ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES

Former Lorden property
South Main Rail Yard
(Illinois Central Gulf Railroad)

Prepared For:

City of Rockford
425 East State Street
Rockford, Illinois 61104

Prepared by:

Fehr-Graham & Associates, LLC
1920 Daimler Road
Rockford, Illinois 61112

Project No.: 10-462

November 9, 2011

TABLE OF CONTENTS

1.0 INTRODUCTION

The South Main Rail Yard (Illinois Central Gulf Railroad) site is located on South Main Street, south of downtown Rockford, Illinois. The project is located across Kent Creek from the historic Tinker Swiss Cottage. The city of Rockford is located in Winnebago County, Illinois with major routes of transportation including Interstates 39 and 90, along with Route 20. Rockford has a population of approximately 152,000 residents according to the most recent Census and is the largest community in Winnebago County.

This Analysis of Brownfield Cleanup Alternatives (ABCA) is provided to outline the four (4) alternatives evaluated during the cleanup planning process for the former Lorden propery of South Main Rail Yard (Illinois Central Gulf Railroad) site. The cleanup activities are planned to be completed during Spring 2012 through Summer 2013.

2.0 SITE BACKGROUND

3.0 CONTAMINANTS AND EXPOSURE ROUTES

Contaminants of concern in the soil include cis-1,2-dichloroethylene, trichloroethylene, vinyl chloride, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, carbazole, 3,3'-dichlorobenzidine, dibenzo(a,h)anthracene, dibenzofuran, indeno(1,2,3-cd)pyrene, and naphthalene. The exposure routes for one or more of the aforementioned contaminants include the Soil Component of the Groundwater Ingestion Exposure Route, the Soil Inhalation Exposure Route, and the Soil Ingestion Exposure Route as determined in the Comprehensive Site Investigation Report.

The volatile organic compounds bromodichloromethane, chloroform, cis-1,2-dichloroethylene, trichloroethylene, vinyl chloride, along with the inorganics antimony, iron, lead, and manganese exist in groundwater exceeding Tier 1 Remediation Objectives. Kent Creek borders the former Depot property to the south and is the most limiting receptor. Tier 2 or Tier 3 modeling or both will be conducted with respect to the upper unconfined aquifer and bedrock aquifer to predict the extent of impacts in soil and groundwater and whether surface water can be expected to be impacted at concentrations greater than Derived Water Quality Criteria, and for areas not affected by Derived Water Quality Criteria, the maximum distance from the site to Tier 1 Remediation Objectives.

4.0 CLEANUP ALTERNATIVES

There are four cleanup alternatives applicable to the former Lorden property that could be used at this site to address the soil and groundwater contamination. These alternatives include:

4.1 Alternative 1 – No Action

The City does not address the contamination in any way at the site.

1. Effectiveness – this alternative does not address the contamination in any manner and, therefore, is not effective.
2. Implementability – implementing this alternative takes no effort on the part of the City, but considering the fact groundwater at the site has been affected at concentrations exceeding those established in 35 IAC, Part 620, an investigation into the source and extent, along with any required corrective action would be necessary.
3. Cost – there is no cost for inactivity.

4.2 Alternative 2 – Air Sparge/Soil Vapor Extraction, and Excavation for Engineered Barrier Placement

Conduct a pilot test using a portable trailer after installing a minimum of one air sparge well and one soil vapor extraction well to assess the feasibility of air sparge along with soil vapor extraction. Bedrock occurs within twenty feet of the ground surface in some areas on the former Lorden property along with the regional water table within the bedrock. The hydrogeology of this property is complicated by the existence of a buried channel with a local water table and where the greatest mass of contaminant occurs above the bedrock. The buried channel is mixed granular and cohesive sediments making

management of contaminated groundwater potentially problematic if excavation were pursued to depth of approximately fourteen feet below surface grade.

1. Effectiveness – This alternative can be very effective at removing contaminant mass both in vapor and dissolved phase. The engineered barrier is an effective corrective action used to exclude the Soil Ingestion Exposure Route and Soil Inhalation Exposure Route.

2. Implementability – The implementability of this alternative is logical in concept and can be accomplished with conventional equipment, however capitol costs can make this technology cost prohibitive considering it is generally low level volatile organic compounds with some inorganics. The engineered barrier would be completed once the soil and groundwater remediation has been completed and would consist asphalt or three feet of clean material or a combination of both and would be accomplished by material core out, waste characterization, and disposal, or establishment of a Soil Management Zone to minimize landfill disposal costs.

3. Cost – The cost to conduct a pilot test and install a simple air sparge and soil vapor extraction system, along with material core out, disposal, and engineered barrier placement is estimated as follows.

Capital Costs	$ 350,000.00
Excavation/Engineered Barrier	$ 350,000.00
Professional/Technical Services	$ 50,000.00
Sampling/O&M	$ 75,000.00
TOTAL	$ 825,000.00

4.3 Alternative 3 – Chemical Oxidation with Excavation for Engineered Barrier Placement

Conduct a pilot test using a vendor supplied chemical oxidant to assess the feasibility and verify the absence of mobilized metals resulting from pH changes.

1. Effectiveness – Most if not all volatile organic compound contamination occurs near or below the local water table on the former Lorden property. By chemically oxidizing soil in this area with expected low oxidant mass requirements, the groundwater will correspondingly also be oxidized. The engineered barrier would remove the exposure routes for the remaining soil impacts by use of asphalt or three feet of clean material or a combination of both. Groundwater treatment by chemical oxidation is a well known method to address VOC contamination in groundwater. In addition, an engineered barrier is an effective corrective action used to exclude the Soil Ingestion Exposure Route and Soil Inhalation Exposure Route.

2. Implementability – The material core out, landfill disposal or establishment of a Soil Management Zone, and placement of an engineered barrier consisting of asphalt or three feet of clean material would be across the entire site, which is straightforward. Injection of the chemical oxidant is expected as straightforward however it may be explored to conduct soil oxidant demand testing prior to oxidant dosing to maximize the stochiometric requirements and in consideration of the shallow carbonate bedrock.

3. Cost – The cost to conduct chemical oxidation and material core out, disposal, and engineered barrier placement is estimated as follows.

Capital Costs	$ 50,000.00
Excavation/Engineered Barrier	$ 350,000.00
Professional/Technical Services	$ 20,000.00
Sampling/Monitoring	$ 15,000.00
TOTAL	$ 435,000.00

4.4 Alternative 4 – Tier 3 Approach using Numerical Flow Model and Excavation for Engineered Barrier Placement

Setup, run, calibrate, perform sensitivity analysis, and calculate error for a groundwater flow model to predict the maximum distance contaminants present attenuate to Tier 1 Remediation Objectives assuming steady state.

1. Effectiveness – This alternative does not remediate the contaminants, but instead attempts to prove based on the receptors present zero risk remains. This is accomplished by collecting site specific hydrogeologic data and developing a conceptual model with corresponding layers. The engineered barrier is an effective corrective action used to exclude the Soil Ingestion Exposure Route and Soil Inhalation Exposure Route, and would be beneficial to include in the flow model as an impermeable or semi-permeable barrier to layer 1.

2. Implementability – The implementability of this alternative is complex in procedure and requires an exhaustive effort to derive a water balance and align calculated hydraulic head to measured hydraulic head. This approach would be cost problematic if at the completion of the flow model it was determined corrective action was necessary, however minimal or comprehensive in extent. The engineered barrier would be completed once the soil and groundwater remediation has been completed and would consist asphalt or three feet of clean material or a combination of both and would be accomplished by material core out, waste characterization, and disposal, or establishment of a Soil Management Zone to minimize landfill disposal costs.

3. Cost – The cost to develop, run, calibrate, perform sensitivity analysis, and calculate error, along with material core out, disposal, and engineered barrier placement is estimated as follows.

Excavation/Engineered Barrier	$ 350,000.00
Professional/Technical Services*	$ 50,000.00
Sampling/Field Testing	$ 50,000.00

TOTAL	$ 450,000.00

*Note: Does not preclude possibility corrective action may be necessary after development of groundwater flow model.

5.0 RECOMMENDATION

Based on the analysis presented in the previous section, the third alternative addresses the contaminant impact, but is also compatible with the end use and is less costly. Therefore, the third alternative is recommended.

6.0 DECISION DOCUMENT

A decision document will be issued at the close of the 30-day public comment period with additional details on the selected alternative.