MNRF Technical Discussion

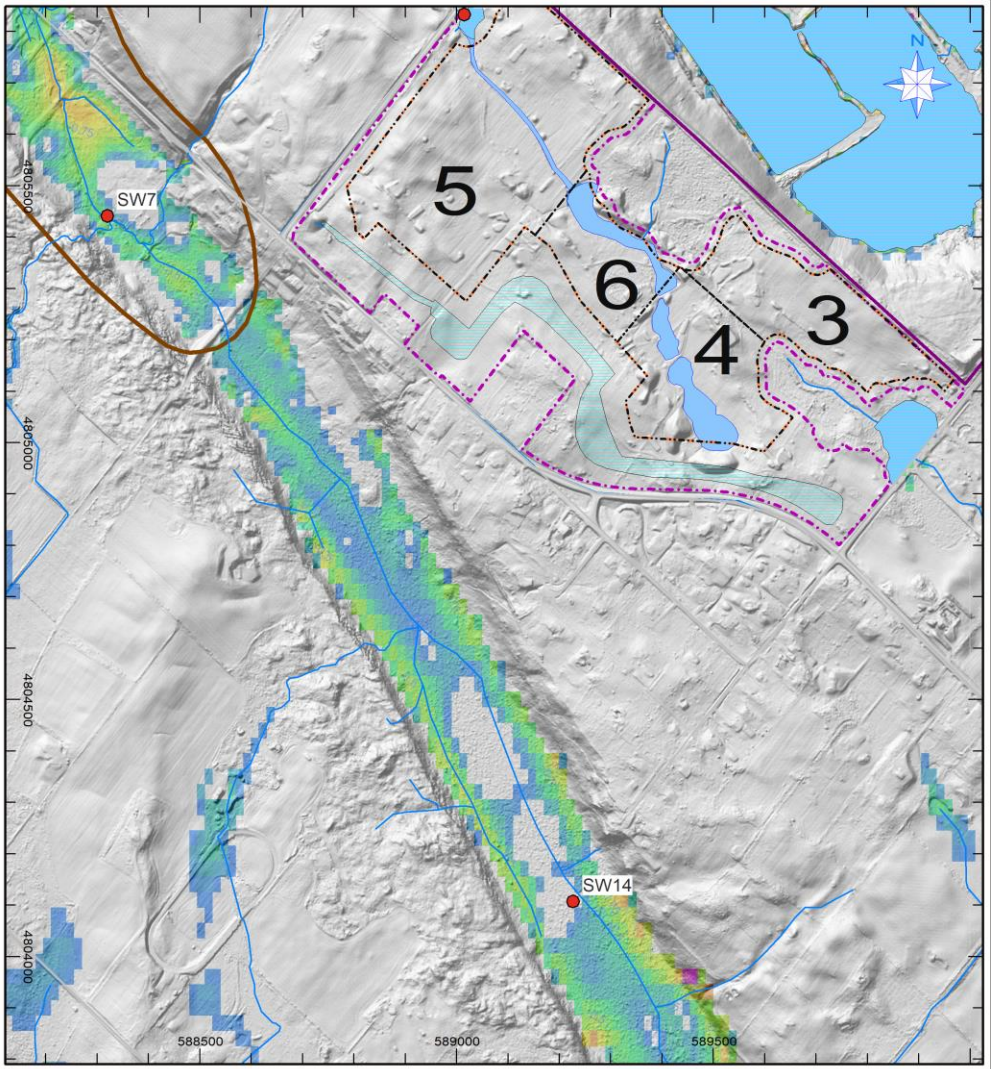
Proposed Burlington Quarry Extension
Nelson Aggregates Co.

Medad Valley Follow-up

May 20, 2022

Baseline Areas of Water Levels above Ground Surface

- **BASELINE**
- Baseline L4 average water level above ground surface



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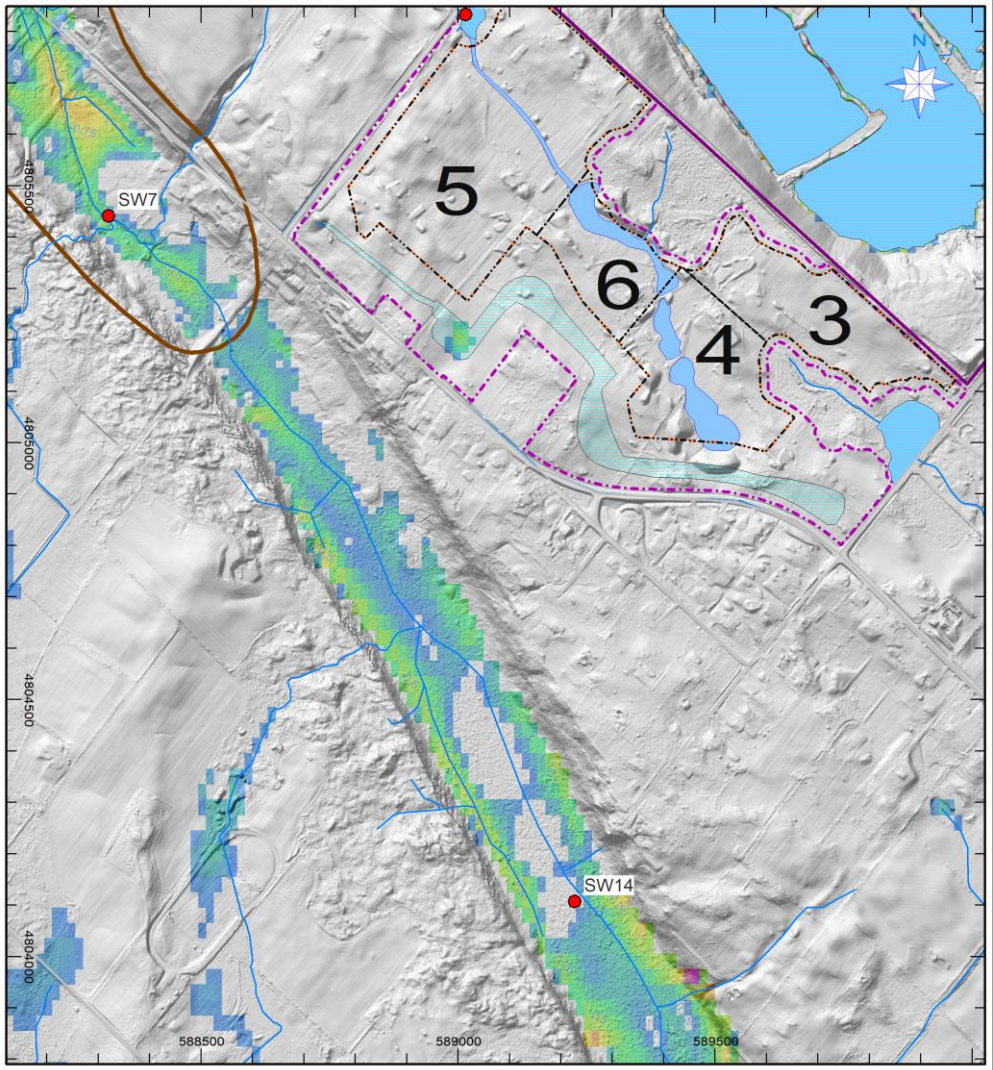
P3456 Areas of Water Levels above Ground Surface

- **Original P3456 Infiltration Pond Design**
- L4 average water level above ground surface



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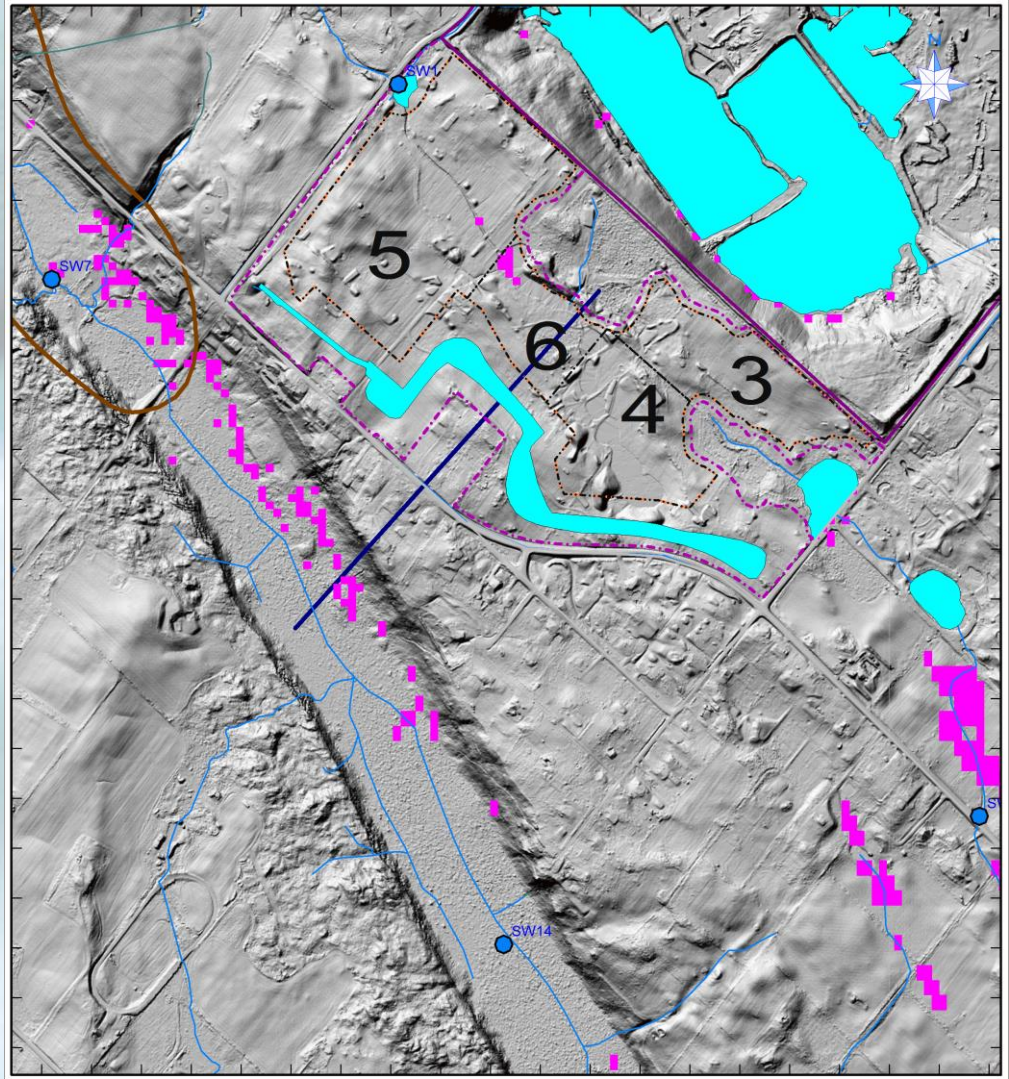
P3456 Change in Areas of Water Levels above Ground Surface

- **Original Design**
- L4 change in area where average water level is no longer above ground surface



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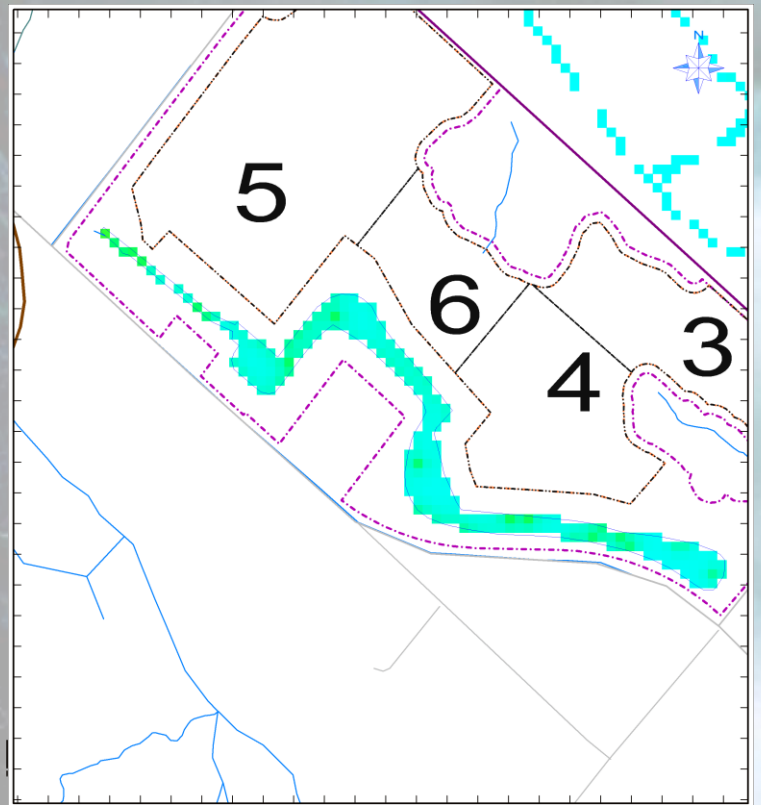
Assessment of Enhanced Infiltration: Deep Ponds

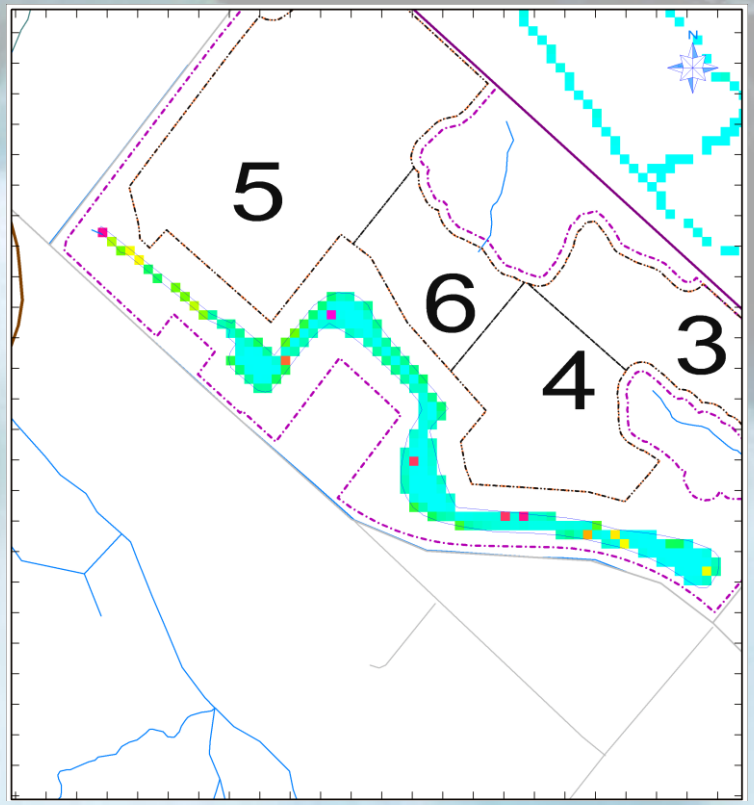
- Current pond purpose and design: Replicate golf course ponds
  - Shallow ponds completed in Halton Till
  - Limited leakage

- New “Deep Pond” Scenario
  - Deepen ponds: Excavate ponds to bedrock
    - Increase lakebed conductance from $1x10^{-6}$ m/s to $1x10^{-5}$ m/s
    - Lake bed K still ½ order less than bedrock K = **Conservative assumption**
  - Raise height of outlet weir at SW1 by 1 m (from 269 masl to 270 masl)

Seepage Increase in Deep Pond Scenario

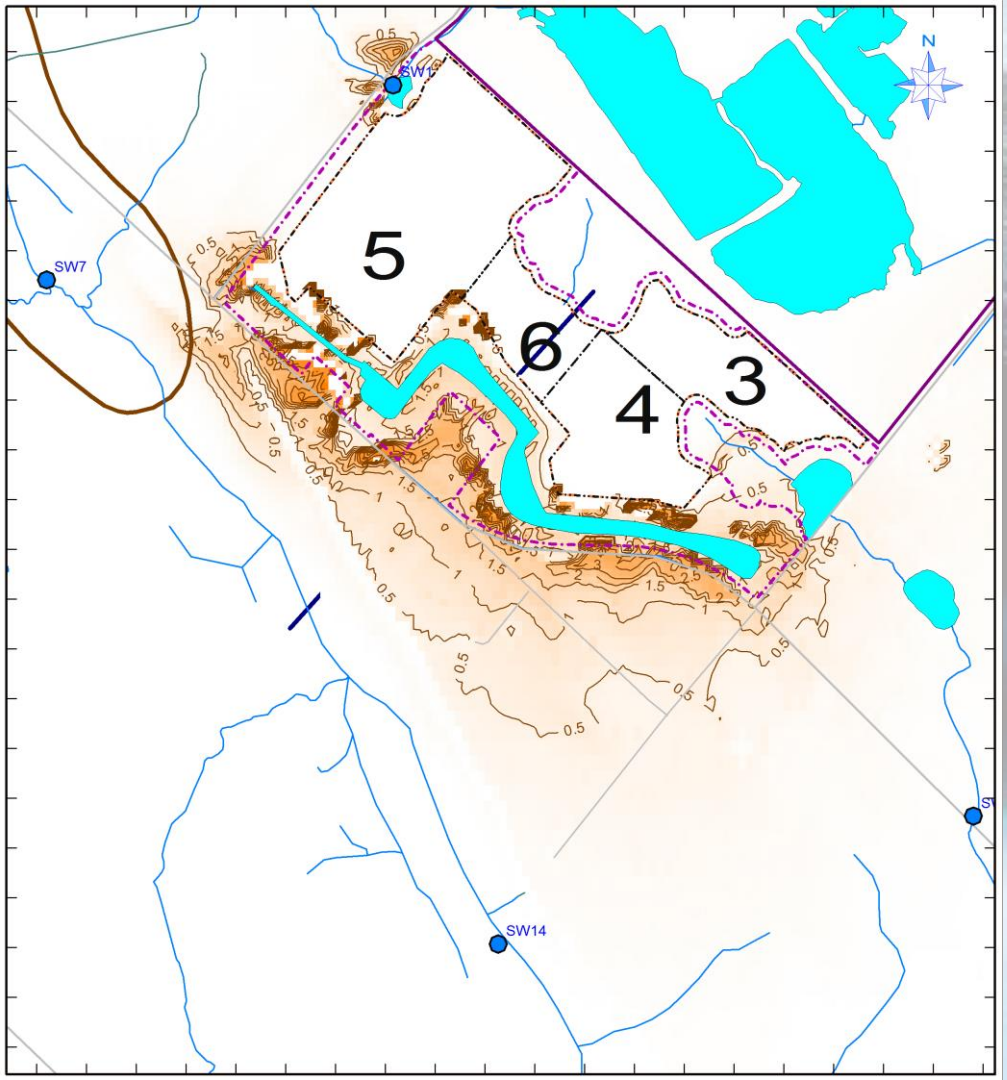
- Lake seepage almost doubles (778 to 1405) m^3/d between P3456 and Deep Pond.





Increase in Heads

- Shallow heads (Layer 1) increase compared to P3456 along Cedar Springs Rd.
- Head increase can exceed 4 m.
- Heads increase up to 0.5 m at valley bottom edge



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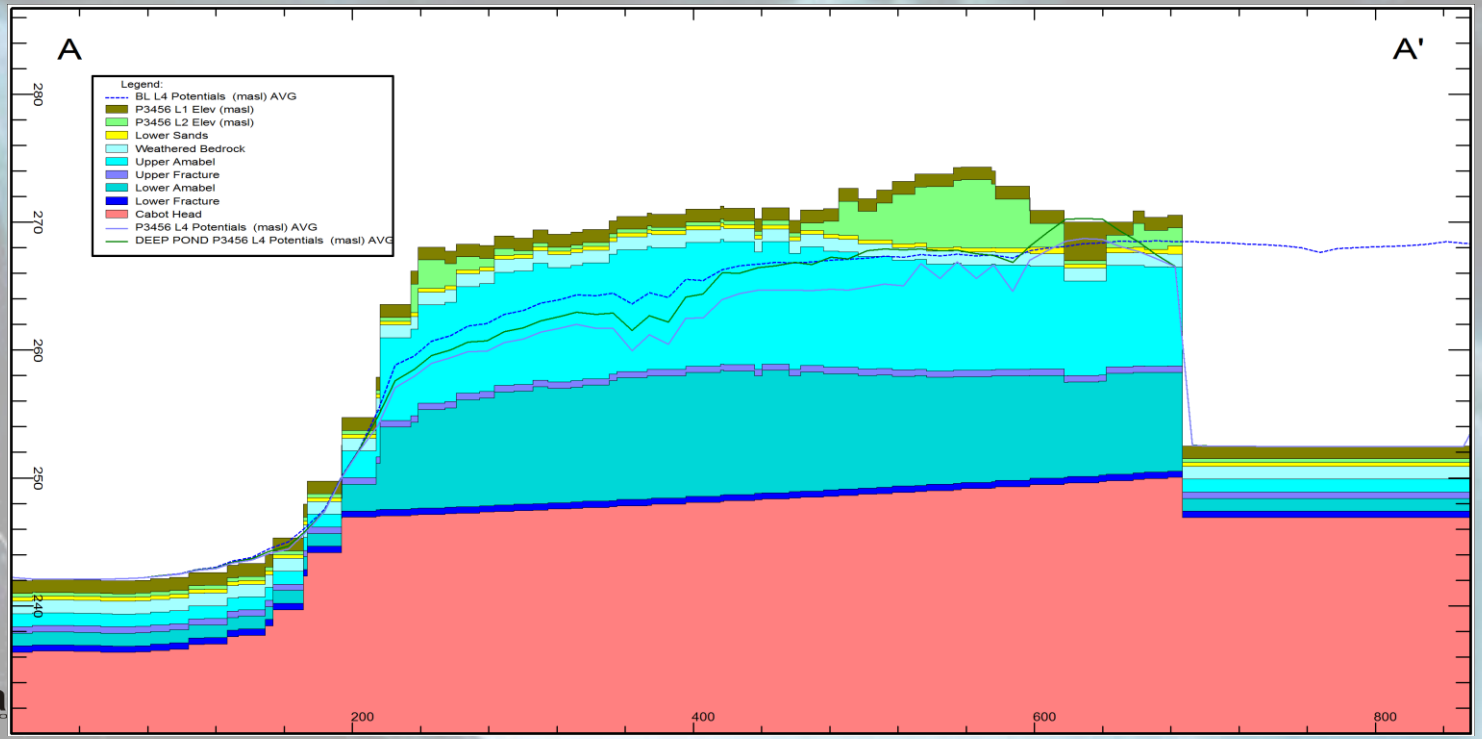
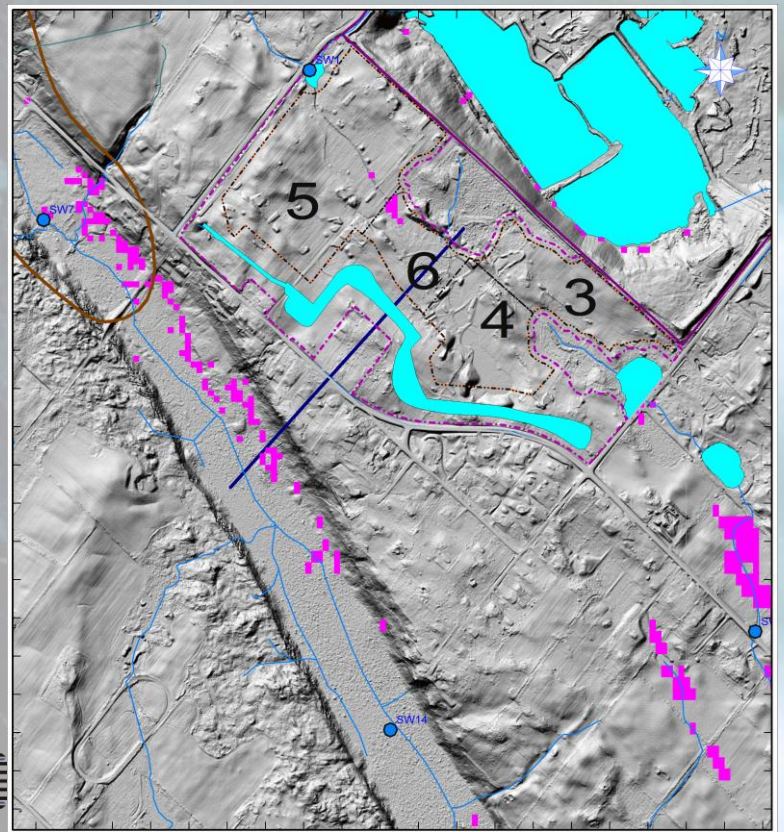
Increase in Heads

- Similar results in Layer 4
- Figure compares baseline (dashed) to P3456 (blue) and Deep Pond (green)

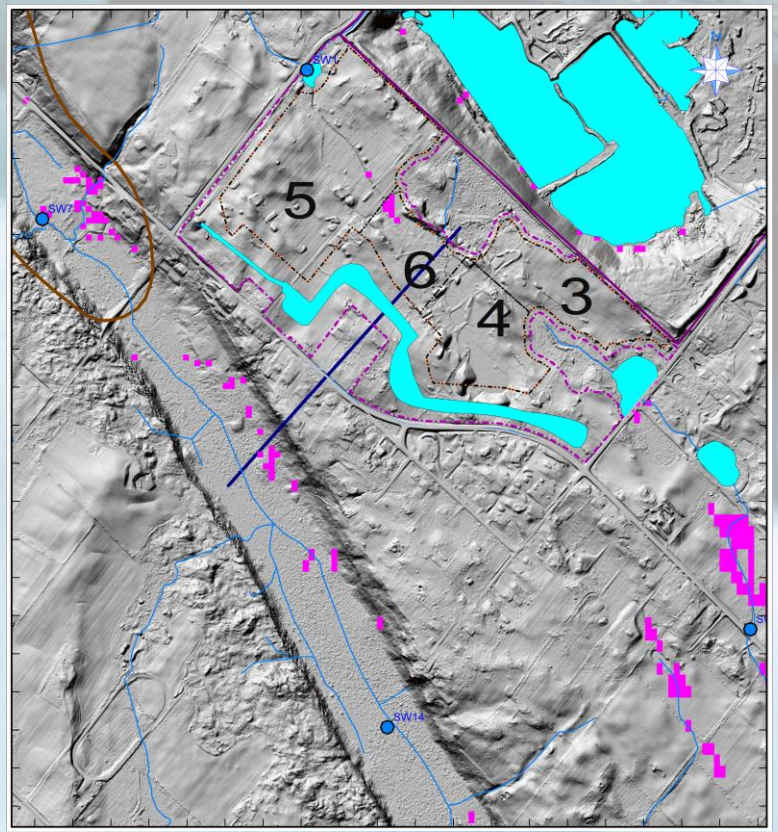


Change in areas of upward gradient: P3456 vs Deep Pond

- L4 change in area where average water level is no longer above ground surface
- P3456 Scenario (116 cells)

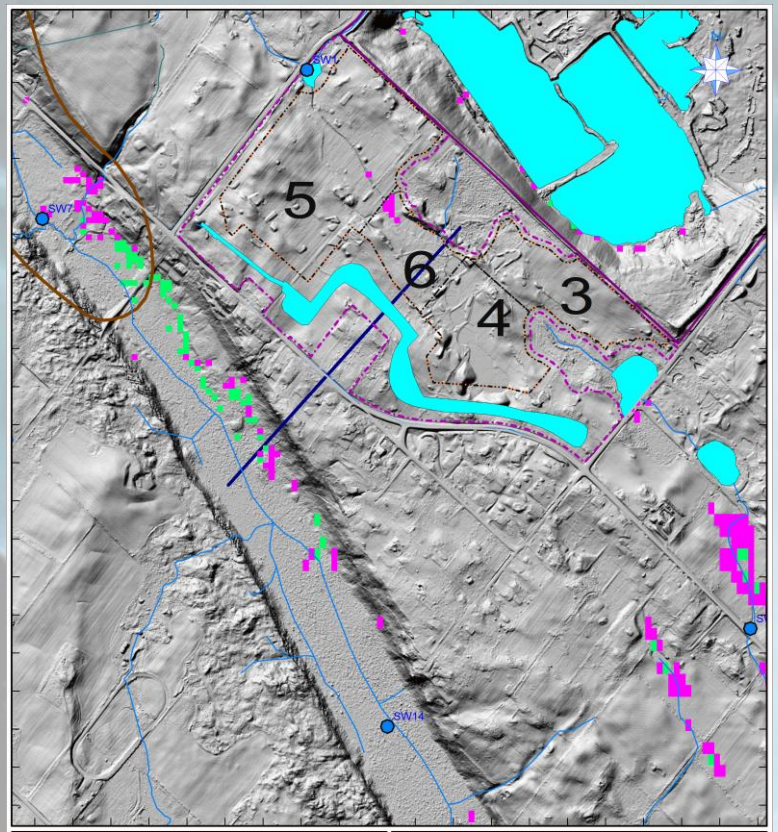


Deep Pond (55 cells – 52% reduction)



Change in areas of upward gradient: P3456 vs Deep Pond

- L4 change in area where average water level is no longer above ground surface
- Deep Pond Scenario



Green cells are no longer affected

Remaining affected area is patchy and related to local topographic variation

Deep Infiltration Pond Summary

- Deepening the infiltration pond and raising the outlet weir increases seepage out.
  - Conservative lake bed assumption: ½ order of magnitude lower K than bedrock
- Heads in the Cedar Springs Road area increase up to 4 m.
  - Heads increase up to 0.5 m in Medad Valley because they are generally close to land surface already
  - Upward gradients are restored in most of the area impacted under P3456.
- Remaining affected area is patchy and related to local topographic variation
- Monitoring will ensure system is working as designed.