Clean Fill Barrier Placement - Direct contact standards for commercial/industrial and recreational land use incorporate a point-of-compliance that is comprised of the upper two feet of soil. An acceptable remedy for direct contact under the VAP is the placement of two or more feet or clean soil meeting the applicable direct contact standard. This approach is readily implemented, especially in lower lying areas that are likely to be subject to filling during site development anyway. A disadvantage is that the impacted soil will remain at the site beneath the clean fill barrier and is therefore available as a future source of potential human risk or environmental harm if the clean soil barrier is removed or altered during future development. The estimated cost of placement of two feet (8,015 tons) of clean soil over REM-1 through REM-8 at $26.00 per ton is $208,390. When ancillary costs (site clearing, mobilization, permitting, etc.) are factored into the cost and the oversight, reporting, and NFA preparation costs are also included, the total cost of this alternative is approximately **$365,390**.

Engineering Controls – Blocking or severing exposure pathways through implementation of engineering controls (e.g., pavement or building floors) is a cost effective and proven approach. If site development plans include large paved areas, such as parking lots, this approach is readily implementable. The primary disadvantage is that the contaminated soil remains at the site and is therefore available as a future source of potential human risk or environmental harm if the engineering control is removed or altered during future site work. An operation and maintenance plan (an agreement with the Ohio EPA) is required to be established and continued in perpetuity under this alternative in order to ensure continued protectiveness. The estimated cost of installing 72,143 square foot of pavement engineering control in Remediation Areas REM-1 through REM-8 at $5.00 per square foot is $360,715. Including other related costs such as site clearing, mobilization, permitting, oversight, reporting, and NFA preparation increases the total cost of this alternative to approximately **$517,715**.

Institutional Controls (Land Use Restrictions) – Land Use restrictions instituted via an Environmental Covenant with the Ohio EPA are a very cost effective and readily implemented means of addressing certain remediation issues. For example, a land use restriction prohibiting ground water use on the Property for potable purposes eliminates the ground water ingestion pathway. However, a land use restriction that would prevent potential contact with the lead-contaminated soil would need to restrict all access to that portion of the site and would render the Property unsuitable for most re-use purposes. The estimated cost of implementing institutional controls stringent enough to eliminate the known exposure pathways is estimated to cost **$120,000** including other related cost such as reporting and NFA preparation. This approach would likely render the site unusable for most redevelopment projects.

Climate Change Evaluation

The subject Property is adjacent to the Mahoning River and straddles Squaw Creek, therefore flood waters may be expected to some extent. However, in the event of more frequent flooding induced by climate change, each of the alternatives evaluated are anticipated to readily withstand the event. In the rare instance of flooding on the Property, the flow energy outside the banks of the river and creek is expected to be relatively low. As a result, deposition of creek sediments onto portions of the site is considered to be far more likely than scouring and displacement of the clean soil layer or engineering controls installed at the site.

Recommended Cleanup Alternative

The preferred remedial approach incorporates a combination of the above alternatives. Source removal via 'excavation and disposal' will be performed in Remediation Areas REM-3, REM-4, REM-6, REM-7, and REM-8. Placement of 2 to 4 feet of clean fill will be used to close the former lagoons (REM-1 and REM-2) and to block the direct-contact exposure pathway in REM-5. If an unexpectedly large amount of the contaminated soil in REM-3 through REM-8 is determined to be hazardous or if the contaminated soil volume exceeds the amount that can be cost-effectively removed and disposed, clean soil barrier placement and/or engineering controls will be implemented, as required, to complete the remedy. Institutional controls consisting of prohibiting ground water use and limiting specific portions of on-site land use to commercial/industrial activities will also be employed. This combination of alternatives will maximize the benefits of the remedial actions while maintaining good use of required resources (e.g., energy needed for remedial actions and prudent use of limited landfill space). Potential increased frequency of flooding related to climate change would have a minimal impact on this approach. As supported in the budget table for this project, the estimated total cost of the recommended cleanup is **$599,000**.

Mayor James Melfi
The City of Girard, Ohio

Signed: _____

Title: _____

Date: _____

Attachments

- *Site Location Map*
- *Identified Area Location Map*
- *Sampling Location Map*
- *Areas of Property Subject to Proposed Soil Remediation*

[This document prepared by Jim C. Smith (Ohio EPA Certified Professional No. 121) of Brownfield Restoration Group, LLC].