MWG

Midwest Generation LLC.

Lincoln Stone Quarry
ID No. W1970450046-01

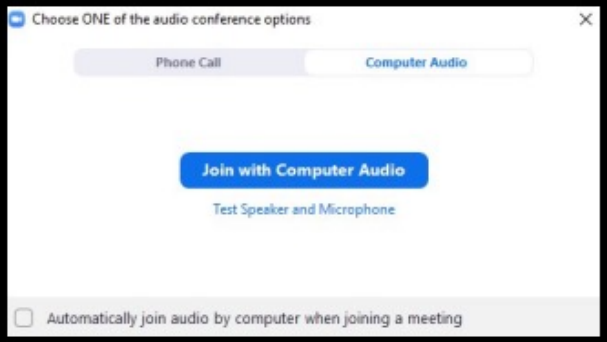
Proposed Closure Construction Project

December 2021

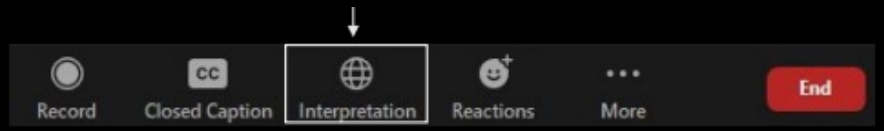
Interpretación en Zoom: Computadora

Instrucciones Para la Audiencia Para Interpretación en Zoom

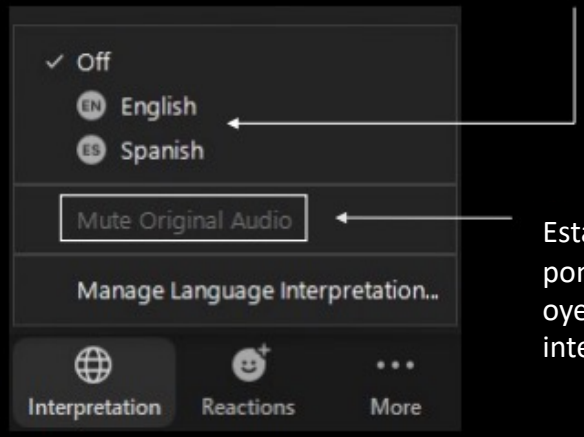
1. Seleccione unirse a la llamada con el audio de la computadora.



2. Seleccione el Globo “Interpretación” en la parte inferior izquierda de la pantalla.



3. Seleccione el idioma en que desea escuchar la interpretación.



Esta opción desactiva la voz del ponente, para que así el oyente solo escuche la interpretación.

interprenet

Safety Message

COVID-19 PRECAUTIONS

- Holding this meeting virtually due to the COVID-19 pandemic

- Participants in Q and A portion will be following CDC protocols
  - Social Distancing
  - Wearing masks
    - Will pull down masks only to speak

Virtual Meeting Reminders

In today's meeting, you can:

Enter questions in "Chat"

Click the chat icon on your screen and type your question

Participate in a live Q&A session

Verbal questions will be taken. After our presentation, we will provide instructions for the live Q&A.

Sign up for a post-meeting summary and IEPA listserv

During the meeting, click the link that Midwest Generation, LLC has placed in the Chat to complete the Google form.

Public Website: midwestgenerationllc.com

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Meeting Agenda

- Illinois Coal Ash & Other Environmental Rules
- Joliet Generating Station Background
- Closure Alternatives Analysis and Groundwater Modeling
- Proposed Closure and Post-Closure Plan
- Question & Answer Session

Illinois Coal Ash Rules & Other Regulations

- In 2015, the US EPA finalized the Federal CCR Rules to regulate coal ash landfills and surface impoundments at power plants.
- In 2019, the state passed a law to regulate coal ash stored in CCR surface impoundments at power plants throughout Illinois.
  - The law required that the Illinois Environmental Protection Agency propose, and that the Illinois Pollution Control Board adopt, state regulations for storage and disposal of coal ash produced from electric generating facilities through a new permitting program.
- As required by the law, the Illinois EPA and the Board undertook a public rulemaking process that resulted in the Board adopting regulations at *35 IAC Part 845 – Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments* (the Illinois Coal Ash Rules) in April 2021.
- Lincoln Stone Quarry is permitted as a landfill by the Illinois EPA and has operated as a landfill for decades.

What is CCR? What is a CCR surface impoundment?

The Illinois Coal Ash Rules define both CCR and CCR surface impoundments:

> "Coal combustion residuals" or "CCR" means fly ash, bottom ash, boiler slag, and flue gas desulfurization materials generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers.

> "CCR surface impoundment" or "impoundment" means a natural topographic depression, man-made excavation, or diked area, which is designed to hold an accumulation of CCR and liquids, and the surface impoundment treats, stores, or disposes of CCR.

We're here today to present plans regarding a specific aspect of the Illinois Coal Ash Rules – the planned closure of Lincoln Stone Quarry.

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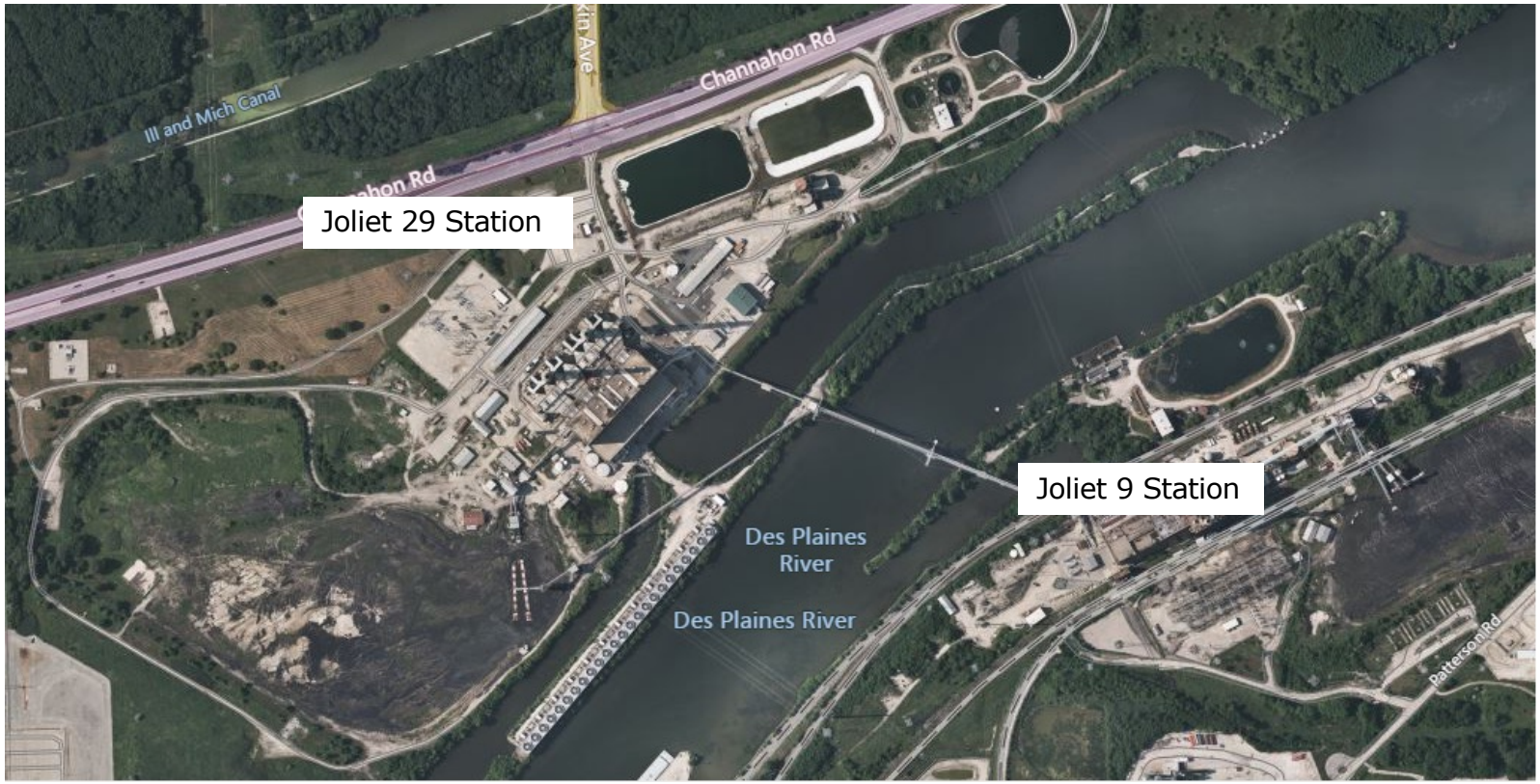
Joliet Generating Station Background

The Illinois EPA Bureau of Water treats Joliet Generating Station as two separate facilities – Joliet 29 and Joliet 9



Joliet 29 Station (Units 7 & 8) is on the northern side of the Des Plaines River, Joliet 9 Station (Unit 6) is on the southern side of the river.

Lincoln Stone Quarry Is A Permitted Landfill

Lincoln Stone Quarry was used, and is still permitted as, a **landfill** for coal ash generated at Joliet Station.

- Since the 1960s, Lincoln Stone Quarry has been used as a **permanent** disposal site for coal ash
- Since the mid-1970's, the beginning of the environmental permitting and regulations in Illinois, the Lincoln Stone Quarry has been permitted as a landfill by the Illinois EPA.
  - As required by the landfill permit:
    - Lincoln Stone Quarry has a landfill closure plan that is approved by both the Illinois EPA and Board. The approved closure plan for the LSQ as a landfill, is closing in place with a final cover system.
    - MWG has been monitoring the groundwater at the LSQ and has a comprehensive understanding of the groundwater flow and quality conditions associated with the Lincoln Stone Quarry.

Lincoln Stone Quarry Is A Permitted Landfill

The current landfill permit requires 39 monitoring wells to be sampled on a quarterly basis, however MWG samples 46 wells quarterly, more than are required. These wells are analyzed for 25 parameters. In addition, 19 wells are also monitored on a quarterly basis for 22 CCR parameters.

- The groundwater wells have given MWG and the Illinois EPA a comprehensive understanding of the groundwater flow and quality conditions associated with the Lincoln Stone Quarry.
  - We know the extent of the constituents in the groundwater.
  - The data shows that there is not, and has not been, movement of Lincoln Stone Quarry water towards the neighborhood to the northeast.

The Joliet Station has operated the Lincoln Stone Quarry for decades and done so responsibly. There are no groundwater impacts to the neighborhood and we will continue to monitor to confirm this in the future.

Lincoln Stone Quarry

Lincoln Stone Quarry consists of three areas: the Main Quarry which is the primary disposal site, the West Filled Area (WFA), and North Quarry

- Main Quarry – inactive, 43 acres in size, approximately 2.6 million cubic yards of CCR, received CCR from 1975-2019
- WFA – inactive, has a soil cover, 17 acres in size, approximately 1.7 million cubic yards of CCR, received CCR from 1962-1975
- North Quarry
  - Operates as a settling pond to treat the water discharged from the Main Quarry – NPDES permitted outfall
  - Not used for CCR storage or disposal
  - MWG closely monitors the elevation of the water in the LSQ and Boyd's Quarry, and discharges water to maintain the elevations.

In total, Lincoln Stone Quarry contains approximately 4.3 million cubic yards of CCR

Lincoln Stone Quarry

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Closure Alternatives Analysis

Two closure methods:

- Closure by Removal of CCR

  An owner or operator may elect to close a CCR surface impoundment by removing all CCR and decontaminating all areas affected by releases of CCR from the CCR surface impoundment. CCR removal and decontamination of the CCR surface impoundment are complete when all CCR and CCR residues, containment system components such as the impoundment liner and contaminated subsoils, and CCR impoundment structures and ancillary equipment have been removed. Closure by removal must be completed before the completion of a groundwater corrective action under Subpart F. *(35 IAC Section 845.740(a))*

- Closure in Place

  If a CCR surface impoundment is closed by leaving CCR in place, the owner or operator must install a final cover system that is designed to minimize infiltration and erosion, and, at a minimum, meets the requirements of this subsection (c). The final cover system must consist of a low permeability layer and a final protective layer. The design of the final cover system must be included in the preliminary and final written closure plans required by Section 845.720 and the construction permit application for closure submitted to the Agency. *(35 IAC Section 845.750(c))*

Closure Alternatives Analysis

The Closure Alternatives Analysis evaluated 8 different closure scenarios within the two closure methods:

Closure Method No. 1 - Closure by removal

- Scenario 1: Closure by removal of CCRs to an existing off-site landfill
  - Trucking;
  - Rail; and
  - Barge Transportation Methods
- Scenario 2: Closure by removal of CCRs to a new on-site landfill

Closure Method No. 2 - Closure in-place

- Scenario 3: Closure in-place with IEPA prescribed final cover
- Scenario 4: Closure in place with alternate final cover system
- Scenario 5: Consolidate and close in place
- Scenario 6: Closure in place with hydraulic controls
- Scenario 7: Closure in place with hydraulic containment
- Scenario 8: Closure in place with wet cap

Overview - Closure by Removal Method

- Consists of excavating CCR and relocating to a permitted landfill facility
- Evaluated both a new onsite landfill and existing offsite landfill scenarios
- Additional permits or approvals that may be required include:
  - Local or state permits for a new road entrance and/or traffic improvements on Patterson Road;
  - Modification of existing third-party off-site landfill permit for waste acceptance of CCRs;
  - New or modification of existing NDPES permit to address CCR dewatering discharge; and
  - Additional permits for siting new landfill on-site (IEPA-BOL, IEPA-BOA and NDPES permit for new stormwater discharge).

Closure Alternative Scenario No. 1
Closure by Removal – Off-site Landfill

- Closure Activities
  - Dewatering the Main Quarry;
  - CCR excavation and loading,
  - transport, and
  - disposal of CCR material at off-site landfill.
- Closure Schedule is more than 12 years, requiring approximately 340,000 trucks
- Off-Site Landfills
  - Laraway Recycling and Disposal Facility (RDF)
    - 6.67 million cubic yards of airspace
    - 5 years of landfill life
  - Prairie View RDF
    - 13.99 million cubic yards of airspace
    - 17 years of landfill life
    - Capacity guarantee to Will County
    - Recently removed waste restriction – June 2021

Laraway RDF

Prairie View RD

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Closure Alternatives Scenario No. 1 – Closure by Removal Transport Methods

Closure by removal transportation methods that were evaluated:

- Rail
  - Requires develop of 2 new railroad unloading facilities
    - At Lincoln Stone Quarry
    - At Unloading Facility
  - Local siting and IEPA permitting at both facilities
  - Requires crossing at Patterson Road
  - Would need approximately 17 acres for rail spur and unloading building
  - Assessed as unfeasible
- Barge
  - Requires develop of 2 new barge unloading facilities
    - At Lincoln Stone Quarry
    - At Unloading Facility
  - Local siting and IEPA permitting at both facilities
  - Requires crossing of five railroads and Patterson Road
  - Assessed as unfeasible
- Trucks –
  - Only existing transportation method that was deemed feasible
  - Doesn’t require building new facilities
  - Significant Impact on Roadway System (usage, accidents, and greenhouse gas emissions)

Closure Alternatives Scenario No. 1 – Example of Truck Traffic to Rte 53 for Closure by Removal

Closure Alternative Scenario No. 2
Closure by Removal – New On-site Landfill

- Closure by Removal to New On-Site Landfill Tasks:
  - Obtaining property;
  - Landfill zoning, permitting, designing;
  - Landfill construction and operation;
  - Engineering and environmental compliance;
  - Financial assurance and closure, 30-year post-closure responsibilities.
- Closure Schedule is over 14 years
- Area Need for New On-Site Landfill
  - 45 acres for landfill;
  - 20 acres for setbacks, stormwater management, operational infrastructure and groundwater monitoring; and
  - Total area is 65 acres (minimum).
- On-site Landfill was not feasible
  - No on-site property available
  - No off-site property was feasible to obtain
  - Greenfield landfill development is challenging

Overview – Closure in-Place Method

Closure Scenario No. 2 - Closure in-Place

- Consists of leaving the CCR in place and installing a final cover system
- Mitigates risks to human health and the environment by:
  - Engineered barrier
  - Reduction of leachate generation
- <u>USEPA and IEPA preferred closure method for similar solid waste management Units</u>
- A drainage system consisting of a series of "finger drains" would be installed under the final cover system to address leachate generation from groundwater infiltration
- Final cover would be installed over WFA (exception of Scenario 8)
- Closure Schedule is approximately 3 to 4 years
- The following permits or approvals may be required for the closure in-place scenarios:
  - 35 IAC Part 845 construction and operation permit(s)
  - Termination of existing IEPA BOL permit
  - Modification to existing NPDES Permit
  - Local permits for installation of borings and associated grout injection for closure scenario no. 7 (hydraulic containment).

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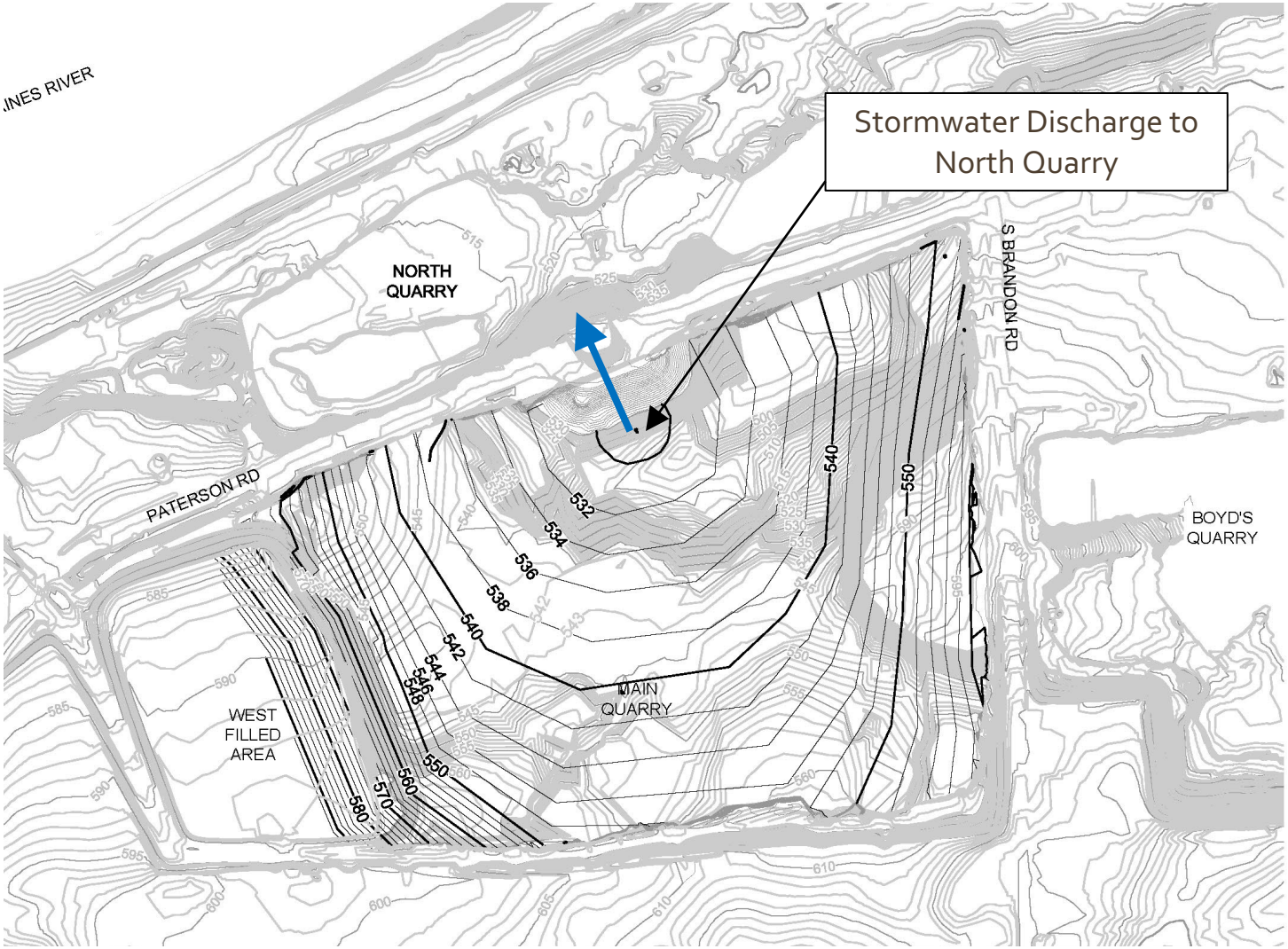
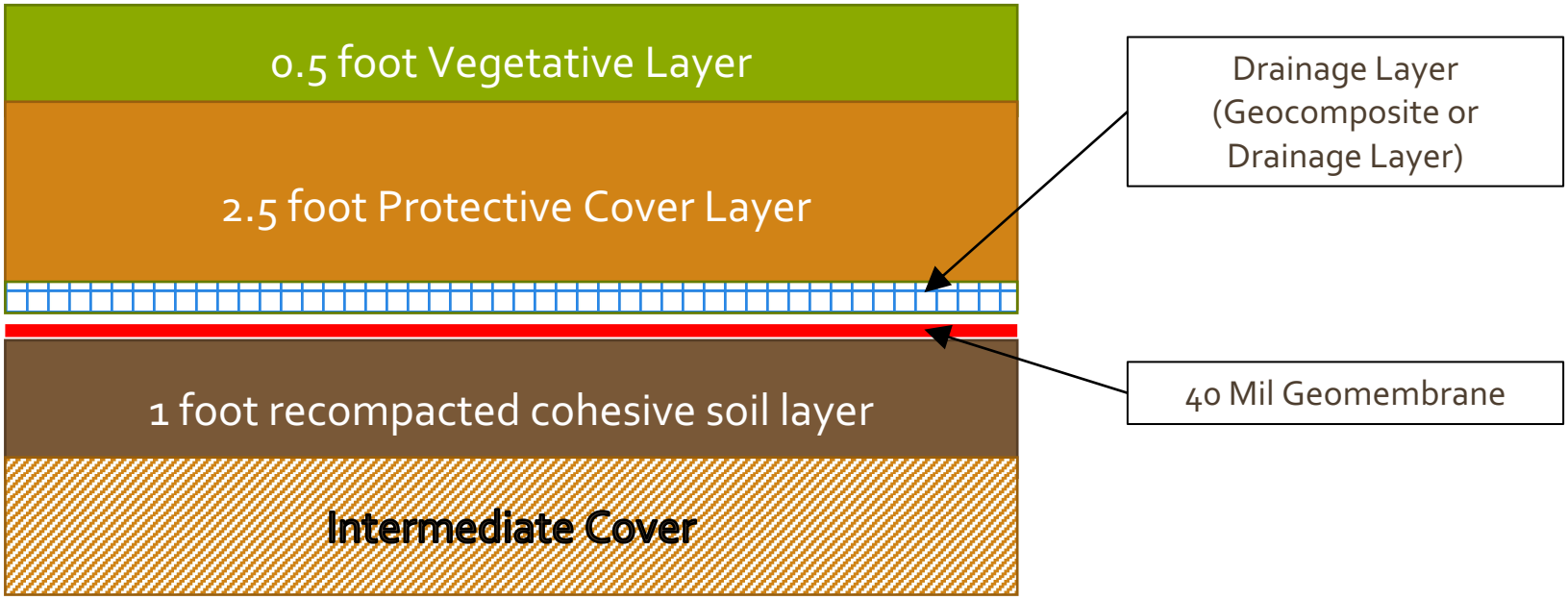
Closure Alternatives Analysis
Closure in-Place - Final Grading Plan



Closure In-Place Final Grading Plan (Scenarios 3, 4, 6, 7)

Closure Alternative Scenario No. 3
Closure in-Place – Illinois EPA Prescribed Cover

- The Illinois EPA prescribed final cover system
- The prescribed cover would require approximately 600,000 cubic yards of soil to be imported to the site, since no on-site source of soil exists

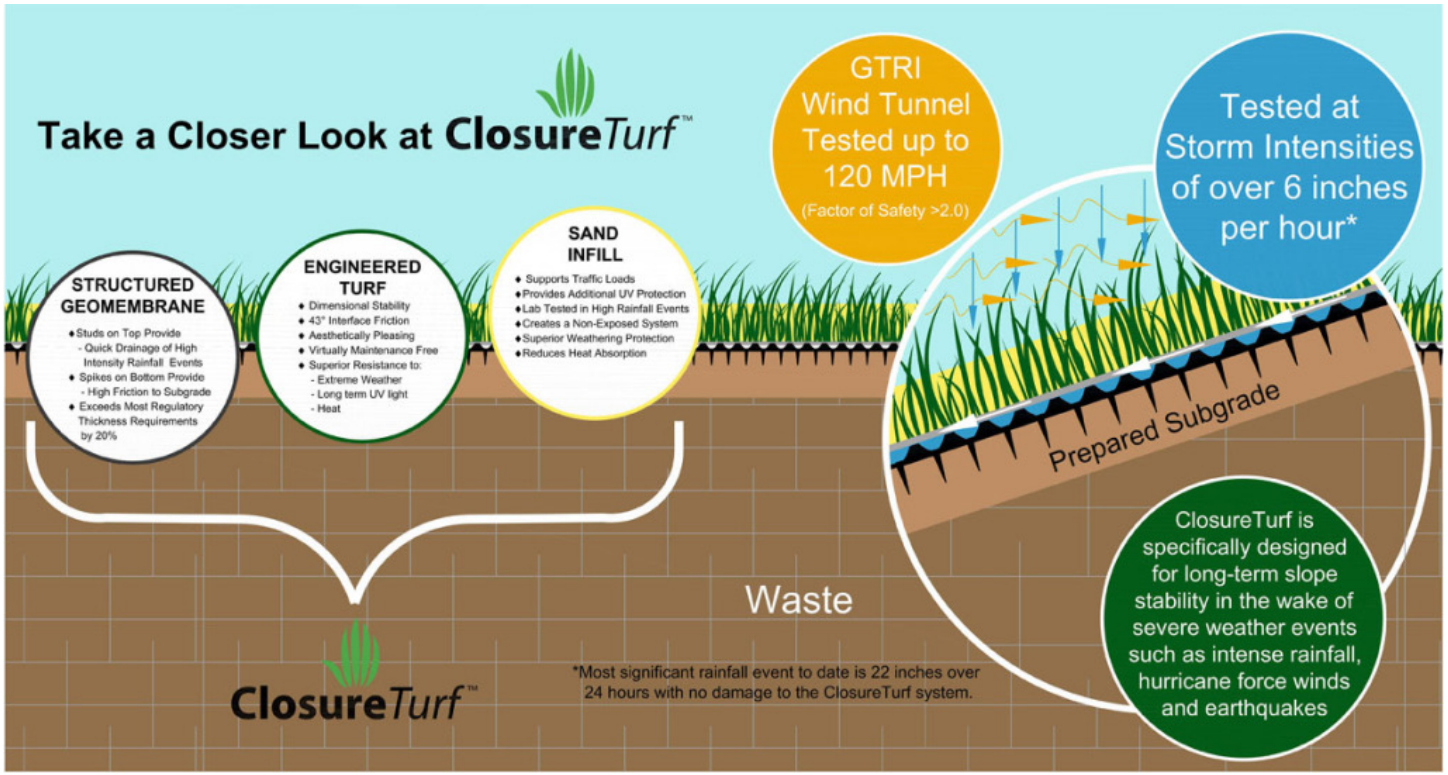


IEPA Prescribed Final Cover System

Closure Alternative Scenario No. 4
Closure in-Place with Alternate Final Cover System

- ClosureTurf® is a three-component system comprised of (bottom to top): structured geomembrane, engineered turf, and a specialized sand infill which minimizes the need for off-sites importation.

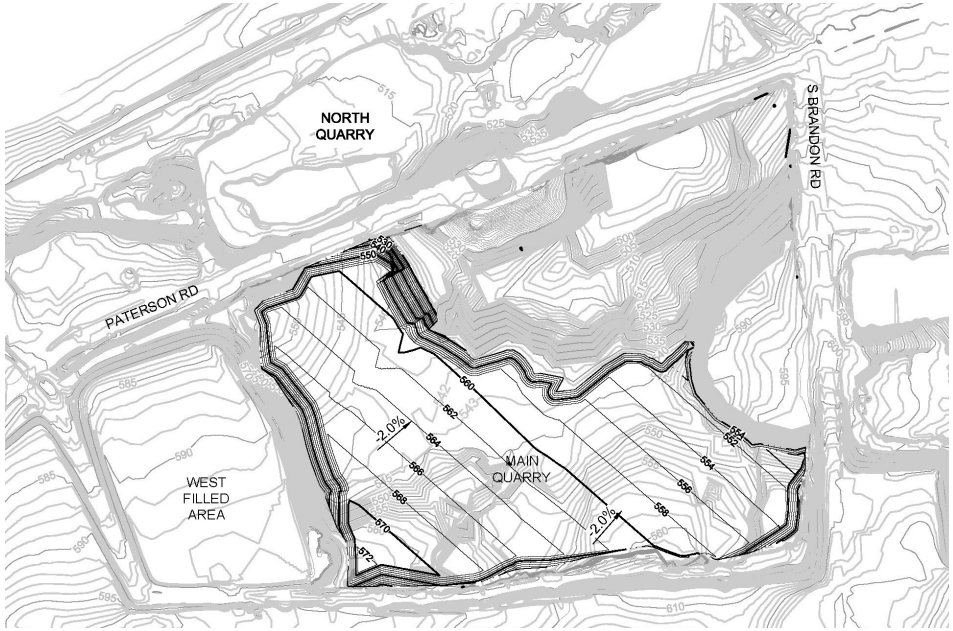
- ClosureTurf® is regulatorily compliant and is can be installed in a quick and efficient manner.



ClosureTurf Cross-Section (http://watershedgeo.com/closureturf/)

Closure Alternative Scenario 5
Consolidate and Close in-Place

- The Consolidate and Close in Place scenario (Scenario 5) consists of the following tasks:
  - Excavating CCR in the main quarry and consolidating the main quarry footprint from 43 acres to 33 acres
  - Final cover system of either IEPA prescribed or ClosureTurf®
- Challenges
  - Dewatering to allow for CCR excavation and consolidation
  - Slope stability of final landform grades



Consolidate Scenario Proposed Grading Plan

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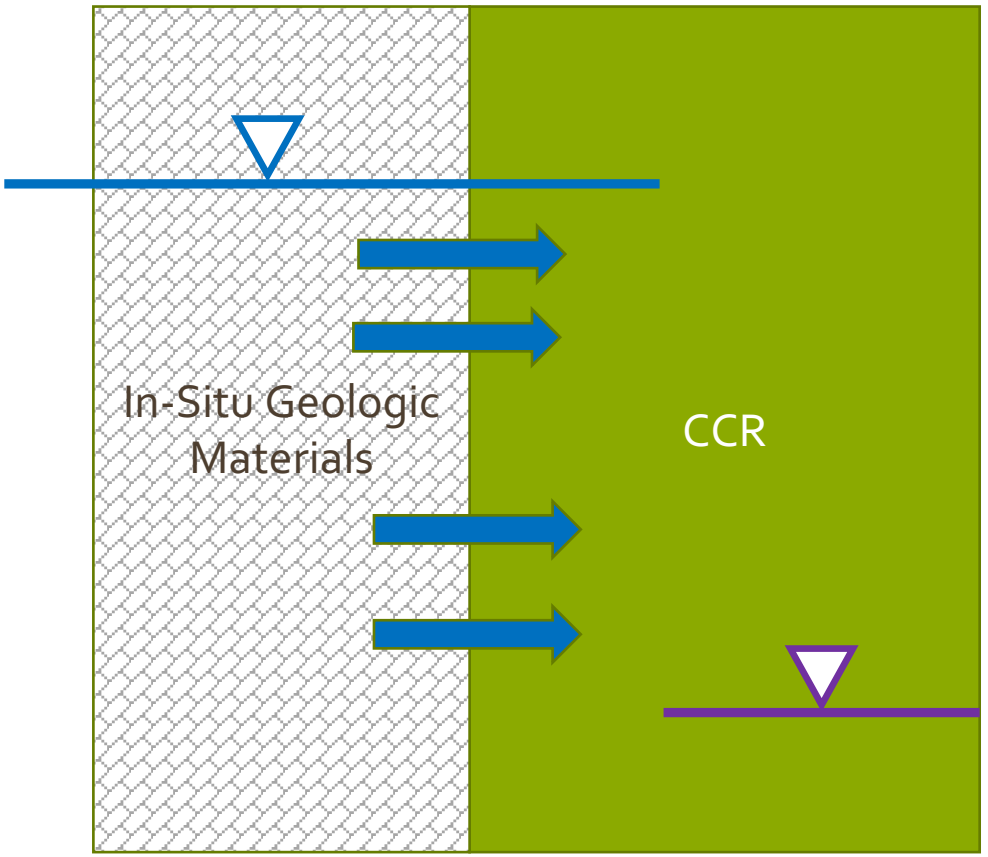
Closure Alternative Scenario 6
Closure in-Place with Hydraulic Controls

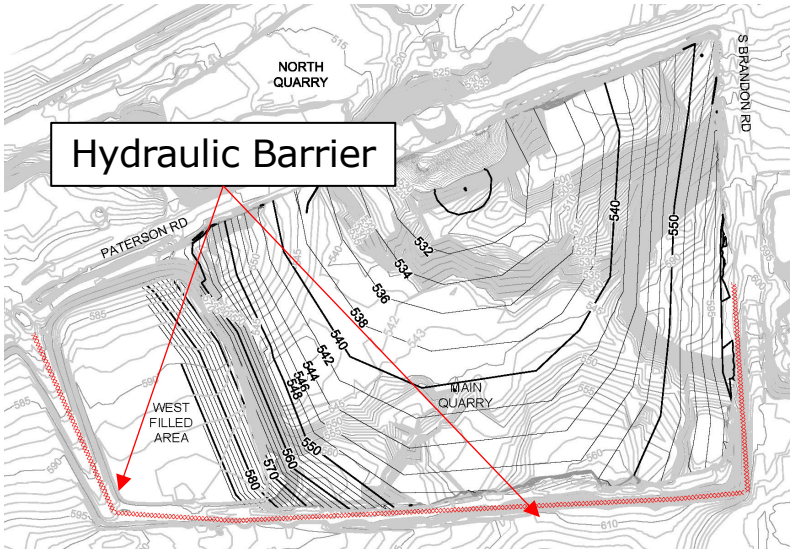
- Under this closure scenario, liquid or leachate extraction wells would be installed in the CCR waste in order to enhance the natural inward gradient conditions at the LSQ.

- A down-hole electronic or pneumatic pump would be installed to lower liquid levels. Pump water or leachate would be discharged through the facility's NPDES permit.



Closure Alternative Scenario 7 – Closure in Place with Hydraulic Containment

- Installation of hydraulic containment wall around the western and southern limits of the WFA and southern and eastern limits of the Main Quarry
- Reduce the hydraulic conductivity of these units (soil and rock) to minimize seepage from LSQ.
- The effectiveness of the hydraulic containment wall will depend on several factors:
  - Fracture pattern;
  - Chemical capability of the grout to bedrock;
  - Spacing of injection points; and
  - Grout intake rate.
- This technology has not evaluated based on the unique site-specific conditions (i.e., bedrock fractures due to weathering and blasting) at the LSQ; therefore, an extensive pilot testing program would be required to verify that this technology would be feasible and implementable.



Hydraulic Containment

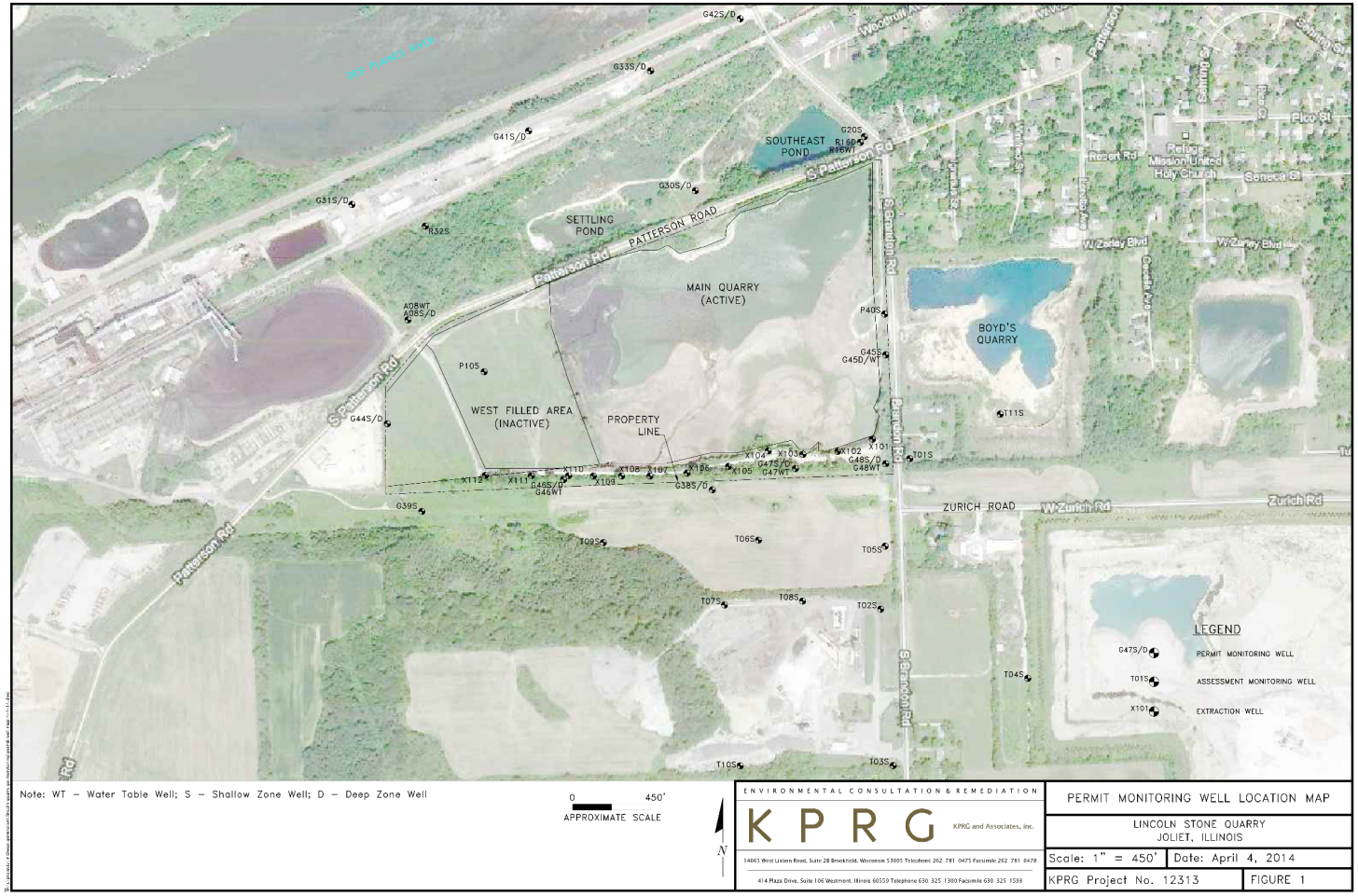
Closure Alternative Scenario No. 8
Closure in Place with Wet Cap

- Current approved closure plan (adjusted standard) allows for a "wet closure or cap"

- Wet Closure Cap consists of:
  - Physical barrier system below the natural water table;
  - Typically engineered sand or other physically durable material
  - Allows for natural reduction and/or oxidation processes; and
  - Common for river and lake sediment clean-up projects (for example the lower Calumet River project).

- Wet closure is a technically viable option and has the potential to enhance natural attenuation processes, it is understood to be a generally unfavorable closure alternative scenario.

Monitoring Well Site Map



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Groundwater Modeling Data

Four groundwater modeling scenarios were run:

1. Removal of CCR – Closure Alternatives #1, 2
2. Closure in place with final cover – Closure Alternatives #3, 4, 5
3. Closure in place with hydraulic containment – Closure Alternative #7
4. Closure in place with hydraulic controls – Closure Alternative #6

Groundwater modeling was done to compare the effectiveness of each closure scenario. Each model shows the current condition and compares to a plume after closure scenario is implemented and completed.

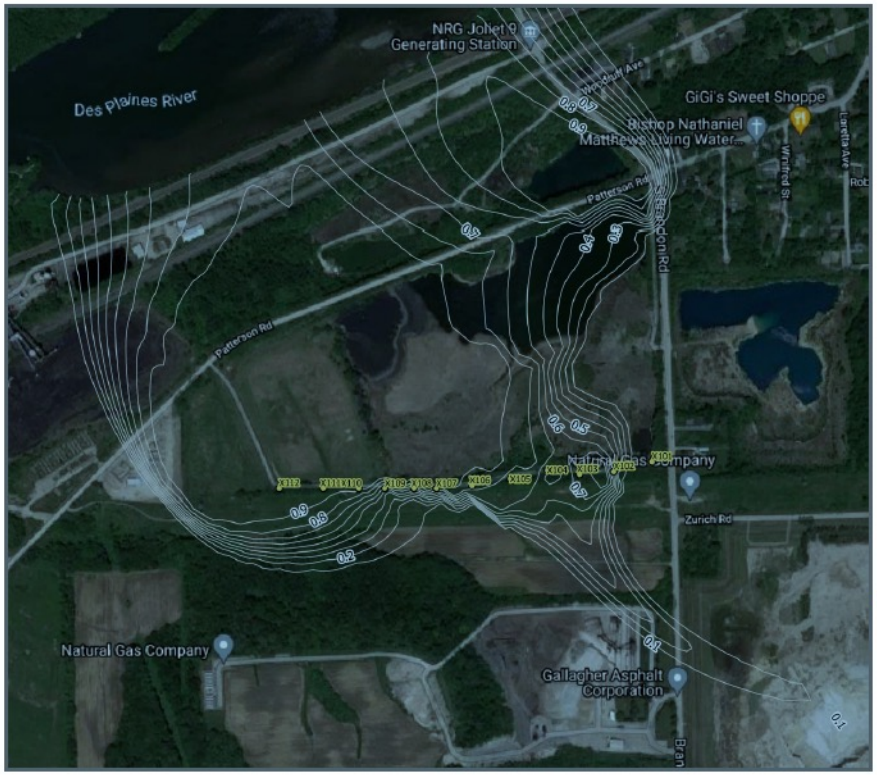
Each contour line shows concentration levels in 10% increments.

- 1 = 100% concentration of groundwater constituents
- 0.9 = 90% concentration of groundwater constituents (10% reduction of concentrations)
- 0.1 = 10% concentration of groundwater constituents (90% reduction of concentrations)

Groundwater Modeling Scenario #1

Corresponds to Closure Alternatives #1 & 2 – Closure by Removal

Source remains



Results shown for model layer 5, base of Main Quarry

Source removed, after 30 years

Groundwater Modeling Scenario #1

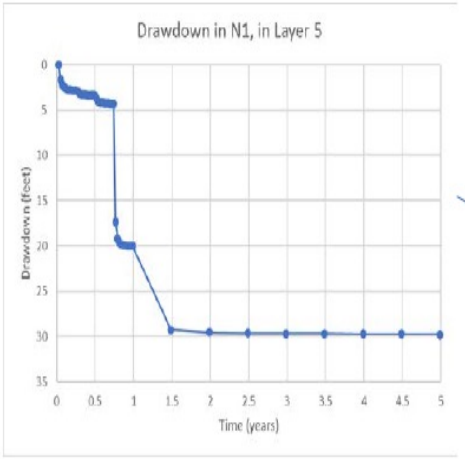
Drawdown of neighboring wells

The modeling shows a significant drawdown of adjacent groundwater wells during the dewatering and closure process

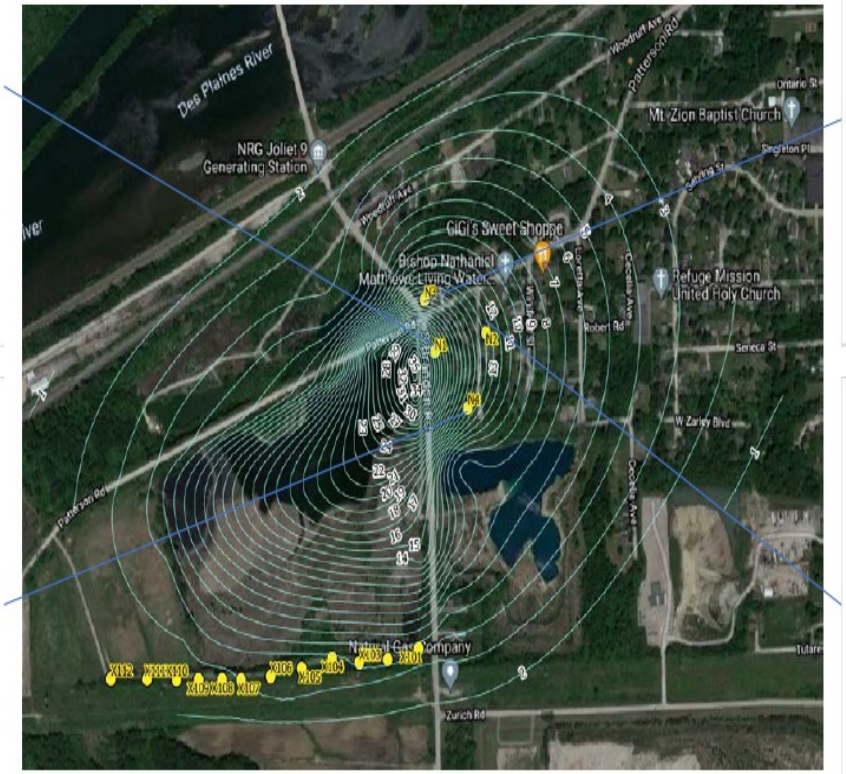
Closure by removal requires dewatering Lincoln Stone Quarry to accomplish. The flow model demonstrates that dewatering Lincoln Stone Quarry will also drawdown neighboring wells. The contours show the model's prediction of the decrease in well water levels at year 1.

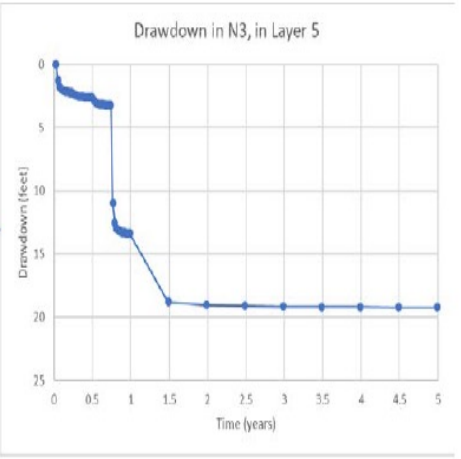
Groundwater Modeling Scenario #1

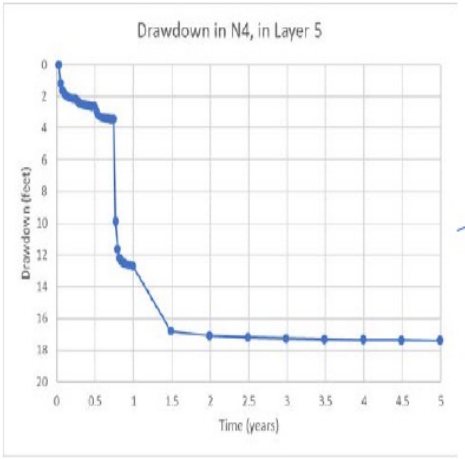
Drawdown of neighboring wells

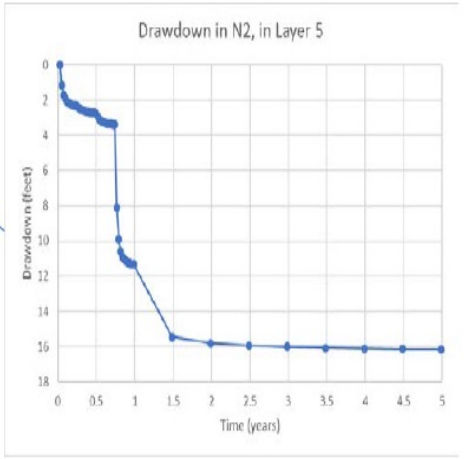


Drawdown in feet in layer 5, at 1 year









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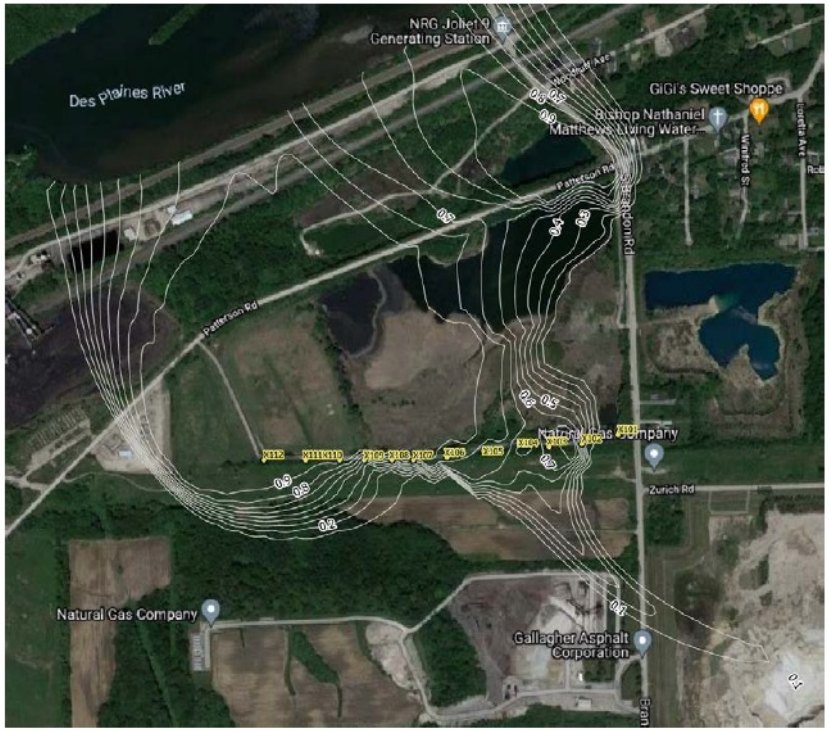
Groundwater Modeling Scenario #2

Corresponds to Closure Alternatives #3,4, & 5 – Closure in place with a final cap

Source remains



Results shown for model layer 5, base of Main Quarry

Capped, after 100 years

Groundwater Modeling Scenario #3

Corresponds to Closure Alternative #7 – Closure in place with hydraulic containment

Source remains

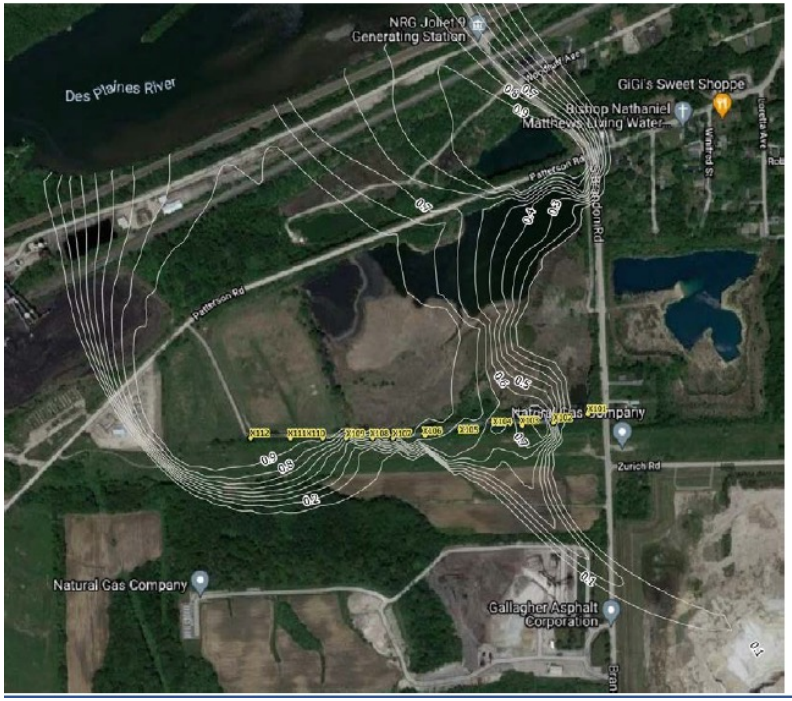
Results shown for model layer 5, base of Main Quarry

Capped, barrier wall along southern and eastern edges through dolomite, after 100 years

Groundwater Modeling Scenario #3

Corresponds to Closure Alternative #7 – Closure in place with hydraulic containment and removal of existing extraction wells

Source remains



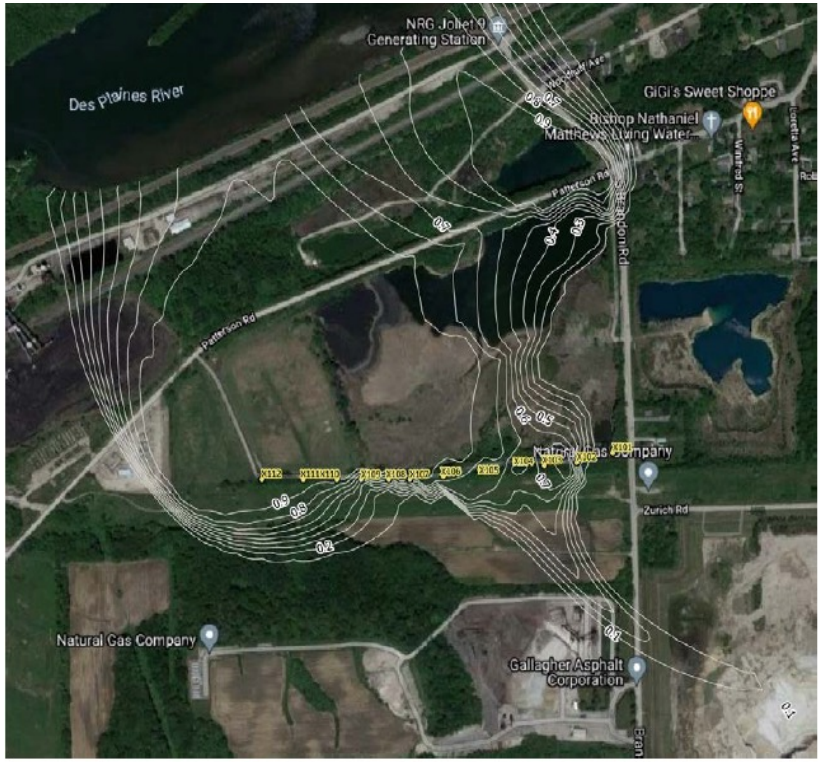
Results shown for model layer 5, base of Main Quarry

Capped, barrier wall along southern and eastern edges through dolomite, remove existing extraction wells, after 100 years

Groundwater Modeling Scenario #4

Corresponds to Closure Alternative #6 – Closure in place with hydraulic controls (extraction wells)

Source remains



Capped, add 47 extraction wells, after 100 years

Results shown for model layer 5, base of Main Quarry

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Closure Alternatives Analysis Conclusions

- The Closure by Removal scenarios are not feasible due to limits on either nearby permitted landfill space, lack of transfer station infrastructure for rail or barge transport, or available real estate to develop a new landfill. Additionally, Closure by Removal has the potential to cause neighboring wells to run dry.

- Additionally, the Closure by Removal scenarios would have larger impacts, as compared to the Closure in Place scenarios, to the environment in the form of greenhouse gas emissions and human health in the form of worker safety, and vehicle accidents.

Based on site specific conditions, the Closure in Place scenarios provide both short- and long-term protection to groundwater and surface water resources along with ensuring overall protection to the public health, welfare and safety.

Proposed Closure & Post-Closure Care Plans

Closure in Place with Alternate Final Cover (ClosureTurf) - Scenario 4

- Final cover isolates CCR from stormwater, helping to protect and manage groundwater
- Minimizes the need for off-site soils to be trucked into the site and used as fill
- Minimizes potential drawdown of neighboring wells
- Proven closure method at other landfills and surface impoundments in US, including in IL
- Long term reliability in minimizing risk to human health and the environment
- Closure could be completed in approximately 2.5 years compared to at least 12 years in the case of closure by removal

- The required post-closure care period for closure in place is at least 30 years or until contaminant concentrations are below the state standards.

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