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

Baltimore Works Site
Baltimore, Maryland

REVISED

November 2013

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

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

TABLE OF CONTENTS

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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.

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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

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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.

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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

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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

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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.

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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.

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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

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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.

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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

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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.

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- 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.

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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

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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.

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- 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.

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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

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- 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).

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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.

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- 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/.

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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.

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