

ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES (ABCA)

US EPA BROWNFIELD CLEANUP GRANT PROGRAM

Northern Parcel - Sibley Mill

1717 Goodrich Street

Augusta, Georgia

Augusta Canal Authority
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1 Introduction and Background

The subject site is located at 1717 Goodrich Street in Augusta, Georgia, and is one parcel of a larger complex, consisting of a former industrial textile manufacturing site with several buildings totaling approximately 518,000 square feet. A Confederate powder works was located on this site prior to the textile mill being constructed. The site is 21.1 acres of land located between the Savannah River and the Augusta Canal. The site is divided into several tracts with the subject tract "A-2" measuring approximately 6.3 acres.

The Sibley Mill was constructed on the canal in 1881 and operated continuously until it closed in 2006. It is one of only four remaining textile structures remaining on the canal. Two of these have been successfully redeveloped as LEED certified buildings consisting of mixed use office, retail and residential. One is still being used as an active textile operation. The Sibley Mill is the most historically significant of the Augusta Mills from an architectural standpoint, and it has remained vacant and underutilized since it closed in 2006. Sibley and two of the other sites still receive their electrical power from on-site hydro-electric generating station powered by water from the Augusta Canal, making this site a true energy efficient facility.

The main obstacle to redevelopment of the Sibley Mill is the existence of hazardous substances on the site and in the remaining buildings. The Authority purchased the site on August 31, 2010, following the "All Appropriate Inquiry" process. This ABCA, once implemented, will allow the Augusta Canal Authority to continue the environmental cleanup that will ultimately lead to the redevelopment of the site.

Once the site is cleaned up, the site will be redeveloped and returned to productive use. Possible planned reuse for the site includes residential, green energy generation, job incubation, and/or office space. Redevelopment costs are estimated to exceed \$30 million dollars generating a 30 percent increase in local tax revenue, generating 175 jobs during construction and 20 permanent jobs after construction. Additionally one of the City's most historic resources will be preserved.

A Brownfield Corrective Action Plan (CAP) was prepared in June 2010 for the site and was subsequently approved by Georgia Environmental Protection Division (GAEPD). A

proposed Addendum to this CAP has been prepared that modifies the CAP to include incremental phases of excavation with confirmation sampling to remediate soils in Sibley Mill's Area F (addressed by this ABCA) to Soil Risk Reduction Standards ("SRRS") established by Georgia's Hazardous Site Reuse and Redevelopment Act (HSRRA).

1.1 Contamination Issues

Augusta Capital signed an option in May 2007 to purchase the site and subsequently completed the following environmental assessment/activities prior to cancelling the option in October 2008. During that time, the following assessments were completed:

- Phase 1 Environmental Site Assessment prepared by Advanced Environmental Options, Inc., Spartanburg, SC, June 2007.
- Phase II Environmental Site Assessment prepared by Advanced Environmental Options, Inc., Spartanburg, SC, October 2007.
- Soil Sampling Report, Alternative Construction and Environmental Solutions, Inc., Augusta, GA, August 2007.
- Review and Update of prior environmental assessments, Alternative Construction and Environmental Solutions, Inc., Augusta, GA, January 2008.
- UST Closure Report by Advanced Environmental Options, Inc., Spartanburg, SC, April 2008 for removal of a 3,000-gallon underground storage tank holding #6 fuel oil for backup heat.

The Augusta Canal Authority commissioned updates of the Phase I & Phase II Environmental Assessments to evaluate the potential for environmental liabilities on the subject site prior to the purchase of the property. American Environmental & Construction Services prepared the reports dated May 20, 2010. These reports were conducted to meet the requirements of All Appropriate Inquiry (AAI) by the Authority prior to purchase.

Potential environmental concerns identified on and in proximity to the subject site included:

- Caustic Tank & lines.
- Dye Tank & lines.
- #6 Fuel Oil Tank.

- PCBs.
- Pesticides and Herbicides.
- Soil contamination consisting of lead, mercury, cadmium, arsenic, and petroleum constituents.
- Lead paint.
- Asbestos.

Soil samples were collected from 83 locations and were analyzed for a variety of constituents, primarily volatile organic compounds (VOCs), Semi-volatile organic compounds (SVOCs), metals, pesticides and PCBs. The Phase II environmental assessment confirmed the existence of soil contamination including:

- Metals: arsenic, barium, cadmium, chromium, lead, and mercury
- Semi-Volatile Organic Compounds: Benzo{a} anthracene, Benzo {a} pyrene, Benzo {b} fluoranthene, Benzo {k} flouranthene, Chrysene, Dibenz {a} anthracene, Indeno {1, 2, 3-cd} pyrene, Phenanthrene, Acetophenone
- Volatile Organic Compounds: tetrachloroethene, trichlorethene, benzene, carbon disulfide
- Lead-based paint, asbestos and PCBs were found within some of the buildings above Type 1 Risk Reduction Standards at various locations on the site.

Most of these compounds have been attributed to the former textile operations with the exception of lead in the soil which can most probably be attributed to the use of the site as the Confederate States Powder Works operation during the Civil War.

Seven borings were converted to groundwater monitoring wells. Groundwater samples from each well have been tested for petroleum constituents associated with the on-site UST which was removed by the prior owner. These tests found VOCs in four locations and RCRA metals in two locations. These locations will be retested throughout the remediation process and it is anticipated that once the soil remediation is complete the groundwater samples will be clean.

Based on the findings of these assessments, a Prospective Purchaser Corrective Action Plan (PPCAP) and an application for approval as a Brownfield site, dated June 2010, was submitted to the GAEPD for approval under the Georgia HSRRA. On August 26,

2010, The GAEPD approved the PPCAP and confirmed that the site met the Brownfields qualifying criteria established under the Act on August 26, 2010.

1.2 Applicable Laws

The applicable law that relates to the cleanup of the site is Section 12-8-200 of the HSRRA under the authority of the Georgia Department of Natural Resources, Environmental Protection Division Hazardous Waste Management Branch, also known as the Georgia Brownfield Program.

Augusta Canal Authority (ACA), as grantee, has cleanup oversight responsibility. Specific day to day responsibility will be assigned to the Executive Director, Dayton L. Sherrouse, AICP who has over forty years of experience with administering state and federal grants. A consultant, who is a licensed environmental professional in the State of Georgia, will be contracted by ACA to perform the cleanup activities at Sibley Mill for ACA. GAEPD is the State agency that has reviewed and approved the CAP, will review and approve the CAP Addendum (Attachment A), and will review and approve the Compliance Status Report (CSR) documenting that the CAP was implemented as required by the State and the HSRRA.

Under the HSRRA, ACA will be responsible to remediate soil and source conditions. Remediation of pre-existing groundwater conditions is not required.

1.3 Cleanup Standards

As described in the proposed CAP Addendum, areas which exceed the SRRS will be subject to further corrective action in order to bring the site into compliance with the CAP Addendum upon approval. Additional confirmation/verification soil sampling to further define the vertical and/or horizontal limits of impacted soil on the property may also be required.

Since the future use of the Sibley Mill will include a mix of end uses, including possible residential, the applicant plans to comply with residential SRRS (Type 1 or 2).

1.4 Climate Change Considerations

The US EPA has directed Cleanup and Revolving Loan Fund grant recipients to “evaluate the resilience of the remedial options in light of reasonably foreseeable

changing climate conditions (e.g., sea level rise, increased frequency and intensity of flooding and/or extreme weather events, etc.).

The climate of the Southeast is uniquely warm and wet, with mild winters and high humidity. Based on an analysis by the South Carolina Department of Natural Resources, the average annual temperature has exhibited natural variation for most of the past century; however during the past 40 years annual average temperature has increased about 2° F. Changes in precipitation have occurred over the past 3 decades with increases in heavy downpours in many parts of the Southeast, even though much of the region has experienced moderate to severe droughts during the same period.

Current climate models predict continued warming across the Southeast with the rate of warming more than twice the current rate over the next 70 years. The frequency, duration and intensity of droughts are likely to continue to increase with higher average temperatures and a higher rate of evapotranspiration. Extreme weather events are of concern and it is postulated that climate change can influence the intensity and number of storm events.

Although supporting data are not entirely conclusive, the physics behind models are well understood. Warmer ocean temperatures potentially can provide more energy to hurricanes, leading to more intense storms. Increased precipitation patterns could have an adverse effect on flooding issues. High intensity rainfalls could lead to greater flooding hazards and mud - or landslides.

2 Analysis of Brownfield Cleanup Alternatives Considered

Under the proposed CAP Addendum for Area F, ACA is required to remove source material, and remediate soil to applicable SRRS. Alternatives for cleanup include the following four basic options (and combination thereof) for identified impacted soil areas:

1. In-place treatment,
2. Excavation, transport and proper disposal of soils off-site,
3. Implementation of institutional and/or engineering controls,
4. Combination of 2 & 3, or
5. No action.

The corrective action scope of work will include a combination of confirmation/verification soil and groundwater sampling and analysis and soil remediation. The intent of the work is to remove soil that exceeds the selected SRRS for constituents of concern (COCs) in order to eliminate the potential soil exposure pathway in relation to end users of the Sibley Mill site. Potential categories of analytes include VOCs, SVOCs, Metals, Pesticides and PCBs.

The Report of Environmental Investigation Activities and the approved CAP indicate the potential for numerous localized areas of soil that will exceed SRRS, possibly comprised of various COCs. As such, in Option 1, the development of an in-place treatment methodology tailored to each specific area and constituent that is above the SRRS is anticipated to be a more costly process, which would adversely affect the remediation schedule and is, therefore, generally considered impracticable in comparison to excavation, transport and proper off-site disposal.

Option 5 is not considered practical due to the presence of constituents above residential risk reduction standards and the intended redevelopment and reuse of the site for potential residential purposes.

Based on the available data, the site setting and the future use of the site, Option 2 excavation/off-site disposal is generally considered most practical to achieve SRRS compliance. Option 3, to implement engineering controls is considered feasible; however, the concurrence of the GA EPD would be required.

2.1 Resilience of Cleanup Alternatives to Predicted Climate Change

The site is potentially subject to flooding during extreme storm events since it is in a slight depression between Goodrich Street bordering the Augusta Canal and the Riverwatch parkway on the bluff bordering the Savannah River. However, the site is not in a FEMA designated flood zone, so any flooding would just be accumulated rainfall and not due to either the river or canal rising over the site. As such, inundation periods are expected to be short-lived subject to the rate of drainage from the site.

The In-Place Treatment alternative (1) is expected to be highly resilient to climate changes since the contaminants will be chemically altered and/or immobilized in the soils. However, there is the slight chance that periods of inundation could potentially reverse the fixation affinity of the contaminants to the soil by altering the soil chemistry.

The Excavation and Off-Site Disposal alternative (2) is expected to be highly resilient to climate changes since the sources of contamination are being removed from the site. However, because the excavations will be returned to grade with non-native soil, there is a slight potential for increased infiltration during storm events and resultant groundwater contamination. While groundwater contamination is not a risk driver on the site, this potential infiltration can be greatly diminished by proper engineering and soil compaction.

The Institutional and Engineering Controls alternative (3) is anticipated to be moderately resilient to climate changes. The site is relatively flat and is unlikely to have significant erosion during storm events that would expose new contaminants. However, modifications on the engineering controls may be required after each storm event to continue to be protective for human exposures.

The “No Action” Alternative (5) is anticipated to be moderately resilient to climate changes. The site is relatively flat and is unlikely to have significant erosion during extreme rain fall events. However, this alternative precludes any further development of the site as contaminants are exposed at the surface.

2.2 Effectiveness and Implementability of Proposed Cleanup

The scope of work described herein was outlined in the Report of Environmental Investigation Activities and is intended to meet the requirements outlined in the proposed CAP Addendum.

Soils that are identified as exceeding the selected SRRS will be excavated to the limits determined through delineation/confirmation sampling in accordance with the Report of Environmental Investigation Activities and the proposed CAP Addendum. Excavated material that requires off-site disposal will be placed directly into a roll-off box or stockpiled with appropriate cover and erosion control. The adequate treatment, removal or control of impacted soil areas will be confirmed through confirmation/verification sampling in order to demonstrate compliance. The material will be sampled and profiled prior to proper transport and off-site disposal.

The intent of the remediation of soil that exceeds the SRRS for any COC is to eliminate the exposure risk for the site end users after redevelopment. Potential categories of analytes include VOCs, SVOCs, Metals, Pesticides and PCBs.

Under Option 2, approximately 11,000 cubic yards of material will require excavation in order to remove the contaminated soils from Area F. The estimated cost for soil excavation, loading, transport and disposal estimate is \$110/cubic yard, including a contingency of 20%. Based on the estimated quantity of soil remediation in these areas at 11,000 cubic yards, the estimated total cost for this work is \$1,210,000.

Under Option 3, an engineered cap will be placed over an approximately 1.25-acre area. The estimated cost for site preparation, transport, placement, and compaction of clean material for the cap is estimated at \$50,000/acre, including a contingency of 20%. Based on the estimated area of contamination in Area F of 1.25 acres, the estimated total cost for this work is \$62,500.

Under Option 2, approximately 1,100 cubic yards of material will require excavation in order to remove the contaminated soils from the areas within Area F with the highest impacts. The estimated cost for soil excavation, loading, transport and disposal estimate is \$110/cubic yard, including a contingency of 20%. In addition, an engineered cap will be placed over an approximately 1.2-acre area. The estimated cost for site preparation,

transport, placement, and compaction of clean material for the cap is estimated at \$50,000/acre, including a contingency of 20%. Based on the estimated quantities, the estimated total cost for this work is \$181,000.

3 Estimated Cost and Schedule for Proposed Cleanup Alternatives

The table below summarizes the task, estimated budget, schedule and deliverables for these proposed cleanup alternatives.

Number	Brownfield Cleanup Alternative	Estimated Budget	Estimated Schedule	Deliverable
1.	In-place Treatment	\$400,000	120 days	Compliance Status Report
2.	Excavation, Transport and Off-site Disposal (11,000 cubic yards of soil)	\$1,285,000	90 days	Compliance Status Report
3.	Implementation of Engineering Control	\$137,500	180 days	Compliance Status Report
4.	Combination of 2 & 3	\$181,000	180 days	Compliance Status Report
5.	No Action	\$0.00	0 days	N/A

These opinions of cost to address soils impacted above applicable SRRS (i.e. soil remediation) have been estimated based on the information that is available at this time. The costs associated with confirmation/verification sampling, monitoring, and documentation of the remedial work is beyond the costs associated with the soil remediation work and/or the implementation engineering controls.

3.1 Reasonableness of Various Cleanup Alternatives Considered

Based on our experience, the various cleanup alternatives in this ABCA are considered reasonable and are consistent with and based on industry standards and practices for cleanup alternatives for these types of environmental conditions and these types of projects.

4 Selected Proposed Cleanup Approach

The primary selected proposed cleanup approach is Option 4, the combination of excavation, transport, and off-site disposal and the implementation of an engineered cap in Area F. This method was selected based on its effectiveness, implementability, and cost considering the anticipated limited extent of soil impacts, potentially at multiple locations within the boundaries of the site. Using a combination of the alternatives will allow the end-user to balance the maximum effectiveness within a reasonable budget. Additional institutional and/or engineering controls may be utilized to protect the public safety, if necessary.

4.1 Ability of Grantee to Implement the Proposed Alternatives

The Augusta Canal Authority is a special purpose government entity created by an act of the Georgia General Assembly in 1989. Similar to a development authority, the Augusta Canal Authority can enter into contracts and issue bonds. In 1999, the Legislature expanded the Authority from 5 to 12 members. Each Augusta Commissioner appoints one member; the Richmond County legislative delegation appoints the rest. In 1993, the Authority adopted a Master Plan that has guided the development and preservation of the Canal as a natural, historic and economic resource. Today, the Authority's mission is to execute the master plan. The Authority does not own the Canal, however, the Augusta Canal Authority is designated by Congress as the Management Entity for the Augusta Canal National Heritage Area. The Canal is public property owned the City of Augusta and the Authority operates under a Memorandum of Understanding with the City of Augusta (www.augustacanal.com)

As owner of the Sibley Mill, the Augusta Canal Authority has experience with administering and overseeing the overall planning, design and construction and redevelopment of the site of which the environmental remediation is a part. ACA is currently conducting environmental remediation on portions of the site.

Augusta Canal Authority, the grantee, has experience with administering grants. The oversight of the cleanup will be provided in-house by the Augusta Canal Authority. Specific day to day responsibility will be assigned to the Executive Director, Dayton L.

Sherrouse, AICP who has over forty years of experience with administering state and federal grants.