



# Former Manufactured Gas Plant Remediation

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## Project Overview

- Team 16 partnered with Hailey and Aldrich (H&A) to design a proposed site remediation strategy for a former manufactured gas plant (MGP) at a confidential location.
- Based on data provided by H&A, groundwater is contaminated with volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs), and soil is contaminated with metals, cyanide, VOCs and PAHs.
- The site will be remediated to industrial closure standards provided by H&A as there are no plans for redevelopment of the property.
- A feasibility study was completed by Team 16, and the following remedial options are being recommended:
  - Contaminated Soil: Surface excavation of 2 ft of existing soil and installation of an impervious cap
  - Contaminated Groundwater: Installation of a pump-and-treat (P&T) system and permeable reactive barrier (PRB)

## Feasibility Study

Criteria:	Impervious Cap	Soil Excavation & Off-Site Disposal	Soil Vapor Extraction
Effectiveness	3	1	2
Short-term and Long-term Reliability	1	2	3
Implementability	1	2	3
Cost	1	3	2
Risks	2	1	3
Benefits	2	1	3
Timeliness	1	2	3
Effect on Non-pecuniary Interests	2	2	3
<b>Total score:</b>	<b>13</b>	<b>14</b>	<b>22</b>

Criteria:	Pump-and-Treat	Permeable Reactive Barrier	In Situ Chemical Oxidation
Effectiveness	3	1	2
Short-term and Long-term Reliability	1	2	3
Implementability	1	3	2
Cost	2	1	3
Risks	2	1	3
Benefits	2	1	2
Timeliness	2	3	1
Effect on Non-pecuniary Interests	3	1	2
<b>Total score:</b>	<b>16</b>	<b>13</b>	<b>18</b>

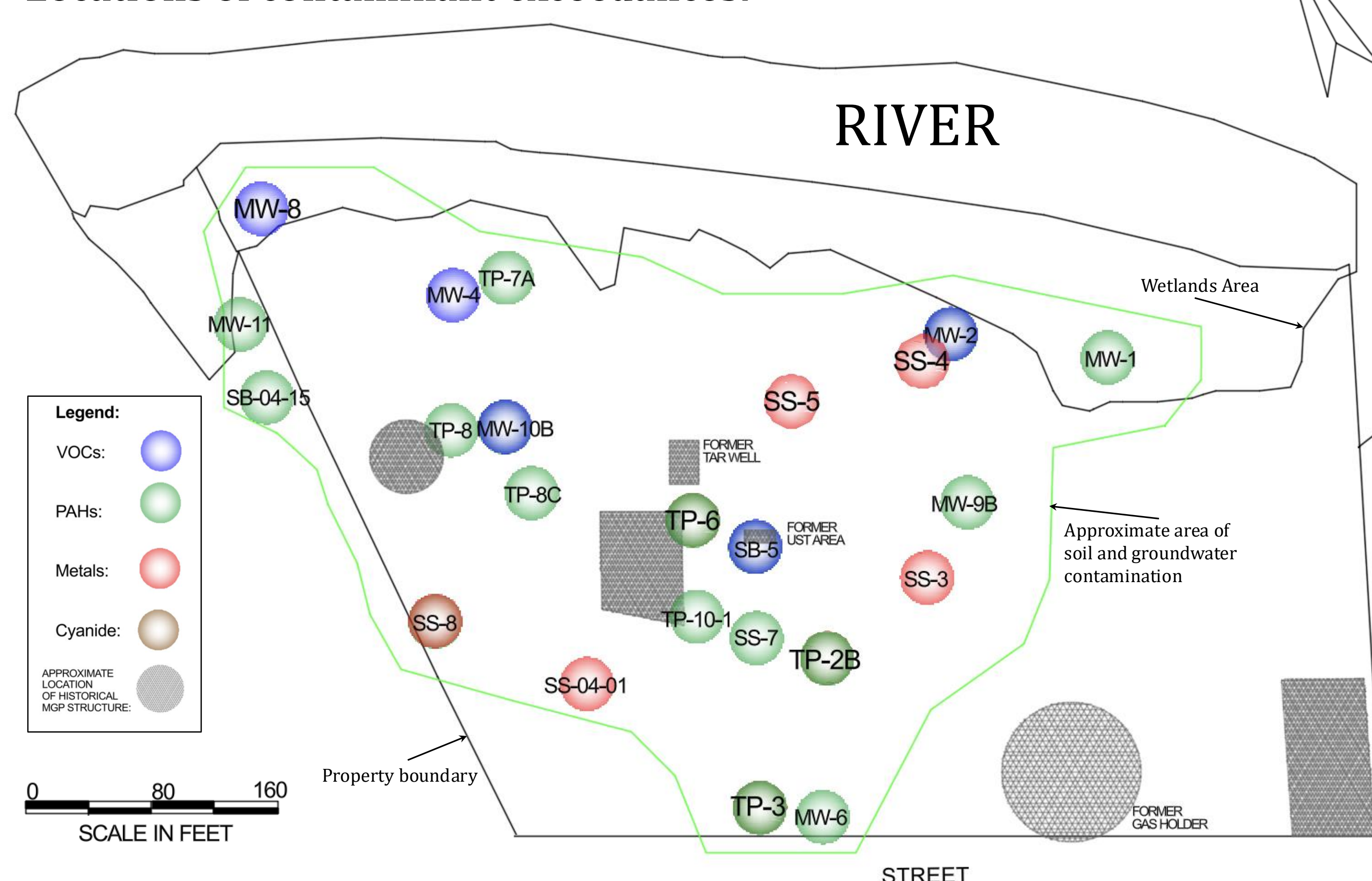
Most Favorable = 1, Least Favorable = 3

## Estimated Cost

Item	Unit Cost (\$)	Units	Quantity	Total (\$)
Impermeable Cap Installation	\$160	Per sq. yd.	9,484.22	\$1,517,475.20
Hazardous Soil Excavation & Disposal	\$460	Per ton	1,005.31	\$462,442.60
Non-hazardous Soil Excavation & Disposal	\$110	Per ton	7,530.69	\$828,375.90
Hydroseed	\$2	Per sq. yd.	9,484.22	\$18,968.44
P&T System Installation	\$210,000	LS	1	\$210,000
GW Extraction Wells	\$38,000	Per well	6	\$228,000
Permeable Reactive Barrier	\$823,914.60	LS	1	\$823,914.60
GW Monitoring Wells	\$2,000	Per well	3	\$6,000
<b>Total Estimated Project Cost (\$)</b>				<b>\$4,306,856.74</b>

## Site Characterization

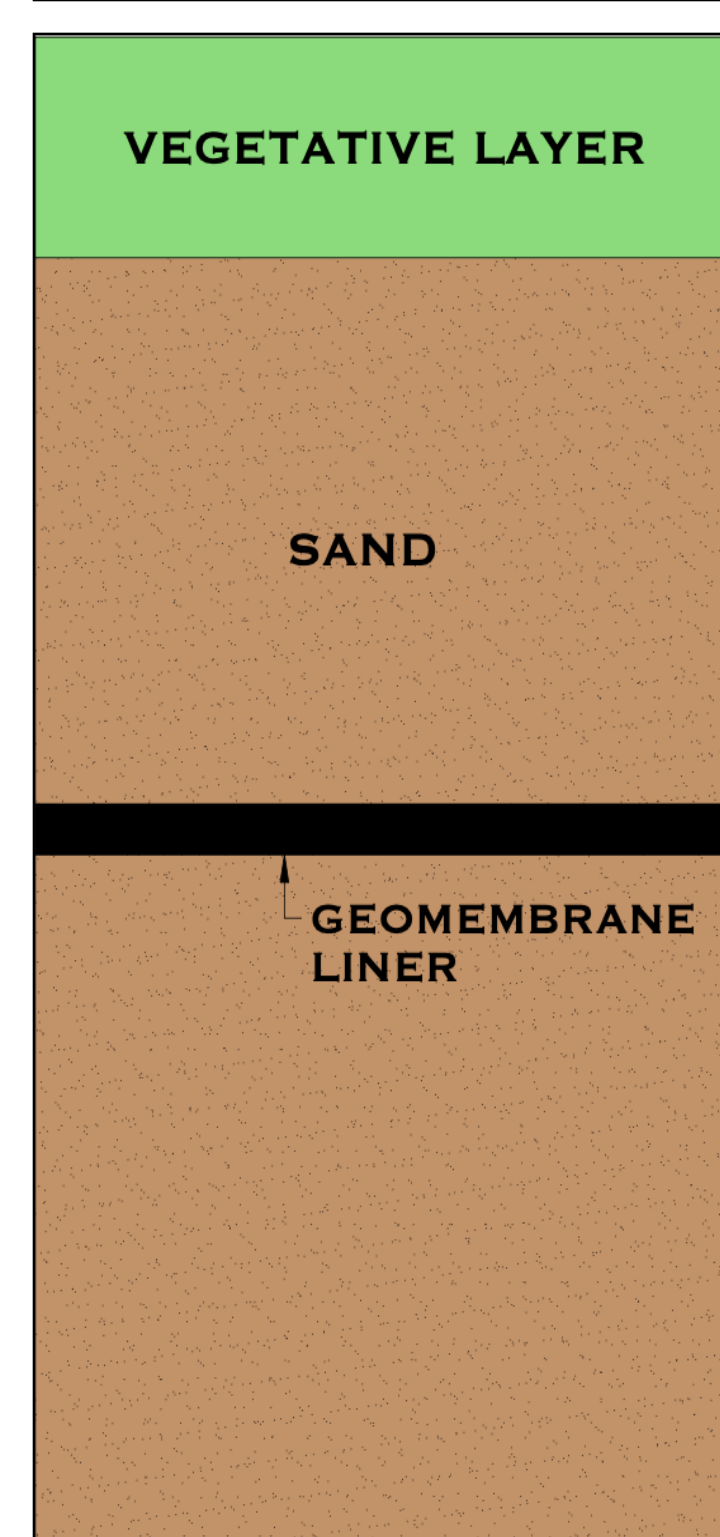
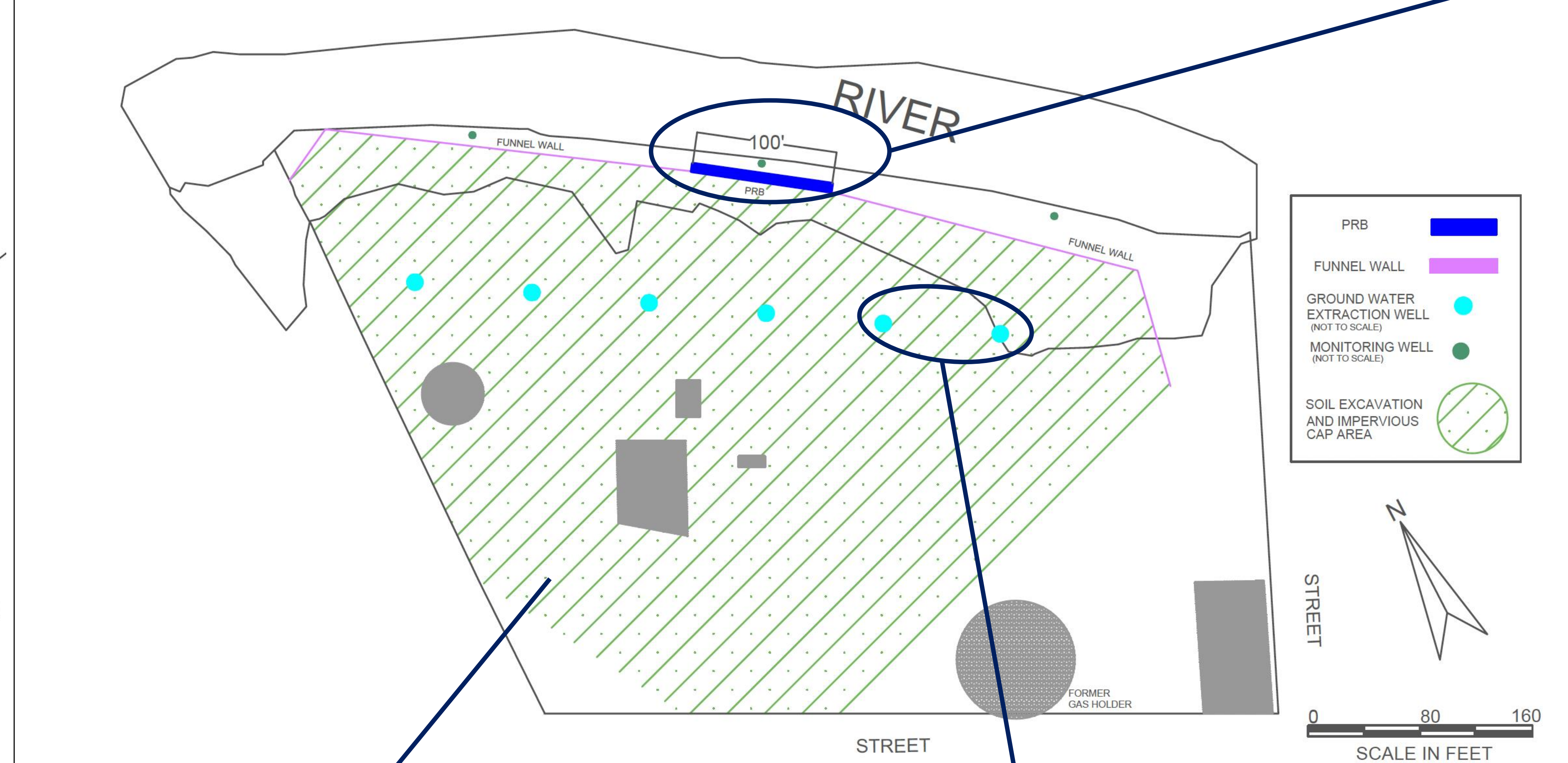
Locations of contaminant exceedances:



Surface Contamination (0-2 ft):	Subsurface Contamination (2-10 ft):	Deep Soil Contamination (10-22 ft/confining clay layer):	Groundwater Contamination (toward river):
<ul style="list-style-type: none"> <li>PAHs</li> <li>Metals</li> </ul>	<ul style="list-style-type: none"> <li>VOCs</li> <li>Cyanide</li> </ul>	<ul style="list-style-type: none"> <li>VOCs</li> <li>PAHs</li> </ul>	<ul style="list-style-type: none"> <li>VOCs</li> <li>PAHs</li> </ul>

## Remediation Recommendation

Approximate locations of proposed soil excavation and impervious cap installation, (6) groundwater extraction wells, funnel wall, PRB, and (3) monitoring wells



**Proposed Impervious Cap:**

- The top 2 ft of contaminated soil will be excavated and disposed of at an approved facility
  - Contaminants of concern are: PAHs and metals
- The proposed impervious cap will be installed in the excavated soil area to:
  - Prevent human and wildlife exposure to contaminated soils; and
  - Limit precipitation infiltration to reduce the potential for contaminant migration in soils to groundwater
- The proposed impervious cap will include a 60 mil HDPE geomembrane between two layers of sand; one for liquid drainage and one for gas venting. The cap will also include a topsoil layer that will be hydroseeded

**Proposed P&T System Design:**

- The pump-and-treat system will be the primary treatment method for the contaminated groundwater
  - Contaminants of concern are: PAHs and VOCs
- Six groundwater extraction wells will be installed perpendicular to groundwater flow to pump the contaminated groundwater to the surface
  - Each well will pump at a rate of 10 gpm
- The contaminated groundwater will then be sent to a treatment system that will include granular activated carbon (GAC) for PAHs removal and then to air stripping to remove VOCs
- After treatment, the water will be discharged into the municipality's sewer
- (3) Monitoring wells will be installed downgradient to verify groundwater capture