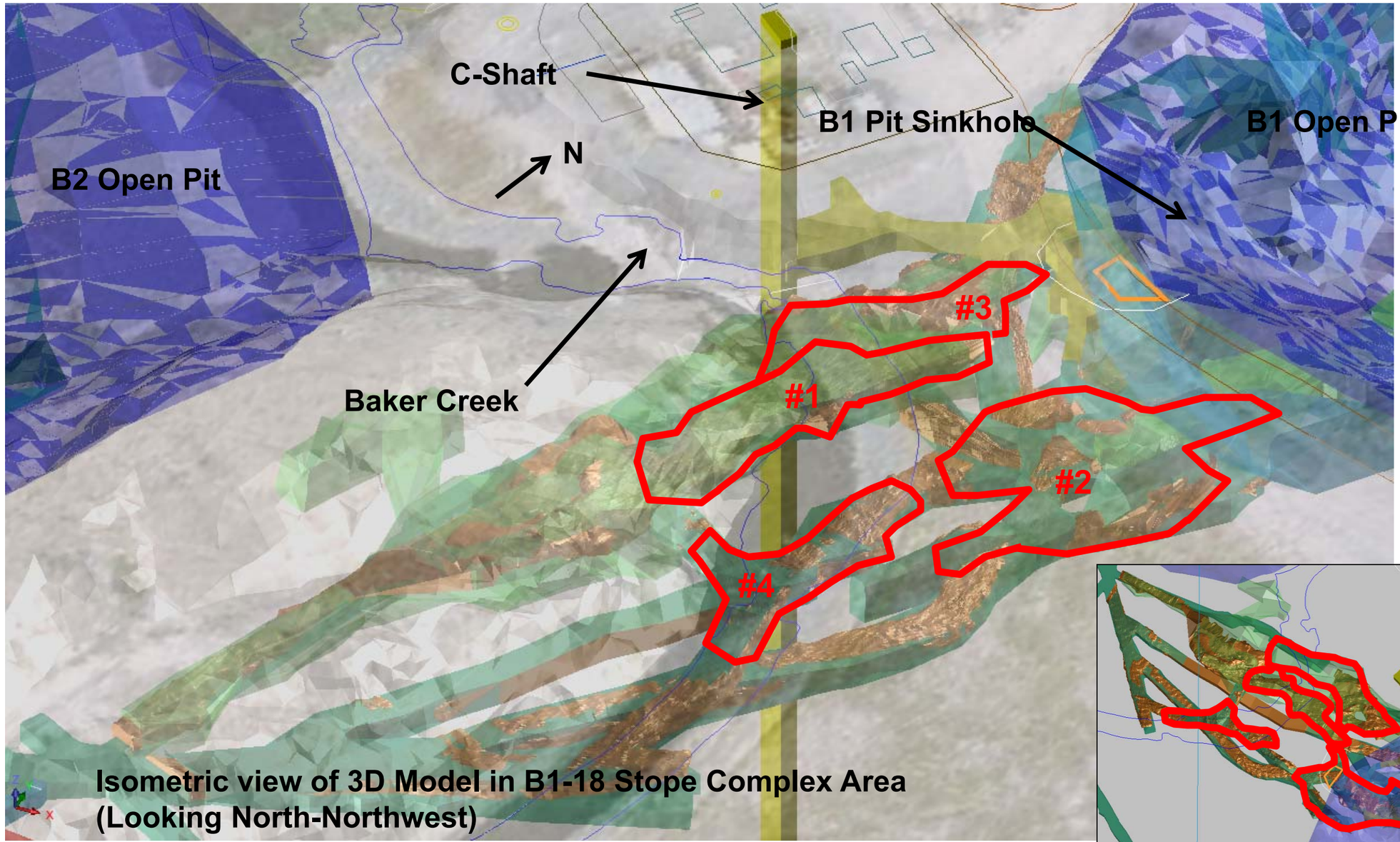
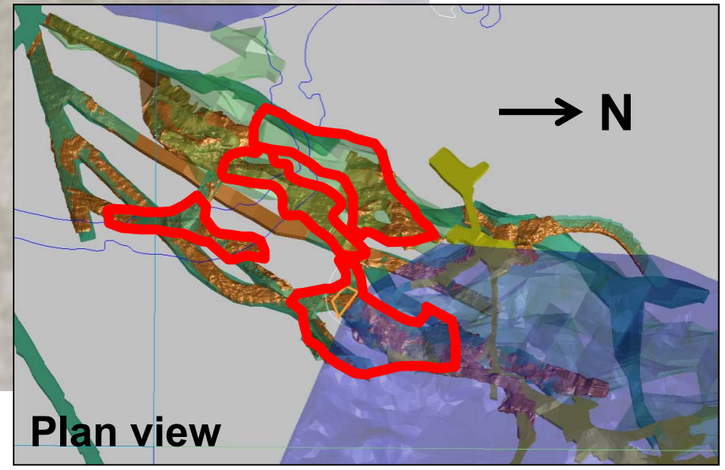


Isometric view of 3D Model in B1-18 Stope Complex Area
(Looking North-Northwest)



Plan view

Areas of Concern:

1. North extension of 1-18 Upper stope
2. B1 Sinkhole Area
3. 1-18 Lower stope
4. North branch of 1-18 Upper access drift

DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Stope and Void Shape

Golder Associates

PROJECT No.	13-1426-0010		PHASE No.	5000	
DESIGN	PM	22FEB14	SCALE	N.T.S.	REV. 0
CADD	PM	22FEB14	Figure 4		
CHECK	DTK	10MAR14			
REVIEW					

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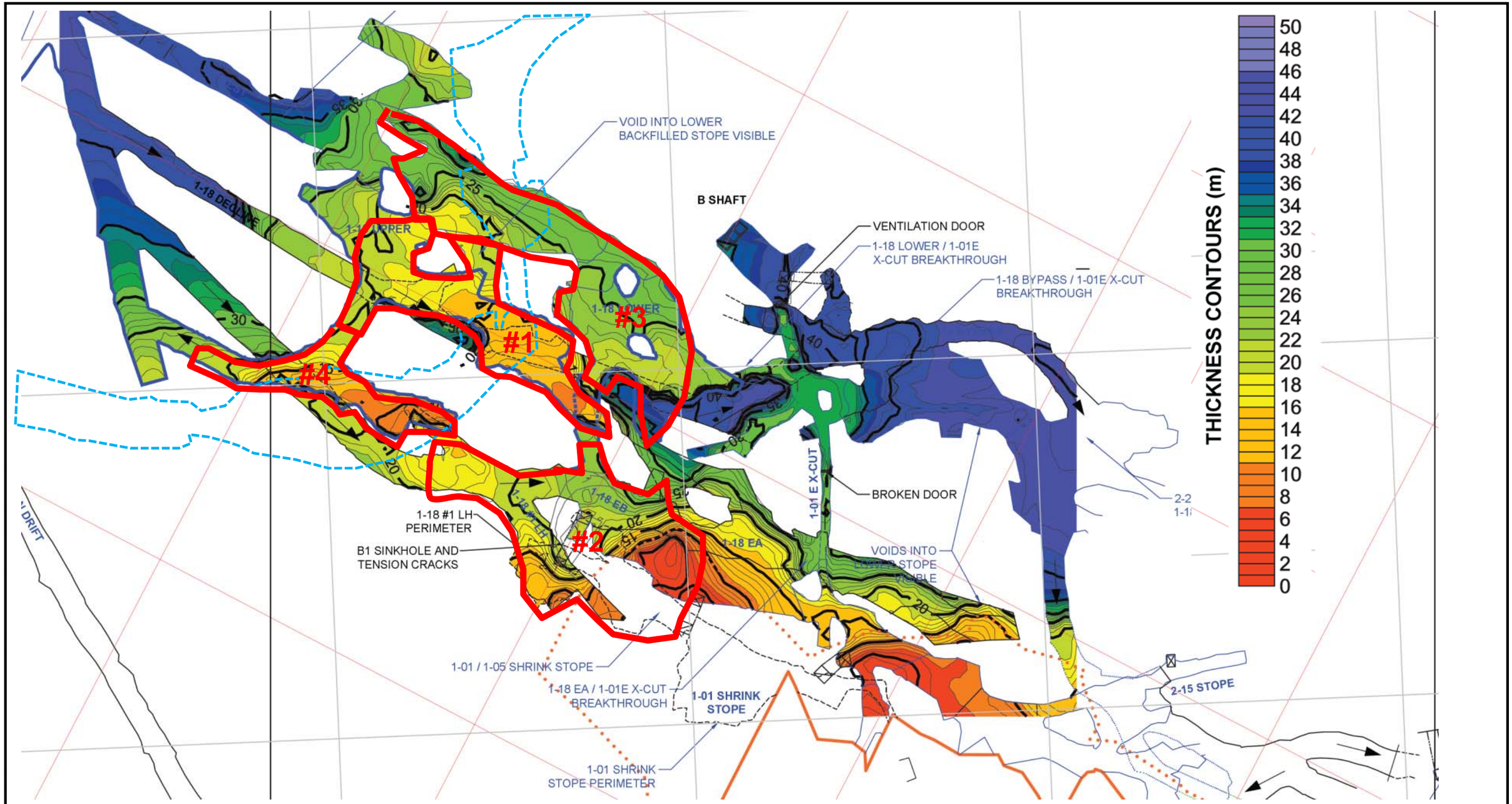

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For full scale drawing refer to Golder Doc. 066 – Figure 8, Drawing :RPT-066_CF11-R1- B1-18 – 1ST LEVEL – Crown Pillar Thickness

DRAFT

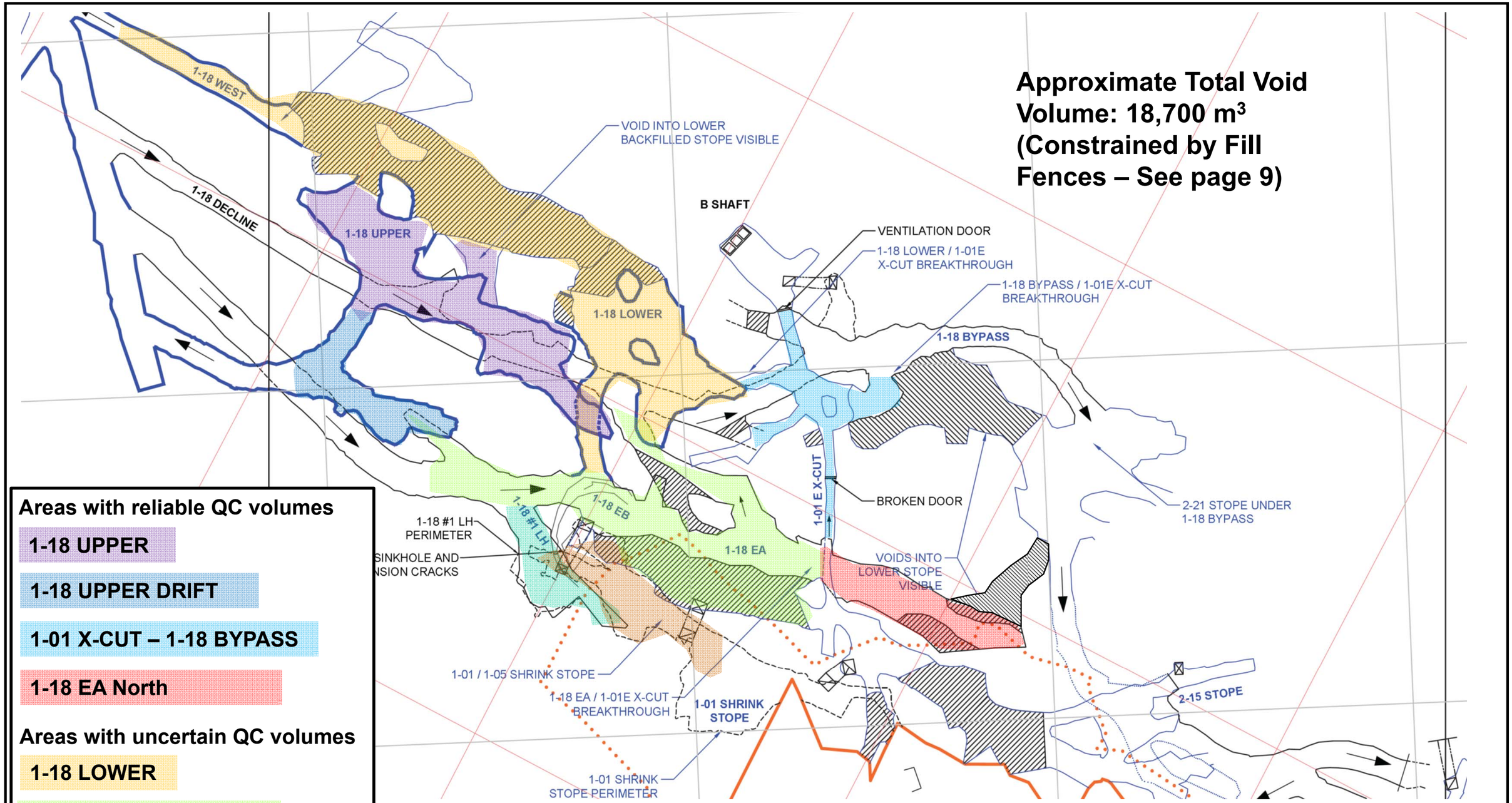
PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Crown Pillar Thickness Contour

Golder Associates

PROJECT No.	13-1426-0010		PHASE No.	5000	
DESIGN	PM	22FEB14	SCALE	N.T.S.	REV. 0
CADD	PM	22FEB14			
CHECK	DTK	10MAR14			
REVIEW					

Figure 5



Approximate Total Void Volume: 18,700 m³ (Constrained by Fill Fences – See page 9)

Areas with reliable QC volumes

- 1-18 UPPER
- 1-18 UPPER DRIFT
- 1-01 X-CUT – 1-18 BYPASS
- 1-18 EA North

Areas with uncertain QC volumes

- 1-18 LOWER
- 1-18 EB – EA North
- 1-01 SHRINK
- 1-18 #1 LH

Partially backfilled connections between voids, potential leakage areas.

DRAFT

PROJECT: PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE: B1-18 Stope
Individual Void Areas

Golder Associates

PROJECT No.	13-1426-0010		PHASE No.	5000	
DESIGN	PM	22FEB14	SCALE	N.T.S.	REV. 0
CADD	PM	22FEB14	Figure 6		
CHECK	DTK	10MAR14			
REVIEW					

For full scale drawing refer to Golder Doc. 066 – Figure 1, Drawing :RPT-066_CF11-R1- B1-18 – 1ST LEVEL

File:O:\Active_2013\1426\13-1426-0010 Giant Mining Support Services\07 Deliverables\Outgoing\O-120 B1-18 Stope Backfilling Completion Report\Completion document March 12 dtk.pptx

Paste Slickline

1-18 WEST
1-18 DECLINE
1-18 UPPER
1-18 LOWER
1-18 BYPASS
B SHAFT
VOID INTO LOWER BACKFILLED STOPE VISIBLE
VENTILATION DOOR
1-18 LOWER / 1-01E X-CUT BREAKTHROUGH
1-18 BYPASS / 1-01E X-CUT BREAKTHROUGH
P_DELIV_118_01
P_DELIV_118_14
P_DELIV_118_10
P_DELIV_118_15
P_DELIV_118_13
P_DELIV_118_03
P_DELIV_118_08
P_DELIV_118_12
P_DELIV_118_02
P_DELIV_118_06
P_DELIV_118_11
PLUG_DELIV_118_04
PLUG_DELIV_118_07
PLUG_DELIV_118_05
PLUG_DELIV_118_09
OBS_118_05
OBS_118_07
OBS_118_03
OBS_118_02
OBS_118_06
OBS_118_04
1-01 E X-CUT
BROKEN DOOR
2-21 STOPE UNDER 1-18 BYPASS
1-18 #1 LH PERIMETER
1-18 #1 LH
1-18 EB
1-18 EA
B1 SINKHOLE AND TENSION CRACKS
VOIDS INTO LOWER STOPE VISIBLE
1-01 / 1-05 SHRINK STOPE
1-18 EA / 1-01E X-CUT BREAKTHROUGH
1-01 SHRINK STOPE
1-01 SHRINK STOPE PERIMETER
2-15 STOPE
DRIFT

Isometric view

N

P_DELIV_118_01
2013 DRILLED PASTE BOREHOLES

OBS_118_01
2013 DRILLED OBSERVATION BOREHOLES

2013 PLANNED BOREHOLES

DRAFT

For full scale drawing refer to Golder Doc. 066 – Figure 4, Drawing :RPT-066_CF11-R1- B1-18 – ALL LEVELS – BOREHOLES V16

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope Boreholes

Golder Associates

PROJECT No.	13-1426-0010		PHASE No.	5000	
DESIGN	PM	22FEB14	SCALE	N.T.S.	REV. 0
CADD	PM	22FEB14	**Figure 7**		
CHECK	DTK	10MAR14			
REVIEW					

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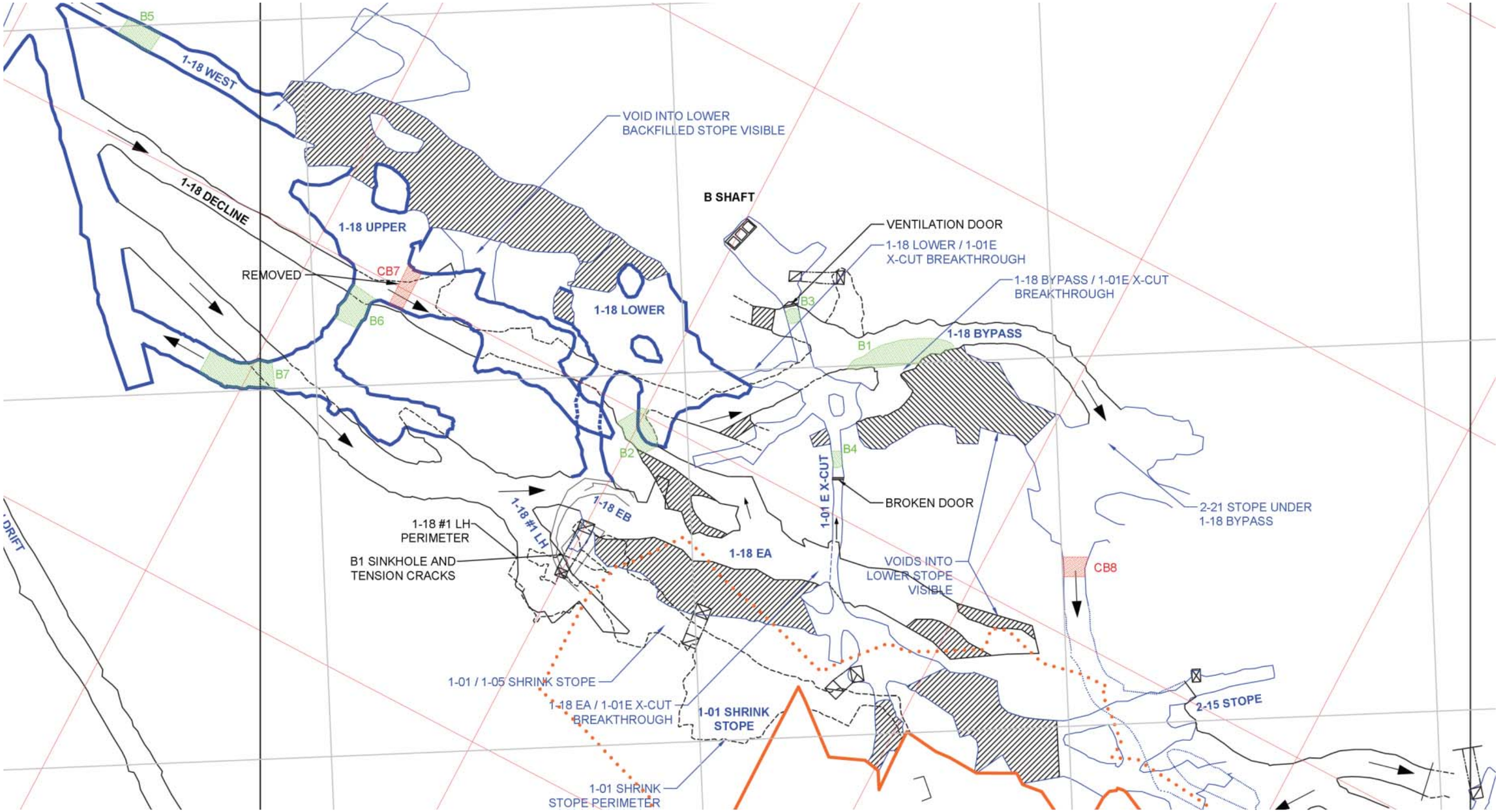

Fill fence (barricade) location and approximate shape

Temporary fill fence (contingency barricade) location and approximate shape

For full scale drawing refer to Golder Doc. 066 – Figure 7, Drawing :RPT-066_CF11-R1- B1-18 – 1ST LEVEL – BARRICADE LAYOUT

DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Fill Fence (Barricade) Locations

Golder Associates

PROJECT No.	13-1426-0010		PHASE No.	5000	
DESIGN	PM	22FEB14	SCALE	N.T.S.	REV. 0
CADD	PM	22FEB14			
CHECK	DTK	10MAR14			
REVIEW					

Figure 8

File:O:\Active_2013\1426\13-1426-0010 Giant Mining Support Services\07 Deliverables\Outgoing\O-120 B1-18 Stope Backfilling Completion Report\Completion document March 12 dtk.pptx

No photo available for:
B4 – Remotely constructed using paste delivered through borehole
CB7 – temporary rock berm

DRAFT

PROJECT	PWGSC GIANT MINE INTERIM U/G STABILIZATION PROJECT YELLOWKNIFE, NWT				
TITLE	B1-18 Stope Fill Fence (Barricade) Photos (Dry Side)				
Golder Associates	PROJECT No. 13-1426-0010			PHASE No. 5000	
	DESIGN	PM	22FEB14	SCALE N.T.S.	REV. 0
	CADD	PM	22FEB14	Figure 9	
	CHECK	DTK	10MAR14		
	REVIEW				

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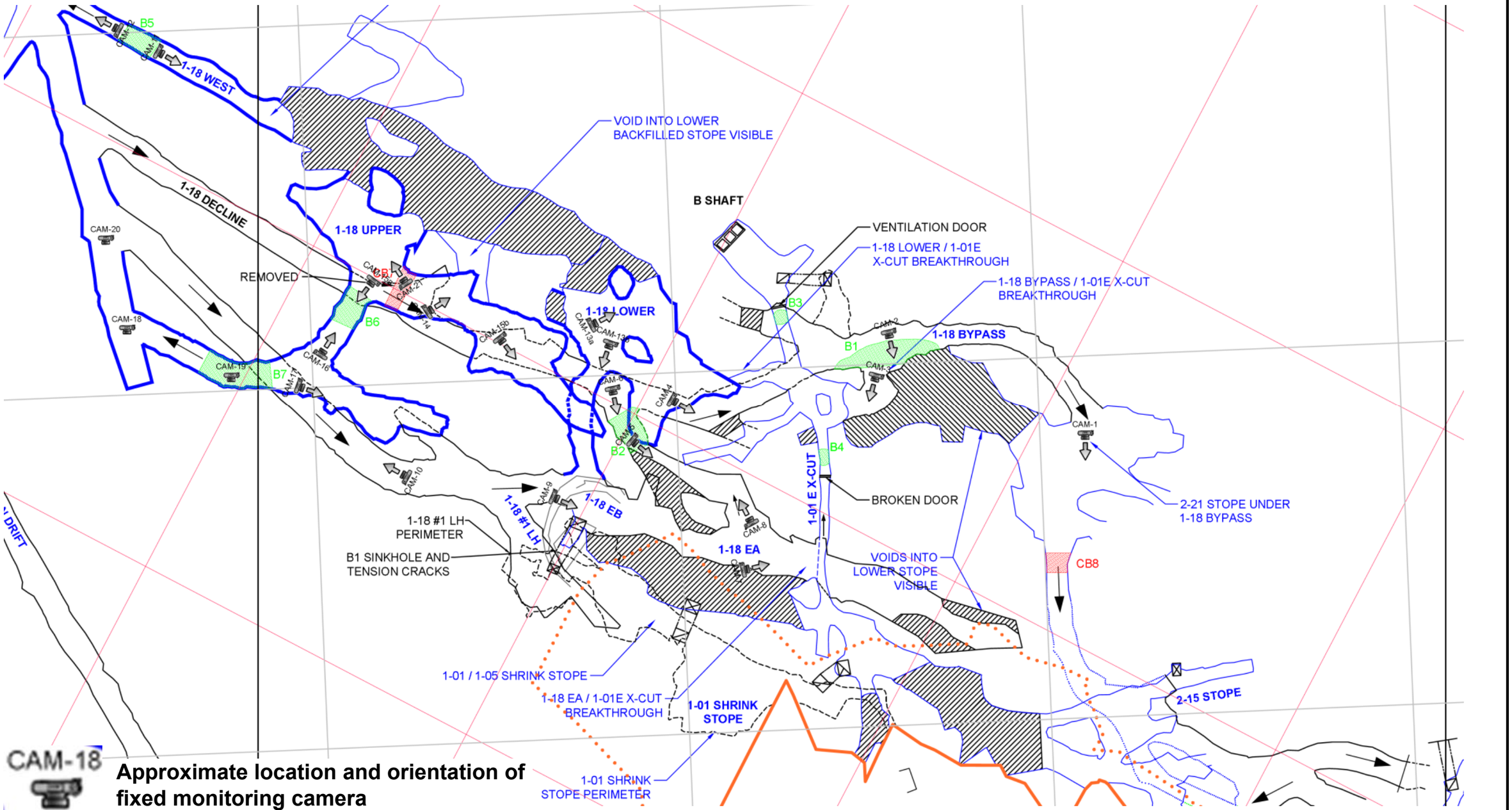


DRAFT

For full scale drawing refer to Golder Doc. 066 – Figure 10, Drawing :RPT-066_CF11-R1- B1-18 – 1ST LEVEL – Camera Locations

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

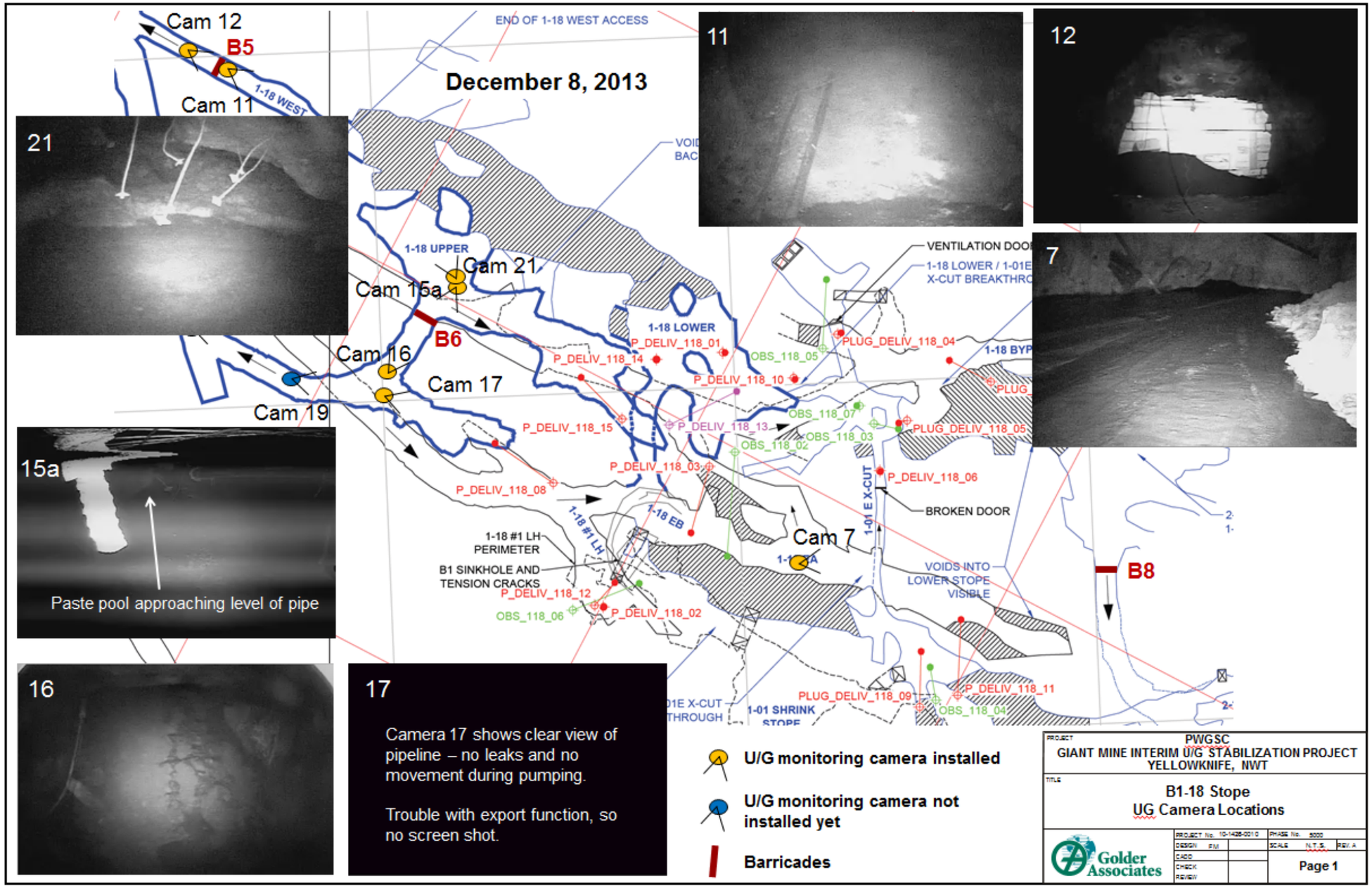
TITLE
B1-18 Stope
Fixed Underground Camera Locations

Golder Associates

PROJECT No.	13-1426-0010		PHASE No.	5000	
DESIGN	PM	22FEB14	SCALE	N.T.S.	REV. 0
CADD	PM	22FEB14			
CHECK	DTK	10MAR14			
REVIEW					

Figure 10

File:O:\Active_2013\1426\13-1426-0010 Giant Mining Support Services\07 Deliverables\Outgoing\O-120 B1-18 Stope Backfilling Completion Report\Completion document March 12 dtk.pptx



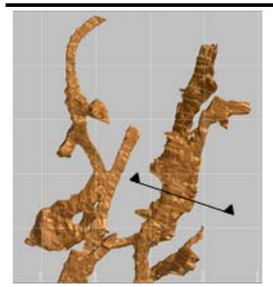
DRAFT

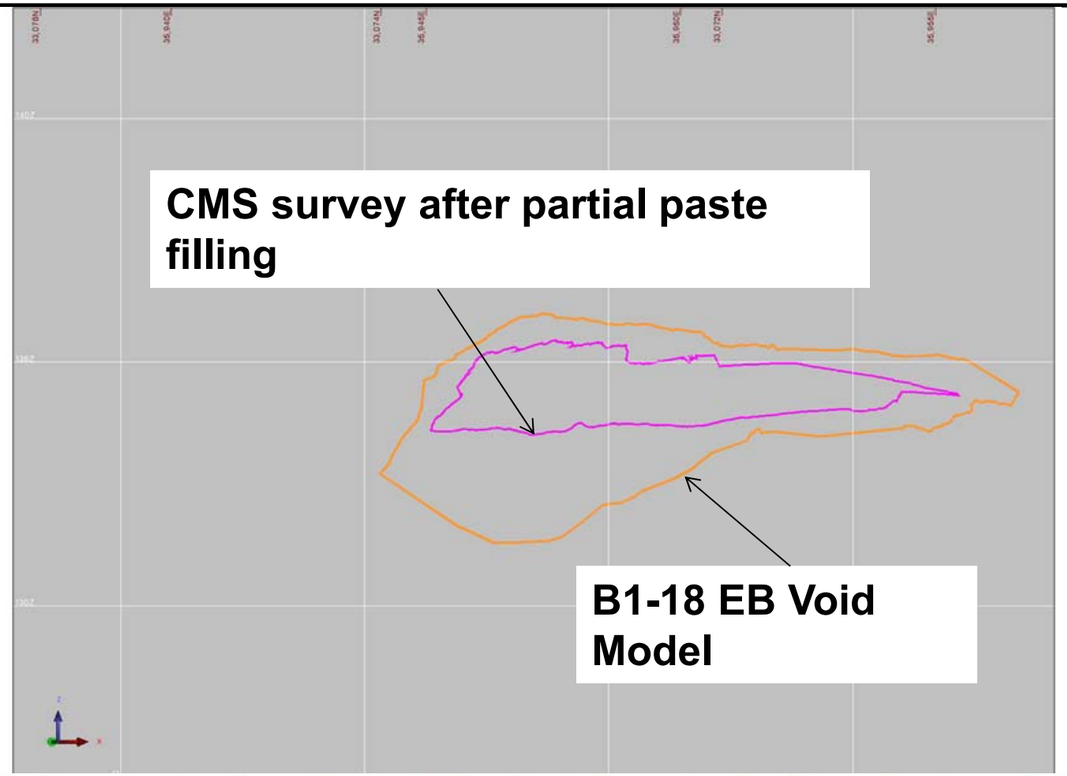
PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Example Daily UG Camera Highlights

Golder Associates

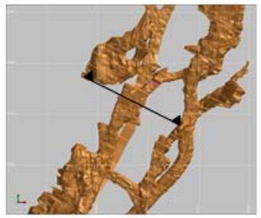
PROJECT No.	13-1426-0010		PHASE No.	5000	
DESIGN	PM	22FEB14	SCALE	N.T.S.	REV. 0
CADD	PM	22FEB14	Figure 11		
CHECK	DTK	10MAR14			
REVIEW					

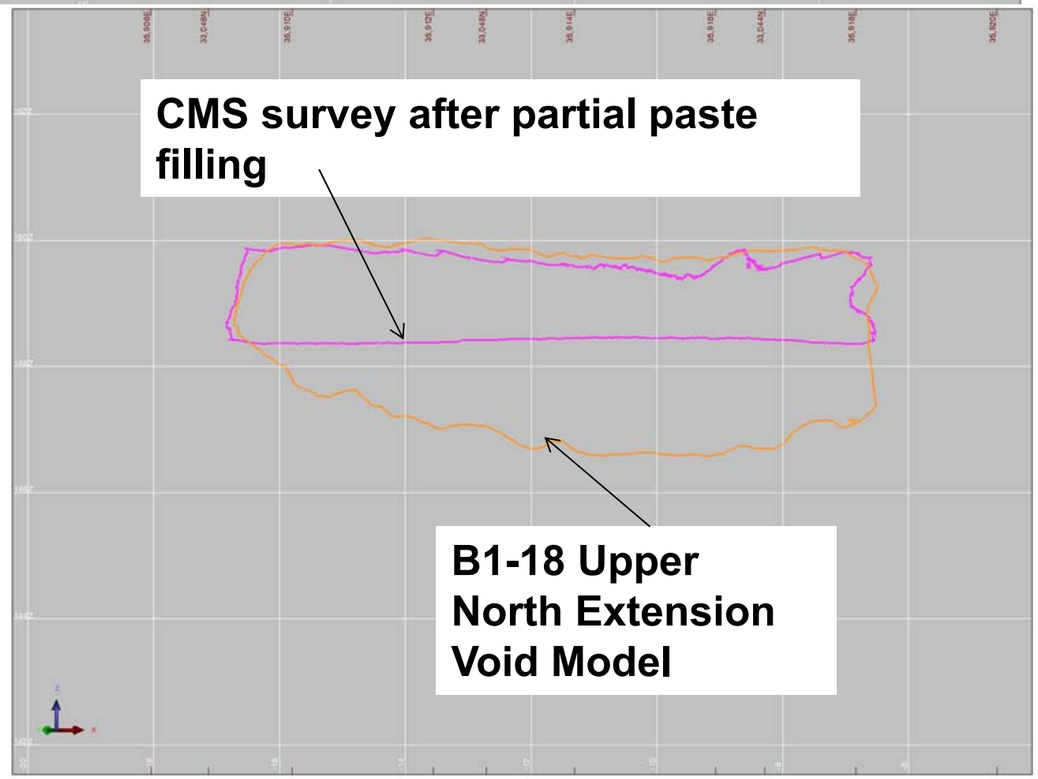




Legend
- 1-18 Void Model
- 1-18 CMS

B1-18 EB Void (Cross-Section)





Legend
- 1-18 Void Model
- 1-18 CMS

B1-18 Upper North Extension Void (Cross-Section)

DRAFT

PROJECT: PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE: B1-18 Stope
Borehole CMS Laser Scans of Paste Profile

Golder Associates

PROJECT No.	13-1426-0010		PHASE No.	5000	
DESIGN	PM	22FEB14	SCALE	N.T.S.	REV. 0
CADD	PM	22FEB14	Figure 12		
CHECK	DTK	10MAR14			
REVIEW					

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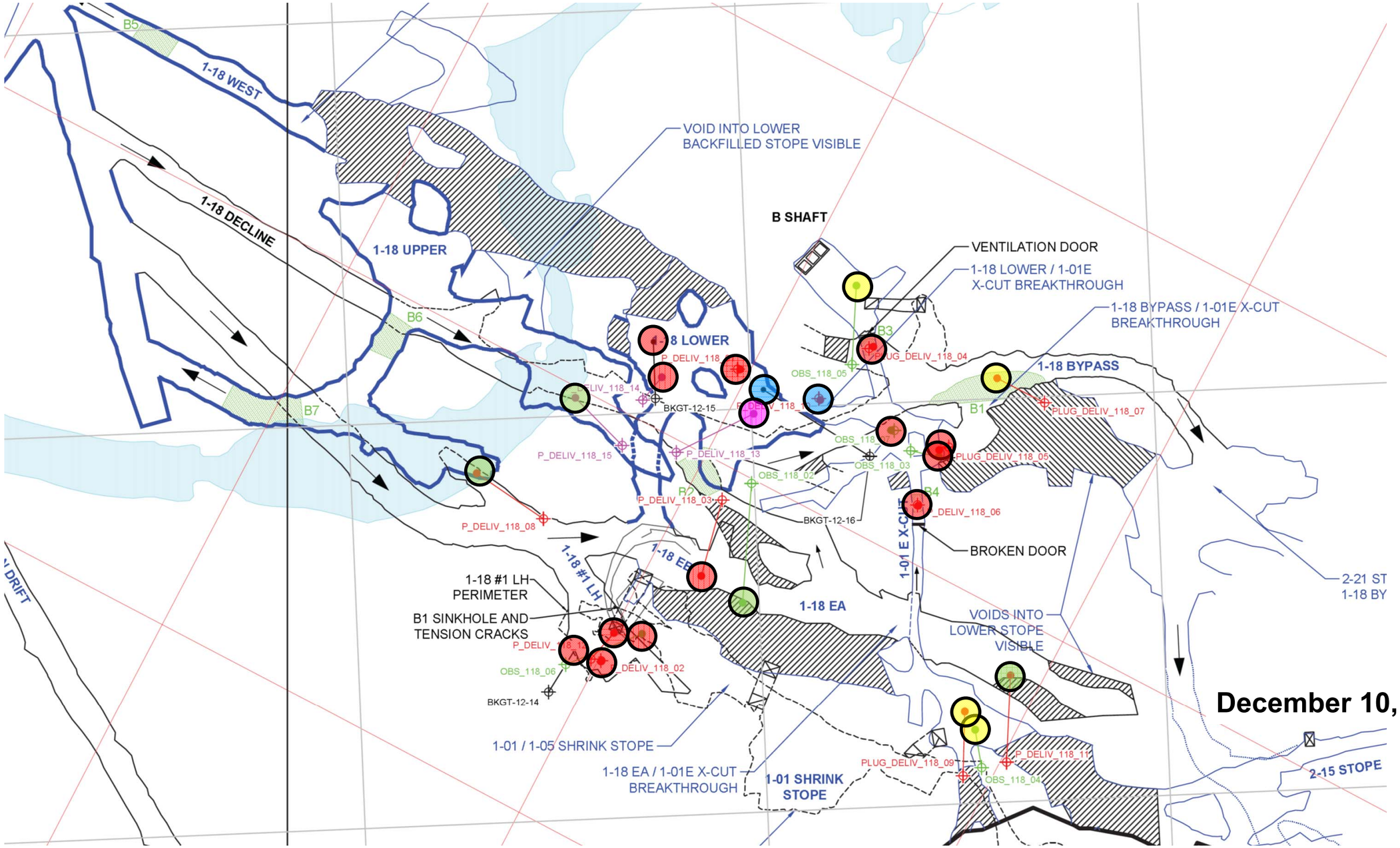


December 10, 2013

Paste Delivery, Observation, and Baker Creek Borehole Status Legend – Symbol Shown at Breakthrough Position

- Open – More Fill Needed
- Open – Non-critical area or not required
- Borehole Plugged
- Grouted Full or Not Drilled
- Not Useable

DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

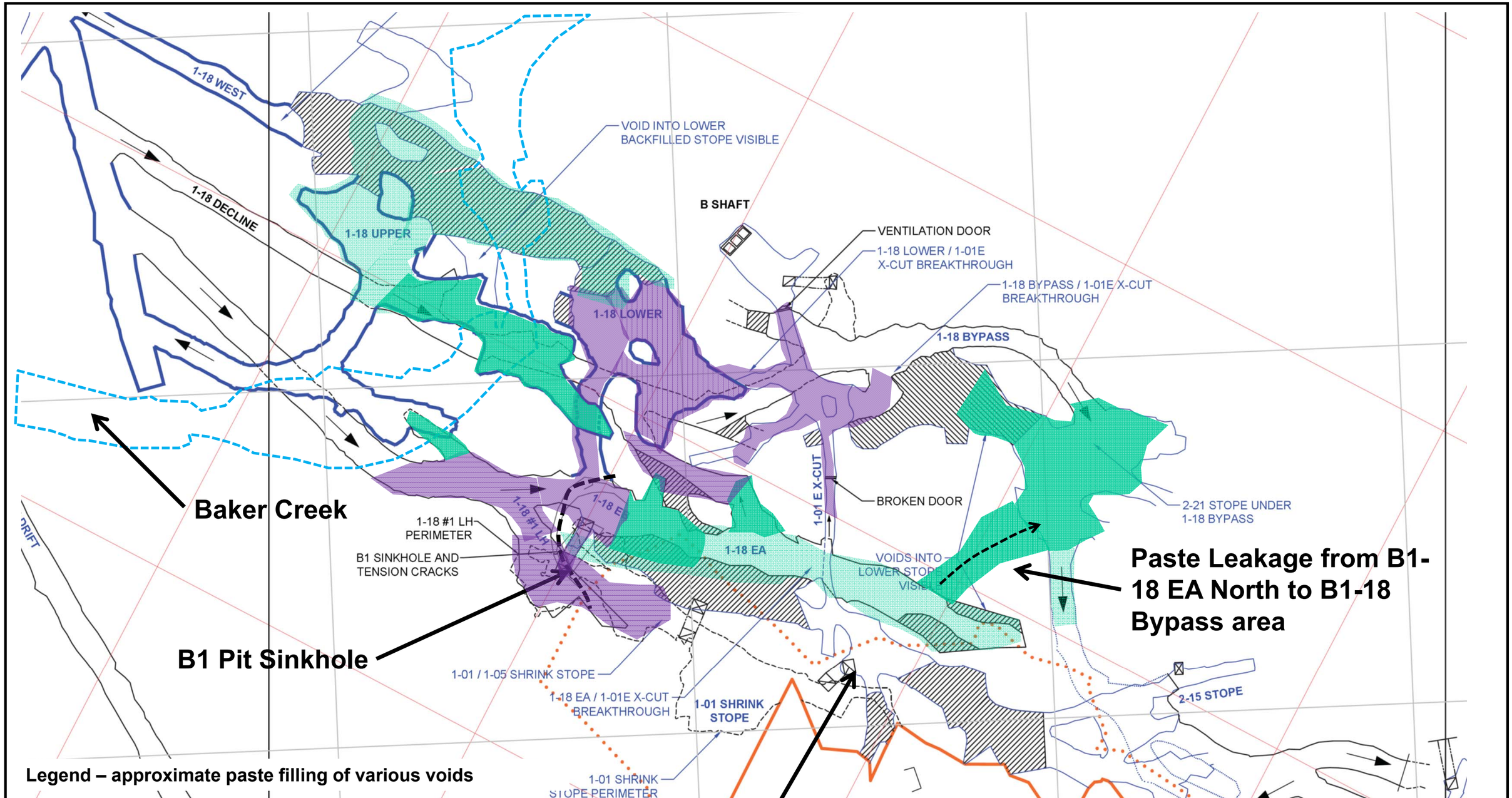
TITLE
B1-18 Stope
Paste Delivery Borehole Status

Golder Associates

PROJECT No.	13-1426-0010		PHASE No.	5000	
DESIGN	CY	30NOV13	SCALE	N.T.S.	REV. A
CADD	PM	22FEB14			
CHECK	BJK	10MAR14			
REVIEW					

Figure 13

FILE: \\golder\data\...\Completion Report\Completion document March 12 dtk.pptx



DRAFT

For full scale drawing refer to Golder Doc. 066 – Figure 1, Drawing :RPT-066_CF11-R1- B1-18 – 1ST LEVEL

PROJECT	PWGSC GIANT MINE INTERIM U/G STABILIZATION PROJECT YELLOWKNIFE, NWT
TITLE	B1-18 Stope Backfill Status Dec 10, 2013

Golder Associates

PROJECT No.	13-1426-0010		PHASE No.	5000	
DESIGN	PM	22FEB14	SCALE	N.T.S.	REV. 0
CADD	PM	22FEB14	Figure 14		
CHECK	DTK	10MAR14			
REVIEW					

File:O:\Active_2013\1426\13-1426-0010 Giant Mining Support Services\07 Deliverables\Outgoing\O-120 B1-18 Stope Backfilling Completion Report\Completion document March 12 dtk.pptx

2) 1-18 Bottom, partially filled stope void connected to barricade 5, 500-2000 m^3 ?

3) 1-18 Upper to barricade 6, need slickline, 1000-1500 m^3

1) 1-18 Upper – North arm, remaining void, 750 m^3

4) 1-18 Upper access between barricade 6 and 7, need slickline, 750 m^3

Baker Creek

B1 Pit Sinkhole

B5
1-18 WEST
?
VOID INTO LOWER BACKFILLED STOPE VISIBLE
B RAISE
1-18 UPPER
REMOVED
CB5
B6
B7
1-18 LOWER
VENTILATION DOOR
1-18 LOWER / 1-01E X-CUT BREAKTHROUGH
1-18 BYPASS / 1-01E X-CUT BREAKTHROUGH
B3
1-18 BYPASS
B1
B2
B4
1-01 E X-CUT
BROKEN DOOR
2-21 STOPE UNDER 1-18 BYPASS
1-18 #1 LH PERIMETER
1-18 EB
1-18 EA
B1 SINKHOLE AND TENSION CRACKS
VOIDS INTO LOWER STOPE VISIBLE
CB8
1-05 SHRINK STOPE
1-18 EA / 1-01E X-CUT BREAKTHROUGH
1-01 SHRINK STOPE
2-15 STOPE
1-01 SHRINK STOPE PERIMETER

Conventional barricade

Remaining Area to Be Tight Filled

Underground pipeline

Estimated Remaining Void in Critical Areas Under Baker Creek To Fill: ≈ 3000 – 4000 m^3

DRAFT

For full scale drawing refer to Golder Doc. 066 – Figure 7, Drawing :RPT-066_CF11-R1- B1-18 – 1ST LEVEL – BARRICADE LAYOUT

PROJECT: PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE: B1-18 Stope
Remaining Backfilling Work Required

Golder Associates

PROJECT No.	13-1426-0010		PHASE No.	5000	
DESIGN	PM	22FEB14	SCALE	N.T.S.	REV. 0
CADD	PM	22FEB14	Figure 15		
CHECK	DTK	10MAR14			
REVIEW					

File:O:\Active_2013\1426\13-1426-0010 Giant Mining Support Services\07 Deliverables\Outgoing\O-120 B1-18 Stope Backfilling Completion Report\Completion document March 12 dtk.pptx

APPENDIX A

B1-18 Void Backfilling Underground Implementation Plan

DRAFT

1-18 stope void(s) backfilling underground implementation plan

Working implementation plan

Revision 8 – Nov 19, 2013

Golder Associates

Key points of implementation plan

- No work and limited man access in stoping areas (wide spans and high backs)
  - adding extra surface drillholes for pumping paste into stoping areas
  - Using fixed underground and borehole cameras to manage the backfill process
- Simple, non-engineered paste fill barricades which act as formwork for cemented paste
  - management of paste design (cement content and slump) and filling rate (limit fill pour heights)
  - Administrative controls on personnel access under or near non-cured paste

DRAFT

PROJECT	PWGSC GIANT MINE INTERIM U/G STABILIZATION PROJECT YELLOWKNIFE, NWT				
TITLE					
Golder Associates	PROJECT No. 10-1426-0010			PHASE No. 1000	
	DESIGN	DTK	24SEP13	SCALE N.T.S.	REV. A
	CADD	DTK/FM	04OCT13	Page 2	
	CHECK	DTK/FM	29OCT13		
	REVIEW				

END OF 1-18 WEST ACCESS

No work access

1-18 WEST

Limited Exposure

VOID INTO LOWER BACKFILLED STOPE VISIBLE

B SHAFT

VENTILATION DOOR

1-18 LOWER / 1-01E X-CUT BREAKTHROUGH

1-18 BYPASS / 1-01E X-CUT BREAKTHROUGH

1-18 DECLINE

1-18 UPPER

No work access

1-18 LOWER

No work access

1-18 BYPASS

No work access

1-18 #1 LH

1-18 #1 LH PERIMETER

B1 SINKHOLE AND TENSION CRACKS

No work access

1-18 EA

1-01 E X-CUT

BROKEN DOOR

VOIDS INTO LOWER STOPE VISIBLE

Very Limited Exposure, Ladder Questionable

1-01 / 1-05 SHRINK STOPE

1-18 EA / 1-01E X-CUT BREAKTHROUGH

1-01 SHRINK STOPE

2-1

Limited Exposure

Main travel way / work areas

Inspection only areas

Inspection and survey areas

DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Underground Access (Sept. 30, 2013)

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning

The goal of this plan is to limit underground access into stoping areas, if and when those areas can be checked from a geotechnical standpoint and ground control can be brought up to mine standard they may become part of the plan.

END OF 1-18 WEST ACCESS

B5

1-18 WEST

VOID INTO LOWER
BACKFILLED STOPE VISIBLE

1-18 DECLINE

B SHAFT

VENTILATION DOOR

1-18 LOWER / 1-01E
X-CUT BREAKTHROUGH

1-18 BYPASS / 1-01E X-CUT
BREAKTHROUGH

CB2

1-18 UPPER

CB7

B7

B6

18 LOWER

B3

CB4

1-18 BYPASS

B1

CB3

CB5

Baker Creek

CB1

B2

1-01 E X-CUT

B4

BROKEN DOOR

1-18 #1 LH

1-18 #1 LH
PERIMETER

1-18 EB

1-18 EA

B1 SINKHOLE AND
TENSION CRACKS

VOIDS INTO
LOWER STOPE
VISIBLE

CB6

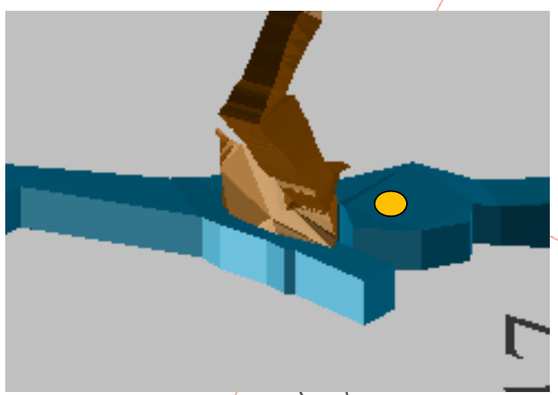
1-01 / 1-05 SHRINK STOPE

1-18 EA / 1-01E X-CUT
BREAKTHROUGH

1-01 SHRINK
STOPE

2-1

Inset – Main Ore Pass on 2nd Level



Underground paste delivery pipe

Conventional barricade

Contingency barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

Borehole camera monitoring / secondary paste fill hole(s)

Borehole low slump or foam barricade

2012 Geotechnical boreholes

DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – All Components Shown

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
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REVIEW					

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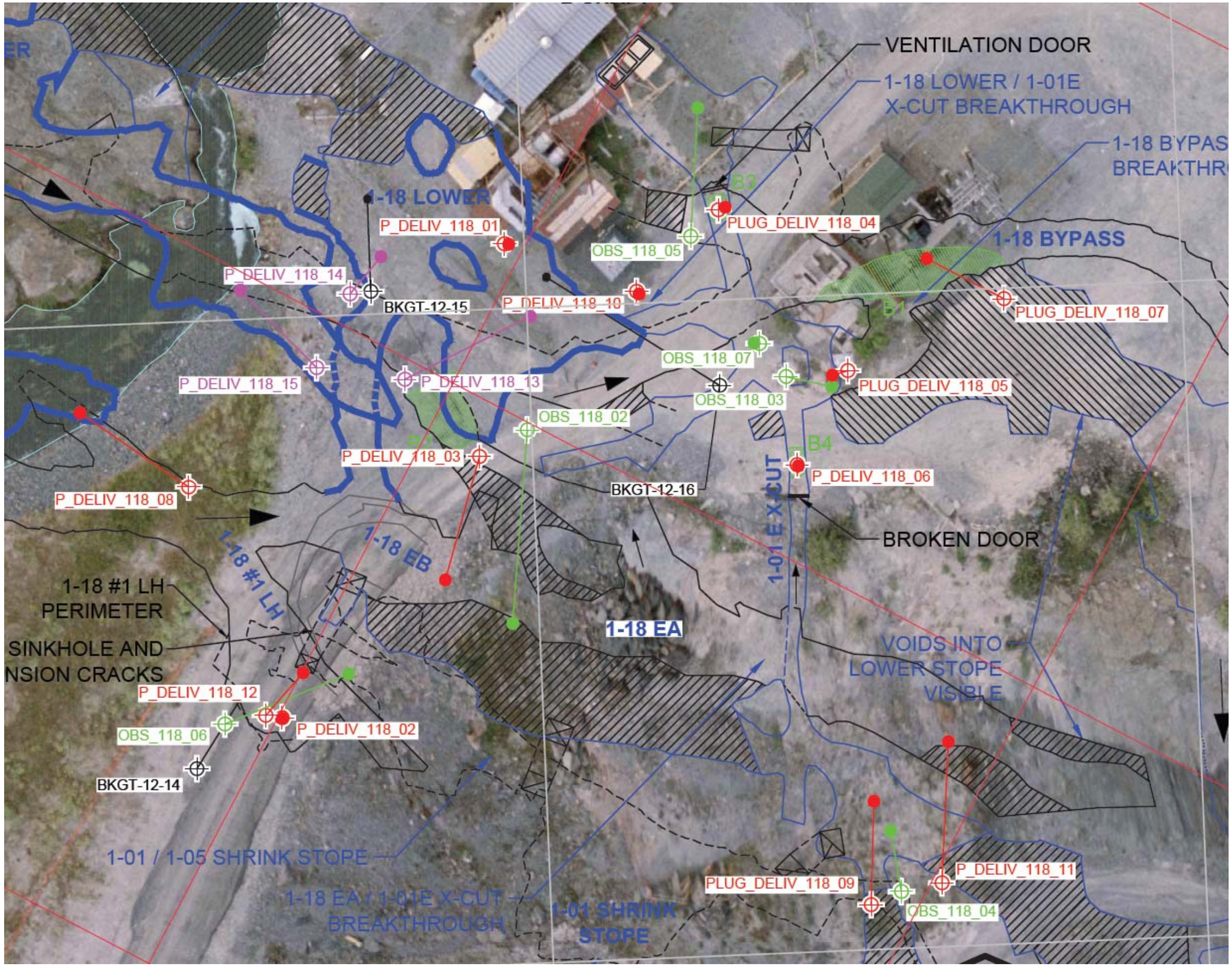

P_Deliv_118_01
2013 DRILLED BOREHOLES - 200mm HOLES DIA.

OBS_118_01
2013 DRILLED BOREHOLES - 96.1mm HOLES DIA.

P_Deliv_118_14
2013 PLANNED BOREHOLES - 200mm HOLES DIA.

BKGT_12_15
2012 GEOTECHNICAL DRILLING

DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Borehole Plan (November 19, 2013)

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
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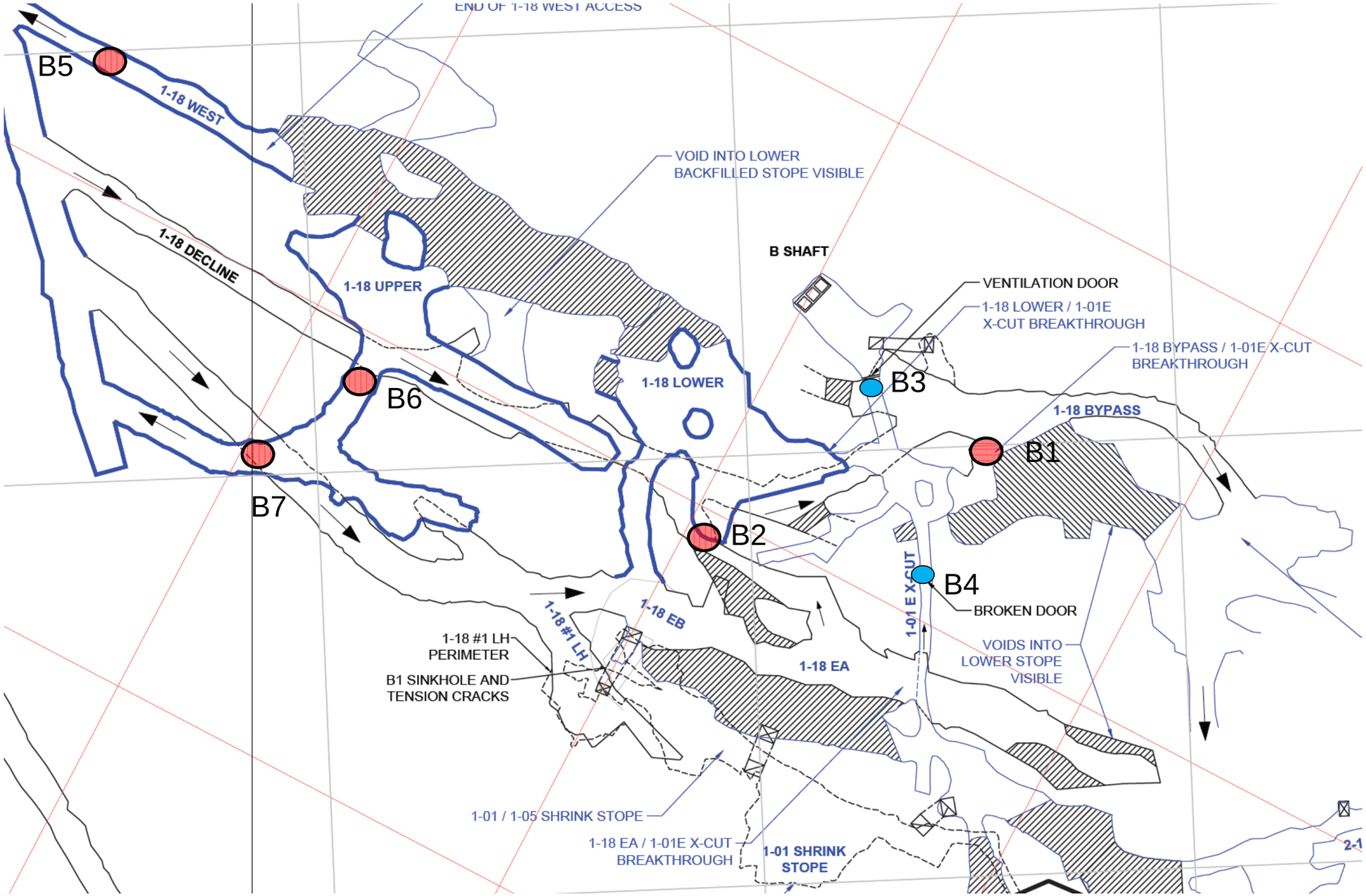
REVIEW					



DRAFT

Conventional barricade

Borehole low slump paste barricade / foam

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

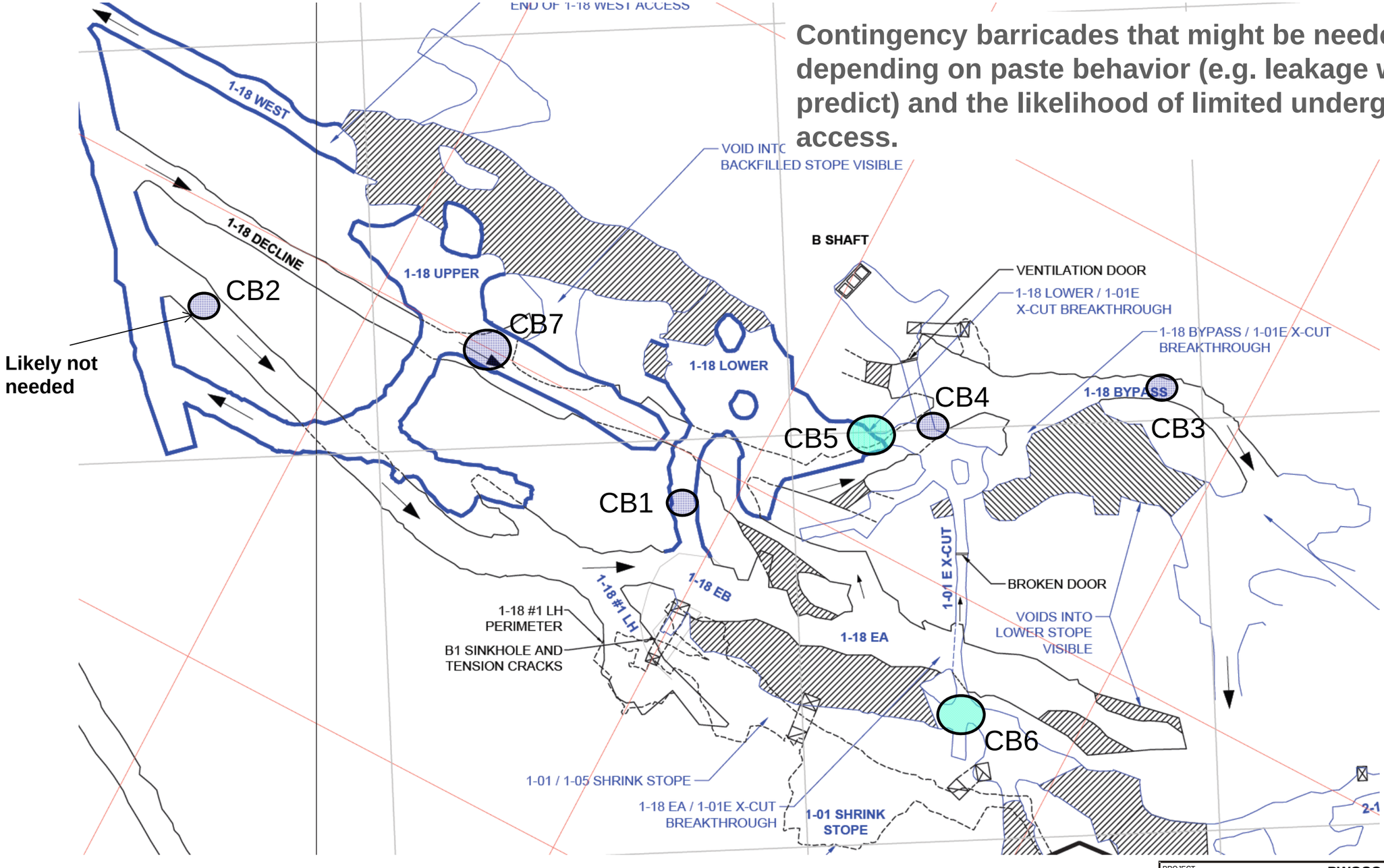
TITLE
B1-18 Stope
Fill Barricade Locations

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning

Contingency barricades that might be needed depending on paste behavior (e.g. leakage we cant predict) and the likelihood of limited underground access.



DRAFT

Contingency conventional barricade likely required if cannot keep paste from exiting 1-18 EA stope or barricade #1

Contingency borehole barricade likely required if cannot keep paste from exiting 1-18 EA stope

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Contingency Fill Barricade Locations

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
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CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning

END OF 1-18 WEST ACCESS

Cam 12

Cam 11

1-18 WEST

VOID INTO LOWER
BACKFILLED STOPE VISIBLE

B SHAFT

VENTILATION DOOR

1-18 LOWER / 1-01E
X-CUT BREAKTHROUGH

1-18 BYPASS / 1-01E X-CUT
BREAKTHROUGH

1-18 DECLINE

Cam 20

1-18 UPPER

Cam 14

Cam 15a

Cam 13b

1-18 LOWER

Cam2

Group 1

Cam 18

Cam 16

Cam 15b

Cam 13a

1-18 BYPASS

Group 3

Cam 4

Cam 3

Cam 19

Cam 17

Cam 6

Cam1

Cam 5

1-01 E X-CUT

Cam 9

Cam 10

1-18 #1 LH

1-18 EA

BROKEN DOOR

1-18 #1 LH
PERIMETER

B1 SINKHOLE AND
TENSION CRACKS

Cam 8

VOIDS INTO
LOWER STOPE
VISIBLE

Cam 7

Group 2

1-01 / 1-05 SHRINK STOPE

1-18 EA / 1-01E X-CUT
BREAKTHROUGH

1-01 SHRINK
STOPE

2-1

DRAFT

U/G monitoring camera installed in-person - Critical

U/G monitoring camera installed in-person - Secondary

Main power supply (1 per Group)

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

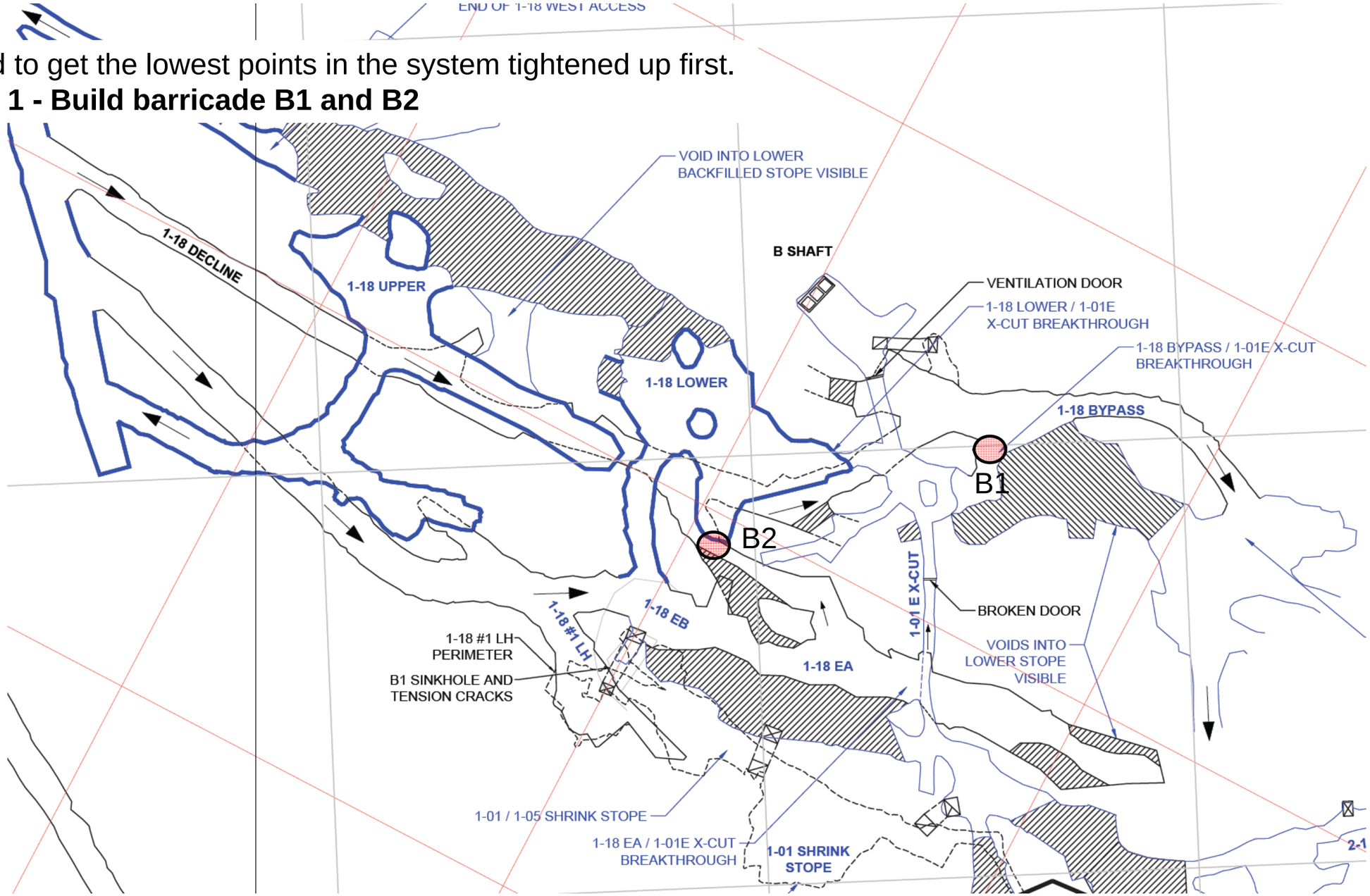
TITLE
B1-18 Stope
Camera Locations

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning

- Need to get the lowest points in the system tightened up first.
- **Step 1 - Build barricade B1 and B2**



DRAFT

Underground paste delivery pipe

Conventional barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

Borehole camera monitoring / secondary paste fill hole(s)

Borehole low slump or foam barricade

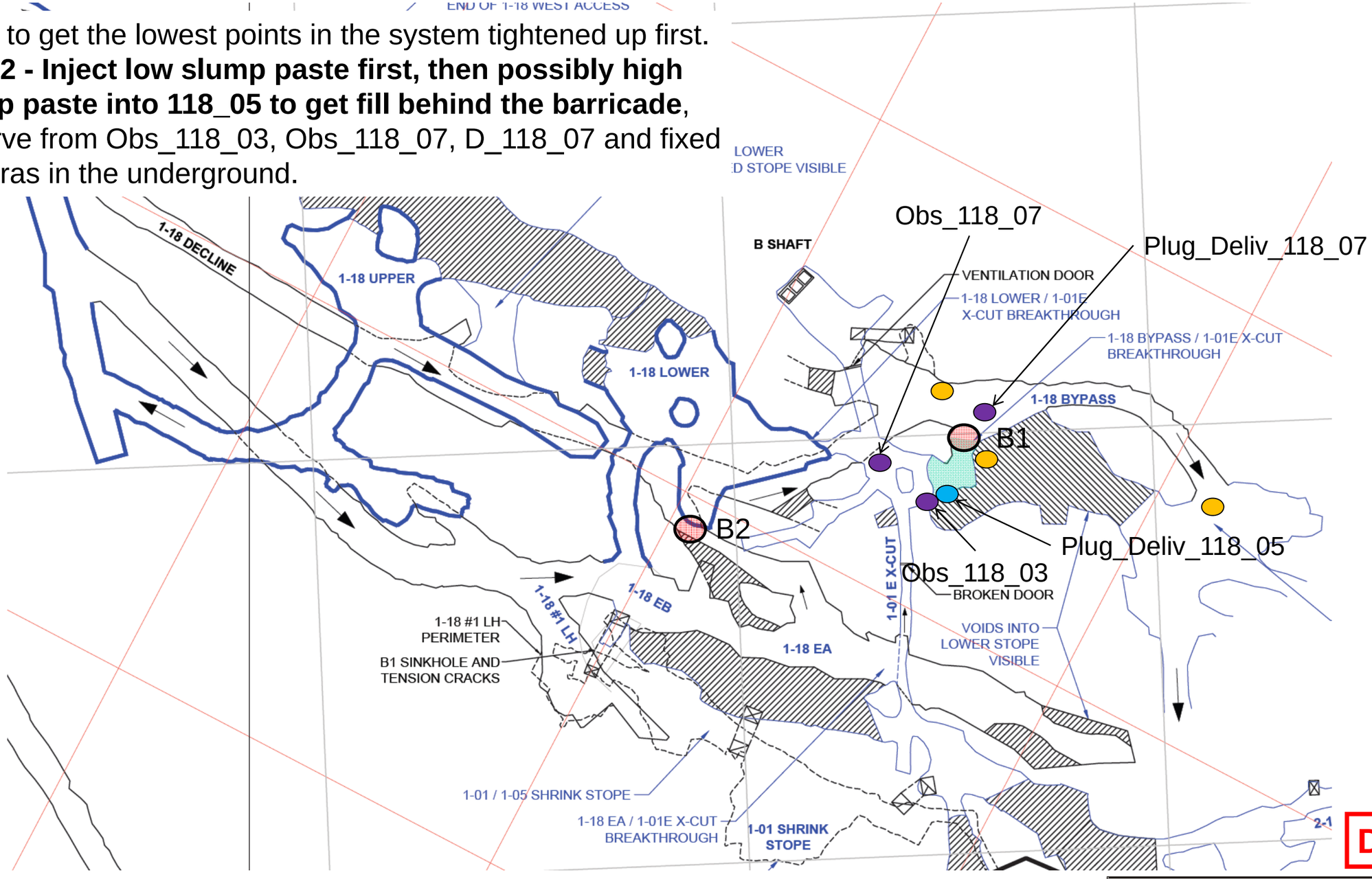
PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 1

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

- Need to get the lowest points in the system tightened up first.
- **Step 2 - Inject low slump paste first, then possibly high slump paste into 118_05 to get fill behind the barricade**, observe from Obs_118_03, Obs_118_07, D_118_07 and fixed cameras in the underground.



DRAFT

Underground paste delivery pipe

Conventional barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

Borehole camera monitoring / secondary paste fill hole(s)

Borehole low slump or foam barricade

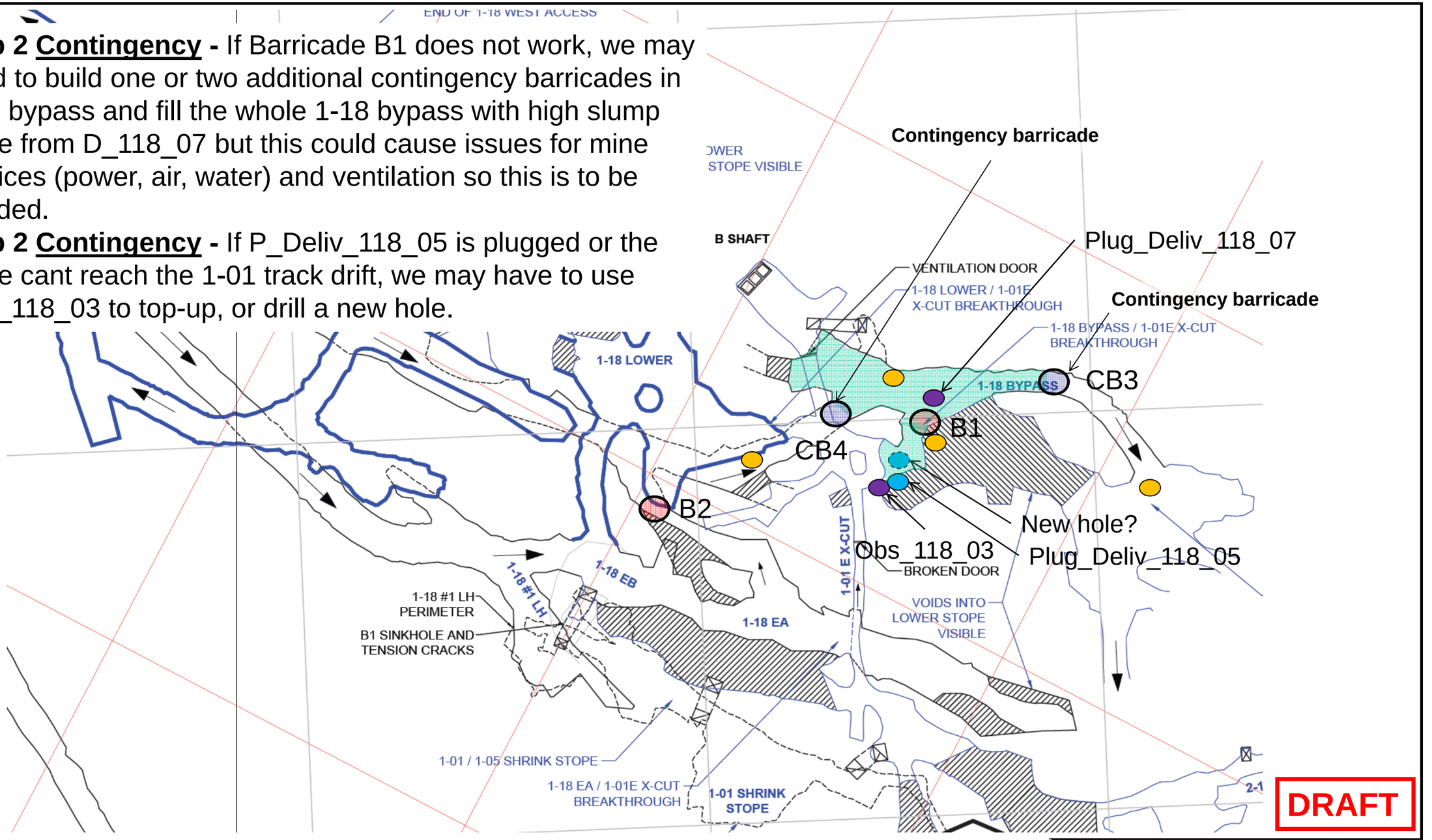
PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 2

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

- **Step 2 <u>Contingency</u> -** If Barricade B1 does not work, we may need to build one or two additional contingency barricades in 1-18 bypass and fill the whole 1-18 bypass with high slump paste from D_118_07 but this could cause issues for mine services (power, air, water) and ventilation so this is to be avoided.
- **Step 2 <u>Contingency</u> -** If P_Deliv_118_05 is plugged or the paste cant reach the 1-01 track drift, we may have to use Obs_118_03 to top-up, or drill a new hole.



DRAFT

Underground paste delivery pipe

Conventional barricade

Contingency barricade

U/G monitoring camera installed in-person

Borehole camera monitoring / secondary paste fill hole(s)

Borehole low slump or foam barricade

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 2 - Contingency

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

33000 N

33050 N

33100 N

175 Z

150 Z

125 Z

P_Deliv_118_05

CMS

1-18 Lower

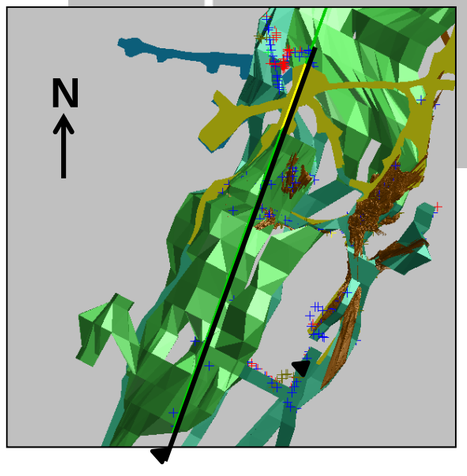
1-01 Track Drift Level

Stope Below Floor

Stope Below Floor

1-18 Bypass

B1



DRAFT

Approx. Void shape

Low slump paste

Observation hole

Delivery hole

Observation camera

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 2

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

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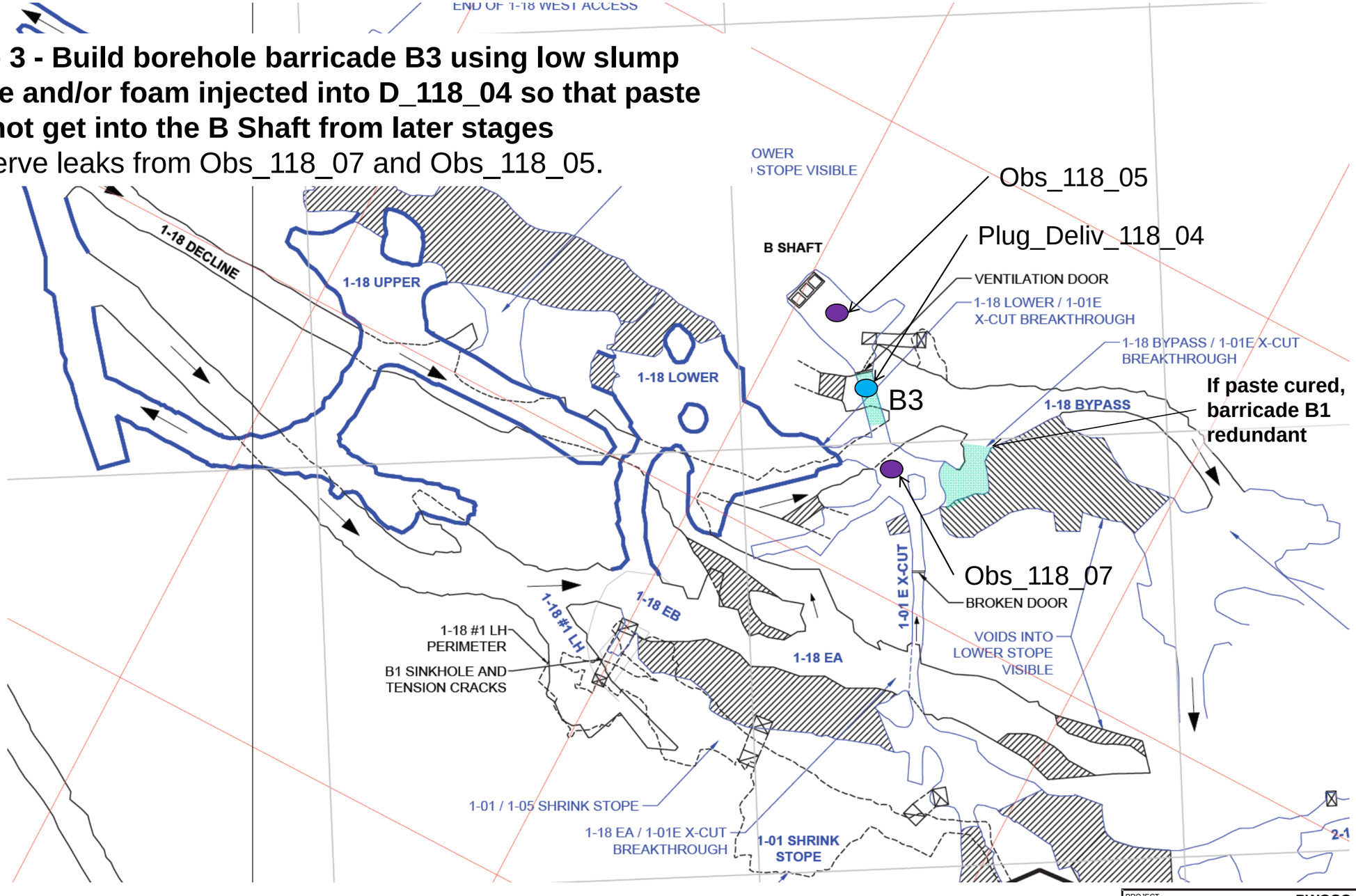
- **Step 3 - Build borehole barricade B3 using low slump paste and/or foam injected into D_118_04 so that paste cannot get into the B Shaft from later stages**
- Observe leaks from Obs_118_07 and Obs_118_05.



DRAFT

Underground paste delivery pipe

Conventional barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

Borehole camera monitoring / secondary paste fill hole(s)

Borehole low slump or foam barricade

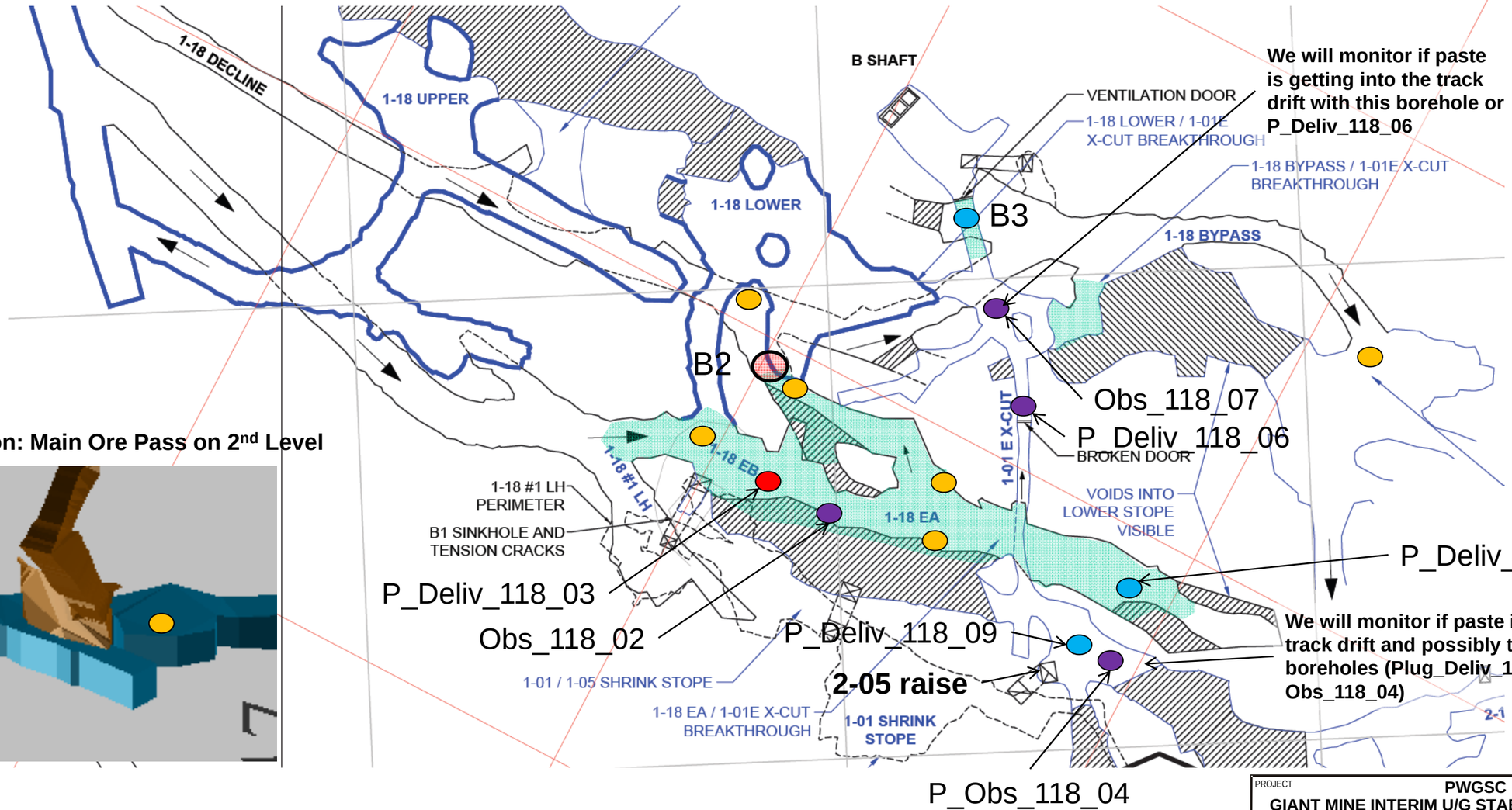
PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 3

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

- **Step 4 -** Start backfilling 1-18 EA from surface borehole D_118_03 with high slump paste.
- If this paste cant get to the north, we could also inject in D_118_11, Obs_118_02 and eventually D_118_06 later.
- We will use high slump paste to fill the lowest area up until the point where we think it is spilling out down the 2-05 raise, then stop and determine the next step.



Inset – Option: Main Ore Pass on 2nd Level

DRAFT

Underground paste delivery pipe

Conventional barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

Borehole camera monitoring / secondary paste fill hole(s)

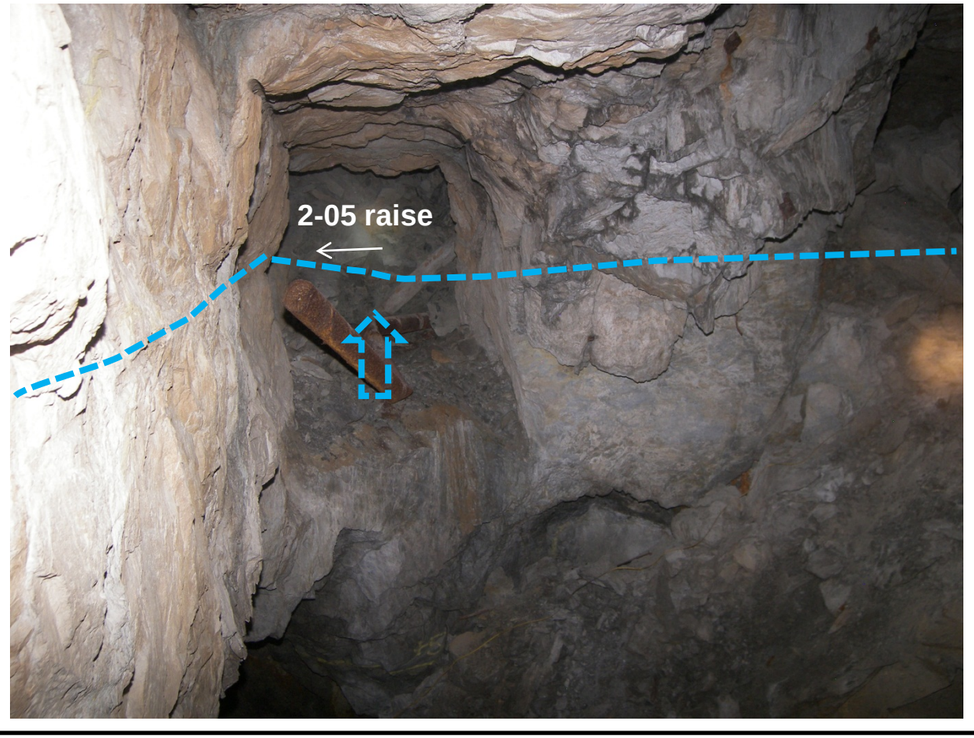
Borehole low slump or foam barricade

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 4

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					



- Start backfilling 1-18 EA from surface boreholes
- Because we cant safely access the 2-05 raise area, we will use high slump paste to fill the lowest area up until the point where we think it is spilling out down the raise.
- We can get the fill into the northern portion of 1-18 EA where it goes under the track drift as seen in the photos
- Once the fill gets to the point of the blue line, it can spill down the track drift and we will need to stop pumping and let the paste setup.
- We will also have to have cameras on the 2nd level where the ore pass is intersected to check for paste entering the raise.

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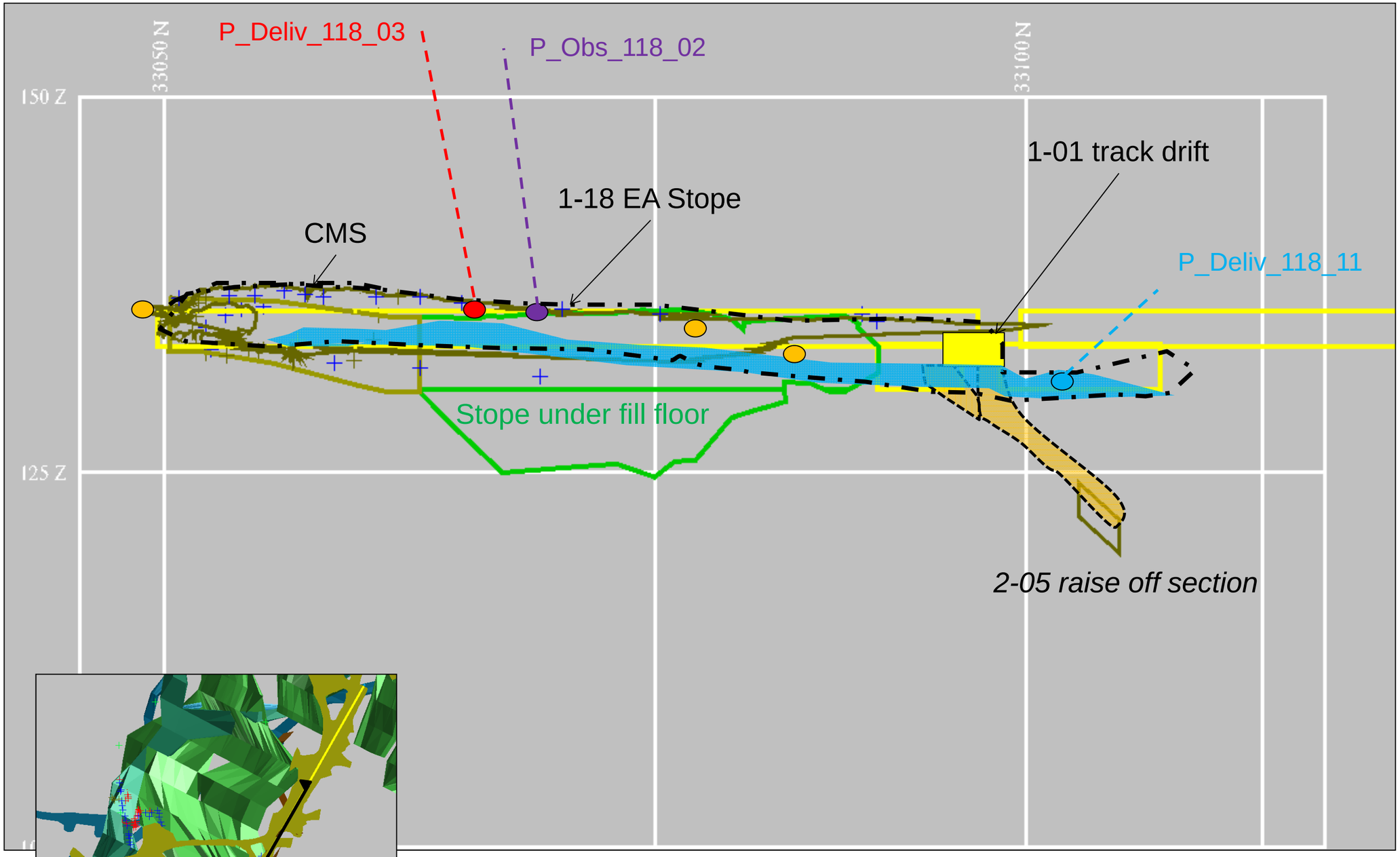
PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 4

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning



Approx. Void Shape

High slump paste

Observation camera

Observation hole

Delivery hole

DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 4

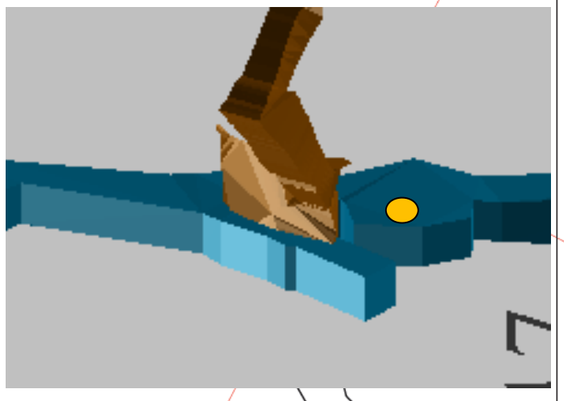
Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning

- **Step 5 -** Pump lower slump paste into P_Deliv_118_03 so that it does not flow into the track drift and the raise area into the north.
- This results in a partial filling of the northern portion of 1-18 EA but holes P_Deliv_118_11, Obs_118_02 and P_Deluv_118_06 can be used as complementary delivery holes later.

Inset – Main Ore Pass on 2nd Level



DRAFT

Underground paste delivery pipe

Conventional barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

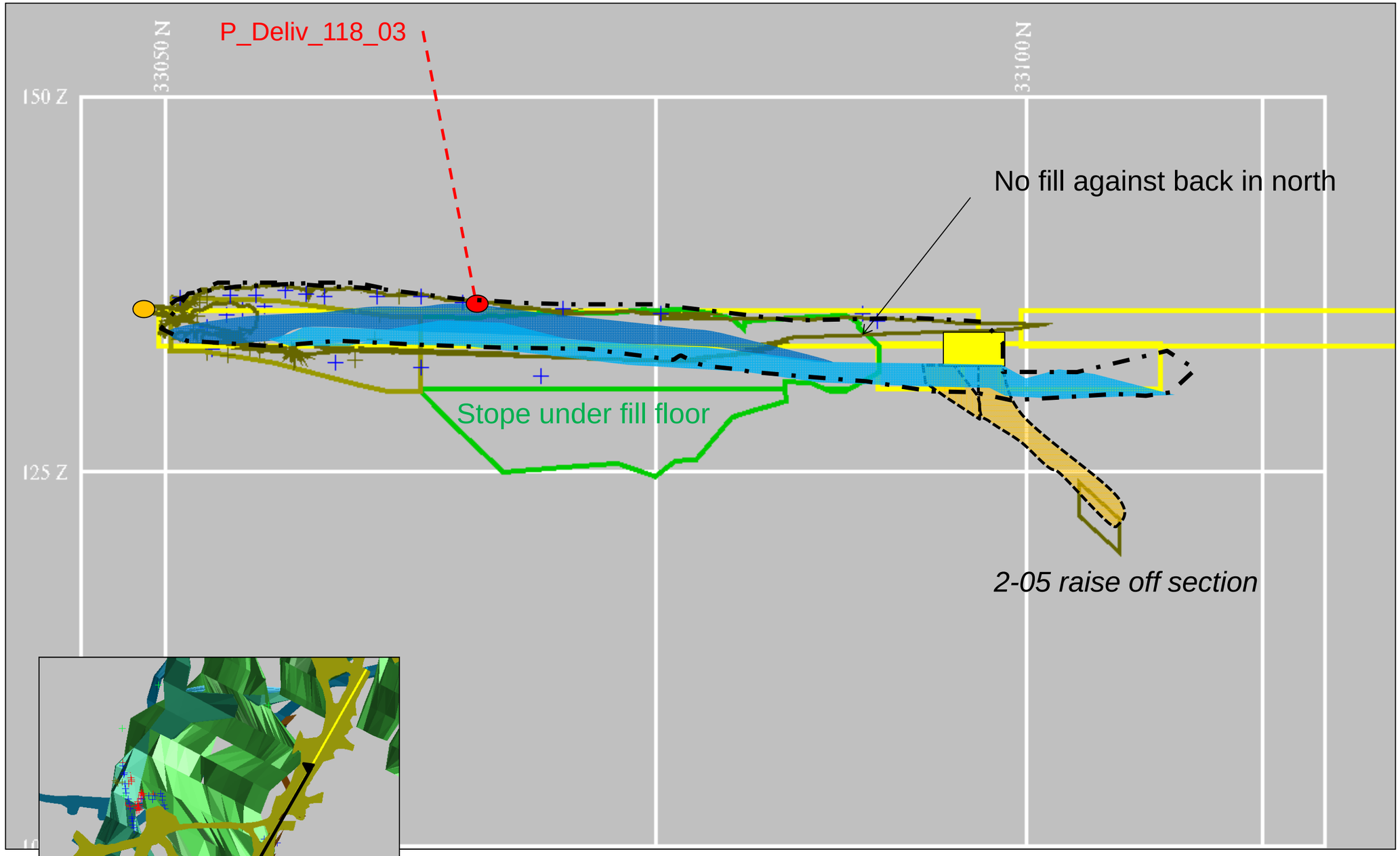
Borehole camera monitoring / secondary paste fill hole(s)

Borehole low slump or foam barricade

PROJECT	PWGSC GIANT MINE INTERIM U/G STABILIZATION PROJECT YELLOWKNIFE, NWT
TITLE	B1-18 Stope Backfill Plan – Step 5

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					



Approx. Void Shape

High slump paste

Lower slump paste

Delivery hole

Observation camera

DRAFT

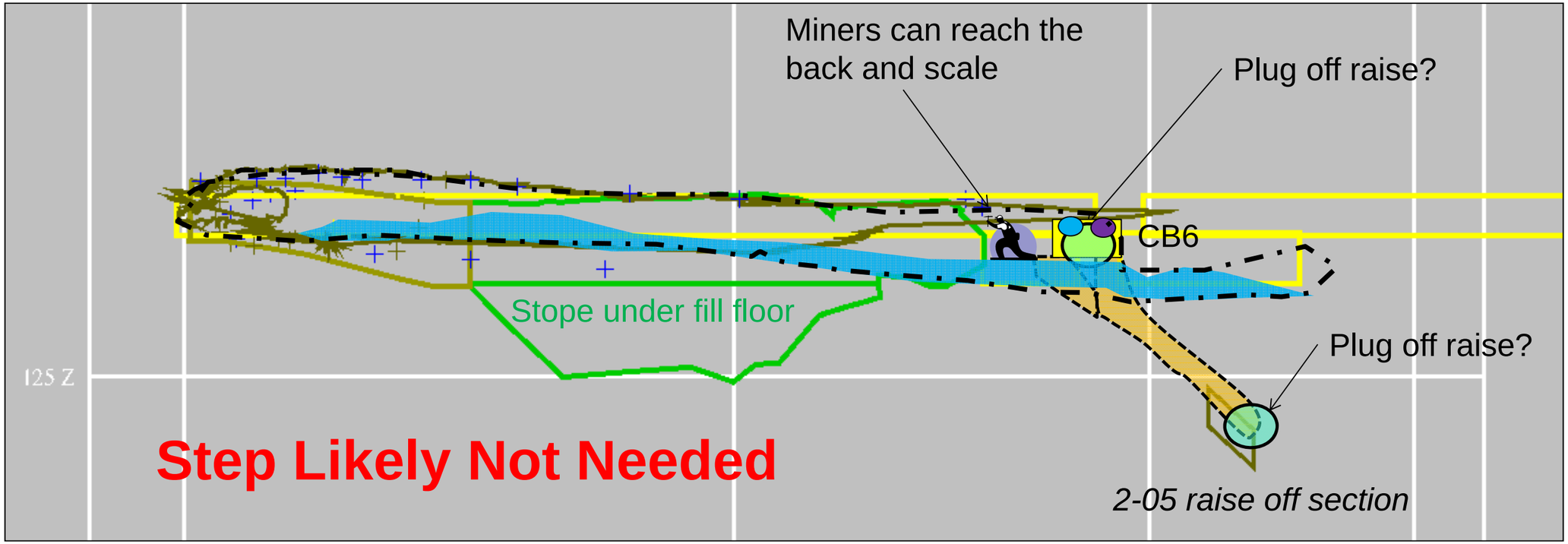
PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 5

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

- **<u>Contingency</u> Step 5a – Plug the 2-05 ore pass and backfill remainder of 1-18 EA stope with high slump paste –** ***can only be done after geotechnical assessment and rehabilitation complete.***
- Once the paste gets to a higher level in the north end of 1-18 EA, allow miners to go into the stope because they might now be able to work off the fill, scale the back, re-gain access to the 2-05 raise area and plug the raise (barricade CB6), allowing us to continue on with filling high slump paste in this area to fill the entire stope fully.
- Alternatively the boreholes drilled from the pit Plug_Deliv_118_09 could be used to build a low slump plug at the raise area but because the mine plans are not complete in this area this is not likely to be a success.



- Last option: look at blocking raise on 2nd level (foam?) then drilling a hole to intersect the ore pass from B1 pit floor and slowly filling

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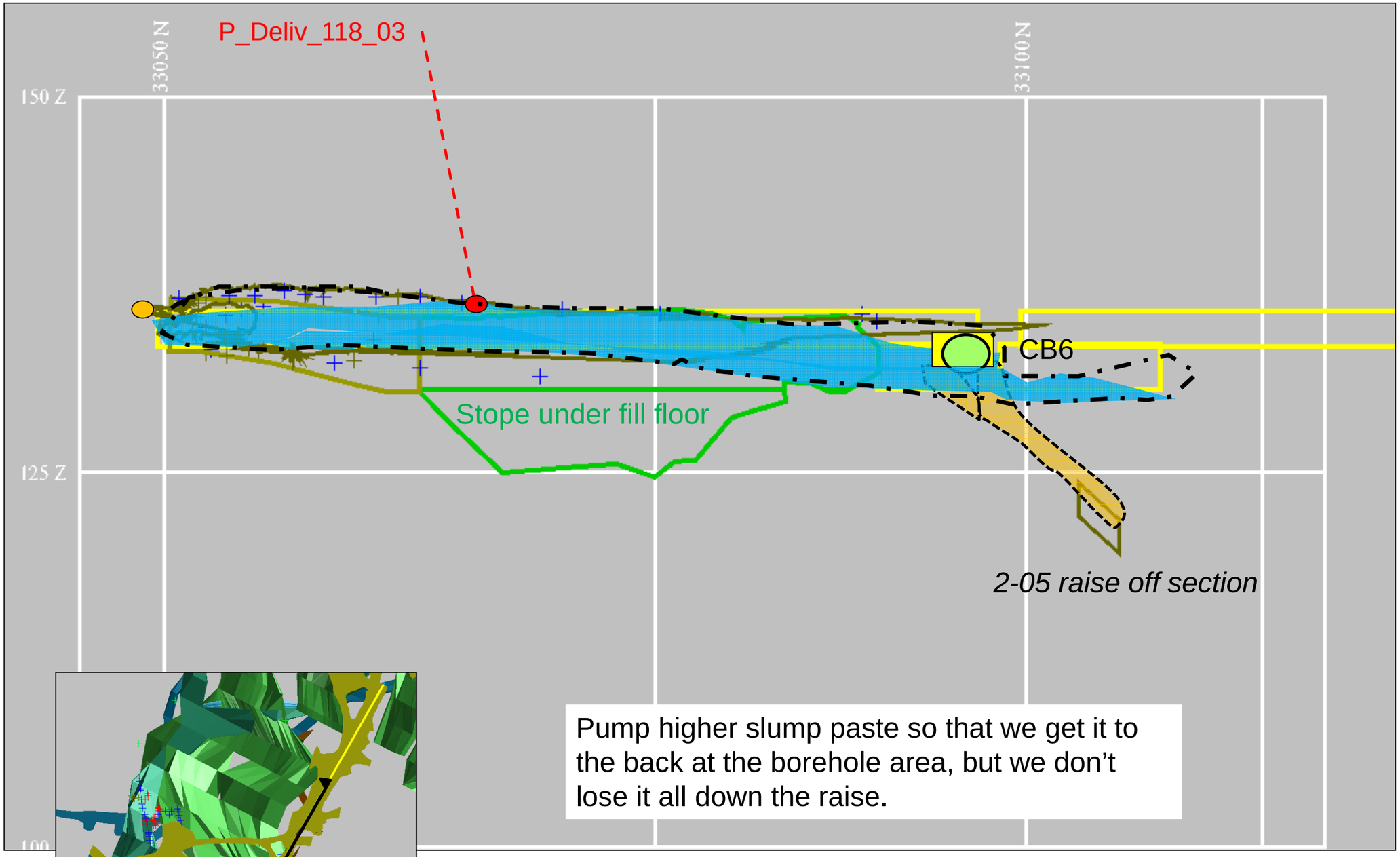
PROJECT: PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE: B1-18 Stope
Backfill Plan – Contingency Step 5a

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					



Pump higher slump paste so that we get it to the back at the borehole area, but we don't lose it all down the raise.

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Approx. Void Shape

High slump paste

Observation camera

Delivery hole

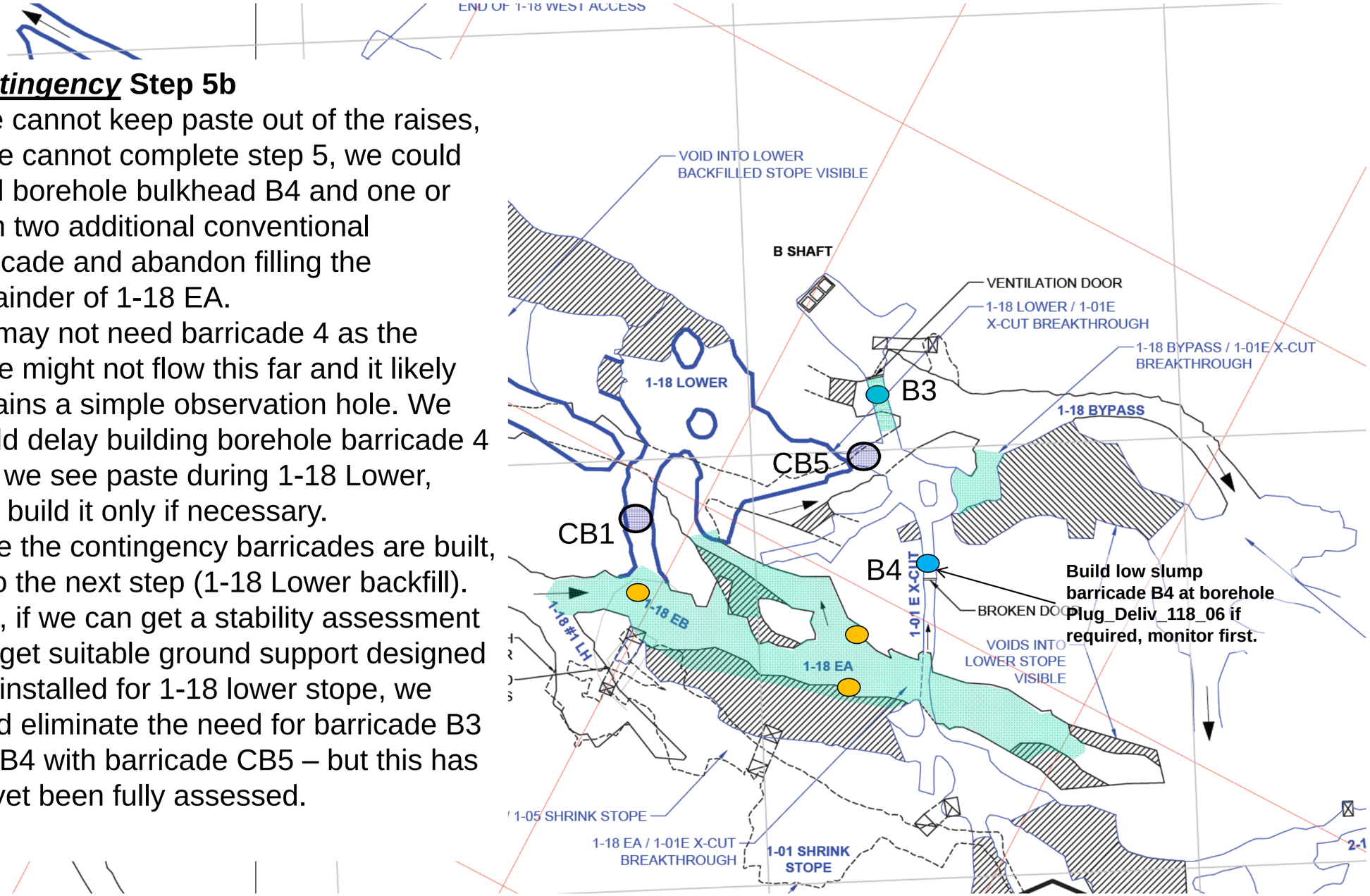
PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Contingency Step 5a

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

- ***Contingency*** **Step 5b**
- If we cannot keep paste out of the raises, or we cannot complete step 5, we could build borehole bulkhead B4 and one or even two additional conventional barricade and abandon filling the remainder of 1-18 EA.
- We may not need barricade 4 as the paste might not flow this far and it likely remains a simple observation hole. We would delay building borehole barricade 4 until we see paste during 1-18 Lower, then build it only if necessary.
- Once the contingency barricades are built, go to the next step (1-18 Lower backfill).
- Also, if we can get a stability assessment and get suitable ground support designed and installed for 1-18 lower stope, we could eliminate the need for barricade B3 and B4 with barricade CB5 – but this has not yet been fully assessed.



DRAFT

Underground paste delivery pipe

Conventional barricade

Contingency barricade

U/G monitoring camera installed in-person

Borehole camera monitoring / secondary paste fill hole(s)

Borehole low slump or foam barricade

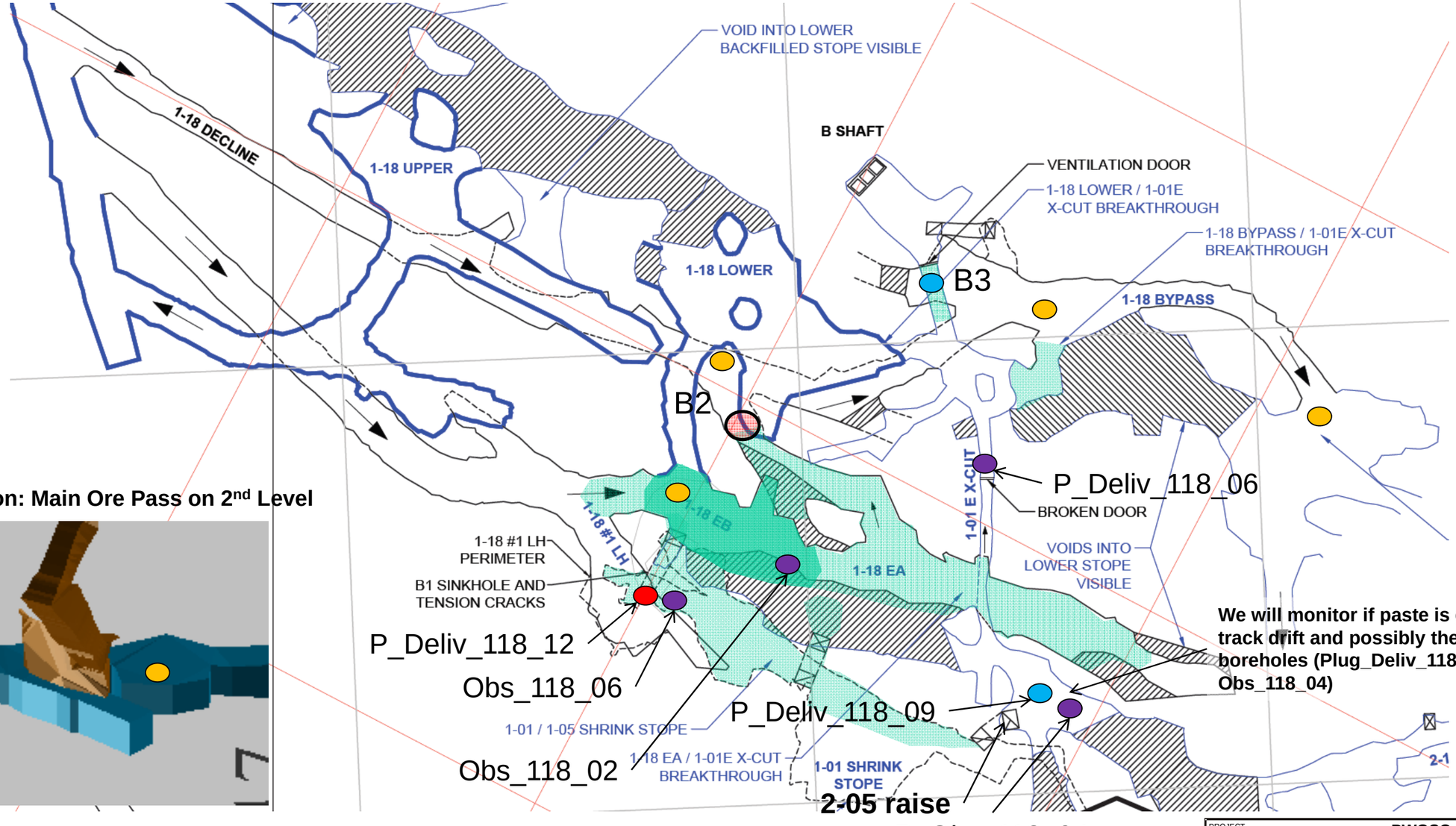
PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Contingency step 5b

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

- **Step 6 -** Backfill 1-01 Shrink stope from P_Deliv_118_12 and observe from Obs_118_06 and Obs_118_02 (if accessible). Some paste will leak through the raises and fill some remaining voids in 1-18 EA.



Inset – Option: Main Ore Pass on 2nd Level

We will monitor if paste is getting into the track drift and possibly the raise in these boreholes (Plug_Deliv_118_09, Obs_118_04)

Conventional barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

Borehole camera monitoring / secondary paste fill hole(s)

Borehole low slump or foam barricade

DRAFT

PROJECT: PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE: B1-18 Stope
Backfill Plan – Step 6

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

Golder Associates

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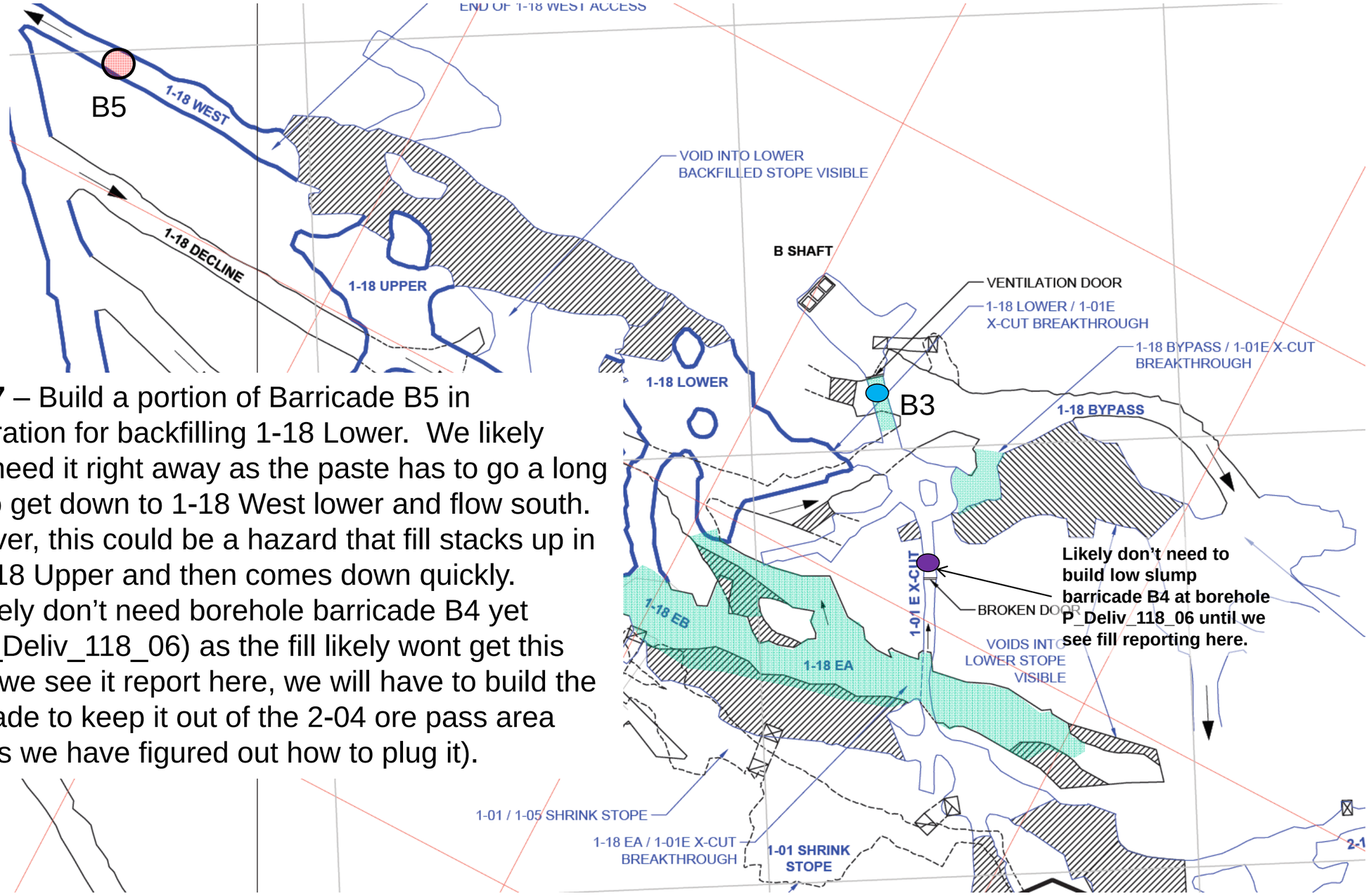

- **Step 7** – Build a portion of Barricade B5 in preparation for backfilling 1-18 Lower. We likely don't need it right away as the paste has to go a long way to get down to 1-18 West lower and flow south. However, this could be a hazard that fill stacks up in the 1-18 Upper and then comes down quickly.
- We likely don't need borehole barricade B4 yet (Plug_Deliv_118_06) as the fill likely wont get this far. If we see it report here, we will have to build the barricade to keep it out of the 2-04 ore pass area (unless we have figured out how to plug it).

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Underground paste delivery pipe

Conventional barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

Borehole camera monitoring / secondary paste fill hole(s)

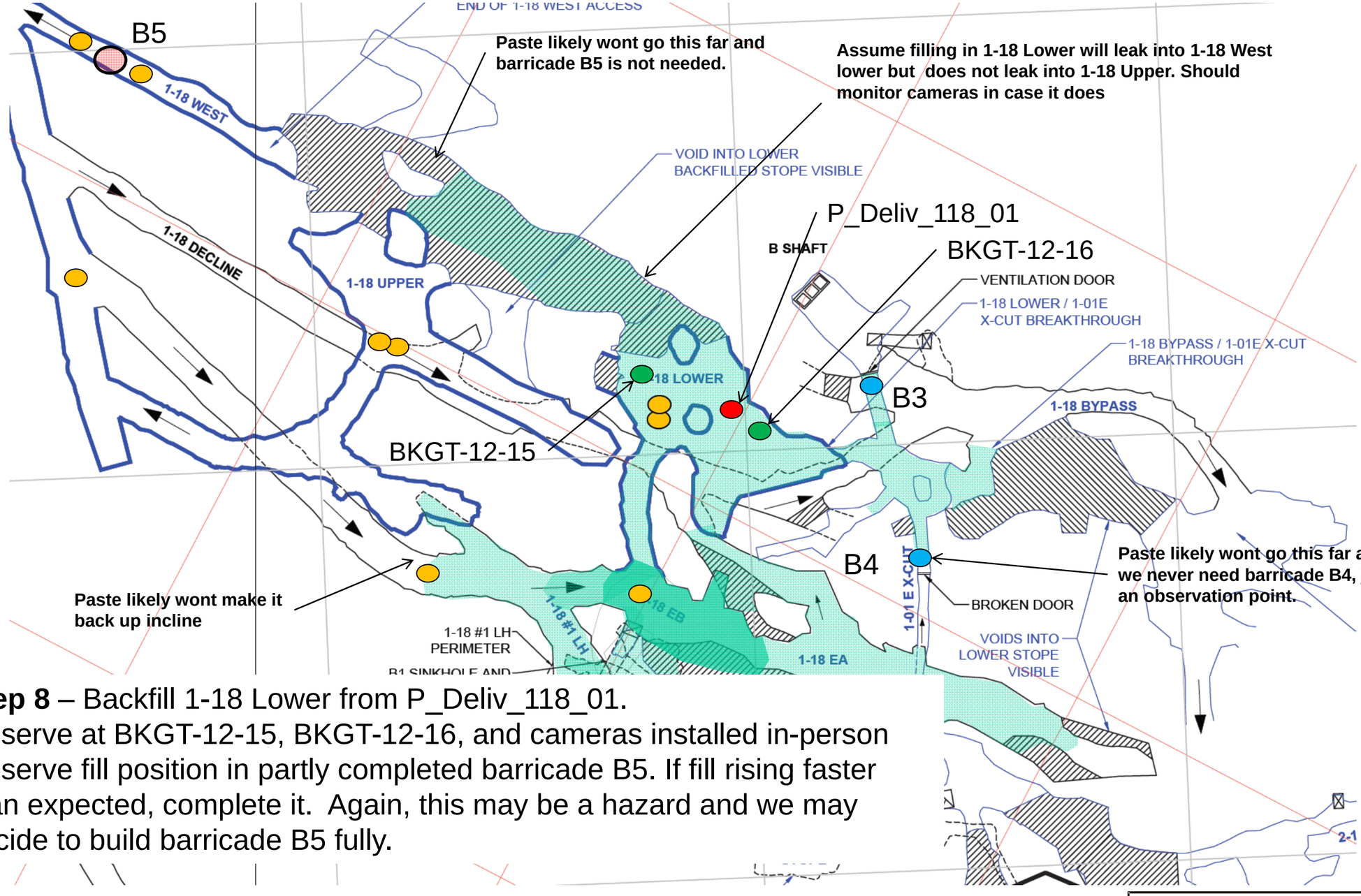
Borehole low slump or foam barricade

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 7

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					



- **Step 8** – Backfill 1-18 Lower from P_Deliv_118_01.
- Observe at BKGT-12-15, BKGT-12-16, and cameras installed in-person
- Observe fill position in partly completed barricade B5. If fill rising faster than expected, complete it. Again, this may be a hazard and we may decide to build barricade B5 fully.

Underground paste delivery pipe

Conventional barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

2012 Geotechnical boreholes

Borehole low slump or foam barricade

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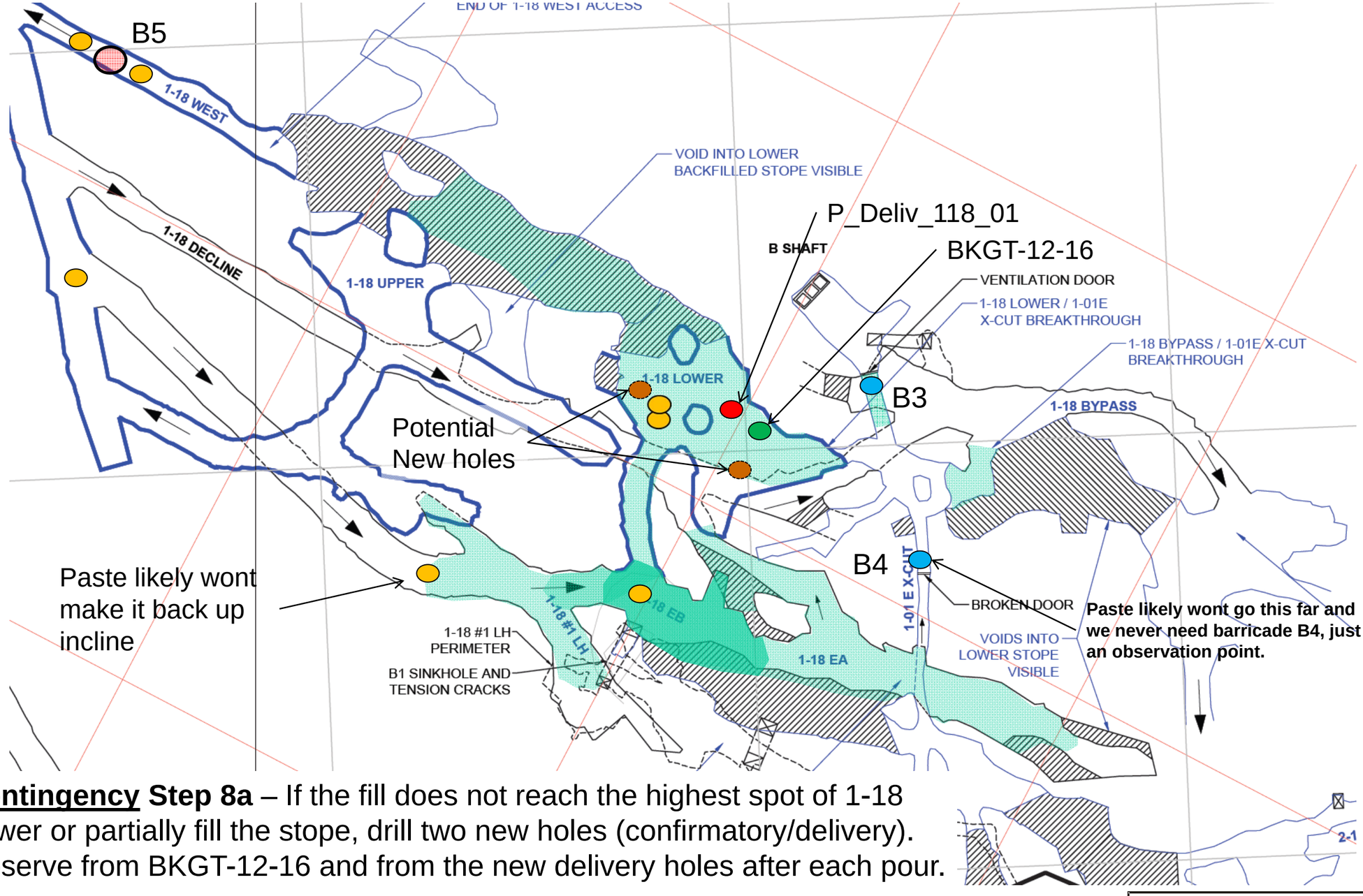
PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 8

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					



- **<u>Contingency</u> Step 8a** – If the fill does not reach the highest spot of 1-18 Lower or partially fill the stope, drill two new holes (confirmatory/delivery).
- Observe from BKGT-12-16 and from the new delivery holes after each pour.

Underground paste delivery pipe

Conventional barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

2012 Geotechnical boreholes

Borehole low slump or foam barricade

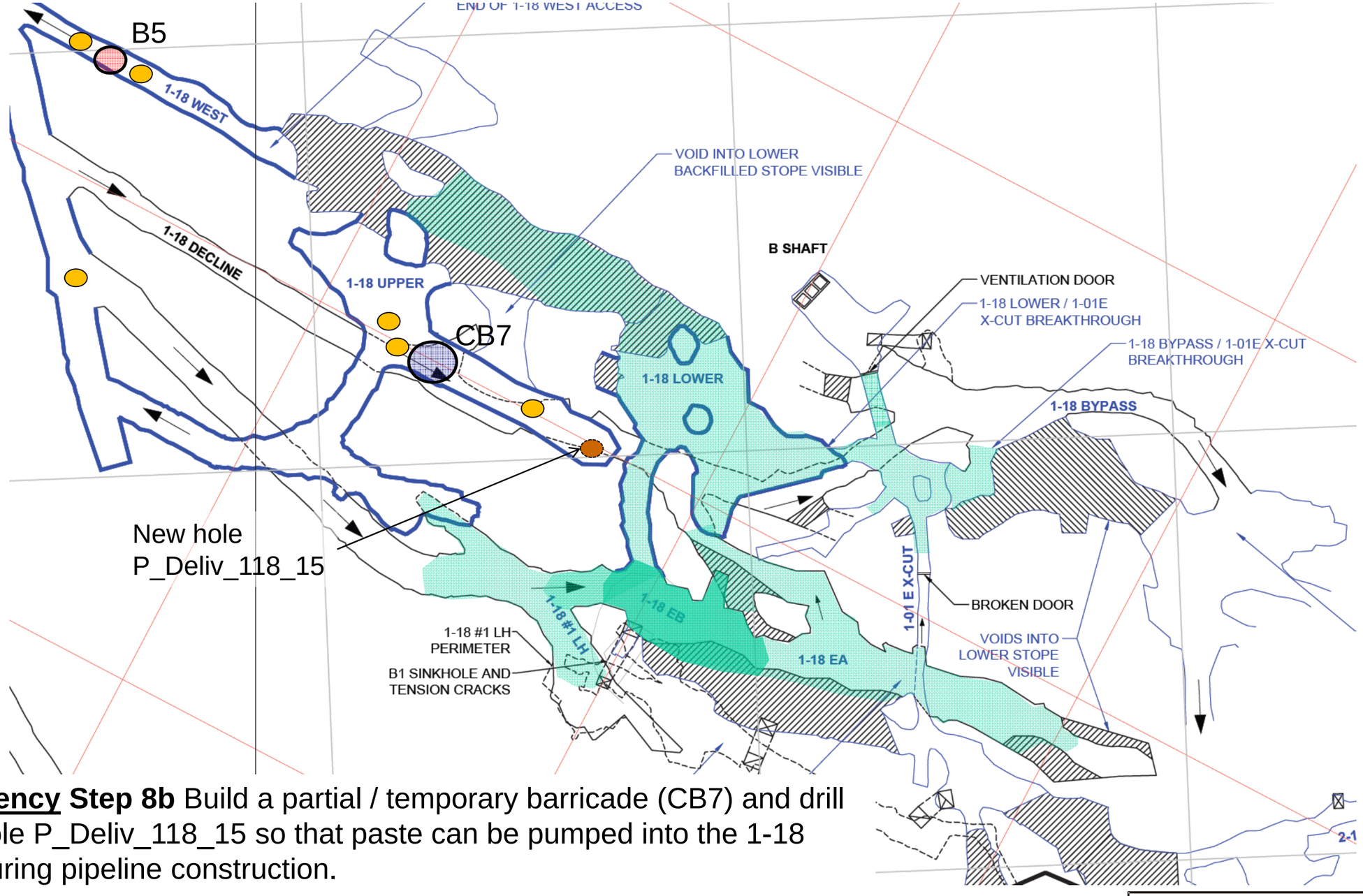
DRAFT

PROJECT: PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE: B1-18 Stope
Backfill Plan – Contingency Step 8a

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					



<u>Contingency</u> Step 8b Build a partial / temporary barricade (CB7) and drill a new hole P_Deliv_118_15 so that paste can be pumped into the 1-18 Upper during pipeline construction.

DRAFT

- **Underground paste delivery pipe**
- **Contingency-temporary barricade**
- **Sub-vertical primary fill delivery surface hole**
- **U/G monitoring camera installed in-person**
- **2012 Geotechnical boreholes**
- **Borehole low slump or foam barricade**

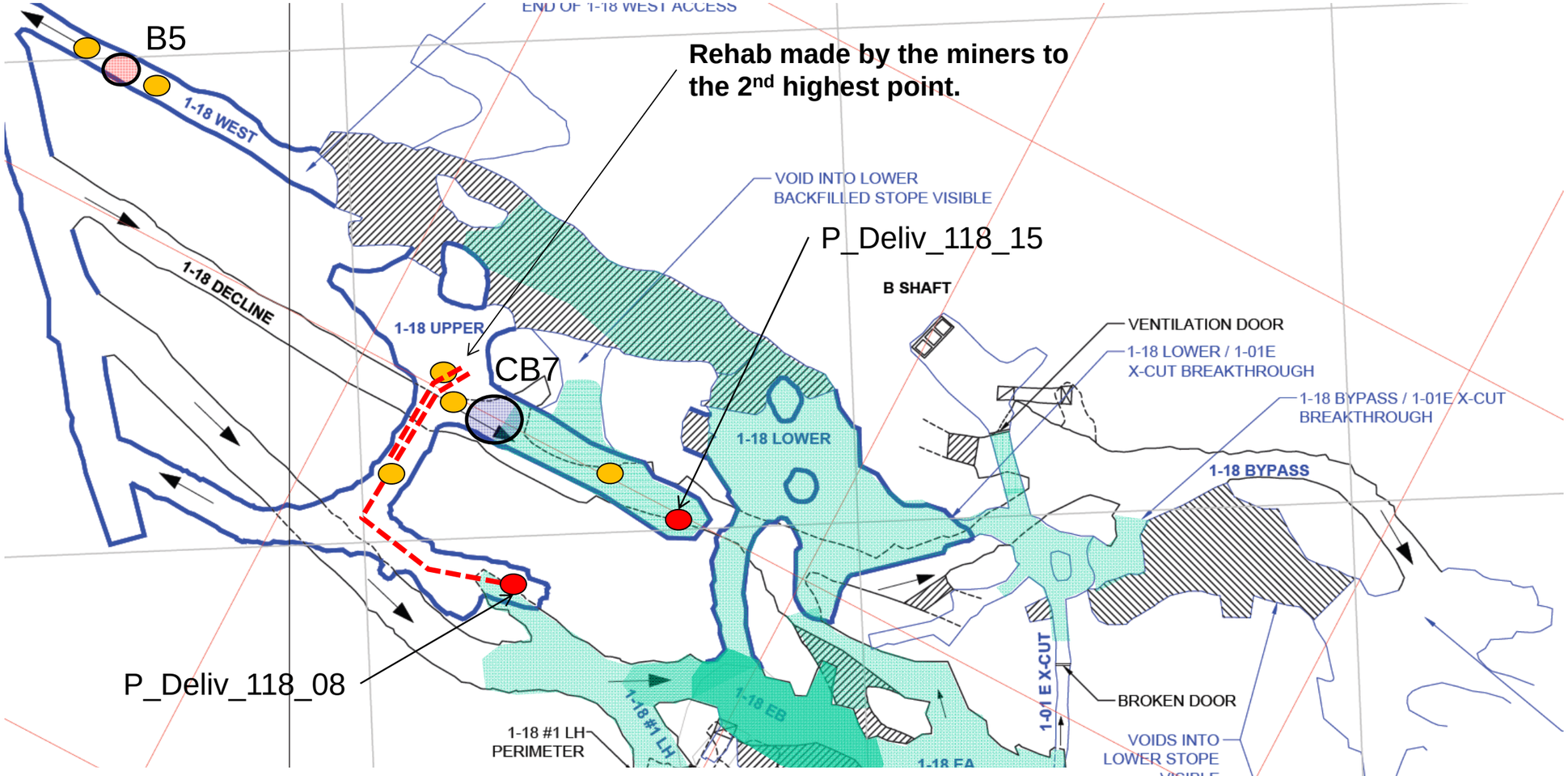
PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Contingency Step 8b

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning



Step 9 – Install paste delivery pipeline into back of 1-18 Upper Stope to the 2nd highest point + a sacrificial pipe (contingency).
Concurrently fill the northern arm of 1-18 Upper (P_Deliv_118_15) if CB7 is built.
Paste fill is monitored by cameras.
Paste is likely to flow down toward voids in the 1-18 Upper stope first. No one works on the pipelines when the paste is building up behind the barricade.

Underground paste delivery pipe

Conventional barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

Borehole camera monitoring / secondary paste fill hole(s)

Borehole low slump or foam barricade

DRAFT

PROJECT: **PWGSC**
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE: **B1-18 Stope**
Backfill Plan – Step 9

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
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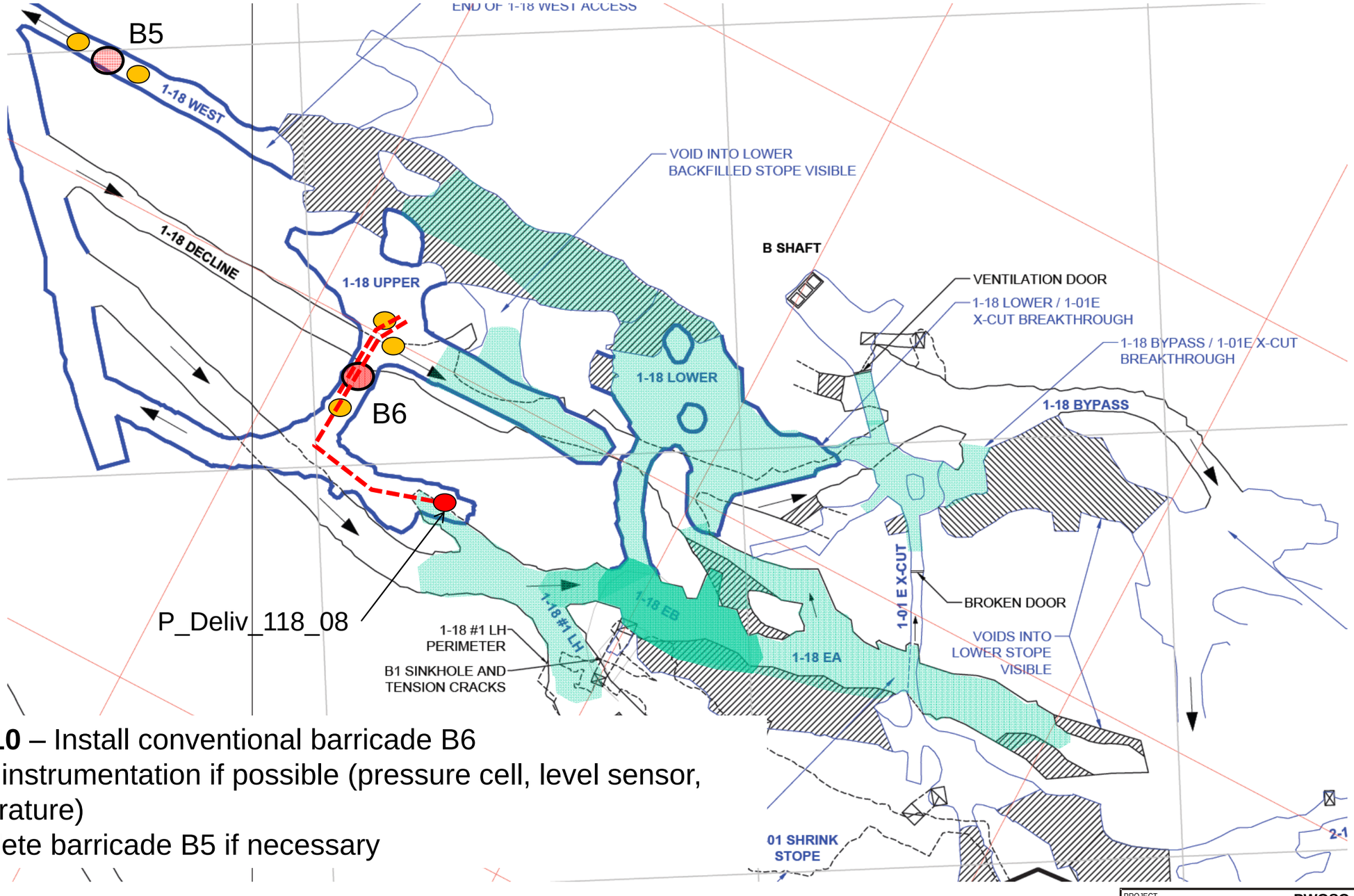
CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning



- **Step 10** – Install conventional barricade B6
- Install instrumentation if possible (pressure cell, level sensor, temperature)
- Complete barricade B5 if necessary

DRAFT

Underground paste delivery pipe

Conventional barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

Borehole camera monitoring / secondary paste fill hole(s)

Borehole low slump or foam barricade

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 10

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
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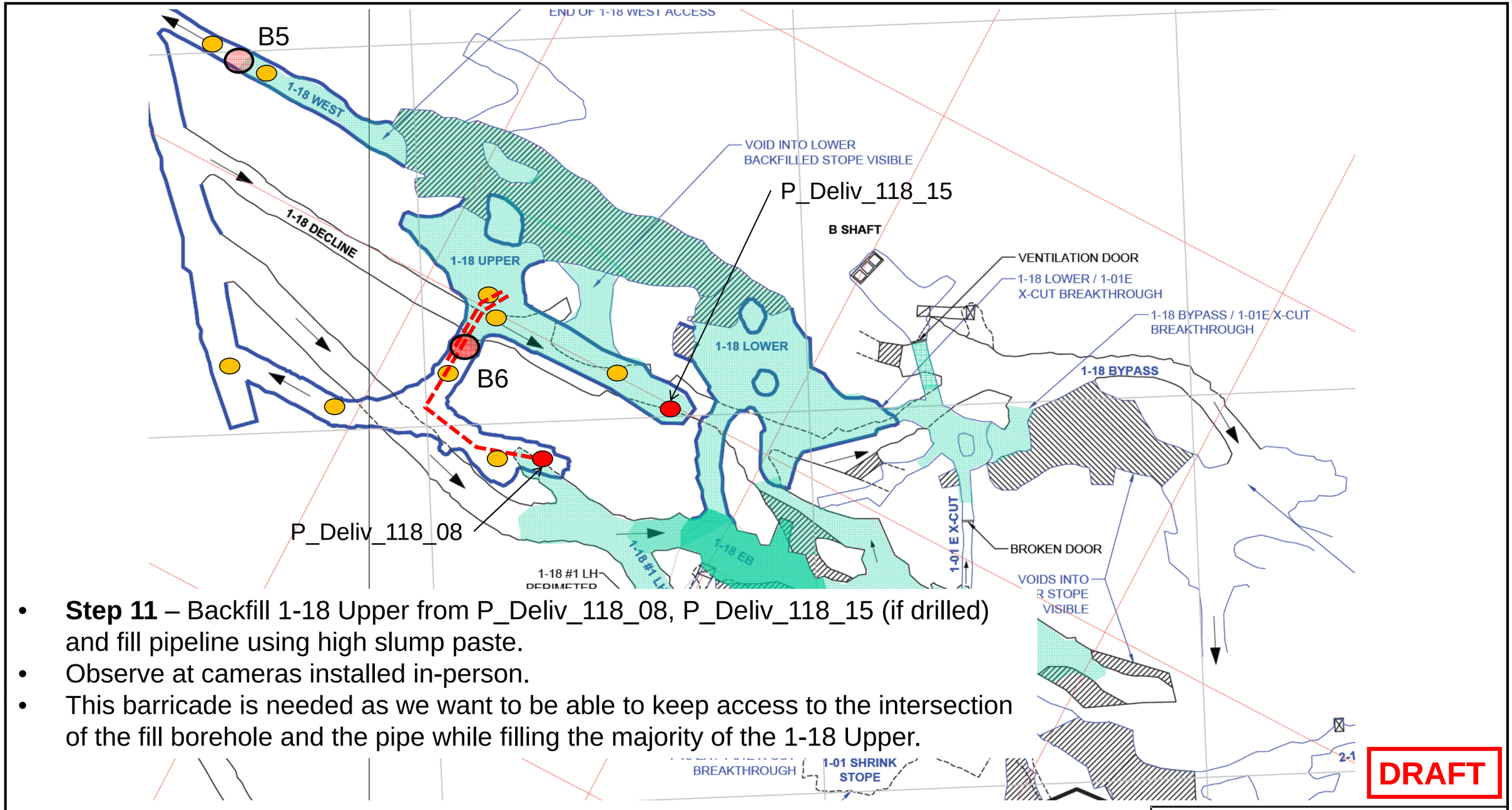
CHECK	DTK/FM	29OCT13			
REVIEW					



- **Step 11** – Backfill 1-18 Upper from P_Deliv_118_08, P_Deliv_118_15 (if drilled) and fill pipeline using high slump paste.
- Observe at cameras installed in-person.
- This barricade is needed as we want to be able to keep access to the intersection of the fill borehole and the pipe while filling the majority of the 1-18 Upper.

DRAFT

Underground paste delivery pipe

Conventional barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

Borehole camera monitoring / secondary paste fill hole(s)

Borehole low slump or foam barricade

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 11

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
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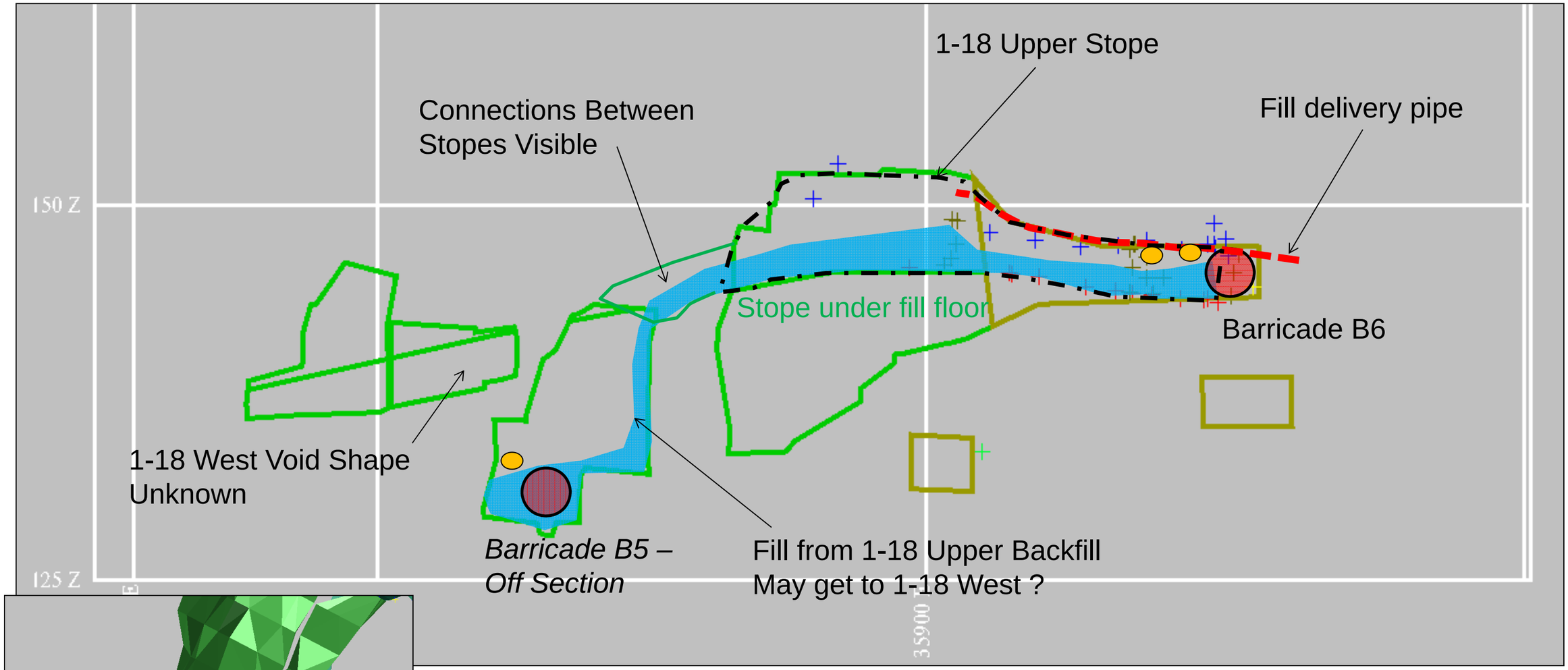

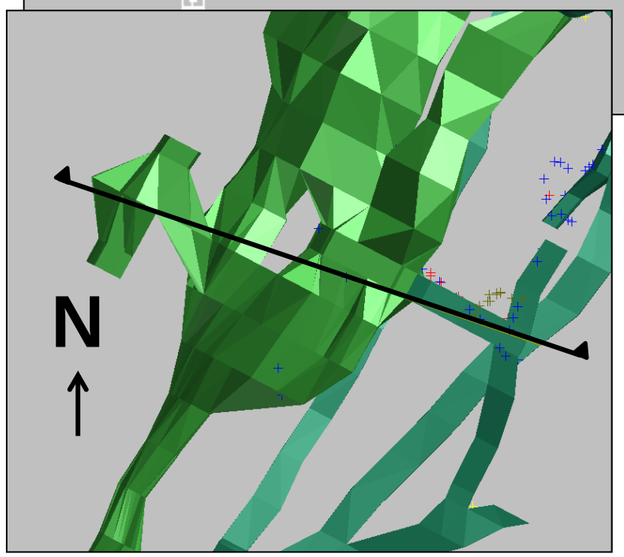

Approx. Void Shape

High slump paste

Observation camera

DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 11

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
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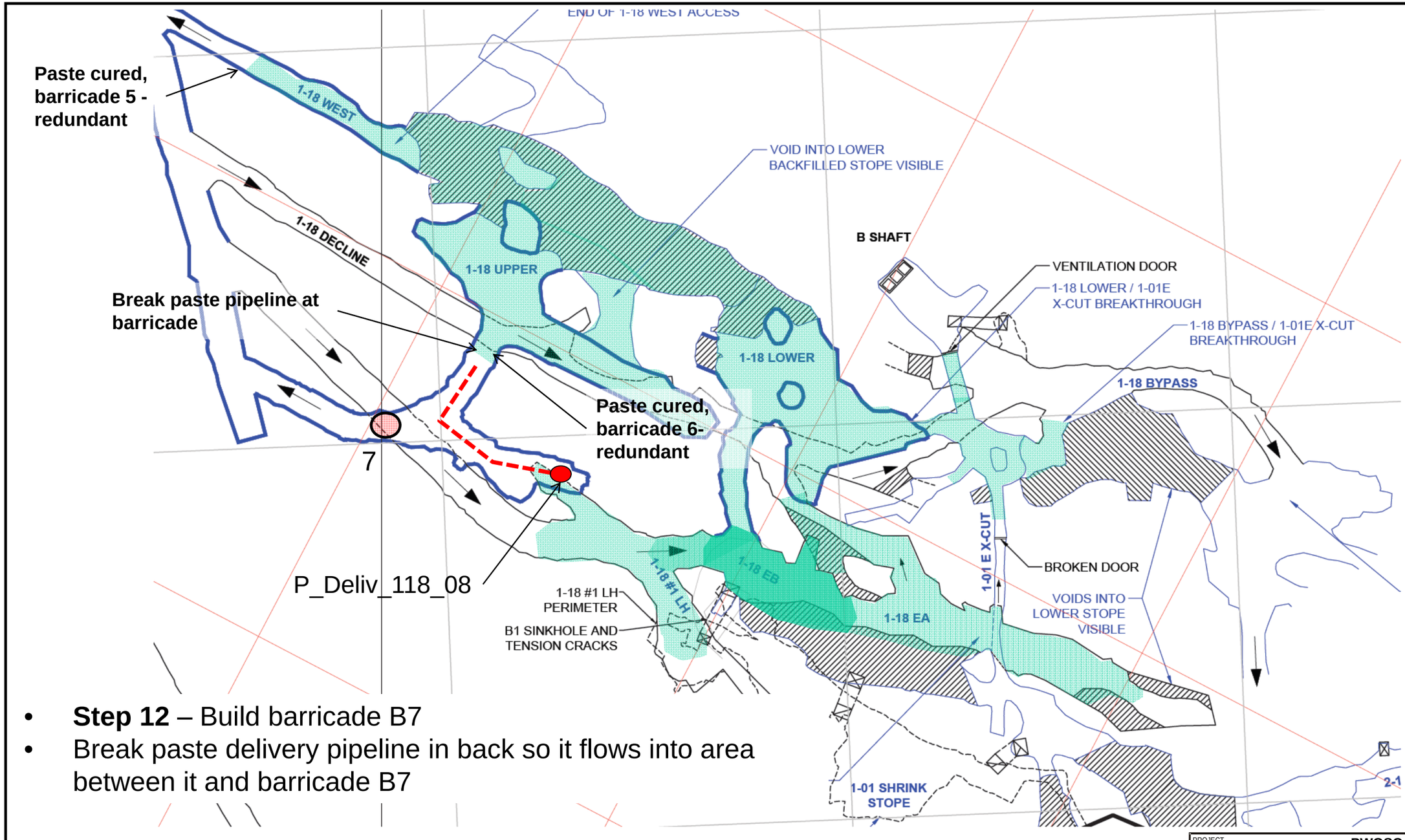

- **Step 12** – Build barricade B7
- Break paste delivery pipeline in back so it flows into area between it and barricade B7

DRAFT

Underground paste delivery pipe

Conventional barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

Borehole camera monitoring / secondary paste fill hole(s)

Borehole low slump or foam barricade

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 12

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
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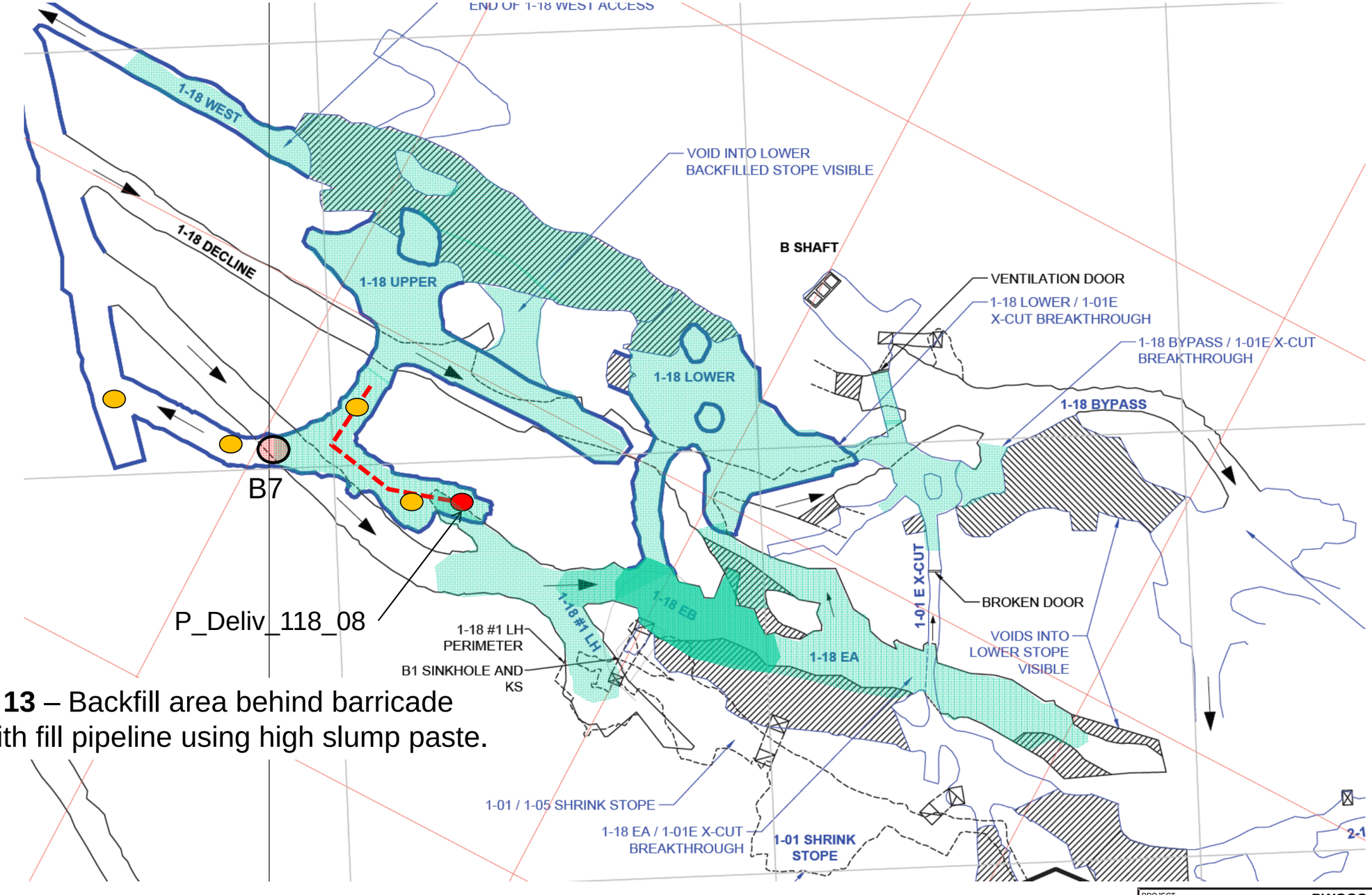
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning



- **Step 13** – Backfill area behind barricade B7 with fill pipeline using high slump paste.

Underground paste delivery pipe

Conventional barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

Borehole camera monitoring / secondary paste fill hole(s)

Borehole low slump or foam barricade

DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 13

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
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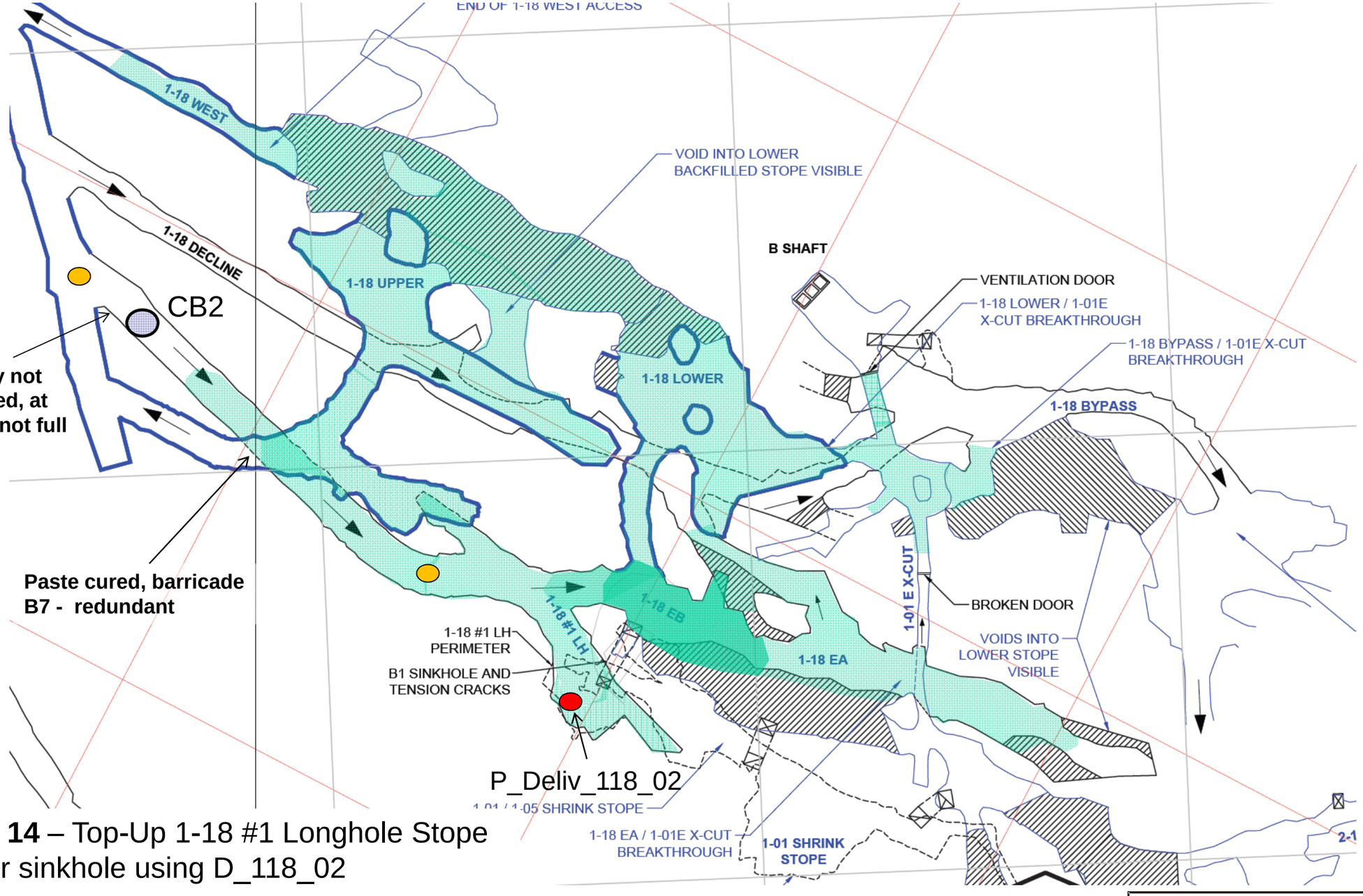

- **Step 14** – Top-Up 1-18 #1 Longhole Stope under sinkhole using D_118_02

Contingency barricade

Conventional barricade

Sub-vertical primary fill delivery surface hole

U/G monitoring camera installed in-person

Borehole camera monitoring / secondary paste fill hole(s)

Borehole low slump or foam barricade

DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 14

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
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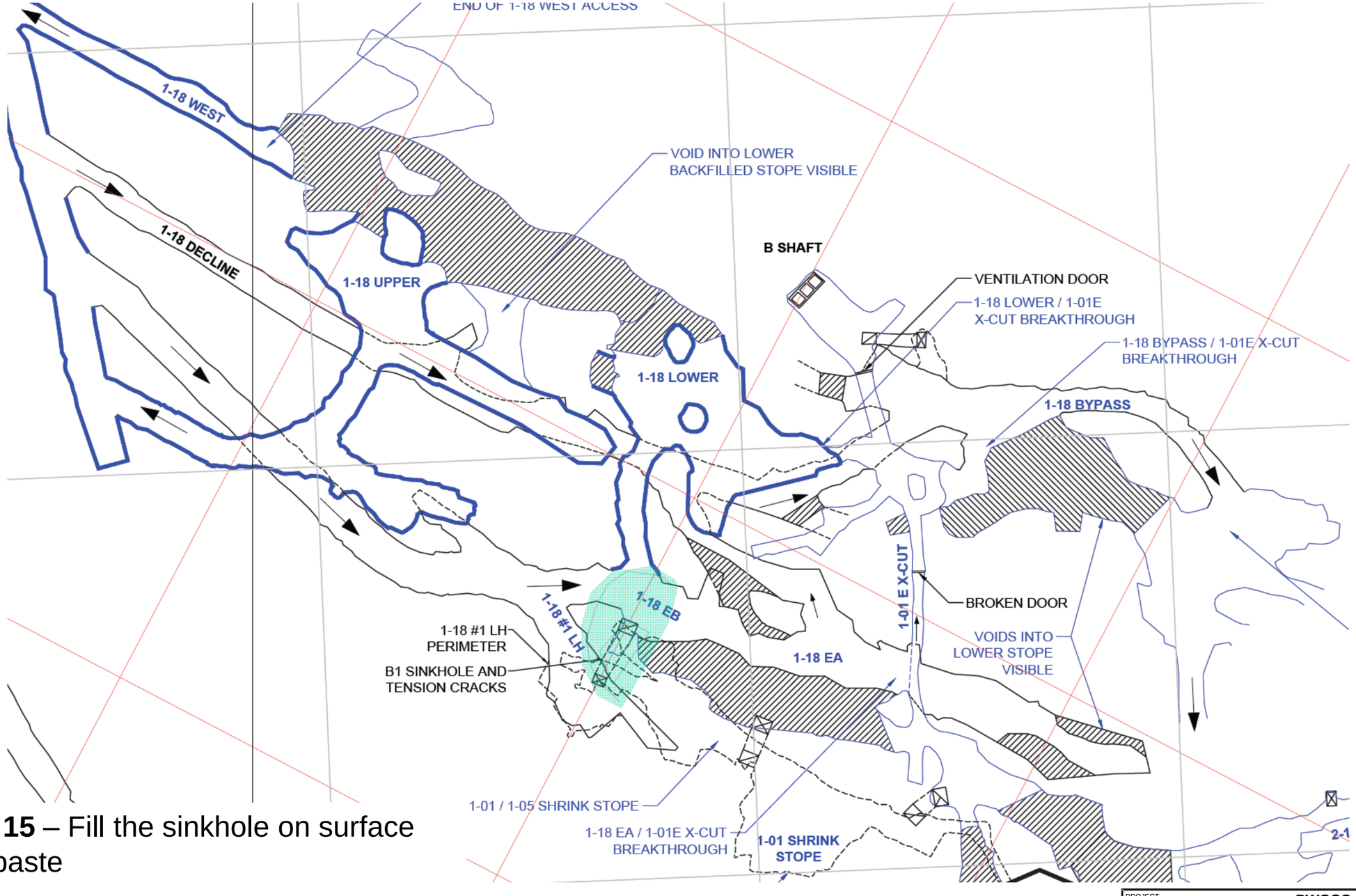

- **Step 15** – Fill the sinkhole on surface with paste

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PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
Backfill Plan – Step 15

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning

APPENDIX B

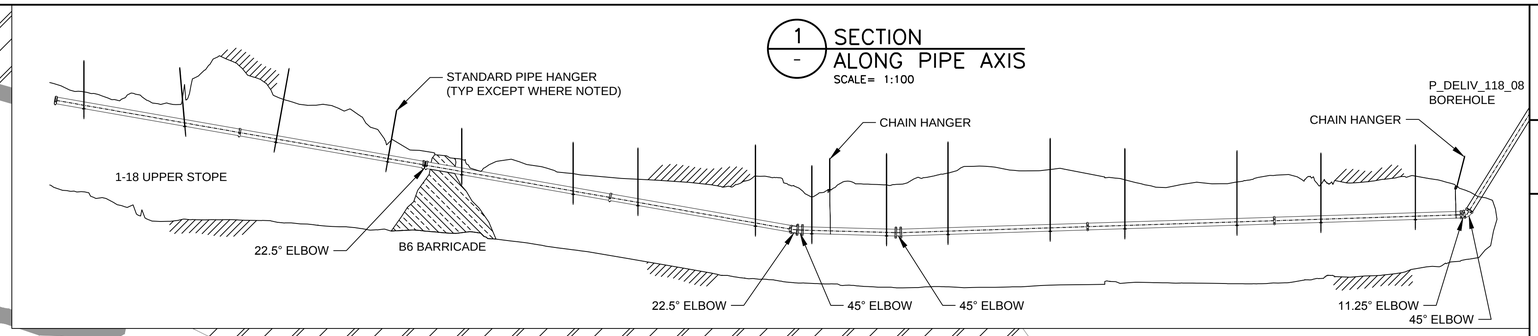
Drilling Performance Table

Golder Associates - Giant Mine
Area: B1-18

Borehole ID	Drilling Method	Collar Coordinates			EOH Coordinates			Borehole Data										Casing		Falling Head Test			Survey Data	
		Northing (GMRP)	Easting (GMRP)	Elevation (GMRP)	Northing (GMRP)	Easting (GMRP)	Elevation (GMRP)	Azimuth (°)	Dip (°)	Hole Length (Design) [m]	OVB/BR Contact Depth (m)	Actual Breakthrough Depth [m]	Hole Diameter (Design) [mm]	Borehole Start Date	Borehole Completion Date	Drilling Hours	Comments	Final Casing I.D. [mm]	Comments	Test Date	Pass/Fail	Comments	Downhole Survey (Boretrak)	CMS Scan
Obs_118_03	Diamond Drilling	33094.37	35923.55	168.11	33098.62	35924.24	134.87	9	83	33.50	1.3	33.27	96	28-Sep-13	29-Sep-13		During drilling: survey tentative but tool doesn't work and no survey taken. McCaw called to make decision to drill or not, proceed with drilling without survey.	96	Surface casing only	28-Sep-13	Passed		Yes	Yes - Not properly oriented
Plug_Deliv_118_07	Percussion Drilling	33114.51	35916.28	168.03	33107.17	35912.01	128.27	210	78	40.70	???	41.70	200	28-Sep-13	3-Oct-13		During drilling: survey tentative but tool doesn't work and no survey taken. McCaw called to make decision to drill or not, proceed with drilling without survey.	200	Install final casing down to 1 metres before breakthrough depth.	28-Sep-13	Passed	Test passed but no sealing methodology was applied.	Yes	Yes - Not properly oriented
Obs_118_02	Diamond Drilling	33070.20	35928.50	167.40	33068.99	35946.17	135.40	94	61	36.60	4.7	35.50	96	3-Oct-13	5-Oct-13			96	Surface casing only	4-Oct-13	Failed		Yes	Yes - Not properly oriented
Obs_118_07	Diamond Drilling	33091.83	35920.47	168.11	33091.83	35920.47	135.44	333	90	32.70	1.2	32.20	96	5-Oct-13	6-Oct-13			96	Surface casing only	6-Oct-13	Failed	Golder observed fractured rock below grout seal.	Yes	Yes
Obs_118_05	Diamond Drilling	33085.40	35910.50	167.80	33085.49	35898.95	135.72	270	70	34.10	2.7	34.99	96	7-Oct-13	8-Oct-13			96	Surface casing only	7-Oct-13	Passed	Falling head test passed at the third attempt.	Yes	Yes
Obs_118_06	Diamond Drilling	33042.09	35955.84	165.12	33052.25	35951.17	147.28	335	58	21.10	10.3	22.42	96	8-Oct-13	11-Oct-13			96	Surface casing only	10-Oct-13	Failed	Borehole located near fracture rock and sinkhole. Falling head test indicate that the borehole is not properly sealed.	Yes	N/A (no scan possible due to the size of the opening underground)
P_Deliv_118_01	Percussion Drilling	33068.12	35911.15	166.50	33068.12	35911.15	142.07	0	90	24.40	4.3	25.70	200	7-Oct-13	12-Oct-13			200	Casing along entire hole length	9-Oct-13	Failed	Falling head test was completed and after discussion, Golder concluded that the test was not carried out as per normal practises, therefore did not pass. Test results indicate that	Yes	Yes
P_Deliv_118_03	Percussion Drilling	33065.64	35931.26	166.44	33061.91	35943.37	136.65	107	67	32.40	5.4	31.10	200	7-Oct-13	14-Oct-13			200	Casing along entire hole length	10-Oct-13	Failed	Borehole located near fracture rock and sinkhole. Falling head test indicate that the borehole is not properly sealed.	Yes	Yes
P_Deliv_118_10	Percussion Drilling	33080.43	35915.65	167.74	33083.38	35916.17	135.54	10	85	32.30	3.1	31.20	200	10-Oct-13	16-Oct-13		Hole unusable - grouted full on 19-Oct-13	200	Casing along entire hole length	11-Oct-13	Failed	P_Deliv_118_10 overburden/bedrock contact is higher than the creek elevation indicating low risk of ground water entering the underground	Yes	N/A(no scan possible due to the size of the opening underground)
Plug_Deliv_118_05	Percussion Drilling	33100.10	35922.94	168.55	33100.10	35922.94	134.39	0	90	34.20	1.5	35.50	200	3-Oct-13	18-Oct-13		Hole deviates from 18 m down to breakthrough depth.	152	Casing only installed to 20 m	6-Oct-13	N/A	Falling head test was not performed	Yes	Yes - Not properly oriented
Plug_Deliv_118_04	Percussion Drilling	33088.01	35908.05	167.94	33088.01	35908.05	135.72	0	90	32.20	0.6	33.00	200	5-Oct-13	18-Oct-13		Drill hit steel at 21 m. Hole deviates from 18 m down to breakthrough depth.	152	Casing down to approximately 15 metres before breakthrough depth.	6-Oct-13	Doubtful	Golder did not observe final measurement. McCaw mentionned water dropped approximatelly 6 mm in 0.5 hrs	Yes	Yes
P_Deliv_118_02	Percussion Drilling	33047.42	35955.23	165.05	33047.42	35955.23	146.18	0	90	18.90	7.5	19.80	200	11-Oct-13	18-Oct-13			200	Casing along entire hole length	14-Oct-13	Passed	Borehole located near fracture rock and sinkhole.	Yes	Yes
P_Deliv_118_06	Percussion Drilling	33095.78	35932.50	168.02	33095.37	35931.69	135.41	243	88	32.60	1.7	34.20	200	15-Oct-13	18-Oct-13			200	Casing along entire hole length	15-Oct-13	Passed	Borehole located near fracture rock and sinkhole.	Yes	Incomplete
P_Deliv_118_12	Percussion Drilling	33046.04	35955.00	165.25	33049.53	35951.09	147.88	312	73	18.10	8.0	17.90	200	13-Oct-13	19-Oct-13			200	Casing along entire hole length	15-Oct-13	Passed	Borehole located near fracture rock and sinkhole.	Yes	Yes
P_Deliv_118_08	Percussion Drilling	33038.42	35933.49	165.25	33029.50	35925.70	147.77	221	56	21.10	8.0	18.50	200	16-Oct-13	19-Oct-13			200	Casing along entire hole length	19-Oct-13	Passed	Borehole located near creek.	Yes	Yes - Not oriented properly
Plug_Deliv_118_09	Percussion Drilling	33102.24	35972.64	144.12	33102.73	35963.16	135.57	273	42	12.80	6.2	12.80	200	19-Oct-13	22-Oct-13			200	Casing along entire hole length	22-Oct-13	Failed	McCaw carried out the falling head test and told Golder that the test passed. After discussion, Golder concluded that the test was not carried out as per normal practises, therefore	Yes	Yes
P_Deliv_118_11	Percussion Drilling	33108.82	35970.60	144.50	33109.67	35958.12	132.58	274	44	17.30	6.0	16.30	200	21-Oct-13	23-Oct-13			200	Casing along entire hole length	23-Oct-13	Passed	Falling head test passed at the second attempt.	Yes	Yes
Obs_118_04	Percussion Drilling	33105.02	35971.02	144.20	33104.00	35963.25	135.31	263	49	11.90	7.0	8.30	96	23-Oct-13	24-Oct-13		McCaw drilled the observation hole to minimize traffic in pit.	96	Casing along entire hole length	24-Oct-13	N/A	McCaw drilled through grout in preparation for falling head test but unexpectedly broke through; therefore no falling head test was carried out for that borehole.	Yes	Yes

APPENDIX C

"As-Constructed" Underground Slickline Drawing



1 - SECTION ALONG PIPE AXIS
SCALE= 1:100

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Western Region
SERVICES IMMOBILIERS
Région de l'ouest

Golder Associates

GENERAL NOTES

1. ALL PIPING 200mm SCH40, ASTM GR. A OR B c/w CUT GROOVE, BOTH ENDS
2. ALL COUPLINGS VICTAULIC (OR EQUIVALENT) STYLE 77 FLEXIBLE COUPLING

0m 1 2 3 4 5
1:100

Revision/ Revision	Description/Description	Date/Date
0	AS-BUILT	14-01-23

Client/client
PUBLIC WORKS GOVERNMENT SERVICES CANADA

Project title/Titre du projet
GIANT MINE REMEDIATION PROJECT YELLOWKNIFE, N.W.T.

Approved by/Approuve par
S.L.

Designed by/Concept par
J.S.

Drawn by/Dessine par
J.S.

PWGSC Project Manager/Administrateur de Projets TPSGC
DAVE COLBOURNE

PWGSC, Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'Ingénierie, TPSGC

Client/client
PWGSC

Drawing title/Titre du dessin
UNDERGROUND PASTE PIPELINE
1-18 UPPER STOPE
GENERAL ARRANGEMENT
AS CONSTRUCTED

Project No./No. du projet	Sheet/ Feuille	Revision no./ La Révision no.
13-1426-0010	1 OF 1	0

AS CONSTRUCTED

DRAFT

PWGSC – A1 – 841X594

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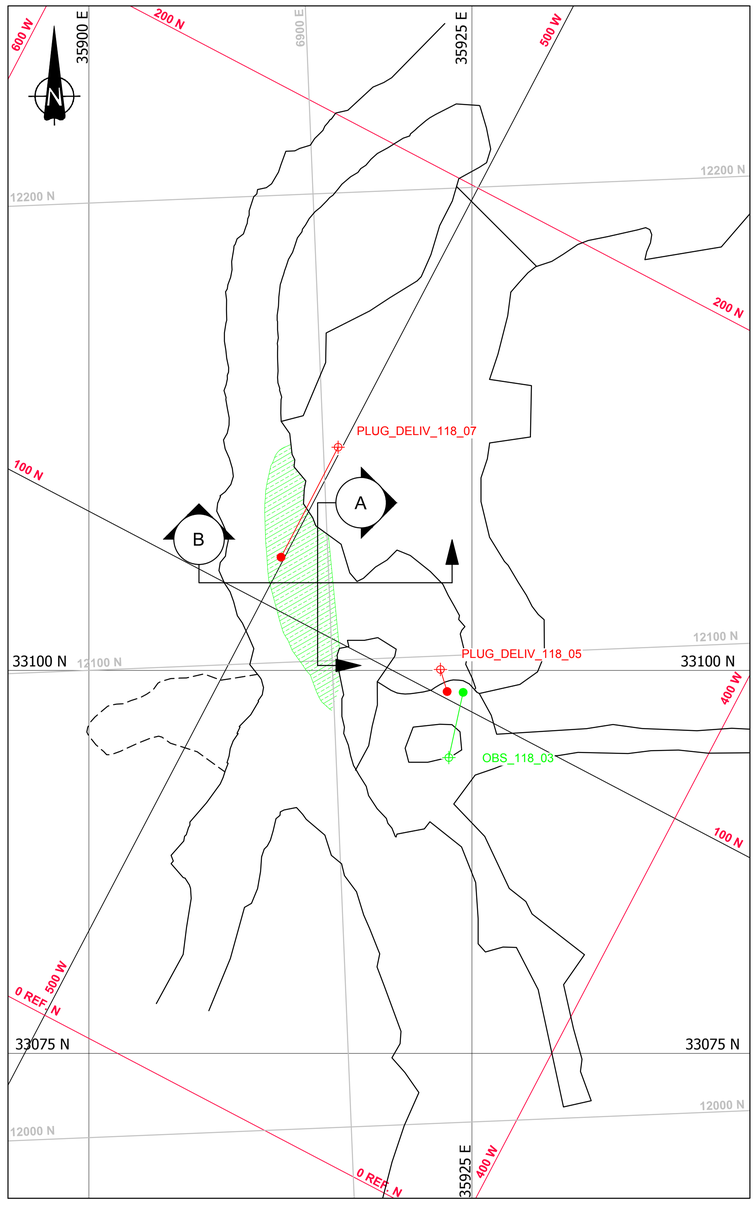
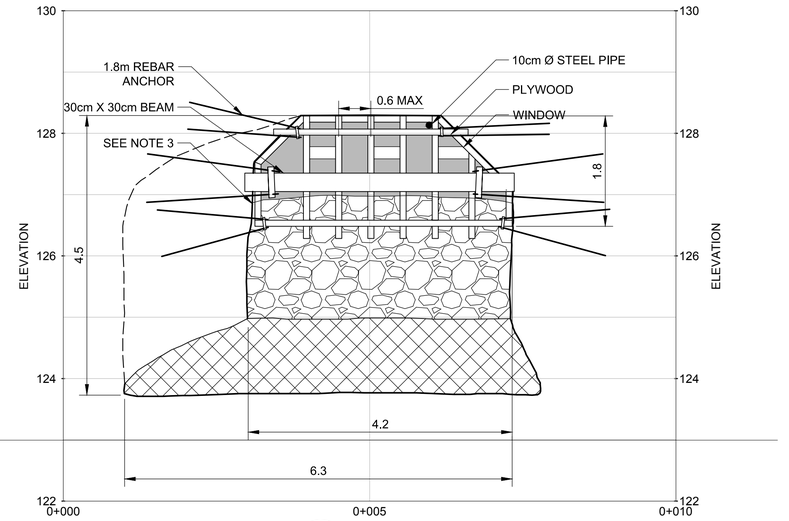
13-1426-0010-M-003

APPENDIX D

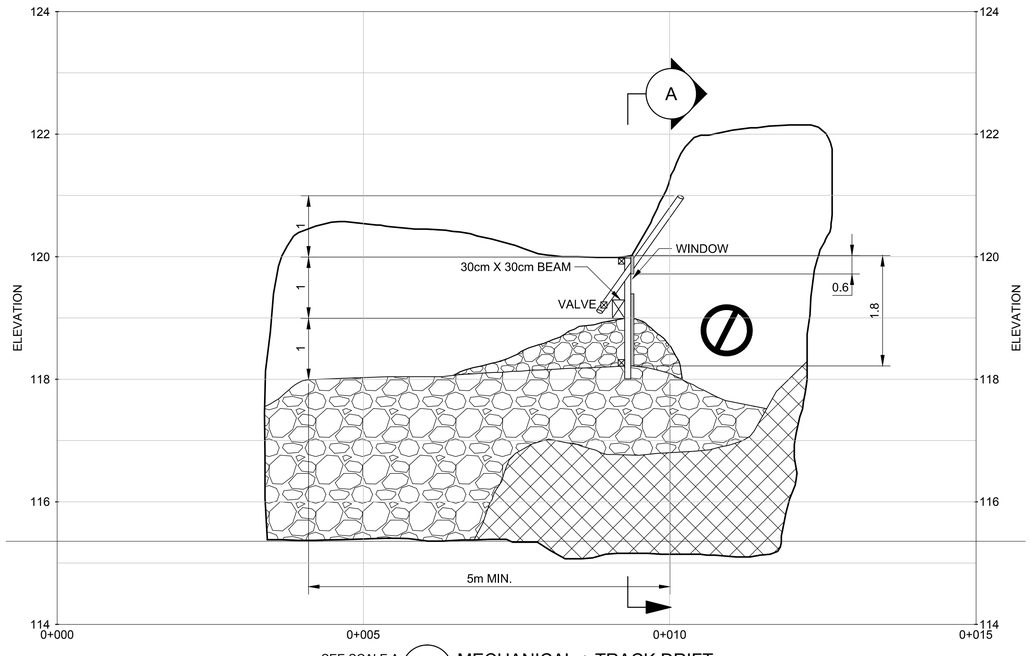
Barricade Drawings



PLAN
SEE SCALE B



SEE SCALE A — A — MECHANICAL DRIFT



SEE SCALE A — B — MECHANICAL + TRACK DRIFT

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Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Western Region
SERVICES IMMOBILIERS
Région de l'ouest

PRELIMINARY
NOT FOR CONSTRUCTION

Golder Associates

LEGEND

- 10000 N — GMRP COORDINATE SYSTEM
- 600 S — IMG COORDINATE SYSTEM
- 6200 S — IME COORDINATE SYSTEM
- BULKHEAD FIELD MEASUREMENT
- PROPOSED ADDITIONAL WASTE ROCK BACKFILL
- EXISTING WASTE ROCK BACKFILL
- PLYWOOD
- BARRICADE OUTLINE IN PLAN VIEW
- PLUG_DELIV_118_05 — 2013 DRILLED DELIVERY BOREHOLES
- OBS_118_03 — 2013 DRILLED OBSERVATION BOREHOLES
- NO ACCESS

NOTES

1. ALL UNITS ARE IN METERS UNLESS OTHERWISE NOTED. COORDINATE SYSTEM IS THE GMRP COORDINATE SYSTEM.
2. IMG GRID DISPLAYED IS IN IMPERIAL UNITS AND SHOWN FOR INFORMATION ONLY.
3. RAGS/FOAM TO PLUG GAPS.

SCALE A: 0 1.0 2.0 3.0 METRES
SCALE B: 0 4 8 12 METRES

Revision/ Revision	Description/Description	Date/Date
0	ISSUED FOR TENDER WITH DOC. #066	2013-12-09
A	ISSUED FOR DISCUSSION	2013-10-29

Client/client

PUBLIC WORKS GOVERNMENT SERVICES CANADA

Project title/Titre du projet

GIANT MINE REMEDIATION PROJECT YELLOWKNIFE, N.W.T.

UNDERGROUND

Approved by/Approuve par: DTK

Designed by/Concept par: FM

Drawn by/Dessine par: TAK

PWGSC Project Manager/Administrateur de Projets TPSGC: DAVE COLBOURNE

PWGSC, Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie, TPSGC

Client/client: PWGSC

Drawing title/Titre du dessin

BARRICADE B1 - PLAN AND SECTION
LEVEL 100 - 1ST LEVEL
STOPE 1-18 AREA

Project No./No. du projet	Sheet/Feuille	Revision no./ La Révision no.
13-1426-0010 DOC. #066	8 OF 57	0

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PWGSC – A1 – 841X594

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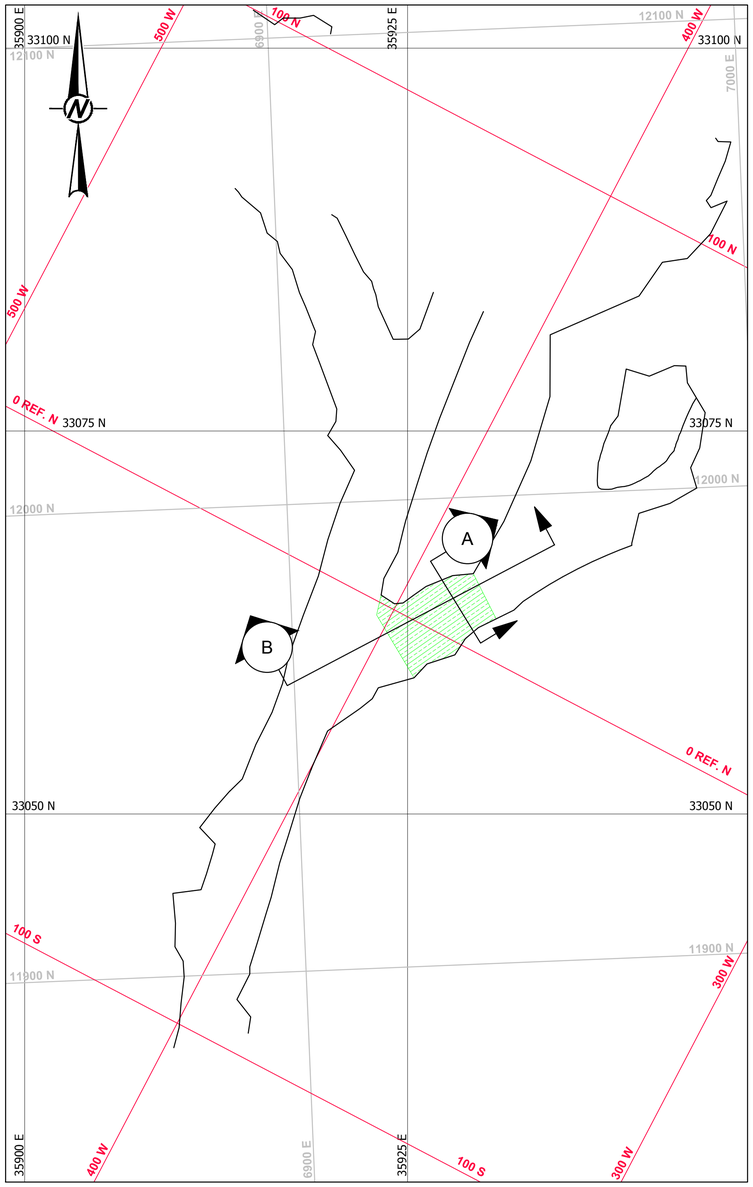
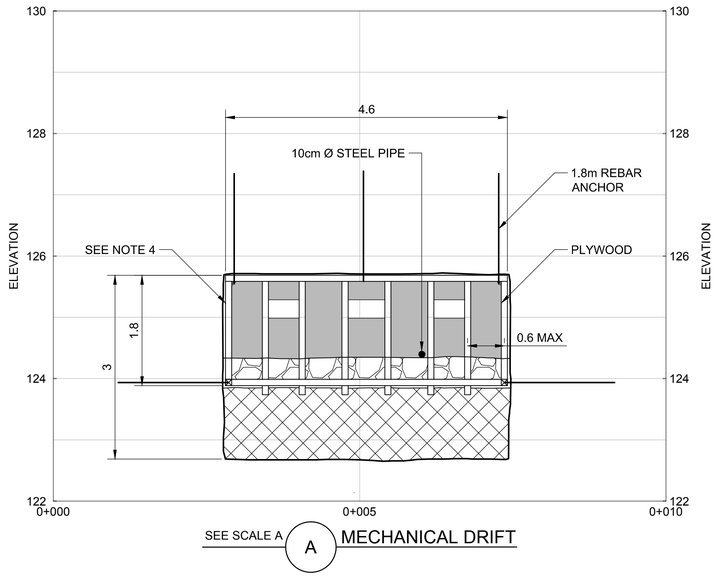
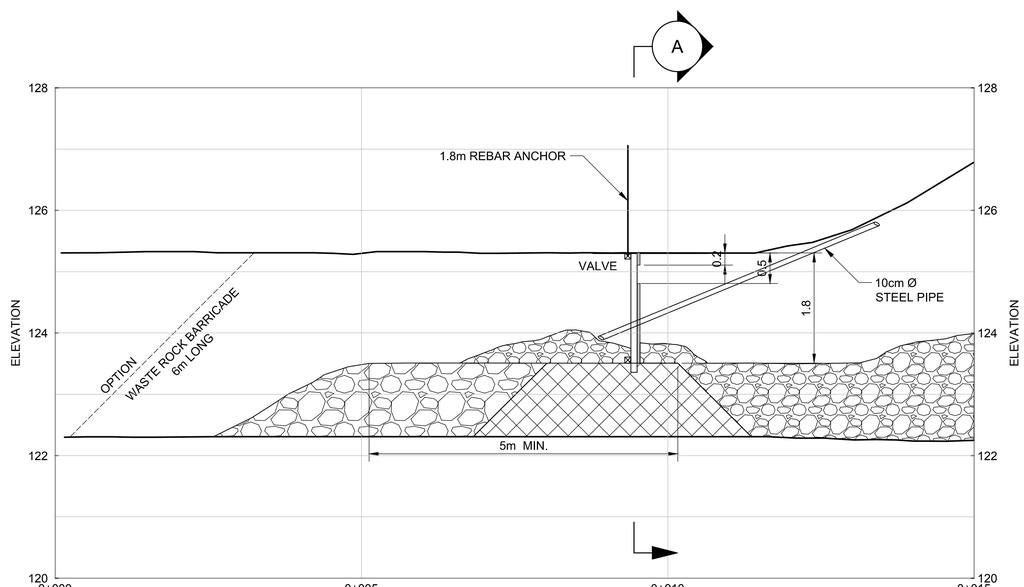


PLAN
SEE SCALE B



SEE SCALE A A MECHANICAL DRIFT



SEE SCALE A B MECHANICAL DRIFT + STOPE

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Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Western Region
SERVICES IMMOBILIERS
Région de l'ouest

PRELIMINARY
NOT FOR CONSTRUCTION

Golder Associates

LEGEND

- 12000 N — GMRP COORDINATE SYSTEM
- 600 S — IMG COORDINATE SYSTEM
- 6200 S — IME COORDINATE SYSTEM
- BULKHEAD FIELD MEASUREMENT
- PROPOSED ADDITIONAL WASTE ROCK BACKFILL
- EXISTING WASTE ROCK BACKFILL
- PLYWOOD
- BARRICADE OUTLINE IN PLAN VIEW

NOTES

1. ALL UNITS ARE IN METERS UNLESS OTHERWISE NOTED. COORDINATE SYSTEM IS THE GMRP COORDINATE SYSTEM.
2. IMG GRID DISPLAYED IS IN IMPERIAL UNITS AND SHOWN FOR INFORMATION ONLY.
3. GEOFABRIC SHOWN ON DRAWING IS OPTIONAL, TO BE VALIDATED AT A LATER DATE.
4. RAGS/FOAM TO PLUG GAPS.

SCALE A: 0 1.0 2.0 3.0 METRES
SCALE B: 0 4 8 12 METRES

Revision/ Revision	Description/Description	Date/Date
0	ISSUED FOR TENDER WITH DOC. #066	2013-12-09
A	ISSUED FOR DISCUSSION	2013-10-29

Client/client

PUBLIC WORKS GOVERNMENT SERVICES CANADA

Project title/Titre du projet

GIANT MINE REMEDIATION PROJECT YELLOWKNIFE, N.W.T.

UNDERGROUND

Approved by/Approuve par: DTK
Designed by/Concept par: FM
Drawn by/Dessine par: TAK
PWGSC Project Manager/Administrateur de Projets TPSGC: DAVE COLBOURNE
PWGSC, Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie, TPSGC:
Client/client: PWGSC

Drawing title/Titre du dessin

BARRICADE B2 - PLAN AND SECTION
LEVEL 100 - 1ST LEVEL
STOPE 1-18 AREA

Project No./No. du projet	Sheet/ Feuille	Revision no./ La Révision no.
13-1426-0010	9 OF 57	0

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PWGSC – A1 – 841X594

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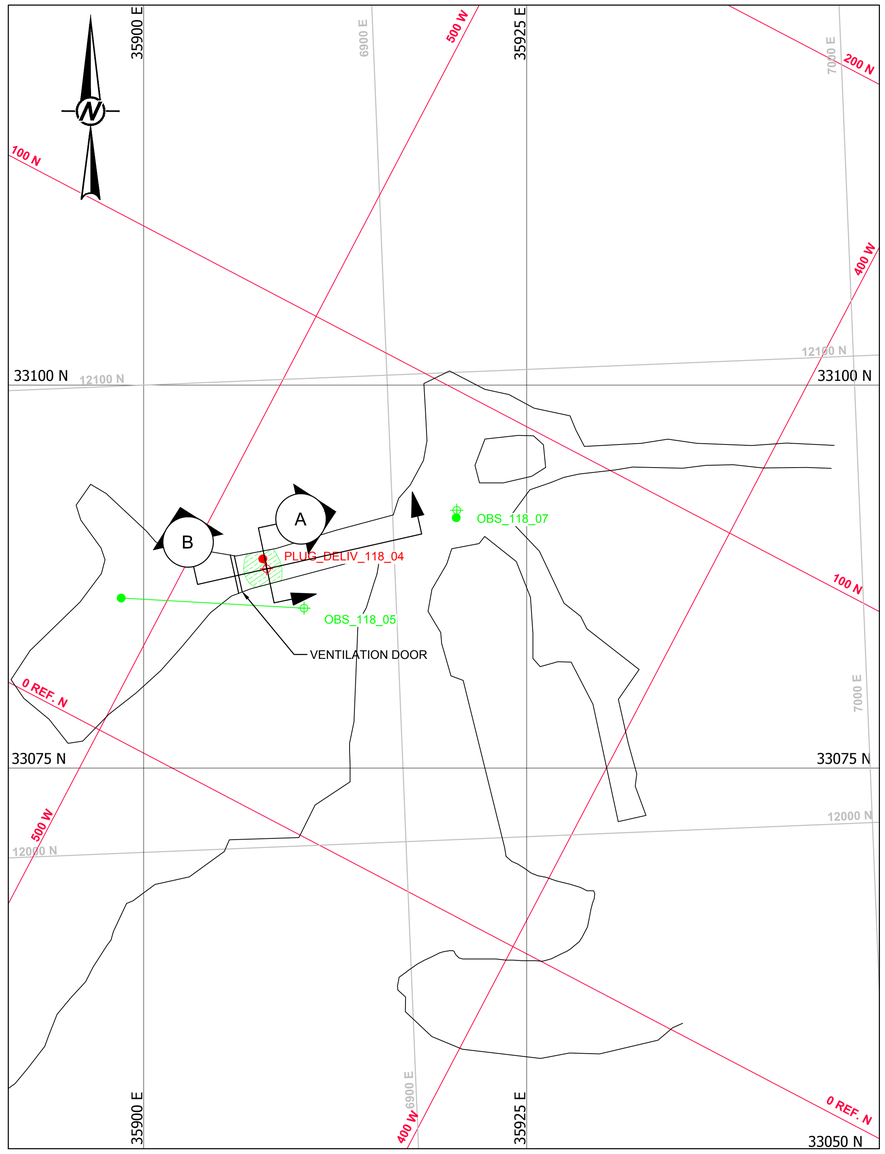
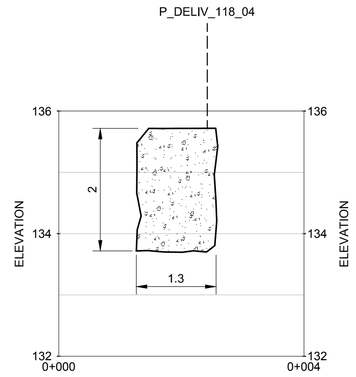
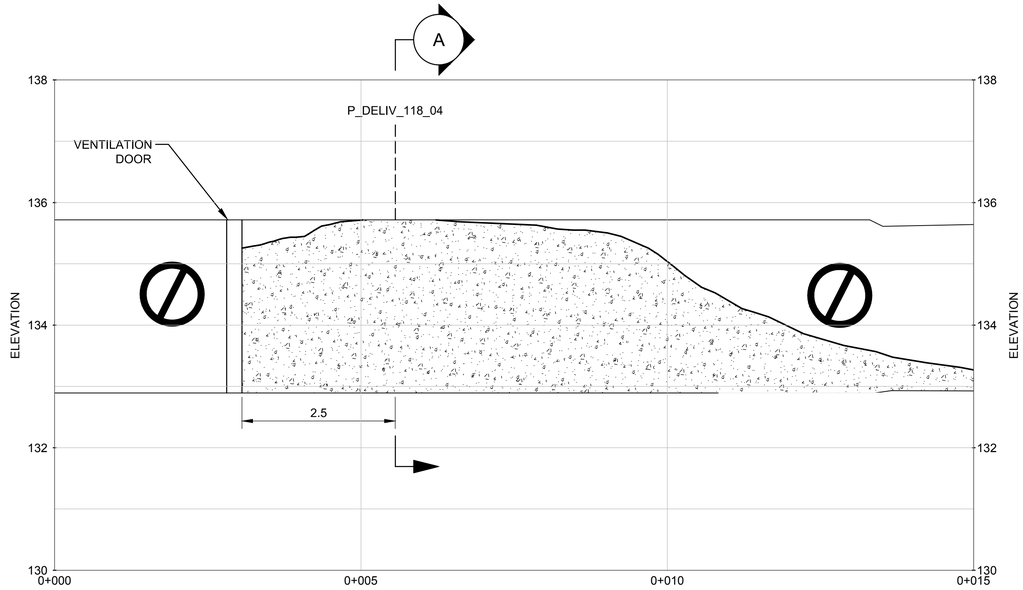


PLAN
SEE SCALE B



SEE SCALE A A TRACK DRIFT



SEE SCALE A B TRACK DRIFT

DRAFT

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Western Region
SERVICES IMMOBILIERS
Région de l'ouest

PRELIMINARY
NOT FOR CONSTRUCTION

Golder Associates

LEGEND

- 10000 N — GMRP COORDINATE SYSTEM
- 600 S — IMG COORDINATE SYSTEM
- 6200 S — IME COORDINATE SYSTEM
- BULKHEAD FIELD MEASUREMENT
- PROPOSED LOW SLUMP PASTE BACKFILL
- BARRICADE OUTLINE IN PLAN VIEW (SEE NOTE 3)
- PLUG_DELIV_118_04 — 2013 DRILLED DELIVERY BOREHOLES
- OBS_118_05 — 2013 DRILLED OBSERVATION BOREHOLES
- NO ACCESS

NOTES

1. ALL UNITS ARE IN METERS UNLESS OTHERWISE NOTED. COORDINATE SYSTEM IS THE GMRP COORDINATE SYSTEM.
2. IMG GRID DISPLAYED IS IN IMPERIAL UNITS AND SHOWN FOR INFORMATION ONLY.
3. EXTENSION OF BARRICADE FOOTPRINT IS APPROXIMATE.

SCALE A: 0 1.0 2.0 3.0 METRES
SCALE B: 0 4 8 12 METRES

Revision/ Revision	Description/Description	Date/Date
0	ISSUED FOR TENDER WITH DOC. #066	2013-12-09
A	ISSUED FOR DISCUSSION	2013-10-29

Client/client

PUBLIC WORKS GOVERNMENT SERVICES CANADA

Project title/Titre du projet
GIANT MINE REMEDIATION PROJECT YELLOWKNIFE, N.W.T.

UNDERGROUND

Approved by/Approuve par: DTK
Designed by/Concept par: FM
Drawn by/Dessine par: TAK
PWGSC Project Manager/Administrateur de Projets TPSGC: DAVE COLBOURNE
PWGSC, Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie, TPSGC
Client/client: PWGSC

Drawing title/Titre du dessin

BARRICADE B3 - PLAN AND SECTION LEVEL 100 - 1ST LEVEL STOPE 1-18 AREA

Project No./No. du projet	Sheet/ Feuille	Revision no./ La Révision no.
13-1426-0010	10 OF 57	0

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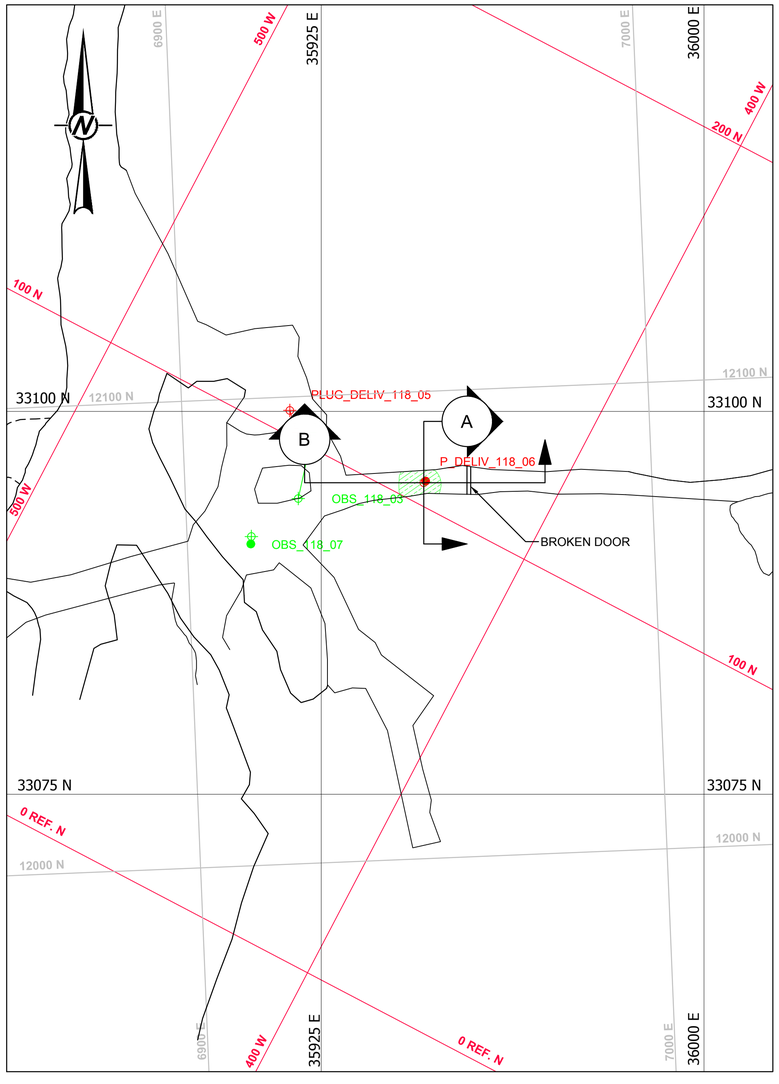
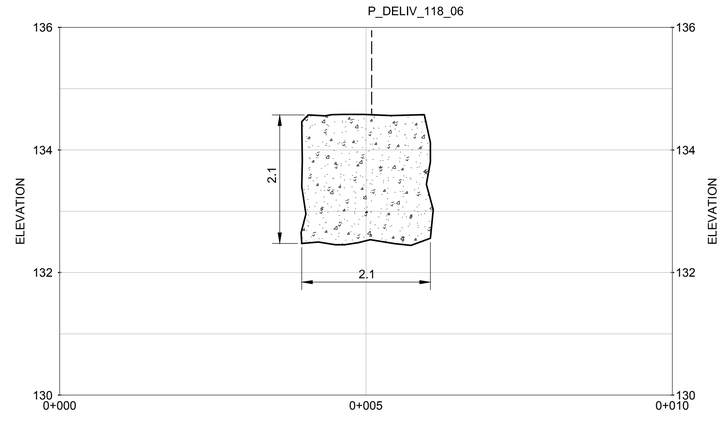
PWGSC — A1 — 841X594

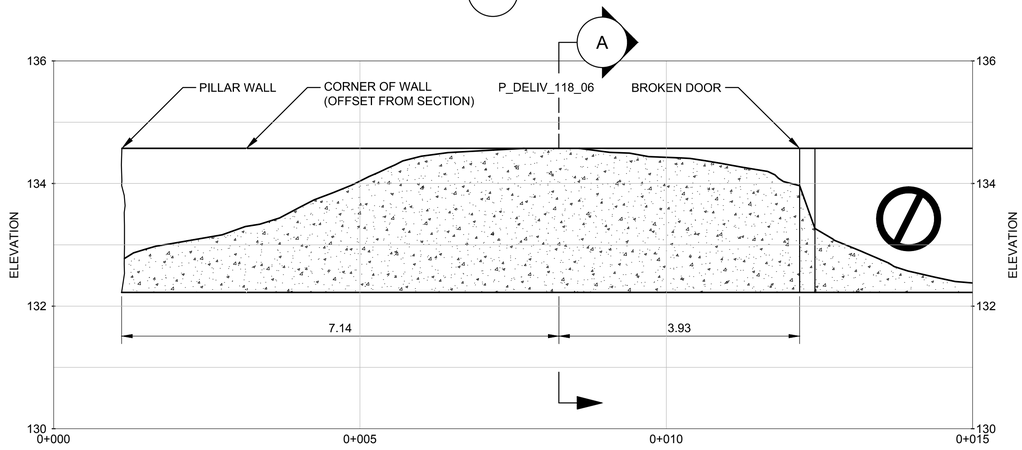
0 10 20 30 40 50 60 70 80 90 100mm



PLAN
SEE SCALE B



SEE SCALE A (A) TRACK DRIFT



SEE SCALE A (B) TRACK DRIFT

DRAFT

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Western Region
SERVICES IMMOBILIERS
Région de l'ouest

PRELIMINARY
NOT FOR CONSTRUCTION

Golder Associates

LEGEND

- 33000 N — GMRP COORDINATE SYSTEM
- 600 S — IMG COORDINATE SYSTEM
- 6200 S — IME COORDINATE SYSTEM
- BULKHEAD FIELD MEASUREMENT
- PROPOSED LOW SLUMP PASTE BACKFILL
- BARRICADE OUTLINE IN PLAN VIEW (SEE NOTE 3)
- PLUG_DELIV_118_05 — 2013 DRILLED DELIVERY BOREHOLES
- OBS_118_03 — 2013 DRILLED OBSERVATION BOREHOLES
- NO ACCESS

NOTES

1. ALL UNITS ARE IN METERS UNLESS OTHERWISE NOTED. COORDINATE SYSTEM IS THE GMRP COORDINATE SYSTEM.
2. IMG GRID DISPLAYED IS IN IMPERIAL UNITS AND SHOWN FOR INFORMATION ONLY.
3. EXTENSION OF BARRICADE FOOTPRINT IS APPROXIMATE.

SCALE A: 0 1.0 2.0 3.0 METRES
SCALE B: 0 4 8 12 METRES

Revision/ Revision	Description/Description	Date/Date
0	ISSUED FOR TENDER WITH DOC. #066	2013-12-09
A	ISSUED FOR DISCUSSION	2013-10-29

Client/client

PUBLIC WORKS GOVERNMENT SERVICES CANADA

Project title/Titre du projet
GIANT MINE REMEDIATION PROJECT YELLOWKNIFE, N.W.T.

UNDERGROUND

Approved by/Approuve par: DTK
Designed by/Concept par: FM
Drawn by/Dessine par: TAK
PWGSC Project Manager/Administrateur de Projets TPSGC: DAVE COLBOURNE
PWGSC, Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie, TPSGC
Client/client: PWGSC

Drawing title/Titre du dessin

BARRICADE B4 - PLAN AND SECTION
LEVEL 100 - 1ST LEVEL
STOPE 1-18 AREA

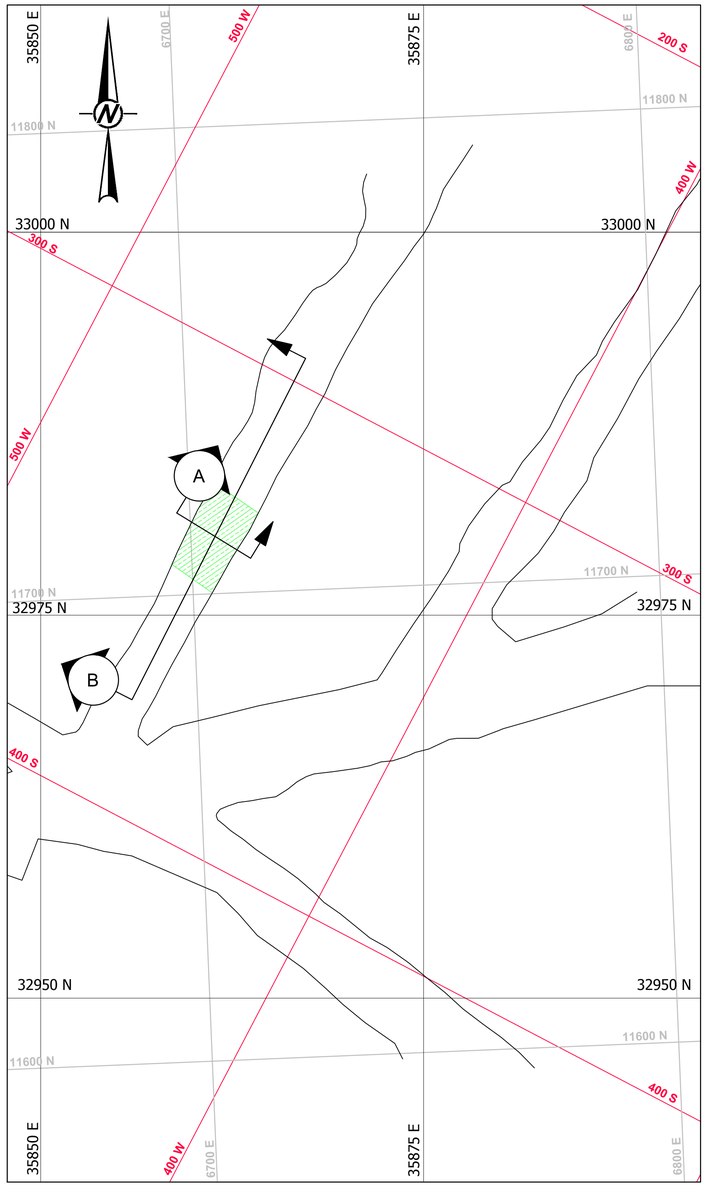
Project No./No. du projet	Sheet/ Feuille	Revision no./ La Révision no.
13-1426-0010	11 OF 57	0

CADD FILE LOCN: N:\BUR_GRAPHICS\PROJECTS\2013\1426\13-1426-0010\100011103\DOC. #066\PRODUCTION\MB1-18\FOR TENDER\RPT-066_CF11-R0 - B1-18 - 1ST LEVEL - BARRICADE B4.DWG

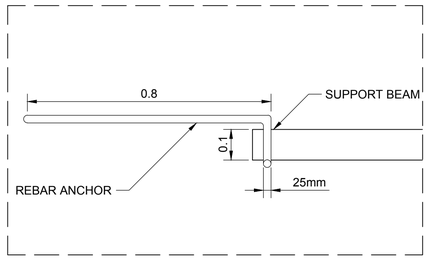
PWGSC – A1 – 841X594

0 10 20 30 40 50 60 70 80 90 100mm

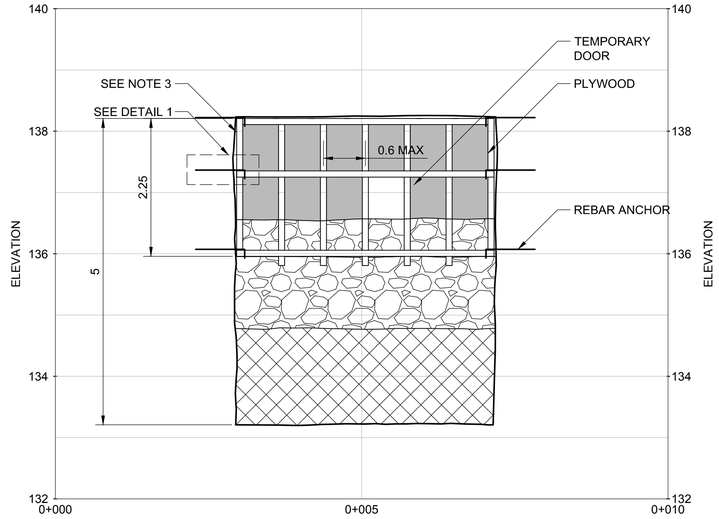
RPT-066_CF11-R0 - B1-18 - 1ST LEVEL - BARRICADE B4



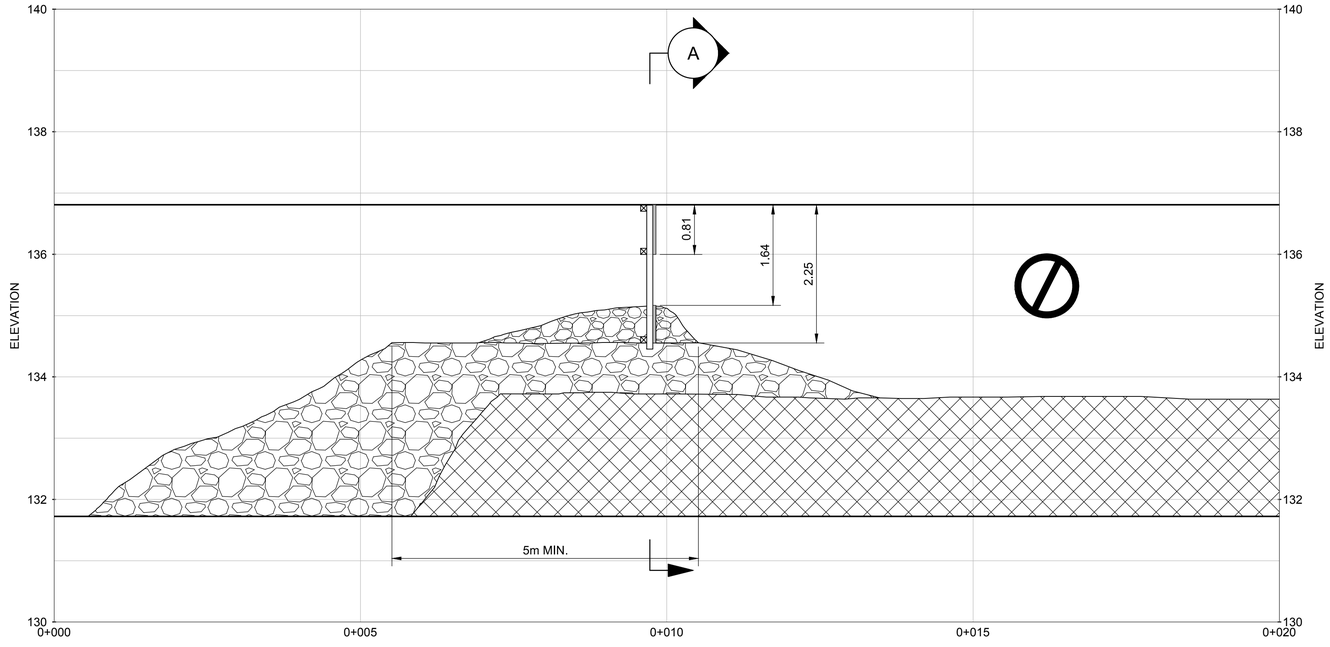
PLAN
SEE SCALE B



SEE SCALE C 1 REBAR + ANCHOR DETAIL



SEE SCALE A A MECHANICAL DRIFT



SEE SCALE A B MECHANICAL DRIFT

DRAFT

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Western Region
SERVICES IMMOBILIERS
Région de l'ouest

PRELIMINARY
NOT FOR CONSTRUCTION

Golder Associates

LEGEND

- GMRP COORDINATE SYSTEM
- IMG COORDINATE SYSTEM
- IME COORDINATE SYSTEM
- BULKHEAD FIELD MEASUREMENT
- PROPOSED ADDITIONAL WASTE ROCK BACKFILL
- EXISTING WASTE ROCK BACKFILL
- PLYWOOD
- BARRICADE OUTLINE IN PLAN VIEW
- NO ACCESS

NOTES

1. ALL UNITS ARE IN METERS UNLESS OTHERWISE NOTED. COORDINATE SYSTEM IS THE GMRP COORDINATE SYSTEM.
2. IMG GRID DISPLAYED IS IN IMPERIAL UNITS AND SHOWN FOR INFORMATION ONLY.
3. RAGS/FOAM TO PLUG GAPS.

SCALE A 0 1.0 2.0 3.0 METRES
SCALE B 0 4 8 12 METRES
SCALE C 0 0.2 0.4 0.6 METRES

Revision/ Revision	Description/Description	Date/Date
0	ISSUED FOR TENDER WITH DOC. #066	2013-12-09
A	ISSUED FOR DISCUSSION	2013-10-29

Client/client

PUBLIC WORKS GOVERNMENT SERVICES CANADA

Project title/Titre du projet

GIANT MINE REMEDIATION PROJECT YELLOWKNIFE, N.W.T.

UNDERGROUND

Approved by/Approuve par: DTK

Designed by/Concept par: FM

Drawn by/Dessine par: TAK

PWGSC Project Manager/Administrateur de Projets TPSGC: DAVE COLBOURNE

PWGSC, Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie, TPSGC

Client/client: PWGSC

Drawing title/Titre du dessin

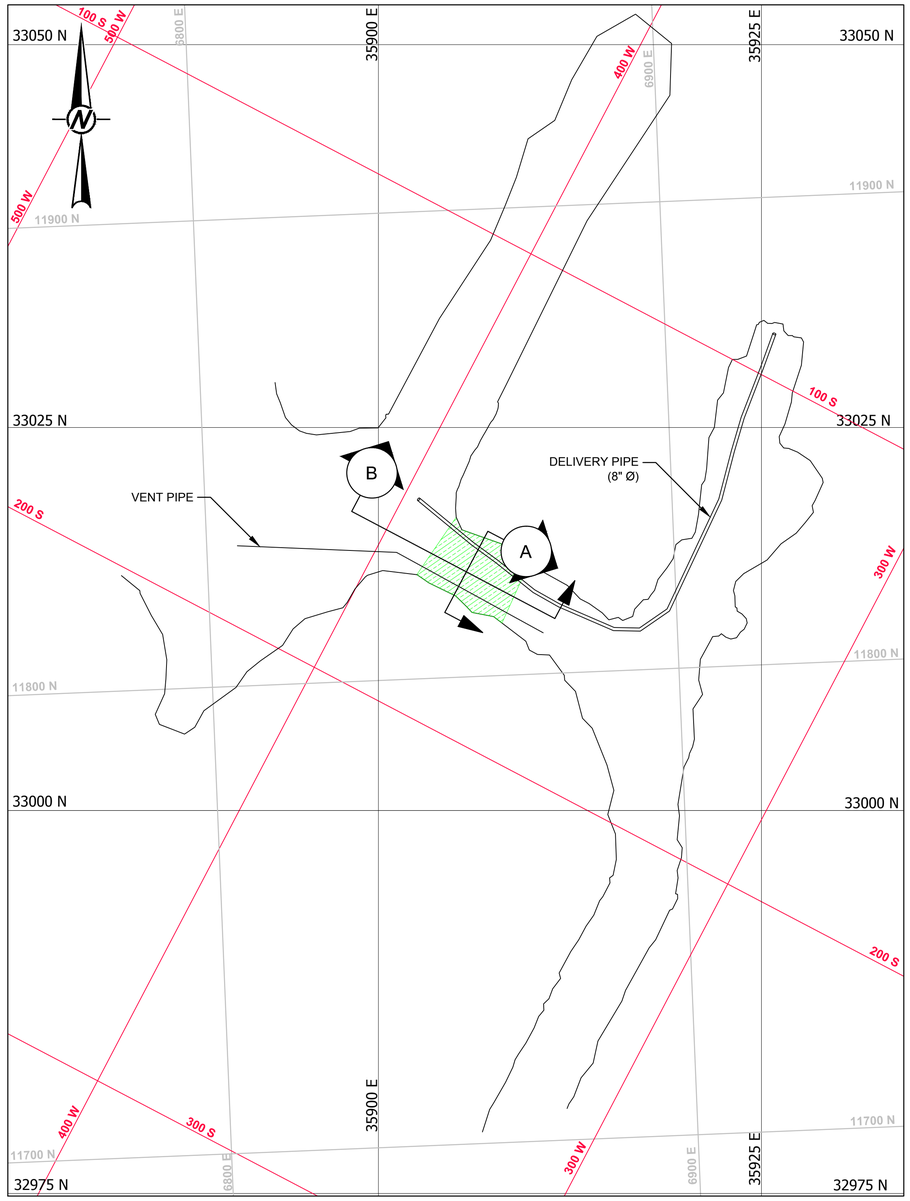
BARRICADE B5 - PLAN AND SECTION
LEVEL 100 - 1ST LEVEL
STOPE 1-18 AREA

Project No./No. du projet	Sheet/Feuille	Revision no./ La Révision no.
13-1426-0010	12 OF 57	0

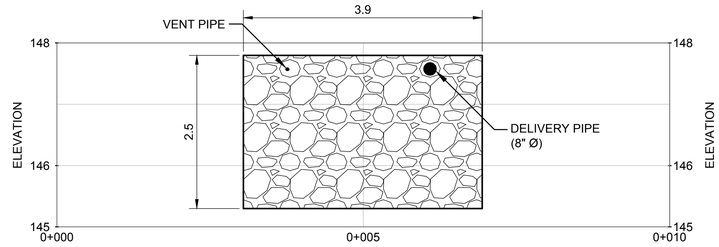
CADD FILE LOCN: N:\BUR-GRAPHICS\PROJECTS\2013\1426\13-1426-0010\10001103\DOC. #066\PRODUCTION\B1-18\FOR TENDER\RPT-066_CF12-R0 - B1-18 - 1ST LEVEL - BARRICADE B5.DWG

PWGSC – A1 – 841X594

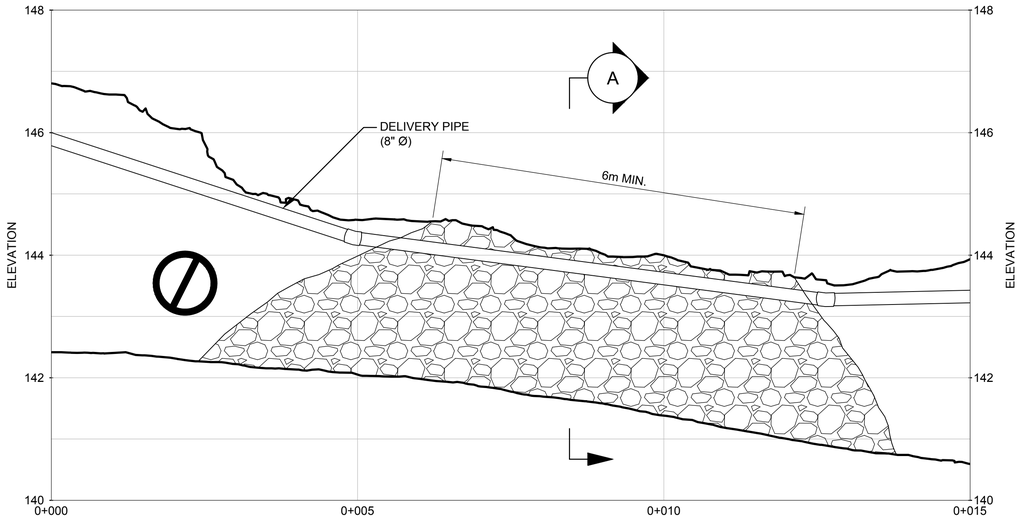
0 10 20 30 40 50 60 70 80 90 100mm



PLAN
SEE SCALE B



SEE SCALE A (A) MECH. DRIFT



SEE SCALE A (B) MECH. DRIFT + STOPE

DRAFT

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Western Region
SERVICES IMMOBILIERS
Région de l'ouest

PRELIMINARY
NOT FOR CONSTRUCTION

Golder Associates

LEGEND

- 10000 N — GMRP COORDINATE SYSTEM
- 600 S — IMG COORDINATE SYSTEM
- 6200 E — IME COORDINATE SYSTEM
- BULKHEAD FIELD MEASUREMENT
- PROPOSED ADDITIONAL WASTE ROCK BACKFILL
- BARRICADE OUTLINE IN PLAN VIEW
- NO ACCESS

NOTES

1. ALL UNITS ARE IN METERS UNLESS OTHERWISE NOTED. COORDINATE SYSTEM IS THE GMRP COORDINATE SYSTEM.
2. IMG GRID DISPLAYED IS IN IMPERIAL UNITS AND SHOWN FOR INFORMATION ONLY.
3. RAGS/FOAM TO PLUG GAPS.
4. AVERAGE SLOPE ANGLE OF BARRICADE FLOOR IS 13.4%.

0 1.0 2.0 3.0
SCALE A METRES

0 4 8 12
SCALE B METRES

Revision/ Revision	Description/Description	Date/Date
0	ISSUED FOR TENDER WITH DOC. #066	2013-12-09
A	ISSUED FOR DISCUSSION	2013-10-29

Client/client

PUBLIC WORKS GOVERNMENT SERVICES CANADA

Project title/Titre du projet
GIANT MINE REMEDIATION PROJECT YELLOWKNIFE, N.W.T.

UNDERGROUND

Approved by/Approuve par
DTK

Designed by/Concept par
FM

Drawn by/Dessine par
TAK

PWGSC Project Manager/Administrateur de Projets TPSGC
DAVE COLBOURNE

PWGSC, Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie, TPSGC

Client/client
PWGSC

Drawing title/Titre du dessin

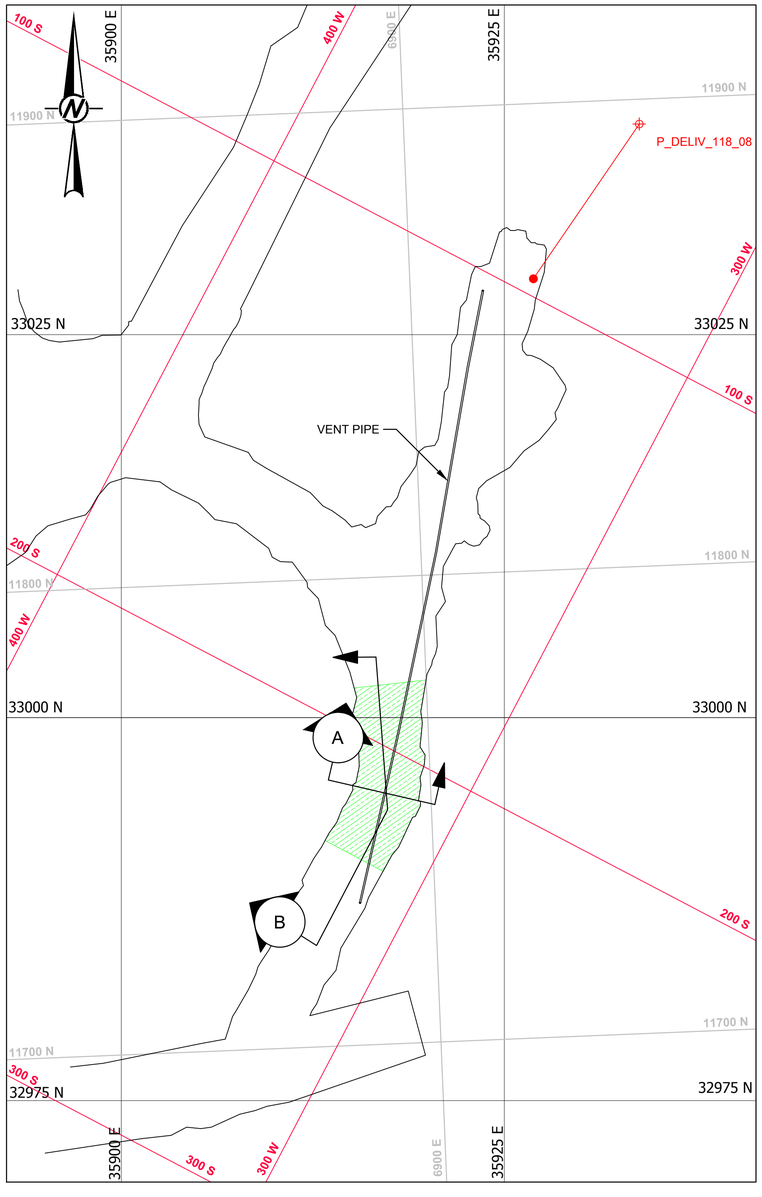
BARRICADE B6 - PLAN AND SECTION
LEVEL 100 - 1ST LEVEL
STOPE 1-18 AREA

Project No./No. du projet	Sheet/ Feuille	Revision no./ La Révision no.
13-1426-0010	13 OF 57	0

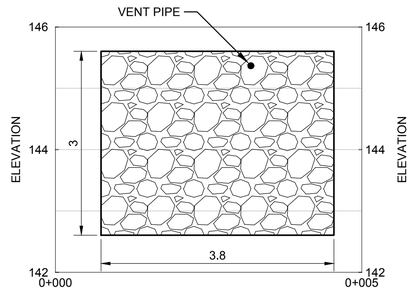
CADD FILE LOCN: N:\BUR-GRAPHICS\PROJECTS\2013\1426\13-1426-0010\10001\1003\DOC. #066\PRODUCTION\B1-18\FOR TENDER\RPT-066_CF13-R0 - B1-18 - 1ST LEVEL - BARRICADE B6.DWG

PWGSC – A1 – 841X594

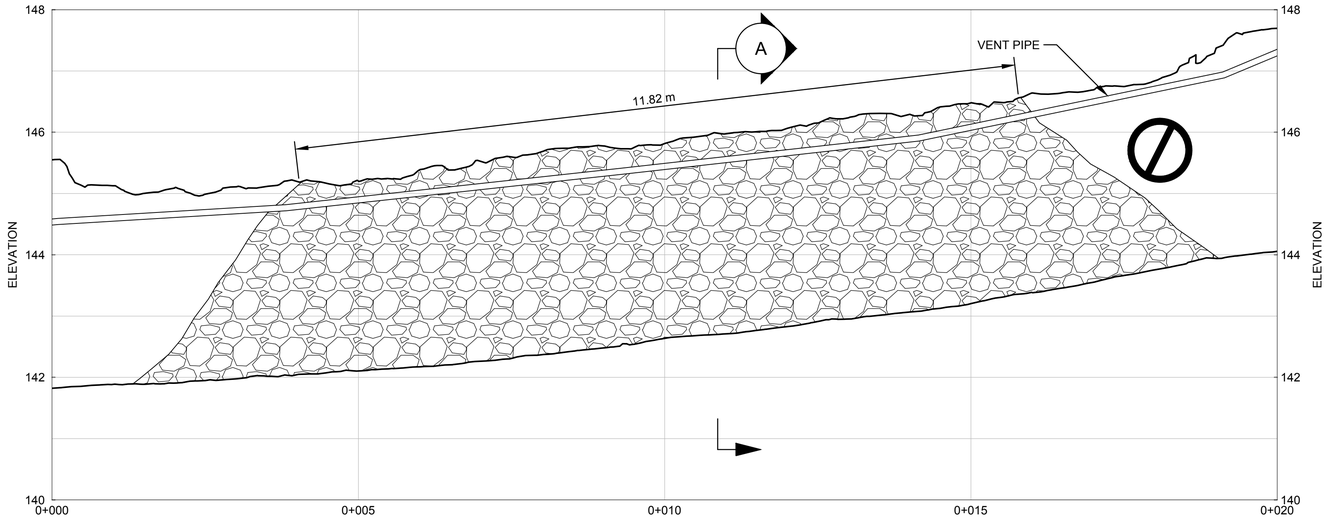
0 10 20 30 40 50 60 70 80 90 100mm



PLAN
SEE SCALE B



SEE SCALE A (A) MECHANICAL DRIFT



SEE SCALE A (B) MECHANICAL DRIFT

DRAFT

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Western Region
SERVICES IMMOBILIERS
Région de l'ouest

PRELIMINARY
NOT FOR CONSTRUCTION

Golder Associates

LEGEND

- 10000 N — GMRP COORDINATE SYSTEM
- 600 S — IMG COORDINATE SYSTEM
- 6200 S — IME COORDINATE SYSTEM
- MECHANICAL DRIFT
- BULKHEAD FIELD MEASUREMENT
- PROPOSED ADDITIONAL WASTE ROCK BACKFILL
- BARRICADE OUTLINE IN PLAN VIEW
- PLUG_DELIV_118_08 — 2013 DRILLED DELIVERY BOREHOLES
- NO ACCESS

NOTES

1. ALL UNITS ARE IN METERS UNLESS OTHERWISE NOTED. COORDINATE SYSTEM IS THE GMRP COORDINATE SYSTEM.
2. IMG GRID DISPLAYED IS IN IMPERIAL UNITS AND SHOWN FOR INFORMATION ONLY.
3. RAGS/FOAM TO PLUG GAPS.
4. AVERAGE SLOPE ANGLE OF BARRICADE FLOOR IS 11.5%.

DRAFT
NOT FOR CONSTRUCTION

SCALE A: 0 1.0 2.0 3.0 METRES
SCALE B: 0 4 8 12 METRES

Revision/ Revision	Description/Description	Date/Date
B	ISSUED FOR TENDER WITH DOC. #066	2013-12-09
A	ISSUED FOR DISCUSSION	2013-10-29

Client/client

PUBLIC WORKS GOVERNMENT SERVICES CANADA

Project title/Titre du projet
GIANT MINE REMEDIATION PROJECT YELLOWKNIFE, N.W.T.

UNDERGROUND

Approved by/Approuve par: DTK
Designed by/Concept par: FM
Drawn by/Dessine par: TAK
PWGSC Project Manager/Administrateur de Projets TPSGC: DAVE COLBOURNE
PWGSC, Architectural and Engineering Resources Manager/ Ressources Architectural et de Directeur d'ingénierie, TPSGC:
Client/client: PWGSC

Drawing title/Titre du dessin

BARRICADE B7 - PLAN AND SECTION
LEVEL 100 - 1ST LEVEL
STOPE 1-18 AREA

Project No./No. du projet	Sheet/ Feuille	Revision no./ La Révision no.
13-1426-0010	14 OF 57	B

DRAFT

CADD FILE LOCN: N:\BUR-GRAPHICS\PROJECTS\2013\1426\13-1426-0010\1000\1103\DOC. #066\PRODUCTION\B1-18\FOR TENDER\RPT-066_CF14-RB - B1-18 - 1ST LEVEL - BARRICADE B7.DWG

PWGSC – A1 – 841X594

0 10 20 30 40 50 60 70 80 90 100mm

APPENDIX E

Filling History - Area Summaries

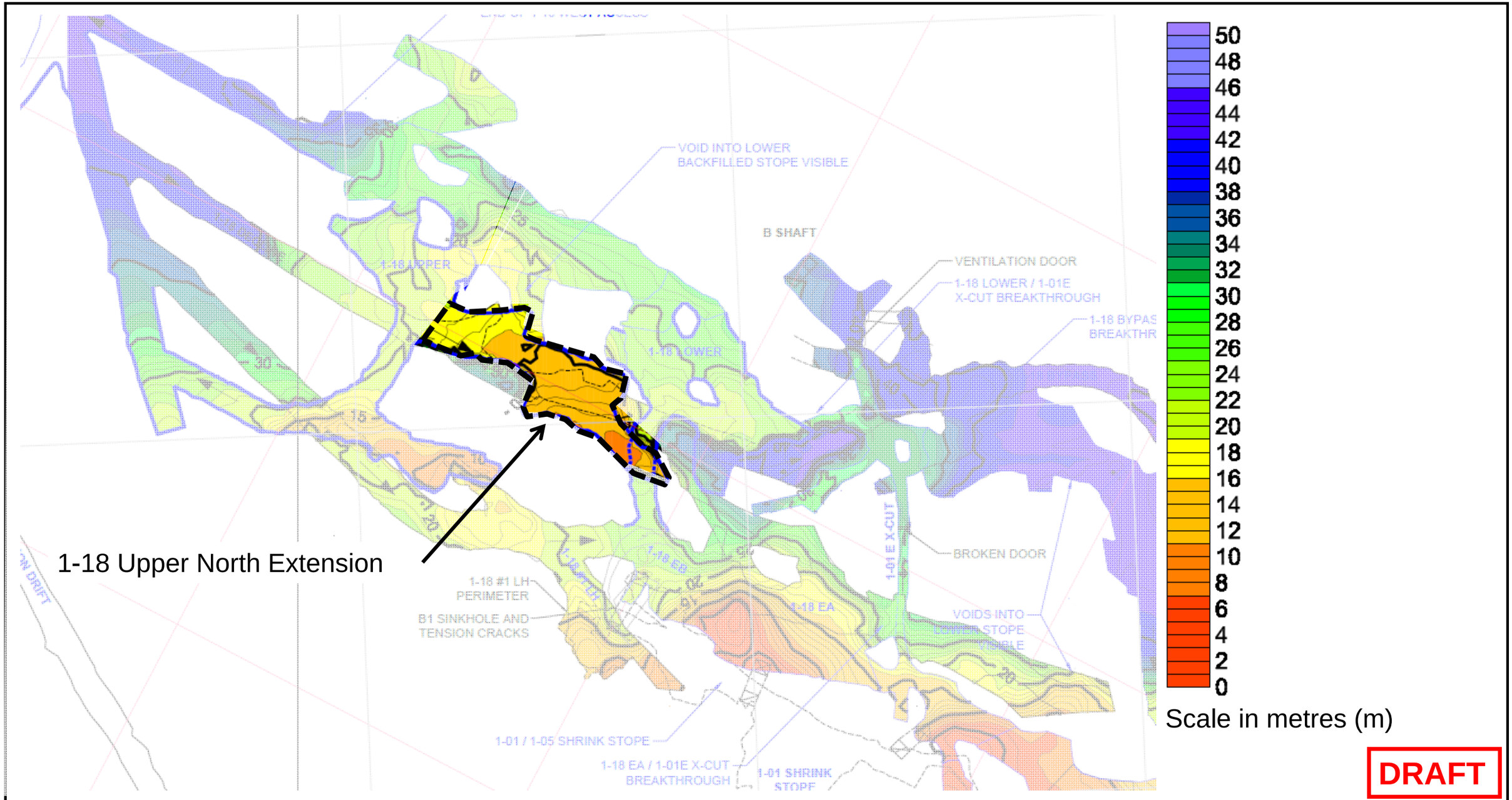
DRAFT

Summary of filling history in critical filling areas

Summary shows evidence for the current status of each area as of March 31st, 2014

Golder Associates

1-18 Upper North Extension



1-18 Upper North Extension

Scale in metres (m)

DRAFT

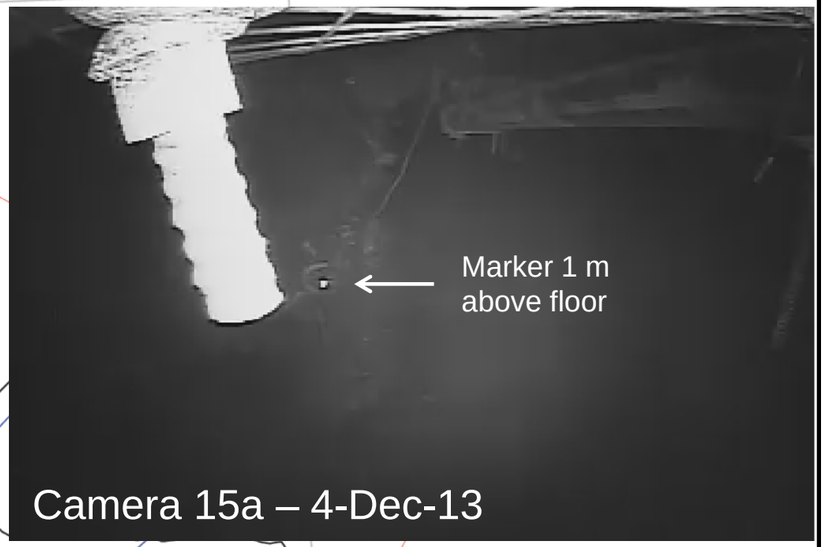
PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

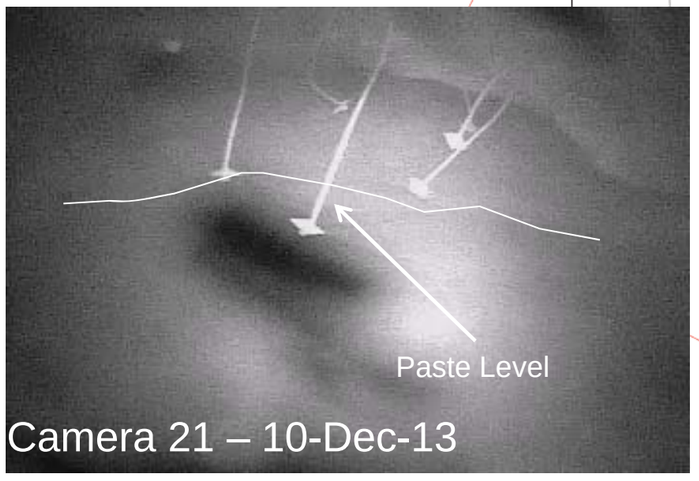
TITLE
Crown pillar thickness
Above 1-18 Upper North Extension

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning





END OF 1-18 WEST ACCESS

VOID INTO LOWER
BACKFILLED STOPE VISIBLE

B SHAFT

1-18 UPPER

21

B6

15a

1-18 LOWER

1-18 BYPASS

1-01 E X-CUT

1-18 #1 LH

1-18 EB

1-18 #1 LH
PERIMETER

B1 SINKHOLE AND
TENSION CRACKS

1-18 EA

1-01 / 1-05 SHRINK STOPE

1-18 EA / 1-01E X-CUT
BREAKTHROUGH

1-01 SHRINK
STOPE

- Camera 15a looking at Barricade 6 shows paste ~ 2 m depth
- Camera 21 looking at the high spot in 1-18 Upper stope shows paste above muck berm ~2 m depth.

U/G monitoring camera installed

Barricades

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

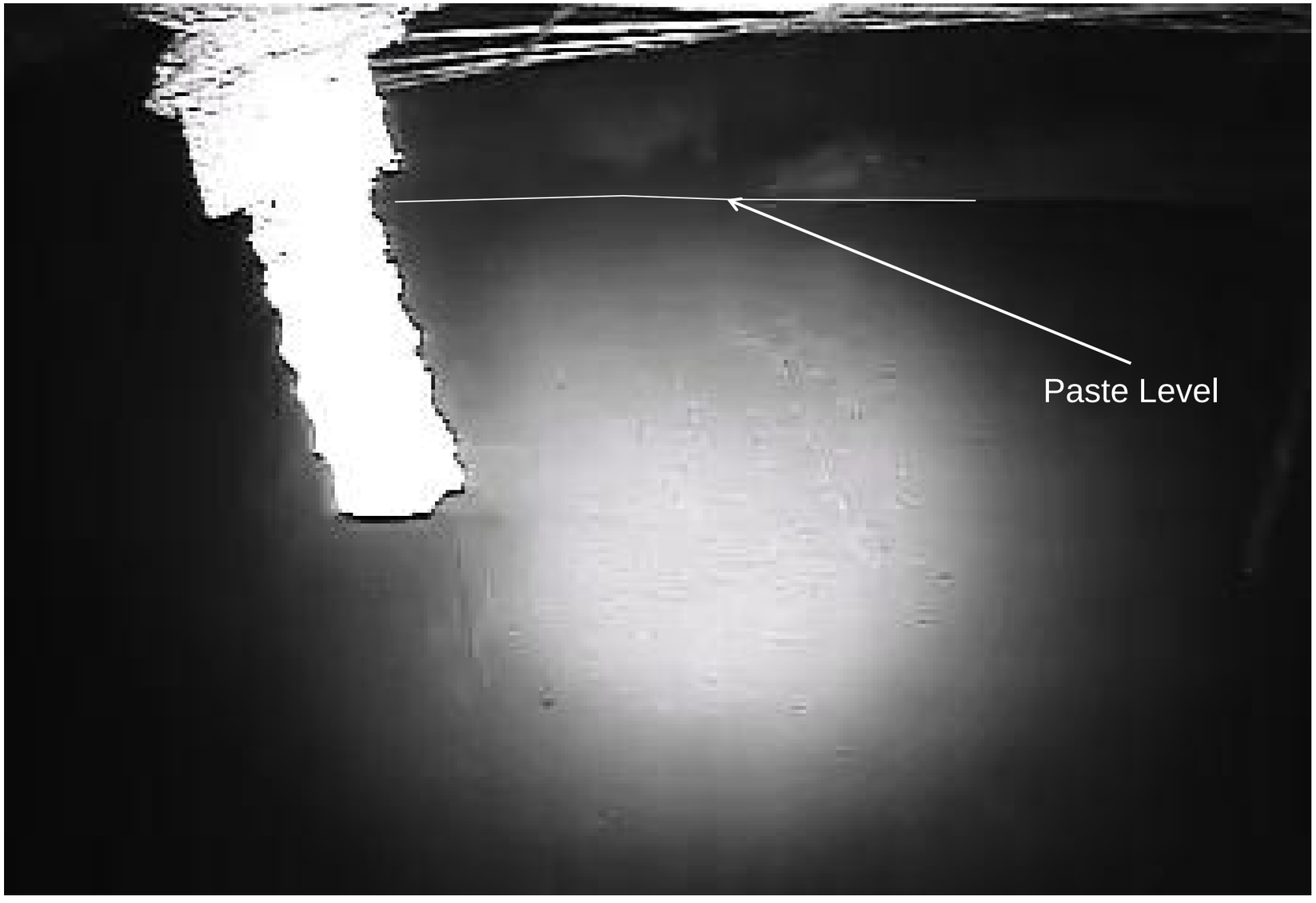
TITLE
B1-18 Stope
UG Camera Locations

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning

- Camera 15a shows paste choking off the brow at top of Barricade 6.
- With the low slump paste pumped into Deliv_118_15 the flat level of the paste at the brow at barricade 6 shows that the finger of the 118 upper is full to approximately 1.4m from the back.



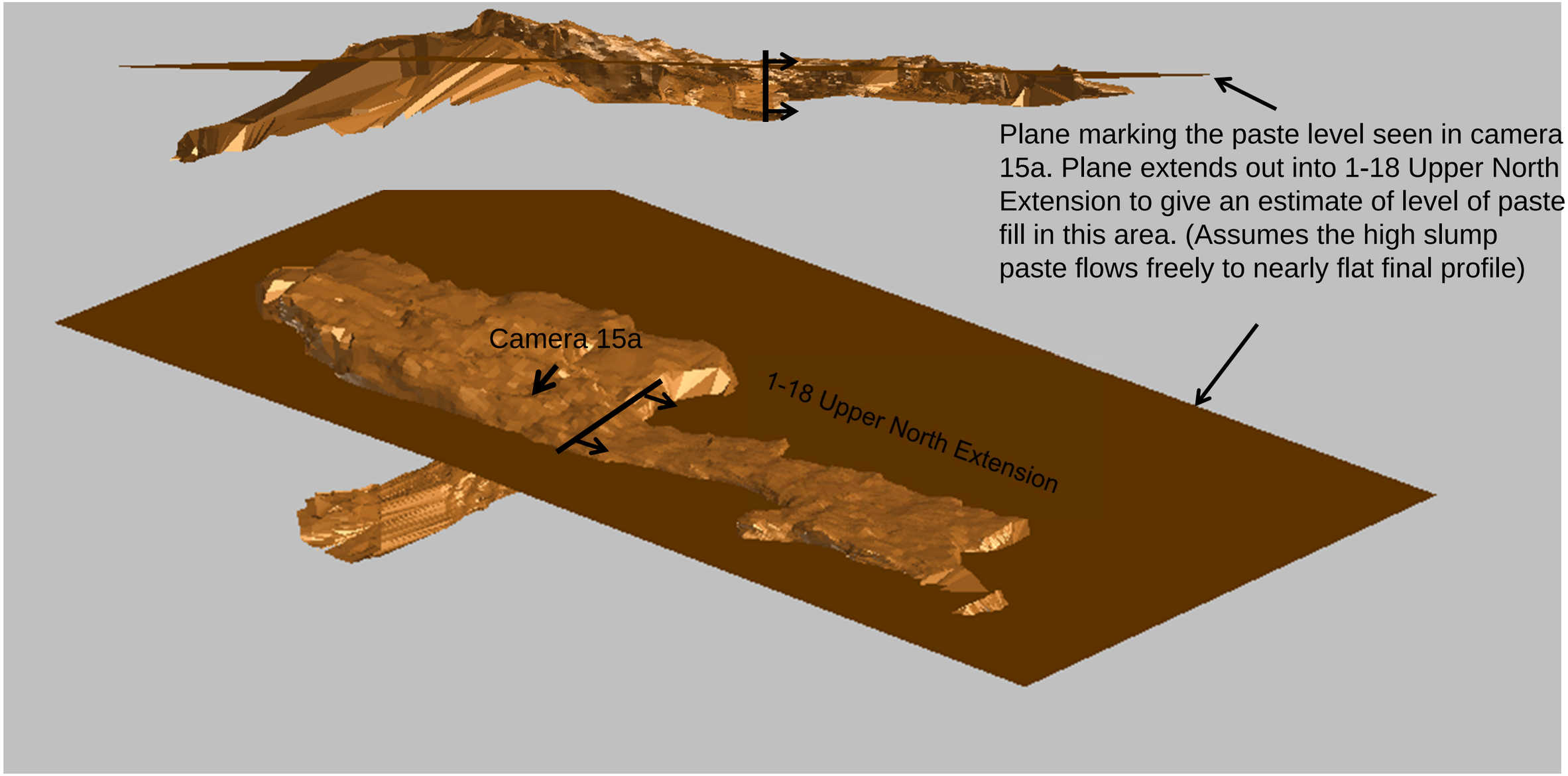
DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
1-18 Upper Stope – Camera 15a
November 15, 2013

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					



DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
Estimated Paste level in 1-18 Upper North Extension

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning

- Borehole video screenshot showing a pig at 19.0 m depth in hole Deliv_118_15.
- No further Paste pours were mad into this hole.

DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

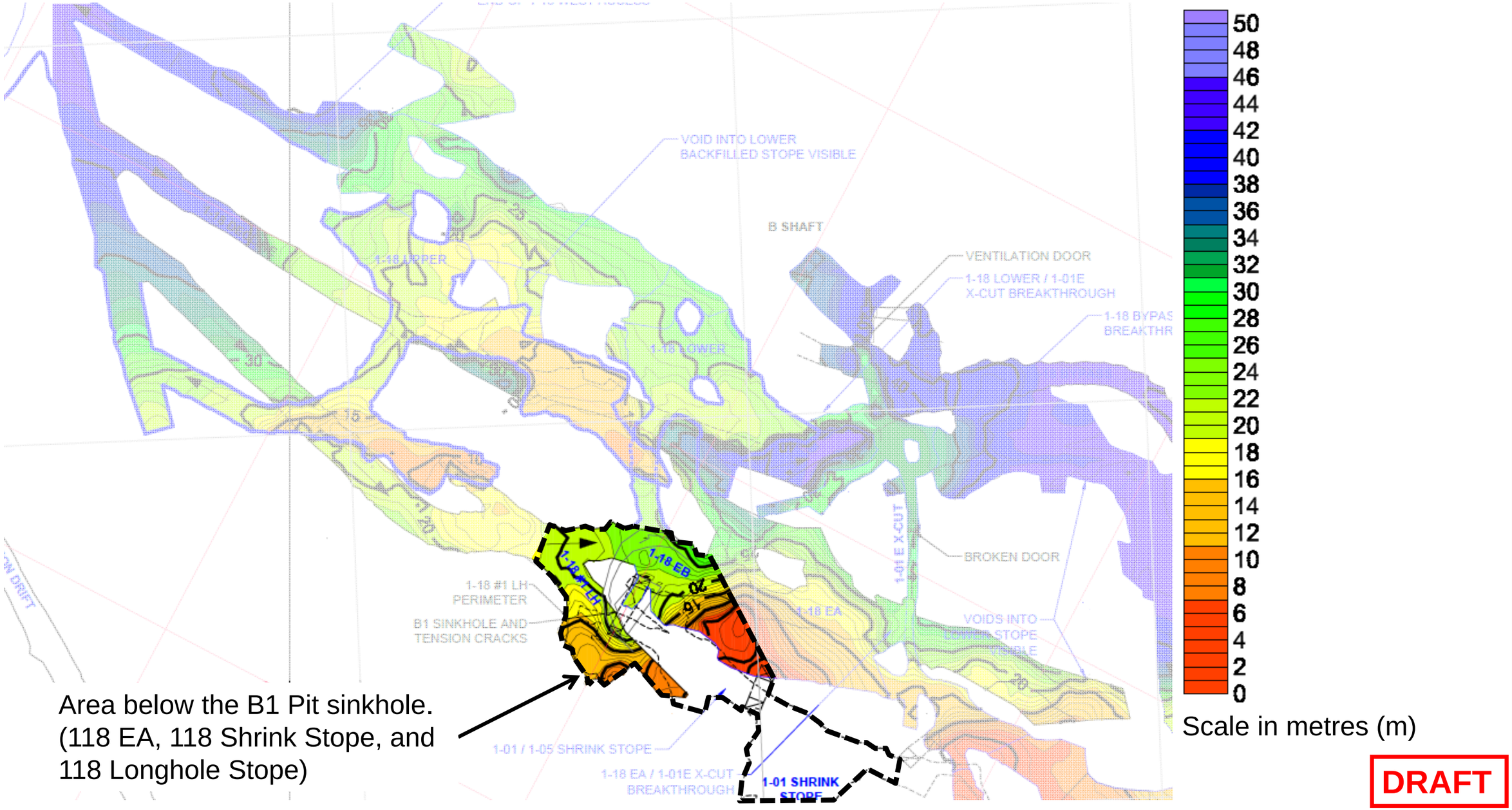
TITLE
P_Deliv_118_15
December 9, 2013
Pig at 19.0m Downhole

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

Area below 1-18 Sinkhole

(1-18 EB, 1-18 Shrink Stope, and 1-18 Longhole Stope)



Area below the B1 Pit sinkhole. (118 EA, 118 Shrink Stope, and 118 Longhole Stope)

Scale in metres (m)

DRAFT

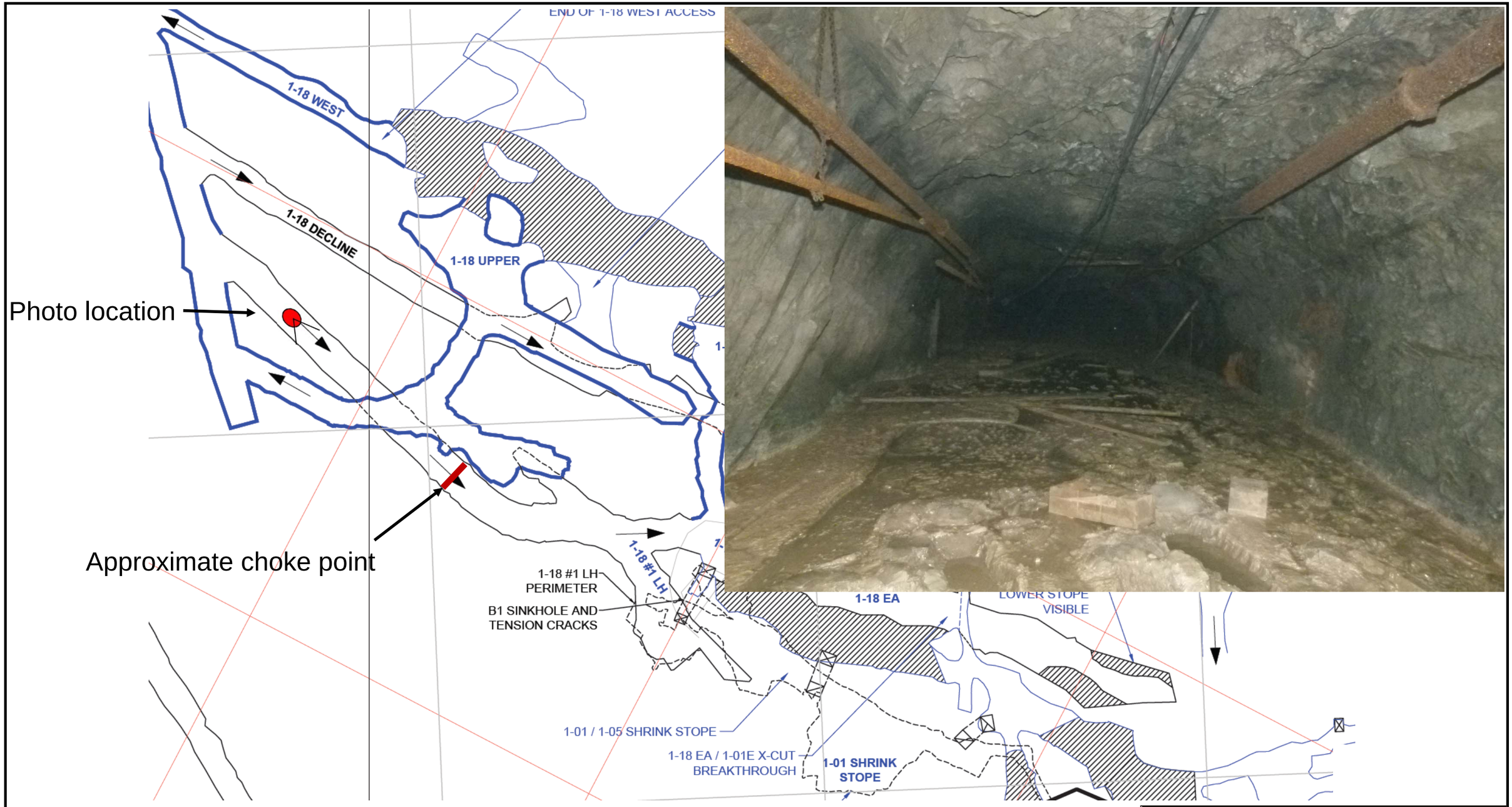
PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
Crown pillar thickness
Below B1 Pit Sinkhole

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning



U/G visit photo location

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
EA/EB Access
Access Choked Off

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning

DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

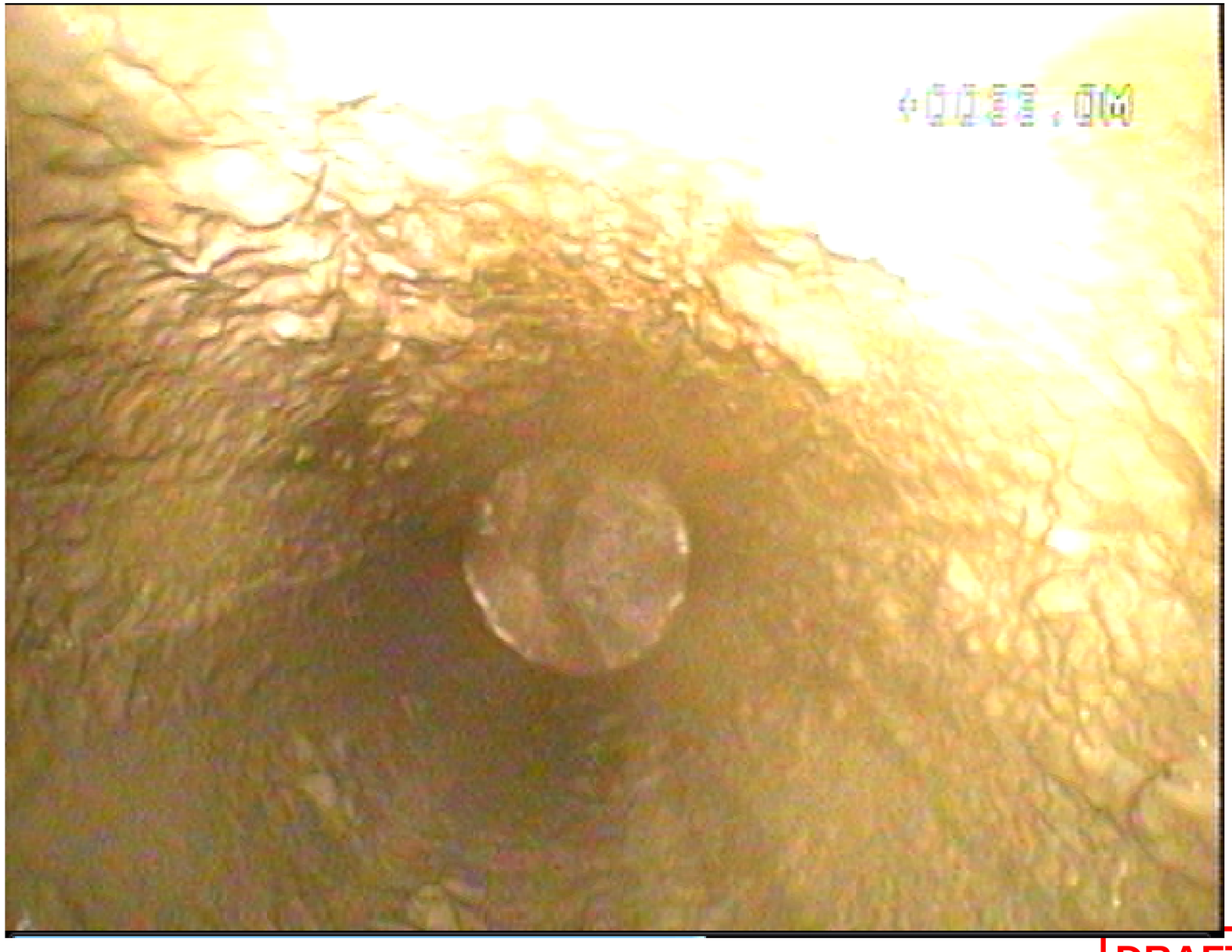
TITLE
PD_Deliv_118-12
November 15, 2013
Paste Delivery Hole Choked Off

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

Page 11

- Paste backed up to 17.5m depth into the drillhole due to pouring on the 14th of November
- Shows that the area below the sinkhole is full as the paste rose in drillholes OBS_118_06, Deliv_118_02, and BKGT_12_14 rather than escaping underground.



DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
OBS_118_06
November 14, 2013
Paste Delivery Hole Full

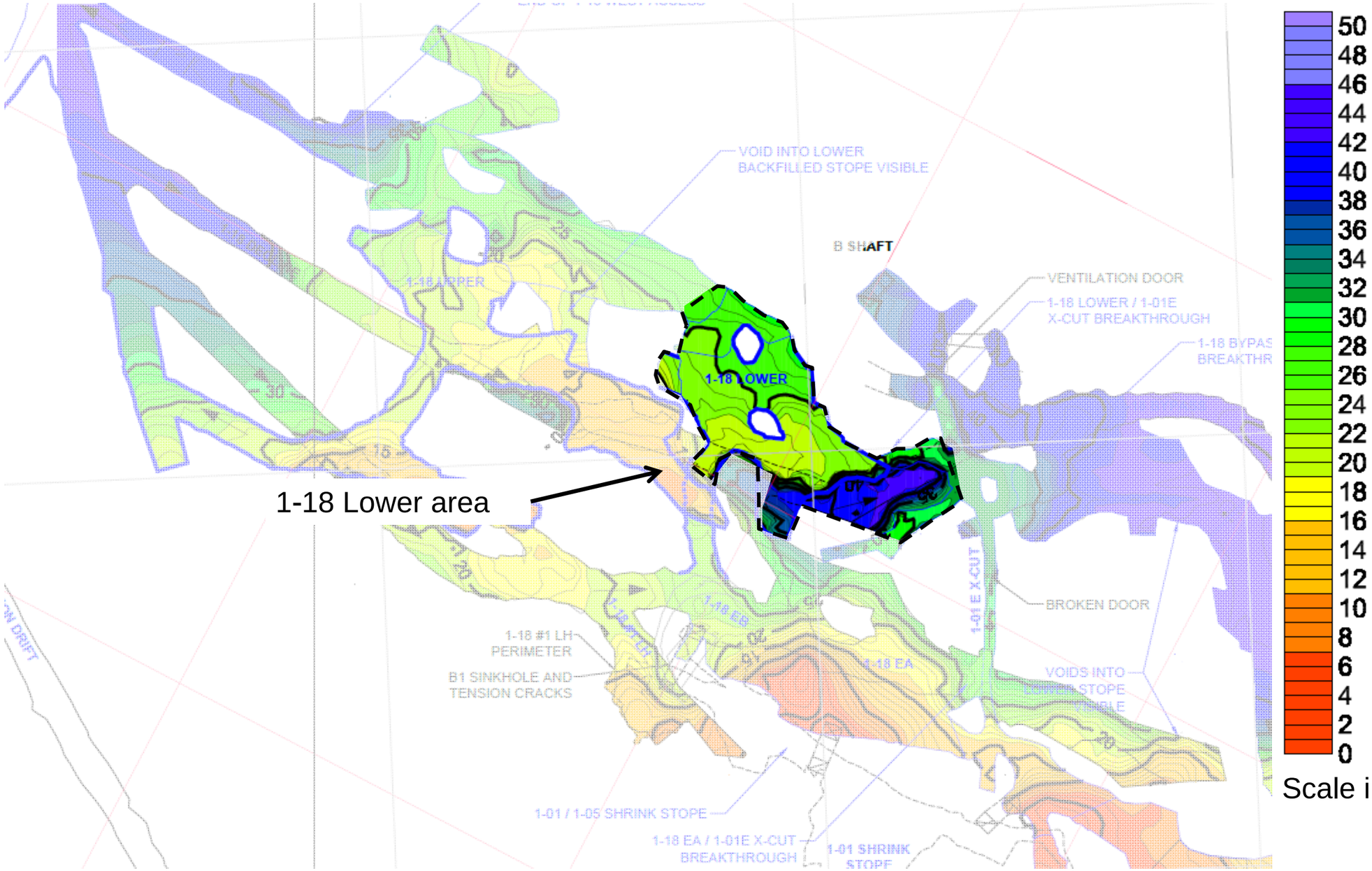
Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

Page 12

1-18 Lower Area

(Includes extension down to the 1-01 East Crosscut)



Scale in metres (m)

DRAFT

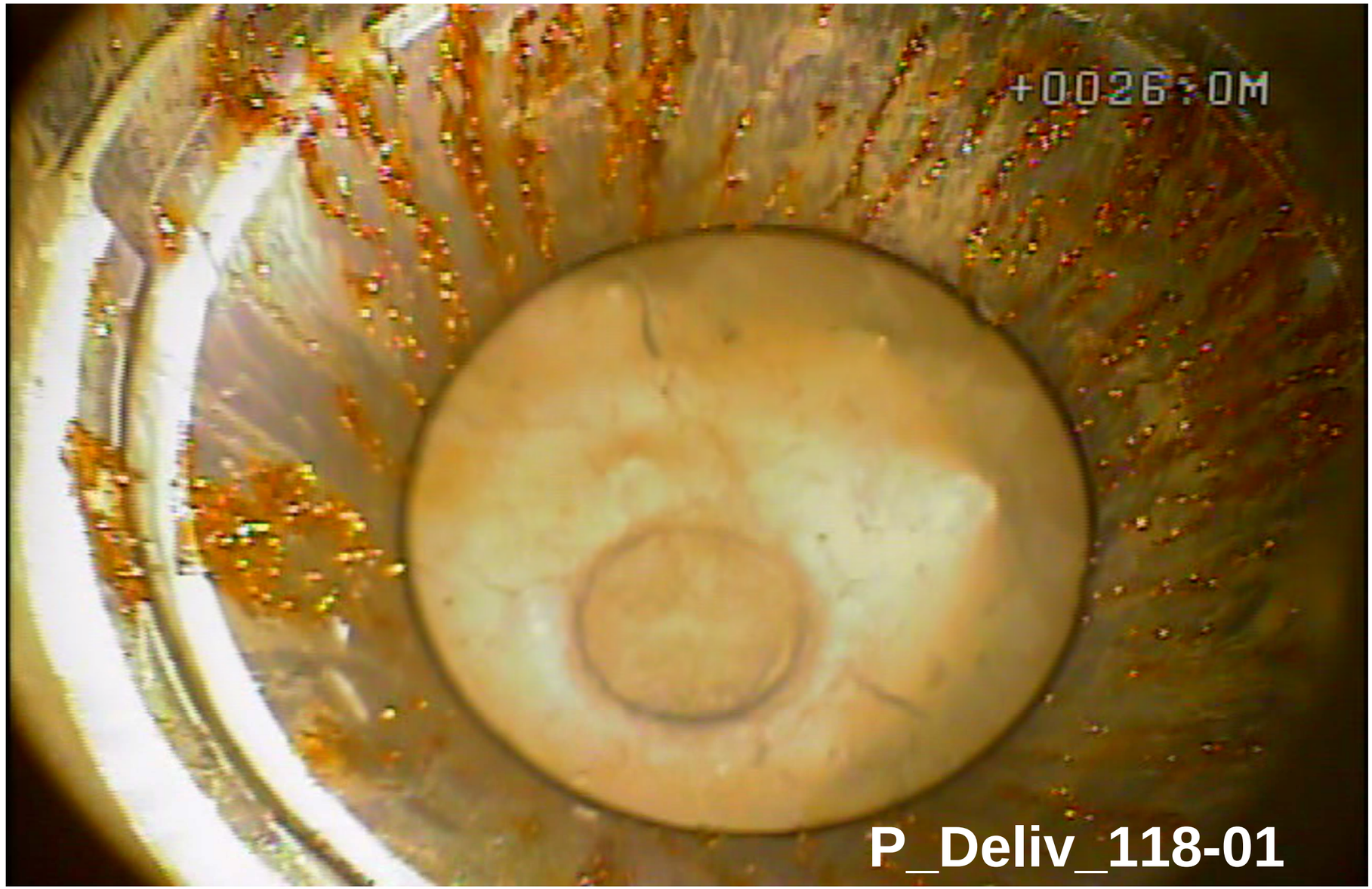
PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
Crown pillar thickness
Above 1-18 Lower

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

FILE: \\golder.gds\gal\burnaby\Active_2013\1426\13-1426-0010 Giant Mining Support Services\1000 - MSS-003 Detailed Planning



DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
P_Deliv_118-01
November 29, 2013
Paste Delivery Hole full

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

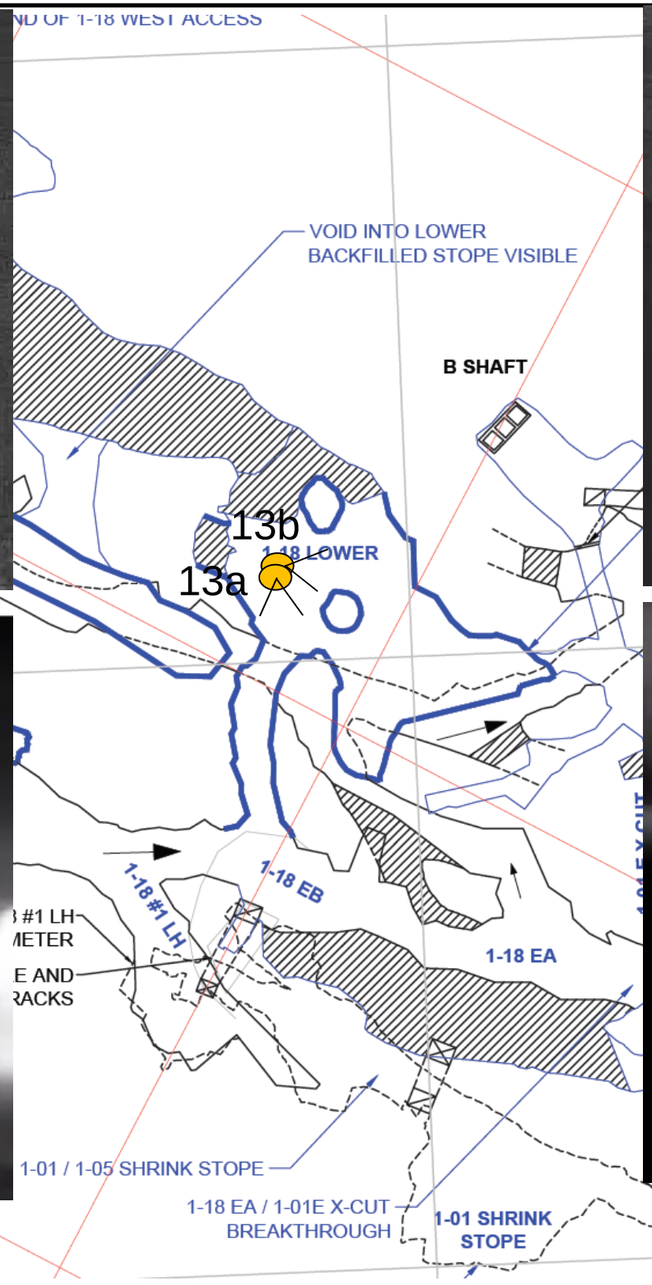
DRAFT

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
P_Deliv_118_01
Paste Delivery Hole full

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					



DRAFT

- Camera 13a is looking at the 1-18 Lower access
- Camera 13b is looking into the back of the inaccessible area in the 1-18 Lower. 13b is installed in the back.

U/G monitoring camera installed in-person - Critical

PROJECT
PWGSC
GIANT MINE INTERIM U/G STABILIZATION PROJECT
YELLOWKNIFE, NWT

TITLE
B1-18 Stope
UG Camera Locations

Golder Associates

PROJECT No.	10-1426-0010		PHASE No.	1000	
DESIGN	DTK	24SEP13	SCALE	N.T.S.	REV. A
CADD	DTK/FM	04OCT13			
CHECK	DTK/FM	29OCT13			
REVIEW					

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