AECOM

Basis of Design Report (30%) Design Stage
Operable Unit Two (OU2)
Standard Chlorine of Delaware Superfund Site
New Castle, New Castle County, Delaware

APPENDIX C:

Wetlands and Other Waters of the U.S. Delineation Report

Executive Summary

The Standard Chlorine of Delaware site has seen multiple historical releases of chlorobenzenes during its past use as a manufacturing plant. This has led to contamination of the site soils and surrounding wetlands and waterways. In 2002, the property was abandoned to the custody of the United States Environmental Protection Agency (USEPA) and Delaware Department of Natural Resources (DNREC). The USEPA has designated multiple Operable Units to manage cleanup of the site (Project). The contents of this report relate to the delineation of wetlands and waterbodies conducted within the area of cleanup activity.

On behalf of the USEPA, AECOM conducted a wetland and watercourse delineation within the Standard Chlorine of Delaware site (Project) study area. The purpose of this report is to provide documentation of wetland boundary determination. The delineation involved a desktop review of existing information and a field delineation of wetlands and watercourses. Information collected during the desktop review was used in conjunction with the field delineation to identify regulated areas pursuant to regulations established by the United States Environmental Protection Agency (USEPA) under Section 404 of the Clean Water Act and delegated to the United States Army Corps of Engineers (USACE), as well as regulations established by DNREC under 7 DE Administrative Code: 7500 Wetlands and Subaqueous Lands, and 7 DE Administrative Code: Chapter 66: Delaware Wetlands Act. Permitting is not required for this project, but the substantive requirements of these regulations must be met.

Field delineation of the study area was conducted between August 28 - September 29, 2023 by AECOM wetland scientists. The wetlands and watercourse delineation identified five wetlands and 14 watercourses within the study area. The total delineated wetland area was 55.16 acres. The total delineated length of watercourses within the study area was 8,334 feet.

Table of Contents

Appendices

Figures

Tables

1 Introduction

The Standard Chlorine of Delaware site has seen multiple historical releases of chlorobenzenes during its past use as a manufacturing plant. This has led to contamination of the site soils and surrounding wetlands and waterways. In 2002, the property was abandoned to the custody of the United States Environmental Protection Agency (USEPA) and Delaware Department of Natural Resources (DNREC). The USEPA has designated multiple Operable Units to manage cleanup of the site (Project). The contents of this report relate to the delineation of wetlands and waterbodies conducted within the area of cleanup activity.

On behalf of the USEPA, AECOM conducted a wetland and watercourse delineation at the Standard Chlorine of Delaware Superfund Site (Project), located in New Castle County, Delaware. The purpose of this report is to provide documentation of wetland boundary determination. The delineation involved a desktop review of existing information and a field delineation of wetlands and watercourses. Information collected during the desktop review was used in conjunction with the field delineation to identify regulated areas pursuant to regulations established by the United States Environmental Protection Agency (USEPA) under Section 404 of the Clean Water Act and delegated to the United States Army Corps of Engineers (USACE), as well as regulations established by DNREC under 7 DE Administrative Code: 7500 Wetlands and Subaqueous Lands, and 7 DE Administrative Code: Chapter 66: Delaware Wetlands Act Permitting is not required for this project, but the substantive requirements of these regulations must be met.

The Project Study Area (PSA) is approximately 173 acres and includes a section of the Red Lion Creek extending from the River Road (State Route 9) bridge approximately 0.4 miles upstream to the west as well as the property affected by the historical releases. The PSA is illustrated in **Figures 1, 2, and 3**.

1.1 Site Description

The PSA is approximately 173 acres and includes a section of the Red Lion Creek extending from the River Road (State Route 9) bridge approximately 0.4 miles upstream to the west. The rest of the PSA consists of wetlands dominated by *Phragmites* australis, hardwood forest, and maintained meadow areas over the prior location of the manufacturing plant. The PSA is bordered by maintained powerline right-of-ways on the west, east, and north boundaries.

2 Methods

This section describes the sources used in the desktop data review and the methods used during the field delineation process.

2.1 Desktop Data Review

A desktop data review of existing information was conducted to assess the potential presence of watercourses, wetlands, and/or wetland indicators within the study area prior to conducting the field delineation. Information reviewed included:

- United States Geological Survey (USGS) Saint Georges, DE 7.5-minute series topographical quadrangles (NGS, 2023) (**Figure 1**);
- United States Department of Agriculture - Natural Resources Conservation Service (USDA-NRCS) soil survey (USDA-NRCS, 2023) (**Figure 2**);
- United States Fish and Wildlife Services' (USFWS) National Wetland Inventory (NWI) Wetland Mapper (USFWS, 2023) (**Figure 2)**;
- USGS National Hydrography Dataset (USGS, 2023);
- Federal Emergency Management Agency (FEMA) National Flood Hazard Layer (FEMA, 2020) (**Figure 2**);
- USGS StreamStats (USGS, 2023) (**Appendix A**); and
- Delaware Department of Natural Resources and Environmental Control (DNREC) State Regulated Wetlands Map Index (DNREC 2024) (**Figure 3**).

2.2 Field Delineation Methods

Field delineation of the study area was conducted between August 28 - September 29, 2023 by AECOM wetland scientists.

2.2.1 Wetlands

Wetlands were delineated using the routine method defined by the USACE *Wetlands Delineation Manual* (Environmental Laboratory, 1987) and the Regional Supplement to the *Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region, Version 2.0* (USACE, 2010). The routine method documents three parameters: vegetation, soil characteristics, and hydrology. It evaluates these parameters for evidence of wetland conditions. Wetland boundaries were identified, and the limits were documented using a combination of GPS and surveying equipment: Trimble S5 Robotic Total Station, and Trimble R10 Base and Rover, both capable of sub-foot accuracy. Data collected with the unit were transferred into a

database for use in the development of mapping to be included with this report, agency consultations, permit applications, and plans. Paired upland and wetland data points were established at each wetland area to confirm delineated boundary conditions. Information regarding the vegetation, soil characteristics, and hydrology for each data point was documented using the USACE Atlantic and Gulf Coastal Plain Wetland Determination Data Form (**Appendix B**). Wetlands were classified based on dominant plant community or mix of communities [i.e., palustrine forested (PFO), palustrine scrub/shrub (PSS), palustrine emergent (PEM), and palustrine unconsolidated bottom (PUB)].

2.2.1.1 Vegetation

Vegetation evaluation included identification of trees, saplings and shrubs, herbaceous plants, and woody vine species. As per the USACE guidance for this region, all vegetation strata were evaluated in an approximate 30-foot radius plot. For each stratum, plants were identified to the lowest taxon possible, and the dominant species were determined based on the absolute percent cover of each species. The wetland indicator status of each species was determined using the USACE *2020 National Wetland Plant List* (USACE, 2020).

2.2.1.2 Soils

At each wetland sample location, a spade shovel or a one-piece hand-auger was used to excavate the soil for inspection of the soil profile. Soil horizon depths were measured and recorded. Each distinct horizon in the soil profile was also examined for hue, value, and chroma using a Munsell Soil color chart (Munsell Color, 2009). In addition, the texture, physical characteristics, and redoximorphic features, if present, of each horizon were noted. This information was used to evaluate the indicators of hydric soil conditions that meet USACE criteria.

2.2.1.3 Hydrology

Wetland areas were evaluated by visual inspection for the presence of wetland hydrologic indicators, including but not limited to inundation, observed saturation, water marks, drift lines, sediment deposits, water-stained leaves, surface scour, drainage patterns, and/or morphological plant adaptations.

2.2.2 Watercourses

Watercourses were identified by a defined streambed and bank; hydrologically sorted substrate material; observable dimension, pattern and profile; and the presence of an ordinary high-water mark (OHWM). Watercourse limits were delineated by identifying both the thalweg and OHWM of each bank. The OHWM was determined by the first substantial break in slope between the edge of the stream bed and the surrounding terrain, often displaying a clear line from scour where terrestrial vegetation was not present. All watercourse boundaries were marked with

sequentially numbered flags on the left and right banks (when facing downstream), and boundary points were collected using a GPS unit and/or survey equipment. Information regarding the stream including geomorphology, flow regime, and other streams characteristics was documented using an AECOM-modified *Physical Characterization/Water Quality Field Data Sheet*. The original base data sheets can be found in the United States Environmental Protection Agency's (USEPA) *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish* (Barbour et al., 1999) (**Appendix C**).

2.2.3 Mapping

GPS data collected during the delineation was projected onto georeferenced aerial images to create maps used to illustrate the location and size of the delineated wetlands and watercourses for incorporation into the wetland delineation report and future use in agency consultations, permit applications, and plans.

3 Results and Discussions

The following is a summary of findings from the desktop data review and the results of the field delineation efforts.

3.1 Desktop Data

The following provides the results of the desktop data review conducted for the soils, watercourses, and NWI wetlands within the study area.

3.1.1 Soils

Soils mapped within the study area were identified from the USDA-NRCS soils database. The review indicated that seven soil mapping units are present in the study area. One of the soil mapping units is listed as being a major hydric soil, and two are listed as having major hydric soil inclusions (USDA-NRCS, 2023). The soils mapped in the study area are listed in Table 1 and are illustrated in **Figure 2.**

Table 1: Mapped Soils within the Study Area

Soil Map Unit	Description	Hydric Rating by Map Unit (%)
NM	Nanticoke and Mannington soils, very frequently flooded, tidal	100
ReA	Reybold silt loam, 0 to 2% slopes	0
ReB	Reybold silt loam, 2 to 5%slopes	0
ReC	Reybold silt loam, 5 to 10% slopes	0
SaD	Sassafras sandy loam, 10 to 15% slopes	5
SaE	Sassafras sandy loam, 15 to 25% slopes	5
Up	Urban land	0

3.1.2 NWI Wetlands

USFWS NWI maps illustrate wetland habitats and vegetation communities using interpretation of aerial photography. The data on these maps provide general boundaries of potential wetlands and require ground surveys to accurately define the boundaries of wetlands present, if any, and determine their proper classification. The habitats and communities identified are classified according to the scheme provided in *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., 1979).

A review of the USFWS NWI Wetlands Mapper website identified nine NWI features within the study area (**Figure 2**). The features include the main channel of the Red Lion Creek and surrounding estuarine and freshwater wetlands. These features are described as:

- Estuarine, subtidal, unconsolidated bottom, subtidal (E1UBL)
- Estuarine, intertidal, emergent, *Phragmites australis*, irregularly flooded, oligohaline (E2EM5P6)
- Palustrine, emergent, persistent, seasonally flooded – fresh tidal (PEM1R)
- Palustrine, forested, broad-leaved deciduous, seasonally flooded (PFO1C)
- Palustrine, forested, broad-leaved deciduous, seasonally flooded-fresh tidal (PFO1R)
- Palustrine, forested, broad-leaved deciduous, temporarily flooded (PFO1A)
- Palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded-fresh tidal (PSS1R)
- Palustrine, unconsolidated bottom, permanently flooded, excavated (PUBHx)

3.1.3 Delaware State Regulated Wetlands

A review of the DNREC State Regulated Wetlands Map Index identified several state regulated wetlands classified as water and marsh wetlands within the study area (DNREC, 2024) (**Figure 3**). These wetlands are limited to the Red Lion Creek and its associated marsh floodplains.

3.1.4 Watercourses

The study area drains directly into the Red Lion Creek which is within the Red Lion Creek-Frontal Delaware River Watershed (HUC 020402050703). Red Lion Creek-Frontal Delaware River Watershed is located at the lower end of the Brandywine-Christina subbasin, which is within the Lower Delaware Basin. Based on available National Flood Hazard Layer (FEMA, 2023), the portion of Red Lion Creek within the study area is mapped as a 100-year FEMA floodplain. Floodplain data is displayed on **Figure 2**.

The drainage area of Red Lion Creek was calculated using the USGS StreamStats (Version 4.18.1) Web Application. The drainage area of Red Lion Creek at the downstream limit of the PSA is 8.67 square miles. Copies of the USGS StreamStats results for all watercourses are provided in **Appendix A**.

According to 7 DE Administrative Code: 7500 Wetlands and Subaqueous Lands, Red Lion Creek and its drainage basin have Designated Use categories of public water supply (freshwater sections only, goal use – not currently attained), industrial water supply, primary

contact recreation, secondary contact recreation, fish, aquatic life & wildlife, agricultural water supply (freshwater sections only) (DNREC, 2023).

3.2 Field Delineation

The field delineation conducted between August 28 - September 29, 2023, resulted in the identification of fifteen watercourses and five wetlands within the study area. Mapping showing the location and extent of the wetlands and watercourses is illustrated on **Figure 3,** and a photographic log is provided in **Appendix D**.

3.2.1 Wetlands

Five wetlands were identified within the study area, one of which contains mapped Delaware State Regulated Wetlands. At least one wetland sample point was taken for each wetland to characterize the properties of the hydrology, vegetation, and soil of the wetland. The field data forms are provided in **Appendix B**. Due to the installation of a tide gate on Rt 9 downstream of the PSA, it was noted that the classification of these wetlands did not include any estuarine features as initially indicated by the NWI features described in Section 3.1.2. Water levels were observed over the course of several months and no tidal pattern was observed, indicating that the tide gate is functioning.

Table 2: Wetlands Identified within the Study Area

Wetland Identification[1]	Classification	Watershed	Delineated Size (acres)[2]
W-JRK-001	PEM	Red Lion Creek-Frontal Delaware River	47.99
	PFO		6.57
W-JRK-002	PEM		0.25
W-JRK-003	PEM		0.10
W-JRK-004	PEM		0.21
W-JRK-005	PEM		0.04
		Total delineated acres	**55.16**

Notes:
PEM = Palustrine Emergent
PFO = Palustrine Forested
(1) Wetland ID generated by AECOM during field delineation
(2) Area of the wetland as delineated within the Study Area

3.2.1.1 Wetland W-JRK-001 PEM

W-JRK-001 PEM is a PEM wetland community located within the greater W-JRK-001 complex. The PEM community represents the Phragmites australis dominated wetland adjacent to Red Lion Creek, as well as a small segment of PEM community in a cleared powerline ROW at the western side of the PSA. This wetland also contains areas mapped as Delaware State Regulated Wetlands and classified as marsh wetlands (**Figure 3**). Surface water runoff, high

water table, spring seeps, and flooding from Red Lion Creek all contribute to the hydrology of this wetland. The wetland boundary generally follows the toe of slope. Observed wetland hydrology indicators included Surface Water (A1), High Water Table (A2), Soil Saturation (A3), Drainage Patterns (B10), Geomorphic Position (D2), and FAC-neutral Test (D5). The observed dominant vegetation included common reed (Phragmites australis), Japanese stiltgrass (Microstegium vimineum), false nutsedge (Cyperus strigosus), and sensitive fern (Onoclea sensibilis). The observed hydric soil indicators included Depleted Matrix (F3) and Depleted Below Dark Surface (A11).

3.2.1.2 Wetland W-JRK-001 PFO:

W-JRK-001 PFO is a PFO wetland community located within the greater W-JRK-001 complex. The PFO community represents a forest on the west side of the PSA crossed by multiple stream channels, as well as a forested edge to the PEM community adjacent to Red Lion Creek. Surface water runoff, high water table, spring seeps, and flooding from Red Lion Creek all contribute to the hydrology of this wetland. The wetland boundary generally follows the toe of slope. Observed wetland hydrology indicators included Surface Water (A1), High Water Table (A2), Soil Saturation (A3), Drift Deposits (B3), Water-Stained Leaves (B9), Drainage Patterns (B10), Geomorphic Position (D2), and FAC-neutral Test (D5). The observed dominant vegetation included red oak (Acer rubrum), green ash (Fraxinus pennsylvanica), spicebush (Lindera benzoin), arrowwood viburnum (Viburnum dentatum), black willow (Salix nigra), common reed, netted chainfern (Woodwardia areolate), sensitive fern, small-spike false nettle (Boehmeria cylindrica), oriental bittersweet (Celasturs orbiculatus), and Japanese honeysuckle (Lonicera japonica) amongst others. The observed hydric soil indicators included Depleted Below Dark Surface (A11), Depleted Matrix (F3), and Redox Dark Surface (F6).

3.2.1.3 Wetland W-JRK-002 PEM:

W-JRK-002 is a PEM wetland that is located within the eastern section of the PSA. The wetland is a depression crossed by stream S-JRK-011. Surface water runoff, high water table, and spring seeps all contribute to the hydrology of this wetland. The wetland boundary follows the toe of slope of hillsides and microtopographic relief surrounding the stream and its channels. Observed wetland hydrology indicators included Saturation (A3), Drainage Patterns (B10), and Geomorphic Position (D2). The observed dominant vegetation included silver maple (Acer Saccharinum), spicebush, amur honeysuckle (Lonicera maackii), Japanese stiltgrass, common reed, poison ivy (Toxicodendron radicans), raspberry (Rubus idaeus), and oriental bittersweet. The soil observed met the Depleted Matrix (F3) indicator for hydric soils.

3.2.1.4 Wetland W-JRK-003 PEM

W-JRK-003 is a PEM wetland that is located within the eastern side of the facility property. The wetland is an isolated depression that extends north and south of the facilities northern fence

line. Surface water runoff, and poor draining soil containing fill material contribute to the hydrology of this wetland. The wetland boundary follows the toe of slope of the slight topographic depression as well as visible transition patterns in vegetation. Observed wetland hydrology indicators included Geomorphic Position (D2) and FAC-Neutral Test (D5). The observed dominant vegetation included common reed, dotted smartweed (Persicaria punctata), and soft rush (Juncus effusus). Observed hydric soil indicators included Depleted Matrix (F3) and Redox Depressions (F8).

3.2.1.5 Wetland W-JRK-004 PEM

W-JRK-004 is a PEM wetland that is located within the eastern side of the facility property. The wetland is an isolated depression that extends north and south of the facilities northern fence line. The wetland is located west of an access road and west of wetland W-JRK-003. Surface water runoff, and poor draining soil containing fill material contribute to the hydrology of this wetland. The wetland boundary follows the toe of slope of the slight topographic depression as well as visible transition patterns in vegetation. Observed wetland hydrology indicators included Geomorphic Position (D2) and FAC-Neutral Test (D5). The observed dominant vegetation included common reed, and soft rush (Juncus effusus). The soil observed met the Redox Depressions (F8) indicator for hydric soils.

3.2.1.6 Wetland W-JRK-005 PEM

W-JRK-005 is a PEM wetland that is located north of the facility property fence line. The wetland is a small, isolated depression that is located north of wetland W-JRK-004 and west of the access road. extends north and south of the facilities northern fence line. Surface water runoff, and poor draining soil containing fill material contribute to the hydrology of this wetland. The wetland boundary follows the toe of slope of the slight topographic depression as well as visible transition patterns in vegetation. Observed wetland hydrology indicators included Geomorphic Position (D2) and FAC-Neutral Test (D5). The observed dominant vegetation included redtop (Agrostis gigantea), and path rush (Juncus tenuis). Observed hydric soil indicators included Depleted Matrix (F3) and Redox Depressions (F8).

3.2.2 Watercourses

Fourteen watercourses were identified within the study area; field data forms are located in **Appendix C**. Brief descriptions of the watercourses are provided below. In addition to delineated watercourses, multiple channels within the wetland were extrapolated from elevation survey data and aerial imagery. They were unable to be ground verified due to the inability to safely access the interior of the wetland. These channels are also illustrated on **Figure 3**.

Table3: Watercourses Identified within the Study Area

Watercourse Identification	Local Name	Stream Class	Top of Bank Width (average feet)	Delineated Length (linear feet)
S-JRK-001	UNT to Red Lion Creek	Intermittent	8	374
S-JRK-002	UNT to Red Lion Creek	Ephemeral	9	38
S-JRK-003	UNT to Red Lion Creek	Perennial	9.35	3,086
S-JRK-004	UNT to Red Lion Creek	Ephemeral	7	189
S-JRK-005	UNT to Red Lion Creek	Ephemeral	5.5	104
S-JRK-006	UNT to Red Lion Creek	Intermittent	4.5 to 7	662
S-JRK-006A	UNT to Red Lion Creek	Intermittent	2.38	26
S-JRK-007	UNT to Red Lion Creek	Intermittent	10.5	577
S-JRK-008	UNT to Red Lion Creek	Ephemeral	7	159
S-JRK-009	UNT to Red Lion Creek	Intermittent	6	82
S-JRK-010	UNT to Red Lion Creek	Ephemeral	7.5 to 8	354
S-JRK-011	UNT to Red Lion Creek	Intermittent	6.75	451
S-JRK-012	UNT to Red Lion Creek	Intermittent	2.5	82
S-JRK-013	Red Lion Creek	Perennial	47	2,150
			Total delineated length:	**8,334**

3.2.2.1 Watercourse S-JRK-001

Watercourse S-JRK-001 (UNT to Red Lion Creek) is a moderate gradient, intermittent watercourse that flows westward through the southwestern part of the PSA, surrounded by small riparian and upland woodlands. The stream reach within the PSA originates just north of Governor Lea Road and just west of the Trash Tech property and drains further to the west into wetland W-JRK-001. The stream has a moderately linear flow morphology with riffle/pool/run complexes although the stream had no flow at the time of survey. The stream has an approximate TOB width of 8 feet and total depth of 2 feet. The substrate consists of cobble, gravel, sand, and silt, and contains a moderate percentage of detritus. The delineated length of the watercourse is 374 feet.

3.2.2.2 Watercourse S-JRK-002

Watercourse S-JRK-002 (UNT to Red Lion Creek) is a moderate gradient, ephemeral watercourse that flows north within the southwestern part of the PSA, surrounded by small riparian and upland woodlands. The stream reach originates southwest of stream S-JRK-001 at a culvert directly north of Governor Lea Road and drains into S-JRK-001 to the north. The stream has a generally linear flow morphology with pool/run complexes although the stream had no flow at the time of survey. The stream had an approximate TOB width of 9 feet and total

depth of 2 feet. The substrate consists of sand and silt and contains a small percentage of detritus. The delineated length of the watercourse is 38 feet.

3.2.2.3 Watercourse S-JRK-003

Watercourse S-JRK-003 (UNT to Red Lion Creek) is a low gradient, perennial watercourse that flows north through the western part of the PSA, surrounded by a large riparian woodland and phragmites dominated wetlands. The stream reach within the PSA originates just north of Governor Lea Road via a large culvert and drains far to the north directly into Red Lion Creek (S-JRK-013). The stream flow morphology has a moderate to advanced sinuosity with riffle/pool/run complexes. The stream has an approximate TOB width of 9.35 feet and total depth of 1.8 feet. The substrate consists of cobble, gravel, sand, and silt, and contains a small percentage of detritus. The delineated length of the watercourse is 3,086 feet.

3.2.2.4 Watercourse S-JRK-004

Watercourse S-JRK-004 (UNT to Red Lion Creek) is a high gradient, ephemeral watercourse that flows west within the western part of the PSA, surrounded by upland woodlands. The stream reach within the PSA originates from a culvert at the top of a steep slope just west of the Trash Tech property and drains into wetland W-JRK-001 downslope and to the west. The stream flow morphology has a slight sinuosity with riffle/pool/run complexes although there was no flow present at the time of survey. The stream has an approximate TOB width of 7 feet and total depth of 2.5 feet. The substrate consists of cobble, gravel, sand, silt, and contains a moderately high percentage of detritus. The delineated length of the watercourse is 189 feet.

3.2.2.5 Watercourse S-JRK-005

Watercourse S-JRK-005 (UNT to Red Lion Creek) is a high gradient, ephemeral watercourse that flows west within the western part of the PSA, surrounded by upland woodlands. The stream reach within the PSA originates from a culvert at the top of a steep slope just west of the Trash Tech property and drains into wetland W-JRK-001 downslope and to the west. The stream is located just north of stream S-JRK-004. The stream flow morphology has a moderate sinuosity with riffle/pool/run complexes although there was no flow present at the time of survey. The stream has an approximate TOB width of 5.5 feet and total depth of 3.5 feet. The substrate consists of boulders, cobble, gravel, sand, and silt, and contains a small percentage of detritus. The delineated length of the watercourse is 104 feet.

3.2.2.6 Watercourse S-JRK-006

Watercourse S-JRK-006 (UNT to Red Lion Creek) is a low gradient, intermittent watercourse that flows north through the western part of the PSA, surrounded by large riparian woodlands. The stream reaches within the PSA originate from a spring seep within the southwestern end of wetland W-JRK-001 and drain into S-JRK-007 to the north. The stream flow morphology has a

low to moderate sinuosity with riffle/pool/run complexes. The stream has an approximate TOB width of 4.5-7 feet and total depth between 1 and 3.4 feet. The substrate consists of cobble, gravel, sand, and silt, and contains a moderately high percentage of muck-mud components. The delineated length of the watercourse is 662 feet.

3.2.2.7 Watercourse S-JRK-006A

Watercourse S-JRK-006A (UNT to Red Lion Creek) is a low gradient, intermittent watercourse that flows northwest within the western part of the PSA, surrounded by large riparian woodlands. The stream reach originates from a spring seep within the southwestern end of wetland W-JRK-001 and drains into S-JRK-006 to the northwest. The stream has a moderately linear flow morphology with pool/run complexes. The stream has an approximate TOB width of 2.38 feet and total depth of 0.9 feet. The substrate consists of silt and contains a moderately high percentage of detritus and muck-mud components. The delineated length of the watercourse is 26 feet.

3.2.2.8 Watercourse S-JRK-007

Watercourse S-JRK-007 (UNT to Red Lion Creek) is a low gradient, intermittent watercourse that flows north within the western part of the PSA, surrounded by large riparian woodlands. The stream reach originates from a spring seep within the western end of wetland W-JRK-001 and drains into S-JRK-007 to the northwest. The stream has a moderately linear flow morphology with pool/run complexes. The stream has an approximate TOB width of 10.5 feet and total depth of 4.1 feet. The substrate consists of sand, silt, and clay, and contains a low percentage of detritus. The delineated length of the watercourse is 577 feet.

3.2.2.9 Watercourse S-JRK-008

Watercourse S-JRK-008 (UNT to Red Lion Creek) is a high gradient, ephemeral watercourse that flows west within the western part of the PSA, surrounded by large riparian and upland woodlands. The stream reach originates from a culvert along the top of a hillside bordering the Trash Tech property to the east and drains into stream S-JRK-003. The stream is located north of S-JRK-005. The stream has a moderately sinuous flow morphology with riffle/pool/run complexes although no flow was present at the time of survey. The stream has an approximate TOB width of 7 feet and total depth of 3 feet. The substrate consists of boulders, cobble, gravel, sand, and silt, and contains a moderate percentage of detritus. The delineated length of the watercourse is 159 feet.

3.2.2.10 Watercourse S-JRK-009

Watercourse S-JRK-009 (UNT to Red Lion Creek) is a low gradient, ephemeral watercourse that flows northeast within the western part of the PSA, surrounded by large riparian woodlands. The stream reach originates from a spring seep within wetland W-JRK-001 and drains into

stream S-JRK-006 to the northeast. The stream has a generally linear flow morphology with pool/run complexes. The stream has an approximate TOB width of 6 feet and total depth of 1.2 feet. The substrate consists of cobble, sand, and silt, and contains a moderate percentage of detritus and muck-mud components. The delineated length of the watercourse is 82 feet.

3.2.2.11 Watercourse S-JRK-010

Watercourse S-JRK-010 (UNT to Red Lion Creek) is a high gradient, ephemeral watercourse that flows west within the western part of the PSA, surrounded by large riparian and upland woodlands. The stream reaches originate from the top of a hillside at the western side of the facility property and drain into wetland W-JRK-001. The stream is located east of the W-JRK-001 PFO 2 data point. The stream has a moderately sinuous flow morphology with riffle/pool/run complexes although no flow was present at the time of survey. The stream has an approximate TOB width of 7.5-8 feet and total depth of 4 feet. The substrate consists of boulders, cobble, gravel, sand, and silt, and contains a low percentage of detritus. The delineated length of the watercourse is 354 feet.

3.2.2.12 Watercourse S-JRK-011

Watercourse S-JRK-011 (UNT to Red Lion Creek) is a moderate gradient, intermittent watercourse that flows north within the eastern part of the PSA, surrounded by large riparian and upland woodlands. The stream reach originates from a culvert along the east side embankment of the facility property and braids throughout wetland W-JRK-002. The stream exits wetland W-JRK-002 to the north and drains into wetland W-JRK-001. Apart from the in-wetland braiding, the stream has a generally linear flow morphology with pool/run complexes although no flow was present at the time of survey. The stream has an approximate TOB width of 6.75 feet and total depth of 0.75 feet. The substrate consists of sand, and silt, and contains a moderate percentage of detritus and muck-mud components. The delineated length of the watercourse is 451 feet.

3.2.2.13 Watercourse S-JRK-012

Watercourse S-JRK-012 (UNT to Red Lion Creek) is a high gradient, intermittent watercourse that flows east within the western part of the PSA, surrounded by large riparian and upland woodlands as well as a cleared ROW. The stream reach originates from a spring fed culvert at the base of the berm on the eastern side of the cleared ROW. The stream hydrology is fed by groundwater associated with wetland community W-JRK-001 PEM 2. The stream dissipates to the east into wetland W-JRK-001 (PFO 1A). The stream has a slightly sinuous flow morphology with riffle/pool/run complexes. The stream has an approximate TOB width of 2.5 feet and total depth of 1 foot. The substrate consists of gravel, sand, and silt, and contains a small percentage of detritus and muck-mud components. The delineated length of the watercourse is 82 feet.

3.2.2.14 Watercourse S-JRK-013

Watercourse S-JRK-013 (Red Lion Creek) is a low gradient, perennial watercourse that flows east across the northern most end of the PSA, surrounded by a large common reed dominated floodplain and riparian and upland woodlands. The stream is open ended both upstream and downstream from the PSA extents. The stream reach within the PSA has a generally linear flow morphology that lacks riffle/pool complexes. The stream has an approximate TOB width of 47 feet and total depth of 3 feet. The substrate consists of just silt and contains a moderately high percentage of muck-mud components. The delineated length of the watercourse is 2,150 feet.

4 Summary and Conclusions

The wetlands and watercourse delineation identified five wetlands and 14 watercourses within the study area. One delineated wetland contained mapped Delaware State Regulated Marsh Wetlands. The total delineated wetland area was 55.16 acres. The total delineated length of watercourses within the study area was 8,334 feet. Permitting is not required for this project, but the substantive requirements of these regulations must be met.

5 References

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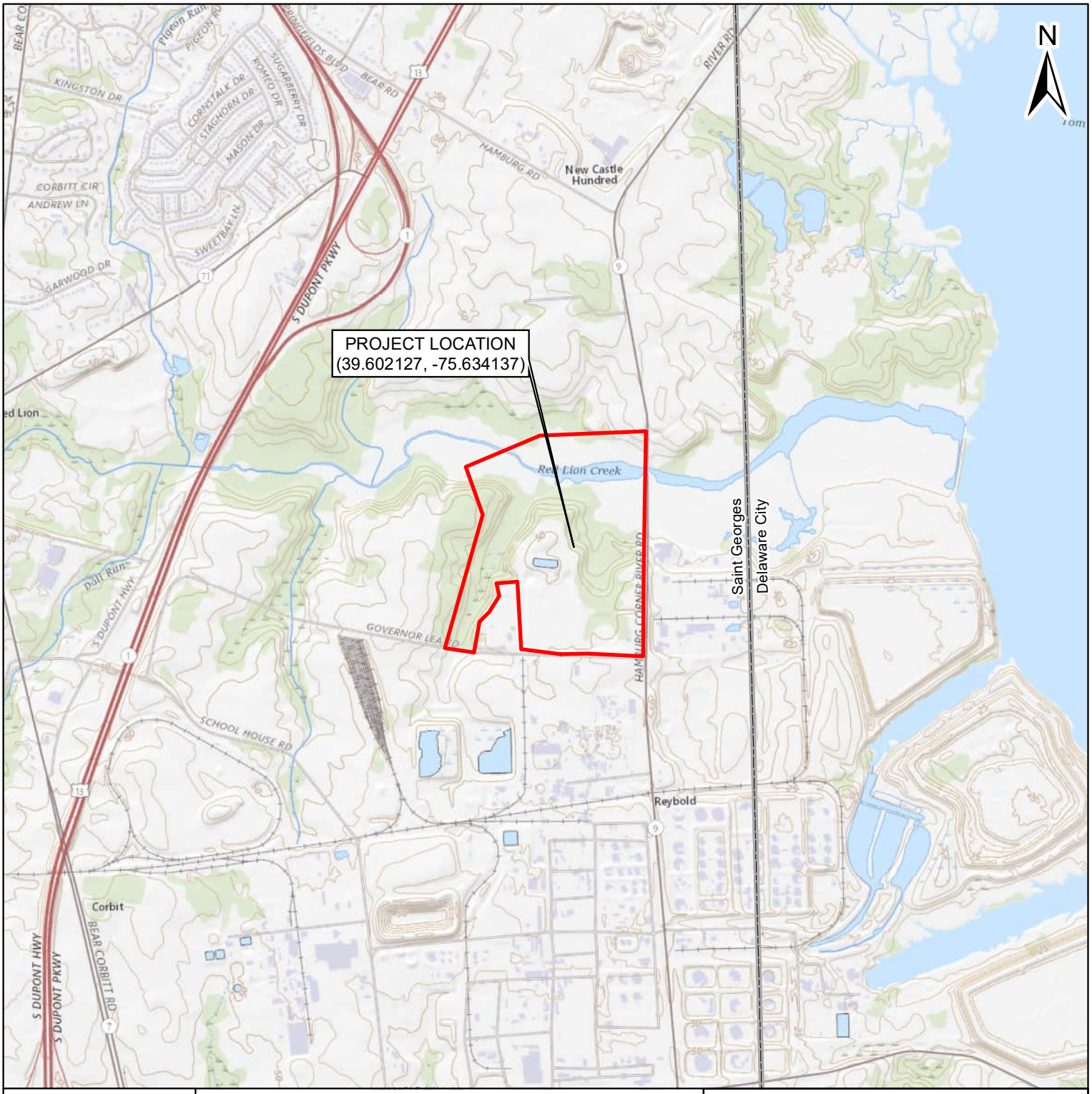
Figures



PROJECT LOCATION

LEGEND

PROJECT STUDY AREA

USGS QUADRANGLE BOUNDARY

0 1,000 2,000 4,000 Feet

REFERENCE: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National

USGS 7.5-MINUTE TOPOGRAPHIC QUADRANGLE: SAINT GEORGES, DE
NEW CASTLE, NEW CASTLE COUNTY, DE

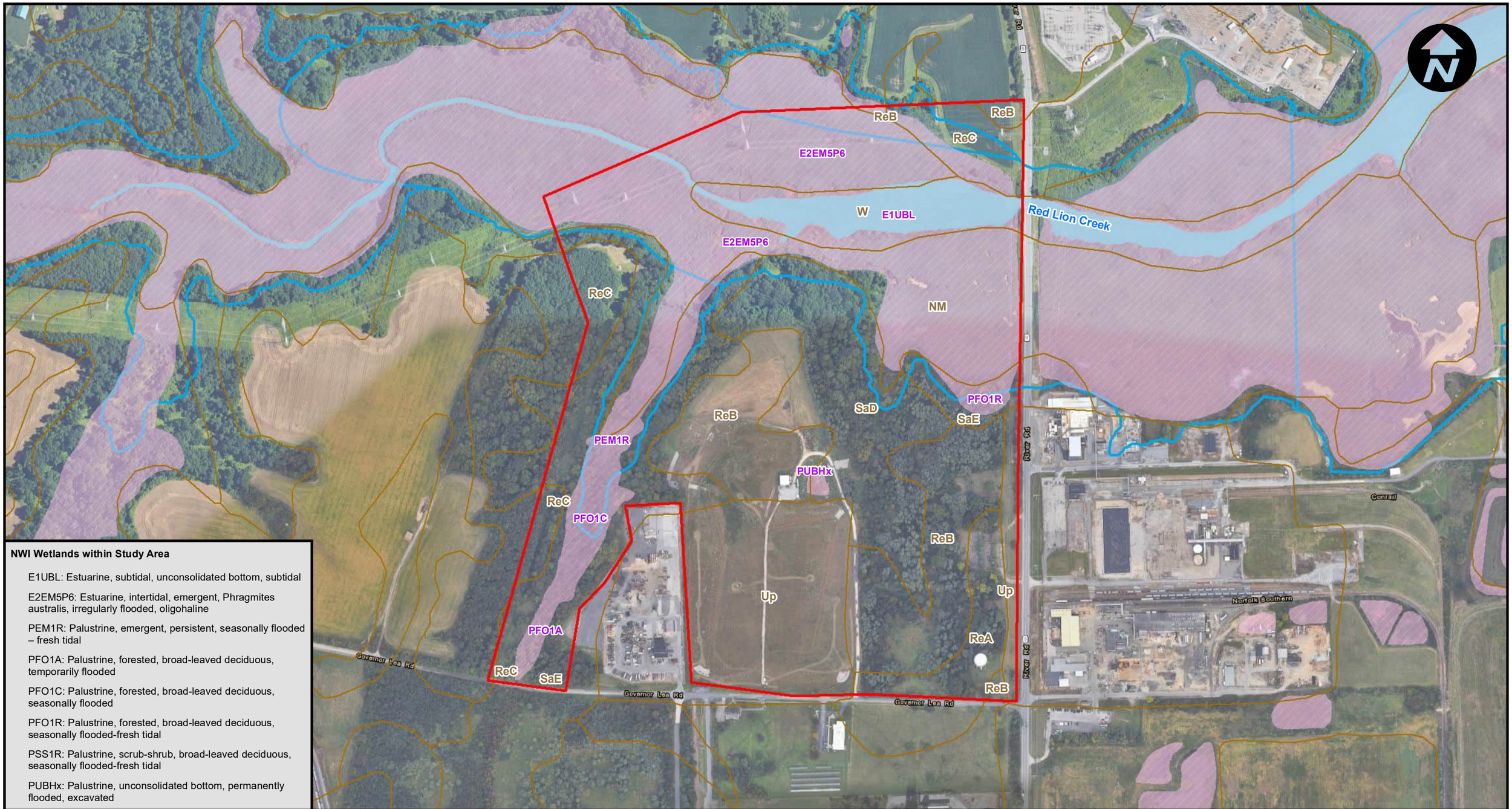
AECOM

STANDARD CHLORINE OF DELAWARE SUPERFUND SITE

FIGURE 1
PROJECT LOCATION MAP

PREPARED BY: MWC	Page 1 of 1
CHECKED BY: JRK	Date: 12/15/2023

L:\DCS\Projects\ENV\60707136_Standard_Chlorine_Field\900_CAD_GIS\920_GIS\maps\StandardChlorine_Figure 1 - USGS.mxd



NWI Wetlands within Study Area

E1UBL: Estuarine, subtidal, unconsolidated bottom, subtidal

E2EM5P6: Estuarine, intertidal, emergent, Phragmites australis, irregularly flooded, oligohaline

PEM1R: Palustrine, emergent, persistent, seasonally flooded – fresh tidal

PFO1A: Palustrine, forested, broad-leaved deciduous, temporarily flooded

PFO1C: Palustrine, forested, broad-leaved deciduous, seasonally flooded

PFO1R: Palustrine, forested, broad-leaved deciduous, seasonally flooded-fresh tidal

PSS1R: Palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded-fresh tidal

PUBHx: Palustrine, unconsolidated bottom, permanently flooded, excavated

Soils within Study Area

NM: Nanticoke and Mannington soils, very frequently flooded, tidal

ReA: Reybold silt loam, 0 to 2 percent slopes

ReB: Reybold silt loam, 2 to 5 percent slopes

ReC: Reybold silt loam, 5 to 10 percent slopes

SaD: Sassafras sandy loam, 10 to 15 percent slopes

SaE: Sassafras sandy loam, 15 to 25 percent slopes

Up: Urban land

Legend

PROJECT STUDY AREA

SOIL BOUNDARY

NHD WATERCOURSE

NWI WETLAND

100 YEAR FLOODPLAIN

0 500 1,000 1,500 2,000 Feet

BASE MAP SOURCES:
AERIAL IMAGERY: GOOGLE MAPS SATELLITE

NWI WETLAND: USFWS, NATIONAL WETLANDS INVENTORY FOR DE, POLYGON, 10/2023

NHD DATASET: USGS, NATIONAL HYDROGRAPHY DATASET FOR DE, 05/2023

FEMA NATIONAL FLOOD HAZARD LAYER FOR NEW CASTLE COUNTY, DE, 09/2023

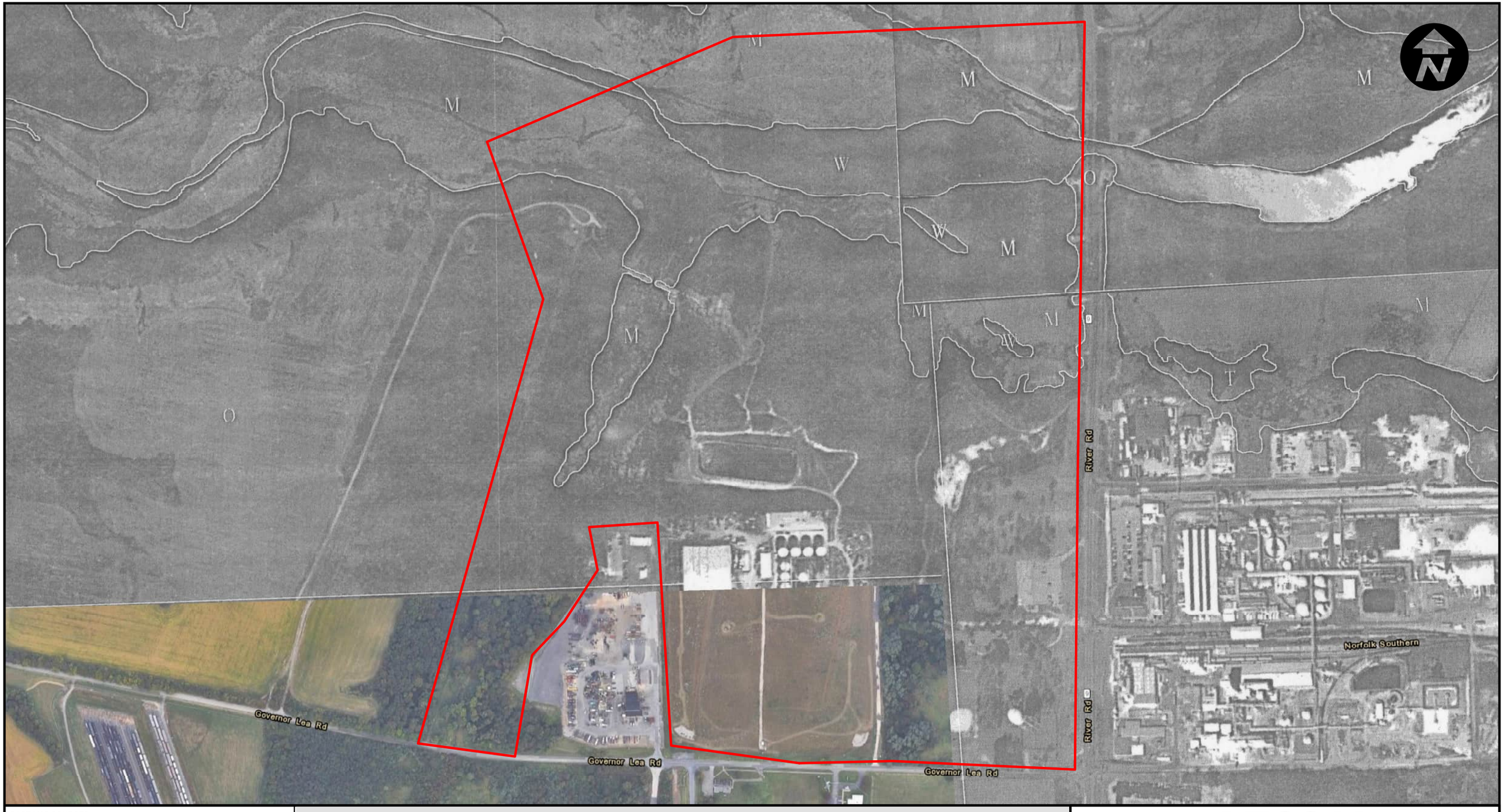
SOIL MAP UNIT: USDA-NRCS, SOIL SURVEY GEOGRAPHIC DATABASE FOR NEW CASTLE COUNTY, DE, 09/2023

AECOM

STANDARD CHLORINE OF DELAWARE SUPERFUND SITE
FIGURE 2
DESKTOP RESOURCES MAP

NEW CASTLE, NEW CASTLE COUNTY, DE

Prepared by: MWC	Checked by: JRK	Date: 6/12/2024	Page 1 of 1



BASE MAP SOURCES:
AERIAL IMAGERY: GOOGLE MAPS SATELLITE

DE STATE REGULATED WETLANDS: PANELS DNR375, DNR376, DNR 377

Legend

PROJECT STUDY AREA

W: WATER

M: MARSH

T: TIDAL MUDFLATS (IN SOME CASES VEGETATED)/SAND BARS

0 500 1,000 1,500 2,000 Feet

AECOM

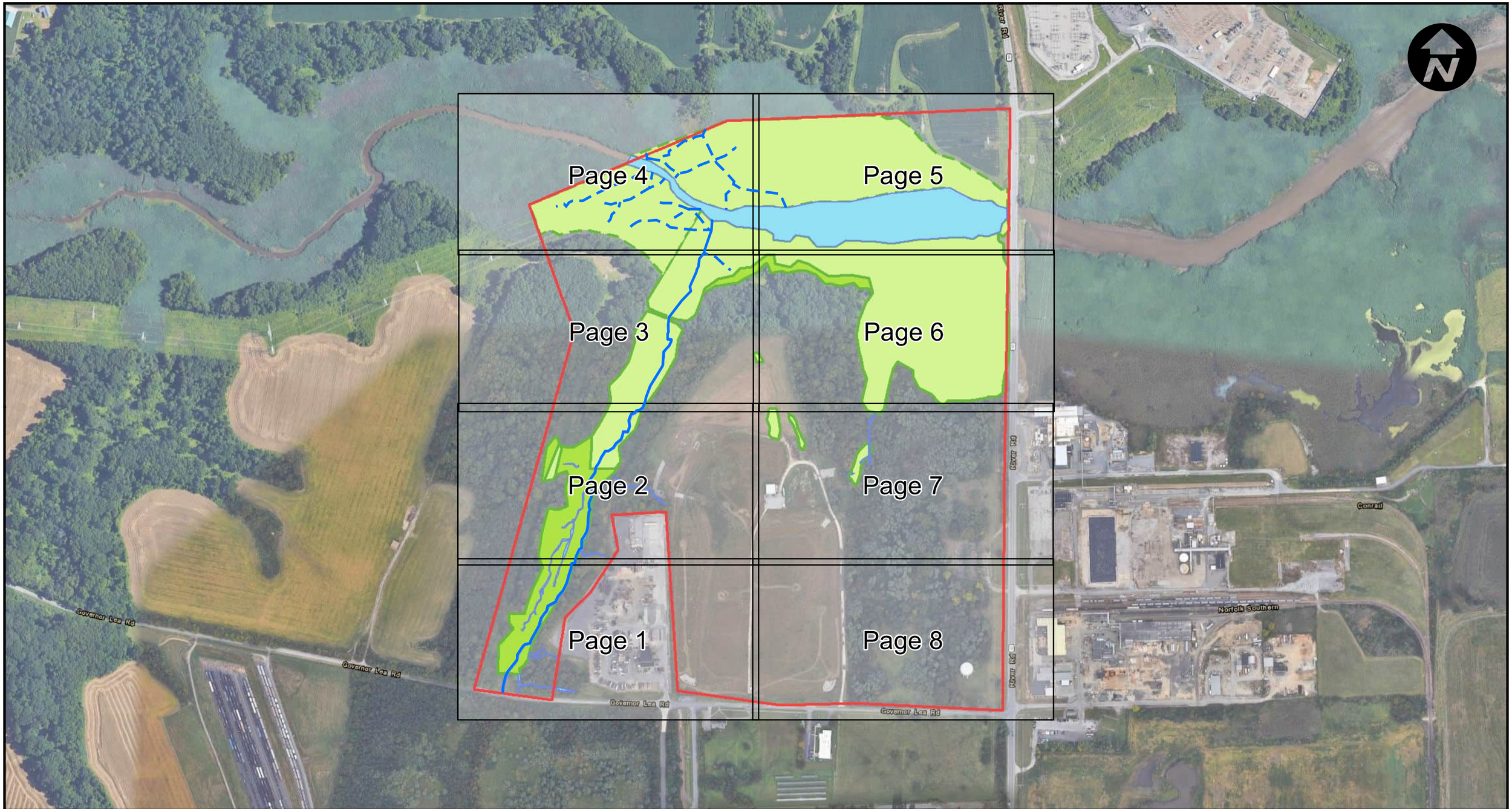
STANDARD CHLORINE OF DELAWARE SUPERFUND SITE

FIGURE 3

DE STATE REGULATED WETLANDS MAP

NEW CASTLE, NEW CASTLE COUNTY, DE

Prepared by: MWC	Checked by: JRK	Date: 2/13/2024	Page 1 of 1



BASE MAP SOURCES:
AERIAL IMAGERY: GOOGLE MAPS SATELLITE

WETLAND AND WATERWAY DELINEATION COMPLETED BY AECOM AUGUST-SEPTEMBER 2023.

Legend

- PAGE EXTENT
- PROJECT STUDY AREA
- DELINEATED STREAMS
- EXTRAPOLATED STREAM
- EXTRAPOLATED WETLAND CHANNEL
- EXTRAPOLATED PEM WETLAND
- DELINEATED PEM WETLAND
- DELINEATED PFO WETLAND

0 500 1,000 1,500 2,000 Feet

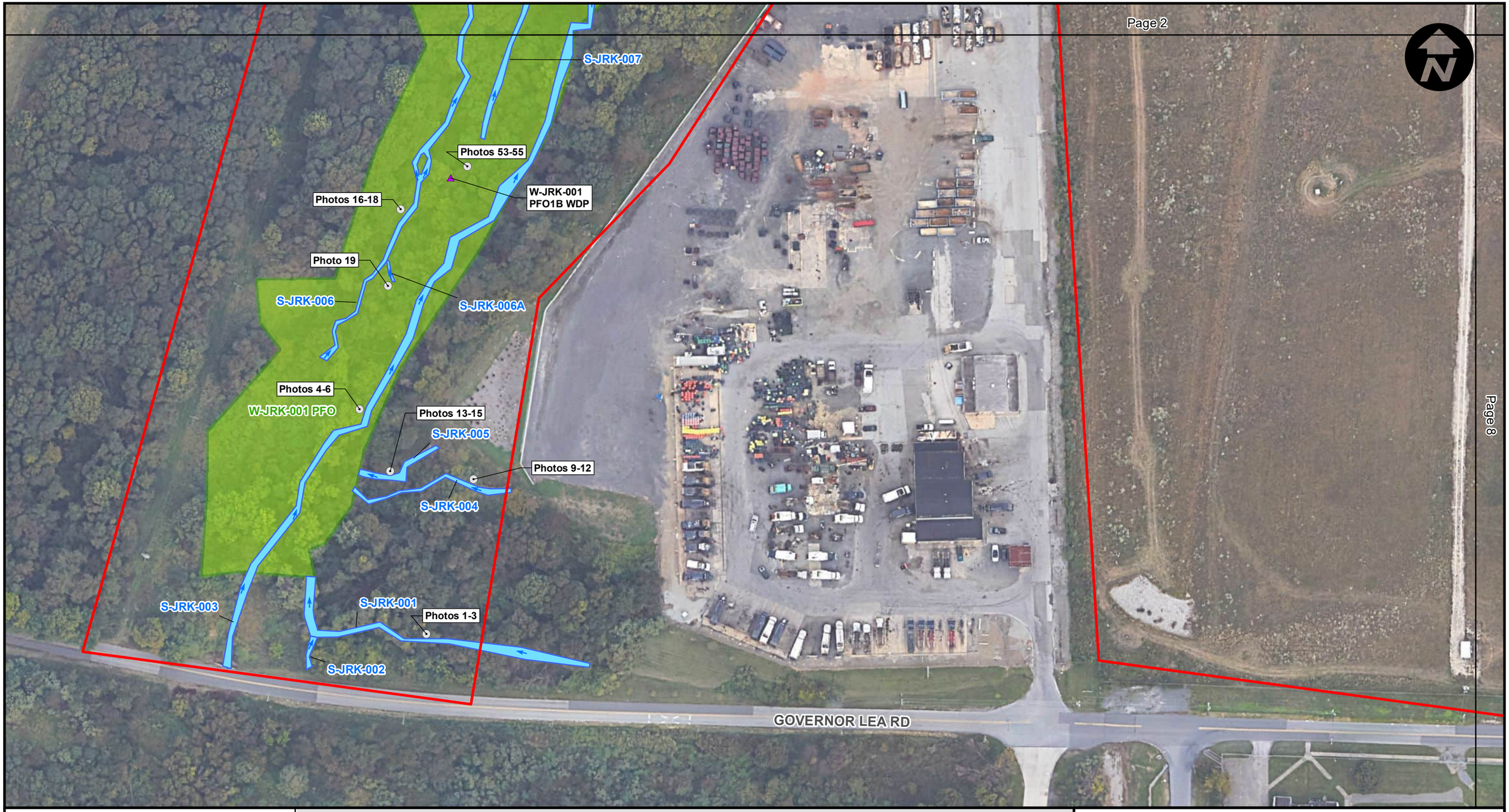
AECOM

STANDARD CHLORINE OF DELAWARE SUPERFUND SITE

PAGE EXTENTS

NEW CASTLE, NEW CASTLE COUNTY, DE

Prepared by: MWC	Checked by: JRK	Date: 6/13/2024	Page 1 of 1



BASE MAP SOURCES:
AERIAL IMAGERY: GOOGLE MAPS SATELLITE

WETLAND AND WATERWAY DELINEATION COMPLETED BY AECOM AUGUST-SEPTEMBER 2023

Legend

- PHOTO LOCATION
- CULVERT
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- PROJECT STUDY AREA
- PAGE EXTENT

0 100 200 300 400 Feet

AECOM

STANDARD CHLORINE OF DELAWARE SUPERFUND SITE
FIGURE 4
RESOURCE DELINEATION MAP

NEW CASTLE, NEW CASTLE COUNTY, DE

Prepared by: MWC	Checked by: JRK	Date: 6/13/2024	Page 1 of 8

Page 3

Page 7

Page 1

W-JRK-001 PFO

W-JRK-001 UPL2

W-JRK-001 PEM2 WDP

W-JRK-001 PFO1A WDP

Photos 50-52

Photos 56-58

S-JRK-012

Photos 43-44

W-JRK-001 PEM

W-JRK-001 PFO

W-JRK-001 PEM1 WDP

S-JRK-003

Photos 47-49

Photos 59-60

W-JRK-001 PFO2 WDP

S-JRK-010

W-JRK-001 UPL1

Photos 37-39

Photos 34-36

Photos 7-8

S-JRK-007

Photos 31-33

S-JRK-009

S-JRK-003

S-JRK-006

Photos 20-22

Photos 23-25

S-JRK-008

Photos 26-27

BASE MAP SOURCES:
AERIAL IMAGERY: GOOGLE MAPS SATELLITE

WETLAND AND WATERWAY DELINEATION COMPLETED BY AECOM AUGUST-SEPTEMBER 2023

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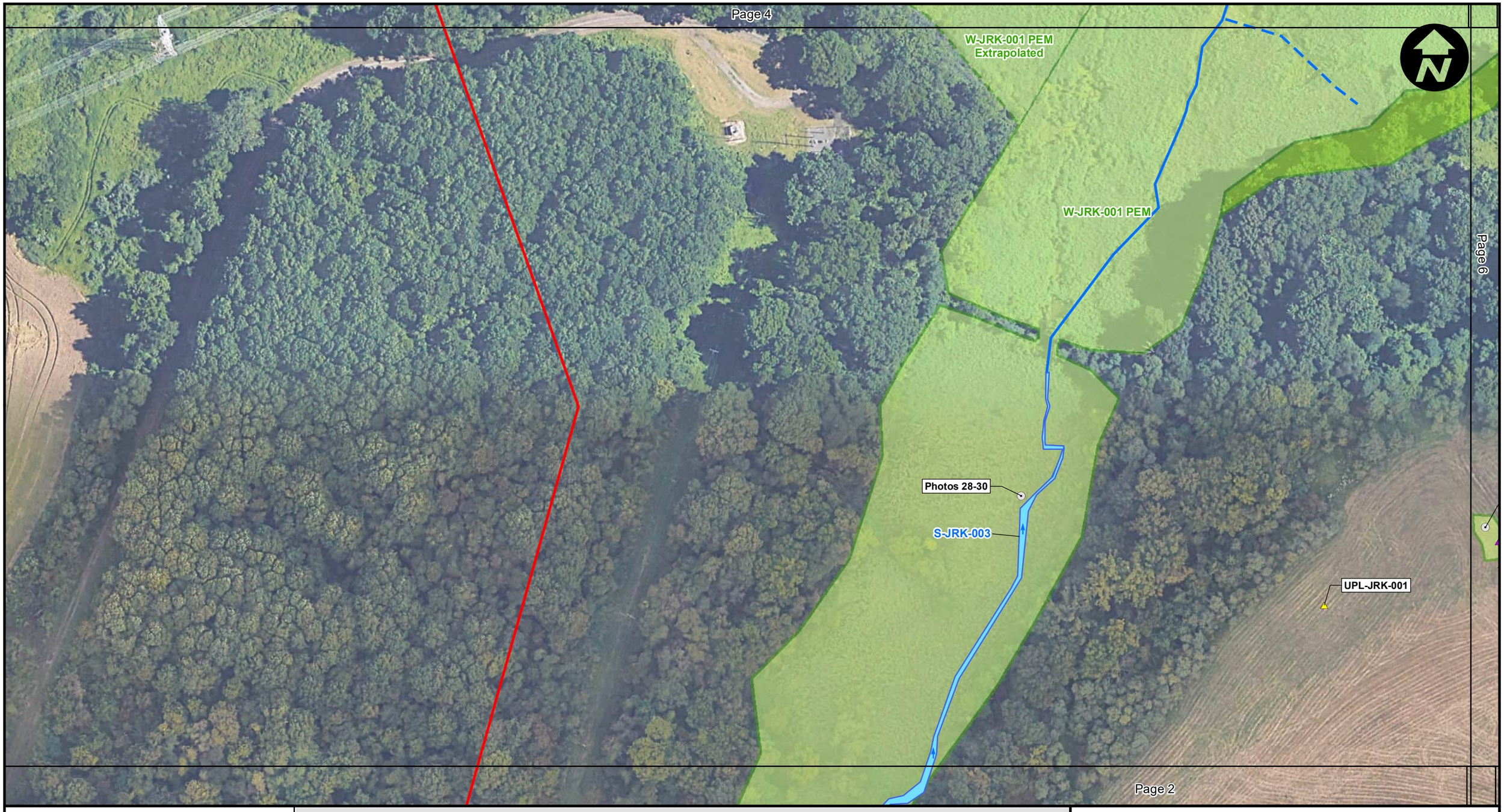
STANDARD CHLORINE OF DELAWARE SUPERFUND SITE
FIGURE 4
RESOURCE DELINEATION MAP

NEW CASTLE, NEW CASTLE COUNTY, DE

Prepared by: MWC	Checked by: JRK	Date: 6/13/2024	Page 2 of 8

Page 4



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BASE MAP SOURCES:
AERIAL IMAGERY: GOOGLE MAPS SATELLITE

WETLAND AND WATERWAY DELINEATION COMPLETED BY AECOM AUGUST-SEPTEMBER 2023

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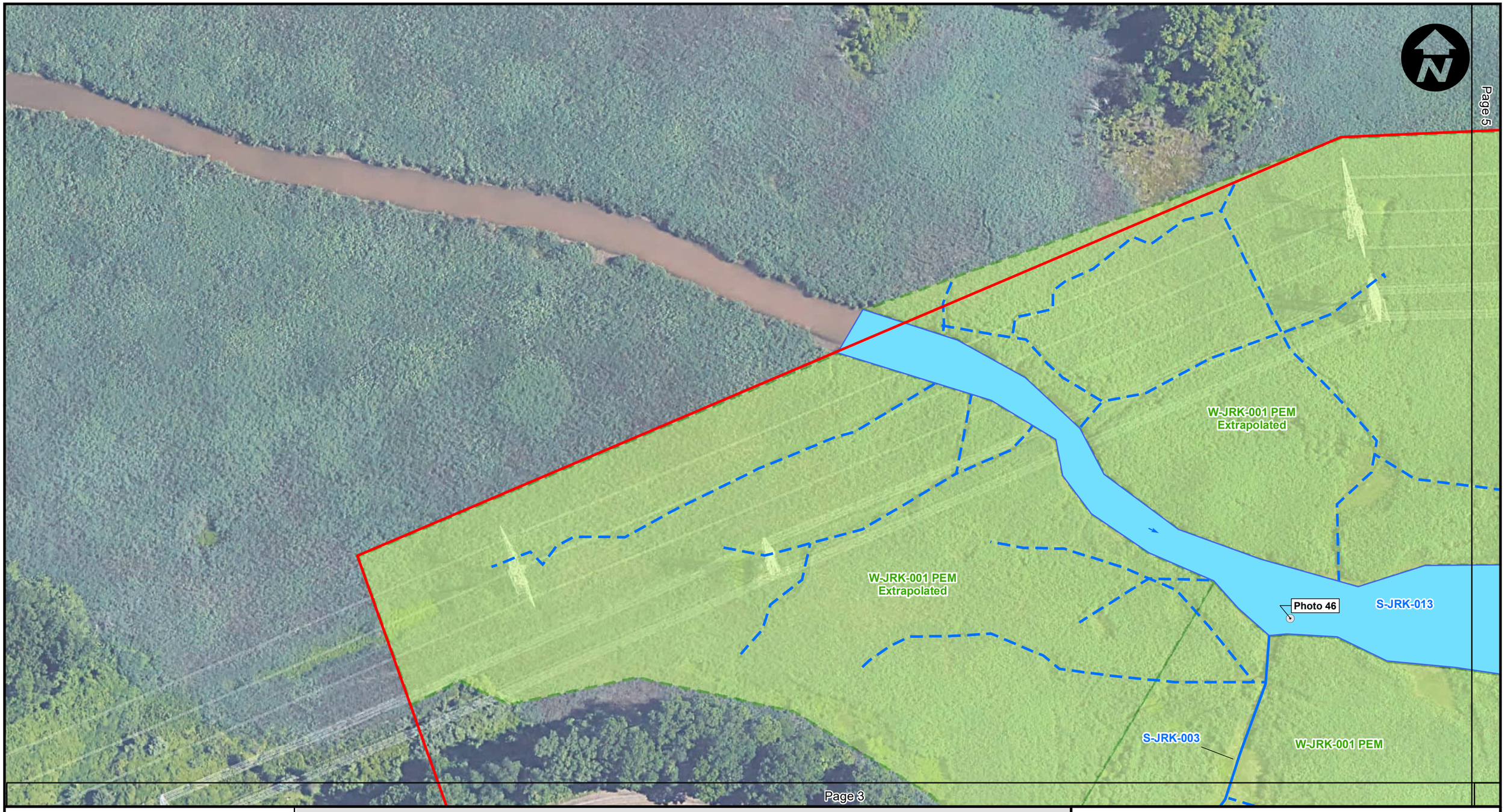
STANDARD CHLORINE OF DELAWARE SUPERFUND SITE
FIGURE 4
RESOURCE DELINEATION MAP

NEW CASTLE, NEW CASTLE COUNTY, DE

Prepared by: MWC	Checked by: JRK	Date: 6/13/2024	Page 3 of 8



BASE MAP SOURCES:
AERIAL IMAGERY: GOOGLE MAPS SATELLITE

WETLAND AND WATERWAY DELINEATION COMPLETED BY AECOM AUGUST-SEPTEMBER 2023

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FIGURE 4
RESOURCE DELINEATION MAP

NEW CASTLE, NEW CASTLE COUNTY, DE

Prepared by: MWC	Checked by: JRK	Date: 6/13/2024	Page 4 of 8

Page 4

Page 6

BASE MAP SOURCES:
AERIAL IMAGERY: GOOGLE MAPS SATELLITE

WETLAND AND WATERWAY DELINEATION COMPLETED
BY AECOM AUGUST-SEPTEMBER 2023

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STANDARD CHLORINE OF DELAWARE SUPERFUND SITE
FIGURE 4
RESOURCE DELINEATION MAP

NEW CASTLE, NEW CASTLE COUNTY, DE

Prepared by: MWC	Checked by: JRK	Date: 6/13/2024	Page 5 of 8

Page 5

Page 3

Photos 61-63

W-JRK-001 PFO

W-JRK-001 PF03 WDP

W-JRK-001 PEM

SR 009 RIVER RD

Photos 76-78

W-JRK-005 PEM WDP

W-JRK-005 PEM

W-JRK-005 UPL

W-JRK-004 PEM

Page 7

W-JRK-001 PEM

BASE MAP SOURCES:
AERIAL IMAGERY: GOOGLE MAPS SATELLITE

WETLAND AND WATERWAY DELINEATION COMPLETED BY AECOM AUGUST-SEPTEMBER 2023

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- PROJECT STUDY AREA
- PAGE EXTENT

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AECOM

STANDARD CHLORINE OF DELAWARE SUPERFUND SITE
FIGURE 4
RESOURCE DELINEATION MAP

NEW CASTLE, NEW CASTLE COUNTY, DE

Prepared by: MWC	Checked by: JRK	Date: 6/13/2024	Page 6 of 8

Page 6

Page 2

Page 8

W-JRK-004 PEM

W-JRK-001 PEM

Photos 73-75

Photos 70-72

W-JRK-003 UPL

W-JRK-003 WDP

Photos 40-42

S-JRK-011

W-JRK-004 PEM WDP

W-JRK-004 UPL

Photos 67-69

W-JRK-002 UPL

W-JRK-002 PEM WDP

W-JRK-003 PEM

W-JRK-002 PEM

S-JRK-011

SR 009 RIVER RD

N

BASE MAP SOURCES:
AERIAL IMAGERY: GOOGLE MAPS SATELLITE

WETLAND AND WATERWAY DELINEATION COMPLETED BY AECOM AUGUST-SEPTEMBER 2023

Legend

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- WETLAND DATA POINT
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AECOM

STANDARD CHLORINE OF DELAWARE SUPERFUND SITE
FIGURE 4
RESOURCE DELINEATION MAP
NEW CASTLE, NEW CASTLE COUNTY, DE

Prepared by: MWC	Checked by: JRK	Date: 6/13/2024	Page 7 of 8

Page 7

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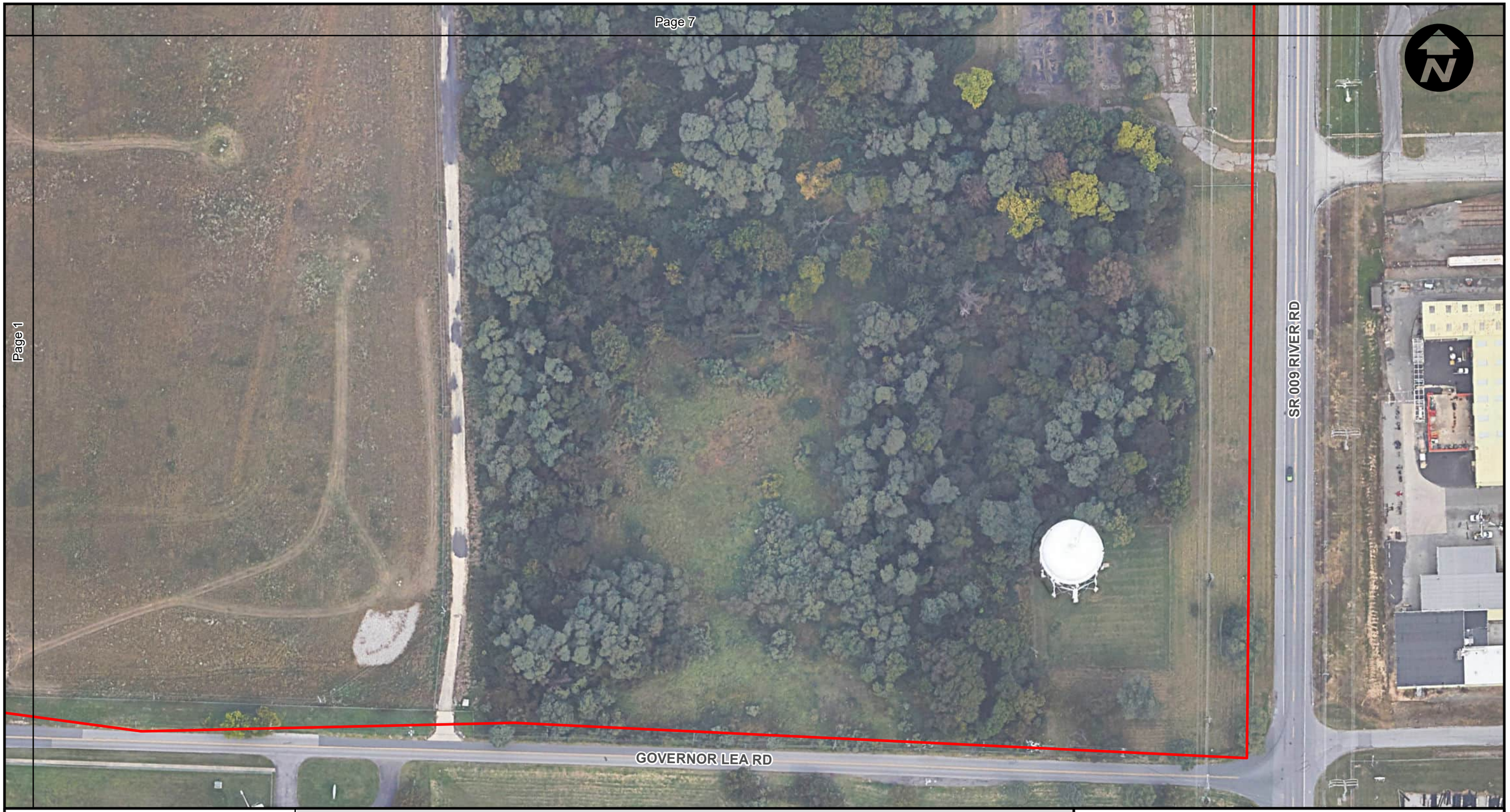

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AERIAL IMAGERY: GOOGLE MAPS SATELLITE

WETLAND AND WATERWAY DELINEATION COMPLETED BY AECOM AUGUST-SEPTEMBER 2023

Legend

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AECOM

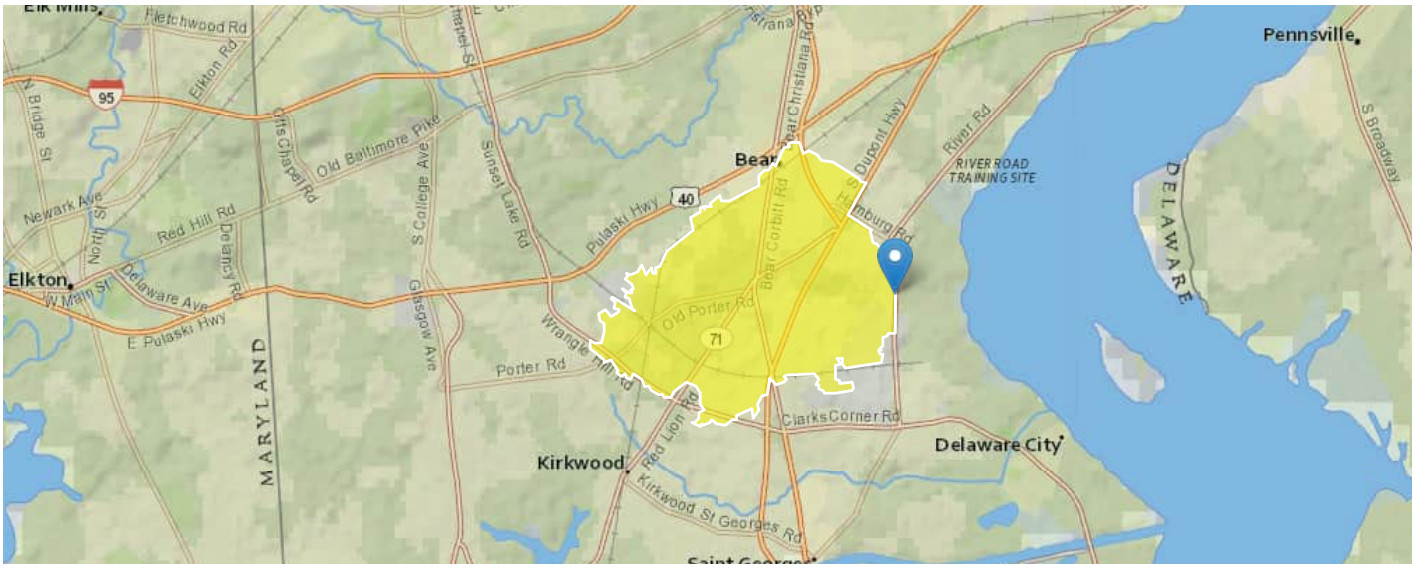
STANDARD CHLORINE OF DELAWARE SUPERFUND SITE
FIGURE 4
RESOURCE DELINEATION MAP
NEW CASTLE, NEW CASTLE COUNTY, DE

Prepared by: MWC	Checked by: JRK	Date: 6/13/2024	Page 8 of 8

Appendix A – USGS Streamstats Results

StreamStats Report

Region ID: DE
Workspace ID: DE20231106154925082000
Clicked Point (Latitude, Longitude): 39.60537, -75.63060
Time: 2023-11-06 10:49:51 -0500



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	8.67	square miles

Bankfull Statistics

Bankfull Statistics Parameters [Atlantic Plain D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.67	square miles	0.30888	1086.8715

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.67	square miles	0.07722	59927.7393

Bankfull Statistics Parameters [VA MD Coastal Plain bankfull SIR2007 5162]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	8.67	square miles	0.28	113

Bankfull Statistics Flow Report [Atlantic Plain D Bieger 2015]

Statistic	Value	Unit
Bieger_D_channel_width	22.5	ft

Statistic	Value	Unit
Bieger_D_channel_depth	2.15	ft
Bieger_D_channel_cross_sectional_area	46.4	ft^2

Bankfull Statistics Flow Report [USA Bieger 2015]

Statistic	Value	Unit
Bieger_USA_channel_width	26.5	ft
Bieger_USA_channel_depth	1.91	ft
Bieger_USA_channel_cross_sectional_area	54.9	ft^2

Bankfull Statistics Flow Report [VA MD Coastal Plain bankfull SIR2007 5162]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE
Bankfull Width	23	ft	23.1
Bankfull Depth	2.07	ft	18.1
Bankfull Area	47.6	ft^2	28.6
Bankfull Streamflow	103	ft^3/s	59.3

Bankfull Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit	
Bieger_D_channel_width	22.5	ft	
Bieger_D_channel_depth	2.15	ft	
Bieger_D_channel_cross_sectional_area	46.4	ft^2	
Bieger_USA_channel_width	26.5	ft	
Bieger_USA_channel_depth	1.91	ft	
Bieger_USA_channel_cross_sectional_area	54.9	ft^2	
Bankfull Width	23	ft	23.1
Bankfull Depth	2.07	ft	18.1
Bankfull Area	47.6	ft^2	28.6
Bankfull Streamflow	103	ft^3/s	59.3

Bankfull Statistics Citations

Bieger, Katrin; Rathjens, Hendrik; Allen, Peter M.; and Arnold, Jeffrey G.,2015, Development and Evaluation of Bankfull Hydraulic Geometry Relationships for the Physiographic Regions of the United States, Publications from USDA-ARS / UNL Faculty, 17p. (https://digitalcommons.unl.edu/usdaarsfacpub/1515?utm_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1515&utm_medium=PDF&utm_campaign=PDFCoverPages)

Krstolic, J.L., and Chaplin, J.J.2007, Bankfull regional curves for streams in the non-urban, non-tidal Coastal Plain Physiographic Province, Virginia and Maryland: U.S. Geological Survey Scientific Investigations Report 2007–5162, 48 p. (https://pubs.usgs.gov/sir/2007/5162/pdf/SIR2007-5162.pdf)

Application Version: 4.18.1
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

Appendix B – Wetland Data Forms

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/1/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-001-PEM 1

Investigator(s): J. Keil, C. Barrett Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Depression Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.601738 Long: -75.638349 Datum: NAD 83

Soil Map Unit Name: SaE: Sassafras sandy loam, 10 to 15% slopes NWI classification: PEM1R

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
This is the data point for the palustrine emergent wetland (PEM) community within wetland (001) dominated by phragmities and beginning south of a berm and is adjacent to a palustrine forested wetland (PFO) community. It is in a depression and had surface water in spots (not at soil core) as well as a mucky surface.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 2.5
Water Table Present?	Yes X	No ____	Depth (inches): 10
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Several primary and secondary indicators of wetland hydrology were observed. Wetland hydrology is present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-001-PEM 1

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. *Fraxinus pennsylvanica*	5	Yes	FACW
2. *Acer negundo*	5	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	10 =Total Cover		
50% of total cover: 5	20% of total cover: 2		
Herb Stratum (Plot size: 30 ft)			
1. *Phragmites australis*	90	Yes	FACW
2. *Boehmeria cylindrica*	5	No	FACW
3. *Onoclea sensibilis*	5	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 =Total Cover		
50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 30 ft)			
1. *Persicaria perfoliata*	10	Yes	FAC
2. *Vitis aestivalis*	2	No	FACU
3.			
4.			
5.			
	12 =Total Cover		
50% of total cover: 6	20% of total cover: 3		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	105	x 2 =	210
FAC species	15	x 3 =	45
FACU species	2	x 4 =	8
UPL species	0	x 5 =	0
Column Totals:	122 (A)		263 (B)

Prevalence Index = B/A = 2.16

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed meets the dominance test and prevalence index indicators for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-001-PEM 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/2	90	7.5YR 5/6	10	C	M	Mucky Loam/Clay	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- X Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** ___

Remarks:

Soil characteristics observed meet requirements for depleted matrix and anomalous bright floodplain soil indicators. Hydric soil is present.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/1/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-001 PEM 2

Investigator(s): J. Keil, C. Barrett Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Hillside Local relief (concave, convex, none): concave Slope (%): 15

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.601924 Long: -75.639072 Datum: NAD 83

Soil Map Unit Name: SaE: Sassafras sandy loam, 10 to 15% slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
The palustrine emergent wetland (PEM) is within the right of way and has spring seeps flowing through the wetland eastward towards the forested wetland. It is a depression along a hillslope.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15) **(LRR U)**
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ____ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 1
Water Table Present?	Yes ____	No X	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Several primary and secondary indicators of wetland hydrology were observed. Wetland hydrology is present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-001 PEM 2

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *fraxinus pennsylvanica*	2	No	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	2 =Total Cover		
50% of total cover: 1	20% of total cover: 1		
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. *fraxinus pennsylvanica*	5	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	5 =Total Cover		
50% of total cover: 3	20% of total cover: 1		
Herb Stratum (Plot size: 30 ft)			
1. *phragmites australis*	30	Yes	FACW
2. *onoclea sensibilis*	15	Yes	FACW
3. *Cyperus strigosus*	30	Yes	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	75 =Total Cover		
50% of total cover: 38	20% of total cover: 15		
Woody Vine Stratum (Plot size: 30 ft)			
1. *Ampelopsis brevipedunculata*	15	Yes	UPL
2.			
3.			
4.			
5.			
	15 =Total Cover		
50% of total cover: 8	20% of total cover: 3		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	82	x 2 =	164
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	15	x 5 =	75
Column Totals:	97 (A)		239 (B)

Prevalence Index = B/A = 2.46

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed meets the dominance test and prevalence index indicators for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-001 PEM 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	100			C	M	Loamy/Clayey	Modified mucky mineral
8-18	2.5Y 4/2	80	10YR 5/6	20	C	M	Loamy/Clayey	Silty loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- X Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- X Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** ___

Remarks:

Soil characteristics observed meet requirements for depleted matrix, piedmont floodplain soils, and anomalous bright floodplain soil indicators. Hydric soils are present.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/8/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-001 PEM 3

Investigator(s): J. Keil, M. Curran Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): concave Slope (%): 8

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.605065 Long: -75.630437 Datum: NAD 83

Soil Map Unit Name: W - Water NWI classification: E1UBL

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
The palustrine emergent wetland (PEM) is located in the floodplain of the Red Lion River near well point #1, west of River Road bridge crossing.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes X	No ____	Depth (inches): 4
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Several primary and secondary indicators of wetland hydrology were observed. Wetland hydrology is present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-001 PEM 3

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 30 ft)			
1. *Phragmites australis*	70	Yes	FACW
2. *Persicaria punctata*	5	No	OBL
3. *Persicaria pensylvanica*	5	No	FACW
4. *Pontederia cordata*	10	No	OBL
5. *Leersia oryzoides*	5	No	OBL
6. *Hibiscus moscheutos*	5	No	OBL
7.			
8.			
9.			
10.			
11.			
12.			
	100 =Total Cover		
50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 30 ft)			
1. *Persicaria perfoliata*	10	Yes	FAC
2.			
3.			
4.			
5.			
	10 =Total Cover		
50% of total cover: 5	20% of total cover: 2		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	25	x 1 =	25
FACW species	75	x 2 =	150
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	110 (A)		205 (B)

Prevalence Index = B/A = 1.86

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed meets the dominance test and prevalence index indicators for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-001 PEM 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2	100			C	M	Mucky Loam/Clay	Mucky mineral
2-10	10YR 4/1	90	10YR 4/4	10	C	M	Loamy/Clayey	Sandy loam
10-11	5YR 4/1	100			C	M	Mucky Loam/Clay	Silty clay loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- X Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** ___

Remarks:

Soil characteristics observed meet requirements for depleted below dark surface, depleted matrix, and anomalous bright floodplain soil indicators. Hydric soils are present.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/1/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-001 PFO 1A

Investigator(s): J. Keil, C. Barrett Section, Township, Range: N/A

Landform (hillside, terrace, etc.): hillside Local relief (concave, convex, none): concave Slope (%): 7

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.601929 Long: -75.638872 Datum: NAD 83

Soil Map Unit Name: SaE: Sassafras sandy loam, 10 to 15% slopes NWI classification: PFO1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
This palustrine forested wetland (PFO) community point is located downslope of groundwater seeps and included lots of buttressed roots and microdepressions. The point was taken on the western most side of the study area. The PFO is large and encompasses most of the western side of the study area. This was the first of two points taken to describe this specific community type.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15) **(LRR U)**
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ____ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 1
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Several primary and secondary indicators of wetland hydrology were observed. Wetland hydrology is present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-001 PFO 1A

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	85	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	85 =Total Cover		
50% of total cover: 43	20% of total cover: 17		
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. *Fraxinus pennsylvanica*	40	Yes	FACW
2. *Viburnum dentatum*	5	No	FAC
3. *Malus sylvestris*	5	No	UPL
4.			
5.			
6.			
7.			
8.			
	50 =Total Cover		
50% of total cover: 25	20% of total cover: 10		
Herb Stratum (Plot size: 30 ft)			
1. *Onoclea sensibilis*	25	Yes	FACW
2. *Phragmites australis*	10	No	FACW
3. *Cyperus strigosus*	10	No	FACW
4. *Microstegium vimineum*	15	Yes	FAC
5. *Smilax rotundifolia*	5	No	FAC
6. *Rosa multiflora*	5	No	FACU
7.			
8.			
9.			
10.			
11.			
12.			
	70 =Total Cover		
50% of total cover: 35	20% of total cover: 14		
Woody Vine Stratum (Plot size: 30 ft)			
1. *Toxicodendron radicans*	10	Yes	FAC
2.			
3.			
4.			
5.			
	10 =Total Cover		
50% of total cover: 5	20% of total cover: 2		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	85	x 2 =	170
FAC species	120	x 3 =	360
FACU species	5	x 4 =	20
UPL species	5	x 5 =	25
Column Totals:	215 (A)		575 (B)

Prevalence Index = B/A = 2.67

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed meets the dominance test and prevalence index indicators for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-001 PFO 1A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/1	95	5YR 3/4	5	C	M	Loamy/Clayey	Prominent redox concentrations
10-18	10YR 5/2	95	10YR 5/8	5	C	M	Mucky Loam/Clay	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ____ **No** ____

Remarks:

Soil characteristics observed meet requirements for depleted below dark surface, depleted matrix, and redox dark surface indicators. Hydric soils are present.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/5/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-001 PFO 1B

Investigator(s): J. Keil, M. Curran Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Depression Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.599811 Long: -75.639334 Datum: NAD 83

Soil Map Unit Name: SaE: Sassafras sandy loam, 10 to 15% slopes NWI classification: PFO1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
This palustrine forested wetland (PFO) community was taken at the southern end of the western side of wetland (001). The community is the same as (W-JRK-001 PFO1A) but located far to the south.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Several primary and secondary indicators of wetland hydrology were observed. Wetland hydrology is present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-001 PFO 1B

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	85	Yes	FAC
2. *Platanus occidentalis*	10	No	FACW
3. *Liquidambar styraciflua*	2	No	FAC
4.			
5.			
6.			
7.			
8.			
	97	=Total Cover	
50% of total cover: 49		20% of total cover:	20
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. *Lindera benzoin*	20	Yes	FACW
2. *Elaeagnus angustifolia*	5	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
	25	=Total Cover	
50% of total cover: 13		20% of total cover:	5
Herb Stratum (Plot size: 30 ft)			
1. *Microstegium vimineum*	30	Yes	FAC
2. *Lindera benzoin*	10	Yes	FACW
3. *Rosa multiflora*	10	Yes	FACU
4. *Boehmeria cylindrica*	10	Yes	FACW
5. *Alliaria petiolata*	5	No	FACU
6. *Lonicera japonica*	5	No	FACU
7.			
8.			
9.			
10.			
11.			
12.			
	70	=Total Cover	
50% of total cover: 35		20% of total cover:	14
Woody Vine Stratum (Plot size: 30 ft)			
1. *Vitis aestivalis*	2	Yes	FACU
2. *Celastrus orbiculatus*	5	Yes	FACU
3. *Toxicodendron radicans*	2	Yes	FAC
4.			
5.			
	9	=Total Cover	
50% of total cover: 5		20% of total cover:	2

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	119	x 3 =	357
FACU species	32	x 4 =	128
UPL species	0	x 5 =	0
Column Totals:	201 (A)		585 (B)

Prevalence Index = B/A = 2.91

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed meets the dominance test and prevalence index indicators for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-001 PFO 1B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/2	100			C	M	Loamy/Clayey	Loam
3-14	2.5Y 6/2	90	10YR 5/6	10	C	M	Loamy/Clayey	Silty loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** ___

Remarks:

Soil characteristics observed meet requirements for depleted below dark surface, and depleted matrix indicators. Hydric soils are present.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/1/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-001 PFO 2

Investigator(s): J. Keil, C. Barrett Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Depression Local relief (concave, convex, none): concave Slope (%): 5

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.601576 Long: -75.638198 Datum: NAD 83

Soil Map Unit Name: SaE: Sassafras sandy loam, 10 to 15% slopes NWI classification: PFO1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
This palustrine forested wetland (PFO) community was taken just southwest of the data point for community PEM 1 as the communities change from PEM to PFO. Data point is located on the eastern side of the southwest portion of study area.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- X Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ____ No ____ Depth (inches): ____

Water Table Present? Yes ____ No ____ Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Several primary and secondary indicators of wetland hydrology were observed. Wetland hydrology is present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-001 PFO 2

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Fraxinus pennsylvanica*	40	Yes	FACW
2. *Salix nigra*	40	Yes	OBL
3. *Acer rubrum*	10	No	FAC
4.			
5.			
6.			
7.			
8.			
	90	=Total Cover	
50% of total cover: 45		20% of total cover:	18
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. *Viburnum dentatum*	15	Yes	FAC
2. *Lindera benzoin*	15	Yes	FACW
3. *Fraxinus pennsylvanica*	5	No	FACW
4.			
5.			
6.			
7.			
8.			
	35	=Total Cover	
50% of total cover: 18		20% of total cover:	7
Herb Stratum (Plot size: 30 ft)			
1. *Phragmites australis*	30	Yes	FACW
2. *Onoclea sensibilis*	40	Yes	FACW
3. *Boehmeria cylindrica*	25	Yes	FACW
4. *Impatiens capensis*	5	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100	=Total Cover	
50% of total cover: 50		20% of total cover:	20
Woody Vine Stratum (Plot size: 30 ft)			
1. *Toxicodendron radicans*	5	Yes	FAC
2. *Persicaria perfoliata*	5	Yes	FAC
3. *Parthenocissus quinquefolia*	5	Yes	FACU
4.			
5.			
	15	=Total Cover	
50% of total cover: 8		20% of total cover:	3

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 9 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 90.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	x 1 =	40
FACW species	160	x 2 =	320
FAC species	35	x 3 =	105
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	240 (A)		485 (B)

Prevalence Index = B/A = 2.02

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed meets the dominance test and prevalence index indicators for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-001 PFO 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 5/8	100			C	M	Sandy	
3-6	10YR 3/2	100			C	M	Sandy	
6-14	10YR 4/1	85	5YR 4/6	15	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** ___

Remarks:

Soil characteristics observed meet requirements for a depleted matrix indicator. Hydric soils are present.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/6/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-001 PFO 3

Investigator(s): J. Keil, M. Curran Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): concave Slope (%): 5

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.604426 Long: -75.633707 Datum: NAD 83

Soil Map Unit Name: NM: Nanticoke and Mannington soils, very frequently flooded, tidal NWI classification: E2EM5P6

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
This palustrine forested wetland (PFO) community is located north of the facility and fringes between the upland forest and the PEM wetland within the direct floodplain of the Red Lion Creek.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): 0
Water Table Present?	Yes X	No ____	Depth (inches): 8
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Several primary and secondary indicators of wetland hydrology were observed. Wetland hydrology is present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-001 PFO 3

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	80	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	80 =Total Cover		
50% of total cover: 40		20% of total cover: 16	
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. *Viburnum dentatum*	5	Yes	FAC
2. *Acer rubrum*	5	Yes	FAC
3. *Salix nigra*	5	Yes	OBL
4.			
5.			
6.			
7.			
8.			
	15 =Total Cover		
50% of total cover: 8		20% of total cover: 3	
Herb Stratum (Plot size: 30 ft)			
1. *Phragmites australis*	50	Yes	FACW
2. *Carex lurida*	5	No	OBL
3. *Boehmeria cylindrica*	10	No	FACW
4. *Woodwardia areolata*	20	Yes	OBL
5. *Liquidambar styraciflua*	2	No	FAC
6. *Osmundastrum cinnamomeum*	2	No	FACW
7. *Arisaema triphyllum*	2	No	FACW
8. *Epilobium ciliatum*	10	No	FACW
9.			
10.			
11.			
12.			
	101 =Total Cover		
50% of total cover: 51		20% of total cover: 21	
Woody Vine Stratum (Plot size: 30 ft)			
1. *Vitis riparia*	2	No	FACW
2. *Celastrus orbiculatus*	5	Yes	FACU
3. *Lonicera japonica*	10	Yes	FACU
4.			
5.			
	17 =Total Cover		
50% of total cover: 9		20% of total cover: 4	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30	x 1 =	30
FACW species	76	x 2 =	152
FAC species	92	x 3 =	276
FACU species	15	x 4 =	60
UPL species	0	x 5 =	0
Column Totals:	213 (A)		518 (B)

Prevalence Index = B/A = 2.43

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed meets the dominance test and prevalence index indicators for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-001 PFO 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/2	100			C	M	Mucky Loam/Clay	Mucky mineral
3-8	2.5YR 5/1	95	2.5Y 5/4	5	C	M	Loamy/Clayey	Silty loam
8-14	2.5Y 6/1	95	2.5Y 5/4	5	C	M	Loamy/Clayey	Silty clay cloam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** ___

Remarks:

Soil characteristics observed meet requirements for depleted below dark surface, and depleted matrix indicators. Hydric soils are present.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/1/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-001 UPL 1

Investigator(s): J. Keil, C. Barrett Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Hillslope Local relief (concave, convex, none): convex Slope (%): 20

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.601432 Long: -75.63808 Datum: NAD 83

Soil Map Unit Name: SaE: Sassafras sandy loam, 10 to 15% slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
This upland data point was taken in association with PFO 2 of Wetland 001. The point was taken east and upslope from PFO 2 data point along a berm.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ____ No ____ Depth (inches): ____

Water Table Present? Yes ____ No ____ Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No hydrology indicators were observed.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-001 UPL 1

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Carya glabra*	10	No	FACU
2. *Prunus serotina*	20	Yes	FACU
3. *Acer rubrum*	25	Yes	FAC
4. *Liriodendron tulipifera*	30	Yes	FACU
5.			
6.			
7.			
8.			
	85	=Total Cover	
50% of total cover: 43		20% of total cover:	17
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. *Sassafras albidum*	1	No	FACU
2. *Clethra alnifolia*	40	Yes	FACW
3. *Carya glabra*	5	No	FACU
4.			
5.			
6.			
7.			
8.			
	46	=Total Cover	
50% of total cover: 23		20% of total cover:	10
Herb Stratum (Plot size: 30 ft)			
1. *Clethra alnifolia*	70	Yes	FACW
2. *Athyrium filix-femina*	5	No	UPL
3. *Sassafras albidum*	10	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	85	=Total Cover	
50% of total cover: 43		20% of total cover:	17
Woody Vine Stratum (Plot size: 30 ft)			
1. *Smilax rotundifolia*	15	Yes	FAC
2.			
3.			
4.			
5.			
	15	=Total Cover	
50% of total cover: 8		20% of total cover:	3

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	110	x 2 =	220
FAC species	40	x 3 =	120
FACU species	76	x 4 =	304
UPL species	5	x 5 =	25
Column Totals:	231 (A)		669 (B)

Prevalence Index = B/A = 2.90

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed meets the dominance test indicator for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-001 UPL 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-1	10YR 3/3	100			C	M	Loamy/Clayey	Loam
1-12	10YR 4/6	100			C	M	Loamy/Clayey	Loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

Hydric soil indicators are not present.

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region** See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R	*OMB Control #: 0710-0024, Exp: 11/30/2024* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/1/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-001 UPL 2

Investigator(s): J. Keil, C. Barrett Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Hillside Local relief (concave, convex, none): convex Slope (%): 10

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.602037 Long: -75.638971 Datum: NAD 83

Soil Map Unit Name: SaE: Sassafras sandy loam, 10 to 15% slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
This upland data point was taken in association with community point PEM 2 of Wetland 001. The point was taken north and upslope of the wetland point/boundary within cleared ROW.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No ____	Depth (inches): ____
Water Table Present?	Yes ____	No ____	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No ____	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No hydrology indicators were observed.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-001 UPL 2

Tree Stratum (Plot size: 30ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *prunus serotina*	10	Yes	FACU
2. *liriodendron tulipifera*	5	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
	15	=Total Cover	
50% of total cover: 8		20% of total cover: 3	

Sapling/Shrub Stratum (Plot size: 30ft)			
1. *fraxinus pennsylvanica*	5	Yes	FACW
2. *Malus hupehensis*	2	Yes	UPL
3.			
4.			
5.			
6.			
7.			
8.			
	7	=Total Cover	
50% of total cover: 4		20% of total cover: 2	

Herb Stratum (Plot size: 30 ft)			
1. *apocynum cannabinum*	10	No	FACU
2. *dichanthelium clandestinum*	10	No	FACW
3. *rubus allegheniensis*	20	Yes	UPL
4. *solanum carolinense*	15	Yes	FACU
5. *boehmeria cylindrica*	15	Yes	FACW
6. *cyperus strigosus*	30	Yes	FACW
7.			
8.			
9.			
10.			
11.			
12.			
	100	=Total Cover	
50% of total cover: 50		20% of total cover: 20	

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 37.5% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	60	x 2 =	120
FAC species	0	x 3 =	0
FACU species	40	x 4 =	160
UPL species	22	x 5 =	110
Column Totals:	122 (A)		390 (B)

Prevalence Index = B/A = 3.20

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed does not meet an indicator for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-001 UPL 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/4	100			C	M	Loamy/Clayey	Loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

No hydric soil indicators were observed.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/6/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-001 UPL 3

Investigator(s): J. Keil, M. Curran Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Hillslope Local relief (concave, convex, none): convex Slope (%): 5

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.603077 Long: -75.635812 Datum: NAD 83

Soil Map Unit Name: SaD - Sassafras sandy loam, 10 to 15 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Upland data point taken in association with PFO 3 of Wetland 001. Point is located upslope and southwest from PFO 3 data point.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ____ No ____ Depth (inches): ____

Water Table Present? Yes ____ No ____ Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No indicators for wetland hydrology were observed.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-001 UPL 3

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Liriodendron tulipifera*	50	Yes	FACU
2. *Juglans nigra*	10	No	UPL
3. *Prunus serotina*	15	No	FACU
4. *Acer saccharinum*	10	No	FACU
5.			
6.			
7.			
8.			
	85	=Total Cover	
50% of total cover: 43		20% of total cover:	17

Sapling/Shrub Stratum (Plot size: 30 ft)			
1. *Lindera benzoin*	20	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	20	=Total Cover	
50% of total cover: 10		20% of total cover:	4

Herb Stratum (Plot size: 30 ft)			
1. *Rubus allegheniensis*	15	Yes	UPL
2. *Cinna arundinacea*	15	Yes	FACW
3. *Smilax rotundifolia*	20	Yes	FAC
4. *Celastrus orbiculatus*	15	Yes	FACU
5. *Microstegium vimineum*	10	No	FAC
6. *Lonicera japonica*	20	Yes	FACU
7. *Athyrium filix-femina*	5	No	UPL
8.			
9.			
10.			
11.			
12.			
	100	=Total Cover	
50% of total cover: 50		20% of total cover:	20

Woody Vine Stratum (Plot size: 30 ft)			
1. *Celastrus orbiculatus*	20	Yes	FACU
2. *Toxicodendron radicans*	10	Yes	FAC
3.			
4.			
5.			
	30	=Total Cover	
50% of total cover: 15		20% of total cover:	6

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 44.4% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	35	x 2 =	70
FAC species	40	x 3 =	120
FACU species	130	x 4 =	520
UPL species	30	x 5 =	150
Column Totals:	235 (A)		860 (B)
Prevalence Index = B/A =			3.66

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed did not meet any indicators for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-001 UPL 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/3	100						Loam
10-16	10YR 4/2	90	10YR 4/6	10	C	M	Loamy/Clayey	Clay loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Soil characteristics observed meet requirements for a depleted matrix indicator. Hydric soils are present.

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region** See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R	*OMB Control #: 0710-0024, Exp: 11/30/2024* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/8/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-001 UPL 4

Investigator(s): J. Keil, M. Curran Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 8

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.604966 Long: -75.63044 Datum: NAD 83

Soil Map Unit Name: NM: Nanticoke and Mannington soils, very frequently flooded, tidal NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil X, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** X
Hydric Soil Present?	Yes ____	No ____	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
This upland point was taken within an old overgrown boat ramp along a hillslope south of the wetland data point (PEM 3). Soil is disturbed due to the presence of fill material off of the roadside (boat launch area).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No indicators for wetland hydrology were observed.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-001 UPL 4

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. *Rhus typhina*	5	Yes	UPL
2. *Morus alba*	2	Yes	FACU
3. *Baptisia australis*	2	Yes	FACU
4. *Phytolacca americana*	2	Yes	FACU
5.			
6.			
7.			
8.			
	11 =Total Cover		
50% of total cover: 6	20% of total cover: 3		
Herb Stratum (Plot size: 30 ft)			
1. *Plantago lanceolata*	15	No	FACU
2. *Dactylis glomerata*	30	Yes	FACU
3. *Setaria pumila*	10	No	FAC
4. *Panicum virgatum*	30	Yes	FAC
5. *Phragmites australis*	10	No	FACW
6. *Artemisia vulgaris*	5	No	UPL
7. *Hibiscus moscheutos*	5	No	OBL
8.			
9.			
10.			
11.			
12.			
	105 =Total Cover		
50% of total cover: 53	20% of total cover: 21		
Woody Vine Stratum (Plot size: 30 ft)			
1. *Lonicera japonica*	10	Yes	FACU
2. *Persicaria sagittata*	2	No	OBL
3. *Vitis riparia*	5	Yes	FACW
4. *Ampelopsis brevipedunculata*	5	Yes	UPL
5.			
	22 =Total Cover		
50% of total cover: 11	20% of total cover: 5		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 22.2% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	7	x 1 =	7
FACW species	15	x 2 =	30
FAC species	40	x 3 =	120
FACU species	61	x 4 =	244
UPL species	15	x 5 =	75
Column Totals:	138 (A)		476 (B)

Prevalence Index = B/A = 3.45

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed does not meet any indicators for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-001 UPL 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/3	100			C	M	Loamy/Clayey	Loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Gravel

Depth (inches): 3

Hydric Soil Present? **Yes** ___ **No** ___

Remarks:

No soil indicators were found. There was a refusal layer of gravel at 3 inches deep.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/11/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-002 PEM

Investigator(s): J. Keil, M. Curran Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 8

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.601811 Long: -75.633221 Datum: NAD 83

Soil Map Unit Name: SaD: Sassafras sandy loam, 10 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
This palustrine emergent wetland (PEM) is a depressional wetland that surrounds the banks of stream S-JRK-011 on the east side of the study area. This wetland is dominated by invasives.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Several primary and secondary indicators of wetland hydrology were observed. Wetland hydrology is present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-002 PEM

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer saccharinum*	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	10 =Total Cover		
50% of total cover: 5	20% of total cover: 2		
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. *Lonicera maackii*	5	Yes	UPL
2. *Lindera benzoin*	10	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	15 =Total Cover		
50% of total cover: 8	20% of total cover: 3		
Herb Stratum (Plot size: 30 ft)			
1. *Microstegium vimineum*	70	Yes	FAC
2. *Phragmites australis*	50	Yes	FACW
3. *Cinna arundinacea*	5	No	FACW
4. *Ampelopsis brevipedunculata*	25	No	UPL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	150 =Total Cover		
50% of total cover: 75	20% of total cover: 30		
Woody Vine Stratum (Plot size: 30 ft)			
1. *Toxicodendron radicans*	10	Yes	FAC
2. *Celastrus orbiculatus*	5	Yes	FACU
3. *Rubus idaeus*	10	Yes	FACU
4.			
5.			
	25 =Total Cover		
50% of total cover: 13	20% of total cover: 5		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 62.5% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	65	x 2 =	130
FAC species	90	x 3 =	270
FACU species	15	x 4 =	60
UPL species	30	x 5 =	150
Column Totals:	200 (A)		610 (B)
Prevalence Index = B/A =			3.05

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed meets the dominance test indicator for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-002 PEM

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-2	10YR 4/1	100			C	M	Loamy/Clayey	Silty loam
2-16	10YR 5/2	60	10YR 4/6	5	C	M	Mucky Loam/Clay	Co matrix of 10YR 4/1 at 35%

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** ___

Remarks:

Soil charactersitics observed meet requirements for a depleted matrix indicator. Hydric soils are present.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/11/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-002 UPL

Investigator(s): J. Keil, M. Curran Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Hillslope Local relief (concave, convex, none): convex Slope (%): 15

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.601884 Long: -75.633282 Datum: NAD 83

Soil Map Unit Name: SaD: Sassafras sandy loam, 10 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
This upland point was taken in association with wetland W-JRK-002 and is located upslope and north of the wetland point and boundary. Upland point is located in forested area with sparse herbaceous cover.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ____ No ____ Depth (inches): ____

Water Table Present? Yes ____ No ____ Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No indicators of wetland hydrology were observed.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-002 UPL

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Juglans nigra*	30	Yes	UPL
2. *Malus hupehensis*	20	Yes	UPL
3. *Celtis occidentalis*	5	No	FACU
4.			
5.			
6.			
7.			
8.			
	55	=Total Cover	
50% of total cover: 28		20% of total cover:	11
Sapling/Shrub Stratum (Plot size: 30 ft)			
1. *Lonicera maackii*	40	Yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	40	=Total Cover	
50% of total cover: 20		20% of total cover:	8
Herb Stratum (Plot size: 30 ft)			
1. *Potentilla indica*	15	Yes	FACU
2. *Geum canadense*	5	No	FAC
3. *Lonicera japonica*	20	Yes	FACU
4. *Rubus phoenicolasius*	5	No	FACU
5. *Parthenocissus quinquefolia*	5	No	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50	=Total Cover	
50% of total cover: 25		20% of total cover:	10
Woody Vine Stratum (Plot size: 30 ft)			
1. *Rubus phoenicolasius*	10	Yes	FACU
2. *Vitis aestivalis*	5	Yes	FACU
3.			
4.			
5.			
	15	=Total Cover	
50% of total cover: 8		20% of total cover:	3

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	5	x 3 =	15
FACU species	65	x 4 =	260
UPL species	90	x 5 =	450
Column Totals:	160 (A)		725 (B)

Prevalence Index = B/A = 4.53

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed did not meet any indicators for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-002 UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/2	100			C	M	Loamy/Clayey	Loam
3-12	10YR 4/3	100			C	M	Loamy/Clayey	Silty loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

No indicators for hydric soil were observed.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/12/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-003 PEM

Investigator(s): J. Keil, M. Curran Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Depression Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.602165 Long: -75.634411 Datum: NAD 83

Soil Map Unit Name: SaD: Sassafras sandy loam, 10 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil X, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
Wetland is a palustrine emergent (PEM) wetland located in a depressioon to the northeast side of the facility. The wetland extends extends both north and south of the facilities northern fence and is dominated by Phragmites and Juncus. Soil is disturbed due to the presence of fill material.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Several secondary indicators for wetland hydrology were observed, including geomorphic position and the FAC-neutral test. Wetland hydrology is present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-003 PEM

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 30 ft)			
1. *Phragmites australis*	50	Yes	FACW
2. *Persicaria punctata*	20	Yes	OBL
3. *Juncus effusus*	20	Yes	OBL
4. *Persicaria pensylvanica*	5	No	FACW
5. *Setaria viridis*	5	No	UPL
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 =Total Cover		
50% of total cover: 50	20% of total cover: 20		
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	x 1 =	40
FACW species	55	x 2 =	110
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	5	x 5 =	25
Column Totals:	100 (A)		175 (B)
Prevalence Index = B/A =			1.75

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed meets dominance test and prevalence index indicators for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-003 PEM

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 5/2	90	10YR 5/6	10	C	M	Mucky Loam/Clay	Silty clay loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Compaction and gravel

Depth (inches): 6

Hydric Soil Present? **Yes** ___ **No** ___

Remarks:

Soil characteristics observed meets requirements for depleted matrix and redox depressions indicators. Hydric soils are present.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/12/2023

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-003 UPL

Investigator(s): J. Keil, M. Curran Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Plane Local relief (concave, convex, none): none Slope (%): 1

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.602167 Long: -75.634347 Datum: NAD 83

Soil Map Unit Name: SaD: Sassafras sandy loam, 10 to 15 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil X, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
This upland point was taken in association with W-JRK-003. The point was taken upslope and east of the wetland boundary and data point. Soil is disturbed due to the presence of fill material.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No indicators for wetland hydrology were observed.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-003 UPL

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 30 ft)			
1. *Panicum virgatum*	30	Yes	FAC
2. *Lespedeza cuneata*	30	Yes	FACU
3. *Setaria viridis*	5	No	UPL
4. *Poa compressa*	10	No	FACU
5. *Tridens flavus*	5	No	FACU
6. *Phragmites australis*	5	No	FACW
7.			
8.			
9.			
10.			
11.			
12.			
	85 =Total Cover		
50% of total cover: 43	20% of total cover: 17		
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	5	x 2 =	10
FAC species	30	x 3 =	90
FACU species	45	x 4 =	180
UPL species	5	x 5 =	25
Column Totals:	85 (A)		305 (B)

Prevalence Index = B/A = 3.59

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed did not meet any indicators for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-003 UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/2	100			C	M	Loamy/Clayey	Silty loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Fill material

Depth (inches): 3

Hydric Soil Present? **Yes** ___ **No** ___

Remarks:

No indicators for hydric soils were observed.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/12/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-004 PEM

Investigator(s): J. Keil, M. Curran Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.602229 Long: -75.634831 Datum: NAD 83

Soil Map Unit Name: SaD: Sassafras sandy loam, 10 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil X, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
Wetland is a palustrine emergent (PEM) wetland depression located just west of the access road and across the access road from wetland W-JRK-003. This wetland also extends north and south of the facilities northern fence. Soil is disturbed due to the presence of fill material.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Several hydrology indicators were observed including geomorphic position and the FAC-neutral test.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-004 PEM

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 30 ft)			
1. *Phragmites australis*	80	Yes	FACW
2. *Juncus effusus*	40	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	120 =Total Cover		
50% of total cover: 60	20% of total cover: 24		
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	x 1 =	40
FACW species	80	x 2 =	160
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	120 (A)		200 (B)

Prevalence Index = B/A = 1.67

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed meets dominance test and prevalence index indicators for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-004 PEM

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4	10YR 4/2	100					Loamy/Clayey	Loam
4-7	10Y 5/2	90	10YR 5/6	10	C	M	Loamy/Clayey	Loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: compaction / fill

Depth (inches): 7

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Soil characteristics observed meet the requirements of a redox depressions indicator. Hydric soils are present. Auger refusal at 7 inches due to fill/ compaction.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/12/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-004 UPL

Investigator(s): J. Keil, M. Curran Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Plane Local relief (concave, convex, none): none Slope (%): 1

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.602216 Long: -75.634693 Datum: NAD 83

Soil Map Unit Name: SaD: Sassafras sandy loam, 10 to 15 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil X, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
The upland point was taken in association with wetland W-JRK-004. The point was taken east of the boundary across the access road. Soil is disturbed due to presence of fill material.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Only one secondary indicator for wetland hydrology was observed. Therefore, wetland hydrology is not present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-004 UPL

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 30 ft)			
1. *Panicum virgatum*	40	Yes	FAC
2. *Agrostis gigantea*	25	Yes	FACW
3. *Apocynum cannabinum*	10	No	FACU
4. *Echinochloa crus-galli*	10	No	FACW
5. *Cyperus strigosus*	10	No	FACW
6. *Lespedeza cuneata*	5	No	FACU
7. *Phragmites australis*	10	No	FACW
8.			
9.			
10.			
11.			
12.			
	110 =Total Cover		
50% of total cover: 55	20% of total cover: 22		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	55	x 2 =	110
FAC species	40	x 3 =	120
FACU species	15	x 4 =	60
UPL species	0	x 5 =	0
Column Totals:	110 (A)		290 (B)

Prevalence Index = B/A = 2.64

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed meets requirements for the dominance test indicator for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-004 UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-6	10YR 4/3	95	10YR 5/6	5	C	M	Loamy/Clayey	Silty loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Compaction / fill

Depth (inches): 6

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

No indicators for hydric soils were observed. Hydric soils are not present.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/12/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-005 PEM

Investigator(s): J. Keil, M. Curran Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Depression Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.603258 Long: -75.635124 Datum: NAD 83

Soil Map Unit Name: ReB: Reybold silt loam, 2 to 5 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil X, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** **Yes** X **No** ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
This weltland is a palustrine emergent (PEM) depressional wetland located north of the northern most facility fence and west of the access road. The wetland is north of wetland W-JRK-004 and is dominated by Juncus and Agrostis. Soil is disturbed due to presence of fill material.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Two secondary indicators of wetland hydrology were observed including geomorphic position and the FAC-neutral test. Wetland hydrology is present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-005 PEM

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 30 ft)			
1. *Agrostis gigantea*	60	Yes	FACW
2. *Setaria pumila*	5	No	FAC
3. *Juncus tenuis*	30	Yes	FAC
4. *Juncus effusus*	20	No	OBL
5. *Panicum virgatum*	10	No	FAC
6. *Lespedeza cuneata*	5	No	FACU
7.			
8.			
9.			
10.			
11.			
12.			
	130 =Total Cover		
50% of total cover: 65	20% of total cover: 26		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	60	x 2 =	120
FAC species	45	x 3 =	135
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	130 (A)		295 (B)

Prevalence Index = B/A = 2.27

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed meets dominance test and prevalence index indicators for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-005 PEM

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y 5/2	85	10YR 4/6	15	C	M	Loamy/Clayey	Loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Compaction / fill

Depth (inches): 6

Hydric Soil Present? **Yes** ___ **No** ___

Remarks:

Soil characteristics observed meet requirements for depleted matrix and redox depressions indicators. Hydric soils are present.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/12/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: W-JRK-005 UPL

Investigator(s): J. Keil, M. Curran Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Plane Local relief (concave, convex, none): none Slope (%): 1

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.603196 Long: -75.635112 Datum: NAD 83

Soil Map Unit Name: ReB: Reybold silt loam, 2 to 5 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil X, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** **Yes** ____ **No** X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Upland point taken in association with wetland W-JRK-005. Data point was taken south and upslope from the wetland data point and wetland boundary, west of access access road. Soil disturbed due to presence of fill material.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No indicators for wetland hydrology were observed. Wetland hydrology is not present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: W-JRK-005 UPL

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 30 ft)			
1. *Lespedeza cuneata*	80	Yes	FACU
2. *Setaria pumila*	5	No	FAC
3. *Agrostis gigantea*	10	No	FACW
4. *Panicum virgatum*	15	No	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	110 =Total Cover		
50% of total cover: 55	20% of total cover: 22		
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	20	x 3 =	60
FACU species	80	x 4 =	320
UPL species	0	x 5 =	0
Column Totals:	110 (A)		400 (B)

Prevalence Index = B/A = 3.64

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed does not meet any indicators for hydrophytic vegetation.

SOIL

Sampling Point: W-JRK-005 UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 4/3	95	10YR 4/1	5	C	M	Loamy/Clayey	Loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Compaction / fill

Depth (inches): 8

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

No indicators for hydric soils were observed. Auger refusal at 8 inches due to compaction / fill material.

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Atlantic and Gulf Coastal Plain Region
See ERDC/EL TR-10-20; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Standard Chlorine City/County: New Castle, New Castle Co. Sampling Date: 9/28/23

Applicant/Owner: United States Environmental Protection Agency (EPA) State: DE Sampling Point: UPL-JRK-001

Investigator(s): J. Keil, M. Curran Section, Township, Range: N/A

Landform (hillside, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1

Subregion (LRR or MLRA): LRR S, MLRA 149A Lat: 39.603077 Long: -75.635812 Datum: NAD 83

Soil Map Unit Name: SaE: Sassafras sandy loam, 15 to 25 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
This upland point is located in a depression dominated by prhagmites but was determined not a wetland due to the lack of hydric soils.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum Moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Several wetland hydrology indicators were observed including hydromorphic position and the FAC-neutral test. Wetland hydrology is present.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: UPL-JRK-001

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Sapling/Shrub Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	=Total Cover		
50% of total cover:	20% of total cover:		
Herb Stratum (Plot size: 30 ft)			
1. *Phragmites australis*	60	Yes	FACW
2. *Juncus tenuis*	40	Yes	FAC
3. *Juncus effusus*	10	No	OBL
4. *Agrostis gigantea*	10	No	FACW
5. *Lespedeza cuneata*	20	No	FACU
6. *Setaria pumila*	5	No	FAC
7. *Pyrus calleryana*	5	No	UPL
8.			
9.			
10.			
11.			
12.			
	150 =Total Cover		
50% of total cover: 75	20% of total cover: 30		
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	70	x 2 =	140
FAC species	45	x 3 =	135
FACU species	20	x 4 =	80
UPL species	5	x 5 =	25
Column Totals:	150 (A)		390 (B)

Prevalence Index = B/A = 2.60

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (If observed, list morphological adaptations below.)
Vegetation observed meets the dominance test indicator for hydrophytic vegetation.

SOIL

Sampling Point: UPL-JRK-001

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10yr 4/3	100			C	M	Loamy/Clayey	Silty loam
3-10	10YR 4/4	90	10YR 5/8	10	C	M	Mucky Loam/Clay	Clay loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (**MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Barrier Islands 1 cm Muck (S12) **(MLRA 153B, 153D)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 149A, 153C, 153D)**
- ___ Very Shallow Dark Surface (F22) **(MLRA 138, 152A in FL, 154)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Coast Prairie Redox (A16) **(outside MLRA 150A)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, T)**
- ___ Anomalous Bright Floodplain Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22) **(outside MLRA 138, 152A in FL, 154)**
- ___ Barrier Islands Low Chroma Matrix (TS7) **(MLRA 153B, 153D)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

Indicators of hydric soils were not observed. Auger refusal at 10 inches due to compaction.

Appendix C – Watercourse Data Forms

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

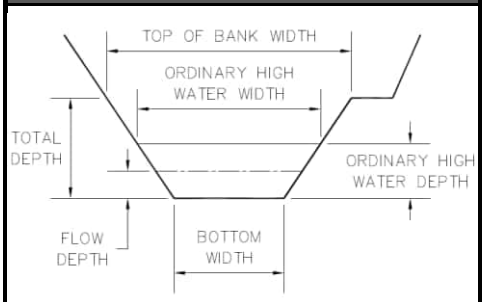
Project/Site:	**Standard Chlorine**	**Stream ID:**	**S-JRK-001**				
Applicant/Owner:	EPA	State:	Delaware				
Investigator(s):	J. Keil, C. Barrett	City/County:	New Castle, New Castle County				
Sampling Date:	8/28/2023	Township:	N/A				
Stream Name:	UNT to Red Lion Creek	Latitude:	39.59843				
Drainage Area (mi^2):		Longitude:	-75.639479				
Slope Category:	(2) Moderate Gradient	Open-Ended?		Upstream		Downstream	
FERC Designation:	N/A	Delineation Type:	x	Centerline	x	R/L Banks	

Stream Description:

A naturalized stream channel flowing west along roadside (Governer Lea Rd.) at the south end of the study area. Stream drains into wetland W-JRK-001 further to the west.

Stream Subsystem		**Stream Origin**		**Predominant Surrounding Landuse**			
	Perennial		Culvert Discharge	x	Forest		Commercial
	Ephemeral		Pond Discharge		Field/Pasture	x	Industrial
x	Intermittent		Swamp, Bog or Wetland		Agricultural		Residential
	Tidal		Spring Fed	x	Other	Roadway	
			Mixture of Origins	**Heavy rain in the last 7 days?**		Yes	x No
Other:		x	Surface Water Runoff	**Turbidity?**		Clear	Other: N/A
Flow Present?		Yes	x No	**Flow Direction:**		West	

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream				**Stream Morphology**		
Right Bank (Do not include flow depth)	Horiz.	3.00	Ft.		Riffle %	25
	Vert.	2.00	Ft.		Pool %	25
Left Bank (Do not include flow depth)	Horiz.	3.00	Ft.		Run %	50
	Vert.	4.00	Ft.	**Canopy Cover**		
Water/Flow Depth		0.00	Ft.		Open	
Bottom of Channel Width		3.50	Ft.		Partly Open	
Ordinary High Water Depth		0.75	Ft.	x	Shaded	
Top of Bank Width		8.00	Ft.	**Is Channel Naturalized?**		
Ordinary High Water Width		5.19	Ft.	x Yes		No
Total Depth		2.00	Ft.	**Fin Fish Present?**		

Macroinvertebrates Present?		Yes	x No						Yes	x No
	Ephemeroptera		Plecoptera		Trichpotera		Other:			

Aquatic Vegetation - Indicate Dominant Cover Type

x	N/A		Rooted Emergent		Rooted Floating		Attached Algae
			Rooted Submergent		Floating Algae		Free Floating
Portion of Stream with Aquatic Vegetation (%):							

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

Trees:	*Acer rubrum, Juglans nigra*	Grasses:	
Shrubs:	*Lonicera morowii, Vaccinium corymbosum*	Herbaceous:	*Persicaria virginiana, Rubus hispidus*

Inorganic Substrate Components (Add to 100%)

Type	Diameter	Composition %
Bedrock	-	
Boulder	10" +	
Cobble	2.5" - 10"	25
Gravel	0.1" - 2.5"	20
Sand	0.06-2 mm	45
Silt	0.004-0.06 mm	10
Clay	<0.004 mm	

Organic Substrate Components (May be <100)

Type	Characteristics	Composition %
Detritus	Sticks, Wood, Coarse Plant Material	20
Muck-Mud	Black, Very Fine Organic Material	
Marl	Grey, Shell Fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

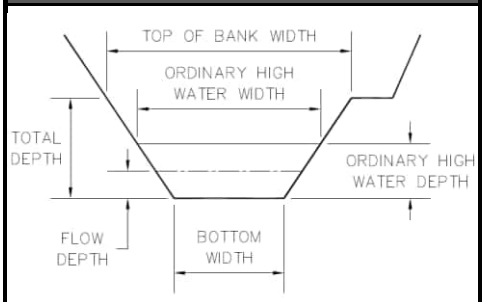
Project/Site:	**Standard Chlorine**	**Stream ID:**	**S-JRK-002**				
Applicant/Owner:	EPA	State:	Delaware				
Investigator(s):	J. Keil, C. Barrett	City/County:	New Castle, New Castle County				
Sampling Date:	8/28/2023	Township:	N/A				
Stream Name:	UNT to Red Lion Creek	Latitude:	39.59843				
Drainage Area (mi^2):		Longitude:	-75.639934				
Slope Category:	(2) Moderate Gradient	Open-Ended?		Upstream		Downstream	
FERC Designation:	N/A	Delineation Type:	x	Centerline	x	R/L Banks	

Stream Description:

A naturalized stream channel flowing north from a culvert just north of Governer Lea Rd. This stream drains into stream S-JRK-001 to the north.

Stream Subsystem		**Stream Origin**		**Predominant Surrounding Landuse**			
	Perennial	x	Culvert Discharge	x	Forest		Commercial
x	Ephemeral		Pond Discharge		Field/Pasture	x	Industrial
	Intermittent		Swamp, Bog or Wetland		Agricultural		Residential
	Tidal		Spring Fed	x	Other	Roadway	
			Mixture of Origins	**Heavy rain in the last 7 days?**		Yes	x No
Other:		x	Surface Water Runoff	**Turbidity?**		Clear	Other: N/A
Flow Present?		Yes	x No	**Flow Direction:**		North	

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream				**Stream Morphology**		
Right Bank (Do not include flow depth)	Horiz.	3.00	Ft.		Riffle %	
	Vert.	2.00	Ft.		Pool %	20
Left Bank (Do not include flow depth)	Horiz.	3.00	Ft.		Run %	80
	Vert.	3.00	Ft.	**Canopy Cover**		
Water/Flow Depth		0.00	Ft.		Open	
Bottom of Channel Width		4.00	Ft.		Partly Open	
Ordinary High Water Depth		1.00	Ft.	x	Shaded	
Top of Bank Width		9.00	Ft.	**Is Channel Naturalized?**		
Ordinary High Water Width		6.50	Ft.	x	Yes	No
Total Depth		2.00	Ft.	**Fin Fish Present?**		

Macroinvertebrates Present?		Yes	x	No					
	Ephemeroptera		Plecoptera		Trichpotera		Other:		

Aquatic Vegetation - Indicate Dominant Cover Type

x	N/A		Rooted Emergent		Rooted Floating		Attached Algae
			Rooted Submergent		Floating Algae		Free Floating

Portion of Stream with Aquatic Vegetation (%):

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

Trees:	*Acer rubrum, Juglans nigra, Maclura pomifera, Ulmus americana*	Grasses:	
Shrubs:	*Lonicera morowii, Lindera benzoin*	Herbaceous:	*Lonicera japonica, Lonicera morrowii*

Inorganic Substrate Components (Add to 100%)

Type	Diameter	Composition %
Bedrock	-	
Boulder	10" +	
Cobble	2.5" - 10"	
Gravel	0.1" - 2.5"	
Sand	0.06-2 mm	20
Silt	0.004-0.06 mm	80
Clay	<0.004 mm	

Organic Substrate Components (May be <100)

Type	Characteristics	Composition %
Detritus	Sticks, Wood, Coarse Plant Material	15
Muck-Mud	Black, Very Fine Organic Material	
Marl	Grey, Shell Fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

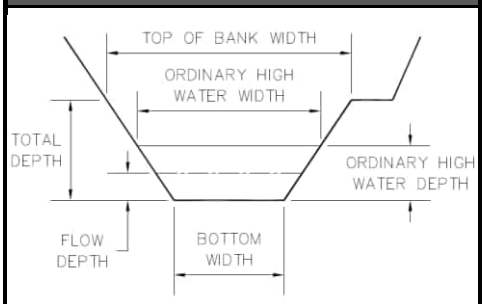
Project/Site:	**Standard Chlorine**	**Stream ID:**	**S-JRK-003**				
Applicant/Owner:	EPA	State:	Delaware				
Investigator(s):	J. Keil, C. Barrett	City/County:	New Castle, New Castle County				
Sampling Date:	8/28/2023	Township:	N/A				
Stream Name:	UNT to Red Lion Creek	Latitude:	39.601133				
Drainage Area (mi^2):	0.39	Longitude:	-75.638479				
Slope Category:	(1) Low Gradient	Open-Ended?		Upstream		Downstream	
FERC Designation:	N/A	Delineation Type:	x	Centerline	x	R/L Banks	

Stream Description:

A naturalized stream flowing north from a culvert just north of Governer Lea Rd. This streams is west of stream S-JRK-002. The stream flows throughout the site and throughout wetland W-JRK-001 and eventually drains directly into the Red Lion Creek to the north.

Stream Subsystem		**Stream Origin**		**Predominant Surrounding Landuse**			
x	Perennial		Culvert Discharge	x	Forest		Commercial
	Ephemeral		Pond Discharge		Field/Pasture	x	Industrial
	Intermittent		Swamp, Bog or Wetland		Agricultural		Residential
	Tidal		Spring Fed	x	Other	Roadway	
		x	Mixture of Origins	**Heavy rain in the last 7 days?**		Yes	x No
Other:			Surface Water Runoff	**Turbidity?**	x Clear	Other:	
Flow Present?	x Yes		No	**Flow Direction:**	North		

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream				**Stream Morphology**		
Right Bank (Do not include flow depth)	Horiz.	1.00	Ft.		Riffle %	15
	Vert.	2.50	Ft.		Pool %	60
Left Bank (Do not include flow depth)	Horiz.	0.75	Ft.		Run %	25
	Vert.	1.50	Ft.	**Canopy Cover**		
Water/Flow Depth		0.30	Ft.		Open	
Bottom of Channel Width		8.00	Ft.		Partly Open	
Ordinary High Water Depth		1.00	Ft.	x	Shaded	
Top of Bank Width		9.35	Ft.	**Is Channel Naturalized?**		
Ordinary High Water Width		8.90	Ft.	x Yes		No
Total Depth		1.80	Ft.	**Fin Fish Present?**		

Macroinvertebrates Present?	x	Yes		No			x	Yes		No
	Ephemeroptera		Plecoptera		Trichpotera		Other:	Water strider		

Aquatic Vegetation - Indicate Dominant Cover Type

x	N/A		Rooted Emergent		Rooted Floating		Attached Algae
			Rooted Submergent		Floating Algae		Free Floating
Portion of Stream with Aquatic Vegetation (%):							

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

Trees:	*Acer rubrum, Juglans nigra*	Grasses:	*Microstegium vimineum*
Shrubs:	*Lonicera morowii, Lindera benzoin, Acer saccharinum*	Herbaceous:	*Persicaria sp., Phragmites australis, Boehmeria cylindrica, Geum canadense*

Inorganic Substrate Components (Add to 100%)			**Organic Substrate Components (May be <100)**		
Type	**Diameter**	**Composition %**	**Type**	**Characteristics**	**Composition %**
Bedrock	-		Detritus	Sticks, Wood, Coarse Plant Material	10
Boulder	10" +				
Cobble	2.5" - 10"	10			
Gravel	0.1" - 2.5"	20	Muck-Mud	Black, Very Fine Organic Material	
Sand	0.06-2 mm	35			
Silt	0.004-0.06 mm	35	Marl	Grey, Shell Fragments	
Clay	<0.004 mm				

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

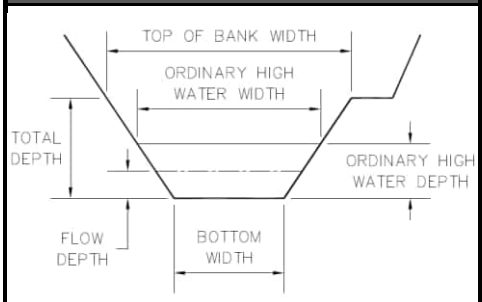
Project/Site:	**Standard Chlorine**	**Stream ID:**	**S-JRK-004**				
Applicant/Owner:	EPA	State:	Delaware				
Investigator(s):	J. Keil, C. Barrett	City/County:	New Castle, New Castle County				
Sampling Date:	8/29/2023	Township:	N/A				
Stream Name:	UNT to Red Lion Creek	Latitude:	39.598905				
Drainage Area (mi^2):		Longitude:	-75.639431				
Slope Category:	(3) High Gradient	Open-Ended?		Upstream		Downstream	
FERC Designation:	N/A	Delineation Type:	x	Centerline	x	R/L Banks	

Stream Description:

An ephemeral stream that originates at a culvert bordering the Trash Tech property east of the study area. The stream flows west down a steep embankment where it drains into wetland W-JRK-001.

Stream Subsystem		**Stream Origin**		**Predominant Surrounding Landuse**			
	Perennial	x	Culvert Discharge	x	Forest		Commercial
x	Ephemeral		Pond Discharge		Field/Pasture	x	Industrial
	Intermittent		Swamp, Bog or Wetland		Agricultural		Residential
	Tidal		Spring Fed	x	Other	Roadway	
			Mixture of Origins	**Heavy rain in the last 7 days?**		Yes	x No
Other:		x	Surface Water Runoff	**Turbidity?**		Clear	Other: N/A
Flow Present?		Yes	x No	**Flow Direction:**		West	

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream				**Stream Morphology**		
Right Bank (Do not include flow depth)	Horiz.	1.00	Ft.		Riffle %	60
	Vert.	2.50	Ft.		Pool %	10
Left Bank (Do not include flow depth)	Horiz.	1.00	Ft.		Run %	30
	Vert.	2.50	Ft.	**Canopy Cover**		
Water/Flow Depth		0.00	Ft.		Open	
Bottom of Channel Width		5.00	Ft.		Partly Open	
Ordinary High Water Depth		1.00	Ft.	x	Shaded	
Top of Bank Width		7.00	Ft.	**Is Channel Naturalized?**		
Ordinary High Water Width		5.80	Ft.	x Yes		No
Total Depth		2.50	Ft.	**Fin Fish Present?**		

Macroinvertebrates Present?		Yes	x	No							
	Ephemeroptera		Plecoptera		Trichpotera		Other:				

Aquatic Vegetation - Indicate Dominant Cover Type

x	N/A		Rooted Emergent		Rooted Floating		Attached Algae
			Rooted Submergent		Floating Algae		Free Floating

Portion of Stream with Aquatic Vegetation (%):

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

Trees:	*Acer rubrum, Platanus occidentalis, Liriodendron tulipifera, Quercus rubra*	Grasses:	*Microstegium vimineum*
Shrubs:	*Rosa multiflora, Lindera benzoin*	Herbaceous:	*Toxicodendron radicans, Rosa multiflora , Boehmeria cylindrica, Celastrus orbiculatus*

Inorganic Substrate Components (Add to 100%)

Type	Diameter	Composition %
Bedrock	-	
Boulder	10" +	
Cobble	2.5" - 10"	15
Gravel	0.1" - 2.5"	30
Sand	0.06-2 mm	20
Silt	0.004-0.06 mm	35
Clay	<0.004 mm	

Organic Substrate Components (May be <100)

Type	Characteristics	Composition %
Detritus	Sticks, Wood, Coarse Plant Material	40
Muck-Mud	Black, Very Fine Organic Material	
Marl	Grey, Shell Fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

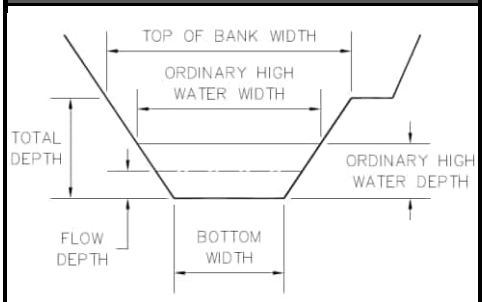
Project/Site:	**Standard Chlorine**	**Stream ID:**	**S-JRK-005**				
Applicant/Owner:	EPA	State:	Delaware				
Investigator(s):	J. Keil, C. Barrett	City/County:	New Castle, New Castle County				
Sampling Date:	8/29/2023	Township:	N/A				
Stream Name:	UNT to Red Lion Creek	Latitude:	39.598926				
Drainage Area (mi^2):		Longitude:	-75.639561				
Slope Category:	(3) High Gradient	Open-Ended?		Upstream		Downstream	
FERC Designation:	N/A	Delineation Type:	x	Centerline	x	R/L Banks	

Stream Description:

An ephemeral stream that originates at a culvert bordering the Trash Tech property east of the study area. The stream flows west down a steep embankment where it drains into wetland W-JRK-001. This stream is very eroded and is located just north of stream S-JRK-004.

Stream Subsystem		**Stream Origin**		**Predominant Surrounding Landuse**			
	Perennial	x	Culvert Discharge	x	Forest		Commercial
x	Ephemeral		Pond Discharge		Field/Pasture	x	Industrial
	Intermittent		Swamp, Bog or Wetland		Agricultural		Residential
	Tidal		Spring Fed	x	Other	Roadway	
			Mixture of Origins	**Heavy rain in the last 7 days?**		Yes	x No
Other:		x	Surface Water Runoff	**Turbidity?**		Clear	Other: N/A
Flow Present?		Yes	x No	**Flow Direction:**		West	

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream				**Stream Morphology**		
Right Bank (Do not include flow depth)	Horiz.	1.00	Ft.		Riffle %	20
	Vert.	3.50	Ft.		Pool %	50
Left Bank (Do not include flow depth)	Horiz.	1.00	Ft.		Run %	30
	Vert.	3.50	Ft.	**Canopy Cover**		
Water/Flow Depth		0.00	Ft.		Open	
Bottom of Channel Width		3.50	Ft.		Partly Open	
Ordinary High Water Depth		2.00	Ft.	x	Shaded	
Top of Bank Width		5.50	Ft.	**Is Channel Naturalized?**		
Ordinary High Water Width		4.64	Ft.	x	Yes	No
Total Depth		3.50	Ft.	**Fin Fish Present?**		

Macroinvertebrates Present?		Yes	x	No					
	Ephemeroptera		Plecoptera		Trichpotera		Other:		

Aquatic Vegetation - Indicate Dominant Cover Type

x	N/A		Rooted Emergent		Rooted Floating		Attached Algae
			Rooted Submergent		Floating Algae		Free Floating
Portion of Stream with Aquatic Vegetation (%):							

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

Trees:	*Acer rubrum, Platanus occidentalis, Acer saccharinum, Prunus serotina, Juglans nigra*	Grasses:	*Phragmites australis*
Shrubs:	*Rosa multiflora, Lindera benzoin, Lonicera sp.*	Herbaceous:	*Toxicodendron radicans, Rosa multiflora , Boehmeria cylindrica, Onoclea sensibilis, Smilax rotundifolia*

Inorganic Substrate Components (Add to 100%)

Type	Diameter	Composition %
Bedrock	-	
Boulder	10" +	15
Cobble	2.5" - 10"	10
Gravel	0.1" - 2.5"	40
Sand	0.06-2 mm	25
Silt	0.004-0.06 mm	10
Clay	<0.004 mm	

Organic Substrate Components (May be <100)

Type	Characteristics	Composition %
Detritus	Sticks, Wood, Coarse Plant Material	25
Muck-Mud	Black, Very Fine Organic Material	
Marl	Grey, Shell Fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

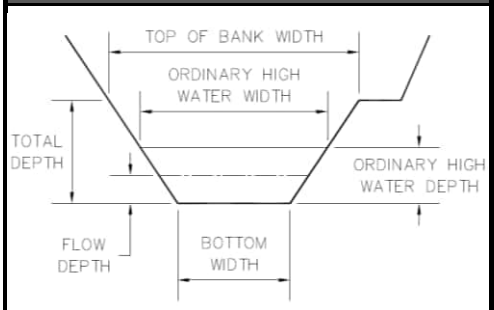
Project/Site:	Standard Chlorine	Stream ID:	S-JRK-006 Reach 1
Applicant/Owner:	EPA	State:	Delaware
Investigator(s):	J. Keil, C. Barrett	City/County:	New Castle, New Castle County
Sampling Date:	8/29/2023	Township:	N/A
Stream Name:	UNT to Red Lion Creek	Latitude:	39.59943
Drainage Area (mi^2):		Longitude:	-75.639713
Slope Category:	(1) Low Gradient	Open-Ended?	Upstream / Downstream
FERC Designation:	N/A	Delineation Type:	x Centerline / x R/L Banks

Stream Description:

A naturalized stream channel flowing north originating from a spring seep within the south western part of wetland W-JRK-001. The stream connects with stream S-JRK-003 further north.

Stream Subsystem		Stream Origin		Predominant Surrounding Landuse			
	Perennial		Culvert Discharge	x	Forest		Commercial
	Ephemeral		Pond Discharge		Field/Pasture	x	Industrial
x	Intermittent		Swamp, Bog or Wetland		Agricultural		Residential
	Tidal	x	Spring Fed	x	Other	Roadway	
		x	Mixture of Origins	Heavy rain in the last 7 days?			Yes / x No
Other:			Surface Water Runoff	Turbidity?	x Clear	Other:	
Flow Present?	x Yes / No			Flow Direction:	North		

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream				Stream Morphology		
Right Bank (Do not include flow depth)	Horiz.	1.00	Ft.		Riffle %	
	Vert.	0.75	Ft.		Pool %	60
Left Bank (Do not include flow depth)	Horiz.	1.00	Ft.		Run %	40
	Vert.	0.75	Ft.	Canopy Cover		
Water/Flow Depth		0.25	Ft.		Open	
Bottom of Channel Width		2.50	Ft.		Partly Open	
Ordinary High Water Depth		0.75	Ft.	x	Shaded	
Top of Bank Width		4.50	Ft.	Is Channel Naturalized?		
Ordinary High Water Width		4.50	Ft.	x Yes	/ No	
Total Depth		1.00	Ft.	Fin Fish Present?		

Macroinvertebrates Present?	x Yes / No						
	Ephemeroptera		Plecoptera		Trichpotera	x	Other: Water Striders

Aquatic Vegetation - Indicate Dominant Cover Type

	N/A		Rooted Emergent		Rooted Floating	x	Attached Algae
			Rooted Submergent		Floating Algae		Free Floating

Portion of Stream with Aquatic Vegetation (%): 20

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

	Trees:	*Acer rubrum, Platanus occidentalis*	Grasses:	*Microstegium vimineum, Phragmites australis*	
	Shrubs:	*Lindera benzoin, Lonicera sp., Rosa multiflora*	Herbaceous:	*Boehmeria cylindrica, Impatiens capensis, Onoclea sensibilis*	

Inorganic Substrate Components (Add to 100%)

Type	Diameter	Composition %
Bedrock	-	
Boulder	10" +	
Cobble	2.5" - 10"	
Gravel	0.1" - 2.5"	
Sand	0.06-2 mm	10
Silt	0.004-0.06 mm	90
Clay	<0.004 mm	

Organic Substrate Components (May be <100)

Type	Characteristics	Composition %
Detritus	Sticks, Wood, Coarse Plant Material	5
Muck-Mud	Black, Very Fine Organic Material	60
Marl	Grey, Shell Fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

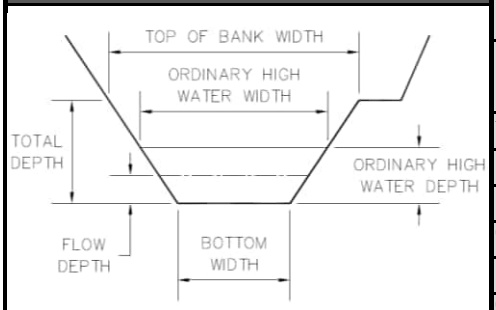
Project/Site:	Standard Chlorine	Stream ID:	S-JRK-006 Reach 2
Applicant/Owner:	EPA	State:	Delaware
Investigator(s):	J. Keil, C. Barrett	City/County:	New Castle, New Castle County
Sampling Date:	8/30/2023	Township:	N/A
Stream Name:	UNT to Red Lion Creek	Latitude:	39.600151
Drainage Area (mi^2):		Longitude:	-75.639264
Slope Category:	(1) Low Gradient	Open-Ended?	Upstream / Downstream
FERC Designation:	N/A	Delineation Type:	x Centerline / x R/L Banks

Stream Description:

This data sheet represents data collected for the second, northern reach of stream S-JRK-006. This reach differed from the first, southern reach due to its change in bed and bank, substrate, and surrounding vegetation. This reach had a wider more defined bed and bank.

Stream Subsystem		Stream Origin		Predominant Surrounding Landuse			
	Perennial		Culvert Discharge	x	Forest		Commercial
	Ephemeral		Pond Discharge		Field/Pasture	x	Industrial
x	Intermittent	x	Swamp, Bog or Wetland		Agricultural		Residential
	Tidal	x	Spring Fed	x	Other	Roadway	
		x	Mixture of Origins	Heavy rain in the last 7 days?		x Yes	x No
Other:			Surface Water Runoff	Turbidity?	x Clear	Other:	Cloudy
Flow Present?	x Yes		No	Flow Direction:	North		

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream			
Right Bank (Do not include flow depth)	Horiz.	1.00	Ft.
	Vert.	3.00	Ft.
Left Bank (Do not include flow depth)	Horiz.	1.00	Ft.
	Vert.	3.00	Ft.
Water/Flow Depth		0.40	Ft.
Bottom of Channel Width		5.00	Ft.
Ordinary High Water Depth		1.00	Ft.
Top of Bank Width		7.00	Ft.
Ordinary High Water Width		5.67	Ft.
Total Depth		3.40	Ft.

Stream Morphology	
	Riffle % 30
	Pool % 30
	Run % 40

Canopy Cover	
	Open
	Partly Open
x	Shaded

Is Channel Naturalized?			
x	Yes		No

Fin Fish Present?			
	Yes	x	No

Macroinvertebrates Present?	x Yes		No				
	Ephemeroptera		Plecoptera		Trichpotera	x	Other: Water Striders/ slugs

Aquatic Vegetation - Indicate Dominant Cover Type

x	N/A		Rooted Emergent		Rooted Floating		Attached Algae
			Rooted Submergent		Floating Algae		Free Floating

Portion of Stream with Aquatic Vegetation (%):

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

	Trees:	*Acer rubrum*		Grasses:	*Microstegium vimineum*
	Shrubs:	*Lindera benzoin, Lonicera sp.*		Herbaceous:	*Boehmeria cylindrica, Rubus phoenicolasius, Onoclea sensibilis*

Inorganic Substrate Components (Add to 100%)

Type	Diameter	Composition %
Bedrock	-	
Boulder	10" +	
Cobble	2.5" - 10"	15
Gravel	0.1" - 2.5"	50
Sand	0.06-2 mm	10
Silt	0.004-0.06 mm	25
Clay	<0.004 mm	

Organic Substrate Components (May be <100)

Type	Characteristics	Composition %
Detritus	Sticks, Wood, Coarse Plant Material	5
Muck-Mud	Black, Very Fine Organic Material	
Marl	Grey, Shell Fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

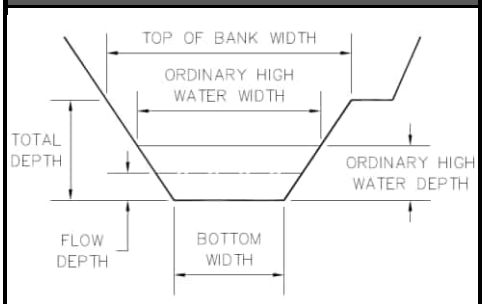
Project/Site:	**Standard Chlorine**	**Stream ID:**	**S-JRK-006A**				
Applicant/Owner:	EPA	State:	Delaware				
Investigator(s):	J. Keil, C. Barrett	City/County:	New Castle, New Castle County				
Sampling Date:	8/29/2023	Township:	N/A				
Stream Name:	UNT to Red Lion Creek	Latitude:	39.599878				
Drainage Area (mi^2):		Longitude:	-75.639415				
Slope Category:	(1) Low Gradient	Open-Ended?		Upstream		Downstream	
FERC Designation:	N/A	Delineation Type:	x	Centerline	x	R/L Banks	

Stream Description:

A naturalized stream channel flowing northwest originating from a spring seep located southeast of flag 9 of stream S-JRK-006.

Stream Subsystem		**Stream Origin**		**Predominant Surrounding Landuse**			
	Perennial		Culvert Discharge	x	Forest		Commercial
	Ephemeral		Pond Discharge	x	Field/Pasture	x	Industrial
x	Intermittent		Swamp, Bog or Wetland		Agricultural		Residential
	Tidal	x	Spring Fed	x	Other	Roadway	
		x	Mixture of Origins	**Heavy rain in the last 7 days?**		Yes	x No
Other:			Surface Water Runoff	**Turbidity?**	x Clear	Other:	
Flow Present?	x Yes		No	**Flow Direction:**	Northwest		

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream				**Stream Morphology**		
Right Bank (Do not include flow depth)	Horiz.	0.50	Ft.		Riffle %	
	Vert.	0.75	Ft.		Pool %	98
Left Bank (Do not include flow depth)	Horiz.	0.50	Ft.		Run %	2
	Vert.	1.00	Ft.	**Canopy Cover**		
Water/Flow Depth		0.15	Ft.		Open	
Bottom of Channel Width		1.50	Ft.		Partly Open	
Ordinary High Water Depth		0.50	Ft.	x	Shaded	
Top of Bank Width		2.38	Ft.	**Is Channel Naturalized?**		
Ordinary High Water Width		2.08	Ft.	x Yes		No
Total Depth		0.90	Ft.	**Fin Fish Present?**		

Macroinvertebrates Present?		Yes	x	No					
	Ephemeroptera		Plecoptera		Trichpotera		Other:		

Aquatic Vegetation - Indicate Dominant Cover Type

x	N/A		Rooted Emergent		Rooted Floating		Attached Algae
			Rooted Submergent		Floating Algae		Free Floating
Portion of Stream with Aquatic Vegetation (%):							

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

Trees:	*Acer rubrum, Platanus occidentalis*	Grasses:	*Microstegium vimineum, Phragmites australis*
Shrubs:	*Lindera benzoin*	Herbaceous:	*Rosa Multiflora, Boehmeria cylindrica, Impatiens capensis, Onoclea sensibilis, Lonicera japonica*

Inorganic Substrate Components (Add to 100%)

Type	**Diameter**	**Composition %**
Bedrock	-	
Boulder	10" +	
Cobble	2.5" - 10"	
Gravel	0.1" - 2.5"	
Sand	0.06-2 mm	
Silt	0.004-0.06 mm	100
Clay	<0.004 mm	

Organic Substrate Components (May be <100)

Type	**Characteristics**	**Composition %**
Detritus	Sticks, Wood, Coarse Plant Material	30
Muck-Mud	Black, Very Fine Organic Material	25
Marl	Grey, Shell Fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

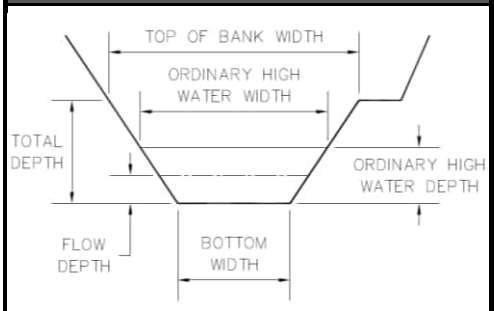
Project/Site:	Standard Chlorine	Stream ID:	S-JRK-007
Applicant/Owner:	EPA	State:	Delaware
Investigator(s):	J. Keil, C. Barrett	City/County:	New Castle, New Castle County
Sampling Date:	8/30/2023	Township:	N/A
Stream Name:	UNT to Red Lion Creek	Latitude:	39.600713
Drainage Area (mi^2):		Longitude:	-75.638825
Slope Category:	(1) Low Gradient	Open-Ended?	Upstream / Downstream
FERC Designation:	N/A	Delineation Type:	x Centerline / x R/L Banks

Stream Description:

A naturally channelized stream that originates in the forested section of wetland W-JRK-001 (south west section). The stream is very eroded and drains north into stream S-JRK-003.

Stream Subsystem		Stream Origin		Predominant Surrounding Landuse			
	Perennial		Culvert Discharge	x	Forest		Commercial
	Ephemeral		Pond Discharge		Field/Pasture	x	Industrial
x	Intermittent	x	Swamp, Bog or Wetland		Agricultural		Residential
	Tidal		Spring Fed	x	Other	Roadway	
		x	Mixture of Origins	Heavy rain in the last 7 days?		x Yes	No
Other:		x	Surface Water Runoff	Turbidity?	x Clear	Other:	
Flow Present?	x Yes		No	Flow Direction:	North		

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream				Stream Morphology		
Right Bank (Do not include flow depth)	Horiz.	1.00	Ft.		Riffle %	
	Vert.	4.00	Ft.		Pool %	50
Left Bank (Do not include flow depth)	Horiz.	2.50	Ft.		Run %	50
	Vert.	4.00	Ft.	**Canopy Cover**		
Water/Flow Depth		0.10	Ft.		Open	
Bottom of Channel Width		7.00	Ft.		Partly Open	
Ordinary High Water Depth		1.50	Ft.	x	Shaded	
Top of Bank Width		10.50	Ft.	**Is Channel Naturalized?**		
Ordinary High Water Width		8.31	Ft.	x Yes		No
Total Depth		4.10	Ft.	**Fin Fish Present?**		

Macroinvertebrates Present?	x Yes		No			Yes	x No
	Ephemeroptera		Plecoptera		Trichpotera	Other:	Water strider

Aquatic Vegetation - Indicate Dominant Cover Type

x	N/A		Rooted Emergent		Rooted Floating		Attached Algae
			Rooted Submergent		Floating Algae		Free Floating

Portion of Stream with Aquatic Vegetation (%):

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

	Trees:	*Acer rubrum*		Grasses:	*Microstegium vimineum*
	Shrubs:	*Lindera benzoin, Lonicera sp.*		Herbaceous:	*Rubus phoenicolasius, Onoclea sensibilis, Lindera benzoin*

Inorganic Substrate Components (Add to 100%)

Type	Diameter	Composition %
Bedrock	-	
Boulder	10" +	
Cobble	2.5" - 10"	
Gravel	0.1" - 2.5"	
Sand	0.06-2 mm	50
Silt	0.004-0.06 mm	40
Clay	<0.004 mm	10

Organic Substrate Components (May be <100)

Type	Characteristics	Composition %
Detritus	Sticks, Wood, Coarse Plant Material	10
Muck-Mud	Black, Very Fine Organic Material	
Marl	Grey, Shell Fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

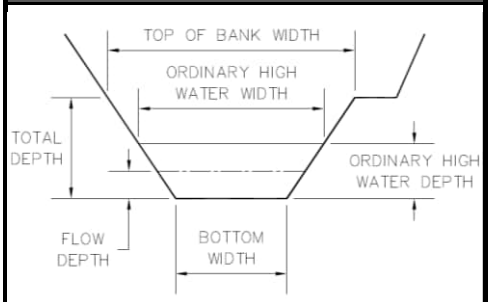
Project/Site:	Standard Chlorine	Stream ID:	S-JRK-008
Applicant/Owner:	EPA	State:	Delaware
Investigator(s):	J. Keil, C. Barrett	City/County:	New Castle, New Castle County
Sampling Date:	8/30/2023	Township:	N/A
Stream Name:	UNT to Red Lion Creek	Latitude:	39.60045
Drainage Area (mi^2):		Longitude:	-75.638479
Slope Category:	(3) High Gradient	Open-Ended?	Upstream / Downstream
FERC Designation:	N/A	Delineation Type:	x Centerline / x R/L Banks

Stream Description:

An ephemeral channel that originates from a culvert along top of hillside bordering the Trash Tech property to the east. This stream is located north of S-JRK-005 and flows west into stream S-JRK-003.

Stream Subsystem		Stream Origin		Predominant Surrounding Landuse			
	Perennial	x	Culvert Discharge	x	Forest		Commercial
x	Ephemeral		Pond Discharge	x	Field/Pasture	x	Industrial
	Intermittent		Swamp, Bog or Wetland		Agricultural		Residential
	Tidal		Spring Fed	x	Other	Roadway	
			Mixture of Origins	Heavy rain in the last 7 days?		x Yes	No
Other:		x	Surface Water Runoff	Turbidity?		Clear	Other: N/A
Flow Present?		Yes	x No	Flow Direction:		West	

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream				Stream Morphology		
Right Bank (Do not include flow depth)	Horiz.	2.00	Ft.		Riffle %	10
	Vert.	3.00	Ft.		Pool %	10
Left Bank (Do not include flow depth)	Horiz.	2.00	Ft.		Run %	80
	Vert.	3.00	Ft.	Canopy Cover		
Water/Flow Depth		0.00	Ft.		Open	
Bottom of Channel Width		3.00	Ft.	x	Partly Open	
Ordinary High Water Depth		1.50	Ft.		Shaded	
Top of Bank Width		7.00	Ft.	Is Channel Naturalized?		
Ordinary High Water Width		5.00	Ft.	x	Yes	No
Total Depth		3.00	Ft.	Fin Fish Present?		

Macroinvertebrates Present?		Yes	x No				
	Ephemeroptera		Plecoptera		Trichpotera		Other:

Aquatic Vegetation - Indicate Dominant Cover Type

x	N/A		Rooted Emergent		Rooted Floating		Attached Algae
			Rooted Submergent		Floating Algae		Free Floating

Portion of Stream with Aquatic Vegetation (%):

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

	Trees:	*Carya glabra, Liriodendron tulipifera, Platanus occidentalis*	Grasses:	*Microstegium vimineum*	
	Shrubs:	*Lindera benzoin, Acer rubrum*	Herbaceous:	*Rubus phoenicolasius, Rubus idaeus, Lonicera japonica, Dryopteris carthusiana*	

Inorganic Substrate Components (Add to 100%)

Type	Diameter	Composition %
Bedrock	-	
Boulder	10" +	5
Cobble	2.5" - 10"	5
Gravel	0.1" - 2.5"	15
Sand	0.06-2 mm	50
Silt	0.004-0.06 mm	25
Clay	<0.004 mm	

Organic Substrate Components (May be <100)

Type	Characteristics	Composition %
Detritus	Sticks, Wood, Coarse Plant Material	25
Muck-Mud	Black, Very Fine Organic Material	
Marl	Grey, Shell Fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

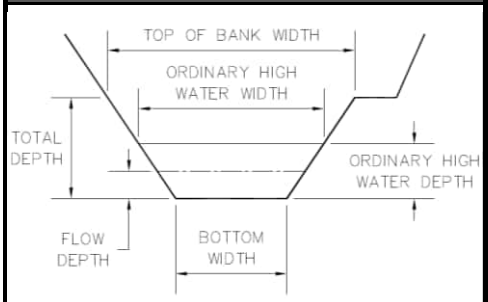
Project/Site:	Standard Chlorine	Stream ID:	S-JRK-009
Applicant/Owner:	EPA	State:	Delaware
Investigator(s):	J. Keil, C. Barrett	City/County:	New Castle, New Castle County
Sampling Date:	8/30/2023	Township:	N/A
Stream Name:	UNT to Red Lion Creek	Latitude:	39.600876
Drainage Area (mi^2):		Longitude:	-75.638875
Slope Category:	(1) Low Gradient	Open-Ended?	Upstream / Downstream
FERC Designation:	N/A	Delineation Type:	x Centerline / x R/L Banks

Stream Description:

A naturally channelized stream that is spring fed and flows northeast and drains into stream S-JRK-007 and is located north of stream S-JRK-006.

Stream Subsystem		Stream Origin		Predominant Surrounding Landuse			
	Perennial		Culvert Discharge	x	Forest		Commercial
	Ephemeral		Pond Discharge	x	Field/Pasture	x	Industrial
x	Intermittent	x	Swamp, Bog or Wetland		Agricultural		Residential
	Tidal	x	Spring Fed	x	Other	Roadway	
		x	Mixture of Origins	Heavy rain in the last 7 days?		x Yes	No
Other:			Surface Water Runoff	Turbidity?	x Clear	Other:	
Flow Present?	x Yes		No	Flow Direction:	Northeast		

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream				Stream Morphology		
Right Bank (Do not include flow depth)	Horiz.	1.00	Ft.		Riffle %	
	Vert.	1.00	Ft.		Pool %	10
Left Bank (Do not include flow depth)	Horiz.	1.50	Ft.		Run %	90
	Vert.	1.00	Ft.	Canopy Cover		
Water/Flow Depth		0.20	Ft.		Open	
Bottom of Channel Width		3.50	Ft.		Partly Open	
Ordinary High Water Depth		0.75	Ft.	x	Shaded	
Top of Bank Width		6.00	Ft.	Is Channel Naturalized?		
Ordinary High Water Width		5.38	Ft.	x Yes		No
Total Depth		1.20	Ft.	Fin Fish Present?		

Macroinvertebrates Present?		Yes	x	No			
	Ephemeroptera		Plecoptera		Trichpotera		Other:

Aquatic Vegetation - Indicate Dominant Cover Type

	N/A		Rooted Emergent		Rooted Floating	x	Attached Algae
			Rooted Submergent		Floating Algae		Free Floating
Portion of Stream with Aquatic Vegetation (%):			5				

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

	Trees:	*Acer rubrum*		Grasses:	*Microstegium vimineum, Phragmites australis*
	Shrubs:	*Lindera benzoin*		Herbaceous:	*Boehmeria cylindrica, Onoclea sensibilis,*

Inorganic Substrate Components (Add to 100%)

Type	Diameter	Composition %
Bedrock	-	
Boulder	10" +	
Cobble	2.5" - 10"	2
Gravel	0.1" - 2.5"	
Sand	0.06-2 mm	10
Silt	0.004-0.06 mm	88
Clay	<0.004 mm	

Organic Substrate Components (May be <100)

Type	Characteristics	Composition %
Detritus	Sticks, Wood, Coarse Plant Material	10
Muck-Mud	Black, Very Fine Organic Material	40
Marl	Grey, Shell Fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

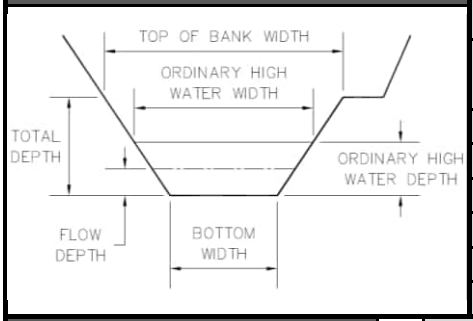
Project/Site:	**Standard Chlorine**	**Stream ID:**	**S-JRK-010 Reach 1**				
Applicant/Owner:	EPA	State:	Delaware				
Investigator(s):	J. Keil, M. Curran	City/County:	New Castle, New Castle County				
Sampling Date:	9/8/2023	Township:	N/A				
Stream Name:	UNT to Red Lion Creek	Latitude:	39.601348				
Drainage Area (mi^2):		Longitude:	-75.637318				
Slope Category:	(3) High Gradient	Open-Ended?		Upstream		Downstream	
FERC Designation:	N/A	Delineation Type:	x	Centerline	x	R/L Banks	

Stream Description:

A naturalized channel that originates from the top of a slope at the western side of the facility property. The channel flows west downslope. This reach has more eroded banks, different width, and different substrate then that of reach 2.

Stream Subsystem		**Stream Origin**		**Predominant Surrounding Landuse**			
	Perennial		Culvert Discharge	x	Forest		Commercial
x	Ephemeral		Pond Discharge		Field/Pasture		Industrial
	Intermittent		Swamp, Bog or Wetland		Agricultural		Residential
	Tidal		Spring Fed		Other		
			Mixture of Origins	**Heavy rain in the last 7 days?**		x	Yes / No
Other:		x	Surface Water Runoff	**Turbidity?**		Clear	Other: N/A
Flow Present?		Yes	x No	**Flow Direction:**		West	

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream				**Stream Morphology**		
Right Bank (Do not include flow	Horiz.	2.00	Ft.		Riffle %	30
	Vert.	4.00	Ft.		Pool %	20
Left Bank (Do not include flow depth)	Horiz.	3.00	Ft.		Run %	50
	Vert.	4.00	Ft.	**Canopy Cover**		
Water/Flow Depth		0.00	Ft.		Open	
Bottom of Channel Width		2.50	Ft.		Partly Open	
Ordinary High Water Depth		2.00	Ft.	x	Shaded	
Top of Bank Width		7.50	Ft.	**Is Channel Naturalized?**		
Ordinary High Water Width		5.00	Ft.	x	Yes	No
Total Depth		4.00	Ft.	**Fin Fish Present?**		

Macroinvertebrates Present?		Yes	x	No						
	Ephemeroptera		Plecoptera		Trichpotera		Other:			

Aquatic Vegetation - Indicate Dominant Cover Type

x	N/A		Rooted Emergent		Rooted Floating		Attached Algae
			Rooted Submergent		Floating Algae		Free Floating

Portion of Stream with Aquatic Vegetation (%):

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

Trees:	*Liriodendron tulipifera, Acer rubrum, Quercus montana*	Grasses:	
Shrubs:	*Elaeagnus umbellata, Lonicera maackii, Lindera benzoin, Clethra alnifolia*	Herbaceous:	*Clethra alnifolia, Toxicodendron radicans, Lonicera japonica, Dryopteris marginalis, Rubus phoenicolasius*

Inorganic Substrate Components (Add to 100%)

Type	**Diameter**	**Composition %**
Bedrock	-	
Boulder	10" +	10
Cobble	2.5" - 10"	30
Gravel	0.1" - 2.5"	30
Sand	0.06-2 mm	20
Silt	0.004-0.06 mm	10
Clay	<0.004 mm	

Organic Substrate Components (May be <100)

Type	**Characteristics**	**Composition %**
Detritus	Sticks, Wood, Coarse Plant Material	5
Muck-Mud	Black, Very Fine Organic Material	
Marl	Grey, Shell Fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

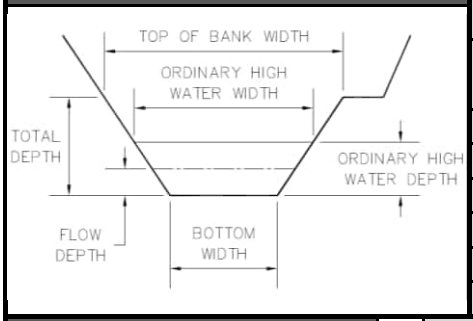
Project/Site:	**Standard Chlorine**	**Stream ID:**	**S-JRK-010 Reach 2**				
Applicant/Owner:	EPA	State:	Delaware				
Investigator(s):	J. Keil, M. Curran	City/County:	New Castle, New Castle County				
Sampling Date:	9/8/2023	Township:	N/A				
Stream Name:	UNT to Red Lion Creek	Latitude:	39.601453				
Drainage Area (mi^2):		Longitude:	-75.637832				
Slope Category:	(3) High Gradient	Open-Ended?		Upstream		Downstream	
FERC Designation:	N/A	Delineation Type:	x	Centerline	x	R/L Banks	

Stream Description:

A naturalized channel that originates from the top of a slope at the western side of the facility property. The channel flows west downslope. This reach has a more dissipated bed and bank, more cobble substrate, and drains into wetland W-JRK-001.

Stream Subsystem		**Stream Origin**		**Predominant Surrounding Landuse**			
	Perennial		Culvert Discharge	x	Forest		Commercial
x	Ephemeral		Pond Discharge	x	Field/Pasture	x	Industrial
	Intermittent		Swamp, Bog or Wetland		Agricultural		Residential
	Tidal		Spring Fed		Other		
			Mixture of Origins	**Heavy rain in the last 7 days?**		x	Yes / No
Other:		x	Surface Water Runoff	**Turbidity?**		Clear	Other: N/A
Flow Present?		Yes	x No	**Flow Direction:**		West	

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream				**Stream Morphology**		
Right Bank (Do not include flow	Horiz.	2.00	Ft.		Riffle %	50
	Vert.	0.50	Ft.		Pool %	
Left Bank (Do not include flow depth)	Horiz.	2.00	Ft.		Run %	50
	Vert.	0.50	Ft.	**Canopy Cover**		
Water/Flow Depth		0.00	Ft.		Open	
Bottom of Channel Width		4.00	Ft.		Partly Open	
Ordinary High Water Depth		0.75	Ft.	x	Shaded	
Top of Bank Width		8.00	Ft.	**Is Channel Naturalized?**		
Ordinary High Water Width		10.00	Ft.	x	Yes	No
Total Depth		0.50	Ft.	**Fin Fish Present?**		

Macroinvertebrates Present?		Yes	x	No					
	Ephemeroptera		Plecoptera		Trichpotera		Other:		

Aquatic Vegetation - Indicate Dominant Cover Type

x	N/A		Rooted Emergent		Rooted Floating		Attached Algae
			Rooted Submergent		Floating Algae		Free Floating

Portion of Stream with Aquatic Vegetation (%):

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

Trees:	*Liriodendron tulipifera, Acer rubrum, Quercus montana*	Grasses:	
Shrubs:	*Lindera benzoin, Clethra alnifolia, Rosa multiflora*	Herbaceous:	*Clethra alnifolia, Toxicodendron radicans, Lonicera japonica, Dryopteris marginalis, Rubus phoenicolasius*

Inorganic Substrate Components (Add to 100%)

Type	**Diameter**	**Composition %**
Bedrock	-	
Boulder	10" +	2
Cobble	2.5" - 10"	80
Gravel	0.1" - 2.5"	10
Sand	0.06-2 mm	5
Silt	0.004-0.06 mm	3
Clay	<0.004 mm	

Organic Substrate Components (May be <100)

Type	**Characteristics**	**Composition %**
Detritus	Sticks, Wood, Coarse Plant Material	15
Muck-Mud	Black, Very Fine Organic Material	
Marl	Grey, Shell Fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

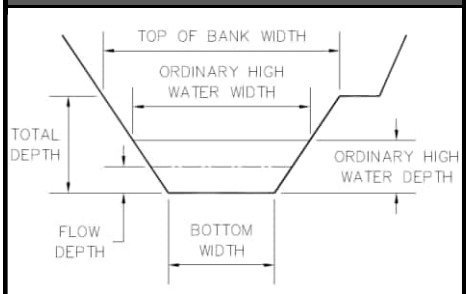
Project/Site:	Standard Chlorine	Stream ID:	S-JRK-011
Applicant/Owner:	EPA	State:	Delaware
Investigator(s):	J. Keil, M. Curran	City/County:	New Castle, New Castle County
Sampling Date:	9/11/2023	Township:	N/A
Stream Name:	UNT to Red Lion Creek	Latitude:	39.602025
Drainage Area (mi^2):		Longitude:	-75.633032
Slope Category:	(2) Moderate Gradient	Open-Ended?	Upstream / Downstream
FERC Designation:	N/A	Delineation Type:	x Centerline / x R/L Banks

Stream Description:

A natrulized stream channel that originates from a small culvert along the east side embankment of the facility property. The stream flows through wetland W-JRK-002 and continues until it drains into wetland W-JRK-001.

Stream Subsystem		Stream Origin		Predominant Surrounding Landuse			
	Perennial		Culvert Discharge	x	Forest		Commercial
	Ephemeral		Pond Discharge		Field/Pasture	x	Industrial
x	Intermittent		Swamp, Bog or Wetland		Agricultural		Residential
	Tidal		Spring Fed		Other		
		x	Mixture of Origins	Heavy rain in the last 7 days?			Yes / No
Other:			Surface Water Runoff	Turbidity?		Clear	Other:
Flow Present?		Yes	x No	Flow Direction:	North		

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream				Stream Morphology		
Right Bank (Do not include flow	Horiz.	1.00	Ft.		Riffle %	
	Vert.	0.75	Ft.	x	Pool %	50
Left Bank (Do not include flow depth)	Horiz.	1.00	Ft.	x	Run %	50
	Vert.	1.00	Ft.	Canopy Cover		
Water/Flow Depth		0.00	Ft.		Open	
Bottom of Channel Width		5.00	Ft.		Partly Open	
Ordinary High Water Depth		0.50	Ft.		Shaded	
Top of Bank Width		6.75	Ft.	Is Channel Naturalized?		
Ordinary High Water Width		6.17	Ft.	x	Yes	No
Total Depth		0.75	Ft.	Fin Fish Present?		

Macroinvertebrates Present?		Yes	x No		
	Ephemeroptera	Plecoptera	Trichpotera		Other:

Aquatic Vegetation - Indicate Dominant Cover Type

x	N/A		Rooted Emergent		Rooted Floating		Attached Algae
			Rooted Submergent		Floating Algae		Free Floating

Portion of Stream with Aquatic Vegetation (%):

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

Trees:	*Acer saccharinum, Juglans nigra, Liriodendron tulipifera, Malus baccata*	Grasses:	*Microstegium vimineum, phragmites australis*
Shrubs:	*Lindera benzoin, Rosa Multiflora*	Herbaceous:	*Boehmeria cylindrica, Toxicodendron radicans, Rubus phoenicolasius, Ampelopsis brevipedunculata, Rubus allegheniensis, Persicaria virginiana, Lonicera japonica*

Inorganic Substrate Components (Add to 100%)

Type	Diameter	Composition %
Bedrock	-	
Boulder	10" +	
Cobble	2.5" - 10"	
Gravel	0.1" - 2.5"	
Sand	0.06-2 mm	50
Silt	0.004-0.06 mm	50
Clay	<0.004 mm	

Organic Substrate Components (May be <100)

Type	Characteristics	Composition %
Detritus	Sticks, Wood, Coarse Plant Material	25
Muck-Mud	Black, Very Fine Organic Material	20
Marl	Grey, Shell Fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

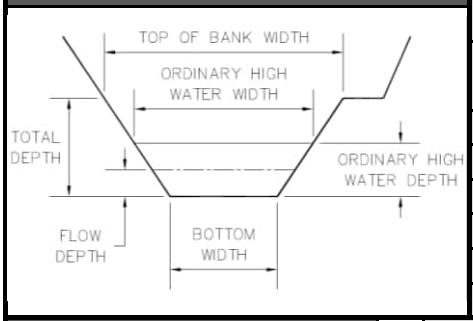
Project/Site:	**Standard Chlorine**	**Stream ID:**	**S-JRK-012**
Applicant/Owner:	EPA	State:	Delaware
Investigator(s):	J. Keil, M. Curran	City/County:	New Castle, New Castle County
Sampling Date:	9/29/2023	Township:	N/A
Stream Name:	UNT to Red Lion Creek	Latitude:	39.60176
Drainage Area (mi^2):		Longitude:	-75.638764
Slope Category:	(3) High Gradient	Open-Ended?	[ ] Upstream [ ] Downstream
FERC Designation:	N/A	Delineation Type:	[x] Centerline [x] R/L Banks

Stream Description:

A natrulized stream channel that originates from a culvert at the base of the berm on the east side of the cleared ROW. The stream seems to come from groundwater associated with wetland community W-JRK-001 PEM 2. The stream dissipates into wetland W-JRK-001 PFO 1A to the east.

Stream Subsystem		**Stream Origin**		**Predominant Surrounding Landuse**			
[ ]	Perennial	[x]	Culvert Discharge	[x]	Forest	[ ]	Commercial
[ ]	Ephemeral	[ ]	Pond Discharge	[x]	Field/Pasture	[x]	Industrial
[x]	Intermittent	[ ]	Swamp, Bog or Wetland	[x]	Agricultural	[ ]	Residential
[ ]	Tidal	[x]	Spring Fed	[x]	Other	Roadway	
[ ]		[x]	Mixture of Origins	**Heavy rain in the last 7 days?**		[x] Yes	[ ] No
Other:		[ ]	Surface Water Runoff	**Turbidity?**	[x] Clear	Other:	
Flow Present?	[x] Yes	[ ] No		**Flow Direction:**	East		

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream				**Stream Morphology**		
Right Bank (Do not include flow	Horiz.	0.50	Ft.	[ ]	Riffle %	20
	Vert.	0.75	Ft.	[x]	Pool %	30
Left Bank (Do not include flow depth)	Horiz.	0.50	Ft.	[x]	Run %	50
	Vert.	0.75	Ft.	**Canopy Cover**		
Water/Flow Depth		0.25	Ft.	[ ]	Open	
Bottom of Channel Width		1.50	Ft.	[ ]	Partly Open	
Ordinary High Water Depth		0.50	Ft.	[ ]	Shaded	
Top of Bank Width		2.50	Ft.	**Is Channel Naturalized?**		
Ordinary High Water Width		2.17	Ft.	[x]	Yes	[ ] No
Total Depth		1.00	Ft.	**Fin Fish Present?**		

Macroinvertebrates Present?	[ ] Yes	[x] No		[ ] Yes	[x] No
[ ] Ephemeroptera	[ ] Plecoptera	[ ] Trichpotera	[ ] Other:		

Aquatic Vegetation - Indicate Dominant Cover Type

[x]	N/A	[ ]	Rooted Emergent	[ ]	Rooted Floating	[ ]	Attached Algae
		[ ]	Rooted Submergent	[ ]	Floating Algae	[ ]	Free Floating

Portion of Stream with Aquatic Vegetation (%):

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

Trees:	*Acer rubrum, Liriodendron tulipifera, Liquidambar styraciflua*	Grasses:	*Microstegium vimineum, phragmites australis*
Shrubs:	*Lindera benzoin, Rosa multiflora, Rubus allegheniensis,*	Herbaceous:	*Lonicera japonica, Celastrus orbiculatus*

Inorganic Substrate Components (Add to 100%)

Type	**Diameter**	**Composition %**
Bedrock	-	
Boulder	10" +	
Cobble	2.5" - 10"	
Gravel	0.1" - 2.5"	25
Sand	0.06-2 mm	40
Silt	0.004-0.06 mm	35
Clay	<0.004 mm	

Organic Substrate Components (May be <100)

Type	**Characteristics**	**Composition %**
Detritus	Sticks, Wood, Coarse Plant Material	5
Muck-Mud	Black, Very Fine Organic Material	10
Marl	Grey, Shell Fragments	

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

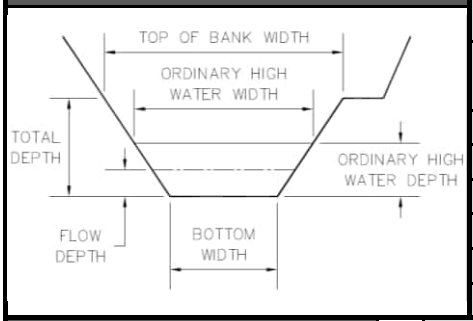
Project/Site:	Standard Chlorine	Stream ID:	S-JRK-013
Applicant/Owner:	EPA	State:	Delaware
Investigator(s):	J. Keil, M. Curran	City/County:	New Castle, New Castle County
Sampling Date:	11/7/2023	Township:	N/A
Stream Name:	Red Lion Creek	Latitude:	39.605291
Drainage Area (mi^2):	8.67	Longitude:	-75.634104
Slope Category:	(1) Low Gradient	Open-Ended?	x Upstream x Downstream
FERC Designation:	N/A	Delineation Type:	x Centerline x R/L Banks

Stream Description:

Red Lion Creek. Creek runs east across the northern most part of the study area.

Stream Subsystem		Stream Origin		Predominant Surrounding Landuse			
x	Perennial		Culvert Discharge	x	Forest		Commercial
	Ephemeral		Pond Discharge	x	Field/Pasture	x	Industrial
	Intermittent		Swamp, Bog or Wetland	x	Agricultural		Residential
	Tidal		Spring Fed	x	Other	Roadway	
		x	Mixture of Origins	Heavy rain in the last 7 days?		x Yes	No
Other:			Surface Water Runoff	Turbidity?		Clear	Other: Turbid
Flow Present?	x Yes		No	Flow Direction:	East		

For linear projects, provide dimensions at centerline of stream crossing



Right bank/Left bank facing downstream				Stream Morphology		
Right Bank (Do not include flow	Horiz.	6.00	Ft.		Riffle %	
	Vert.	2.00	Ft.		Pool %	
Left Bank (Do not include flow depth)	Horiz.	6.00	Ft.	x	Run %	100
	Vert.	2.00	Ft.	Canopy Cover		
Water/Flow Depth		1.00	Ft.	x	Open	
Bottom of Channel Width		35.00	Ft.		Partly Open	
Ordinary High Water Depth		2.00	Ft.		Shaded	
Top of Bank Width		47.00	Ft.	Is Channel Naturalized?		
Ordinary High Water Width		47.00	Ft.	x	Yes	No
Total Depth		3.00	Ft.	Fin Fish Present?		

Macroinvertebrates Present?	x Yes		No			x Yes	No
Ephemeroptera		Plecoptera		Trichpotera		Other:	

Aquatic Vegetation - Indicate Dominant Cover Type

x	N/A	x	Rooted Emergent		Rooted Floating	x	Attached Algae
			Rooted Submergent		Floating Algae		Free Floating

Portion of Stream with Aquatic Vegetation (%): 20

Riparian Buffer Veg. (60 Ft.) - Indicate Dominant Cover Type And Species

Trees:	*Acer rubrum, Liriodendron tulipifera, Liquidambar styraciflua, Platanus occidentalis*	Grasses:	*Microstegium vimineum, phragmites australis*
Shrubs:	*Lindera benzoin, Rosa multiflora, Rubus allegheniensis,*	Herbaceous:	*Lonicera japonica, Celastrus orbiculatus, Schoenoplectus tabernaemontani, Typha angustifolia*

Inorganic Substrate Components (Add to 100%)			Organic Substrate Components (May be <100)		
Type	**Diameter**	**Composition %**	**Type**	**Characteristics**	**Composition %**
Bedrock	-		Detritus	Sticks, Wood, Coarse Plant Material	
Boulder	10" +				
Cobble	2.5" - 10"				
Gravel	0.1" - 2.5"		Muck-Mud	Black, Very Fine Organic Material	50
Sand	0.06-2 mm				
Silt	0.004-0.06 mm	100	Marl	Grey, Shell Fragments	
Clay	<0.004 mm				

Appendix D – Photographic Log

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APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **1**	**Date:** August 2023

Description:

S-JRK-001 (INT) view upstream facing east.

Photo No. **2**	**Date:** August 2023

Description:

S-JRK-001 (INT) view downstream facing west.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **3**	**Date:** August 2023

Description:

S-JRK-001 (INT) view sub-stream.

Photo No. **4**	**Date:** August 2023

Description:

S-JRK-003 (PER) view upstream of southern reach facing south.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **5**	**Date:** August 2023

Description:

S-JRK-003 (PER) view downstream of southern reach facing northwest.

Photo No. **6**	**Date:** August 2023

Description:

S-JRK-003 (PER) view sub-stream.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **7**	**Date:** August 2023

Description:

S-JRK-003 (PER) view upstream of northern reach facing south.

Photo No. **8**	**Date:** August 2023

Description:

S-JRK-003 (PER) view downstream of northern reach facing north.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **9**	**Date:** August 2023

Description:

S-JRK-004 (EPH) view upstream towards culvert facing east.

Photo No. **10**	**Date:** August 2023

Description:

S-JRK-004 (EPH) view downstream towards cobble facing west.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. 11	**Date:** August 2023

Description:

S-JRK-004 (EPH) view sub-stream.

Photo No. 12	**Date:** August 2023

Description:

S-JRK-004 (EPH) view upstream facing northeast.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **13**	**Date:** August 2023

Description:

S-JRK-005 (EPH) view upstream towards culvert facing northeast.

Photo No. **14**	**Date:** August 2023

Description:

S-JRK-005 (EPH) view downstream facing west.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **15**	**Date:** August 2023

Description:

S-JRK-005 (EPH) view sub-stream.

Photo No. **16**	**Date:** August 2023

Description:

S-JRK-006 view upstream of southern reach facing south.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **17**	**Date:** August 2023

Description:

S-JRK-006 view downstream of southern reach facing north.

Photo No. **18**	**Date:** August 2023

Description:

S-JRK-006 (INT) view sub-stream.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **19**	**Date:** August 2023

Description:

S-JRK-006A (INT) view upstream facing southeast.

Photo No. **20**	**Date:** August 2023

Description:

S-JRK-006 (INT) view upstream of northern reach facing south.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **21**	**Date:** August 2023

Description:

S-JRK-006 (INT) view downstream of northern reach facing north.

Photo No. **22**	**Date:** August 2023

Description:

S-JRK-006 (INT) view sub-stream.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **23**	**Date:** August 2023

Description:

S-JRK-007 (INT) view upstream facing south.

Photo No. **24**	**Date:** August 2023

Description:

S-JRK-007 (INT) view downstream facing north.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **25**	**Date:** August 2023

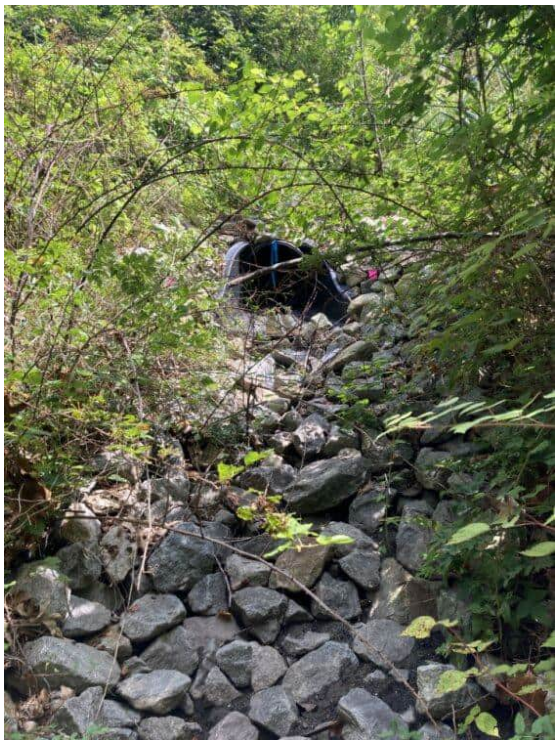
Description:

S-JRK-007 (INT) view sub-stream.

Photo No. **26**	**Date:** August 2023

Description:

S-JRK-008 (EPH) view upstream facing east.



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APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **27**	**Date:** August 2023

Description:

S-JRK-008 (EPH) view downstream facing southwest.

Photo No. **28**	**Date:** August 2023

Description:

S-JRK-003 (PER) view downstream of the northern reach facing northwest.

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APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **29**	**Date:** August 2023

Description:

S-JRK-003 (PER) view upstream of northern reach facing south.

Photo No. **30**	**Date:** August 2023

Description:

S-JRK-003 (PER) view downstream towards ponded area south of earthen berm, facing north.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **31**	**Date:** August 2023

Description:

S-JRK-009 (INT) view upstream facing west.

Photo No. **32**	**Date:** August 2023

Description:

S-JRK-009 (INT) view downstream facing northeast.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **33**	**Date:** August 2023

Description:

S-JRK-009 (INT) view sub-stream.

Photo No. **34**	**Date:** September 2023

Description:

S-JRK-010 (EPH) view upstream of reach 1 facing southeast.

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APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. 35	**Date:** September 2023

Description:

S-JRK-010 (EPH) view downstream of reach 1 facing northwest.

Photo No. 36	**Date:** September 2023

Description:

S-JRK-010 (EPH) view sub-stream of reach 1.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **37**	**Date:** September 2023

Description:

S-JRK-010 (EPH) view upstream of reach 2 facing east.

Photo No. **38**	**Date:** September 2023

Description:

S-JRK-010 (EPH) view downstream of reach 2 facing west.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **39**	**Date:** September 2023

Description:

S-JRK-010 (EPH) view sub-stream of reach 2.

Photo No. **40**	**Date:** September 2023

Description:

S-JRK-011 (INT) view upstream facing south.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **41**	**Date:** September 2023

Description:

S-JRK-011 (INT) view downstream facing north.

Photo No. **42**	**Date:** September 2023

Description:

S-JRK-011 (INT) view sub-stream.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **43**	**Date:** September 2023

Description:

S-JRK-012 (INT) view upstream facing west.

Photo No. **44**	**Date:** September 2023

Description:

S-JRK-012 (INT) view downstream facing west.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **45**	**Date:** September 2023

Description:

S-JRK-013 (PER) view upstream facing northwest from Well 1 location.

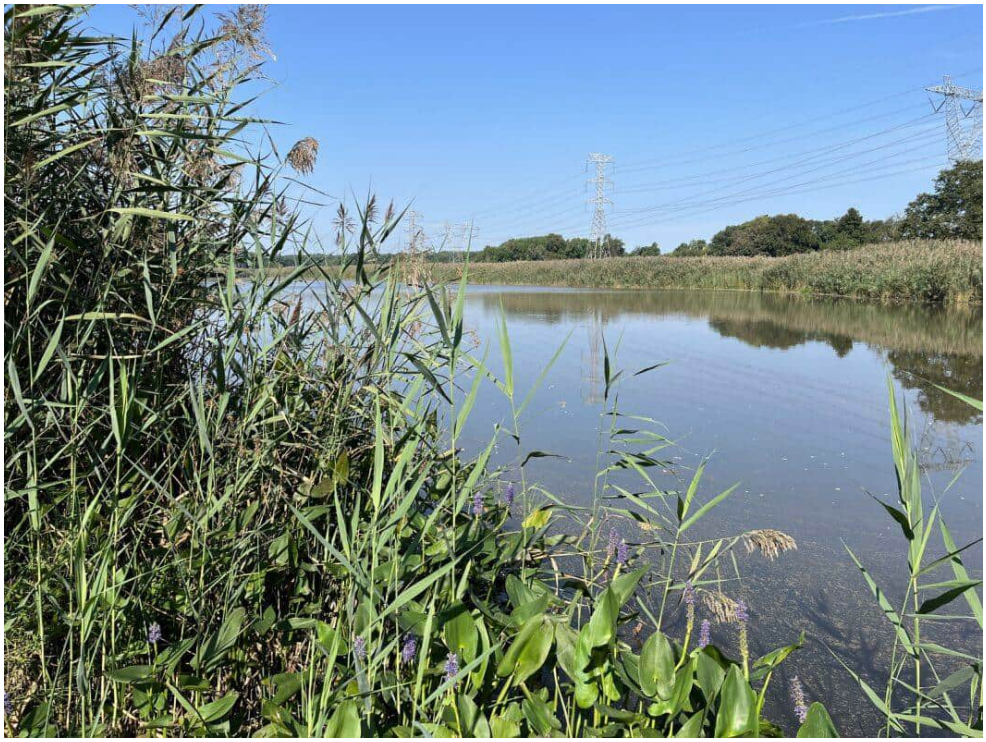

Photo No. **46**	**Date:** November 2023

Description:

S-JRK-013 (PER) view south towards confluence with S-JRK-003 (INT).

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APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **47**	**Date:** September 2023

Description:

W-JRK-001 PEM1 view east towards wetland data point.

Photo No. **48**	**Date:** September 2023

Description:

W-JRK-001 PEM1 view northeast towards wetland from north of wetland data point.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **49**	**Date:** September 2023

Description:

W-JRK-001 PEM1 view towards data point soil boring.

Photo No. **50**	**Date:** September 2023

Description:

W-JRK-001 PFO1A view east towards wetland data point.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **51**	**Date:** September 2023

Description:

W-JRK-001 PFO1A view west from wetland data point.

Photo No. **52**	**Date:** September 2023

Description:

W-JRK-001 PFO1A view towards data point soil boring.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. 53	**Date:** September 2023

Description:

W-JRK-001 PFO1B view northwest towards wetland data point.

Photo No. 54	**Date:** September 2023

Description:

W-JRK-001 PFO1B view northeast from wetland data point.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **55**	**Date:** September 2023

Description:

W-JRK-001 PFO1B view towards data point soil boring.

Photo No. **56**	**Date:** September 2023

Description:

W-JRK-001 PEM2 view south towards wetland data point.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **57**	**Date:** September 2023

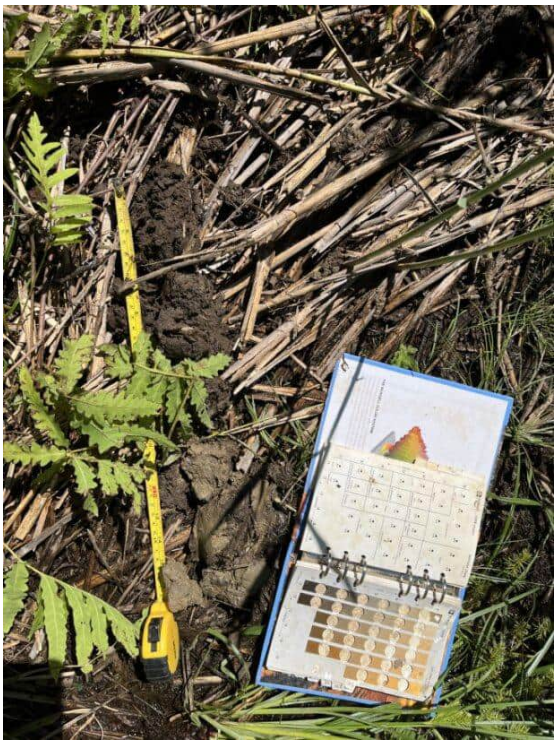
Description:

W-JRK-001 PEM2 view east from wetland data point.

Photo No. **58**	**Date:** September 2023

Description:

W-JRK-001 PEM2 view towards data point soil boring.



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APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **59**	**Date:** September 2023

Description:

W-JRK-001 PFO2 view west towards wetland data point.

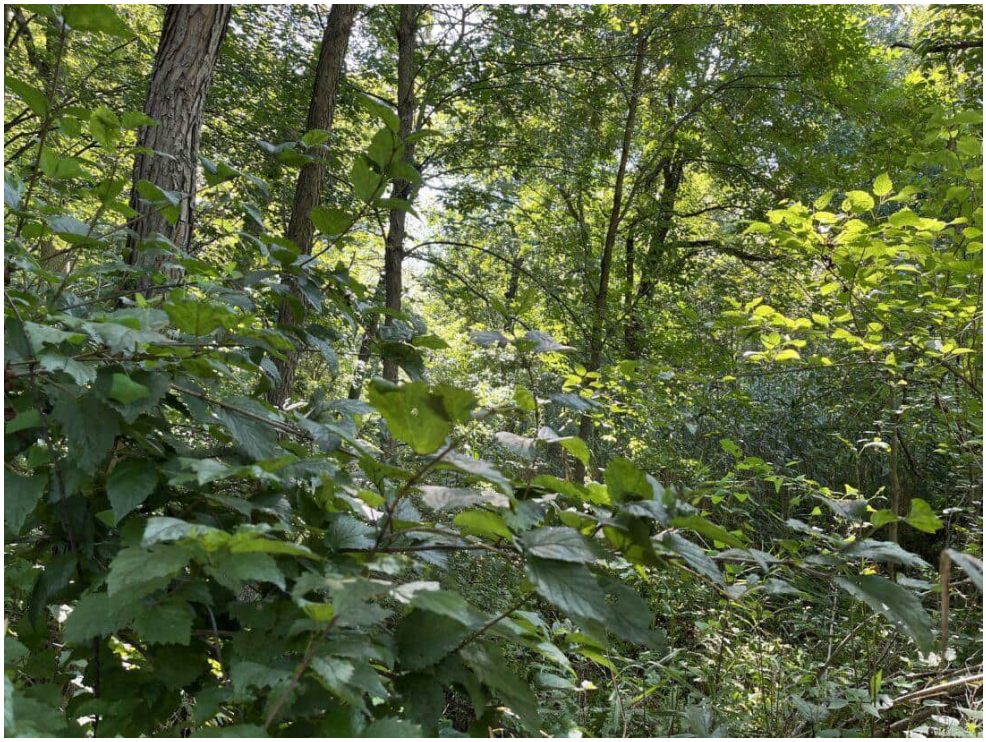

Photo No. **60**	**Date:** September 2023

Description:

W-JRK-001 PFO2 view northeast towards wetland data point.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **61**	**Date:** September 2023

Description:

W-JRK-001 PFO3 view northwest from wetland data point.

Photo No. **62**	**Date:** September 2023

Description:

W-JRK-001 PFO3 view south from wetland data point.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **63**	**Date:** September 2023

Description:

W-JRK-001 PFO3 view towards data point soil boring.

Photo No. **64**	**Date:** September 2023

Description:

W-JRK-001 PEM3 view west towards wetland data point.

AECOM	APPENDIX B PHOTOGRAPH LOG	
Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **65**	**Date:** September 2023

Description:

W-JRK-001 PEM3 view southeast from wetland data point.

Photo No. **66**	**Date:** September 2023

Description:

W-JRK-001 PEM3 view towards data point soil boring.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. 67	**Date:** September 2023

Description:

W-JRK-002 PEM view southwest towards wetland data point.

Photo No. 68	**Date:** September 2023

Description:

W-JRK-002 PEM view north towards wetland data point.

AECOM	APPENDIX B PHOTOGRAPH LOG	
Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **69**	**Date:** September 2023

Description:

W-JRK-002 PEM view towards data point soil boring.

Photo No. **70**	**Date:** September 2023

Description:

W-JRK-003 PEM view northwest towards wetland data point.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **71**	**Date:** September 2023

Description:

W-JRK-003 PEM view southwest towards wetland data point.

Photo No. **72**	**Date:** September 2023

Description:

W-JRK-003 PEM view towards data point soil boring.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **73**	**Date:** September 2023

Description:

W-JRK-004 PEM view west from wetland data point.

Photo No. **74**	**Date:** September 2023

Description:

W-JRK-004 PEM view northwest towards wetland data point.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **75**	**Date:** September 2023

Description:

W-JRK-004 PEM view towards data point soil boring.

Photo No. **76**	**Date:** September 2023

Description:

W-JRK-005 PEM view north towards wetland data point.

AECOM

APPENDIX B
PHOTOGRAPH LOG

Standard Chlorine of Delaware Superfund Site Project	**Site Location: New Castle, Delaware**	**Project No.** 60707136

Photo No. **77**	**Date:** September 2023

Description:

W-JRK-005 PEM view northwest towards western wetland boundary.

Photo No. **78**	**Date:** September 2023

Description:

W-JRK-005 PEM view towards data point soil boring.