FYN PAINT & LACQUER CO., INC.
230 KENT AVENUE
KINGS COUNTY, NEW YORK

REMEDIAL ACTION WORK PLAN
NYSDEC BCP SITE NO. C224154

Prepared For
Kent Riverview LLC

March 2016

Prepared By:

LBG ENGINEERING SERVICES, P.C.
Professional Environmental & Civil Engineers
4 Westchester Park Drive, Suite 175
White Plains, NY  10604
(914) 694-5711
CERTIFICATIONS

I, William Beckman, am currently a registered professional engineer licensed by the State of New York. Working on behalf of Kent Riverview LLC (KR), I have primary direct responsibility for oversight of the implementation of the remedial program for the Fyn Paint & Lacquer Co., Inc. site (the “Site”) listed in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) as Index No. C224154-02-15, Site No. C224154.

I certify that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

I certify that this RAWP has a plan for transport and disposal of all soil, fill, fluids and other material removed from the property under this Plan, and that all transport and disposal will be performed in accordance with all local, State and Federal laws and requirements. All exported material will be taken to facilities licensed to accept this material in full compliance with all Federal, State and local laws.

I certify that all information and statements in this certification are true. I understand that a false statement made herein is punishable as a Class “A” misdemeanor, pursuant to Section 210.45 of the Penal Law.

NYS Professional Engineer # Date Signature

Note: include PE stamp

It is a violation of Article 145 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CERTIFICATIONS</td>
<td>i</td>
</tr>
<tr>
<td>EXECUTIVE SUMMARY</td>
<td>ES-1</td>
</tr>
<tr>
<td>1.0 INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Site Location and Description</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Description of Surrounding Property</td>
<td>2</td>
</tr>
<tr>
<td>1.3 Contemplated Redevelopment Plan</td>
<td>3</td>
</tr>
<tr>
<td>1.4 Site History</td>
<td>3</td>
</tr>
<tr>
<td>1.4.1 Past Uses and Ownership</td>
<td>3</td>
</tr>
<tr>
<td>1.4.2 Sanborn Fire Insurance Maps</td>
<td>3</td>
</tr>
<tr>
<td>1.5 Geological Conditions</td>
<td>4</td>
</tr>
<tr>
<td>2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS</td>
<td>5</td>
</tr>
<tr>
<td>2.1 Con Edison Property (214 Kent Avenue) Summary of Remedial Investigations</td>
<td>5</td>
</tr>
<tr>
<td>2.2 Fyn Property (230 Kent Avenue) Summary of Remedial Investigations</td>
<td>6</td>
</tr>
<tr>
<td>2.2.1 Fyn UST Closure Activities</td>
<td>6</td>
</tr>
<tr>
<td>2.2.2 LBG Environmental Investigation Activities</td>
<td>7</td>
</tr>
<tr>
<td>2.2.2.1 Surrounding Properties History</td>
<td>8</td>
</tr>
<tr>
<td>2.2.2.2 2001 Subsurface Investigation</td>
<td>8</td>
</tr>
<tr>
<td>2.2.2.3 2003 Site Inspection</td>
<td>10</td>
</tr>
<tr>
<td>2.2.2.4 2003 Subsurface Investigation</td>
<td>14</td>
</tr>
<tr>
<td>2.2.2.5 2004 Groundwater Monitoring</td>
<td>16</td>
</tr>
<tr>
<td>2.2.2.6 2005-2008 Subsurface Investigation</td>
<td>17</td>
</tr>
<tr>
<td>2.2.2.6.1 Monitoring Well Installation and Soil Sampling</td>
<td>17</td>
</tr>
<tr>
<td>2.2.2.6.2 Abandonment of the Micro-Wells on the Con Edison Parking Lot</td>
<td>18</td>
</tr>
<tr>
<td>2.2.2.6.3 Soil Quality Analysis</td>
<td>18</td>
</tr>
<tr>
<td>2.2.2.6.4 2006 Groundwater Pumping Test</td>
<td>19</td>
</tr>
<tr>
<td>2.2.2.6.5 Groundwater Sampling and Analysis (2005-2009)</td>
<td>20</td>
</tr>
<tr>
<td>2.2.2.6.6 Soil Vapor Survey (2005)</td>
<td>21</td>
</tr>
<tr>
<td>2.2.2.6.7 2007 Soil Vapor Intrusion Investigation</td>
<td>22</td>
</tr>
<tr>
<td>2.3 Public Health And Environmental Assessments</td>
<td>25</td>
</tr>
<tr>
<td>2.3.1 Qualitative Human Health Exposure Assessment</td>
<td>25</td>
</tr>
<tr>
<td>2.3.2 Contaminant Fate and Transport</td>
<td>27</td>
</tr>
<tr>
<td>2.3.2.1 Soil</td>
<td>28</td>
</tr>
<tr>
<td>2.3.2.2 Groundwater</td>
<td>29</td>
</tr>
<tr>
<td>2.3.2.3 Soil Vapor</td>
<td>29</td>
</tr>
<tr>
<td>2.3.3 Fish and Wildlife Remedial Impact Analysis</td>
<td>30</td>
</tr>
<tr>
<td>2.4 Significant Threat</td>
<td>30</td>
</tr>
<tr>
<td>2.5 Contamination Conditions</td>
<td>30</td>
</tr>
<tr>
<td>2.5.1 Conceptual Model of Site Contamination</td>
<td>31</td>
</tr>
<tr>
<td>2.5.2 Description of Areas of Concern</td>
<td>31</td>
</tr>
<tr>
<td>2.6 Interim Remedial Measures</td>
<td>31</td>
</tr>
<tr>
<td>2.6.1 2007 IRM Extraction and Treatment System</td>
<td>31</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS

(continued)

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.6.2</td>
<td>RCRA Closure Activities</td>
<td>34</td>
</tr>
<tr>
<td>2.6.3</td>
<td>2014 Implementation of the NYSDEC Approved Remedial Design</td>
<td>35</td>
</tr>
<tr>
<td>2.6.3.1</td>
<td>Sub-Slab Depressurization System</td>
<td>36</td>
</tr>
<tr>
<td>2.6.3.2</td>
<td>Combined DPE and AS System</td>
<td>36</td>
</tr>
<tr>
<td>2.6.3.3</td>
<td>Groundwater Extraction and Treatment System</td>
<td>37</td>
</tr>
<tr>
<td>2.6.3.4</td>
<td>Remedial System Operational Effectiveness Evaluation</td>
<td>38</td>
</tr>
<tr>
<td>2.7</td>
<td>Remedial Action Standards, Criteria and Guidance (SCG)</td>
<td>39</td>
</tr>
<tr>
<td>2.8</td>
<td>Remedial Action Objectives</td>
<td>40</td>
</tr>
<tr>
<td>2.8.1</td>
<td>Groundwater</td>
<td>40</td>
</tr>
<tr>
<td>2.8.2</td>
<td>Soil</td>
<td>41</td>
</tr>
<tr>
<td>2.8.3</td>
<td>Soil Vapor</td>
<td>41</td>
</tr>
<tr>
<td>3.0</td>
<td>ALTERNATIVES ANALYSIS</td>
<td>42</td>
</tr>
<tr>
<td>3.1</td>
<td>Remedial Alternatives</td>
<td>42</td>
</tr>
<tr>
<td>3.1.1</td>
<td>Alternative 1 – Track 1 Cleanup for Unrestricted Site Use</td>
<td>43</td>
</tr>
<tr>
<td>3.1.2</td>
<td>Alternative 2 – Track 4 Restricted Use Cleanup for Commercial Site Use</td>
<td>45</td>
</tr>
<tr>
<td>3.2</td>
<td>Remedy Selection Evaluation Criteria</td>
<td>47</td>
</tr>
<tr>
<td>3.2.1.1</td>
<td>Alternative 1</td>
<td>47</td>
</tr>
<tr>
<td>3.2.1.2</td>
<td>Alternative 2</td>
<td>48</td>
</tr>
<tr>
<td>3.2.2</td>
<td>Compliance with Standards, Criteria and Guidance</td>
<td>49</td>
</tr>
<tr>
<td>3.2.2.1</td>
<td>Alternative 1</td>
<td>49</td>
</tr>
<tr>
<td>3.2.2.2</td>
<td>Alternative 2</td>
<td>49</td>
</tr>
<tr>
<td>3.2.3</td>
<td>Long-Term Effectiveness and Permanence</td>
<td>49</td>
</tr>
<tr>
<td>3.2.3.1</td>
<td>Alternative 1</td>
<td>49</td>
</tr>
<tr>
<td>3.2.3.2</td>
<td>Alternative 2</td>
<td>50</td>
</tr>
<tr>
<td>3.2.4</td>
<td>Reduction of Toxicity, Mobility and Volume</td>
<td>50</td>
</tr>
<tr>
<td>3.2.4.1</td>
<td>Alternative 1</td>
<td>50</td>
</tr>
<tr>
<td>3.2.4.2</td>
<td>Alternative 2</td>
<td>51</td>
</tr>
<tr>
<td>3.2.5</td>
<td>Short-Term Impacts and Effectiveness</td>
<td>51</td>
</tr>
<tr>
<td>3.2.5.1</td>
<td>Alternative 1</td>
<td>51</td>
</tr>
<tr>
<td>3.2.5.2</td>
<td>Alternative 2</td>
<td>52</td>
</tr>
<tr>
<td>3.2.6</td>
<td>Implementability</td>
<td>52</td>
</tr>
<tr>
<td>3.2.6.1</td>
<td>Alternative 1</td>
<td>53</td>
</tr>
<tr>
<td>3.2.6.2</td>
<td>Alternative 2</td>
<td>53</td>
</tr>
<tr>
<td>3.2.7</td>
<td>Cost-Effectiveness</td>
<td>53</td>
</tr>
<tr>
<td>3.2.7.1</td>
<td>Alternative 1</td>
<td>53</td>
</tr>
<tr>
<td>3.2.7.2</td>
<td>Alternative 2</td>
<td>54</td>
</tr>
<tr>
<td>3.2.8</td>
<td>Land Use</td>
<td>55</td>
</tr>
<tr>
<td>3.2.8.1</td>
<td>Alternative 1</td>
<td>55</td>
</tr>
<tr>
<td>3.2.8.2</td>
<td>Alternative 2</td>
<td>55</td>
</tr>
<tr>
<td>3.2.8.2.1</td>
<td>Current Use</td>
<td>55</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS

## (continued)

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2.8.2.2 Consistency with Zoning Laws</td>
<td>55</td>
</tr>
<tr>
<td>3.2.8.2.3 Brownfield Opportunity Areas</td>
<td>56</td>
</tr>
<tr>
<td>3.2.8.2.4 Applicable Land Use Plans</td>
<td>56</td>
</tr>
<tr>
<td>3.2.8.2.5 Surrounding Property Uses</td>
<td>57</td>
</tr>
<tr>
<td>3.2.8.2.6 Citizen Participation</td>
<td>58</td>
</tr>
<tr>
<td>3.2.8.2.7 Environmental Justice Concerns</td>
<td>58</td>
</tr>
<tr>
<td>3.2.8.2.8 Land Use Designations</td>
<td>59</td>
</tr>
<tr>
<td>3.2.8.2.9 Population Growth Patterns</td>
<td>59</td>
</tr>
<tr>
<td>3.2.8.2.10 Accessibility to Existing Infrastructure</td>
<td>60</td>
</tr>
<tr>
<td>3.2.8.2.11 Proximity to Cultural Resources</td>
<td>60</td>
</tr>
<tr>
<td>3.2.8.2.12 Proximity to Natural Resources</td>
<td>60</td>
</tr>
<tr>
<td>3.2.8.2.13 Offsite Groundwater Impacts</td>
<td>61</td>
</tr>
<tr>
<td>3.2.8.2.14 Proximity to Floodplains</td>
<td>61</td>
</tr>
<tr>
<td>3.2.8.2.15 Geography and Geology of the Site</td>
<td>61</td>
</tr>
<tr>
<td>3.2.8.2.16 Current Institutional Controls</td>
<td>61</td>
</tr>
<tr>
<td>3.2.9 Community Acceptance</td>
<td>62</td>
</tr>
<tr>
<td>3.2.9.1 Alternative 1</td>
<td>62</td>
</tr>
<tr>
<td>3.2.9.2 Alternative 2</td>
<td>62</td>
</tr>
<tr>
<td>3.3 Alternatives Analysis Conclusion</td>
<td>63</td>
</tr>
<tr>
<td>3.4 Comparative Analysis Of Remedial Alternatives</td>
<td>63</td>
</tr>
<tr>
<td>3.5 Alternatives Analysis Conclusion</td>
<td>63</td>
</tr>
<tr>
<td>3.6 Selected Cleanup Track</td>
<td>65</td>
</tr>
<tr>
<td>3.7 Contemplated Redevelopment Plan</td>
<td>67</td>
</tr>
<tr>
<td>4.0 ELEMENTS OF THE SELECTED REMEDY</td>
<td>69</td>
</tr>
<tr>
<td>4.1 Remedial Design</td>
<td>70</td>
</tr>
<tr>
<td>4.2 Excavation</td>
<td>71</td>
</tr>
<tr>
<td>4.2.1 Building Demolition</td>
<td>71</td>
</tr>
<tr>
<td>4.2.2 Structural Support and Soil Excavation</td>
<td>71</td>
</tr>
<tr>
<td>4.3 Groundwater Remedial Activities</td>
<td>74</td>
</tr>
<tr>
<td>4.3.1 Groundwater Extraction and Treatment</td>
<td>74</td>
</tr>
<tr>
<td>4.3.2 In-Situ Chemical Oxidation</td>
<td>75</td>
</tr>
<tr>
<td>4.3.3 Remedial System Transfer</td>
<td>75</td>
</tr>
<tr>
<td>4.4 Vapor Intrusion Assessment</td>
<td>76</td>
</tr>
<tr>
<td>4.5 Contingency Remedial Elements - Track 2 Cleanup</td>
<td>76</td>
</tr>
<tr>
<td>4.5.1 Institutional Controls</td>
<td>77</td>
</tr>
<tr>
<td>4.5.2 Site Management Plan</td>
<td>78</td>
</tr>
<tr>
<td>5.0 REMEDIAL ACTION PROGRAM</td>
<td>80</td>
</tr>
<tr>
<td>5.1 Governing Documents</td>
<td>80</td>
</tr>
<tr>
<td>5.1.1 Site-Specific Health &amp; Safety Plan (HASP)</td>
<td>80</td>
</tr>
<tr>
<td>5.1.2 Quality Assurance Project Plan (QAPP)</td>
<td>80</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>5.1.3 Construction Quality Assurance Plan (CQAP)</td>
<td>82</td>
</tr>
<tr>
<td>5.1.3.1 Responsibilities and Authority Organization</td>
<td>82</td>
</tr>
<tr>
<td>5.1.3.2 Qualifications of the Quality Assurance Personnel</td>
<td>82</td>
</tr>
<tr>
<td>5.1.3.3 Monitoring Testing and Frequency</td>
<td>83</td>
</tr>
<tr>
<td>5.1.3.4 Sampling Activities</td>
<td>83</td>
</tr>
<tr>
<td>5.1.3.5 Requirements for Project Coordination Meetings</td>
<td>84</td>
</tr>
<tr>
<td>5.1.3.6 Reporting Requirements</td>
<td>84</td>
</tr>
<tr>
<td>5.1.3.7 Final Documentation Retention</td>
<td>84</td>
</tr>
<tr>
<td>5.1.4 Excavation Plan</td>
<td>84</td>
</tr>
<tr>
<td>5.1.5 Storm-Water Pollution Prevention Plan (SWPPP)</td>
<td>85</td>
</tr>
<tr>
<td>5.1.6 Community Air Monitoring Plan (CAMP)</td>
<td>85</td>
</tr>
<tr>
<td>5.1.7 Contractors Site Operations Plan (SOP)</td>
<td>85</td>
</tr>
<tr>
<td>5.1.8 Citizen Participation Plan</td>
<td>86</td>
</tr>
<tr>
<td>5.2 General Remedial Construction Information</td>
<td>87</td>
</tr>
<tr>
<td>5.2.1 Project Organization</td>
<td>87</td>
</tr>
<tr>
<td>5.2.1.1 NYSDEC</td>
<td>87</td>
</tr>
<tr>
<td>5.2.1.2 Owner/Developer/Volunteer</td>
<td>88</td>
</tr>
<tr>
<td>5.2.1.3 Project Personnel Structuring</td>
<td>88</td>
</tr>
<tr>
<td>5.2.1.3.1 Principal-In-Charge</td>
<td>88</td>
</tr>
<tr>
<td>5.2.1.3.2 Remedial Engineer</td>
<td>89</td>
</tr>
<tr>
<td>5.2.1.3.3 Project Manager</td>
<td>90</td>
</tr>
<tr>
<td>5.2.1.3.4 Project Field Supervisor</td>
<td>90</td>
</tr>
<tr>
<td>5.2.1.3.5 Health and Safety Officer</td>
<td>91</td>
</tr>
<tr>
<td>5.2.2 Remedial Action Construction Schedule</td>
<td>92</td>
</tr>
<tr>
<td>5.2.3 Work Hours</td>
<td>92</td>
</tr>
<tr>
<td>5.2.4 Site Safety and Security</td>
<td>92</td>
</tr>
<tr>
<td>5.2.5 Traffic Control</td>
<td>93</td>
</tr>
<tr>
<td>5.2.6 Contingency Plan</td>
<td>94</td>
</tr>
<tr>
<td>5.2.7 Worker Training and Monitoring</td>
<td>94</td>
</tr>
<tr>
<td>5.2.8 Agency Approvals</td>
<td>94</td>
</tr>
<tr>
<td>5.2.9 NYSDEC BCP Signage</td>
<td>95</td>
</tr>
<tr>
<td>5.2.10 Pre-Construction Meeting with NYSDEC</td>
<td>95</td>
</tr>
<tr>
<td>5.2.11 Emergency Contact Information</td>
<td>96</td>
</tr>
<tr>
<td>5.2.12 Remedial Action Costs</td>
<td>96</td>
</tr>
<tr>
<td>5.3 Site Preparation</td>
<td>96</td>
</tr>
<tr>
<td>5.3.1 Mobilization</td>
<td>96</td>
</tr>
<tr>
<td>5.3.2 Erosion and Sedimentation Controls</td>
<td>96</td>
</tr>
<tr>
<td>5.3.3 Construction Entrance(s)</td>
<td>97</td>
</tr>
<tr>
<td>5.3.4 Utility Marker and Easements Layout</td>
<td>97</td>
</tr>
<tr>
<td>5.3.5 Baseline Certified/Licensed Site Survey</td>
<td>97</td>
</tr>
<tr>
<td>5.3.6 Sheeting and Shoring</td>
<td>98</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS (continued)

<table>
<thead>
<tr>
<th>Paragraph</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3.7</td>
<td>100</td>
</tr>
<tr>
<td>5.3.8</td>
<td>100</td>
</tr>
<tr>
<td>5.3.9</td>
<td>102</td>
</tr>
<tr>
<td>5.3.10</td>
<td>103</td>
</tr>
<tr>
<td>5.3.11</td>
<td>104</td>
</tr>
<tr>
<td>5.4</td>
<td>105</td>
</tr>
<tr>
<td>5.4.1</td>
<td>105</td>
</tr>
<tr>
<td>5.4.2</td>
<td>106</td>
</tr>
<tr>
<td>5.4.3</td>
<td>106</td>
</tr>
<tr>
<td>5.4.4</td>
<td>107</td>
</tr>
<tr>
<td>5.4.5</td>
<td>107</td>
</tr>
<tr>
<td>5.4.6</td>
<td>107</td>
</tr>
<tr>
<td>6.0</td>
<td>108</td>
</tr>
<tr>
<td>6.1</td>
<td>111</td>
</tr>
<tr>
<td>6.2</td>
<td>111</td>
</tr>
<tr>
<td>6.2.1</td>
<td>112</td>
</tr>
<tr>
<td>6.2.2</td>
<td>114</td>
</tr>
<tr>
<td>6.2.2.1</td>
<td>115</td>
</tr>
<tr>
<td>6.2.2.2</td>
<td>116</td>
</tr>
<tr>
<td>6.2.3</td>
<td>117</td>
</tr>
<tr>
<td>6.2.4</td>
<td>119</td>
</tr>
<tr>
<td>6.3</td>
<td>120</td>
</tr>
<tr>
<td>6.4</td>
<td>121</td>
</tr>
<tr>
<td>6.4.1</td>
<td>122</td>
</tr>
<tr>
<td>6.4.2</td>
<td>124</td>
</tr>
<tr>
<td>6.4.3</td>
<td>125</td>
</tr>
<tr>
<td>6.4.4</td>
<td>126</td>
</tr>
<tr>
<td>6.4.5</td>
<td>127</td>
</tr>
<tr>
<td>6.4.6</td>
<td>128</td>
</tr>
<tr>
<td>6.4.7</td>
<td>130</td>
</tr>
<tr>
<td>6.4.7.1</td>
<td>130</td>
</tr>
<tr>
<td>6.4.7.2</td>
<td>131</td>
</tr>
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<td>6.4.7.3</td>
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</tr>
<tr>
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<td>134</td>
</tr>
<tr>
<td>6.4.7.7</td>
<td>135</td>
</tr>
<tr>
<td>6.4.7.8</td>
<td>136</td>
</tr>
<tr>
<td>6.4.7.9</td>
<td>136</td>
</tr>
<tr>
<td>6.4.8</td>
<td>136</td>
</tr>
</tbody>
</table>
6.4.9  Appropriate Groundwater Control ..................................................... 137
6.4.10  Fluids Management ..................................................................... 137
6.4.11  Demarcation .............................................................................. 138
6.4.12  Import of Backfill Soil From Offsite Sources .............................. 138
6.4.13  Backfill of Excavation Areas ....................................................... 142
6.4.14  Storm-Water Pollution Prevention ............................................... 144
6.4.15  Contingency Plan .................................................................... 144
6.4.16  Community Air Monitoring Plan (CAMP) ................................... 145
6.4.17  Odor, Dust and Nuisance Control ................................................. 146
  6.4.17.1  Odor Control Plan ............................................................... 146
  6.4.17.2  Dust Control Plan ................................................................ 147
  6.4.17.3  Other Nuisances .................................................................. 147

7.0  RESIDUAL CONTAMINATION TO REMAIN ON-SITE ..................... 148
  7.1  Track 1 Cleanup ........................................................................ 148
  7.2  Track 2 Cleanup ........................................................................ 148

8.0  ENGINEERING CONTROLS .............................................................. 149
  8.1  Engineering Control Systems .......................................................... 149
    8.1.1  Cover System ....................................................................... 149
    8.1.2  Waterloo® Hydraulic Barrier ................................................... 149
    8.1.3  In-Situ Chemical Oxidation (ISCO) Groundwater Treatment ....... 149
  8.2  Criteria For Completion ................................................................ 151
    8.2.1  Cover System ....................................................................... 151
    8.2.2  Waterloo® Hydraulic Barrier ................................................... 151
    8.2.3  In-Situ Chemical Oxidation (ISCO) Groundwater Treatment ....... 151

9.0  INSTITUTIONAL CONTROLS ............................................................ 152
  9.1  Environmental Easement ............................................................... 152
  9.2  Site Management Plan ................................................................. 156

10.0  FINAL ENGINEERING REPORT .................................................. 159
  10.1  Certifications ........................................................................... 160

11.0  SCHEDULE .................................................................................. 163

APPENDICES
  (on CD)
LIST OF APPENDICES
(at end of report)

Appendix

A  Fyn Paint Property Metes and Bounds & Sanborn Fire Insurance Maps
B  Geologic Logs, Well Construction Diagrams and Geologic Cross-Sections
C  Historical Groundwater/Product Elevation Tables, Contour Maps
D  Groundwater Pumping Test Field Data
E  Historical Soil Quality Tables
F  Historical Groundwater Quality Tables
G  Historical Indoor Air and Soil Vapor Data
H  NYSDEC Spill Reports
I  Material Safety Data Sheets
J  2003 Site Inspection
K  Dissolved-Phase Plume Extent Figures
L  NYSDEC Soil Cleanup Objectives and GW Quality Standards
M  Health and Safety Plan (HASP)
N  IRM Equipment Specifications and Information
O  Cost Estimate (Track 1 Cleanup Remedial Actions and OM&M)
P  Surrounding Property Information (Zoning)
Q  Property Shark Report
R  Resumes of Key Personnel
S  Quality Assurance Project Plan (QAPP)
T  Storm Water Pollution Prevention Plan (SWPPP)
U  Community Air Monitoring Plan (CAMP)
V  Citizen Participation Plan (CPP)
W  NYSDEC BCP Project Sign Template
X  Waterloo® Hydraulic Barrier Installation Specifications
Y  Liquid Boot® Brownfield Membrane
Z  NYSDEC Environmental Easement Template Specifications
# LIST OF TABLES
(at end of report)

<table>
<thead>
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<tr>
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# LIST OF FIGURES
(at end of report)

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<tbody>
<tr>
<td>1</td>
<td>Site Map</td>
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<tr>
<td>2</td>
<td>1999 UST Abandonment and Sampling Location Map</td>
</tr>
<tr>
<td>3</td>
<td>Soil Boring and Groundwater Monitoring Well Location Map</td>
</tr>
<tr>
<td>4</td>
<td>2003/2005 Soil Vapor and Ambient Air Sample Location Map</td>
</tr>
<tr>
<td>5</td>
<td>2007 Soil Vapor Intrusion Sample Location Map</td>
</tr>
<tr>
<td>6</td>
<td>2007 IRM Treatment System Location and Piping Layout</td>
</tr>
<tr>
<td>7</td>
<td>Groundwater Extraction Well Piping Cross-Section</td>
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<tr>
<td>8</td>
<td>Product Recovery Well Piping Cross-Section</td>
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<tr>
<td>9</td>
<td>Typical Trench Specifications – Cross-Section</td>
</tr>
<tr>
<td>12</td>
<td>2013 IRM System Trailer Location</td>
</tr>
<tr>
<td>13</td>
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<td>2013 IRM System Location and Piping Layout</td>
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<tr>
<td>15</td>
<td>2013 Remediation System DPE and GW Extraction Process Flow Diagram</td>
</tr>
<tr>
<td>16</td>
<td>2013 Remediation System Air Sparge Process Flow Diagram</td>
</tr>
<tr>
<td>17</td>
<td>Alpha/Numeric Work Area Identification Map</td>
</tr>
<tr>
<td>18</td>
<td>NYCDOT Approved Truck Routes</td>
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## ACRONYMS AND ABBREVIATIONS

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**ACRONYMS AND ABBREVIATIONS**  
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Kent Riverview LLC (KR and/or the “Volunteer”) has applied and been accepted into the Brownfield Cleanup Program (BCP) with the New York State Department of Environmental Conservation (NYSDEC) as a Volunteer to remediate the property located at 230 Kent Avenue, Brooklyn New York (hereinafter referred to as the “Site”). The Site is recorded under the Brownfield Cleanup Agreement (BCA) with a Site Name of Fyn Paint & Lacquer Co., Inc., Site Number C224154 and Index Number C224154-02-15.

LBG Engineering Services, P.C. (LBG) on behalf of KR, has prepared the following Remedial Action Work Plan (RAWP) for the Site. Based on the historical remedial investigations and remedial actions completed at the Site, LBG concludes that sufficient information has been generated to enable KR to implement this RAFP as a Volunteer in the BCP without the need to conduct additional investigations.

This RAFP summarizes the nature and extent of contamination as determined from data gathered during past remedial investigations and remedial actions performed on the Site and surrounding properties between 1999 and 2014. It provides an evaluation of Remedial Action alternatives following a Track 1 cleanup and a Track 4 cleanup, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. As this project is following a Track 1 remediation plan with all contaminated material to be removed from the Site, a significant threat determination and a Fish and Wildlife Resources Impact Analysis have not been undertaken by applicant.
Site Information

The Site is located in an area of Brooklyn (Williamsburg) which was predominantly industrial and commercial with lesser amounts of residential properties throughout. Recent developments of the surrounding properties with new residential buildings will determined the change in zoning from the manufacturing/industrial zoning to residential use. The Site is located at the intersection of Kent Avenue and North First Street and consists of a partial two story industrial/warehouse building. The Site was historically an active paint and lacquer manufacturing facility operated by Fyn Paint and Lacquer Co., Inc. (Fyn), as has been the case since at least 1951. While an active manufacturing facility, the Site was active RCRA facility, and a large quantity generator of hazardous waste (EPA ID #001270867). A site map is presented as figure 1.

Summary of Findings of Historical Remedial Investigations

Environmental investigations were performed at the Site and surrounding properties by Consolidated Edison, Inc. (Con Edison) via its representatives (Lawler, Matusky & Skelly Engineers, LLP (LMS) and subsequently HDR, Inc.), and representatives for Fyn (Fenley & Nicol Environmental and LBG). This RAWP was developed based on the results of the following activities performed from 1996-2014: historical remedial investigation activities (characterizing soil quality, groundwater quality, soil vapor and indoor air quality and delineating the extent of non-aqueous phase liquid at the Site); interim remedial measures completed at the Site to provide active recovery of Light Non-Aqueous Phase Liquid (LNAPL) and remediation of contaminated groundwater; and implementation of remedial actions including UST closure activities, and installation and operation of an active remedial system.

Based on the historical environmental investigations performed by Con Edison and Fyn, the extents and concentrations of onsite and offsite contamination has been comprehensively characterized. As a result of the historical property uses in the area, the following subsurface contamination is present at the Site:
1. Light Non-Aqueous Phase Liquid (LNAPL)

The historical observations have identified LNAPL (primarily consisting of acetone, toluene, and xylene) as primarily being localized to the northeast corner of the Site, as well as within the adjacent Con Edison facility parking lot adjacent to the Site. Historical observations of LNAPL have also been observed to the south-southeast of the Site in offsite groundwater monitoring wells. The continued presence of LNAPL in the subsurface supports the need for active extraction measures as part of the remedy.

2. Soil Contamination

Volatile organic compound (VOC) soil contamination consisting mainly of toluene and xylenes was detected at its highest concentrations (during the drilling of soil borings and construction of groundwater monitoring wells) in the northeast corner of the Site, as well as within the adjacent Con Edison parking lot with lesser amounts of contamination in the soil to the southwest of the Site. Additionally, toluene and xylene were detected in soil collected from upgradient of the Site (to the southeast). While several metals and semi volatile organic compounds (SVOCs) were detected above Unrestricted Soil Cleanup Objectives (SCOs), SCOs for protection of groundwater, the concentrations were below the Restricted Use Soil Cleanup Objectives (RUSCOs) for Commercial Use. Concentrations of contaminants in soil (some of which is representative of historic fill) support the need for either soil excavation or installation and maintenance of a Site cover as part of the remedy.

3. Groundwater Contamination

The Site represents a continuing source area for dissolved phase VOC contamination. The dissolved phase VOCs in groundwater beneath the Site and surrounding properties correlates with the distribution of VOC contamination recorded in soil samples collected throughout the Site and offsite. The highest
concentrations of dissolved VOCs detected in the groundwater are located beneath the Site and offsite on the adjacent Con Edison property (north), extending downgradient to the west. VOC concentrations in groundwater analyzed from locations outside of the block encompassing the Site are, on average, several orders of magnitude lower than those beneath the Site. Concentrations of VOCs in groundwater support the need for either Site containment and source removal, or operation, maintenance and monitoring (OM&M) of engineering controls (ECs) and institutional controls (ICs) as part of the remedy.

4. **Soil Vapor Contamination**

The types and relative concentrations of VOCs detected in soil vapor samples collected from beneath the Site and surrounding properties correlate with the distribution of the soil and groundwater VOC contamination. Furthermore, there are additional compounds of concern detected in the soil vapor both onsite and surrounding the Site (namely chlorinated solvents) which do not correlate with the soil and/or groundwater contamination observed as part of the environmental investigations and with the chemicals historically used by Fyn at the Site. The extents and concentrations of soil vapor contamination beneath the Site indicates that activities are required to mitigate the potential for soil vapor intrusion of VOCs to negatively impact the indoor air quality at the Site.

**Remedial Action Objectives**

Due to the contamination present beneath the Site as well as the proposed Cleanup Track and contemplated Redevelopment Plan, the following Remedial Action Objectives (RAOs) have been identified for this Site.

**Groundwater:**

- RAOs for Public Health Protection
  - Prevent ingestion of groundwater containing contaminant concentrations exceeding drinking water standards.
o Prevent contact with, or inhalation of, volatiles emanating from contaminated groundwater.

- RAOs for Environmental Protection
  o Remove the source of ground or surface water contamination.

Soil:

- RAOs for Public Health Protection
  o Prevent ingestion/direct contact with contaminated soil.
  o Prevent inhalation of or exposure to, contaminants volatilizing from contaminants in soil.

- RAOs for Environmental Protection
  o Prevent migration of site-related contaminants that would result in groundwater or surface water contamination.

Soil Vapor:

- RAOs for Public Health Protection
  o Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into the building at the Site.

Alternatives Analysis

The continued presence of LNAPL surrounding the Site, the residual soil contamination and the resulting dissolved phase and vapor phase VOC beneath the Site indicate that corrective action is required to mitigate VOC contaminant exposure at the Site. Leggette, Brashears & Graham, Inc. (LBG) and LBG Engineering Services, P.C. (LBGES) completed an Alternatives Analysis (AA) report for the Site to evaluate available remedial alternatives to address residual subsurface contamination present beneath the Site. As part of the AA, a detailed evaluation of two (2) potential remedial alternatives was completed. The two proposed remedial alternatives evaluated are:

1. Alternative 1 - Track 1 Cleanup for Unrestricted Site Use;
2. Alternative 2 – Track 4 Cleanup for Restricted Commercial Site Use.

The two potential remedial alternatives were evaluated for achieving the remediation of residual soil vapor as well as being protective of human health and the environment relative to
residual soil vapor and groundwater contamination beneath the Site. The remedial alternatives were individually and comparatively evaluated with respect to the following nine criteria as defined in 6 New York Codes, Rules and Regulations (NYCRR) Part 375:

1. Overall Protection of Human Health and the Environment;
2. Compliance with Standards, Criteria and Guidance;
3. Long-Term Effectiveness and permanence;
4. Reduction of Toxicity, Mobility and Volume;
5. Short-Term Impacts and Effectiveness;
6. Implementability;
7. Cost-effectiveness;
8. Land Use; and,

Of note, community acceptance can only be determined following the required public comment period. Following a comparative evaluation of the above listed criteria, Alternative 1 (a Track 1 Cleanup) is proposed as the most appropriate method for remediation of the Site. Implementation of Alternative 1 as the Site remedy will be effective at protecting human health and the environment from residual contamination currently present beneath the Site.

**Summary of the Remedy**

In order to achieve these goals and to facilitate redevelopment of the Property for the currently zoned as well as proposed future uses, the remedial action would include the following tasks:

- New York City Department of Buildings (NYCDOB) and associated permitting activities associated with the building demolition activities.
- Operation of the NYSDEC approved remediation system as an interim remedial measure (IRM) during the review/approval process for the Track 1 Cleanup RAWP. The IRM will remain operational until such time that the building demolition activities are ready to commence, at which time the system will be used
to treat extracted groundwater associated with construction dewatering performed to facilitate the contaminated soil excavation.

- Implementation of plans for the protection of onsite workers, community, and environment during remediation and construction activities.
- Demolition of the current building and offsite disposal of demolition debris.
- Installation of structural excavation support.
- Excavation of the contaminated soil present within the entire property boundary to a depth of approximately 15 feet.
- Waste material loading for hauling and offsite disposal.
- Construction dewatering and treatment of impacted groundwater (as required).
- Verification sampling to confirm excavation extents achieve Unrestricted Use SCOs.
- Relocation of the IRM dual-phase extraction (DPE) system and transfer of OM&M responsibility to the NYSDEC (or designated representative).
- Backfilling of excavated areas to development grade with certified-clean material meeting Unrestricted Use SCOs or virgin, native crushed stone.
- Associated decontamination activities.
- Building reconstruction activities.
- Installation of soil vapor monitoring points and post-remedy soil vapor monitoring to confirm the effectiveness of the remedy for mitigation of soil vapor contamination.
- Preparation and submission of the Final Engineering Report (FER).

Attainment of Unrestricted SCOs for the completed excavation would eliminate the requirement for any ECs or ICs at the Site. After completing excavation activities, the Site will be backfilled with certified clean fill meeting unrestricted SCOs. Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP and the Department-issued Decision Document.
The FER will be submitted to NYSDEC following completion of the Remedial Action defined in this RAWP. The FER will provide the documentation that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the Site and surrounding properties including the surveyed map(s) of all sources. The FER will include as-built drawings for all constructed elements, certifications, manifests, bills of lading as well as the complete SMP (formerly the Operation and Maintenance Plan). The FER will provide a description of the changes in the Remedial Action from the elements provided in the RAWP and associated design documents. The FER will provide a tabular summary of all performance evaluation sampling results and all material characterization results and other sampling and chemical analysis performed as part of the Remedial Action. The FER will provide test results demonstrating that all mitigation and remedial systems are functioning properly. The FER will be prepared in conformance with DER-10.

The FER will include written and photographic documentation of all remedial work performed under this remedy. The FER will include an itemized tabular description of actual costs incurred during all aspects of the Remedial Action.

The FER will include an accounting of the destination of all material removed from the Site, including excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. It will provide an accounting of the origin and chemical quality of all material imported onto the Site.

Before approval of a FER and issuance of a Certificate of Completion, all project reports must be submitted in digital form on electronic media (portable document format [PDF]).

All deviations from the RAWP and/or Decision Document will be promptly reported to NYSDEC for approval and fully explained in the FER.
**Track 2 Cleanup Contingency**

In the event that Unrestricted SCOs are not attained following excavation activities, the Site remedy will be modified to a Track 2 cleanup. Because residual contamination would remain at the Site, ECs and ICs would be required to protect human health and the environment. Long-term management of EC/ICs and of residual contamination will be executed under a Site-specific Site Management Plan (SMP) that will be developed and included in the FER.

ECs would be implemented to protect public health and the environment by appropriately managing residual contamination. The Site would have three (3) primary EC systems. These are: (1) a steel sheeting hydraulic barrier surrounding the perimeter of the Site; and (2) a waterproofing membrane/soil vapor barrier of composite cover system installed in association with any future Site redevelopment; and, (3) in-situ chemical oxidation to address residual dissolved phase contamination.

ICs would also be implemented to protect public health and the environment by appropriately managing access to residual contamination associated with the Site. The Site would have 2 primary IC systems. These are:

1. **Recording of an Environmental Easement (EE)**

   The EE will reference all ECs and ICs that are part of the Site remedy, and would be an enforcement vehicle to ensure compliance with land use or groundwater use restrictions at the Site.

2. **Implementation of the Site Management Plan**

   As part of Site Management, post-remedy soil vapor monitoring (following Site reconstruction) would be implemented to document the effectiveness of the remedy. The results of the soil vapor monitoring would be used to demonstrate that the remedy has mitigated the soil vapor intrusion risk at the Site. Additionally, Periodic Review Reports will be submitted to the NYSDEC to certify that all EC/IC components of the Site remedy are in place and maintained as per the design in the RAWP.
If the remediation is completed as a Track 2 cleanup, the FER will provide a thorough summary of all residual contamination left on the Site after the remedy is complete. Residual contamination includes all contamination that exceeds 6 NYCRR Part 375 SCOs for Unrestricted Use. The FER will also provide an explanation for why the material was not removed as part of the Remedial Action. A table and a map that shows the location and summarizes exceedances from 6 NYCRR Part 375 SCOs for Unrestricted Use for all soil/fill remaining at the Site after the Remedial Action will be included in the FER.

A SMP (required if Track 2 cleanup is performed) will be submitted with the FER to NYSDEC following completion of the Remedial Action defined in this RAWP.
1.0 INTRODUCTION

Kent Riverview LLC (KR and/or the “Volunteer”) has applied and been accepted into the Brownfield Cleanup Program (BCP) with the New York State Department of Environmental Conservation (NYSDEC) as a Volunteer to remediate the property located at 230 Kent Avenue in Williamsburg, Brooklyn, Kings County, New York (hereafter referred to as the “Site”). The Site is recorded under the Brownfield Cleanup Agreement (BCA) with a Site Name of Fyn Paint & Lacquer Co., Inc., Site Number C224154 and Index Number C224154-02-15. The Site is currently inactive.

LBG Engineering Services, P.C. (LBG) on behalf of KR, has prepared the following Remedial Action Work Plan (RAWP) for the Site. This RAWP summarizes the nature and extent of contamination as determined from data gathered during the past remedial investigations, and remedial actions completed on the Site and surrounding properties between 1996 and 2014. Based on the historical remedial investigations and remedial actions completed at the Site, LBG concludes that sufficient information has been generated to enable KR to implement this RAWP as a Volunteer in the BCP without the need to conduct additional investigations.

RAWP provides an evaluation of a Track 1 cleanup and other applicable Remedial Action alternatives, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10 and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. The NYSDEC and New York State Department of Health (NYSDOH) have determined that this Site does pose a significant threat to human health and the environment. The RI for this Site did not identify fish and wildlife resources to exist onsite. Therefore, the selected remedy does not have to account for impacts to fish and wildlife resources.

A formal Remedial Design document will be prepared. The Remedial Design will be submitted after NYSDEC and NYSDOH approval of the RAWP.

1.1 Site Location and Description

The Fyn Site is located in the Borough of Brooklyn, New York City. The Site consists of a partial two-story industrial/warehouse building situated on the block bounded by Kent
Avenue to the east, Metropolitan Avenue to the north, North First Street to the south and River Street to the west. The Metes and Bounds are presented in Appendix A. The global positioning system coordinate for the starting point of the Metes and Bounds is 40°43'01.6"N 73°57'55.1"W.

The Site was historically utilized as a paint and lacquer factory. The vicinity of the property consists of industrial, commercial and residential properties. The two properties contaminated with VOCs are the Site located at 230 Kent Avenue and Con Edison property located at 214 Kent Avenue. A Site map is shown on figure 1.

The footprint of the building is approximately 5,862 ft² (square feet). The building’s heat was provided by an onsite furnace and the electrical service enters the building from Kent Avenue. A small basement was used for the heating oil tanks, furnace and controls for the sprinkler system and air compressor. The Site is connected to the New York City municipal sewer system.

1.2 Description of Surrounding Property

The Site is located in an industrial/commercial area with some residential properties (currently expanding residential development). The property adjacent to the north of the Site is the Con Edison building and parking lot located at 214 Kent Avenue which was formerly a part of the North First Street Terminal (NFST). A Site map is shown on figure 1. The surrounding properties in the area consist of mixed use residential/commercial/industrial buildings. To the north of Metropolitan Avenue are several commercial buildings. To the south of the Site (south of North First Street) is a commercial building (currently under construction) as well as several residential and commercial buildings to the southeast. To the east of the Site (east of Kent Avenue) is a newly constructed residential building. To the west of the Site (west of River Street) are Con Edison properties containing above ground storage tanks associated with the former NFST. Also across River Street to the southwest of the Site there a New York State Power Authority (NYSPA) sub-station. Additionally, the East River is located approximately 300 feet west of the Site. There were no schools, day care facilities or hospitals observed in the immediate vicinity of the Site.
1.3 **Contemplated Redevelopment Plan**

The Remedial Actions to be conducted at the Site under the RAWP (Track 1 cleanup in addition to the contingency Track 2 cleanup) will result in post-remedy Site conditions which are protective of human health and the environment. The cleanup track will exceed the requirements for the current Site use zoning (commercial/manufacturing) and will comply with the requirements for the contemplated future end use of the Site as a mixed-use residential property.

1.4 **Site History**

1.4.1 **Past Uses and Ownership**

A review of historical sources confirmed that the Site has historically been used for industrial and commercial purposes consisting of: lumber storage; steel storage; and from at least 1951 to 2009, paint and lacquer manufacturing. The property ownership history is as follows:

- 1942 To 1945 - 240 Kent Avenue Realty Co., Inc.;
- 1945 To 1964 - Jaylac Corporation; and,
- 1964 To Present - Kent River Corporation.

1.4.2 **Sanborn Fire Insurance Maps**

Historical Sanborn fire insurance maps were reviewed to determine past uses of the Site and surrounding properties. The review of Sanborn maps indicated that the Site and the surrounding area have been heavily utilized for industrial and commercial activities for more than 100 years. A detailed evaluation of the historical Sanborn fire insurance maps is presented in Section 2.5.2.1. Copies of the historical Sanborn fire insurance maps are included in Appendix A.
1.5 **Geological Conditions**

Based on the remedial investigation activities performed at the Site, the geologic conditions have been comprehensively characterized. Geologic logs are presented in Appendix B. The ground surface at the Site consists of concrete and asphalt pavement. The shallow soils/sediments beneath the Site consist of medium and coarse grained brown sand with some silt and a trace of gravel. The depth to groundwater is approximately 12 ft bg (feet below grade) to 15 ft bg. In general, the subsurface beneath the area consists of interbedded layers of sand, gravel, clay and silt to approximately 65 feet below ground surface. Bedrock beneath the Site was not encountered but it is expected to be below 75 feet. Geological cross-sections are included in Appendix B. The regional groundwater flow direction beneath the property is toward the west. Based on the results of investigations performed at the Site (and groundwater contour maps generated from this data, the hydraulic gradient at the Site is approximately 0.025 per foot to the west (toward the East River) and the regional hydraulic gradient surrounding the Site is approximately 0.01 foot per foot to the west. Although the wells adjacent to the East River show tidal influence, the wells at the Site and in the immediate vicinity of the Site show no significant tidal influence. Tables summarizing the historical groundwater elevations recorded during the groundwater monitoring rounds are included in Appendix C. Historical groundwater elevation contour maps generated from data obtained during groundwater monitoring rounds are included in Appendix C.

Based on data collected during the groundwater pumping test, the hydraulic conductivity in the subsurface at the Site is 2.7 feet/day. The pumping test data for EW-1, MW-21 and MW-24 (presented in tabular form) as well as the hydraulic conductivity calculations from the pumping test are included in Appendix D. The groundwater velocity (beneath the Site) using an effective porosity of 25% and a hydraulic gradient of 0.025 is approximately 0.27 foot/day.
2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

This RAWP was developed based on the results of the historical investigations performed at the Site and the Con Edison property (1996-2001); the NYSDEC-approved September 2003 SRI Report; Supplemental Remedial Investigation Work Plan (Addendum I); Remedial Investigation activities performed in 2005 consisting of a soil vapor survey, groundwater monitoring and aquifer testing; Remedial Investigation activities conducted in 2006 and 2007; and, Interim Remedial Measures (IRM) which started in 2007. These investigations were conducted from May 2001 to the present. The results of the investigations were presented in the Remedial Investigation Report (RIR), which was submitted to the NYSDEC in January 2008.

The following sections summarize the remedial investigations performed at the Site and the contamination conditions at the Site. Tables summarizing the analytical results of historical Site characterization sampling activities for soil, groundwater and indoor air/soil vapor are presented in Appendix E, F and G, respectively.

2.1 Con Edison Property (214 Kent Avenue) Summary of Remedial Investigations

Information provided by Con Edison indicated that in 1996, product containing VOCs was encountered in soil borings advanced for the cathodic protection installation associated with the Con Edison 10,000-gallon UST, which had historically been used to store No. 6 fuel oil.

The 10,000-gallon UST was abandoned in place by Con Edison. No information is available regarding the UST abandonment procedure. The VOCs detected in soil included toluene, ethylbenzene and xylenes totaling 876,000 mg/l (milligrams per liter). NYSDEC Spill Number 96-04977 was assigned to Con Edison Fuel Depot in association with the contamination identified adjacent to the UST. A copy of the NYSDEC spill report is included in Appendix H. The Con Edison representative who reported the spill identified the potential spiller as the adjacent Fyn Paint facility. The materials identified in the spill report were PCB oil, lead and toluene detected in soil samples.

A Phase II Environmental Site Assessment (ESA), performed for Con Edison by LMS, was completed on January 14, 2000. This investigation covered the NFST to the north and
west of the Site as well as the former Pfizer property located to the southwest of the Site (currently the NYSPA sub-station).

In addition to the soil borings, groundwater samples were collected from four monitoring wells (MW-1, MW-2, MW-3 and MW-4). The water sample from one monitoring well (MW-4) contained VOCs in concentrations exceeding the NYSDEC Class GA standards. The analytical results of the groundwater samples collected from the monitoring wells were generally consistent with the analytical results of the soil samples collected from the same location.

The primary recommendation by LMS was to further delineate the contamination on Con Edison property. LMS also proposed several conceptual remediation alternatives for the Con Edison property, including no action/natural attenuation, “hot spot” soil excavation, and an air sparging (AS)/soil vapor extraction (SVE)/vapor treatment system.

2.2 Fyn Property (230 Kent Avenue) Summary of Remedial Investigations

The Fyn Site was historically a facility which manufactured paints and lacquers up until 2009. This facility is a NYSDEC registered Chemical Bulk Facility (ID #2-000151), and is still considered an active RCRA facility and Large Quantity Generator of hazardous waste (EPA ID #001270867) because the RCRA closure has not yet been finalized.

2.2.1 Fyn UST Closure Activities

In January 1999 on behalf of Fyn, Fenley & Nicol Environmental performed the closure of three (3) steel 550-gallon USTs; four (4) steel 1,100-gallon USTs; and one (1) steel 1,500-gallon UST at the Site. The tanks had been historically used to store acetone, toluene, and xylene. The locations of the abandoned Site USTs are shown on figure 2.

In February 1999, following the abandonment in-place of the tanks (cut cleaned and filled with concrete), eight (8) soil borings (B-1 to B-8) was drilled inside of the Site building. Selected soil samples were analyzed in the laboratory. The laboratory analysis indicated the presence of ethylbenzene, toluene, o-xylene, m/p xylene and acetone. An UST closure report was prepared by Fenley & Nicol Environmental on March 23, 1999 and was submitted to the
NYSDEC. Based on the soil analytical results, NYSDEC assigned Spill #9815508 to the Site. A copy of this NYSDEC Spill Report is included in Appendix H.

In November and December 2000, Fenley & Nicol Environmental conducted a limited subsurface investigation in order to determine the groundwater quality beneath the Site. Three temporary groundwater sampling wells (TW-1, TW-2 and TW-3) were installed in the vicinity of the former USTs located in the northeast corner of the Site. The locations of these temporary groundwater sampling wells are shown on figure 2. Laboratory analysis of the groundwater samples collected from TW-1, TW-2 and TW-3 identified several VOCs at elevated concentrations (primarily acetone, xylene, toluene, ethylbenzene, 2-butanone and methylene chloride). The highest concentrations of VOCs (Appendix F) detected were acetone (10,558,250 ug/l in TW-3), xylene (452,653 ug/l in TW-3), toluene (241,037 ug/l in TW-1), ethylbenzene (74,258 ug/l in TW-3), 2-butanone (35,826 ug/l in TW-2) and methylene chloride (7,784 ug/l in TW-1).

2.2.2 LBG Environmental Investigation Activities

In April 2001, LBG was retained by Fyn to conduct a subsurface investigation and subsequent data evaluation of contamination conditions related to the Fyn Site and adjacent Con Edison site. The purpose of this work was to: better define the direction of groundwater flow in the area; obtain additional data regarding the quality of soil and groundwater beneath the area; evaluate potential contributors to the subsurface contamination in the area; evaluate the proposed remediation cost estimate prepared by Con Edison; and prepare a conceptual remedial plan.

Following the initial environmental investigation activities completed by LBG work, it was determined that a more comprehensive investigation would be required to fully delineate and characterize the contamination both onsite and offsite, as well as to develop an appropriate remedial action to address said contamination. Summaries of the investigations and remedial actions completed by LBG are presented below and the summary tables are included in Appendix E (soil), Appendix F (groundwater) and Appendix G (indoor air/soil vapor).
2.2.2.1 Surrounding Properties History

To develop a more complete historical profile of the Site, LBG searched the fire insurance maps from EDR’s Sanborn map database. Sanborn maps, originally created to aid insurance underwriters in assessing the potential for fire risk, also contain information on a structure’s use and the location of any fuel and chemical storage areas on a site.

A search of the fire insurance maps consisted of reviewing maps for the Site for the years 1887, 1904, 1905, 1916, 1918, 1935, 1941, 1942, 1950, 1951, 1965, 1980, 1986, 1991 and 1996. Copies of these historical Sanborn Fire Insurance Maps are included in Appendix A. Several noticeable areas of concern are evident from the Sanborn maps. The Site has historically been used for lumber storage, steel storage and from at least from 1951 to 2009 for paint and lacquer manufacturing.

In addition to the past occupants at the Site, there have also been several occupants on adjacent and surrounding properties, which have potentially negatively impacted the environmental status of the Site. These include, but are not limited to, Major Oil Storage Facilities (MOSFs), numerous machine shops, the Old Dutch Mustard Co. facility, the Imperial Plating Co., the Charles Pfizer Co., Inc. property, a lacquer storage building, several properties with listed gasoline tanks, metal manufacturing facilities, a fur company, a laundry company, an iron foundry, filling stations, a metal stamping facility, a painting and auto refinishing facility, an electro-plating facility, a shellac mixing facility as well as numerous properties with no listed owner/occupant descriptions. This review of available historical Sanborn Maps shows that the entire area within the immediate vicinity of the Site has a history of substantial industrial/commercial activity capable of having negatively impacted the subsurface (soil, soil vapor and/or groundwater) surrounding and beneath the Site.

2.2.2.2 2001 Subsurface Investigation

In 2001, LBG conducted a subsurface investigation at the Site and the adjacent areas including the adjacent Con Edison North First Street Facility. The purpose of the investigation was to evaluate the soil and groundwater quality beneath the Site and Con Edison facility, and the areas surrounding these two facilities.
During the 2001 subsurface investigation by LBG, eight (8) soil borings, which were completed as microwells with the exception of CE-4, were drilled using the Geoprobe drilling technique (GP-1, GP-2, GP-3, GP-4, CE-1, CE-2, CE-3 and CE-4). Four additional soil borings, which were completed as Monitoring Wells MW-5, MW-6, MW-7 and MW-8, were drilled using the hollow-stem auger drilling technique. The soil boring locations are shown on figure 3. A summary table showing laboratory analysis of soil samples is included in Appendix E. Four additional soil borings, which were completed as Monitoring Wells MW-5, MW-6, MW-7 and MW-8, were drilled using the hollow-stem auger drilling technique.

Soil samples were collected at 5-foot intervals, logged, screened with a PID and select soil samples were analyzed by EPA Method 8260 and 8270. Boring logs show that overburden soil beneath the Site consists of generally medium to fine sand and silt. Occasionally, a small amount of gravel was encountered. Bedrock was not encountered to the maximum depth drilled (i.e., 65 ft bg).

The groundwater elevation data show that the groundwater flow is westward toward the East River. The average hydraulic gradient at the Site is approximately 0.025 per foot to the west and the regional hydraulic gradient surrounding the Site (calculated downgradient of the Site) is approximately 0.01 foot per foot to the west.

The results of laboratory analyses indicated that the highest concentrations of VOCs in soil are in the vicinity of borings CE-1, CE-2, CE-3 (all located offsite on the adjacent Con Edison parking lot) and GP-3 (beneath the Site). Xylenes and acetone are the most prevalent VOCs in soil, with toluene and ethylbenzene also present at high concentrations. The xylene concentration in the CE-1 soil sample was 3,200,000 ug/kg and acetone concentration in the GP-3 soil sample was 640,000 ug/kg. Low concentrations of toluene, ethylbenzene and xylenes were detected in a soil sample collected from the GP-2 boring. Laboratory analysis data for soil samples are summarized in tables presented in Appendix E.

The results of laboratory analysis indicated that groundwater samples from all 13 wells contained detectable concentrations of dissolved VOCs. The highest concentrations of dissolved VOCs were encountered in groundwater samples from Wells CE-1 and CE-2. Xylenes were the most prevalent VOC in groundwater and were detected at concentrations of
1,200,000 ug/l and 1,400,000 ug/l in groundwater samples from CE-1 and CE-2. Other detected VOCs included toluene, ethylbenzene and acetone at concentrations on the order of $10^5$ ug/l.

LNAPL consisting of mixture of various solvents (primarily acetone, toluene, ethylbenzene and xylene) was measured in CE-1 and CE-2 in June 2001, at thicknesses of 0.84 foot and 0.02 foot, respectively. The LNAPL was removed by bailing from both wells during groundwater sampling and periodically when access to the Con Edison property was available. Subsequent measurements of these wells indicated that the LNAPL thickness in CE-1 had recovered to 0.01 foot and there was no remaining LNAPL in CE-2. In July 2001, CE-2 was dry (i.e., no water or LNAPL) and CE-1 had a LNAPL thickness of 0.14 foot. Historical fluid-level measurements are included in Appendix C.

Detected VOC concentrations in the groundwater sample collected from downgradient well MW-4 ranged from 3,400 ug/l to 18,000 ug/l and included acetone, toluene, ethylbenzene and xylene. Acetone, toluene, ethylbenzene and xylene were also detected in groundwater samples from upgradient wells MW-6 and MW-7 at concentrations ranging from 6 ug/l to 200 ug/l. Xylene was detected in samples from all wells. A summary table showing laboratory analysis results for 2001 groundwater sampling is included in Appendix F. In general, subsequent to the 2001 sampling event the groundwater monitoring was performed on a quarterly basis.

### 2.2.2.3 2003 Site Inspection

At the request of the NYSDEC, a Site inspection was completed at the Fyn facility on May 27, 2003. The Site inspection was conducted by LBG in the presence of Mr. William Feinstein, owner of Fyn and Mr. Howard Simka, chemist for the facility. The purpose of the inspection was the following:

- develop an inventory of the materials used for preparing paint at the time of the inspection;
- obtain data regarding the paint preparation process; and,
• determine the presence of potential leaks or spills related to the storage of chemicals and manufacturing of paint and pathways for such materials to reach the environment.

The Site inspection started at the first floor (ground level) of the facility from the Kent Avenue entrance. The following materials used for paint were stored on the first floor.

- titanium dioxide pigment (six 50 pound bags);
- talc powder (eleven 50 pound bags);
- various powder paints for coating (forty-five 55 and 44 pound boxes);
- twenty empty 1-gallon cans;
- solvent 100 (one sealed 55-gallon drums and one 55-gallon drum containing 10 gallons);
- lacquer (one hundred thirty 5-gallon containers);
- water-based paint (fifteen 5-gallon plastic containers); and,
- kelsol water-based resin (thirty-five empty 55-gallon drums).

The access to the second floor is via a staircase located in the vicinity of the Kent Avenue entrance. In addition, a service lift (only for chemicals) is used to bring drums and containers of chemicals from the first floor to the second floor. The second floor is used for storage and paint processing by mixing various chemicals. The final products are various paint colors. The inspection identified the following:

- thirty-four 55-gallon drums sealed containing processing chemicals;
- one empty, out-of-service 550-gallon blending tank;
- six mixers;
- four empty, out-of-service 175-gallon tanks (information not available);
- two sand mills;
- empty 5-gallon containers for final product; and,
- empty 55-gallon drums, for storage of final product;
During the visit, Fyn provided a list of hazardous chemicals used at the facility for paint manufacturing. Copies of the Material Safety Data Sheets (MSDS) for the manufacturing chemicals are included in Appendix I. LBG interviewed Mr. William Feinstein (former owner) and Mr. Howard Simka (chemist) regarding the quantities of hazardous chemicals stored at the Site during the visit. The following hazardous chemicals were on the list supplied by Fyn.

The list represents the chemicals stored during the May 27, 2003 inspection.

**Solvents:** (All purchased in 55-gallon steel, sealed drums)

- Acetone: one full 55-gallon drum and one 55-gallon drum containing 15 gallons;
- N butyl acetate: one full 55-gallon drum;
- N butyl alcohol: one full 3-gallon container;
- Methyl alcohol: one full 55-gallon drum and one 55-gallon drum containing 40 gallons;
- Isopropyl alcohol: None currently stored onsite;
- Solvent 100: one full 55-gallon drum and one 55-gallon drum containing 10 gallons;
- Blend 90 (lacquer thinner): two full 55-gallon drums and twenty-five full 5-gallon containers;
- Blend BA cleaning solvent: None currently stored onsite;
- VMP naptha (aliphatic hydrocarbon): one 55-gallon drum containing 45 gallons;
- Toluol (toluene): one full 55-gallon drum;
- Xylol (xylene): one full 55-gallon drum and one 55-gallon drum containing 18 gallons; and,
- Oxsol: (total of 42 gallons packaged in 5-gallon containers.

**Resins:**

- Alkyd resins: fifteen full 55-gallon drums;
Water reducible resins: twelve full 55-gallon drums;
Melamine resins: one full 55-gallon drum;
Nitrocellulose resins: six full 55-gallon drums; and,
Finished paint product: fifteen cases (six 1-gallon cans per case), and fifty full 5-gallon containers

The manufacturing process at the Site was also evaluated during the Site inspection. The first floor is used for receiving chemicals which are stored for sale to various customers. The powdered paint is not manufactured at the facility.

All other chemicals received at the first floor, via the Kent Avenue entrance or the North First Street entrance, are in 55-gallon steel sealed drums or containers of 5-gallon capacity. At the time of the inspection, Mr. Simka stated that manufacturing processes were conducted on the mezzanine level with no activities performed on the first floor. During the visits, no significant stains, drains or other areas of possible spill or leaks of chemicals were observed on the first floor. According to the owner of the facility, no bulk deliveries for storage in onsite registered storage tanks were made at the Site since December 1999 when the facility's underground storage tanks were taken out of service and abandoned in-place in accordance with applicable regulations.

The majority of the paint manufacturing took place on the second floor where various chemicals were mixed using the existing six mixers. In general, the manufacturing process was the following:

The chemical containers or drums from the storage area located on the first floor were transported to the second floor using an electric lift. The chemical ingredients were measured and put into the mixing vessel. After mixing and quality control processing the finished batch was strained, set in the appropriate containers and labeled.

The Site visit and inventory indicated the following:

1. First Floor
   - first floor is used for storage of processed chemicals and finished products;
no underground storage tanks are in use at the Site; the USTs were abandoned in place in 1999; all fill boxes were sealed at the same time;

- no drainage or other pathways for leaks of chemicals to underground were observed at the first floor; and,

- the first floor appears to be generally well kept.

2. Mezzanine

- the mezzanine is used for paint manufacturing;

- throughout the mezzanine, drums and mixing basins are splashed with paint; and,

- there is no current pathway or potential for chemicals from this floor impacting the environment. No sinks, drains or floor drains were observed on second floor.

A copy of this inspection is attached as Appendix J.

2.2.2.4 2003 Subsurface Investigation

In 2003, on behalf of Fyn, LBG conducted a Supplemental Remedial Investigation at the Site. Between July and August 2003, eleven (11) soil borings (MW-5, MW-6, MW-7, MW-8, MW-9A, MW-10, MW-11, MW-12, MW-13, MW-14 and MW-15) were drilled using the hollow-stem auger method. The locations of these soil borings are shown on figure 3. Because of subsurface obstructions one boring (MW-16) was completed using the mud-rotary drilling method.

Soil samples were visually inspected, recorded on a geologic log and screened for the presence of VOCs with a PID. All selected soil samples were sent to Toxikon Corporation (Toxikon) of Bedford, Massachusetts for analysis of VOCs, SVOCs, polychlorinated biphenyls (PCBs), pesticides, cyanide and Target Analyte List (TAL) metals by methods outlined in EPA SW-846. The results of laboratory analysis of soil samples are included Appendix E.

Following the completion of soil borings, a monitoring well was installed in each borehole. All monitoring wells (MW-5, MW-6, MW-7, MW-8, MW-9A, MW-10, MW-11,
MW-12, MW-13, MW-14 and MW-15) installed during the Supplemental Investigation, with the exception of MW-16, were constructed with 4-inch diameter screen and casing. MW-16 was constructed with 2-inch diameter PVC screen and riser pipe. Twenty feet of well screen was set in each boring with the exception of MW-12 where a subsurface obstruction necessitated the installation of 15 feet of screen. The screen length was set for seasonal fluctuation and to allow LNAPL to enter the well. Wells were completed at grade with a well plug and 8-inch diameter street box. The locations of these monitoring wells are shown on figure 3.

The laboratory analyses showed the highest concentrations of VOCs (toluene, xylene, ethylbenzene, acetone, isopropylbenzene and naphthalene) in soil to be located in samples collected from the soil boring for Monitoring Well MW-15, which is located on the east-northeast corner of the Site building along Kent Avenue. Soil samples from borings MW-11 and MW-12 also had significantly elevated concentrations of toluene, xylene and ethylbenzene detected in the soil.

Analysis of groundwater samples collected from the twelve monitoring wells contained dissolved VOCs at concentrations above NYSDEC Technical and Operational Guidance Series (TOGS) Groundwater Quality Standards (GWQS). In addition, several chlorinated solvents such as PCE, trichloroethene (TCE) and 1,1,1 trichloroethane were detected in groundwater samples collected from upgradient/crossgradient Wells MW-5, MW-6 and MW-7. The source of the chlorinated solvents in groundwater could not be identified during the subsurface investigation; however, the highest concentrations of PCE identified throughout the Site in groundwater were found in June 2001 in samples collected from CE-1 and CE-2 (960 ug/l and 1,400 ug/l, respectively), both of which are located on the adjacent Con Edison property. The chlorinated solvents were also detected in the soil at 8,200 ug/kg in CE-1 sample (8-16 ft bg) and 2,300 ug/kg in CE-2 sample (8-12 ft bg) (Appendix E). A summary table showing groundwater quality data for the 2003 investigation is included in Appendix F.

Also in 2003, LNAPL was observed in groundwater samples collected from Wells MW-15, CE-1 and MW-9A, and had previously been observed in Well CE-2 groundwater sample. The LNAPL appeared to be confined to the area beneath the north wall of the Site building and the adjacent Con Edison parking lot north of the Site. Following the com-
pletion of the 2003 investigation, LNAPL was bailed from these wells and stored temporarily inside the onsite building pending offsite disposal.

An initial soil vapor sampling round was conducted in July 2003. The 2003 soil vapor sampling points are shown on figure 4. The results of this investigation indicated that VOCs were present in soil gas samples collected from both the perimeter and interior of the Site building. VOCs were detected in every soil gas sample as well as the ambient (outdoor) air sample. The most prevalent VOC in the soil gas was acetone, which was detected at concentrations up to 1,180,000 ppbv (Sample AS-6). Other VOCs detected at high concentrations were toluene, xylenes and isopropanol. Additionally an air sample was collected from inside the Site building. The indoor air sample had VOC concentrations that correlated with the soil gas samples, where the compounds detected in the highest concentrations included acetone, toluene and isopropanol. Results of the initial soil vapor sampling round are summarized in a table presented in Appendix G.

2.2.2.5 2004 Groundwater Monitoring

In February 2004, LBG completed a groundwater sampling round which included 18 monitoring wells on and surrounding the Site (figure 3). The results of this groundwater sampling round indicate that the primary contaminants observed in the dissolved phase throughout the Site during previous investigations were still present at similar concentrations, with the exception of a groundwater sample from MW-4 which showed a significant decrease in VOC concentrations. Additionally, samples were not collected from CE-2 and MW-9A due to the presence of LNAPL observed on the water table. As such, there are no 2004 groundwater quality data for these wells to correlate with the results from previous sampling events. A summary table showing the results of the groundwater sampling round is included in Appendix F.
2.2.2.6 2005-2008 Subsurface Investigation

In 2005, following the NYSDEC approval of the “Supplemental Investigation Work Plan (Addendum I – Revised)”, LBG conducted an additional subsurface investigation on behalf of Fyn. The investigation included:

- installation of 8 monitoring wells and 2 extraction wells;
- development of the newly installed groundwater monitoring wells;
- abandonment of the micro-wells (CE-1, CE-2 and CE-3) on the Con Edison parking lot;
- soil quality analysis;
- groundwater sampling and analysis;
- a soil vapor survey; and,
- a groundwater pumping test.

2.2.2.6.1 Monitoring Well Installation and Soil Sampling

In 2005, Fyn installed eight (8) additional groundwater monitoring wells (MW-20, MW-21, MW-22, MW-23, MW-24, MW-25, MW-26 and MW-27) and two (2) groundwater extraction wells (EW-1 and EW-2). The locations of the 8 monitoring wells and 2 extraction wells are shown on figure 3. Prior to installing the wells, soil samples were collected from each boring location using the Geoprobe drilling method. The soil sample which exhibited the highest PID concentration for each boring was placed into laboratory supplied containers and stored in a cooler with ice. The soil samples were then submitted to a New York State certified laboratory, under chain of custody procedure, for analysis of VOCs by EPA Method 8260.

Following the soil sampling, the monitoring wells were installed using the hollow-stem auger drilling method. The monitoring wells and extraction wells (well screen and riser) were constructed of 2-inch diameter and 4-inch diameter stainless steel, respectively. MW-20 was constructed with 2-inch diameter PVC well material due to its distance from the source area as well as the lack of detected LNAPL and low concentrations of dissolved phase contamination detected in adjacent wells. Following the installation of the eight monitoring and two extrac-
tion wells, all wells were developed using a reciprocating pump with a check valve in conjunction with a suction pump. All purge water was temporarily stored in 55-gallon steel drums pending offsite disposal. Disposal manifests are on file at LBG and are available for review upon request. Geologic logs and monitoring well construction diagrams are presented in Appendix B.

2.2.2.6.2 Abandonment of the Micro-Wells on the Con Edison Parking Lot

In addition to the installation of new wells, the three micro-wells on the Con Edison parking lot (CE-1, CE-2 and CE-3) were removed and the locations backfilled with clean sand and an asphalt cap. Of note, the three micro-wells, which were constructed of 1-inch diameter PVC, were no longer competent wells as the PVC had been compromised due to the nature of the contamination. As observed during the abandonment activities, the PVC well material had lost all rigidity and the screen slots were closed. This observation confirmed the selection of stainless steel screen and riser for the newly installed monitoring and groundwater extraction wells at and surrounding the Site.

2.2.2.6.3 Soil Quality Analysis

Soil samples collected in 2005 prior to the installation of the 8 new monitoring wells indicated that the highest soil contamination is present in the east end of the Con Edison parking lot adjacent to the Site. The highest VOC concentrations were found in groundwater samples from MW-22 with acetone detected at a concentration of 19,000 ug/kg, total xylenes detected at a concentration of 7,000,000 ug/kg, toluene detected at a concentration of 4,000,000 ug/kg and ethylbenzene detected at a concentration of 1,500,000 ug/kg. VOCs in groundwater samples collected from MW-23 were found in the following concentrations: toluene at 770,000 ug/kg, ethylbenzene at 520,000 ug/kg and total xylenes at 3,050,000 ug/kg. Tables summarizing soil quality laboratory results for historical soil samples collected from onsite and offsite are included in Appendix E.
2.2.2.6.4 2006 Groundwater Pumping Test

In order to quantify hydraulic parameters and to evaluate the feasibility of groundwater remediation using the pump and treat technology, a pumping test was conducted on extraction well EW-1, a 4-inch diameter stainless steel well installed on the Con Edison parking lot adjacent to the northeast corner of the Site. The purpose of the test was to calculate the hydraulic conductivity of the formation, determine the radius of influence on the groundwater table, and to obtain data necessary for designing the groundwater extraction system. The field data indicate a water-table aquifer in the overburden on top of surficial bedrock. The pumping test was conducted on April 4 and 5, 2006 from EW-1 at a rate of 4.75 gpm (gallons per minute) for approximately 18 hours. The groundwater from the well was pumped into a 10,000-gallon fractionation tank. The water from the fractionation tank was disposed of offsite by Con Edison. Prior to and during the pumping test, groundwater levels were measured in the pumping well and surrounding monitoring wells. Prior to, during and after the 18-hour pumping test, depth to groundwater was measured and drawdowns were calculated in the pumping well and select monitoring wells.

Based on groundwater level measurements recorded during the pumping test, a 4.75 gpm pumping rate from extraction well EW-1 is capable of influencing the groundwater table for a radius of approximately 60 feet. This result demonstrates that a groundwater pumping rate of 4.75 gpm has the potential to induce a cone of depression sufficient for extraction from the subsurface of groundwater with dissolved chemical compounds and/or NAPL, and to control further offsite migration of contaminated groundwater. The pumping test results indicated that the groundwater remediation onsite and offsite can be accomplished by the groundwater extraction and treatment (i.e., “pump and treat”) technology. Detailed data regarding the pumping test are included as Appendix D. The pumping test data from EW-1 were used to calculate transmissivity (135 ft²/day), storage coefficient (0.0943) and hydraulic conductivity (2.7 ft/day).
2.2.2.6.5 Groundwater Sampling and Analysis (2005-2009)

All of the newly installed wells and the previously installed wells were then included in the quarterly groundwater monitoring program. However, several wells (MW-6, MW-13, MW-15 and MW-25) were not included in future groundwater sampling rounds as they were destroyed by city sidewalk repair activities. Additionally, other wells were not included in various groundwater monitoring rounds as a result of access restrictions or because the wells were abandoned. The total number of remaining wells included in the quarterly groundwater sampling in February 2009 was twenty-one (21).

The laboratory results for the groundwater sampling completed in December 2005 indicated the continued presence of VOCs/LNAPL in the groundwater and that the major contaminants onsite and offsite continue to be toluene, xylenes, acetone and ethylbenzene. Summary tables showing the historical groundwater elevations for wells both onsite and offsite are included in Appendix C and summary tables of laboratory results for the historical groundwater sampling events conducted for the Site are included in Appendix F.

Subsequent groundwater monitoring and sampling rounds were completed onsite and offsite in May 2006, September 2006, December 2007, March 2007, October 2007 and February 2008, May 2008, August 2008, November 2008 and February 2009. The laboratory results for the groundwater samples again indicated the continued presence of VOCs in the groundwater and that the major contaminants at the Site continue to be toluene, xylenes and ethylbenzene.

The acetone concentrations in the October 2007 samples were all non-detectable and showed a significant decreasing trend following the implementation of the IRM groundwater pump and treat system. In addition to the groundwater contamination, LNAPL was historically observed in Monitoring Wells MW-21, MW-22 and MW-9A. During the September 2006 sampling round, NAPL was drawn in to monitoring wells MW-21 and MW-22 as a result of the low-flow groundwater sampling from each respective well. Summary tables showing the historical fluid-level measurements for wells both onsite and offsite are included in Appendix C. Summary tables of laboratory results for the historical groundwater sampling events conducted onsite and offsite are included in Appendix F.
The laboratory analysis data from the downgradient monitoring wells located on the west side of River Street (MW-4, MW-5, MW-14 and MW-20) showed non-detectable concentrations and/or a general decrease in concentrations of acetone, benzene, toluene, ethylbenzene and xylene between December 2006 and February 2009. MW-12 VOC concentrations remained relatively stable from December 2006 and February 2009. Non-detectable concentrations (or only isolated exceedances) of acetone, benzene, toluene, ethylbenzene and/or xylene were also observed in downgradient Wells MW-1, MW-2, MW-3 and MW-10 in groundwater samples collected from August 2003 to February 2009. Laboratory data for groundwater samples collected from select monitoring wells located crossgradient on North First Street (MW-8, MW-24 and MW-26) showed non-detectable concentrations (or only isolated exceedances) of acetone, benzene, toluene, ethylbenzene and/or xylene in groundwater samples from MW-8 and MW-26 from May 2006 to February 2009. The only groundwater monitoring well showing a significant increase in VOC concentrations is MW-24 which showed an increase in toluene from non-detect in October/November 2007 to 94,000 µg/l in February 2009.

When evaluating the data from past sampling rounds, the plume migration seems to have been minimal with the concentrations of the primary contaminants of concern being confined beneath the Site and the adjacent Con Edison property with migration to the south (just across North First Street) and to the west (just across River Street). Figures illustrating the approximate dissolved phase plume extents for sampling events in 2004, 2005, 2006 and 2007 are presented in Appendix K. The relatively small plume migration can be attributed to several variables including but not limited to: a localized source area; no surface-water infiltration in the source area; subsurface obstructions at and surrounding the source area; and, natural attenuation of dissolved phase VOCs downgradient of the Site.

### 2.2.2.6.6 Soil Vapor Survey (2005)

A second soil vapor survey was completed in 2005, both onsite and offsite, to evaluate the potential impact to adjacent properties. The soil vapor sampling locations are shown on figure 4. Two compounds, PCE and TCE, were detected at concentrations exceeding the New
York State Department of Health (NYSDOH) air guidance value established for indoor air quality in eight of the eleven sample locations, SG-1, SG-2, SG-5, SG-7, SG-8, SG, SG-10 and CE SG-6, however, these values are not applicable to regulating soil vapor concentrations. The highest concentrations of PCE and TCE were detected in SG-10, located in the Con Edison parking lot adjacent to the Site. Several other VOCs (such as xylene, ethylbenzene, 1,1,1 TCA, acetone, etc.) were detected above the laboratory detection limits, however, there are no established NYSDOH air guidance values for these compounds. A “Soil Vapor Survey Report” was submitted to NYSDEC and NYSDOH in February 2006. The results of the second soil vapor survey completed in 2005 are presented in a summary table included in Appendix G.

The agencies provided comments on the report and a response to NYSDEC and NYSDOH comments on the report was submitted in August 2006.

2.2.2.6.7 2007 Soil Vapor Intrusion Investigation

Based on the presence of VOCs detected in the soil vapor surrounding the Site during the 2005 soil vapor sampling event, subsequent soil vapor intrusion (SVI) sampling was requested by NYSDEC and NYSDOH. This sampling was requested to be conducted at the Site building and the adjacent Con Edison building, as well as at commercial and residential buildings to the north, south and east of the Site. Prior to the commencement of the SVI sampling, both verbal and written access requests were submitted to property owners in the neighborhood. Several property owners granted access for the SVI sampling, while some property owners to the east/southeast offsite refused to grant access to their properties for SVI sampling.

The SVI investigation was conducted in accordance with the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006). The SVI investigation consisted of collecting sub-slab soil vapor and indoor air samples from various locations between February 13, 2007 to May 16, 2007. The purpose of the SVI investigation was to determine the following:

- the potential for current human exposure;
- the potential for future human exposure; and,
the need for measures to be implemented for removal of vapors from the subsurface.

All activities conducted in conjunction with the SVI investigation were conducted in adherence to the Site’s Health and Safety Plan (HASP) which was used for the implementation of the Site investigation activities.

As a result of the remedial investigation activities, a characterization of the soil vapor and indoor air quality at the Site and at properties surrounding the Site has been completed. The results are presented in the RIR. The 2007 sampling locations for the SVI sampling survey are shown on figure 5.

Based on the NYSDOH Soil Vapor/Indoor Air Matrices (which correlates soil vapor concentrations and indoor air for TCE, PCE, 1,1,1-TCA and carbon tetrachloride), the recommended course of action for the Site building consists of: Monitor based on the TCE detected in the soil vapor (<54 ug/m³) under the first floor sub-slab and indoor air (<0.107 ug/m³) on the first floor; and, Monitor/Mitigate based on the TCE detected in the soil vapor (<210 ug/m³) under the basement) and indoor air (0.322 ug/m³) and Monitor based on the PCE detected in the soil vapor (<270 ug/m³) under basement sub-slab and indoor air (1.7 ug/m³) in the basement of the building. It should be noted that the Fyn building is an active manufacturing facility and the indoor air concentrations of VOCs are below established Occupational Safety and Health Administration (OSHA) limits. However, OSHA limits apply to those chemicals which are actively being used at a facility and/or those which have MSDS sheets maintained at the facility. MSDS sheets for chemicals used at the facility are included in Appendix I. PCE and TCE are not currently used in the Fyn facility. Summary tables showing the VOC concentrations detected in the soil vapor, indoor air and outdoor ambient air samples from the 2007 sampling round conducted in the Fyn factory are presented in Appendix G.

The laboratory analyses of the soil vapor samples concluded that several VOCs were detected in the soil vapor beneath the Con Edison property located adjacent to the Site at 214 Kent Avenue. It should be noted that none of the indoor air samples collected from
Con Edison property contained concentrations of PCE, TCE or methylene chloride above the established NYSDOH indoor air guidance values. Additionally, based on the NYSDOH Soil Vapor/Indoor Air Matrices (which correlates soil vapor concentrations and indoor air for TCE, PCE, 1,1,1-TCA and carbon tetrachloride), the recommended course of action for the Con Edison property (with respect to addressing soil vapor and soil vapor intrusion concerns) consists of **No Further Action** for TCE, 1,1,1-TCA and PCE. Although the carbon tetrachloride concentrations were below the laboratory detection limit, the recommended course of action for the Con Edison property (as a result of the laboratory detection limit not being below 0.25 ug/m³) is *taking reasonable and practical action to identify source(s) and reduce exposure*. Tables summarizing the VOC concentrations detected in the soil vapor, indoor air and outdoor ambient air samples from the 2007 sampling round conducted on the Con Edison property are presented in Appendix G.

The laboratory analyses of the soil vapor samples indicated that several VOCs were detected in the soil vapor beneath buildings to the north, east and south of the Site (210 Kent Avenue, 229 Kent Avenues, and 240 Kent Avenue). Tables summarizing the VOC concentrations detected in the soil vapor, indoor air and outdoor ambient air samples from the 2007 sampling rounds conducted at 210 Kent Avenue, 229 Kent Avenue and 240 Kent Avenue are presented in Appendix G. Based on the NYSDOH Soil Vapor/Indoor Air Matrices (which correlates soil vapor concentrations and indoor air for TCE, PCE, 1,1,1-TCA and carbon tetrachloride), the most conservative recommended course of action for each of the properties surrounding the Site building are as follows:

- **210 Kent Avenue** - *Taking reasonable and practical action to identify source(s) and reduce exposure* based on the TCE detected in the soil vapor (4.8 ug/m³ under the sub-slab) and indoor air (0.43 ug/m³) as well as a results of the laboratory detection limit of carbon tetrachloride not being below 0.25 ug/m³.

- **229 Kent Avenue** - *Monitor/Mitigate* based on the TCE detected in the soil vapor (120 ug/m³) under the sub-slab and indoor air (82 ug/m³). It should be noted that if the TCE concentration for the indoor air using the SIM mode (low detection limit) was <0.107 ug/m³, a concentration which when compared with the
sub-slab concentration would make the NYSDOH recommended course of action *Taking reasonable and practical action to identify source(s) and reduce exposure*. *Taking reasonable and practical action to identify source(s) and reduce exposure* would also be the course of action as a result of the laboratory detection limit of carbon tetrachloride not being below 0.25 ug/m$^3$.

- **240 Kent Avenue** - *Taking reasonable and practical action to identify source(s) and reduce exposure* based on the TCE detected in the soil vapor samples (<11 ug/m$^3$) under the sub-slab #2 and (4.8 ug/m$^3$) under the sub-slab #3, and indoor air (0.914 ug/m$^3$) as well as a result of the laboratory detection limit of carbon tetrachloride not being below 0.25 ug/m$^3$.

### 2.3 Public Health And Environmental Assessments

#### 2.3.1 Qualitative Human Health Exposure Assessment

As part of the Public Health and Environmental Assessments, a qualitative human health and exposure assessment was performed. Based on previous investigations performed on the Site, VOCs were determined to be present in the subsurface (soil, groundwater and soil vapor). Summary tables presenting laboratory results for soil, groundwater and soil vapor samples collected as part of the environmental investigation are included in Appendix E, F and G, respectively.

The contamination beneath the Site is the result of historical activities on the Site and/or surrounding properties. The workplace activities at the Site include the manufacture, formulation, and/or commercial use of the contaminants and Site workers are involved in directly handling many of the contaminants. As such, a direct exposure pathway exists for Site workers via ingestion, inhalation or dermal contact. Additionally, a possible exposure route is through soil vapor intrusion. The possible contamination exposure route at the surrounding properties may be only if a contaminant is finding its way into food, water or air supplies. The physical location of the contamination is in the subsurface. The surrounding area is completely paved and covered with buildings. As such, the potential for humans being directly exposed through ingestion and/or dermal contact is minimal. The evaluations of human exposure to soil vapor...
contamination on adjacent residential and commercial properties of all requested areas could not be completed because of access restrictions or construction activities.

For people living and working at adjacent residential and commercial properties, the potential exposure route is through soil vapor intrusion through the concrete slabs in the building’s floor slab. In 2007, a soil vapor intrusion sampling round was conducted at the Site and surrounding properties. Based on the NYSDOH Soil Vapor/Indoor Air Matrices (which correlates soil vapor concentrations and indoor air for TCE, PCE, 1,1,1-TCA and carbon tetrachloride), the most conservative recommended course of action for each of the properties surrounding the Site (210 Kent Avenue, 214 Kent Avenue, 229 Kent Avenue, and 240 Kent Avenue) are as follows:

- **210 Kent Avenue** - Taking reasonable and practical action to identify source(s) and reduce exposure based on the TCE detected in the soil vapor (4.8 ug/m³) under the sub-slab) and indoor air (0.43 ug/m³) as well as a results of the laboratory detection limit of carbon tetrachloride not being below 0.25 ug/m³.

- **214 Kent Avenue** - Taking reasonable and practical action to identify source(s) and reduce exposure based solely on the fact that the laboratory detection limit of carbon tetrachloride was greater than 0.25 ug/m³.

- **229 Kent Avenue** - Monitor/Mitigate based on the TCE detected in the soil vapor (120 ug/m³) in the sub-slab and indoor air (82 ug/m³). It should be noted that if the TCE concentration for the indoor air using the SIM mode (low detection limit) was <0.107 ug/m³, a concentration which, when compared with the sub-slab concentration, would make the NYSDOH recommended course of action Taking reasonable and practical action to identify source(s) and reduce exposure. Taking reasonable and practical action to identify source(s) and reduce exposure would also be the course of action as a result of the laboratory detection limit of carbon tetrachloride not being below 0.25 ug/m³.

- **240 Kent Avenue** - Taking reasonable and practical action to identify source(s) and reduce exposure based on the TCE detected in the soil vapor samples (<11 ug/m³) under the sub-slab #2 and (4.8 ug/m³) under the sub-slab #3, and
indoor air (0.914 µg/m³) as well as a result of the laboratory detection limit of carbon tetrachloride not being below 0.25 µg/m³.

- With the exception of 229 Kent Avenue (the Fyn office basement), implementation of mitigation activities are not required to address potential soil vapor intrusion issues. Additionally, based on the historical activities (and chemicals associated with those activities), the Site did not use PCE and/or generate PCE waste as part of its operations. Additionally, the historical review of surrounding properties indicated that there were numerous industrial and commercial operations which potentially used PCE and/or other chlorinated solvents in their operations. As such, the PCE impact to the indoor air at 229 Kent Avenue cannot be attributed to past or current activities at the Site.

### 2.3.2 Contaminant Fate and Transport

The onsite and offsite contamination, as delineated through historical subsurface investigations, consists of VOCs which are present in the soil, groundwater and soil vapor. There are several factors that affect contaminant migration in the matrices onsite and offsite (soil, groundwater and soil vapor). Each of these factors was evaluated and the difficulties and concerns associated with the presence of contamination in the subsurface are presented herein.

The onsite and offsite contamination, as delineated through historical subsurface investigations, consists of VOCs present in the soil, groundwater as well as in the soil vapor. Although semivolatile organic compounds (SVOCs) were detected in soil and groundwater samples at the Site and surrounding properties, only VOCs were observed at concentrations that were above maximum contaminant levels defined in the NYSDEC soil and groundwater standards. Summary tables presenting the 6 NYCRR Part 375 Soil Cleanup Objectives (SCOs), NYSDEC TAGM Recommended Soil Cleanup Objectives (RSCO) and NYSDEC TOGS GWQS are included in Appendix L. The 6 NYCRR Part 375 Soil Guidance provides: SCOs for Unrestricted Use; Restricted Use Soil Cleanup Objectives (RUSCOs) for Protection of Public Health; SCOs for Protection of Ecological Resource; and, SCOs for Protection of Groundwater. The results of laboratory analyses of soil, groundwater and soil vapor samples
indicate that contaminants associated with the chemicals used onsite, as well as chemicals not listed as having been used as part of the Site operations (specifically chlorinated solvents), are present beneath the Site and surrounding properties.

Primary routes of migration for VOCs within the area of the Site are dissolved phase contamination flow within the groundwater, and migration of soil vapors (resulting from volatilization of residual contamination in the subsurface soils as well as VOCs in groundwater). The migration of the dissolved phase contamination is related to the natural hydraulic flow of the groundwater. The migration of the VOCs in the soil vapor however, is not constrained by hydrogeologic factors. The analytical results of groundwater samples collected at downgradient groundwater monitoring wells indicate that the contaminated groundwater has not reached the East River at significant concentrations and as such, it is not negatively impacting the surface water and/or sediment within the East River. As previously mentioned, this can be attributed to several variables including but not limited to: a localized source area; no surface-water infiltration in the source area; subsurface obstructions at and surrounding the source area; and, natural attenuation of dissolved phase VOCs downgradient of the Site.

After release to the subsurface, NAPL migrated downward by gravity toward the groundwater table. Due to the density of the chemicals used in association with the Site operations (all are light non-aqueous phase liquids [LNAPL]), upon reaching the groundwater table, the LNAPL would float. This phenomena has been demonstrated through historical gauging of onsite and offsite groundwater monitoring wells. All of the detected NAPL has been of the LNAPL type and no dense non-aqueous phase liquid (DNAPL) has been measured/observed.

2.3.2.1 Soil

Due to the fact that the Site and the surrounding area are primarily paved with limited recharge areas, infiltration and downward percolation of water can be considered a minimal contributor to transport. As such, transport within the vadose (unsaturated) zone was by gravity and lateral diffusion throughout the pore spaces. Preferential pathways encountered during vertical migration would have accentuated lateral migration. A portion of the LNAPL likely
remains in the pore space due to the capillary attraction. Additionally, any LNAPL which reached the groundwater table will spread laterally (primarily in the direction of the hydraulic gradient which is toward the East River) until the minimum degree of saturation needed for flow is reached.

2.3.2.2 **Groundwater**

The transport of dissolved phase VOCs in groundwater (mass or solute transport) is dependent on the properties of the VOCs as well as the Site-specific hydraulic properties. The primary variable for dissolved phase contaminant transport is the groundwater flow. This variable determines the direction which the contamination plume will spread. The transport of the VOCs is advection, which is a function of the quantity of the groundwater flowing within the subsurface. As the resulting plume moves downgradient, the plume widens/spreads vertically and laterally and concentrations decrease away from the source (dispersion). Additionally, dissolved phase VOCs will move from an area of greater concentration (source area) to an area where it is less concentrated, also known as diffusion. Diffusion will occur as long as a concentration gradient exists, irrespective of movement of the groundwater. Based on the historical subsurface investigations performed at the Site, the baseline regional hydraulic gradient beneath the Site is approximately 0.025 foot per foot to the west (toward the East River). Additionally, based on an evaluation of the data collected from the subsurface investigation (pumping test), the estimated hydraulic conductivity in the subsurface at the Site is 2.7 feet/day.

2.3.2.3 **Soil Vapor**

Similarly to transport in groundwater, transport in the vapor phase may also be described by advection and dispersion. In most cases mechanical dispersion is ignored because vapor velocities are generally too small due to steady state conditions (no forced air flow in the subsurface). As such, the effects of diffusion are generally much greater than dispersion in the vapor phase. Additionally, based on this “steady state” condition, soil vapor migration direction cannot be determined without quantitative sampling. This sampling has been performed at
the Site and surrounding properties and results of the investigation are summarized in Section 2.7.8. Molecular diffusion coefficients are approximately four orders of magnitude greater in the vapor phase than in the liquid phase. As such, residual contamination in the vadose zone will impact soil vapor faster than residual contamination impacting the groundwater (from the smear zone and/or LNAPL).

2.3.3 Fish and Wildlife Remedial Impact Analysis

Based on historical investigations performed at and surrounding the Site, the pathway with the potential to impact fish and wildlife as a result of the contamination originating from the Site is through groundwater containing elevated concentrations of VOCs. However, during recent remedial investigation activities conducted at the Site and surrounding properties no significant groundwater contamination has been observed at the downgradient monitoring locations adjacent to the East River (MW-1, MW-2 and MW-3). Historical VOC concentrations detected in groundwater are presented in Appendix F. As presented in the groundwater tables, no significant VOC concentrations have been detected in Monitoring Wells MW-1, MW-2 and MW-3 (located adjacent to the East River) from 2006 to the present.

2.4 Significant Threat

The NYSDEC and NYSDOH have determined that this Site could pose a significant threat to human health and the environment.

2.5 Contamination Conditions

Based on the historical environmental investigations performed onsite and offsite, the primary contaminants of concern consist of NAPL (acetone, toluene, xylene and ethylbenzene), residual VOCs in subsurface soils, dissolved phase VOCs in groundwater and VOCs in soil vapor. Tables summarizing soil quality data are included in Appendix E.
2.5.1 Conceptual Model of Site Contamination

- The onsite contamination consists of limited LNAPL, residual VOC in subsurface soils (Appendix E), dissolved phase VOC in groundwater (Appendix F) and VOC in soil vapors (Appendix G).
- The offsite contamination consists of dissolved phase VOCs in groundwater and VOCs in soil vapor.

2.5.2 Description of Areas of Concern

The primary Areas of Concern at the Site include:

- The former UST area located in the northeast corner of the Site building;
- localized LNAPL on groundwater in the northeast corner of the Site;
- dissolved phase VOC contamination beneath the Site; and,
- contaminated soil and fill material associated with the former USTs located beneath the eastern portion of the Site.

2.6 Interim Remedial Measures

2.6.1 2007 IRM Extraction and Treatment System

Interim Remedial Measures (IRMs) at the Site consist of a groundwater extraction and treatment system, and a LNAPL recovery system. The IRM component installation was completed in February 2007 and, following receipt of the NYC Department of Environmental Protection (NYCDEP) discharge permit, the treatment system was started in April 2007. The IRM installation activities were completed in accordance with the NYSDEC-approved IRM Work Plan dated August 2006.

The IRMs were designed to be protective of human health and the environment in the short and long term until the final Site remedy is completed. The objectives of the IRMs are to:

- remove LNAPL using product skimmer/ferret pumps;
- prevent migration using groundwater extraction to create a capture zone;
- treatment and discharge of extracted groundwater; and,
monitor the IRM systems and groundwater to evaluate and determine potential additional remedial alternatives.

The IRM installation began with trenching activities which were conducted on the Con Edison parking lot located adjacent to the Site at 214 Kent Avenue. The trenching activities were performed by American Environmental Assessment Corp. of Wyandanch, New York with oversight and supervision by LBG. All activities associated with the IRM trenching activities were conducted in accordance with the Site-specific Health and Safety Plan (HASP) and other addendums, which were included in the NYSDEC-approved IRM Work Plan dated June 2006. A copy of the HASP is included in the Appendix M.

Five-foot wide trenches were saw-cut through the existing concrete and asphalt. The locations of the trenches for MW-21, MW-22 and EW-1 are shown on figure 6. After the saw-cutting, the asphalt and concrete were removed using a bobcat loader. The trenches were excavated to a depth of 3.75 ft bg. All soil excavated from the trenches was placed into a roll-off pending disposal. Following all excavation activities, a sample of the excavated soil was sent to a NYSDOH-approved laboratory for waste characterization analysis. After the trenches were excavated to the final depth, a base layer of pea gravel (approximately 5-inches thick) was installed along the base of the trenches. A 4-inch diameter schedule 40 PVC pipe conduit was then installed in the trench. A cross section illustration of the well head and conduit piping for the groundwater extraction well (EW-1) is shown on figure 7. A cross section illustration presenting the typical trench piping and well heads for the two monitor/NAPL recovery wells (MW-21 and MW-22) is shown on figure 8. After the conduit piping was installed in the trenches, the piping was covered with approximately 1.5 feet of pea gravel. The pea gravel was then covered with a layer of filter fabric and the remainder of the excavation was backfilled with clean fill. An illustration of a typical trench cross section is illustrated in figure 9. As per the Con Edison requirement, the fill was certified as clean by the supplier. After the trench was backfilled, it was compacted and then capped with an asphalt layer. The Con Edison property was inspected periodically after the trenching activities to ensure that no
additional settling had taken place. Following receipt of the laboratory analysis for waste characterization, the excavated soil was disposed of offsite by Con Edison.

After the installation of the conduit pipe in trenches, the groundwater treatment system and LNAPL recovery system was installed. The IRM groundwater extraction and treatment system was composed of the following: a pneumatic submersible groundwater extraction pump; a low-profile air stripper and associated explosion-proof regenerative blower; a vapor exhaust stack; a transfer pump; a liquid-phase carbon unit; associated piping; and a control panel. Both systems utilized pneumatic pumps installed within wells EW-1 (for groundwater) and MW-21 and MW-22 (for NAPL). The pumps were set based on the measured depths to groundwater and/or LNAPL and the tubing was installed in the conduits in the trenches and connected to the treatment system erected inside of the Fyn building. Both systems were powered by a 3 horsepower explosion-proof air compressor located in the Fyn building. Due to the excess load imposed on the air compressor, the pneumatic groundwater extraction pump was replaced with an electric submersible pump. Detailed equipment specifications for all IRM equipment are included in Appendix N.

The groundwater was pumped from EW-1 and subsequently MW-28 through polyethylene tubing rated for onsite chemicals, and steel piping to a low-profile air stripper which was equipped with the blower, cleanout holes, gauges and switches to control the operation. As the water flowed through the air stripper, air was forced through it using an explosion-proof regenerative blower. After treatment through the air stripper, the groundwater was processed through a liquid-phase carbon polish and then discharged to the NYC sanitary sewer utilizing a transfer pump. A process flow diagram for the 2007 IRM groundwater extraction and treatment system is shown on figure 10.

The LNAPL pumps were set up with independent control boxes and cycled at set time intervals to allow maximum LNAPL accumulation/recovery. The LNAPL was pumped through chemical-rated tubing and stored in steel 55-gallon drums. A process flow diagram for the 2007 IRM LNAPL recovery system is shown on figure 11.

Treatment System Operation Summary Reports were prepared and submitted to the NYSDEC, presenting the operational data and monitoring results for the remedial system. The
reports summarized the: sampling and analysis procedures; permitting status; maintenance and monitoring observations; groundwater treatment (liquid phase and vapor phase) laboratory analytical results; a data evaluation interpretation; treatment system status; and, future OM&M activities. The data evaluation showed that the groundwater pump and treat system was actively removing contaminated groundwater from beneath the Site and the adjacent Con Edison property. As of November 28, 2011, 1,820,962 gallons of contaminated groundwater had been extracted from EW-1 and MW-28 and was treated via the onsite groundwater treatment system. Aside from the LNAPL recovery achieved upon the initial startup of the 2007 treatment system, no significant LNAPL accumulation was observed in the recovery wells. The majority of the LNAPL recovery was achieved via manual bailing activities. Tables presenting the fluid level measurements (and LNAPL thicknesses) recorded during the operational period of the 2007 IRM treatment system are included in Appendix C. Tables presenting the historical groundwater quality for both onsite and offsite monitor wells are included in Appendix F.

2.6.2 RCRA Closure Activities

In November 2011, EPA started RCRA closure activities at the Fyn Paint facility. LBG on behalf of Fyn Paint, the property owner and the Volunteer continued the RCRA closure activities, which included closure of chemical bulk storage (CBS) tanks as well as the removal and offsite disposal of: hazardous waste bulk chemicals; contaminated building materials (concrete and wood); and, remedial decontamination waste. A total quantity of 10.92 tons of hazardous waste material was generated as a result of the RCRA closure activities and transported offsite for disposal. The remaining work onsite associated with the RCRA closure consists of the post-remedial surface confirmation sampling of the interior concrete floor. If the interior concrete slab on grade is removed in conjunction with the building demolition activities transported offsite for disposal at an approved waste disposal facility, then the RCRA closure report can be finalized. In that case, a RCRA closure report will be finalized following the receipt of the waste disposal manifests from the selected waste disposal facility.
2.6.3  **2014 Implementation of the NYSDEC Approved Remedial Design**

Following the NYSDEC approval of the Remedial Design of the Dual Phase Extraction (DPE), the 2007 IRM treatment system was decommissioned. The new DPE remedial system trailer was installed at the Site in June 2014 and commenced operation in July 2014. The equipment in the remedial system installed consists of: the DPE recovery system; an oil-water separator and LNAPL storage tank; a sub-slab depressurization system (SSDS); a groundwater extraction pump; an AS injection system (inactive); and associated groundwater and vapor treatment equipment. The extraction and treatment system components were installed in a trailer that was constructed offsite and transferred to the Site. The treatment trailer is currently staged adjacent to the west side of the Site building on the adjacent right-of-way. Figure 12 shows the location of the 2013 IRM treatment system trailer and figure 13 shows the layout of the components for the remedial system in the treatment trailer.

The DPE remedial system incorporates a network of extraction wells which are currently installed within flush-mount manholes. These wells include MW-11, MW-15, MW-21, MW-22, MW-23, MW-27, MW-28, MW-29, MW-30, MW-31, MW-32, MW-33, EW-1 and EW-2. Additional remedial system includes two air sparge wells (ASW-1 and ASW-2), which are installed in the Con Edison parking lot; however the air sparge component is currently not operating (commencement pending removal of residual LNAPL). The locations of the extraction wells and the air sparge wells are illustrated in figure 3 and figure 14.

The extraction points and the air sparge wells are connected to the DPE remedial system via schedule 40 PVC pipe conduits installed in trenches. The locations of the conduit trenches connecting to the extraction wells and air sparge wells are illustrated on figure 14. A cross-sectional illustration presenting typical trench specifications used onsite are illustrated on figure 9.

The remediation system consists of multiple process flow components which are summarized below.
2.6.3.1 Sub-Slab Depressurization System

The SSDS piping has been installed beneath the slab in the Fyn building as part of the RAWP field activities. The layout of the SSDS piping installed beneath the Fyn building is shown on figure 14. The SSDS piping is connected to the vacuum blowers utilized as part of the DPE system and the vacuum pressure/air flow is controlled with a valve. This system connection will allow the two vacuum systems to operate independently from one another. The components of the Remediation System are summarized in Section 3.1.2, below.

In addition to acting as ECs to prevent potential SVI within the Fyn building, the SSDS will also indirectly remediate the soil by inducing soil vapor circulation throughout the subsurface, removing and treating contaminated soil vapors.

2.6.3.2 Combined DPE and AS System

Several potential remedial technology alternatives were evaluated to most effectively address the residual contamination beneath the Site. Based on the subsurface geology at the Site, the DPE technology is most appropriate to address the dissolved phase contamination, the LNAPL and the soil contamination. DPE, also known as multi-phase extraction (MPE), vacuum-enhanced extraction, or bioslurping, is an in-situ technology that uses pumps to remove various combinations of contaminated groundwater, LNAPL, and hydrocarbon vapor from the subsurface. This extraction technology is supplemented by a groundwater extraction pump where vacuum extraction is not feasible. DPE is not feasible in the former UST excavation area because the gravel backfill material would be a preferential path for air flow, thereby short circuiting the vacuum influence within the native soils. Additionally, the anticipated low vacuum that would be generated would be redundant low vacuum created by the SSDS.

DPE systems are simply a combination of traditional soil vapor extraction (SVE) and groundwater (and/or LNAPL) recovery systems. The vacuum applied to the subsurface with DPE systems creates vapor-phase pressure gradients toward the extraction well. These vapor-phase pressure gradients are also transmitted directly to subsurface liquids, and those liquids existing in a continuous phase (e.g., water and LNAPL) will flow toward the extraction well in response to the imposed gradients. Additionally, a greater amount of LNAPL may be recov-
erved using vacuum-enhanced DPE compared to the fraction of LNAPL recoverable using gravity drainage alone. The higher the applied vacuum the larger the proposed hydraulic gradients which can be achieved in both vapor and liquid phase. The end result is greater rates of vapor and liquid recovery.

Combined AS and DPE systems can be effective in removing LNAPL from the subsurface, thereby reducing contaminant concentrations in both the saturated and unsaturated zones of the subsurface. DPE systems are typically designed to maximize contaminant extraction rates. An ancillary benefit is that the combined AS and DPE technologies also stimulate biodegradation of petroleum constituents in both the saturated zone and the unsaturated zone by increasing the supply of oxygen through increased air flow. Considering the system is designed to also extract LNAPL, an oil-water separator will be utilized prior to the groundwater treatment.

The pumping test data generated from the test performed on EW-1, the data generated during the operation of the IRM pump and treat system as well as the DPE pilot test data (2010 and 2012) demonstrated that continuous pumping is capable of inducing a cone of depression sufficient to both minimize further migration of groundwater with dissolved VOCs and to remove free-phase product from the subsurface.

A process flow diagram for the DPE components of the remedial system is shown on figure 15.

2.6.3.3 Groundwater Extraction and Treatment System

A submersible groundwater pump is utilized to extract groundwater with dissolved phase VOC contamination from MW-28, which was installed in the completed UST excavation within the Fyn building. The groundwater pumped from MW-28 is processed by the remedial treatment system along with the fluids generated by the DPE components. As previously noted, vacuum extraction is not feasible from MW-28 due to the gravel backfill material used in the UST excavation. However, if it is deemed more efficient, MW-28 can be incorporated into the extraction system as a DPE point, with the main target being groundwater recovery.
In addition to actively remediating the dissolved-phase VOC contamination, the objective of this system is to prevent offsite migration of the dissolved-phase contamination through hydraulic control. As evidenced through the pilot test conducted on EW-1 (prior to implementation of the IRM treatment system), as well as by operation of the IRM treatment system, groundwater extraction from a single extraction point (EW-1) at a rate of approximately 3 gpm has the ability to create a cone of depression encompassing the Site and the adjacent Con Edison property to the north of the Fyn Paint building. Additionally, the depth at which the extraction pump will be set and the extraction rate can both be modified to ensure that the nearby DPE wells are not dewatered as a result of MW-28 lowering the groundwater table.

A process flow diagram for the groundwater extraction and treatment components of the remedial system is shown on figure 15.

2.6.3.4 Remedial System Operational Effectiveness Evaluation

The currently active remedial system was installed as per the NYSDEC Remedial Design report. On July 31, 2014, the DPE remedial system commenced operation at the Site. The remedial system operated until October 8, 2014, when the system operation was discontinued. During late 2014, the Site remedial activities were transitioned from the NYSDEC Voluntary Cleanup Program (VCP) to the BCP. During this time, October 2014 to March 2015, the system was temporarily shut down. On March 9, 2015, the DPE system was restarted following the approval of the Site BCP Application. The SSDS was not activated during March 2015. The air sparge components of the remediation system for which a process flow diagram is illustrated on figure 16 will remain inactive pending the recovery/removal of all residual LNAPL from beneath the site.

Active remediation of both onsite and offsite contamination is being accomplished by a DPE high vacuum pump and a submersible groundwater pump, which effectively extracts LNAPL, groundwater and soil vapor. The DPE system uses a high vacuum liquid ring pump to remove various combinations of contaminated groundwater, LNAPL, and hydrocarbon vapor from the subsurface. Extracted groundwater and soil vapor is being treated by the remediation system. In addition to actively remediating the soil, groundwater and soil vapor
beneath the Site and the Con Edison property, this remedial action is also acting as an EC to prevent potential soil vapor intrusion in onsite and offsite buildings.

During the operational period of the current DPE remediation system (July 31, 2014 to January 26, 2016), a total of 236,500 gallons of groundwater have been extracted, treated and discharged to the NYS sanitary sewer under a NYCDEP discharge permit.

The total quantity of hazardous waste materials generated from 2007 to February 2016 in connection with the operation of the active remedial systems and transported offsite for disposal consisted of:

- 0.66 tons of recovered hazardous waste LNAPL;
- 1.0 ton of hazardous waste sludge; and,
- 6.385 tons of spent carbon.

2.7 Remedial Action Standards, Criteria and Guidance (SCG)

In Accordance with DER-10, the Remedial Action Objective of this Site are defined as medium-specific objectives for the protection of public health and the environment and are developed based on contaminant-specific SCGs. The remedial action SCGs utilized at the Site to direct the progress of the past RI and IRM activities, as well as to evaluate remedial alternatives include the following:

- NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation - December 2010;
- 6 NYCRR Part 375-6 Restricted Use Soil Cleanup Objectives – Restricted Residential;
- 6 NYCRR Part 703 New York State Groundwater Quality Standards;
- NYSDEC Division of Water Technical and Operational Guidance Series TOGS (1.1.1) Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations;
- NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York - October 2006;
2.8 Remedial Action Objectives

Based on the results of the Remedial Investigations performed at and surrounding the Site, the contamination beneath the Property and surrounding properties consists of: Lighter Non-Aqueous Phase Liquid (LNAPL); residual VOCs in soil; dissolved phase VOCs in groundwater; and VOCs in soil vapor. Due to the contamination present beneath the Site as well as the proposed Cleanup Track and contemplated Redevelopment Plan, the following Remedial Action Objectives (RAOs) have been identified for this Site.

2.8.1 Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater containing contaminant concentrations exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles emanating from contaminated groundwater.
RAOs for Environmental Protection

- Remove the source of ground or surface water contamination.

2.8.2 Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

2.8.3 Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into the building at the Site.
3.0 ALTERNATIVES ANALYSIS

LBG completed an analysis of potential remedial alternatives available to address the residual soil, groundwater and LNAPL contamination at the Site. This Alternatives Analysis was developed based on the results of the past remedial investigations and remedial actions completed at the Site (outlined in Section 2.0). The past Remedial Investigation Report (RIR) and the Remedial Action Work Plan (RAWP-V) were both completed for the Site under the VCP. The RAWP-V was approved by the NYSDEC on October 16, 2009.

Two (2) remedial alternatives were evaluated with respect to the following nine criteria as defined in 6 NYCRR Part 375-1.8(f) and listed below. The first two criteria are considered “threshold criteria” and the remaining criteria are “balancing criteria”. A remedial alternative must meet the threshold criteria in order to be considered and evaluated further under the balancing criteria.

1. Overall Protection of Human Health and the Environment;
2. Compliance with SCGs;
3. Long-Term Effectiveness and Permanence;
4. Reduction of Toxicity, Mobility and Volume;
5. Short-Term Impacts and Effectiveness;
6. Implementability;
7. Cost-effectiveness;
8. Land Use; and,

3.1 Remedial Alternatives

This section summarizes the evaluation of the two potential remedial alternatives which were evaluated for the remediation of the Site:

1. Alternative 1 - Track 1 Cleanup for Unrestricted Site Use (with a contingency for implementation of ECs/ICs needed for a Track 2 Cleanup); and,
2. Alternative 2 – Track 4 Cleanup for Restricted Commercial Site Use.
3.1.1 Alternative 1 – Track 1 Cleanup for Unrestricted Site Use

Alternative 1 employs the removal of all soil/fill exceeding Track 1 Unrestricted Use SCOs throughout the Site and confirmation that Track 1 Unrestricted Use SCOs has been achieved with post-excavation endpoint sampling. LNAPL observed in any portion of the excavation would be removed. Alternative 1 would consist of the following activities:

- NYCDOB and associated permitting activities associated with the building demolition activities.
- Operation of the NYSDEC approved remediation system as an interim remedial measure (IRM) during the review/approval process for the Track 1 Cleanup RAWP. The IRM will remain operational until such time that the building demolition activities are ready to commence, at which time the system will be used to treat extracted groundwater associated with construction dewatering performed to facilitate the contaminated soil excavation.
- Implementation of plans for the protection of onsite workers, community, and environment during remediation and construction activities.
- Demolition of the current building and offsite disposal of demolition debris.
- Installation of structural excavation support.
- Excavation of the contaminated soil present within the entire property boundary to a depth of approximately 15 feet.
- Waste material loading for hauling and offsite disposal.
- Construction dewatering and treatment of impacted groundwater (as required).
- Verification sampling to confirm excavation extents achieve Unrestricted Use SCOs.
- Relocation of the IRM DPE system and transfer of OM&M responsibility to the NYSDEC (or designated representative).
- Backfilling of excavated areas to development grade with certified-clean material meeting Unrestricted Use SCOs or virgin, native crushed stone.
- Associated decontamination activities.
- Building reconstruction activities.
• Installation of soil vapor monitoring points and post-remedy soil vapor monitoring to confirm the effectiveness of the remedy for mitigation of soil vapor contamination.

• Preparation and submission of the Final Engineering Report (FER).

Attainment of Unrestricted SCOs for the completed excavation would eliminate the requirement for any ECs or ICs at the Site. After completing excavation activities, the Site will be backfilled with certified clean fill meeting unrestricted SCOs. Remedial activities will be performed at the Site in accordance with this NYSDEC-approved RAWP and the Department-issued Decision Document. All deviations from the RAWP and/or Decision Document will be promptly reported to NYSDEC for approval and fully explained in the FER.

**Track 2 Cleanup Contingency**

In the event that Unrestricted SCOs are not attained following excavation activities, the Site remedy will be modified to a Track 2 cleanup. Because residual contamination would remain at the Site, Engineering and Institutional Controls (ECs and ICs) would be required to protect human health and the environment. Long-term management of EC/ICs and of residual contamination will be executed under a Site-specific Site Management Plan (SMP) that will be developed and included in the FER.

ECs would be implemented to protect public health and the environment by appropriately managing residual contamination. The Site would have three (3) primary EC systems. These are: (1) a steel sheeting hydraulic barrier (with grouted seams) installed surrounding the perimeter of the Site; and (2) a waterproofing membrane/soil vapor barrier of composite cover system installed in association with any future Site redevelopment; and, (3) in-situ chemical oxidation to address residual dissolved phase contamination.

ICs would also be implemented to protect public health and the environment by appropriately managing access to residual contamination associated with the Site. The Site would have 2 primary IC systems. These are:
1. **Recording of an Environmental Easement (EE)**

   The EE will reference all ECs and ICs that are part of the Site remedy, and would be an enforcement vehicle to ensure compliance with land use or groundwater use restrictions at the Site.

2. **Implementation of the Site Management Plan**

   As part of Site Management, post-remedy soil vapor monitoring (following Site reconstruction) would be implemented to document the effectiveness of the remedy. The results of the soil vapor monitoring would be used to demonstrate that the remedy has mitigated the soil vapor intrusion risk at the Site. Additionally, Periodic Review Reports will be submitted to the NYSDEC to certify that all EC/IC components of the Site remedy are in place and maintained as per the design in the remedial action work plan.

3.1.2 **Alternative 2 – Track 4 Restricted Use Cleanup for Commercial Site Use**

   Because residual contamination would remain at the Site, ECs and ICs would be required to protect human health and the environment. Alternative 2 employs continued OM&M of the current in-situ remedial system (as outlined in Section 2.6.3, above) to remediate residual subsurface contamination beneath the Site and maintenance of certified site covers (impermeable surface caps and if necessary certified cover) to eliminate the exposure pathway to residual contamination left in place beneath the Site. These ECs will actively remediate residual contamination beneath the Site, mitigate the potential for SVI to negatively impact the indoor air quality onsite as well as eliminate the direct exposure pathway to residual contamination beneath the Site. The site cover specifications will satisfy the restricted use commercial requirements and will at a minimum consist of: impermeable surface caps (the building concrete slab and the asphalt and concrete cover in the alleyways north and east of the building); and, if necessary a 1-foot thick or greater layer of certified clean fill meeting restricted use commercial SCOs for any undeveloped area(s) of exposed soil.

   Alternative 2 addresses the contamination by extracting contaminated groundwater, LNAPL and soil vapor, and then treating or storing the contaminants to comply with regula-
tions for discharge or disposal. The treatment methods for groundwater include: LNAPL extraction; in-situ chemical oxidation (and/or ISCO); SVE (augmented with AS following LNAPL source removal); air stripping; and treatment using activated carbon. The treatment method for soil include: SVE; LNAPL extraction; and/or ISCO. The treatment and mitigation methods for soil vapors include: SVE (via DPE wells and SSDS); and treatment with activated carbon; and installation of a vapor barrier. Treated groundwater would be discharged directly to the NYCDEP sanitary sewer. Prior to any modifications to the discharge volume previously approved by the NYCDEP in conjunction with the IRM (maximum of 7,200 gallons per day), all necessary permitting requirements would be addressed with the NYCDEP and a modified permit would be obtained. Effectiveness of the remedy will be evaluated by the performance of a Groundwater Monitoring Program. The Groundwater Monitoring Program would track the decline in concentrations resulting from the active remediation processes.

ICs would also be implemented to protect public health and the environment by appropriately managing access to residual contamination associated with the Site. The ICs will ensure: long-term management of the ECs/ICs including the performance of periodic inspections and certification that the controls are performing as they were intended; and continued Site Management following the remedial action and maintenance of the ECs/ICs to ensure that the Volunteer continues to maintain these controls as required. An EE and SMP would be implemented to ensure the continued operation, maintenance and monitoring (OM&M) of the treatment systems (referred to as ECs). Long-term management of EC/ICs and of residual contamination will be executed under a SMP that will be developed and included in the FER. Since source material constituting a continuous source has been identified onsite, in addition to the remedial measures addressing the onsite contaminant source area, monitoring activities would be implemented to assess the effectiveness of the remedial system. The SMP would detail the OM&M plan for the Site which would include monitoring of post-remedy groundwater and soil vapor quality trends. Additionally, the SMP will contain an excavation plan that will outline the compliance activities required for future ground invasive activities at the Site.
3.2 Remedy Selection Evaluation Criteria

The sections below present the evaluation of the nine remedy evaluation criteria as defined in 6 NYCRR Part 375 for the two potential remedial alternatives.

3.2.1 Overall Protection of Human Health and the Environment

3.2.1.1 Alternative 1

Alternative 1 would provide protection for human health by removing all contamination from beneath the Site and import of approximately 8 to 15 feet of certified clean backfill. This will eliminate all onsite source material, eliminating the risk of contamination leaching into groundwater. This remedial action would eliminate the exposure pathway to the residual offsite contamination via a containment barrier. The Site will be regraded with certified clean backfill imported from an offsite source.

Public health would be protected during remediation activities under the remedy by implementing a HASP and enforcing dust, odor, and organic vapor control and monitoring procedures when needed. Alternative 1 cleanup activities would be performed in a way to ensure they are protective of human health and the environment through implementation of the HASP and Community Air Monitoring Plan (CAMP). These plans would minimize potential exposure to contaminated soils during construction. Contact with contaminated groundwater would be a manageable issue as it would be encountered during construction dewatering which would be necessary to facilitate the contaminant source material remedial soil excavation activities.

Contingency

There is potential for contact with contaminated groundwater encountered in association with dewatering activities, however it will be treated with the onsite treatment system during remedial activities. If any contamination beyond a depth of 15 feet is left in place, a waterproofing/vapor barrier and/or composite cover system will be installed (prior to redevelopment construction) to address the potential exposure pathway to the residual contamination. With the waterproofing membrane/vapor barrier installed as an engineering control, a Track 1
cleanup cannot be achieved because of the need for site management and this remedy would become a Track 2 remedial action.

3.2.1.2 Alternative 2

The Alternative 2 Track 4 remedy would provide protection to public health and the environment similar to Alternative 1. Under a Track 4 remedy, potential exposure pathways for ingestion, dermal contact or inhalation to residual impacted soil and groundwater would be incomplete due to the installation of an impervious surface cover throughout the entire Site. In addition, groundwater in Brooklyn is not used as a source of drinking water. Potential exposure pathways for inhalation of impacted soil vapor would be incomplete due to the installation of a SVI barrier and use of a SSDS for mitigation of soil vapor contamination.

During the implementation of Alternative 2, a risk to human health would still be present in the event of potential ground intrusive activities. The exposure risk would be minimized through the implementation of the HASP and through enforcement of dust, odor, and organic vapor control and monitoring procedures as per the CAMP. Additionally, any future post-remedy ground invasive activities performed on the Site would be governed by HASP and CAMP, and all Site modifications would comply with the requirements for Restricted Commercial Use.

Since residual contamination will remain beneath the Site, monitoring activities would be required at the Site to assess the remedial system effectiveness. This will confirm that the system is controlling the residual onsite contamination and preventing potential impacts to onsite and offsite receptors.

Alternative 2 would provide protection for human health and the environment because the highly contaminated source material would be actively remediated via the active treatment system and because the direct exposure pathway would be eliminated and any potential indoor air intrusion issue (current or future) would be addressed via the onsite cover system.
3.2.2 **Compliance with Standards, Criteria and Guidance**

3.2.2.1 **Alternative 1**

Alternative 1 would achieve compliance with the remedial goals, SCGs and RAOs for the Site through construction dewatering and complete removal of all onsite contaminated soil to Track 1 Unrestricted Use SCOs.

3.2.2.2 **Alternative 2**

VOC contaminated soil is known to exist beneath the Site at concentrations exceeding RUSCOs for the lower of the commercial use or the protection of groundwater. The Track 4 cleanup alternative was designed to meet the requirements of a restricted commercial use and complies with the SCGs.

This alternative would achieve compliance with RAOs. These actions would reduce the volume of onsite contamination (with a Site Specific SCO complying with the Track 4 RUSCOs for Commercial) as well as reducing associated potential risk. Implementation of the DPE system would actively remediate the residual subsurface contamination left in place beneath the Site. Implementation of the SSDS will mitigate the risk of soil vapor intrusion of the elevated VOCs detected in the soil vapor beneath the first floor and basement slab. The soil vapor barrier and impervious soil covers at the Site will satisfy the Track 4 requirements by restricting access to the residual subsurface contamination, thereby eliminating the exposure pathway to contaminated soil and/or groundwater.

3.2.3 **Long-Term Effectiveness and Permanence**

3.2.3.1 **Alternative 1**

Alternative 1 would achieve long-term effectiveness and permanence by permanently removing all impacted source material (impacted soil and all accessible LNAPL) from beneath the Site. Additionally, the perimeter sheeting will be let in-place post-excavation, and will act as a hydraulic barrier preventing offsite contamination from negatively impacting the Site (post-remedy).
3.2.3.2 Alternative 2

This alternative would address exposure to site contaminants in the long-term, as source area contaminant mass concentrations in the subsurface will decrease over time. This will also result in a decrease in the potential for exposure impacts. Soil cover systems will also eliminate the direct exposure pathway to residual contamination beneath the Site. The long-term effectiveness would be achieved by continued OM&M of the active remedial system as well as continued maintenance of the vapor barrier and impermeable surface caps. In addition, continued maintenance of the ECs, use restrictions for the Site and adherence to the SMP would be memorialized via the EE thereby ensuring long-term effectiveness. The SMP will ensure long-term effectiveness of all ECs and ICs by requiring periodic inspection and certification that these controls and use restrictions continue to be in place and are functioning as they were intended; thereby assuring that protections designed into the remedy will provide continued high level of protection in perpetuity.

Alternative 2 would ensure long-term effectiveness by establishing use restrictions, establishing a SMP to ensure long-term management of ICs and ECs, and placing a deed restriction to memorialize these controls for the long term. Establishment of an SMP will ensure that the protection remains effective for the long-term by requiring periodic inspection and certification that the Site controls and use restrictions continue to be in place and are functioning as they were intended assuring that protections designed into the remedy will provide continued high level of protection in perpetuity.

3.2.4 Reduction of Toxicity, Mobility and Volume

3.2.4.1 Alternative 1

Treatment or removal is the preferred remedy to eliminate contaminants at a Site, reduce the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce total volume of contaminated media. Alternative 1 would permanently eliminate the toxicity, mobility, and volume of contaminants from onsite soil and groundwater and meet Unrestricted Use SCOs through contaminant removal. Additionally, the DPE system which is currently operating as an IRM will be utilized to achieve construction dewatering during the
onsite soil excavation activities. It is expected that the dewatering activities will improve the groundwater quality beneath the Site. The elimination of the contaminant volume would thereby reduce the contaminant mobility originating from the Site.

Since excavation of onsite soil would not eliminate the toxicity, mobility, and volume of upgradient contamination migrating onto the Site, a hydraulic barrier would be installed to mitigate impacts to the Site.

### 3.2.4.2 Alternative 2

ECs and ICs would be utilized on the Site to mitigate potential impacts related to subsurface contamination remaining in place beneath the Site. Alternative 2 would incorporate active remediation through in-situ contaminant extraction and treatment and/or disposal. Alternative 2 would remove contaminated groundwater, soil, soil vapor and LNAPL during operation. Therefore, it would reduce the contaminant volume and contaminant mobility through active extraction in liquid phase and vapor phase, and to a lesser extent contaminant reduction via ISCO activities.

Alternative 2 would reduce the mobility and volume of soil vapor contamination in unsaturated soil beneath the Site via active operation of the DPE system and the SSDS. This in turn will ensure the indoor air within the building is protective of human health via mitigation of soil vapor.

Alternative 2 would not reduce the toxicity, mobility or volume of the contaminated groundwater migrating onto the Site in the short or long-term. This situation would result in an increase in the duration required for the Site to be remediated under Alternative 2.

### 3.2.5 Short-Term Impacts and Effectiveness

#### 3.2.5.1 Alternative 1

Short-term exposure risks to construction workers and the surrounding community could result from demolition, remediation and redevelopment activities at the Site. These risks would be effectively avoided through the use of standard construction and health and safety precautions. Additionally, implementation of the CAMP, diligent onsite materials management
and potential oversight/enforcement of truck routing protocols during the implementation of the remedy would minimize or negate the overall impact of these activities and any differences between these alternatives.

This remedial action would require a significantly longer time (relative to Alternative 2) to implement, and would be expected to take approximately one year to fully complete.

3.2.5.2 Alternative 2

Exposure risks for the surrounding community are considered low due to the fact that the remedy will be confined to the onsite remedial system and adjacent properties for access to remote wells. Short-term exposure risks to construction workers could result from remediation activities at the Site. These risks would be effectively managed through the implementation of a HASP as well as adherence to standard construction and health and safety precautions. Additionally, implementation of the CAMP, diligent onsite materials management and detailed oversight and enforcement of truck routing protocols during the implementation of the remedy will minimize or negate the overall impact of these activities.

The majority of this remedial action has already been implemented as an IRM and is currently active. The beneficial impacts of this remedial alternative are currently being observed, and would continue along with continuation of the remedy. This remedial action will be required to operate for an undetermined amount of time.

3.2.6 Implementability

This evaluation criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation. These factors include: technical feasibility of construction and operation; reliability of the selected technology; ease of undertaking remedial action; monitoring considerations; administrative feasibility (e.g., obtaining permits for remedial activities); capital costs (such as construction costs, equipment costs, disposal costs, and engineering expenses); availability of services and materials; and, site management costs (costs incurred after remedial construction is complete) necessary to ensure the continued effectiveness of a remedial action.
3.2.6.1 Alternative 1

The technical feasibility of implementing Alternative 1 is moderate. It uses standard materials and services that are well established technology. However, this remedy will also include the demolition of the onsite structure and the installation of perimeter sheeting to function as a hydraulic barrier.

The reliability of the remedy is high. This alternative utilizes standard methods that are commonly available and routinely applied by the industry.

3.2.6.2 Alternative 2

The technical feasibility of implementing Alternative 2 remedy is high. The remedy consists of continuation of the current remedial system, and the addition of a soil vapor barrier to interior slab on grade surfaces. The risk of damage to adjacent property buildings and impacts to occupants is low for the Alternative 2 remedy.

3.2.7 Cost-Effectiveness

3.2.7.1 Alternative 1

Based on the assumptions detailed for Alternative 1, associated costs would include demolition of the existing building and disposal of associated regulated wastes and construction and demolition (C&D) debris, installation of support of excavation and hydraulic barrier elements, removal and offsite disposal of all soil exceeding Unrestricted Use SCOs, construction dewatering, import of backfill, and costs associated with redevelopment. Property zoning requirements aside, the Track 1 cleanup would allow for less restrictive future property uses. As the Site would be remediated to an unrestricted-use level, there are no OM&M costs associated with the proposed remedy. Alternative 1 is the most cost effective alternative, considering the estimated time-frame required for in-situ remediation to clean up the Site.

Initial costs associated with achieving the Track 1 cleanup with Alternative 1 will be significantly higher than the Track 4 alternative based on higher volume of soil removal. The cost for Alternative 1 is the greatest because it required demolition of the existing building,
supported excavation (sheeting and shoring) for the entire property and localized dewatering. Assuming a minimum excavation depth of 15 ft bg, an estimate for the implementation of Alternative 1 is approximately $3,214,555. An itemized cost estimate for Track 1 cleanup remedial actions (Alternative 1) is included in Appendix O. This excludes the cost of redevelopment of the Site, which depending on the costs associated with potential Site redevelopment alternatives could result in total cleanup/redevelopment cost ranging from $5 million to $30 million.

Alternative 1 is the most costly remedial alternative, although Alternative 2 has the potential to be more costly based on the operation period of the remedial system. Long-term costs would be lower for Track 1 (compared to an Alternative 2 Track 4 cleanup) because it would not require the need for implementation of a SMP. In both cases, appropriate public health and environmental protections are achieved.

3.2.7.2 Alternative 2

Based on the assumptions detailed for Alternative 2, the estimated remediation cost to achieve a Track 4 cleanup would be approximately $250,000 to $350,000 in capital costs, while the revolving annual costs for the remedial system OM&M and implementation of the SVI and groundwater monitoring activities for this alternative would be approximately $500,000 per year.

The initial costs associated with achieving the Alternative 2, Track 4 cleanup will be significantly lower than the Track 1 alternative. However, the actual total remedial cost will be dependent on the operational extraction/treatment rate achieved with the remedial system, the operational effectiveness of the remedial system, the volume of remedial waste generated by the remedial system operation and the results of the monitoring activities and the residual contamination concentration trends observed at the Site. In addition to the initial remedial activities, a SMP would be required to assure compliance with the remediation goal and objectives. The SMP would outline the scope of Site maintenance requirements including the long-term OM&M of the ECs, annual Site inspection activities, preparation of Periodic Monitoring Reports, and implementation of any/all requirements for future Site activities as required.
under the SMP. When compared to Alternative 1, Alternative 2 presents a lower initial cost for implementation, however depending on these cost variables, this alternative has the potential to be the most costly remedial alternative based on the duration for which the remedial system operation is required.

3.2.8 Land Use

This criterion is an evaluation of the current, intended and reasonably anticipated future use of the site and its surroundings, as it relates to an alternative or remedy.

3.2.8.1 Alternative 1

An evaluation of the land use criteria is not required when unrestricted levels would be achieved.

If the post-remedy Site conditions required the remedy be modified to a Track 2 cleanup requiring implementation of ECs/ICs as part of the final remedy, land use criteria (as summarized for Alternative 2 below) would not prohibit the implementation of Alternative 1 as the final remedy.

3.2.8.2 Alternative 2

3.2.8.2.1 Current Use

The Site is located in Williamsburg, Brooklyn, New York City. The Site is located in a manufacturing district and is recorded with a manufacturing code of M3-1. This zoning limits land use at the Site to manufacturing. The Site is currently vacant.

3.2.8.2.2 Consistency with Zoning Laws

Future commercial use of the Site would be compliant with city zoning. The zoning of the Site would allow for the implementation of Alternative 2.
3.2.8.2.3 **Brownfield Opportunity Areas**

To the best of our knowledge, the Site does not fall within the boundaries of an existing Brownfield Opportunity Area (BOA).

3.2.8.2.4 **Applicable Land Use Plans**

On May 11, 2005, the New York City Council approved the Department of City Planning’s Greenpoint-Williamsburg Rezoning proposal, as modified by the Council and the City Planning Commission, for nearly 200 blocks in the Greenpoint and Williamsburg neighborhoods of Brooklyn. Several proposed changes were submitted October 31, 2005 and on March 1, 2006, the City Council adopted the proposed changes, which are now in effect. The rezoning plan is intended to provide opportunities for new residential and commercial development and enhancement and upgrade of the waterfront areas, including new parkland on the waterfront to provide waterfront access and recreational opportunities. The proposed action would create opportunities for new housing development on underutilized and vacant land formerly used for manufacturing, where there is no longer a concentration of industrial activity and where strong demand for housing exists. It would bring existing non-conforming residential uses into conformance. In addition, the mixed-use districts proposed in certain areas would permit the continuation of light industrial uses as well as the residential re-use of underutilized and vacant land. The proposed action would also facilitate the redevelopment of the area’s derelict East River waterfront, establishing a blueprint for a revitalized waterfront with a continuous public walkway and enlarged parks along approximately 2 miles of the East River, including the mapping of a new park along the waterfront between North 9 Street and the northern edge of Bushwick Inlet. The proposed action would produce new waterfront development with a sensitive transition to the adjoining neighborhoods, a pedestrian-friendly streetscape, and a compelling skyline. Light industry and residences would be permitted to coexist in mixed-use areas, and manufacturing zoning would be retained in areas where concentrations of industrial activity already exist.
Considering the Site is outside of the zone encompassing the Greenpoint-Williamsburg Rezoning, Comprehensive Community Master Plans or Land Use Plans would not prohibit the implementation of Alternative 2.

3.2.8.2.5 Surrounding Property Uses

The surrounding property uses throughout the Site consist of primarily manufacturing and residential uses with a special purpose district being located adjacent to the east of the Site. There are also approximately three blocks of commercial zoned properties located two blocks north of the Site. Copies of the land zoning maps encompassing the Site (as generated by the New York City Planning Commission) are included in Appendix P. The properties which are located within the special purpose district are assigned an “E” designation. The designation “E” where shown on the “zoning map”, indicates that environmental requirements pertaining to potential hazardous material contamination or noise or air quality impacts have been established which are incorporated into the provisions of a “zoning map” amendment to this Resolution for one or more tax lots. The said environmental requirements are set forth in the City Environmental Quality Review (CEQR) Declaration related to a specific “zoning map” amendment. In the case of a merger or subdivision of tax lots or “zoning lots” with an “E” designation, involving improved or unimproved properties, the “E” designation will apply to all portions of the property. The CEQR Declarations are on file with the designated lead agency and the Office of Environmental Coordination (OEC). A listing of such CEQR Declarations, entitled City Environmental Quality Review Requirements Declarations, is appended to the “zoning maps”. However, CEQR Declarations for the properties adjacent to the Site were not available for review. Prior to issuing a building permit for any “development”, for an “enlargement”, “extension” or a change of “use”, any of which involves a “residential” or a “community facility use”, or for an “enlargement” of a “building” for any “use” that involves a disturbance of the soil, on a lot that has an “E” designation for potential hazardous material contamination, the Department of Buildings shall be furnished with a report from the New York City Department of Environmental Protection (NYCDEP) stating that the environmental requirements related to the “E” designation have been met for that lot.
Aside from the need to implement best management practices as well as following the HASP and CAMP, the surrounding property uses would not prohibit the implementation of Alternative 2.

3.2.8.2.6 Citizen Participation

The environmental investigation and remediation which has taken place at the Site, as well as future proposed RAs, have been and will continue to be conducted under the BCP. As such, a component of the BCP is citizen participation. Prior to major milestones in the progress of the work, Fact Sheets will be mailed out to a public contact list. The Fact Sheets will list the time frame for a public comment period as well as locations of document repositories where previously submitted reports are available for review. Based on the results of the public comment period for the RAWP, if necessary, modifications will be made to the document (after evaluation of the comments by both the Volunteer as well as the NYSDEC and NYSDOH). Following the completion of the public comment period, the RAWP will be implemented.

3.2.8.2.7 Environmental Justice Concerns

The QA/QC methodologies implemented at the Site, as well as the collaborative oversight by state agencies (NYSDEC and NYSDOH), will ensure environmental justice for all citizens adjacent to and surrounding the Site.

Census Tract information provided by the NYC Department of City Planning for the Site and the surrounding area was evaluated (utilizing the 2010 Census Profile data). The Site is located within Census Tract 555, which has a demographic profile indicating the following approximate distribution: white – 66%; black/African American – 3.7%; Asian non-hispanic – 10.4%; Some other race non-hispanic – 0.7%; Non-hispanic of two or more races – 2.5%; and, Hispanic origin – 16.7%. Based on the NYC Census demographic information, there are no significant concentrations of groups/communities within the Site Census Tract that may be disadvantaged due to socio-economic conditions or as a result of language barriers.
However, the Census Tract immediately south of the Site (Census Tract 551) has a demographic profile indicating the following distribution: white – 38.7%; black/African American – 3.6%; Asian non-hispanic – 5%; Some other race non-hispanic – 0.6%; Non-hispanic of two or more races – 1.7%; and, Hispanic origin – 50.4%. Based on the review of data for surrounding the Site, there is a significant Spanish-speaking population to the south of the Site. Additionally, due to the type of residential buildings in the Community Impact Zone (CIZ), the NYSDEC has recommended that outreach materials be translated into Spanish. As such, the Citizen Participation Plan and project Fact Sheets will be translated into Spanish and filed at the document repositories.

Based on the available demographic information, there are no significant concentrations of groups/communities within the Site census tract or immediately adjacent vicinity that may be disadvantaged due to socio-economic conditions or as a result of language barriers.

3.2.8.2.8 Land Use Designations

The land use designation for the Site is a 1 or 2 floor industrial manufacturing facility. The land use designations for the area surrounding the Site consists of: 1 or 2 floor industrial manufacturing/wholesale buildings; 1 or 2 floor industrial mixed M/R buildings; 3+ floor industrial manufacturing buildings; 3+ floor industrial mixed M/R buildings; and residential. There are also a negligible amount of commercial, community facility, automotive repair, vacant properties. There are no Federal or State land designations for the Site.

The land use designations of the Site and the area surrounding the Site would not prohibit the implementation of the preferred remedy.

3.2.8.2.9 Population Growth Patterns

One resource utilized to further investigate the Site was Property Shark. This online resource brings together and presents information on specific sites including property area descriptions (demographics, local municipal services), building information, zoning information, property tax information, title documents, surrounding toxic sites, neighboring properties, building permits and judgments and liens. Population growth patterns within the area sur-
rounding the Site are increasing. This situation is evidenced with the increased development of residential buildings in the surrounding area. This growth pattern is consistent with what is seen throughout the majority of New York City. Of note, the Site is located on the outskirts of (the western boundary) Williamsburg and represents the lowest population density of the area. This fact is illustrated on the population density map presented on page 11 and 12 of the Property Shark report, which is included in Appendix Q. The population growth pattern of the area surrounding the Site would not prohibit the implementation of Alternative 2.

3.2.8.2.10 **Accessibility to Existing Infrastructure**

The accessibility to existing infrastructure at the Site and in the area surrounding the Site would not prohibit the implementation of Alternative 2.

3.2.8.2.11 **Proximity to Cultural Resources**

No cultural resources were observed in the immediate vicinity of the Site. Additionally, based on the small area of which the implementation of the proposed remedy would encompass, the proximity of the Site to cultural resources would not prohibit the implementation of Alternative 2.

3.2.8.2.12 **Proximity to Natural Resources**

The Site is in a heavily developed urban area. The nearest receiving body of water is the East River which is approximately 300 feet west of the Site. The implementation of Alternative 2 will address the offsite migration of contaminated groundwater, reducing (with the long-term goal of eliminating) the dissolved-phase VOC concentrations migrating to the East River. As such, the proposed remedy would both eliminate residual source material from the subsurface as well as much of the dissolved phase contamination. By doing so, it will lower dissolved phase VOC concentrations, reduce the contaminant mass migrating off Site and actively enhance the remediation of dissolved-phase VOCs which are already located offsite. The fact that there have already been offsite groundwater impacts supports the need for the remedial action. Since implementation of Alternative 2 would actively reduce the
residual contaminant mass, it would not present an increased potential for groundwater impact. Therefore, the proximity to natural resources would not prohibit the implementation of Alternative 2.

3.2.8.2.13 Offsite Groundwater Impacts

The implementation of Alternative 2 will address the offsite migration of contamination by: eliminating residual onsite source material in the subsurface; removal of dissolved-phase contamination via a groundwater pump and treat system; remediation of residual soil contamination via a combined AS/SVE system; and chemical oxidation injections downgradient to address dissolved-phase contamination. The combination of these engineering controls will help to remediate offsite groundwater impacts. The fact that there have already been offsite groundwater impacts supports the need for the implementation of the preferred remedy.

The groundwater in the area surrounding the Site is not a source of potable water. Additionally, there is no direct exposure pathway to the residual subsurface dissolved-phase contamination. Therefore, offsite groundwater impacts would not prohibit the implementation of Alternative 2.

3.2.8.2.14 Proximity to Floodplains

The Site is not located in or adjacent to a floodplain and as such, no floodplain issues need to be addressed. Therefore, the proximity of the Site to floodplains is not an issue and therefore would not prohibit the implementation of Alternative 2.

3.2.8.2.15 Geography and Geology of the Site

The geography and geology of the Site and the area surrounding the Site would not prohibit implementation of Alternative 2.

3.2.8.2.16 Current Institutional Controls

The Site has several institutional controls which were applied in the past under the VCP. Currently the Site, which is entered in the NYSDEC BCP, has maintained the ICs.
First, the environmental characterization and remediation work at the Site has been and will continue to be performed according to NYSDEC-approved work plans. Additionally, a Site-specific HASP developed for the Site (which includes a CAMP) will provide safety guidance for all environmental work completed in association with implementation of Alternative 2 as the Site remedy.

Based on the Site review, the current ICs for the Site would not prohibit the implementation of Alternative 2.

3.2.9 Community Acceptance

This modifying criterion is evaluated after any public comments on the remedy have been received, prior to DER selection of the remedy.

3.2.9.1 Alternative 1

Alternative 1 should be acceptable to the community because the potential exposure pathways to onsite contamination would be eliminated upon completion of the remedy and the Site would be effectively utilized for commercial activities or even less restrictive site uses in the future. Alternative 1 could potentially result in the Site being redeveloped into a more attractive use.

However, Alternative 1 would have negative impacts on the community including the following: building demolition/redevelopment activities would be necessary; noise and vibration impacts would result from the hydraulic barrier installation; the remedial activities would be visible to the surrounding community; and the expanded scope of work would result in increased truck traffic and nuisance impacts.

3.2.9.2 Alternative 2

Alternative 2 should be acceptable to the community because the potential exposure pathways to onsite contamination would be eliminated upon completion of the respective alternatives and the Site would be effectively utilized for commercial activities. Alternative 2 would be appealing based on the fact that: no building demolition/redevelopment activities
would be necessary; the remedial activities would be contained to the interior of the onsite building; and the reduced scope of work would result in reduced truck traffic noise and nuisance impacts to the surrounding community.

However, the aspect of long-term OM&M of the onsite remedial system required with Alternative 2 would be viewed as a negative impact on the community.

3.3 Alternatives Analysis Conclusion

The sections above provide information on the advantages and disadvantages of each alternative as well as Site-specific factors considered when selecting the preferred remedy. The remedial techniques in each of the alternatives have been used on many sites and are proven to be effective for remediating contaminated groundwater, soil and soil vapor impacted with the Site contaminants of concern. Based on the evaluation of the remedial alternatives described above, both alternatives would be protective of human health and the environment and meet the remedy selection criteria, however Alternative 1 represents the more complete Site remedy.

3.4 Comparative Analysis Of Remedial Alternatives

This section summarizes the evaluation of the two remedial alternatives with respect to the criteria as defined in 6 NYCRR Part 375.

3.5 Alternatives Analysis Conclusion

A Remedial Alternative numerical rating was performed for Alternatives 1 and 2. The numerical rating assigns a number value to each evaluation criteria relative to the degree with which the remedial alternative satisfied the respective criteria. The rating description is as follows:

1. Low – Minimally Satisfies Criteria;
2. Medium – Satisfies Criteria To A Moderate Degree; and,
3. High – Satisfies Criteria To A High Degree.
The numerical score for each evaluation criteria relative as well as the aggregate numerical score for each of the alternatives evaluated is shown in the table below. Higher relative scores represent a higher level of effectiveness with respect to the evaluation criteria.

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Alt. 1</th>
<th>Alt. 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Protection of Human Health and the Environment</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Compliance with Standards, Criteria and Guidance</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Long-Term Effectiveness and Permanence</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Reduction of Toxicity, Mobility and Volume</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Short-Term Impacts and Effectiveness</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Implementability</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Cost-effectiveness</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Land Use</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Community Acceptance</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Aggregate Score</strong></td>
<td><strong>23</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>

As reflected by the table above, Alternative 1 was determined to have the highest aggregate score when evaluating relative to the 6 NYCRR Part 375 criteria. Implementation of Alternative 1 provides for removal of all impacted, onsite soil contamination exceeding Track 1 SCOs and therefore provides an effective remedy that achieves the remedial objectives. This alternative would render the Site suitable for the current Site use, and would permit future modifications for less restrictive Site uses (i.e., restricted residential) subject to any required zoning adjustments. Although Alternative 1 requires additional measures to implement, it will completely address the Site contamination via removal and Site containment, and long-term may be less costly than Alternative 2.

Alternative 1 has, therefore, been determined to be the most appropriate method for effectively remediating the Site. It is anticipated that these remedial alternatives will be effective at bringing the onsite contamination to levels meeting the Track 1 Cleanup for Unrestricted
Use as well as being compliant with the Site redevelopment requirements established for restricted commercial use as well as the more restrictive restricted residential use (which will allow for potential future property use modification).

3.6 **Selected Cleanup Track**

As per the NYSDEC requirements for remedial programs under all Tracks, the threat to public health and the environment resulting from contamination in environmental media other than soil must be evaluated in the development of remedial alternatives and addressed in the alternatives analysis to ensure that the remedial program meets the requirements of ECL 27-1415(1), Subdivisions 375-3.8(a) and (f), and Section 375-6.7. This evaluation is presented in Section 3.0, below.

The proposed cleanup track for the Site is Track 1: Unrestricted Use Soil Cleanup Objectives (SCOs). The scope of the cleanup entails the excavation of all contaminated material from beneath the Site to a minimum depth of 15 ft bg. This approach requires that contaminant concentrations not exceed the applicable Unrestricted Use SCOs.

Additionally, where it is necessary to utilize offsite soil to achieve this requirement, the soil brought to the Site for use as a soil cover or backfill must be comprised of soil or other unregulated material as set forth in 6 NYCRR Part 360. The imported soil must not exceed the applicable SCOs for the use of the Site, as set forth in 6 NYCRR Part 375-6.8(b). For the selected Unrestricted Use, the lower of the protection of groundwater or the protection of public health SCOs is the regulatory guidance value.

Due to the volume and extent of contamination in the subsurface (both onsite and offsite) in addition to the contaminant concentrations, Track 1 cleanup was selected because it allows for the most complete remediation of the Site. However, as a result of the physical constraints of the subsurface contamination (i.e., dissolved phase contamination which extends offsite), implementation and maintenance of ECs and/or ICs as part of the final remedy may be necessary.

A Track 1 Cleanup requires that the soil component of the remedial program achieve the Unrestricted Use SCOs as set forth in Table 375-6.8(a) for all soils above bedrock. How-
ever, based on historical Site characterization data, soil excavation activities at the Site may not be able to achieve the Unrestricted Use SCOs in all locations. In this instance, the remedial action for the Site will be modified to a Track 2 Cleanup. As per the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, for a Site (or portion thereof) being addressed pursuant to Track 2, the requirement to achieve contaminant-specific soil cleanup objectives for all soils above bedrock shall not apply to soils at a depth greater than 15 feet below ground surface. This exclusion applies provided that: the soils below 15 feet do not represent a source of contamination; the EE for the site requires that any contaminated soils remaining at depth will be managed along with other site soils pursuant to a SMP; offsite groundwater does not exceed standards and, onsite groundwater use is restricted. Additionally, the remedial program may include the use of long-term institutional or engineering controls to address contamination related to other media including, but not limited to, groundwater and soil vapor. This would be realized in the form of a soil vapor barrier or waterproofing membrane that would be incorporated as part of any Site redevelopment. The redevelopment scope would ensure that the onsite cover material is of sufficient thickness to comply with the redevelopment requirements established for Unrestricted Use of the Site. This will ensure that the Site will meet the certified clean cover requirements in the event that there is a proposed property use modification request (for residential use).

Residential and Restricted Residential SCOs were developed for Track 2, in place of unrestricted use as referenced in Article 27-1415(7) of the Environmental Conservation Law, to avoid confusion with Track 1 and better describe the remedial scenario for the four Brownfield Cleanup Program cleanup tracks. The residential category is intended for sites that could be developed for single family housing, but with restrictions that prohibit raising livestock or producing animal products for human consumption. The restricted residential category is intended for sites that could be developed for residential uses, specifically, multi-family residential housing and other uses with potentially higher exposures than commercial and industrial uses, but with restrictions that prohibit single family housing and vegetable gardens (although community vegetable gardens may be considered with NYSDEC approval).
3.7 Contemplated Redevelopment Plan

The Site is currently zoned as a manufacturing district (M2-1) by the City of New York. The intended future use of the Property (post remediation) has yet to be finalized, however; following implementation of the remedial activities as outlined in the RAWP and receipt of the Certificate of Completion (COC) the contemplated/anticipated end use for the Property will be as a commercial/industrial facility or a mixed use development. Any proposed change/modification to the current zoned property use will be handled independently from the BCP cleanup activities. To permit the most flexible Site reuse condition, the Track 1 cleanup will be performed. This cleanup track will allow for future modification of the property land use without the need for additional mobilization and remediation, the RAP for the Site will be developed to comply with the requirements outlined for the Unrestricted use. This cleanup Track will exceed the requirements for “restricted commercial use”, which will make the Site more protective of human health. This will permit immediate re-use under current Site zoning.

“Restricted use” implies that a property may be used for a specific use (i.e.; Residential, Restricted Residential, Commercial or Industrial) with imposed restrictions, such as environmental easements. Thus, if a Track 2 cleanup is required (due to post-excavation Site conditions), the proposed “restricted use” land use category for the Site for future redevelopment activities would be “restricted residential use”. As part of the remedy selected for a restricted use Site, the imposed restrictions require a SMP which relies on institutional controls (ICs) and/or engineering controls (ECs) to manage exposure to contamination remaining at a site. Due to the nature and extent of the contamination beneath and surrounding the Site, the end use of the Site will be classified as “restricted use” by the NYSDEC.

The Site is eligible for the land use category of “Restricted-residential use” since there is common ownership or a single owner/managing entity of the Site. Therefore, even though only commercial uses are currently contemplated, the evaluation of remedial alternatives will assume a restricted residential future use. Restricted residential use shall, at a minimum, include restrictions which prohibit:
any vegetable gardens on the Site (although community vegetable gardens or gardens not in contact with site soils within the residual contaminant management zone may be proposed for Department approval); and

• single family housing.

The RAP and/or RAWP for the Site will be developed so as to be protective of human health and the environment.
4.0 ELEMENTS OF THE SELECTED REMEDY

Following the alternatives analysis and confirmation of feasibility to address the remediation of the Site, the proposed remedial alternative is a Track 1 Cleanup meeting requirements for Unrestricted Use. The following section outlines the Site remedy and the proposed scope of activities that will be performed to address the residual contamination present at the Site. This remedial action would include the following tasks:

- NYCDOB and associated permitting activities associated with the building demolition activities.
- Operation of the NYSDEC approved remediation system as an interim remedial measure (IRM) during the review/approval process for the Track 1 Cleanup RAWP. The IRM will remain operational until such time that the building demolition activities are ready to commence, at which time the system will be used to treat extracted groundwater associated with construction dewatering performed to facilitate the contaminated soil excavation.
- Implementation of plans for the protection of onsite workers, community, and environment during remediation and construction activities.
- Demolition of the current building and offsite disposal of demolition debris.
- Installation of hydraulic barrier for Site containment and also to provide structural excavation support.
- Excavation of the contaminated soil present within the entire property boundary to a depth of approximately 15 feet.
- Waste material loading for hauling and offsite disposal.
- Construction dewatering and treatment of impacted groundwater (as required).
- Verification sampling to confirm excavation extents achieve Unrestricted Use SCOs.
- Backfilling of excavated areas to development grade with certified-clean material meeting Unrestricted Use SCOs or virgin, native crushed stone.
- Associated decontamination activities.
- Building reconstruction activities.
- Installation of soil vapor monitoring points and post-remedy soil vapor monitoring to confirm the effectiveness of the remedy for mitigation of soil vapor contamination.
- Preparation and submission of the FER.

The following sections outline the details for the elements of the selected remedy. The intent of the following remedial elements is to achieve Track 1 unrestricted use; therefore, no EE or SMP is anticipated. No groundwater use restriction is needed because the area is served by public water and Article 141 of the New York City Department of Health (NYCDOH) code prohibits potable use of groundwater without prior approval. If a sub-grade parking garage is constructed beneath the entire onsite future building(s), then the soil vapor intrusion pathway will be adequately addressed by the New York City Mechanical Code, which requires proper ventilation.

4.1 Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:
- considering the environmental impacts of treatment technologies and remedy stewardship over the long-term;
- reducing direct and indirect greenhouse gases and other emissions;
- increasing energy efficiency and minimizing use of non-renewable energy;
- conserving and efficiently managing resources and materials;
- reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- maximizing habitat value and creating habitat when possible;
fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and,
integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

4.2 **Excavation**

4.2.1 **Building Demolition**

It is anticipated to take up to approximately three to six months to receive the demolition permit for the onsite building from the NYCDOB. All necessary local permits must be obtained from the City of New York prior to the initiation of remedial activities on the Site. Following receipt of the demolition permit, the building demolition and remedial activities are anticipated to take up to approximately three to six months to complete.

The majority of the building material waste generated during demolition will be handled and disposed of as C&D debris, exclusive of historically impacted materials, pending waste characterization sampling and confirmation via analytical results that the material can be handled as C&D debris. If analytical results indicate the material is impacted, it will be shipped offsite for disposal at an approved waste disposal facility. The building demolition activities are estimated to generate approximately 300 tons of hazardous demolition waste, and 400 tons of non-hazardous C&D debris.

If feasible, the remedial system will remain active during the initial stages of the building demolition to continue the active in-situ remedial actions.

4.2.2 **Structural Support and Soil Excavation**

Following completion of the building demolition, a Waterloo® Hydraulic Barrier will be installed surrounding the perimeter of the Site. The Waterloo® Hydraulic Barrier system consists of a series of interlocked steel sheets with a sealable cavity within each interlock. After installation, the interlock is flushed and a proprietary low permeability grout is injected into the entire length of the interlock. For construction at the Site, WEZ95 steel sheeting will be utilized. Additionally, both the top and bottom five feet of each steel sheet are reinforced.
with two 3/8-inch stiffener plates to improve driving mechanics. The hydraulic barrier is installed to a sufficient depth to provide structural support which will facilitate the remedial soil excavation activities within the interior of the property boundaries. Due to these requirements, the hydraulic barrier will be installed to an approximate depth of 25-30 ft bg.

Prior to the installation of the perimeter Waterloo® Hydraulic Barrier, the extraction legs will be disconnected from the remedial system and the extraction tubing (currently installed within the Fyn building) will be removed from the interior walls and stored onsite. Based on Site conditions during the implementation of the remedial action, select wells will be connected to the remedial system. All efforts will be made to maximize the number of active extraction wells connected to the remedial system.

After the hydraulic barrier installation is complete, subsurface soils will be excavated within the property boundary. The proposed remedy of Soil Excavation and Removal is the only remedial method that complies with the applicable environmental laws, regulations, standards and guidance set forth by the Track 1 - Unrestricted Use Soil Cleanup Objectives in 6 NYCRR Part 375. Exceedances of Part 375 Unrestricted Use SCOs were reported throughout the footprint of the Site. To achieve Track 1, soil removal excavation activities will be advanced to a minimum depth of 15 ft bg (exclusive of areas where soil quality meets Unrestricted SCOs). Additionally, the final excavation depths beneath select areas of the Site (i.e., in the northeastern corner) will extend to a depth below the groundwater table (approximately 17 ft bg) and will require construction dewatering. This will facilitate excavation of all accessible contamination source material.

Dewatering activities will utilize local sumps within the excavation to lower the groundwater table. If existing groundwater monitor wells can be protected during the soil excavation activities, they will also be utilized as extraction wells for dewatering activities. The onsite remedial system (currently operating as an IRM pending approval and implementation of this RAWP) will be utilized to treat dewatering fluids prior to discharge into the NYC sewer system. The effluent discharge will be performed under the NYCDEP wastewater discharge permit issued for the remedial system. If the dewatering conditions result in a groundwater extraction rate that exceeds the capacity of the remedial system, temporary
fractionation tanks will be mobilized to the Site. This increased storage capacity will allow a greater extraction rate, and the treatment/discharge rate can be controlled to remain within the operational limits of the remedial system.

Under this Unrestricted Use alternative, the fill impacted with contaminants at concentrations above the appropriate Unrestricted Use SCOs would be excavated and disposed of at appropriately permitted offsite waste disposal facilities. This will include excavation and offsite disposal of contaminant source areas, including:

- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- removal of any underground storage tanks (USTs), fuel dispensers, underground piping or other structures associated with a source of contamination;
- NAPLs; and
- soils which exceed the protection of groundwater soil cleanup objectives (PGWSCOs), as defined by 6 NYCRR Part 375-6.8 for those contaminants found in site groundwater above standards.

Based on an estimated excavation depth of 15 to 17 feet throughout the Site, the soil excavation activities completed for achieving a Track 1 cleanup are estimated to require removal and offsite disposal of approximately 3,600 tons of soil. This is estimated to consist of approximately 2,000 tons of soil classified as hazardous waste, and approximately 1,600 tons of soil classified as non-hazardous waste. These estimates are based on vertical excavation limits derived from the field observations and laboratory analytical results from previous environmental investigations. These volume calculations reflect an off-set for the certified clean backfill from past remedial excavation activities, the concrete slab on grade removed during building demolition and the sub-grade partial basement (void space).

Any Underground Storage Tanks (USTs), fuel dispensers, underground piping or other structures associated with a source of contamination will be removed.

All waste generated as a result of performing these activities will be appropriately stored onsite in contaminant compatible containers or stockpiled pending appropriate waste characterization and offsite disposal.
Clean fill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought in to establish the designed grades at the Site.

This complete excavation disposal alternative would be a long-term remedy and it is anticipated to be acceptable to the community. This remedial alternative effectively reduces the toxicity, mobility, and volume of impacted media through the removal of all contaminated fill and soil from the Site and replacement with clean material. Additionally, the hydraulic barrier surrounding the property perimeter and extending to a depth of 25-30 ft bg will provide a permanent barrier following the completion of the remedial action, preventing offsite contamination from migrating onto the Site in the future.

Under the Soil Excavation and Removal remedial approach, once the contaminated soils are excavated and transported off of the Site, the remediation will be entirely completed (and use of the Site will be without restriction) without the need for any institutional or engineering controls or other on-going remedial efforts or post-cleanup operation, monitoring or maintenance activities.

The selected remedial action is in accord with the Brownfields Remedial Program Cleanup Objectives (Track 1 - Unrestricted Use Soil Cleanup Objectives), which promotes residential development because there will be no restrictions on future Site use after the remedy is completed. Thus, the proposed remedy is fully consistent with use of the Site for residential housing once the remedy is fully completed.

4.3 Groundwater Remedial Activities

4.3.1 Groundwater Extraction and Treatment

A DPE system was designed and previously installed under the VCP. The extraction system currently covers the area beneath the footprint of the onsite building and the adjacent parking lot to the north of the Site. As outlined in Sections 4.1 and 4.2 above, when feasible the remedial system will be operated for active groundwater extraction from the DPE well network, and will be utilized to meet localized construction dewatering requirements during the performance of the remedial excavation activities.
Prior to the installation of the perimeter Waterloo® Hydraulic Barrier, the dual phase extraction legs will be disconnected from the remedial system and the extraction tubing (currently installed within the Fyn building) will be removed from the interior walls and stored onsite. Based on Site conditions during the implementation of the remedial action, select wells will be re-connected to the remedial system for continued remediation during the remedial activities. All efforts will be made to maximize the number of active extraction wells connected to the remedial system.

Due to the planned excavation depth and the typical groundwater elevations at the Site, construction dewatering will be required to facilitate the excavation and foundation work. Contaminated groundwater from dewatering operations will be treated as necessary prior to discharge to the municipal sewer system. It is expected that the dewatering will improve groundwater quality beneath the site.

### 4.3.2 In-Situ Chemical Oxidation

Following completion of the excavation, ISCO will be implemented to achieve a bulk reduction of VOCs in groundwater within the property boundary. A chemical oxidant will be injected into the subsurface to destroy the contaminants via injection wells. The method and depth of injection will be determined during the remedial design.

### 4.3.3 Remedial System Transfer

Following completion of the remedial excavation at the Site, the remedial system will be relocated for future remediation of residual offsite contamination (future OM&M to be performed by the NYSDEC or other designated remedial contractor). The system trailer will be relocated to either the Con Edison parking lot (preferred) or to the sidewalk adjacent to the west of the Con Edison parking lot. The Volunteer will work directly with Con Edison, the NYSDEC and/or any other designated remedial contractor during the relocation. It should be noted that cooperation by Con Edison will be required to complete the relocation activities and to reconnect the offsite extraction wells (located on the Con Edison parking lot) to the treatment system. Following the system relocation, the flexible extraction tubing (removed from
the interior of the Site building) will be used to connect the remaining extraction wells to the intake ports on the system trailer. 

After the system is relocated and the extraction well network is re-connected, the OM&M activities will be performed by the NYSDEC and/or any other designated remedial contractor. The system relocation activities will consist solely of: moving the system trailer to the new location for future operation; and, reconnection of the offsite extraction wells located on the Con Edison parking lot. Of note, the NYSDEC and/or other designated remedial contractor will be responsible for connecting the remedial system trailer to utilities (electric, sewer, broadband) and for any set-up and ongoing fees associated with those utilities.

4.4 **Vapor Intrusion Assessment**

A post-remedial soil vapor intrusion evaluation will be completed prior to occupying any buildings developed on the Site. The assessment will include a provision for implementing actions recommended to address exposures related to soil vapor intrusion, if identified.

4.5 **Contingency Remedial Elements - Track 2 Cleanup**

A Track 1 Cleanup requires that the soil component of the remedial program achieve the Unrestricted Use SCOs as set forth in Table 375-6.8(a) for all soils above bedrock. Additionally a Track 1 cleanup will require that the groundwater and soil vapor remedial action objectives are achieved. However, based on historical Site characterization data, soil excavation activities at the Site may not be able to achieve the Unrestricted Use SCOs in all locations. This situation would require the imposition of an IC in the form of an EE and a SMP, as described below.

In this instance, the Volunteer will petition NYSDEC to modify the BC Agreement from a Track 1 to a Track 2 Cleanup. The contingent remedy will achieve a Track 2 residential cleanup if soil greater than 15 feet deep does not meet the unrestricted use SCOs, as described below. As per the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, for a Site (or portion thereof) being addressed pursuant to Track 2, the requirement to achieve contaminant-specific soil cleanup objectives for all soils above bedrock shall
not apply to soils at a depth greater than 15 feet below ground surface. This exclusion applies provided that: the soils below 15 feet do not represent a source of contamination; the EE for the site requires that any contaminated soils remaining at depth will be managed along with other site soils pursuant to a SMP; and, onsite groundwater use is restricted.

Additionally, the remedial program may include the use of long-term institutional or engineering controls to address contamination related to other media including but not limited to groundwater and soil vapor. This would be realized in the form of the hydraulic barrier installed around the Site perimeter, a waterproofing membrane/soil vapor barrier that would be incorporated as part of any Site redevelopment, and the performance of ISCO to enhance natural attenuation of dissolved phase contamination beneath the Site and downgradient. The redevelopment scope would ensure that the onsite cover material is of sufficient thickness to comply with the redevelopment requirements established for the Restricted Use of the Site. This will ensure that the Site will meet the certified clean cover requirements in the event that there is a proposed property use modification request (for restricted residential use).

### 4.5.1 Institutional Controls

In the event the Site remedy is modified to a Track 2 Cleanup, the Site will become a controlled property. Imposition of an IC in the form of an EE will be required for the controlled property that:

- requires the remedial party or Site owner to complete and submit to the Department a periodic certification of IC/ECs in accordance with Part 375-1.8 (h)(3);
- allows the use and development of the controlled property for restricted residential, commercial and industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or NYCDOH; and,
- requires compliance with the Department approved SMP.
4.5.2 Site Management Plan

In the event the Site remedy is modified to a Track 2 Cleanup, a SMP would be required, which includes the following:

a) an Engineering and Institutional Control Plan that identifies all use restrictions and EC for the site and details the steps and media-specific requirements necessary to ensure the following IC and/or EC controls remain in place and effective:
   - Engineering Controls: the hydraulic barrier installed around the property perimeter, the certified composite cover system, and ISCO discussed in Section 4.3.2.
   - Institutional Controls: the EE discussed in Section 4.5.1.

This Engineering and Institutional Control Plan includes, but may not be limited to:
   - an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
   - descriptions of the provisions of the EE including any land use, and groundwater use restrictions;
   - a provision for evaluation of the potential for SVI for any buildings developed on the Site, including provision for implementing actions recommended to address exposures related to SVI;
   - provisions for the management and inspection of the identified ECs;
   - maintaining Site access controls and Department notification; and,
   - the steps necessary for the periodic reviews and certification of ICs and/or ECs.

b) A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
   - a schedule of monitoring and frequency of submittals to the Department; and,
• monitoring for vapor intrusion for any buildings developed on the site, as may be required by the Institutional and Engineering Control Plan.

c) an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

• procedures for operating and maintaining the remedy;
• compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
• maintaining Site access controls and Department notification; and,
• providing the Department access to the Site and O&M records.
5.0 REMEDIAL ACTION PROGRAM

5.1 Governing Documents

Several governing documents were developed in order to facilitate compliance with co-operative parties involved with the remedial activities (LBG, NYSDEC, NYSDOH), as well as to ensure safe and efficient performance of required remedial activities. The documents developed and/or utilized during remedial investigation activities, IRM activities, and monitoring activities or those that will be utilized during implementation of the RAWP and subsequent Site monitoring are summarized below.

5.1.1 Site-Specific Health & Safety Plan (HASP)

All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by the Federal OSHA.

The Volunteer and associated parties preparing the remedial documents submitted to the State, and those performing the construction work, are completely responsible for the preparation of an appropriate Health and Safety Plan and for the implementation of that work according to that plan and applicable laws. As such, LBG has prepared a Site-specific HASP for the environmental investigation and remediation activities performed in association with the Fyn Site, which is presented in Appendix M. The HASP and requirements defined in this RAWP pertain to all remedial and invasive work performed onsite and offsite.

As outlined in Section 5.5, Mr. David Morelli of LBG will be the designated Health and Safety Officer for the remedial action activities at the Site. A copy of his resume is included in Appendix R.

Confined space entry will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gasses.

5.1.2 Quality Assurance Project Plan (QAPP)

The QAPP is a formal document describing in comprehensive detail the necessary QA/QC and other technical activities that must be implemented to ensure that the results of the
work performed will satisfy the stated performance criteria. The QAPP provides a framework for how environmental characterization samples will be collected to achieve specific project objectives, and describes the procedures that will be implemented to obtain data of known and adequate quality. This document includes proposed sampling methods and analytical methods for both characterization sampling and endpoint sampling.

The QAPP will provide sufficient detail to demonstrate that: the project technical and quality objectives are identified and agreed upon; the intended measurements, data generation, or data acquisition methods are appropriate for achieving project objectives; assessment procedures are sufficient for confirming that data of the type and quality needed and expected are obtained; and, any limitations on the use of the data can be identified and documented.

Most environmental data operations require the coordinated efforts of many individuals, including managers, engineers, scientists, statisticians and others. The QAPP integrates the contributions and requirements of everyone involved into a clear, concise statement of what is to be accomplished, how it will be done, and by whom. It provides understandable instructions to those who must implement the QAPP, such as the field sampling team, the analytical laboratory, and the data reviewers.

In order to be effective, the QAPP specifies the level or degree of QA and QC activities needed for the particular environmental data operations. Because this will vary according to the purpose and type of work being done, a graded approach will be used in planning the work. The QAPP is composed of elements covering the entire project from planning, through implementation, to assessment. All applicable elements, including the content and level of detail under each element, are addressed in the QAPP. If an element is not applicable, it will be stated in the QAPP. Documentation, such as the approved RAWP may be referenced in response to a particular required QAPP element to reduce the size of the QAPP.

The QAPP that will constitute a governing document for the completion of the onsite RAWP activities is included in Appendix S.
5.1.3 **Construction Quality Assurance Plan (CQAP)**

During the performance of all Remedial Action construction activities, the Construction Quality Assurance Plan (CQAP) will be implemented to ensure appropriate QA/QC methodologies are applied in the field and in the lab to ensure quality. The CQAP provides details related to the observation and testing activities that will be used to monitor construction quality and confirm that remedy construction is in conformance with the remediation objectives and specifications. The methodologies will consist of performing required activities to industry standards. All personnel will have had the proper training and experience necessary to fulfill project-specific responsibilities. Project coordination meetings will occur between the Volunteer and its representatives, the construction manager, excavation contractor, remedial or environmental subcontractors, and other involved parties prior to each major phase of the RA activities.

5.1.3.1 **Responsibilities and Authority Organization**

LBG will act as the Remedial Engineer (representative for Volunteer) and will be responsible for all soil sampling, hydrogeologic, health and safety, reporting and oversight aspects of the Remedial Action activities. LBG is utilizing several contractors for the completion of the Remedial Action activities. Among the contractors to be used on this project, LBG will be utilizing an environmental laboratory, a general construction company and a drilling company. An organization chart is included in table 1.

The Remedial Engineer will be responsible for review and finalization of the RAWP, as well as ensuring that RAWP activities are carried out as outlined in the work plan.

5.1.3.2 **Qualifications of the Quality Assurance Personnel**

All personnel certifying any aspect of the project will have the appropriate required certification(s). All personnel working on the Site as part of the Remedial Action activities will have at a minimum a 40-hour OSHA HAZWOPER certification. This certification will be validated with annual 8-hour refresher courses. Additionally, all personnel will be subject to their specific company medical monitoring program (i.e., annual physical).
5.1.3.3 Monitoring Testing and Frequency

Real-time air monitoring will be performed to assess the onsite and perimeter air quality during the performance of the RAWP field activities. Onsite air monitoring will be performed in accordance with the Community Air Monitoring Plan (CAMP) as summarized in Section 5.1.6, below. Frequent air monitoring will be conducted at 30-minute intervals within the 20 Foot Zone (the work zone). If required based on the air monitoring results, mitigation measures will be implemented to control migration of particulates and/or volatiles.

In addition to air monitoring, soil monitoring will be performed to direct excavation activities and to determine the termination points for excavations.

5.1.3.4 Sampling Activities

Excavation endpoint sampling activities at the Site and surrounding properties will be performed in accordance with DER-10. DER-10 outlines the sample locations and frequency for a given excavation size. The size of the excavation will be limited by clearance as well as building infrastructure.

Soil monitoring will be performed in combination with field observations (visual and olfactory) to assess the extent of onsite excavations. These factors will be used in association with field conditions to determine the final extents of onsite excavation activities.

Excavation endpoint sampling activities at the Site will be performed as outlined in Section 6.2, below. The size of the excavations may include but not be limited to one or more of the following factors: utilities; clearance; building infrastructure; proximity to adjacent properties; subsurface obstructions; and site redevelopment specifications. At a minimum, all endpoint confirmation soil samples will be analyzed for parameters regulated under both 6 NYCRR Part 375-6 SCOs for Unrestricted Use, and NYSDEC CP-51: Soil Clean-Up Guidance Supplemental Soil Cleanup Objectives.

The sampling frequency as well as analytical parameter requirements for waste characterization analyses will be performed in accordance with the requirements established for the approved waste disposal facilities (for each respective waste stream). At a minimum, all waste
characterizations samples will be analyzed for VOCs, SVOCs, Pesticides, PCBs, total Resource Conservation and Recovery Act (RCRA) metals, Toxicity Characteristic Leaching Procedure (TCLP) RCRA metals, corrosivity (pH), reactivity and flashpoint.

5.1.3.5 Requirements for Project Coordination Meetings

The Volunteer and its representatives will schedule meetings between the Construction Manager, Excavation Contractor, remedial or environmental subcontractors, and other involved parties. These coordination meetings will, at a minimum, consist of a conference call between all parties involved outlining upcoming remedial activities.

There will be an initial health and safety meeting prior to the commencement of the RAWP activities. Additionally, there will be a daily tailgate meeting with onsite personnel covering the daily scope of work as well as project scope-specific health and safety requirements/issues.

5.1.3.6 Reporting Requirements

The descriptions for project reporting requirements are presented in Section 5.4.

5.1.3.7 Final Documentation Retention

Copies of all final documentation (including reports, lab analysis, permits, etc.) will be retained by the Volunteer and made available for review upon request. Copies of all final documentation (including reports, lab analysis, permits, etc.) will be retained by the Volunteer and made available for review upon request.

5.1.4 Excavation Plan

The objective of the Excavation Plan is to set guidelines for management of excavated material during any ground invasive activities performed at the Site. The Excavation Plan will be utilized during all remedial action activities performed onsite and offsite as outlined in this RAWP, as well as for any future ground invasive work (if necessary) that is performed under
the subsequent SMP. The components of the Excavation Plan for the Site are outlined in Section 6.4.

5.1.5 Storm-Water Pollution Prevention Plan (SWPPP)

All necessary and appropriate actions will be taken to ensure that New York State Storm-Water Management Regulations (including physical methods to control and/or divert surface water flows and to limit the potential for erosion and migration of Site soils, via wind or water) are met.

The erosion and sediment controls will be in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. All excavated soil will be stored in sealed containers or covered with plastic to avoid any contamination via wind or rain water. All open excavations will be covered with plastic when no work is active until the backfill is completed.

A summary of the Storm Water Pollution Prevention Plan (SWPPP) was prepared and is presented in Section 6.4.14, below. A stand-alone SWPPP is also included in Appendix T.

5.1.6 Community Air Monitoring Plan (CAMP)

Environmental air monitoring and visual observation will be conducted during the remedial activities onsite and offsite by LBG. The proposed program consists of two primary forms of environmental monitoring: particulates (dust) and volatile organic compounds. The purpose of the Community Air Monitoring is to ensure that the engineering controls designed to protect the community from fugitive releases are functioning properly and, should any such releases occur, ensure immediate notice thereof so that appropriate abatement actions may be implemented. A summary of the CAMP are presented in Section 6.4.16, below. A stand-alone CAMP is also included in Appendix U.

5.1.7 Contractors Site Operations Plan (SOP)

The Remedial Engineer will review all plans and submittals for this remedial project and confirms that they are in compliance with this RAWP. The Remedial Engineer is respon-
sible to ensure that all later document submittals for this remedial project, including contractor and sub-contractor document submittals, are in compliance with this RAWP. All remedial documents will be submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work.

5.1.8 Citizen Participation Plan

All historical documents related to the environmental activities performed at the Site have been filed with the NYSDEC as well as public document repositories. The document repositories will be inspected prior to implementation of the RAWP to ensure/verify that they contain all of applicable project documents.

A certification of mailing will be sent by the Volunteer to the NYSDEC project manager following the distribution of all Fact Sheets and notices that includes: (1) certification that the Fact Sheets were mailed, (2) the date they were mailed; (3) a copy of the Fact Sheet, (4) a list of recipients (contact list); and (5) a statement that the repository was inspected on (specific date) and that it contained all of applicable project documents.

No changes will be made to approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing.

The stand-alone Citizen Participation Plan for this project is attached in Appendix V. Document repositories have been established at the following locations and contain all applicable project documents:

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<thead>
<tr>
<th>Document Repository 1</th>
<th>Document Repository 2</th>
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<tbody>
<tr>
<td>Brooklyn Public Library – Greenpoint Branch</td>
<td>Brooklyn Public Library – Leonard Branch</td>
</tr>
<tr>
<td>107 Norman Avenue &amp; Leonard</td>
<td>81 Devoe Street at Leonard</td>
</tr>
<tr>
<td>Brooklyn, NY 11222</td>
<td>Brooklyn, NY 11211</td>
</tr>
<tr>
<td>Telephone: (718) 349-8504</td>
<td>Telephone: (718) 486-3365</td>
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<td>Hours of Operation:</td>
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<td>Mon. and Thur. - 1 p.m. to 6 p.m.</td>
<td>Mon. - 1 p.m. to 8 p.m.</td>
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<td>Tue. and Fri - 10 a.m. to 6 p.m.</td>
<td>Tue. and Wed - 10 a.m. to 6 p.m.</td>
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<tr>
<td>Wed. - 1 p.m. to 8 p.m.</td>
<td>Thur. and Fri. - 1 p.m. to 6 p.m.</td>
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<tr>
<td>Sat. - 11 a.m. to 3 p.m.</td>
<td>Sat. - 11 a.m. to 3 p.m.</td>
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<tr>
<td>Sun. – Closed</td>
<td>Sun. – Closed</td>
</tr>
</tbody>
</table>
In addition to the above-listed public document repository locations, all files and/or reports associated with the environmental activities at the Site are maintained and available for review at the NYSDEC Region 2 Office. The information for this office is:

**NYSDEC Region 2 Office**
Hunters Point Plaza
47-40 21st Street
Long Island City, NY  11101
(718) 482-4900 (call in advance for appointment)
Hours: Mon. to Fri. 9 a.m. to 5 p.m.

### 5.2 General Remedial Construction Information

#### 5.2.1 Project Organization

This Section presents the anticipated project organization and associated roles, including key personnel, descriptions of duties, and lines of authority in the management of the RAWP. LBG will act as the remedial contractor (representative for Volunteer) and will be responsible for all soil sampling, hydrogeologic, health and safety, reporting and oversight aspects of the Remedial Action activities. In addition to in-house staff, LBG is utilizing several sub-contractors for the completion of the Remedial Action activities.

Key LBG project personnel are listed below along with brief descriptions of their experience and anticipated project responsibilities. An organization chart is included in table 1. Additionally, resumes of key personnel involved in the Remedial Action are included in Appendix R. Information regarding the organizations/personnel and their associated responsibilities is provided below.

#### 5.2.1.1 NYSDEC

NYSDEC, Region 2- Division of Remediation, will serve as the lead regulatory agency for this remediation. The NYSDEC Project Manager, Mrs. Ioana Munteanu-Ramnic, will provide and coordinate regulatory oversight and direction.
5.2.1.2 Owner/Developer/Volunteer

As owner of the site, Kent Riverview LLC will be responsible for implementing the voluntary cleanup of the Site. General responsibilities of Kent Riverview LLC are set forth in the BCP agreement. To assist in the remediation implementation, Kent Riverview LLC will contract with a Construction Contractor and has contracted with LBG to act as the environmental consultant, and Mr. William Beckman, P.E. of LBG Engineering Services, LLC to act as Remediation Engineer.

5.2.1.3 Project Personnel Structuring

LBGES/LBG (LBG Engineering Services, P.C./Leggette, Brashears & Graham, Inc.) will act as the environmental consultant (representative for Volunteer) and will be responsible for: coordination of field activities with all related subcontractors; soil sampling; groundwater sampling; air monitoring sampling; waste sampling; hydrogeologic activities, excavation and dewatering plans; health and safety oversight; communications with regulatory officials; and, documentation and reporting for the RA activities. In addition to in-house staff, LBGES/LBG will be utilizing several subcontractors for the completion of the RA activities. Among the subcontractors to be used on this contract, LBGES/LBG will be utilizing several environmental laboratories, an environmental construction company, a structural shoring company, a portable groundwater treatment system company, waste trucking/hauling companies, and waste disposal facilities. An organization chart is included in table 1.

Key project personnel are listed below along with brief descriptions of their experience and anticipated project responsibilities. Resumes of key personnel who will be involved in the implementation of the RAWP are included in Appendix R.

5.2.1.3.1 Principal-In-Charge

Mr. John Benvegna has been in charge of the New York office since 2014. As Principal-in-Charge, Mr. Benvegna’s responsibilities would include contract execution and overall QA/QC. He will be briefed regularly by the Project Manager and will review all final work products.
5.2.1.3.2 Remedial Engineer

The Remedial Engineer for this project will be Mr. William Beckman who is a registered professional engineer licensed by the State of New York. Mr. Beckman is the President of LBGES and has been with the firm since 1978. Mr. Beckman’s engineering experience includes but is not limited to: remediation system selection and design, operation and maintenance of remedial systems (i.e., air sparging [AS]/SVE), pump and treat, chemically-enhanced remediation, dual-phase extraction [DPE]), site inspections, environmental site investigation, sensitive receptor impact statements, RIs, feasibility studies, design of storm water collection and detention structures, drainage structure design, wetland impact assessments and mitigation measure design, drainage basin delineation, precipitation-probability curve generation, and hydrologic modeling.

As Remedial Engineer, Mr. Beckman will work with LBGES/LBG personnel and collaborate directly with the Principal-in-Charge as well as the Project Manager. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the Site (NYSDEC BCA Site No. C224154, Index No. C224154-02-15). The Remedial Engineer will certify in the FER that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in this RAWP and any other relevant provisions of Environmental Conservation Law (ECL) 27-1419 have been achieved in full conformance with that Plan. Other Remedial Engineer certification requirements are listed later in this RAWP.

The Remedial Engineer, and/or LBGES/LBG representatives under his supervision, will coordinate the work of other contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services, import of backfill material, and management of waste transport and disposal. The Remedial Engineer, and/or LBGES/LBG representatives under his supervision, will be responsible for all appropriate communication with NYSDEC and NYSDOH.
The Remedial Engineer will review all pre-remedial plans submitted by contractors for compliance with this RAWP. The Remedial Engineer will provide the certifications (presented in Section 10.1, below) in the FER.

5.2.1.3.3 Project Manager

Mr. Sean Groszkowski has been with LBGES/LBG since 2000 and has been an Associate Vice President with the company since 2014. Mr. Groszkowski has worked on many contaminated site remediation projects in New York for both public and private entities with a specialization in the NYSDEC BCP. Mr. Groszkowski has extensive experience completing long-term hazardous soil remediation projects in collaboration with State regulatory agencies. As such, he is very familiar with Federal and State regulations governing hazardous waste remediation projects.

As Project Manager, Mr. Groszkowski would be the primary contact for the project and would be responsible for coordinating and conducting all tasks necessary to complete the required scope of work. These tasks would include coordination and oversight of all tasks necessary to complete the required scope of work. Mr. Groszkowski would work with all associated subcontractors and would report directly to the Principal-in-Charge and the Remedial Engineer.

5.2.1.3.4 Project Field Supervisor

Mr. Brian Hawe and/or qualified LBGES/LBG representatives under his supervision will serve as Project Field Supervisor for this project. Mr. Hawe, a Senior Hydrogeologist, has been with LBGES/LBG since 2005. His hydrogeologic experience includes but is not limited to: hazardous waste remediation projects; soil excavation oversight; collection of soil, groundwater, soil vapor and indoor air samples; drilling supervision and formation sampling; well design; installation of groundwater/NAPL monitor and recovery wells; underground storage tank (UST) closures, development and test pumping of recovery wells, supervision of hazardous soils/liquids removal; and air monitoring.
The Project Field Supervisor will be responsible for implementation and oversight of all RAWP activities performed as part of remedial field activities. This will include the supervision and coordination of all onsite RAWP activities. The Project Field Supervisor will be responsible for conducting daily tailgate meetings with all contractors involved in the remedial project that day. Additionally, the Project Field Supervisor will be responsible for documenting the daily activities associated with the implementation of the RAWP on Daily Field Sheets. The Daily Field Sheets will outline remedial activities performed for each day and will be submitted to the NYSDEC and NYSDOH Project Managers (via e-mail) at the end of each day following the reporting period.

The Project Field Supervisor will work alongside the Health and Safety Officer (HSO) during the implementation of the RAWP. The Project Field Supervisor will report directly to the Project Manager and Remedial Engineer.

5.2.1.3.5 Health and Safety Officer

Mr. David Morelli has been with LBGES/LBG since 2002 and has been a Senior Hydrogeologist with the company since 2008. Mr. Morelli’s hydrogeologic experience includes but is not limited to: project management for soil and groundwater remediation sites; community air monitoring activities; collection of soil, groundwater, soil vapor and indoor air samples; well design; drilling supervision and installation of groundwater/NAPL monitor and recovery wells; UST closures; development and test pumping of recovery wells; and air monitoring.

As HSO, Mr. Morelli and/or designated LBGES/LBG representatives under his supervision would be responsible for implementation, enforcement and monitoring of the Health and Safety Plan (HASP). This responsibility will primarily consist of field oversight to ensure work activities/conditions are completed/maintained in compliance with the HASP. This includes but is not limited to: the performance of the pre-project Health and Safety meeting; the performance of the daily Health and Safety tailgate meeting (during implementation of the RAWP); oversight of field work and halting activities in the event of an observed Health and Safety condition. As HSO, he will also be responsible for the pre-decontamination indoctrina-
tion and periodic training of all personnel entering and/or working at the Site with regard to the HASP. The HSO will also be responsible for alerting the Project Manager, the Remedial Engineer and the NYSDEC Project Manager of any Health and Safety issues that arise in association with the onsite remedial activities.

The HSO will work alongside the Project Field Supervisor during the implementation of the RAWP. The HSO will report directly to the Project Manager and Remedial Engineer.

5.2.2 Remedial Action Construction Schedule

A schedule for performance of the remedial work is presented in Section 11.0. This schedule is broken down into Remedial Action elements.

5.2.3 Work Hours

The hours for operation of remedial construction will conform to the NYCDOB construction code requirements or according to specific variances issued by that agency. The anticipated work hours for activities outlined in this RAWP will be from approximately 7:00 a.m. until 4:00 p.m. NYSDEC will be notified by the Volunteer of any variances issued by the Department of Buildings. NYSDEC reserves the right to deny alternate remedial construction hours.

5.2.4 Site Safety and Security

All remedial action activities will be performed in accordance with the Site-specific HASP, which is presented in Appendix M. During all remedial activities, access onsite and offsite will be limited and all persons entering the Site will be required to sign a log book and meet all applicable health and safety requirements. All excavations will be secured during non-working hours. Offsite work areas will be regulated so that the public will be protected from injury or accident. Adequate danger signs, barriers, etc., will be placed to effectively warn the public of hazards as well as to restrict access to dangerous areas. Necessary barricades, walkways, lighting, and posting will be provided for the protection of the public prior to the start of remedial action activities. Excavation operations on or near state, county, or city
streets, access ways, or other locations where there is extensive interface with the public and/or motorized equipment will not start until the area surrounding the work zone has been made safe for the public. Additionally, the onsite Health and Safety Officer will monitor operations during the remedial activities to ensure that applicable protective measures are in place and functioning.

Additionally, safe access will be provided for employees, including installation of walkways, stairs, ladders, etc. When operations are conducted during hours of darkness, adequate lighting will be provided at the excavation, borrow pits, and waste areas.

5.2.5 Traffic Control

The basic objective of traffic control is to permit the contractor to work within the public right of way efficiently and effectively while maintaining a safe, uniform flow of traffic. The construction work and the public traveling through the work zone in vehicles, bicycles or as pedestrians must be given equal consideration when developing a traffic control plan.

When road traffic is needed to be diverted and/or stopped to accommodate remedial action activities, a flagger will be used. The flaggers will wear hard hats and high-visibility day-glow vests. When/if working at night, the vest will have light-reflective strips. The Health and Safety Officer will assign the traffic control personnel.

All construction vehicles will be equipped with backing alarms and Slow Moving Vehicle signs when appropriate. All operators must be qualified and trained to operate the equipment they are using. If a vehicle will be parked alongside the road, orange safety cones will be placed around it to alert drivers.

Offsite transport vehicles will be inspected at the exit pad to ensure they meet the requirements established for offsite waste transport. They will be inspected for caked on soils or debris, and for transport integrity (i.e. leaking trailer bed, appropriately covered. At this location, corrective measure will be taken prior to leaving the Site. If necessary, transport vehicles will proceed to a decontamination pad, prepared and maintained by the Contractor. Cleaning of the vehicle wheels and under carriage will be performed to eliminate soils tracked
offsite by transport vehicles exiting the Site. The truck routes will be provided to the truck drivers. No idling in the streets will be allowed.

### 5.2.6 Contingency Plan

If underground tanks or other previously unidentified contaminant sources are found during onsite remedial excavation or development related construction, sampling will be performed on product, sediment and surrounding soils, etc. Chemical analytical work will be for full scan parameters (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs). These analyses will not be limited to STARS parameters where tanks are identified without prior approval by NYSDEC. Analyses will not be otherwise limited without NYSDEC approval. Identification of unknown or unexpected contaminated media identified by screening during invasive Site work will be promptly communicated by phone to NYSDEC’s Project Manager. These findings will be also included in daily and periodic electronic media reports.

### 5.2.7 Worker Training and Monitoring

All personnel working on the Site as part of the RA activities will have at a minimum a 40-hour Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) certification. This certification will be validated with annual 8-hour refresher courses. Additionally, all personnel will be subject to their specific company medical monitoring program (i.e., annual physical).

All personnel performing work at the Site as well as those certifying any aspect of the project will have the appropriate required certification(s).

### 5.2.8 Agency Approvals

The Volunteer has addressed all SEQRA requirements for this Site. All permits or government approvals required for remedial construction have been, or will be, obtained prior to the start of remedial construction.
The planned end use for the Site is in conformance with the current zoning for the property as determined by New York City Department of Planning. A COC will not be issued for the project unless conformance with zoning designation is demonstrated.

The need for the following permits, certificates or other approvals or authorizations are anticipated to perform the remedial and development work:

- Building permit;
- Support Of Excavation (SOE) permit;
- Sidewalk permit;
- Street opening permit;
- Con Edison access permit; and,
- NYCDEP discharge permit.

If any additional permits are deemed necessary, they will be obtained by the Volunteer. In addition to the required local NYCDOB permits, compliance with all substantive requirements associated with the regulated activities will be maintained. This includes activities associated with the soil excavation activities as well as the dewatering and groundwater treatment system effluent discharge activities.

5.2.9 NYSDEC BCP Signage

A project sign will be erected at the main entrance to the Site prior to the start of any remedial activities. The sign will indicate that the project is being performed under the NYSDEC BCP. The sign will meet the detailed specifications as outlined in DER-10 and as provided by the NYSDEC Project Manager. A sample of the NYSDEC BCP project sign is included in Appendix W.

5.2.10 Pre-Construction Meeting with NYSDEC

A pre-construction meeting outlining major construction activities to be performed in conjunction with the Remedial Action implementation will take place prior to the start of major
construction activities. This meeting will include at a minimum the Volunteer’s representative, the remediation contractor, and the NYSDEC project manager.

Additionally, the field supervisor and HSO will conduct daily meetings (project scope and health and safety hazards for the day’s work).

5.2.11 Emergency Contact Information

An emergency contact sheet with names and telephone numbers is included in table 2. That document defines the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

5.2.12 Remedial Action Costs

The estimated cost of the total Remedial Action is approximately $3,214,555. This estimate will be revised based on actual costs and submitted as an Addendum in the Final Engineering Report. Due to cost fluctuations through time, the actual costs for waste disposal cannot be provided at this time.

A cost estimate for completing the preferred remedial action is included in Appendix O.

5.3 Site Preparation

5.3.1 Mobilization

Mobilization for Remedial Action activities will be performed on a daily basis. If made available, the Con Edison parking lot will be utilized to store heavy machinery and/or excavating equipment. If this is not possible, then required machinery will be mobilized to the Site daily. No remedial equipment, materials, or temporary structures shall be placed on the streets without proper local permits.

5.3.2 Erosion and Sedimentation Controls

Erosion and sedimentation controls will be employed during ground invasive activities which are located in areas exposed to the elements (i.e., outside trenching activities). For these activities, if the duration of the excavation activity will be longer than a single day, then
the erosion and sedimentation controls will be implemented following each day’s work, if necessary. Silt fencing will be the applied method for addressing this issue and is explained further in Section 5.3.9, below.

5.3.3 Construction Entrance(s)

Continuity will be established between the arrival path, the dedicated truck wash area and the egress path so that trucks do not spread contaminated material when departing the Site.

5.3.4 Utility Marker and Easements Layout

The Volunteer and its contractors will be solely responsible for the identification of utilities that might be affected by work under the RAWP and implementation of all required, appropriate, or necessary health and safety measures during performance of work under this RAWP. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. The Volunteer and its contractors must obtain any local, State or Federal permits or approvals pertinent to such work that may be required to perform work under this RAWP. Approval of this RAWP by NYSDEC does not constitute satisfaction of these requirements.

The presence of utilities and easements on the Site will be investigated by the Remedial Engineer. It has been determined that no risk or impediment to the planned work under this Remedial Action Work Plan is posed by utilities or easements on the Site.

5.3.5 Baseline Certified/Licensed Site Survey

A historical grade elevation survey has been conducted by a New York State licensed surveyor.

As per DER-10, the locations and elevations of the final excavation extents and endpoint confirmation samples are required to be surveyed by a New York State licensed surveyor. The Site survey will be amended to include dedicated Site-specific benchmarks established by a New York State licensed surveyor. The locations and elevations of the final excavation extents and endpoint confirmation samples will then be recorded in the field by the
Remedial Engineer (or designated representative) using a Trimble GPS unit. As per discussions with the NYSDEC, the GPS survey results will then be integrated with the surveyed benchmarks for quality control validation.

5.3.6 Sheeting and Shoring

Appropriate management of structural stability of onsite or offsite structures during onsite activities including excavation will be evaluated and implemented as necessary and if deemed feasible. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan. The Applicant and its contractors must obtain any local, State or Federal permits or approvals that may be required to perform work under this Plan. Further, the Applicant and its contractors are solely responsible for the implementation of all required, appropriate, or necessary health and safety measures during performance of work under the approved Plan.

A Waterloo® Hydraulic Barrier will be installed to a depth of 25-30 ft bg around the entire perimeter of the Site. This will permit the supported excavation of the contamination beneath the Site to a minimum depth of 15-20 feet. The Waterloo® Hydraulic Barrier system consists of a series of interlocked steel sheets with a sealable cavity within each interlock. After installation, the interlock is flushed and a proprietary low permeability grout is injected into the entire length of the interlock. For construction at the Site, WEZ95 steel sheeting will be utilized. Additionally, both the top and bottom several feet of each steel sheet will be reinforced with two 3/8-inch stiffener plates to improve driving mechanics. After completion of the excavation and confirmation sampling activates, the sheeting will remain in-place to act as a permanent containment barrier preventing offsite contamination from impacting the Site. Appendix X contains the following reference documents related to the Waterloo® Hydraulic Barrier: a manufacturer specification sheet; a manufacturer performance sheet; and, installation specifications for the Site.

Following NYSDEC approval of the RAWP, full details of the excavation sheeting specifications will be prepared and submitted to the NYCDOB as part of the Support of Excava-
vation (SOE) permit application. The excavation sheeting specifications will be developed to address the following aspects of the RAWP:

- design specifications for the temporary steel sheeting to support the control of groundwater into the excavations during the excavation activities and to ensure worker safety;
- procedures that will be followed to excavate contaminated soil to the extent and depth required;
- contingency measures required to dry any saturated soil, such as using gravity drying pads, adding kiln cement or other material to stabilize the water within the excavated material, so that it meets disposal or transport requirements; and
- to detail the certified clean backfill procedures following the excavation activities.

Mobilization and Site Preparation Activities for the Waterloo® Hydraulic Barrier (interlocking steel sheet piling) will include Site preparation activities, construction of temporary facilities and staging areas, location of utilities, removal of interior fencing, installation of soil erosion and sediment control measures, and construction of decontamination pads.

A third-party professional engineer will be retained to perform the quality control inspections during the installation of the hydraulic barrier. Following final installation of the hydraulic barrier, the third-party professional engineer performing the installation QA/QC will issue a Final Report for the Waterloo Barrier® steel sheeting and grouted interlock system installation. The Final Report will also include a two-year warranty for the maximum bulk hydraulic conductivity of $1 \times 10^{-5}$ cm/sec of the Waterloo Barrier®.

The excavation shall be protected from any source of surface water and stormwater runoff at all times. At no time shall the excavated area be allowed to fill with storm water runoff. Proper temporary drainage structures will be utilized to detour runoff from the excavated areas.
5.3.7 Equipment and Material Staging

Due to size of the equipment involved with the RAWP as well as the mobilization costs associated with such, equipment will be staged at the Site during dedicated phases of the implementation of the RAWP. The staging of equipment and materials will be contingent on the establishment of adequate Site security. If made available, the Con Edison parking lot will be utilized to store heavy machinery and/or excavating equipment as well as for stockpiling soil. If this is not possible, then required machinery will be mobilized to the Site daily.

In addition to the equipment staging, large volumes of materials will be utilized as part of the RAWP activities. These materials include but are not limited to: fencing, demarcation layer filter fabric; sheeting/shoring materials; and, certified clean fill material. If material staging and/or stockpiling is performed, adequate measures will be taken to ensure that the material is segregated from the residual onsite contamination.

5.3.8 Decontamination Area

To facilitate working in the containment area while ensuring the safety for workers and the public, the Site will be divided into three (3) delineated areas: work zone, decontamination zone, and clear zone. The locations of these three areas will vary based on the work being performed at the Site.

- The “Work Zone”

The work zone is the area where potentially hazardous contaminants and physical hazards to Site workers may be encountered. This area will be dictated based on the location of active remedial work. Personnel will not be allowed in the work zone without the proper personal protective equipment (PPE), medical authorization, and training certification. In addition, all personnel entering the work zone or decontamination zone shall practice the buddy system. The buddy system requires that at least two individuals work as a team, and remain in close proximity to each other to maintain voice and visual contact. At the discretion of the HSO, when the work zone and decontamination zone present minimal
hazards (e.g., low flow monitoring well sampling with low dissolved concentrations of contaminants) one member of the buddy pair may remain outside the zone if voice and visual contact can be maintained. In addition, some monitoring of minimally invasive activities requires a single person; the buddy system does not have to be used at these locations.

The work zone will be designated around the specific excavation, sampling, drilling, or other such work locations. The size of the work zone may be altered to accommodate Site conditions. All equipment and personnel leaving a work zone shall undergo appropriate decontamination.

When using a drill rig or backhoe to penetrate the earth, the work zone perimeter will be set at a distance of 20 feet from the rig in all directions unless space restrictions preclude it. In restricted space areas, the largest work zone possible shall be established; however, a minimum distance of 10 feet from the back of the rig shall be maintained during operation of the rig, and sufficient space around the rig to permit safe operations of the rig. The rig shall be shut down, as appropriate, when persons other than Site workers enter within 20 feet of an operating rig. The size of the work zone must be approved by the HSO and Field Project Manager.

In addition to the perimeter fencing, dust suppression will be implemented as needed to limit fugitive dust emissions. Utilizing hoses, dust generation will be controlled and prevented with a water spray, and any accumulated dust shall be washed off of individuals, tools and equipment.

• **The “Decontamination Zone”**

All construction equipment exiting the work zone must first be decontaminated regardless if the equipment has come in contact with contaminated materials. Additionally, to prevent the spread of gross contamination, equipment in contact with gross contamination will be decontaminated after use. During remediation, soil and liquids adhered to construction vehicles and
equipment will be removed in the decontamination area prior to such vehicles and equipment leaving the zone. After wetting with potable water, brooms or shovels will be utilized for the gross removal of soil from vehicles and equipment. The decontamination procedure for the removal of the remaining soil and liquids will consist of washing with potable water. Soil generated by the decontamination process will be stockpiled and tested prior to offsite disposal. Decontamination liquids will be collected and tested prior to offsite disposal.

- **The “Clear Zone”**

  All remaining areas of the Site not included in the “work zone” or the “decontamination zone”, shall be considered the clear zone. The clear zone will be situated in a clean area where the chance to encounter Site contaminants and/or hazardous material and conditions is minimal. Therefore, Modified or Standard Level D PPE will be required, as deemed necessary by the HSO. The clear zone shall serve as the staging area for emergency response. Emergency equipment such as first aid kits, fire extinguishers, and eyewash will be stored in this zone and transported to other work areas as necessary. Site access and the majority of Site operations will be controlled from this area.

5.3.9 **Silt Fencing**

  When and where applicable, silt fencing will be utilized as a temporary erosion and sedimentation control measure. This measure will be employed during active construction stages as deemed necessary or upon request by the NYSDEC. If required, prior to any construction activity, temporary silt fencing will be installed and maintained until such time that they are no longer required for remedial action activities.

  As sediment collects along the silt fences, they will be cleaned to maintain desired removal performance and prevent structural failure of the fence. Accumulated sediment will be removed and/or the silt fences will be repositioned when 50% of the storage capacity of the silt fence is full. Removed sediment will be stockpiled and characterized prior to offsite disposal. The perimeter silt fences will remain in place until construction activities in the area are
completed. Silt fences will be provided and installed in accordance with the New York Guidelines for Urban Erosion and Sediment Control.

5.3.10 Equipment Decontamination

Following completion of the excavation, loading, transportation and disposal activities for the contaminated historic fill topsoil, the excavation equipment will be decontaminated. Equipment and materials will be decontaminated using the following procedure:

1. The equipment/material will be washed with clean water and detergent, using a brush if necessary, to remove particulate matter and surface films. Steam cleaning (high pressure hot water with detergent) may be necessary to remove matter that is difficult to remove with the brush.

2. Rinse thoroughly with tap water.

Following the completion of the decontamination procedures, the excavation equipment will be permitted for use in the certified clean backfilling and regrading activities. If backfill and regrading activities are performed simultaneous to the excavation/stockpiling/loading of contaminated historic fill, dedicated equipment (not exposed to the work zone) will be used.

All equipment used in association with the contaminated materials onsite will be properly decontaminated. Exterior surfaces on small equipment used onsite (e.g., tools, monitoring instruments, radios, clipboards) will be washed in a detergent solution and rinsed with clean water, air dried, and stored or serviced for reuse. The decontamination of sampling devices or tools requiring the use of solvents or acids will be conducted in a separate location within each decontamination zone. All large mechanical and motorized equipment is to be steamed cleaned by subcontractor.

Spent cleaners or other liquid waste generated during investigation activities shall be containerized onsite for future disposal at an appropriate disposal facility. All decontamination water and rinsate shall be containerized, and labeled for future disposal at an appropriate disposal facility. Any decontamination waste generated at the Site will be sampled and sub-
mitted to a New York State certified laboratory for waste characterization and will be transported offsite to a permitted waste management facility for disposal.

Following the decontamination of all equipment and materials used for handling contaminated materials in association with the RAWP, the onsite decontamination station and truck wash station will be deconstructed. All materials utilized in their construction and/or residual waste generated during their use (gravel, dirt, sludge, wastewater…) will be sampled and submitted to a New York State certified laboratory for waste characterization for VOCs, SVOCs, PCBs, pesticides, and TCLP metals to determine whether special handling/disposal procedures will be required. Following waste characterization, the waste will be transported offsite to a permitted waste management facility for disposal. Additional construction materials used during the implementation of the RAWP will be disposed of as like contamination based on the analytical waste characterization results associated with their use.

### 5.3.11 Demobilization

Following the completion of the Remedial Action activities, all disturbed areas at the Site and surrounding properties (both investigation areas as well as support areas [e.g., staging areas, decontamination areas, storage areas, temporary water management area(s), and access areas]) will be restored to pre-remediation conditions. Additionally, temporary access areas (whether onsite or offsite) will be restored to pre-remediation conditions.

All general refuse, as well as materials associated with sediment and erosion control measures utilized at the Site (if applicable), will be disposed of in accordance with applicable rules and regulations. Any decontamination waste generated at the Site will be sampled and submitted to a NYSDOH certified laboratory for waste characterization and will be transported offsite to a permitted waste management facility for disposal.

Project generated trash will be segregated into two categories, potentially contaminated trash, and general trash. Potentially contaminated trash includes disposable PPE and disposable sampling supplies such as well purge tubing, bailers, and plastic scoopulas. Potentially contaminated trash accumulated during the RA activities will be containerized, managed, and disposed as a contaminated material.
General trash includes items such as lunch debris, or other miscellaneous trash that does not come in contact with potentially contaminated materials. The individual subcontractors will be responsible for properly disposing of general trash.

5.4 Reporting

All Daily Field Sheets and Monthly Reports will be included in the Final Engineering Report.

5.4.1 Daily Field Sheets

Daily Field Sheets will be maintained by onsite field personnel. These field sheets will outline remedial activities performed for each day. These Daily Field Sheets will be submitted to the NYSDEC and NYSDOH Project Managers (via e-mail) at the end of each day following the reporting period. The report format will comply with DER-10 Section 5.7, and will include:

- an update of progress made during the reporting day;
- locations of work and quantities of material imported and exported from the Site;
- a summary of any and all complaints with relevant details (names, phone numbers);
- a summary of CAMP finding, including excursions; and,
- an explanation of notable Site conditions.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill), requests for changes to the RAWP or other sensitive or time critical information. However, such conditions must also be included in the daily reports. Emergency conditions and changes to the RAWP will be addressed directly to NYSDEC Project Manager via personal communication.

Daily Reports will include a description of daily activities as well as a summary of air monitoring results, odor and dust problems and corrective actions, photos, and all complaints
received from the public. Daily Reports will include a description of daily activities keyed to an alpha-numeric map for the Site that identifies work areas. A Site map that shows a predefined alpha-numeric grid for use in identifying locations described in reports submitted to NYSDEC is attached in figure 17.

The NYSDEC project number assigned to the Site will appear on all reports.

5.4.2 Monthly Reports

Monthly reports will be submitted to NYSDEC and NYSDOH Project Managers within one week following the end of the month of the reporting period and will include:

- activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (i.e. tons of material exported and imported, etc.);
- description of approved activity modifications, including changes of work scope and/or schedule;
- sampling results received following internal data review and validation, as applicable; and,
- an update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

5.4.3 Annual Hazardous Waste Reporting

For calendar years where hazardous waste is generated at the Site and disposed of at an offsite facility, an annual Hazardous Waste Report must be submitted to the NYSDEC. This report will outline the waste classification(s) of hazardous waste generated at the Site, as well as the disposal facility information and the waste disposal method. This report must be submitted to the NYSDEC by March 1st of the year following the generation and disposal of hazardous waste.
5.4.4 Other Reporting

Photographs will be taken of all remedial activities. Photos will illustrate all remedial program elements and will be of acceptable quality. Representative photos of the Site prior to final Remedial Actions will be recorded. Representative photos of each contaminant source, source area and structures before, during and after remediation will also be recorded. Photos will be made available to the NYSDEC and NYSDOH in digital (JPEG) format. Photos will be submitted to NYSDEC on CD or other acceptable electronic media and will be sent to NYSDEC’s Project Manager (2 copies) and to NYSDOH’s Project Manager (1 copy). CD’s will have a label and a general file inventory structure that separates photos into directories and sub-directories according to logical Remedial Action components. A photo log keyed to photo file ID numbers will be prepared to provide explanation for all representative photos. For larger and longer projects, photos should be submitted on a monthly basis or another agreed upon time interval. Additionally, photos documenting the activities performed under the RAWP will be included in the FER.

Job-site record keeping for all remedial work will be appropriately documented. Upon request, these records will be available for inspection by NYSDEC and NYSDOH staff.

5.4.5 Complaint Management Plan

Complaints from the public regarding nuisance or other site conditions will be handled on an individual basis. Once a complaint is filed with regards to site remedial action activities, the NYSDEC will be notified and all required steps will be taken to rectify the cause of the complaint.

5.4.6 Deviations from the Remedial Action Work Plan

Upon institution of the RAWP, should Site conditions require deviation from the approved RAWP, the NYSDEC will be notified in writing once the necessity is evident. A request for a change to the RAWP will be submitted the NYSDEC. The written request will outline the effect of the deviations on overall remedy. Upon approval for changes/editions to the RAWP from the NYSDEC, the modifications will be implemented.
6.0 REMEDIAL ACTION: MATERIAL REMOVAL FROM SITE

The NYSDEC approved remediation system (which resumed operation on March 10, 2015) is currently operating as an interim remedial measure (IRM). The remediation system will continue to operate during the review/approval process for the Track 1 Cleanup RAWP. The IRM will remain operational until such time that the building demolition activities are ready to commence, and when conditions allow it will be operated intermittently thereafter.

The proposed RAWP for the Site entails the performance of a Track 1 Remedy. As part of the remedy, this remedial action would include the following tasks:

- demolition of the current building and offsite disposal of approximately 700 tons of contaminated waste and/or C&D debris;
- installation of a Waterloo® Hydraulic Barrier to function as a structural excavation support during the soil excavation activities and to provide Site containment from offsite contamination post-remediation;
- excavation of approximately 3,600 tons of contaminated soil within the entire property boundary to a minimum depth of 15 ft bg;
- waste material loading and transport for offsite disposal of approximately 3,600 tons of contaminated soil;
- construction dewatering and treatment of impacted groundwater (as required);
- collection and analysis of confirmatory soil samples (excavation bottom verification sampling) to evaluate the performance of the remedy with respect to attaining the RAWP goals;
- relocation of the IRM DPE system to an adjacent property and transfer of OM&M responsibility to the NYSDEC (or their designated representative);
- import of materials to be used for backfill of excavated areas to development grade with certified-clean material meeting Unrestricted Use SCOs or virgin, native crushed stone;
- associated decontamination activities;
• building reconstruction activities (incorporating a waterproofing layer/soil vapor barrier); and,
• installation of soil vapor monitoring points.

The building demolition and remedial activities are anticipated to take up to approximately three to six months to complete. All necessary local permits will be obtained from the City of New York prior to the initiation of remedial activities on the Site.

The majority of the building material waste generated during demolition will be handled and disposed of as C&D debris, exclusive of historically impacted materials (i.e., original concrete slab on grade).

The excavation depth beneath the Site will extend to a minimum depth of 15 ft bg (exclusive of areas where no soil contamination is present and soil quality meets Unrestricted Use SCOs). In contamination source areas (i.e., in the northeast corner of the Site), the excavation activities are expected to be advanced to a depth greater than 17 ft bg. These excavations will be advanced below the groundwater table elevation. The soil excavation activities will therefore require structural excavation supporting and localized construction dewatering. Following completion of the building demolition, a Waterloo® Hydraulic Barrier (interlocking steel sheeting with grouted seams) will be installed surrounding the perimeter of the Site. Appendix X contains the following reference documents related to the Waterloo® Hydraulic Barrier: a manufacturer specification sheet; a manufacturer performance sheet; and, installation specifications for the Site. The hydraulic barrier will be installed to a depth of 25-30 ft bg. As per the manufacturer performance specification data, the completed hydraulic barrier will demonstrate a hydraulic conductivity range of approximately $1 \times 10^{-5}$ to $1 \times 10^{-5}$ centimeters per second (cm/sec). There is no confining layer beneath the Site for keying the hydraulic barrier into at the termination depth. Therefore, the hydraulic barrier will function as a structural excavation support for the contaminated soil excavation activities and it will function as a hanging cut-off wall to contain residual offsite contamination and prevent impact of the Site (post-remedy). Additionally, the hydraulic barrier will likely minimize the groundwater recharge rate during dewatering. The hydraulic barrier will redirect groundwater from the Site
boundary (excavation area). As upgradient groundwater encounters the hydraulic barrier it will initially be redirected to the north and south along the eastern hydraulic barrier wall. As groundwater encounters the hydraulic barrier adjacent to the north of the Site it will be contained outside of the Site boundary and will flow to the west along hydraulic barrier wall towards the East River. Migration will then assume a westerly flow component consistent with the regional groundwater flow. Limited groundwater mounding is anticipated along the wall. However, while mounding would increase the hydraulic gradient and seepage velocities adjacent to and immediately upgradient of the wall, the removal of source material from the Site should result in no appreciable impact to downgradient groundwater quality (i.e., stabilized plume), and no off site migration of contamination. Additionally, the continued operation of the remedial system (with OM&M maintained until March 2017), will be actively remediating contamination from the adjacent Con Edison property to the north of the Site.

After the Waterloo® Hydraulic Barrier installation is complete, subsurface soils will be excavated from within the property boundaries. Contaminated soil will be removed from the Site and will encompass an area of approximately 101 ft x 54 ft x 15 ft deep (approximately 3,600 tons of material). The volumetric estimate for excavated material includes an off-set for the concrete slab on grade removed during building demolition and the sub-grade partial basement (void space). The excavation will encompass the most concentrated zone of contamination which is located in the northeastern corner of the Site. Accordingly it is anticipated that a significant volume of the subsurface contaminant mass will be removed as a result of the excavation activities. Confirmatory sampling will be completed at the final excavation depths to determine if any remaining soils exceed the SCOs. Upon the completion of the contaminated soil removal, the excavations will be backfilled with certified clean fill.

The proposed remedy of Soil Excavation and Removal is the only remedial method that complies with the applicable environmental laws, regulations, standards and guidance set forth in 6 NYCRR Part 375 for the Track 1 cleanup Unrestricted Use SCOs. To achieve Track 1, soil removal and disposal is roughly estimated to have to extend to 15 feet below the existing grade. Exceedances of 6 NYCRR Part 375 Unrestricted Use SCOs were reported throughout
the footprint of the Site, with the highest concentrations located beneath the northeastern corner of the Site.

While it is possible that some residual soil contamination (exceeding Unrestricted Use SCOs) may remain in the excavation, this contamination will be well below the surface and there will be no potential for direct contact, and therefore no risk to Site occupants. However, this condition will result in a modification of the cleanup track from a Track 1 to a Track 2.

If the remedial action is modified to a Track 2 cleanup, ISCO lateral injection points will be installed in the locations in which the endpoint confirmation soil samples exceed Unrestricted Use SCOs. These lateral injection points will be installed within the permeable grave certified clean backfill, and will facilitate ISCO direct application activities following the completion of the remedial action. Additionally, replacement groundwater monitor wells will be installed within the Site interior. These groundwater monitor wells will be used to evaluate the effectiveness of the Site remedy. The remedial action effectiveness evaluation will be assessed by comparison of groundwater quality trends obtained from sampling activities performed under a Groundwater Monitoring Program.

6.1 Soil Cleanup Objectives

The Track 1 Soil Cleanup Objectives (SCOs) for this Site are the 6 NYCRR Part 375 SCOs for Unrestricted Use. Summary tables presenting the 6 NYCRR Part 375 SCOs are presented on the tables included in Appendix L. The values for the protection of public health are also presented on the tables included in Appendix L.

Soil and materials management onsite and offsite will be conducted in accordance with the Soil/Material Management Plan presented in Section 6.4 of this RAWP (above). UST closures (if performed) will at a minimum, conform to criteria defined in DER-10.

6.2 Remedial Performance Evaluation

An evaluation of the selected remedy demonstrates that it will be fully protective of human health and the environment. The selected remedy utilizes source removal as the primary means of remediating the Site. Source removal is the primary goal of the BCP.
In the event that post-excavation Site conditions require that the remedial action be modified to a Track 2 cleanup, the selected remedial action will also utilize institutional (EE and deed restrictions) and engineering controls as part of the final remedy. Engineering controls include: a hydraulic barrier around the perimeter of the Site to prevent contaminated groundwater from entering the Site during and after the completion of the remedial excavation activities; a waterproofing layer/soil vapor barrier will be installed in association with future Site redevelopment, which will prevent any potential residual VOC vapors from entering the future structure on the Site; and, ISCO applications to the subsurface in locations where residual contamination (exceeding 6 NYCRR Part 375 SCOs for Unrestricted Use) is left in place.

Verification that remedial action objectives have been met will be accomplished through confirmatory soil sampling (following excavation activities) and groundwater monitoring for a period of 2 years following installation of the hydraulic barrier.

### 6.2.1 Endpoint Sampling Frequency

Per NYSDEC Department of Environmental Remediation (DER) policy, confirmation soil sample collection is to be completed from the bottom of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.

Due to the fact that the perimeter of the Site will consist of a steel sheeting hydraulic barrier for the support of excavation, the sidewall confirmation endpoint samples will not be collected from the interior of the Site perimeter during the advancement of the excavation activities. If required, representative sidewall soil samples could be collected using a Geoprobe direct-push drill rig prior to performing the steel sheeting and excavation activities. The excavation pre-sampling endpoint confirmation soil samples would be collected to characterize the Residual Management Zone. The pre-sampling activities would provide soil quality data that will not be attainable following the installation of the hydraulic barrier. If Geoprobe pre-sampling for endpoint confirmation soil samples is performed, the sampling protocol would consist of collection of one (1) sidewall sample for every 30 linear feet around the property.
The vertical sampling depth for each boring would be selected in the field, and would be representative of the highest observed VOC concentration as determined based on the PID concentrations recorded during field screening. It should be noted that following the installation of the hydraulic barrier, the Site will be isolated from residual contamination offsite. Therefore, the soil quality analysis for perimeter soil borings samples would have no bearing on the post-remedy soil quality within the Site boundaries.

Excavations will be continually evaluated in the field using a PID to screen VOC concentrations. Based on the field screening, (and if present, approval from a NYSDEC field representative), once the termination of an excavation is reached, endpoint soil samples will be collected. Endpoint sampling, including bottom and side-wall sampling for ground invasive activities associated with the implementation of this RAWP, will be performed in accordance with Section 5.4 of DER-10. Bottom samples will be collected at a rate of one for every 900 square feet, however; bottom samples will not be collected if the excavation is advanced to groundwater. Based on the DER criteria, approximately eight (8) bottom confirmation endpoint samples, plus required QA/QC samples, would be collected. Endpoint soil samples would be analyzed for Part 375 VOCs, SVOCs, pesticides, polychlorinated biphenyls (PCB), and metals by an NYSDOH Environmental Laboratory Approval Program (ELAP) certified laboratory.

Where USTs were excavated and removed, sidewall samples will be collected from the approximate depth of the center of the tank. The endpoint sampling frequency for UST excavation sidewalls will be performed a minimum of every 20 linear feet. Additionally, a minimum of one bottom sample will be collected from beneath the former location of each UST removed from the subsurface. If the entire area underlying any USTs is excavated to the total depth of 15 ft bg, the standard DER-10 sampling frequency will be utilized. If following the excavation activities there is any evidence of groundwater contamination (including without limitation, a sheen or odor or if groundwater is within 20 feet of the surface), a groundwater sample will be collected.

If the initial endpoint samples fail to meet the 6 NYCCR Part 375 SCOs for Unrestricted Use, over-excavation will be performed and additional endpoint samples will be
collected. Where analytes exceed 6 NYCRR Part 375 SCOs for Unrestricted Use, excavation in the area represented by the failing sample would be advanced 1 to 2 additional feet vertically and resampled until all analytes are reported below the Unrestricted Use SCOs. No offsite excavation will be required. Because the excavation scope entails excavation of the eastern portion of the Site to a depth beyond the groundwater table, potential expanded excavation activities would likely be limited to the western portion of the Site. The western portion of the Site has lesser amounts of contamination documented under past remedial investigation activities and is the only area of the Site where excavation to a minimum depth of 15 ft bg is expected to be adequate for the remedial action. Upon a demonstration that endpoint samples satisfy the Unrestricted Use SCOs, no further soil remediation will be necessary and a request would be made to NYSDEC to consider the soil remedy complete.

The FER will provide a tabular and map summary of all endpoint sample results and exceedances of RUSCOs.

6.2.2 Soil Sampling Methodology

Anticipated subsurface soil sampling activities associated with the RAWP will be performed via direct excavation and soil sampling or Geoprobe® drilling.

Surface and subsurface soil/fill samples will be collected for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), PCBs, pesticides, and Target Analyte List (TAL) metal analysis. Endpoint confirmation soil sample analytical results will be compared to Applicable or Relevant and Appropriate Regulations (ARARs) and to 6 NYCRR Part 375 Unrestricted Use SCOs to adequately evaluate environmental quality. Waste characterization soil sample analytical results will be compared to waste classification standards as well as permissible contaminant concentration limits of respective waste disposal facilities.

Surface and subsurface soil/fill sample intervals may be adjusted in the field based on the actual excavation depths and to allow for sampling of any native soil separately from the overlying fill material or soils. The actual locations of any of the boreholes and/or sample intervals may be changed in the field based on actual field conditions encountered.
The portion of the collected endpoint confirmation soil sample not required for chemical analysis will be returned to the sampling location. The portion of the collected soil boring soil sample not required for chemical analysis will be temporarily stored onsite and will be aggregated with additional waste stream for offsite disposal.

All field sample locations will be tied to three permanent features and surveyed with a Global Positioning System (GPS) unit or other appropriate surveying equipment to obtain horizontal and vertical control for each sampling location.

Field sampling personnel will screen and document field soil vapor headspace in a sealable plastic bag using a photoionization detector (PID) calibrated to a 100 ppm (parts per million) isobutylene standard. The collection of soil samples will be biased toward known disposal areas or areas with grossly contaminated soil/fill. Sample depths may be altered in the field based on visual and olfactory observations and field screening instrument readings.

6.2.2.1 Surface Soil Sampling Procedures

Post-excavation endpoint confirmation samples will be collected upon completion of the total excavation extent. Prior to sample collection, all sampling locations will be determined and marked. Soil samples will be collected as follows:

1. A new pair of disposable gloves will be used at each facility to avoid potential cross-contamination of the sample.

2. Sampling equipment will be decontaminated as described herein prior to use. Dedicated or disposable sampling equipment will be used where possible. Plastic sampling equipment will not be used for collection of samples that will be analyzed for organic compounds.

3. Surface soil samples will be collected (at locations where only surface soils will be sampled) as follows:
   a. At each surface soil sample location, a pre-cleaned or dedicated/disposable sampling tool (e.g., spoon, trowel, or scoop) will be used to remove soil uniformly from 0 to 3-inch depth interval. Any debris
(e.g., large stones, glass, wood, etc.) will be avoided as much as possible from inclusion in the soil sample.

b. The soil will be placed in a clean, dedicated container (e.g., aluminum foil pan or plastic cup) for homogenization. Plastic sampling equipment will not be used for collection of samples that will be analyzed for organic compounds. Pre-cleaned dedicated sampling tools will be used to collect and homogenize the soil sample prior to transferring it into the sample jar(s) provided by the laboratory. When collected, the field duplicates, matrix spike/matrix spike duplicate (MS/MSD) sample, and investigative sample will be taken from the same soil aliquot homogenized in the container.

c. Descriptions of the soil type encountered at each sample location will be recorded on Sample Collection Field Sheets (SCFS). At each sample location, the following information will be logged: soil stratigraphy; the depths to the soil interface, and native soil/clay interface and fill/native soil interface, if possible and where present.

### 6.2.2.2 Subsurface Soil Sampling Procedures

**Geoprobe® Soil Sampling**

The preferred method for subsurface soil collection will be the Geoprobe® direct-push method as described below:

i. At each sample location, a new acetate/plastic liner will be inserted into the direct-push soil sampler.

ii. The sampler will be fitted with a cutting tip/drive shoe and pushed/driven into the ground mechanically with powered equipment mounted on a track unit (approximately 4 feet by 6 feet and 10 feet high) or truck (pick-up truck or van) beyond the depth of the deepest designated sample depth. The sampler may be manually driven if the direct-push unit cannot access the sample location (i.e., presence of large trees, roots, and steep slopes) or may cause significant damage.
to the area or ground surface. If the deepest sampling depth exceeds the length of the soil sampler, then a second lined sampler will be advanced down the same hole subsequent to retrieval of the first sampler.

iii. The sampler will then be removed and the liner containing the soil core will be removed. The liner will be cut and the soil core will be measured, logged and recorded on a geologic log. At each borehole location, the following information will be logged: soil stratigraphy; depth to refusal where encountered; and the depths to the native soil/clay interface and fill/native soil interface, if possible and where present.

iv. If necessary to obtain sufficient sample volume, additional soil cores may be collected next to the first soil core location.

v. The soil sample from the selected sample interval(s) will be removed and placed in a clean, dedicated container (e.g., aluminum foil pan or plastic cup) for homogenization. Plastic sampling equipment will not be used for collection of samples that will be analyzed for organic compounds. Pre-cleaned dedicated sampling tools will be used to collect and homogenize the soil sample prior to transferring it into the sample jar(s) provided by the laboratory. When collected, the field duplicate sample, split sample, MS/MSD sample, and investigative sample will be taken from the same soil aliquot homogenized in the container.

6.2.3 Reporting of Results, Quality Assurance (QA)/Quality Control (QC) and Data Usability

Soil, sediment, and groundwater samples will be analyzed by laboratory that is a United States Environmental Protection Agency (USEPA) approved laboratory. Chemical labs used for all endpoint sample results and contingency sampling will be NYSDOH Environmental Laboratory Accreditation Program (ELAP) certified. The analytical laboratory must maintain current NYSDOH certifications during the project. The laboratories utilized for the project will implement the appropriate project-required SOPs. Laboratory SOPs are based on analyti-
cal methods published by the USEPA (USEPA Test Method for Evaluating Solid Waste, Physical/Chemical Methods, Final Update IIIB, June 2005) or consistent with specific method requirements under the Safe Drinking Water Act (SWDA) and/or other applicable methods (such as American Society for Testing and Materials [ASTM]). The laboratory SOPs are provided in the QAPP which is included in Appendix S.

Laboratory analysis of soil and groundwater samples will consist of Category A (as defined in the Analytical Services Protocol [ASP]) or Category Spills laboratory data deliverables for all sampling performed at the Site with the exception of confirmatory (post remediation) samples and final delineation samples.

For all confirmatory (post remediation) samples and final delineation samples, Category B laboratory data deliverables as defined in the ASP will be submitted. In addition, for samples analyzed according to Category B laboratory data deliverables, a DUSR will be prepared by a party independent from the laboratory performing the analysis, when required by the NYSDEC.

Laboratory reports will include a raw data package and a QC summary package and will be submitted in hard copy and portable document format (PDF). An electronic data deliverable (EDD) will also be provided. This will be a Microsoft Excel format for inclusion by the Project Manager into a database. The file provided in Excel format will be prepared in accordance with the Environmental Information Management System (EIMS) implemented by the NYSDEC. The EIMS uses the database software application EQuIST™ (EQuIS) from EarthSoft® Inc. (EarthSoft). The use of the NYSDEC standardized EDD format (required for all data submitted) will allow for the incorporation of the analytical data into a comprehensive geospatial database.

The laboratory’s internal data management QA/QC measures will be performed in accordance with the laboratory specific Quality Assurance Manual and SOPs. All analytical data will be transmitted both electronically and as hard copy to the Project Manager. The Project Manager and/or designee will be responsible for processing the data. The data will be summarized in tables and on figures for data analysis and presentation. Once the data has been re-
viewed and QC checks have been verified, both electronic and hard copy laboratory data reports will be archived in the electronic and permanent project files in document control.

After all data have been reviewed and validated, the third party validator will prepare a DUSR. Within the DUSR, all data points observed as having either a high or low bias (qualified data) will be evaluated for determination of data usability.

All laboratory and field data obtained will be reviewed and both qualitatively and quantitatively assessed by the Project Manager and/or designee on a project-wide, matrix-specific, parameter-specific, and/or unit-specific basis to confirm that it complies with this QAPP. The results of this assessment will be presented and discussed in detail in the FER. In addition, the Principal in Charge will review all data generated during this project as a part of the process of preparing the FER. Data that does not meet QC objectives will be qualified and will be used for decision-making purposes in accordance with the qualifiers.

6.2.4 Reporting of Endpoint Data in FER

Chemical labs used for all end-point sample results and contingency sampling will be NYSDOH ELAP certified.

End point sampling, including bottom and side-wall sampling, will be performed in accordance with DER-10 sample frequency requirements. Sampling of the excavated area will be conducted using a 30 by 30 foot grid spacing between each sample. Confirmatory soil sampling will include one sample collected from the bottom of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom every 900 square feet of bottom area. The analytical data generated for the endpoint confirmation samples (collected following the onsite remedial actions) will be used to assess the soil quality that will constitute the Residuals Management Zone. The FER will include tables and figures representing the soil quality for the endpoint samples. The soil quality results for the endpoint samples will be compared to the 6 NYCRR Part 375 SCOs for Unrestricted Use. All areas in which endpoint samples exceed the SCOs for Unrestricted use will be presented in the FER.
6.3 **Estimated Material Removal Quantities**

Following approval of the R.A.W.P, the onsite remedial activities will commence. The initial field activities will consist of the demolition of the onsite building. The building demolition and remedial activities are anticipated to take up to approximately three to six months to complete. All necessary local permits will be obtained from the City of New York prior to the initiation of remedial activities on the Site.

The majority of the building material waste generated during demolition will be handled and disposed of as C&D debris, exclusive of historically impacted materials. The building demolition activities are estimated to generate approximately 300 tons of hazardous demolition waste, and 400 tons of non-hazardous C&D debris. This estimate assumes that segregation activities are possible in the field.

Based on the RI results, and for purposes of this assessment, all soil beneath the Site has been assumed to contain concentrations of contaminants above the Unrestricted Use SCOs. Based on an estimated average fill thickness of 15 feet throughout the Site, the soil excavation activities completed for achieving a Track 1 cleanup are estimated to require removal and offsite disposal of approximately 3,600 tons of soil. This is estimated to consist of approximately 2,000 tons of soil classified as hazardous waste, and approximately 1,600 tons of soil classified as non-hazardous waste. These estimates are based on vertical excavation limits derived from the field observations and laboratory analytical results from previous environmental investigations. These volumes include an off-set for the certified clean backfill from past remedial excavation activities, the concrete slab on grade removed during building demolition and the sub-grade partial basement. All waste generated as a result of performing these activities will be appropriately stored onsite in contaminant compatible containers or stockpiled pending appropriate waste characterization and offsite disposal. It should be noted that the actual volumes of waste material may vary due to the field conditions and observations.

This complete excavation disposal alternative would be a long-term remedy and it is anticipated to be acceptable to the community. This remedial alternative effectively reduces the toxicity, mobility, and volume of impacted media through the removal of all contaminated fill.
and soil from the Site and replacement with clean material. Additionally, the hydraulic barrier surrounding the property perimeter will provide a continuous barrier after the completion of the remedial excavation work, preventing offsite contamination from migrating onto the Site in the future.

Under the Soil Excavation and Removal remedial approach, once the contaminated soils are excavated and transported off of the Site, the remediation will be entirely completed (and use of the Site will be without restriction) without the need for any institutional or engineering controls or other ongoing remedial efforts or post-cleanup operation, monitoring or maintenance activities.

The selected remedial action is in accordance with the Brownfields Remedial Program Cleanup Objectives (Track 1 cleanup), which promotes residential development because there will be no restrictions on future Site use after the remedy is completed. Thus, the proposed remedy is fully consistent with requirements that would permit for the use of the Site for residential housing once the remedy is fully completed.

6.4 **Excavation Plan**

This Excavation Plan outlines detailed plans for managing all soils/materials that are disturbed at the Site, including excavation, handling, storage, transport and disposal. It also includes all of the controls that will be applied to these efforts to assure effective, nuisance-free performance in compliance with all applicable Federal, State and local laws and regulations. The Excavation Plan will be utilized during all remedial action activities performed onsite as outlined in this RAWP, as well as for any future ground invasive work (if necessary) that is performed under the subsequent SMP.

As part of remedial action, the existing building will be razed to facilitate the ground-intrusive excavation activities. Masonry, rubbish, scrap, debris, pavement, curbs, fences, etc. (i.e., solid waste) will be removed and properly disposed offsite or temporarily stockpiled in accordance with applicable solid waste regulations prior to proper offsite disposal. Only exempt materials as defined in 6 NYCRR Part 360-7.1(b)(1) are allowed for stockpiling.
During remedial construction activities onsite and offsite, the excavation of soil/fill material will be necessary. Excavation may also be necessary during future construction of footings for structures and for other activities not associated with the remedial actions. For excavation work, a Professional Engineer’s representative with construction/remediation experience, representing the Volunteer or developer, will monitor soil/fill excavations or disturbances. During excavation performed to support development activities, the soil/fill will be inspected for staining and will be field screened for the presence of VOCs.

6.4.1 Soil Screening Methods

During onsite remedial construction activities, the excavation of soil/fill material will be necessary. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of the COC.

Screening will be performed by qualified environmental professionals. Resumes will be provided for all personnel responsible for field screening (i.e. those representing the Remedial Engineer) of invasive work for unknown contaminant sources during remediation and development work. During all excavation activities, the soil/fill will be inspected for staining and will be field screened for the presence of VOCs with a PID. Visual, olfactory and PID soil screening and assessment will be performed by or under the supervision of the Field Project Supervisor and/or HSO and will be reported in the FER.

Based on the soil that is observed to be discolored, tinted, dyed, unnaturally mottled, or has a sheen, or excavated soil/fill that is visibly stained or produces elevated PID readings (i.e., above background) will be considered potentially contaminated and stockpiled on the Site for further assessment. The potentially contaminated soil/fill will be stockpiled or will be stored in labeled drums and/or a lined and covered roll-off container. All waste soil will be sampled for waste characterization. The waste will then be transported offsite to a permitted waste management facility for disposal.

If buried drums or USTs are encountered during excavation activities, they will be properly removed (in the case of drums) or closed per 6 NYCRR Part 595 and/or Part 613 (in the case of tanks), and any associated waste will be characterized and disposed offsite. The
soil/fill surrounding the buried drums or USTs will be considered as potentially contaminated and will be stockpiled and characterized. Post-excision samples will be collected and analyzed from the sidewalls/bottom of any drum or tank excavation as per DER-10 Section 5.4.

Soil/fill screened in the field as having PID concentrations below background and exhibiting no visual or olfactory evidence of contamination may be left onsite below the demarcation fabric and certified cover fill. Soil/fill that is excavated as part of development which cannot be left in place below the cover system will be characterized prior to transportation offsite for disposal at a permitted facility. For excavated soil/fill with visual evidence of contamination (i.e., staining or elevated PID measurements), one grab sample (for VOCs), and one composite sample and a duplicate sample (for all other parameters) will be collected for each 100 cubic yards of stockpiled soil/fill (or at a frequency required/accepted by the disposal facility). For excavated soil/fill that does not exhibit visual evidence of contamination but must be sent for offsite disposal, one grab sample (for VOCs), and one composite sample and a duplicate sample (for all other parameters) will be collected for 2000 cubic yards of stockpiled soil, and a minimum of 1 grab and one composite sample will be collected for volumes less than 2000 cubic yards (or at a frequency required by the disposal facility). Soil samples will be composited by placing equal portions of fill/soil from five separate locations into a pre-cleaned, stainless-steel (or Pyrex glass) mixing bowl. The soil/fill will be thoroughly homogenized using a stainless-steel scoop or trowel and transferred to pre-cleaned jars provided by the laboratory. Sample jars will then be labeled and a chain-of-custody form will be prepared.

Sub-grade material used to backfill excavations or placed to increase Site grades or elevation shall meet the following criteria:

- Offsite borrow soils will be documented as having originated from locations having no evidence of disposal or release of hazardous, toxic or radioactive substances, wastes or petroleum products.
- Offsite soils intended for use as Site backfill cannot otherwise be defined as a solid waste in accordance with 6 NYCRR Part 360-1.2(a).
• If the contractor designates a source as "virgin" soil, it shall be further documented in writing to be native soil material from areas not having supported any known prior industrial or commercial development or agricultural use.

• Soil/fill imported to the Site for use as backfill below the final cover will be certified as clean by the Remedial Engineer by meeting Unrestricted Use Soil Cleanup Objectives. This certification will consist of composite sampling of backfill (one sample for every 500 cubic yards) and laboratory analysis for VOCs, SVOCs, total metals, PCBs and pesticides.

6.4.2 Stockpile and Temporary Storage Methods

Excavated soil from suspected areas of contamination will be stockpiled separately and will be segregated from clean soil and construction materials. Stockpiles will be used only when necessary and will be removed as soon as practicable.

While stockpiles are in place, they will be inspected daily, and before and after every storm event. Results of inspections will be recorded on the daily field sheets and will be available for inspection by NYSDEC. Excavated soils will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced. All stockpile activities will be compliant with applicable laws and regulations. Soil stockpile areas will be appropriately graded to control run-off in accordance with applicable laws and regulations. Hay bales or equivalent will surround soil stockpiles except for areas where access by equipment is required. Silt fencing and hay bales will be used as needed near catch basins, surface waters and other discharge points.

Due to the proposed dewatering activities in addition to the DPE activities, contaminated groundwater will likely be generated during the implementation of the RAWP. The onsite remedial system will be used to treat the extracted groundwater to comply with discharge requirements established by the NYCDEP (for discharge to the sanitary sewer). If the groundwater extraction rate exceeds the treatment capacity of the remedial system, extracted
groundwater will be temporarily stored in onsite 21,000-gallon fractionation tanks (or similar) prior to treatment and discharge.

As an alternative to the temporary water treatment system, vacuum trucks will be available for extraction/containment of contaminated groundwater and subsequent offsite disposal.

### 6.4.3 Characterization of Excavated Materials

Based on the extent of the Site use history, the onsite subsurface contamination can be attributed to a documented commercial or industrial process. Therefore, onsite waste generated as part of remedial actions will be classified as hazardous waste as a listed waste.

Alternatively, hazardous waste characterization may be determined based on evaluation of hazardous waste characteristics. A contained-in request will be submitted to the NYSDEC to permit the waste disposal according to laboratory analytical hazardous waste characterization. If the contained-in request is approved by the NYSDEC, laboratory analytical sampling will be utilized to identify and define a characteristic of hazardous waste at the Site. The classification of a solid waste as hazardous based on a characteristic of toxicity will be determined using the Toxicity Characteristic Leaching Procedure (TCLP), test Method 1311 in “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,” EPA Publication SW-846.

For soil/fill and C&D debris (where required) excavated from the Site under the remedial program, grab and composite waste characterization samples will be collected and sent to a New York State approved laboratory for waste characterization analysis for 375-6.8 requirements of VOCs, SVOCs, TAL metals, cyanide, PCBs and pesticides. The sampling plan will consist of collecting a representative number of samples for the respective volume of material to be disposed. As per DER-10 Table 5.4(e)10, the following recommended number of soil samples (frequency for various quantities of soil) for soil imported to or exported from a Site have been established:
### Table: Contaminant Quantity and Sample Types

<table>
<thead>
<tr>
<th>Soil Quantity (Cubic Yards)</th>
<th>VOCs</th>
<th>SVOCs, Inorganic and PCBs/Pesticide</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-50</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>50-100</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>100-200</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>200-300</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>300-400</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>400-500</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>500-800</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>800-1,000</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Greater than 1,000</td>
<td>An additional 2 VOC and 1 Composite for each additional 1,000 cubic yards</td>
<td></td>
</tr>
</tbody>
</table>

In addition to the 6 NYCRR Part 375-6.8(b) analytical parameters, excavated soil/fill and/or other excavated media that will be transported off-Site for disposal will be sampled in accordance with the requirements of the receiving facility, and in compliance with applicable laws and regulations. Soils proposed for reuse on-Site will be managed as defined in this RAWP.

EPA regulations in 40 CFR 268.40 describe the treatment standards for the disposal of hazardous wastes in landfills. Materials for disposal must be tested to meet these limits for disposal. Disposal facility waste acceptance criteria (WAC) prescribe requirements for identification and reporting of waste constituents. Each waste class must be tested for key constituents to properly classify these wastes for disposal.

### 6.4.4 Materials Excavation, Load-Out and Departure

The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan. The Remediation Engineer or a qualified environmental professional under his/her supervision will:

- oversee remedial work and the excavation and load-out of excavated material;
• ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;

• ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this RAWP;

• ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this RAWP are properly addressed by appropriate parties;

• ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site;

• ensure that all loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements); and,

• ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site remediation.

Locations where vehicles exit the Site shall be inspected daily for evidence of soil tracking off premises. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials. Open and uncontrolled mechanical processing of historical fill and contaminated soil on-Site will not be performed without prior NYSDEC approval.

The Remedial Engineer will ensure that Site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in this Remedial Action Work Plan.

6.4.5 Offsite Materials Transport

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with
applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364. Outbound truck transport routes are included as figure 18. The trucking routes take into account the following factors:

1. limiting transport through residential areas and past sensitive sites;
2. use of mapped truck routes;
3. minimizing off-Site queuing of trucks entering the facility;
4. limiting total distance to major highways;
5. promoting safety in access to highways; and,
6. overall safety in transport.

All trucks loaded with Site materials will exit the vicinity of the Site using only this approved truck route. Trucks will not stop or idle in the neighborhood after leaving the project Site. Transportation of contaminated waste from the Site to the prescribed treatment/disposal facility will utilize: Department of Transportation (DOT) approved steel 55-gallon drums, lined roll-off containers and/or lined dump trucks. Permits, licenses and insurance will be provided as per regulations. Material transported by trucks exiting the Site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of causing leakage from trucks, truck liners will be used.

All trucks will be washed prior to leaving the Site. Truck wash waters will be collected and disposed of off-Site in an appropriate manner. Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation and development.

Queuing of trucks will be performed on-Site, when possible in order to minimize off-Site disturbance. Off-Site queuing will be minimized.

6.4.6 Materials Disposal Offsite

The following documentation will be established and reported by the Remedial Engineer for each disposal destination used in association with the remedial program. The follow-
ing letters will document that the disposal of regulated material exported from the Site conforms to applicable laws and regulations:

1. A letter from the Remedial Engineer or designee to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at a NYSDEC BCP environmental remediation Site in Brooklyn, New York. The letter will provide the project identity and the name and phone number of the Remedial Engineer or designee. The letter will include as an attachment a summary of all chemical data for the material being transported.

2. A letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is approved to accept the material. These documents will be included in the FER.

Waste characterization will be performed for off-Site disposal in a manner suitable to the receiving facility and in conformance with applicable permits. Sampling and analytical methods, sampling frequency, analytical results and quality assurance/quality control (QA/QC) will be reported in the FER. All data available for soil/material to be disposed at a given facility must be submitted to the disposal facility with suitable explanation prior to shipment and receipt.

Appropriately licensed haulers will be used for material removed from this Site and will be in full compliance with all applicable local, State and Federal regulations. Bill of Lading system or equivalent will be used for off-Site movement of all material removed from the Site. An itemized account of the destination of all material removed from the Site during this remedial action will be maintained. Documentation associated with disposal of all material will include records and approvals for receipt of the material. This information will be presented in the FER.

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be stored, transported, and disposed of in compliance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be
handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility). A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the FER.

### 6.4.7 Potential Disposal Facilities

Laboratory waste characterization of the waste material will be completed prior to the loading and transport to the disposal facility. Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the FER.

Based on the results of the laboratory analysis, the waste material will be classified as either hazardous or non-hazardous. The disposal/treatment facility to be utilized will be determined based on the contaminant(s) present and the contaminant concentrations as determined by the waste characterization analysis. Based on the Site contaminants of concern, it is anticipated that the waste generated at the Site will be disposed of at one of the following facilities listed below.

#### 6.4.7.1 Clean Earth of North Jersey, Inc.

Clean Earth of North Jersey, Inc.
115 Jacobus Avenue
South Kearny, NJ 07032
Telephone: (973) 344-4004
Fax: (973) 344-8652

Clean Earth of North Jersey, Inc., located in South Kearny, New Jersey, operates a state-of-the-art RCRA Part B Facility, considered to be the premier Treatment Storage and Disposal Facility in the New York/New Jersey Metropolitan Area. Its location makes Clean Earth of North Jersey, Inc. the facility of choice for some of America’s largest corporations. Clean Earth of North Jersey, Inc. specializes in the management of heavy metal contaminated soil, (fuel blending) flammable liquids, PCB transformers and drum waste. Clean Earth of North Jersey, Inc. is also permitted to manage lab-pack waste for an unlimited variety of waste
streams. This facility provides fuel blending technology, stabilization of RCRA metals, lab-pack services, management of PCB transformers, wastewater blending and a wide variety of drum waste disposal services. Clean Earth of North Jersey, Inc. also provides manifesting and transfer services for some of the United States and Canada’s most well respected RCRA incinerators and landfills.

For waste soil/fill classified as non-hazardous, it may qualify to be transported to the Clean Earth facility located in Philadelphia, Pennsylvania.

6.4.7.2 Clean Earth of Carteret, Inc.

Clean Earth of Carteret, Inc.
Fixed Base Bioremediation Services
24 Middlesex Avenue
Carteret, NJ 07008
Telephone: (732) 541-8909

Clean Earth of Carteret, Inc. (CEC) is the first “fixed based” bioremediation facility permitted in the State of New Jersey and the largest (of its design) operating in the United States. The facility has 80,000 sf of treatment area, with an additional outside storage capacity of 45,000 sf. The facility utilizes an onsite laboratory to ensure compliance and quality control for incoming waste streams. Heated air is generated with overhead radiant heaters to provide climate control capability for year round operation. All treatment of soils is conducted under a “negative air” (New Jersey Department of Environmental Protection [NJDEP]-Designed) air handling system that exchanges clean air through the facility and processes airborne organics via baghouse followed in series by two activated carbon absorption units.

CEC is permitted and capable of processing 400,000 tons of petroleum contaminated soil per year.
6.4.7.3 Soil Safe, Inc.

Soil Safe
378 Route 130
Logan Township, NJ 08085
Toll Free: (800) 562-4365
Telephone: (410) 872-3990
Fax: (410) 872-9082

The Soil Safe Logan facility is located on 160 acres in southern New Jersey. Soil Safe’s unique micro-encapsulation process eliminates future liability by fully processing industrial waste and contaminated soil into a safe and usable end product. The Soil Safe process binds contaminants at a molecular level into a high quality sub-base material. The sub-base has been used in government and private construction projects.

Soil Safe offers a complete continuum of turnkey services. From testing, excavation, loading, transportation, recycling of waste material, and final placement of the recycled sub-base material.

Soil Safe specializes in handling petroleum contaminated soils, metals contaminated soils, and a variety of other industrial wastes. Soil Safe’s specialization in construction waste and encapsulation process enables a unique opportunity to save money on remediation. Soil Safe’s competitive advantages allow for recycling of soil for less than thermal treatments and landfilling and also saving up to sixty-five percent on paving projects using a recycled material. Soil Safe believes they provide the solution to a situation which would otherwise be an environmental problem.

6.4.7.4 Waste Management, Inc. - CWM Chemical Services, LLC

Office Address
1550 Balmer Road
Youngstown, NY 14174
Phone: 716-286-1550
Fax: 716-286-0211

Mailing Address
P.O. Box 200
Model City, New York 14107
Telephone: (716) 286-1550
Waste Management's Industrial Services Group design specialized waste collection, transportation and disposal services such as recycling, hazardous and special waste disposal and fuels blending operations to customers in a wide range of industries. We provide daily onsite management of these services, with a Waste Management representative. Contact us about developing a safe and environmentally sound plan for your business. CWM Chemical Services, LLC is a waste disposal facility operating under NYSDEC approval for disposal of the following waste streams:

2. Storage of Liquid Hazardous & Non-Hazardous Waste in Tanks;
3. Treatment of Liquid Hazardous & Non-Hazardous Waste in Tanks;
4. Treatment (Stabilization, Immobilization & Encapsulation) of Solid Hazardous & Non-Hazardous Waste in Tanks;
5. Storage of Liquid Hazardous & Non-Hazardous Waste (Post-Treatment) in Surface Impoundments;
6. Disposal of Solid Hazardous & Non-Hazardous Waste in a Landfill (Residual Management Unit - One (RMU-1));
7. Commingling of Liquid Hazardous Waste and Repackaging of Laboratory Chemical Waste for Shipment;
8. Implementation of Final Corrective Action Remedies for Site-Wide Contamination; and,
9. Groundwater Monitoring and Perpetual Post-Closure Care at All On-Site Land Disposal Units.

Hazardous waste generated at the Site (listed waste and/or waste classified based on analytical results) will be transported under Uniform Hazardous Waste Manifests to the CWM Chemical Services, LLC facility in Model City, New York.
6.4.7.5 Republic Environmental Systems (PA), LLC

Republic Environmental Systems (PA), LLC
2869 Sandstone Drive
Hatfield, PA  19440
Telephone:  (215)822-8995

Republic Environmental Systems (PA), LLC (PSC) is a state of the art waste treatment facility, which accepts hazardous and non-hazardous wastes offsite from industrial sources and site clean-up activities. The treatment operations have been designed to handle a wide variety of wastes including liquids, solids, and contaminated soils containing both organic and inorganic constituents. The facility provides waste management, which stresses waste minimization and environmentally sound methods of waste treatment. Waste accepted for chemical and or physical wastewater treatment are aqueous based. The constituents in all waste managed at the facility are known and monitored closely. The waste source, description of waste, contaminants present, and contaminant limitations are established for all categories of bulk liquid wastes treated at the facility. The concentrations of the constituents/contaminants are measured upon receipt from the generator.

PSC is a waste management facility which treats, stores and transfers hazardous and non-hazardous (Residual) wastes. The primary waste management activities conducted at RESPA are the storage and or treatment of numerous categories of waste including but not limited to, aqueous wastes, oil and petroleum production waste, industrial solids and sludge’s, solvents, paints and organic waste, contaminated debris/soil, lab packs and PCB contaminated wastes.

6.4.7.6 Hazleton Creek Properties, LLC

Hazleton Creek Properties, LLC
282 South Church Street
Hazleton, PA  18201
Telephone:  (570)501-5050

Hazleton Creek Properties, LLC (Hazleton Creek)  The site is an abandoned mine site that has been severely impacted by past deep and surface mining practices containing 277 acres
of un-reclaimed abandoned mine pits and spoil piles. Portions of the site (approximately 50 acres) were subsequently used for disposal of municipal and industrial waste in several mine pits.

The site is a brownfield site and is a designated Special Industrial Area under the PA Act 2 and has been designated a Brownfield Action Team site (BAT) by the Governor of Pennsylvania giving the site priority attention for remediation. Hazleton Creek is authorized to conduct the site reclamation and remediation using the residual materials approved under WMGR085, WMGRO96, WMGR097, and WMGR125.

The Hazleton Reclamation Project site has the capacity to accept over 10 million cubic yards of residual materials to complete the site reclamation. Hazleton Creek is a permitted site for the beneficial use of the following: dredge material, coal ash, cement kiln dust, lime kiln dust, C&D fines, regulated fill material, PA clean fill materials, concrete, brick block and asphalt.

6.4.7.7 **Michigan Disposal Waste Treatment Plant**

Michigan Disposal Waste Treatment Plant  
49350 North I-94 Service Drive  
Belleville, MI 48111  
Telephone: (800)592-5489

Michigan Disposal Waste Treatment Plant (MDWTP) is the largest stabilization and treatment facility in North America (by volume) with the ability to process hazardous and non-hazardous materials through stabilization, chemical oxidation/reduction, deactivation, micro encapsulation and other permitted technologies. MDWTP manages more than 600 federal and state waste codes. The facility also features a Regenerative Thermal Oxidation (RTO) system, and is the only treatment and stabilization facility in North America that is fully compliant with RCRA Subpart CC emissions standards. This allows MDWTP to treat organic waste streams with high concentrations of Volatile Organic Compounds (above 500 ppm) as a more cost-effective option than incineration. MDWTP is ISO 9001:2000, ISO 14001:2004 and OHSAS 18001:2007 certified.
6.4.7.8 **Clean Water of New York, Inc.**

Clean Water of New York, Inc.
3249 Richmond Terrace
P.O. Box 030312
Staten Island, NY 10303-0312
Telephone: (718) 981-4600

Clean Water of New York, Inc. (Clean Water) offers a wide variety of services. Those applicable to the RAWP activities include water processing and drum disposal. Clean Water’s state of the art, water treatment plant has a capacity of over 4,000,000 gallons at a processing flow of 250 gpm (gallons per minute). This provides the capability of handling large jobs quickly.

Clean Water can manage drum removal projects of any size, from one drum to trailer loads. Oil and oily water streams are managed at Clean Water’s facility. Solids are consolidated for offsite disposal. Landfill and incineration are two disposal methods offered for solids.

6.4.7.9 **Clear Flo Technologies, Inc.**

Clear Flo Technologies, Inc.
1110A Route 109
Lindenhurst, NY 11757
Telephone: (631)956-7600

Clear Flo Technologies, Inc. (Clear Flo) specializes in the receiving, processing, and disposal of non-hazardous liquid wastes for: restaurants, shopping centers, shopping malls, car wash, pharmaceutical plants, manufacturing plants, textile manufacturing plants, automobile manufacturing plants, sewage treatment facilities, water treatment facilities, landfills and other waste facilities.

6.4.8 **Materials Reuse Onsite**

Soil and fill that is derived from the property that meets the 6 NYCRR Part 375 SCOs for Unrestricted Use may be reused on-Site. Material that is excavated during the remedy or
development, does not leave the property, and is relocated within the same property and on comparable soil/fill material, will be subject to future management under the SMP. The Remedial Engineer will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this RAWP are followed. The placement locations of reused material will be presented in the FER.

6.4.9 Appropriate Groundwater Control

The excavation is anticipated to be advanced to a depth that is below the observed groundwater table elevation. Select locations will be dewatered in advance of the excavation beyond the groundwater table to reduce the volume of water in the excavated soil and to provide a solid bottom to place clean backfill material. Additionally, localized dewatering sumps will be utilized as needed to ensure sufficient dewatering is achieved to facilitate the required excavation activities.

Necessary dewatering equipment will be maintained onsite to remove all groundwater from excavations and keep water at least 12 inches below the excavation bottoms. This equipment will be maintained until all backfill is in place to at least 24 inches above anticipated water levels before dewatering activities are discontinued. All dewatering activities shall be subject to approval by the Engineer.

6.4.10 Fluids Management

The onsite remedial system will be utilized to treat dewatering fluids prior to discharge into the NYC sewer system. This will be performed under the NYCDEP wastewater discharge permit issued for the remedial system. The NYCDEP regulates discharges to the NYC sewers under Title 15, Rules of the City of New York Chapter 19. The extracted groundwater will be pretreated (i.e., sediment filters to reduce total suspended solids) as necessary to comply with NYCDEP discharge criteria. Prior to any discharge, effluent water quality sampling and analysis activities (as outlined in the wastewater discharge permit) will be completed to ensure compliance with NYCDEP requirements. All water treatment system effluent samples will be
submitted to a New York State approved laboratory for analysis of parameters required under the NYCDEP discharge criteria.

If discharge to the NYC sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility. All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable laws and regulations. Dewatered fluids will not be recharged back to the land surface or subsurface of the Site.

6.4.11 Demarcation

After the completion of soil removal and any other invasive remedial activities and prior to backfilling, a land survey will be performed by a New York State licensed surveyor. The survey will define the top elevation of residual contaminated soils. A physical demarcation layer, consisting of orange snow fencing material or equivalent material will be placed on this surface to provide a visual reference. It is expected that solid cap materials (i.e., concrete and/or asphalt) may be used on portions of the Site as part of the redevelopment plan. Concrete may be used in areas that will become slab-on-grade structures, utilities, footings, foundations, or signs supports.

This demarcation layer will constitute the top of the Residuals Management Zone (if present), the zone that requires adherence to special conditions for disturbance of contaminated residual soils defined in the SMP. The survey will measure the grade covered by the demarcation layer before the placement of cover soils, pavement and sub-soils, structures, or other materials. This survey and the demarcation layer placed on this grade surface will constitute the physical and written record of the upper surface of the Residuals Management Zone in the SMP. A map showing the survey results will be included in the FER and the SMP.

6.4.12 Import of Backfill Soil From Offsite Sources

Offsite material will be utilized to facilitate regrading of the Site. The backfill brought to the Site for regrading will be comprised of soil or other unregulated material as set forth in 6 NYCRR Part 360. Additionally, due to the selected cleanup track for restricted-residential...
use, the imported backfill and cover soil may not exceed the lower of the protection of groundwater or the protection of public health SCO for unrestricted use, as set forth in 6 NYCRR Part 375-6.8(b). For each source of backfill that is imported to the Site, one of the following will be completed prior to importing the backfill.

a. documentation will be provided to NYSDEC as to the source of the material and the consistency of the material in accordance with the exemption for no chemical testing listed in DER-10 Section 5.4(e)(5); OR,

b. chemical testing will be completed in accordance with Table 5.4(e)10 of DER-10.

In the event that laboratory analytical testing is conducted, the results for each new source of fill must meet the values provided in Appendix 5 of DER-10 for the identified use (of potential future use) of the Site and must receive approval by the NYSDEC. Copies of the summary tables presenting the Imported Fill Soil Quality Standards (Appendix 5 of DER-10) are included in Appendix L.

Backfill (other than virgin stone) brought to the Site for regrading will require sampling and laboratory analysis in accordance with this subdivision and Table 5.4(e)10. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.

Samples of the fill will be collected based on the soil quantity and type of constituents identified in the table and will be a combination of discrete and composite samples, handled as follows:

1. for VOCs only, grab samples are allowed. These grab samples are one or more discrete samples taken from the fill, with the number as specified in the volatile column of Table 5.4(e)10 for the soil quantity in question, and analyzed for the VOCs identified in Appendix 5 of DER-10; or,

2. for SVOCs, inorganics and PCBs/pesticides:
a. one or more composite samples are collected from the volume of soil identified in Table 5.4 for analysis, with each composite from a different location in the fill volume;

b. each composite is prepared by collecting discrete samples from 3 to 5 random locations from the volume of soil to be tested; and,

c. the discrete samples are mixed, and after mixing, a sample of the mixture is analyzed for the SVOCs, inorganic and PCBs/pesticide constituents identified in Appendix 5 of DER-10.

As per DER-10 Table 5.4(e)10, the following recommended number of soil samples (frequency for various quantities of soil) for soil imported to or exported from a Site have been established:

<table>
<thead>
<tr>
<th>Soil Quantity (Cubic Yards)</th>
<th>VOCs Discrete Samples</th>
<th>SVOCs, Inorganic and PCBs/Pesticide Composite Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-50</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>50-100</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>100-200</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>200-300</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>300-400</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>400-500</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>500-800</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>800-1,000</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Greater than 1,000</td>
<td>An additional 2 VOC and 1 Composite for each additional 1,000 cubic yards</td>
<td></td>
</tr>
</tbody>
</table>

For remedial projects where large amounts of cover material/backfill are required (as is the condition at the Site), DER-10 allows for a reduction in the sampling frequency from that specified in Table 5.4(e)10 once a trend of compliance is established.

A process will be established to evaluate sources of backfill and cover soil to be imported to the Site, and will include an examination of source location, current and historical use(s), and any applicable documentation. Inspection of imported fill material will include
visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:

- trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;
- the Remedial Engineer or designee is responsible to ensure that every truck load of imported material is inspected for evidence of contamination; and,
- fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The following potential sources may be used pending attainment of backfill and cover soil quality objectives:

- clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations; and,
- clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYSDEC.

RCA may be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the FER. The Remedial Engineer or designee is responsible to ensure that the facility is compliant with 6 NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. 

*RCA material is not acceptable for, and will not be used as cover material.*
All materials received for import to the Site will be approved by the Remedial Engineer and will be in compliance with provisions in this RAWP. The FER will document the source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

The Final Engineering Report will include the following certification by the Remedial Engineer: “I certify that all import of soils from off-Site, including source evaluation, approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan”.

6.4.13 Backfill of Excavation Areas

Backfilling will be performed following the endpoint confirmation sampling, sample location surveying and installation of the demarcation layer. The demarcation layer will be installed overlying the onsite soils that will remain in-place, and will consist of a geotextile fabric (or similar material) that will adequately stabilize the grade. Geotextile fabrics provide filtration through their defined openings that retain soil particles but allow the flow of water. This results in a free-draining demarcation layer.

Initial backfill shall be with select material and compacted prior to placement of remaining backfill. Backfill material will be staged onsite in a dedicated staging area pending use for backfilling activities.

Upon commencement of backfilling activities, the backfill material will be placed within the completed excavation in horizontal layers not exceeding 12 inches in loose material thickness before compaction. Each layer will be satisfactorily compacted by mechanical means. Backfilling shall be carried up evenly and shall be compacted to a minimum of 95 percent density when tested in accordance with American Society for Testing and Materials (ASTM) D 698. Each layer of backfill will be compacted into place by tamping before the next layer is applied. The compacting method used will be selected based on the characteristics of the excavation area (i.e., the deep “hot spot” excavations or the surface layer excavations). Several of the compaction methods that may be used onsite include:
- Flat Plate Vibrators

These are flat plate vibrators, with a gasoline engine mounted to a unit that causes a flat skid plate to vibrate. These will do an excellent job on sands and small gravels, compacting to a depth or lift thickness of about 8-12 inches. Commonly used on small trenches and for small diameter pipe installation.

- Vibratory Hammer

The vertical vibration in the pile disturbs or “liquefies” the soil and causes the soil particles to lose their frictional grip on the pile. The pile moves downward under its own weight, plus the weight of the vibratory hammer. Amplitude of at least one inch is usually required to cause enough soil disturbances to achieve pile driving. Vibratory compaction works well as the soil disturbance due to vibration, causes the soil particles to move into a denser configuration. Large amplitude results in a high soil strain level, a greater influence radius and higher degree of compaction.

- Vibratory Rollers

This type of equipment is designed to consolidate granular soils to a high density, compacting very efficiently to shallow depths. They come in different sizes and different ton capacity. It is anticipated that vibratory rollers will be utilized for the compaction of the 2-foot cover system throughout the majority of the undeveloped portion of the Site.

Continuous field surveying will be performed during the backfilling activities. The surveying activities will ensure that the required backfill cover system thickness is achieved.

For areas which were previously excavated, additional regrading layers (required to meet the required re-grade elevation) will be compacted in 6-inch lifts. Each layer will be compacted to a density equivalent of not less than 100% of an ASTM D 698 Proctor Curve.

Any depression resulting from settlement of a backfilled excavation prior to the date of project completion will be brought to proper grade and surface and made to match the adjacent surface.
6.4.14 Storm-Water Pollution Prevention

Storm water management is an important component of the remedial construction at the Site. All necessary and appropriate actions will be taken to ensure that New York State Storm Water Management Regulations (including physical methods to control and/or divert surface water flows and to limit the potential for erosion and migration of Site soils, via wind or water) are met. All aspects of stormwater management related to the scope of the RAWP will be implemented and regulated according to a Site-specific Storm Water Pollution Prevention Plan (SWPPP). The Site-specific SWPPP is included in Appendix T.

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials. Manufacturer’s recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the RAWP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the remedial construction area.

6.4.15 Contingency Plan

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to NYSDEC Project Manager.
If underground tanks or other previously unidentified contaminant sources are found during on-Site remedial excavation or development related construction, sampling will be performed on product, sediment and surrounding soils, etc. Chemical analytical work will be for full scan parameters (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs). These analyses will not be limited to STARS parameters where tanks are identified without prior approval by NYSDEC. Analyses will not be otherwise limited without NYSDEC approval.

Identification of unknown or unexpected contaminated media identified by screening during invasive Site work will be promptly communicated by phone to NYSDEC’s Project Manager. These findings will be also included in daily and periodic electronic media reports.

6.4.16 Community Air Monitoring Plan (CAMP)

Environmental air monitoring and visual observation will be conducted during implementation of all remedial activities onsite and offsite. The proposed program consists of two primary forms of environmental monitoring: particulates (dust) and VOCs. The purpose of the community air monitoring is to ensure that the ECs designed to protect the community from fugitive releases are functioning properly and, should any such releases occur, ensure immediate notice thereof so that appropriate abatement actions may be implemented.

A CAMP has been prepared for this Site and is included in Appendix U. The CAMP outlines the following information relative to the RAWP:

- details of the perimeter air monitoring program;
- action levels to be used;
- methods for air monitoring; and,
- analytes measured and instrumentation to be used.

Air monitoring locations will be determined daily and will be established based on the prevailing wind direction. During the implementation of the RAWP, action level exceedances observed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers and included in the Daily Report.
6.4.17 Odor, Dust and Nuisance Control

During the implementation of the RAWP field activities, appropriate measures will be implemented to ensure odor, dust and other nuisances created by the remedial activities do not negatively impact the surrounding community.

The Final Engineering Report will include the following certification by the Remedial Engineer: “I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the Remedial Action Work Plan.”

Details of the odor, dust and other nuisance control measures are presented in the CAMP, which is included in Appendix U. A summary of the respective control measures are presented below.

6.4.17.1 Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-Site. All necessary means will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and, (c) use of foams to cover exposed odorous soils.

If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (a) direct load-out of soils to trucks for off-Site disposal; and (b) use of chemical odorants in spray or misting systems.

This odor control plan is capable of controlling emissions of nuisance odors. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC (and NYSDOH if required) will be notified of all odor complaint events. Implementation of all odor controls, including halt of work, will be the responsibility of the Remedial Engineer certifying the Final Engineering Report or a designee.
6.4.17.2 Dust Control Plan

A dust suppression plan that addresses dust management during invasive on-Site work, will include, at a minimum, the items listed below:

- use of a dedicated water spray methodology for roads, excavation areas and stockpiles;
- use of properly anchored tarps to cover stockpiles;
- exercise extra care during dry and high-wind periods; and,
- use of gravel or RCA on egress and other roadways to provide a clean and dust-free road surface.

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. NYSDEC (and NYSDOH if required) will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the Remedial Engineer certifying the FER or a designee.

Noise control will be exercised during the remedial program. All remedial work will conform, at a minimum, to NYC noise control standards. Rodent control will be provided, during Site clearing and grubbing, and during the remedial program, as necessary, to prevent nuisances.

6.4.17.3 Other Nuisances

A plan for rodent control will be developed and utilized by the contractor prior to and during Site clearing and Site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work and will conform, at a minimum, to NYCDEP noise control standards.
7.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

7.1 Track 1 Cleanup

Following the implementation of the RAWP, the objective is to remove all contaminated material exceeding 6 NYCRR Part 375 SCOs for Unrestricted Use. In this situation, no Engineering Controls or Institutional Controls will be required at the Site.

7.2 Track 2 Cleanup

In the event that Site conditions prevent the recovery of all contaminated material, inaccessible residual contamination may remain onsite. The residual contamination is likely to be limited to contaminated soil in the saturated zone below the groundwater table. This contamination is representative of dissolved phase contamination in groundwater. In the event that residual contaminated soil and/or groundwater will exist beneath the Site after the remedy is complete, the Site cleanup will then be modified to a Track 2 cleanup. In this situation, ECs and ICs will be required to protect human health and the environment. These ECs and ICs are described hereafter. Long-term management of EC/ICs and of residual contamination will be executed under a Site specific SMP that will be developed and included in the FER.

ECs will be implemented to protect public health and the environment by appropriately managing residual contamination. The Controlled Property (the Site) will have one EC system. This will consist of an impermeable cap and/or a waterproofing layer/soil vapor barrier installed beneath the lowest level of any Site redevelopment building.

Additionally, ICs will be established for the Site to appropriately manage activities which may disturb residual contamination. The Site will have two (2) primary ICs, an EE and the SMP.

The FER will report residual contamination on the Site in tabular and map form. This will include presentation of exceedances of 6 NYCRR Part 375 SCOs for Unrestricted Use. Additionally, the FER will include the SMP as well as certification of the filing of the EE.
8.0 ENGINEERING CONTROLS

The following sections present the ECs that will be installed at the Site as part of the Remedial Action.

8.1 Engineering Control Systems

8.1.1 Cover System

Exposure to subsurface soils will be prevented by a cover system that will be constructed on the Site. The cover system will be comprised of an impermeable cap or a Liquid Boot waterproofing membrane/soil vapor barrier (or similar compatible with the Site contaminants) that will be installed beneath the concrete building slab at the time of redevelopment. The cover system will be installed throughout the extent of the Site footprint. Manufacturer specifications as well as the installation specifications for the waterproofing membrane/soil vapor barrier (if utilized) are included in Appendix Y.

8.1.2 Waterloo® Hydraulic Barrier

A Waterloo® Hydraulic Barrier (steel sheeting with grouted seams) will be installed surrounding the perimeter of the Site. The hydraulic barrier will be installed to approximately 30 feet in depth.

8.1.3 In-Situ Chemical Oxidation (ISCO) Groundwater Treatment

In the event the Site conditions result in modification of the remedial action to a Track 2, In-Situ Chemical Oxidation (ISCO) will be performed onsite to address the residual saturated soil contamination and dissolved phase VOC contamination. ISCO involves injection of an aggressive chemical oxidant into the subsurface. Based on the dissolved phase contamination at the Site, the proposed chemical oxidant is RegenOx™, an advanced chemical oxidation technology (manufactured by Regenesis from San Clemente, California) that reduces contaminant concentrations through controlled chemical reactions. This product maximizes in-situ performance while using a solid alkaline oxidant that employs a sodium percarbonate complex with a multi-part catalytic formula. RegenOx™ directly oxidizes contaminants while
its catalytic component generates a range of highly oxidizing free radicals that oxidize a range of target contaminants.

A RegenOx application will provide a mechanism to break down contamination in the subsurface. The application process enables the two part (Part A and Part B) product to be combined just prior to use. Part A is the oxidizer powder and Part B is the liquid activator. Part A consists of a mixture of sodium percarbonate \([2\text{Na}_2\text{CO}_3 - 3\text{H}_2\text{O}_2]\), sodium carbonate \([\text{Na}_2\text{CO}_3]\), sodium silicate and silica gel. Part B consists of a mixture of sodium silicate solution, silica gel and ferrous sulfate. Both parts of the product are packaged and shipped to the Site (or designated staging location) in 30 lb., 5-gallon PVC buckets. Once in the subsurface, RegenOx produces a cascade of efficient oxidation reactions via a number of mechanisms including: surface mediated oxidation, direct oxidation and free radical oxidation. These reactions destroy a range of contaminants and can be propagated in the presence of RegenOx for periods of up to 30 days on a single application/injection. RegenOx produces minimal heat and is highly compatible with enhanced bioremediation applications.

Following the completion of the soil excavation activities, subsurface injection pipes will be installed in the locations where residual contamination will be left in place. The injection pipes will consist of lateral well screen installed within permeable gravel. A riser pipe will connect the lateral screen to the surface and will provide remote access to future injections directly to the residual contaminant zone. RegenOx will be applied to the completed excavation area(s) to target the impacted groundwater beneath the source area. The second application method involves using direct-injection techniques into temporary wells. The locations of the injection pipes (if required) will be determined based on the analytical results of the post-excavation confirmation samples.

Volume and density application rates for the pilot test will be based on the manufacturer’s recommendations based on subsurface soil and groundwater contaminant concentrations. All as-built drawings, diagrams, calculation and manufacturer documentation for ISCO treatment will be included in the FER.
8.2 Criteria For Completion

8.2.1 Cover System

The cover system is an engineering control that will be a permanent component of Site redevelopment. There is no monitoring or maintenance associated with the waterproofing membrane/soil vapor barrier.

8.2.2 Waterloo® Hydraulic Barrier

The hydraulic barrier is an engineering control that will be a permanent component of Site. There is no monitoring or maintenance associated with the hydraulic barrier.

8.2.3 In-Situ Chemical Oxidation (ISCO) Groundwater Treatment

Groundwater monitoring activities to assess ISCO treatment effectiveness will continue, as determined by NYSDOH and NYSDEC, until residual groundwater concentrations are found to be below NYSDEC standards or have become asymptotic over an extended period. Monitoring will continue until permission to discontinue is granted in writing by NYSDEC and NYSDOH. Monitoring activities will be outlined in the Monitoring Plan of the SMP.
9.0 INSTITUTIONAL CONTROLS

If post remedial Site conditions leave residual contamination in place exceeding 6 NYCRR Part 375 SCOs for Unrestricted Use, the remedial action will be modification to a Track 2 cleanup. Institutional Controls (ICs) for the residual contamination have been incorporated into the remedy to render the overall Site remedy protective of public health and the environment. Two IC elements are designed to ensure continual and proper management of residual contamination in perpetuity: an EE and a SMP. These elements are described in this Section. A Site-specific EE will be recorded with Kings County to provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. This EE requires that the grantor of the Deed Restriction and the grantor’s successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on this Site and the adjacent Con Edison property by this NYSDEC-approved remedy. ICs provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. The SMP will describe appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the EE. Once the SMP has been approved by the NYSDEC, compliance with the SMP will be required by the grantor of the EE and grantor’s successors and assigns.

9.1 Environmental Easement

An EE is required when residual contamination is left onsite after the Remedial Action is complete. The EE renders the Site a Controlled Property and will provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. Any ICs, ECs, use restrictions and/or any site management requirements applicable to the Site will be contained in the EE, which is created and recorded pursuant to ECL Article 71, Title 36 in compliance with GOL 5-703(1) and ECL 71-3605(2), and recordable pursuant to RPL 291.1-20. The EE will require that the grantor of the EE and the grantor’s successors and assigns adhere to all ECs/ICs placed on this Site by this NYSDEC-
approved remedy. The EE approved by NYSDEC must be recorded with the Kings County Clerk before the Certificate of Completion can be issued by NYSDEC. The EE will be submitted as part of the FER. A copy of the NYSDEC template for the EE that will be used for the Site is included in Appendix Z.

Currently, groundwater analytical results revealed dissolved phase VOC contamination above NYSDEC TOGS 1.1.1 Groundwater Quality Standards in samples collected throughout the Site. Additional groundwater sampling will be conducted pre and post remediation with an evaluation whether there has been a bulk reduction in groundwater contamination to asymptotic levels. Additionally, the Site may have residual contamination exceeding 6 NYCRR Part 375 SCOs for Unrestricted Use after completion of all Remedial Actions (and the remedial action is modified to a Track 2 cleanup), in which case an EE would be required.

If necessary, an EE will be placed on the Site to restrict groundwater use. This is pursuant to the following regulations:

The following provisions apply to a site, or portion thereof, being addressed pursuant to Track 1:

i. the remedial program shall achieve a cleanup level that will allow the site to be used for any purpose without any restrictions on the use of the site as described in subparagraph 375-1.8(g)(1)(i);

ii. the soil component of the remedial program shall achieve the unrestricted soil cleanup objectives as set forth in Table 375-6.8(a) for all soils above bedrock;

iii. the remedial program shall not include the use of long-term institutional or engineering controls; provided, however, that a restriction on groundwater use may be included as a component of the remedial program if the applicant:
   1. is a volunteer; and,
   2. has demonstrated to the Department’s satisfaction that there has been a bulk reduction in groundwater contamination to asymptotic levels.

The proposed development of the BCP Site will utilize a municipal water system for potable use.
ICs provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. A series of ICs are required under this remedy to implement, maintain and monitor these EC systems, prevent future exposure to residual contamination by controlling disturbances of the subsurface soil, and restricting the future use of the Site to commercial or industrial uses only. These ICs are requirements or restrictions placed on the Site that are listed in, and required by, the EE. ICs can, generally, be subdivided between controls that support ECs, and those that place general restrictions on Site usage or other requirements. ICs in both of these groups are closely integrated with the SMP, which provides all of the methods and procedures to be followed to comply with this remedy.

The anticipated ECs that will be supported by the ICs are:

- The watertight perimeter sheeting; and,
- the waterproofing layer/soil vapor barrier and/or composite cover system that will be installed in association with future redevelopment construction; and,
- ISCO which would be performed at the Site to address residual dissolved phase contamination beneath the Site.

Engineering Controls on the Controlled Property must be inspected and certified at a frequency and in a manner defined in the SMP. Data and information pertinent to Site Management for the Controlled Property must be reported at a frequency and in a manner defined in the SMP. Onsite environmental monitoring devices, including but not limited to soil vapor monitoring points must be protected and replaced as necessary to ensure proper functioning in the manner specified in the SMP. ICs and ECs may not be discontinued without an amendment or extinguishment of the EE.

As a note, ICs may be modified, added or deleted from this list as warranted by Site conditions and deemed necessary by NYSDEC. Adherence to these ICs for the Site is mandated by the EE and will be implemented under the SMP (discussed in the Section 9.2, below). The Controlled Property (the Site) will also have a series of ICs in the form of Site restrictions and requirements. The restrictions that apply to the Site are:
• vegetable gardens and farming on the Site are prohibited without NYSDEC authorization;
• use of groundwater underlying the Site is prohibited without treatment rendering it safe for intended purpose;
• all future activities on the Site that will disturb residual contaminated material are prohibited unless they are conducted in accordance with the soil management provisions in the SMP;
• The Site may be used for the currently zoned property use (commercial/industrial) and if rezoned for restricted residential mixed use, provided the long-term Engineering and Institutional Controls included in the SMP are employed;
• the Site may not be used for a higher level of use (e.g., unrestricted use) without an amendment or extinguishment of this EE; and,
• Grantor agrees to submit to NYSDEC a written statement that certifies, under penalty of perjury, that:
  o (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and
  o (2) nothing has occurred that impairs the ability of the controls to protect public health and environment (or that would constitute a violation or failure to comply with the SMP).

NYSDEC retains the right to access the Site at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow. This annual statement must be certified by an expert that the NYSDEC finds acceptable.
9.2 Site Management Plan

Site Management is the last phase of remediation and begins with the approval of the FER and issuance of the COC for the Remedial Action. The SMP is submitted as part of the FER but will be written in a manner that allows its removal and use as a complete and independent document. Site Management continues in perpetuity or until released in writing by NYSDEC. The property owner is responsible to ensure that all Site Management responsibilities defined in the EE and the SMP are performed. Long-term management of EC/ICs and of residual contamination will be executed under a Site-specific SMP that will be developed and included in the FER. The SMP will describe appropriate methods and procedures required to ensure compliance with all ECs and ICs that are required by the EE. Once the SMP has been approved by the NYSDEC, compliance with the SMP will be required by the Grantor of the EE and Grantor’s Successors and Assigns.

The SMP is intended to provide a detailed description of the procedures required to manage residual contamination left in place at the Site and surrounding properties following completion of the Remedial Action in accordance with the BCA with the NYSDEC. This includes: (1) development, implementation, and management of all Engineering and Institutional Controls; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain any treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of any ECs or ICs constituting the remedy.

To address these needs, the SMP will include three plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; and, (3) an O&M Plan for governing requirements for any mechanical or physical components of the remedy. The contents of these components of the SMP are presented in Section 4.5.2, above. The SMP will be prepared in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, and the guidelines provided by NYSDEC.
Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be annually. The Site Management Report will be based on a calendar year and will be due for submission to NYSDEC by April 1 of the year following the reporting period. A Periodic Review Report (PRR) evaluating the ICs/ECs employed as part of a remedy, will be completed and submitted to the NYSDEC annually, unless an alternate certification period is provided in writing by the NYSDEC. The PRR certification shall be included in a report summarizing the site management effort for the certification period, in such form and manner as approved by the NYSDEC, and shall certify that:

1. The inspection of the Site to confirm the effectiveness of the ICs/ECs required by the remedial program was performed under the direction of the Remedial Engineer.

2. The ICs/ECs employed at the Site:
   a. are in-place;
   b. are in the NYSDEC-approved format; and,
   c. that nothing has occurred that would impair the ability of such control to protect the public health and environment.

3. The owner will continue to allow access to the Site to evaluate the continued maintenance of such controls;
   a. nothing has occurred that would constitute a violation or failure to comply with any SMP for such controls;
   b. the report and all attachments were prepared under the direction of, and reviewed by, the Remedial Engineer; and,
   c. to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the Site remedial program, and generally accepted engineering practices; and the information presented is accurate and complete.

4. Only one such certification shall be filed for the Site.
5. In the event that the certification cannot be provided due to a failure of one or more of the ICs/ECs, the NYSDEC will be provided:
   a. a timely notification explaining the cause for such failure;
   b. a work plan to implement the corrective measures necessary in order to be able to provide the certification; and,
   c. a schedule for those corrective measures.

6. In addition to the periodic reporting requirement, the remedial party shall timely notify the NYSDEC of failures of one or more of the ICs/ECs and shall provide a work plan to remedy the failure of the ICs/ECs. The work plan will be reviewed by the NYSDEC and the corrective measures shall be implemented in accordance with the approved work plan. A certification shall be submitted upon completion of the corrective measures.

The SMP will be submitted as part of the FER but will be written in a manner that allows its removal and use as a complete and independent document. Site management continues in perpetuity or until released in writing by NYSDEC. The property owner is responsible to ensure that all Site Management responsibilities defined in the EE and the SMP are performed.

If, following the implementation of the RAWP, the status of the Site is changed to a non-significant threat, the institutional and engineering control certification shall:

1. certify that no new information has come to the owner's attention, including groundwater monitoring data from wells located onsite and at the Site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of offsite contamination are no longer valid;

2. every five years the remedial party or owner shall certify that the assumptions made in the qualitative exposure assessment remain valid; and,

3. the requirement to provide such certifications may be terminated as set forth in ECL 27-1415(7)(c).
10.0 FINAL ENGINEERING REPORT

A FER and SMP (if required) will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP. The FER will provide the documentation that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the Site and surrounding properties including the surveyed map(s) of all sources. The FMR will include as-built drawings for all constructed elements, certifications, manifests, bills of lading as well as the complete SMP (formerly the Operation and Maintenance Plan). The FER will provide a description of the changes in the Remedial Action from the elements provided in the RAWP and associated design documents. The FER will provide a tabular summary of all performance evaluation sampling results and all material characterization results and other sampling and chemical analysis performed as part of the Remedial Action. The FER will provide test results demonstrating that all mitigation and remedial systems are functioning properly. The FER will be prepared in conformance with DER-10.

Where determined to be necessary by NYSDEC, a Financial Assurance Plan will be required to ensure the sufficiency of revenue to perform long-term operations, maintenance and monitoring tasks defined in the SMP and EE. This determination will be made by NYSDEC in the context of the FER review.

The FER will include written and photographic documentation of all remedial work performed under this remedy. The FER will include an itemized tabular description of actual costs incurred during all aspects of the Remedial Action.

If the remediation is completed as a Track 2 cleanup, the FER will provide a thorough summary of all residual contamination left on the Site after the remedy is complete. Residual contamination includes all contamination that exceeds 6 NYCRR Part 375 SCOs for Unrestricted Use. The FER will also provide an explanation for why the material was not removed as part of the Remedial Action. A table and a map that shows the location and summarizes exceedances from 6 NYCRR Part 375 SCOs for Unrestricted Use for all soil/fill remaining at the Site after the Remedial Action will be included in the FER.
The FER will include an accounting of the destination of all material removed from the Site, including excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. It will provide an accounting of the origin and chemical quality of all material imported onto the Site.

Before approval of a FER and issuance of a Certificate of Completion, all project reports must be submitted in digital form on electronic media (portable document format [PDF]).

Subsequent to the issuance of a Certificate of Completion, the Volunteer shall be entitled to the liability limitation protections set forth at ECL 27-1421, subject to the terms and conditions stated therein.

The Certificate of Completion entitles the applicant to file for Brownfield tax credits under Articles 21, 22 and 23 of the tax law. Only those costs incurred on or after the effective date of the Brownfield site cleanup agreement are eligible for consideration for credits.

10.1 Certifications

The following certification will appear in front of the Executive Summary of the FER. The certification will be signed by the Remedial Engineer (William Beckman) who is a Professional Engineer registered in New York State. This certification will be appropriately signed and stamped. The certification will include the following statements:

I, William Beckman, am currently a registered professional engineer licensed by the State of New York. Working on behalf of Kent Riverview LLC (KR), I have primary direct responsibility for oversight of the implementation of the remedial program for the Fyn Paint & Lacquer Co., Inc. site (the “Site”) listed in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) as Site No. C224154 and Index No. C224154-02-15.

I certify that the Site description presented in this Final Engineering Report (FER) is identical to the Site descriptions presented in the EE, the SMP, and the Brownfield Cleanup Agreement for the Fyn Paint & Lacquer Co., Inc. site and related amendments.
I certify that the Remedial Action Work Plan dated [month day year] and Stipulations [if any] in a letter dated [month day year] and approved by the New York State Department of Environmental Conservation were implemented and that all requirements in those documents have been substantively complied with.

I certify that the remedial activities were observed by qualified environmental professionals under my supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved.

I certify that all use restrictions, institutional controls, engineering controls, and all operation and maintenance requirements applicable to the Site are contained in an EE created and recorded pursuant to ECL 71-3605 and that all affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded. A SMP has been submitted by the Applicant for the continual and proper operation, maintenance, and monitoring of all engineering controls employed at the Site, including the proper maintenance of all remaining monitoring wells, and that such plan has been approved by the New York State Department of Environmental Conservation.

I certify that the export of all contaminated soil, fill, water or other material from the property was performed in accordance with the Remedial Action Work Plan, and were taken to facilities licensed to accept this material in full compliance with all Federal, State and local laws.

I certify that all import of soils from offsite, including source approval and sampling, has been performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan.

I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology and soil screening methodology defined in the Remedial Action Work Plan.

I certify that all information and statements in this certification are true. I understand that a false statement made herein is punishable as a Class “A” misdemeanor, pursuant to Section 210.45 of the Penal Law.
It is a violation of Article 130 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 130, New York State Education Law.”
11.0 SCHEDULE

A schedule of Remedial Actions is included below. It subdivides work elements and provides estimated dates for performance of work and deliverables.

The Volunteer will implement the Remedial Action activities following NYSDEC approval of the final RAWP. The schedule will follow the general outline below:

- Resume OM&M of Extraction/Treatment System as per Remedial Design (RD) .......................... Currently Operational

- Building Demolition and Offsite Waste Disposal ....... 90-120 days after NYSDEC approval of RAWP and Issuance of Decision Document (After NYCDOB Permit is Issued)

- Supported Excavation Watertight Sheeting Install..... Following completion of building demolition activities (duration of ~ 2 weeks)

- Site Soil Excavation and Offsite Waste Disposal ...... Approximately 180 days after NYSDEC approval of RAWP (duration of ~ 6-8 weeks)

- IRM DPE System Relocation Activities................ Following completion of soil excavation activities which require construction dewatering

- Preparation of FER and SMP ......................... 60 days after completion of RAWP implementation

- Post-remedy Site redevelopment and post-remedy Soil Vapor Monitoring ................. Not Required under Track 1

- COC Issuance by NYSDEC .......................... Following NYSDEC approval of FER/SMP

- Periodic Certification (outlined in SMP) .......... Not Required under Track 1

March 23, 2016