May 3, 2019

Mr. Chad Staniszewski
Mr. Eugene Melnyk
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, NY 14203
OU-3 Sheen Remedy Work Plan
NYSDEC Site No. C915201D

Dear Mr. Staniszewski & Mr. Melnyk:

On behalf of Elk Street Commerce Park, LLC, Amec E&E PC have prepared this Work Plan to address the release of a separate phase liquid (SPL) to the Buffalo River emanating from the former Babcock Street Property Area (BSPA). It is presumed that separate phase liquid (SPL) may be present in the unconsolidated deposits adjoining Buffalo River, in the area of the Babcock Street Storm Sewer. SPL in the area of the Babcock Street Storm Sewer would be bounded from movement toward the river by the presence of the Babcock Street Storm Sewer bulkhead structure, which is Critical Infrastructure and may not be altered. East of the concrete bulkhead, a sheet pile wall has been installed that ties into a slurry wall, which contains groundwater in the Operable Unit-3 (OU3) area. Oil sheen has been noted discharging to the Buffalo River around and immediately east of the Babcock Street Storm Sewer concrete bulkhead and adjacent to the sheet pile wall. It is assumed that additional SPL may be present in the soil immediately north of the bulk head and that SPL may or may not pose the potential to migrate.

1.0 Background

The OU3 Remedial Action (RA) included the installation of a sealed steel bulkhead along the eastern portion of the BSPA which formed the down gradient component of the hydraulic containment for the OU3 site. A sealed steel sheet pile wall connects the bulkhead to a cement bentonite slurry wall the runs parallel to Babcock Street between Babcock Street and the former Lube Building. The slurry wall, sheet pile return wall and the bulkhead along with the eastern slurry wall and the western portion of the OU4 slurry wall form a hydraulic containment area for OU3. Groundwater elevations within OU3 are currently controlled by two well point extraction systems which will be replaced by new groundwater extraction wells currently being installed as part of the RA.

When ice on the Buffalo River started melting in mid-March 2019, SPL was observed and appeared to be released in the vicinity of the interface of the two bulkheads. Over the next several weeks an oil sheen was occasionally observed within the river, apparently emanating from this same location. That location is outside of the hydraulic containment area. A containment boom and absorbent booms have been deployed to contain and remove the sheen.

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Historically, oil sheens have been observed within the river adjacent to the Babcock Street Storm Sewer Outfall. It is believed that the source of the sheen is from either the sewer or soils/fill underlying the sewer. A containment boom has been seasonally deployed within the river from the western corner of the bulkhead extending to the east past the face of the outfall to contain the sheen.

1.1 Bulkhead Construction

The existing Babcock Street Storm Sewer outfalls to the Buffalo River via a 6-foot diameter pipe within the reinforced concrete bulkhead. The bulkhead extends the width of Babcock Street and is supported by timber piles that extend to bedrock. A concrete relieving platform extends from the concrete façade of the bulkhead to 20 feet behind the bulkhead. The top of the 2-foot thick reliving platform is approximately 10.5 feet below existing grade. Both the relieving platform and the bulkhead façade are further supported by concrete deadmen located approximately 40 feet behind the façade based on design drawings.

2.0 Scope of Work

The scope of work presented herein addresses the immediate need of preventing additional SPL from entering the river at the interface of the two bulkheads. The scope includes mitigation measures designed to further reduce the migration of SPL to the river and includes an investigation to determine and document the extent of potentially impacted material around the bulkhead that will be left in-place to avoid damage to this critical infrastructure. The scope also includes features that will allow for monitoring the effectiveness of the remedy post construction.

2.1 Downgradient Barrier

A physical barrier will be installed at the point of release to the river between the two bulkheads. The barrier will consist of a steel pipe pile or sheet pile at the river and auger cast piles between the sheet pile return wall and the concrete Babcock Street Sewer Bulkhead. Hollow stem augers will be installed between the in-pan sections of the sheet pile and the concrete bulkhead as shown on Figure 1. The augers will be advanced to a depth of at least 16 feet below existing grade. A cement-based grout will be pumped under low pressure into the augers as they are raised, forming a grouted curtain between the bulkheads. The augers will be installed from south to north ending at the pipe pile which will act as a form to prevent release of grout to the river.

2.2 Upgradient Barrier

The SPL is believed to be migrating from north to south moving towards the river. Components of the OU3 RA that would reduce migration of SPL have been completed. These components include the installation of a hydraulic barrier in the form of a slurry wall along the east side of Babcock Street and in-situ treatment of upgradient petroleum impacted soils on the west side of Babcock Street. However, soils immediately below Babcock Street and the Babcock Street Storm Sewer were not addressed to avoid potentially damaging the critical infrastructure. To construct a long-term remedy, more direct remedial measures are required. On the north side of the tie-back dead men for the Babcock Street Storm Sewer bulkhead, a new steel sheet pile wall will be installed. The wall will be connected to the existing sheet pile return wall. New sheet piles will run perpendicular to the storm sewer from the return wall to the western property boundary. Near the western property boundary, the sheet pile wall will run north approximately

50 feet to create a wing wall to reduce the potential for SPL to migrate around the end of the wall. Sheet piles will have sealant installed in the common interlocks to create a hydraulic barrier. The sheets will be driven to approximately 16 feet below ground surface (bgs) and create a “hanging wall”. The bottom of wall will be several feet below groundwater. The intent of the hanging sheet pile wall is to allow groundwater to pass below the wall while the SPL will be trapped behind the wall.

Concrete columns will be installed at the east and west side of the Babcock Street Storm Sewer at the sheet pile locations. The concrete columns will extend to 16 feet below ground surface and create a barrier between the sheets and the sewer. The columns will be installed using auger cast methods by injecting grout at a low pressure to avoid damaging the sewer structure.

2.3 Subsurface Conditions Survey

Migration of SPL in water-wetted sediment depends upon the relative presence of either SPL and water or both in the pore space of the unconsolidated sediment. As described in the Interstate Technology & Regulatory Council (ITRC) 2018 “Light Non-Aqueous Phase Liquid (LNAPL) Site Management: LCSM Evolution, Decision Process and Remedial Technologies”:

- LNAPL does not enter soil pores as easily as groundwater.
    - Typically, water is the wetting fluid in direct contact with soil and fills the smaller pore spaces. LNAPL must displace the water and any gases present in the pores before it can migrate. The driving force on the LNAPL must overcome the existing capillary pressure exerted by the water to enter the pores.

- LNAPL does not float on the water table and capillary fringe (pancake style) and penetrates below the water table.
    - The distribution of the LNAPL is above, at, and below the water table at saturations that vary based on previous LNAPL driving forces and water table fluctuations.

As a means of assessing the degree and extent of SPL in subsurface soil to the north of the concrete Babcock Street Storm Sewer bulkhead, a subsurface survey of the soils to determine whether SPL is present and to estimate the degree to which the soil is saturated by SPL will be conducted. The term MIP Survey is a broad term indicating a direct push profiling method to identify SPL. MIP is a membrane interface probe, which is conducive to identification of organics and their relative concentrations and is not the tool that is intended for use in this application. More correctly stated, a Laser-induced fluorescence (LIF) survey will be conducted to delineate the SPL. Dakota Technologies has been a leader in the development of laser survey methods to identify hydrocarbons for 20 years. The methodology relies on the fluorescence of polycyclic aromatic hydrocarbons (PAHs) associated with SPL. An ultra violet light source is used to excite the PAHs, which in turn produce violet to green fluorescence.

Use of the probe array set and processors developed by Dakota permits the evaluation of the time between the laser pulse and emission of fluorescence to aide in the evaluation of the characteristics of the SPL such as whether it is crude oil or diesel. Measurement of the lifetime of the fluorescent activity allows the processing systems to differentiate between SPL and false positives. Because the survey is advanced on a direct push drive point, a continuous log is developed with a data spacing of approximately one-inch resolution. The drive point is typically advanced at a rate of approximately 1-inch per second and data are analyzed in real time. The LIF survey is advantageous because:

- LIF detects PAH fluorescence in NAPL and logs NAPL vs depth
- LIF produces a continuous data log with depth at a rate of approximately one inch per second
- Drag-down of NAPL is uncommon unless a very soft soil is encountered
- NAPLS can be differentiated by evaluation of logged waveforms from the detector
- LIF works equally well in vadose and saturated soil
- LIF detection limit ranges between 10 and 1000 mg/kg for total petroleum hydrocarbons depending on soil type
- LIF does not respond to dissolved VOCs and SVOCs or detect BTEX
- Soil matrix affects fluorescence; permeable materials such as sands and gravels may have 10 times higher response than low permeability materials
- Potential false positive materials have wave form shape and intensity that nearly always identifies them as suspect

Two LIF probes are potentially suited for this characterization: Ultra Violet LIF (UVOST) and the visible LIF (TarGOST). The TarGOST is typically reserved for use to delineate Coal Tars and creosotes, while the UVOST is commonly used to delineate lighter hydrocarbon liquids. A sample will be provided to Dakota to test by both light sources and select the more appropriate LIF array.

A Geoprobe operator will mobilize to the site to advance approximately ten borings with the LIF array. The borings will be advanced to approximately 15 feet, at which depth the probe is assumed to have been driven at least three feet below the upper surface of the zone of saturation. This depth is anticipated to equal or exceed the maximum depth of smeared SPL. The borings will be located between the deadmen and the bulk head structure east and west of the storm drain, and north of the deadmen east and west of the storm drain. Two additional borings will be advanced with a hydraulic profiling tool (HPT) array to provide an assessment of the hydraulic properties of the soil north of the deadmen to be used with the SPL delineation. These data will be used to assess whether SPL detected is likely to be or become mobile based on the properties of the soil.

Fieldwork is expected to require a maximum of two days to complete. The data will then be provided in a three-dimensional evaluation to assess the spatial distribution of SPL and will be used to assess the proposed details of the proposed sheen abatement as well as documents SPL associated with the bulk head that cannot be accessed.

2.4 Monitoring

A new monitoring well will be installed on the upgradient side of the bulkhead to monitor the potential depth of SPL trapped on the upgradient side of the wall. The monitoring well will be installed on the east side of the Babcock Street Storm Sewer. Due to traffic in the area, the well will be finished as a flush-mount monitoring well. Installation of the well is planned as follows:

- Hollow Stem auger drill to 20 feet (6.25-inch inside diameter [id] augers)

- o Actual total depth to be approximately 8 feet below top of groundwater in boring (assume 12 feet to groundwater).
- 10 feet 4-inch id Schedule 40 PVC 0.020-slot PVC mill-slot screen
  - o Screen installed to straddle water table with top of screen approximately 2 feet above groundwater level.
- 10 feet 4-inch id Schedule 40 PVC flush threaded riser casing
  - o Casing installed to finish within 0.5 ft of grade.
- Sand pack, sized to match 0.020-inch slot screen, 20 ft (bgs) to 9 ft (bgs)
  - o Sand pack installed to height one foot above top of screen
- Bentonite pellet seal 9 ft (bgs) to 7 ft (bgs)
  - o Bentonite seal installed above sand pack to be two feet thick
- Bentonite-cement grout 7 ft (bgs) to 2 ft (bgs)
  - o Cement with approximately 5% bentonite added installed from top of bentonite seal to approximately two feet below grade

The well will be finished with a flush-mount, 8-inch steel, protective cover, concreted in place with concrete collar set 2 ft (bgs) to ground surface and finished to drain away from the well. A locking “J” plug will be placed in the top of the PVC casing to secure the well.

The newly installed monitoring well will be surveyed horizontally and vertically with elevation accuracy of +/- 0.01 foot.

An existing monitoring well, MW-37, is currently installed on the western side of the storm sewer and will also be used for monitoring, which will be included in the Site Management Plan.

Sincerely,
AMEC E&E, PC

Richard D Egan

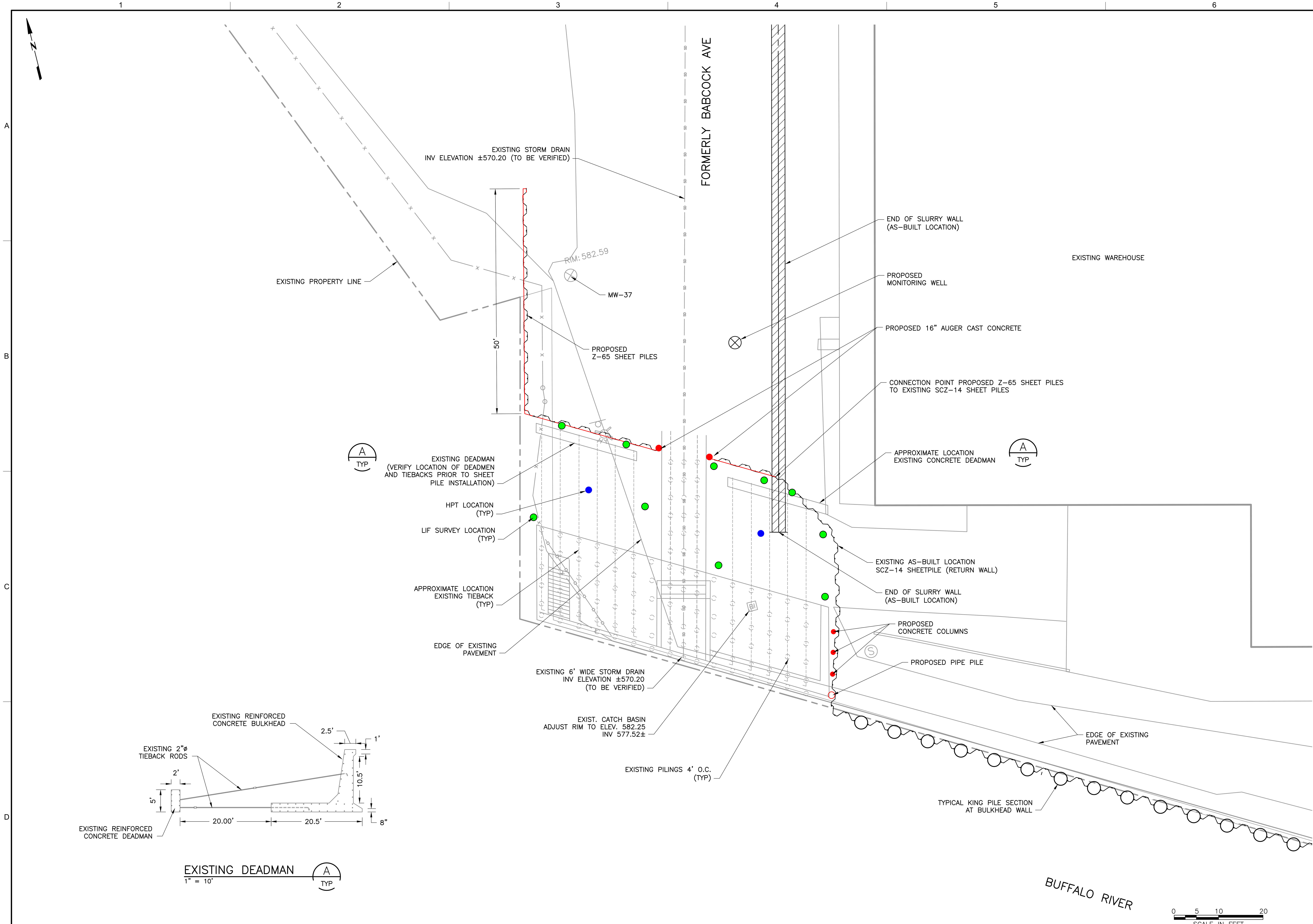
Richard Egan, P.E.
Associate Geotechnical Engineer

Dayne M Crowley

Dayne Crowley
Principal Hydrogeologist

Attachments

cc: Paul Neureuter ESCP
Arnie Cubins Krog
Ben Genes Krog
Sam Farnsworth Amec



NO.	DATE	REVISION	BY	APVD
A	5/02/19	DRAFT REVIEW	WJW	RSE

DSGN R. Egan | DR W. Whitten | CHK M. Peters | APVD S. Farnsworth

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OU3 REMEDIAL DESIGN
ELK STREET COMMERCE PARK, LLC
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DRAWING STATUS
ISSUED FOR CONSTRUCTION

CIVIL
SITE PLAN WEST
OU3 SEEP REMEDY

amec

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VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE APRIL 2019
PROJ 3617-16-7397
DWG FIGURE 1

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