Eagle Valley Generating Station corrective measures assessment public meeting

May 8, 2024

aes Indiana

Agenda

Topic	Presenter
AESI Overview	Brandi Davis-Handy, AESI President, AES Indiana
AESI Eagle Valley	Mark Holbrook, AESI Plant Manager
Environmental Regulations	Pilar Cuadra, AESI Environmental Manager
Eagle Valley CMA Report	Steve Putrich, Haley & Aldrich Professional Engineer
Summary and Next Steps	Pilar Cuadra, AESI Environmental Manager
Open for Comments	

AES Indiana overview

Brandi Davis-Handy

President, AES Indiana

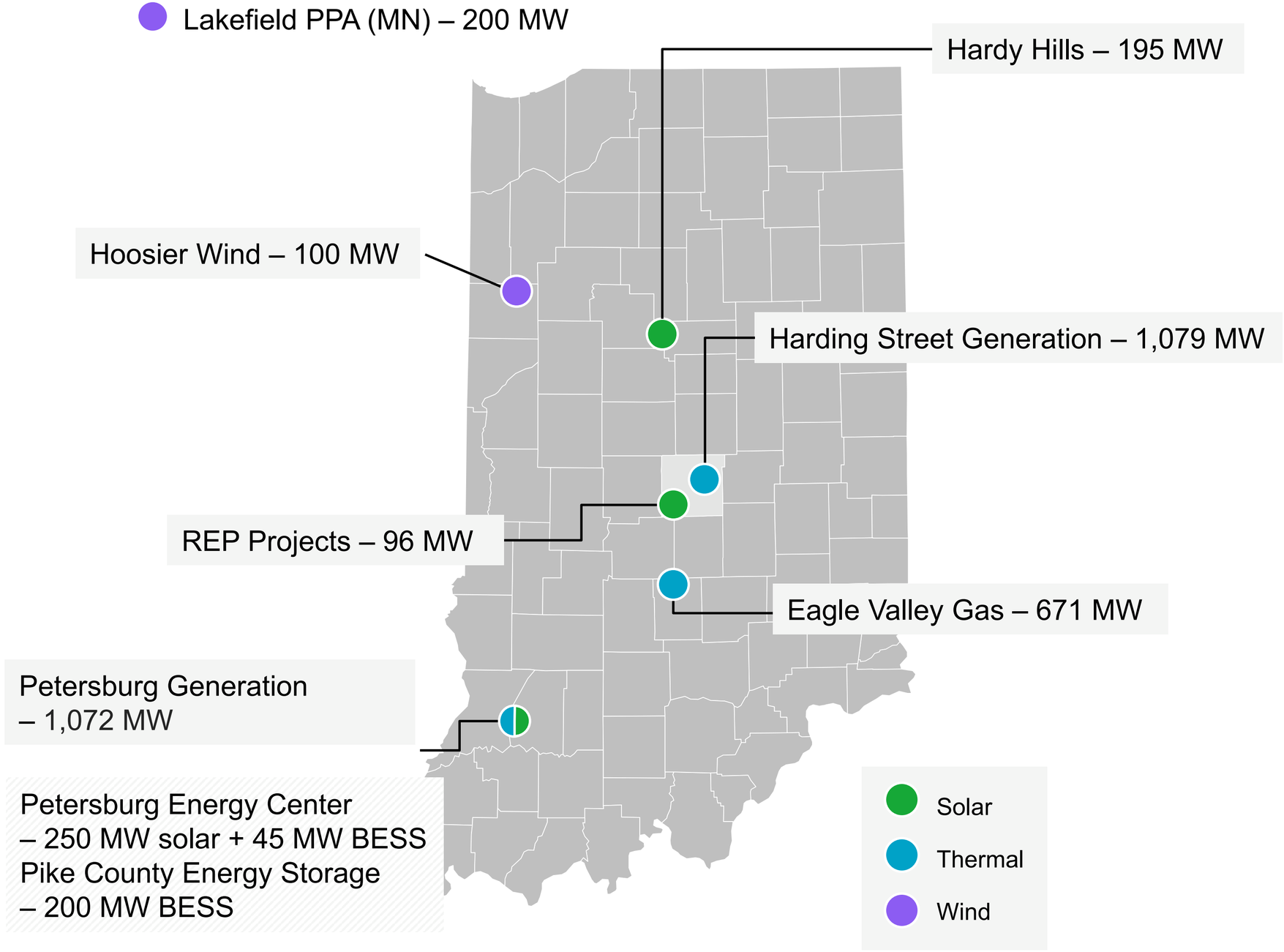
aes Indiana

AES Indiana

528
square miles

521,00
customers

3,956
MW of Generation



Accelerating the future of energy, together

Customer Centric

Create exceptional customer-focused experiences

Economic and Community Development

Community investments improving quality of life

Sustainability

Transforming to cleaner, greener technologies

Reliability

Modernizing our grid

All Together

Improving lives, by delivering greener, smarter energy solutions the world needs

Our **Values**

Safety first

Highest standards

All together

AESI Eagle Valley overview

Mark Holbrook

Plant manager

aes Indiana

Eagle Valley Generating Station

In Service from 1947 to 2016

395 MW

30% Efficiency

In Service in 2018

671 MW

67% Efficiency

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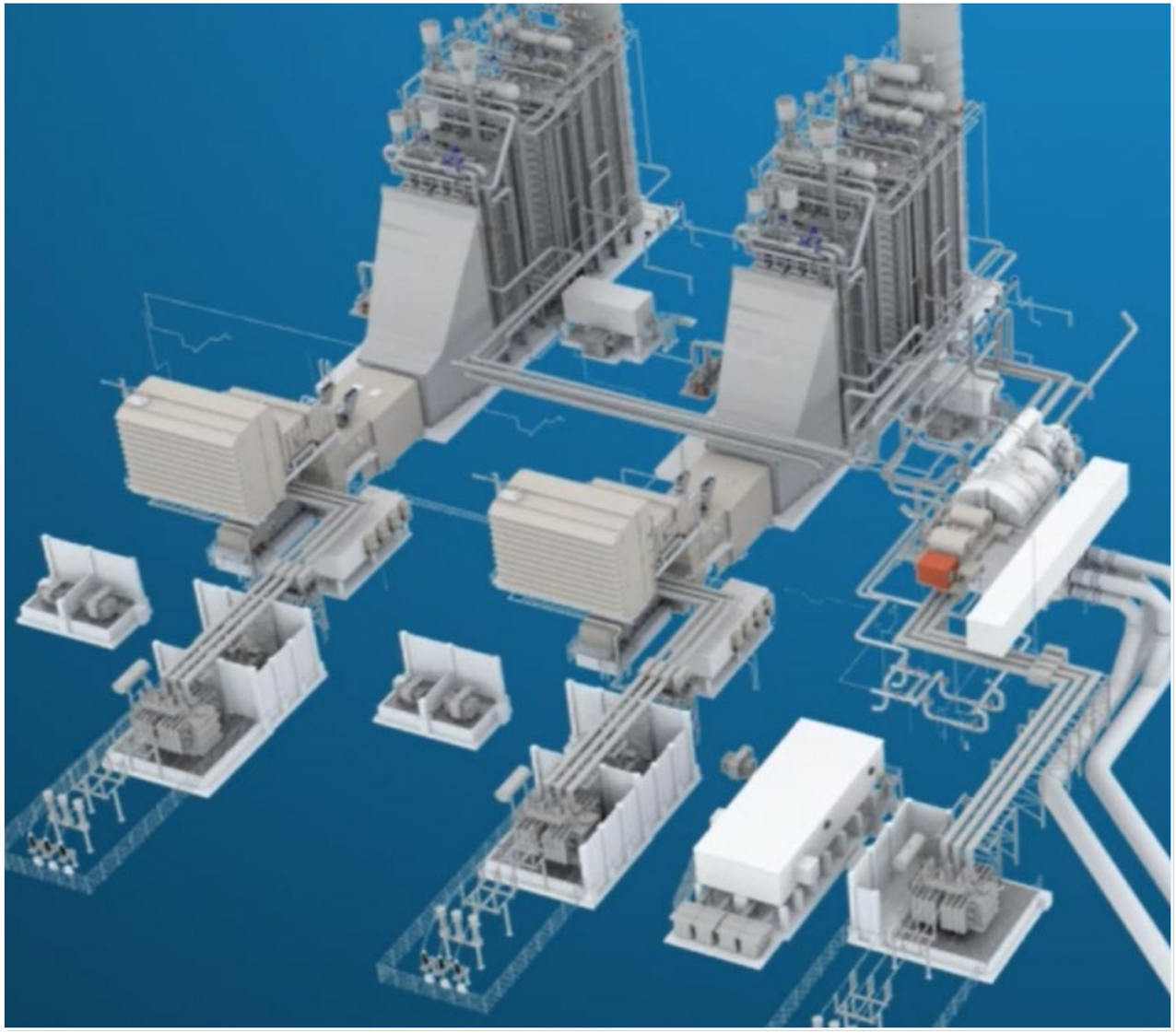
Eagle Valley Generating Station

- → Located in Martinsville, IN on 650 acres
- → Stopped coal use and coal combustion residuals (CCR) production in April 2016
- → CCGT commercial operation began in April 2018
- → Significant reductions in air emissions



Environmental regulations

Pilar Cuadra

Environmental manager

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What are Coal Combustion Residuals?

→ Coal Combustion Residuals (CCR) are byproducts generated from the combustion of coal from coal-fired power plants

→ CCR contains trace metal elements, generally called CCR constituents

2015 CCR Federal Rule

Rule overview – General requirements

Establish groundwater monitoring systems to determine if there are impacts to the groundwater above groundwater protection standards.

If impacts are above groundwater protection standards, initiate evaluation of corrective measures.

Initiate and complete closure of CCR units within a specific timeframe.

Depending on operating status of units.

Publish compliance data and information to a public website.

2015 CCR Federal Rule

Rule overview – Implementation

Detection

→ 8 Initial Events

→ Twice per Year

Assessment

→ Twice per Year

Corrective Measures

→ Assessment

→ Nature & Extent

→ Selection of Remedy

→ Implementation

Eagle Valley CMA report

Steve Putrich

Professional Engineer
Haley and Aldrich

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Technical Agenda

1. CCR Groundwater Program & Groundwater Monitoring Results
2. Corrective Measures Assessment (CMA): Background & Process
3. CMA Analysis and Results
4. Conclusion and Next Steps (H&A/AESI)

CCR Groundwater Program & Groundwater Monitoring Results

HALEY ALDRICH

EVGS Site Features

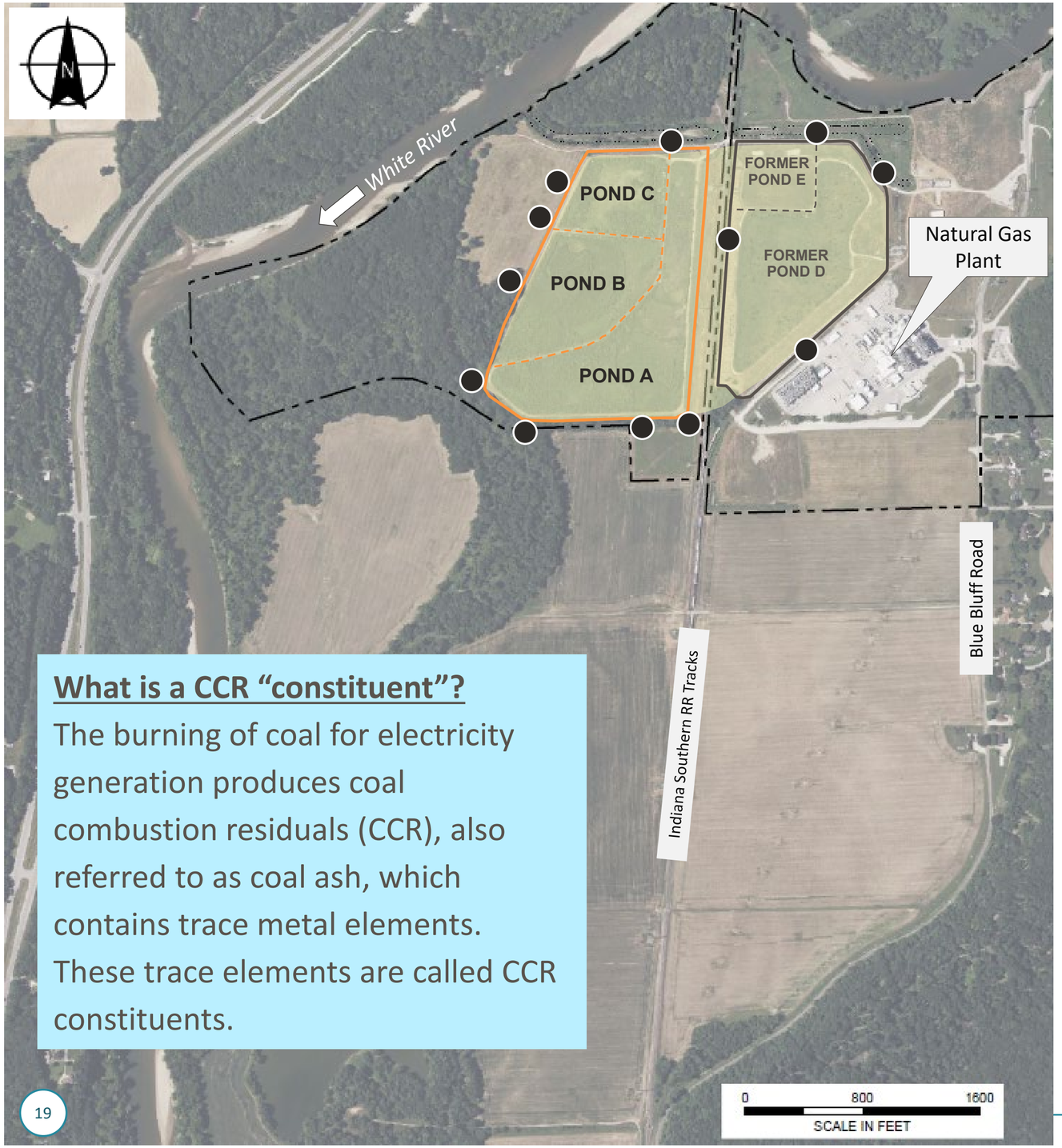
- The EVGS Ash Pond System including Ponds A, B and C & Former Ponds D and E has a total acreage of approximately 70 acres.
- Ponds A, B, C subject to federal rule, Former Ponds D&E not subject to federal rule but included in the Ash Pond System being monitored.

LEGEND

- APPROX. LIMITS OF PROPERTY LINE
- APPROX. LIMITS OF PONDS A, B, AND C
- APPROX. LIMITS OF FORMER PONDS D AND E
- APPROX. LIMITS OF ASH POND SYSTEM

Overview of the CCR Groundwater Monitoring Program

CCR Compliance Groundwater Monitoring Wells



- AESI has been monitoring groundwater quality at EVGS in compliance with the CCR Rule since 2016.
- CCR monitoring wells include a total of 12 well locations installed immediately upgradient and at the downgradient edge of the CCR units.
- Groundwater monitoring results for the Eagle Valley Generating Station Ash Pond System identified three (3) CCR constituents [**arsenic, lithium, and molybdenum]** at levels above the Groundwater Protection Standards (which are the drinking water standards) set by the USEPA in the CCR Rule.

LEGEND

● CCR COMPLIANCE MONITORING WELL

What is a CCR "constituent"?

The burning of coal for electricity generation produces coal combustion residuals (CCR), also referred to as coal ash, which contains trace metal elements. These trace elements are called CCR constituents.

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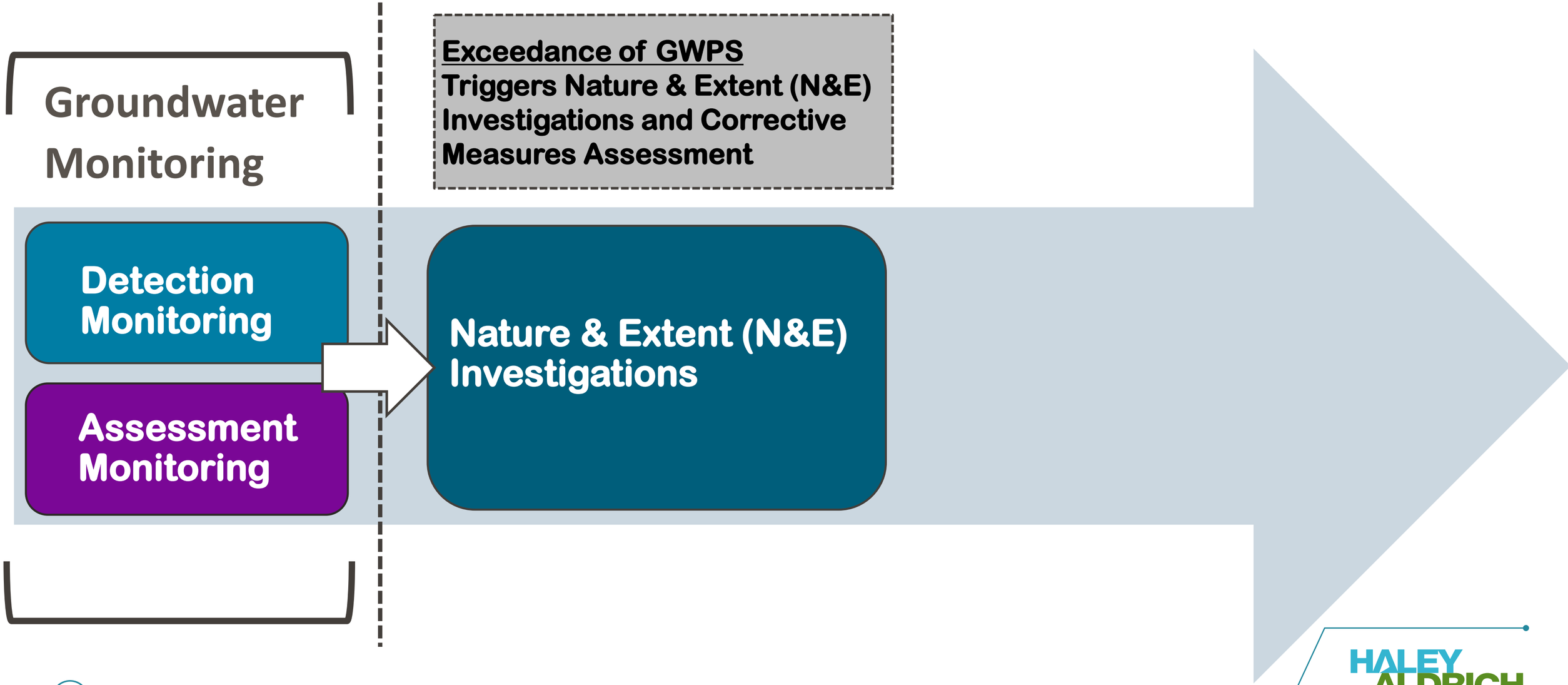
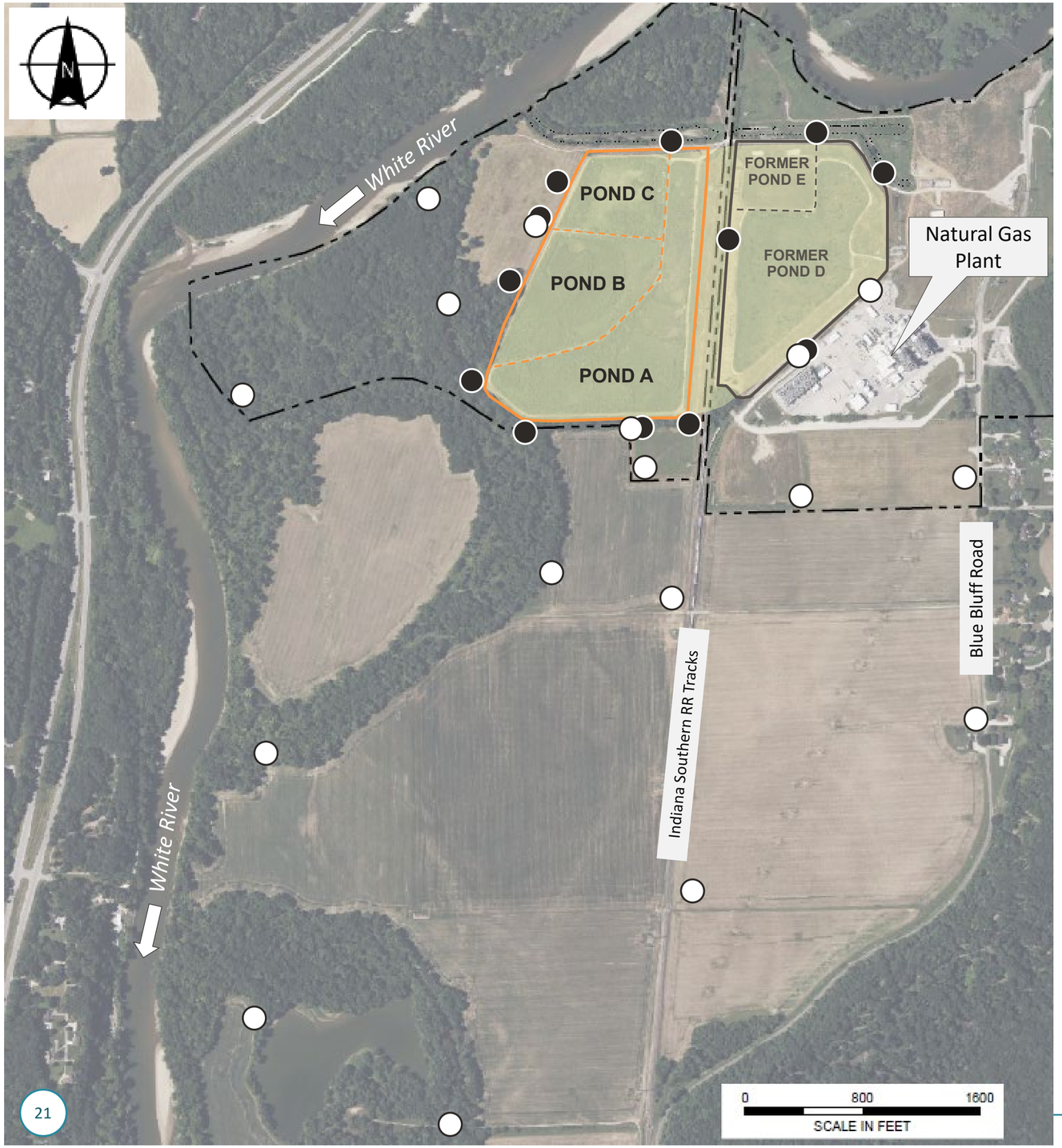
CCR Rule Groundwater Monitoring Program & CMA Development (40 CFR 257)





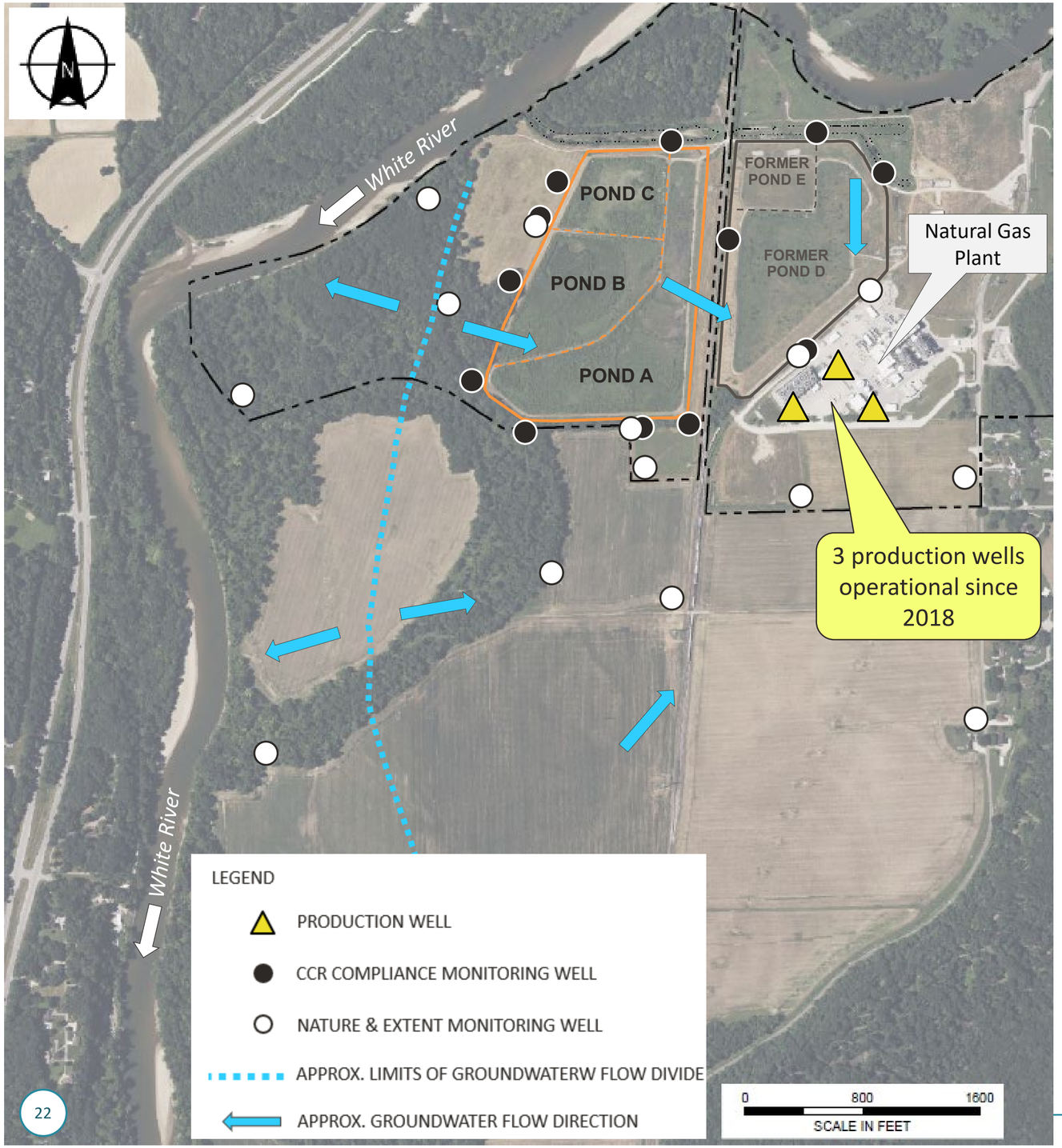
Nature & Extent (N&E) Groundwater Monitoring Wells

- A total of 17 Nature & Extent (N&E) wells were installed south and west of the Ash Pond System.
- The N&E wells are used to determine the nature (i.e., to measure the CCR constituents present and the groundwater chemistry below the site) and the lateral and vertical extent of CCR-related groundwater impacts.

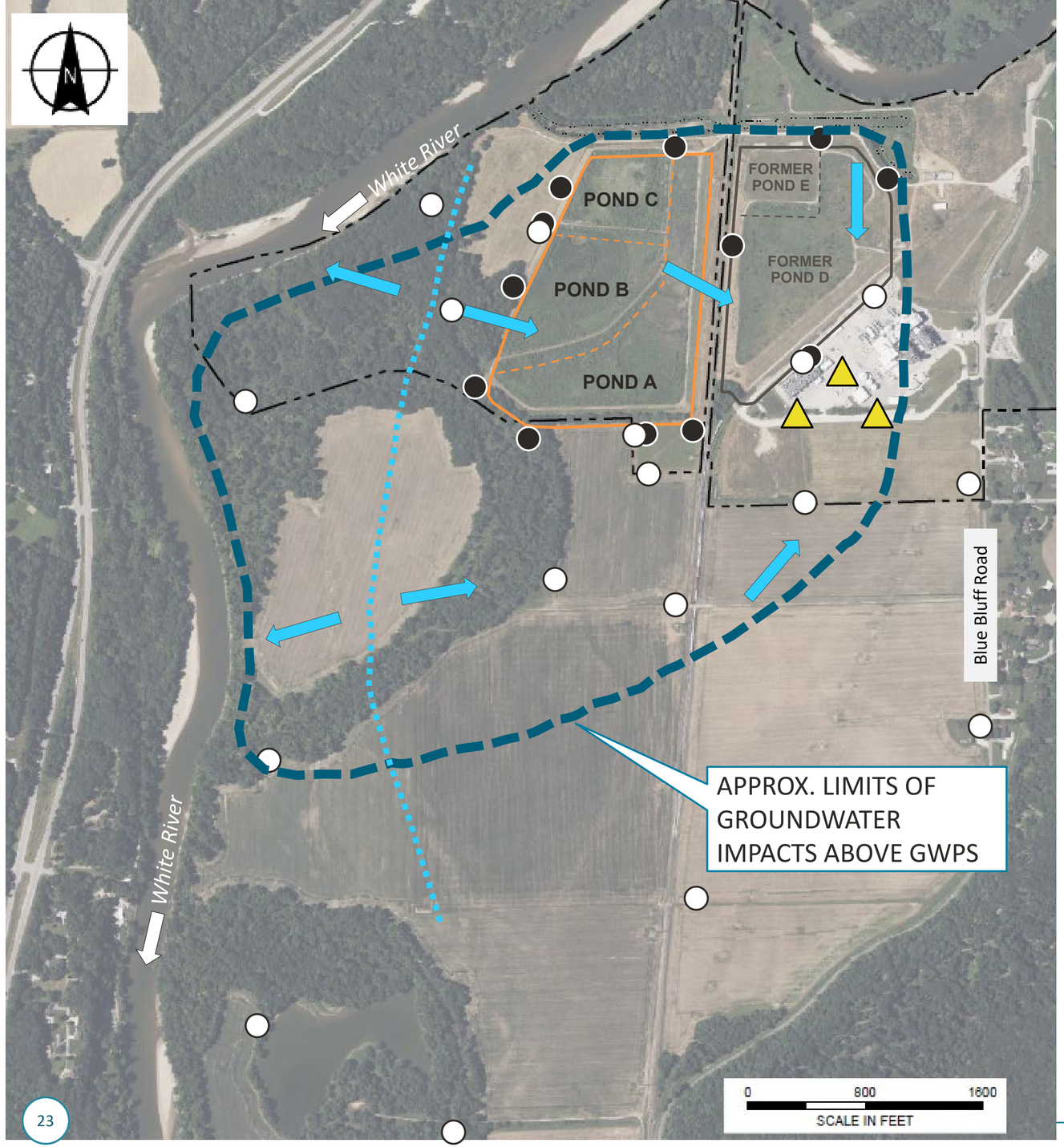
LEGEND

- ○ NATURE & EXTENT MONITORING WELL
- ● CCR COMPLIANCE MONITORING WELL

Generalized Groundwater Flow



- Groundwater near the Ash Pond System naturally flows west toward the White River.
- However, three production wells located east of the Ash Pond System influence groundwater flow across the Site, creating an inward hydraulic gradient (i.e., attracts flow toward the production wells).
- The blue dashed line and flow arrows illustrates the generalized groundwater flow direction at EVGS:
  - east of the divide flows to the production wells; and
  - west of the divide flows to White River.



Findings from N&E Investigation

- The horizontal extent of groundwater impacts covers approx. 360 acres which encompasses the Ash Pond System and extends offsite west and southwest.
- The vertical extent of affected GW limited by low permeability shale bedrock, on average 90 ft. below ground surface.
- Groundwater pumping via production wells (that support gas plant operations) provides groundwater flow control for a significant portion of CCR-impacted groundwater.
- The trends of CCR-related GW concentrations within the impacted area are generally stable or decreasing over time.

LEGEND

- PRODUCTION WELL
- CCR COMPLIANCE MONITORING WELL
- NATURE & EXTENT MONITORING WELL

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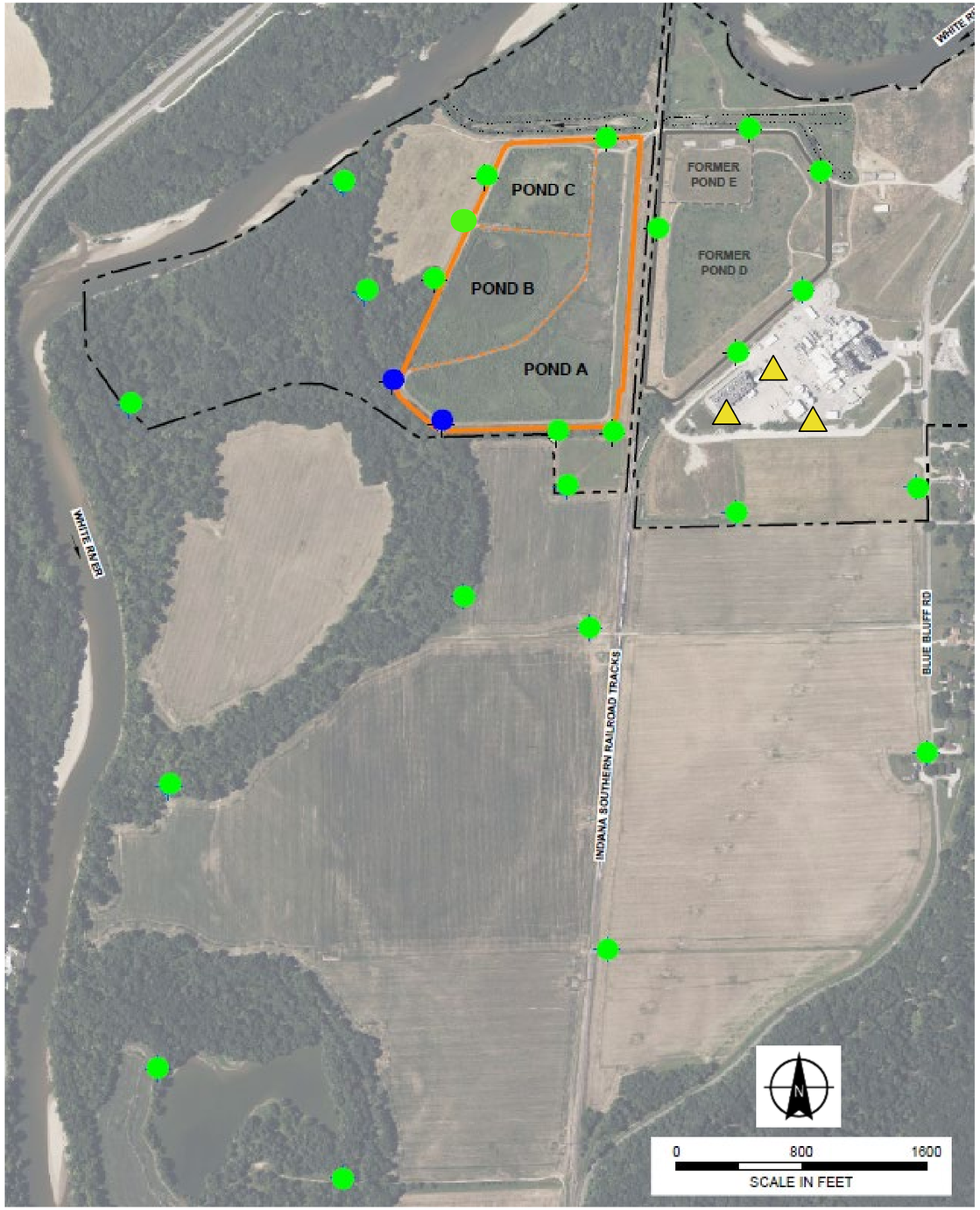


CCR Constituent: Arsenic

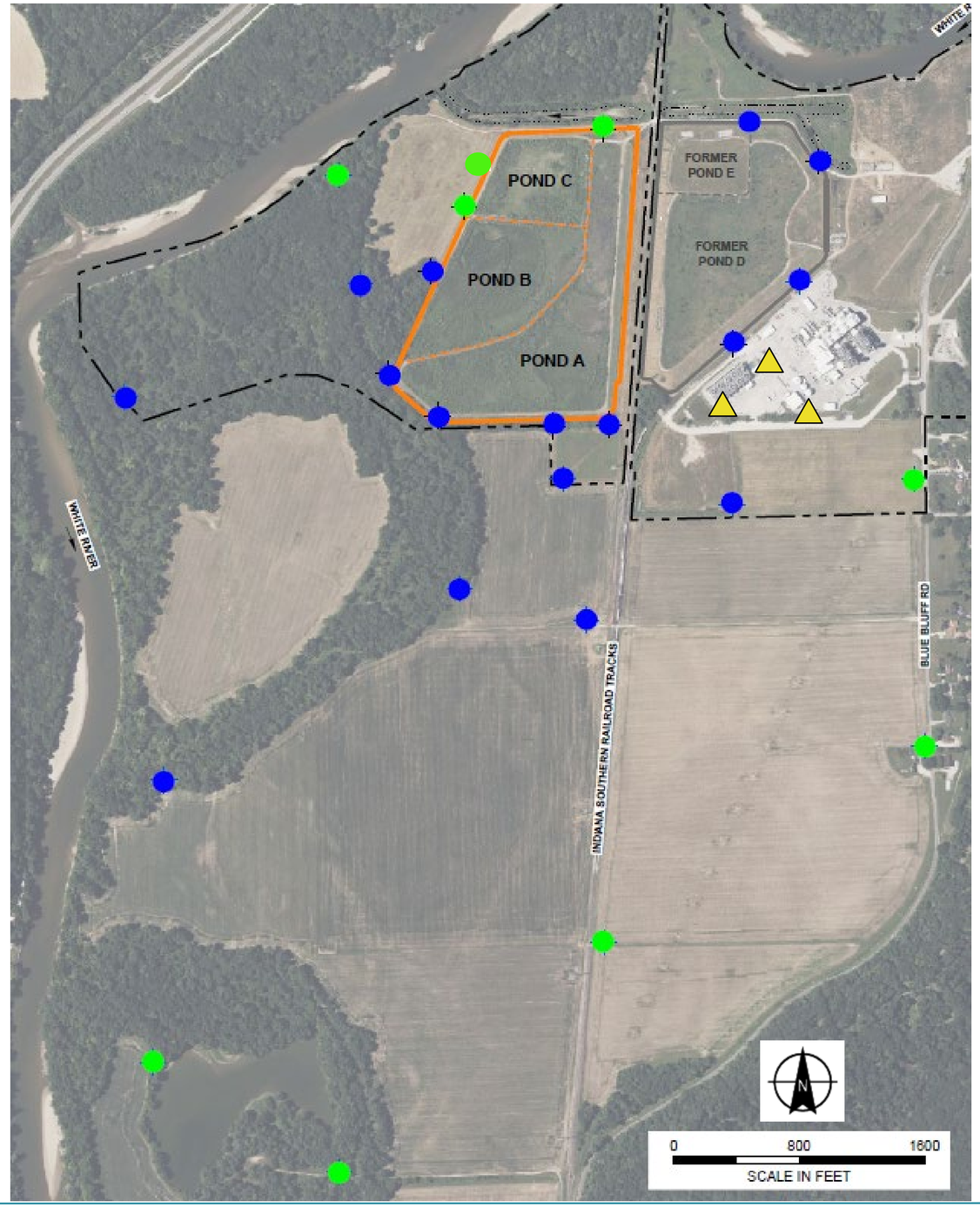
Arsenic N&E Summary

- Arsenic is one of three (3) constituents above Groundwater Protection Standards (GWPS).
- Arsenic is the least mobile of the three (3) constituents identified in this group.
- For that reason, the extent of arsenic above GWPS is limited to a shallow segment in groundwater along the southwest corner of Pond A and western side of Pond B.

LEGEND

- Concentration < GWPS
- Concentration > GWPS

CCR Constituent: Lithium

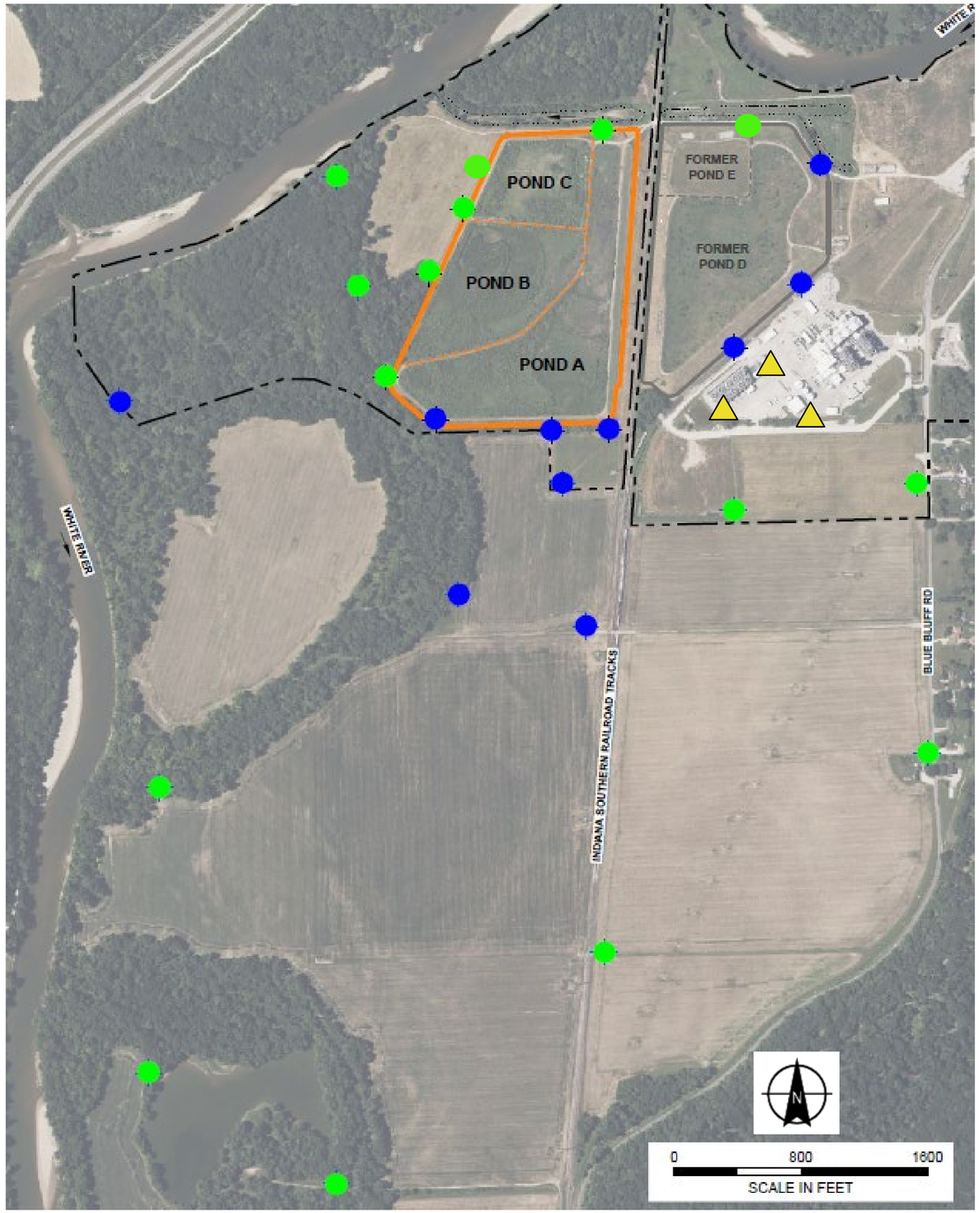


Lithium N&E Summary

- Lithium is one of three (3) constituents above Groundwater Protection Standards (GWPS).
- Lithium is relatively mobile in the environment and has been detected at concentrations above the GWPS in each of the three flow zones, primarily in the immediate vicinity of the Ash Pond System.
- Limited migration is observed past the influence area of production wells to the west of the Ash Pond System and the Southwest.

LEGEND

- Concentration < GWPS
- Concentration > GWPS



CCR Constituent: Molybdenum

Molybdenum N&E Summary

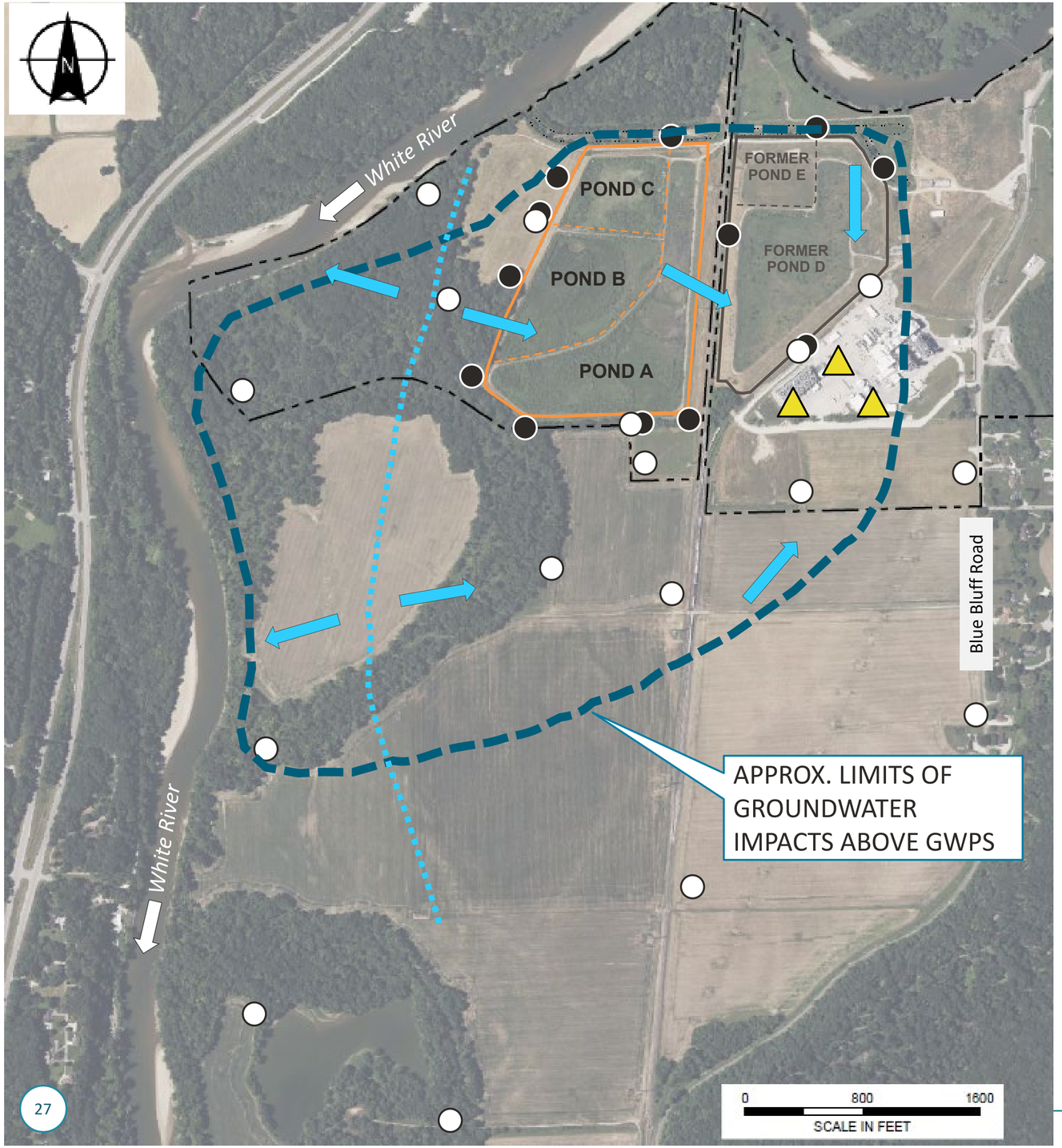
- Molybdenum is one of three (3) constituents above Groundwater Protection Standards (GWPS).
- Like Lithium, Molybdenum is relatively mobile in the environment and has been detected at concentrations above the GWPS in each of the three flow zones, primarily in the immediate vicinity of the Ash Pond System.
- Limited migration is observed past the influence area of production wells to the west of the Ash Pond System.

LEGEND

Concentration < GWPS

Concentration > GWPS

Implications of N&E Findings



- Although groundwater results indicate levels above drinking water standards for arsenic, lithium, and molybdenum**, there is no use of groundwater for drinking water on or downgradient of the EVGS site.**
- Furthermore, site-specific risk assessments conducted in accordance with EPA standards conclude **there is no adverse risk to people or the environment from the presence of these CCR constituents in groundwater at the site.**

LEGEND

- PRODUCTION WELL
- CCR COMPLIANCE MONITORING WELL
- NATURE & EXTENT MONITORING WELL

Risk Evaluation Summary

- **What work was performed?**
  - Reviewed the analytical data at the Site and Site vicinity using EPA tools;
  - Identified the pathways by which people and the environment could potentially come in contact with groundwater;
  - Evaluated if the pathways could cause an adverse impact to people or the environment.
- **What was determined?**
  - There is no direct contact between people or environmental receptors and groundwater impacted by the Ash Pond System.
  - Detected concentrations of CCR constituents in groundwater are below screening levels and do not pose an adverse impact to the White River and do not pose a risk to human health or ecological receptors.
- **What does this mean?**
  - **There are no adverse impacts on human health or the environment from groundwater affected by the Ash Pond System.**

Corrective Measures Assessment (CMA): Background & Process

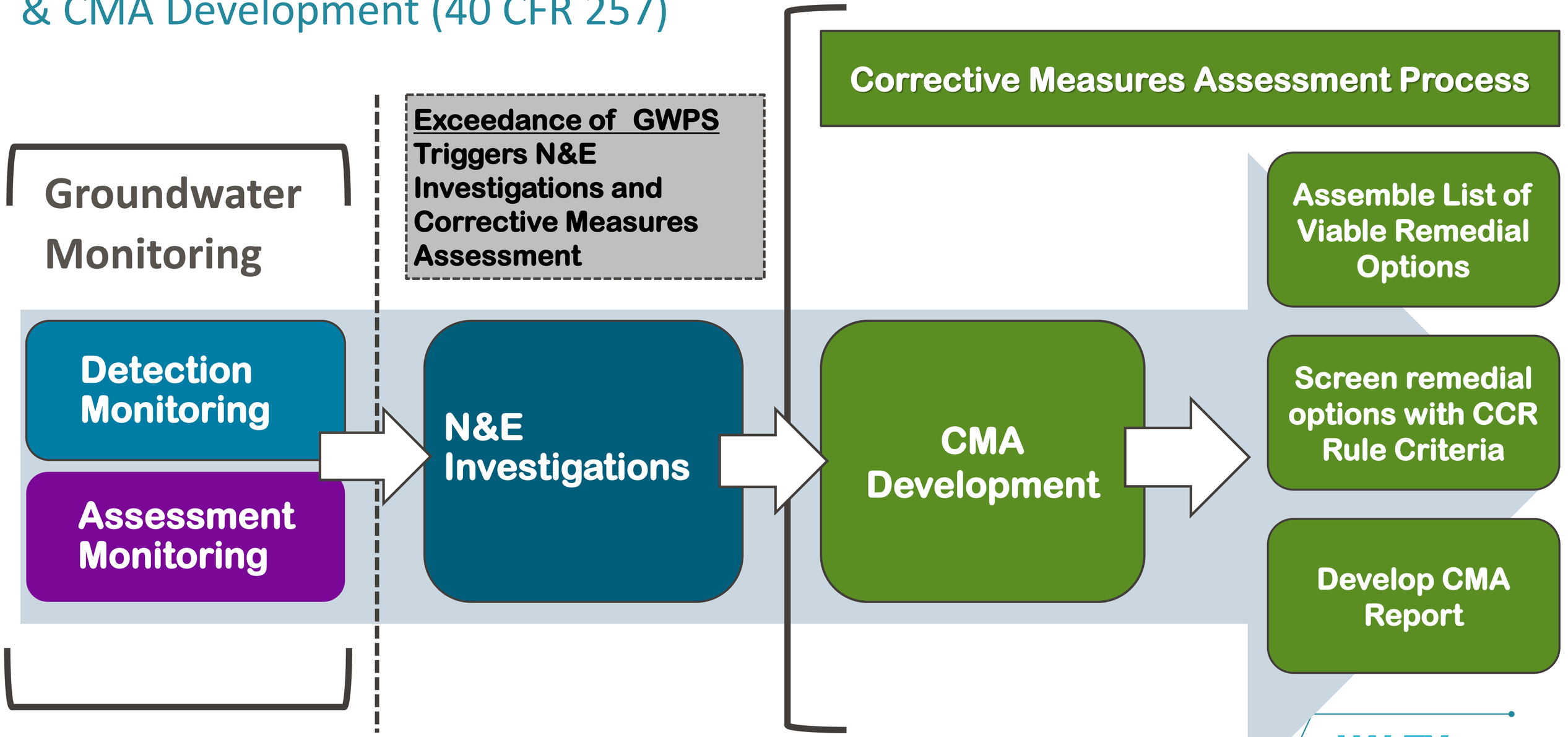
HALEY ALDRICH

What is a Corrective Measures Assessment (CMA)?

- When levels of constituents in groundwater are found to be above the groundwater protection standards, the CCR Rule calls for corrective measures to be evaluated.

- The Corrective Measures Assessment evaluates potential corrective measures that can be pursued to remediate groundwater for the constituents that are above the groundwater protection standards.

CCR Rule Groundwater Monitoring Program & CMA Development (40 CFR 257)



Background - Why was the CMA updated?

- The CMA and associated report were updated to account for the supplemental information collected since 2019. That supplemental information is sourced from:
  - additional monitoring data and groundwater N&E investigations,
  - conceptual site model development and groundwater modeling updates,
  - supplemental geochemical and site-specific investigations, and
  - potential corrective measures evaluations.
- The updated CMA includes four (4) remedial alternatives that expand on the alternatives considered in the initial 2019 CMA report. The four (4) remedial alternatives were evaluated in the updated CMA.
- Following review of information and feedback from this public meeting, AESI will then make the remedy selection for EVGS Ponds A, B, and C in accordance with the CCR Rule.

Groundwater Corrective Measures/Remedy Diagram

Source Control Measures

- Hybrid Closure in Place (HCIP)
- Closure by Removal (CBR)

+

Groundwater (GW) Treatment Measures

- Ex-situ (above ground) Hydraulic Controls
  - ✓ Pump
  - ✓ Pump & Treat (e.g., reverse osmosis)
- In-situ (treatment in the ground)
  - ✓ Monitored Natural Attenuation
  - ✓ Reagent injection
  - ✓ Air sparging

=

Remedial Alternatives

Note: The source control and groundwater treatment measures were selected based on site-specific conditions and limitations (257.96).

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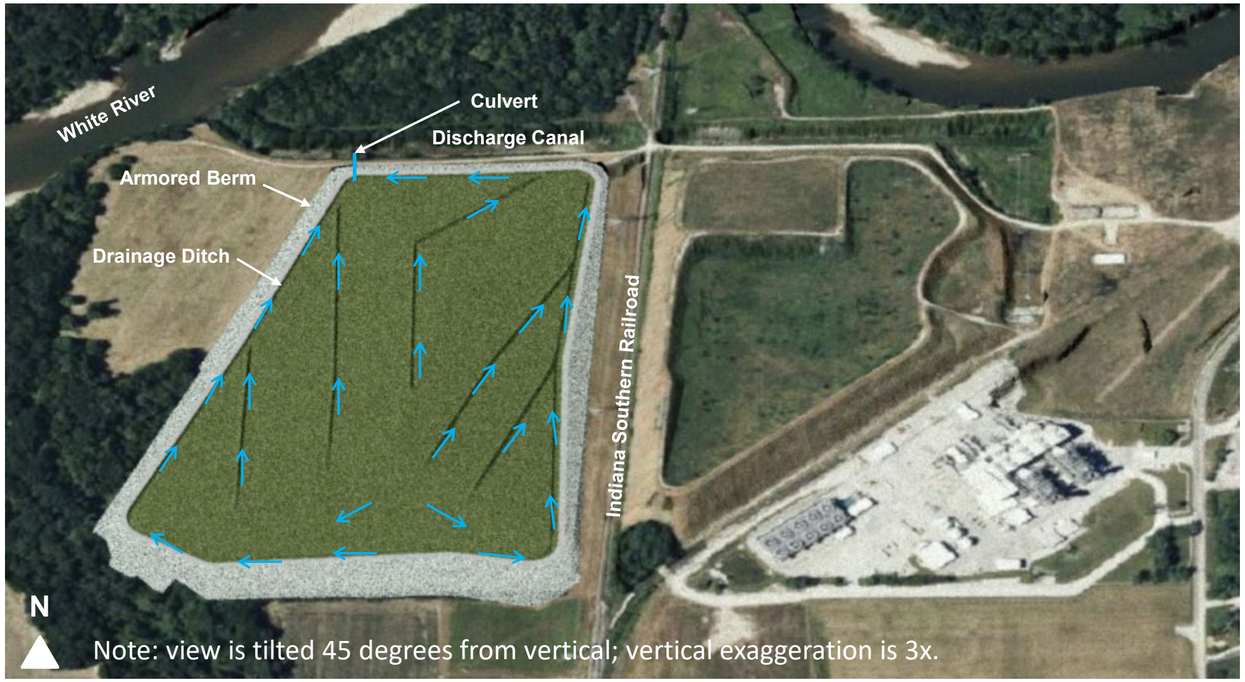
Source Control (Closure) Measures

Hybrid Closure in Place will minimize infiltration into the CCR and restrict potential for leaching

- Removal of CCR in potential contact with seasonal high groundwater (GW)
- Backfill areas where CCR was removed with clean soil to at least 1 foot above seasonal high GW table
- Regrade CCR within Ponds A, B & C footprint
- Place a final cover over the CCR

Soil Cover Detail



Plan View of Soil Cover

Source Control (Closure) Measures

Closure by Removal

- Excavate CCR and place into dump trucks
- Transport CCR material to an offsite landfill
- Regrade area (focus on eliminating steep and or unsafe slopes) and promoting drainage of stormwater runoff

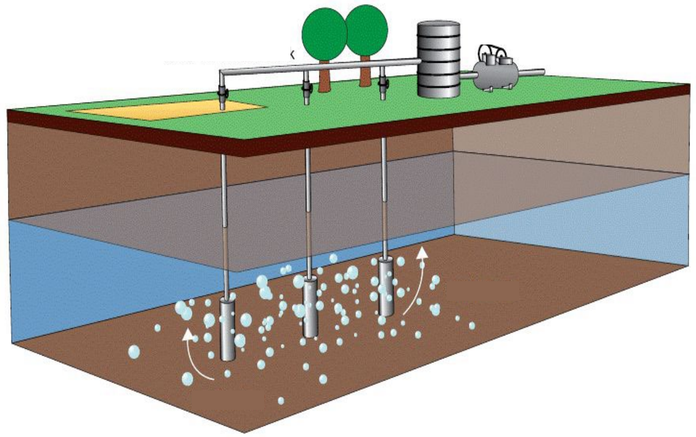
Groundwater Treatment Measures

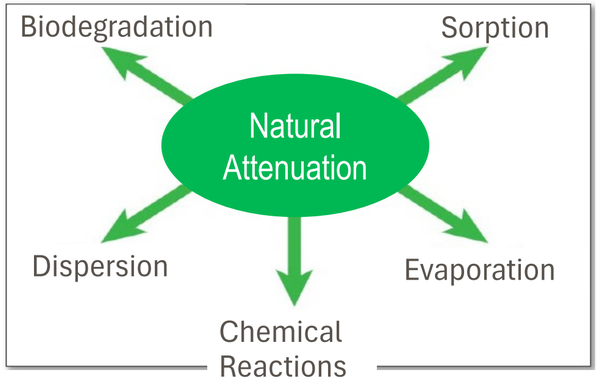
In-situ (treatment in the ground)

- Monitored Natural Attenuation
- Reagent injection
- Air sparging

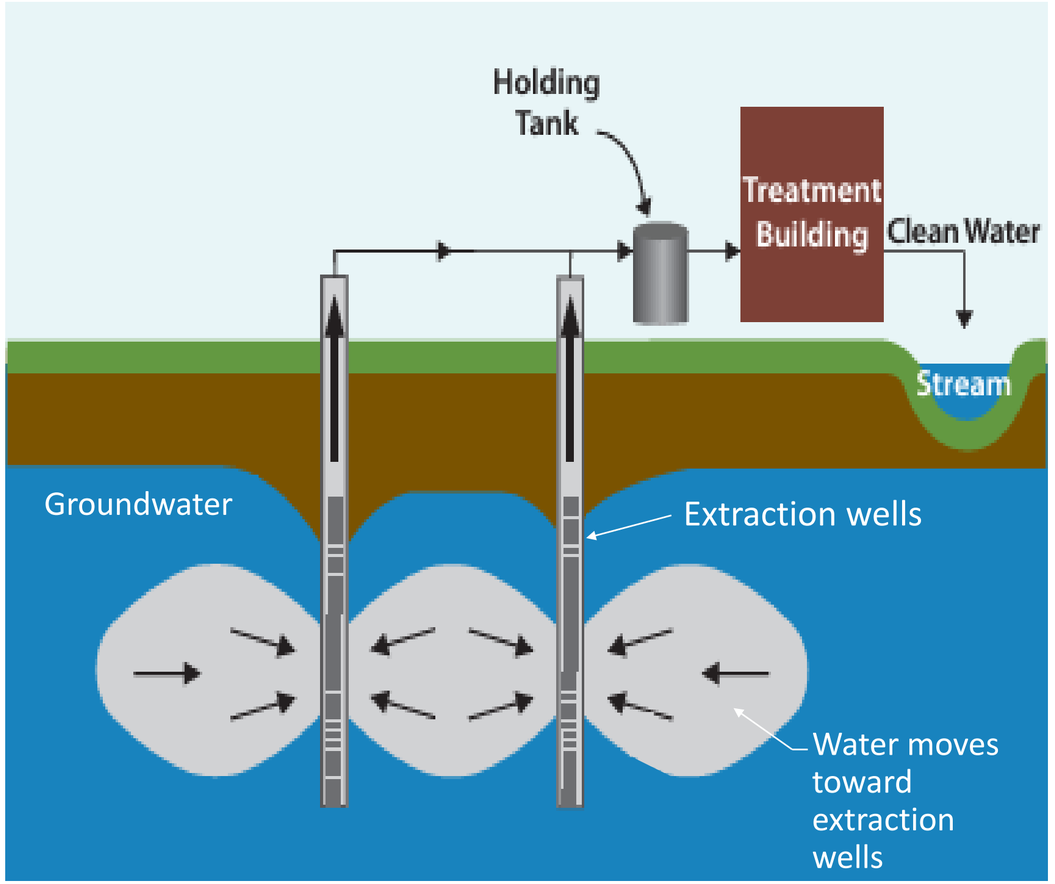
Ex-situ (above ground) Hydraulic Controls

- Pump
- Pump & Treat (e.g., reverse osmosis)



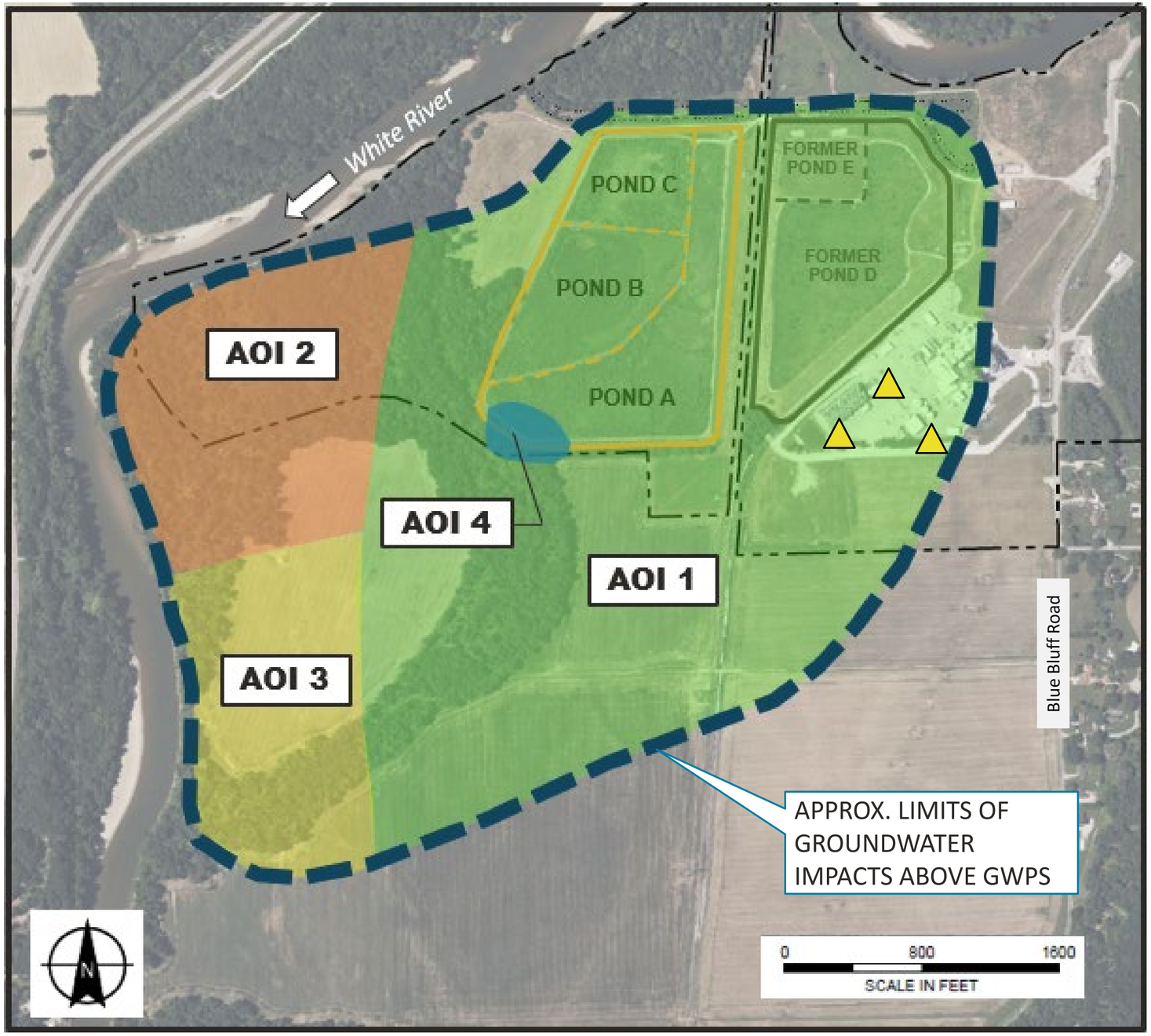


In-situ (treatment in the ground)



Ex-situ (above ground) Pump & Treat

Impacted Groundwater Areas of Interest (AOI)



Areas of Interest (AOI) are used to designate portions of the impacted groundwater based on the CCR constituents above the GWPS [Arsenic, Lithium, Molybdenum] and the location on the site [within or outside of the influence of the natural gas plant production wells].

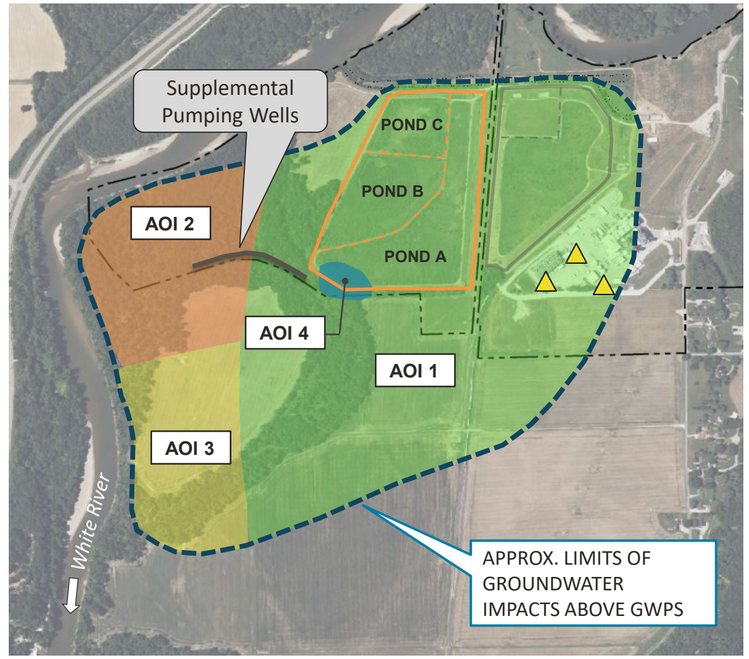
AOI 1	WITHIN INFLUENCE OF PRODUCTION WELLS • LITHIUM, MOLYBDENUM
AOI 2	OUTSIDE OF PRODUCTION WELL INFLUENCE • LITHIUM, MOLYBDENUM
AOI 3	OUTSIDE OF OPRODUCTION WELL INFLUENCE • LITHIUM
AOI 4	WITHIN INFLUENCE OF PRODUCTION WELLS • ARSENIC

LEGEND

△ PRODUCTION WELL

Summary of Remedial Alternatives

Source Control	Groundwater Treatment				Alternative Number	Remedial Alternative
	AOI 1	AOI 2	AOI 3	AOI 4		
Hybrid Closure in Place (HCIP) with Final Cover	Groundwater Pumping	Groundwater Pumping	Monitored Natural Attenuation	In-Situ Treatment	1	Hybrid Closure in Place with Final Cover and Hydraulic Containment through Groundwater Pumping
	Groundwater Pumping with Ex-Situ Treatment	Groundwater Pumping with Ex-Situ Treatment			2	HCIP with Final Cover and Hydraulic Containment through Groundwater Pumping with Ex-Situ Treatment
Closure By Removal	Groundwater Pumping	Groundwater Pumping			3	Closure by Removal with Hydraulic Containment through Groundwater Pumping
	Groundwater Pumping with Ex-Situ Treatment	Groundwater Pumping with Ex-Situ Treatment			4	CBR with Hydraulic Containment through Groundwater Pumping with Ex-situ Treatment



AOI 1	WITHIN INFLUENCE OF PRODUCTION WELLS • LITHIUM, MOLYBDENUM
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AOI 3	OUTSIDE OF OPRODUCTION WELL INFLUENCE • LITHIUM
AOI 4	WITHIN INFLUENCE OF PRODUCTION WELLS • ARSENIC

LEGEND

△ PRODUCTION WELL

Corrective Measures Assessment (CMA): Analysis and Results

HALEY ALDRICH

How are the Remedial Alternatives Evaluated? Threshold Criteria (Minimum Requirements)

All five of the Threshold Criteria are satisfied for the four Remedial Alternatives considered in the Corrective Measures Assessment

Remedies must:

(1) Be protective of human health and the environment;

(2) Attain the groundwater protection standard as specified pursuant to § 257.95(h);

(3) Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in appendix IV to this part into the environment;

(4) Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems; and

(5) Comply with standards for management of wastes as specified in § 257.98(d).

How are Remedial Alternatives Evaluated?
Balancing Criteria (Effectiveness and Performance)

The four Remedial Alternatives were evaluated against the first three Balancing Criteria in CMA

(1) The long- and short-term effectiveness and protectiveness of the potential remedy(s), along with the degree of certainty that the remedy will prove successful;

(2) The effectiveness of the remedy in controlling the source to reduce further releases;

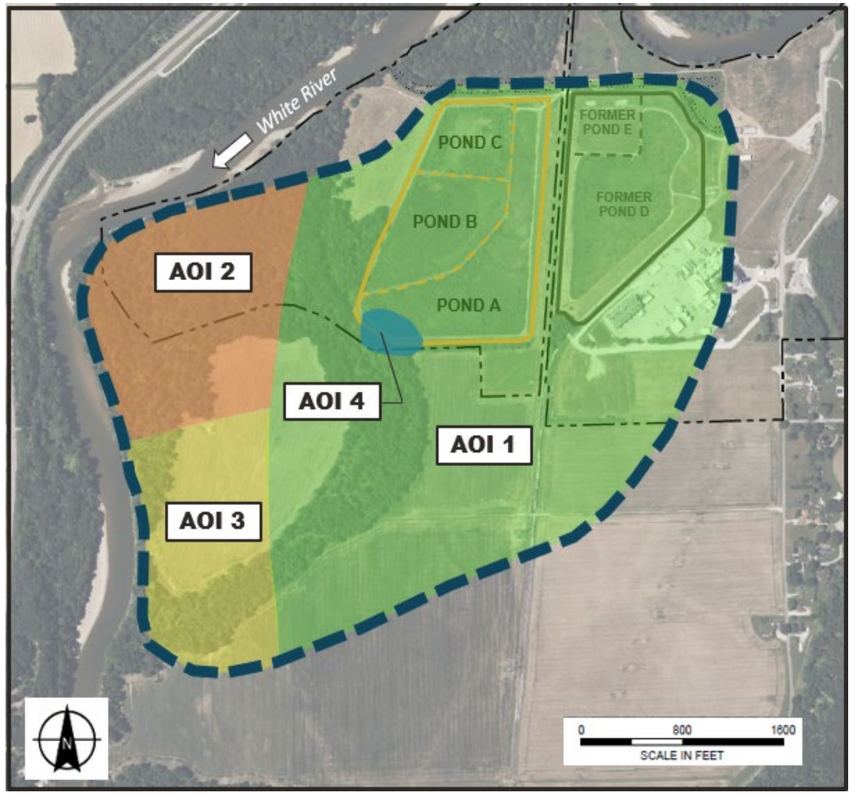
(3) The ease or difficulty of implementing a potential remedy(s); and

(4) The degree to which community concerns are addressed by a potential remedy(s).

Summary of CMA Balancing Criteria Analysis

Balancing Criteria #1 - The long- and short-term effectiveness and protectiveness of the remedy(s), along with the degree of certainty that the remedy will prove successful.

- Each remedial alternative involves ongoing pumping at the natural gas plant production wells and is anticipated to be effective in the long term based on current performance.
- Ex-situ (above ground) treatment in AOI 1 and AOI 2 would generate a waste stream requiring handling and disposal, posing potential exposure risks and additional long-term operations and maintenance.
- Monitored natural attenuation is expected to effectively address lithium in AOI 3, with concentrations slightly above the GWPS. Levels are projected to decrease due to source control measures.
- In-situ (in ground) treatment in AOI 4 is expected to effectively treat arsenic by creating a chemical reaction allowing it to be absorbed into soil.
- Closure by Removal would pose exposure risks during the removal process and community impacts during offsite material transportation.



AOI 1	WITHIN INFLUENCE OF PRODUCTION WELLS • LITHIUM, MOLYBDENUM
AOI 2	OUTSIDE OF PRODUCTION WELL INFLUENCE • LITHIUM, MOLYBDENUM
AOI 3	OUTSIDE OF OPRODUCTION WELL INFLUENCE • LITHIUM
AOI 4	WITHIN INFLUENCE OF PRODUCTION WELLS • ARSENIC

Summary of CMA Balancing Criteria Analysis

Balancing Criteria #2 - The effectiveness of the remedy in controlling the source to reduce further releases.

- Hybrid Closure in Place and Closure by Removal (CBR) effectively minimize the risk of further releases by isolating CCR onsite above the seasonal high groundwater table or transferring it to an offsite lined landfill.

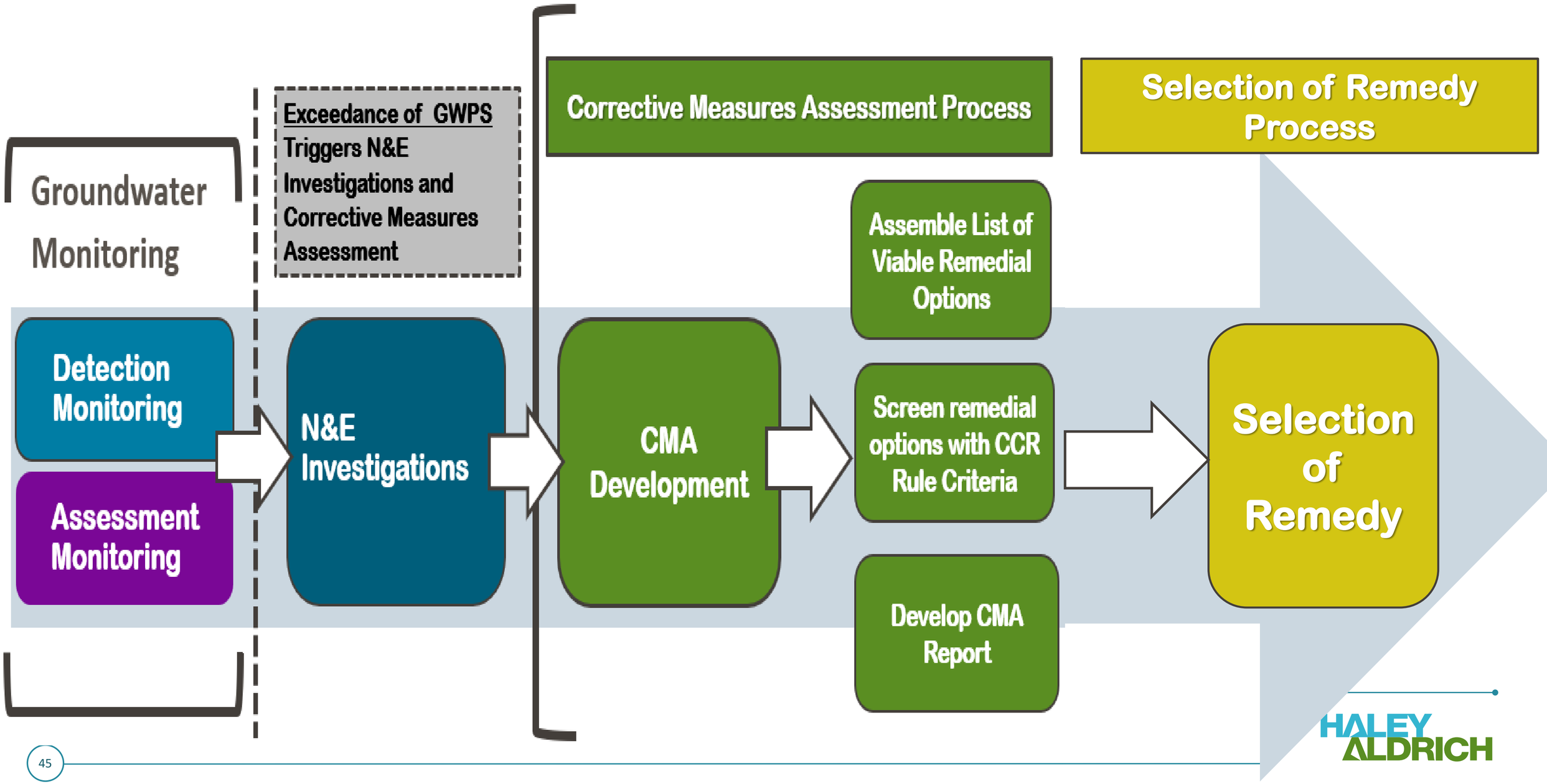
Balancing Criteria #3 - The ease or difficulty of implementing a potential remedy(s).

- For Hybrid Closure in Place, ongoing maintenance is required for the final cover and pumping systems, but closure equipment is readily available. No extra construction is needed, and the CCR material stays onsite without further treatment or disposal requirements.
- Ex-situ treatment (above ground) demands additional system construction, ongoing maintenance, and the handling of post-treatment waste streams.
- CBR entails significant construction and the need for permits and approvals for complete CCR excavation, transport, and disposal offsite.

Balancing Criteria #4 - The degree to which community concerns are addressed by a potential remedy(s).

Conclusion and Next Steps

What is the process to move from completion of the CMA to Selection of Remedy?



Next steps

The comment period for the CMA will be open for 30 days.

Comments can be submitted via the public meeting website.

https://www.aesindiana.com/eagle-valley-cma-meeting

Public comments will be considered, per the CCR Rule, in the Selection of Remedy process.

Comments and Discussion

https://www.aesindiana.com/eagle-valley-cma-meeting

May 8, 2024

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