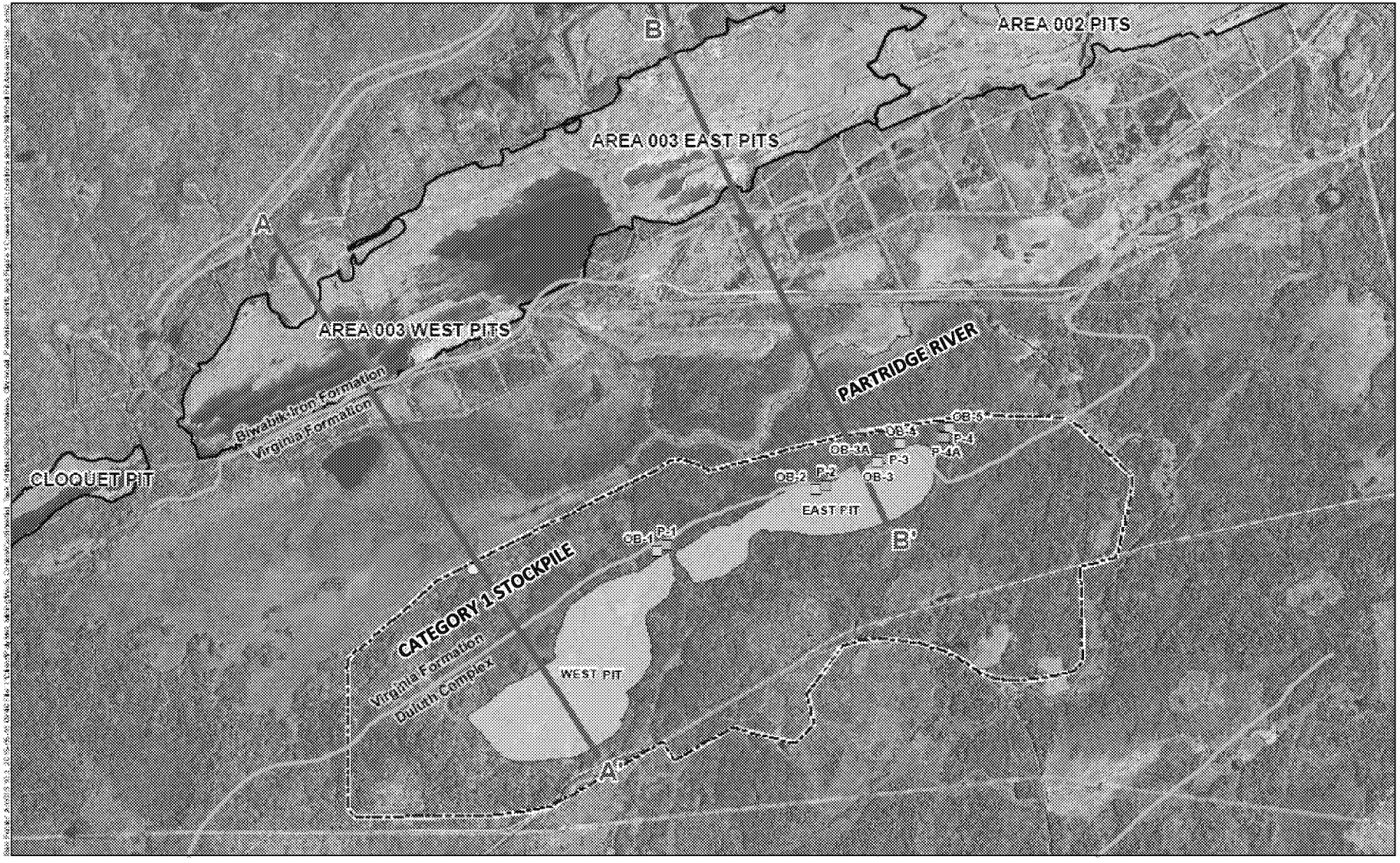
Figure 1: Physiographic Features and Bedrock Contacts



Drill Hole
Existing Bedrock Monitoring Wells
Observation Wells
Pumping Test Wells
Cross Section Locations
Geologic Contacts

Peter Mitchell Pit Areas
DNR Mining Features, 2013
NorthMet Mine Site
NorthMet Pits

0 1,750 3,500 7,000
Feet

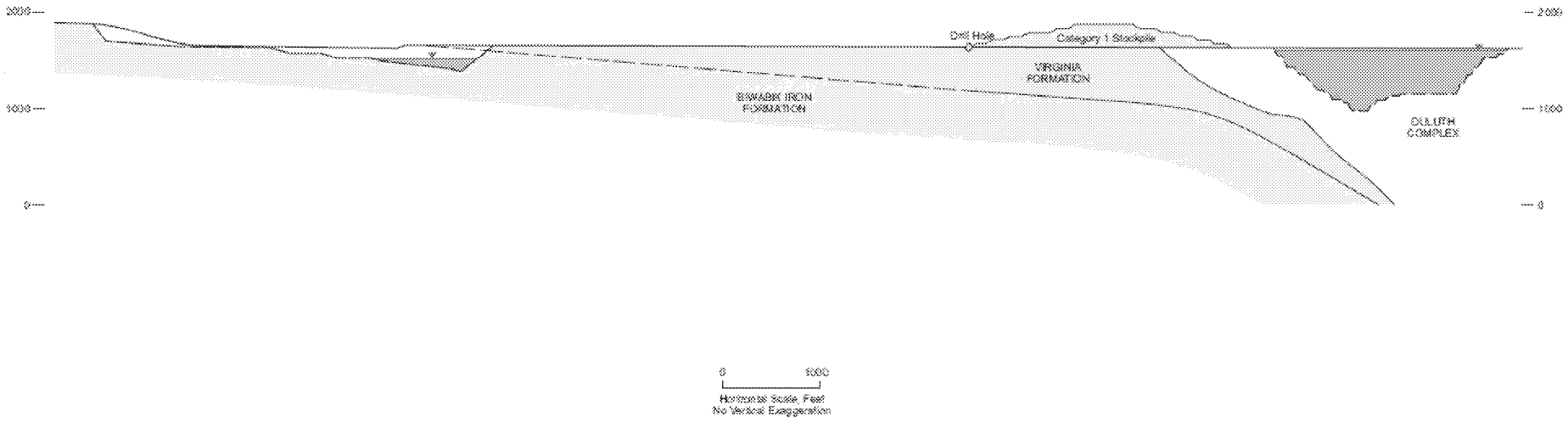
Figure 2: Scaled Cross-Section A-A'

A
North

A'
South

Northshore Area 003 West
WLE = 1,350 ft amsl (year 2070)
WLE = 1,500 ft amsl (year 2080 +)

NorthMet West Pit
WLE = 1,576 ft amsl (year 2070+)



No vertical exaggeration

WLE: Pit water-level elevation in feet (ft) above mean sea level (amsl)

— — — Inferred geologic contact

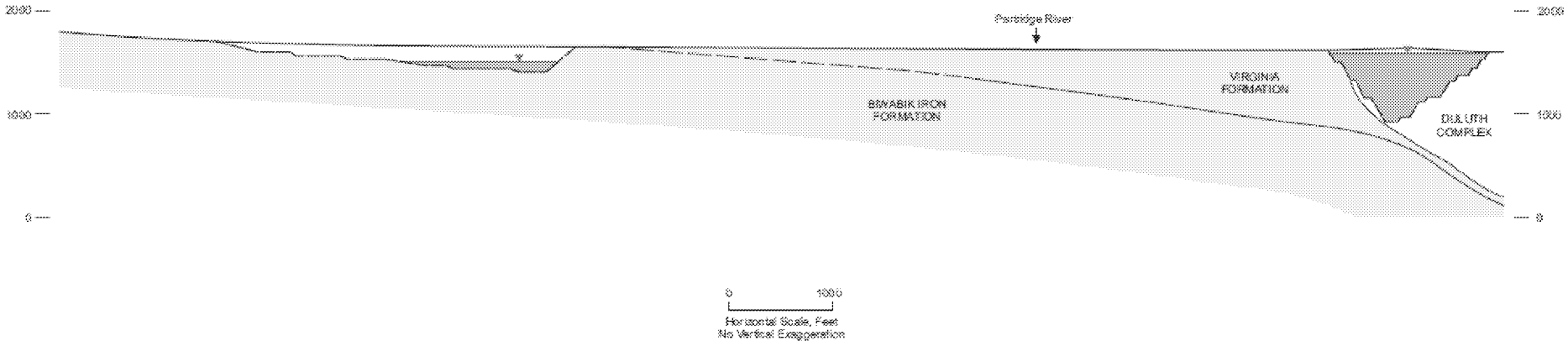
Figure 3: Scaled Cross-Section B-B'

B
North

B'
South

Northshore Area 003 East
WLE = 1,300 ft amsl (year 2070)
WLE = 1,500 ft amsl (year 2080+)

NorthMet East Pit
WLE = 1,592 ft amsl (year 2035+)



No vertical exaggeration

WLE: Pit water-level elevation in feet (ft) above mean sea level (amsl)

— — — Inferred geologic contact

Figure 4: Conceptual Model with Sufficient Leakage to Create a Bedrock Groundwater Mound

Northshore Area 003 East
WLE = 1,300 ft amsl (year 2070)
WLE = 1,500 ft amsl (year 2080+)

NorthMet East Pit
WLE = 1,592 ft amsl (year 2035+)

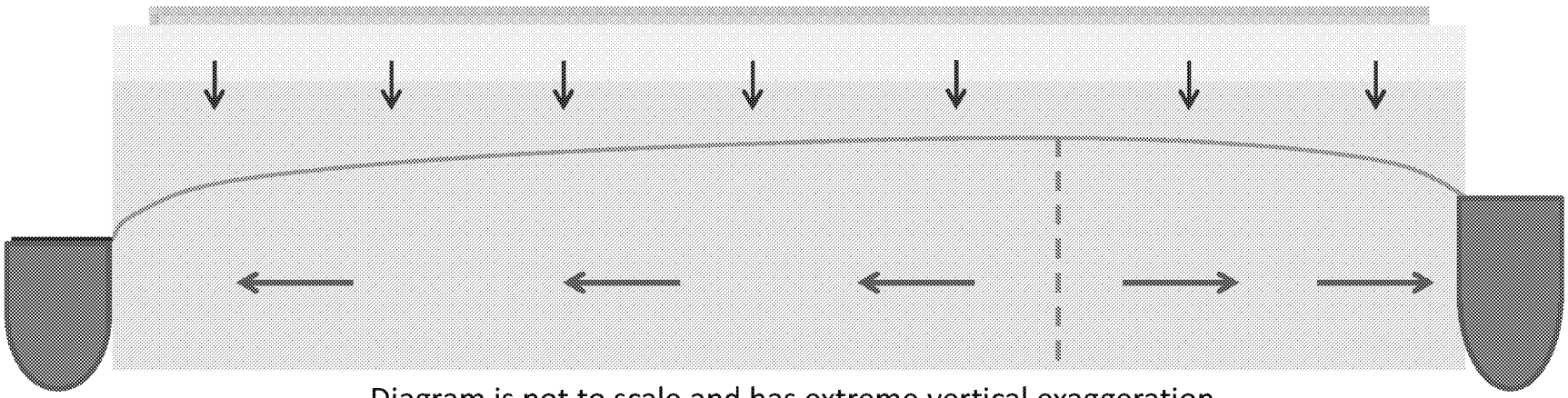


Diagram is not to scale and has extreme vertical exaggeration

100 Mile Swamp surface water

Surficial deposits

Bedrock

WLE Pit lake water-level elevation in feet (ft) above mean sea level (amsl)

Downward leakage from surficial deposits into bedrock

Bedrock groundwater flow

Piezometric surface in bedrock

Pit water level

Bedrock groundwater divide

Figure 5: Conceptual Model with Negligible Leakage

Northshore Area 003 East
WLE = 1,300 ft amsl (year 2070)
WLE = 1,500 ft amsl (year 2080+)

NorthMet East Pit
WLE = 1,592 ft amsl (year 2035+)

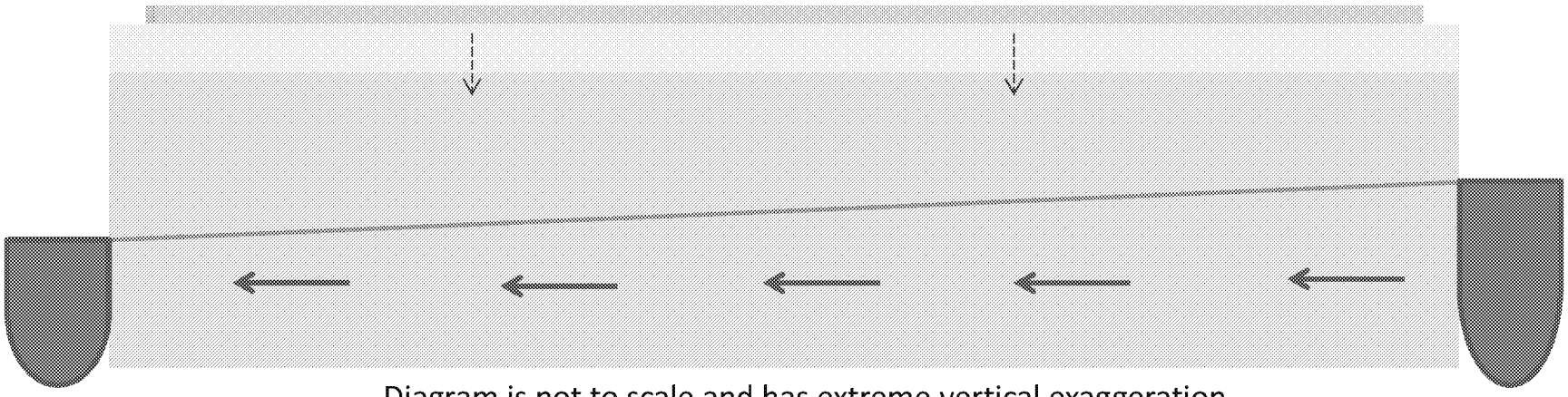


Diagram is not to scale and has extreme vertical exaggeration

100 Mile Swamp surface water

Surficial deposits

Bedrock

WLE Pit lake water-level elevation in feet (ft) above mean sea level (amsl)

Downward leakage from surficial deposits into bedrock

Bedrock groundwater flow

Piezometric surface in bedrock

Pit water level

Figure 6: Response in NorthMet Bedrock Wells Compared to Water Level Changes at Northshore

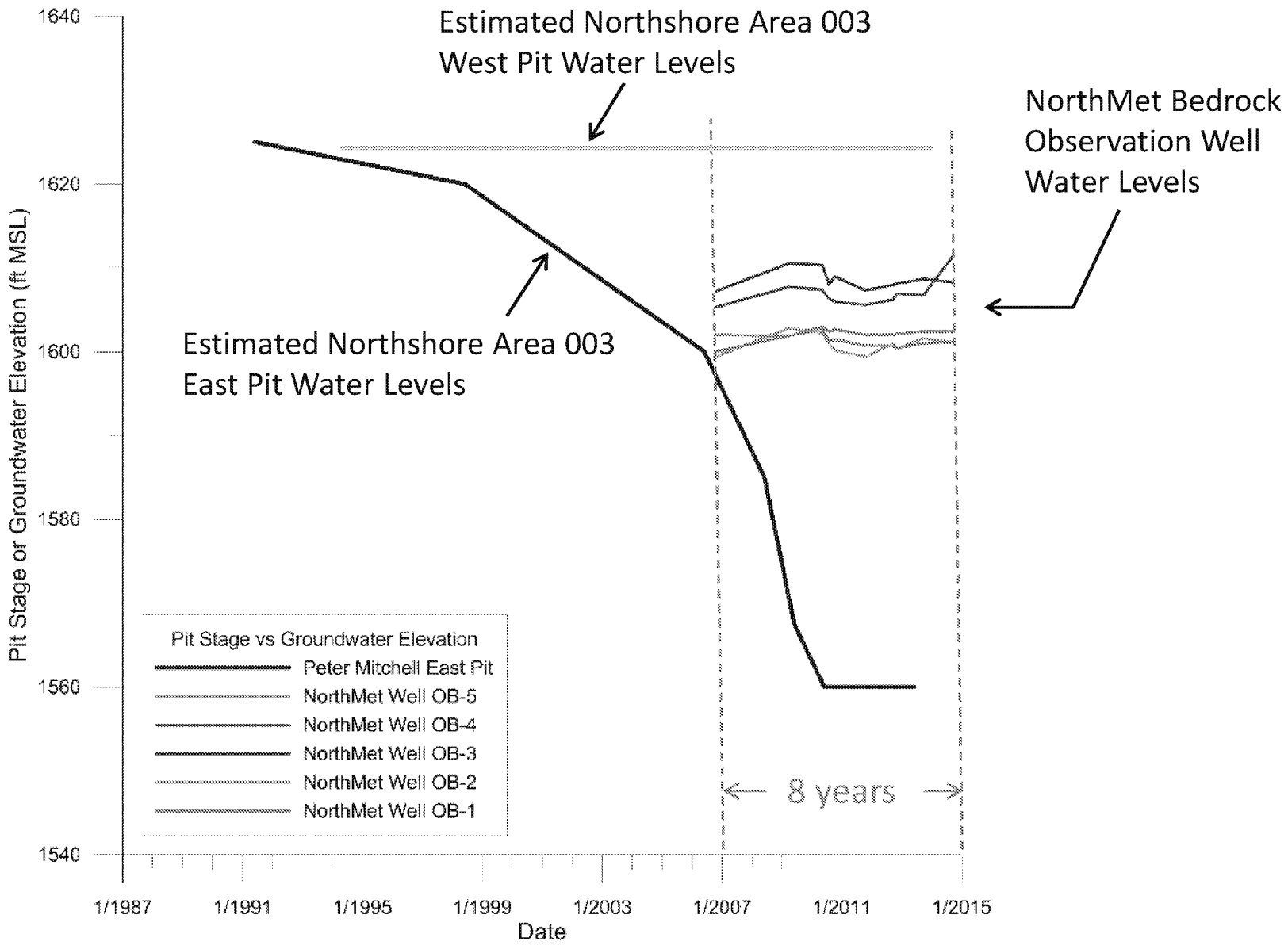


Figure 7: Lakes Adjacent to Northshore Mine Pits

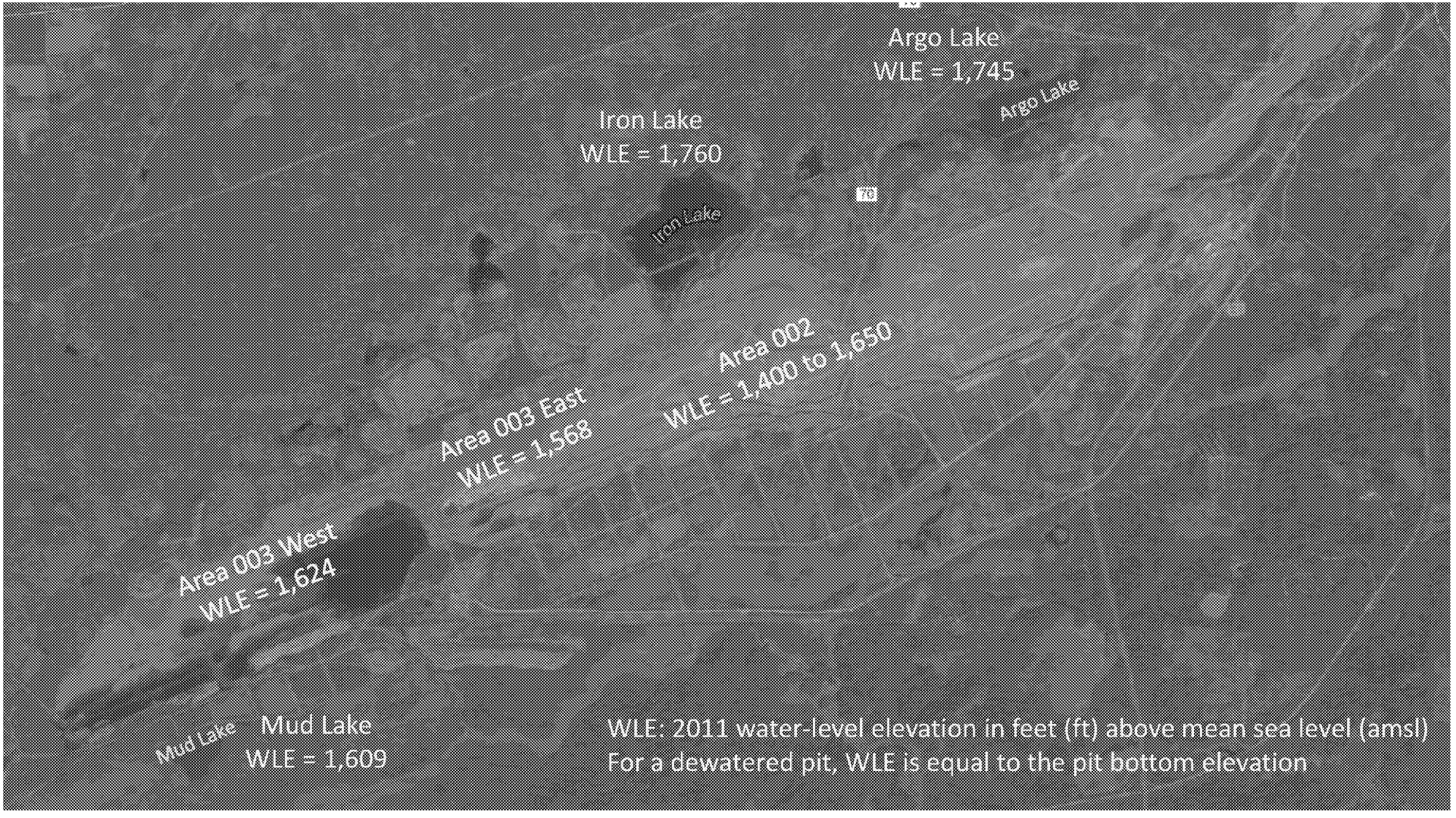


Figure 8: Historic Water Levels in Iron Lake and Argo Lake (1946-1981)

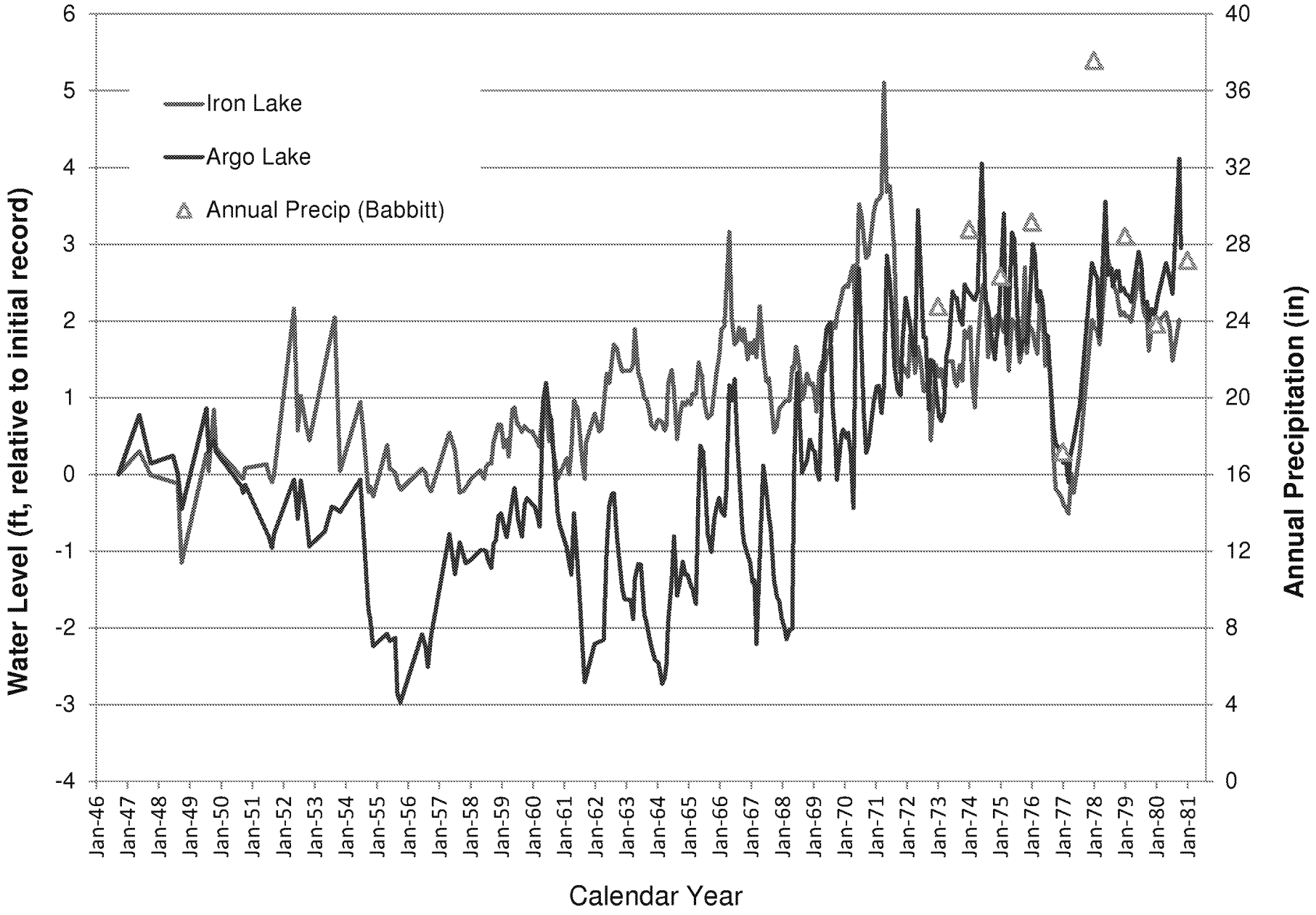
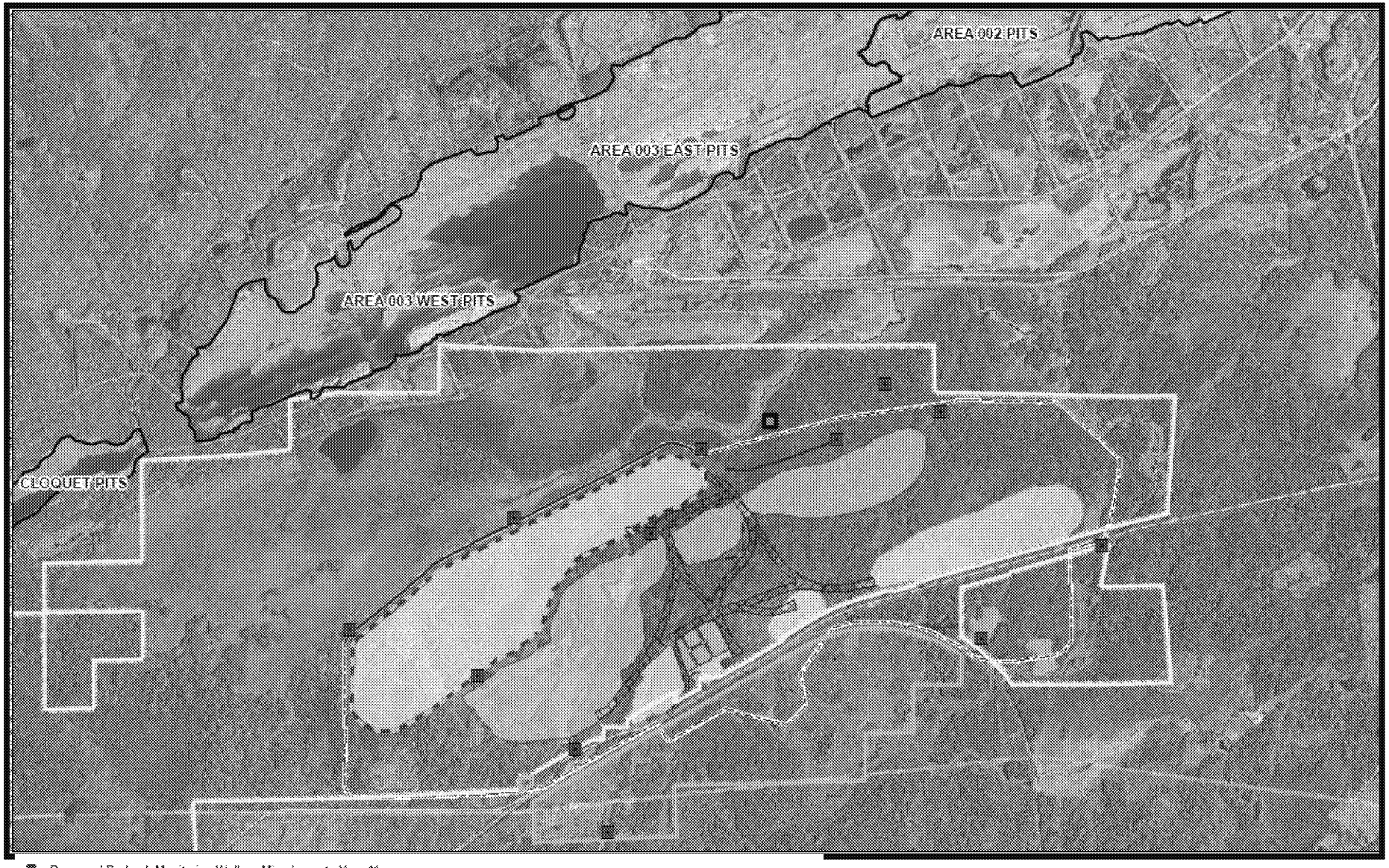


Figure 9: PolyMet Proposed and Co-Lead Agency Recommended NorthMet Bedrock Groundwater Monitoring Wells*



Proposed Bedrock Monitoring Wells
NorthMet Mine Site
Peter Mitchell Pit Areas DNR Mining Features, 2013
PolyMet Owned/Leased Area
USFS Federal Land Exchange Parcel

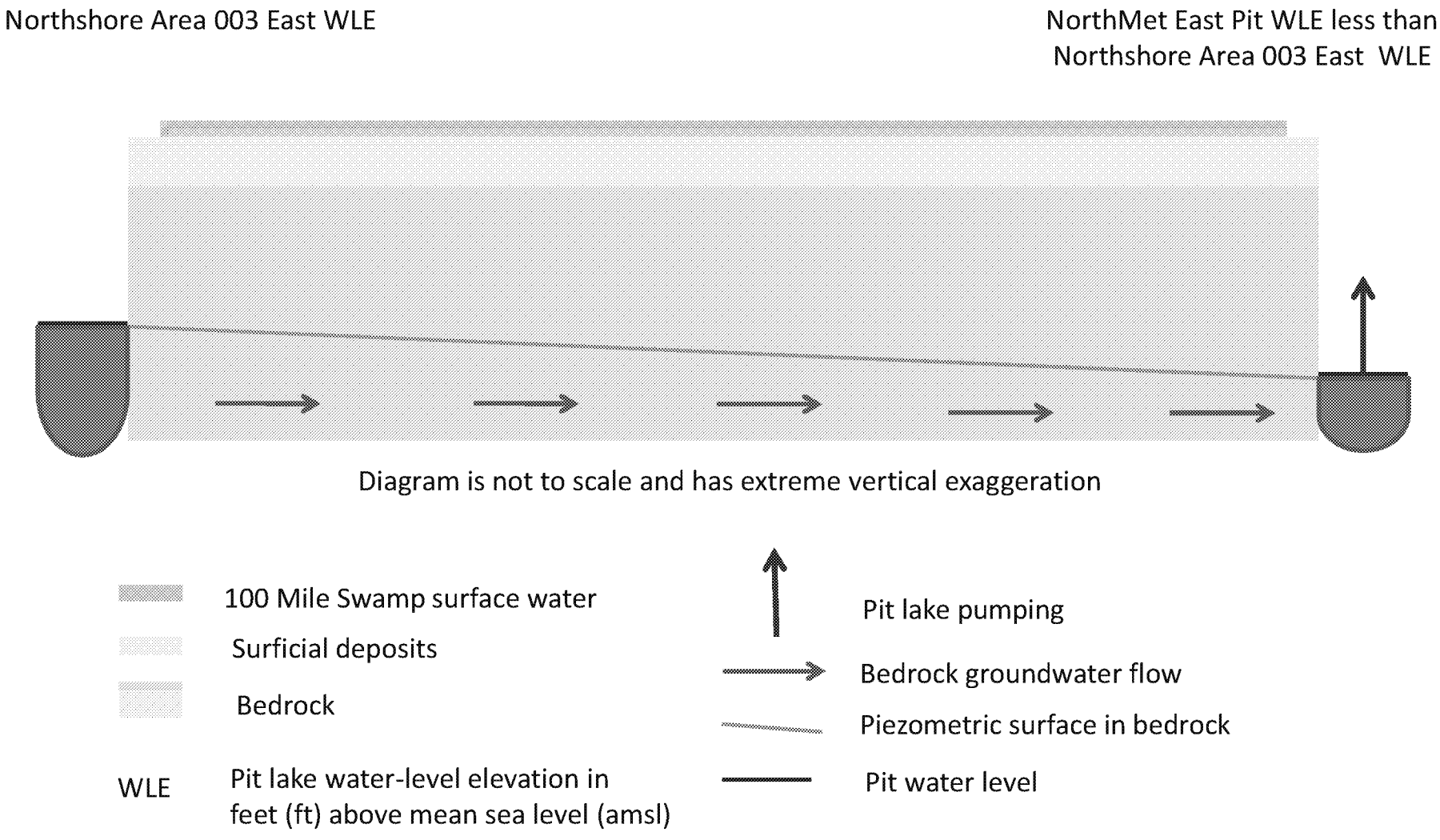
Mine Layout - Year 11
Mine Pit
Active Stockpile
Removed Stockpile
Haul Roads
Groundwater Containment System
Perimeter Dike

0 1,750 3,500 7,000
Feet

Co-Lead Agency Recommended Bedrock Groundwater Monitoring Well

* Note: additional groundwater monitoring wells may be stipulated during permitting

Figure 10: Conceptual Hydraulics for a Lowered East Pit Water Level



[a] Note: the water level in the East Pit can be temporarily depressed during refill (by pumping) to prevent a north flowpath from developing while other mitigation options are being evaluated and/or implemented

Figure 11: Conceptual Hydraulics for a Groundwater Collection System

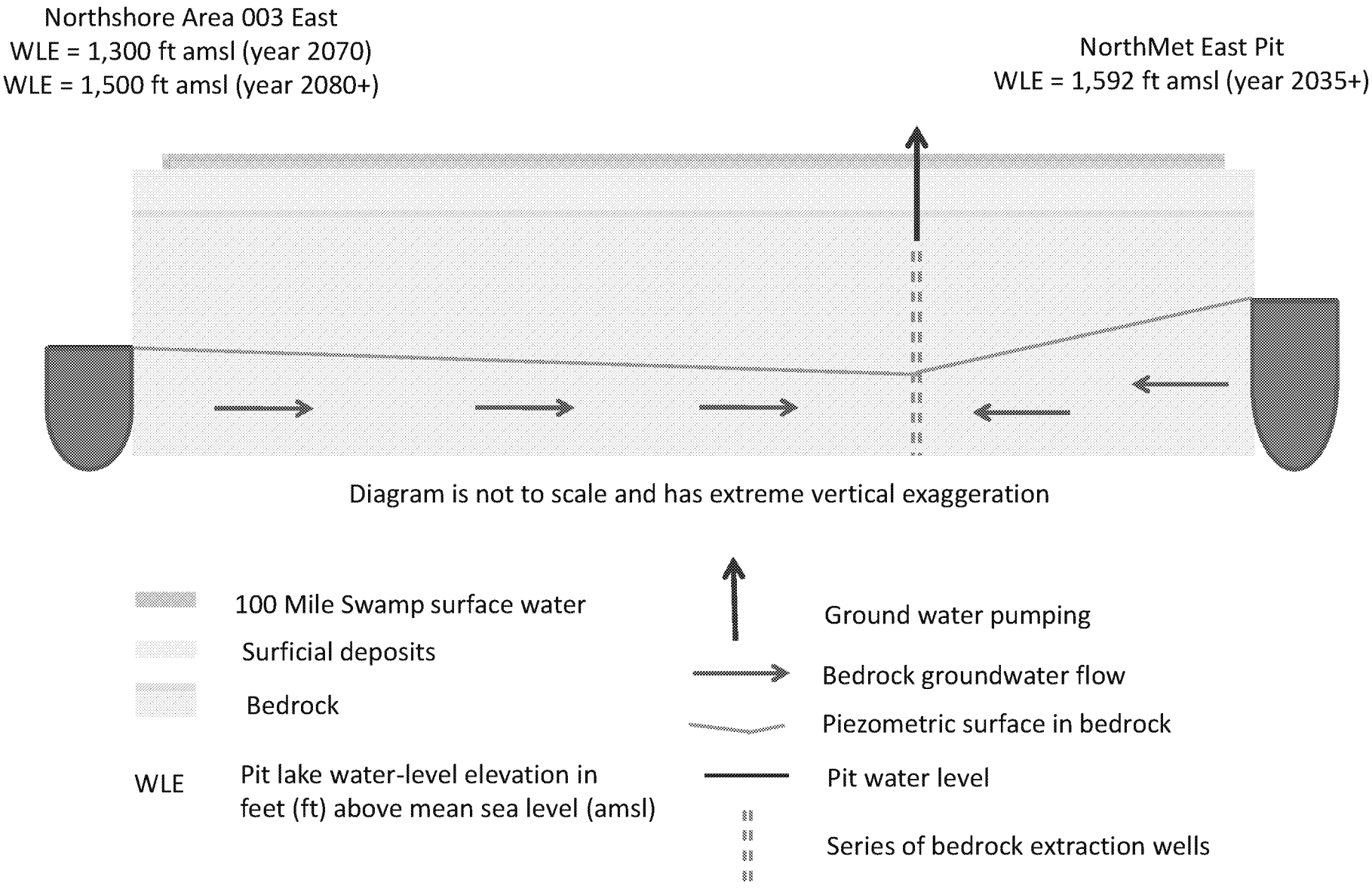
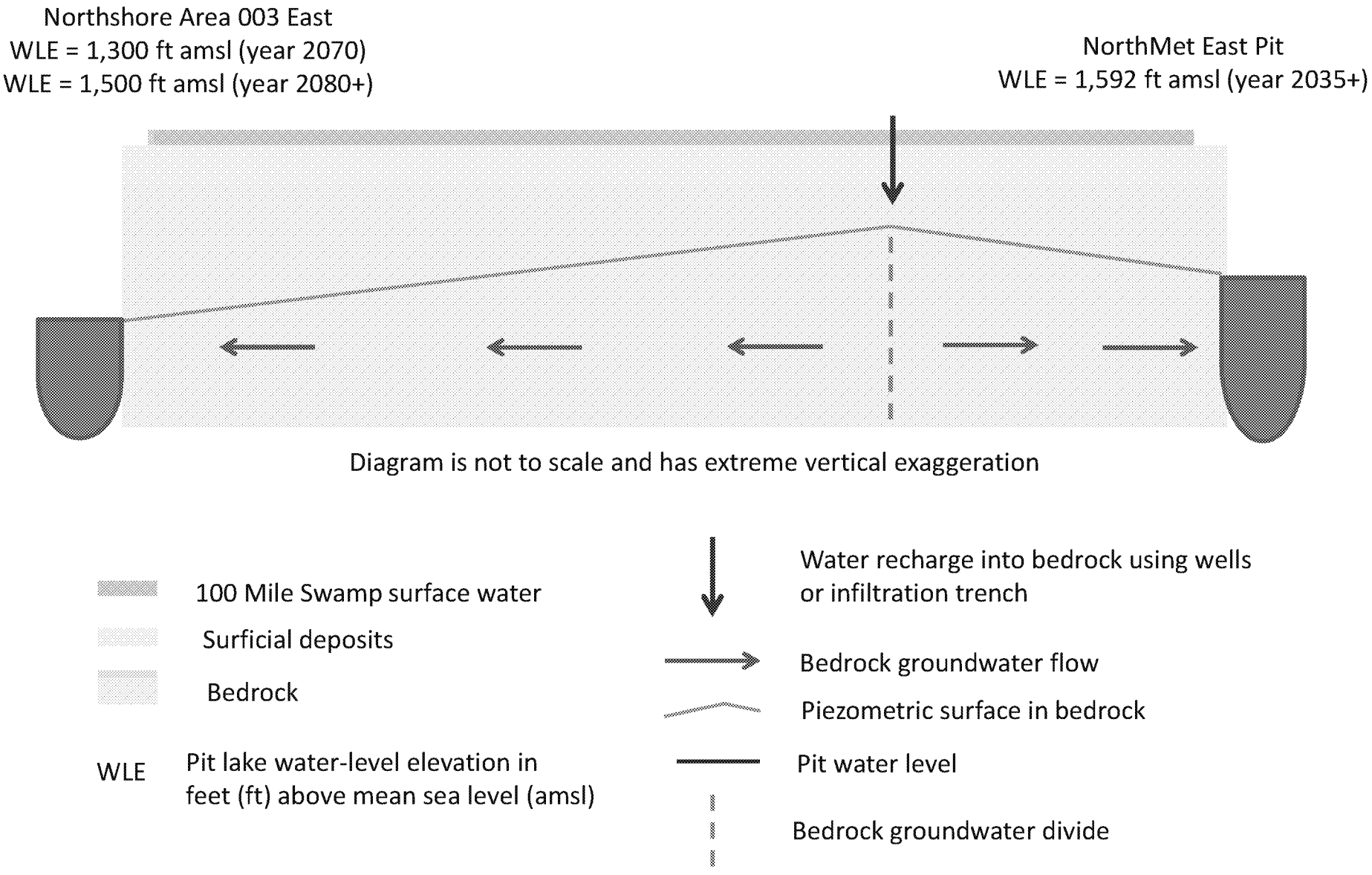



Figure 12: Conceptual Hydraulics for an Artificial Groundwater Mound