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DRAFT MEMORANDUM

To: Kristine Iazzetta, New Jersey Department of Environmental Protection

From: Maryann Welsch, Patrick Gwinn, Integral Consulting Inc. and
Scott Drew, Geosyntec Consultants

Date: January 30, 2025

Subject: Field Confirmation of Environmentally Sensitive Natural Resources and
Identification of Proposed Ecological Screening Values to Support the
Ecological Evaluation of the Solvay Specialty Polymers USA, LLC
(Specialty Polymers) West Deptford Facility

Project No.: CF1165A

INTRODUCTION

In accordance with the terms of the Judicial Consent Order (JCO) Paragraphs 33(d), 13(d), and 14(e), and as detailed in the June 2024 Receptor Evaluation (Integral 2024), an ecological investigation will be prepared for the facility located at 10 Leonard Lane, West Deptford, New Jersey ("Site," Figure 1) and the surrounding area. This memorandum presents information pertaining to the presence of environmentally sensitive natural resources (ESNRs) on or adjacent to the Site, including within 2,500-ft of the Site per the JCO in support of the ecological investigation. In addition, as separately discussed with the Department, available toxicological information pertaining to the evaluation of potential ecological risks is presented for the per- and polyfluoroalkyl substances (PFAS) specified in Paragraph 13 of the JCO. JCO-specified PFAS include alternative PFAS defined as monofunctional surfactants (MFS), which are chloro-perfluoro-polyether carboxylic acids; and bifunctional surfactants (BFS), which are perfluoropolyether



dicarboxylic acids¹; as well as perfluorononanoic acid (PFNA) and perfluorooctanoic acid (PFOA).²

The information presented herein on ESNRs and available toxicological information relevant to the JCO-specified PFAS will be discussed with the New Jersey Department of Environmental Protection (NJDEP) to determine the next steps in the ecological investigation of the Site.

This memorandum is submitted for this investigation under the NJDEP Contaminated Site Remediation and Redevelopment Program (CSRRP, formerly the Site Remediation Program [SRP]) Program Interest No. 015010 (SRP PI No. 015010). Applicable CSRRP Activity Numbers for this document include RPC140002 – Solvay PFCs (PFAS) and RPC230001 – Spill ID 22-04-08-1354-45 (MFS).

ENVIRONMENTALLY SENSITIVE NATURAL RESOURCES

The identification of ESNRs on and near the Site within the 2,500-ft area specified by the JCO is based on a desktop evaluation of available remote data on ecological resources as well as observations made during Site visits in October 2023 and May 2024. Preliminary details of the ESNRs were presented in the June 2024 Receptor Evaluation. This section details observations made during the two site visits, the desktop survey completed using publicly available data sets maintained by the NJDEP Bureau of Geographic Information Systems (GIS),³ and a data request submitted to NJDEP's Natural Heritage Database in May 2024.

Site Visit Observations

Two site visits were conducted by Integral Consulting Inc. (Integral) staff in October 2023 and May 2024 to qualitatively survey the vegetation communities, habitat types, and land uses on and near the Site within 2,500-ft area. In October 2023, vegetation was in the process of autumn senescence, but most of the vegetation was still foliated and dense. In May 2024, the vegetation was foliated and dense and grasses were high (>3 to 4 ft) in areas not maintained. Most of the observations made during these Site visits were within the property boundary, with more limited observations (due to lack of permissible access)

¹ The JCO defines MFS as those constituents with Chemical Abstract Service Numbers (CAS Nos.) of CAS No. 220207-15-8, CAS No. 330809-92-2, and CAS No. 220182-27-4, and BFS as constituents with CAS No. 69991-62-4.

² C6O4 is not currently identified for the ecological evaluation per Paragraph 13 of the JCO. However, C6O4 is currently, and will continue to be, monitored in Site-related media. No ecological screening criteria are available for this compound, similar to MFS and BFS (further described below).

³ Available at [NJ-GeoWeb \(arcgis.com\)](https://arcgis.com); accessed April 2024

of the surrounding 2,500-ft area from publicly accessible vantage points along the waterways. The on and offsite areas are described as follows and illustrated in Figure 2:

- Onsite areas include the “main plant area” or the industrial portion of the Site located within the fenced boundary. The remaining area onsite but outside of the fenced main plant area is divided into two subareas: the “northern outer area” and the “western outer area.” Both are accessed via locked gates at the northeastern boundary of the main plant area.
- Offsite areas include the following:
 - The “Main Ditch area” is located east of the property boundary and consists primarily of the Main Ditch and associated wetlands and the confluence of the Main Ditch and Delaware River to the north. This area also includes a recreational area to the northeast (RiverWinds Community Center), a residential area to the east, and an industrial/commercial area to the south.
 - The “Little Mantua Creek area” is west and south of the property boundary and consists of primarily the creek and associated wetlands, with industrial, agricultural, or commercial land uses to the south-southwest.

The following is a summary of observations of the onsite and offsite areas. Photographs are presented in the attached photolog (Attachment A).

Onsite—Main Plant Area

The main plant area (approximately 58 acres) is mostly developed and covered by structures or paved/gravel areas (illustrated as “urban” on Figure 3). Photos 1–4 show two small, forested areas (totaling approximately 5 acres) located to the northeast and northwest within the main plant area, which is consistent with the 2020 land use/land cover data (NJDEP 2020). Both areas are higher in elevation than the other developed land areas of the plant. Vegetation observed in these areas include black walnut (*Juglans nigra*), sycamore (*Platanus occidentalis*), maple (*Acer* spp.), oak (*Quercus* spp.), common reed (*Phragmites australis*), Oriental bittersweet (*Celastrus orbiculatus*), goldenrod (*Solidago* spp.), and pokeweed (*Phytolacca americana*).

Onsite—Northern Outer Area

Most of this area (approximately 120 acres) consists of wetlands and forested areas and is bordered by the Delaware River at the northernmost point of the Site (Figure 3). The shoreline of the Delaware River has a steep ledge that extends along Delaware River and down the western edge of the property along the channel of Little Mantua Creek (Photo 5). During the May 2024 visit, the beaches (approximately 1.5 acres) below the steep ledge

along the Delaware River had sparse patches of grasses and clumps of trees present (Photo 6).

The Drainage Channel connecting Little Mantua Creek to the Delaware River bisects this area (Figure 3). The Drainage Channel was observed to be tidally influenced by the Delaware River (Photo 7) and flows in both directions. Patches of arrow arum (*Peltandra virginica*) and small fish (unidentified) were observed in the channel.

A stormwater drainage ditch is located along the northern main plant fence line to the east of the railroad tracks. At the time of both Site walks, the ditch was dry and consisted of mowed grass.

Four former managed fields categorized as “agriculture” based on the NJDEP 2020 land use/land cover data (approximately 18 acres; Figure 3) are located in the northern outer area. These fields are or have been managed (i.e., maintained by clearing or cutting vegetation present) and do not currently support ecologically significant habitats. These include one area east of the northern end of the Drainage Channel, one area to the west of the Drainage Channel toward Little Mantua Creek, one area near the eastern edge of the northern extent of the property along mowed paths, and one area on the western edge near the northern extent of the property, adjacent to Little Mantua Creek. In addition, a fenced solar panel array bordered by meadow is immediately north of the main plant area.

Onsite—Western Outer Area

This area (approximately 40 acres) consists of a floodplain meadow to the north and fenced solar panel arrays bordered by meadow to the south (Figure 3). Two areas (approximately 16 acres in total) are categorized as “agriculture” based on the NJDEP 2020 land use/land cover data but currently support floodplain meadow habitat. In October 2023, various tall grasses (little bluestem [*Schizachyrium scoparium*]) and unidentified sedges were observed in the large floodplain meadow to the north (Photo 8). Large areas of common mugwort (*Artemisia vulgaris*) with false indigo (*Amorpha fruticosa*) are located toward the edges of the meadow to the northwest. In May 2024, the northern meadow had not been mowed since the previous Site visit in October. Vegetation observed included herbaceous species such as red sorrel (*Rumex acetosella*) and small unidentified shrubs. *Phragmites*, spatterdock (*Nuphar lutea* spp.), arrow arum, and cattail (*Typha* spp.) were observed along the edge of the meadow to the northwest along Little Mantua Creek (Photos 9 and 10).

The meadow (approximately 7 acres) located to the west of the fenced solar panel area also had large stands of mugwort (Photo 11). A forested area (approximately 6 acres) located south of this meadow borders Little Mantua Creek. Evidence of forested wetland conditions (identified as “Observed Wetlands” on Figure 3) were observed, including staining of leaves and tree trunks and wetland vegetation, including jewelweed (*Impatiens*

capensis), spatterdock, yellow-flag iris (*Iris* spp.), and silky dogwood (*Cornus amomum*) (Photos 12–15). A small drainage channel (identified as “Observed Drainage Swale” on Figure 3) runs along the northern side of the railroad to Little Mantua Creek (this swale is south of the property boundary).

Offsite—Main Ditch

The Main Ditch area (approximately 140 acres) is located east of the Site boundary, and access to this area is restricted by private property. During the Site visits, a portion of this area was viewed from the eastern shoreline of the Main Ditch via the RiverWinds Community Center trails off Eagle Point Road and near the confluence of the Main Ditch with the Delaware River (Photo 16). There is low visibility at this vantage point due to the dense vegetation and tree cover along the shoreline. The shoreline of the Main Ditch and the Delaware River in this area is steep, and the top of bank is approximately 50 ft above the water.

The portion of this area east of the Main Ditch is predominantly undeveloped with areas of emergent and forested wetlands bordered by residential, commercial, and industrial land uses to the south and southeast. The area to the west of the Main Ditch is undeveloped with marsh and forested wetlands. A pipeline corridor, which is a narrow strip of managed fields, is present along the perimeter of the eastern property boundary, consistent with the NJDEP 2020 land use/land cover data (“Observed Agriculture” on Figure 3; Photo 17).

Offsite—Little Mantua Creek

The Little Mantua Creek area (approximately 140 acres) is located west of the Site boundary, and access to this area is restricted by private property. During the Site visits, this area was viewed from the eastern shoreline onsite (i.e., the Western Outer Area described above) and from Route 44 southwest of the property. Both shorelines of Little Mantua Creek support emergent and forested wetlands bordered by riparian forested areas. *Phragmites*, spatterdock, arrow arum, and cattail were observed along the shoreline of the channel (Photo 10). This area is bordered to the west by the industrial land uses along Paradise Road and the West Deptford Energy facility to the south.

Desktop Evaluation

A desktop survey was completed using publicly available data sets maintained by the NJDEP Bureau of GIS,⁴ specifically the 2020 land use/land cover data, to identify potential

⁴ Available at [NJ-GeoWeb \(arcgis.com\)](https://arcgis.com); accessed July 2024.

ESNRs both onsite and within the 2,500-ft radius of the Site (Figure 3). The following land uses, habitats, and surface water resources were identified:

- Forested habitats account for approximately 350 acres, patches of which are located both onsite and offsite in the surrounding 2,500-ft area. The largest patches are located onsite west of the Drainage Channel, offsite west of Little Mantua Creek, and east of the Main Ditch.
- Wetlands (approximately 300 acres) are located along the waterways and in the interior portions of the Site and the 2,500-ft surrounding area. Wetland types include freshwater tidal marshes, *Phragmites*-dominated wetlands, and deciduous wooded or scrub-shrub wetlands. The largest patches of wetlands are located in the onsite northern outer area west of the drainage channel and north near the Delaware River, and offsite on both sides of the Main Ditch and on the western side of Little Mantua Creek.
- As noted above, the undeveloped land area classified by NJDEP as “agriculture” (approximately 130 acres) in the onsite northern and western outer areas currently supports meadow habitat. Solar arrays are also located in both of these areas onsite. The solar arrays are underlain by maintained grasses.
- Urban and barren lands (approximately 370 acres) are predominantly located in the main plant area onsite, south of the railroad tracks immediately adjacent to the southern Site boundary, and on developed offsite properties to the east and west of the Site.
- Open water habitat on and near the Site comprises the largest area (approximately 420 acres), the majority of which is the Delaware River, extending north from the Site boundary to the state line. Other open water habitats include Little Mantua Creek to the west of the Site, the Main Ditch to the east, and the Drainage Channel that bisects the onsite northern outer area and connects Little Mantua Creek with the small embayment on the Delaware River just west of the mouth of the Main Ditch.

A data request was submitted to NJDEP’s Natural Heritage Database on May 2, 2024, for information regarding occurrences of rare wildlife species and habitats in the vicinity of the Site (within 0.25 mile; Attachment B). The list of rare wildlife species and habitat and special status species onsite and offsite in the surrounding 2,500-ft area is presented in the table below. Sightings of species confirmed in the search area of the Site include Atlantic and shortnose sturgeon (uses the Delaware River as a migration corridor). In addition, “occupied habitat” is noted for the eastern box turtle and eastern pondmussel. These findings are similar to those reported in the 2013 receptor evaluation (ERM 2014a).

Rare or Special-Status Species Present on or near the Site

Resource	Status
Birds	
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	State—Endangered/Threatened
Great Blue Heron (<i>Ardea herodias</i>)	State—Special Concern
Osprey (<i>Pandion haliaetus</i>)	State—Threatened
Fish	
Atlantic Sturgeon (<i>Acipenser oxyrinchus</i>)	Federal & State—Endangered
Shortnose Sturgeon (<i>Acipenser brevirostrum</i>)	Federal & State—Endangered
Reptiles	
Eastern Box Turtle (<i>Terrapene carolina carolina</i>)	State—Special Concern
Shellfish	
Eastern Pondmussel (<i>Ligumia nasuta</i>)	State—Threatened
Invertebrates	
Pink Streak (<i>Dargida rubripennis</i>)	Rare—Tracked Species
Noctuid Moths (<i>Macrochilo louisiana</i> and <i>Macrochilo santerivalis</i>)	Rare—Tracked Species

Source: NJDEP Natural Heritage Program, data request response dated May 2024 (Attachment B)

Notes:

Tracked Species = Rare occurrence in state, tracked by the Endangered and Nongame Species Program

ESNR Conclusions

The Site observations of habitats and resources and the results of the desktop evaluation indicate the following resources onsite and offsite within the 2,500-ft area:

- Surface waters of the Delaware River, Little Mantua Creek, and Main Ditch
- Surface waters of the Drainage Channel that bisects the Site connecting Little Mantua Creek and the small embayment at the mouth of the Main Ditch and the Delaware River
- Riparian areas of the surface waters listed above
- Wetlands, including freshwater tidal emergent wetlands, freshwater deciduous scrub-shrub and wooded wetlands, herbaceous wetlands, and modified or disturbed wetlands (according to the NJDEP 2020 land use/land cover data)
- Forested or scrub-shrub uplands and meadow habitats that are not maintained.

The main plant area provides very limited ecological resources as most of the area is occupied by and maintained for the facility buildings and surrounding infrastructure. Therefore, the ESNRs identified are north and west of the main plant area onsite and in the surrounding 2,500-ft area, predominantly along the shorelines of the waterways in these areas, with the exceptions of the residential, commercial, and industrial areas and land uses on nearby properties and other associated infrastructure (e.g., roads). This ESNR evaluation is consistent with the ESNRs identified and presented in the 2014 remedial investigation report (ERM 2014b).

TOXICOLOGICAL INFORMATION FOR JCO-SPECIFIED PFAS AND RECOMMENDED ECOLOGICAL SCREENING VALUES

The purpose of the ecological investigation is to assess whether there are actual or potential effects to ecological receptors, including invertebrates, fish, and wildlife, because of the presence of the JCO-specified PFAS (MFS, BFS, PFNA, and PFOA) in ESNRs. In the June 2024 Receptor Evaluation, the potential or confirmed migration pathways of these compounds to ESNRs were presented in an updated ecological conceptual site model (CSM). Based on the CSM, toxicological information was researched for JCO-specified PFAS in the primary media identified for the migration pathways. New Jersey ecological screening criteria have not been developed for the Site-related contaminants specified in the JCO as subject to the ecological evaluation (i.e., MFS, BFS, PFNA, and PFOA). Therefore, consistent with discussions with the Department, a review of toxicological information and ecological screening thresholds available from federal or other states' guidance and literature sources is provided. In addition, recommendations are made for ecological screening values against which ESNR media concentrations can be compared.

Ecological CSM

Potentially complete exposure pathways relevant to ecological receptors were identified for the following media and resources onsite⁵ and within 2,500-ft of the Site boundary (Figure 4):

- Surface water: JCO-specified PFAS may be transported to surface water onsite and offsite via the interaction between groundwater and surface water and via atmospheric deposition and stormwater runoff. If present, ecological receptors such as aquatic invertebrates, amphibians and reptiles, fish, birds, and mammals may be exposed to JCO-specified PFAS through the ingestion of and direct contact

⁵ The CSM for the Site was presented in Integral (2022a) and is the basis for the ecological CSM presented herein.

with surface water. Birds and mammals may also be exposed via the food chain through the ingestion of food items.

- Sediment and hydric soil: JCO-specified PFAS may be transported to sediment or wetland hydric soil via stormwater runoff and the interaction between surface water and sediment and between groundwater and surface water. If present, ecological receptors such as aquatic invertebrates, amphibians and reptiles, fish, birds, and mammals may be exposed to JCO-specified PFAS through the ingestion of and direct contact with sediment or hydric soil. Birds and mammals may also be exposed via the food chain through the ingestion of food items.
- Surface soil: JCO-specified PFAS may be transported to soils via onsite spills and via atmospheric deposition⁶ onsite and potentially offsite. Ecological receptors such as terrestrial invertebrates, amphibians and reptiles, birds, and mammals may be exposed to JCO-specified PFAS by way of ingestion of or direct contact with surface soils. Birds and mammals may also be exposed via the food chain through the ingestion of food items.

The potential transport pathways of stormwater runoff, discharge of groundwater to surface water, and atmospheric deposition continue to be assessed as part of the ongoing remedial investigation and remedial action activities (Integral 2023a,b). The ecological CSM, including the assessment of complete pathways, will also be refined as additional information is available.

Toxicological Information and Proposed Ecological Screening Values for Alternative PFAS

As stated above, NJDEP does not have published ecological screening values for the alternative PFAS, MFS and BFS, and while toxicological data for the alternative PFAS do exist, they are limited to acute aquatic toxicity test data. Nevertheless, a summary of the aquatic toxicity data is provided below, and from the data, aquatic screening values are derived and proposed for use in the ecological assessment.

MFS

RCC (2002a, b, c) provides the results of acute toxicity testing of MFS for fish, daphnia, and algae. For fish, zebrafish (*Brachydanio rerio*) were exposed to one of five MFS

⁶ Deposition of airborne particles is a confirmed historical transport pathway to onsite soil. As the Facility no longer uses fluorinated process aids, this transport pathway has been minimized. Assessment of historical emissions and deposition is ongoing through the investigation of soil, groundwater, and other media (Integral 2021, 2022b).

exposure concentrations (4.6, 10, 22, 46, and 100 mg/L⁷), plus a control. Each of the six test aquaria contained seven fish (RCC 2002a). The test was a 96-hour semi-static exposure with daily test medium renewal. The endpoint evaluated was mortality. At the highest test concentration, three of the seven fish expired on the last day of the test. No fish mortality was observed for any of the other test concentrations and in the control. Based on these data, the acute no-observed-effect concentration (NOEC) and lowest-observed-effect concentration (LOEC) were 46 mg/L and 100 mg/L MFS, respectively. The lethal effect concentration to 50 percent of the organisms (LC₅₀) was >100 mg/L MFS.

RCC (2002b) provides test results for an acute toxicity test of the aquatic invertebrate, *Daphnia magna*. The invertebrate test was a 48-hour static test with six MFS test concentrations (0.32, 1, 3.2, 10, 32, and 100 mg/L⁸) and a control. Twenty daphnia were administered to each test chamber. The acute NOEC was 10 mg/L MFS, the acute LOEC was 32 mg/L MFS, and the concentration eliciting an effect to 50 percent of the test organisms (EC₅₀) was estimated to be 23 mg/L MFS.

Finally, a 72-hour static algal growth inhibition test was performed using *Scenedesmus subspicatus*. Nominal MFS test concentrations were 4.6, 10, 22, 46, and 100 mg/L, plus a control.⁹ The resulting acute NOEC was 46 mg/L MFS, the acute LOEC was 100 mg/L MFS, and the acute EC₅₀ was estimated to be 100 mg/L MFS, based on reduced biomass (RCC 2002c).

The results of the MFS toxicity tests are summarized in Table 1.

BFS

RTC (1995, 1996a, b) reports the results of single exposure concentration tests of BFS (100 mg/L) run on each of the following:

- Aquatic vertebrate, zebrafish (*B. rerio*) (96-hour)
- Aquatic invertebrate, *D. magna* (48-hour)
- Aquatic algae, *Selenastrum capricornutum* (72-hour).

The acute NOECs reported for the zebra fish and daphnia were both 100 mg/L BFS (RTC 1995 and 1996a).

⁷ Nominal concentrations. Measured test media were found to be 90 to 92 percent of nominal concentrations, on average.

⁸ Nominal concentrations. Measured test media were found to be 85 to 105 percent of nominal concentrations, on average.

⁹ Measured test concentrations were between 87 and 89 percent of nominal concentrations, on average.

At the single 100 mg/L BFS exposure concentration, a 32.9 percent growth inhibition was reported for the algae (RTC 1996b). Because only a single concentration was tested, an acute NOEC for the algae cannot be computed.

Given that all tests were single dose tests, it was not possible to compute a LOEC, LC₅₀, or EC₅₀ concentrations for BFS.

Results of the BFS toxicity testing are summarized in Table 1.

Acute to Chronic NOEC Conversions

To derive proposed aquatic ecologic screening values for MFS and BFS, the acute aquatic NOECs discussed above were converted to chronic NOECs using the acute to chronic ratios (ACRs) reported in the ECological Structure-Activity Relationship Model (ECOSAR; USEPA 2022). The ACRs used in the ECOSAR method are dependent on the nature of the chemical (i.e., whether the chemical is a neutral organic, in a class exhibiting excess toxicity, a polycationic polymer, a nonionic surfactant, or an anionic surfactant).

MFS and BFS are anionic surfactants (Bucalietti et al. 2024), so the following ECOSAR ACRs for anionic surfactants were used to derive chronic aquatic screening values from the acute MFS and BFS NOECs (USEPA 2022):

- ACR for fish is 6.5
- ACR for daphnid is 6.5
- ACR for green algae is 4.

Using these ACRs, the NOECs summarized above for MFS and BFS were converted to chronic screening values using the following equation:

$$ChV_i = NOEC_i / ACR_i$$

Where:

ChV_i = Chronic value for test organism, i (mg/L)

$NOEC_i$ = NOEC for test organism, i (mg/L)

ACR_i = Acute to chronic ratio for organism, i (unitless)

Table 1 summarizes the resulting ChV concentrations for MFS and BFS.

The proposed aquatic screening values for MFS and BFS are the lowest of the ChV concentrations shown in Table 1. More specifically, the proposed aquatic screening value

is 1.5 mg/L for MFS and 15.4 mg/L for BFS. These proposed screening values will be used to screen surface water and sediment porewater data in the ecological investigation.

Surface Soil and Sediment

Adequate toxicological data for MFS and BFS to develop proposed ecological screening values for soil or sediment are not available. However, it is potentially plausible to employ the proposed aquatic screening value derived above, using sediment porewater as a proxy for sediment.

Toxicological Information Available for PFOA and PFNA

New Jersey ecological screening values have not been developed for PFNA and PFOA. Therefore, a range of ecological screening thresholds for PFOA and PFNA derived or identified by federal or other state programs are considered for these purposes. Table 2 presents the thresholds available for the primary media identified in the ecological CSM: surface soil, surface water, and sediment. A range of values is presented, when available, for the primary media, and the lowest value identified is recommended as the ecological screening value.

Surface Soil

Ecological screening thresholds for PFOA in surface soil identified from regional guidance and literature sources range from 0.084 to 79.5 mg/kg for terrestrial plants, soil invertebrates, and terrestrial wildlife based on the following sources:

- The lowest threshold value (0.084 mg/kg) represents a no-effect risk-based screening level (RBSL) derived for terrestrial plants by Zodrow et al. (2021) following the U.S. Environmental Protection Agency (EPA) 2005 ecological soil screening level (Eco-SSL) methodology. This value is also designated by the San Francisco Bay Regional Water Quality Control Board (RWQCB) final environmental screening levels (ESLs) (SFB RWQCB 2020) for significantly vegetated areas.
- The Argonne National Laboratory (2021) derived NOECs for terrestrial mammals (3.84 mg/kg) and terrestrial plants (79.5 mg/kg).

For PFNA in surface soil, thresholds ranged from 0.0242 to 10 mg/kg:

- The lowest threshold value (0.0242 mg/kg) represents the lowest no-effect levels derived for mammals by Argonne National Laboratory (2021) following the EPA 2005 Eco-SSL methodology. The highest threshold (10 mg/kg) is also from Argonne National Laboratory (2021) and represents a NOEC for soil invertebrates.

- Zodrow et al. (2020) derived no-effect RBSLs of 1 mg/kg for both soil invertebrates and terrestrial mammals (the lowest value among mammalian feeding classes).

Surface Water

Ecological screening thresholds for PFOA in surface water identified from state and federal sources range from 0.1 to 1.7 mg/L:

- The lowest threshold value (0.1 mg/L) is the final recommended chronic freshwater aquatic life water quality criterion (i.e., the chronic continuous criterion) from USEPA (2024a).
- The highest threshold value (1.7 mg/L) is the chronic aquatic life water quality criterion for the State of Minnesota (MPCA 2007).

For PFNA, thresholds range from 0.002 to 0.12 mg/L, where the lower value represents thresholds protective of aquatic mammals (Argonne National Laboratory 2021; Zodrow et al. 2021) and the higher value represents a chronic water quality RBSL (Zodrow et al. 2021). While EPA has published a freshwater benchmark for PFNA, it is an acute concentration of 0.65 mg/L (USEPA 2024b).

Sediment

There are limited ecological screening thresholds available for PFOA and PFNA in sediment. Zodrow et al. (2021) derived no-effect RBSLs for aquatic insectivore mammals of 0.006 mg/kg for PFOA and 0.01 mg/kg for PFNA. These values are the lowest among the feeding classes for wildlife for PFOA and PFNA.

CONCLUSIONS

This memorandum presents an update to the ESNR evaluation for the Site, including the 2,500-ft area surrounding the property, that was previously presented in the June 2024 Receptor Evaluation. The ESNRs identified based on both field observations and a desktop investigation include surface waters (Delaware River, Drainage Channel, Little Mantua Creek, Main Ditch), riparian areas adjacent to the waterways, wetlands (herbaceous and forested), forested or scrub-shrub uplands, and meadow habitats. Special status species observed on or near the Site include bald eagle, osprey, great blue heron, sturgeon, eastern box turtle, eastern pondmussel, the invertebrate pink streak, and two noctuid moths.

The ecological CSM identifies complete and significant pathways onsite and offsite for surface soil, surface water, and sediment for ecological receptors. Based on the evaluation

of toxicological data and/or regulatory values, ecological screening values are proposed for use in the ecological investigation. A summary of proposed ecological screening values is provided in Table 3.

The information in this memorandum will be used to inform the problem formulation of the ecological investigation, including work plans that will be prepared to support that effort, and will be updated as new information becomes available.

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RCC. 2002c. Acute toxicity of [redacted trade name of chloroperfluoropolyether carboxylates] to *Scenedesmus subspicatus* in a 72-hour algal growth inhibition test. Prepared by RCC Ltd, Environmental Chemistry and Pharamalytics Division, Switzerland. October.

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RTC. 1996a. Summary report: Acute toxicity study in *Daphnia magna*. Research Toxicology Centre. January.

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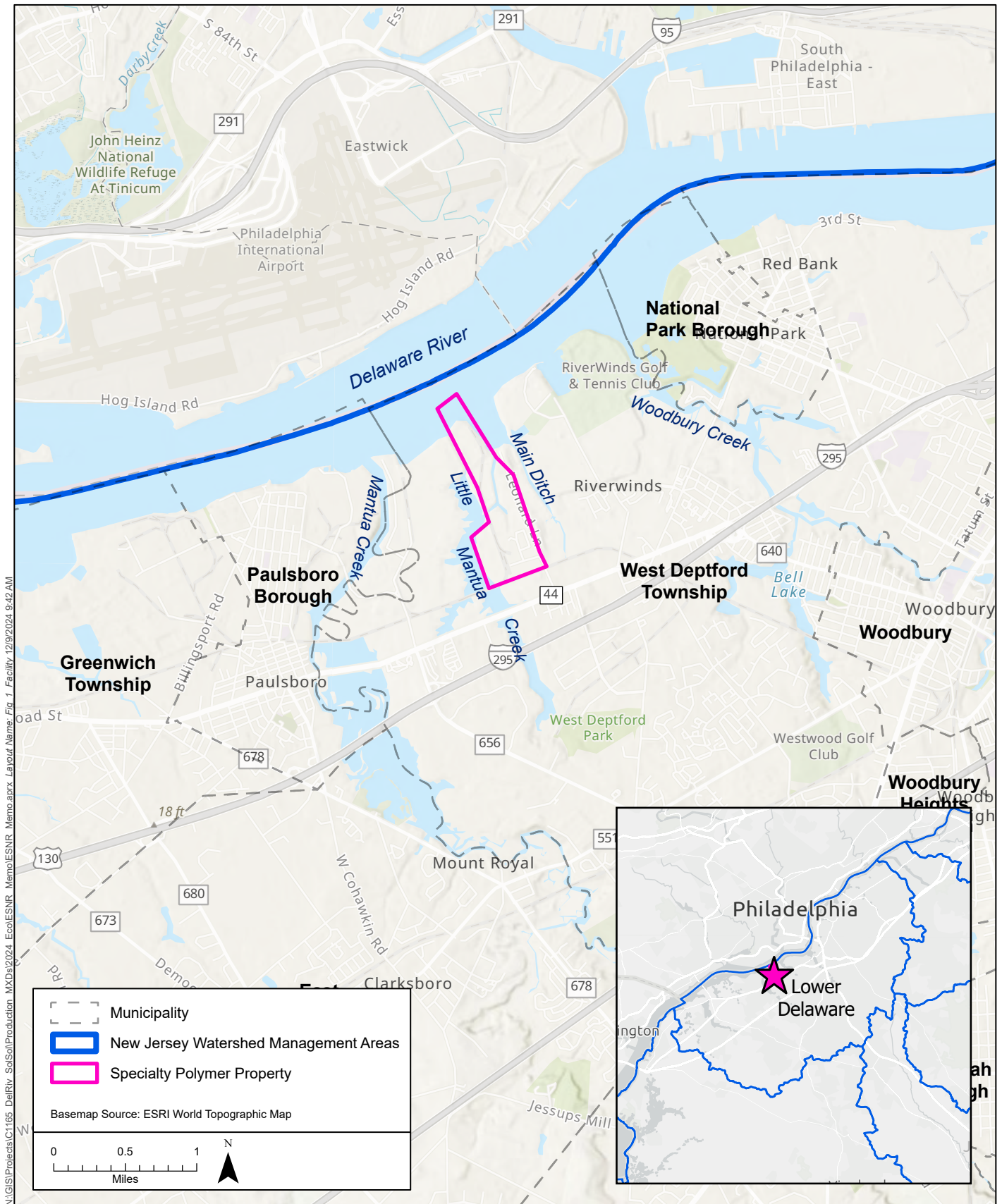
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Figures



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Figure 1.
Facility Location

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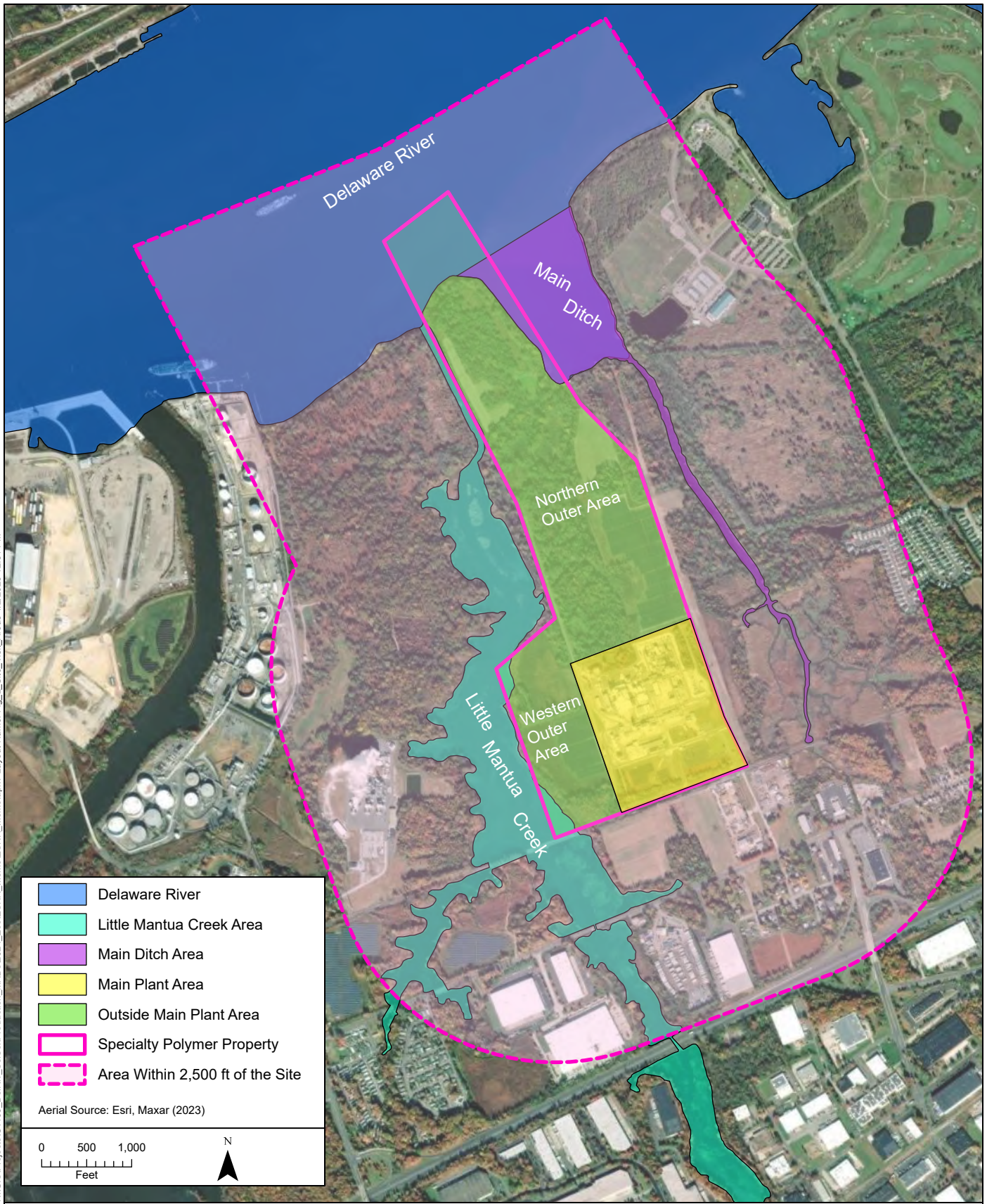
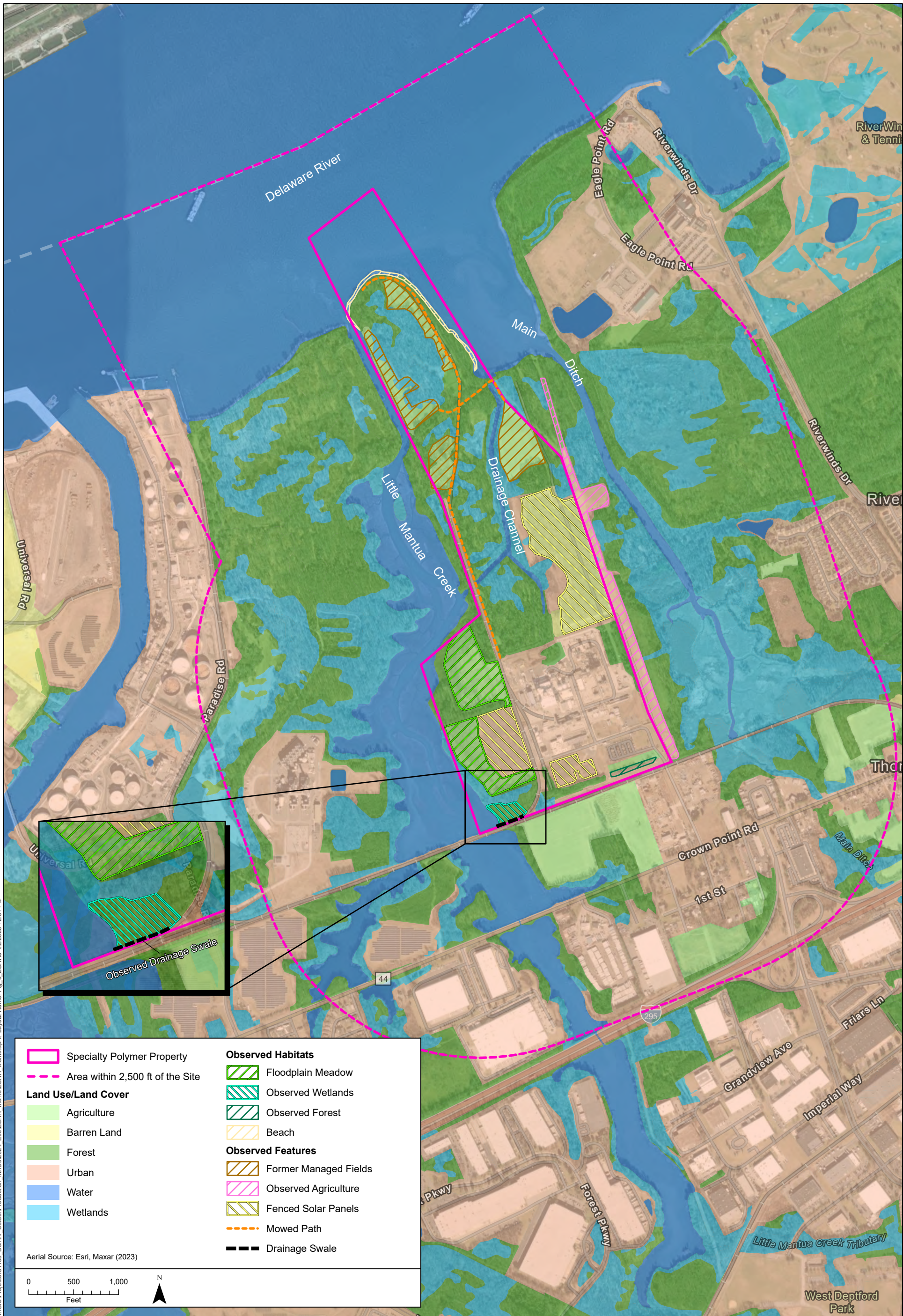


Figure 2.
Site Walk Areas
October 2023 and May 2024



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Notes:
 1. The 2020 land use/land cover data is from New Jersey Department of Environmental Protection Bureau of GIS.
 2. Observed habitats and features were noted during site visits conducted in October 2023 and May 2024.

Figure 3.
 Environmentally Sensitive Natural Resources at the Specialty Polymer Facility and in the Surrounding Area

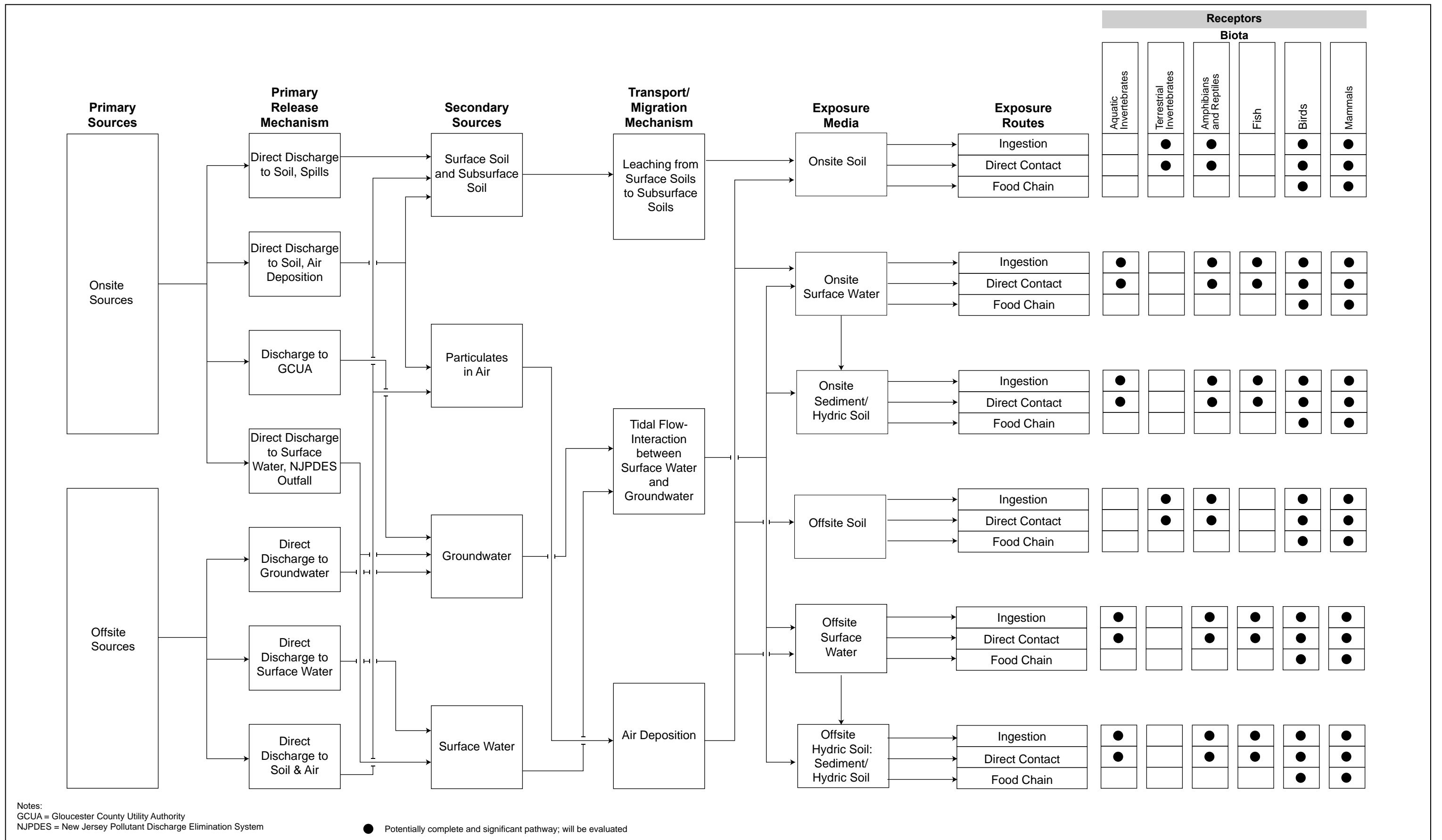


Figure 4. Ecological Conceptual Site Model

Tables

Table 1. Summary of Acute Aquatic Toxicity Results for MFS and BFS

Test Result	MFS ^a			BFS ^b		
	96-hr Vertebrate - Zebrafish (<i>Brachadanio rerio</i>)	48-hr Invertebrate (<i>Daphnia magna</i>)	72-hr Algae (<i>Scenedesmus subspicatus</i>)	96-hr Vertebrate - Zebrafish (<i>Brachadanio rerio</i>)	48-hr Invertebrate (<i>Daphnia magna</i>)	72-hr Algae (<i>Scenedesmus capricornutum</i>)
NOEC (mg/L)	46	10	46	100	100	NA
LOEC (mg/L)	100	32	100	NA	NA	100
LC ₅₀ /EC ₅₀ (mg/L)	>100	23	100	NA	NA	NA
ACR	6.5	6.5	4	6.5	6.5	4
ChV (mg/L)	7.1	1.5	11.5	15.4	15.4	NA

Notes:

ACR = acute to chronic ratio

BFS = bifunctional surfactants

ChV = chronic screening value (mg/L), computed as the NOEC/ACR

EC₅₀ = concentration effecting 50% of organisms; applicable to invertebrates and algae

LC₅₀ = lethal concentration to 50% of organisms; applicable to vertebrates

LOEC = lowest-observed-effect concentration

MFS = monofunctional surfactants

NA = not available

NOEC = no-observed-effect concentration

^a Results from RCC (2002a,b,c)

^b Results from RTC (1995), and RTC (1996a,b)

Table 2. Ecological Screening Thresholds for PFOA and PFNA

Media	Compound	Threshold Value	Unit	Basis	Source
Surface Soil	PFOA	0.084	mg/kg	NOAEL - significantly vegetated areas	San Francisco Bay RWQCB Interim Final ESLs (2020); Zodrow et al. (2021) Argonne National Laboratory (2021) Argonne National Laboratory (2021) Argonne National Laboratory (2021) Zodrow et al. 2021 Argonne National Laboratory (2021)
		3.84	mg/kg	NOEC - terrestrial mammals	
		79.5	mg/kg	NOEC - terrestrial plants	
	PFNA	0.0242	mg/kg	NOEC - terrestrial mammals (lowest value among feeding classes)	
		1	mg/kg	NOEC - soil invertebrates; RBSL terrestrial mammal	
		10	mg/kg	NOEC - soil invertebrates	
Surface Water	PFOA	0.1	mg/L	Final recommended chronic freshwater aquatic life WQC	USEPA (2024a)
		0.88	mg/L	FCV for aquatic life	Michigan (MI EGLE 2020)
		1.7	mg/L	WQC - chronic aquatic life	Minnesota (MPCA 2007)
		0.54	mg/L	Direct exposure ecotoxicity	San Francisco Bay RWQCB Interim Final ESLs 2020
	PFNA	0.00208	mg/L	ESV for aquatic-dependent mammals	Argonne National Laboratory (2021)
		0.12	mg/L	Chronic RWQ RBSL	Zodrow et al. 2021
		0.0022	mg/L	NOAEL RBSL - muskrat	Zodrow et al. 2021
		0.65	mg/L	Acute freshwater aquatic life benchmark	USEPA (2024b)
Sediment	PFOA	0.006	mg/kg	Aquatic NOAEL RBSL - aquatic insectivore	Zodrow et al. 2021
	PFNA	0.01	mg/kg	Aquatic NOAEL RBSL - aquatic insectivore	Zodrow et al. 2021

Notes:

Values in bold are recommended for ecological screening benchmarks.

ESV = ecological screening value

FCV = final chronic value

NOAEL = no-observed-apparent-effect level

NOEC = no-observed-effect concentration

PFOA = perfluorooctanoic acid (CAS: 335-67-1)

PFNA = perfluorononanoic acid (CAS: 375-95-1)

RBSL = risk-based screening level

RWQ = recommended water quality

RWQCB = Regional Water Quality Control Board

WQC = water quality criteria

Table 3. Proposed Ecological Screening Values for Use in the Ecological Investigation

Media	Compound	Threshold Value	Unit
Surface Soil	PFOA	0.084	mg/kg
	PFNA	0.0242	mg/kg
	MFS	NA	mg/kg
	BFS	NA	mg/kg
Surface Water	PFOA	0.1	mg/L
	PFNA	0.00208	mg/L
	MFS	1.5	mg/L
	BFS	15.4	mg/L
Sediment	PFOA	0.006	mg/kg
	PFNA	0.01	mg/kg
	MFS ^a	NA	mg/kg
	BFS ^a	NA	mg/kg

Notes:

BFS = bifunctional surfactants

MFS = monofunctional surfactants

NA = not available

PFNA = perfluorononanoic acid

PFOA = perfluorooctanoic acid

^a While sediment-specific screening values for MFS and BFS could not be developed, the use of their proposed surface water screening values in comparison to sediment porewater could be used as a proxy for sediment.

Attachment A

Photographs of Habitats and
Conditions on and near the Site
Taken during Site Visits in
October 2023 and May 2024

Solvay West Deptford
ENSR Memorandum Photo Log
Site Photographs from 2024



Photograph 1. Small patch of scrub/shrub and forested area in the Onsite Main Plant Area (October 18, 2023)



Photograph 2. Small patch of scrub/shrub and forested area in the Onsite Main Plant Area (October 18, 2023)

Solvay West Deptford
ENSR Memorandum Photo Log
Site Photographs from 2024



Photograph 3. Small patch of scrub/shrub and forested area in the Onsite Main Plant Area (October 18, 2023)



Photograph 4. Small patch of scrub/shrub and forested area in the Onsite Main Plant Area (October 18, 2023)

Solvay West Deptford
ENSR Memorandum Photo Log
Site Photographs from 2024



Photograph 5. Shoreline of the Deware River along the Northern Outer Area of Main Plant (May 23, 2024)



Photograph 6. Beach with sparse patches of grass and clumps of trees along Delaware River in the Northern Outer Area of the Main Plant (May 23, 2024)

Solvay West Deptford
ENSR Memorandum Photo Log
Site Photographs from 2024



Photograph 7. Drainage Channel in Northern Outer Area of Main Plant (May 23, 2024)



Photograph 8. Large floodplain meadow in the Western Outer Area of the Main Plant (May 23, 2024)

Solvay West Deptford
ENSR Memorandum Photo Log
Site Photographs from 2024



Photograph 9. Large floodplain meadow in the Western Outer Area of the Main Plant along Little Mantua Creek (May 23, 2024)



Photograph 10. Large floodplain meadow in the Western Outer Area of the Main Plant along Little Mantua Creek (May 23, 2024)

Solvay West Deptford
ENSR Memorandum Photo Log
Site Photographs from 2024



Photograph 11. Large floodplain meadow in the Western Outer Area of the Main Plant located to the west of fenced solar panels (May 23, 2024)

Solvay West Deptford
ENSR Memorandum Photo Log
Site Photographs from 2024



Photograph 12. Observed wetlands in Western Outer Area of the Main Plant
(May 23, 2024)

Solvay West Deptford
ENSR Memorandum Photo Log
Site Photographs from 2024



Photograph 13. Observed wetlands in Western Outer Area of the Main Plant
(May 23, 2024)



Photograph 14. Observed wetlands in Western Outer Area of the Main Plant
(May 23, 2024)

Solvay West Deptford
ENSR Memorandum Photo Log
Site Photographs from 2024



Photograph 15. Observed wetlands in Western Outer Area of the Main Plant
(May 23, 2024)

Solvay West Deptford
ENSR Memorandum Photo Log
Site Photographs from 2024



Photograph 16. Main Ditch viewed from the shoreline on the RiverWinds
Community Center Trails off Eagle Point Road (May 23, 2024)

Solvay West Deptford
ENSR Memorandum Photo Log
Site Photographs from 2024



Photograph 17. Narrow strip of managed fields along the perimeter of the eastern property boundary (May 23, 2024)

Attachment B

Response from NJDEP
Regarding Rare Species on or
near the Site



State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE PARKS, FORESTS & HISTORIC SITES
OFFICE OF NATURAL LANDS MANAGEMENT

501 East State Street

P.O. Box 420, Mail Code 501-04

Trenton, New Jersey 08625-0420

Tel. (609) 984-1339 * Fax (609) 984-1427

<https://www.nj.gov/dep/parksandforests/natural/index.html>

PHILIP D. MURPHY

Governor

SHAWN M. LATOURETTE

Commissioner

TAHESHA L. WAY

Lt. Governor

May 24, 2024

Katrina McCormick
Integral Consulting Inc.
704 E. Main Street
Moorestown, NJ 08057

Re: West Deptford, NJ Site
E(x) - 291902, N(y) - 370645
West Deptford & Paulsboro Townships, Gloucester County

Dear Katrina McCormick:

Thank you for your data request regarding rare species information for the above referenced project site.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.3) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the map(s) submitted with the Natural Heritage Data Request Form into our GIS. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as 'Yes' in Table 1.

We have also checked the Landscape Project habitat mapping and Biotics Database for occurrences of rare wildlife species or wildlife habitat in the immediate vicinity (within ¼ mile) of the referenced site. Additionally, the Natural Heritage Database was checked for occurrences of rare plant species or ecological communities within ¼ mile of the site. Please refer to Table 2 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented within the immediate vicinity of the site. Detailed reports are provided for all categories coded as 'Yes' in Table 2. These reports may include species that have also been documented on the project site.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State's best habitats for rare and endangered species and ecological communities. Please refer to Tables 1 and 2 (attached) to determine if any priority sites are located on or in the immediate vicinity of the site.

A list of rare plant species and ecological communities that have been documented from the county (or counties), referenced above, can be downloaded from <https://nj.gov/dep/parksandforests/natural/heritage/database.html>. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS, which can be downloaded from https://nj.gov/dep/parksandforests/natural/docs/nhpcodes_2010.pdf.

NHP File No. 24-3907572-30575

Beginning May 9, 2017, the Natural Heritage Program reports for wildlife species will utilize data from Landscape Project Version 3.3. If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive web application at the following URL, <https://njdep.maps.arcgis.com/apps/webappviewer/index.html?id=0e6a44098c524ed99bf739953cb4d4c7>, or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

For additional information regarding any Federally listed plant or animal species, please contact the U.S. Fish & Wildlife Service, New Jersey Field Office at <http://www.fws.gov/northeast/njfieldoffice/endangered/consultation.html>.

Information supplied by the Natural Heritage Program summarizes existing data known to the program at the time of the request regarding the biological elements (species and/or ecological communities) or their locations. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,



Robert J. Cartica
Administrator

c: NHP File No. 24-3907572-30575

Table 1: On Site Data Request Search Results (6 Possible Reports)

<u>Report Name</u>	<u>Included</u>	<u>Number of Pages</u>
1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	No	0 pages included
2. Natural Heritage Priority Sites On Site	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.3 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.3	No	0 pages included
5. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.3 Stream Habitat File	Yes	1 page(s) included
6. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	Yes	1 page(s) included

**Rare Wildlife Species or Wildlife Habitat on the
Project Site Based on Search of
Landscape Project 3.3 Species Based Patches**

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
<i>Aves</i>								
	Bald Eagle	Haliaeetus leucocephalus	Foraging	4	NA	State Endangered	G5	S1B,S2N
	Bald Eagle	Haliaeetus leucocephalus	Nest	4	NA	State Endangered	G5	S1B,S2N
	Bald Eagle	Haliaeetus leucocephalus	Wintering	3	NA	State Threatened	G5	S1B,S2N
	Great Blue Heron	Ardea herodias	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Osprey	Pandion haliaetus	Foraging	3	NA	State Threatened	G5	S2B,S4N
	Osprey	Pandion haliaetus	Nest	3	NA	State Threatened	G5	S2B,S4N
<i>Osteichthyes</i>								
	Atlantic Sturgeon	Acipenser oxyrinchus	Migration Corridor - Juvenile Sighting	5	Federally Listed Endangered	State Endangered	G3	S1
	Shortnose Sturgeon	Acipenser brevirostrum	Migration Corridor - Adult Sighting	5	Federally Listed Endangered	State Endangered	G3	S1
<i>Reptilia</i>								
	Eastern Box Turtle	Terrapene carolina carolina	Occupied Habitat	2	NA	Special Concern	G5T5	S3

**Rare Wildlife Species or Wildlife Habitat
On the Project Site Based on Search of
Landscape Project 3.3 Stream Habitat File**

Link ID	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank	Last Observed	Count
36826	Eastern Pondmussel	Ligumia nasuta	Occupied Habitat	3	NA	State Threatened	G4	S2	2007	1

Total number of records: 1

**Other Animal Species
On the Project Site Based on
Additional Species Tracked by
Endangered and Nongame Species Program**

Scientific Name	Common Name	Federal Protection Status	State Protection Status	Grank	Srank
<i>Invertebrate Animals</i>					
Dargida rubripennis	Pink Streak			G3G4	S3
Macrochilo louisiana	A Noctuid Moth			G4	S2S3
Macrochilo santerivalis	A Noctuid Moth			G3G4	S1S3
Total number of records:	3				

Table 2: Vicinity Data Request Search Results (6 possible reports)

<u>Report Name</u>	<u>Included</u>	<u>Number of Pages</u>
1. Immediate Vicinity of the Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	No	0 pages included
2. Natural Heritage Priority Sites within the Immediate Vicinity	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.3 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat In the Immediate Vicinity of Project Site Based on Search of Landscape Project 3.3	No	0 pages included
5. Rare Wildlife Species or Wildlife Habitat In the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.3 Stream Habitat File	Yes	1 page(s) included
6. Other Animal Species In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	Yes	1 page(s) included

**Rare Wildlife Species or Wildlife Habitat Within the
Immediate Vicinity of the Project Site Based on Search of
Landscape Project 3.3 Species Based Patches**

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
<i>Aves</i>								
	Bald Eagle	Haliaeetus leucocephalus	Foraging	4	NA	State Endangered	G5	S1B,S2N
	Bald Eagle	Haliaeetus leucocephalus	Nest	4	NA	State Endangered	G5	S1B,S2N
	Bald Eagle	Haliaeetus leucocephalus	Wintering	3	NA	State Threatened	G5	S1B,S2N
	Great Blue Heron	Ardea herodias	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Osprey	Pandion haliaetus	Foraging	3	NA	State Threatened	G5	S2B,S4N
	Osprey	Pandion haliaetus	Nest	3	NA	State Threatened	G5	S2B,S4N
<i>Osteichthyes</i>								
	Atlantic Sturgeon	Acipenser oxyrinchus	Migration Corridor - Juvenile Sighting	5	Federally Listed Endangered	State Endangered	G3	S1
	Shortnose Sturgeon	Acipenser brevirostrum	Migration Corridor - Adult Sighting	5	Federally Listed Endangered	State Endangered	G3	S1
<i>Reptilia</i>								
	Eastern Box Turtle	Terrapene carolina carolina	Occupied Habitat	2	NA	Special Concern	G5T5	S3

**Rare Wildlife Species or Wildlife Habitat
In the Immediate Vicinity of the
Project Site Based on Search of
Landscape Project 3.3 Stream Habitat File**

Link ID	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank	Last Observed	Count
36826	Eastern Pondmussel	Ligumia nasuta	Occupied Habitat	3	NA	State Threatened	G4	S2	2007	1

Total number of records: 1

**Other Animal Species
In the Immediate Vicinity of the Project Site Based on
Additional Species Tracked by
Endangered and Nongame Species Program**

Scientific Name	Common Name	Federal Protection Status	State Protection Status	Grank	Srank
<i>Invertebrate Animals</i>					
Dargida rubripennis	Pink Streak			G3G4	S3
Macrochilo louisiana	A Noctuid Moth			G4	S2S3
Macrochilo santerivalis	A Noctuid Moth			G3G4	S1S3
Total number of records:	3				

Department of Environmental Protection
Office of Natural Lands Management
 Mail Code 501-04, P.O. Box 420
 Trenton, New Jersey 08625-0420
 Tel. (609) 984-1339; Fax. (609) 984-1427



Invoice

	Date	Invoice #
	5/24/2024	30575

Bill to:
 Integral Consulting Inc.
 704 E. Main Street
 Moorestown, NJ 08057

Make check payable to:
 DEP - Office of Natural Lands Management

Include this invoice with payment & send to:
 NJDEP Office of Natural Lands Management
 Mail Code 501-04, P.O. Box 420
 Trenton, New Jersey 08625-0420

Quantity (hrs.)	Description	Rate (per hr.)	Amount
1	Natural Heritage Database search for locational information of rare species and ecological communities. Project: 24-3907572-30575	\$ 70.00	\$ 70.00
Katrina McCormick Project Name: West Deptford, NJ Site		Total	\$ 70.00