

RECORD OF DECISION

***LOWER DARBY CREEK AREA SUPERFUND SITE
OPERABLE UNIT 1 – CLEARVIEW LANDFILL SOILS
& WASTE***

***PHILADELPHIA AND DARBY TOWNSHIP, PHILADELPHIA AND
DELAWARE COUNTIES PENNSYLVANIA***



***U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 3, PHILADELPHIA, PENNSYLVANIA***

September 2014

[This page left intentionally blank]

TABLE OF CONTENTS

I. DECLARATION.....	ix
II. DECISION SUMMARY.....	xiv
1.0 SITE NAME, LOCATION AND DESCRIPTION.....	1
2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES.....	1
3.0 COMMUNITY PARTICIPATION.....	6
4.0 SCOPE AND ROLE OF RESPONSE ACTION.....	7
5.0 SITE CHARACTERISTICS.....	8
5.1 SURFACE FEATURES, SOIL AND GEOLOGY, HYDROGEOLOGY, SURFACE HYDROLOGY, ECOLOGY AND SENSITIVE ENVIRONMENTS.....	8
5.1.1 <i>Surface Features and Resources</i>	8
5.1.2 <i>Soils and Geology</i>	9
5.1.3 <i>Hydrogeology and Surface Hydrology</i>	10
5.1.4 <i>Ecology and Sensitive Environments</i>	11
5.2 NATURE AND EXTENT OF CONTAMINATION.....	13
5.2.1 <i>Landfill Stratigraphy and Waste</i>	14
5.2.2 <i>Landfill and Soil Gas</i>	15
5.2.3 <i>Surface and Subsurface Soils</i>	17
5.2.4 <i>Stormwater Runoff</i>	21
5.2.5 <i>Groundwater</i>	21
5.2.6 <i>Sediment and Surface Water</i>	23
5.3 CONCEPTUAL SITE MODEL.....	25
5.4 PRINCIPAL THREAT WASTE.....	26
6.0 CURRENT AND POTENTIAL FUTURE LAND USES.....	27
7.0 SUMMARY OF SITE RISKS.....	27
7.1 SUMMARY OF HUMAN HEALTH RISK ASSESSMENT.....	27
7.1.1 <i>Contaminants of Concern</i>	28
7.1.2 <i>Exposure Assessment</i>	28
7.1.3 <i>Toxicity Assessment</i>	30
7.1.4 <i>Risk Characterization</i>	31
7.1.5 <i>Uncertainties in Risk Characterization</i>	41
7.2 SUMMARY OF ECOLOGICAL RISK ASSESSMENT.....	43
8.0 REMEDIAL ACTION OBJECTIVES.....	48
8.1 CLEANUP LEVELS.....	48
9.0 SUMMARY OF REMEDIAL ALTERNATIVES.....	51
9.1 REMEDIAL ALTERNATIVES COMMON ELEMENTS.....	52
9.2 REMEDIAL ALTERNATIVES.....	57
10.0 EVALUATION OF ALTERNATIVES.....	67
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT (THRESHOLD CRITERIA).....	68

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) (THRESHOLD CRITERIA).....	69
LONG-TERM EFFECTIVENESS AND PERMANENCE (PRIMARY BALANCING CRITERIA).....	71
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT (PRIMARY BALANCING CRITERIA).....	72
SHORT-TERM EFFECTIVENESS (PRIMARY BALANCING CRITERIA).....	72
IMPLEMENTABILITY (PRIMARY BALANCING CRITERIA).....	73
COSTS (PRIMARY BALANCING CRITERIA).....	74
STATE/SUPPORT AGENCY ACCEPTANCE (MODIFYING CRITERIA).....	74
COMMUNITY ACCEPTANCE (MODIFYING CRITERIA).....	74
11.0 SELECTED REMEDY	75
11.1 SUMMARY OF THE RATIONALE FOR THE SELECTED REMEDY	75
11.2 DESCRIPTION OF THE SELECTED REMEDY AND PERFORMANCE STANDARDS.....	75
11.2.1 <i>Conduct Pre-Design Investigation</i>	76
11.2.2 <i>Installation, Maintenance and Monitoring of an Evapotranspiration Cover System for Landfill Wastes and Contaminated Soils</i>	78
11.2.3 <i>Excavation and Off-Site Disposal of PCB Principal Threat Wastes</i>	81
11.2.4 <i>Excavation and Consolidation of Wastes and Contaminated Soils above Cleanup Levels beneath the ET Cover System</i>	81
11.2.5 <i>Construction of Leachate Collection Trench and Engineered Treatment Wetlands</i>	82
11.2.6 <i>Long-term Monitoring and Maintenance to Evaluate Remedy Performance and Effectiveness</i>	83
11.2.7 <i>Land Use Restrictions, Groundwater Use Restrictions and Fishing Advisories for the Site and Surrounding Area</i>	84
11.3 SUMMARY OF THE ESTIMATED REMEDY COSTS	85
11.4 EXPECTED OUTCOMES OF THE SELECTED REMEDY	85
12.0 STATUTORY DETERMINATIONS	86
12.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT.....	87
12.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS	87
12.3 COST EFFECTIVENESS.....	87
12.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE	87
12.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT.....	87
12.6 FIVE-YEAR REVIEW REQUIREMENTS.....	88
13.0 DOCUMENTATION OF SIGNIFICANT CHANGES.....	88
III. RESPONSIVENESS SUMMARY	90

11.0 SELECTED REMEDY

Following review and consideration of the information in the Administrative Record, the requirements of CERCLA and the NCP, and public comments, EPA has selected the following as the remedy for the Lower Darby Creek Area Superfund Site – OU1 Clearview Landfill Soils and Waste: Alternative 7, Evapotranspiration (ET) Cover to address Landfill waste, contaminated soils and shallow leachate.

11.1 Summary of the Rationale for the Selected Remedy

EPA's selected remedy meets the threshold criteria of overall protection of human health and the environment and compliance with ARARs. Based on the information currently available, EPA (the lead agency) has determined that Alternative 7 provides the best balance of advantages and disadvantages among the alternatives, when evaluating them using the balancing criteria.

EPA's selected remedy for the Landfill:

1. Will be protective of human health and the environment;
2. Will meet federal and state ARARs with the exception of 40 C.F.R. § 258.60(a) which is being waived under the "Equivalent Standard of Performance" waiver established under CERCLA § 121(d)(4)(D), 42 U.S.C. § 9621(d)(4)(D);
3. Will be readily implementable in a shorter amount of time and provides long-term effectiveness, yet will require less maintenance;
4. Will be more cost effective while providing the same level of protectiveness as the other alternatives
5. Will address known principal threat wastes at the Site; and,
6. Prevents human and ecological exposure to Site contaminants above cleanup levels, reduces the generation and migration of contaminants, and achieves all RAOs.

Overall, EPA's selected remedy satisfies the statutory requirements of CERCLA §121 and the NCP by being protective of human health and the environment; complying with ARARs except as has been noted; being cost-effective; utilizing permanent solutions and alternative treatment technologies to the maximum extent practicable; and addressing principal threat waste. The selected remedy represents the best balance of the nine evaluation criteria.

11.2 Description of the Selected Remedy and Performance Standards

Based on the comparison of the nine criteria, EPA's selected remedy for the Landfill is Alternative 7. The total present worth cost for the EPA's selected remedy is \$23,955,276. In addition to the common elements described in **Section 9.1**, the major components of the selected remedy (as discussed in detail in **Section 9.2**) are:

1. Pre-design investigation (PDI) activities to delineate waste and contaminated soil boundaries.
2. Installation, maintenance and monitoring of an evapotranspiration (ET) Cover System over approximately 50 acres, including relocation of on-site business and demolition of all structures within the ET Cover boundary, Site grading, storm water controls and erosion controls along the east bank of Darby and Cobbs Creeks.
3. Removal and off-site disposal of PCB principal threat wastes.
4. Excavation and consolidation of wastes and contaminated soils above cleanup levels within and beneath the ET Cover.
5. Construction and maintenance of a leachate collection trench along the Landfill creek banks down to the mean high tide elevation of the creeks and construction, maintenance, and monitoring of engineered wetlands to treat contaminants to surface water discharge requirements.
6. Long-term monitoring of groundwater, leachate, landfill gas, surface water and sediment, to evaluate remedy performance and effectiveness.
7. Land and groundwater use restrictions to be implemented and maintained through institutional controls (ICs) and engineering controls to protect the integrity of the selected remedy including the ET Cover, leachate collection trench, engineered wetlands, and prevent exposure to soils outside of the ET Cover above cleanup levels. Additional fishing advisories may also be required. Signs will be placed along the stream bank to warn fisherman of all fishing advisories and the potential risks from fish consumption. An Institutional Control Implementation and Assurance Plan (ICIAP) will be developed for OUI during the remedial design (RD) to ensure appropriate land and groundwater use restrictions are implemented, and monitored and maintained against future land owners.

The selected remedy shall meet all applicable or relevant and appropriate requirements as set forth in **Table 41**.

11.2.1 Conduct Pre-Design Investigation

Perform pre-design investigation (PDI) to refine landfill waste boundaries, determine extent of soil contamination above cleanup levels and evaluate background levels of PAHs.

Performance Standards for PDI

1. As discussed under Element #1 of Section 9.1, an investigation shall be conducted prior to or during the initial stages of the RD to address the following six factors:

- a. Geotechnical studies will be performed to evaluate long-term evapotranspiration (ET) Cover stability, minimize long-term grade deterioration, and estimate Landfill settlement rates after construction.
- b. Install additional borings and collect additional sample data as necessary in the approximate 11 acre area outside the ET Cover perimeter in the eastern portion of the Eastwick City Park and western edge of Eastwick Neighborhood (as identified by the area outlined in a yellow dashed-line in **Figure 20**) to confirm 1) only construction and demolition debris are present in the subsurface soils and 2) no exceedances of cleanup levels in soils that are outside of excavation areas or ET Cover perimeter, as well as to 3) evaluate thickness of clean surface soil in areas with construction and demolition debris present in subsurface. Relevant and appropriate portions of 25 PA Code 277.233(a)(3) regarding final cover requirements of construction/demolition waste landfills will be met.
- c. Collect surface and subsurface soil samples to determine horizontal and vertical extent of soil cleanup level exceedances in areas outside of the ET Cover perimeter and engineered treatment wetlands. **Figures 20, 22 – 24** and **Tables 38 and 39** identify those locations with one or more exceedances of cleanup levels. The soil sampling plan should take into account potential future uses of sampled areas. Multi-increment sampling (MIS) should be utilized where appropriate.
- d. Collect surface and subsurface soil samples to evaluate regional anthropogenic background levels of PAHs in soils not impacted by the Landfill. It is likely that some, if not all, of the PAHs concentrations in the Eastwick Neighborhood samples are potentially related to the surrounding urban environment. Based on results of background study, reevaluate and refine PAH cleanup levels in soils as appropriate. MIS should be utilized where appropriate.
- e. Collect surface and subsurface soil samples in Eastwick City Park to evaluate concentrations of dioxins in soils outside of the planned ET Cover perimeter. Background sampling for dioxins should also be conducted. Soil sampling plan should take into account potential future uses of sampled areas. MIS should be utilized where appropriate. Potential human and ecological risks from dioxins should be evaluated pursuant to EPA risk assessment guidance. If sample results indicate potential unacceptable risks, the dioxin evaluation should be expanded until areas with acceptable dioxin risks around the landfill or a non-site-related source is identified. EPA will evaluate potential risks to determine what appropriate response actions for dioxins in OUI soils, if any, are necessary pursuant to CERCLA and the NCP. This would include documentation of any new or changes to cleanup levels in a of decision document issued by EPA.
- f. Conduct an additional archaeological evaluation to determine the potential presence of cultural resources within the Areas of Potential Effect (APE) in any portions to be disturbed by the selected remedy. The evaluation shall be conducted in accordance with the applicable portions of the National Historic Preservation Act, 18 C.F.R. §380.14

11.2.2 Installation, Maintenance and Monitoring of an Evapotranspiration Cover System for Landfill Wastes and Contaminated Soils

Prevent human and ecological exposure to contaminated soils and landfill materials that pose an unacceptable risk, reduce infiltration of precipitation into Landfill waste materials and reduce the subsequent quantity of leachate that is generated by constructing an evaporation (ET) cover. This work shall include relocation of on-site business and demolition of all structures within the cover system boundary, Site grading, storm water controls, erosion controls along the east bank of Darby Creek and revegetation of the new ET cover.

Performance Standards for Evapotranspiration Cover System for Landfill Wastes and Contaminated Soils

1. Remedial design (RD) of the ET Cover shall include determination of how much water must be stored by the ET Cover based on meteorological conditions at the Landfill, how much water can be stored in the proposed cover profile, water balance simulations of the designed cover system using appropriate computer models, and goals, objectives, success criteria and monitoring parameters for ET Cover revegetation and performance.
2. As part of the RD, the environmental footprint of the remedy shall be evaluated following the EPA *Methodology for Understanding and Reducing a Project's Environmental Footprint*, EPA 542-R-12-002. The environmental footprint includes metrics such as, but not limited to, energy use and water use as well as air emissions to fully represent the effects a cleanup project may have on the environment. This footprint evaluation shall be applied to the design, construction, long-term monitoring, and operation and maintenance phases of the remedy. Based on the findings of the footprint analysis, effective steps should be taken to reduce the remedy footprint, while still meeting the regulatory requirements established in this Record of Decision (ROD).
3. The ET Cover will prevent human and animal exposure to contaminated soils and landfill materials, and reduce infiltration of precipitation into waste materials. The ET Cover shall include soil and vegetation of quantity and quality to be determined during the RD. The ET Cover may extend over areas with no waste but with contaminated soil above cleanup levels at depths which make excavation impracticable, e.g., below the water table. The ET Cover meets, and in one instance waives, the applicable or relevant and appropriate requirements for landfill closure. Applicable requirements include 40 C.F.R. § 258.60(a). 40 C.F.R. § 258.60(a)(1) requires that a final cover for a MSW landfill have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1.0×10^{-5} cm/sec, whichever is less. This requirement is being waived using the "Equivalent Standard of Performance" under CERCLA § 121(d)(4)(D), 42 U.S.C. § 9621(d)(4)(D). As discussed under the **Evaluation of Alternatives** section, a conventional landfill cover built to attain a 1×10^{-5} cm/sec permeability should result in a percolation rate through the cover system that is no greater than 1×10^{-5} cm/sec, which equates to 9,237 gallons/day/acre (461,837 gallons/day over 50 acres). The ET Cover shall provide an Equivalent Standard of Performance to achieve the relevant and appropriate requirement in 40 C.F.R. § 258.60(a)(1) by ensuring the drainage

rate from the bottom of the ET Cover is no greater than the above value. The ET Cover is expected to achieve this performance standard incrementally over time and that progress shall be evaluated during the first five-year review for which five years of monitoring data is available after the remedy is determined to be Operational and Functional. Performance data for the ET cover with respect to drainage and other factors shall be collected on a daily basis. These data will be used to evaluate the ET cover's performance on, at minimum, an annual basis. An annual average drainage rate from the bottom of the ET cover shall be calculated each year and used to evaluate the ET Cover's ability to attain the 9,237 gallons/acre/day percolation rate. Collection and evaluation of the ET cover performance monitoring data shall continue until sufficient data are available such that EPA can determine that the ET cover is providing an equivalent standard of performance as required by the ROD. The effectiveness of the ET Cover will continue to increase over time as the vegetation grows and becomes more established.

4. Any businesses still operating on the landfill within the boundaries of the ET Cover at the commencement of the remedial action shall be permanently relocated and the structures used by them vacated and demolished as they physically block and will interfere with the selected remedy. Relocation of businesses/tenants will be performed pursuant to the Uniform Relocation Act, 42 U.S. Code §§ 4601 et seq., and regulations promulgated pursuant thereto at 49 C.F.R Part 24.
5. To the extent practicable, all vegetation used for the ET Cover shall be native species to promote transpiration and minimize erosion by stabilizing the surface of the cover.
6. Proposed design for the ET Cover final elevation and elevations of other remedial components shall be evaluated for potential flooding impacts to the 100-year floodplain. Potential impacts from potential sea level rise over the lifetime of the remedy shall be taken into consideration as part of the RD. The final ET Cover shall not significantly increase the 100-year flood height or stream velocity as is required by 25 PA Code § 106.31(a)(1). Additional relevant and appropriate requirements in 25 PA Code § 106.31-.32 shall be met by the final ET Cover. Applicable portions of Executive Order 11988, Federal Floodplains Requirements, shall be met. As needed, the applicable process for a Conditional Letter of Map Revision per 44 C.F.R. § 65.8 shall be followed.
7. Vegetation will be removed as needed within the ET Cover boundary. Some existing trees may be suitable for incorporation into the ET Cover. Erosion and sediment controls will be in place throughout the construction phase to prevent silt, soil and contaminant movement into adjacent water bodies or the Eastwick Neighborhood.
8. After all contaminated soils and Landfill wastes have been consolidated at the Landfill or shipped off-site, and the structures and debris at the SIA are removed, grading will be required prior to placing the cover system to ensure adequate and stable slopes. Grading will allow for maximum slopes of 33%. The slopes will be terraced as needed for erosion control and successful vegetation. The applicable portions of the Pennsylvania Air Quality Standards, 25 PA Code § 123.31 and the Pennsylvania Erosion Control Regulations, 25 PA Code § 102.4, .11 and .22 shall be met during grading of the Site and construction of all remedy components.

9. Stormwater management controls and surface drainage features, such as swales and/or bioswales generally encircling the Landfill cover system to convey stormwater via gravity to stormwater outfalls near the Site, will be incorporated into the design. Consideration of other stormwater best management practices (BMPs), e.g., rain gardens, may also be considered during the design. The stormwater controls shall meet the applicable requirements of the Pennsylvania Water Quality Standards 25 PA Code, Chapter 93 and the applicable requirements of 40 C.F.R. § 122.26 and 40 C.F.R. § 122.44(h)(i)(4).
10. Portions of the creek banks along Darby and Cobbs Creeks impacted by the ET cover and/or other components of the remedy will be permanently stabilized to help ensure the remedy's integrity. Stabilization products and materials that allow for full slope vegetation of native species shall be used to the extent practicable. Periodic monitoring for damage or degradation of these banks shall be included in the long-term monitoring program.
11. Landfill gas monitoring shall be conducted during construction and as part of long-term monitoring to ensure the concentration of methane gas generated does not exceed 25% of the lower explosive limit (LEL) for methane in any structures on the landfill and that the concentration of methane gas does not exceed the LEL for methane at the landfill cover boundary. Perimeter gas monitoring wells to monitor landfill gas will be installed. If necessary, gas vents or wells will be installed to mitigate methane gas that may exceed the requirements above. The landfill gas levels shall meet the relevant and appropriate requirements of 40 C.F.R. § 258.23(a), Explosive Gases Control.
12. Engineering controls, including fencing, shall be incorporated into the design and construction of the remedy to prevent unauthorized access and protect the integrity of the remedy. Contiguous fencing around the landfill cover and engineered treatment wetlands will be necessary for several years after construction is complete until the vegetation is well established. Once vegetation is well established, modifications to fencing or other access controls to allow for uses compatible with the remedy may be considered and implemented, as appropriate. During and after construction, signs will be placed along the stream bank to warn fisherman of all fishing advisories and the potential risks from fish consumption.
13. Long-term monitoring to evaluate the ET Cover's drainage rate and attainment of Performance Standard #3 shall be conducted. Direct performance monitoring of the cover is required. Pan lysimeters or an equivalent shall be installed on the top deck, side slopes and in other variations within the cover design. At least one nest of sensors to collect interpretive data shall be installed within each lysimeter. These sensors will include, but not be limited to water content and temperature. Number and placement depths for the sensors will depend on the final cover design. Sensors may also be placed at other locations in the cover to assess the variation in hydrologic conditions due to microclimates. An evaluation of spatial variability in flux using flux meters should also be conducted. Long-term monitoring of vegetation will also be conducted. Vegetation surveys will evaluate the relative distribution of plant species on the cover as well as the percent coverage to ensure that a diverse and desirable plant community has been established and that succession toward a complex plant community is occurring. Such surveys will be conducted annually for the initial 5 years after cover installation is complete. The frequency of the surveys thereafter may be adjusted, depending on observations and trends.

14. The following additional applicable requirements shall be met during construction:
Fugitive Particulate Matter, 25 PA Code Chapters 123.1 and 123.2; Ambient Air Quality Standards for Particulate Matter, 25 PA Code Chapters 131.2 and 131.3;

11.2.3 Excavation and Off-Site Disposal of PCB Principal Threat Wastes

Excavate known PCB principal threat wastes in the SIA and ship off-site for treatment (if practicable) and disposal.

Performance Standards for Excavation and Off-Site Disposal of PCB Principal Threat Wastes

1. Develop and submit a plan to EPA Region III, Land and Chemicals Division, Office of Toxics and Pesticides, which documents the basis for using a risk-based approach as described in this ROD to address PCB principal threat wastes and other criteria required by 40 C.F.R. § 761.61(c). The plan shall provide justification for the approach's equivalency with 40 C.F.R. § 761.61(a) and will demonstrate that there is no greater risk posed by this approach when compared to the requirements in 40 C.F.R. § 761.61(a) or (b).
2. Characterize the wastes with PCBs above 100 mg/kg around GPR -11 (**Figure 2**) as required by the selected off-site treatment/disposal facility to determine if treatment of PCBs is practicable.
3. PCBs above 100 mg/kg associated with GPR-11 will be excavated and sent off-site for treatment (if practicable) and/or disposal. Should other areas be identified with levels above 100 mg/kg in the SIA, those PCBs will also be handled in the same manner as GPR-11 soils.

11.2.4 Excavation and Consolidation of Wastes and Contaminated Soils above Cleanup Levels beneath the ET Cover System

Prevent human and ecological receptor exposure to contaminated soils and Landfill materials that pose an unacceptable risk. Based on the results of the PDI, excavate soils outside of the ET Cover perimeter that are above soil cleanup levels in the City Park or Eastwick neighborhood and place under the ET Cover. Soils below asphalt or other hardened surfaces with solely exceedances of PAHs will be left in place and addressed with ICs.

Performance Standards for Excavation and Consolidation of Wastes and Contaminated Soils above Cleanup Levels beneath the ET Cover System

1. Perform excavation of approximately 2.3 acres of soils above cleanup levels established in **Table C**. Ecological cleanup levels apply only to the top two feet of soil. Human cleanup levels apply to all soils. **Figures 20, 22 – 24** and **Tables 38 and 39** list the known sample locations with one or more exceedances of soil cleanup levels.
2. Initial excavations will be to a depth of at least six inches. Exposed soils will be iteratively sampled to evaluate attainment of cleanup levels. Confirmatory samples shall be collected from excavation floor and sidewalls. After completion of excavation activities, a minimum

of 12 inches of clean fill will be used to restore the surface to the appropriate grade and elevation. Factors that will be taken into consideration regarding proper grade and elevation of the excavated areas include, but are not limited to: final design conditions of the ET cover, long-term stability, planned future use(s) of the areas being excavated and potential impacts to flooding within the 100-year flood plain at the Site, upstream and downstream.

3. Excavations shall be conducted until cleanup levels are achieved or excavation is no longer practicable. If excavation of soils is not practicable, the ET Cover will be extended over the area and/or ICs will be put in place to prevent future unacceptable risks. These determinations will be made during the RD and will rely on the findings from the RI and PDI.
4. Eight of the nine soil cleanup level exceedances in Zone 3 (Eastwick Neighborhood) are covered by asphalt. GP108 was the lone location in a grassy area. Pending findings from the PDI and background evaluation, ICs will be put in place in the asphalt covered areas if PAH levels are determined to be above background. Non-PAH and PAH exceedances of soil cleanup levels in non-asphalt areas will be addressed by excavation.
5. GP108 (**Figures 20 and 23**) is considered to be outside of the contiguous “area of contamination” (AOC) for the Landfill. Excavated soil will be tested to determine if it is a RCRA characteristic hazardous waste pursuant to the applicable requirements in 25 PA Code Chapter 261a.1 which incorporates 40 C.F.R.§ 261.20-24 by reference. Unless determined to be hazardous waste, the soils in the vicinity of GP108 will be excavated and consolidated under the ET Cover. Should the contaminated soils in the vicinity of GP108 demonstrate a characteristic(s) of hazardous waste upon testing, the applicable portions of the Resource Conservation and Recovery Act (RCRA) Land Disposal Restriction (LDR), 40 C.F.R. Part 268 requirements will be followed.

11.2.5 Construction of Leachate Collection Trench and Engineered Treatment Wetlands

Minimize and control seasonal leachate seeps that migrate into adjacent surface water bodies. Reduce risks to aquatic ecological receptors via preventing the discharge of Landfill-related contaminants to surface waters and sediments in Darby and Cobbs Creeks. Construct a leachate collection trench along the creek banks down to the mean high tide elevation of the creeks from which collected leachate will be conveyed to an engineered wetland for treatment of contaminants. Construct and monitor engineered wetlands to treat contaminants to meet surface water discharge requirements.

Performance Standards for Leachate Collection Trench and Engineered Treatment Wetlands

1. Construct a trench along the Landfill’s western perimeter adjacent to Darby and Cobbs Creek banks. The trench will be excavated down to the mean high tide elevation of the creeks. The trench is intended to collect a portion of landfill leachate. Leachate collected in the trench will be conveyed to engineered treatment wetlands prior to discharging to creek surface water.

2. Design and construct engineered subsurface flow (SSF) treatment wetlands with the ability to treat and/or remove solid and dissolved contaminants in leachate conveyed from the trench to achieve National Pollutant Discharge Elimination System (NPDES) permit equivalent discharge standards. Quantity and quality of leachate to be treated, location, discharge standards, monitoring criteria and frequency, and other parameters shall be determined during RD. Characteristics of local natural wetlands should be used as model for the constructed wetland.
3. NPDES discharge requirements for the engineered treatment wetlands shall be determined during the RD in accordance with the applicable portions of the Pennsylvania Water Quality Standards regulation, 25 PA Code Chapter 93.1-.4, 93.6-.7, 93.8a-.8dc, and 93.9 and 93.9g and the Clean Water Act NPDES Requirements, 40 C.F.R. § 122.1-.2, 122.4-.5, 122.21, 122.26, 122.29, 122.41, 122.43-.45, 122.47-.49, and 122.61-.64.
4. A synthetic liner will be used to seal the bottom of the SSF treatment wetlands to avoid possible contamination of groundwater and also to prevent groundwater from infiltrating into the wetland. Some portions of the SSF treatment wetlands may be constructed on top of contaminated soils and waste, and can serve as the cover system for those areas.
5. SSF wetlands will be constructed to minimize the attraction of large birds, using e.g., minimal open water area, dense vegetation, goose wire, etc.
6. Sediment and surface water from the engineered SSF treatment wetland will be monitored to ensure that unacceptable risk is not posed to ecological receptors. If unacceptable risks are identified, the SSF wetland shall be maintained as appropriate to address those risks.

11.2.6 Long-term Monitoring and Maintenance to Evaluate Remedy Performance and Effectiveness

Collect sampling data from groundwater, collected leachate, landfill gas, surface water, engineered treatment wetlands, and sediment from within or in the vicinity of the Landfill to determine the effectiveness of the remedy with regard to containment of contamination from the Landfill waste, soils and leachate. Conduct regular inspections of all remedy components and perform all necessary maintenance. Develop a long-term monitoring plan and operation and maintenance plan for the selected remedy.

If EPA conducts the remedy, criteria for determining that the remedy is Operational and Functional, including the ET Cover, will be established during the Remedial Design and included Superfund State Contract.

Performance Standards for Long-term Monitoring to Evaluate Remedy Performance and Effectiveness

1. Collect and analyze samples from groundwater, collected leachate, landfill gas, surface water, engineered treatment wetlands, and creek sediment at multiple locations. The specific locations and frequency of sampling shall be as determined in the Long-Term

Monitoring Plan (LTMP), which will be updated as necessary. Effluent samples will also be used to evaluate the effectiveness of the engineered treatment wetlands. The LTMP shall include monitoring requirements for any portions of the Site impacted by large flood events to evaluate the potential for recontamination of surface soils by contaminants in flood waters. Although approximately 33% of the Landfill is permanently saturated below the water table, positive effects from minimizing the amount of precipitation reaching the waste should be realized. Groundwater contamination and risks are being addressed under OU3 and data collected from OU1 will be used to supplement the OU3 investigation.

2. Develop and implement an O&M Plan (OMP) detailing activities for operating, inspecting and maintaining all components of the remedy. These activities should include regular inspections and maintenance on an as-needed basis (e.g., revegetation, erosion repair, sediment removal, etc.). For engineered wetlands, long-term O&M may be needed to sustain the wetland plants. Engineered wetland O&M activities may include planting additional wetland species, adding limestone as a buffer material, removing sediments to maintain grades, monitoring treatment concentrations, and accounting for seasonal variations in system performance and maintenance.
3. Update the LTMP and OMP every five years, coinciding with EPA's five year review, unless EPA develops an alternate schedule.

11.2.7 Land Use Restrictions, Groundwater Use Restrictions and Fishing Advisories for the Site and Surrounding Area

An Institutional Control Implementation and Assurance Plan (ICIAP) shall be developed during the RD to address land and groundwater use restrictions, for OU1. The requirements for such use restrictions contained in this ROD are based on current, reasonably anticipated uses of the Site and areas in the vicinity of the Site. The purpose of the restrictions shall be to prevent exposure to unacceptable risks associated with remaining Landfill-related contaminants and to protect the components of the selected remedy. The restrictions will be implemented through ICs which may include property use controls (such as easements and restrictive covenants) and governmental controls (such as zoning ordinances and local permits). The ICIAP shall identify parties responsible (i.e., federal, State or local authorities or private entities) for implementation, enforcement, and monitoring and long-term assurance of each IC including costs, both short-term and long-term, and methods to fund the costs and responsibilities for each step. The ICIAP shall include maps, which shall describe coordinates of the restricted areas depicting all areas that do not allow unlimited use/unrestricted exposure and areas where ICs have been implemented along with a schedule for implementation of the remaining ICs. The maps and information about the ICs shall be made available to the public in several ways, including being posted on the internet and in the Information Repository for the Site. In addition, the ICIAP shall identify reporting requirements associated with each institutional control which shall include at a minimum an annual review of the status and effectiveness of the ICs.

Performance Standards for Land Use Restrictions, Groundwater Use Restrictions and Fishing Advisories for the Site and Surrounding Area

1. Maintain and protect the integrity of the selected remedy including, but not limited to, the landfill cover and stormwater management features, leachate collection trench and infrastructure, engineered treatment wetlands and monitoring wells.
2. Prohibit exposure to contaminated soils not under the ET cover that are left in place. This potentially includes subsurface soils in the SIA, City Park, or Eastwick Neighborhood. Specific activities that could result in unacceptable exposure to contaminated soils at the Landfill, via ingestion or dermal contact shall be prohibited and/or specific protocols shall be put in place to ensure appropriate precautions are taken in the event that exposure to these soils is necessary.
3. Use and/or contact with contaminated groundwater beneath OU1 shall be prohibited to ensure no human exposure to contaminants in groundwater.
4. Evaluate current Pennsylvania fishing advisories to determine if additional advisories are warranted. If necessary to reduce human consumption of fish in Darby and Cobbs Creeks that may be impacted by the Landfill, fish consumption advisories shall be put in place in coordination with appropriate local, state and federal agencies.

11.3 Summary of the Estimated Remedy Costs

The estimated present worth costs of the selected remedy is \$23,955,276. See **Table 42** for a detailed cost summary.

The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the response action. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Minor changes may be documented in the form of a memorandum in the Administrative Record. Changes that are significant, but not fundamental, may be documented in an Explanation of Significant Differences. Any fundamental changes would be documented in a ROD amendment.

11.4 Expected Outcomes of the Selected Remedy

This section presents the expected outcomes of the selected remedy in terms of resulting land use and risk reduction achieved as a result of the response actions. Following excavation of contaminated soils above cleanup levels and the completion of the ET Cover, there should no longer be an unacceptable health risk to current or future residents, recreational users or workers due to exposure to contaminated soil or wastes. The ET Cover will prevent any future erosion or exposure of Landfill contents. The ET cover will also minimize the amount of precipitation that reaches the Landfill waste and the subsequent amount of generated leachate that could reach groundwater or surface water bodies.

The ET cover remedy selected for OU1 is expected to eliminate any potential unacceptable risks to humans or the environment from exposure to Landfill-related contaminants. The ET Cover

remedy and stabilization of the eastern creek bank will also eliminate the potential for erosion of contaminated wastes and soil into adjacent water bodies. The ET Cover will not significantly increase the 100-year flood height or stream velocity as is required by 25 PA Code § 106.31(a)(1).

Construction of the ET Cover is expected to take 14 to 16 months. The ET cover is expected to require at least two to five years to fully establish vegetation and achieve the required precipitation drainage rate from the bottom of the cover. The selected remedy should restrict the use of the Landfill area that could interfere with any of the engineered components of the cover system. The ET Cover is expected to operate for at least 30 years.

The excavation and/or implementation of use restrictions on Landfill soils that are above the cleanup levels summarized in **Table C** will eliminate any potential unacceptable risks to humans or the environment outside of the final boundaries of the ET Cover. Excavation and the implementation of use restrictions are expected to be completed within the construction timeframe of the cover. Treatment of leachate in the engineered wetlands will meet the surface water discharge requirements that will be established during the RD. The construction of engineered wetlands should be completed within the cover construction timeframe and, once established, the leachate collected from the trench will be sent to the wetlands for treatment prior to discharge.

The ET Cover, collection and treatment of leachate, and excavation of contaminated soils above cleanup levels are expected to reduce the contaminant loading to the adjacent water bodies, and should help improve the ecological integrity of the adjacent aquatic environments in the creeks including sediments, surface water and biota.

The area addressed by the ET Cover will be available for certain light recreational purposes such as walking trails in areas that are not too steep or narrow. Allowable surface load weight limits for the ET Cover will be established in the RD. The ET cover will also by its nature provide improved ecological habitat both along the stream bank and at higher elevations which should help extend the natural riparian corridor northward from the John Heinz National Wildlife Refuge. Areas outside the ET Cover boundary should be available for all of the current uses, e.g., recreational and residential use; the exception being areas where any contaminated soils above cleanup levels are left in place. It is anticipated that any contaminated soils addressed by ICs will be at substantial depths, e.g., below the water table, or beneath hardened surfaces, e.g., asphalt. For these areas, uses would be unlimited until the depths at which the contaminated soils are present; ICs will describe the steps to be taken if these contaminated soils are to be encountered.

12.0 STATUTORY DETERMINATIONS

Under CERCLA, selected remedies must protect human health and the environment, comply with ARARs, be cost-effective and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Additionally, CERCLA includes a preference for remedies that use treatment to significantly and permanently reduce the volume, toxicity or mobility of hazardous wastes, as their principal element. The following sections discuss how the selected remedy for the Lower Darby Creek Area Superfund Site – Clearview Landfill OU1 meets these statutory requirements.

12.1 Protection of Human Health and the Environment

The selected remedy will protect human health and the environment by eliminating exposure or the potential for exposure to landfill waste and Site-related contaminants through the installation of a landfill ET cover system. . The collection and treatment of shallow leachate along the landfill creek will provide treatment for the contaminated leachate which will reduce the volume and toxicity of the contamination. The soil excavation will remove and contain or dispose of contaminants in soil that are above cleanup levels and/or considered to be principal threat wastes.

12.2 Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy will attain, and in one instance waive, all applicable or relevant and appropriate requirements, which are identified as a performance standard in **Section 11.2** and specified in **Table 41** of this ROD. The applicable requirement in 40 C.F.R. § 258.60(a). 40 C.F.R. §258.60(a)(1) requires that a final cover for a MSW landfill, "have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1.0×10^{-5} cm/sec, whichever is less." This requirement is being waived using the "Equivalent Standard of Performance" criterion under CERCLA § 121(d)(4)(D), 42 U.S.C. § 9621(d)(4)(D). As discussed under the **Evaluation of Alternatives** section, a conventional landfill cover built to attain a permeability of 1×10^{-5} cm/sec should result in a percolation/drainage rate through the cover system that is no greater than 1×10^{-5} cm/sec, which equates to 9,237 gallons/day/acre (461,837 gallons/day over 50 acres), assuming there are no construction flaws. The ET Cover shall provide an Equivalent Standard of Performance to achieve the relevant and appropriate requirement in 40 C.F.R. § 258.60(a)(1) by ensuring the drainage rate from the bottom of the ET Cover is no greater than the value, which results from multiplying the total final acreage of the ET Cover by 9,237 gallons/day.

12.3 Cost Effectiveness

The selected remedy is cost effective in that it eliminates or mitigates the risks posed by the contaminants for OU1, meets all requirements of CERCLA and the NCP, and provides overall effectiveness in meeting the RAOs. The ET Cover alternative is the least costly of the alternatives that satisfy the threshold criteria discussed above.

12.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected remedy utilizes long-term solutions and treatment technologies to the maximum extent practicable through the use of engineered treatment wetlands to address collected leachate. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the selected remedy provides the best balance of advantages and disadvantages, in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume through treatment, short-term effectiveness, implementability, and cost, while also considering the statutory preference for treatment as a principal element, and State and community acceptance.

12.5 Preference for Treatment as a Principal Element

The selected remedy will meet the statutory preference for treatment as a principal element

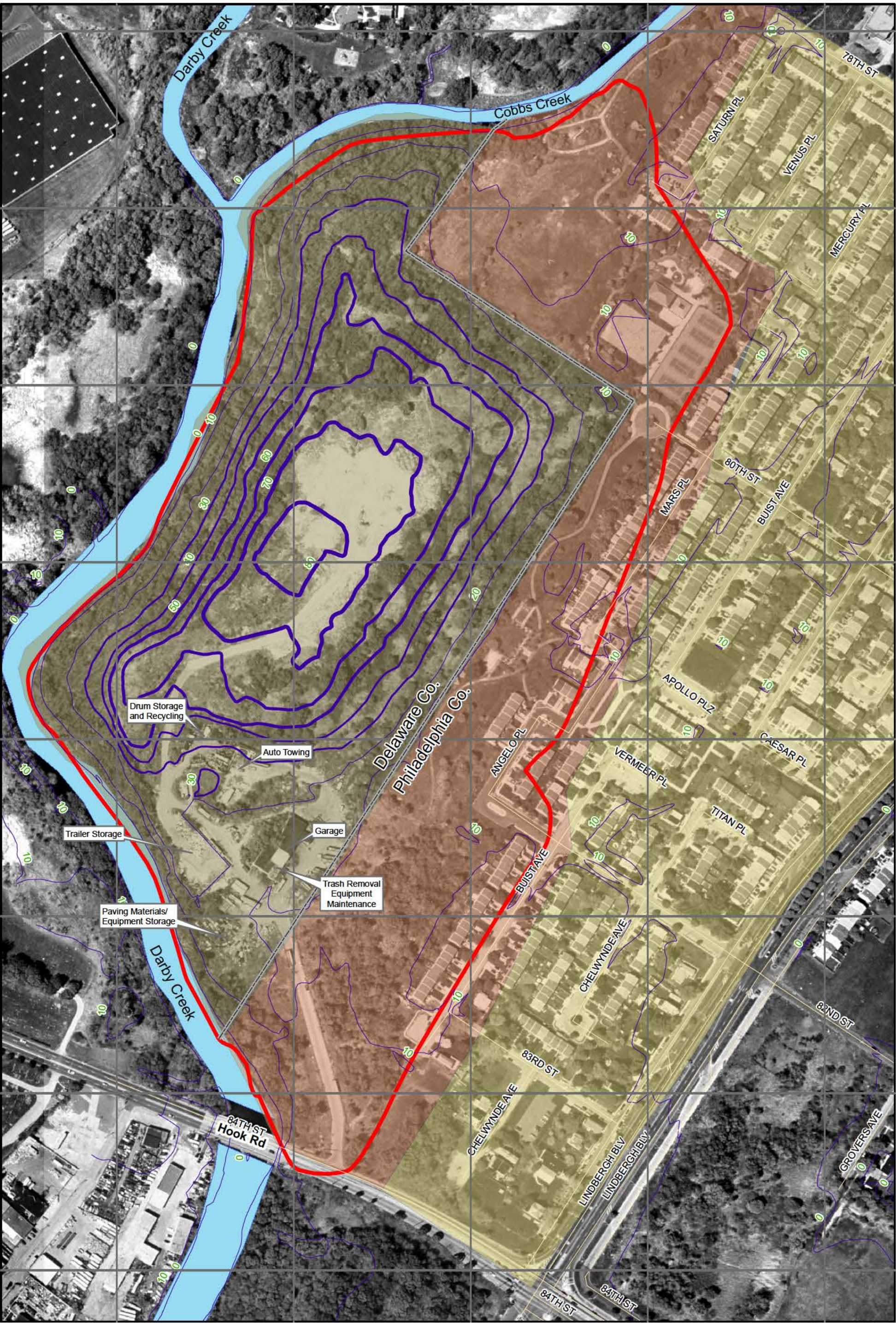
since it treats the collected leachate along the eastern creek bank. If practicable, PCB principal threat wastes excavated will be shipped off-site and treated prior to disposal.

12.6 Five-Year Review Requirements

Because the OU1 remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted every five years to ensure that the selected remedy is, or will be, protective of human health and the environment pursuant to CERCLA Section 121(c) and the NCP, 40 C.F.R. § 300.430(f)(5)(iii)(C). The first review will be conducted five years after the initiation of remedial action at the Site and will continue every five years thereafter.

13.0 DOCUMENTATION OF SIGNIFICANT CHANGES

There have been no significant or fundamental changes to the proposed remedy as a result of public comments.



Grid in PA State Plane South (ft)

147111.0109

- Clearview Landfill
- City Park
- Eastwick Neighborhood
- Historical Extent of Landfill Footprint
- Elevation (ft)
- County Boundary

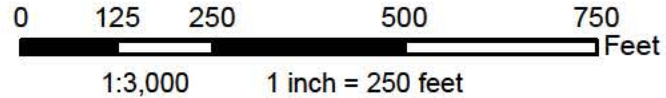


Figure 2-3
Surface Features of Clearview Landfill
Lower Darby Creek Area
Pennsylvania

Tetra Tech Delaware
 Phone: (302) 738-7551
 Toll Free: (800) 462-0910
www.tetrattech-de.com
www.tetrattech.com

This map is provided by Tetra Tech solely for display and reference purposes and is subject to change without notice. No claims, either real or assumed, as to the absolute accuracy or precision of any data contained herein are made by Tetra Tech, nor will Tetra Tech be held responsible for any use of this document for purposes other than which it was intended.