15 November 2017

# C5-09 Stope Complex Void Backfilling Bidder Meeting and Tour

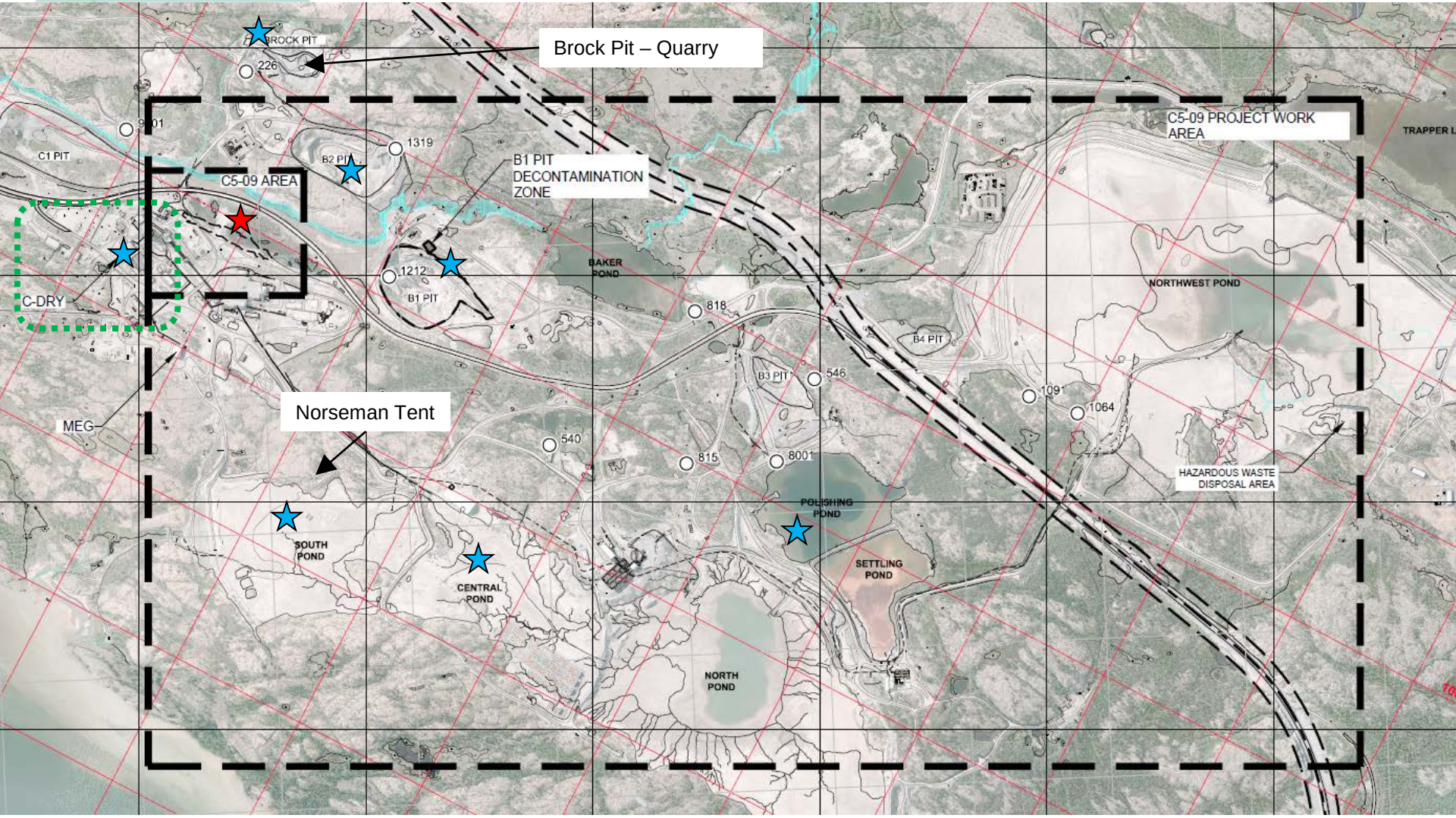
Golder Associates

FOR DISCUSSION PURPOSES

# C509 Stope Complex

- C5-09 Stope Complex is a series of old mined stopes – extend ~320 m in strike length, located directly adjacent to arsenic filled stopes and chambers.
- The complex was mined using a mix of long hole, shrink and cut and fill stoping methods.
- Complex was previously filled with run of mine muck. Some of this muck moved deeper into the mine in 2007 resulting in a void greater than 53,000 $m^3$.
- Design to backfilling the void with a self-supporting fill to mitigate future instabilities.

# SITE MAP



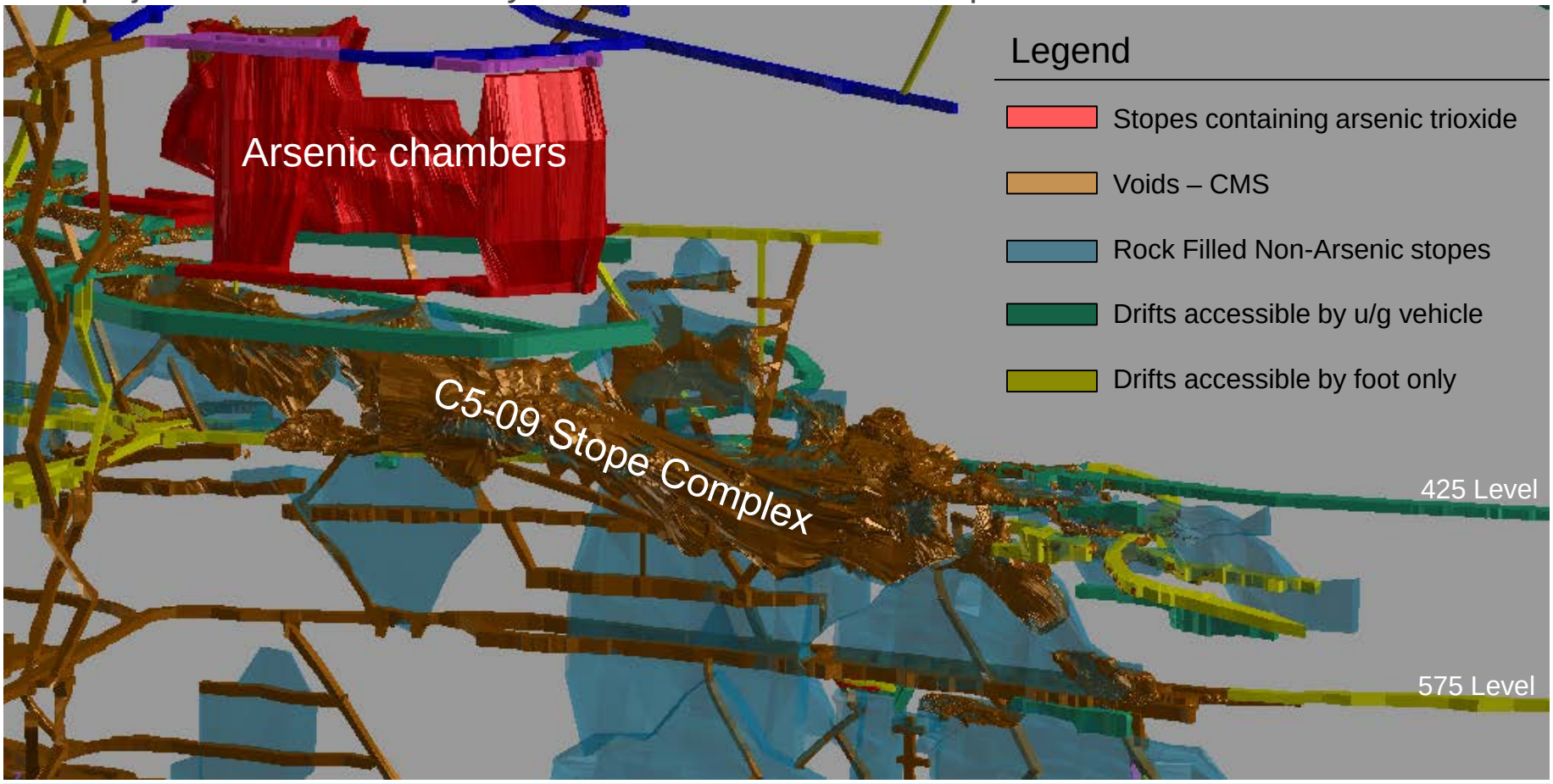



**FOR DISCUSSION PURPOSES**

Golder Associates

# C5-09 Stope Complex

- Proximity of C5-09 Stope Complex to the Arsenic Stopes and Chambers increase risk to project in event of instability in the C5-09 crown and rib pillars.



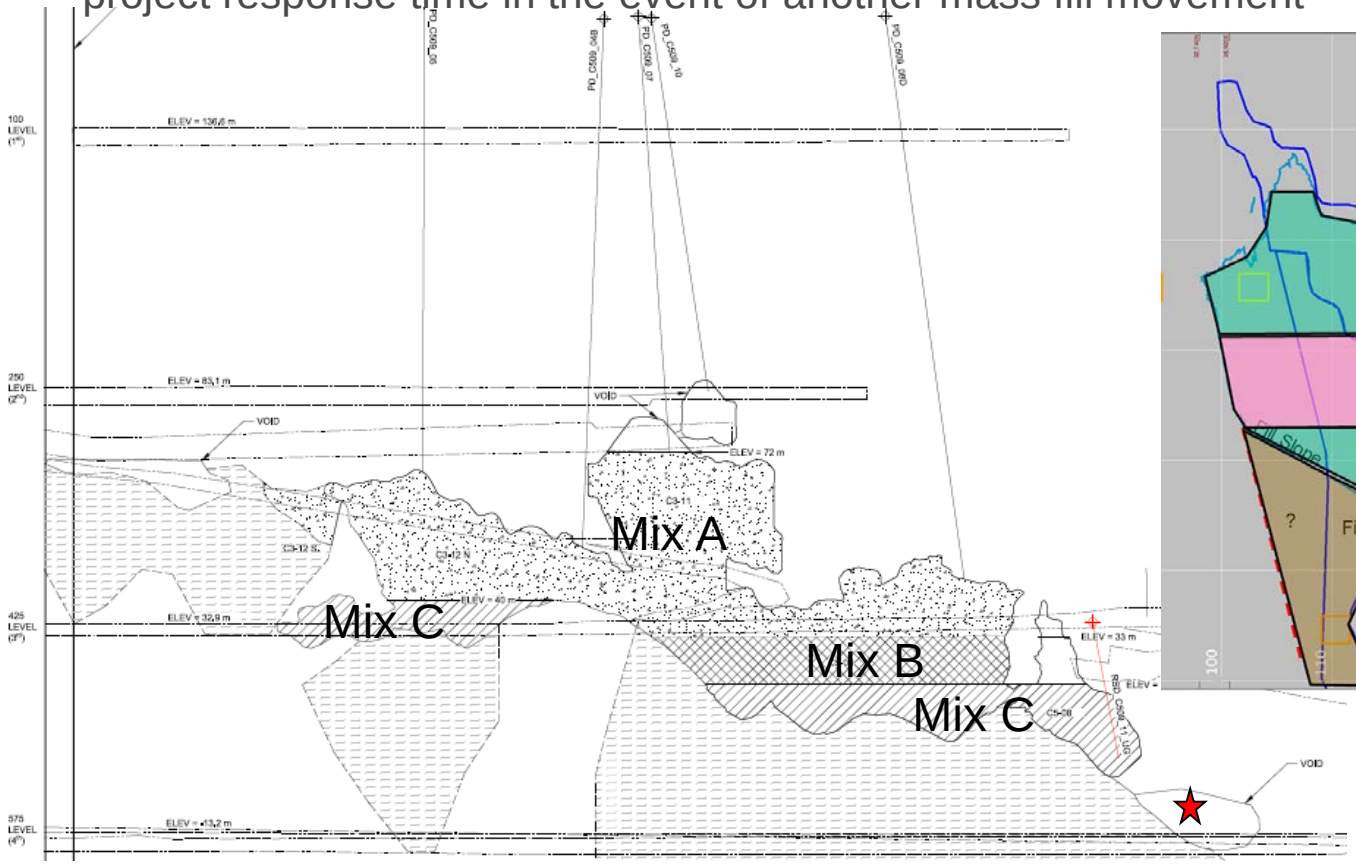


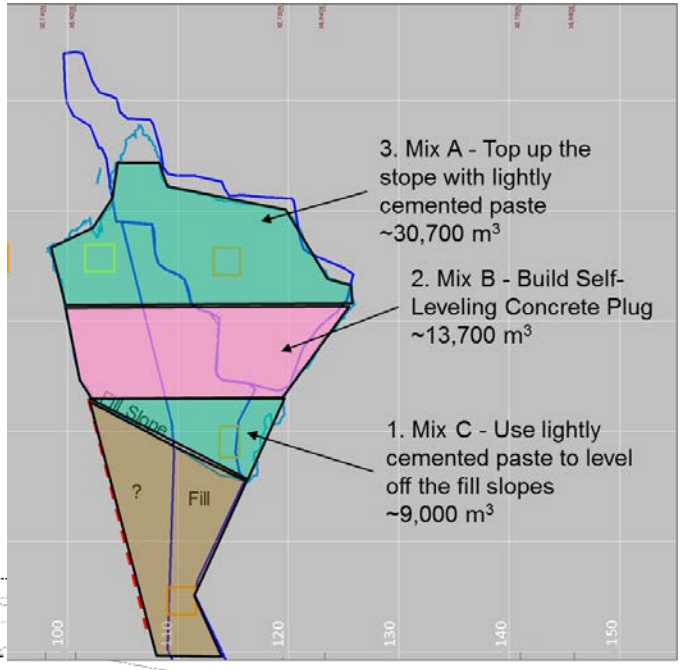



Golder Associates

# C5-09 Stope Complex – Backfill

- Remediation is to backfill C5-09 Stope with paste and self-leveling concrete.
- Self-Leveling Concrete is designed to be a self-supporting fill, which will increase the project response time in the event of another mass fill movement






FOR DISCUSSION PURPOSES

# Paste – Mix A and C

## Definition for C5-09 Stope Backfill

- A non-segregating construction material comprised of GMRP processed tailings, water, binder and other constituent additives.

## Design Criteria

- Fill C5-09 void from current elevation to z=23 m (Mix C), and above z = 33 m (Mix A).
- Strength ≥ 100 kPa
- Maintain slump of < 10.5” (< 9” for Mix C)
- Be contained within the C5-09 stope complex by use of fill fences/barricades etc.
- Mix C - Low Slump Paste Fill to minimize leakage/erosion of existing rock fill in the C5-09 Void

## Placement Methodology

- Sequence and volume through boreholes,
- Method of delivery (tremie into void, or use slicklines in u/g drift into void)
- Placement monitoring methods (leaks and elevation gain)


# Self – Leveling Concrete – Mix B

## Definition for C5-09 Stope Backfill

- A non-segregating, self-consolidating under own weight, flowable construction material comprised of a mixture of aggregate, water, binder and other constituent additives.

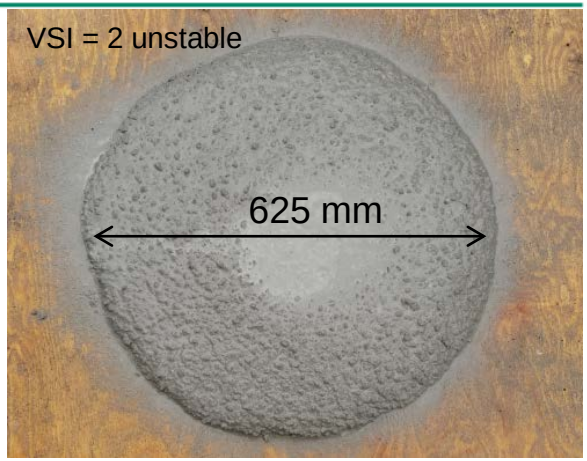
## Design Criteria

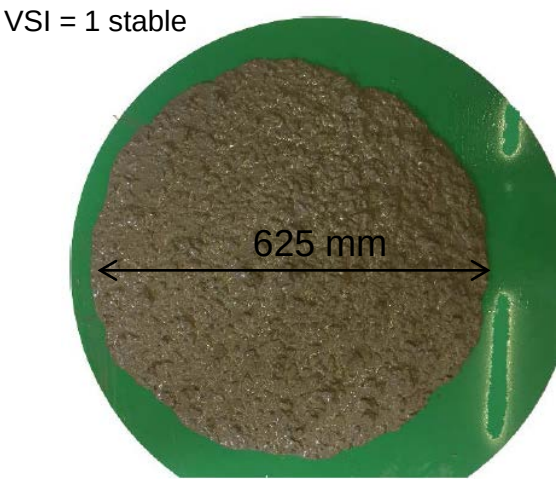
- Backfill C5-09 void with concrete between mine elevation z = 23 m to z = 33
- Reduce, to extent possible the formation of all cold joints (continuous monolithic pour)
- Maintain a slump flow of 625 ±25 mm
- Strength ≥ 12 MPa
- Design max temperature of plug < 70 C
- Differential temperature < 20 C

} As modeled

## Placement Methodology

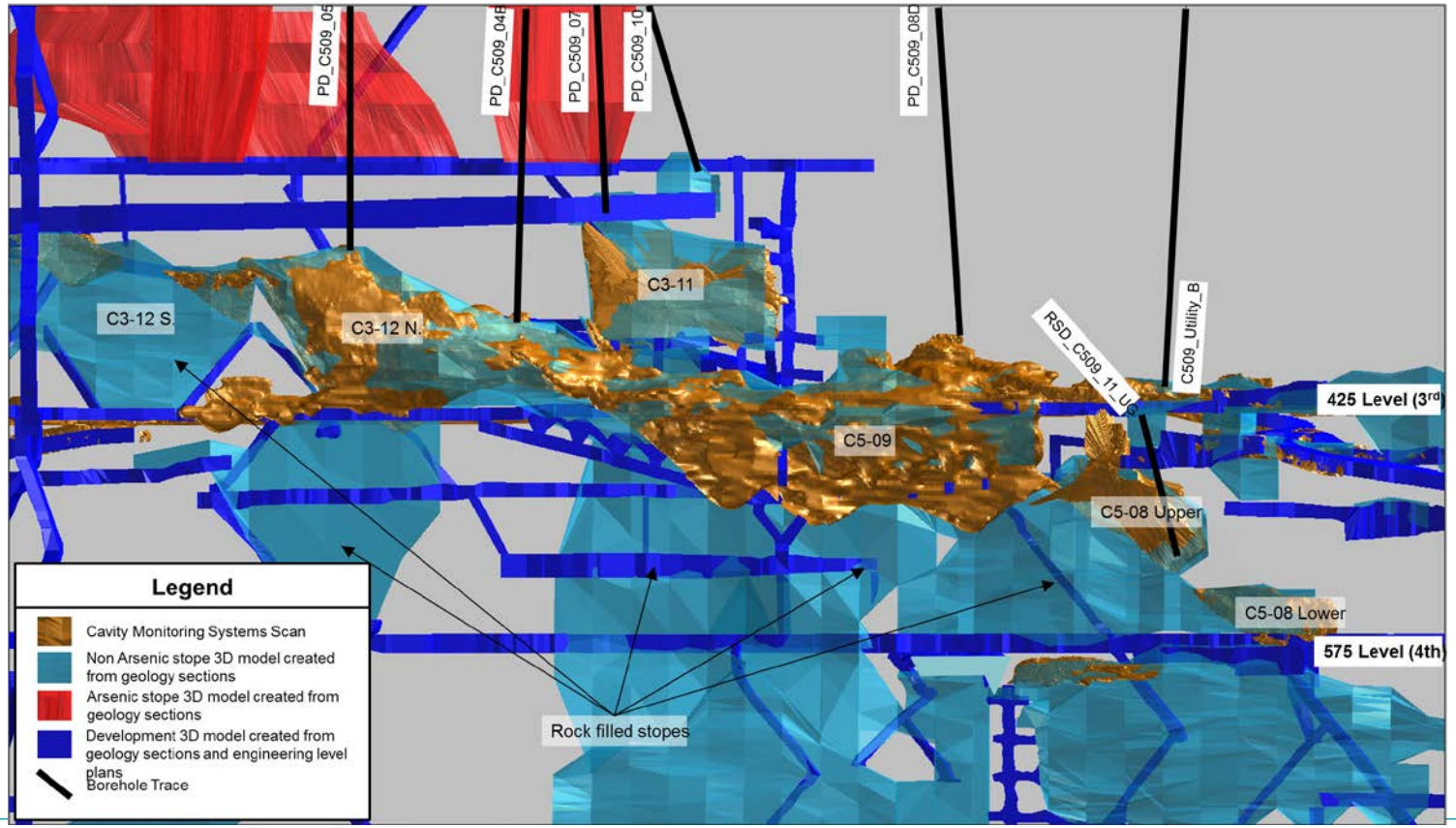
- Sequence and volume through boreholes,
- Method of delivery (tremie into void, or use slicklines in u/g drift into void)
- Placement monitoring methods (leaks and elevation gain)



# Boreholes - Existing

- Existing boreholes are cased with I.D. of 8” and enter the void at an angle
- C5-09 Utility B – 5.5” uncased borehole which enters an accessible drift.



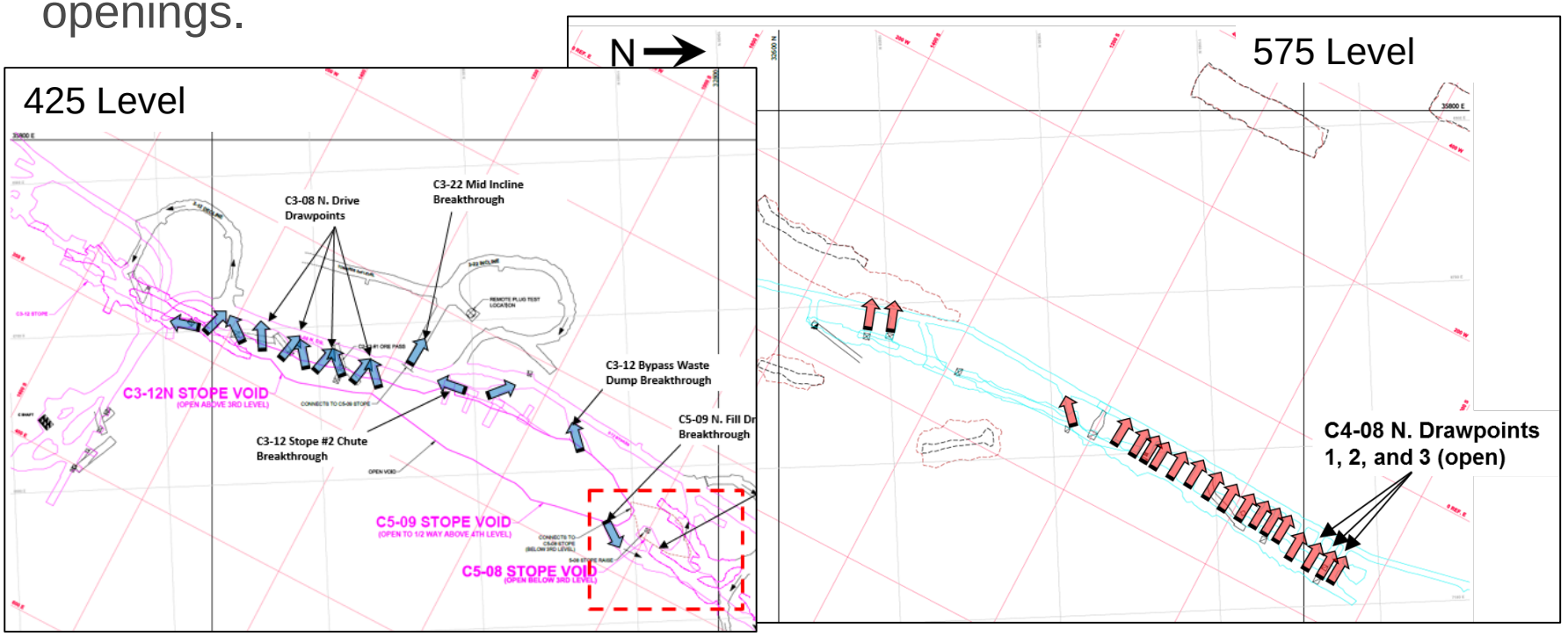



FOR DISCUSSION PURPOSES

Golder Associates

# C5-09 Stope Complex – Leakage Points

- 15 known paste exit points exist on the 425 level that will require type of barricade to prevent paste from leaking onto the 425Level
- 22 possible paste leakage points on the 575 and 750 levels require monitoring/blocking to prevent paste from entering critical mine openings.

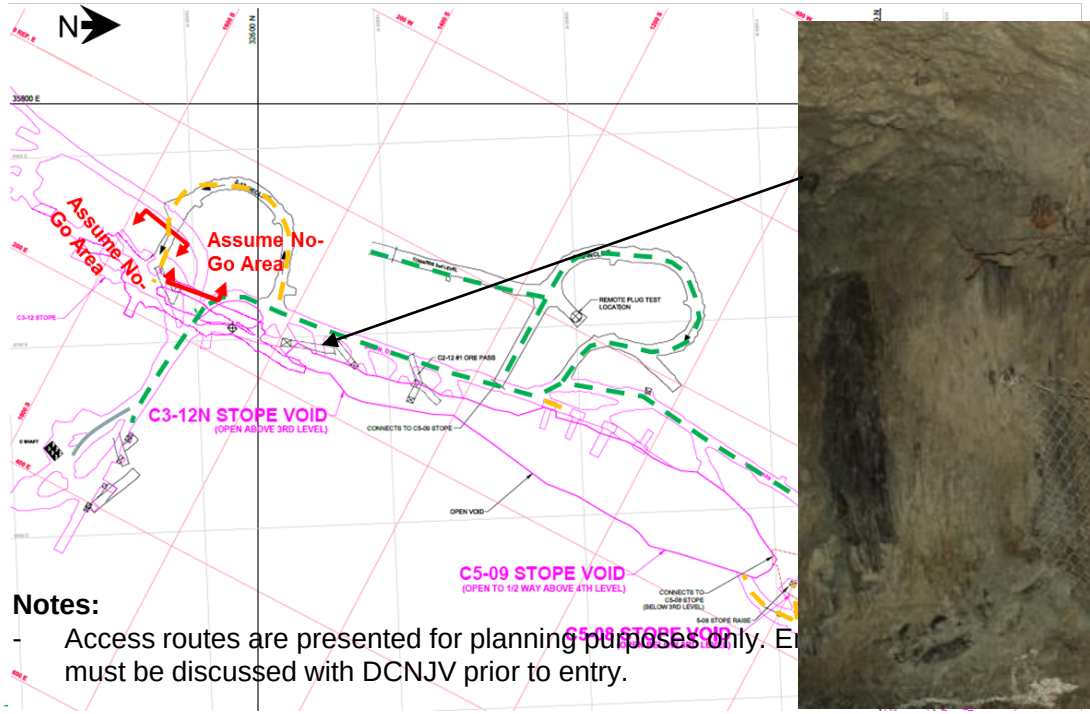


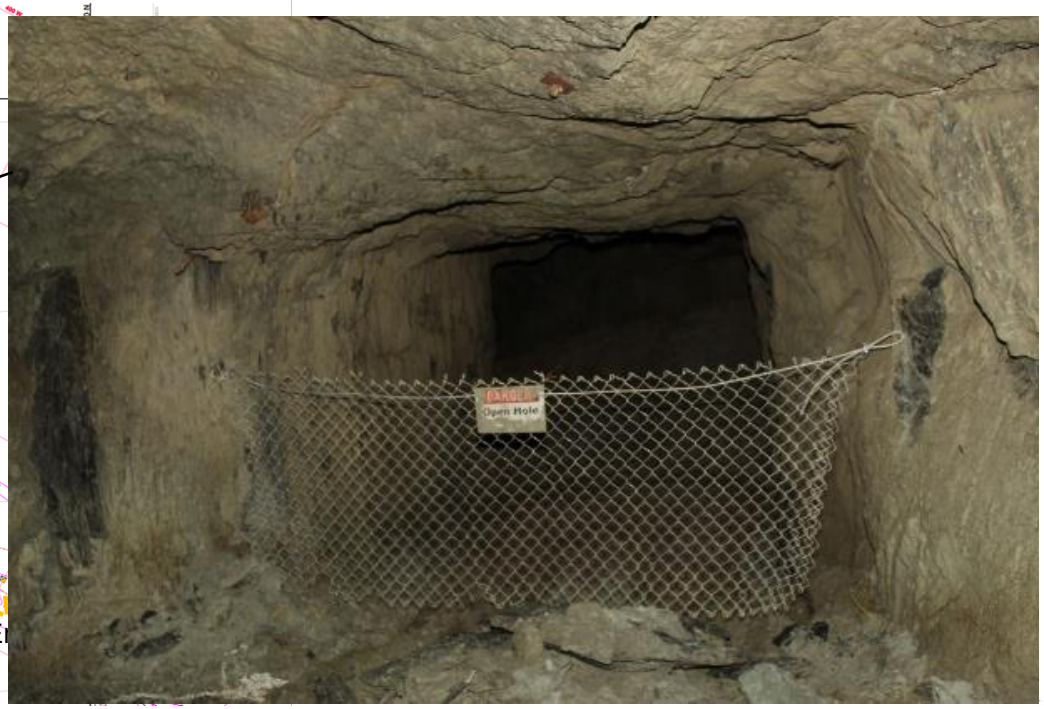

FOR DISCUSSION PURPOSES

Golder Associates

# Ground Support Upgrades – As required

- Preliminary assessment of ground conditions and support requirements have been completed along the access routes to the C5-09 Stope complex.
- Assumed that some work areas may not conform to minimum ground support recommendations and may require upgrading by contractor.




**Notes:**

- Access routes are presented for planning purposes only. E
  must be discussed with DCNJV prior to entry.



**FOR DISCUSSION PURPOSES**

Golder Associates

# Questions?