

Acton Quarry – Proposed Extension

Pre-Consultation - Water

Pre-Submission Liaison Committee Information Session

November 25, 2008



Session Summary

- 1. Project Orientation**
- 2. Background on Water**
- 3. Proposed Extension Water Management**
- 4. Proposed Rehabilitation Plan and Water Benefits**
- 5. Question and Answer / Discussion**



1.1 Welcome

- Thank you for joining us today.
- Dufferin is committed to the public consultation process and working with you as representatives of the community
- We hope today's discussion offers an opportunity to familiarize yourself with water related matters
- We appreciate your continued participation in this standing committee over the next 2+ years.
- Please don't hesitate to contact Dufferin:
 - Andrea Bourrie, MCIP, RPP Property & Resource Manager
 - Enzo Bertucci, BLA, Property & Resource Project Manager



1.2 Agenda

7:10 – 7:30 pm	Overview on Water by Richard Murphy of CRA
7:30 – 8:00 pm	Question & Answer
8:00 – 9:00 pm	Discussion

The next session is planned for discussion of the natural environment aspects of the Acton Quarry and Proposed Extension.



1.3 Site Overview



1.4 Phasing Plan and Operation Overview

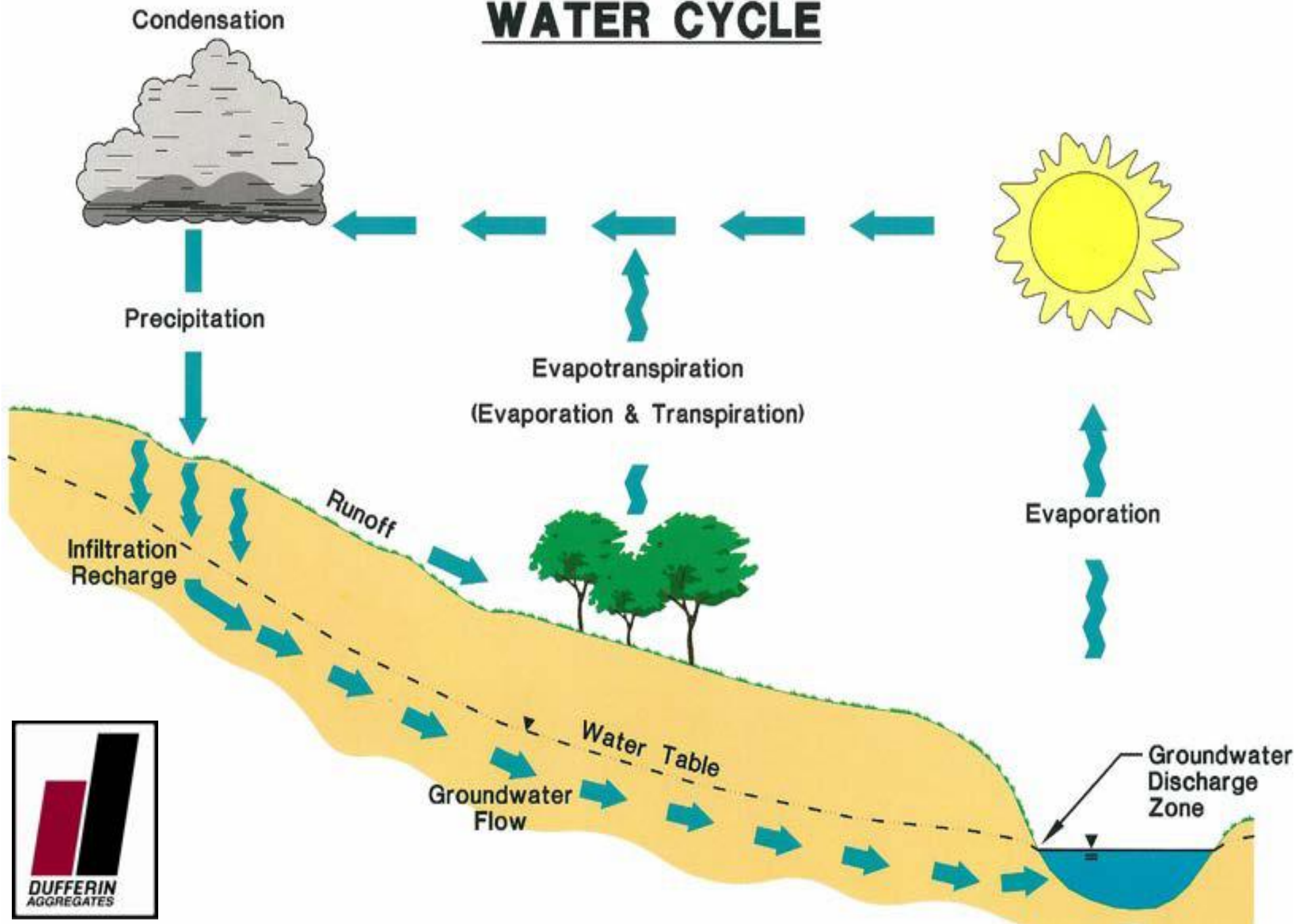


2.0 Background on Water

- Water Cycle
- Surface Water (Hydrology)
- Groundwater (Hydrogeology)
- Existing Quarry Water Management



WATER CYCLE



2.2 Surface Water Flow

- Majority of water evaporates in natural environment
- Water surplus in fall/spring, deficit in summer
- Runoff occurs primarily in spring and with major storms
- Dry period flows depend on upstream and/or groundwater contribution
- Headwater Area
 - ▶ Primarily ephemeral to intermittent flow
 - ▶ Perennial flow in Black Creek and 16 Mile Creek

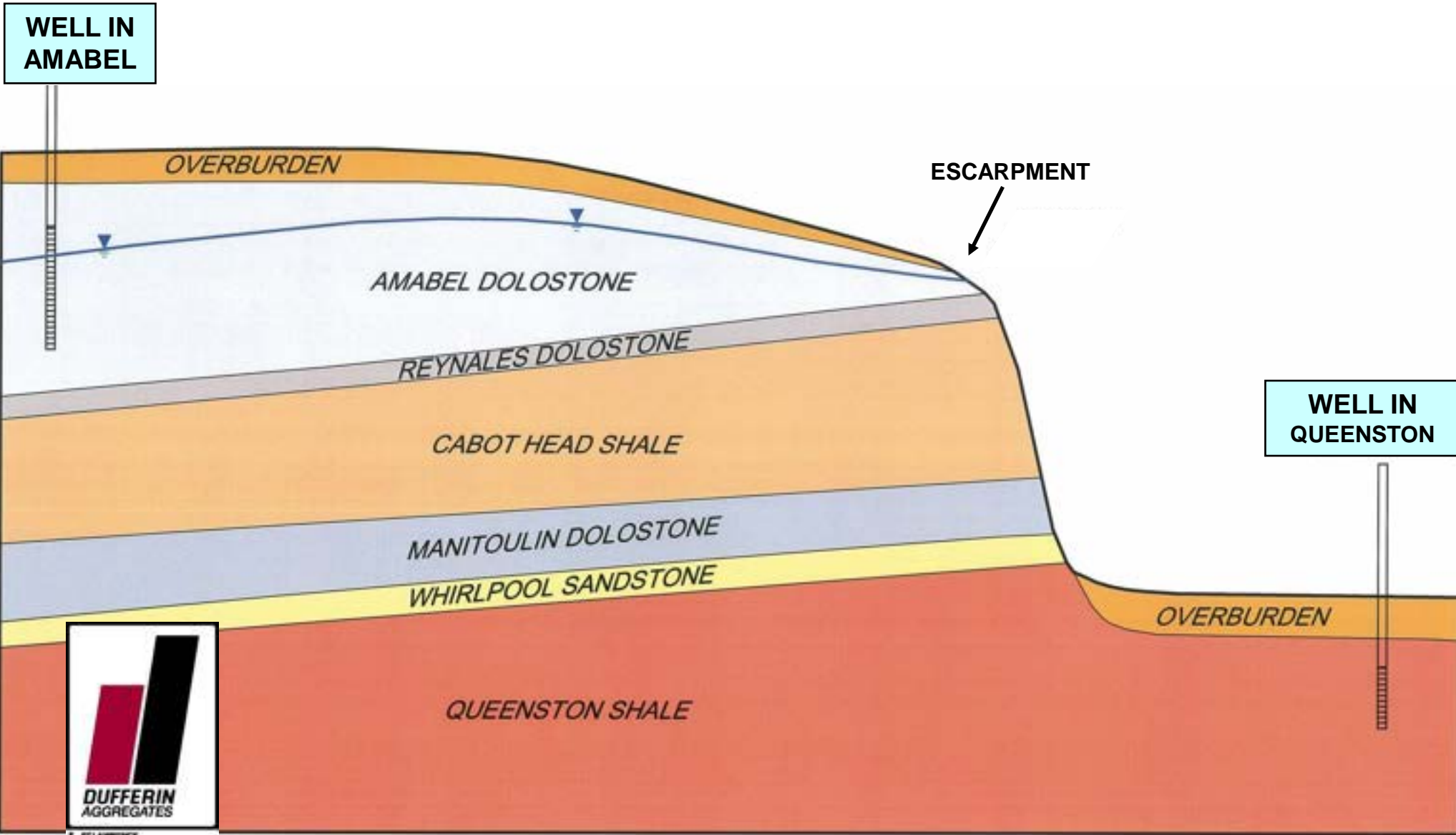


2.2 Groundwater Flow

- Water infiltrates to groundwater flow system
- Rate/amount of infiltration varies
- Groundwater flows horizontally through small openings (porosity) in soil or bedrock = “Aquifer”
- Groundwater flows under gravity to areas of discharge or water taking that may include:
 - ▶ Creeks, wetlands, springs
 - ▶ Wells
 - ▶ Excavations (e.g. quarry)
- Rate of flow depends on permeability/hydraulic conductivity of aquifer and the hydraulic gradient
 - ▶ i.e. resistance and driving force



Geology and Groundwater

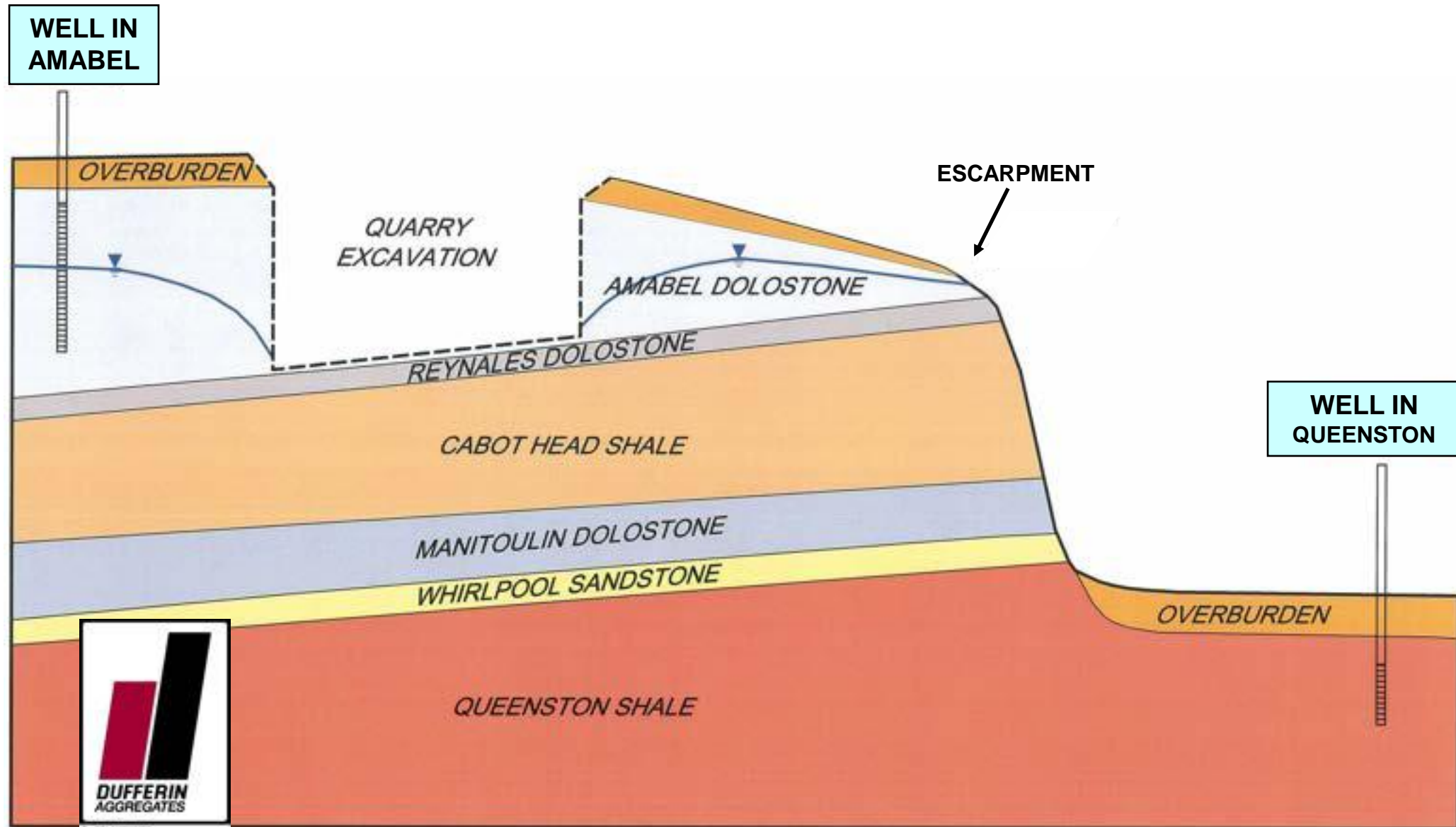


2.3 Existing Quarry Water Management

- Existing Quarry extends below groundwater table.
- Quarry collects water from direct precipitation as well as groundwater inflow. Minimal runoff into quarry.
- Water is discharged to surface water where some of it infiltrates to groundwater.



Quarry Removes Amabel

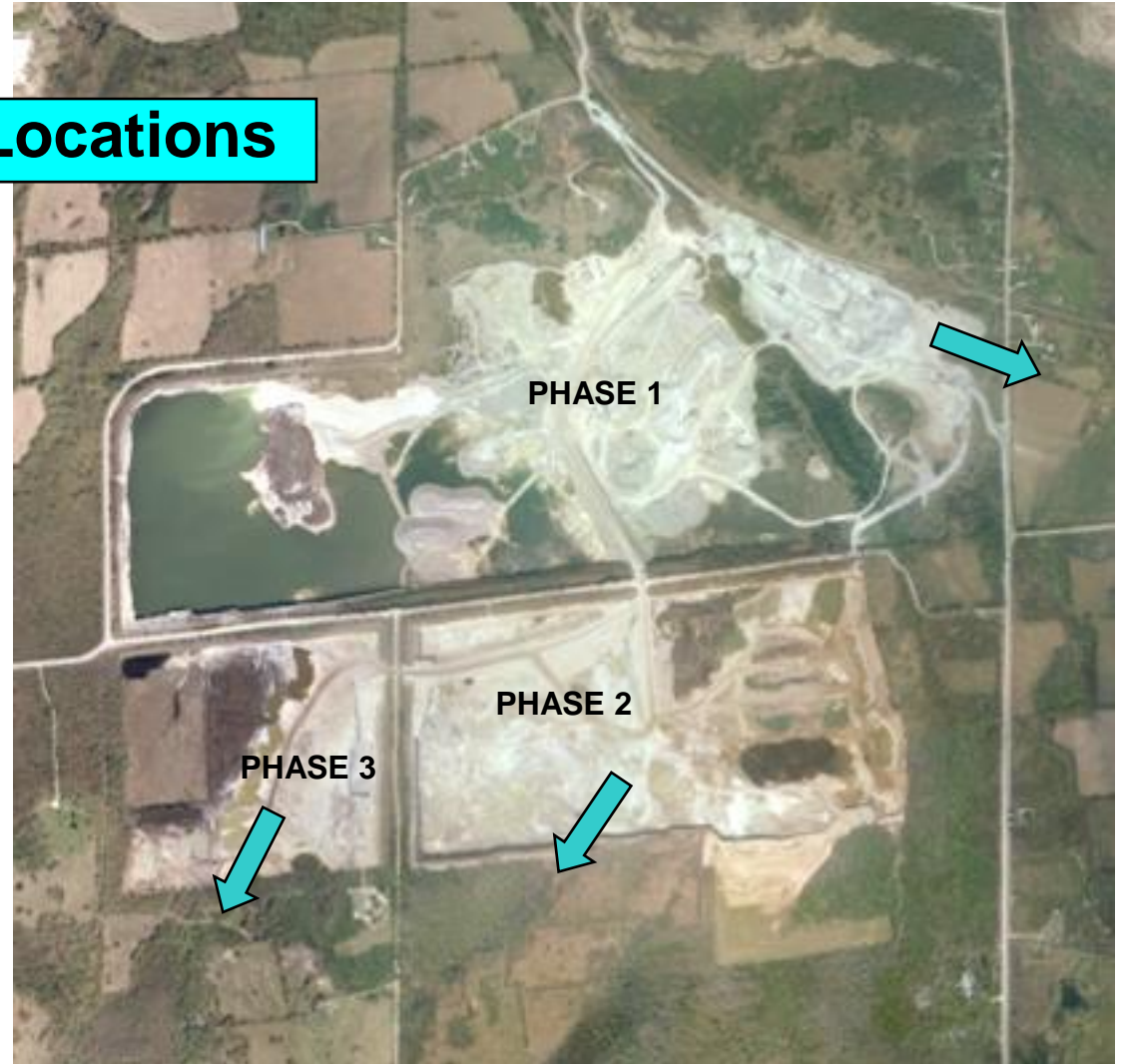


Quarry Dewatering

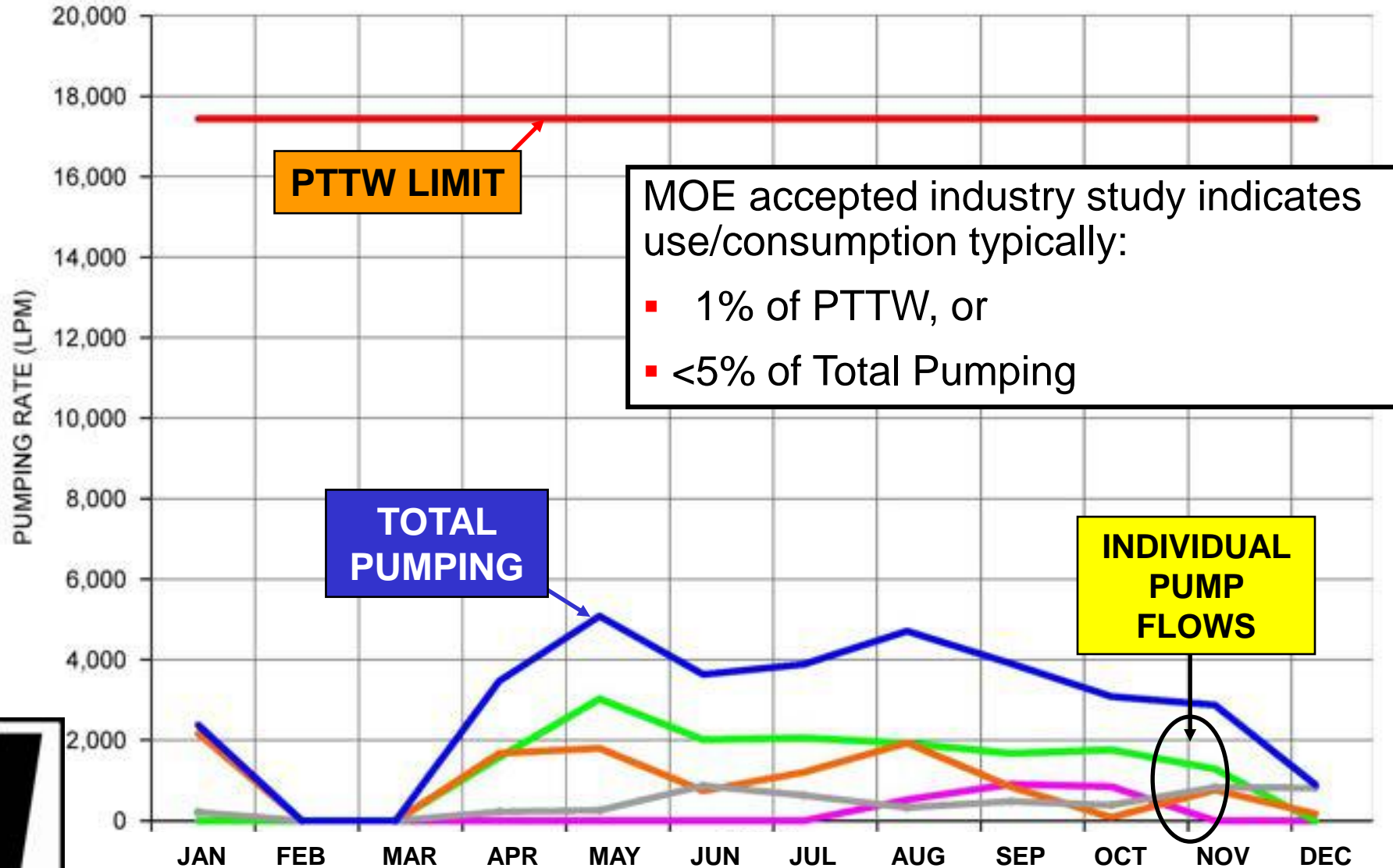
Discharge Locations

Discharge of Dewatering flow regulated primarily by MOE under OWRA:

- PTTW = Permit to Take Water
- C of A = Certificate of Approval



Acton Quarry Dewatering



3.0 Proposed Extension Water Management

- Studies Undertaken
- Water Resources Findings
- Proposed Water Management and Mitigation Plan



3.1 Studies Undertaken

Extensive Study Undertaken including:

- Monitoring wells, piezometers, staff gauges, flow monitoring
- Routine water level and flow monitoring
- Hydraulic conductivity testing – pumping tests and single well response tests
- Field assessment
- Tracer testing/karst analysis
- Integrated with Natural Environment Study



3.2 Water Resources - Highlights

- Amabel is primary groundwater flow zone
- Flow generally to east (up-dip) with discharge (including some seeps/springs) to:
 - Limehouse (Acton) Re-Entrant Valley to north,
 - Existing Quarry,
 - Local topographic features draining to south,
 - Limited flow to Escarpment to east
- Potential dewatering influence varies
- Local surface water resources are mostly seasonal
 - Wetlands and Tributaries
 - Black Creek and 16 Mile Creek Watersheds
- Variable degree of connection of groundwater to surface water but features generally depend on seasonal groundwater support
- Differing conditions for private water supply wells – 4 areas



3.3 Proposed Water Management Plan

- Proposed Extension includes a comprehensive plan to ensure protection of water resources
- Existing quarry has affected some adjacent features in and mitigation is underway/planned – primarily surface water discharge
- Extension will extend on this mitigation – primarily to protect ecological features (wetlands).
 - ▶ Phased extraction in cells
 - ▶ Water storage in reservoir
 - ▶ Surface discharge/seepage
 - ▶ Recharge ponds/wells
 - ▶ Other measures as necessary
- No significant private/municipal water supply concerns due to geology, land ownership, and mitigation



3.3 cont'd - Proposed Water Management Plan

- Adaptive Management Plan (AMP):
 - ▶ Adaptive approach to address variability in conditions and over time
 - ▶ Details objectives, requirements, monitoring, response actions, and reporting for protection of water resources
- Defined regions for monitoring and mitigation approaches based on the “green line”



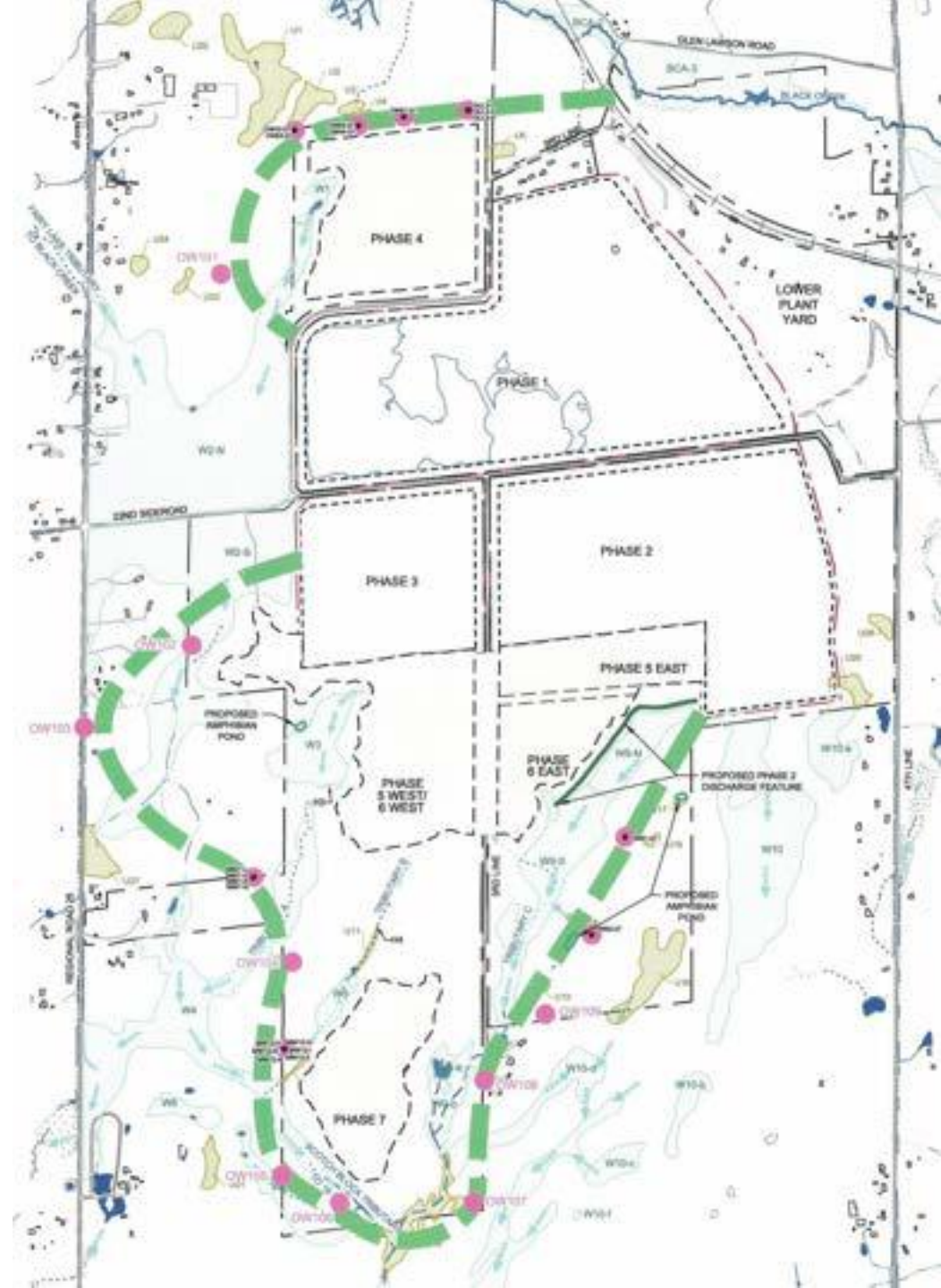
3.3 cont'd – Green Line

Within:

- Directly monitor and maintain

Beyond:

- Monitor along green line
- If necessary, adjust mitigation within green line
- Confirmatory monitoring depending on conditions and access
- Water wells – monitor and address if necessary



3.3 cont'd - Proposed Water Management Plan

- Water management opportunities include:
 - ▶ Water storage and conservation
 - ▶ Baseflow augmentation and peak flow attenuation
 - ▶ Ecological habitat enhancement and creation
- Approach is to maximize passivity and benefits, particularly for rehabilitation



4.0 Proposed Rehabilitation

- Integrated plan for proposed Extension and Existing Quarry provides major enhancements to existing approved plan
- System of lakes, wetlands, terrestrial habitat, large reservoir for water storage, and lands for public use.
- Maximizes benefits while minimizing long-term management efforts
- Significant water-related public benefit and ecological enhancement opportunities:
 - Reservoir for storage and conservation of water
 - Low flow augmentation to Black Creek and 16 Mile Creek
 - Natural environment and assimilative capacity benefits
 - Peak flow attenuation (flooding/erosion control, water conservation)
 - Habitat creation and enhancement



5.0 Question & Answer / Discussion

- Technical?
- Process, Timing, Involvement of Parties?
- Next Steps?

