EXPERIENCE

COMMITMENT

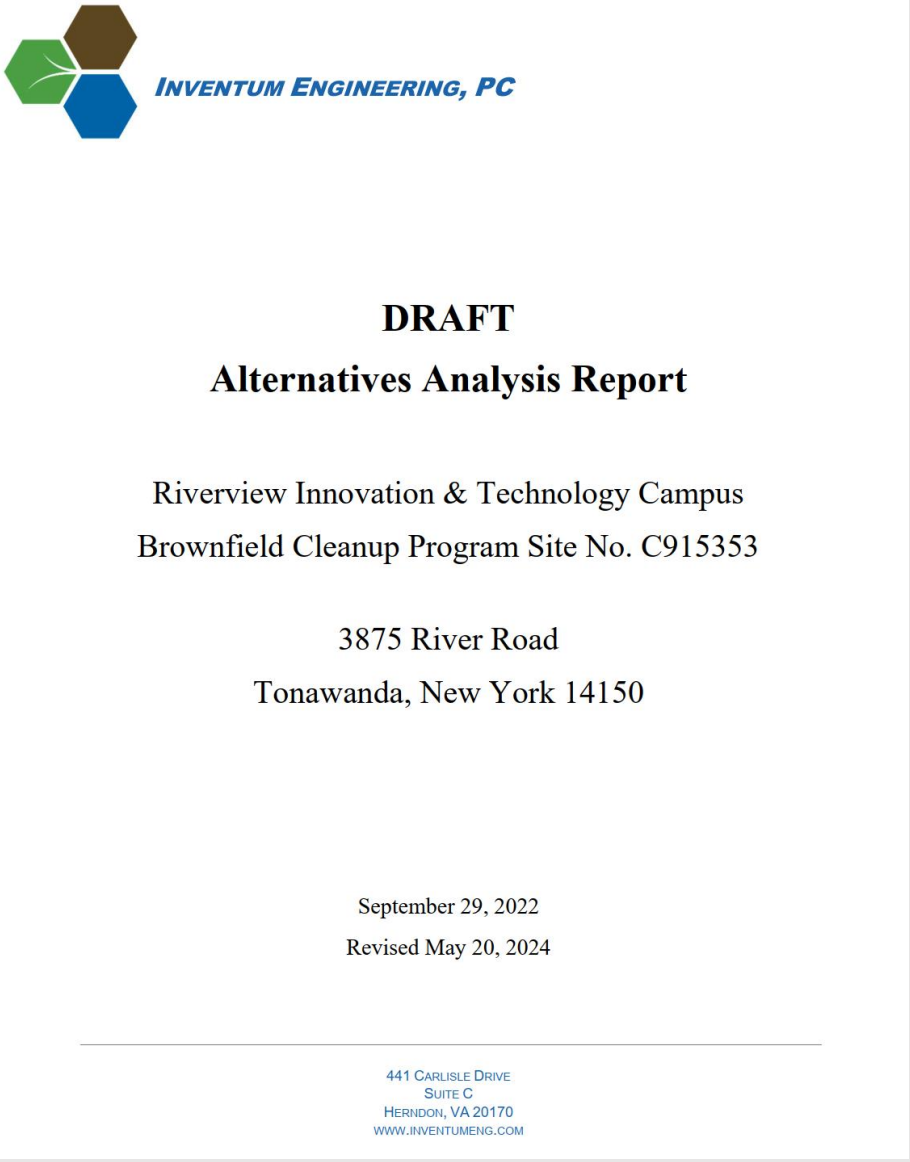
riverview
Innovation & Technology Campus

VISION

INNOVATION

Introduction & Overview

IRM Milestones



INVENTUM ENGINEERING, PC

DRAFT

Alternatives Analysis Report

Riverview Innovation & Technology Campus

Brownfield Cleanup Program Site No. C915353

3875 River Road

Tonawanda, New York 14150

September 29, 2022

Revised May 20, 2024

441 CARLISLE DRIVE
SUITE C
HERNDON, VA 20170
WWW.INVENTUMENG.COM

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent, or reduce to the extent practicable, the discharge of compounds to surface water.
- Remove the source of ground water contamination.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation exposure to contaminants volatilizing from soil.

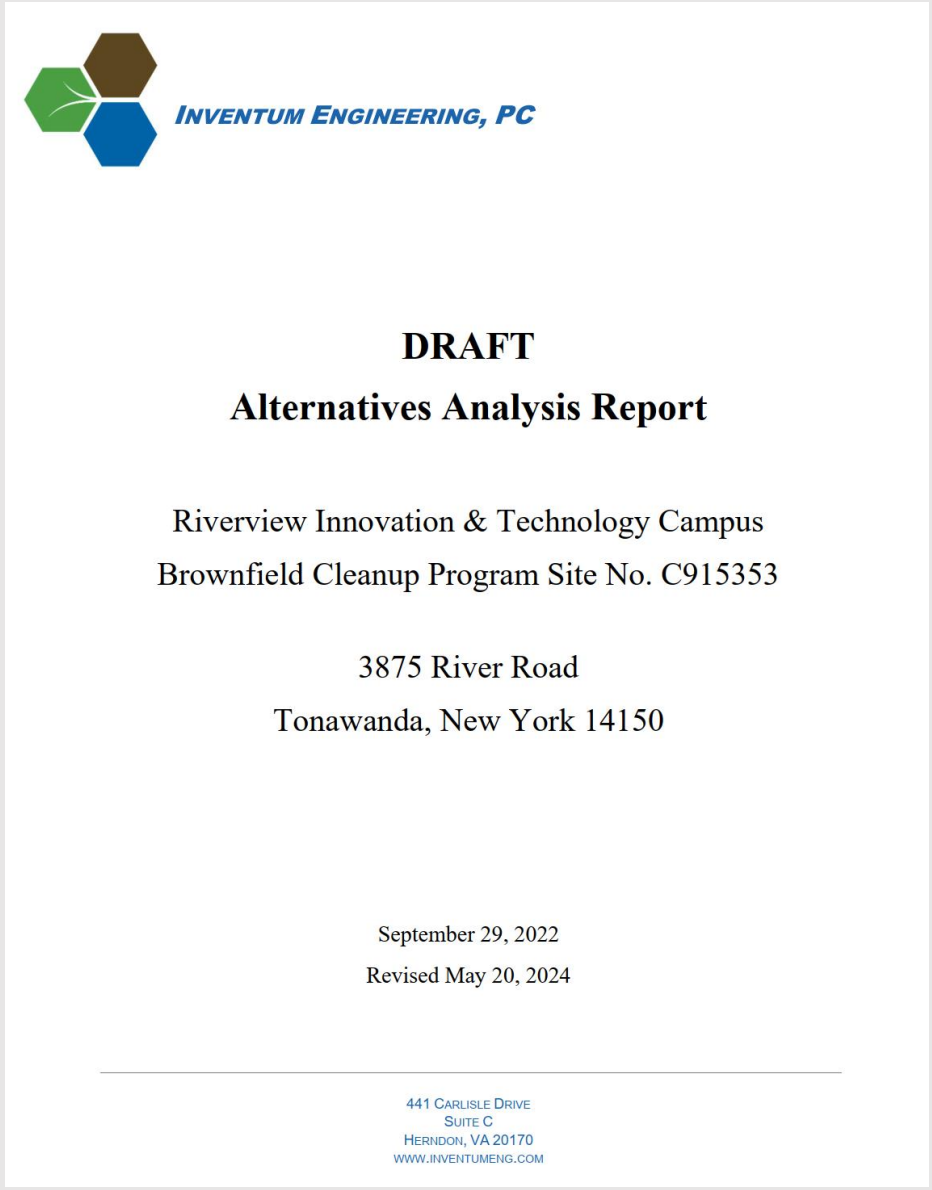
RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at the BCP Site.



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- Threshold Criteria
  - Overall Protection of Human Health and the Environment
  - Compliance with Standards, Criteria and Guidance (SCGs)
- Primary Balancing Criteria
  - Long-term Effectiveness and Permanence
  - Reduction of Toxicity, Mobility or Volume of Contamination through Treatment
  - Short Term Impact and Effectiveness
    - Conventional Evaluation
    - Innovative and Sustainable Evaluation
  - Implementability
  - Cost Effectiveness
  - Land Use
- Modifying Criteria
  - Community Acceptance

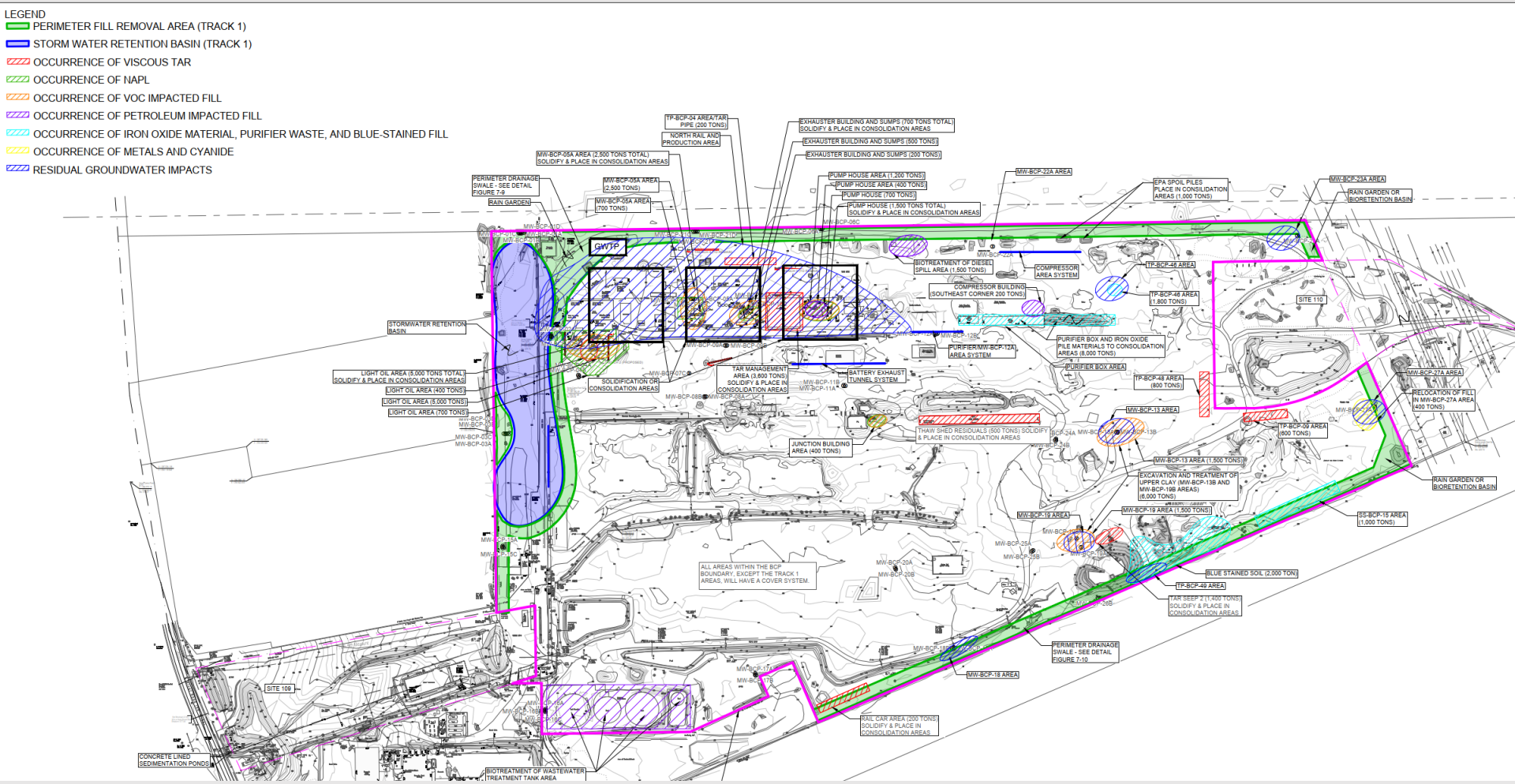
ALTERNATIVES SCREENING

Alternative	Description	Evaluation Criteria Primary Balancing Criteria Long-term Effectiveness and Permanence	Reduction of Toxicity, Mobility or Volume of Contamination through Treatment	Short-term Impact and Effectiveness Conventional Evaluation	Short-term Impact and Effectiveness Innovative and Sustainable Evaluation	Implementability	Cost Effectiveness	Land Use
1	No Action	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
2	Source Containment	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3	Source Containment, Groundwater Control	Effectiveness is based on long-term maintenance of the cover, operation of the expanded groundwater extraction and treatment system, and natural attenuation.	The reduction in toxicity is based on natural attenuation. The reduction in mobility is based on the reduction of infiltration BCP Site-wide, and the extraction and treatment of the groundwater across the BCP Site. The reduction in volume is based on the extraction and treatment of water and separate phase liquids from the BCP Site.	The placement of the cover and construction of a larger storm water retention pond will provide short-term protection from directed contact and improve surface water quality. Both the cover and stormwater systems are passive and will be effective with relatively little maintenance. The expansion of the groundwater collection system across the BCP Site will accelerate the rate of attenuation in the shallow water zone.	A larger storm water retention pond can be designed incorporating native and natural habitats. Pond construction will reduce the amount of material that would remain onsite and increase offsite export for waste disposal and increase fuel usage and GHGs from trucking and equipment operations. Little maintenance required and unused portions of the site can be designed to minimize surface vegetation maintenance which would reduce fuel use and GHGs. The construction phase of implementing the groundwater collection system expansion would create a short term increase in fuel consumption and GHGs. However, operation of an expanded groundwater collection system would have lower GHG emissions compared to the benefit to the environment.	Implementable. The actions do not rely on any unproven technology. The permitting will likely define the schedule.	Cost effective. Although much more expensive than Alternative No. 3, the verifiable control of the shallow water zone significantly improves the control of the potential constituent migration..	Allows commercial or industrial redevelopment.
4	Source Containment, NAPL Stabilization, Groundwater Control	Effectiveness is based on elimination of any partitioning of constituents from separate phase liquids, long-term maintenance of the cover, operation of the expanded groundwater extraction and treatment system, and natural attenuation.	The reduction in toxicity is achieved by solidification and stabilization of NAPL materials than can potentially allow additional partitioning of constituents and ongoing natural attenuation. Natural attenuation will be more effective by the removal of additional constituent partitioning from separate phase liquids. The reduction in mobility is based on the stabilization of separate phase liquids, reduction of infiltration BCP Site-wide, and the extraction and treatment of the groundwater across the BCP Site. The reduction in volume is based on the extraction and treatment of water containing constituents from the TCC	Stabilization and solidification is a effective short-term treatment to stop any potential partitioning from the separate phase liquids on the property. The placement of the cover and construction of a larger storm water retention pond will provide short-term protection from directed contact and improve surface water quality. Both the cover and stormwater systems are passive and will be effective with relatively little maintenance. The expansion of the groundwater collection system across the BCP Site will accelerate the rate of attenuation in the Shallow water zone.	Same innovative evaluation as Alternative No. 4., with increase in fuel use and increased GHGs for the insitu stabilization work. Natural attenuation will be a viable process over a larger area and the energy and fuel required for long-term operation of the groundwater collection system would be reduced.	Relatively easily implemented. The actions do not rely on any unproven technology. The difficulty is weather related. Periods of high precipitation limit access and mobility on the BCP Site. The permitting and weather will likely define the schedule.	Expensive. While very expensive, the elimination of the separate phase liquids will in the long-term reduce the need for the groundwater extraction and treatment system. The verifiable control of the Shallow water zone will be accelerated and significantly improved. Potential constituent migration will be more rapidly effected and natural attenuation processes will accelerate.	Allows commercial or industrial redevelopment.
5	Insitu Stabilization, Containment, Groundwater Control	Effectiveness is based on elimination of any partitioning of constituents from separate phase liquids and hydrocarbon impacted fill., long-term maintenance of the cover, operation of the expanded groundwater extraction and treatment system, and natural attenuation.	The reduction in toxicity is achieved by solidification and stabilization of materials than can potentially allow additional partitioning of constituents and ongoing natural attenuation. Mobility is reduced by stabilization and consolidation. Natural attenuation will be more effective by the removal of additional constituent partitioning from separate phase liquids. The reduction in mobility is based on the stabilization of separate phase liquids, reduction of infiltration BCP Site-wide, and the extraction and treatment of the groundwater across the BCP Site. The reduction in volume is based on the extraction and treatment of water	Stabilization and solidification is a effective short-term treatment to stop any potential partitioning from the separate phase liquids on the property. The placement of the cover and construction of a larger storm water retention pond will provide short-term protection from directed contact and improve surface water quality. Both the cap and cover and stormwater systems are passive and will be effective with relatively little maintenance. The expansion of the groundwater collection system across the BCP Site will accelerate the rate of attenuation in the shallow water zone.	Same innovative evaluation as Alternative No. 5., with increase in fuel use and increased GHGs for the additional insitu stabilization and chemical treatment work. Natural attenuation will be a viable process over a larger area and the energy and fuel required for long-term operation of the groundwater collection system would be reduced.	Relatively easily implemented. The actions do not rely on any unproven technology. The difficulty is weather related. Periods of high precipitation limit access and mobility on the BCP Site. The permitting and weather will likely define the schedule.	Expensive. While very expensive, the elimination of the separate phase liquids, biological and chemical treatment will in the long-term reduce the need for the groundwater extraction and treatment system. The verifiable control of the shallow water zone will be accelerated and significantly improved. Potential constituent migration will be more rapidly effected and natural attenuation processes will accelerate.	Allows commercial or industrial redevelopment. The consolidation of the stabilized materials from the proposed development makes the site more attractive and reduces the scope and cost of the EWP.

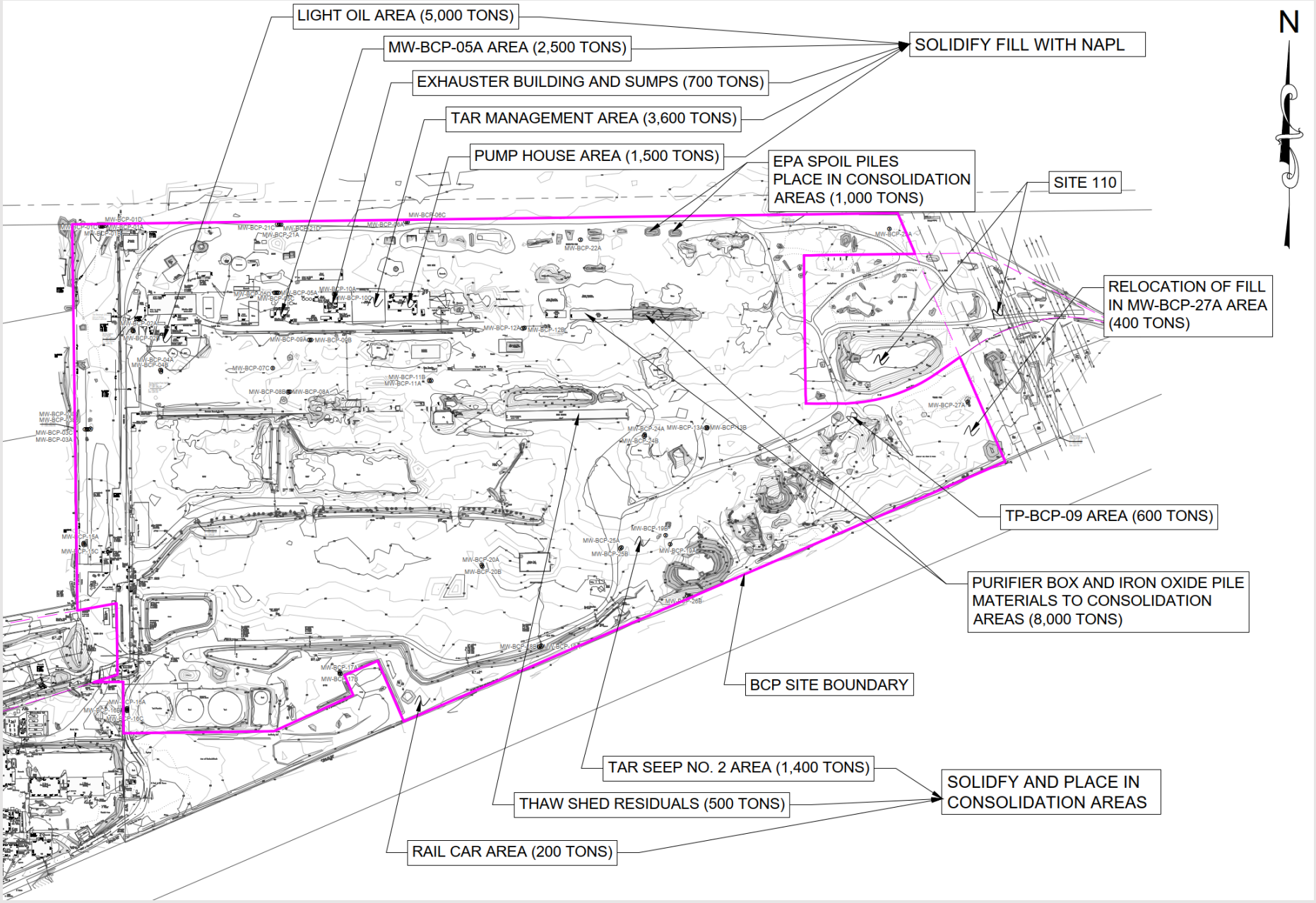
ALTERNATIVES SCORING

Alternative	Description	Evaluation Criteria: Threshold Criteria: Overall Protectiveness of the Public Health and the Environment	Threshold Criteria: Compliance with Standards Criteria and Guidance (SCGs)	Primary Balancing Criteria: Long-term Effectiveness and Permanence	Primary Balancing Criteria: Reduction of Toxicity, Mobility or Volume of Contamination through Treatment	Primary Balancing Criteria: Short-term Impact and Effectiveness: Conventional Evaluation	Primary Balancing Criteria: Short-term Impact and Effectiveness: Innovative and Sustainable Evaluation	Primary Balancing Criteria: Implementability	Primary Balancing Criteria: Cost Effectiveness	Modifying Considerations: Land Use	Modifying Considerations: Community Acceptance	Overall Score
	Weighting Factor >>	10	10	8	8	5	4	6	4	4	N.A.	
1	No Action	0	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
2	Source Containment	5	5	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
3	Source Containment, Groundwater Control	7	7	8	5	7	5	8	10	8	To be determined	419
4	Source Containment, NAPL Solidification, Groundwater Control	10	10	10	7	9	5	7	9	9	To be determined	515
5	Insitu Stabilization, Containment, Groundwater Control	10	10	10	9	9	5	7	8	10	To be determined	**531**
6	Ex Situ Thermal and Stabilization, Containment, Groundwater Control	10	10	10	9	7	2	4	4	8	To be determined	467
7	Source Removal, Containment, Groundwater Control	7	10	10	9	6	2	3	4	5	To be determined	414
8	Track 1 Remediation	5	10	10	10	2	2	0	0	10	To be determined	368

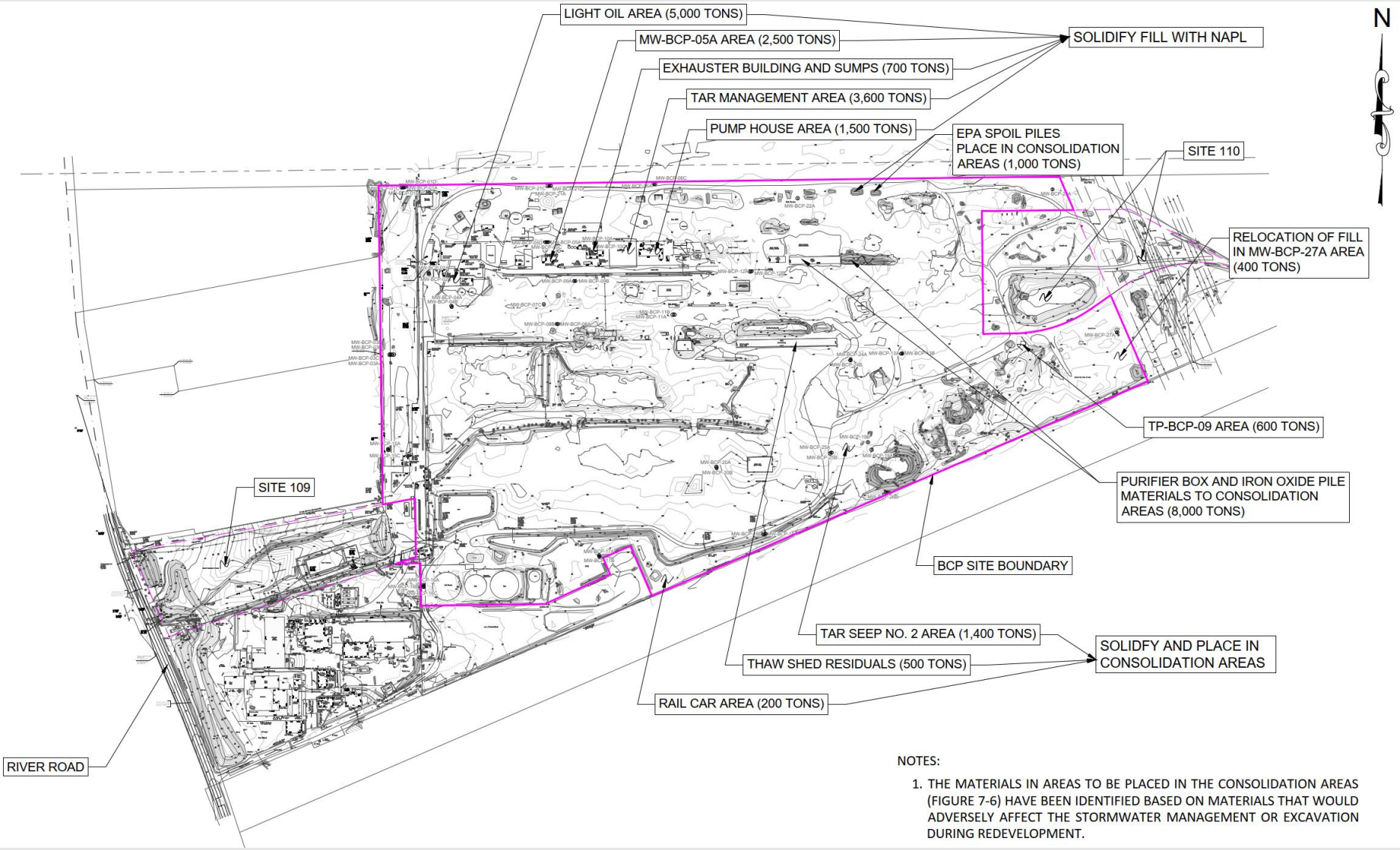
SPECIFIC ACTIONS (FIGURE 7-2)



SOLIDIFICATION AND CONSOLIDATION (FIGURE 7-5)



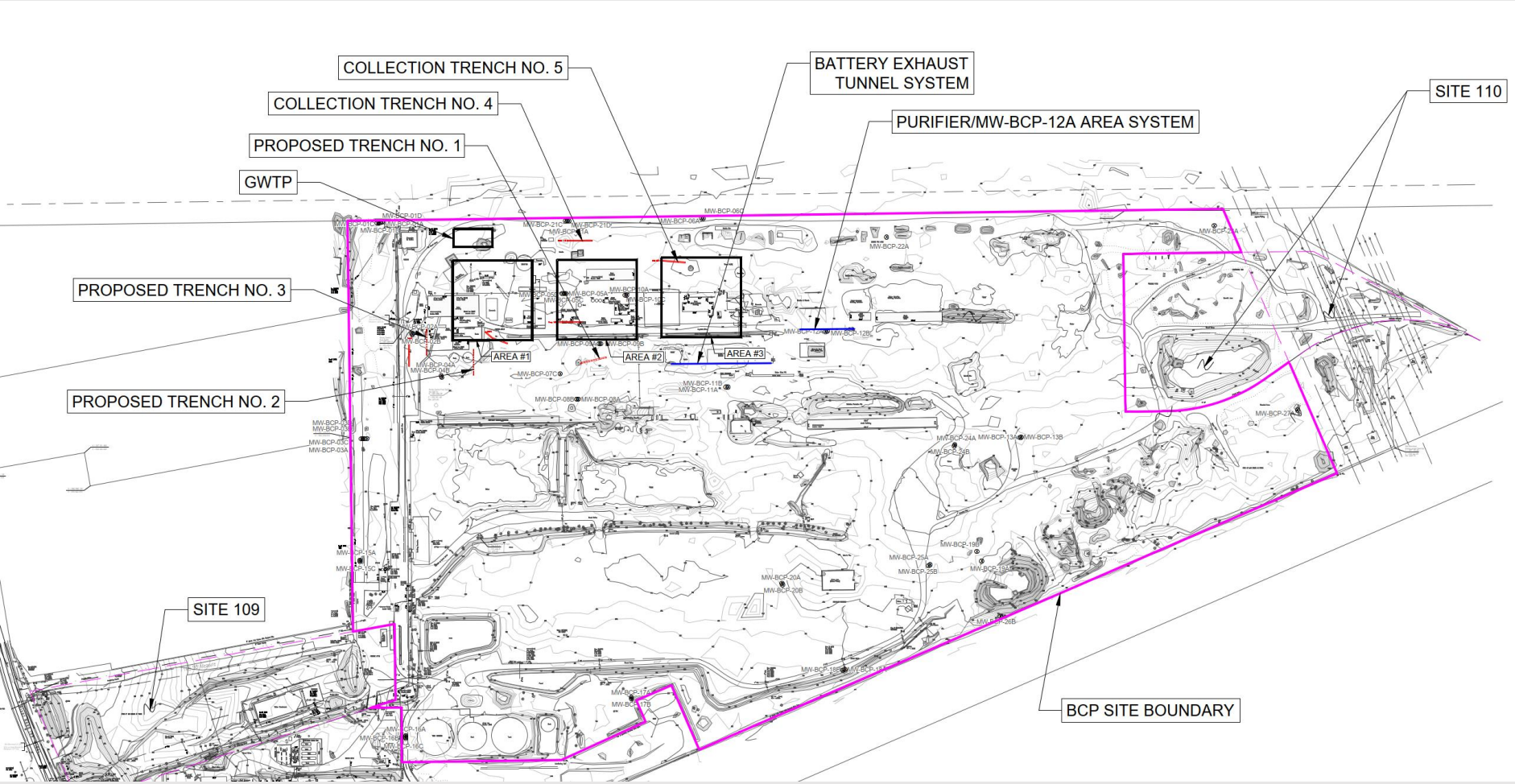
SOURCE CONTROL (FIGURE 7-5)



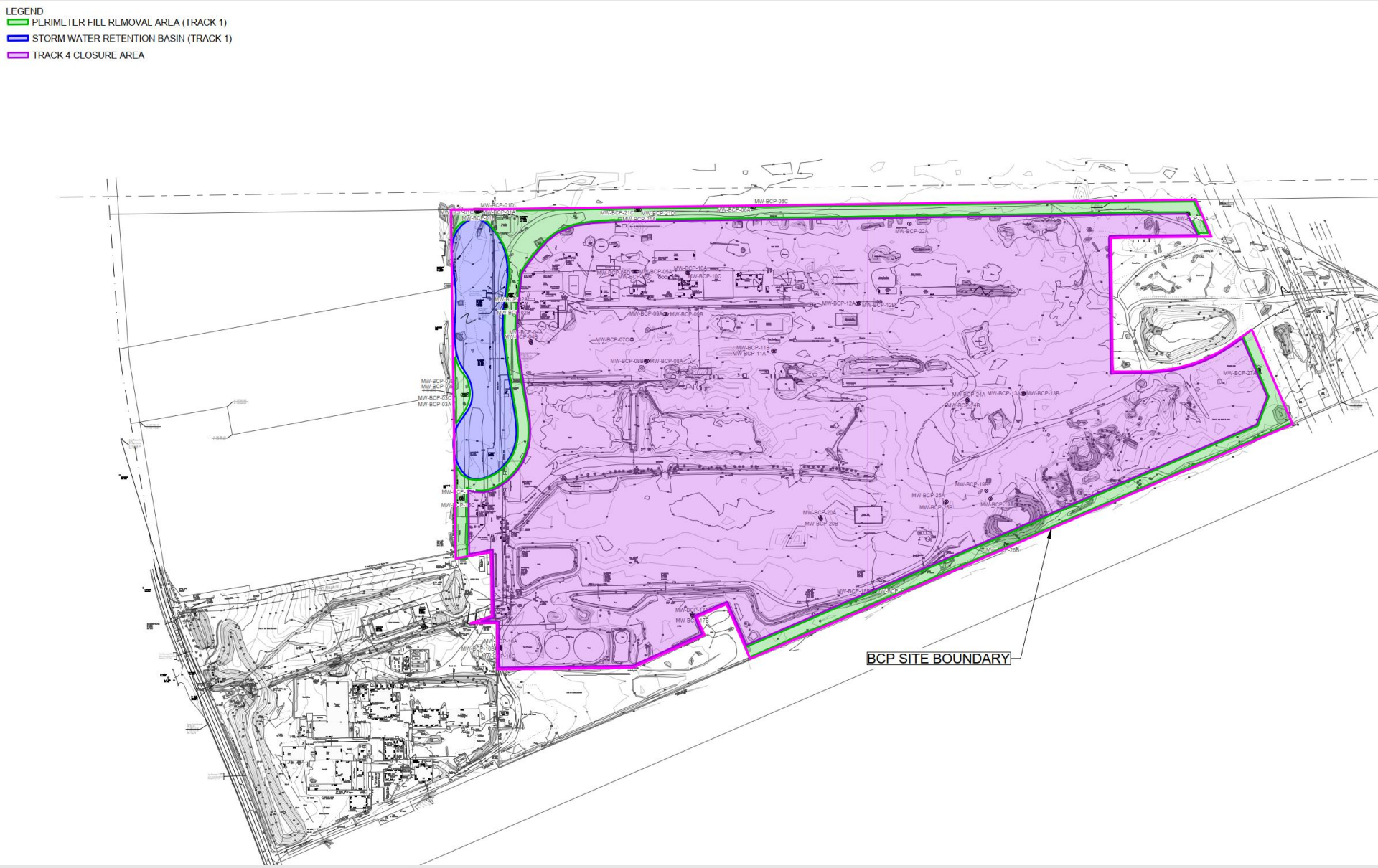
NOTES:

1. THE MATERIALS IN AREAS TO BE PLACED IN THE CONSOLIDATION AREAS (FIGURE 7-6) HAVE BEEN IDENTIFIED BASED ON MATERIALS THAT WOULD ADVERSELY AFFECT THE STORMWATER MANAGEMENT OR EXCAVATION DURING REDEVELOPMENT.

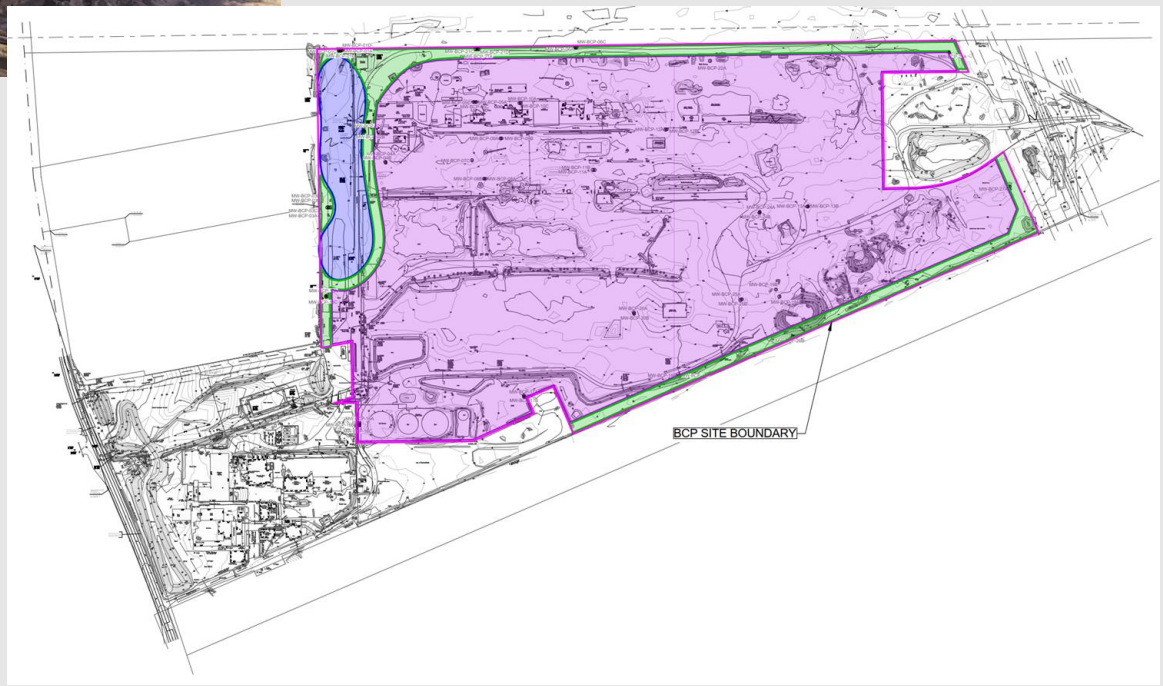
GROUNDWATER MANAGEMENT (FIGURE 7-9)



TRACK 1 AND 4 AREAS (FIGURE 7-1)



NEXT STEPS

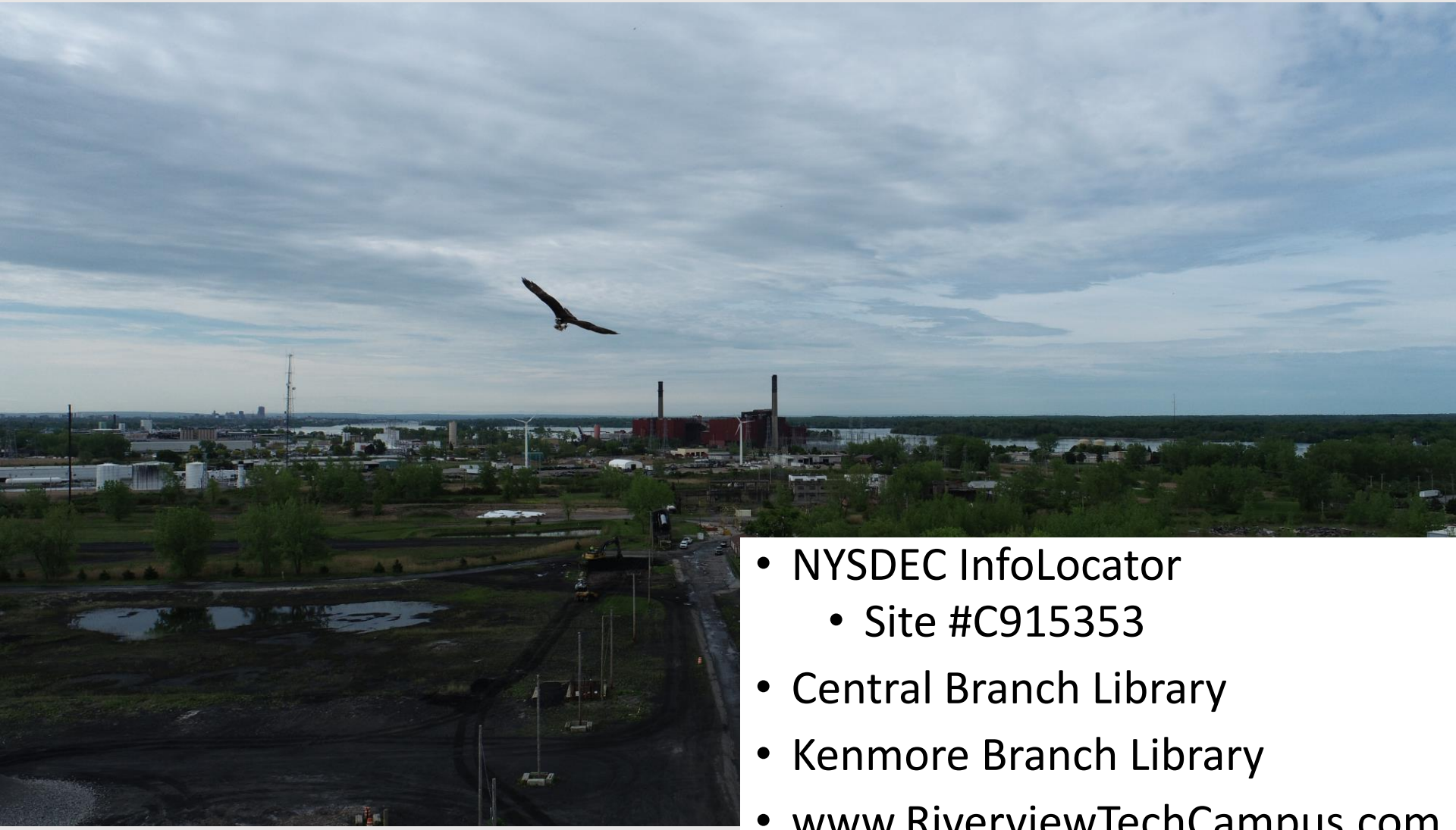


REMEMBER BROADWAY?

A Quick Trip Down the New Broadway

READY FOR THE FINAL REMEDY

Document Access



- NYSDEC InfoLocator
  - Site #C915353
- Central Branch Library
- Kenmore Branch Library
- www.RiverviewTechCampus.com

THANK YOU