remedial soil gas assessment. The pre-remediation and post-remediation sampling confirmed that soil gas did not indicate any concern. This showed that sub-slab venting systems for new construction were not necessary. The No Further Action (NFA), approved on June 27, 2019, included the results of the soil gas assessment and confirmed the conclusions reached by AKT Peerless.

3.1.1.7 Engineering Controls – Former Landfill Area

Complete removal of the area of the highest contamination, the former landfill area on the eastern parcel, is not financially feasible.

In July 2019, HM Environmental Services retained Mersino to install the slurry wall using one pass trenching equipment. However, the one pass trenching equipment encountered difficulty in excavating through hard soils (clay and silt) or cobbles that were encountered during trenching. Therefore, a new method is proposed to install the slurry wall. A slurry wall will be installed around the perimeter of the former landfill area (approximately 1,000 linear feet).

The slurry wall will be installed by an excavation panel method. Depending on the slope of the land, the 2-foot slurry wall will consist of either of the following: (1) soil-bentonite or (2) cement-bentonite. Soil bentonite panels will be installed at the locations with flat topography locations (north and south walls) and cement-bentonite panels will be installed at the locations that slope (west and east walls). The panels will be installed in 40-foot alternating sections to allow slurry to harden and then overlap to ensure no gaps between sections. The depths of the slurry wall will extend into native low permeable layers of clay and silt encountered between 20 and 43 feet below ground surface (see Appendix E). While this method is different than the one-pass technology approach envisioned in the Brownfield Plan and Act 381 Work Plan, this slurry wall design keying into low permeability layers of clay and silt is consistent with the previously approved Brownfield Plan and Act 381 Work Plan in the objective of preventing infiltration of groundwater into the former landfill area. This installation method adds cost to the project and is a driving reason for the Act 381 Amendment.

After installing the slurry wall, the cover system will be installed. The first layer will be class II sand to flatten the topographic surface. Then a flexible membrane liner ("FML") followed with a bentonite geosynthetic clay cover (GCL) with a brand name, Bentomat will be installed over the former landfill area. The GCL provides a hydraulic barrier into the former landfill area. The swelling bentonite in the Benotmat 200R material fills in the pore space and constricts the flow paths of water, resulting in a low permeability hydraulic barrier similar to clay but at a lower installation cost to the project. The FML and GCL will be anchored outside the slurry wall. These control measures will act to prevent leach formation within the former landfill area and prevent exacerbation of existing contamination. Following the FML and GCL covers another layer of class II sand (approximately 36-inches thick) Above this sand layer will be 6 inches of topsoil to support grass vegetation similar to the adjacent Innovation Hills Park. The thickness of the class II sand and topsoil above the FML and GCL materials is to allow for a healthy root system for the grass vegetation to thrive while not coming into contact with the engineered materials.

A passive vent system trench will be installed below the liner as shown in Appendix E. The vents from the passive trench system will be located on the uphill side of each trench. The venting system will include two subsurface vapor vent/geovent trenches below the flexible membrane layer/Bentomat 200R geosynthetic clay cover connected to an 8-foot tall, 4-inch diameter metal vent pipe at southeastern end of each run. The vent heights are a requirement by EGLE. A screen will be placed on the top 6 inches of the vent pipe.

Refer to Appendix E for the cover system design specifications.

As noted in Section 3.1.1.2, the Developer intends that the DDCC will be reviewed and approved by EGLE, but does not intend to pursue regulatory closure for Parcel B. The specifications for the engineering controls will be included with the DDCC.

The environmental consultant will prepare and implement an O&M Plan for the engineering controls installed in the former landfill area. The O&M Plan is anticipated to include a recommendation for quarterly long-term inspection/methane monitoring. The cost estimate for implementation of an O&M Plan is $24,000~~30,000~~ per year for ~~24~~ 30 years (costs eligible for reimbursement in the Brownfield Plan), although the O&M Plan implementation will continue beyond that date. ~~for at least a total of 30 years.~~

This cost includes design, installation, reporting, and project management for the systems.

3.1.1.8 Passive Methane Venting System

Costs associated with a Passive Methane Venting System will be installed as part of the engineering controls – former landfill area. For more details, please refer to section 3.1.1.7.

3.1.1.9 Waterproofing Seals and Gaskets for Stormwater Piping

Due to known contamination in soil that will be left in place on Parcel B and to mitigate against exacerbation of contamination, chemical resistant seals and gaskets may be installed on piping located on Parcel B to prevent the intrusion of contaminants on site into the stormwater system. The piping will run along the northern side of the property, north of the encapsulation zone.

3.1.1.10 Site Control & Erosion Control

In order to be protective of workers and residents, the excavation areas will be fenced or barricaded to minimize potential for unauthorized access to contaminated soil. These costs include the silt fencing for the north and east in order to mitigate erosion concerns; dust monitoring during environmental mitigation work in order to address further concerns of the neighbors to the north; a Soil Erosion and Sedimentation Control Plan; and a Fugitive Dust Emission Control and Contingency Plan. Other protective measures may include a gravel mat along the truck route leaving the property and/or other measures to minimize tracking of dirt and potentially impacted soil from the property. Protective measures will be outlined in the HASPs, as detailed in Section 3.1.1.3. Once developed, the HASPs will be made available to the City and the EGLE.

During soil excavation and removal activities the truck routes will be as follows:

Site Arrival

- The trucks will initially use the entrance ramps on M-59 at the Adams Road interchange.
- The trucks will proceed north on Adams Road to Hamlin Road.
- Turn right (east) on Hamlin Road to enter the subject property. All trucks will be staged on subject property while waiting to be loaded or completion of shipping papers.

Site Departure

- The trucks leave the site onto Hamlin Road and proceed west toward Adams.
- The trucks will turn left (south) onto Adams Road and proceed to the M-59 interchange.
- The trucks will access M-59 from Adams Road and procedure to their destination.

3.1.1.11 Dewatering

In the event that groundwater is encountered, or if surface runoff accumulates, in sufficient quantities to require dewatering, the water will be containerized in frac tanks. Once containerized, the water will be sampled to determine whether or not disposal is necessary or if the water can be discharged to the