AREA 1, PHASE 1 DETAILED DEVELOPMENT PLAN

Baltimore Works Site
Baltimore, Maryland

REVISED

December 2013

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1.0 INTRODUCTION

Harbor Point Development LLC (HPD) and its consultants have prepared this Detailed Development Plan (DDP) for Phase 1 of development on Area 1 of the former AlliedSignal Baltimore Works Site (or "Site"), located in Baltimore, Maryland. This Phase of the development project consists of the Exelon Tower and Trading Floor Garage, the Central Plaza Garage, modifications to the existing Transfer Station, general site development (streets, sidewalks, etc.) and utilities, foundations, roadways, and other related site development elements and remedy restorations for development.

The Site is located on a peninsula on the northeast shore of the Patapsco River of the Inner Harbor in the Fells Point section of Baltimore City. The Site consists of three Areas. Area 1 is the principal site of Honeywell's (formerly AlliedSignal) Baltimore Works Facility which included chromium processing production and support buildings on an area that covered approximately 14 acres. Prior to acquisition by Honeywell, Areas 2 and 3 were used for various industrial and warehousing operations, including chromate ore storage (Area 2) and brass foundry casting, oil blending and storage, coating/plastics production, lumber storage and foundry (Area 3). Areas 2 and 3 currently include the Thames Street Wharf Office Building, and its associated parking lots, constructed in 2010 to the east. The Site is surrounded by water on the north, west and south and the Living Classrooms campus to the north.

The majority of planned construction will occur in the northeast region of Area 1, located west of Wills Street and south of Dock Street. The Living Classroom educational facility is located north of Dock Street. The development to the east of Area 1 is the Thames Street Wharf Office Building and parking lots owned by HPD. Drawing DDP-C1.00 is an existing conditions plan showing Area 1, Area 2 and Area 3, the existing Environmental Remediation System (ERS), and other pertinent Site features.

The principal contaminant of concern in Area 1 is hexavalent chromium (CrVI). An Environmental Remediation System (ERS) is maintained and operated by Honeywell International Inc. (Honeywell) to contain CrVI-impacted groundwater in Area 1 and control the potential for human exposure to affected soil. The ERS consists of a Multimedia cap (MMC), Hydraulic barrier, Head Maintenance System (HMS), a groundwater storage and transfer system, and Outboard Embankment. The HMS maintains an inward groundwater gradient to mitigate the migration of chromium-impacted groundwater from the Site.

The Site development must not interfere with the efficacy of the corrective measures or Honeywell's ability to comply with the performance standards defined in the Consent Decree between Honeywell, the U.S. Department of Justice, USEPA and the MDE, the Groundwater Gradient Monitoring Plan, the Surface Water Monitoring Plan, and the Environmental Media Monitoring Plan. This DDP describes the redevelopment improvements and the means and methods that will be implemented to meet the requirements established in the Consent Decree and its appendices, as amended, as well as the Owner/Developer covenants. Honeywell retains responsibility for operating the ERS and monitoring environmental media to demonstrate continued attainment of Consent Decree performance criteria.

Phase 1 Development on Area 1 is the first of multiple phases of construction/development planned for the property. The schedule for Phase 1 Development is aggressive, with the Certificate of Occupancy milestone of June 2015. The ground floor space consists of the residential lobby, retail spaces, plaza garage entry, service docks and the Honeywell transfer station and offices.

The planned foundations include driven, environmental concentric closed-end pipe piles filled with concrete and with concrete pile caps on top of them. The one-story Central Plaza Garage, Dock Street deck, and Point and Wills Street elevated deck structures will be supported on pipe piles constructed concentric with column locations so that pile caps are not required. After piles are driven, a new geomembrane will be sealed to the pile wall below the pile caps.

The planned site utility systems include storm water drainage, sanitary sewer, domestic water, natural gas, electric, and telecommunications. Storm water will be discharged to Baltimore Harbor, or will be allowed to infiltrate into the soils to the east of Area 1 to facilitate recharge of shallow sand strata. Utilities will generally follow the proposed roadway network, or be suspended from the ceiling of the parking garage connecting the proposed structures to the existing infrastructure in Block Street, Caroline Street and future Central Avenue Bridge.

2.0 PROJECT TEAM / ROLES

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3.0 EXISTING ENVIRONMENTAL REMEDIATION SYSTEM (ERS)

The ERS consists of the following components (collectively referred to herein as "ERS Components"):

1. Multimedia cap (MMC) in Area 1;
2. Layered Soil Cap (LSC) – Area 2;
3. Soil Cap (SC) – Area 3;
4. Hydraulic Barrier;
5. Head Maintenance System (HMS);
6. Groundwater Storage (Tank Room);
7. Transfer Station; and
8. Outboard Embankment.

3.1 MULTIMEDIA CAP (AREA 1)

3.1.1 Cap Function and Features

The MMC is designed (i) to mitigate upward migration of contaminants and limit the potential for direct exposure to contaminated soils or groundwater and (ii) to reduce infiltration to the groundwater within Area 1. Multimedia Cap components are illustrated in Drawing DDP-F1.30 Detail 1 (see DDP Appendix A, Table A for analysis of cap features).

The MMC was constructed in 1998 using both a synthetic geomembrane liner (60 mil [0.06-inch thick] Linear Low Density Polyethylene [LLDPE]) and a geosynthetic clay liner (GCL). An underlying granular capillary break was installed to prevent upward migration of chromium. High-density polyethylene (HDPE) drainage net was placed above the geomembrane liner to collect and convey infiltration to the Harbor. The drainage net and membranes are protected by a thick non-woven geotextile cushion above and below. These synthetic layers are covered with 24 inches or more of granular cover soil cover and six inches of crushed stone (30 inches total cover) to protect against mechanical damage

and to reduce thermal changes at the synthetic layers. Some areas of the Area 1 multimedia cap are covered with asphalt pavement.

The geomembrane is crowned at the center of the Site and slopes down towards the perimeter. The drainage net conveys collected water to a collection pipe at the land perimeter and to the embankment at the waterfront perimeter of Area 1 outboard of the hydraulic barrier. The MMC grades were established to promote runoff by placing a controlled fill below the cap over the abandoned foundations and asphalt cover. The planned development places roof and independent storm water control structures over the crown of the geomembrane.

3.1.2 Ground Conditions Below Cap

Much of Area 1 Phase 1 development area that is underlain by compressible clay of Stratum O (Drawing DDP F1.11 for Stratum O locations) was pre-loaded to support the MMC and existing structures without pile foundations. Vertical drains and surcharge fill techniques were used to consolidate the compressible clay to allow construction of the cap and Transfer Station with minimal settlement. These ground improvement areas are illustrated in Drawing DDP F1.12.

3.1.3 Methane Gas Venting System

The organic clay of Stratum O may generate methane gas as decomposition of the organic components continues over time. A vent pipe was placed in the capillary break gravel, at the high point of the multimedia cap, to vent methane gas which may collect below the geomembrane.

3.1.4 Perimeter Drain (Toe Drain)

The perimeter toe drain is perforated polyvinyl chloride (PVC) pipe on the landward perimeter and HDPE drain tubing or stone infiltration without pipe at the waterfront perimeter. The pipes were placed in a stone-filled infiltration trench at the perimeter of the geomembrane outboard of the hydraulic barrier. The perimeter drain allows storm water infiltration within the cap drainage layer (i.e., above the geomembrane layer of the cap) to drain into the embankment outboard of the Perimeter hydraulic barrier.

3.2 AREA 2 SOIL CAP

The Layered Soil Cap (LSC) in Area 2 was designed and constructed to limit exposure pathways by preventing the generation of airborne particulates, dermal contact with underlying soil, ingestion of surface soils, and storm water erosion of soil. The cap components from bottom to top are a non-woven geotextile, capillary break layer, non-woven geotextile, a crushed stone sub-base, and an asphalt surface. The major elements of the cap are described further below:

Capillary Break Layer - A capillary break layer is the bottom layer of the LSC. The capillary break minimizes the potential for upward migration of chromium contaminated water potentially present in the capillary fringe above groundwater. Groundwater is located at a depth of greater than 5 feet below the LSC. The capillary break consists of a layer of coarse gravel, which limits capillary action. This layer has a minimum thickness of 6 inches. AASHTO No. 5 stone is used for the capillary break. To protect the capillary break from the intrusion of fine-grained soils, a non-woven geotextile filter was installed on the prepared sub-grade under the capillary break stone. An upper geotextile was installed prior to the placement of any dissimilar soil material on the capillary break surface.

Asphalt Surface - The LSC surface is comprised of an aggregate base overlain by bituminous asphalt. A 6-inch thick course of RC-6 aggregate base material was placed above the capillary break upper geotextile to form the support for the asphalt surface. The asphalt was placed over the RC-6 base. The asphalt was installed consistent with Baltimore City Specification Article 20.12. Bituminous asphalt constitutes a hydrophobic layer that further inhibits capillary rise.

Sediment and Erosion Control Structures - Storm water flows across the asphalt surface of the LSC and is directed toward the harbor. The asphalt and the stone revetment at the harbor edge are non-erosive and therefore no additional erosion control structures are necessary.

3.3 AREA 3 SOIL CAP

Area 3, also referred to as "Silver North" and "Silver South", is capped with two feet of clean fill that overlies a synthetic visual warning layer. Area 3 is divided by Block Street and is also currently asphalt paved and used as parking lots.

3.4 HYDRAULIC BARRIER

The Consent Decree requires Honeywell to maintain an inward gradient in the coarse sand and gravel of Stratum S-4 and in the shallow S-1, S-2, and S-3 sand strata along Wills Street. The inward gradient is intended to prevent the release of hexavalent chromium from Area 1 to the groundwater and surface water surrounding the site. The inward gradient is maintained by extraction of groundwater by the Head Maintenance System (HMS).

The hydraulic barrier was placed at the perimeter of Area 1 to isolate groundwater below Area 1 from Harbor surface water and the surrounding groundwater. The hydraulic barrier reduces the amount of groundwater that must be extracted by the HMS to maintain an inward hydraulic gradient.

The hydraulic barrier is a soil-bentonite backfilled slurry trench. It was constructed by excavating a 36-inch wide trench to the top of decomposed rock (between 60 and 85 feet below construction grade), and placing low permeability backfill in the trench as the permanent barrier. The backfill was prepared from the trench excavation spoils, bentonite slurry, and dry bentonite addition. Laboratory testing demonstrated low permeability of the backfill before placement. The designed top of the hydraulic barrier is at an Elevation +5 at the waterside perimeter, and is Elevation +7 and at Elevation +12 at the land perimeter (Wills Street).

Trench excavation, cleaning, and backfill placement for the hydraulic barrier were carefully controlled to exclude excavation debris and thickened slurry from the backfill profile. Backfill was placed at a slump of 4 to 5 inches. Because the backfill is confined within a narrow trench and is protected from evaporation, it is expected to have the same physical characteristics today as when it was placed.

HPD understands that during hydraulic barrier installation, the side wall of a portion of the slurry wall in Wills Street sloughed during installation. Additionally, the wall in the area of the Dock and Wills Street intersection settled under pre-load in the area of the Transfer Station. Any impact that this may have on the installation of the proposed sheet pile is discussed in Section 6.1.

At the embankment perimeter, the backfill contains a substantial amount of crushed stone from the embankment portion of the excavation spoils. As much as 50 percent of the backfill material, by dry weight, was allowed to be gravel size. However, the trench was first constructed on Wills Street (starting at the Block Street intersection) so that the Wills Street

portion of the barrier has lower gravel content than does the embankment at the waterside perimeter. The higher gravel content will reduce backfill compressibility, reducing settlement potential of the backfill.

3.5 HEAD MAINTENANCE SYSTEM

The HMS withdraws groundwater from within Area 1 to maintain a groundwater level within the hydraulic barrier that is lower than the water table outside of the hydraulic barrier (i.e., maintain an inward groundwater gradient). The HMS is comprised of (i) the Extraction System, (ii) the Monitoring and Control System, (iii) the Conveyance System, (iv) the Transfer Station and (v) the Transfer Station Truck Pad. The Groundwater Gradient Monitoring Plan (GGMP) documents the means and methods used by Honeywell to monitor compliance with the Groundwater Gradient Performance Standard and assess the performance of the HMS.

Paired piezometers measure the water levels inboard and outboard of the perimeter barrier and activate the adjacent extraction wells to maintain the inward gradient if the outboard water levels drop relative to inboard levels. The quantity of groundwater extracted is controlled by changes in the outboard water levels, which are influenced by the tidal, seasonal and wind-blown tide effects. The extracted groundwater is conveyed to the storage tanks located at the Transfer Station for periodic loading into tanker trucks for off-site treatment and disposal at a licensed hazardous waste treatment facility, currently the Environmental Quality (EQ) Company of Baltimore, Maryland.

3.5.1 Extraction System

The existing groundwater extraction system consists of 12 deep and 4 shallow extraction wells installed at approximately equal spacing around the perimeter of Area 1. The groundwater extraction system is used to provide hydraulic control of groundwater at the Site and has been operational since late 1998. The system will continue to be operational during and after redevelopment. The extraction wells are housed inside concrete vaults and contain pneumatic pumps and water level measurement devices. Single and double well vaults exist at the Site below the MMC synthetic layers. The inside dimensions for the double extraction well vaults vary from 11 feet long by 7 feet wide by 7 feet high to 14 feet long by 7 feet wide by 9 feet high. The single well vaults have dimensions of 8 feet long by 8 feet wide by 7 feet high.

The extraction wells include 12 deep wells designated DW1 through DW12. The remaining 4 extraction wells are shallow wells designated as SWl through SW4. The shallow wells are located on the land perimeter (Wills Street) of Area 1. The well and piezometer locations are shown in Drawing DDP- EN1.01. Soil profiles are shown in Drawing DDP-F1.11.

The deep wells are screened in the Cretaceous Sand (designated as Stratum S-4 in the project documents) at a depth of approximately 50 to 80 feet below ground surface (bgs). The shallow wells are screened in the Pleistocene Sands (designated as Strata S-2 and S-3 in the project documents) at a depth of approximately 20 to 40 feet bgs.

All extraction wells consist of 6-inch diameter well screens and casing. Each well includes a filter piezometer that is intended to allow for a method to assess the condition and maintain the filter pack of the well.

Each extraction well contains a water level transducer and a pneumatic pump. The transducers are used to monitor the level of water in the well to prevent damage to the pump during operation. Compressed air is supplied to the pneumatic pumps through l-inch inside diameter pipe. The air supply is provided by a compressor located in the Transfer Station loading dock.

Electric sump pumps are located in each extraction well vault. All vault sump pumps are capable of pumping 5 gpm at 200 feet of total dynamic head. The sumps extend below the bottom of the vault to extract shallow groundwater from immediately below the vault. Rainwater that may enter the vault access hatches is also managed by these sump pumps. The pumps are actuated by a water level indicator in the sump. The sumps primarily maintain the vault in a dewatered condition and provide contingency control of shallow water level in the fill beneath the vaults. In addition, the HMS conduit sub-grade fill drains to the sumps so that the perimeter HMS pipe trenches function as collectors and act as a contingency for shallow groundwater control at the perimeter of the Site.

3.5.2 Monitoring and Control System

The HMS monitoring and control system provides a means to remotely check and execute HMS system controls. The system includes remote intelligent controllers (RIC) or nodes in the vaults for input/output connections. The system is monitored with the Master Supervisory Station (MSS) located in the Transfer Station.

The system includes twin paired piezometers (one inside and one outside of the hydraulic barrier) for measurement of water levels across the hydraulic barrier. The piezometers are located approximately 10 feet away from the hydraulic barrier. The piezometer pairs are located at midpoints between extraction wells and are screened in the same stratum pumped by the extraction wells. The pairs are numbered 1 through 12 and 1S through 4S (shallow), similar to the extraction well numbering.

When the gradient measured at any piezometer pair is above the minimum inward gradient criteria and an additional factor of safety, the RIC in the vault activates the pumps on either side of that piezometer pair, until the measured gradient meets the established criteria. The RIC controller sends signals to solenoid valves that control the pumps.

This MSS enables Honeywell to record and view the hydraulic gradient and pumping activity at each extraction well real-time. The MSS can activate alarms related to maintenance and operational needs.

3.5.3 Conveyance System

Head maintenance system piping connecting the pumping vaults was placed below the MMC synthetic layers. Oversized 8-inch conduits were installed between the vaults to house the groundwater conveyance pipes. The 8-inch conduits and pipes are below the MMC geomembrane. The groundwater conveyance pipes are comprised of three 1 ½-inch diameter HDPE continuous pipes, placed within the 8-inch diameter HDPE pipe which provides secondary containment. Three additional conduits, two 4" and one 3" are provided to allow a 480V electrical supply loop, a 1" compressed air supply loop and several low voltage lines allowing communication between the RICs and the MSS and security systems wiring.

The conduit and pressurized force main design allows some differential settlement of the HMS force main pipes. Redundant conduit capacity allows replacement of the air and electrical lines between the vaults, if required.

3.5.4 Transfer Station

The Transfer Station handles storage of extracted groundwater with two 10,000-gallon storage tanks, and includes the air compressor, filters, a desiccant dryer, air storage tank which supply the pneumatic extraction pumps. The two groundwater storage tanks are used to provide excess storage capacity and to facilitate maintenance. The storage tanks are located in a concrete secondary containment basin to contain spills. The

inside dimensions of the containment basin are 28 feet by 30 feet by 3 feet high. The volume within the containment area is 12,000 gallons, having the ability to safely contain the entire contents of one-10,000 gallon storage tank.

The conveyance system consists of a duplicate system of header pipes around the perimeter for contingency and maintenance purposes. Water from the two header pipes can be separated into different tanks. Separation by water quality is possible with the existing vault pipe valve system. This option is used if site conditions arise that may require separation of water flows based on chromium concentration, pH, or other water quality criteria.

Water levels in the storage tanks are remotely monitored. The monitoring and control system generate an alarm at high water levels in the storage tanks and stop pumping if the maximum water level is reached in the active storage tank.

A clean water supply is used to periodically flush the conveyance pipes and remove any precipitation buildup. Water is pumped into the pipes from the Transfer Station. The water supply has adequate pressure for flow around the perimeter and back to the storage tank location. Process water from pipe flushing is discharged to a storage tank. The piping system is constructed to allow flushing of alternate conveyance pipes while the other is in use to convey extracted groundwater.

3.5.5 Transfer Station Truck Pad

Extracted groundwater stored at the Transfer Station is transferred into tanker trucks for off-site treatment and disposal. Tanker-truck loading activities occur in an outdoor containment area (i.e., Truck Pad) adjacent to the Transfer Station. Within the containment area, concrete curbing and steel bollards protect aboveground process piping and tank fittings.

For loading trucks, a hose from the vacuum tank truck is attached to a port at the unloading station and groundwater is pulled from the storage tanks to the tank truck. During transfer operations, containers are placed beneath pipe and valve joints to collect small volume spillage. Authorized and trained Honeywell personnel supervise the truck filling and emptying of the storage tanks. A warning sign is posted in the area to prevent vehicular departure before complete disconnection of the transfer lines.

The Truck Pad is furnished with a trench drain and sump for spill containment and conveyance purposes outside of the building. In the event of a spill, flow is collected via the trench drain to a sump pit. From

there, a sump pump directs the water to either one of the 10,000 gallon storage tanks within the Transfer Station.

The frequency with which groundwater is transported from the facility is based on the groundwater extraction rate, which is somewhat dependent on the seasonal tidal elevations. Shipments for off-site treatment occur when a tanker truck volume of water is accumulated and before the regulatory 90-day storage limit is exceeded.

3.6 OUTBOARD EMBANKMENT AND WATERSIDE PERIMETER

The north, west, and south perimeters of the Site were defined by bulkhead structures along the Patapsco River and the Inner Harbor. These structures were part of the original construction, dating from 1890's to 1950's.

The north and west bulkheads were comprised of timber piles at low water supporting granite block gravity headwalls, with timber pile dead-men and timber ties for lateral restraint. These bulkhead structures were left in place below the MMC. To protect against failure of these original perimeter structures during or after installation of the ERS described above, a section of fill was placed to the water side of those structures.

Soft compressible Stratum O clay was dredged for embankment fill placement. The embankment fill was placed in organized lifts. "Wall Zone" fill placed against the bulkhead was sand and gravel sized crushed stone blend designed to enable construction of the hydraulic barrier Larger sized "Core Stone" was placed outboard to construct the bulk of the embankment volume.

Rip rap was placed for erosion control above Elevation -10 feet mean sea level (msl), in the wave zone. The embankment fill included a coarse filter stone gradation to separate fine gravel sized Wall Zone fill from coarse core stone in the tidal region. The embankment is generally west of the planned Exelon development area. The planned Central Avenue Bridge crosses over the embankment just west of the Living Classrooms' Center Pier structure.

The former Back Basin is north of the planned Exelon Tower and Garage development. The Back Basin contains a thick deposit of Stratum O clay below low tide. These soft compressible deposits were isolated from the Harbor by a steel sheet pile retaining wall, visible today, aligned with the west end of the Center Pier retaining wall. The compressible deposits were stabilized with vertical wick drains and pre-loading.

Compressible Stratum O deposits below the existing Transfer Station and adjacent areas were stabilized with vertical wick drains and pre-loading prior to MMC construction. The timber 1890's Dock Street bulkhead was abandoned in place below the interim cap. HMS Vaults V11, V12, and MJ1 were supported on the 1890's era timbers, and the HMS conveyance pipes were placed above these structures.

3.7 MONITORING OF REMEDIAL COMPONENTS AND ENVIRONMENTAL MEDIA

The integrity of the remedial components is demonstrated through routine monitoring of remedial components and testing of environmental media, i.e., air, surface water, groundwater and sediment, and drainage layer effluent samples. The monitoring program is designed to demonstrate that the performance goals of the MMC, the HMS, and the Hydraulic Barrier are maintained. The performance goals are summarized below.

1. The MMC serves two major purposes: (1) to prevent upward migration of contaminants and limit the potential for direct exposure to contaminated soils or groundwater; and (2) to reduce infiltration to the groundwater table.

2. The HMS monitoring program maintains an inward hydraulic gradient as determined by monthly average head gradients based on hourly water level measurements at each piezometer pair around the site perimeter. Automated monitoring and control by the HMS enables these criteria to be met with minimal groundwater extraction. Data collection and control signals are coordinated as part of the control logic to alert the site personnel if malfunctions occur in the system.

3. The Hydraulic Barrier was placed at the perimeter of Area 1 to isolate site groundwater from the Harbor surface water and surrounding groundwater. The hydraulic barrier effectively reduces the amount of groundwater that must be extracted by the HMS to maintain an inward hydraulic gradient. Hydraulic barrier performance is monitored by observation of the quantity of groundwater extracted to maintain the inward gradient.

3.7.1 Environmental Media Monitoring Plan

The Environmental Media Monitoring Plan (EMMP) defines the monitoring program for air, surface water, groundwater and sediment.

The current monitoring program consists of the following:

- Air sampling for total chromium, hexavalent chromium, total dust and asbestos whenever the synthetic layers of the MMC are penetrated.

- Surface water is sampled quarterly at the top, middle (where depths are sufficient) and bottom of the water column at 18 locations around the perimeter of the site and two background locations. The Consent Decree, Section V, Part 12, establishes the Surface Water Performance Standard: "The surface water performance standard […] for total chromium shall be 50 parts per billion (ppb), calculated for each sample location by arithmetically averaging the samples taken at all depths over 4 consecutive days." In October of 2002 the sample frequency was amended to be 1 day of sampling at each sampling location per quarter. In addition, the EMMP states that Honeywell will review analytical data for results greater than 11 ppb of dissolved hexavalent chromium.

- Groundwater is sampled semi-annually and analyzed for chromium and, in specific locations, for cyanide.

- Sediment continued to be sampled every three years after the completion of remedial construction until the requirements for this monitoring period were met. The results of the sampling rounds are compared to data reported from prior sampling events.

3.7.2 Surface Soil Monitoring Plan

The Surface Soil Monitoring Plan (SSMP) documents the methodology used to monitor the MMC performance, and its ability to prevent the upward migration of contaminants. Monitoring areas include the MMC, drainage layer sampling points, drainage layer, settlement points, surface covers, and cap penetrations.

The SSMP does not address the post-development cap foundations and pile penetrations, but allows the Plan to be revised to address development (see drawing DDP-F1.60 for development cap locations).

The SSMP inspections of the cap at penetrations focus on soil discoloration, seepage, erosion, and settlement. Soil discoloration is a sign of upward migration of contaminants (chromium would impart a yellow color and crystallize at the moisture drying front). Seepage, erosion, and settlement all indicate a migration of soil particles by piping mechanism.

MMC Cap Components: Restoration of GCL. The SSMP describes the base functions of each component of the Area 1 MMC. The geomembrane and GCL are defined as an infiltration barrier: "The two components of this composite barrier layer are considered to function as one system in minimizing infiltration into the underlying contaminated soil" (P. 8, Part 2.1.2).

Settlement Monitoring. Settlement is monitored by repeat elevation survey of defined points (settlement monitoring plates). The Plan requires corrective action if settlement monitoring determines that the slope of the geomembrane/drainage layer is less than 1% outward from the center of the site.

Drainage Layer Sampling. Water from within the drainage layer is observed and sampled at four locations around the perimeter. Each location is examined for flow and examined for the presence of sediment. The water samples are tested for chromium and cyanide.

3.7.3 Groundwater Gradient Monitoring Plan

The Groundwater Gradient Monitoring Plan (GGMP) prepared by Black & Veatch Waste Science, Inc. August 1993, Revised June, 1995, and Addendum 1, August 10, 2001 describes the methods used to monitor compliance with the Groundwater Gradient Performance Standard and assess the performance of the deep vertical hydraulic barrier and head maintenance system (HMS). The principal components of the GGMP are described below.

Groundwater Monitoring Piezometers. Shallow and deep piezometers are used to monitor water levels inboard and outboard of the hydraulic barrier. Piezometers ISP1, OSP1, ISP2, OSP2, IP1, OP1, IP2, OP2, IP11, OP11, IP12, and OP12 are within the planned development area.

Groundwater level monitoring is performed by acoustic electronic sensor reading of the level water in the piezometers. Manual readings are periodically taken to confirm the electronic sensor readings and for purposes of calibration. The elevations of the piezometer casings are periodically confirmed by survey.

The Groundwater Gradient Performance Standard requires that for each pair of piezometers for a thirty day period, the average hydraulic head measured at the inside of the barrier shall be lower than the average hydraulic head measured outside of the barrier, and the absolute value of the average hydraulic head differential shall be greater than a value which represents the sum of 0.01 feet plus two times the maximum potential error of measurement of the hydraulic head in any one piezometer. The present performance calculation has been progressively refined over time and the current performance standard for the installed ultrasonic water level devices equals [0.01 foot + (2 × 0.031 measurement error)] = 0.072 foot.

4.0 DEVELOPMENT PLAN AND SCHEDULE

4.1 SCOPE OF PROJECT

The project on the Baltimore Works Site includes the Exelon Tower, the Plaza Parking Garage, modifications to the existing Transfer Station, general site development (plaza, streets, sidewalks, etc.), a new bridge connecting Central Avenue to the Site and related utilities, foundations, and other ancillary elements supporting the development as further described below.

4.1.1 Exelon Tower and Trading Floor Garage

The planned Exelon Tower is a 23-story structure with a footprint of approximately 70,249 square feet (sf) and top of the building projected at 364 feet above mean sea level (msl). Its footprint will comprise a full block on the northern edge of the Site (Drawings C.400 and A1.00.01). The ground floor of the building will be at Elevation +13 to +17 msl and includes the residential lobby, retail spaces, plaza garage entry, service docks and the Honeywell transfer station and offices. The second level will be at Elevation +28 with an office lobby and retail spaces opening onto the new Plaza on the south side and at Elevation +30 msl with mechanical and support spaces on the north side. Floors 3 to 7 will contain an enclosed parking garage with adjacent residential apartments on the west and south sides on each of these levels, and floors 8 to 23 will be commercial office space.

4.1.2 Plaza Parking Garage

Directly adjacent to the south of the Exelon building will be a new single level parking garage of approximately 71,000 sf with a structural deck supporting the new landscaped plaza, roads and sidewalks (Drawing DDP -A1.00.02). The garage will be at Elevation +13.75 msl on the northern edge sloping up to Elevation +14.75 msl on the southern end.

4.1.3 Transfer Station Revisions

The existing tank room and maintenance room of the Transfer Station will be retained, modified as required, and incorporated into the design of the new Exelon Trading floor garage structure. The support sections (i.e., office, conference rooms, etc.) of the existing building will be demolished during construction and new spaces will be reconstructed within the first floor level of the new structure (Drawing DDP- A1.31.00). A dedicated indoor loading dock for the Transfer Station will be constructed in the

lower level of the building on Dock Street. New, double walled piping will be installed connecting the new loading dock to the existing storage tanks.

4.1.4 Roadways & Plaza

This first phase will include the design and construction of new roadways, sidewalks, site utilities and related amenities (landscaping, signage, street furniture) along with the new pile supported elevated Central Plaza (see Drawing DDP-C4.00). Utilities from Central Avenue Bridge and Caroline Street access the site from the Dock Street and Wills Street. Dock Street and Wills Street grades are constructed of earth fill to provide for utility burial.

The MMC and Hydraulic Barrier remedial components underlie the south half of future Dock Street. Because compressible materials underlie Dock Street, a pile supported platform will be constructed to support the MMC, HMS, and earthwork fill. A retaining wall and platform structure will be constructed at the north side of Dock Street to retain fill and allow raised grades at the Point Street intersection with Dock Street. Point Street sloping up from the new Central Avenue Bridge to the new Central Plaza will be a structural deck above the Central Plaza Garage. Wills Street south of Dock Street will transition from earthwork fill to a structural deck above the Central Plaza Garage. Trees in the Dock Street and Wills Street fill will be planted in concrete planters to restrict root migration to the underlying MMC.

Shallow cutoff sheeting will be placed at the north edge of the Dock Street pile supported platform. The sheets will be connected to the platform for vertical and lateral restraint. The cutoff sheeting will retain soil surrounding the soil-bentonite barrier and provide embankment stability during utility excavations and pile driving for the new Central Avenue Bridge.

4.1.5 Central Avenue Bridge

A new vehicular bridge will be constructed connecting Harbor Point with Central Avenue to the north. The bridge will be completed under a Baltimore City Department of Transportation (BCDOT) Design/Build contract. The proposed bridge will land on Harbor Point at a bridge abutment off Site with a roadway connection to the Site at the intersection of the new Dock Street and Point Street. The bridge will also include the extension of the Promenade connecting the existing Promenade on Lancaster Street to the planned Promenade on the Site, which will be designed and constructed in a future phase. A temporary promenade

connection will be constructed as required by Baltimore City around the west end of the Site. Although the limits of the bridge are off Site, the Design/Build RFP will include historical and regulatory documentation for the bridge contractor to understand controls and standards applicable to working within the vicinity of the ERS.

Future Central Avenue Bridge construction requires foundation construction outboard of the HMS deep hydraulic barrier and former Honeywell bulkhead structure. The use of closed-end driven high capacity pipe piles has been recommended, but this work will be produced under City jurisdiction, and cannot be controlled by the development. The Exelon project will implement three key features to isolate the bridge foundation construction from the HMS and MMC:

1. First, a sheet pile barrier will be installed to augment the existing Soil Bentonite (SB) Barrier (i.e., the Hydraulic Barrier component of the ERS) to prevent pile driving energy from influencing barrier performance.

2. Second, a cutoff sheet pile will be placed outboard of the SB Barrier to support the existing SB barrier during pile driving. The top of the cutoff sheeting is pinned to the Dock St. platform and the toe of the cutoff sheeting is embedded in natural sand below the embankment. The cutoff sheeting will confine the embankment fill supporting the SB Barrier and separate the embankment slope from the barrier. The cutoff sheeting provides a discontinuity which will isolate the SB Barrier from any embankment slope movement resulting from this work.

3. Third, a structural platform will be placed to support the existing HMS Vault 11, Vault 12, MJ-1, and conveyance lines, and a new structurally supported MMC. The existing HMS conveyance and pumping systems are inboard of the former bulkhead, so that they are isolated from the bridge foundation construction.

These features isolate future Central Avenue Bridge construction from the remedy and provide independent support for the HMS and MMC; future bridge construction will not impact the HMS or MMC.

4.2 SCHEDULE

The construction schedule is provided in Appendix D. EPA and MDE will be provided updates to the construction schedule immediately upon revision. Project milestones are listed below:

- Pile Load Test – May, 2013 ("Off-Cap" and completed);
- Detailed Design Plan (i.e., the DDP), including a draft Air Monitoring Plan – Revision submitted to Agencies on November 12, 2013;
- Engineering Evaluation – Revision submitted to Agencies on November, 12 2013;
- Approval of the DDP – Subject to EPA and MDE approval;
- Pre-Construction Air Monitoring Plan– Subject to EPA and MDE approval;
- Pre-Construction Air Monitoring Sampling and Analysis Plan (SAP) – Subject to EPA and MDE approval;
- Construction Air Monitoring SAP – Subject to EPA and MDE approval;
- Air Monitoring Program Quality Assurance Project Plan (QAPP) – Subject to EPA and MDE approval;
- Construction Air Monitoring Plan – Subject to EPA and MDE approval;
- Commence Approved SAP and QAPP for the Pre-Construction Air Monitoring – Subject to EPA and MDE approval;
- Submit Construction Air Monitoring Plan, incorporating the results of the Pre-Construction Air Monitoring – Subject to EPA and MDE approval;
- Relocation of temporary Transfer Station – January 2014;
- Commence foundation construction – January 2014;
- Commence Garage/Tower superstructure –May 2014;
- Commence Roads, Utilities, Site Garage – October 2014;
- Construction of new Transfer Station Office – June 2015;
- Substantial Completion – December 2015.

5.0 DEVELOPMENT IMPLEMENTATION ACTIVITIES

5.1 EARTHWORK

5.1.1 Excavations

The synthetic layers that comprise the MMC will be opened within the pile cap excavation zone. The MMC synthetic layers will not be disturbed between the new pile caps. The new pile caps and slab will have a new geomembrane sealed at each pile pipe penetration. The exposed MMC geomembrane will be protected while piles are installed. A new geomembrane will be placed after the piles are installed. The existing cover soil will remain in place to protect the MMC synthetic layers.

Tower cranes will be supported on independent pile foundations separate from the building piles. The crane support piles and pad will be constructed after installation of the sheet pile barrier and located so as not to interfere with the operation of the HMS.

The tower crane pile construction and cap interface will most likely be identical to building piles. Potential tower crane pad locations are shown on Drawing DDP F1.15. Tower crane piles and pile caps will be left in place. Crane Loads will determine pile pattern. The typical pile cap detail (as shown on Drawing DDP F1.50) for the appropriate number of piles will be used.

Final crane pad locations and pile layout will be provided in Contractor Work Plan Submittals. Crane locations are somewhat flexible and support pads provide few restrictions on area covered. The crane pad and pile locations will be laid out to bridge over the HMS components. The HMS components will be marked in the field where piles are driven within 15 feet of the HMS. In addition, drawing DDP F1.01 General Note 5 has been clarified to read as follows: "General Contractor shall verify and mark location of all existing utilities and structures within 15 feet of the work before starting construction."

If the final crane pad location ends up over some portion of the existing HMS, the pad will be designed to bridge over the HMS and the pad support piles will be located so that they maintain a minimum distance of 3 feet from the HMS. The piles will be left in place after the tower crane is dismantled (see Drawing F1.15 for crane pad location).

Excavation of the MMC cover soil will be required in all areas where foundations are constructed. Excavation will be performed with machine and labor methods to protect the synthetic layers.

Below the planned Exelon Trading Floor Garage, the MMC will be removed at individual pile cap locations. Below the Exelon Tower the cap will be excavated over a larger area where the future shear wall foundations will be constructed below the tower. Excavation will include demolition and removal of abandoned historic foundation and concrete floors that were left in place below the MMC. See Drawing DDP - F1.13 for obstruction locations and obstruction management requirements. Excavations will extend where necessary for obstruction demo or removal to drive piles and place pile caps below the MMC.

Suitable excavated materials may be used for backfill to fill voids left from obstruction removal below the repaired/restored MMC. Excavated clean cover soil from above the existing MMC will be temporarily stockpiled and covered daily in a controlled area for subsequent testing and beneficial re-use as "clean" fill above the MMC. Excavated materials from below the MMC will be direct loaded into lined, sealed containers for off-site disposal at an approved RCRA facility per the Material Management and Handling Plan (Appendix B). Workers engaged in these activities will follow the project-specific health and safety plan.

The excavations will be performed with a sequence and process designed to minimize storm water runoff and accumulation in excavations, to protect against dust generation, and to control exposure of Cr(VI) impacted soil from below the MMC to workers and clean materials above the MMC. The excavated surfaces will be covered with suitable excavated cover soil to reduce the potential for human contact and dust generation from impacted soil. The excavation slope will be covered with a geotextile for stability and protection.

Piles will be driven through the clean cover soil work surface. The clean soil will be left in place below the new development cap synthetic layers, capillary break layer and structural slab. See detailed pile cap construction sequence on Drawings DDP-F1.30. Other dust controls, such as wetting, will be used to manage and mitigate dust as appropriate.

5.1.2 Dewatering (Groundwater and Surface Water)

EE Memorandum No. 2 provides an analysis of storm water management under existing conditions, during construction, and post development. Surface water runoff will be diverted away from the excavations using diversion berms during construction (Drawings DDP-F1.30 and F1.31).

Direct rainfall on disturbed construction sites will be contained from adjacent areas using containment berms. Suitable excavated cover soil may be used for berm construction per the Material Management and Handling Plan (Appendix B).

Storm water infiltration into the cap is collected in the synthetic drainage net above the geomembrane. The drainage net layer will be dammed on all faces along excavation perimeters (temporary and permanent details on Drawing DDP-F1.30). After the MMC geomembrane is removed, storm water collected in excavations will be managed to control water that contacts soil beneath the membrane from rising above the membrane. Storm water in the excavation will be collected, stored, and tested to determine disposal criteria pursuant to EE Memorandum 2.

Calculations for storm water collection for several open excavation scenarios required for the pile foundations as a result of a 25-year storm and 100 year flood are provided in the EE Memorandum No. 2. Water collected during construction storm events will be stored in tanks for testing to determine if it meets discharge criteria or must be managed as a waste requiring off-site transport and disposal. Separate tanks will be used for storm water collected above temporary membranes and storm water collected below the MMC synthetic layers. A general construction discharge permit will be obtained from MDE to establish discharge requirements for applicable constituents.

A storm drain outfall to the Baltimore Harbor will be constructed just east of the future Central Avenue Bridge landing at the elevation of low tide. The storm drain pipe is intended to carry storm water from the Central Plaza elevated deck and Trading Floor Garage roof. The storm drain will cross the hydraulic barrier at the intersection of Wills Street and Dock Street, and will continue to the west, outboard of the hydraulic barrier, in the Dock Street right of way. Compressible clay below the future Dock Street cannot support the planned fill and storm drain utility. A low level structural platform will be constructed east of the Point Street intersection to support fill and utilities. The low platform construction area will be within a sheet pile enclosure. Pumping will be required for platform and pipe construction. The perimeter sheeting will close with the underlying clay to provide ground water cutoff from the shallow Harbor water, but will not penetrate Stratum M. HMS outboard piezometer OP-11 is within the planned dewatering sheeting. This piezometer is isolated in Stratum S-4 below Stratum M. Dewatering for outfall construction may reflect in the piezometer, and trigger HMS pumping in this area. However, the pumping is anticipated to be a short-term construction need and not a permanent condition.

5.1.3 Obstruction Removal

Concrete floor slabs, footings, and asphalt are expected below the existing MMC at many new foundation locations. These obstructions will be removed at pile locations, and where they interfere with pile cap geometry. Otherwise, abandoned foundations will be left in place below the future structures. Pit excavations will be used to determine the presence of obstructions to pile driving at the time of excavation. MDE-approved erosion and sediment control procedures will be followed to provide containment of open excavations.

At the planned Exelon Tower and Garage foundations, piles may be moved a few feet to avoid obstructions, but the pile cap may require enlargement to accommodate the wider spacing and provide column support without eccentric loading. At every pile cap location the MMC will be removed to allow obstruction demolition. See note on Drawing DDP F1.13. At the Plaza Garage, obstructions will be demolished or removed to provide for pile placement at the garage structure plan location.

Anticipated deep obstructions are indicated on Drawing DDP F1.13. Soil removal will be performed to manage displacement of the MMC surrounding each planned Plaza Garage pile as a consequence of pile penetration. The soil will be managed as described in the Material Management and Handling Plan in Appendix B.

Shallow obstructions will be broken up and left in place or removed to an approved off-site disposal facility at the time of excavation. Abandoned groundwater wells exposed during the excavation that present an open annulus (i.e., wells not previously abandoned in place) will be properly abandoned in-place or removed, as required, following Maryland's COMAR 26.04.04.11 – Abandonment Standards. Dynamic hoe-ram or spud driving will be used to demolish obstructions encountered during pile driving. Excavation and removal will be used where necessary and will be performed with a sequence and process organized to protect against dust generation and cross-contamination of the cover soil as shown in Drawings DDP EN1.01.

5.1.4 Fill Placement / Raised Grades

The building structures and ground floor slabs of both the planned Exelon Tower and the Trading Floor Garage will be pile supported so that future settlement is mitigated. Estimated settlement due to raised grades is provided in the EE Memorandum No. 1.

Construction sequence and details for the "new MMC" referenced are detailed in Drawings DDP F1.23 and 24, citations and clarifications have been added to the DDP text. The "new MMC" is connected to the existing MMC at the Valley Drain using Detail 4 on Drawing DDP F1.24. Foundation piles and pile caps will connect to the existing MMC as detailed in Drawings DDP F1.30 and F1.31.

Fill may be placed to raise grades in a few areas, including Wills Street and Dock Street. Fill materials may be recycled cover soil or imported clean soil or special aggregate. Imported fill materials placed above the synthetic layers must be deemed suitable and acceptable by the Field Engineer prior to placement. HMS components (vaults and piezometers) affected by the new grades will be modified or replaced to ensure access (Drawings DDP EN1.05, EN1.06 and EN1.06.01. Documentation requirements of imported soil are described in the Material Management and Handling Plan provided in Appendix B.

The historic waterfront perimeter of the former Baltimore Works site was constructed in the late 1800's by placing fill over compressible sediment to make land. Compressible soils and timber bulkhead structures are present at the site perimeter, outboard of the historic shoreline. The location of compressible soils is illustrated on Drawing DDP F1.12.

In the vicinity of the existing Transfer Station and Dock Street, surcharge fill was used to pre-load the compressible deposits and the bulkhead structure to reduce settlement of the HMS system, MMC and Transfer Station. The extent and magnitude of preloading are provided on Drawing DDP F1.12. The HMS and MMC were placed after the pre-loading. The pre-loading allows for fill placement for development with minimal risk of differential settlement if the development fill load is below the pre-load (EE Memorandum No. 1).

Arching of soil overburden to the timber bulkhead frame may have prevented consolidation of Stratum O clay present below the bulkhead as discussed in the EE Memorandum No. 1. Degradation of the timber frame with time would result in compression of the clay and settlement of the HMS, MMC, utilities and street. A pile-supported concrete slab is proposed above the abandoned Dock Street Bulkhead to support the HMS and MMC and development infrastructure (Drawing DDP F1.40; EE Memorandum No. 9). The pile-supported concrete slab will be constructed above the existing MMC synthetic layers, which will be abandoned in place. The HMS and a new MMC will be supported on the new structure, the construction sequence for abandonment of MMC in this area, construction of the pile supported concrete slab and construction of replacement MMC is detailed on Drawings DDP F1.23 and 24 . This design prevents sheet flow runoff from the drainage layer along the Dock Street perimeter as discussed in EE Memorandum No. 3. A new "valley drain" will be constructed up slope of the new Dock Street platform to replace/augment the existing "toe drain" which discharges infiltration to the embankment at sampling point SSMP-4. A new SSMP-4A will be established west of HMS Vault 11 to allow sampling of water collected in the valley drain (see Drawing DDP EN1.01 and Section 6.3.2, below).

Existing settlement monitoring point MP-1 at the intersection of Dock Street and Point Street will be abandoned, as the HMS and MMC structures will be supported on the new Dock Street platform in this area. A new settlement monitoring point MP-1A will be added below the Wills Street fill (see Drawing DDP EN1.01 for the planned location of MP-1A).

Observations for settlement of remedy features will be performed during construction. Up to two-to-four inches of settlement will be allowed, as long as the geomembrane or HMS conveyance piping is not compromised and positive slope is maintained for drainage within the synthetic drainage layer above the geomembrane (see EE Memorandum No. 3 for analysis). Where differential settlement occurs the synthetic layers will be exposed for inspection or repair, or addition of new synthetic layers in localized areas as appropriate (see Section 7.2.5 for settlement monitoring).

5.1.5 Cap Settlement Estimates and Importance to Cap Function

Fill placed in street areas of the proposed development reaches Elevation +18 msl (9 ft. of fill) at the intersection of Dock Street and Point Street and to Elevation +15 msl (4 ft. of fill) at the intersection of Dock Street and Wills Street. Utilities will connect to existing systems at Caroline and Dock Street, and new services will be provided at Dock Street and Point Street from the new Central Avenue Bridge. Significant portions of the

Site are underlain by compressible clay deposits. In some areas of Dock Street and Wills Street, the compressible deposits were improved by pre-loading before MMC construction. The pre-load areas and grades are outlined on Drawing DDP-F1.12. The HMS and MMC at Dock Street were placed over an abandoned 1890's era low water timber bulkhead structure. The SSMP requires settlement monitoring in this area. Where the raised grades are below the maximum pre-load elevation, the settlement will be negligible. Where the raised grades are higher than the pre-load or where there was no pre-load constructed, settlement under the planned grades will be unacceptable. If the abandoned timber bulkhead were to degrade with continued aging, settlement is estimated to range from 1 ft. to 2.5 ft. (EE Memorandum No. 1).

The development will use structural decks or will support fill on pile supported platforms where the pre-loading was not performed and where pre-load grades were lower than the proposed new grades:

1. See drawing DDP-F1.43 for location and DDP-F1.52 for Sections and Details of retaining wall and protective slab.

2. A pile-supported concrete slab will be constructed above the abandoned Dock Street Bulkhead from Vault 11 to MJ1 (Drawing DDP F1.40). The Dock Street structure will support fill at the Dock Street and Point Street intersection and will be the foundation for retaining walls at the edge of the fill. HMS vaults V11 and V12, and junction manhole MJ1 will be supported on this structure. HMS conveyance lines from vault V11 to MJ1 will also be supported on this structure. Synthetic layers of the MMC will be placed on top of the slab, and cover soil will provide the development street grades. This improvement reduces the risk of settlement to the HMS and MMC remedy components. Settlement monitoring point MP1 will be abandoned (Dock and Point St), and a new settlement monitoring point will be established over the HMS conveyance lines below the Wills Street fill. The new structure will be constructed above the existing membrane, and will obstruct MMC drainage net discharge to the toe drain. A collection pipe will be placed upslope of the new Dock Street structure to convey drainage net water to the perimeter toe drain or the embankment. A new sampling point for toe drain discharge will be constructed west of vault V11 (SSMP4A). See Drawing EN-1.01.

3. Lightweight Fill to Reduce Settlement

   Lightweight expanded shale aggregate or geofoam polystyrene block materials may be used to raise grades and reduce the weight of fill. Lightweight materials will be used above the elevated deck of the Plaza Garage, but are not contemplated in the present design for foundations and fill placement on the MMC.

5.2 FOUNDATIONS

Foundation selection was dependent on the subsurface conditions. Geologic sections are provided in Drawing DDP F1.11 and boring locations on Drawing F1.10.

Cap penetrations are needed for piles and pile caps. The developed cap below buildings and pile caps will be constructed in accordance with the feature requirements found in Table A of Appendix A.

5.2.1 Pile Selection

Piles will be closed-end pipe piles filled with concrete and capped with epoxy filler or steel plates, similar to the environmental piles utilized for the Thames Street Wharf structure on adjacent Area 2. Piles will be driven in clusters below columns, and large groups of piles will be placed below shear walls. Pipe piles are also proposed for the one-story Plaza Garage a single pile will be located at each column (concentric pile) to alleviate the need for pile caps, to reduce excavation below the geomembrane. A pile load test was performed to determine the most technically suitable and cost efficient pile. The pile driving and static load test program was performed to determine the performance of two pipe pile options (diameters, 16 inches and 18 inches with 0.5 inch wall). Dynamic PDA tests and static load tests demonstrated the 16 inch pipe pile can support allowable loads up to 250 tons and the 18 inch pipe pile can support allowable loads up to 287 tons.

Pipe piles will bear in Stratum M clay or the underlying Stratum S-4 sand and gravel. Penetration of Stratum M clay is not of environmental significance in Area 1, which is enclosed by the hydraulic barrier and is managed by pumping to maintain an inward gradient. However, the closed-end environmental pipe pile will allow the clay to seal the penetration due to high smooth wall and earth pressure resulting from soil displacement during pile driving.

Pipe piles will be filled with concrete for structural purposes. The concrete fill also prevents vertical conductance of water, which may penetrate the casing wall. High Strength Epoxy or steel plates will be placed as an evaporation barrier at the top of each pipe pile to reduce evaporation and the potential for capillary uptake of chromium from the pile to the concrete pile cap.

The Honeywell HMS piezometers and pumps will be used to control the water table, which will prevent a general rise in the water table as piles are placed. Water table control is provided with the standard inward gradient algorithm for operation of the pumps. In addition, construction pumps will be available to dewater open excavations to remove storm water and construction water to prevent a water level rise to the MMC (DDP §7.2.3). Each pipe pile will displace soil and ground water, causing a temporary rise in the water surface local to the pile.

The planned neat pile volume driven below the water table will displace approximately 700,000 gallons of groundwater: 150,000 gallons is in the lower confined aquifer (Stratum S-4) and 550,000 gallons is in the shallow aquifer (Strata S-1 and S-2). This displacement occurs over a 4 month period anticipated for pile installation. This total displacement would cause the ground water elevation to rise 6 inches if contained within the development area, and 2 inches if contained within the entire site. However, the head maintenance system will continue to operate during construction to manage the inward gradient and prevent a violation of the Performance Standard of a positive gradient greater than 0.071 feet on a 30 day rolling average of hourly gradient measurements. Local to pile driving, pore water pressure may increase due to pile installation. This water pressure will dissipate with time as water flows away from the pile. The lowest pile cap subgrade is 3.5 ft above the groundwater level managed by the HMS system. In this area, groundwater levels will be monitored during pile driving by open standpipe installed at Elev. +1 over 6 in of clean gravel. Water will be collected and removed if the water surface rises within 2 ft of the interim cap subgrade (See Drawing DDP F1.01 Earthwork Note 9.

5.2.2 Pile Caps

Reinforced Concrete Pile caps will be placed below columns at the interior and perimeter of the planned Exelon Tower and Trading Floor Garage. The bottom of the majority of the pile caps is below the general membrane elevation surrounding the pile cap. Pile caps will be protected against potential chromium uptake by a new geomembrane and underlying capillary break. Infiltration in the drainage net will be permanently isolated from the pile cap depression.

5.2.3 Shear Wall Foundations

Shear wall pile caps will be placed below the planned Exelon Tower core and by the east wall of the Trading Garage to provide overturning resistance for the tower. The shear wall pile caps will be as thick as 8 feet. The elevator pits will be within the cap thickness. (For plans and sections of shear wall foundations see Drawings F1.50 and F1.51.)

Pile penetrations will be sealed with geomembrane boots. The boots will be mechanically clamped to the pipe pile wall with a gasket material between the pile and the boot. The boots will be welded to the geomembrane sheet by extrusion welding. The geomembrane will be supported on grade. Settlement is not anticipated to create a concern because the excavation required for shear wall pile cap construction substantially unloads the underlying clay. For more detailed construction sequence see Drawing DDP-F1.30.

5.2.4 Slab on Grade

The one story deck of the Central Plaza Garage and the platform structures on Point Street and Wills Street will be supported on "concentric" pipe piles. Equipment used to construct these elevated structures will be constructed using the existing cover soil thickness to support construction equipment. After the upper deck is completed, the cover soil will be removed for construction of the garage floor. The reinforced slab will provide mechanical protection and management control against geomembrane damage. The garage floor will be a 5-inch thick, 5,000 psi reinforced concrete slab on grade. The 5-inch thick slab has been demonstrated to be capable of supporting the rear axle of a tow truck with automobile in tow, with a significant margin of safety against punching. Larger loads are not feasible because the garage space has a 7 ft. high headroom limitation. With reinforcing bar, the slab will perform to distribute wheel loads even with cracking. A 1-inch thick polystyrene insulation board will be placed below the slab on grade to protect the geomembrane against thermal expansion and contraction. For a detailed construction sequence see Drawing DDP F1.31.

EE Memorandum No. 6 provides an assessment of the Slab-on-Grade Development Cap at Central Plaza Garage.

5.2.5 Shallow Foundations Above the Cap Synthetic Layers

Shallow foundations may be constructed above the synthetic layers of the cap to support light-weight structures (with maximum bearing stress of 2,000 pounds per square foot (psf)), at the drainage net). The cover soil

will also support pipes and conduits, with the protective concrete slab below.

5.2.6 Structural Ground Floor Slabs

Ground floor slabs in the Exelon and Trading Floor Garage structures will be supported on the pile caps and shear wall foundations, which support the overlying structure.

5.3 UTILITIES

5.3.1 Site Utilities (General)

The site utility systems include storm drains, sanitary sewer, domestic water, natural gas, electric and telecommunications. Their alignments will generally follow the proposed roadway network, connecting the planned building/garage to the public infrastructure in Caroline Street, Central Avenue, or discharging to the Inner Harbor (Patapsco River). A detailed utility plan is provided (Drawing DDP – C5.10) showing the planned utility network connecting the planned on-site utilities between the development parcel and existing utilities adjacent to the Site.

The first phase of the development will provide service to Area 1 and includes utility infrastructure that will serve future development parcels as well. The DDP utility profile design is focused on minimizing disturbance below the existing MMC geomembrane. The potential for disturbance below the existing MMC geomembrane has been considered during design for the proposed site utilities. Contingency details are provided for modifying the geomembrane layer and restore the MMC where the utility vertical profile will require a "clean" corridor under roadways for future maintenance or repair. Clean utility corridor(s) will be constructed (Drawing DDP-F1.32) where utilities are placed below the existing MMC geomembrane. No utilities will be installed beneath the existing or reconstructed MMC geomembrane layer. EPA and MDE will be contacted via telephone and electronic mail prior to initiating utility construction requiring intrusive activities.

The majority of utility work required for this phase of development is within 30 feet of the centerline of the hydraulic barrier. All utilities will have service connections crossing over the hydraulic barrier and the HMS system. The vaults provide access for maintenance and replacement of HMS and wiring components, which are under the geomembrane (Drawing DDP-EN1.05). Protective slabs and concrete bridge over the S-B

Barrier for utility crossings are shown on Drawing DDP F1.20 and sections and details on DDP F1.21 and DDP F1.22.

The bottom of the MMC will be lowered to Elev. +5±. Generally, storm event high water rises to Elev. +3. The Elev. +5 barrier provides ample freeboard against the typical high water level. The sheet pile barrier is embedded into the Dock St. concrete platform. This contact closure will provide a physical barrier to protect against occasional high water and storm events. The lowered barrier will not adversely impact barrier performance and will not increase the water volume collected by the HMS system.

5.3.2 Sanitary Sewer

The sanitary sewer will discharge into a force main in the parking garage. The site sanitary sewer line will pick up at the east wall of the planned garage. Under this phase, the Exelon building sanitary sewer service will be routed through the garage to the intersection of Block/Wills Street. The sanitary line will then connect into the existing sanitary sewer in Block Street. In the future, a 12-inch sanitary line will collect additional service connections and direct all flow through a gravity system east on Block Street to an existing 12-inch sanitary line at Caroline Street). The projected Master Plan sewer demand has been submitted to Baltimore City so that they can evaluate the capacity of the downstream public sanitary sewer system.

5.3.3 Storm Drain

A storm water management analysis was completed in 2007 and approved by Baltimore City Department of Public Works. An updated storm water management analysis was completed in 2013, which has been submitted to Baltimore City for review. The quantity control goal of the storm water management plan is to discharge storm water, to the greatest extent possible, directly to the Harbor in lieu of discharging to the Caroline Street storm drain system. For the portion of Harbor Point that must drain to Caroline Street, the goal is to maintain runoff levels at existing conditions or no greater than a 10% increase.

Storm drainage will be collected in catch basins above the Central Plaza portion of the planned parking garage and pumped to the northwest and southeast outlet points. From there, the 24-inch to 30-inch site storm drain lines will carry the drainage north and south, respectively to the Northwest Branch of the Patapsco River. Also added to this discharge volume will be runoff from the proposed building and portions of Dock and Wills Streets. New storm drain outfalls will be constructed through the existing sheet pile wall at the south end of Wills Street and the new Central Avenue Bridge bulkhead to the north to accommodate the 24-inch and 30-inch lines.

A storm drain outfall to the Baltimore Harbor will be constructed just east of the future Central Avenue Bridge landing at the elevation of low tide. The storm drain pipe is intended to carry storm water from the Central Plaza elevated deck and Trading Floor Garage roof. The storm drain will cross the hydraulic barrier at the intersection of Wills Street and Dock Street, and will continue to the west outboard of the hydraulic barrier in the future Dock St right of way. Compressible clay below the future Dock Street cannot support the planned fill and storm drain utility. A low level structural platform will be constructed east of the Point Street intersection to support fill and utilities. The low platform construction area will be within a sheet pile enclosure. Pumping will be required for platform and pipe construction.

Storm drainage will be collected in catch basins above the Future Pad Site portion of the planned parking garage and pumped to the southeast corner. From there a temporary 8-inch site storm drain will discharge the runoff at grade on the existing asphalt parking lot.

The majority of the site storm water will be discharged to proposed outfalls into the Harbor at the Point/Dock Street intersection and at the south end of Wills Street. The remaining portion of the site (Dock Street east of Wills Street) discharges to an existing 30-inch storm drains in Caroline Street, which outfalls into the Harbor to the north of Caroline/Dock Street intersection. The proposed 30" storm drain line, east of the perimeter barrier, discharging at the south foot of Wills Street is a temporary line that will be replaced when Wills Street south of the Central Plaza is constructed in the future. This temporary line will be perforated to allow storm water runoff collected from the Central Plaza area to recharge groundwater levels east of the SB wall (Area 2).

As the grading plan Drawing DDP-C5.20 shows, runoff will sheet flow away from the open faces of the temporarily above-grade parking garage. This will be achieved by installing temporary low (1 to 3 feet) mechanically stabilized earth walls along the edge of the garage to

transition from existing cap grade outside the garage (i.e., Elevation +15 msl) down to the proposed garage grade (typical Elevation +13 msl), see Drawing DDP-F1.40 for plan and DDP-F1.54 for section. Storm drainage collection basins and eight water-tight sumps with pumps will be located within the garage as shown on Drawing DDP-A1.00.01. The sumps will be sealed within a small depression below the MMC geomembrane. Details for the construction of the sump will follow pile cap penetration details on Drawing DDP-F1.30.

5.3.4 Domestic and Fire Water

A 12-inch fire/domestic water loop is proposed off the existing 12-inch line in Caroline Street, making connections at the Dock Street/Caroline Street intersection. An extension across the proposed Central Avenue Bridge was also requested by Baltimore City. The proposed on-site water main loop will continue up Dock Street to the planned Central Avenue Bridge, up Point Street, up Wills Street and run the entire loop of the Central Plaza roadway. Service connections will be made as necessary. The line requires a minimum 4 feet of clean cover; however, if this cover cannot be maintained, alternate measures will be proposed such and heat tracing and/or insulation. The water main will also feed fire hydrants positioned around the site in accordance with Baltimore City standards.

5.3.5 Gas

A gas main extension will serve the development from the public main in Caroline Street with connections at the Dock Street intersection. The gas main extension in Dock Street will serve the northern half of the Site. A future Block Street extension will serve the south half of the Site. Service connections will be made as future development parcels are completed.

5.3.6 Electric and Telecommunications Conduits

Electric and telecommunications conduits will be looped through the Site from Baltimore City and Verizon duct banks at the intersections of Caroline Street with Block and Dock Streets. An additional duct bank extension across the planned Central Avenue Bridge is being considered that would connect with existing utilities in Central Avenue.

5.3.7 Diesel Fuel Storage During Construction

Fuel storage for construction equipment will be performed in accordance with regulations for containment and management. Construction equipment will be re-fueled within secondary containment as described in the Spill Prevention and Response Plan (SPRP). This secondary

containment is shown as a portable "collapse-a-tainer" system described as a Temporary Loading Dock on Drawing DDP-EN1.03.

5.4 ROADS, STREETS AND PARKING

The proposed roadway network connects to the surrounding existing roadway network. The proposed roadway network will also provide access to the ERS components below grade in these areas (i.e., hydraulic barrier and HMS System). All proposed roadways are 2-lane, 2-way except around the Central Plaza and the Central Avenue Bridge. The loop around the Central Plaza will be a 2-lane, 1-way road. The Central Avenue Bridge will be a 4-lane, 2-way road, facilitating traffic flow in and out of the Site. Parking will be provided via parallel parking spaces at street level and in proposed/future parking garages (Central Plaza Garage and Exelon Trading Floor Garage under Phase 1 Area 1).

The anticipated everyday users of the Site are vehicles as large as HS-20 delivery trucks down to passenger vehicles. A truck route will be proposed which excludes the loop around the Central Plaza.

Although the loads imposed by everyday vehicles are not a concern, extraordinary loading, such as from construction vehicles is an important consideration for the roadway construction. Record drawings indicate that portions of Wills Street and Dock Street already have protective concrete bridge slabs constructed over the hydraulic barrier. These slabs will be demolished during sheet pile wall installation and then reconstructed as shown in drawing F1.22 (see Drawing DDP-F1.20 for plan view). Extensions to the existing protective slab are required in select areas shown on the Development Cap Plan (Drawing DDP-F1.60) and the Civil Plan (Drawing DDP-C4.00) to provide further stress relief for the MMC, the hydraulic barrier, and the HMS system.

5.5 STRUCTURES

The existing tank room and maintenance room of the Transfer Station will be retained, modified as required, and incorporated into the design of the new Exelon Tower (Drawing DDP-A100.01). The support sections (i.e., office, conference rooms, etc.) of the existing building will be demolished during construction and new spaces will be reconstructed within the first floor level of the new Exelon Trading Floor Garage (Drawing DDP-A1.31.00). See drawings DDP-F1.16 and DDP-F1.17 for demolition of transfer station office building, foundations and truck pad.

5.5.1 Honeywell Office Building Demolition

The Honeywell Transfer Station consists of a two-story office building, a one-story section containing a Tank Room and a Mechanical Room and a Transfer Pad. The building is of steel frame construction, and is supported on spread foundations and slabs and a mat on grade. The foundation elements bear on cover soils over the MMC synthetic layers. HMS lines pass from vault V1 in the sidewalk of Wills Street above the geomembrane through the cover soil beneath the office portion of the building to the Tank Room.

As further discussed in Section 6.3.1, the office building will be demolished while the Tank Room, Mechanical Room and Transfer Pad will be protected and maintained. Demolition will be performed selectively, with caution to avoid damage to the building portions to remain, the HMS lines, and MMC. Transfer pad demolition will be performed within the sequence of foundation construction, so that the existing transfer pad can continue to function until the final transfer pad location is available for construction.

5.5.2 Existing Structural Foundations

The foundations consist of shallow strip footings, shallow isolated column footings and slabs on grade, all of which are founded above the multimedia cap synthetic layers. All demolition work will be performed above the multimedia cap and the synthetic layers will not be exposed. The bottom of existing footing elevations are approximately Elevation +11 and the elevation of synthetic layers vary from Elevation 8 to Elevation 10. The synthetic layers in this area of the site are protected by a concrete mud mat overlain by structural backfill.

5.5.3 Stages of Foundation Demolition and Effect on Use of Transfer Pad

Portions of the foundations to remain will be protected by using saw cuts to separate from the demolition areas. Partial Demolition will be carried out in two stages to minimize effect on loading dock use.

Stage 1 Demolition will commence after temporary relocation of select HMS components is complete. Stage 1 consists of saw cutting and removing all portions of the HMS in conflict with Trading Floor Garage foundations. The existing Transfer Pad will remain functional during Stage 1 demolition.

Stage 2 Demolition will commence after pile installation in the adjacent area is complete. Stage 2 consists of removing the existing Transfer Pad. Based upon the construction schedule and sequence, Stage 2 Demolition will be performed during the winter months when the Transfer Pad use for groundwater transfer occurs more frequently. Operation of the Transfer Station during construction is discussed further in Section 6.3.3 and in the Contingency Plan provided in Appendix B. Upon demolition completion, proposed piles, pile caps, grade beams, slabs and new loading containment area will be constructed.

5.5.4 Pile Driving Adjacent to Existing Groundwater Storage Tanks and Equipment

The Trading Floor Garage structure is founded on pile foundations. The proposed piles and pile caps will be constructed adjacent to the Tank room. See Section 6.3 for the design and contingency plans regarding water storage during selective demolition and foundation construction.

Prior to pile installation, the MMC at the pile cap area will be excavated and the synthetic layers removed for obstruction demolition. After pile installation the synthetic layers will be repaired. The process of cutting and repair of synthetic layers is described in detail on drawing DDP-F1.31.

5.5.5 New Loading Dock

A dedicated indoor loading dock for the Transfer Station will be constructed on Dock Street adjacent to the transfer station (Drawing DDP-A1.31.00). New double-walled piping within conduits will be installed connecting the new loading dock to the existing storage tanks (Drawing DDP-EN1.07). The loading dock will be designed with similar features as the existing Transfer Pad to capture and contain spills or leaks, including secondary containment, trench and sump (Drawing DDP-F1.42). It should be noted that since the new loading dock will be indoors, the capacity of the trench and sump does not need to include provisions for precipitation.

The new loading dock slab will be constructed after completion of demolition of the existing loading dock and after installation of new piles and pile caps adjacent to the HMS. The new loading dock will be constructed to provide secondary containment for 5,790 gal, which is greater than the capacity of the transport tank truck (5,000 gal), see EE Memorandum No. 5 for analysis.

The new loading dock will be a structural concrete slab (approximately 57 feet long x 15 feet wide) supported on the Trading Floor Garage pile caps and grade beams. The slab will be 12 inches thick at the interface with sump pit and 15 inches deep at the perimeter providing a slope towards the sump pit to facilitate flow of potential spillage into the sump pit.

A collection sump pit 45 feet long x 6 feet wide x 2.5 feet deep will be constructed at the east side and below the loading dock. The new sump pit dimensions are shown on Drawing DDP F1.44. The sump pit provides 5,050 gallons of storage. The sloped slabs and drainage trough provide additional storage for 740 gallons.

The top of the loading dock slab slopes up from Elevation +13 at the sump pit to Elevation +13.25 at the perimeter on all four sides. The loading dock is enclosed on the east, west and south ends by walls that connect to adjacent floor slabs. On the North end the loading dock slab connects to the street. The walls on the three sides and the sloped slab in addition to the sump pit will contain a potential spill during transfer of groundwater from the tanks.

The sump pit and drainage trough will be covered with a series of metal gratings (similar to the one used at the Transfer Pad to be demolished) which allow access to the pit for cleaning and inspection. The sump pit base slab and the sump pit walls will be placed in one pour, and the loading dock slab will be constructed in a second pour to reduce the number of cold joints. Water stops will be used at all joints. In addition, the concrete for the slabs and walls will contain fiber reinforcement to control shrinkage cracking and the concrete mix design will be specified for shrinkage control. The hardened concrete will be coated with a corrosion inhibitor such as Silane Sealer or approved equal.

As substantiated by Calculation 1 in EE Memorandum No. 5, the total volume available for spill containment, including the sump pit and available storage volume above loading dock slab is more than adequate for the design spill of 5,000 gallons.

6.0 DESIGN MEASURES TO PROTECT THE ENVIRONMENTAL REMEDIATION SYSTEM

6.1 HYDRAULIC BARRIER

The perimeter hydraulic barrier (soil bentonite wall) effectively increases the efficiency for Honeywell to maintain its inward gradient obligation. To reduce vibration-related densification settlement of the S-B backfill, Honeywell requires monitoring and construction controls to curtail vibrations above 2 inches/second at the ground surface above the barrier. These same requirements prohibit installation of driven piles within 30 feet of the barrier. Other requirements include the measurement of ground surface above the barrier before and after pile driving to assess possible settlement occurrence.

The project design places piles closer than 30 feet to the barrier, and requires construction of permanent structures above the barrier alignment. Honeywell requires repair of the hydraulic barrier in the event pumping quantities increase with time. The preemptive repair designed for the redevelopment consists of driving a steel sheet pile to augment the barrier. The alignment proposed for sheet pile placement is indicated in Drawing DDP-F1.20. Details and Sections for sheet pile wall installation are provided on Drawings DDP-F1.21 and DDP-F1.22.

Steel sheet pile should be well protected against corrosion in the hydraulic barrier backfill which typically has a pH between 8 and 10, and burial in the barrier below the water table should prevent oxygen to access the steel. A corrosion rate of 0.05 millimeters per year (mm/yr.) is anticipated (Eurocode 3), which computes to complete corrosion loss of section in 170 years for standard carbon steel. An analysis of potential corrosion rates is presented in the EE Memorandum No. 4. Sheet pile joints will be sealed using a hydrophilic expansive rubber water stop. It is possible that sheet pairs will be shop welded to simplify installation and reduce the number of joints sealed on placement (EE Memorandum No. 4). Materials and Quality Control/Quality Assurance requirements are provided on Drawing DDP-F1.02.

6.2 MULTIMEDIA CAP (AREA 1)

The MMC was designed to protect against storm water infiltration, and human exposure. In the planned developed Site, overlying building structures, roadways and storm drains will remove much of the storm water load from the Area 1 cap. Overlying hard structures and

management control provided by development will protect against human exposure and errant excavation.

Where the MMC is removed for foundation construction, a new geomembrane will be placed below the concrete foundations, and sealed to the pile penetrations and existing geomembrane (Drawing DDP- F1.60 for membrane replacement locations). The existing MMC geomembrane will be connected to the geomembrane at the pile caps and the new membrane will be booted to each pile. Some synthetic layers such as the GCL, which is a backup to the geomembrane protection against infiltration and the drainage net, will not be replaced beneath the new pile caps (EE Memorandum No. 3)

The complete MMC, with all synthetic layers, will be maintained or replaced outside of the footprint of development structures. Excavation of cover soil below the warning layer will be performed with labor assistance where the synthetic layers are intended to survive construction. The synthetic layers will be protected by cutting without tension stress or tearing. Repairs will be made by extrusion welding new geomembrane sections.

The MMC will be pile supported at Dock Street above the abandoned timber bulkhead and where the underlying clays were not preloaded. This work is illustrated on Drawing DDP-F1.43. A pile-supported concrete platform will extend from the new sheet pile barrier to the inboard extent of the bulkhead frame. The existing MMC synthetic layers will be abandoned in place below the new concrete structure. The new MMC will incorporate the existing capillary break gravel and new synthetic layers (drainage net /geomembrane /GCL) with a protective concrete cover below future Dock Street.

- Construction equipment, including dozers, excavators, trucks, cranes, and other traditional redevelopment equipment, will be traversing the Area 1 cap throughout construction activities. Equipment loads will controlled so that after the load is spread through soil cover, a maximum bearing stress of 2,000 psf will be applied to the drainage net. Computations indicate the existing soil cover will spread loads from an HS-20 truck load (rated truck for Baltimore City Streets) are permitted to operate on areas where the existing 30-inch soil cover remains in place (Drawing DDP-F1.15 and EE Memorandum No. 7). A minimum soil thickness of 24 inches will be in place to protect the geosynthetic materials against mechanical damage by construction equipment. Mats and additional fill will be placed to spread construction loads to meet the 2,000 psf restriction. In some areas, asphalt will be placed to

reduce rutting to prevent thinning of the existing soil cover and control dust.

6.2.1 Excavation of Impacted Soil

Excavation of impacted soils from below synthetic layers will follow a protocol for protection of the cover soil against chromium cross-contamination, and dust generation (Material Handling and Management Plan-Appendix B). The temporary storage areas for the excavated material are shown in Drawings EN1.01 and EN1.06.01 and discussed below in Section 7.2.9.1. Soil and obstruction debris removed from below the membrane will be managed for disposal off Site. Obstructions will be broken and sized in the excavation zone to allow loading directly to lined, sealed roll-off container boxes. Suitable, non-hazardous excavated soils may be stockpiled for use to fill areas where obstruction debris are removed, or where coarse stone is placed below new membranes for construction work platforms.

6.2.2 Foundation Penetrations and Repair

A complete MMC, equal to or thicker than the MMC design section, will be provided outside of any area not covered by a development structure. Where possible, the existing MMC will be protected and used for the development cap. Connections at pile penetrations and the perimeter of pile caps will only be made to the geomembrane layer (Drawing DDP-F1.60 for locations of replacement cap).

The geomembrane will be protected against mechanical damage by providing adequate soil cover/thermal insulation (EE Memorandum No. 6). The geomembrane will also be protected by cushion geotextiles for abrasion control, mud mat for structural and puncture control, or additional geomembrane thickness. Where street Right Of Way are located on fill above the MMC, a protective concrete slab will be placed above the drainage layer to protect the MMC synthetic layers against potential damage caused by excavation for installation or maintenance of utilities (Drawing DDP F1.32).

Pile penetrations will be sealed using a geomembrane "skirt", extrusion welded to the MMC geomembrane layer, and sealed using a mechanical boot to the pile. The purpose of the skirt is to allow oversized openings in the geomembrane necessary for geomembrane replacement or resulting from construction disturbance. The boot seal for each pile penetration placed will be tested using the vacuum box method. Materials and Quality Control/Quality Assurance requirements are provided on Drawing DDP-F1.03.

6.3 HEAD MAINTENANCE SYSTEM

6.3.1 Transfer Station Design

Transfer station functional operations shall be uninterrupted during selective demolition and construction. The design provides two levels of operation. Level 1 elements are required prior to the start of construction and are maintained during construction. Level 2 elements are designed to be implemented on an as-need-basis. The sequencing and modifications for each Level are provided on Drawing DDP-EN1.02.

Level 1 describes using the existing water storage tanks located in the Tank Room by making minor modifications to the existing system, e.g. providing positive pressure inside the Tank and Mechanical rooms during potential dust generating activities immediately adjacent to these rooms. Water stored in the exiting tanks will be transferred for off-site disposal using the existing 3-inch "Kamlock" connection located on the western wall of the Tank room. Double-wall flexible hose will be connected from the Kamlock to a portable, temporary loading secondary containment system. The "collapse-a-tainer" containment system provides the portability needed to ensure water transfer operations by vacuum truck are uninterrupted.

Level 2 describes as-needed measures, e.g., during selective demolition of the offices, the water storage tanks will be kept in a "near-empty" (one-foot to tank drain pipe) bypass status. Double wall conveyance pipe will be connected from the existing Vault 1 to one of two 16,000-gallon double wall portable storage ("Frac") tanks (Drawing DDP EN1.04). The design provides 50% greater water storage capacity than the (2) existing 10,000-gallon tanks. The portable containment system described above will be utilized for transferring water from the Frac tanks by vacuum truck.

To minimize interruption and enable maximum integration, selective demolition will be conducted on the existing transfer station (Drawings DDP EN1.02, DDP F1.16 and DDP F1.17). The storage tank and maintenance rooms will remain, including walls, floor and roof. The Trading Floor Garage will be built around the tank and maintenance rooms. The loading dock will be relocated adjacent to the garage entrance for the building. It will be an isolated, dedicated loading dock, complete with walls, trench drain and secondary containment. New conveyance piping will be installed using dual contained pipe (Drawing EN1.04).

Loading dock access to the tank room is designed to allow for the handling of larger equipment through two new 4′ x 8′ doors to the existing bay door to be retained on the Tank room west wall. A set of administrative controls have been designed to segregate employees from this area during those infrequent occasions when equipment replacement is necessary. All decontamination procedures will be performed within the Tank room secondary containment.

The existing air receiver located in the existing loading dock will be relocated to the existing Mechanical Room (see Drawing EN1.07). The HVAC system on the roof will be relocated and rerouted to the exterior of the proposed Exelon Building in order to maintain the exhaust fan and other existing HVAC systems within the preserved portions of the Transfer Station. Electric service will also be relocated.

During construction, the tank and maintenance rooms will remain operational and accessible and HPD will provide temporary office, conference room, and additional support space in a mobile trailer to be located adjacent to the Site (Drawing DDP-EN1.01). A portable, temporary loading containment area will be available on the Site in the event that access to the existing loading dock becomes restricted during construction (Drawing DDP-EN1.04).

Groundwater storage will be limited to 2,500 gallons in either tank located in the Tank room during demolition and pile driving activities within 50 feet of the transfer station. Portable, 16,000-gallon capacity, double-walled water storage containers ("Frac" tanks) will be placed to the west of the existing tank room to augment storage capacity during this time. Double-wall conveyance piping will be installed from the Vault 1 to these Frac tanks to bypass the Tank room (Drawing DDP EN1.03).

Once potentially disruptive work is completed, the Tank room will be restored to full functionality by re-routing the groundwater from Vault 1 back to the Tank room as the permanent condition.

Offices, conference room, storage rooms, and other transfer station support areas will be relocated and integrated into the first floor of the trading garage Drawings A1.00.01 and A1.31.00.

6.3.2 HMS Design Changes

To avoid disruption to the HMS system during construction, and to maintain continuous operation and access to all HMS components post-construction, modifications have been designed for certain components of the HMS system including vaults, piezometers, junction boxes and

conveyance piping and electrical conduits. The specific HMS components to be affected by the development are shown on Drawing EN1.01, and presented in the table below. Details for modification of these HMS components are shown on Drawings DDP EN1.01, EN1.05, EN1.06, EN1.06.01 and EN1.09.

HMS Components	**Conflict**	***Resolution***
<u>Vaults:</u>		
V1	Elevation	*Extend access riser to new road elevation*
V2	Elevation	*Reduce vault (wall) height to new road elevation*
V11	Timber Piles and Bulkhead/ Elevation	*Support vault on pile supported platform. Extend access riser to new road elevation*
V12	Timber Piles and Bulkhead/ Elevation	*Support vault on pile supported platform./Extend access man-way riser to new sidewalk elevation*
<u>Manhole Junction:</u>		
MJ1	Timber Piles and Bulkhead/ Elevation	*Support MJ1 on pile supported platform. Extend access riser to new road elevation*
<u>Piezometers (PZ):</u>		
IP-1, IP-1S, OP-1, OP-1S	Elevation	*Reduce PZ height, adjust conduits and cables*
IP-2, IP-2S, OP-2, OP-2S	Elevation	*Reduce PZ height, adjust conduits and cables*
IP-11 and OP-11	Elevation	*Extend PZ height, adjust conduits and cables*
IP-12 and OP-12	Elevation	*Reduce IP-12 and extend OP-12*
<u>Junction Boxes:</u>		
JB-1	Elevation	*Replace box, adjust cable and conduits*
JB-2	Elevation	*Replace box, adjust cable and conduits*

HMS Components	Conflict	*Resolution*
JB-11	Elevation/ Curb	*Replace box, adjust cable and conduits/Relocate outside curb*
JB12	Elevation	*Replace box, adjust cable and conduits*

Vault 11 (V11), Vault 12 (V12), and Manhole Junction 1 (MJ1) will be supported on the Dock Street pile supported platform. The existing conveyance lines between these structures will also be supported from the new pile supported platform (Drawings DDP F1.43 and DDP EN1.09). These HMS modifications are designed to provide long-term stability to the existing systems where fill is added to raise grades.

Vault 2 and piezometers IP-1/OP-1, IP-1S/OP-1S, IP-2/OP-2 and IP-2S/OP-2S will be located below the Wills Street platform. Access will be maintained at the Vault 2 man-way, Vault 2 service access ports and both sets of piezometers on street level. DOT rated access ports will be installed in Wills Street ramp immediately above these locations for equipment and piezometer maintenance or replacement in the future (Drawing DDP EN1.05). The existing SSMP-4 sampling point will be abandoned and relocated to the east of the current location to provide drainage net sampling during construction. A new sampling point, SSMP-4A will be installed west of Vault 11 (Drawings DDP EN1.01 and DDP EN1.06.01)

The existing methane gas vent will be relocated to avoid conflict with new construction (Drawings EN1.01 and EN 1.06.01). The vent is situated outside the Plaza Garage south wall and generally within the highest elevation area. The elevation of the geomembrane at the new vent location is slightly lower than the geomembrane elevation at the current location (Elevation +13 msl). The underlying capillary break will facilitate conveyance of any gas toward the vent. The vent is constructed as a 3-foot high standpipe with perforations at the top of the pipe that will be incorporated into an architectural feature.

6.3.3 Transfer Station and HMS Operations During Construction

The preserved portion of the Transfer Station (TS), will contain all critical operating systems necessary to store impacted groundwater conveyed by the HMS and will remain in operation throughout all phases of construction (Drawing DDP-EN1.02). In the event that the tanks are damaged or the impacted groundwater needs to be routed away from the TS, the piping in vault V1 will be modified to divert all flow from V1 to one of two double-walled water storage tanks as detailed on Drawing

DDP-EN1.04. The piping outside of V1 will be flex pipe with secondary containment.

The HMS system contains a redundant discharge pipe network. The tank storage and discharge control also have redundant capacity that will allow a high degree of operational flexibility during construction. The temporary loading dock with secondary containment and temporary conveyance pipe, which is described in Section 6.3.1, will be provided prior to construction activities in the vicinity of the Transfer Station to maintain loading operations at all times (Drawing DDP-EN1.03 and EN1.04).

As discussed in Section 6.3.1, the construction presents potential risks from dust and vibration that may impact the conveyance, electrical, monitoring and control systems of the facility. A detailed Contingency Plan (Appendix B) has been developed to address these issues and sets forth an increasing level of action based on potentially increasing levels of system inoperability. The plan takes a practical approach to mitigate operational impacts, maintain system controls, maintain data logging and minimize the risk of system downtime. It also provides a level of flexibility to adapt to changing construction requirements.

The piezometers and vaults will be operated continuously to the extent possible during construction. It is anticipated that power and controls will be severed when making the necessary height and other adjustments to the piezometer wells as detailed in Section 6.3.2 and as shown on the Drawings DDP-EN1.05 and 1.06. The downtime will be coordinated with Honeywell. Further, the downtime will be localized. In other words, only a specific set of piezometers that is being modified (and the corresponding remedial system components such as associated extraction wells) will be nonoperational, while the remaining HMS system will be operational. As such, the piezometers height adjustment will not have a significant impact on the overall HMS operation. Alternative or temporary controls and power will be provided for both the piezometers and vaults in the event that power/controls will be out of service for more than one day. Design aspects of the Contingency Plan involving the Transfer Station are shown on Drawings DDP- EN1.02, EN1.03 and EN1.04. Those items involving the HMS are shown on Drawings EN1.05, EN1.06, EN1.06.01 and EN1.09.

The Level I Contingency Plan specifies the installation of all diversion piping connections within vault V1 as detailed on Drawing EN1.03. The installed diversion connections are specified in order to reduce the conveyance downtime to less than 4 hours in order to facilitate the installation of the diversion piping from vault V1 to the frac tanks as

shown on Drawing EN1.04 and as discussed under the Level II Contingency Plan.

The quantity of water extracted will be monitored daily as a means to confirm construction activity is not damaging the HMS components. Performance reviews of the HMS components will be initiated if rapid changes in the HMS collection quantity are noted. The elevation of piezometer references will be confirmed before and after pile driving within 50 feet of any piezometer. Elevations of the vault/manhole floor below the access manhole, and levelness of the floor will be observed twice weekly when piles are driven within 50 feet of any vault or junction manhole.

6.4 OUTBOARD EMBANKMENT AND WATERSIDE PERIMETER

The Outboard Embankment is intended to provide structural support of the former bulkhead structures, now abandoned in place, and to prevent erosion of the perimeter barrier. The embankment receives discharge from the MMC drainage layer to the perimeter drain.

Shallow cutoff sheeting will be placed at the north edge of the Dock Street pile supported platform. The sheets will be connected to the platform for vertical and lateral restraint. The cutoff sheeting will retain soil surrounding the soil-bentonite barrier and provide embankment stability during utility excavations and pile driving for the new Central Avenue Bridge (see Drawing DDP-F1.43 for plan locations).

Above Elevation 10 the embankment is protected from erosion by a layer of rip rap stone. Rip rap will be removed to facilitate pile driving through the embankment. Rip rap will be replaced and chinked around the new piles to restore the integrity of the rip rap layer. Rip rap in the area of development will be visually inspected and replenished where necessary to maintain its original thickness.

The embankment receives discharge from the MMC drainage layer perimeter pipe. This discharge mechanism shall be protected during construction, and restored, as required. Outfall water sampling point SSMP4 will be modified as discussed in Section 6.3.2 and presented on Drawing EN1.06.01.

7.0 PROJECT-SPECIFIC ENGINEERING, CONSTRUCTION AND ENVIRONMENTAL CONTROLS AND MONITORING

7.1 CONSTRUCTION QUALITY ASSURANCE/ QUALITY CONTROL

The contract drawings and specifications will identify work items that require contractor Quality Control (QC) and items that require developer/owner Quality Assurance (QA). The Contractor will be required to prepare CQC/CQA Work Plans for operations that encounter the Environmental Remediation System (ERS). The Work Plan system will allow the Contractor to determine detailed means and methods for developer approval, and for the developer to control the work that protects the MMC and other ERS elements. QA/QC activities include inspections, testing, monitoring, and reporting. This subsection presents the QA activities related to inspections, testing and monitoring; reporting and documentation are further described in subsection 7.3.

The Developer's CQA team will solely participate in the quality assurance function and will not be involved in any other aspect of the construction effort. This team will, however, possess all of the credentials, capabilities, and experience of an independent design/construction oversight team. The number of interested parties involved in the Area 1 development will require separate HPD and Honeywell CQA organizations. The Contactor's CQC and the Developer's CQA team will be comprised of the positions listed below.

- Project Manager: The Contractor's project manager is responsible for overall implementation and management of QC activities.

- CQC Manager: The Contractor's CQC Manager will report to the project manager. The CQC manager will perform and/or oversee all CQC activities; coordinate CQC activities with the developer; and, maintain copies of all CQC records and test results. The CQC Manager should not have any other duties other than CQC.

- CQC Laboratory: The laboratory is an entity independent of the owner, developer and contractor located either on or off-site that is responsible for conducting tests on materials, i.e., soil, water, air and geosynthetics, to document conformance with the contract plans and specifications.

- Developer Field CQA Inspectors: Inspectors will report to the Developer's CQA Manager and will inspect major construction activities for conformance with the Contract Plans and

Specifications. Inspectors will visually observe imported materials for conformance with the specifications; obtain QC samples; observe CQC sampling; and, observe work performed on ERS components, observe CQC testing, record observations, and prepare daily reports.

HPD will provide resident QA field staff to manage, inspect and monitor construction on a daily basis throughout work that is conducted at or below ground surface, i.e., work that potentially affects the ERS. Specific QA activities are summarized below:

- Inspect the work to confirm that construction complies with the Contract Documents and Specifications. Primary work elements that will be inspected include but are not limited to the following:
    - exposure, removal or repair of any component of the MMC, including geosynthetics and soil materials; including pile penetration boot assembly and geomembrane field welds;
    - installing, modifying or relocating elements of the HMS;
    - selective demolition of the transfer station;
    - installation and operation of the temporary measures for the HMS;
    - gas vent relocation;
    - sheet wall installation through the existing slurry wall;
    - installation of infrastructure that may affect the ERS, i.e., utilities and roadways;
    - excavation within 2 feet of the MMC geosynthetics to remain;
    - installation of new MMC drainage;
    - other construction activities that directly affect the ERS.
- Prepare daily construction reports to document the work, including photographs;
- Attend progress meetings;

- Review construction submittals to confirm compliance with the design;

- Collect and coordinate QA sampling and testing;

- Review QA/QC test results, including soil compaction, geosynthetic materials testing, concrete testing, and testing of other construction materials and completed portions of the project;

- Document materials management activities, including on- and off-site operations. Confirm that hazardous, non-hazardous, and clean materials are managed separately, profiled appropriately, and verify waste manifest procedures. The quantity of waste materials (i.e., water and soil) removed from the site will be documented;

- Verify conformance with the project control plans, such as the Air Monitoring and Material Handling and Management Plans; and

- Confirm that vibration and settlement monitoring is being performed appropriately during construction activities.

Honeywell, or its designee, has the right to review and comment on Contractor's Work Plans, inspect the work, conduct inspections with EPA and MDE, submit required reports to the Agencies, and participate in progress meetings with the Agencies during construction. Honeywell, or its designee, will also have the right to issue a Stop Work notification for work that may significantly impact the ERS in a manner that is not consistent with this DDP. A Stop Work notification may be issued immediately upon learning of the potential for any significant impact to the ERS. MDE's Field Representative will be notified by the Developer's Field Representative at the time a Stop Work notification is issued to Contractors in the field. MDE's Field Representative will then contact and relay the information to EPA's and MDE's Project Coordinators as deemed appropriate by the agency's field representative. The Stop Work procedures will include the following:

- *Stop Work Notification*: written notification to stop work with a description of the issue and requirements (requirements may include time frames and/or actions associated with mitigating further impacts on the ERS);

- *Stop Work Compliance Response*: written response that describes the planned corrective measures to address the issues described in the Stop Work Notification and a schedule for implementation; and,

- *Stop Work Completion*: written notification that the corrective measures have been completed, including a description of any deviations from the Compliance Response.

Specifically, Honeywell will independently inspect the work, coordinate with the resident QA staff regarding construction activities and QA/QC results, and document the activities, accordingly. Honeywell will communicate with the developer and QA staff and document any deficiencies, potential changes, and corrective actions required to meet the performance function of the ERS and the intent of this DDP. As noted above, Honeywell may review any submittals, test results, changes, or other engineering or QA/QC documentation issued for the project.

7.2 CONSTRUCTION AND ENVIRONMENTAL CONTROLS

7.2.1 Air Monitoring and Dust Control

A project specific draft Air Monitoring Plan was submitted to the Agencies on November 12, 2013. Air monitoring will be implemented at the initiation of intrusive activities and will continue through the completion of all intrusive activities, restoration of the cap and removal of all controlled soil and debris from the Site. For the purpose of the Air Monitoring Plan, "intrusive activities" occur any time there is disturbance of the surface immediately below the MMC synthetic layers in Area 1.

Site intrusive activities shall not commence until all of the Agency required documents comprising the Air Monitoring Program have been approved by EPA and MDE, as listed below:

- Pre-Construction Air Monitoring Plan
- Pre-construction Air Monitoring Sampling and Analysis Plan (SAP);
- Construction Air Monitoring SAP;
- Air Monitoring Program Quality Assurance Project Plan (QAPP)
- Construction Air Monitoring Plan

The schedule for these activities is provided in Section 4.2, above.

The Construction Air Monitoring Plan will establish the construction air monitoring effort, station locations, project-specific background and action levels, and responses to action levels to be implemented during the Area 1 development project. It is understood that EPA and MDE can set and modify the methodologies, number and location of sampling stations, and other critical elements of the air monitoring program, if necessary.

The Construction Air Monitoring Plan will also provide a description of the methods to be utilized to evaluate field and laboratory data and reporting requirements to document the effectiveness of the dust control measures implemented during intrusive activities.

Best management practices for soil/debris handling that reduce dust generation and prevent excavation spoil deposition onto the adjacent surfaces will be implemented. The potential for dust emissions will be further controlled by misting with potable water during excavation and obstruction removal activities as needed to keep exposed soil surfaces moist. The potable water misting operation is also an effective means to control and/or intercept the migration of airborne particulates. The erection of particulate-capturing barrier fences, curtaining activities, or use of temporary coverings (tarps, fabrics, or plastic) over exposed soils, debris, stockpile cover soils, and other potential particulate-generating sources may also be implemented. Installation of dust control components will not penetrate the MMC synthetic layers in areas not designed for repair or replacement. Stockpiles of any construction, demolition or excavation materials on site that could generate airborne particles will be covered at all times, except when materials are being added or removed.

Dust control measures will be implemented during intrusive activities. Should real-time aerosol monitoring detect the unlikely occurrence of particulate concentrations above Site-specific action level at the work zone limits, additional dust control measures as appropriate will be triggered. The Field Engineer will have stop-work authority should the work conditions observed at the time require immediate mitigation.

A sufficient quantity of potable water will be maintained on the Site for dust control use. Watering equipment shall be used to minimize the potential for elevated airborne particulate concentrations and consist of wet, vacuum-sweeper trucks, water tank trucks, or other devices that are capable of applying a uniform spray of water over the asphalt paved temporary construction road surface.

The use of spray-applied foam to seal the exposed soil surface may be utilized in difficult locations to cover with construction plastic or geotextile fabric. These temporary measures will be replaced during construction by installing mudmat across the bottom and up the slopes of the excavation as shown in drawing DDP-F1.30. This more permanent condition will provide protection from potential direct contact with soil or inhalation of dust by pile driving and concrete work crews.

7.2.2 Erosion and Sediment Control and Storm Water Management

Erosion and sediment control at the Site and during construction will be addressed with conventional best management practices, which include silt fence/super silt fence, perimeter berms/swales, stabilized construction entrances, and inlet protection (Drawings C8.00, C8.10 and C8.20). Super silt fence will not be installed within Area 1 to avoid potentially penetrating the MMC synthetic layers with the required depth of the fence posts. Prior to the initiation of any intrusive activities, the erosion and sediment controls and storm water management features will be installed in accordance with the permit drawings to be prepared and submitted to the City of Baltimore under separate cover, and in accordance with the General Permit to Discharge Storm Water associated with Construction Activities, to be submitted to MDE Water Management Division under separate cover.

The Site is considered redevelopment per Baltimore City Code Division 2 Section 23-7 (a) and, therefore, recharge volume, channel protection storage volume, and overbank flood protection volume requirements are anticipated to be waived. Per the latest storm water management regulations, a combination of impervious area reduction and storm water management implementation must be utilized to provide qualitative control for at least 50% of the Site's impervious area. Preliminary analysis of the post-construction surface conditions suggests that the storm water management requirements will be met via a combination of impervious area reduction, green roof, and rainwater harvesting.

The above storm water management (SWM) summary was prepared while MDE's 2000 Maryland Storm Water Design Manual and the Baltimore City's February 2003 supplement to the MD SWM manual were in effect. In 2009 the MDE manual and the SWM requirements were updated. However, as of May 2012, the City's SWM supplement has yet to be updated and it is unclear if the new MDE regulations will be fully adopted. If they are, the SWM approach will be re-evaluated.

Additionally, erosion and sediment controls as detailed on Drawing DDP-C8.10 will be applied to individual excavations made for sheet pile, pile cap, shear wall foundation installation. Erosion and sediment controls will include the construction of temporary decontamination pads for loading excavated soil from below the MMC. The erosion and sediment controls will also include the construction of a temporary storage area that will include the ability to collect rainwater that could potentially leak from a lined, sealed roll-off container. An asphalt pad and perimeter asphalt berm will be constructed with a shallow perimeter drain to direct run-off to a sealed collection sump installed at the low point in the asphalt surface (Drawings EN1.01 and EN1.06.01).

Run-off water collected in the sealed sump will be pumped to a nearby portable, 16,000-gallon double-wall, closed-top container ("Frac" tank). Further discussion on water handling and disposal is provided in the Materials Handling and Management Plan in Section 5 – Water Management.

7.2.3 Storm Water Pollution Prevention

A Storm Water Pollution Prevention Plan has been prepared outlining the controls for erosion, sediment and storm water during construction (Appendix B).

The storm water management plan was examined for the 25-year storm event and 100-year storm event, however the storage requirements were determined based primarily on the 25-year storm event (EE Memorandum 2). When a storm event occurs, the only water that will come in contact with soil below the membrane will be storm water falling directly into an excavation. All water that falls outside of the excavations is treated as surface runoff because it will be deflected away from open excavations by diversion berms. Infiltration through the cover soil into the drainage net was assumed to not occur because the drainage net is dammed at the perimeter of each excavation. The bottom of each excavation is open to soil below membrane, so that any storm water collected in the excavation is defined as "impacted".

A sump pump will be installed in each excavation to collect storm water which does not infiltrate into the ground, to prevent it from rising to the capillary break gravel at the down-slope side of the MMC. The entire footprint of the excavation, including the sloped sidewalls, was considered to catch storm water in the excavation. Contact and non-contact water handling and testing and proper disposal procedures are described in the Material Handling and Management Plan project control document.

The sump pumps will convey water to storage tanks sized to contain 24 hours of a 25 year storm (Drawing EN1.01). A second tank will be placed to collect a second 24 hours to enable testing and disposal of the first tank. Double wall pipes will be provided for sump pump discharge.

7.2.4 Spill Prevention and Response Plan

A project-specific Spill Prevention and Response Plan (SPRP) for Area 1 has been prepared to meet the requirements of construction for this development phase (Appendix B).

In general, the handling of liquids shall be done in a manner such that contaminated material will be contained on the construction site and not allowed to flow onto on-site areas where existing environmental protections will not be disturbed, onto completed work, or off the Site as surface water discharge. Liquids include groundwater, seeps, decontamination liquids, liquids generated from subsurface dewatering activities, liquid that may have come in contact with site soils beneath the existing environmental protections exposed by the work, or liquids that may have come in contact with other potentially contaminated material.

Direct discharge of collected liquids to adjacent surface waters, ground surface, or public storm or sanitary sewer will not be allowed until appropriate characterization has been performed, including testing. Proper disposal of captured and stored liquids will be performed in accordance with the Material Handling and Management Plan (Appendix B).

Surface water monitoring will continue during and following construction per the approved EMMP. There are currently 18 monitoring locations and two background locations, which are sampled quarterly by Honeywell at low tide and analyzed for total dissolved chromium. The Consent Decree establishes a surface water performance standard of no more than 50 parts per billion of total chromium.

7.2.5 Optical Survey

Preconstruction Survey

A Preconstruction Survey documenting existing conditions of the Transfer Station tank pad, tanks and connections, mechanical room, and mechanical connections shall be performed prior to demolition and pile installation.

Hydraulic Barrier

Early in the project implementation a new steel sheet pile barrier will be installed along the centerline of the S-B barrier. This construction may cause settlement of the S-B backfill, which is desirable. As a result, the S-B barrier will not be monitored for settlement because installation of the new sheet pile barrier along the entire effected perimeter precludes the need to observe deformation of the S-B barrier.

Vaults

Masonry Survey Nails (PK Nails) shall be placed at each corner of vaults V-1, V-2, V-11, and V-12 once exposed.

Honeywell Transfer Station

The existing Transfer Station tank pad and equipment room will be optically monitored (see Monitoring Notes on DDP-F1.01) for lateral and vertical movement (Northing, Easting and Elevation) as follows:

- Monitor two points on each side of the tank pad, and monitor floor areas at 25 ft. spacing or closer;
- Monitor at two different levels on exterior walls to determine slope of wall;
- Reference readings to a stable horizontal control. Survey accuracy shall be 1/16" accuracy or better. Install crack monitoring gages on any cracks observed on the inside walls or floor of the tank pad.
- Take three baseline readings prior to demolition or pile installation within 50 ft.

7.2.6 Vibration Monitoring

Vibrations caused by pile driving will be monitored using seismographs. Vibration monitoring will be performed at the transfer station maintenance room and tank room, and HMS vaults/manholes within 50 ft. of pile driving (see Monitoring Notes Drawing DDP-F1.01).

Seismographs will record maximum peak particle velocities in three mutually perpendicular planes and its associated zero-crossing frequencies. Seismographs will be equipped with a wireless broadband modem which enables remote communication with the seismograph and

allows automatic alerts to designated field personnel when vibrations exceed the pre-established threshold value.

Based on site specific vibration data collected during the test pile program, it was determined that production piles will induce vibrations on structures within 50 feet of pile driving. Pile driving must be performed within close proximity of the HMS vaults and conveyance lines in order to pile support those structures (note that the HMS conveyance lines are flexible pipes within oversized conduits, and at present grades the vault structures are lightly loaded). Pile driving will be performed adjacent to the Transfer Station in order to incorporate that structure within the footprint of the development. A "threshold value" of 1.0 in/sec and a "limiting value" of 2.0 in/sec shall be established for the HMS structures. A "threshold value" of 0.5 in/sec and a "limiting value" of 1.0 in/sec shall be established for the Transfer Station tank pad and mechanical room. Where limiting values are exceeded, performance of the structure will be observed and evaluated, and performance of utilities may be tested. Peak particle velocities above the limiting values will be permitted if structure/ utility performance is deemed acceptable.

7.2.7 Settlement Monitoring

HMS Conveyance Pipe Alignment

Existing settlement plate MP1 will be made obsolete by the new Dock Street platform which will support the MMC and HMS systems in Dock Street on piles. A new settlement plate, MP-1A, will be placed above the HMS conveyance pipes on Wills Street where permanent fill thickness is greater than 8 ft. (Drawing DDP EN1.01).

New settlement plates will be constructed and placed with details similar to the existing settlement monitoring plates, and protected with flush mount covers at the finished grade. Construction settlement observations will be made during construction of the fill and monthly for 12 months after fill placement is completed.

7.2.8 Head Maintenance Pumping Quantity Monitoring

The water pumped from each of the 16 HMS extraction wells is monitored by a magnetic flow meter installed proximal to the well head for each location. A flow meter is connected to a Programmable Logic Controller (PLC) by a 4-20 million pulse per second analog connection and a digital pulse. This volume of groundwater extracted is reported to the EPA and MDE in the Honeywell Baltimore Inner Harbor Quarterly Report.

The volume of water removed from the tanks is logged in the MSS. In addition, the operator of the vacuum truck measures the volume of water in the tank of the truck. The resulting volume is recorded on the Hazardous Waste Manifest and in a spreadsheet maintained by plant personnel. The volume from the truck operator and the volume reported by the MSS are compared to check the accuracy of the tank level monitors and to confirm the volume removed. These procedures will continue during and after construction.

7.2.9 Material Handling & Management Plan

The Material Handling & Management Plan (MHMP) addresses the handling and management of solids (asphalt, stone aggregates, concrete and wood debris and soil) and liquids (storm water and groundwater) that may be encountered during the intrusive activities at the Site. For the purpose of this plan, "intrusive activities" occur any time there is disturbance of the surface immediately below synthetic layers of the MMC in Area 1 or below the LSC in Area 2. There is an orange plastic warning layer 12 inches above the MMC synthetic layers and LSC. Additional provisions for the proper handling of fuels and other controlled liquids are provided in the project-specific Spill Prevention and Response Plan (SPRP) in Appendix B.

7.2.9.1 Handling and Disposal of Regulated Construction Materials

Direct-loading of excavated soil/debris into lined, sealed roll-off containers is the preferred excavation and transportation method; a controlled, temporary storage area will be constructed for use in the event that excavated material cannot be transported daily off-Site disposal (Drawings EN.01 and EN1.06.01). Conditions that might prompt the use of this temporary storage area, as a contingency, are:

- Volume limit to the daily capacity of the primary and alternate off-site disposal facilities;
- Off-site disposal facility hours of operation; and
- Limited availability of long-haul trucks.

The controlled storage/decontamination area will be located in close proximity to the excavation zone required for construction of the moment slab to reduce the distance for moving containers on the dedicated, temporary construction roads (Drawing DDP-F.15). The controlled area will be an approximately 2,500 square feet asphalt 3-inch pavement section with construction mats to displace the container loading on the

MMC synthetic layers. The location of the controlled storage area is not in an area where the compressible clay stratum has been identified.

The controlled area will provide a storage capacity of ten 25-cubic yard lined and sealed roll-off containers, approximately 150 cubic yards of containerized soil/debris storage. Further discussion regarding soil/debris transportation and disposal is provided in Section 4 – Soil/Debris Handling and Management.

7.2.9.2 Imported Soil/Materials Control

In order to minimize the potential of introducing unacceptable materials onto the Site, it will be necessary to verify through documentation that imported materials are being provided from locations with a known history of the material source area. Imported materials will be provided by commercial suppliers only. Commercial suppliers shall provide a certification letter stating the environmentally acceptable historical use(s) of the material source property.

Fill documentation should include detailed information on the previous use of the land from where the fill is taken, whether an environmental site assessment was performed and its findings, and the results of any testing performed as described in the MDE Voluntary Cleanup Program (VCP) *Clean Imported Fill Material* guidance document (MHMP, Appendix B).

If there are no analytical results from testing performed by the commercial supplier, and prior to importing soil from any source, the material will be sampled and tested based on the requirements of the MDE VCP *Clean Imported Fill Material* guidance document Tables 1 and 2 (MHMP, Appendix B).

7.2.9.3 Handling and Re-Use of Site Soil

Clean soil/aggregate removed from above the synthetic layers of the MMC will be segregated from contaminated soil removed from below. Clean soil will be temporarily stockpiled within a designated stockpile area for cover soil (Drawing EN1.01). Aggregates and clean soil removed from above the MMC synthetic layers may be used below the new MMC synthetic layers. However, aggregates and granular soil removed from above the MMC synthetic layers will be sampled and analyzed prior to beneficial re-use above the MMC synthetic layers as provided in the MHMP, Appendix B. Air monitoring will be conducted at the Cover Soil Stockpile Area 24 hours per day/7 days a week. No controlled material will be stockpiled.

7.2.9.4 Transportation and Off-site Disposal

Based upon the review of the historical analytical soil data and the prior waste profile classification as D007 for materials below the MMC, it is anticipated that contaminated soil/debris generated during excavation will be disposed of at an approved RCRA Landfill. Materials will be transported off-site for disposal following written approval of acceptance from the RCRA landfill facility's representative.

Honeywell maintains a list of their approved Subtitle C landfill facilities and as such the addition of alternative, proposed disposal facilities must be pre-approved.

There are four categories of water anticipated to be managed during intrusive work, including:

- Non-Contact: Storm water diverted from contact with contaminated material below the MMC synthetic layers;
- Contact: Storm water that comes into contact with contaminated material below the MMC synthetic layers;
- Contact: Equipment decontamination water; and
- Groundwater generated by the HMS and construction dewatering.

Should storm water that has not come into contact with contaminated material below the MMC synthetic layers pond on a controlled surface (e.g., mudmat, cover soil aggregate); the standing water will be pumped to a double-walled Frac tank (Drawings EN1.01 and EN1.04). This non-contact water will be held for analytical testing results to determine proper disposal as required by the City of Baltimore.

Storm water that inadvertently comes in contact with contaminated soil below the MMC synthetic layers will be collected in a sealed sump and pumped to a separate, double-walled Frac tank.

Equipment decontamination water will be temporarily stored in the same double-walled Frac tank provided for contact water and while the Tank room is isolated during selective demolition and pile driving activities.

Off-site transportation and disposal of HMS generated groundwater to Environmental Quality, Baltimore, MD will continue uninterrupted by construction.

7.3 PROGRESS SUBMISSIONS AND REPORTING

7.3.1 Documentation

As described in Section 7.1, the Contractors QC staff and Developer's field inspection /QA engineer will prepare field records to document construction, QC, and QA activities. Weekly reports will be prepared to summarize the major work activities, work approvals, construction issues, and corrective actions. Digital construction photographs will be included in weekly progress reports in the form of CD-ROMs and posted on the Project website for public access. A schedule update will be prepared monthly. From a geotechnical perspective, field staff will document the following elements:

1. Vibration monitoring;

2. Ground and instrument settlement monitoring;

3. Pipe pile driving records;

4. Fill compaction testing; and

5. Multimedia Cap reconstruction and QA inspection of contractor's vacuum/spark QC testing for geomembrane field welds and boot penetration seals.

From an environmental perspective, field staff will document the following:

1. Perimeter and work zone real-time air monitoring data and laboratory analytical results;

2. Source(s) of clean fill/aggregates, type of material, and documentation used to certify that the material is suitable and "clean" for on-site use;

3. Waste characterization laboratory analytical results;

4. Waste profile and facility acceptance of all materials to be transported and disposed off-Site;

5. Waste manifests;

6. Approved work plans; and

7. Approved material submittals.

Collectively, the geotechnical, environmental, and QA field staff will prepare the daily and weekly logs. At a minimum, the logs will identify the following:

- work performed;
- changed conditions;
- QA elements and deficiencies;
- monitoring results;
- corrective actions;
- design and construction modifications; and,
- other relevant design or construction activities.

Honeywell's Engineer will review weekly progress reports and monthly schedule updates. The weekly report will summarize the results of daily logs and visual inspections, any deficiencies and corrective actions, design changes, QA/QC activities, and work progress.

7.3.2 Modifications to the DDP or Consent Decree Work Plans

As discussed in Section 3.7.2, the current SSMP does not address the post-development cap foundations and pile penetrations, but allows the Plan to be revised to address development. Minor modifications to the SSMP that will be necessary during the active phase of construction are identified in Section 9. Honeywell will submit a formal request for the minor modification to address SSMP activities during construction under separate cover. Upon completion of construction, a revised Surface Soil Monitoring Plan will be submitted by Honeywell for agency review and approval.

During the course of construction, if field conditions or construction activities warrant a modification to the elements presented in this DDP or any other minor modification to the Consent Decree Work Plans, HPD and Honeywell will notify USEPA and MDE, accordingly. The modification will be submitted to USEPA and MDE for review and approval.

7.3.3 Construction Completion Report

A Construction Completion Report will be prepared and submitted to USEPA, MDE and Honeywell. The report will be assembled and submitted upon completion of construction, construction-related monitoring, and receipt of all QA/QC test results. The report will document construction activities, compliance with the DDP, and any modifications. Specifically, the report will include the following information:

- construction activities;
- QA/QC documentation;
- documented deviations from the DDP;
- As-Built drawings related to the ERS components;
- Construction photographs;
- monitoring data;
- selected correspondence; and,
- other relevant construction and design information related to the modifications or restoration of the ERS.

8.0 PROJECT-SPECIFIC HEALTH AND SAFETY

ERM has prepared a *Health and Safety Plan, Area1, Phase 1 Development*, dated August 2013 (Appendix B). The purpose of this Health and Safety Plan (HASP) is to establish general personal protection standards and safety practices and procedures to be used as guidelines for the work at the Site. The HASP guidance is not intended to be and shall not be used as a Contractor-Specific Health and Safety Plan (HASP); rather, the contractor will be required to prepare their own HASP that meets or exceeds the requirements specified in the guidance plans.

Also, these documents are not intended to be inclusive of all Health and Safety issues that may be encountered at the Site, such as those associated with general construction activities. Rather, these documents are solely intended to provide guidance to Contractors by identifying environmental issues and constraints that Contractors at a minimum should include in their own HASPs.

Contractors will be required to prepare and implement and comply with their own HASP in accordance with all applicable federal, state and local regulations and standards of care. All Contractor-prepared HASPs will be approved by the General Contractor, or its designee, prior to their personnel mobilizing to the Site.

9.0 REMEDY PERFORMANCE MONITORING DURING AND AFTER CONSTRUCTION

As discussed previously in Section 3.7, the development design provides that all ERS components will remain operable and accessible following construction. This will allow Honeywell to meet the requirements of currently established monitoring programs.

Honeywell will continue to implement all monitoring requirements established in the Environmental Media Monitoring Plan and the Groundwater Gradient Monitoring Plan. As discussed in Section 7.3.2, a minor modification of the Surface Soil Monitoring Plan (SSMP) is required for the construction phase of the redevelopment, and a revised SSMP must be submitted for agency review and approval following construction. A summary of minor modifications for purposes of construction and revisions to the SSMP following construction are indicated below:

- The design proposes to terminate existing settlement monitoring point MP-1 because it is below the planned Dock Street platform which will structurally support the HMS and MMC. A new MP1A will be installed above the Wills Street HMS conveyance alignment below the Wills Street fill (The SSMP requires a minimum of six settlement monitoring points).

- Construction of the planned Dock Street platform will prevent sheet flow in the MMC drainage net from entering the toe drain on Dock Street. The design proposes to construct a new drain at the low point (Valley Drain) of the drainage net created by the Dock Street platform to convey water at the east end of Dock Street to the existing toe drain. This water will be sampled at the relocated SSMP-4 during construction. Water at the west side of Dock Street will be conveyed to a new infiltration point west of the Dock Street platform. A new sampling point SSMP-4A will be installed for sampling of drainage net water from the west portion of the development site and a new sampling point SSMP-4 will be installed (relocated) for sampling of drainage net water from the east portion of the development site.

- A 30″ storm drain in Wills Street crosses Dock Street at the east end of the Dock Street platform. This storm drain interrupts the toe drain at the east end of Dock Street. The Dock Street platform also obstructs flow to the toe drain. The design proposes to capture drainage net water from 90% of the development area for discharge

to a new drain along Dock Street inboard of the Dock Street platform (Valley Drain). This water will be discharged through relocated SSMP-4 (east Valley Drain-65%) and a new SSMP-4A (west Valley Drain-25%) west of the Dock Street platform. The 10% of the development area cap which will not pass through SSMP-4 is at the east edge of the MMC along Wills Street. The design proposes to allow drainage net water to infiltrate into the ground outside of the barrier by subdividing the existing toe drain into 50 ft long segments and creating infiltration points at each segment. Distribution of the infiltration along Wills Street will prevent collection of toe drain water at the intersection of Dock and Wills Streets. Design calculations and summary is presented in EE Memorandum No. 3.

- Construction of the pile supported platform for the HMS and MMC over the abandoned Dock Street bulkhead obstructs flow in the drainage net at the north perimeter. This pile support improvement requires revision of the SSMP requirement for the geomembrane to have a minimum slope of 1% at the perimeter. A collection pipe (new "valley drain") will be added up-slope of Dock Street to convey water off of the MMC. New sampling locations will be added for sampling of drainage net discharge. The substantial reduction in storm water loading provided by the building roof and streets and their storm drainage systems permits flatter slopes to be employed for MMC drainage net discharge.

Honeywell will submit a formal request for the minor modification to address SSMP activities during construction under separate cover. Upon completion of construction, a revised Surface Soil Monitoring Plan will be submitted by Honeywell for agency review and approval.

There are no revisions required in the Groundwater Gradient Monitoring Plan or the Environmental Media Monitoring Plan.

Appendix A
Table A

Table A - Multimedia Cap Function Analysis

	Multimedia Cap Layer	Material	Inerim Cap Function	Final Development Cap		
				Areas Outside of Structures	Below Floor Slab	Below or Adjacent to Foundation on Piles
	Cover Soil	2 foot thick clean, imported cover soil, placed in two loose lifts and 6" of crushed stone	Protects multimedia cap against freeze-thaw and mechanical damage. Spreads concentrated loads over synthetic layers.	Leave in place; restore to original design.	May replace with 5" min concrete and management control.	May replace with 5" min concrete and management control.
	Visual Barrier	Bright orange synthetic grid installed 1 foot above geomembrane.	Provids a visual warning of presence of underlying membrane.	Leave in place; restore to original design.	Replace except where concrete is placed within 1 ft of geomembrane.	Not required; membrane penetration prevented by foundation element.
Synthetic Layers	Geotextile Cover	Non-woven getextile bonded to top of the drainage net, 16 oz/sy, overlap joints.	Prevents overlying soil from clogging the geonet flow voids.	Leave in place; replace to original design.	Leave in place; replace to original design.	Not required. Protect geomembrane before concrete is placed.
	Synthetic Drainage Layer	High flow HDPE geonet. Placed with overlap joints.	Provides drainage for cover soil. Conveys water down slope. Designed to perform under high overburden stress.	Leave in place; replace and restore drainage / discharge down slope.	Replacement not needed where infiltration is collected by structure. Seal cut faces against soil clogging.	Not required. Infiltration prevented by foundation element.
	60-Mil LLDPE Geomembrane	60-mil thick linear low-density polyethylene membrane. Overlap seams placed shingle-style, with welded seals. Positive slope from center of site to perimeter.	Protects overlying materials from subsurface contamination, and prevents infiltration to reduce ground water pump & treat quantity.	Leave in place; replace to original design. Extrusion weld seams.	Leave in place; replace to original design. Extrusion weld seams.	Required. Function is to protect overlying concrete from underlying contamination. Extrusion weld seams.
	Geosynthetic Clay Layer (GCL)	Low permeability bentonite clay sanwiched between two synthetic mesh layers; about 1/4" thinckness. Overlap joints, with powdered bentonite seal at joints.	Functions in conjunction with the overlying membrane to seal leaks through imperfections in the membrane. Bentonite should swell on contact with water leaking through the membrane to seal the leak.	Leave in place; replace to original design.	Replacement not needed where infiltration is collected by structure.	Not required; infiltration is prevented by foundation element.
	Geotextile Cushion	Non-woven geotextile, 16 oz/sy, needle punched.	Protects the geomembrane and GCL from mechanical damage due to contact with the crushed stone capillary break.	Leave in place; replace to original design.	Leave in place; replace to original design.	Not required where overburden load is carried by foundation element.
	Capillary Break Gravel	Min 6" thick layer of washed No. 57 crushed stone.	Prevent chromium from rising into the multimedia cap by capillary action.	Leave in place; restore to original design.	Leave in place; restore to original design.	Restore where foundation is above managed water level. Not required below water level.
	Base Geotextile	Non-woven geotextile, 16 oz/sy, needle punched.	Separates Capillary Break Gravel from the subgrade soil to prevent soil fouling of the Capillary Break Gravel.	Leave in place; replace to original design.	Leave in place; replace to original design.	Required where capillary break gravel is placed.
	Cap Subgrade Fill or Existing Subsurface	Compacted miscellaneus fill over abandend foundation.	Compacted fill was placed to establish multimedia cap grades and to support the multimedia cap. Asphalt paving may be directly below the capillary break and base geotextile in some areas.	Leave in place; restore to original design.	Leave in place or restore to provide positive slope.	Not required; geomembrane line and grade controlled by adjacent fill.
	Mechanical Boot	LLDPE extrusion-welded boot field welded to geomembrane. Neoprene gasket (closed cell) with stainless steel pipe clamps to close with steel pipe pile wall.	none	none	At each pile penetration through geomembrane.	At each pile penetration through geomembrane.

Appendix B
Project Control Documents

Area 1, Phase 1
Head Maintenance System and Transfer Station Construction Contingency Plan

Baltimore Works Site
Baltimore, Maryland

REVISED

December 2013

By:
Environmental Resources Management, Inc.
Harbor Point Development LLC

For:
U.S. Environmental Protection Agency – Region III
Maryland Department of the Environment

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1.0 INTRODUCTION

The Baltimore Works Treatment facility will undergo a period of demolition and construction commencing in late 2013. The proposed construction presents potential impacts from dust, vibration and construction activities which could potentially impact the conveyance, electrical, monitoring and control systems of the facility. The following plan discusses the preparation of the existing system, workaround details and other contingencies with the intent of maintaining operation of the Head Maintenance System (HMS) and Transfer Station (TS) with minimal service interruptions.

The Contingency Plan is divided into two levels: Level I consists of preparing the existing systems and making minor modifications to the existing system in anticipation of dust and vibration that may cause equipment, electrical and control system failure (Section 5.0); Level II addresses more advanced modifications to mitigate potential interruptions to the operations systems and control network (Section 6.0). The Contingency Plan is cumulative in that all Level I elements are required at all times and Level II elements may be selected and implemented on an as needed basis. Aspects of the Contingency Plan involving the TS and HMS are described on Drawing DDP–EN1.02. Level I and Level II Contingency Plan details are presented in Drawings DDP-EN1.03, DDP-EN1.04, DDP-EN1.07, and DDP-EN1.08.

The Level II plan includes the requirements to completely isolate the HMS controls and the diversion of all impacted groundwater from the existing TS to a Temporary Transfer Station (TTS) in the event the existing TS would become inoperable. The plan narrative focuses primarily on critical system components such as the Master Supervisory System (MSS) controls and the Compressed Air System (CAS). The MSS is critical to recording and documenting system operation and compliance with the Groundwater Gradient Monitoring Plant (GGMP). The CAS is critical to the TS system for maintaining HMS operations (See Compressed Air P&ID detailed on Drawing DDP-EN1.08).

Section 7.0 of the Contingency Plan includes a list of required and recommended materials and equipment necessary to maximize readiness. All suppliers and vendors have been vetted to ensure that all necessary recommended replacement equipment can be obtained and installed within 1 working day. All equipment with longer lead times or a higher likelihood of being required must be obtained prior to construction (i.e., pre-construction). Supplier and vendor contact information is provided in

Section 8.0 in order to provide quick reference and access to both critical and non-critical system components.

Section 9.0 of the Contingency Plan details the restoration requirements that must be performed after the completion of construction.

2.0 FACILITY CONTACT SUMMARY

Honeywell Contact:	Chris French Honeywell International Inc. 101 Columbia Road, P.O. Box 2105 Morristown, NJ 07962 973-216-7506
Resident Site Manager:	Kenneth Biles CH2M Hill 1000 Wills Street Baltimore, MD 21231 410-271-6694
Developer:	Jonathan Flesher Beatty Development Group, LLC 1300 Thames Street, Suite 10 Baltimore, MD 21231 443-463-3937
Developer's Contractor:	Tim Hodges Armada Hoffler Construction Company 1000 Lancaster Street Baltimore, MD 21202 410-727-2929
Developer's Field Representative:	Jeff Boggs Environmental Resources Management, Inc. 200 Harry S Truman Parkway Suite 400 Annapolis, Maryland 21401 443-803-8495

3.0 GENERAL SYSTEM OPERATION DESCRIPTION

The following is an overview of the existing system and is not intended to be comprehensive. The reader is advised to refer to the Honeywell Operation and Maintenance (O&M) Plan prepared by Black & Veatch, May 2002, for a more detailed description of current general system operations. For detailed information on the modified controls network and current operations, refer to the Baltimore Inner Harbor Site Master Supervisory System/HMS RIC Operations Manual, May 2002, prepared by Roher Systems International, Inc.

The pumping operation within each Head Maintenance System (HMS) vault (e.g. precast vault V1) is controlled by a local Programmable Logic Controller (PLC) control panel, also known as a Remote Intelligent Control (RIC or "node"). The RIC monitors the inboard and outboard piezometer water levels and controls the pneumatic extraction well pumps through a 3-way solenoid valve. Each HMS extraction vault node transmits piezometer and extraction well level data back to the MSS, also known as a Human-Machine Interface (HMI), located in the TS, for monitoring and compliance reporting purposes. Flow data is also transmitted from each extraction vault. The electric sump pumps contained in each well vault are controlled by B/W Conductivity Sensors and Controls level sensors.

Water is pumped from both the "deep" and "shallow" extraction wells through a common header. Each extraction well riser is equipped with an air relief valve to release built up air in the line. The conveyance piping system consists of three headers: Header A, Header B, and Header C. Header A and B are used for extraction well conveyance. Header B serves as a backup to Header A. Header C serves the sump pumps. Each vault contains control valving to direct flow to any of the Headers as necessary to maintain system operation.

The TS PLC monitors tank water levels and provides high level alarms for system shutdown at the plant level; which includes the CAS and external HMS system. The main process controls to the HMS are provided remotely, over a data-network by the RICs that can be isolated from the TS PLC without interruption of HMS data logging. More detailed discussion is provided in the sections below.

4.0 POTENTIAL IMPACTS

The potential for dust emissions and vibration to be created by the proposed construction presents potential risks that the following could occur. Each of these potential risks are addressed as part of this plan:

- Water damage;
- Exposure to unintentional conditions such as weather;
- Electrical shorts;
- Wire breakage;
- Conveyance pipe breakage;
- Airline breakage;
- Controls power interruptions;
- Motor failure;
- Fire;
- Weakening of mounting hardware;
- Damage to the control systems.

The existing fire suppression system only serves the existing TS office space slated for demolition. However, a water main and natural gas line is routed through the Electrical/Mechanical room and poses a potential risk to those systems if damaged during construction. To address this potential risk, the Contractor shall shut off and properly prepare all water and gas utilities prior to construction. All natural gas unit heaters in the Tank Room will be replaced with electric unit heaters as specified on DDP-EN-1.08 in order to eliminate natural gas lines to the TS. Contractor requests for modifications to the requirements provided in this Contingency Plan will require a written request and approval from ERM and MDE.

Concentric steel piles will be driven and concrete pile caps will be constructed for the Exelon Trading Floors and Garage buildings. Foundations are to be installed adjacent to the Tank Room and the Electrical/Mechanical Room, which are to remain in place (Drawing DDP-

EN1.01). The Programmable Logic Controller (PLC) and Motor Control Center (MCC), located in the Electrical/Mechanical Room, are rated to withstand periods of vibration; however, vibration and daily monitoring are required during these construction activities to minimize interruptions to operations.

A pile load test was performed in May 2013 in the test areas east of the existing soil bentonite slurry wall and in proximity to the outboard shallow piezometer, OSP-1, and outboard deep piezometer, OP-1. The test produced a marked response in the water level at OSP-1 and a minor response at OP-1. The Resident Site Manager will need to monitor and compare water level spikes to baseline water levels to ensure that the groundwater levels remain in conformance with the O&M Plan, GGMP and Consent Decree.

The Resident Site Manager shall be responsible for communicating any operational issues to the Developer's Field Representative. The Developer's Construction Contractor (Construction Contractor) shall adjust construction operations based on HMS and TS conditions and shall stop work in the event there is a direct conflict to the TS/HMS operations. The Construction Contractor shall notify the Resident Site Manager and Developer's Field Representative immediately in the event that the TS/HMS is damaged in anyway.

The Developer's Field Representative and the Resident Site Manager will assess the operability of the system and determine what aspects of the Contingency Plan to implement. No component of the TS/HMS shall be down for a period more than 24-hours. Any damages, repairs, direct conflicts, etc. shall be documented in field logs and clearly articulated in the Honeywell quarterly progress reports. The Contractor shall increase the calibration frequency of all instrumentation as directed by the Resident Site Manager. An increase in calibration frequency is likely during pile driving activities in known proximity to sensitive instrumentation.

5.0 LEVEL I CONTINGENCY PLAN

The following items are required as part of the Level I Contingency Plan:

- Keep the existing TS PLC and RICs in-place without modification: This will prevent the costly reverse-engineering of the PLC programming and avoid rerouting controls wiring;

- Backup the existing PLC programming in the TS and HMS systems: The existing PLC consists of Siemens type Simatic-200 in both the TS and the HMS vaults. All components for these systems are available and replaceable. The Developer's Field Representative will back-up the existing programs in the event that any PLC component is damaged and need to be replaced. This ensures that the controls system can be re-established quickly. The Developer's Field Representative will also employ a hard-drive imaging strategy periodically during construction to ensure the operator terminal maintains data-integrity throughout the work schedule. This measure will avoid the costly and time intensive process of reprogramming and configuring of the MSS Wonderware terminal in the event that the hard drive were to become corrupted. The Contractor is required to document system backups.

- Relocate the existing Wonderware MSS/HMI computer system to a temporary field office: ERM performed a site survey and determined that the controls system was the most sensitive component of the TS/HMI. The relocation of the HMI computer system is shown as Scenario 1 on Drawing DDP-EN1.03 and involves the use of a wireless Ethernet Network Switch (ENS) at the existing 8 port hardline ENS. A second wireless ENS will be placed in a temporary field office (See Drawing EN1.01) in order to connect the field HMI to the existing controls system. Prior to construction the Contractor shall test and document that all existing hardline Ethernet network components are in good condition and working properly. The Contractor shall establish a hardline communication line if the wireless system proves unreliable during Construction.

  The Contractor shall obtain approval from the Developer's Field Representative prior to relocating the temporary field office from the location specified on Drawing DDP-EN1.01. The control computer, BAW-1, will be relocated to the temporary field office. The backup control computer BAW-2 shall be relocated within the Electrical/Mechanical (to be placed under positive pressure for

dust protection as detailed below) and placed in a hardened console (See Section 6.0 below). The Contractor shall provide power, portable air conditioning unit, hard wiring or any other appurtenances necessary to relocate BAW-2 within the remaining TS.

The HMI relocation will allow the Resident Site Manager to be safely out of the existing Transfer Station/Tank Area during construction, and allows 24/7 monitoring of the process. This will allow for immediate notification in case of component failure or wire breakage. The Developer's Field Representative will reference the Wonderware HMI to troubleshoot affected instrumentation and controls without having to stop work to enter the construction zone or control room. All wireless networking equipment/methods detailed in this Contingency Plan shall be tested and secured by the Contractor using the following: hidden SSID, 256-bit AES-2 encryption and strong password(s) (utilizing mixed case, numeric and ASCII symbols).

- Provide dust control: The Electrical/Mechanical Room is particularly sensitive to dust. In order to mitigate this issue, the Contractor will need to place the Electrical/Mechanical Room under a minimum positive pressure of 0.1 inch W.C. during construction. Placing the room under positive pressure will require isolating the sections of the HVAC ductwork specific to the Electrical/Mechanical Room and feeding air into the room with a portable blower equipped with a particulate filter, preferably upstream of the blower. Fan EF-203 (See Subproject 6 drawings TM-2 and TM-7) will need to be taken offline. Other materials and equipment should be protected to the extent possible using tarps or plastic. The Contractor will be required to test that the room is under positive pressure.

- Provide backup power supply: Power Interruption can cause damage to the PLCs or the RICs. American Power Conversion (APC) 3000VA USB & Serial 120V Smart-Uninterruptible Power Supply (UPS) capable of handling the sensitive PLC, power supply and Input/Output components for over four (4) hours. In conjunction with an on-site generator, these should provide smooth power support during the construction. The Wonderware HMI computer and monitor and wireless link(s) will also be plugged into a UPS system for smooth power delivery.

- Perform regular inspections of TS and HMS systems: It is anticipated that downtime will be scheduled with the Contractor to allow the Operator to access the TS and HMS vaults to maintain and inspect the existing system. The Operator will check alarms, general system conditions and inspect lines for leaks and general system issues. All control cabinets and enclosures will be inspected every two weeks to be scheduled in between construction work. The Developer's Field Representative will monitor the dust and moisture in the control room periodically.

- Relocate air receiver: The existing air receiver (i.e. the pressurized air tank of the compressed air system) is currently located in the corner of the existing loading dock and will need to be relocated during construction. The air receiver will be relocated to its permanent location in the Maintenance Room between the existing after-cooler and air dryer during construction in order to minimize downtime. The pneumatic system will be down temporarily during the relocation of the air receiver. The downtime is anticipated to be less than one workday. It should be noted that an equivalent amount of time would be required to install a temporary air receiver. Downtime will be minimized by installing the temporary quick air connection detailed under the Level I Contingency Plan concurrently with the air receiver relocation/ installation. Being in proximity to the existing lines will minimize piping to and from the existing system and maintain air system operations through the existing air lines that are routed through the existing vault V1 penetration. Any controls associated with the air receiver will also need to be re-located and rewired to the TS PLC.

6.0 LEVEL II CONTINGENCY PLAN

The following items will be performed in addition to the Level I Contingency Plan as required to maintain system operations:

- Provide wireless telemetry: It is anticipated that some wire breakage will occur between each HMS vault during construction. All health and safety issues associated with this work (such as breakage of a high voltage line) shall be considered in the Construction Contractor's health and safety plan. The HMS controls network consists of daisy-chained LAN lines connected by ENSs in each vault. The ENS in each vault boosts the control signal between each vault and contains open Ethernet ports for connecting additional wireless ENSs.

  In the event that a signal wire is severed between vaults, wireless ENSs will be installed at each effected HMS vault in order to maintain the data signal as represented by Scenario 2 on Drawing DDP-EN1.04. It is anticipated that establishing a wireless connection will take less than one workday. The Contractor shall repair hard line connections whenever possible. A wireless connection will only be established if the severed hardline cannot be repaired within one workday. Any broken network link(s) must be repaired before back-filling or before other above-grade construction ceases.

  All wireless networking Equipment/ methods detailed in this Contingency Plan shall be tested and secured by the Contractor using secured using the following: hidden SSID, 256-bit AES-2 encryption and strong password(s) (utilizing mixed case, numeric and ASCII symbols). The Field Representative and control support personnel shall field test wireless operations with the TS/HMS operator after the HMI is relocated by simulating a severed line.

- Isolate the entire HMS control system: The individual well vaults are linked together with an Ethernet network. The Contractor should maintain hardline connections to the extent possible but wireless telemetry can be quickly established within one workday to re-link damaged RIC network node to the HMI if necessary. As represented by the Scenario 3 control detail on Drawing DDP-EN1.04, an ENS will be installed within V1 and V2 in order to establish a data link with the wireless field HMI ENS.
  As part of the controls system preparation the Contractor shall simulate a severed communication line between two HMS Vaults

under Controls Scenario II as detailed on drawing DDP.EN.1.04. To perform this test the Contractor shall temporarily disconnect the RIC hard lines between the selected HMS Vaults and install the wireless ENS. The Contractor shall then reestablish the hardline connection after the wireless connection test is complete.

- Divert impacted groundwater: In the event that the tanks are damaged or the impacted groundwater needs to be routed away from the TS, the piping in vault V1 will be modified to divert all flow from V1 to one of two double-walled water storage tanks as detailed on Drawing DDP-EN1.04. The piping outside of V1 will be flex pipe with secondary containment. The pipe will be heat traced during the colder months of the year as necessary. An area with the proper tanker turning radius to access each of the two tanks will be provided in order to maintain a temporary loading dock with secondary containment at all times. Line drainage shall be accomplished by routing the pipe volume to the sump inside V1.

- Install Wireless I/O and Instrumentation: Temporary wireless I/O (receiver/transmitter/transceiver) will be installed as necessary to maintain communications with individual pieces of equipment (for data logging or controls). The wireless transceivers will be necessary if an individual data/control line is severed (e.g. the transducer line at a piezometer is severed) or a temporary system is placed into operation (e.g. a temporary wireless pressure transmitter relaying Compressed Air System pressure to the HMI).

  As part of the controls system preparation the Contractor shall also simulate a severed communication line prior to construction between a RIC and a piezometer representing Controls Scenario III on Drawing DDP.EN.1.04. This does not need to be performed on an actual piezometer in the field. The Contractor may perform and document a successful wireless connection between a simulated RIC and piezometer using a remote I/O configuration in a remote test lab. The configuration, equipment, setup and test result shall be documented for field implementation.

  The Developer's Field Representative and Resident Site Manager shall verify proper wireless I/O operation in the field. In the case of a severed signal line, the Contractor will repair the severed line as soon as possible to minimize the use of battery and maximize the availability of wireless I/Os for other system repairs. The wireless I/O devices act as a "repeater" of discrete or analog (4-20ma) signals. Both Transmitter and Receiver need to be DC powered and fitted with appropriate antennas for communication.

7.0 PARTS SOURCING

The Contractor will source and procure the following items prior to construction to support the Level 1 contingency plan detailed above. The Contractor will provide a submittal for the equipment to the Engineer for review prior to installation:

- Uninterruptible Power Supply (3,000 kva or better) for PLC
- Uninterruptible Power Supply (3,000 kva or better) for HMI and Computer
- Wireless G routers for PLC and HMI
- High-Gain Antennas for wireless routers
- Appropriate cabling (power, signal, data) to support remote HMI
- Ethernet-to-serial adapter to connect wireless HMI to PLC
- Master Input/Output telemetry radio and antenna
- One Slave Input/Output telemetry radio and antenna
- Siemens Simatic PLC Programming Cable
- Siemens Simatic PLC Programming Software
- Stock of signal cable to connect instrument(s) to wireless telemetry
- Backup Hard Drive to image Wonderware HMI Computer System;
- Siemens Simatic I/O card(s)
- Hardened Console for BAW-2

The Contractor will source and procure the following parts during construction on an as-needed basis to support the Level II contingency plan as described above:

- Fuses
- Terminal Blocks

- Wire and Cable

- Instrument(s) (to replace damaged piezometer for instance)

The Contractor will work with a site electrician to assist with components of the MCC, but it is up to the electrical contractor to repair any issues with high-voltage equipment (> 220/240 volts AC).

8.0 DISTRIBUTORS OF REPLACEMENT EQUIPMENT

- General Equipment – Tyco – P: (800) 289-2647. http://www.tyco.com.

- General Equipment – Jobe and Company, Inc., 7677 Canton Center Drive, Baltimore, MD, 21224, (410) 288-0560. http://www.jobeandcompany.com/.

- Siemens Simatic PLC, Control Panel supplies (fuses, terminal blocks, etc.) – Wesco, 1710 Edison Hwy Baltimore, MD 21213. (410) 563-8200. http://www.wesco.com/.

- MSS/HMI Operator Interface Software –Wonderware North (Invensys) 425 Caredean Drive Horsham, PA 19044. P: (877) 900-4996. http://wonderware.com.

- Wire and Cable, select instrumentation and solenoid valves, general equipment – Grainger, 2100 Haines St. Baltimore, MD. P: (410) 391-9000. http://www.grainger.com.

- Additional Instrumentation and Controls – Dwyer Inc. – 102 Indiana Hwy. 212 Michigan City, IN 46361. http://www.dwyer-inst.com.

- Computer Components, Wired (Ethernet) and Wireless Networking Equipment – Newegg – 9997 Rose Hills Road Whittier, CA 90601. http://www.newegg.com.

- Hardened Console: (http://www.armagard.com/ip54/computer-enclosure.html).

- Pneumatic Pumps - Geo Pump - 213 State Street, Medina, NY 14103. P: (800)-645-7654. www.geopump.com.

- Well Drillers - SGS North America Inc. - 5712 Erdman Ave., Baltimore, Maryland. P: (410) 483-2200. www.sgsgroup.us.com.

- Compressed Air System Rentals – Aggreko Rentals - 124 N. Langley Road, Glen Burnie, MD 21060. P: (410) 689-1514, www.aggreko.com/northamerica - Contact John Sibiski: john.sibiski@aggreko.com.

- Heavy Duty Cable Protector – Cable Ties and More - 1623 Central Ave, Suite 3 Cheyenne, WY 82001, UPS shipping Buffalo, N.Y. 14225. http://www.cabletiesandmore.com.

- Collapsible Secondary Containment for Frac Tank – New Pig, One Pork Avenue, PO Box 304, Tipton, PA 16684-0304. http://www.newpig.com/pig/US/.

- Frac Tank – Adler Tank Rentals, 260 Mack Place South Plainfield, NJ 07080. P: (908) 462-9800. http://www.adlertankrentals.com/home.aspx.

- Self-Priming Pump for Secondary Containment – Home Depot, 6315 Eastern Ave, Baltimore, MD 21224. P: (410) 631-4440. http://www.homedepot.com/.

- Flexworks Double Containment Pipe – OPW, 3701 Commerce Dr. #108 Baltimore, Maryland 21227; 443-833-1565. http://www.opwglobal.com/.

9.0 POST CONSTRUCTION

Ultimately, the controls system will be re-wired to its original state post-construction so the measures outlined above are for the duration of construction only. The HMS and TS systems will operate as originally designed.

Upon completing construction, the existing Contingency Plan included in the Owner's existing Operations and Maintenance (O&M) Plan will be used to address any emergency situations.

Area 1 Phase 1
Health and Safety Plan

Baltimore Works Site
Baltimore, Maryland

REVISED

December 2013

By:
Environmental Resources Management, Inc.
Harbor Point Development LLC

For:
U.S. Environmental Protection Agency – Region III
Maryland Department of the Environment

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1.0 INTRODUCTION

This Health and Safety Guidance ("HSG") has been prepared for inclusion with the Detailed Development Plan (DDP) for Harbor Point Area 1 Development ("Site"). For Phase 1 construction in Area 1, the primary chemical of concern is hexavalent chromium in soil and groundwater, or on debris below the MMC synthetic layers. Lead and PNAs are identified as potential contaminants of concern in Areas 2 and 3.

Harbor Point is located on a peninsula in the Northwest Branch of the Patapsco River located in Baltimore, Maryland (Figure 1). The peninsula joins the mainland at the east side of the site, bounded by South Caroline Street and the Baltimore Inner Harbor. The main site area is referred to as Area 1, and the Southeast Quadrant is referred to as Area 2. Additionally, the property located midway between Wills Street and South Caroline Street North of Philpot Street is referred to as Area 3.

The approved Environmental Remediation System (ERS) is operated and maintained by Honeywell International Inc. ("Honeywell") pursuant to the Consent Decree dated April 27, 1989, as amended, among Honeywell, EPA and MDE, to contain chromium contaminated groundwater and minimize the possibility of exposure to impacted soil. The ERS consists of the Multimedia Cap (MMC), Hydraulic Barrier, Head Maintenance System (HMS) and Outboard Embankment.

1.1 PURPOSE

Harbor Point Development (HPD) is developing this site which is currently owned and maintained by Honeywell International. Environmental Resources Management, Inc. (ERM) has prepared this HSG to be used, as appropriate, by Contractors engaged in preparing and implementing Contractor-Specific Health and Safety Plans (HASP) for Area 1 development. This HSG is intended to address worker safety related to potential exposure to environmental constituents of concern, e.g., chromium, and not health and safety, OSHA or other regulations pertaining to general construction activities.

This HSG does not supersede the *Final Master Health and Safety Plan for Honeywell Baltimore Inner Harbor*, dated August 2002 and revised June 2007.

This Health and Safety guidance document is not intended to be and shall not be used as a Contractor-Specific HASP. Also, this document is not intended to be inclusive of all health and safety conditions that may be encountered at the Site, such as those associated with general construction activities. Rather, this document is solely intended to provide guidance to Contractors to identify and address contaminated environmental media that may affect their work and, at a minimum, must be included in their HASP. It is the sole responsibility of Contractors to prepare and implement their own HASP in accordance with all applicable federal, state and local regulations and standards of care.

All Contractor-Specific HASPs will provide Site-specific health and safety requirements that are pertinent to their own anticipated activities. It is the responsibility of the Contractor to review the project documents to make its own determination as to the appropriate level of personnel protection based on the task being performed.

In the event that a conflict in procedures or requirements exists between this HSG and a Contractor-Specific HASP, the procedures or requirements that are most protective of human health will be applied. HPD, or its representative, will review all Contractor-Specific HASPs, but will not be responsible for approving the completeness or measures specified.

1.2 BACKGROUND

The Site has been divided into Areas 1, 2, and 3. Area 1 is the principal site of Honeywell's (formerly AlliedSignal) Baltimore Works Facility (Figure 1). Chromium ore was processed in Area 1 from 1845 to 1985. The former manufacturing processes resulted in chromium impacts to soil and groundwater. An Environmental Remediation System (ERS) is maintained and operated by Honeywell International Inc. (Honeywell) to contain CrVI-impacted groundwater in Area 1 and control the potential for human exposure to affected soil. The ERS consists of a Multimedia cap (MMC), Hydraulic barrier, Head Maintenance System (HMS), a groundwater storage and transfer system, and Outboard Embankment. The HMS maintains an inward groundwater gradient to mitigate the migration of chromium-impacted groundwater from the Site.

Area 2 was mainly used for coal and raw chromium ore storage. In addition, a fertilizer warehousing and supply company operated in this area for many years.

Area 3 consists of five separate properties all with a history of industrial activity. This industrial activity included brass casing, oil blending and storage, lumber storage and coating/plastics production.

Honeywell purchased all of these properties by 1993 at which time all manufacturing was halted and subsequently all buildings and tanks were removed from these sites.

2.0 PROJECT PERSONNEL AND RESPONSIBILITIES

Contractors shall designate and assign appropriately trained and qualified personnel to fulfill the following responsibilities for implementation of its HASP. These titles and the names of the individuals assigned should be included in the written HASP:

- Project Manager (PM) – The Project Manager will serve as the Contractor's principal point of contact for project-related decisions and communication;

- Project Health and Safety Coordinator (HSC) – the HSC will be responsible for preparing and overseeing implementation of the Contractor-Specific HASP, as well as updating the HASP as conditions warrant. The HSC will be consulted by the Contractor's PM or field personnel whenever site conditions may require modification to the Contractor's HASP.

- Site Safety Officer (SSO) – The SSO or designee will be responsible for ensuring that the Contractor's HASP is properly implemented by contractor's employees and subcontractors. The SSO will serve as the primary point of contact for communications between field personnel and management. The SSO will be responsible for notifying the PM and the HSC of field conditions that may require modification to the HASP. It is the responsibility of the SSO or designee to ensure that site personnel are in conformance with the level of personal protection equipment (PPE) specified by the Contractor's HASP. It is incumbent upon the SSO to establish and maintain direct lines of communication with the Owner and/or its representative.

3.0 SITE CONTROL MEASURES

The Contractor's written HASP must describe how site control will be maintained. The Contractor should ensure through the assigned SSO that site control is maintained by establishing egress and ingress points for work activities and modifying them, as appropriate, as the project and work areas progress. The Contractor's HASP should ensure that the site is properly secured at all times to restrict unauthorized access by visitors or other personnel.

The Contractor must ensure that visitors not engaged in site work will be provided with the appropriate level of PPE and escorted at all times while onsite by the SSO or designee. The Contractor should implement controls for all on-site personnel such that smoking, eating, drinking, or other activities which promote hand to mouth contact are only permitted in designated clean area(s), the locations of which will be determined by the SSO.

4.0 PERSONNEL TRAINING

The Contractor's HASP must describe what training is necessary to safely conduct the specific job and what types of employees receive training. The Contractor will distribute its HASP to appropriate employees and subcontractors involved in the project. Prior to commencing with the fieldwork, the Contractor's SSO should discuss the contents of the HASP with Contractor's workers and subcontractor employees. The SSO shall maintain documentation of specialty training provided for his role and the Contractor's employees based on their specific work task and responsibility. These documents shall be made available to the Owner or Owner's representative if requested.

It is the responsibility of the Contractor to ensure that its employees and subcontractors engaged in implementation of project activities comply with the applicable OSHA regulations in 29 CFR 1910 and 29 CFR 1926. It is required that employees who may come into contact with subsurface soils and groundwater during performance of the work comply with the training specified in 29 CFR 1910.120(e). Particular attention to dust suppression activities will be required should Chromium Ore Process Residue (COPR) be encountered. Additionally, field staff will be provided training in advance of site activities on the physical and characteristics of COPR and, should COPR be identified, the Contractor will use that opportunity to train field staff to visually recognize this material. It is the Contractor's responsibility to determine which employees may potentially be in contact with contaminated subsurface soils and groundwater. It is anticipated that the workers with the following job descriptions may potentially come into contact with contaminated media and must have the appropriate health and safety training:

- Backhoe Operators
- Vacuum Truck or Pump Operators
- Truck Drivers
- Laborers/Spotters

Workers on site only occasionally for a specific limited task (such as, but not limited to, groundwater monitoring, land surveying, or geophysical surveying) should also comply with the training specified in 29 CFR 1910.120(e).

5.0 MEDICAL MONITORING

Personnel involved in site operations with the potential for encountering contaminated media must have undergone medical surveillance with their employer, to include initial and periodic examinations, prior to performing field work at the site. Each employer's occupational health physician will determine the frequency of examinations based on a variety of factors. The Contractor is responsible for the Contractor's employees involved in field activities associated with the project would be required, as appropriate, to adhere to the medical monitoring requirements of 29 CFR 1910.120(f). Project personnel will utilize the services of a licensed occupational health physician with knowledge and/or experience in the hazards associated with the project to provide the medical examinations and surveillance specified herein. Medical "fit-for-duty" certifications shall be maintained on Site for all HAZWOPER workers.

6.0 HAZARD IDENTIFICATION CONTROL

6.1 HAZARD IDENTIFICATION PROCESS

Prior to initiating any new project activity or when there is a change in site conditions, the SSO will assist project team members in completing and documenting a Job Hazard Analysis (JHA). A copy of the JHA form that may be used by the Contractor is located in Appendix B.

6.2 CHEMICAL HAZARDS

Chromium, hexavalent chromium, lead and polynuclear aromatics (PNAs) may be present at the Site. For Phase 1 construction in Area 1, the primary chemical of concern is hexavalent chromium in soil, COPR and groundwater, or on debris below the MMC synthetic layers. Lead and PNAs may be present in Areas 2 and 3. Chemicals may be introduced into the body by ingestion, inhalation, or absorption through the skin. Since not all chemicals have the same level of toxicity, the length of time for the exposure and the concentration of the chemical are important in determining the potential risk to onsite workers. Inhalation and skin contact are the most common routes of entry for the type of work that is contemplated for this site. Chemicals can be introduced into the body by ingestion when chemicals present on the hands are transferred to food or cigarettes.

6.3 SOIL CONDITIONS

The uppermost material encountered in all of the soil borings collected on this site is fill material, ranging in thickness from about 7 to 30 feet. The fill consists of medium compact to loose, gray and brown fine to coarse sand, with some silt, trace to some gravel, trace clay, and with variable amounts of brick, concrete fragments, cinders and wood and likely contain materials impacted by hexavalent or trivalent chromium. As a general practice COPR was not land filled at the site; however, the 1985 IT report and 1986 NUS report indicated the potential presence of COPR in dispersed in soils at the site. Soil containing elevated concentrations of chromium can be expected to be encountered below the layers of the multimedia cap. Lead and PNAs may also be encountered in soil in Area 2.

6.4 GROUNDWATER CONDITIONS

Elevated concentrations of hexavalent chromium have been reported in shallow groundwater. Shallow ground water levels have not been recorded above elevation +3 feet mean sea level (msl).

7.0 FIELD ACTIVITIES

The following activities are anticipated to be performed during construction of the Area 1, Phase 1 development.

- Continuous operation of the Transfer Station and HMS including the storage and transfer contaminated groundwater;
- Installation of erosion and sediment controls;
- Demolition of concrete structures and asphalt paving;
- Selective demolition of the Transfer Station;
- Exposing portions of the MMC synthetic materials;
- Excavation, temporary storage and transportation of clean and contaminated soils and water;
- Sheet Pile and Pipe Pile driving;
- Concrete forming;
- Installation of clean fill, aggregates, and synthetic materials;
- Installation of utilities in clean fill;
- Backfill and surface grading;
- Vibration monitoring; and
- HMS modifications.

8.0 SITE PERSONNEL

Workers with the following job descriptions will be engaged in activities conducted in at the site:

- Heavy Equipment Operators
- Vacuum Truck or Pump Operators
- Truck Drivers
- Laborers/Spotters
- Technical Personnel

Other visitors to the site, not directly involved in proposed work activities, will be considered in the HASP as Technical Personnel listed above.

9.0 PERSONAL PROTECTIVE EQUIPMENT

Level D is the expected level of protection for this construction work. However, it is the responsibility of the Contractor to review the project documents in order to make its own determination as to the appropriate level of PPE for its personnel and subcontractors, as well as applicable action levels for use of more protective PPE. At a minimum, Level D PPE consists of the following:

- Coveralls or long sleeve shirts and long pants, unless otherwise directed by the SSO;
- Outer protective work gloves at a minimum for all hazardous or potentially hazardous material handling activities that may occur during site activities;
- As a conservative measure, workers that may routinely come into contact with groundwater (e.g., workers in the trench making the utility line connections) should be in poly-coated Tyvek, (Modified Level D) or similar chemical resistant suit, chemical resistant gloves and boots;
- Steel-toed work boots;
- Hard Hat, where appropriate;
- Safety Glasses; and
- High visibility outer ware or safety vest.
- Options, as required;
    - Disposable outer boots;
    - Hearing protection; and
    - Chemical Resistant gloves.

Contractors performing intrusive operations into known or potential chromium impacted areas must address specific air/personal air monitoring requirements for hexavalent chromium in accordance with either 29 CFR 1910.1026 or 1926.1126. Prior to initiating any new project activity or when there is a change in site conditions, an additional JHA will be completed. A copy of the JHA form is located in Appendix B.

Personal Protective Equipment requirements are provided in Table 9-1, below.

Table 9-1. Personal Protection Equipment Requirements

PPE Level	Ensemble Components	Anticipated Use
Level D Should be worn only as a work uniform and not in any area with respiratory or skin hazards. It provides minimal protection against chemical hazards.	• Long pants and shirt with sleeves. • Safety-toed footwear. • Safety glasses with molded side shields. • Hard hat. • Work gloves • Hearing protection if hazard is present	• Demolition of concrete structures and asphalt paving. • Excavation, temporary stock pile and transportation of soils. • Installation of clean fill, aggregates, and synthetic materials. • Installation of utilities in clean fill area. • Air monitoring. • Backfill and surface grading. • Pile driving. • Concrete forming. • Dewatering.

PPE Level	Ensemble Components	Anticipated Use
Modified Level D	Level D and the following: • Disposable poly-coated Tyvek coveralls. • Safety-toed rubber boots or disposal boot covers over shoes. • Thin nitrile gloves. • Green nitrile gloves over thin nitrile gloves when primary gloves may tear or puncture.	Any of the above-referenced tasks in which there is moderate potential for skin contact with chromium impacted soil and/or water and for all activities involving direct contact with chromium impacted soils located beneath the multimedia cap.
Level C Should be worn when the criteria for using air-purifying respirators are met, and a lesser level of skin protection is needed.	Level D or Modified Level D and the following: • Full-face air purifying respirator with combination dust organic vapor cartridges at least rated N-100 or better. If second action level surpassed • Half-face air purifying respirator with combination dust organic vapor cartridges at least rated N-100 or better. If first action level surpassed	Any of the above-referenced tasks in which there is moderate potential for skin contact with chromium soil and air monitoring data indicate a need for respiratory protection.

PPE Level	Ensemble Components	Anticipated Use
Level B Should be worn when the highest level of respiratory protection is needed, but a lesser level of skin protection is needed.	Not anticipated to be required	Tasks requiring Level B PPE are not anticipated during this project. If Level B PPE is needed, as determined by the SSO and/or the Project Health and Safety Coordinator, the HASP will be revised.
Level A Should be worn when the highest level of respiratory, skin, and eye protection is needed.	Not anticipated to be required	Tasks requiring Level A PPE are not anticipated during this project. If Level A PPE is needed, as determined by the SSO and/or the Project Health and Safety Coordinator, the HASP will be revised.

10.0 RESPIRATORY PROTECTION

The type of respiratory protection required will be based on the results of ambient air monitoring, the results of any models used to predict ambient air concentrations, and the professional judgment of either the SSO or the Project Health and Safety Coordinator (HSC). Respiratory protection requirements are outlined on Table 9-1.

As required by 29 CFR 1910.134, *Respiratory Protection*, a cartridge change-out schedule will be developed based on either the results of ambient air monitoring, the results of any models used to predict ambient air concentration or the professional judgment of the Project HSC. The Site-specific dust action levels utilized for this HASP were developed from the data collected during the Pre-Construction Air Monitoring Study, conducted from 23 April through 22 June 2013.

The Site soil data indicates that the soil CrVI concentration presents conditions requiring exposure monitoring for the project. As such, the action level triggering upgrading to Level C is based on the Site-specific dust action level, as provided in Section 12 and the Site-specific Air Monitoring Plan. The Site-specific dust action levels are more conservative than the OSHA requirements and as such are protective of both perimeter receptors and those workers involved in intrusive work on the Site.

11.0 DECONTAMINATION PROCEDURES

Decontamination involves the orderly controlled removal of contaminants from both personnel and equipment. The purpose of decontamination procedures is to prevent the spreading of contaminated materials into uncontaminated areas. All site personnel should limit contact with contaminated soil, groundwater or equipment in order to reduce the need for extensive decontamination. Decontamination only applies to site personnel and equipment that contact contaminated media.

11.1 EQUIPMENT DECONTAMINATION

All contaminated tools and equipment will be decontaminated on site using appropriate methods. Dry decontamination procedures will consist of thoroughly brushing or wiping down tools and equipment. Wet decontamination will consist of thoroughly scrubbing and cleaning tools with a designated cleaning solution. All wipes, pads or towels will be containerized. All decontamination fluids will be drummed and temporarily stored within the limits of the sealed container storage area shown on DDP Drawing EN1.01 for proper off-site disposal.

Equipment and materials used in the decontamination process may include the following:

- High pressure/hot water cleaning using only potable water/fire water;
- Phosphate-free detergent;
- Five-gallon bucket;
- Potable water;
- Distilled water;
- Paper towels; and
- Brushes.

11.2 PERSONNEL DECONTAMINATION

Decontamination is required for all workers exiting a contaminated area. Personnel may re-enter the Support Zone only after undergoing the decontamination procedures. Personnel shall remove all contaminated PPE and containerize it in drums. All work boots are to be decontaminated using a secured boot brush mounted over disposable plastic sheeting. All personnel shall remove any inner clothing that is contaminated and redress. All personnel must wash face and hands before taking breaks, eating and at the end of the work shift. All PPE and wash water drums will be disposed properly.

Emergency decontamination for a life threatening medical emergency will consist of removal of the victim's outer protective clothing or equipment to the extent where life saving procedures/medical treatment can be performed. Final decontamination can be postponed until emergency medical attention is received. The emergency medical personnel must be advised of the potential contamination.

12.0 ACTION LEVELS

The potential exposure pathways of concern are incidental inhalation, ingestion or dermal contact with CrVI, lead and polynuclear aromatics from soil/debris/dust. Therefore, measures will be followed during soil/debris handling to eliminate the potential exposure pathway. Particular attention to dust suppression activities will be required should COPR be encountered.

The SSO will routinely conduct real-time air monitoring for total airborne particulate concentrations to demonstrate that the Site-specific dust action level, as provided in the Air Monitoring Plan, is not exceeded during construction. It is expected that such monitoring will be performed throughout the duration of intrusive activities below the MMC synthetic layers and until contaminated media has been completely removed from the Site.

Site-specific background values and action levels have been established based upon the data evaluation presented in the Air Monitoring Plan, as derived from the Preconstruction Air Monitoring program. It is important to note that the site-specific dust action level will be established in the Air Monitoring Plan. Since the Site-specific dust action level is based on the background threshold value for pre-construction baseline air, compliance with the plan should result in no increase in particulate born inorganic or organic constituents due to project soil intrusive activities and serves as a real-time surrogate for CrVI as well as other particulate borne constituents including lead and PAHs. Therefore the Site-specific dust action level is significantly protective of potential particulate exposure to workers during intrusive activities.

A correlation between total airborne particulate concentrations and CrVI concentrations has been established for the site based upon the results of the Preconstruction Air Monitoring Study as presented in the Air Monitoring Plan. Based upon this correlation, it is extremely improbable that either the OSHA action levels for total particulates or CrVI will be exceeded given the restrictive Site-specific dust action level and response actions, including stopping work potentially contributing to elevated particulate concentrations (See Table 12-1). To meet the OSHA and Site-specific monitoring requirements, CrVI air sampling will be initiated should the Site-specific dust level be exceeded, as described in the Air Monitoring Plan. Air sampling will continue for 5 consecutive days to document CrVI airborne concentrations. Confirmation that the Site-specific dust levels are serving as a surrogate for the OSHA action level, will be accomplished by comparing laboratory analytical results utilizing

OSHA Method ID 215 to the OSHA action level (0.25 µg/M^3). While highly unlikely, if the OSHA CrVI action level is exceeded, reassessment of the response actions will be taken and changes made to reduce potential dust emitting activities.

Real-time aerosol monitors (RAM, DustTrak™ DRX 8534 will be utilized at four (4) perimeter air monitoring (PAM) stations to continuously monitor total particulate concentrations as the surrogate for CrVI (Figure 2). The PAM stations will continuously monitor and record total particulate concentrations at 1-minute averages operating at approximately 2 liters per minute (lpm), 24 hours per day, seven days per week.

Work Zone (WZ) monitoring will be performed utilizing two (2) RAMs; one positioned upwind and the other positioned downwind of the intrusive activity area. The WZ stations will continuously monitor and record total particulate concentrations at 1-minute averages operating at approximately 2 liters per minute (lpm) during work hours.

The DustTrak™ DRX 8534 total particulate concentration audible alarm shall be set at to the site-specific dust action level as approved by EPA and MDE. Real-time and sampling pump instrumentation will be calibrated daily per manufacturer's instructions and have adequate and redundant power-supplies to ensure constant operation. All documentation regarding real-time results, monitoring times, dates, duration and monitoring locations shall be available to the Owner or Owner's representative upon request. The Developer or Developer's representative must provide all air monitoring data to MDE immediately upon receipt and, in a similar time frame, will also place the data on a website that can be accessed by the public.

Table 12-1 outlines the steps to be taken by the SSO when the Site-specific action levels of the various contaminants are exceeded. Respiratory protection is selected based on occupational exposure limits of the constituents at the site and the potential for exposure to vapors and dust from site activities.

Table 12-1. Action Levels and Response Actions Requirements

Chemical (Method)	Site-Specific Action Level	Response Actions
Dust Real-time Aerosol Monitor (RAM) and NIOSH Analytical Method 500	Greater than established action level sustained in the work zone for 15 minutes	• Contact PM and Project Health and Safety Coordinator. • Evaluate work practices and assess engineering controls to reduce airborne concentrations. • Continue to monitor RAM dust concentration level. • Implement dust suppression. • If readings are less than action level for 15 minutes, resume work.
	Greater than action level sustained in the work zone for 30 minutes	• If readings are at or greater than the action level for more than 15 minutes, initiate air sampling at WZ stations.
	Greater than action level sustained in the work zone for 1 hour	• If readings are at or greater than the action level for more than one hour, STOP work and contact the Owner or its representative. • Continue RAM monitoring and air sample collection for one, 24-hour duration after the RAM level has stabilized.
Chemical (Method)	**Regulatory Action Level**	**Response Actions**
Hexavalent Chromium (OSHA Analytical Method ID 215)	OSHA Action Level: 0.25 µg/M^3	Site-specific dust action levels are serving as a real-time surrogate for this requirement. If the Site-specific dust action level is exceeded for more than 1 hour follow the response actions above and don respiratory protection. CrVI analyses will be used to confirm the protectiveness of the surrogate.

13.0 THERMAL STRESS

13.1 HEAT STRESS

Heat stress is caused by a combination of factors such as temperature, humidity, type of work being performed, and use of personal protective equipment including protective clothing. Heat stress tends to increase body temperature, heart rate, and sweating. The key to preventing heat stress is education of personnel relative to the hazards associated with working in the heat and implementation of proper controls and work practices. Table 13-1 summarizes heat stress disorders and prevention/first aid issues.

When the temperature is above 80^{o} Fahrenheit (F), the SSO will monitor both the temperature and the humidity throughout the day in order to determine the Heat Index. The National Weather Service has developed a Heat Index that combines the ambient temperature and humidity into value that reflects how hot it really feels. This Heat Index can be used to determine the risk associated with working outdoors during the hot months of the year. To use the heat index chart (Table 13-2), read the temperature at the left and humidity across the top, the Heat Index is where the two intersect. For example, with a temperature of 96 and a humidity of 50%, the Heat Index is 108.

The SSO will also inform site workers when the Heat Index Risk Level, as defined on Table 13-3, reaches Danger and/or Extreme Danger; the following additional precautions may be implemented at the discretion of the SSO based on factors such as use of Tyvek coveralls and the physical activity associated with each task. The following actions or work practices will be implemented, as practical, as part of the Heat Stress Management Program.

- Designated areas will be used for site workers to take breaks and for eating;

- If possible, physically demanding and strenuous tasks may be scheduled for the cooler parts of the day;

- Site workers will be required to drink 6-8 ounces of cool water or electrolyte replacement drinks every 60 minutes. Diabetics should use caution when using electrolyte replacement drinks to replenish fluids as these drinks may have high sugar content;

- Site workers taking prescription medications should check with their doctor or other medical professional regarding the interaction between working in hot environments and their medications;

- SSO will more closely observe site workers, especially those working in Tyvek coveralls or performing strenuous job tasks;

- Implement worker rotation during strenuous or physically demanding job tasks; and

- SSO will implement a work-rest cycle.

Table 13-1. Heat Stress Disorders

Disorder	Symptoms	Cause	Prevention/First Aid
Heat Rash or Prickly Heat	♦Rash ♦Itching	♦Hot, humid conditions ♦Sweat doesn't evaporate easily ♦Sweat ducts become clogged	♦Ointments ♦Keep skin clean and dry ♦Good daily personal hygiene
Heat Cramps	♦Sudden onset of muscle cramps usually in legs or arms ♦Hot, moist skin ♦Normal pulse ♦Normal or slightly elevated temperature	♦Loss of water (sweating) ♦Loss of electrolytes ♦Replacing water but not electrolytes	♦Move into shade ♦Loosen clothing ♦Drink tepid electrolyte drinks or water ♦Seek medical assistance if conditions persist

Disorder	Symptoms	Cause	Prevention/First Aid
Heat Exhaustion	♦ Pale, clammy skin ♦ Profuse perspiration ♦ Thirst from dehydration ♦ Weakness ♦ Headache ♦ Nausea ♦ Loss of coordination	♦ Overexertion ♦ Excessive loss of water and electrolytes	♦ Move into shade ♦ Remove PPE ♦ Loosen street clothing ♦ Cool by applying damp cool compresses or ice packs ♦ Drink tepid electrolyte drinks or water ♦ Summon medical assistance
Heat Stroke	♦ Elevated temperature (>103F) ♦ Flushed, hot, dry skin ♦ Absence of sweating ♦ Delirious ♦ Rapid pulse ♦ Nausea ♦ Headache ♦ Dizziness ♦ Unconsciousness	♦ Failure of body's cooling (sweating) mechanism	♦ **Summon medical assistance immediately** ♦ Move to shade ♦ Remove PPE ♦ Loosen street clothing ♦ Cool by fanning or applying damp compress or ice packs

Table 13-2. Heat Index Chart

Relative Humidity (%)														
Temperature (F)		40	45	50	55	60	65	70	75	80	85	90	95	100
	110	136												
	108	130	137											
	106	124	130	137										
	104	119	124	131	137									
	102	114	119	124	130	137								
	100	109	114	118	124	129	136							
	98	105	109	113	117	123	128	134						
	96	101	104	108	112	116	121	126	132					
	94	97	100	102	106	110	114	119	124	129	136			
	92	94	96	99	101	105	108	112	116	121	126	131		
	90	91	93	95	97	100	103	106	109	113	117	122	127	132
	88	88	89	91	93	95	98	100	103	106	110	113	117	121
	86	85	87	88	89	91	93	95	97	100	102	106	108	112
	84	83	84	85	86	88	89	90	92	94	96	98	100	103
	82	81	82	83	84	84	85	86	88	89	90	91	93	95
	80	80	80	81	81	82	82	83	84	84	85	86	86	87

Table 13-3. Heat Index Risk Level and Associated Health Effects

Heat Index	Associated Risk
>130	*Extreme Danger* Heat stroke highly likely with continued exposure
105-130	*Danger* Heat exhaustion and heat cramps likely and heat stroke possible with prolonged exposure and/or physical activity
90-105	*Extreme Caution* Heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity
80-90	*Caution* Fatigue possible with prolonged exposure and/or physical activity

Notes:

- Heat Index values were devised for shady, light wind conditions. Exposure to full sun may increase these values by up to 15°.
- Heat Index values were devised for the general public wearing typical lightweight summer clothing. Acclimatized workers may be able to work under conditions with a slightly higher Heat Index.
- The use of personal protective equipment, including clothing increases the heat stress load on the body.

The work-rest cycle outlined below may be implemented based on the professional judgment of the SSO and/or the Project Health and Safety Coordinator.

Heat Index	Risk Level	Work-Rest Cycle
> 130	Extreme Danger	15 minute break every 30 minutes
105-130	Danger	15 minute break every 60 minutes
90-105	Extreme Caution	15 minute break every 90 minutes
80-90	Caution	15 minute break every 120 minutes

13.2 COLD STRESS

Cold stress situations may be encountered at the site. If lower than normal temperatures (i.e., less than 35°F) are forecasted the following information will be utilized. Most cold related worker fatalities have resulted from failure to escape low environmental air temperatures, or from immersion in low temperature water. The two most prominent adverse effects from exposure to cold temperatures are frostbite and hypothermia. A person qualified in first aid or a professional medical provider should administer treatment for cold related injuries. The single most important aspect of life-threatening hypothermia is a drop in the deep-core body temperature. Response to cold stress will be based on Cold Stress section of the ACGIH TLV booklet.

13.2.1 Frostbite

Frostbite occurs when the extremities do not get sufficient heat from the central body stores. The fluids around the cells of the body tissues freeze from exposure to low temperatures. This condition can result in damage to, and loss of, tissue. The most vulnerable areas are the nose, cheeks, ears, fingers, and toes. Damage from frostbite can occur in either the outer layers of skin or in the tissue beneath these layers and can be serious, resulting in scarring, tissue death, permanent loss of movement, or amputation.

13.2.2 Hypothermia

This is the most severe form of cold stress and results from a drop in the body's core temperature. Hypothermia can occur in relatively mild temperatures if there is a wind and the person's clothing becomes wet. The symptoms of hypothermia are:

- First, uncontrollable shivering and the sensation of the cold;
- Heartbeat slows and may become irregular;
- Pulse weakens and blood pressure changes;
- As the body's core temperature drops, other signs may include cool skin, slow irregular breathing, and apparent exhaustion;

- When core temperatures are in the mid-range, the victim may become listless, confused, exhibit severe shivering, or develop severe pain in the extremities; and

- Final signs are a significant drop in blood pressure, fatigue, and shallow respiration.

13.2.3 Control Measures for Cold Stress

Worker comfort will be monitored and increased layers of PPE or modesty clothing worn under the PPE may be required to minimize cold stress for those persons working inside a building. For those workers performing tasks outside a building when ambient temperature falls below 36°F, the following guidelines should be used:

- If wind chill is a factor, shielding the work area or providing employees an outer windbreak layer garment will reduce the cooling effect of the wind;

- Extremities, ears, toes, and nose will be protected from extreme cold by protective clothing;

- Employees performing light work and whose clothing may become wet will wear an outer layer of clothing that is impermeable to water;

- Employees performing moderate to heavy work and whose clothing may become wet will wear an outer layer of clothing that is water repellent; and

- Outer garments must provide for ventilation to prevent wetting of inner clothing by sweat.

Workers who become immersed in water or whose clothing becomes wet will immediately be provided a change of clothing and be treated for hypothermia if necessary. If the clothing becomes wet from sweating, the employees may finish the task that caused the sweating before changing into dry clothes. Metal handles of tools and control bars will be covered by thermal insulating materials when temperatures fall below 30°F. Whenever a site becomes covered with snow or ice, eye wear providing employees' protection against ultraviolet light, glare, and blowing ice crystals shall be worn.

When conducting work in air temperatures below 35° F, the following practices shall be followed:

- If the clothing of an employee is expected to become wet, the outer layers of clothing must be impermeable to water;

- If an employee's underclothing becomes wet it must be changed immediately. If the clothing becomes wet from sweating, the employee may finish the task that caused the sweating before changing into dry clothing;

- Employees will be provided a warm area (65° F or above) to change from work clothing into street clothing and for breaks;

- Hot liquids, such as soups, warm drinks, etc. shall be provided in the break area. The intake of caffeine containing products shall be discouraged due to their diuretic and circulatory effects;

- If appropriate, approved space heaters may be provided in the work area to warm the hands, feet, etc;

- The buddy system shall be practiced. Any employee observed with signs of cold stress shall immediately proceed to the break area;

- Employees will be reminded to layer their clothing, i.e., wear thinner, lighter clothing next to the body with heavier clothing layered outside the inner clothing;

- Avoid overdressing when going into warm areas or when performing activities that are strenuous. This could potentially lead to heat stress situations;

- Auxiliary heated versions of hand wear, footwear, etc., can be used in lieu of mittens, insulated socks, etc. if extremely cold conditions exist;

- Employees handling liquids with high evaporation rates (gasoline, hexane, alcohol, etc.) shall take special precautions to avoid soaking of clothing with the liquids because of the added danger of cold injury caused by evaporative cooling;

- Work shall be arranged in such a way that sitting still or standing for long periods is minimized; and

- If the air temperature is 20° F or below the hands shall be protected by mittens or gloves prior to contact with cold surfaces such as metal, etc.

Air temperature is not the only factor to be considered while evaluating cold stress situations. Wind chill cooling rate and the cooling power of air are critical factors. The higher the wind speed the greater the risk of experiencing cold related injuries. For exposed skin, continuous exposure should not be permitted when the air speed and temperature result in an equivalent chill temperature of –25° F or less.

14.0 SAFE WORK PRACTICES AND STANDARD OPERATING PROCEDURES

14.1 GENERAL SAFE PROVISIONS

For Contractor's convenience, key regulations (including construction-related regulations) that may apply to the project activities are listed below. Contractors are responsible for ensuring that their HASPs address the issues and regulations applicable to their respective scopes of work for the project.

- Hazardous Waste Site Operations (29 CFR 1910.120);
- Construction Activities (29 CFR 1926);
- Hazard Communication (29 CFR 1910.1200 & 29 CFR 1926.59);
- Personal Protective Equipment (29 CFR 1920.132 & 29 CFR 1926.95)
- Fire Protection (29 CFR 1910.39 & 29 CFR 1926.150);
- Excavations (29 CFR 1926 Subpart P);
- Powered Hand Tools (29 CFR 1910.242 & 29 CFR 1926.301);
- Electrical Safety (29 CFR Subpart S & 29 CFR 1926.400-449);
- Fall Protection (29 CFR 1926 Subpart M);
- Walking Working Surfaces (29 CFR 1910.22)'
- Welding (29 CFR 1910.251 & 29 CFR 1926.350-354);
- Earthmoving Equipment (29 CFR 1926.602);
- Hazardous Energy Control (29 CFR 1910.147);
- Sanitation (29 CFR 1926.51);
- Scaffolding (29 CFR 1910.28 &29 CFR 1926.450-454);
- Confined Space Entry (29 CFR 1910.146):
- Respiratory Protection (29 CFR 1910.134).

14.1.1 Smoking and Eating Areas

Smoking will only be allowed in designated areas. Upon mobilization at the site, the SSO will establish smoking areas per site-specific or client-specific requirements. Individuals caught smoking outside the designated smoking areas will be subject to disciplinary action up to and including immediate termination.

Upon mobilization at the site, the SSO will establish eating and break areas per site-specific or client-specific requirements. Eating will only be allowed in the designated areas and the areas will be maintained in a clean and sanitary condition.

14.1.2 Sanitation and Potable Water

Containers used for drinking water will be equipped with a tap and capable of being tightly closed. In addition, the container will be labeled as "Drinking Water" or "Potable Water." Disposal cups will be stored in a sanitary condition and a receptacle for disposing of the cups will be near-by.

Potable and non-potable water containers and portable toilets (if used) will comply with OSHA 29 CFR 1910.141 requirements.

14.1.3 Temporary Facilities

All temporary facilities will be maintained in a clean and sanitary condition to discourage the entrance of rodents or vermin. If rodents or vermin become an issue, the SSO will be responsible for implementing an extermination program per site-specific or client-specific guidelines.

Trailers and other temporary structures used as field offices or for storage will be anchored with rods and cables or by steel straps to ground anchors. The anchor system will be designed to withstand winds and must meet applicable state or local regulations for the anchoring of mobile trailer homes. Use of standard anchoring systems to anchor structures is not permitted in Area 1 due to potential damage to the MMC. Methods designed to avoid impacting the MMC will be used to secure structures.

14.1.4 First Aid Station

A designated area must be readily accessible to employees. Signs shall be posted indicating the location for the first aid station and name of designated first aid provider(s). The sign should be in the form of a symbol that does not require workers to have language skills to understand it.

14.1.5 Eye Wash Stations

The location of each eyewash station must be identified with a highly visible sign. The sign should be in the form of a symbol that does not require workers to have language skills to understand it. Eye wash stations must be inspected monthly.

15.0 STANDARD OPERATING PROCEDURES

The following standard operating procedures will be adhered to at all times:

- All personnel entering the site must check in with the SSO.
- All individuals entering the site must demonstrate to the SSO that they have been adequately trained as defined in Section 4.
- All individuals must be familiar with emergency communication methods and how to summon emergency assistance.
- Use of alcoholic beverages before, during operations, or immediately after hours is absolutely forbidden. Alcohol can reduce the ability to detoxify compounds absorbed into the body as the result of minor exposures and may have negative effects with exposure to other chemicals. In addition, alcoholic beverages will dehydrate the body and intensify the effects of heat stress.
- Horseplay of any type is forbidden.
- All unsafe conditions will be immediately reported to the SSO, who will document such conditions in the field log. The SSO will be responsible for ensuring that the unsafe condition is correctly as quickly as possible.
- No smoking, eating, chewing gum or tobacco, taking medication, or applying cosmetics in the Contamination Reduction Zone or the Exclusion Zone. Wash hands and face thoroughly prior to conducting the activities in the Support Zone.
- Smoking, matches, and lighters are only allowed in the designated smoking area.
- Avoid contact with potentially contaminated substances. Avoid, whenever possible, kneeling on the ground, or leaning or sitting on trucks, equipment or the ground. Do not place equipment on potentially contaminated surfaces.
- If PPE becomes torn or saturated with contaminated material, immediately leave the Exclusion Zone, go through the decontamination steps, and replace the affected PPE. Additionally, wash any exposed skin thoroughly with soap and water.

16.0 SAFE WORK PRACTICES

16.1 PRE-EXCAVATION

Prior to mobilizing to the field, the Project Manger will be responsible for ensuring a Subsurface Clearance Checklist is followed, including verifying that the following issues have been adequately addressed.

- Contacting the State's One Call or equivalent utility locator service to identify underground pipelines, utility lines, and fiber optic cable;
- Contacting appropriate municipality to identify underground water and sewer lines;
- Contacting posted pipeline companies; and
- Contacting client to identify underground pipelines or other obstructions.
- Contacting client to notify Honeywell, the MDE and the EPA that excavation to the synthetic layers, or through the synthetic layers is about to occur. The anticipated date of the beginning of excavation will also be stated.

16.2 FALL PROTECTION

In the event that project team members and/or subcontractors are working more than six feet above grade and are not protected by handrails, complete floor decking or working on approved access ways, fall protection equipment will be required.

The distance above grade is measured from the employee's feet to the grade or approved work surface. Fall protection equipment will consist of an ANSI-approved full-body harness and shock-absorbing (or retractable) lanyard with double-locking d-rings.

Acceptable anchor points to which the lanyard may be attached includes, but are not limited to, the following:

- Structural beams at least six-inches in depth for one or more persons in a completed structure;

- Pipes at least four-inches in diameter for one person;
- Pipes at least six-inches in diameter for two people;
- Nozzles at least three-inches for one person;
- Nozzles greater than three-inches for two people; and
- Permanent platform handrail post below mid-rail for one person.

16.3 WEATHER-RELATED EVENTS

Weather-related events that may impact field work include, but are not limited to, rain, thunder, lightning, flash flooding, high winds and tornados. The SSO will be responsible for determining what site work can be performed safely in the rain and at what point work will cease due to either quality or safety issues. In the event of thunder and/or lightning, all work will be suspended until 15 minutes have elapsed from the last clap of thunder or flash of lightning.

16.3.1 Lightning Safety for Outdoor Workers

Safety and productivity are not mutually compatible, so one must be chosen over the other. Easy choice: SAFETY FIRST! Lightning has visited most all outdoor work environments. Anticipate a high-risk situation and move to a low-risk location.

Lightning safety awareness is a priority at every outdoor facility and operation. Education is the single most important means to achieving lightning safety. The following steps are suggested:

- Monitor weather conditions in the early morning hours. Local weather forecasts -- from The Weather Channel or NOAA Weather Radio or other notably reliable source -- should be noted 24 hours prior to scheduled activities. An inexpensive portable weather radio is recommended for obtaining timely storm data.
- Suspension and resumption of work activities should be planned in advance. Understanding of SAFE shelters is essential. SAFE evacuation sites include:
    - Fully enclosed metal vehicles with windows up;
    - Substantial buildings;

- Low ground -- seek cover in clumps of bushes; and
- Trees of uniform height, such as a forest.

- UNSAFE SHELTER AREAS include all outdoor metal objects, like power poles, fences and gates, high mast light poles, metal bleachers, electrical equipment, mowing and road machinery. AVOID solitary trees. AVOID water. AVOID open fields. AVOID high ground and caves.

- Lightning's distance from you is easy to calculate: If you hear thunder, the associated lightning is within audible range ... about 6-8 miles away. The distance from Strike A to Strike B also can be 6-8 miles. Suspend activities, allowing sufficient time to get to shelter. Of course, different distances to safety will determine different times to suspend activities. A good lightning safety motto is:

- *If you can see it (lightning), flee it; if you can hear it (thunder), clear it.*

- If you feel your hair standing on end, and/or hear "crackling noises," you are in lightning's electric field. If caught outside during close-in lightning, immediately remove metal objects (including baseball cap), place your feet together, duck your head, and crouch down low in baseball catcher's stance with hands on knees.

- Wait a minimum of 30 minutes from the last observed lightning or thunder before resuming activities. Be extra cautious during this phase as the storm may not be over.

- People who have been struck by lightning do not carry an electrical charge and are safe to handle. Apply first aid immediately if you are qualified to do so. Get emergency help promptly.

During rain, lightning and/or thunder events, site workers should seek shelter in either a building or vehicle. In the event of a tornado, site workers should seek shelter in a building, expect trailers, or in a low-lying area.

16.3.2 Noise

Employees performing any noisy task, such as but not limited to, operating heavy equipment, using power tools, or employees working nearby the person performing the task will wear hearing protection consisting of either earplugs or earmuffs. Personnel operating heavy equipment, such as pile driving equipment and excavators with hoe-ram attachments will also wear hearing protection.

17.0 CONFINED SPACE ENTRY PROCEDURES

Entry into existing Site confined spaces is strictly forbidden by untrained personnel and without a confined space permit issued by the Site Safety Officer. Entry into HMS confined spaces is anticipated for the Harbor Point construction activities. HMS confined space signage is current at the Site. If a project task or activity involves entry into a permit-required confined space or if there is a question as to whether or not a job task or activity involves a permit-required confined space, the PM or SSO will contact the Project Health and Safety Coordinator for assistance.

18.0 SPILL CONTAINMENT PROGRAM

The spill containment program for this project will involve the use of preventative measures in order to reduce the potential for environmental releases. These preventative measures will include the following:

- Equipment inspection;
- Staging equipment on containment pads;
- Secondary containment for fuel storage tanks; and
- General housekeeping practices; and
- Appropriately sized and stocked spill/release kits/containers.

If project activities involve the use of drums or other containers, the drums or containers will meet the appropriate DOT regulations and will be inspected and their integrity assured prior to being moved. Operations will be organized so as to minimize drum or container movement. Drums or containers that cannot be moved without failure will be over-packed into an appropriate container.

Additionally, refer to the site-specific Spill Prevention and Response Plan dated November 2013.

19.0 SITE COMMUNICATION

Telephones and two-way radios will be used for communication between the project team and the client. Cell phones may be used as part of the communication method. However, cell phones cannot be used while driving any type of vehicle.

20.0 COMMUNICATION AND REVIEW OF SITE-SPECIFIC HASP PLAN (HAZARD COMMUNICATION)

An initial review of the site-specific HASP will be held either prior to mobilization or after mobilization but prior to commencing work at the site to communicate HASP details and answer questions to individuals working at the site. Daily tailgate safety meetings will be held each morning to review work practices for the day and to discuss safety issues. Any new hazard or safety information will be disseminated at the daily tailgate safety meeting or as needed throughout the day.

21.0 EMERGENCY RESPONSE PLAN

This section describes possible contingencies and emergency procedures to be implemented at the site.

21.1 PERSONNEL ROLES AND LINES OF AUTHORITY

The SSO has primary responsibility for site evacuation and notification in the event of an emergency situation. This includes taking appropriate measures to ensure the safety of site personnel and the public. Possible actions may involve the evacuation of personnel from the site area and ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. If the SSO is not available, the Project Health and Safety Coordinator will assume these responsibilities. Subcontractors are responsible for assisting the SSO in their mission within the parameters of their scope of work.

21.2 EVACUATION ROUTES AND PROCEDURES

In the event of an emergency, it is important to be aware of the prevailing wind direction and evacuate upwind or crosswind.

21.3 ASSEMBLY POINTS

The primary Assembly Point is in front of the construction trailer. The secondary Assembly Point is in front of the spill trailer. In the event of an emergency requiring evacuation to an Assembly Point, the SSO will be responsible to account for the presence of all project team members and subcontractors on-site at the time of the emergency.

22.0 EMERGENCY RESPONSE

22.1 NOTIFICATION OF SITE EMERGENCIES

The Contractor must have systems in place for responding to all emergencies. The written HASP should note the potential emergencies associated with this specific project and describe methods anticipated to perform the following:

- Notify appropriate individuals, authorities, and/or health care facilities of the site activities and anticipated duration prior to the mobilization of equipment;

- Ensure that, at a minimum, the following safety and monitoring equipment is available at the site: first aid supplies, fire extinguishers, a non-phosphate soap and water solution and potable water rinse, and potable water for eye washing;

- Ensure that a sufficient number of cellular telephones are present during site activities for emergency response and office communications. If deemed appropriate by the SSO or HSC, two-way radios may also be used on site for communication among workers;

- Have working knowledge of all safety equipment available at the site;

- Ensure that a map, which details the most direct route to the nearest hospital, is readily available with the emergency telephone numbers;

- The Contractor's HASP shall contain a list of emergency response telephone numbers. This list will be maintained at the work site by the SSO or his designee in a readily accessible location for use in case of an emergency.

22.2 DIRECTIONS TO THE NEAREST HOSPITAL

The Contractor's HASP will include a map and written directions to the Johns Hopkins Hospital Emergency Entrance located at 1800 Orleans Street (Appendix A). The SSO will identify site egress routes during the daily briefing prior to commencement of that day's work.

23.0 EVACUATION PROCEDURES

Where site evacuation could possibly be a health and safety consideration, the Contractor's HASP should define the primary evacuation route and also identify an alternate evacuation route based on the scheduled site operations. The two routes will be established independent of each other in the event of an obstruction on a particular route. A system should be in place to ensure that employees can easily evacuate the work area. It is recommended that daily evacuation routes will be reviewed with site workers at the start of each day.

24.0 INCIDENT REPORTING PROCEDURE

In the event that a health and safety incident occurs, it is imperative that specific reporting procedures be followed so that appropriate corrective action can be taken by the HSC and the PM for the duration of the project. The Contractor's HASP must define methods by which accidents are reported, investigated, and prevented in the future. It is recommended that the Contractor's PM and the HSC investigate the facility/site conditions to determine: (1) the severity of the incident; (2) the cause of the incident; (3) the means to prevent the incident from recurring; and, (4) personnel responsible for implementing the corrective action.

The following additional personnel shall be identified in the Contractor's HASP and notified within a reasonable timeframe, but this should be no later than 1 hour after any incident.

- Jonathan Flesher, HPD, (cell: 443-463-3937
- Ken Biles, CH2M Hill, (cell: 443-271-6694);
- Bob Steele, CH2M Hill (cell: 609-625-1780)
- Bill Berlett, CH2M Hill (cell: 847-770-0209)
- Chris French, Honeywell (cell: 973-216-7506)

The Contractor's HASP will include an incident reporting form so that consistent and appropriate information is obtained regarding employee exposures or accidents. The form will be filed at the Contractor's office with the employee's medical and safety records to serve as documentation of the incident and the actions taken.

25.0 INCIDENT INVESTIGATIONS

All safety events, including incidents, will be recorded and documented within 24 hours of an incident. All incidents will be reported to Bill Berlett (see above) and investigated in a timely manner. Incidents will require entry into the Honeywell Event Tracking System by CH2M Hill. The Safety Team will schedule the investigation and include the SSO, the Project Manager, project supervision (subcontractors, and client), the injured/involved employee(s) and the Project Health and Safety Coordinator. Root cause analysis will be performed to assess the apparent cause and identify corrective measures to be implemented to prevent re-occurrence. The last page of the Incident Form is used to document the investigation.

26.0 CERTIFICATION OF FAMILIARITY WITH PLAN BY SITE PERSONNEL

By signing below, signee certifies that they have read, understand and will abide by the contents of this HASP.

Name	Signature	Company	Date

Name	Signature	Company	Date

Figures

Figure 1
Site Location Map

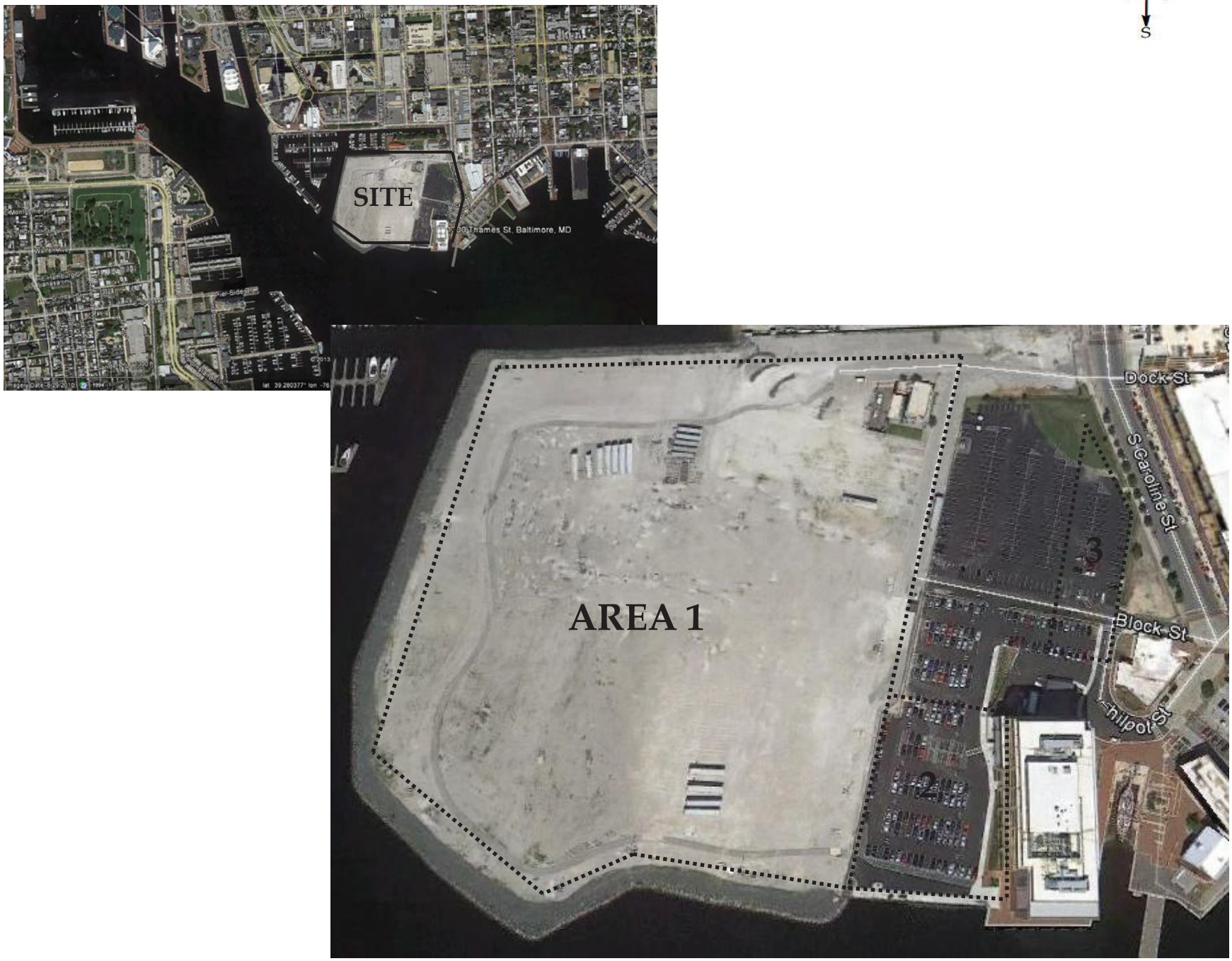


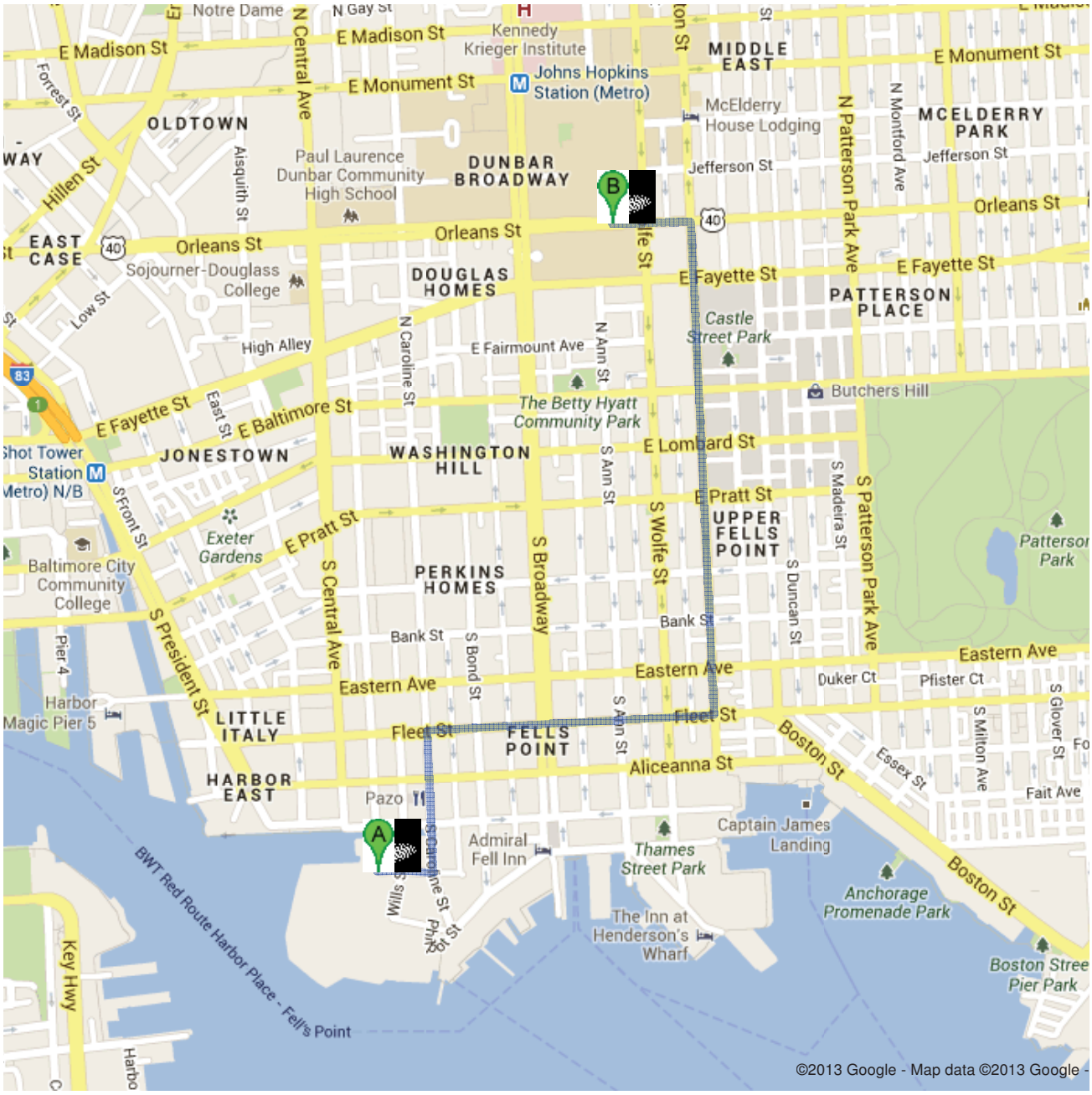
Figure 2
Construction Air Monitoring Locations
Harbor Point
Baltimore, Maryland

MET – Meteorological Station
PAM – Perimeter Air Monitor
OAM – Off-site Air Monitor
1 – City Recreation Pier
2 – Baltimore National Aquarium

ERM®

Appendix A
Map to Hospital

Directions to 1800 Orleans St, Baltimore, MD 21287
1.6 mi – about **9 mins**



1000 Dock St, Baltimore, MD 21231

1.	Head **east** on **Dock St** toward **Wills St** Restricted usage road	go 443 ft total 443 ft
2.	Take the 1st left onto **S Caroline St** About 1 min	go 0.2 mi total 0.3 mi
3.	Take the 3rd right onto **Fleet St** About 2 mins	go 0.4 mi total 0.7 mi
4.	Turn left onto **S Washington St** About 4 mins	go 0.7 mi total 1.5 mi
5.	Turn left onto **Orleans St** Destination will be on the right About 1 min	go 0.1 mi total 1.6 mi

1800 Orleans St, Baltimore, MD 21287

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

Appendix B
Job Hazard Analysis Form

JHA
Job Hazard Analysis

Project Number:		Project / Client Name:	
Project Manager:		Location:	
Partner-in-Charge:		Date and Revision Number:	

SPECIFIC TASK:	

Minimum Required PPE for Entire Task:	☐ Hard Hat ☐ Safety-Toe Shoes ☐ Hearing Protection ☐ Goggles ☐ Face Shield ☐ Respirator <enter type and cartridge type> ☐ Other (specify): ☐ Safety Glasses ☐ Reflective Vest ☐ Gloves <enter type here> ☐ PPE clothing <enter type here (eg, Tyvek, FRC, long sleeves)> <enter additional PPE here>		
Additional Task-Step Specific PPE: (as indicated below under Controls)		Equipment / Tools Required:	
Training Required for this Task:		Permits Required for this Task:	
Forms Associated with This Task:			

JHA Developed / Reviewed By:			JHA Review In Field
Name / Job Title:	Name / Job Title:	Name / Job Title:	Field Safety Officer (FSO) to ensure all personnel performing this task have reviewed JHA and agree to follow it. Site-specific changes to this JHA have been made as warranted based on this review. **<u>FSO Signature/Date:</u>**

Task Steps[1]		**Potential Hazards & Consequences[2]**		**Hazard Types[3]**	**Likelihood[5]**	**Severity[5]**	**RISK[5]**	**Controls to Eliminate or Reduce Risks[4]**	
1		1a						1a	
		1b						1b	

Task Steps[1]		Potential Hazards & Consequences[2]		Hazard Types[3]	Likelihood[5]	Severity[5]	RISK[5]	Controls to Eliminate or Reduce Risks[4]	

ONE JHA PER TASK. SUBCONTRACTORS MUST PROVIDE THEIR OWN JHAS. JHAS SHOULD BE WRITTEN IN PLAIN LANGUAGE AND SHOULD BE NO MORE THAN 2-3 PAGES IN LENGTH.
INSERT ADDITIONAL ROWS AS NEEDED ABOVE (MUST MANUALLY COPY AND PASTE FORMULA IN COLUMN H). ROW HEIGHTS MAY NEED TO BE MANUALLY EXPANDED TO VIEW ALL TEXT.
LEAVE SEVERAL BLANK OVERSIZED ROWS TO ALLOW HANDWRITTEN FIELD ADDITIONS. CAN ALSO DELETE UNNEEDED ROWS TO FIT PAGE(S).

1. Each task consists of a set of steps. List and number all the steps in the sequence they are performed. Specify the equipment or other details.

2. List potential hazards and consequences - ONE PER ROW. Use numbers and letters for each hazard/impact listed (1a, 1b, etc). Hazards should be described in terms of their specific origin and negative consequences (e.g., instead of “moving equipment”, write “injury from getting struck by forklift”).

3. For each potential hazard, select the hazard type from the following list:
   - H&S - Health & Safety
   - S - Security
   - E - Environmental
   - PL - Property Loss
   - multiple - multiple hazard types

4. Describe the specific actions or procedures that will be implemented to eliminate or reduce each hazard. Be clear, concise, and specific. Use objective, observable, and quantified terms (e.g., instead of “use good body positioning,” write “don’t bend at waist or reach above head”). Use numbers and letters corresponding to listed hazards.

5. Select the likelihood of occurrence and severity of each hazard, AFTER implementation of the planned control measures (use the Risk Matrix as a guide). The corresponding risk rating should be calculated by multiplying the likelihood and severity [RISK = Likelihood x Severity].
A risk rating of > 15 indicates that work cannot continue without additional control measures and approval of Partner-in-Charge.

WAYS TO ELIMINATE OR REDUCE RISKS (IN ORDER OF PREFERENCE):

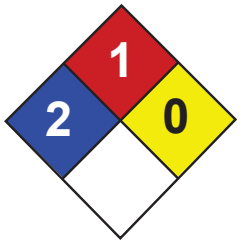
ELIMINATE / AVOID --> SUBSTITUTE / MODIFY --> ISOLATE --> ENGINEER / SAFEGUARD --> TRAINING AND PROCEDURES --> WARNING AND ALERT MECHANISMS --> PPE

Risk Matrix

What could go wrong? What is the worst thing that could happen if something goes wrong?

			Hazard Severity				
			1	2	3	4	5
			INSIGNIFICANT negligible or no injury could result	**MINOR** minor injury requiring only first aid	**MODERATE** Injury resulting in lost time could occur	**HIGH** Serious injury or death could occur	**VERY HIGH** multiple deaths could occur
Likelihood	1	VERY UNLIKELY	1	2	3	4	5
	2	UNLIKELY	2	4	6	8	10
	3	POSSIBLE	3	6	9	12	15
	4	LIKELY	4	8	12	16	20
	5	VERY LIKELY	5	10	15	20	25

Appendix C
Material Safety Data Sheets
(Example)



Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Chromium MSDS

Section 1: Chemical Product and Company Identification

Product Name: Chromium

Catalog Codes: SLC4711, SLC3709

CAS#: 7440-47-3

RTECS: GB4200000

TSCA: TSCA 8(b) inventory: Chromium

CI#: Not applicable.

Synonym: Chromium metal; Chrome; Chromium Metal Chips 2" and finer

Chemical Name: Chromium

Chemical Formula: Cr

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Chromium	7440-47-3	100

Toxicological Data on Ingredients: Chromium LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. Slightly hazardous in case of ingestion.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, lungs, liver, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 580°C (1076°F)

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances:
Slightly flammable to flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Moderate fire hazard when it is in the form of a dust (powder) and burns rapidly when heated in flame. Chromium is attacked vigorously by fused potassium chlorate producing vivid incandescence. Pyrophoric chromium unites with nitric oxide with incandescence. Incandescent reaction with nitrogen oxide or sulfur dioxide.

Special Remarks on Explosion Hazards:
Powdered Chromium metal +fused ammonium nitrate may react violently or explosively. Powdered Chromium will explode spontaneously in air.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.5 (mg/m3) from ACGIH (TLV) [United States] TWA: 1 (mg/m3) from OSHA (PEL) [United States] TWA: 0.5 (mg/m3) from NIOSH [United States] TWA: 0.5 (mg/m3) [United Kingdom (UK)] TWA: 0.5 (mg/m3) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 52 g/mole

Color: Silver-white to Grey.

pH (1% soln/water): Not applicable.

Boiling Point: 2642°C (4787.6°F)

Melting Point: 1900°C (3452°F) +/- !0 deg. C

Critical Temperature: Not available.

Specific Gravity: 7.14 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water. Soluble in acids (except Nitric), and strong alkalies.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, acids, alkalis.

Corrosivity: Not available.

Special Remarks on Reactivity:
Incompatible with molten Lithium at 180 deg. C, hydrogen peroxide, hydrochloric acid, sulfuric acid, most caustic alkalies and alkali carbonates, potassium chlorate, sulfur dioxide, nitrogen oxide, bromine pentafluoride. It may react violently or ignite with bromine pentafluoride. Chromium is rapidly attacked by fused sodium hydroxide + potassium nitrate. Potentially hazardous incompatibility with strong oxidizers.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: kidneys, lungs, liver, upper respiratory tract.

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May cause cancer based on animal data. There is no evidence that exposure to trivalent chromium causes cancer in man.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: May cause skin irritation. Eyes: May cause mechanical eye irritation. Inhalation: May cause irritation of the respiratory tract and mucous membranes of the respiratory tract. Ingestion: May cause gastrointestinal tract irritation with nausea, vomiting, diarrhea. Chronic Potential Health Effects: Inhalation: The effects of chronic exposure include irritation , sneezing, reddness of the throat, bronchospasm, asthma, cough, polyps, chronic inflammation, emphysema, chronic bronchitis, pharyngitis, bronchopneumonia, pneumoconoisis. Effects on the nose from chronic chromium exposure include irritation, ulceration, and perforation of the nasal septum. Inflammation and ulceration of the larynx may also occur. Ingestion or Inhalation: Chronic exposure may cause liver and kidney damage.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Chromium Illinois toxic substances disclosure to employee act: Chromium Illinois chemical safety act: Chromium New York release reporting list: Chromium Rhode Island RTK hazardous substances: Chromium Pennsylvania RTK: Chromium Minnesota: Chromium Michigan critical material: Chromium Massachusetts RTK: Chromium Massachusetts spill list: Chromium New Jersey: Chromium New Jersey spill list: Chromium Louisiana spill reporting: Chromium California Director's List of Hazardous Substances: Chromium TSCA 8(b) inventory: Chromium SARA 313 toxic chemical notification and release reporting: Chromium CERCLA: Hazardous substances.: Chromium: 5000 lbs. (2268 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):
R40- Limited evidence of carcinogenic effect S36/37/39- Wear suitable protective clothing, gloves and eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:16 PM

Last Updated: 05/21/2013 12:00 PM

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MATERIAL SAFETY DATA SHEET
ERA A Waters Company

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER: ERA
ADDRESS: 16341 Table Mountain Parkway
Golden, CO, 80403 U.S.A.

BUSINESS PHONE: 303-431-8454
FAX: 303-421-0159 **EMAIL:** info@eraqc.com
CHEMICAL EMERGENCY PHONE: 352-535-5053 (INFOTRAC)

Product Name(s): Hexavalent Chromium 1000 mg/L
Catalog / Part Number(s): 019, 973, 186004178
MSDS Creation Date: November 22, 2005
Revision Date: July 18, 2012 **MSDS Reference Number:** 019

SECTION 2: HAZARDS IDENTIFICATION

Toxic. Harmful by inhalation. May cause cancer. Risk of cancer depends on duration and level of exposure. The matrix of each standard is a K2Cr2O7/water mixture listed below which is classified as dangerous by Directive 199/45/EC. Use only as directed and in accordance with good laboratory practices.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

				EXPOSURE LIMITS		EU LABEL
CHEMICAL INGREDIENT NAME	CAS NUMBER	EC NUMBER	% BY WT.	OSHA	ACGIH	HAZARD LABEL
Potassium dichromate	7778-50-9	231-906-6	≤0.1	0.1 mg/m3 PEL	0.05 mg/m3	

Notes: This standard is 125 mL of a mixture containing potassium dichromate salt with the balance being ≥99.9% water. Hexavalent chromium is a known human carcinogen. Exposure Limits are 8-Hour TWA (Time Weighted Average) unless designated C (Ceiling) or STEL (Short Term Exposure Limit). Other components considered Non-Hazardous under OSHA 1910.1200 (HazCom) as they are not present in concentrations exceeding 1% (or 0.1% if considered a known or potential carcinogen). Material Use: Analytical reagent or certified reference material used in laboratories. Uses also include research and development.

SECTION 4: FIRST-AID MEASURES

Inhalation: Remove to fresh air.
Skin Contact: Flush with water.
Eye Contact: Immediately flush with water for a minimum of 15 minutes.
Ingestion: Get medical attention
After following first aid measures, seek medical attention.

SECTION 5: FIRE-FIGHTING MEASURES

Flammable Properties: Not flammable.
Extinguishing Media: Dry chemical, carbon dioxide or appropriate foam.
Unique Aspects Contributing To a Fire: None.
Special Fire Fighting Procedures: None.
Note: As in any fire, wear self-contained breathing apparatus, and full protective gear.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Absorb liquid with spill pillow or other absorbent. Ventilate and wash spill site after material pick up is complete. Place wastes into closed containers for proper disposal.

SECTION 7: HANDLING AND STORAGE

Handle in accordance with good laboratory practices. Store in a dry well-ventilated place. This product is intended for use only by people trained in the safety and handling of chemicals and laboratory preparations.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Handle in accordance with good laboratory practices. Wash thoroughly after handling.
Respiratory Protection: Not normally needed. If exposure limits are exceeded, use approved respirator.
Eye Protection: Safety glasses with side shields or safety goggles
Skin Protection: Neoprene or other chemical resistant gloves.
Engineering Controls: Not normally needed. If exposure limits are exceeded, work in a fume hood.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

DATA FOR MATRIX:

Appearance:	**Clear to yellow**	**Specific Gravity:**	**NA**	**Melting Point:**	**NA**
Physical State:	**Liquid**	**Flash Point:**	**NA**	**Vapor Pressure:**	**NA**
Odor:	**NA**	**Explosion Limits:**	**NA**	**Vapor Density (air=1):**	**NA**
pH:	**NA**	**Boiling Point:**	**NA**	**Solubility in Water:**	**Soluble**

SECTION 10: STABILITY AND REACTIVITY

Hazardous Polymerization Will Not Occur __X__ May Occur____ Stability: Stable __X__ Unstable ____
Hazardous Decomposition/Combustion Products: NA
Conditions and Materials to Avoid: Oxidizing agents.

SECTION 11: TOXICOLOGICAL INFORMATION

Primary Route(s) of Exposure Under Normal Use: Skin contact: may cause skin irritation or be harmful if absorbed through skin. Eye contact: may cause eye irritation. Inhalation: hamful if inhaled, may be irritation to mucous membranes and upper respiratory tract. Ingestion: harmful if swallowed.

Target Organ(s): Lungs, kidneys, blood.

Acute Effects: Harmful by inhalation. May cause sensitization by inhalation and skin contact. Ingestion can cause vomiting.
Potassium dichromate: Oral, child: LDLO=26 mg/kg; Oral, man: LDLO=143 mg/kg; Oral, rat:LD50=25 mg/kg; Skin, rabbit:LD50=14 mg/kg.

Chronic Effects: Carcinogen; Teratogen; May cause heritable gentic damage. Reproductive hazard; May impair fertility. May cause harm to the unborn child.

Other Information: Chemical Ingredient(s) potassium dichromate is classified as carcinogen(s) by OSHA, IARC (Group 1), NTP, ACGIH (A1), or California. California Prop-65: This product is or contains chemicals known to the state of California to cause cancer.

SECTION 12: ECOLOGICAL INFORMATION

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Avoid release into the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

To determine proper disposal, consult applicable federal, state and local environmental control regulations.

SECTION 14: TRANSPORT INFORMATION

Shipment Name/Type: Non-hazardous for transport.
UN Number: NA Shipping/Hazardous Class: NA Packing Group: NA
Shipping regulations are based on combinations of criteria such as quantity, class and packaging according to DOT, IATA and (49) CFR.

SECTION 15: REGULATORY INFORMATION

EU Symbol of Danger: Toxic (T) concentration ≤0.1 C <0.2%
EU Risk Phrases: May cause cancer [R45]; May cause heritable genetic damage [R46]; Harmful by inhalation [R20].

U.S. TSCA: Listed
Canada: This product has been classified according to the hazard criteria of the CPR and this MSDS contains all the information required by the CPR.

SECTION 16: OTHER INFORMATION

United States EPA Regulatory Information:		**NFPA Rating:**	**Health: 3**	**Flammability: 0**	**Reactivity: 0**
SARA 313:	**Yes (0.1% deminimis)**				
CERCLA RQ:	**10 lbs**	**HMIS Rating:**	**Health: 3**	**Flammability: 0**	**Physical Hazard: 0**

NOTE: NA = Data not available, not established, determined or not pertinent.

Appendix D
Daily Safety Meeting Form

Daily Safety Meeting Documentation Form

Project Name: Project Number: Meeting Date & Time: Meeting Leader:

Document Routing	
FSO	Retain copy in site health & safety file.

What work will be conducted on site today and by whom?

Work Task	Conducted By

What overlapping operations/simultaneous operations will occur today?

Any follow-up from previous Major Incidents, Near Misses, Unsafe Acts or Unsafe Conditions discussed today?

List any new / short-service personnel on site today?

Safety Meeting Core Topics – All Site Workers *and* Visitors

- ☐ What PPE is required in order to enter the work zone?
- ☐ What are the potential hazards associated with today's work. How will they be managed?
- ☐ What are the potential impacts of planned activities to: Visitors? Nearby workers? Public?
- ☐ Is everyone aware that they are empowered to stop work if something is questionable or unsafe?
- ☐ What happens and who do you contact if there is an injury or emergency? If working at an active facility, how will you be alerted of an emergency and what will you do?
- ☐ Who do you contact if you have questions, or before deviating from written procedures?
- ☐ Where is fire extinguisher, first aid kit, eyewash, safety shower located?
- ☐ Are any work permits required? Are permits completed and posted in plain view of workers?
- ☐ Have all excavation / borehole locations been cleared of underground utilities/structures, in accordance with ERM and client-specific subsurface clearance procedures?
- ☐ Have all tools / equipment / vehicles been inspected today to ensure safe operating condition?
- ☐ Will a follow-up safety meeting be conducted after lunch?
- ☐ Has anything unexpected or out-of-the-ordinary occurred on this job recently to share?
- ☐ What is the worst that could happen if something goes wrong today?

Daily Safety Meeting Documentation Form

Project Name: Project Number: Meeting Date & Time: Meeting Leader:

Safety Topics Related to ERM 2011/2012 Incident Trends – All Site Workers *and* Visitors

- ☐ What activities occurring today could result in hand injuries? Is everyone aware that the use of fixed open-blade knives is not permitted without cut-resistant gloves?
- ☐ Does the site pose natural hazards to be avoided? Thorny underbrush/ticks/poison ivy?
- ☐ What areas of the site have slip/trip/fall hazards? Are everyone's work boots in good shape?
- ☐ How will the on-site team avoid vehicle accidents? Is everyone aware that taking their eyes off the road for more than 2 seconds (for any reason) leads to vehicle accidents?

Who attended the safety meeting today (employees, subcontractors, visitors)?

Name	Company	Signature	Sign-In Initials*	Sign-Out Initials**

* Initials in this space verify that the employee is fit for performing work.
**Initials in this space verify that the employee was uninjured during the workday.

Who visited the site today but was not involved in work activities?

Name	Company	Arrival Time

Area 1, Phase 1
Material Handling and Management Plan

Baltimore Works Site
Baltimore, Maryland

REVISED

December 2013

By:
Environmental Resources Management, Inc.
Harbor Point Development LLC

For:
U.S. Environmental Protection Agency – Region III
Maryland Department of the Environment

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A ***Referenced Document:*** MDE Fact Sheet, "VCP - Clean Imported Fill Material"

1.0 INTRODUCTION

This Material Handling and Management Plan ("Plan") has been prepared for inclusion with the Detailed Development Plan (DDP) for Harbor Point Area 1, Phase 1 Development ("Site"). The principal contaminant of concern (COC) identified at the Site is hexavalent chromium (CrVI).

Harbor Point is located on a peninsula in the Northwest Branch of the Patapsco River located in Baltimore, Maryland (Figure 1). The peninsula joins the mainland at the east side of the site, bounded by South Caroline Street and the Baltimore Inner Harbor. The main site area is referred to as Area 1, and the Southeast Quadrant is referred to as Area 2. Additionally, the property located midway between Wills Street and South Caroline Street North of Philpot Street is referred to as Area 3.

The approved Environmental Remediation System (ERS) is operated and maintained by Honeywell International Inc. ("Honeywell") pursuant to the Consent Decree dated April 27, 1989, as amended, among Honeywell, EPA and MDE, to contain chromium contaminated groundwater and limit exposure to impacted soil. The ERS consists of the Multimedia Cap (MMC), Hydraulic Barrier, Head Maintenance System (HMS) and Outboard Embankment.

1.1 PURPOSE

The Plan addresses the handling and management of solids (asphalt, stone aggregates, concrete and wood debris and soil) and liquids (storm water, decontamination water and groundwater) that may be encountered during the intrusive activities at the Site. For the purpose of this Plan, "intrusive activities" occur any time there is disturbance of the surface immediately below the Multimedia Cap (MMC) synthetic layers in Area 1. This Plan provides a description of the methods to be utilized for material handling, segregating, storing, waste profiling, transporting and disposing waste off-Site. The Plan will be implemented prior to the initiation of intrusive activities and will continue through the completion of all intrusive activities, including restoration of the synthetic layers of the MMC and removal of all controlled material that is disturbed by the installation of the improvements from the Site.

1.2 SITE DESCRIPTION

The Site is located on a peninsula on the northeast shore of the Patapsco River of the Inner Harbor, in the Fells Point section of Baltimore City, Maryland. The former chromium chemical manufacturing facility consisted of chromium processing production buildings and numerous support buildings on an area that covered approximately 14 acres. The Site is surrounded by water on the north, west and south, the Living Classrooms facility to the north and by the Thames Street Wharf Office Building, and parking areas associated with that building to the east.

1.3 SITE USE HISTORY

The Site has been divided into Areas 1, 2, and 3. Area 1 is the principal site of Honeywell's (formerly AlliedSignal) Baltimore Works Facility (Figure 1). Chromium ore was processed in Area 1 from 1845 to 1985. The former manufacturing processes resulted in chromium impacts to soil and groundwater. An Environmental Remediation System (ERS) is maintained and operated by Honeywell International Inc. (Honeywell) to contain CrVI-impacted groundwater in Area 1 and control the potential for human exposure to affected soil. The ERS consists of a Multimedia cap (MMC), Hydraulic barrier, Head Maintenance System (HMS), a groundwater storage and transfer system, and Outboard Embankment. The HMS maintains an inward groundwater gradient to mitigate the migration of chromium-impacted groundwater from the Site.

Area 2 was mainly used for coal and raw chromium ore storage. In addition, a fertilizer warehousing and supply company operated in this area for many years.

Area 3 consists of five separate properties all with a history of industrial activity. This industrial activity included brass casing, oil blending and storage, lumber storage and coating/plastics production.

Honeywell purchased all of these properties by 1993 at which time all manufacturing was halted and subsequently all buildings and tanks were removed from these sites.

1.4 PRIOR DEVELOPMENT (AREAS 2 AND 3)

During the development of the Thames Street Wharf Office Building in Areas 2 and 3, the previously approved Plan (ERM, 2007) was implemented throughout intrusive activities for the period November 2007 through August 2008, and for short durations in late 2009 and early 2010. Off-site waste disposal included Subtitle D, special waste soil (9,500 tons) and Subtitle C, D007 concrete debris (32 tons). There was no off-site disposal of contaminated water.

1.5 FUTURE DEVELOPMENT (AREA 1)

During future development the exposure pathways of concern for CrVI are via potential airborne dust from intrusive activities below the MMC resulting in incidental inhalation, ingestion or dermal contact, including contact with contaminated materials and liquids while handling during construction. The approved Material Handling and Management Plan will be implemented during future Harbor Point development and will be modified, if necessary, as part of the Development Plan approval process.

2.0 ENVIRONMENTAL REQUIREMENTS

The Developer must protect the existing Environmental Remediation System (ERS). The ERS remedial components for Area 1 include the Outboard Embankment and Waterside Perimeter, the Hydraulic Barrier, the Head Maintenance System (HMS) and the Multimedia Cap, including a methane gas venting system. The Developer's design, construction, and finished improvements shall conform to the requirements of the Consent Decree and preserve and protect Honeywell's ability to comply with the Performance Standards defined in a Consent Decree between Honeywell, the USEPA and the MDE.

Specific requirements include, but are not limited to:

- All imported material must meet MDE/LRP residential standards for materials, e.g., imported soil, topsoil, and stone (See Appendix A, MDE Fact Sheet, "VCP - Clean Imported Fill Material"). The analytical results will be compared to residential soil standards presented in MDE's *Cleanup Standards for Soil* and *Groundwater, dated June 2008,* to determine whether the fill source is acceptable. Copies of all imported fill analyses will be provided to MDE for review, consultation and approval prior to importing fill.

- Environmental controls shall be instituted once a Cap is penetrated or removed, including perimeter air monitoring and dust suppression; and

- All Cap components must be repaired or replaced in any disrupted or penetrated area of the Cap, unless otherwise noted on the approved Detailed Development Plan for that development. All repairs must be initiated immediately upon completion of work or discovery of damage.

3.0 EXELON DEVELOPMENT

The development project consists of the Exelon Tower and Trading Floor Garage, the Central Plaza Garage, modifications to the existing Transfer Station, general site development (plaza, streets, and sidewalks) and utilities, foundations, roadways, and other related site development elements. Site access is currently limited to Dock Street. Additional access to the Site will be provided by connecting a new bridge to Central Avenue.

The majority of construction will occur in the northeast region of Area 1, located west of Wills Street and south of Dock Street (Drawing DDP-EN1.01). The new foundations (environmental concentric piles and concrete pile caps) will be constructed above, within and below the MMC (Drawing DDP-F1.60).

3.1 EXISTING CONDITIONS

The existing Environmental Remediation System consists of a multimedia cap (MMC), a hydraulic barrier and head maintenance system (HMS). The MMC is designed (i) to prevent upward migration of contaminants and limit the potential for direct exposure to contaminated soils or groundwater and (ii) to reduce infiltration to the groundwater within Area 1. MMC components are illustrated in Drawing DDP-F1.30 Detail 1.

The groundwater control measures consisting of the hydraulic barrier and HMS were installed prior to the installation of the MMC. The hydraulic barrier was placed at the perimeter of Area 1 to isolate groundwater below Area 1 from Harbor surface water and the surrounding groundwater. The hydraulic barrier reduces the amount of groundwater that must be extracted by the HMS to maintain an inward hydraulic gradient. The HMS withdraws groundwater from within Area 1 to maintain a groundwater level within the hydraulic barrier that is lower than the water table outside of the hydraulic barrier (i.e., maintain an inward groundwater gradient).

According to the Conceptual Geologic Section A:A – Harbor Point Area 1 (Drawing DDP-F1.11), the excavation zone below the MMC synthetic layers is described as fill (Stratum F), ranging in thickness from 5 to 10 feet below ground. The fill consists of medium compact to loose, gray and

brown fine to coarse sand, with some silt, trace to some gravel, trace clay, and with variable amounts of brick, concrete fragments, cinders and wood.

3.2 EROSION AND SEDIMENT CONTROLS

Prior to the initiation of any intrusive activities, the erosion and sediment controls described on Drawing DDP-C8.00 will be installed. Additionally, erosion and sediment controls as detailed on Drawings DDP-F1.22 and F1.30 will be applied to individual excavations made for sheet pile; pipe pile; clean utility corridor; and pile cap and momentum slab installation, including storm water diversion berms to reduce or limit run-on into open excavations.

Erosion and sediment controls will include the construction of temporary decontamination pads for loading excavated soil from below the MMC synthetic layers (Drawing DDP-EN1.01). The erosion and sediment controls also include the construction of a temporary storage area that will include the ability to collect water that could potentially leak from a lined, covered, sealed roll-off container. An asphalt pad and perimeter asphalt berm will be constructed with a shallow perimeter drain to direct run-off to a sealed collection sump installed at the low point in the asphalt surface (Drawing DDP-EN1.06.01).

Run-off water collected in the sealed sump will be pumped to a nearby portable, 16,000-gallon double-wall, closed-top container ("Frac" tank). Further discussion on water handling is provided in Section 5 – Water Management.

In accordance with COMAR 23.13.03.05E, Accumulation Time, hazardous waste shall be shipped off-site within 90 days of generation of the waste to an approved, permitted facility. Specific provisions, e.g. container labeling, secondary containment, inspection and record keeping, will be followed.

3.3 EXCAVATION

The excavation planned for the Exelon Tower moment slab, pile caps, concentric piles, and any other excavations through the MMC will generate clean soil/aggregate from above the MMC synthetic layers and chromium contaminated soil/debris. EPA and MDE shall be provided written notice a minimum of two weeks in advance of initiating the Exelon Tower moment slab excavation.

The proposed moment slab excavation will terminate at El. +3 feet mean sea level (msl), approximately four feet below the MMC synthetic layers (DDP-EN1.60). Abandoned, concrete or wood foundation structures have been identified that will be encountered below the MMC during centric, steel pile driving and concrete pile cap construction. The abandoned structures will be removed only to the extent necessary for construction of new foundations. As such, the removed, abandoned structures will be considered contaminated debris requiring off-site disposal. Qualified, environmental personnel, familiar with chromium contamination, will be responsible for visually identifying gross chromium contamination present in the form of chromium salts or Chromium Ore Process Residue (COPR). If COPR is encountered, the Contractor will use that opportunity to train field staff to visually recognize this material. Any materials generated in response to such an occurrence of chromium salts or COPR will be managed in accordance with this Plan.

Direct-loading of excavated soil/debris into lined, sealed roll-off containers is the preferred daily excavation and transportation method. However, a controlled, temporary storage area will be constructed, as described above, for use in the event that sealed roll-off containers cannot be transported daily for off-Site disposal. Some events that might prompt the use of this temporary storage area, as a contingency, are:

- Volume limit to the daily capacity of the primary and alternate off-site disposal facilities;
- Off-site disposal facility hours of operation; and
- Limited availability of long-haul trucks.

The storage area will be located in close proximity to the excavation zone required for construction of the moment slab (west side of Limit of Disturbance) to reduce the distance for moving containers (Drawing DDP-EN1.01). The controlled area will be approximately 5,000 square feet which will provide a storage capacity of 20; 25-cubic yard lined and sealed roll-off containers or approximately 250 cubic yards of containerized soil/debris storage. Further discussion regarding soil/debris transportation and disposal is provided in Section 4 – Soil/Debris Handling and Management. As mentioned above in Section 3.2, in accordance with COMAR 23.13.03.05E, Accumulation Time, all hazardous waste shall be shipped off-site within 90 days of generation of the waste to an approved, permitted facility. Specific provisions, e.g. container labeling, secondary containment, inspection and record keeping, will be followed.

3.4 DUST CONTROL

Excavation surfaces will be covered by geotextile as soon as practical during the excavation sequence to limit wind-blown caused dust emissions. Other soil sealing materials such as polyethylene plastic sheeting or foam spray-applied to the slopes of excavation zones may also be utilized. The bottom of the excavation zone will be further sealed by installing either clean, aggregate layer and/or mudmat, thereby allowing general construction trade workers to perform work in a clean zone (DDP-F1.30 and DDP-F.131.

Additional dust suppression will be employed by misting the excavation zone with potable water as needed to keep exposed soil surfaces moist until the controls described above are installed. The aerosolized water misting is also effective in precipitating dust emissions.

A schedule for submitting an Air Monitoring Plan is provided in the Detailed Development Plan (DDP) for the Harbor Point Area 1, Phase 1 Development. The Air Monitoring Plan will provide a description of the methods to be utilized for real-time particulate and weather data collection, air sample collection, laboratory analytical methods, and reporting to demonstrate the effectiveness of the dust control measures implemented during intrusive activities.

For the purpose of the Air Monitoring Plan, "intrusive activities" occur any time there is disturbance of the surface immediately below the synthetic layers of the existing Multimedia Cap (MMC) in Area 1. The Air Monitoring Plan will be implemented at the initiation of intrusive activities and will continue through the completion of all intrusive activities, restoration of the MMC and the removal from the Site of all soil and debris excavated from below the MMC synthetic layers. It is contemplated that the Air Monitoring Plan will require perimeter air monitoring stations to be operated continuously, 24 hours a day, seven days a week.

4.0 SOIL/DEBRIS HANDLING & MANAGEMENT

Materials generated from the centric pile, pile cap, slab and utility excavations will include asphalt, CR-6, 57 stone, clean soil and contaminated soil. Materials will be segregated and managed as described below. Materials may be beneficially re-used on the Site in accordance with requirements as discussed in this section.

4.1 CLEAN SOIL/AGGREGATE SEGREGATION

Clean soil/aggregate removed from above the MMC synthetic layers will be segregated from contaminated soil removed from below the MMC synthetic layers. Clean soil will be temporarily stockpiled within a designated stockpile area (Drawing DDP-EN1.01).

4.2 CONTAMINATED SOIL SEGREGATION

Contaminated soil removed from below the MMC synthetic layers will be segregated from clean soil/aggregate and loaded directly into lined, sealed roll-off containers. Empty and loaded containers that are not transported off-site daily will be sealed prior to temporarily being stored within the designated controlled area (Drawing DDP-EN1.01).

4.3 CLEAN SOIL/AGGREGATE STORAGE

Clean soil/aggregate storage areas will be located west of the Central Plaza footprint. A clean soil stockpile area will be established separate from the temporary controlled storage area. Erosion and sediment controls for these stockpile areas include the installation of a 3-inch thick asphalt pad to separate the existing surface materials from the stockpiled cover soil. Additionally, an asphalt berm will be installed around the clean soil stockpile with a perimeter drain and a collection sump to collect precipitation run-off within the stockpile area.

4.4 BENEFICIAL RE-USE

On-site materials removed from above the MMC synthetic layers may be re-used to either backfill excavations below the MMC synthetic layers or to backfill the foundation structures above the MMC synthetic layers.

4.4.1 Below MMC Synthetic Layers

Aggregates and clean soil removed from above the MMC synthetic layers may be used below the new MMC synthetic layers without laboratory analyses.

4.4.2 Above MMC Synthetic Layers

Aggregates and soil removed from above the MMC synthetic layers will be sampled and analyzed prior to beneficial re-use above the MMC synthetic layers following the MDE Voluntary Cleanup Program (VCP) *Clean Imported Fill Material* fact sheet Tables 1 and 2 (Appendix A). The analyses to be performed are the same as those provided in Section 6.4 for Imported Soil/Aggregates.

4.5 TRANSPORTATION AND OFF-SITE DISPOSAL

Based upon the review of the historical analytical soil data and the prior waste profile classification as D007 for materials below the MMC, it is anticipated that contaminated soil/debris generated during excavation will be disposed of at an approved RCRA Landfill. Materials will be transported off-site for disposal following written approval of acceptance from the RCRA landfill facility's representative.

Off-site disposal of soil/debris excavated from below the MMC will be profiled as a RCRA characteristic hazardous waste D007 – Chromium per EPA 40 CFR 261, Subpart C and Code of Maryland Regulations Title 26, Subtitle 13. In accordance with COMAR 23.13.03.05E, Accumulation Time, hazardous waste shall be shipped off-site within 90 days of generation of waste materials to an approved, permitted facility. Specific provisions, e.g. container labeling, secondary containment, inspection and record keeping, will be followed.

Further discussion regarding soil/debris sampling for disposal is provided in Section 6.

Honeywell maintains a list of their approved Subtitle C landfill facilities and as such the addition of alternative, proposed disposal facilities must be pre-approved. The following RCRA landfill and treatment facilities are located within reasonable proximity to the Site and be may be considered, as may others with the caveat of Honeywell approval, for off-site disposal:

- Environmental Quality (EQ) [EPA ID: PAD010154045]
  730 Vogelsong Road
  York, PA 17404
  ~ 60 miles

- MAX Environmental Technologies [EPA ID: PAD004835146]
  233 Max Lane
  Yukon, PA 15698
  ~ 200 miles

- Waste Management Solutions [EPA ID: NYD049836679]
  1550 Balmer Road
  Youngstown, NY 14174
  ~ 400 miles

It is the generator's responsibility to make the appropriate waste profile determination as well as ensuring that all activities associated with waste disposal comply with State, Federal and Local regulations. Temporarily stored, containerized soil and debris will be removed from the Site within 90 days of the initial filling of each individual container.

The Developer will be responsible for maintaining and distributing all documentation regarding waste profiles and shipping manifests for off-site disposal facilities to EPA and MDE. The generator's authorized representative will be responsible for reviewing and signing the shipping manifests. The Developer's designee will ensure that the transporter signs a shipping manifest for each load upon leaving the Site; and, ensures that the disposal facility-signed acceptance copy of each manifest is received. A waste disposal tracking log will be maintained utilizing the measured net weight (tons) for each truck or roll-off container load accepted.

Waste disposal documentation including laboratory analyses, if any, Waste Profiles and Waste Acceptance will be forwarded to EPA and MDE prior to commencing off-site disposal operations. A tracking log summarizing the disposal information will be maintained by the generator's representative and will be forwarded to EPA and MDE designees at the completion of intrusive activities.

5.0 WATER MANAGEMENT

As discussed in Section 3.2, erosion and sediment controls will be applied to individual excavations made for sheet pile, pile cap, momentum slab and sheer-wall installation. There are four categories of water anticipated to be managed during intrusive work, including:

- Storm water diverted from contact with contaminated material below the MMC synthetic layers;
- Storm water that comes into contact with contaminated material below the MMC synthetic layers;
- Groundwater from below the MMC; and
- Equipment decontamination water.

5.1 STORM WATER – NON-CONTACT

To minimize the quantity of water to be actively managed and treated off-site, storm water will be diverted from excavation zones by installing the required erosion and sediment controls as shown on Drawings DDP-C8.00, DDP-EN1.01 and DDP-EN1.06.01. This diverted non-contact storm water will be managed through the Erosion and Sediment Control Plan.

Should storm water that has not come into contact with contaminated material below the MMC synthetic layers pond on a controlled surface (e.g., mudmat, geotextile-supported aggregate), the standing water will be pumped to one of two double-walled Frac tanks. This non-contact storm water will be held for analytical testing results to determine proper disposal (Section 6).

Non-contact water may be discharged to Baltimore City storm sewer if, and only if, the laboratory results justify this option when compared to City sewage discharge limits as described in Section 6. Provisions in Article 25 Sewers, Subsection 4 for self-monitoring and Sewer Discharge Limits published by Baltimore City Pollution Control Section will be followed. No discharge will be allowed to Baltimore City sanitary sewers.

5.2 STORM WATER – CONTACT WATER

Storm water that inadvertently comes in contact with contaminated soil below the MMC synthetic layers will be collected in a sealed sump and pumped to one of two separate double-walled Frac tanks. The sump pumps will be operated as needed to dewater the rain water collected in the excavation zones. Sumps and conveyance lines will be pumped "dry" to the dedicated double-walled Frac tank for contact water. It is anticipated that contact storm water will be profiled as RCRA characteristic hazardous waste D007 – Chromium for proper off-site disposal. Contact storm water and non-contact storm water will not be commingled.

Storm water collected in the sealed sump from the perimeter drain installed at the temporary storage areas and equipment decontamination water will be pumped to a separate Frac tank. This contact water will be held for analytical testing results to ensure proper off-site disposal, presumably at the Honeywell approved EQ York, PA facility. In accordance with COMAR 23.13.03.05E, Accumulation Time, hazardous waste shall be shipped off-site within 90 days of generating the wastes to an approved, permitted facility. Specific provisions, e.g. container labeling, secondary containment, inspection and record keeping, will be followed.

5.3 GROUNDWATER

As described in Section 3.3 above, the deepest excavation for the Exelon project will be for the shear wall/moment slab which is planned at Elev. +6 feet mean sea level (msl). According to historical Inside Piezometer (IP) groundwater monitoring data, the groundwater elevation the Site within the hydraulic barrier seldom rises to Elev. +3 feet msl. As such, it is not anticipated that groundwater will be encountered, nor require special handling during intrusive activities. The uninterrupted, continuous operation of the HMS, as required by the Consent Decree, will allow for monitoring and control of the groundwater elevation during construction. However, in the event of an interruption of the HMS, the SPRP (Appendix B of the DDP) specifies the actions to be taken in this unlikely event.

In the event groundwater is encountered during excavation it will be collected and disposed of in a similar manner to contact water. All groundwater will require off-site disposal at the Honeywell approved EQ York, PA facility. In accordance with COMAR 23.13.03.05E, Accumulation Time, hazardous waste shall be shipped off-site within 90

days of generation to an approved, permitted facility. Specific provisions, e.g. container labeling, secondary containment, inspection and record keeping, will be followed.

5.4 25-YEAR STORM EVENT

The storm water management plan was examined for the 25-year storm event and 100-year storm event, however the storage requirements were determined based primarily on the 25-year storm event. When a storm event occurs, the entire footprint of the excavation, including the sloped portions, was considered to receive storm water. All water that falls outside of the excavations is treated as surface runoff (i.e., non-contact storm water) because it will be diverted away from open excavations by temporary berms. Infiltration through the cover soil into the drainage net was assumed to not occur because the drainage net is sealed at the edge of each excavation. As described in section 4.2.3 of the Storm Water Pollution Prevention Plan (SWPPP), the drainage net will be flapped-up the slope of the excavation and anchored at the edge of the excavation to divert storm water from entering into the excavation zone.

Storm water collected from the bottom of each excavation opened below the MMC synthetic layers will be considered contact water. To address this, a sump will be installed at the lowest elevation point in each excavation to collect storm water to prevent it from rising above the capillary break gravel at the down-slope side of the excavation. The pump(s) required to dewater the excavation zone(s) will be adequately sized to manage storm water during the peak intensity rainfall rate of a 25-year storm event. This contact storm water will be managed as discussed in Section 5.2.

No discharge will be allowed to Baltimore City sanitary sewers. Provisions in Baltimore City Article 25 Sewers, Subsection 4 for self-monitoring, and Sewer Discharge Limits published by Baltimore City Pollution Control Section for discharging clean rain water to Baltimore City storm sewer will be followed. Once the non-contact storm water sample results demonstrate that none of the published Sewer Discharge Limits are exceeded, Baltimore City Department of Public Works (DPW) must be contacted to determine current capacity for discharging to the local storm sewer and provide the testing results to the DPW prior to discharge. Contact and non-contact water testing and storm sewer discharge or off-site disposal procedures are described above and in Section 6.

The total volume of impacted water generated by a 25-year storm event over 24 hours has been calculated to be approximately 107,000 gallons, based on the open excavation area computed. This volume will be contained in one 75 ft. x 75 ft. x 4 ft. "modutank" container rated at approximately 168,000 gallons. Considering it takes approximately 24 hours to sample and properly discharge impacted water, two (2) 75 ft. x 75 ft. x 4 ft. tanks will be present at the initiation of construction to store the volume of impacted water generated as well as any additional surge that may occur during the 25-year storm event at the location shown on DDP Drawing EN1.01. The storage volume provided by a single 168,000-gallon modutank storage container is approximately 57% greater than the volume of impacted water generated during a 25-year storm event, and approximately 22% greater than the volume of impacted water generated during a 100-year storm event.

Two storage containers will provide sufficient storage required to test, sample, and dispose of impacted water during a 24-hour, 25-year or 100-year frequency storm event at the site. A 120 ft. x 205 ft. x 1.5 ft. deep containment berm with 14-inches of filling capacity will provide storage sufficient to handle water stored in a single ModuTank.

5.5 SNOW AND ICE

Snow collected or ice formed inside the limits of the excavation zone that comes into contact with the contaminated zone, i.e., soil/debris below the MMC synthetic layers, will be handled as contact storm water as provided above. Snow and/or ice will be removed from the excavation zone and temporarily stored in lined, sealed containers. Melted snow and/or ice will be transferred from the lined containers to the "contact water" Frac tank for testing to determine the appropriate disposal action.

6.0 MATERIAL TESTING

6.1 SOIL/DEBRIS

Soil and debris removed from below the MMC synthetic layers is assumed to be RCRA characteristic hazardous waste D007 – Chromium. However, for the purpose of waste profiling, analyses will be performed per the landfill facility requirements for written acceptance of the characterized waste. Waste characterization analyses will include, at a minimum:

- pH
- Moisture
- Ignitability
- Reactivity for Cyanide
- Reactivity for Sulfide
- TCLP Metals

6.2 WATER – NON-CONTACT

The Consent Decree establishes a surface water performance standard of no more than 50 parts per billion (ppb) of total chromium. With the exception of total chromium, the provisions in Baltimore City Article 25 Sewers, Subsection 4 for self-monitoring, and Sewer Discharge Limits published by Baltimore City Pollution Control Section will be followed. The following sewage discharge limits will be used to determine whether non-contact water can be discharged to Baltimore City storm sewer:

Pollutants	**Limits**
Cadmium	0.21 mg/L
Chromium	0.05 mg/L (per Consent Decree)
Copper	6.59 mg/L
Cyanide	1.9 mg/L
Lead	0.01 mg/L
Mercury	0.01 mg/L
Nickel	2.82 mg/L
Silver	1.2 mg/L
Zinc	17.85 mg/L

Pollutants	Limits
Fat/Oil	100.0 mg/L
Total Toxic Organics	2.13 mg/L
pH range	6.0 to 10.0 pH units

No discharge will be allowed to Baltimore City sanitary sewers. Non-contact water will be properly disposed of off-site at Environmental Quality should any of the above sewer discharge limits be exceeded.

6.3 WATER- CONTACT AND GROUNDWATER

Contact water will be tested and the results compared to the sewer discharge limits as described above for non-contact water. No discharge will be allowed to Baltimore City sanitary sewers. Contact water will be properly disposed of off-site at Environmental Quality should any of the above sewer discharge limits be exceeded.

Groundwater removed from below the MMC synthetic layers is assumed to be RCRA characteristic hazardous waste D007 – Chromium based on the current waste profile for groundwater recovered by the Head Maintenance System. As such, groundwater removed from below the MMC synthetic layers will not be tested for the purpose of waste profiling unless the Environmental Quality facility requires updated analyses.

6.4 IMPORTED SOIL/AGGREGATES

In order to minimize the potential of introducing unacceptable materials onto the Site, it will be necessary to verify through documentation that the material source is appropriate and/or to have the material analyzed for potential contaminants based on the location and history of the source area. It is anticipated that imported materials will be provided by commercial suppliers, only. Commercial suppliers shall provide a certification letter stating the environmentally acceptable historical use(s) of the material source property.

Fill documentation should include detailed information on the previous use of the land from where the fill is taken, whether an environmental site assessment was performed and its findings, and the results of any testing performed as described in the MDE Voluntary Cleanup Program (VCP) *Clean Imported Fill Material* fact sheet (Appendix A). If the selected commercial supplier maintains records of the source of the selected materials and has implemented a testing program meeting the

requirements of the MDE VCP fact sheet, a description of the sampling plan and analytical results may be used to meet the imported material requirements of this plan.

If there are no analytical results from testing performed by the commercial supplier, and prior to importing soil from any source, the material will be sampled and tested based on the requirements of the MDE VCP *Clean Imported Fill Material* fact sheet Tables 1 and 2 (Appendix A). For example, the testing requirements for a residential acceptable fill source material will include the following, depending on the source of the fill material as specified in Table 1 of the VCP *Clean Imported Fill Material* fact sheet:

- VOCs (EPA Method 5035)
- SVOCs (EPA method 8270C)
- TPH (modified EPA method 8015)
- PCBs (EPA method 8082)
- Heavy Metals including lead (EPA methods 6010B and 7471A)
- Hexavalent Chromium: EPA method 3060A.
- Asbestos (OSHA Method ID-191)

The analytical results will be compared to residential soil standards presented in MDE's *Cleanup Standards for Soil* and *Groundwater, dated June 2008,* to determine whether the fill source is acceptable. Copies of all imported fill analyses will be provided to MDE for review, consultation and approval prior to importing fill. All imported material must meet MDE/LRP residential standards.

Figures

Figure 1
Site Location Map

Appendix A
Referenced Documents

MARYLAND
Department of the Environment

Facts About...

VCP - Clean Imported Fill Material

The purpose of the Voluntary Cleanup Program (VCP) is to encourage the cleanup and redevelopment of properties throughout Maryland. In many cases, fill materials are imported onto a property as part of the redevelopment process. As more properties are relying upon the use of imported fill materials, the VCP has prepared this guidance document for assisting participants who anticipate using imported fill material at VCP sites.

Introduction

No one wants to introduce new contamination onto a VCP site through the importation of fill material that is believed to be clean. This document was developed specifically for VCP participants who seek guidance on steps to take to minimize the possibility of importing contaminated fill onto VCP sites.

Overview

Because fill material may come from a variety of sources, it is important to determine that any material brought onto a VCP site not only meets engineering specifications for a particular use, but that it also passes some level of screening to ensure that it is, in fact, clean.

Residential or Commercial / Industrial Scenario

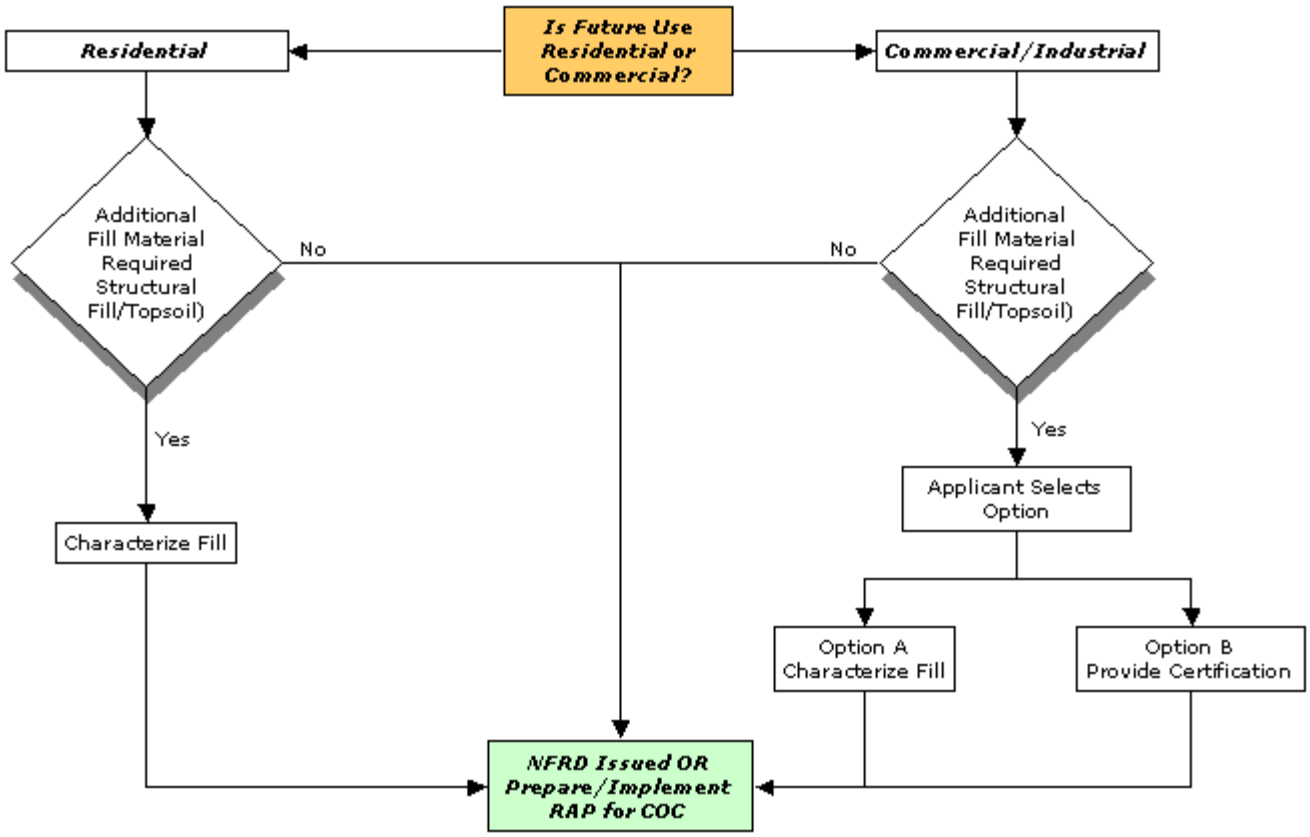
Depending upon the land use scenario, a VCP participant may be required to characterize the fill or provide a certification stating that the imported fill is not contaminated. As indicated in Exhibit 1, all imported fill materials for properties where the land use is determined to be residential must be characterized. In limited circumstances, the VCP may allow a participant to use imported fill material that has not been characterized for areas where no pathway will exist between the fill material and the property's end-users. In such circumstances, a Phase I Environmental Site Assessment conducted within a year from the date of scheduled delivery of fill material documenting that no recognized environmental conditions are present must be submitted to the VCP.

For commercial or industrial land uses, a VCP participant has the option of either characterizing the imported fill material or relying upon an affidavit from the vendor stating that the imported material has not been contaminated by controlled hazardous substances or oil. A template of the affidavit is attached to this guidance.

Selecting Fill Material

In general, the fill source area should be located in non-industrial areas, and not from sites undergoing an environmental cleanup. Non-industrial sites include those that were previously undeveloped, or used solely for residential or agricultural purposes. If the source is from an agricultural area, care should be taken to insure that the fill does not include pesticides, herbicides or metals. Unacceptable sources of fill material include industrial and/or commercial sites where

Exhibit 1: Use of Fill Material for Residential or Commercial/Industrial Decision Tree



hazardous materials were used, handled or stored as part of the business operations, or unpaved parking areas where petroleum hydrocarbons could have been spilled or leaked into the soil. Commercial sites to avoid include former gasoline service stations, retail strip malls that contained dry cleaners or photographic processing facilities, paint stores, auto repair and/or painting facilities, and agricultural supply stores. Industrial facilities to avoid include metal processing shops, manufacturing facilities, aerospace facilities, oil refineries, waste treatment plants, or other similar facilities.

Alternatives to using fill from construction sites include the use of fill material obtained from a commercial supplier of fill material or from soil pits in rural or suburban areas. However, care should be taken to ensure that those materials are also uncontaminated.

Table 1: Potential Contaminants Based on the Fill Source Area	
Fill Source	*Target Compounds/Recommended Analyses**
Land near to an existing highway	• Lead (EPA method 6020 [Rev 0 – 9/9]) • PAHs (EPA method 8270C [Rev 3 – 12/96)
Land near a mining area or rock quarry	• Heavy Metals (EPA method 6020 [Rev 0 – 9/9]) • Asbestos (polarized light microscopy) • pH
Agricultural land	• Pesticides (Organochlorine Pesticides: EPA method 8081A or 8080A; Organophosphorus Pesticides: EPA method 8141A; Chlorinated Herbicides: EPA method 8151A [Rev 1 – 12/96]) • Heavy Metals (EPA method 6020 [Rev 0 – 9/9])
Residential/acceptable commercial land	• VOCs (EPA Method 8260B (Rev 2 - 12/96); Note: The soil and sediment collection method has changed to EPA Method 5035) • SVOCs (EPA method 8270C) • TPH (modified EPA method 8015) • PCBs (EPA method 8082) • Heavy Metals including lead (EPA methods 6010B and 7471A) • Asbestos (OSHA Method ID-191)
*The recommended analyses should be performed in accordance with USEPA SW-846 methods (1996). Other possible analyses include Hexavalent Chromium: EPA method 3060A.	

Documentation and Analysis

In order to minimize the potential of introducing unacceptable fill material onto a site, it is necessary to verify through documentation that the fill source is appropriate and/or to have the fill material analyzed for potential contaminants based on the location and history of the source area. Fill documentation should include detailed information on the previous use of the land from where the fill is taken, whether an environmental site assessment was performed and its findings, and the results of any testing performed. It is recommended that an environmental professional, as defined by ASTM, should sign any such documentation. If such documentation is not available or is inadequate, samples of the fill material should be chemically analyzed. Analysis of the fill material should be based on the source of the fill and knowledge of the prior land use. The Department recommends using the analytical methods in Table 1 to determine whether potential contaminants are present in fill source areas.

Detectable amounts of compounds of concern within the fill material should be evaluated for risk in accordance with the *Soil and Groundwater Cleanup Guidance Document, August 2001*. A standard laboratory data package, including a summary of the QA/QC (Quality Assurance/Quality Control) sample results should also accompany all analytical reports. When possible, representative samples should be collected at the borrow area while the potential fill material is still in place, and analyzed prior to removal from the borrow area. In addition to performing the appropriate analyses of the fill material, an appropriate number of samples should also be determined based on the approximate volume or area of soil to be used as fill material. Table 2 can be used as a guide to determine the number of samples needed to adequately characterize the fill material when sampled at the borrow site.

Alternative Sampling

A Phase I environmental site assessment may be conducted prior to sampling to determine whether the borrow area may have been impacted by previous activities on the property. After the property has been evaluated, any sampling that may be required can be determined during a meeting with MDE. However, if it is not possible to analyze the fill material at the borrow area or determine that it is appropriate for use via a Phase I, it is recommended that the participant use Table 2 to determine the fill material sampling schedule. (See chart on Potential Contaminants Based on the Fill Source Area for appropriate analyses).

This sampling frequency may be modified upon consultation with the MDE if all of the fill material is derived from a common borrow area. However, fill material that is not characterized at the borrow area will need to be stockpiled either on or off-site until the analyses have been completed. In addition, should contaminants exceeding the criteria in *Soil and Groundwater Cleanup Guidance Document, August 2001* be identified in the stockpiled fill material, that material will be deemed unacceptable and new fill material will need to be obtained, sampled and analyzed. Therefore, MDE recommends that all sampling and analyses should be completed prior to delivery to the site to ensure the soil is free of contamination, and to eliminate unnecessary transportation charges for unacceptable fill material.

Composite sampling for fill material characterization may or may not be appropriate, depending on quality and homogeneity of source/borrow area, and compounds of concern. It is not acceptable to composite samples for volatile and semi-volatile constituents. Composite sampling for heavy metals, pesticides, herbicides or PAH's from unanalyzed stockpiled soil is also unacceptable, unless it is stockpiled at the borrow area and originates from the same source area. In addition, if samples are composited, they should be from the same soil layer, and not from different soil layers.

When very large volumes of fill material are anticipated, or when larger areas are being considered as borrow areas, MDE recommends that a Phase I be conducted on the area to ensure that the borrow area has not been impacted by previous activities on the property. After the property has been evaluated, any sampling that may be required can be determined during a meeting with MDE.

Table 2: Recommended Fill Material Sampling Schedule

Area of Individual Borrow Area	*Sampling Requirements*
2 acres or less	Minimum of 4 samples
2 to 4 acres	Minimum of 1 sample every 1/2 acre
4 to 10 acres	Minimum of 8 samples
Greater than 10 acres	Minimum of 8 locations with 4 sub samples per location
Volume of Borrow Area Stockpile	*Samples per Volume*
Up to 1,000 cubic yards	1 sample per 250 cubic yards
1,000 to 5,000 cubic yards	4 samples for first 1000 cubic yards +1 sample per each additional 500 cubic yards
Greater than 5,000 cubic yards	12 samples for first 5,000 cubic yards + 1 sample per each additional 1,000 cubic yards

Area 1, Phase 1
Spill Prevention and Response Plan

Baltimore Works Site
Baltimore, Maryland

REVISED

December 2013

By:
Harbor Point Development LLC
Environmental Resources Management, Inc.

For:
U.S. Environmental Protection Agency – Region III
Maryland Department of the Environment

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LIST OF ACRONYMS AND ABBREVIATIONS

AST	Aboveground Storage Tank
CFR	Code of Federal Regulations
CrVI	Hexavalent chromium
COC	Contaminant of Concern
COMAR	Code of Maryland Regulations
DOT	U.S. Department of Transportation
EC	Emergency Coordinator
EPA	U.S. Environmental Protection Agency
ERP	Emergency Response Plan
HMS	Head Maintenance System
HPD	Harbor Point Development, LLC
HW	Hazardous waste
MDE	Maryland Department of the Environment
MHMP	Material Handling and Management Plan
MMC	Multimedia Cap
NPDES	National Pollutant Discharge Elimination System
PE	Professional Engineer
SPCC	Spill Prevention, Control, and Countermeasure
SPRP	Spill Prevention and Response Plan
UST	Underground Storage Tank

1.0 INTRODUCTION

1.1 BACKGROUND AND PURPOSE

This Spill Prevention and Response Plan (SPRP) has been prepared as part of the Detailed Development Plan (DDP) for Harbor Point Area 1, Phase 1 Development (Site) and is meant to be used in conjunction with the Material Handling & Management Plan (MHMP) as well as the Storm Water Pollution Prevention Plan (SWPPP) and Contingency Plan prepared for the Site. This SPRP is applicable to development support activities as described in the DDP.

The approved Environmental Remediation System (ERS) is operated and maintained by Honeywell International Inc. (Honeywell) pursuant to the Consent Decree dated April 27, 1989, as amended, by and between Honeywell, the U.S. Department of Justice, U.S. Environmental Protection Agency (EPA) and Maryland Department of the Environment (MDE), to contain chromium contaminated groundwater and limit exposure to impacted soil. The ERS consists of the Multimedia Cap (MMC), Hydraulic Barrier, Head Maintenance System (HMS) and Outboard Embankment.

Honeywell currently stores less than 1,320 gallons of aboveground oil storage and less than 42,000 gallons of underground oil storage. Based on these thresholds volumes, Honeywell is not subject to the Spill Prevention, Control, and Countermeasures (SPCC) regulations under 40 CFR 112. Nonetheless, Honeywell maintains a SPCC for activities associated with the operation of the ERS. The Honeywell SPCC will continue to remain in effect for routine ERS operations and maintenance activities conducted outside the footprint of redevelopment.

This Plan is intended to describe the measures to be implemented by Harbor Point Development LLC (HPD) and its Contractors to prevent hazardous material and petroleum product discharges (i.e., spills) from occurring, and mitigate the effects of a discharge, should one occur. Spills are inclusive of solids and liquids.

Solids include, but are not limited to, asphalt, stone aggregates, concrete and wood debris, soil and product residuals from the former chromium ore production facilities. Liquids include but are not limited to groundwater, seeps, fuel, oil, decontamination liquids, liquids generated from subsurface dewatering activities, liquid that may have come in contact with site soils beneath the existing environmental protections exposed by the work, or liquids that may have come in contact with other potentially contaminated material.

For the purpose of this development project, HPD is considered the "Developer". Contractors are required to notify as soon as possible the Developer's Representative and Honeywell's Representative of a spill that occurs and is subject to this SPRP. Examples of spills that could occur that would be subject to this document include the following:

1. Diesel fuel spill from construction equipment or re-fueling tank, either during re-fueling or a fuel line;

2. Hydraulic fluid spill from a hydraulic line break in construction equipment;

3. Soil spill during loading of soil excavated from below the MMC into containers or during on-site transport;

4. Water spill of either chromium-contaminated ground water or surface water in contact with affected soil during transfer into a temporary holding tank or tanker for off-site disposal.

The Solid Waste Program within MDE must be notified immediately in the event of a release of hazardous waste or hazardous waste-contaminated materials (See Section 6.0).

1.2 CONSISTENCY WITH OTHER PLANS

A MHMP has been prepared to address the handling and management of solids (asphalt, stone aggregates, concrete and wood debris, COPR and soil) and liquids (storm water, decontamination water and groundwater) that may be encountered during the intrusive activities at the Site. A Surface Water Pollution Prevention Plan (SWPPP) has been prepared which presents best management practices for managing storm water runoff during construction activities. The Contingency Plan describes the pre-construction preparation of the existing systems, details and other contingencies designed with the intent of maintaining operation of the HMS and Transfer Station with minimal service interruptions. The EN drawings found in Appendix B of the DDP provide additional information regarding the HMS and Transfer Station, including potential service interruptions.

2.0 GENERAL SITE DESCRIPTION

2.1 LOCATION, SITE USE AND LAYOUT

The Site is located on a peninsula on the northeast shore of the Patapsco River of the Inner Harbor, in the Fells Point section of Baltimore City, Maryland, on an area that covers approximately 14 acres. The Site is surrounded by water on the north, west and south, the Living Classrooms facility to the north and by the Thames Street Wharf Office Building and its associated parking lots to the east.

2.2 SITE USE

The Site has been divided into Areas 1, 2, and 3. Area 1 is the principal site of Honeywell's (formerly AlliedSignal) Baltimore Works Facility (Figure 1). Chromium ore was processed in Area 1 from 1845 to 1985. The former manufacturing processes resulted in chromium impacts to soil and groundwater. The ERS is maintained and operated by Honeywell to contain ground water impacted by hexavalent chromium (CrVI) in Area 1, and to control the potential for human exposure to affected soil. The ERS consists of the MMC, the Hydraulic Barrier, the HMS, groundwater storage and transfer system, and the Outboard Embankment. The HMS maintains an inward ground water gradient to mitigate the migration of chromium-impacted ground water from the Site.

Area 2 was mainly used for coal and raw chromium ore storage. In addition, a fertilizer warehousing and supply company operated in this area for many years.

Area 3 consists of five separate properties all with a history of industrial activity. This industrial activity included brass casing, oil blending and storage, lumber storage and coating/plastics production.

Honeywell purchased all of these properties by 1993 at which time all manufacturing was halted and subsequently all buildings and tanks were removed.

The Site is the location for the future development project to be conducted by HPD. The development project consists of: the Exelon Tower and Trading Floor Garage; the Central Plaza Garage; modifications to the existing Transfer Station, HMS and MMC; general site development (landscaped plaza, streets, sidewalks, etc.); and utilities, foundations, roadways, and other related site development elements.

3.0 FACILITY CONTACT SUMMARY AND APPLICABLE PERMITS

Honeywell Contact:

Chris French
Honeywell International Inc.
101 Columbia Road, P.O. Box 2105
Morristown, NJ 07962
973-216-7506

Resident Honeywell Site Manager:

Kenneth Biles, CH2M Hill
1000 Wills Street
Baltimore, MD 21231
410-271-6694

Developer:

Jonathan Flesher
Beatty Development Group, LLC
1300 Thames Street, Suite 10
Baltimore, MD 21231
443-463-3937

The Emergency Coordinator (EC) and contact information is presented in Section 6.1.

Applicable state and local permits and/or approvals required for this project are summarized below:

Jurisdiction	Permits and/or Approvals
MDE	General Permit for Stormwater Associated with Construction Activity
MDE	Chesapeake Bay Critical Area
City of Baltimore	Building Permit
City of Baltimore	Stormwater Management
City of Baltimore	Developer's Agreement

4.0 LIQUID DISCHARGE PREVENTION

Direct discharge of collected liquids to adjacent surface waters or ground surfaces is prohibited. Characterization and proper disposal of captured and stored liquids in accordance with the Material Handling and Management Plan (MHMP) is required. Liquids characterized as non-contact water may be discharged to storm sewer following the appropriate testing as described in the MHMP.

Surface water, i.e. rain water sheet flow, will be excluded from the excavation zones using temporary diversion berms (See DDP Drawing F1.30) constructed from clean cover soil. Temporary diversion berms must therefore be covered by plastic or other impermeable material to reduce the potential for erosion of the berm material.

Containment berms for "controlled" storage and equipment decontamination areas, as shown on drawing DDP EN1.01, must be constructed with asphalt to mitigate potentially impacted water contacting clean cover soil. Controlled storage and equipment decontamination areas will also have a sealed, sump within the containment berms for removal of potentially impacted water (see MHMP).

Two types of fuel storage tanks are anticipated during construction activities at the Site. The two types of storage tanks will likely include a generator and small above ground storage tanks (ASTs) for storage of equipment fuel. A fuel truck is also anticipated to enter and exit the site for re-fueling equipment at the site. All petroleum product ASTs used at this facility will be double walled and constructed in accordance with industry specifications and will contain approximately 250-500 gallons of fuel. Alternatively, the storage tanks may be placed in secondary containment. The storage containers used will be compatible with the characteristics of the petroleum product they contain, and with temperature and pressure conditions.

Emergency generators with a day tank will also likely be used at the Site with a capacity of approximately 250 gallons. Piping between storage tanks and in connection with a storage tank will be placed aboveground for easy access and visual monitoring during use. The piping will either be double walled or placed in secondary containment. The total volume of petroleum stored on site during the project, including the generator day tank and small AST, is anticipated to be between 500 and 750 gallons.

Fuel trucks will be brought on Site during construction activities to re-fuel equipment and fuel oil storage tanks. (i.e., cranes, excavators, day tanks, etc.). Fueling of equipment will be performed using the portable, containment system (Drawing DDP EN1.04). The Developer's Representative will direct the Contractor to ensure that the driver understands the site layout, knows the protocol for entering the Site and unloading product, is familiar with this SPRP, and has the necessary equipment to respond to a discharge from the vehicle or fuel delivery hose. The trucks and/or site contractor will be equipped with a functioning spill kit that meets industry standards exercised by experienced professionals performing the same services under similar circumstances. Those engaged with re-fueling activities will be knowledgeable with the deployment and use of the spill kit.

Transfer of contact storm water and groundwater extracted by the HMS or extracted for construction purposes will be conducted within a containment area of sufficient size and construction of appropriate materials to contain materials spilled during transfer (Drawings DDP EN1.03, EN1.04, F1.16 and F1.17). A spill kit will be maintained near the area where the transfer occurs. Spills within the containment area will be managed in a similar manner to the procedures noted in section 5.0 of this plan.

ASTs for the storage of extracted groundwater are located inside the Transfer Station tank room and are within secondary containment (Drawing DDP EN1.07). The ASTs include two (2) 10,000 gal ASTs for storing contaminated groundwater extracted by the HMS and one (1) 1,000 gal AST periodically filled with a potable water/acid mix (Table 5-1). These tanks are covered under this SPRP only as they relate to the redevelopment and construction activities, specifically during selective demolition of the Transfer Station and during pipe pile driving activities adjacent to the Transfer Station.

For the purpose of the this Plan, "non-contact" water is defined as storm water that is collected above the MMC synthetic layers, while "contact" water is defined as storm water collected from excavation zones below the MMC synthetic layers. Contaminated groundwater is defined as water extracted from below the MMC synthetic layers via the HMS or water other than contact water removed from any excavation. Each of these waters is further described in the MHMP.

Temporary storage containers to be provided include two (2) 16,380-gallon double-walled Frac tanks (Table 5-1). Contaminated groundwater will be temporarily diverted to one of the two Frac tanks via double-wall conveyance lines plumbed below grade from Vault 1 (Drawing DDP EN1.05). Should the Level II contingency plan be implemented, double-wall conveyance lines will be plumbed above grade and protected from vehicular traffic. The second Frac tank is provided primarily for collecting non-contact water that may pond on the surface during "normal" storm events or may be used as supplemental storage for HMS generated contaminated groundwater, if needed. In the event the second Frac tank is used for supplemental storage, the tank will be decontaminated and verified as clean by sample results prior to being used for storage for non-contact water.

Additional temporary storage containers include two (2) 168,000-gallon MODU™ tanks (Table 5-1). The MODU™ tanks are 75 ft. x 75 ft. x 4 ft. and are provided for temporary storage of contact water generated from open excavation(s) during a 24-hour period of 25-year and 100-year frequency storm event (Drawing DDP EN1.01). One MODU™ tank has adequate volume capacity to store approximately 107,000 gal/day and 138,000 gal/day, for 25-year and 100-year frequency storm event, respectively. The second MODU™ tank is provided for supplemental storage during the period when the first MODU™ tank is being emptied.

A 120 ft. x 205 ft. x 1.5 ft. deep containment berm with 14-inches of filling capacity will provide storage sufficient to handle water stored in a single ModuTank.

Since the storm water collected will be potentially impacted by contact with the bottom of the excavation, double-walled conveyance pipes or alternatively conveyance pipes within secondary containment must be installed from the pump location to the storage tanks. Double-walled conveyance pipes will drain back to the excavation for recovery. Contact and non-contact water testing and disposal requirements are provided in the MHMP.

Table 5-1. On Site Storage Tanks/Drums Anticipated during Construction

Tank #	Container Type	Size (gal)	Contents
Tank # 1 (GWT-201)	AST	10,000	Contaminated groundwater
Tank # 2 (GWT-202)	AST	10,000	Contaminated groundwater
Frac Tank #1	AST	16,380	Non-contact water Frac Tank
Frac Tank #2	AST	16,380	Contact water Frac Tank
MODU Tank #1	AST	168,000	Storm Water management (Contact water)
MODU Tank #2	AST	168,000	Storm Water management (Contact water)
MWT-210	AST	1,000	Existing water/Acid Mix
NA	Drum	55	Impacted PPE

Existing Tanks #1 and #2 and Frac Tanks #1 and #2 will be emptied via a vacuum tanker truck for transportation and appropriate off-site disposal. In the event that a vacuum truck is not available, a centrifugal transfer pump may be used to pump water to a transfer tractor-trailer.

Water stored in the ASTs will be transferred for off-site disposal using the existing 3-inch "Kamlock" connection located on the western wall of the Tank room. Double-wall flexible hose will be connected from the Kamlock to a portable, temporary loading secondary containment system. During periods when access to the existing loading dock is restricted, a "collapse-a-tainer" containment system, described as a Temporary Loading Dock (Drawing DDP-EN1.03), will provide the portability needed to ensure water transfer operations by vacuum truck or tractor-trailer are uninterrupted. The vacuum truck will be equipped with a functioning spill kit that meets industry standards exercised by experienced professionals performing the same services under similar circumstances.

Construction equipment will be re-fueled nearby its working location and, when possible, stationed on a portable "collapse-a-tainer" secondary containment system as described above. In situations where a portable secondary containment system is not used, i.e., stationary equipment such as tower cranes, spill control supplies will be provided during re-fueling. Those engaged with re-fueling activities will be knowledgeable with the deployment of the collapse-a-tainer and use of the spill kit. If a fuel spill occurs outside of the collapse-a-tainer system, other measures in addition to a spill kit may be used to contain and manage the spill. These measures include the following:

- installation of containment berms around the spill;
- installation of swales around the spill;
- construction of a sump(s) for removal of the spill. Spilled fuel liquids that are collected will be conveyed to a storage container specifically designated for spilled fuel or other petroleum materials; spilled fuel will not be mixed with the groundwater storage tanks designated for other purposes;
- other containment measures may be used to immediately stop the migration of the liquids; and,
- removal of soil materials that are impacted by the spill for characterization and off-site disposal. The soil would be excavated at a minimum to a depth at which there is no visual or olfactory evidence of the spill. Soil excavation will not penetrate any part of the ERS not intended to be disturbed as part of development.

- Temporary storage of impacted soil or water will be in designated containers located within the Sealed Container Storage Area shown on drawing DDP-EN1.01.

Tank MWT-210 is used for storing maintenance/backwash water on an as-needed basis. This tank will temporarily hold an acid solution used for flushing accumulated precipitates from the HMS lines (only used during backwash activities). Tank MWT-210 is also a vertical cylindrical, flat bottom, reinforced flat/vent top tank constructed of fiberglass reinforced plastic with a nominal capacity of 1,000 gallons.

During proposed construction activities, an Emergency Generator will also be maintained at the Site by HDP. The generator will be inspected daily for leaks during use.

The generator will include a double-walled fuel tank (110% containment system) to ensure all fuels are isolated from the surrounding environment. In the event of a fuel leak, sorbent pads or other similar response materials will be used to recovery fuel, and contaminated soil will be promptly excavated and properly disposed off-site, along with the sorbent material. The soil would be excavated at a minimum to a depth at which there is no visual or olfactory evidence of the spill. Depending on the extent of the spill, soil sampling may be required to confirm cleanup. Soil excavation will not penetrate any part of the ERS not intended to be disturbed as part of development.

5.1 DISPOSAL OF RECOVERED MATERIALS

During construction activities, diesel fuel storage for small construction equipment will be provided on Site in the form of small ASTs and/or generator belly tanks. In the event of a small fuel spill during construction activities (e.g., spills less than 5 gallons) at the facility, fuel will be recovered by the environmental response contractor's employees using absorbent materials from spill kits, or other measures. The Developer's environmental response contractor (Environmental Waste Minimization, Inc. – EWMI) will be on the project site throughout the site work phase of construction. Any oil-soaked recovered material or wastes resulting from a spill cleanup will be stored in an approved container and then disposed or recycled off-site according to applicable federal and State regulations.

In the event of an oil spill or discharge at the facility, the Developer's Representative and Honeywell's Resident Site Manager will be notified immediately. The Maryland Department of the Environment (MDE) Oil Control Program (OCP) will to be notified by the Developer's Representative in accordance with Code of Maryland Regulations

(COMAR) 26.10.08.01 Reporting Of Suspected Releases. The MDE OCP contact number to report a spill is 866-633-4686 (24 hour) or 410-974-3551.

In addition to the Developer's environmental response contractor (EWMI: 877-460-1038), Honeywell's emergency response contractor, Maryland Environmental Services at 410-979-8200, Baltimore City or the Maryland Department of the Environment's HAZMAT Team may be contacted by the Developer's Representative to recover the oil. Disposal of any recovered materials generated from cleanup by a spill response contractor will be coordinated through the Site Manager to ensure proper disposal of recovered materials in accordance with Maryland regulations.

6.0 DISCHARGE NOTIFICATIONS

The Contractor will immediately commit all necessary manpower, equipment, and materials required to prevent a spill from reaching waterways, shorelines, or sewers. Once the spill, release or discharge is under control, the Contractor will immediately notify the Developer's Representative and Honeywell's Representative.

The MDE OCP is to be notified by the Developer's Representative in accordance with Code of Maryland Regulations (COMAR) 26.10.08.01 Reporting Of Suspected Releases. The MDE OCP contact number to report a spill is 866-633-4686 (24 hour) or 410-974-3551. In the event of a release of hazardous waste or hazardous waste-contaminated materials, the Solid Waste Program (SWP) within MDE must also be notified at 410-537-3315, and if possible contact Jim Leizear (MDE) at 410-537-3369.

6.1 PROJECT SPECIFIC EMERGENCY CONTACTS

In the event of a contaminated groundwater spill, material release, fire or explosion, the following Honeywell and developer should be notified immediately.

Emergency Coordinator (EC)

Developer: Jonathan Flesher – 443-463-3937

Resident Site Manager: Ken Biles – 443-271-6694

6.2 EMERGENCY NOTIFICATIONS

The following table (Table 6-1) provides government agency and emergency response contact information in the event of a spill:

Table 6-1. Emergency Contact Information

	Name	Phone
US Coast Guard Spill Reporting	National Response Center (Chemtrec)	800-424-8802
EPA Region III Reporting	US EPA Region III	215-814-5000

	Name	Phone
State Reporting	Maryland Department of the Environment Emergency Response Notification	866-633-4686 (24 hour) or 410-974-3551
	Maryland Natural Resources Police	410-643-5773
Local Reporting	Baltimore Fire Department	911 (emergency) 410-396-3083 (non-emergency)
Emergency Response Contractor	Maryland Environmental Services	410-729-8200
	EWMI (Developer's response contractor)	877-460-1038

6.3 DISCHARGE RESPONSE PROCEDURES

In the event of an oil, contaminated groundwater or contact water spill outside of the containment area, spill response measures will be utilized to minimize migration of contaminated material.

If the EC determines that the facility has had a release, fire, or explosion that could threaten human health or the environment, or if the release is of a quantity which would exceed the Reportable Quantity (RQ) for chromium (1 pound as referenced in 40 CFR 302.4) outside of the tank containment or truck loading area, he shall report his findings as follows:

- Name, address, and telephone number of the person reporting
- Name, address, and telephone number and the responsible party
- Specific location of the incident
- Date and time the incident occurred or was discovered
- Name of the chemical/material released
- Source and cause of the release
- Total quantity discharged
- Medium into which the substance was discharged
- Amount spilled into water
- Weather conditions

- Name of the carrier or vessel, the railcar/truck number, or other identifying information
- Number and type of injuries or fatalities
- Whether an evacuation has occurred
- Estimation of the dollar amount of property damage
- Description of current and future cleanup actions
- Other agencies notified or about to be notified

If the facility stops operations in response to a fire, explosion, or release, the EC shall monitor for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment, wherever this is appropriate. Immediately after an emergency, the EC shall provide for storage or disposal of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion at the facility.

If the spill material is flammable, all ignition sources shall be controlled/disabled. Fire extinguishers will be on hand for immediate use. The following actions should be taken as needed:

- Clear the area;
- Keep unnecessary personnel away;
- Identify the spilled material and report to the SM;
- Develop a plan of action;
- Don additional protective equipment;
- Control the source of the spill;
- Dike or apply absorbent material to spill;
- Decontaminate area as necessary; and
- Decontaminate personnel.

The EC shall ensure that, in the affected areas of the site:

- Waste that may be incompatible with the released material is not stored or disposed of until cleanup procedures are completed;
- Treatment or disposal of waste materials may not occur on site; and
- All emergency equipment listed in the contingency plan is cleaned and fit for its intended use before operations are resumed.

Material spills may occur during construction from excavation, truck loading, and vehicle accidents, as well as during operation and maintenance of the HMS during Level II operations (See Contingency Plan and Drawing DDP EN1.02). Every effort will be made to prevent or minimize spilled groundwater discharge to the local surface waters.

Should an onsite spill of contaminated groundwater occur, the immediate response will include closing off the source of the spill, controlling the spilled material, application of a sorbent material or sand bagging, and street sweeping, as appropriate. The spill shall be collected as soon as possible, either manually or with equipment such as pumps. Ground material such as concrete or asphalt, which comes in contact with the spill, shall be cleaned as appropriate. Ground material that comes in contact with the spill that would not or cannot be cleaned will be removed for disposal and replaced with clean material. Removed materials that were in contact with the spilled contaminated groundwater will be stored in roll-off containers for characterization testing. The final disposition of these materials will be determined based on the test results. Spilled contaminated groundwater that is collected will be stored in the designated groundwater tanks and managed with the HMS extracted groundwater.

Records of all spills and releases will be documented in a log. The reported information described above will be included in the log.

6.4 WRITTEN NOTIFICATIONS

If the facility discharges more than 1,000 U.S. gallons of oil in a single discharge, or discharges more than 42 U.S. gallons of oil in each of two discharges that occur within any twelve-month period, into or upon navigable waters, a written report will be sent to the following address within 60 days of meeting the 1,000-gallon or 42-gallon criteria discussed above (this reporting criteria is consistent with 40 CFR 112.4):

U.S. EPA – Region III
Office of Remediation, 3LC20
1650 Arch Street
Philadelphia, PA 19103
Attn: Mr. Russell Fish

A copy of this written report will also be sent to the following State agencies:

Maryland Department of the Environment (MDE)

Solid Waste Program
1800 Washington Boulevard
Baltimore, Maryland 21230
Attn: Mr. Edward Dexter

Maryland Department of the Environment (MDE)
Land Management Administration – Oil Control Program
1800 Washington Boulevard
Baltimore, Maryland 21230
Phone: 410-537-3442

The written report will include the following information:

- Name and location of the facility and name of the owner/operator;
- Corrective actions and countermeasures taken, including a description of equipment repairs and replacements;
- Description of facility, including maps, flow diagrams, and topographical maps;
- Cause of the discharge(s) to navigable waters and adjoining shorelines, including a failure analysis of the system and subsystem in which the failure occurred;
- Additional preventive measures taken or contemplated to minimize possibility of recurrence; and
- Other pertinent information requested by the Regional Administrator.

7.0 DISCHARGE PREVENTION MEASURES, CONTROLS, AND COUNTERMEASURES POST CONSTRUCTION ACTIVITIES

This SPRP is limited to construction-related activities. Once construction is completed, the current spill prevention control and countermeasures (SPCC) plan will continue to be employed at the site.

Figures

Figure 1
Site Location Map

Area 1, Phase 1
Storm Water Pollution Prevention Plan

Baltimore Works Site
Baltimore, Maryland

REVISED

December 2013

By:
Environmental Resources Management, Inc.
Harbor Point Development LLC

For:
U.S. Environmental Protection Agency – Region III
Maryland Department of the Environment

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1.0 INTRODUCTION

1.1 REGULATORY BACKGROUND

This Storm Water Pollution Prevention Plan (SWPPP) was developed for the Harbor Point site, located in Fell's point, next to the Baltimore Inner Harbor in Baltimore, Maryland. This SWPPP presents best management practices for managing storm water runoff during construction activities identified in the November 2013 Detailed Design Plan (DDP). This SWPPP pertains specifically to the Exelon construction activities and its effectiveness terminates post-construction.

This SWPPP has been prepared in accordance with the United States Environmental Protection Agency (USEPA) and Maryland Department of the Environment (MDE) regulations governing storm water runoff. The federal requirements regarding storm water runoff are codified under the National Pollutant Discharge Elimination System (NPDES) regulations, found in Title 40, Part 122, Subpart B of the Code of Federal Regulations (40 CFR 122.26). USEPA has delegated NPDES authority in the State of Maryland to MDE. The State regulations governing the storm water discharge permit program are codified in the Code of Maryland Regulations in Title 26, Subtitle 08 and Subtitle 17 (COMAR 26.08 and COMAR 26.17).

Federal storm water regulations 40 CFR 122.26(a)(1)(ii) and 40 CFR 122.26(b)(14) and corresponding state storm water regulations require a permit for the discharge of storm water associated with industrial activities within SIC code 2813. The State of Maryland, through the Maryland Department of the Environment (MDE), has primacy for NPDES storm water discharges. A General Discharge Permit for Storm Water Associated with Construction Activities will be required for implementation of the construction project. As of the date of this SWPPP, the permit application has been submitted but the permit has not been issued. MDE has confirmed that the NPDES application was received and the 45 day public notice period ends on 1/8/2014.

The management activities for compliance with this permit are provided in the site's Erosion and Sediment Control Plan. As noted above, this SWPPP is intended to discuss best management practices for managing storm water runoff during construction activities. This SWPPP should be utilized in conjunction with other plans as discussed in Section 1.3.

This SWPPP was developed in accordance with the requirements of *USEPA's NPDES Multi-Sector General Permits for Storm Water Discharges Associated with Industrial Activities* as published in the Federal Register on October 30, 2000. A copy of this SWPPP must be kept on site at all times.

1.2 PURPOSE OF SWPPP

The purpose of the SWPPP is to evaluate potential pollution sources at the Facility that could come in contact with storm water and to select and implement appropriate measures to mitigate or control the discharge of pollutants in storm water runoff.

The pollution prevention approach focuses on three objectives: (1) to identify sources of pollution potentially affecting the quality of storm water discharges associated with industrial activity from the Facility; (2) to describe and outline implementation of practices to minimize and control pollutants in storm water discharges associated with industrial activity from the Facility; and (3) to provide a mechanism for compliance with the terms and conditions of the General Permit.

This SWPPP document is a foundation for the Facility's storm water pollution prevention program. This document is revised accordingly as conditions and practices at the Facility change to accommodate new methods of production, storage and material transfer.

The SWPPP describes activities, materials and physical features of the Facility that may contribute pollutants to storm water runoff and the procedures and methods that are used to minimize these impacts.

1.3 CONSISTENCY WITH OTHER PLANS

Special Condition Part IV-C.3 of the General Discharge Permit states that the SWPPP may incorporate parts of other plans or permits that are relevant to storm water pollution prevention.

Honeywell stores less than 1,320 gallons of above ground oil storage and less than 42,000 gallons of underground oil storage. Based on these thresholds, Honeywell is not subject to the Spill Prevention Control and Countermeasures (SPCC) regulations under 40 CFR 112.

A Material Handling and Management Plan (MHMP) has been prepared to address the handling and management of solids (asphalt, stone aggregates, concrete and wood debris and soil) and liquids (storm water,

decontamination water and groundwater) that may be encountered during the intrusive activities at the Site. This Plan also includes dust control measures that describe soil/debris handling practices to be implemented to minimize dust emissions.

An Air Monitoring Plan has also been prepared to ensure the safety of workers and the public during construction.

Additionally, a Spill Prevention and Response Plan (SPRP) has been prepared and is meant to be used in conjunction with the Material Handling & Management Plan.

This SWPPP will serve as the site document relevant to storm water pollution prevention and does not incorporate parts of any other plans or permits.

1.4 PLAN ORGANIZATION

The remainder of the SWPPP is organized in the manner listed below.

- *Section 2.0 - Facility Description.* Section 2.0 presents a narrative of the site location, a description of the site history, and current storm water runoff control.

- *Section 3.0 - Identification of Potential Pollution Sources.* Section 3.0 describes in more detail potential storm water pollution sources at the Facility.

- *Section 4.0 - Best Management Practices for Storm Water Management Controls.* Section 4.0 describes those practices to be implemented to ensure proper storm water management control.

- *Section 5.0 - Storm Water Pollution Prevention Team and Training.* Section 5.0 identifies the pollution prevention team and training to implement the SWPPP.

2.0 FACILITY DESCRIPTION

2.1 SITE LOCATION

The Site is located on a peninsula that occupies approximately 18 acres on the northeast shore of the Patapsco River of the Inner Harbor, in the Fells Point section of Baltimore City, Maryland. The former chromium chemical manufacturing facility consisted of chromium processing production buildings and numerous support buildings on an area that covered approximately 14 acres (this area is referred to as Area 1). Only a portion of Area 1 is incorporated in the Area 1-Phase 1 project (see Section 4.2.4 for the area of disturbance). The Site is surrounded by water on the north, west and south, the Living Classrooms facility to the north and by the redevelopment project, Thames Street Wharf Office Building, constructed in 2009, to the east.

2.2 SITE HISTORY

The Site has been divided into Areas 1, 2, and 3. Area 1 is the principal site of Honeywell's (formerly AlliedSignal) Baltimore Works Facility. Chromium ore was processed in Area 1 from 1845 to 1985. The former manufacturing processes resulted in chromium impacts to soil and groundwater. An Environmental Remediation System (ERS) is maintained and operated by Honeywell International Inc. (Honeywell) to contain CrVI-impacted groundwater in Area 1 and control the potential for human exposure to affected soil. The ERS consists of a Multimedia cap (MMC), Hydraulic barrier, Head Maintenance System (HMS), a groundwater storage and transfer system, and Outboard Embankment. The HMS maintains an inward groundwater gradient to mitigate the migration of chromium-impacted groundwater from the Site.

Area 2 was mainly used for coal and raw chromium ore storage. In addition, a fertilizer warehousing and supply company operated in this area for many years. This area was covered with a soil and asphalt cap system.

Area 3 consists of five separate properties all with a history of industrial activity. This industrial activity included brass casing, oil blending and storage, lumber storage and coating/plastics production. This area was covered with a soil cap which has since been paved.

Honeywell purchased the five properties by 1993 prior to which all manufacturing was halted and subsequently all buildings and tanks were removed from these sites.

3.0 IDENTIFICATION OF POTENTIAL POLLUTION SOURCES

The planned foundations include driven concentric closed-end pipe piles filled with concrete. The driven concentric pipe pile is proposed for the one-story Plaza Garage. Pile caps with driven piles will be placed below columns at the interior and perimeter of the Exelon Tower and Trading Floor Garage. A large, pile-supported moment slab will be placed below the Exelon Tower.

The potential pollutant sources are hexavalent chromium encountered during excavation activities being conducted on this site (primary source), stored groundwater generated by the HMS collected to maintain an inward groundwater gradient to the site (secondary source), and sulfuric acid (90% solution), which is used on an intermittent basis to create pH adjusted water used in the maintenance (cleaning) of the conveyance piping. Hexavalent chromium is expected to be encountered when the liner is exposed and removed to facilitate excavation of foundations. The source of the dissolved chromium is groundwater conveyed via piping to the enclosed permitted, secondarily contained storage tanks. Tanks are emptied via vacuum tanker trucks within the loading area of the Transfer Building. The sulfuric acid is delivered and stored in 1 gallon glass bottles. In the event of a spill, the spilled contents would be contained within the secondarily contained loading area and disposed of in accordance with the Facility SPCC Plan.

There is also the potential for fuel leaks during construction activities, such as during fuel deliveries. This potential pollution source will be discussed in the SPRP.

3.1 SIGNIFICANT DUST OR PARTICULATE GENRATING PROCESS

A Material Handling and Management Plan has been prepared for inclusion in the November 2013 DDP that describes soil/debris handling practices to be implemented to minimize dust emissions. In general, dust emissions will be controlled by misting with potable water onto open excavations as needed to keep exposed soil surfaces moist. The aerosolized water misting is also effective in precipitating dust emissions.

3.2 LOADING AND UNLOADING OPERATIONS

Honeywell International is the generator of any hazardous wastes at the site. Honeywell, or its authorized agent will sign manifests for materials that are generated.

The excavation planned for the Exelon Tower moment slab, pile caps, concentric piles, and any other excavations through the MMC will generate clean soil/aggregate from above the MMC synthetic layers and chromium contaminated soil/debris. The EPA and MDE shall be provided written notice a minimum of two weeks in advance of initiating the Exelon Tower moment slab excavation, or any other excavations through the MMC. The proposed moment slab excavation is the largest and deepest excavation and will terminate at El. +6 feet mean sea level (msl), approximately four feet below the MMC. Abandoned, concrete or wood foundation structures have been identified that will be encountered below the MMC during concentric, steel pile driving and concrete pile cap construction. The abandoned structures will be removed only to the extent necessary for construction of new foundations. As such, the removed, abandoned structures will be considered contaminated debris requiring off-site disposal. All hazardous waste storage operations must be performed in compliance with all relevant requirements specified in COMAR 26.13.

While direct-loading excavated soil/debris into lined, sealed roll-off containers is the preferred daily excavation and transportation method, a controlled, temporary storage area will be constructed, as described above, for use in the event that sealed roll-off containers cannot be transported daily for off-site disposal. Some events that might prompt the use of this temporary storage area, as a contingency, are:

- Volume limit to the daily capacity of the primary and alternate off-site disposal facilities;
- Off-site disposal facility hours of operation; and
- Limited availability of long-haul trucks.

The storage area will be located in close proximity to the excavation zone required for construction of the moment slab (west side of Limit of Disturbance) to reduce the distance for moving containers (Drawing DDP-EN1.01). The controlled area will be approximately 5,000 square feet which will provide a storage capacity of 20, 25-cubic yard lined, covered, and sealed roll-off containers.

There are four categories of water anticipated to be managed during intrusive work, including:

- Storm water diverted from contact with contaminated material below the MMC;
- Storm water that comes into contact with contaminated material below the MMC;
- Groundwater; and
- Equipment decontamination water.

As specified in the MHMP, contact and non-contact water will be transported via piping to 16,000-gallon double-walled Frac tanks. Non-contact water will not be stored in a Frac tank designated for contact water. Contact water will not be stored in a Frac tank designated for non-contact water. Contact water will be transferred from the Frac tanks by vacuum trucks for disposal at a hazardous waste facility listed in section 3.3. All connections will be tightly secured prior to unloading. A Harbor Point Development designee will be present for the duration of each water transfer activity.

3.3 OUTDOOR STORAGE ACTIVITIES

Non-contact and contact water removed from excavations during construction will be pumped to 16,000-gallon double-walled Frac tanks and tested prior to disposal. The water will be stored in the Frac tanks until the appropriate disposal classification is determined.

Honeywell maintains a list of their approved Subtitle C landfill facilities and as such the addition of alternative, proposed disposal facilities must be pre-approved. The following RCRA landfill facilities are located within reasonable proximity to the Site and be may be considered, as may others with the caveat of Honeywell approval, for off-site disposal:

- Environmental Quality (EQ) [EPA ID: PAD010154045]
  730 Vogelsong Road
  York, PA 17404
  ~ 60 miles

- MAX Environmental Technologies [EPA ID: PAD004835146]
  233 Max Lane
  Yukon, PA 15698
  ~ 200 miles

- Waste Management Solutions [EPA ID: NYD049836679]
  1550 Balmer Road
  Youngstown, NY 14174
  ~ 400 miles

4.0 BEST MANAGEMENT PRACTICES FOR STORM WATER MANAGEMENT CONTROLS

Best Management Practices (BMPs) for storm water management control are described in this section. The BMPs were developed using EPA's publication *Storm Water Management for Industrial Activities* (October 1992) as a guidance.

Baseline BMPs are employed across the entire Site and are not necessarily associated with any specific source of significant materials. The BMPs described below are consistent with the conditions of the General Permit to ensure proper management of storm water runoff.

4.1 EXISTING BMPS

The site currently has a drainage system in place. A MMC with LLPDE liner with a composite drainage net covers the entire site and is sloped to drain water to a perimeter drain. The perimeter drain is perforated polyvinyl chloride (PVC) pipe on the landward perimeter and HDPE drain tubing at the waterfront perimeter. The tubing was placed in a stone-filled trench at the perimeter of the geomembrane outboard of the hydraulic barrier. The perimeter drain was placed around the entire perimeter. The perimeter drain allows storm water infiltration within the cap drainage layer (i.e., above the synthetic layers of the cap) to drain to the surface water of the Inner Harbor.

The only other existing BMP is a riprap waterside perimeter embankment. This embankment helps to mitigate the potential erosion of the slope into the river.

4.2 DURING CONSTRUCTION

This SWPPP addresses best management practices for managing storm water runoff during construction activities.

4.2.1 Non-contact Water

Storm water will be diverted from excavation zones by installing the required erosion and sediment controls as shown on drawings DDP-C8.00 and DDP-F1.21, F1.30 and F1.31. Should storm water that has not come into contact with contaminated material below the MMC pond on a controlled surface, the standing water will be pumped to one of two

16,000-gallon double-walled Frac tanks. This non-contact water will be held for analytical testing results to ensure proper disposal. Non-contact water will not be stored in a Frac tank designated for contact water. Non-contact water will not be commingled with groundwater.

4.2.2 Contact Water

Storm water that inadvertently comes in contact with contaminated soil below the MMC and ponds in open excavations will be collected in a sealed sump and pumped to one of two 16,000-gallon double-walled Frac tanks. Additionally, storm water collected in the sealed sump from the perimeter drain installed at the temporary storage area will be pumped to this Frac tank. This contact water will be held for analytical testing results to ensure proper off-site disposal. Contact water will not be stored in a Frac tank designated for non-contact water.

4.2.3 Storm Water Management System

The storm water management plan was examined for the 25-year storm event and 100-year storm event, however the storage requirements were determined based primarily on the 25-year storm event. When a storm event occurs, the only water that will come in contact with soil below the membrane will be storm water falling directly into an excavation. All water that falls outside of the excavations will be treated as surface runoff because it will be deflected away from open excavations by diversion berms. Infiltration through the cover soil into the drainage net was assumed to not occur because the drainage net will be flapped-up the slope of the excavation and anchored at the edge of the excavation to divert storm water from entering into the excavation zone . The bottom of each excavation is open to soil below the membrane, so that any storm water collected in the excavation may be impacted.

Each excavation will be sloped and a sump will be installed in each excavation to collect storm water to prevent it from rising above the capillary break gravel at the down-slope side of the excavation. The entire footprint of the excavation, including the sloped portions, was considered to catch storm water in the excavation. Excavations will be covered with plastic overnight or in the event of work stoppage to minimize the generation of contact water in the event of rainfall before the excavation is complete. Completed excavations will be covered with geotextile fabric and a 6-inch thickness of clean cover soil will be placed across the excavation footprint in preparation for pile driving. Contact and non-contact water testing and proper disposal procedures are described in the Material Handling and Management Plan project control document.

The total volume of impacted water generated by a 25-year storm event over 24 hours has been calculated to be approximately 107,000 gallons, based on the open excavation area computed. This volume can be contained in one 75 ft. x 75 ft. x 4 ft. (168,000-gallon) "modutank" container. Considering it takes approximately 24 hours to sample and properly discharge impacted water, two modutanks will be present at the initiation of construction to store the volume of impacted water generated as well as any additional surge that may occur during the 25-year storm event at the location shown on DDP Drawing EN1.01. The storage volume provided by a single 168,000-gallon modutank storage container is approximately 57% greater than the volume of impacted water generated during a 25-year storm event, and approximately 22% greater than the volume of impacted water generated during a 100-year storm event (See revised Engineering Evaluation Memo #2).

Two storage containers will provide sufficient storage required to test, sample, and dispose of impacted water during a 24-hour, 25-year or 100-year frequency storm event at the site. A 120 ft. x 205 ft. x 1.5 ft. deep containment berm with 14-inches of filling capacity will provide storage sufficient to handle water stored in a single ModuTank. See Material Handling and Management Plan, Section 5.4, for contact storm water provisions.

4.2.4 Sediment and Erosion Control

The Erosion and Sediment Control Plan outlines specific activities to mitigate erosion by water or wind transport of sediment and soil during construction activities. The area of disturbance, as provided on drawing C8.00, is 339,938 square feet (7.80 acres). In general, sediment control measures will consist of perimeter control devices such as:

- Silt fence and Super silt fence (except on Multimedia Cap);
- Asphalt berms;
- Earth dikes; and
- Stabilized construction entrances.

Point control measures will include dewatering practices such as portable sediment tanks and sump pits.

4.2.5 Spill Prevention and Response Procedures

The following measures should be implemented upon discovery of a release:

- Control and contain the release, to the extent possible;
- Clean up the impacted area as soon as possible;
- Assess the risk;
- Implement the construction SPRP based on the source of the release;
- Report the release to management and government agencies; and
- Follow up with preventive measures and any necessary documentation.

Site personnel will immediately commit all necessary manpower, equipment, and materials required to prevent the spill from reaching waterways, shorelines, or sewers. The SPRP further outlines spill prevention and control measures.

4.2.6 Good Housekeeping

Good housekeeping practices are designed to maintain a clean and orderly work environment. Good housekeeping practices to be used during construction activities are the following:

- Maintain clean vehicle access roads;
- Keep all paved and vegetated areas clean of litter and debris and properly maintained.
- Maintain regular refuse pick-up and disposal;
- Spill response equipment is properly located, in adequate supply and working order, and the location(s) are known to all employees;
- Promptly clean up spills and leaks and properly dispose of recovered material;
- Keep walkways and passageways easily accessible and free of protruding objects, materials, and equipment;

- Make sure all trucks which entered any disturbed area, have gone through decontamination procedures for tires, prior to leaving the site; and

- Discuss and promote good housekeeping practices with employees.

Good housekeeping elements are covered in the storm water inspections and throughout the Facility's storm water management process.

Workers should be familiar with and have access to the Spill Prevention and Response Plan (SPRP), dated November 2013 in Appendix B of the DDP, for specific procedures and protocols regarding spills and leaks. On-site training will be conducted prior to the start of work to orient workers with plan requirements. Each worker receiving training will be required to sign an attendance log confirming their participation.

4.2.7 Visual Inspections

Storm water inspections will be conducted at this facility as required. Inspection forms are provided in Appendix B of this document. At a minimum, authorized personnel will perform a monthly inspection of the Facility. The trained inspector will perform the inspections consistent with the requirements of the General Discharge Permit and Materials Handling and Management Plan. A copy of the General Discharge Permit will be provided to MDE. The inspections will be performed to detect evidence of potential common problems that may occur during construction.

At the completion of each inspection, the inspector will review the SWPPP to determine if any observation may require revisions to the SWPPP. Any suggested revisions to the SWPPP will be brought to the attention of the Developer's representative. If the Developer's team determines that revisions are necessary, the SWPPP will be revised. No changes to the SWPPP may be implemented without prior MDE approval.

In addition to the monthly inspections, quarterly inspections of proposed outfalls will also be performed and after major storm events. The inspections will be performed to detect evidence of potential storm water blockage or pollution.

4.3 POST CONSTRUCTION

This SWPP pertains specifically to the Exelon construction and its effectiveness terminates post-construction.4.3.1 Best Management Practices Stormwater best management practices (BMPs) incorporated into project are intended to collect, convey, and manage stormwater from the re-developed site. Rainwater conveyance pipes, a 6-foot by 4-foot basin, stormwater interceptor, rainwater pumps and filters, and sand traps are among the BMPs presented on the plumbing drawings (P1.01A and P1.01B) provided in Appendix B.

4.3.1 Management of Runoff

The following methods are planned to help with the management of runoff at the site post construction:

- Reduce impervious area via the installation of a green roof;
- Reduce impervious area via the installation of green space within the Central Park and tree pits along the street network;
- Rainwater harvesting within the building (collect rooftop runoff) and reuse for mechanical/plumbing systems; and
- Collect surface runoff from open space areas and direct the discharge via piping to the harbor.

4.3.2 Preventive Maintenance

Preventive maintenance involves the timely inspection and maintenance of storm water management devices as well as inspecting and testing facility equipment and operational systems to uncover conditions that could cause breakdowns or failures resulting in discharges of pollutants to surface waters. Honeywell's on-site consultant, CH2M Hill, performs inspections and preventative maintenance at this facility. Additionally, CH2M Hill performs operations, maintenance and inspections required by the Consent Decree. Inspection forms are provided in Appendix B.

The preventive maintenance program for facility equipment is intended to mitigate breakdowns or failures by adjustment, repair, or replacement, and includes the following elements:

- identification of equipment at the facility that should be inspected;
- a schedule for periodic inspections of the equipment;

- appropriate and timely adjustment, repair, or replacement of equipment; and

- maintenance of complete records of inspections and equipment.

Preventive maintenance for site management areas and sediment and erosion control structures includes inspection for debris or other clogging material to ensure proper functioning of the structures, repair of minor erosion, cleaning of ditches and structures, reseeding and fertilization of vegetative areas.

4.3.3 Good Housekeeping

Good housekeeping practices require that the facility is maintained in a clean and orderly manner. This is accomplished through instilling proper employee work habits and by training and checking the progress through visual inspections. Good housekeeping assures that:

- floors and surfaces are kept clean and orderly;

- spill response equipment is properly located, in adequate supply and working order, and the location(s) are known to all employees;

- spills and leaks are promptly cleaned up and recovered material is properly disposed; and

- all paved and vegetated areas are routinely kept clean of litter and debris and are properly maintained.

Employees should be familiar with and have access to the Spill Prevention and Response Plan (SPRP), dated November 2013 in Appendix B of the DDP, for specific procedures and protocols regarding spills and leaks.

Floors and ground surfaces should be cleaned by sweeping or shoveling and not by washing. Hosing down an area with water increases the potential for pollutants to be carried down-gradient to be released at a later time into storm water. Brooms should be stored in an appropriate area and should not be exposed to precipitation. Shovels should be cleaned before being stored.

Sorbents are materials that are capable of cleaning up spills through the physical/chemical processes of adsorption and absorption. Typical sorbent materials that can be thrown onto a spill on paved surfaces include clays, sand, kitty litter, and sorbent booms, matting and pads. Sorbent booms should be used to absorb spills on unpaved areas. For

absorbent materials to be effective, they must be applied immediately onto the spilled area, and cleanup should proceed immediately. Proper disposal of the used absorbent material is necessary. Additional activities for spills on unpaved areas after the spill has been contained and sorbent materials applied include the removal of materials impacted by the spill, i.e., excavation. These materials shall be staged in proper containers and disposed at a permitted off-site facility.

In the areas outside of the Exelon tower and in the parking garage, good housekeeping involves:

- picking up refuse and recyclables deposited outside of any dumpsters or trash bins;
- sweeping or shoveling any dry/solid materials that may have accumulated outside of any dumpsters and recycled material collection areas;
- proper disposal of refuse and recyclable materials;
- keeping walkways and passageways easily accessible; and
- cleaning the storm drain inlets.

4.4 SWPPP REVISION

This SWPPP will be amended whenever there is a change in design, operation, maintenance, or other circumstances that materially increase the potential for releases of significant materials, or that changes the response necessary in an emergency. No changes to the SWPPP may be implemented without prior MDE approval.

This SWPPP will also be amended in the event of new regulations, there is a change in the Developer's team, or if the SWPPP proves ineffective in achieving the general objective of controlling storm water discharges. At least once a year, the Developer's Team will review and discuss the appropriateness of the SWPPP, and determine whether the SWPPP requires revisions. As appropriate, the plan will be revised within a reasonable time period following the plans annual review.

Amendments to the SWPPP will be recorded on a SWPPP Revisions Log and appended to this document.

5.0 STORM WATER POLLUTION PREVENTION TEAM AND TRAINING

5.1 PROJECT SPECIFIC TEAM MEMBERS AND RESPONSIBILITIES

The members of the Storm Water Pollution Prevention Team are listed below:

Facility Coordinator
During Construction: Jonathan Flesher: 443-463-3937

Resident Site Manager: Ken Biles: 410-522-5293

The above-listed persons are trained to implement the SWPPP. Mr. Flesher will designate an inspector for the SWPPP responsible for monthly inspections and documentation as well as assurance that appropriate BMPs are in place. The Facility Coordinator has the overall responsibility for ensuring plan adherence, updated training, and authorizing the resources necessary to implement the SWPPP, including inspections and corrective measures. Honeywell's on-site consultant, CH2M Hill, represented by the Resident Site Manager, will monitor compliance with procedures for inspections and preventative maintenance at this facility during construction. During construction, the Developer's Field Representative will perform the necessary inspections. Additional team members will provide support on an as needed basis.

5.2 TRAINING REQUIREMENTS

Members of the pollution prevention team are responsible for conducting employee training programs. The employee training programs are designed to inform personnel at all levels of responsibility of the components and goals of the SWPPP. Training sessions, including initial orientation training discussed in Section 4.2.6, will address topics such as spill prevention and response, preventive maintenance, good housekeeping, storage practices, visual inspections, and recordkeeping and reporting. At a minimum, formal training sessions shall be conducted annually. Topics discussed in the training session and a roster of employees who attend the training sessions are to be recorded and retained in the SWPPP file. Informal training in the form of one-on-one communications with personnel on the importance of pollution prevention should occur during visual inspections by members of the pollution prevention team. This will allow members of the pollution prevention team to point out potential pollutants to employees and to verify that the information addressed in the training sessions has been communicated effectively to them.

The information described in the plan regarding potential pollution sources (Section 3.0) and storm water management controls/BMPs (Section 4.0) is distributed to all employees whose work influences storm water or includes a potential pollution source. At a minimum, this includes maintenance personnel, equipment and vehicle operators, and anyone who handles or oversees the transfer of fuel or other granular or liquid materials into and out of the facility. Employee training includes these four core subjects.

- *Good Housekeeping* - Employees are required to maintain a clean and orderly work environment. The routine sweeping of floors and the prompt cleanup of spilled material is discussed. The location of shovels, brooms, absorbents, and any other spill response equipment are identified. Employees are informed to regularly check for leaks, and spills. Housekeeping issues are addressed during regular safety meetings.

- *Spill Prevention and Response* - Employees are made aware of potential spill areas, drainage routes, and to whom a spill should be reported. Specific material handling procedures to avoid spills and response procedures in the event of a spill are also discussed.

- *Loading and Unloading Procedures* - Employees are instructed to provide constant supervision during all outdoor fuel transfer and material handling operations and to ensure that all containers are properly sealed prior to handling.

- *Preventive Maintenance* – Employees are instructed to provide constant care when using equipment to ensure that the equipment is maintained properly.

No other types of materials other than petroleum products and materials associated with the Transfer Station and general housekeeping products are anticipated to be maintained/used on site.

Appendix A
Plumbing Drawings

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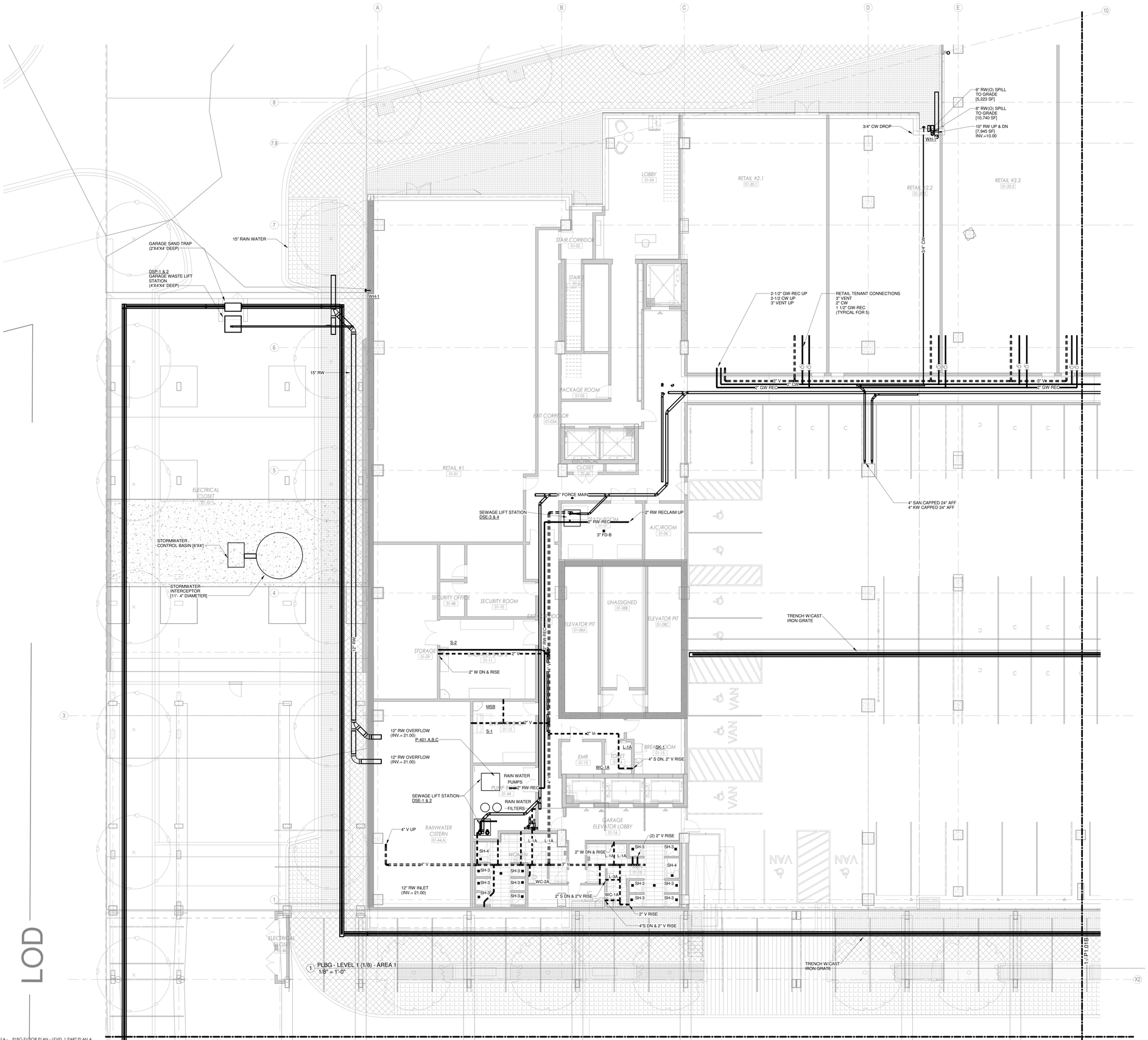
KEYED NOTES:

1 4" SAN, 2" VENT AND 1 1/2" CW ROUGH-IN FOR FUTURE RETAIL TOILET.



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project
EXELON BLDG & PLAZA GARAGE

8/1/13

key plan

seal

issued	date	description

revision	date	description

title
PLBG FLOOR PLAN - LEVEL 1 PART PLAN A

date:	6/28/2013
drawn by:	Author
checked by:	Approver
scale:	1/8" = 1'-0"
project number:	N1162.00
	scaled.indb

sheet number
P1.01A

LOD

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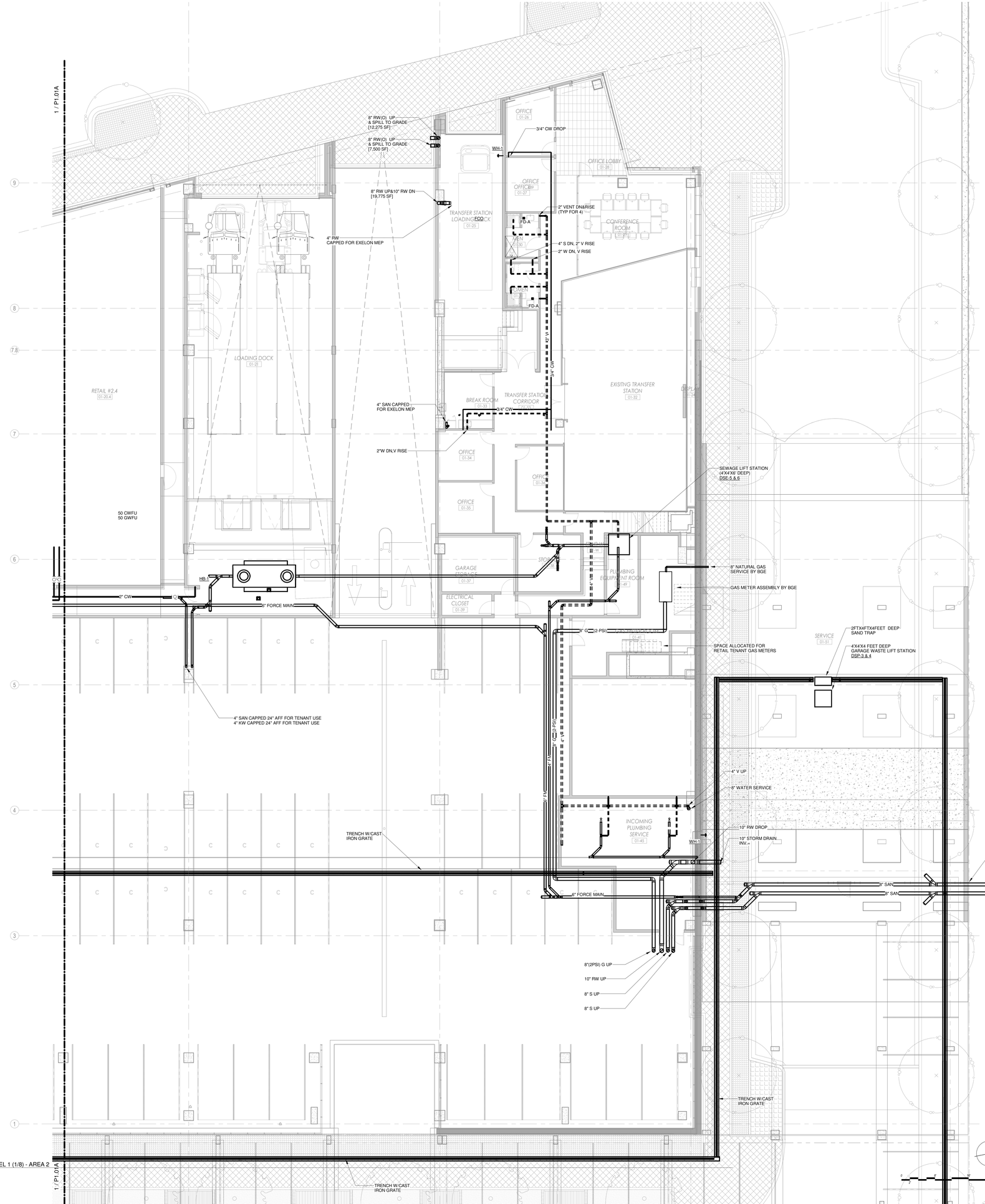

1 PLBG - LEVEL 1 (1/8) - AREA 2
1/8" = 1'-0"

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project
EXELON BLDG & PLAZA GARAGE

8/1/13

key plan

seal

revision	date	description

title
PLBG FLOOR PLAN - LEVEL 1 PART PLAN B

date:	6/28/2013
drawn by:	Author
checked by:	Approver
scale:	1/8" = 1'-0"
project number:	N1162.00

sheet number
P1.01B

Appendix B
Inspection Forms

9.0 INSPECTION FORMS

This section includes forms for inspections of the remedial components. Only one set of inspections will be done to cover all remedial components (the Layered Soil Cap, the Multimedia Cap, the HMS, the Hydraulic Barrier, and the Embankment.)

In addition, the Cap Inspection Form, Table 9-1, will be used to inspect the Layered Soil Cap and the Multimedia Cap. This table is also included in the SSMP.

Table 9-1. Multimedia and Layered Soil Cap Inspection Form
Honeywell Baltimore Works Site O&M Plan [5]

Inspector: Date: Time:

Activities on Site:

Weather:

The multimedia and Layered Soil Caps serve as barriers against surface water infiltration, and the upward migration of contaminants. A cap inspection priority is to evaluate the effects of observed problems. As such, contaminant seepage and migration effects shall be evaluated as part of observed inspection problems.

Each inspection component item lists typical associated types of problems and their required inspection frequencies. The types of cap component problems include, but are not limited, to those listed. The inspection frequencies for each component are described in the following table. All cap components shall also be inspected following catastrophic or other unanticipated events.

Cap Component Items	Types of Problems (to review during inspection)	Item Inspection Frequency [4] (check applicable)	Status	Observations	Date & Nature of Repairs/Corrective Action
Protective Cover for Soil and Multimedia Caps (including stone and lawn)	Erosion, settlement, slumping, saturation of surface soil, seepage, frost heave, Weeds/ vegetation, lawn care	After storms [1] Monthly [2] Quarterly [3]			
Asphalt	Cracks, deterioration, spalling, uneven settlement, ponded water, slumping, seepage	After storms [1] Monthly [2] Quarterly [3]			
Cap Penetrations	Soil discoloration, seepage, erosion, settlement, damage to geosynthetic cap materials	After storms [1] Monthly [2] Quarterly [3]			
Sediment and Erosion Control Structures	Inadequate Riprap, Check dam integrity , and short circuiting	After storms [1] Monthly [2] Quarterly [3]			
Settlement Plate Surveying and drainage layer slope	Total settlement, differential settlement	Baseline and annually until 3 consecutive measurements indicate no change; then every 5 years thereafter. Visual inspection after storm events exceeding the 25-year, 24-hour storm			

Cap Component Items	Types of Problems (to review during inspection)	Item Inspection Frequency [4] (check applicable)	Status	Observations	Date & Nature of Repairs/Corrective Action
Drainage Layer Sampling	Blockage of drainage layer, total chromium and cyanide levels above baseline value.	Baseline, then annually.			
Drainage Layer Inspection	Flow/no flow, debris, water volume and color.	After rain for 1st year. Monthly [2] After storms [1] Quarterly [3]			
Multimedia Cap/Layered Soil Cap	Field inspection for signs of disturbance, seepage	Semi-annual and after storms [1]			
Cover Soil Sampling	Total chromium levels above baseline value	Baseline Once every five years			
HMS Operation	Increase in volume of water pumped with no significant increase in rainfall or unusual tidal events	Daily volume reporting (to be reported quarterly)			
Cap Repair and Reconstruction	As applicable to item being repaired. Conformance with repair and reconstruction specifications. Damage to geosynthetic materials and capillary break layer.	Daily during repair and reconstruct. Immediately after repair or reconstruct event.			
Outfall and Swale	Damage, blockage, and erosion/sediment	After storms [1] Quarterly [3]			
Security Fencing	Damage to fencing or locks, missing sections or locks	After storms [1] Monthly [2] Quarterly [3]			

1. After storm events exceeding 2 year, 24-hour storm.
2. Monthly for first year after construction completion.
3. Quarterly after first year following construction completion.
4. In all cases, inspections shall be performed after catastrophic site events such as earthquakes, ship collisions, hurricanes, or other unanticipated events.
5. This form is also utilized by the SSMP.

Comments Or Actions Required/Performed:

Table 9-2. HMS Inspection Form
Honeywell Baltimore Works Site O&M Plan

Inspector: Date: Time:

Activities on Site:

Weather:

Inspection Item [1]	Types of Problems (to review during inspection)	Maintenance Frequency	Status	Observations	Date & nature of repairs/corrective action
Extraction Wells	Clogging	semi-annually or as needed			
Pumps	Clogging, Precipitation	annually			
Air Line	Leakage, Pressure check	quarterly			
Air Compressor, parts	Leakage, Fatigue	Quarterly - Varies by components			
Air Filters	Clogging	Weekly or as needed			
Desiccant Dryer	Spent desiccant	Check quarterly			
Conveyance Pipe	Leakage, Clogging, Precipitation	annually			
Electrical Systems	Enclosures, Connections	Quarterly			
Monitoring/Control System	Adequacy, Connections	Quarterly			
Well/ Piezometer Vaults	Settlement	annually			
	Instruments, Equipment and Piping	monthly			
Groundwater Level Device	Accuracy	quarterly			

1. In all cases, inspections shall be performed after catastrophic site events such as earthquakes, ship collisions, hurricanes, or other unanticipated events.

Comments Or Actions Required:

Table 9-3. Hydraulic Barrier Inspection Form
Honeywell Baltimore Works Site O&M Plan

Inspector: Date: Time:
Activities on Site:

Weather:

Type of Problems	Frequency	Observed Conditions (Check One) None	Good	Fair	Poor	Action Required (Y/N)	Was Problem Observed? Y/N
Barrier Movement Evident	Semi-annual and after significant events		NA	NA	NA		
Erosion Damage Evident	Semi-annual and after significant events		NA	NA	NA		
Impact Damage Evident	After significant events		NA	NA	NA		
Seismic Damage	After significant events		NA	NA	NA		
Chemical/natural degradation	Semi-annual and after significant events		NA	NA	NA		
Settlement Damage Evident	Semi-annual and after significant events		NA	NA	NA		
HMS Pumping Data	Quarterly	NA	NA	NA	NA		
Overall Condition	Semi-annual and after significant events	NA					NA
Action Required			NA	NA	NA		

NA - Not Applicable

Comments Or Actions Required:

Table 9-4. New Outboard Embankment Inspection Form
Honeywell Baltimore Works Site O&M Plan

Inspector: Date: Time:

Activities on Site:

Weather:

NOTE: Inspections for this form include both the New Outboard Embankment, and the stone embankment around the Layered Soil Cap

Description	Frequency	Observed Condition (Check One)				
		None	Good	Fair	Poor	Was Problem Observed? Y/N
Stone Condition*	Semi-annual and after significant events	NA				NA
Armor Condition**	Semi-annual and after significant events	NA				NA
Slope Condition\Changes	Semi-annual and after significant events	NA				NA
Erosion Damage Evident	Semi-annual and after significant events		NA	NA	NA	
Evidence of Containment Seepage	Semi-annual and after significant events		NA	NA	NA	
Impact Damage Evident	Semi-annual and after significant events		NA	NA	NA	
Settlement Damage Evident	Semi-annual and after significant events		NA	NA	NA	
Floating Debris	Semi-annual and after significant events		NA	NA	NA	
Overall Condition	Semi-annual and after significant events	NA				NA
Weeds/vegetation	Semi-annual and after significant events	NA				NA
Action Required			NA	NA	NA	

NA - NOT APPLICABLE

* Stone condition: environmental or climatic degradation of the individual stones.

** Armor condition: Riprap stone placed on the embankment surface between El.-10 and the top of the embankment to protect against wave action. Armor condition is related to the condition of the rip rap, including the erosion of the rip rap or the gross movement of the rip rap that is not associated with a slope failure.

Comments Or Actions Required:

Appendix C
Index of Drawings

INDEX OF DRAWINGS

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DDP A1.00.01 Floor Plan – Level 1

DDP A1.00.02 Floor Plan – Level 2

DDP A1.31.00 Enlarged Floor Plans – Transfer Station

DDP C1.00 Existing Conditions Site Constraints

DDP C1.01 Existing Conditions

DDP C2.00 Site Demolition Plan

DDP C4.00 Site Plan

DDP C5.00 Existing Utility Disposition Plan

DDP C5.10 Utility Composite Plan

DDP C5.20 Storm Drain & Grading Plan

DDP C7.00 Water Profiles & Details

DDP C7.10 Storm Drain Profiles & Details

DDP C7.11 Storm Drain Profiles & Details

DDP C7.20 Telecom Profiles & Details

DDP C7.30 Electric Profiles & Details

DDP C7.31 Electric Profiles & Details

DDP C7.40 Conceptual Gas Profiles

DDP C8.00 Erosion & Sediment Control Plan

DDP C8.10 Erosion & Sediment Control Details

DDP C8.20 Erosion & Sediment Control General Notes

DDP C8.30 Erosion & Sediment Control Notes

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DDP F1.02	General And Technical Notes
DDP F1.03	General And Technical Notes
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DDP F1.12	Historic Pre-Load Areas Plan
DDP F1.13	Potential Obstructions Plan
DDP F1.14	Foundation Excavation Areas Plan
DDP F1.15	Construction Access Roads Plan
DDP F1.16	Demolition of Honeywell Offices Plan
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DDP F1.23	Sheet Pile Wall Construction Sequence
DDP F1.24	Sheet Pile Wall Typical Details
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DDP F1.42	Foundation Partial Plan
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DDP F1.44	Foundation Partial Plan
DDP F1.50	Foundation Details And Sections
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DDP F1.54	Foundation Details And Sections
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DDP F1.60	Development Cap Plan

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DDP EN1.02 Transfer Station Operation And Sequencing Plan

DDP EN1.03 Level 1 Contingency Piping Plan And Details

DDP EN1.04 Level 2 Contingency Piping Plan And Details

DDP EN1.05 Vault Modification Details

DDP EN1.06 Piezometer, Junction Box And Other Details (1 of 2)

DDP EN1.06.01 Piezometer, Junction Box And Other Details (2 of 2)

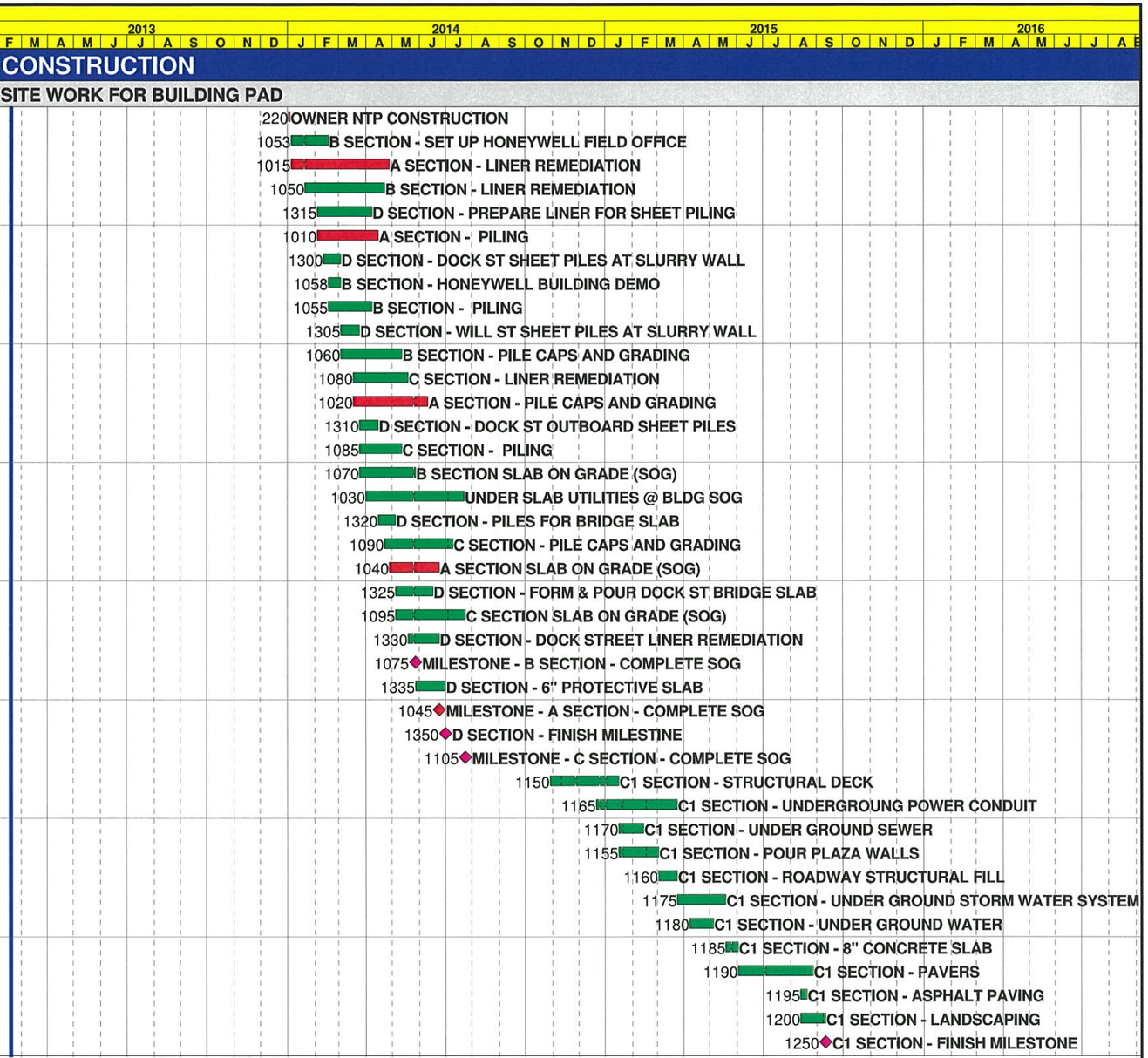
DDP EN1.07 Transfer Station Piping And Conduit Plan

DDP EN1.08 Transfer Station Contingency Modifications

DDP EN1.09 Modifications For Pile Supported HMS Vaults And Piping In Dock Street

Appendix D
Construction Schedule

Activity ID	Activity Description	Orig Dur	Rem Dur	Early Start	Early Finish	Predecessors
CONSTRUCTION						
SITE WORK FOR BUILDING PAD						
220	OWNER NTP CONSTRUCTION	1	1	03JAN14	03JAN14	190*
1053	B SECTION - SET UP HONEYWELL FIELD OFFICE	30	30	06JAN14	17FEB14	1015*
1015	A SECTION - LINER REMEDIATION	80	80	06JAN14	28APR14	220*
1050	B SECTION - LINER REMEDIATION	65	65	21JAN14	21APR14	1015*
1315	D SECTION - PREPARE LINER FOR SHEET PILING	45	45	04FEB14	07APR14	1010*
1010	A SECTION - PILING	50	50	04FEB14	14APR14	1015*
1300	D SECTION - DOCK ST SHEET PILES AT SLURRY WALL	15	15	11FEB14	03MAR14	1010*
1058	B SECTION - HONEYWELL BUILDING DEMO	10	10	18FEB14	03MAR14	1053*
1055	B SECTION - PILING	35	35	18FEB14	07APR14	1010*
1305	D SECTION - WILL ST SHEET PILES AT SLURRY WALL	15	15	04MAR14	24MAR14	1300*
1060	B SECTION - PILE CAPS AND GRADING	50	50	04MAR14	12MAY14	1050*, 1055*, 1055*
1080	C SECTION - LINER REMEDIATION	45	45	18MAR14	19MAY14	1015*, 1015*
1020	A SECTION - PILE CAPS AND GRADING	60	60	18MAR14	10JUN14	1010*, 1010*
1310	D SECTION - DOCK ST OUTBOARD SHEET PILES	15	15	25MAR14	14APR14	1305*
1085	C SECTION - PILING	35	35	25MAR14	12MAY14	1055*
1070	B SECTION SLAB ON GRADE (SOG)	45	45	25MAR14	27MAY14	1060*, 1060*
1030	UNDER SLAB UTILITIES @ BLDG SOG	79	79	01APR14	22JUL14	1020*, 1020
1320	D SECTION - PILES FOR BRIDGE SLAB	15	15	15APR14	05MAY14	1310*, 1315*
1090	C SECTION - PILE CAPS AND GRADING	55	55	22APR14	09JUL14	1080*, 1085*, 1085*
1040	A SECTION SLAB ON GRADE (SOG)	40	40	29APR14	24JUN14	1020*, 1020*
1325	D SECTION - FORM & POUR DOCK ST BRIDGE SLAB	30	30	06MAY14	17JUN14	1320*
1095	C SECTION SLAB ON GRADE (SOG)	55	55	06MAY14	23JUL14	1090*, 1090*
1330	D SECTION - DOCK STREET LINER REMEDIATION	25	25	20MAY14	24JUN14	1325*, 1325*
1075	MILESTONE - B SECTION - COMPLETE SOG	0	0		27MAY14	1070*
1335	D SECTION - 6" PROTECTIVE SLAB	25	25	28MAY14	01JUL14	1330*, 1330*
1045	MILESTONE - A SECTION - COMPLETE SOG	0	0		24JUN14	1040*
1350	D SECTION - FINISH MILESTINE	0	0		01JUL14	1335*
1105	MILESTONE - C SECTION - COMPLETE SOG	0	0		23JUL14	1095*
1150	C1 SECTION - STRUCTURAL DECK	50	50	30OCT14	15JAN15	13125*
1165	C1 SECTION - UNDERGROUNG POWER CONDUIT	60	60	22DEC14	23MAR15	1150*
1170	C1 SECTION - UNDER GROUND SEWER	20	20	16JAN15	13FEB15	1150*
1155	C1 SECTION - POUR PLAZA WALLS	30	30	16JAN15	02MAR15	1150*
1160	C1 SECTION - ROADWAY STRUCTURAL FILL	15	15	03MAR15	23MAR15	1155*
1175	C1 SECTION - UNDER GROUND STORM WATER SYSTEM	40	40	24MAR15	18MAY15	1160*, 1165*, 1170
1180	C1 SECTION - UNDER GROUND WATER	20	20	07APR15	04MAY15	1175*
1185	C1 SECTION - 8" CONCRETE SLAB	10	10	19MAY15	02JUN15	1175*, 1180
1190	C1 SECTION - PAVERS	60	60	03JUN15	26AUG15	1185*
1195	C1 SECTION - ASPHALT PAVING	5	5	13AUG15	19AUG15	1190*
1200	C1 SECTION - LANDSCAPING	20	20	13AUG15	10SEP15	1190*
1250	C1 SECTION - FINISH MILESTONE	0	0		10SEP15	1195, 1200*



Start Date	18FEB13
Finish Date	02NOV15
Data Date	18FEB13
Run Date	12NOV13 14:57

Early Bar
Progress Bar
Critical Activity

EP15

ARMADA HOFFER Construction Co.

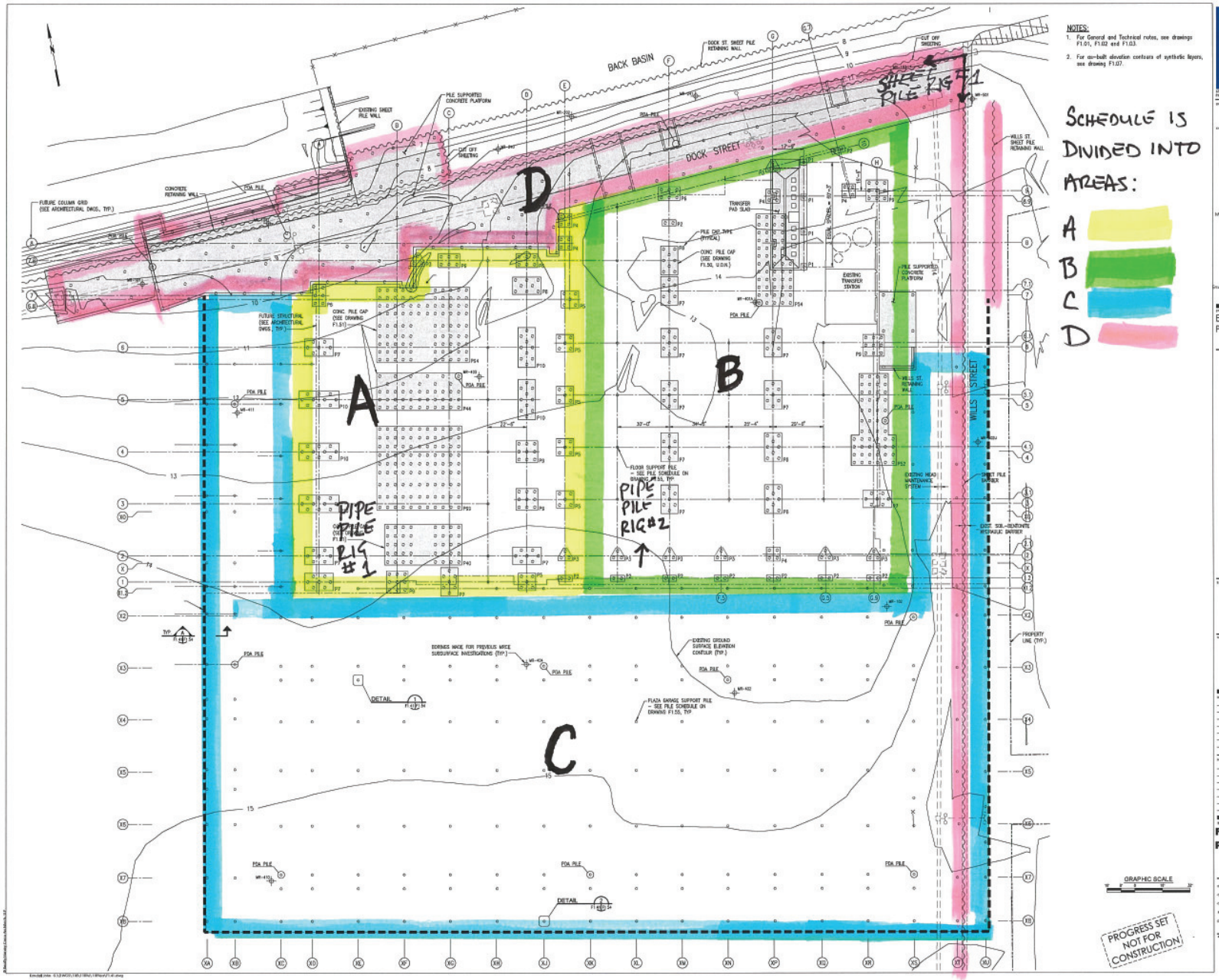
Exelon Program & Area Schedule

SITE WORK X EARLY START

Sheet 1 of 1

HARDT CONSTRUCTION SERVICES, INC. 888-628-6595

Date	Revision	Checked	Approved



BHC ARCHITECTS

EXELON BLDG & PLAZA GARAGE

8/1/13

FOUNDATION PARTIAL PLAN

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