

February 9, 2015

Mr. Robert Stewart, Site Director
Croda, Inc.
Atlas Point Site
315 Cherry Lane
New Castle, DE 19720

RE: Project No. 7510.CD
Mantis Project Permits and Approvals
Natural Resource Assessment
Croda, Inc.
New Castle, Delaware

Dear Mr. Stewart:

This letter summarizes the natural resources assessment performed by Duffield Associates, Inc. (Duffield Associates) in support of the proposed Croda, Inc. (Croda), Mantis Project (the “Project”) Coastal Zone Permit application, submitted by Croda. The project assessment area consists of approximately 10 acres of an approximate 30-acre property owned by Croda, which is identified as New Castle County Tax Parcel No. 1001600007 (see Attachment 1: Location Map and project sketches). This report summarizes our findings.

Duffield Associates assessed the project area for natural resources regulated by Federal and State authority, specifically rare, threatened, and endangered species and supportive habitat. Duffield Associates did not observe occurrences of rare, threatened or endangered species or suitable habitat within the assessment area. The adjacent habitat was observed to be unremarkable with regards to supporting rare, threatened, or endangered species. Based on an assessment of government database information and field verification, Duffield Associates’ professional opinion is that the proposed project has little potential to impact endangered species and supportive habitat, adversely or beneficially, within the proposed project area or adjacent lands.

With regards to natural resources, as the proposed use and development of the project area is not anticipated to differ significantly in character from prior development, use or impacts in the normal course of manufacturing, the proposed project is anticipated to have little measurable effect on rare, threatened, or endangered species or habitat.

Site Characteristics

The project site is located south of the Interstate Route 295 / U.S. Highway 40 approach to the Delaware Memorial Bridge. It is bounded to the west by other Croda manufacturing facilities and a rail line, to the east by Delaware Memorial Bridge support facilities, to the southeast by

wetlands and forest, and the Delaware River, to the south and west by Cherry Lane and adjacent commercial/industrial development. The project site was previously a manufacturing facility and a portion has been in continuous use as a truck/equipment storage area. The project site is developed and covered with either stone or paved as an impervious surface. A fence separates the Croda property from the adjacent lands (see Attachment 1 and Attachment 2, Assessment Photographs).

Assessment rationale and summary results

Duffield Associates performed desktop research on February 2 and 3, 2015, and site reconnaissance on February 4, 2015. Research was performed in accordance with the Federal Endangered Species Act (16 USC §§ 1531-1543, 1973 as amended) as administered by the State (Delaware Administrative Code Title 7: 3900) Endangered Species guidelines and species-specific management plans. The assessment focused on migratory songbirds, waterfowl, and raptors, as well as their pathways and habitat. Less consideration was given to terrestrial plants and animals, as the proposed project site has been observed to be developed for greater than 20 years (see Attachment 1).

The Delaware Endangered Species list (Attachment 3) was reviewed for species and habitat types that may occur on the proposed project site and in the immediate vicinity. Elements (i.e., organisms) that would not be expected in the area or habitat were not reviewed (e.g., ocean going species). This truncated list of elements known from similar habitats or that may occur in the vicinity were reviewed against existing data, including individual species plans and the Delaware Wildlife Action Plan (Attachment 4). Potential species and habitat targets were reviewed against third-party observations (Attachment 5: eBird.org reports). Several bird species were reported to have been observed approximately one mile to the southeast of the project site, through citizen science. No third-party sightings were discovered from the project site or immediately adjacent lands.

The Delaware Wildlife Action Plan (Attachment 4) indicated a habitat of conservation concern (mixed broadleaf freshwater tidal marsh) southeastward of the site. There are no habitats of conservation concern on or immediately adjacent to the project site. The Delaware Wildlife Action Plan considers the area to be developed.

The Department of Natural Resources and Environmental Control (DNREC) Delaware Wildlife Species Conservation and Research Program was consulted via Environmental Review for listed occurrences of rare, threatened, or endangered species and habitats that may be known from the project site or vicinity (Attachment 6, Environmental Review Letter). No rare, threatened or endangered species have been recorded by the State of Delaware from the site or adjacent lands.

Duffield Associates reviewed the project area and adjacent lands for wetlands, waters, and subaqueous lands regulated by Federal and State authority. Duffield Associates reviewed the U.S. Fish and Wildlife Service National Wetlands Inventory (Attachment 7) and New Castle

County GIS Viewer (Attachment 1) to review protected lands in the vicinity of the proposed project site. Aside from their own management regimes, these areas are often associated with rare, threatened, or endangered species habitat. Regulated wetlands and waters were not observed on the proposed project site, but were observed from adjacent lands.

The site was visually assessed for habitat indicators and target species (see Attachment 2, Assessment Photographs). Areas near the site were assessed to compare habitat conditions.

The site reconnaissance supported the desk research findings that no significant impact to endangered species or habitat are likely to occur from the proposed project site. The site was observed to have impervious cover and to be maintained in continual use. It was observed during the assessment that significant noise and light is generated by the adjacent Delaware Memorial Bridge access ramp and toll facility. Further, the bridge and highway were observed to be at a greater elevation than the proposed project site, which indicates they would be a significant migration, feeding, or breeding barrier to migratory songbirds, raptors and waterfowl in relation to the project. No attractive nuisances such as open containers of garbage (which attracts rodents) or bird feeders were observed at the site.

The adjacent wetlands were observed to be primarily a monoculture of the invasive plant *Phragmites australis*. *Phragmites* outcompetes native plants and reduces plant and invertebrate community diversity. Literature review suggests *Phragmites* offers limited refuge and feeding/breeding habitat for migratory songbirds when compared to native vegetation. Woodlands were observed adjacent to the proposed project site as well, though no bird activity and no raptor nests were observed in the canopy. In contrast, the abovementioned birding site located to the southeast of Croda's property was observed to have amenable habitat, including refuge and feeding habitat.

Conclusion and recommendations

Rare, threatened, or endangered species were not observed from the project site or immediately adjacent lands. Habitat conducive to rare, threatened, or endangered species was not observed on site or immediately adjacent lands. The project site should be considered to be unremarkable for rare, threatened or endangered species and birds in general. In contrast, amenable habitat with documented rare, threatened or endangered species occurrences exists within one mile of the proposed project site.

The uses and practices anticipated at the proposed project site are not expected to impact natural resources, specifically State endangered, threatened and rare species, positively or negatively.

Mr. Robert Stewart
RE: Project No.7510.CD
February 9, 2015
Page 4



Duffield Associates appreciates having had this opportunity to provide these services to you. Should you have questions regarding the contents of this report or require additional service, please contact us at (302) 239-6634.

Sincerely,

DUFFIELD ASSOCIATES, INC.

A handwritten signature in blue ink, appearing to read "D. Gosse", is positioned above the typed name.

David C. Gosse LEED GA
Senior Project Scientist

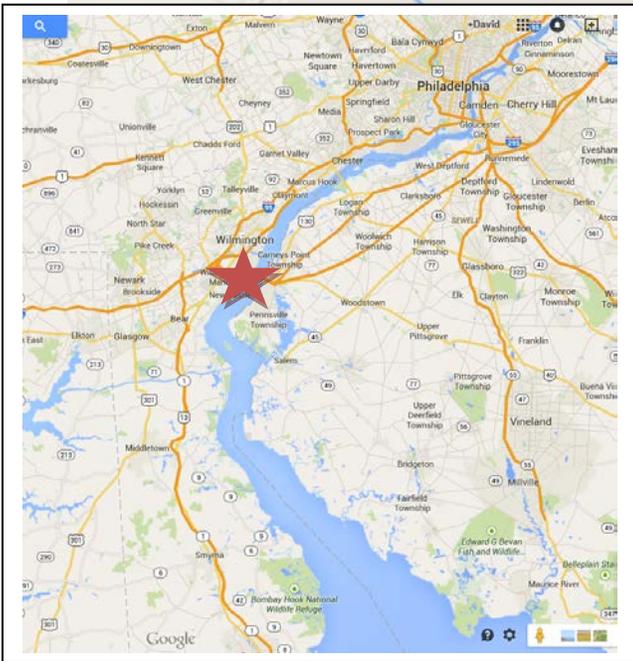
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7510CD.0215-NR-Assessment.COR

- Attachments:
1. Location Map and project sketches
 2. Assessment Photographs
 3. Endangered Species List
 4. Delaware Wildlife Action Plan, Map B
 5. EBird.org reports
 6. Environmental Review Letter
 7. NWI results

cc: Shawn Tucker, Esq
Robert Touhey – Croda, Inc.

ATTACHMENT 1

LOCATION MAP AND PROJECT SKETCHES



Sketch 1 – Location map. Source: Google maps, www.maps.google.com, accessed online February 3, 2015. Sketch not to scale.

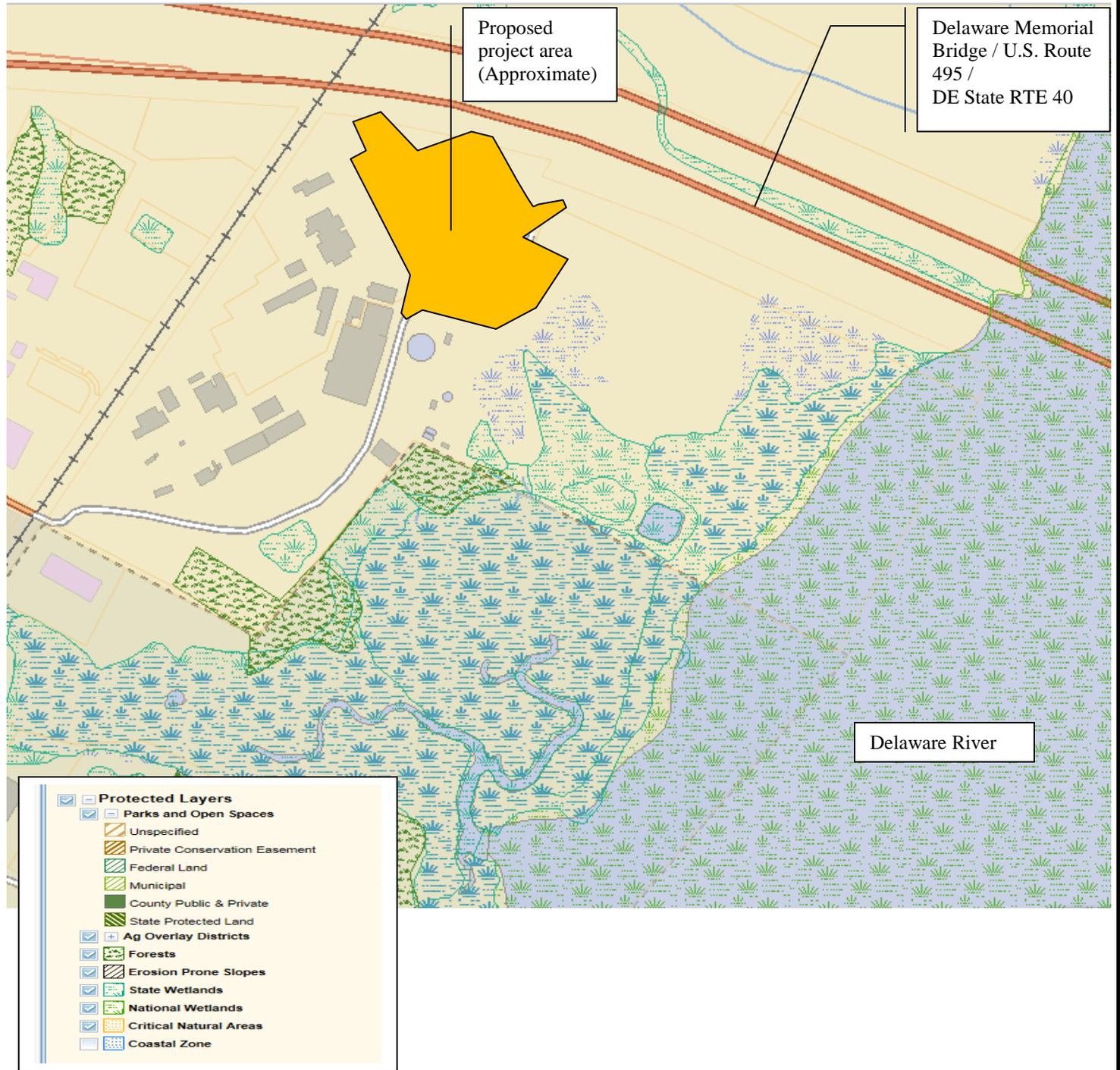
**CRODA Mantis Project
Location Sketch
New Castle County, Delaware**



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E-MAIL: duffield@duffnet.com

Project No. 7510.CD

Date: February, 2015



Sketch 2 – New Castle County GIS viewer showing project property, proposed project site, and nearby natural or protected areas.

Source: New Castle County Geographic Information System Map View, accessed online at http://gis.nccde.org/gis_viewer/ February 3, 2015. Sketch not to scale.

CRODA Mantis Project
Protected Lands via NCC-GIS Map Viewer
New Castle County, Delaware



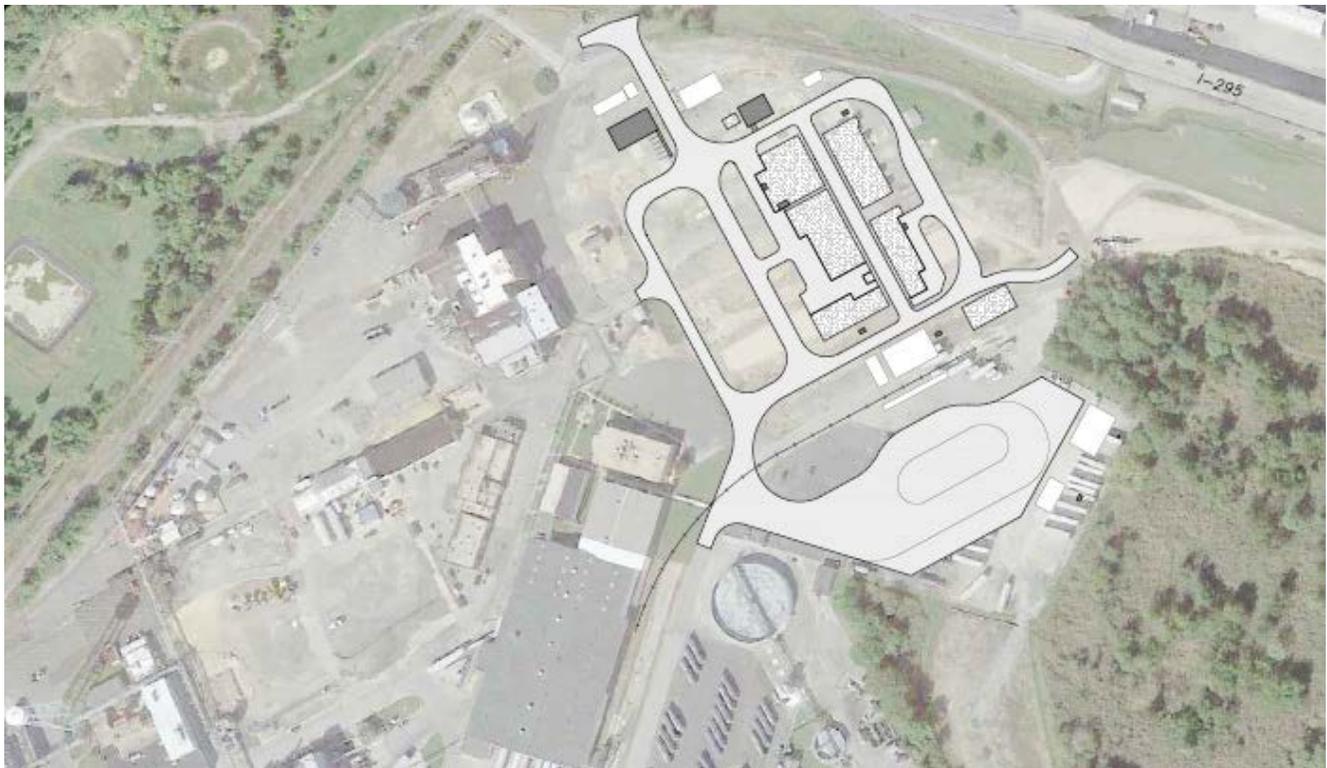
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Photograph 1 – 2008 aerial photograph showing proposed project area after demolition of previous structures.



Photograph 2 – 2011 aerial of proposed project area showing proposed development concept and improvements.

Source: Vandemark & Lynch, Inc. Aerial Exhibit and concept sketch, not to scale, January 15, 2015.

CRODA Mantis Project
Project Concept Plan
New Castle County, Delaware



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Source: New Castle County GIS Viewer showing proposed project site in similar condition and use in 1992.

Source: New Castle County Geographic Information System Map View, accessed online at http://gis.nccde.org/gis_viewer/ February 5, 2015.

Maps not to scale.

CRODA Mantis Project
1992 aerial photograph
New Castle County, Delaware



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Date: February , 2015

ATTACHMENT 2

ASSESSMENT PHOTOGRAPHS



Photograph 1 -- Proposed project site facing northeastward; Delaware Memorial Bridge and approach are visible in background.



Photograph 2 – Proposed project site facing southeastward.

CRODA Mantis Project
 Assessment Photographs
 New Castle County, Delaware



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Photograph 3 -- Proposed project site facing northeastward, showing adjacent bridge approach lighting, electric wires, and truck traffic on bridge (circled). Note absence of attractive nuisances (i.e., seed plants, garbage, rodentia, etc) that would lead to migratory or songbird feeding/breeding stopover activity.



Photograph 4 --Lands adjacent to the southeastern perimeter of proposed project site (beyond fence line), showing maintained area and limited cover.

CRODA Mantis Project
Assessment Photographs
New Castle County, Delaware



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Photograph 5 – Lands adjacent to the southeastern perimeter of proposed project site at southeastern most extent, (beyond fence line). Adjacent to project site is Phragmites and small forested area. No large bird nests (e.g. raptors) were observed from the tree areas.



Photograph 6 -- Lands adjacent to the southeastern perimeter of proposed project site facing northeastward towards Delaware Memorial Bridge; (beyond fence line).

CRODA Mantis Project
Assessment Photographs
New Castle County, Delaware



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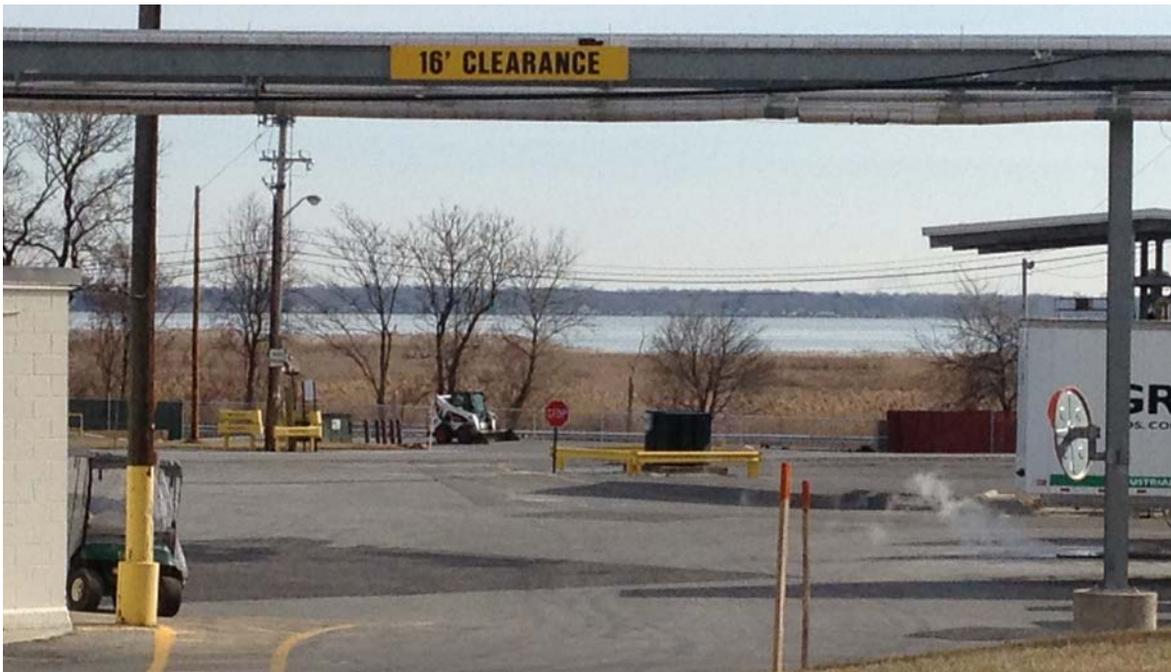
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Photograph 7 – Southeastern most area of the proposed project site, facing southwestward. Note maintained condition, impervious surface, and treeline of small forested area adjacent to the project site beyond the fenceline. Portions of the Croda manufacturing facility are visible in the background (circled). No large bird nests (e.g. raptors) were observed from the tree areas.



Photograph 8 – Interior portion of the Croda manufacturing facility, southward from the proposed project site, facing southeastward. Note impervious surface and maintained condition to fence line; *Phragmites* field and Delaware River visible in background.

CRODA Mantis Project
Assessment Photographs
New Castle County, Delaware



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Photograph 9 – Open area approximately 1 mile southeastward from the proposed project site, facing the proposed project site to the north (circled). Citizen science reports of birding activity are recorded southward of this location.



Photograph 10 – From abovementioned open area, facing more eastward to Delaware Memorial Bridge.

CRODA Mantis Project
Assessment Photographs
New Castle County, Delaware



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Photograph 11 – Calm water impoundment approximately 1 mile southward from proposed project site, facing eastward. This is the approximate location of citizen science birding monitoring location. Note thick herbaceous layer (not *Phragmites*).



Photograph 12 – Approximate location of citizen science bird monitoring location as shown in Photograph 11, facing eastward. Note migratory fowl (circled), diverse seed stock for songbirds and waterfowl in foreground.

CRODA Mantis Project
 Assessment Photographs
 New Castle County, Delaware



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ATTACHMENT 3

ENDANGERED SPECIES LIST

<p>Birds</p> <ul style="list-style-type: none"> •Pied-billed GrebeBR (<i>Podilymbus podiceps</i>) •Northern HarrierBR (<i>Circus cyaneus</i>) •Broad-winged HawkBR (<i>Buteo platypterus</i>) •Black-Crowned Night-Heron (<i>Nycticorax nycticorax</i>) •Yellow-Crowned Night-Heron (<i>Nyctanassa violacea</i>) •American Kestrel (<i>Falco sparverius</i>) •Red Knot (<i>Calidris canutus</i>) •Piping Plover (<i>Charadrius melodus</i>) •Short-eared Owl BR (<i>Asio flammeus</i>) •American Oystercatcher (<i>Haematopus palliatus</i>) •Black Rail (<i>Laterallus jamaicensis</i>) •Upland Sandpiper (<i>Bartramia longicauda</i>) •Black Skimmer (<i>Rynchops niger</i>) •Henslow's Sparrow (<i>Ammodramus henslowii</i>) •Common TernBR (<i>Sterna hirundo</i>) •Forster's TernBR (<i>Sterna forsteri</i>) •Least Tern (<i>Sterna antillarum</i>) •Cerulean Warbler (<i>Setophaga cerulea</i>) •Hooded Warbler BR (<i>Setophaga citrina</i>) •Swainson's Warbler (<i>Limnothlypis swainsonii</i>) •Sedge Wren (<i>Cistothorus platensis</i>) <p>BR Breeding population only</p>	<p>Insects</p> <ul style="list-style-type: none"> •Little White Tiger Beetle (<i>Cicindela lepida</i>) •White Tiger Beetle (<i>Cicindela dorsalis</i>) •Seth Forest Scavenger Beetle (<i>Hydrochus sp.spangleri</i>) •Burgundy Bluet (<i>Enallagma dubium</i>) •Pale Bluet (<i>Enallagma pallidum</i>) •Baltimore Checkerspot (<i>Euphydryas phaeton</i>) •Banner Clubtail (<i>Gomphus apomyius</i>) •Laura's Clubtail (<i>Stylurus laurae</i>) •Midland Clubtail (<i>Gomphus fraternus</i>) •Sable Clubtail (<i>Gomphus rogersi</i>) •Black-tipped Darner (<i>Aeshna tuberculifera</i>) •Taper-tailed Darner (<i>Gomphaeschna antelope</i>) •Black Dash (<i>Euphyes conspicua</i>) •Frosted Elfin (<i>Incisalia irus</i>) •Treetop Emerald (<i>Somatochlora provocans</i>) •Bethany Beach Firefly (<i>Photuris bethaniensis</i>) •Hessel's Hairstreak (<i>Mitoura hesseli</i>) •King's Hairstreak (<i>Satyrium kingi</i>) •Aralia Shoot Borer Moth (<i>Papaipema araliae</i>) •Dark Stoneroot Borer Moth (<i>Papaipema duplicatus</i>) •Maritime Sunflower Borer Moth (<i>Papaipema maritima</i>) •Pitcher Plant Borer Moth (<i>Papaipema appassionata</i>) •Yellow Stoneroot Borer Moth (<i>Papaipema astuta</i>) •Elfin Skimmer (<i>Nannothemis bella</i>) •Rare Skipper (<i>Problema bulenta</i>) •Brown Spiketail (<i>Cordulegaster bilineata</i>) •Sely's Sundragon (<i>Helocordulia selysii</i>) •Marbled Underwing (<i>Catocala marmorata</i>) •Ulalume Underwing (<i>Catocala ulalume</i>) •Mulberry Wing (<i>Poanes massasoit massasoit</i>) •Chermock's Mulberry Wing (<i>Poanes massasoit chermocki</i>)
<p>Reptiles</p> <ul style="list-style-type: none"> •Leatherback Turtle (<i>Dermochelys coriacea</i>) •Kemp's Ridley Turtle (<i>Lepidochelys kempii</i>) •Green Turtle (<i>Chelonia mydas</i>) •Loggerhead Turtle (<i>Caretta caretta</i>) •Bog Turtle (<i>Clemmys muhlenbergii</i>) •Corn Snake (<i>Elaphe guttata guttata</i>) •Eastern Scarlet Snake (<i>Cemophora coccinea</i>) •Redbelly Watersnake (<i>Nerodia erythrogaster</i>) <p>Amphibians</p> <ul style="list-style-type: none"> •Eastern Mud Salamander (<i>Pseudotriton montanus montanus</i>) •Eastern Tiger Salamander (<i>Ambystoma tigrinum tigrinum</i>) •Barking Treefrog (<i>Hyla gratiosa</i>) 	<p>Mammals</p> <ul style="list-style-type: none"> •Little Brown Bat (<i>Myotis lucifugus</i>) •Northern Long-eared Bat (<i>Myotis septentrionalis</i>) •Delmarva Fox Squirrel (<i>Sciurus niger cinereus</i>) •Blue Whale (<i>Balaenoptera musculus</i>) •Fin Whale (<i>Balaenoptera physalus</i>) •Humpback Whale (<i>Megaptera novaengliae</i>) •North Atlantic Right Whale (<i>Eubalaena glacialis</i>) •Sei Whale (<i>Balaenoptera borealis</i>) •Sperm Whale (<i>Physeter macrocephalus</i>)
<p>Fish</p> <ul style="list-style-type: none"> •Glassy Darter(<i>Etheostoma vitreum</i>) •Blueridge Sculpin (<i>Cottus caeruleomentumum</i>) •Bridled Shiner (<i>Notropis bifrenatus</i>) •Ironcolor Shiner (<i>Notropis chalybaeus</i>) •Atlantic Sturgeon (<i>Acipenser oxyrinchus</i>) •Shortnose Sturgeon (<i>Acipenser brevirostrum</i>) •Blackbanded Sunfish (<i>Enneacanthus chaetodon</i>) 	<p>Mollusks</p> <ul style="list-style-type: none"> •Yellow Lampmussel (<i>Lampsilis cariosa</i>) •Eastern Lampmussel (<i>Lampsilis radiata</i>) •Dwarf Wedgemussel (<i>Alasmidonta heterodon</i>) •Eastern Pondmussel (<i>Ligumia nasuta</i>) •Brook Floater (<i>Alasmidonta varicosa</i>) •Triangle Floater (<i>Alasmidonta undulata</i>) •Tidewater Mucket (<i>Leptodea ochracea</i>)

List of Delaware endangered species as managed by DNREC. Source: Delaware Wildlife Species Conservation and Research Program, accessed online at <http://www.dnrec.delaware.gov/> February 3, 2015.

CRODA Mantis Project
State of Delaware Endangered Species list
New Castle County, Delaware



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ATTACHMENT 4

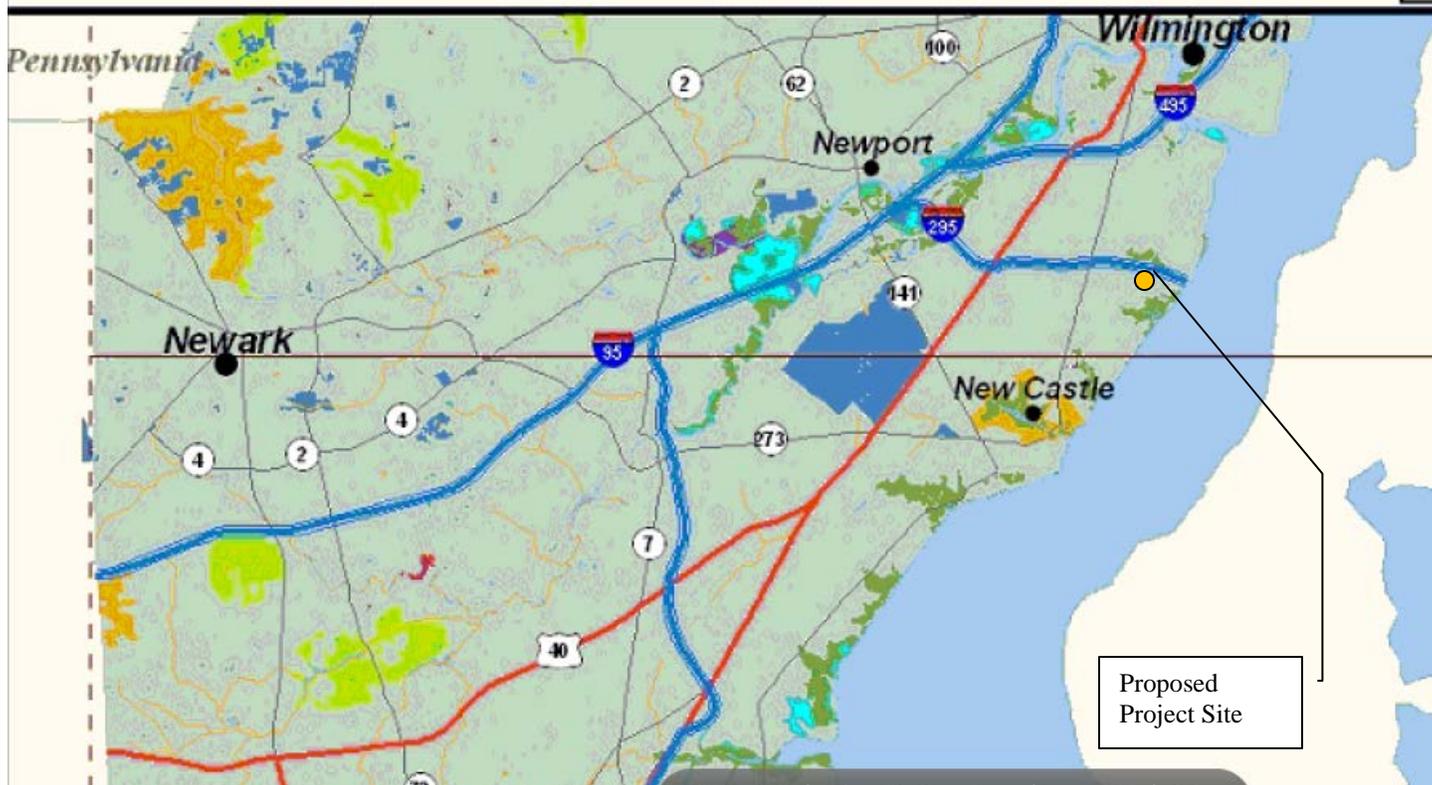
DELAWARE WILDLIFE ACTION PLAN, MAP B



Delaware Wildlife Action Plan

Key Wildlife Habitats - B

- | | | |
|--|--|---|
| Forests > 250 acres | Chestnut Oak - Hairgrass Forest | Mixed Herb Deep Peat Wetland |
| Wetlands > 250 acres | Coastal Plain Seasonal Ponds | Piedmont Stream Valley Wetlands |
| SGCN | Smooth Cordgrass - Liliopsis Brackish Marsh | Riverine Aquatic and Submerged Vegetation |
| <i>Habitats of Conservation Concerns</i> | | |
| Ancient Sand Ridge Forest | Early Successional Upland Habitats | Spartina High Salt Marsh |
| Atlantic White Cedar Non-tidal Wetlands | Freshwater Intertidal Quilwort Flat | Tuliptree Rich Wood (Coastal Plain variant) |
| Bald Cypress - Red Maple - Swamp Black Gum Swamp | Mixed Broadleaf Freshwater Tidal Marsh | Unvegetated Intertidal Mudflat |
| Bishop-weed - Mixed Species Brackish Marsh | Freshwater Tidal Forested & Scrub-Shrub Wetlands | Unvegetated Sandy Beach & Dune Grasslands |
| Black Ash Seepage Swamp | Intertidal Wetlands | Non-tidal Coastal Plain Streams |
| | Isolated Freshwater Wetlands | |



Sketch 4 – Delaware Wildlife Action Plan, Key Wildlife Habitat. Sketch shows occurrence of mixed broadleaf freshwater tidal marsh in the vicinity of the proposed project site. Source: DNREC Wildlife Action Plan accessed online at <http://www.dnrec.delaware.gov/fw/dwap/Pages/DEWAPlan.aspx>, February 4, 2015.

Sketch not to scale.

CRODA Mantis Project
 Delaware Wildlife Action Plan, Map A
 New Castle County, Delaware

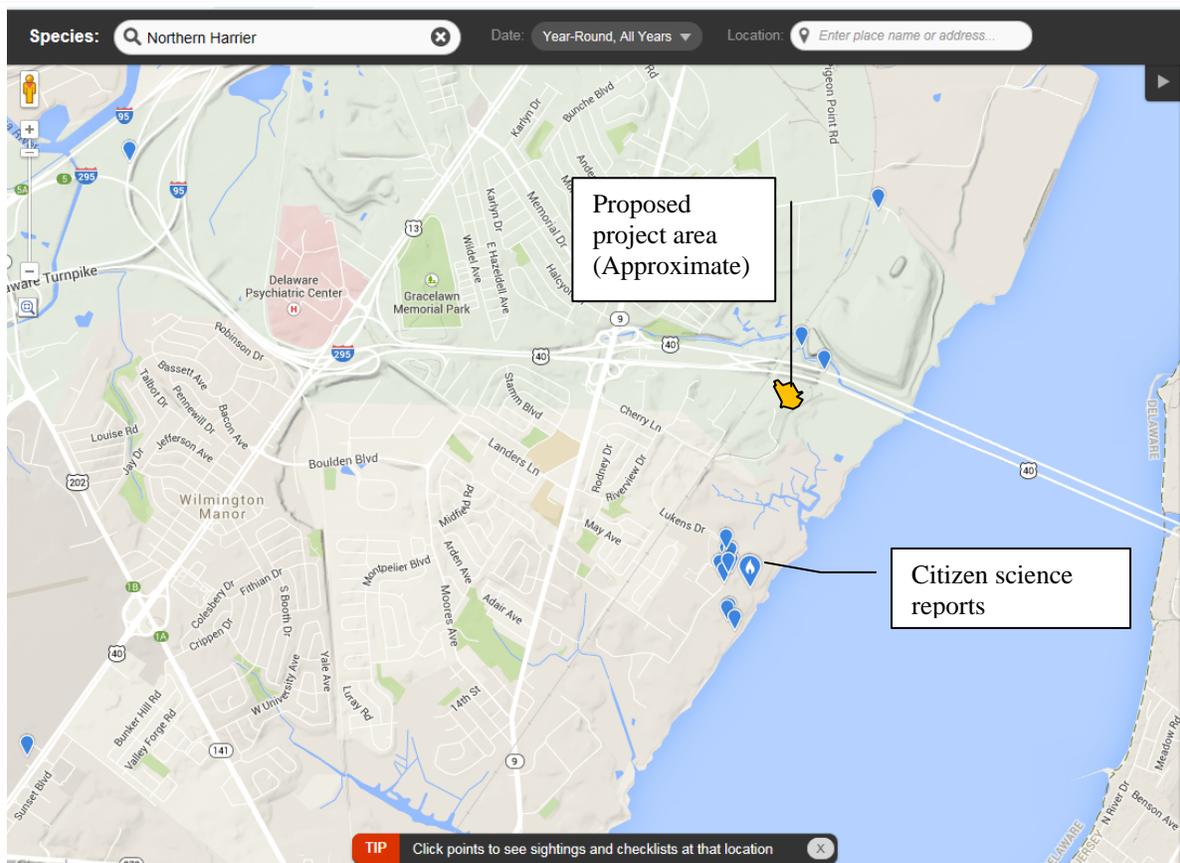


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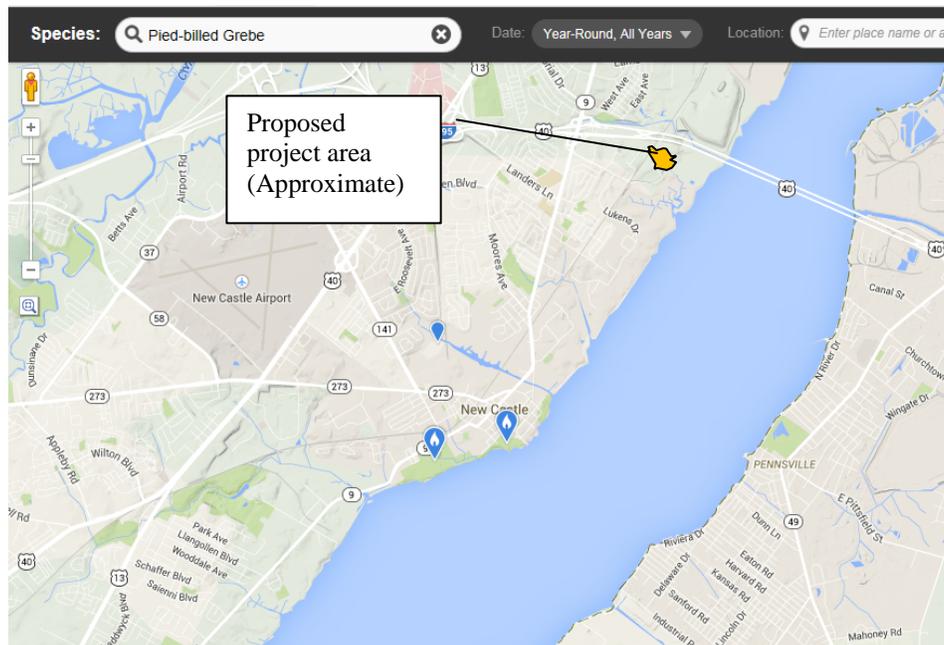
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ATTACHMENT 5

EBIRD.ORG REPORTS



Recent (2013-present) citizen science reports for Northern Harrier (*Circus cyaneus*), in vicinity of proposed project site. Source: National Audubon Society and Cornell Ornithology Lab, accessed online at www.ebird.org, February 3, 2015.



Recent (2013-present) citizen science reports for Pied-billed Grebe (*Podilymbus podiceps*), in vicinity of proposed project site. Source: National Audubon Society and Cornell Ornithology Lab, accessed online at www.ebird.org, February 3, 2015. Sketches not to scale.

CRODA Mantis Project
 Delaware ESA bird reports
 New Castle County, Delaware

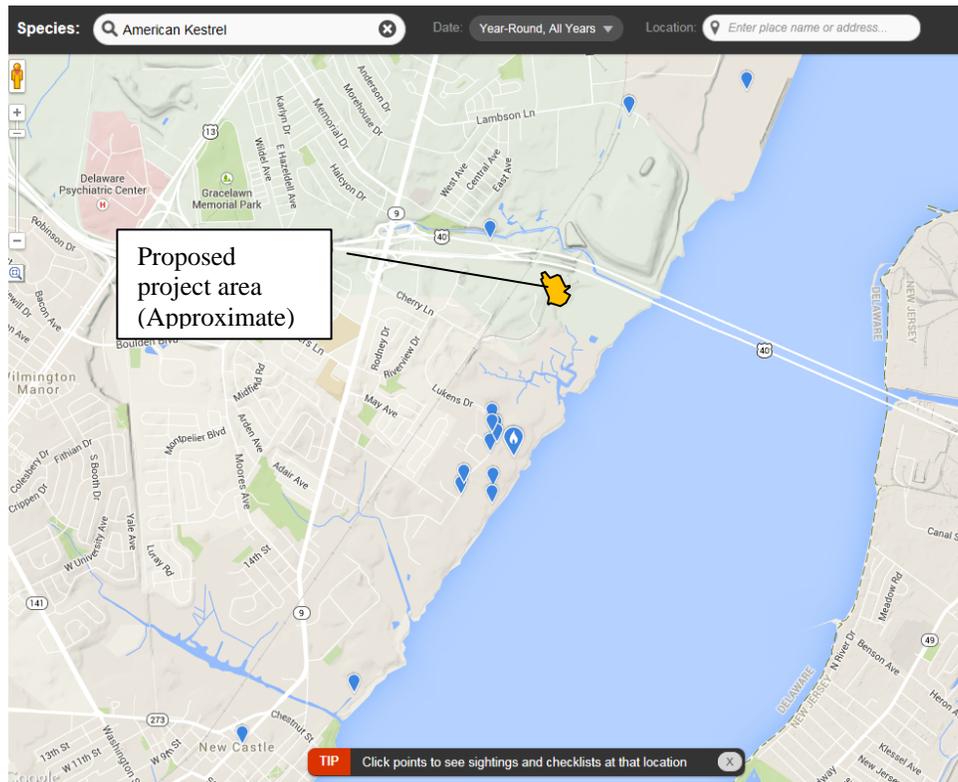


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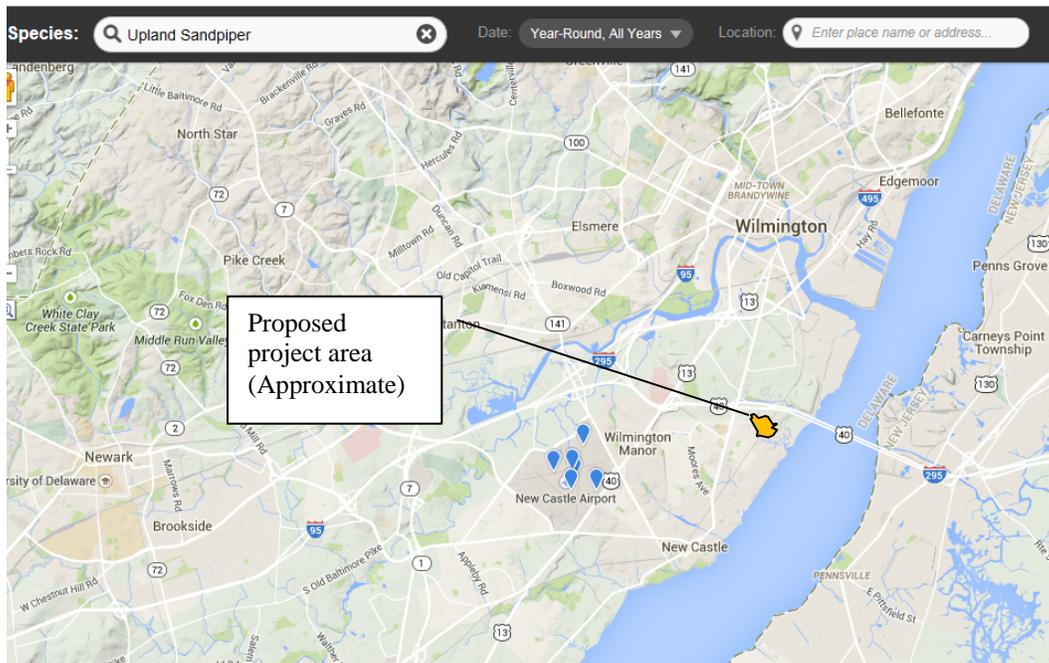
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Recent (2013-present) citizen science reports for American Kestrel (*Falco sparverius*), in the vicinity of proposed project site. Source: National Audubon Society and Cornell Ornithology Lab, accessed online at www.ebird.org, February 3, 2015.



Recent (2013-present) citizen science reports for Upland Sandpiper (*Bartramia longicauda*), in the vicinity of proposed project site. Source: National Audubon Society and Cornell Ornithology Lab, accessed online at www.ebird.org, February 3, 2015.

Sketches not to scale.

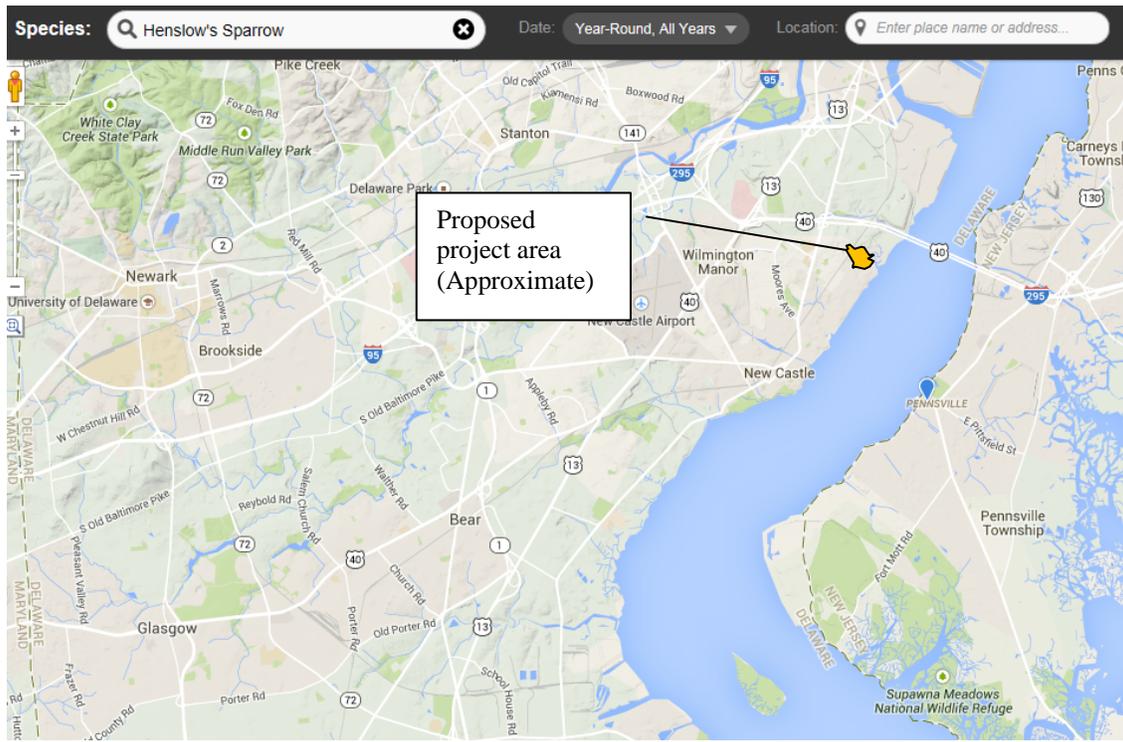
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 Delaware ESA bird reports
 New Castle County, Delaware



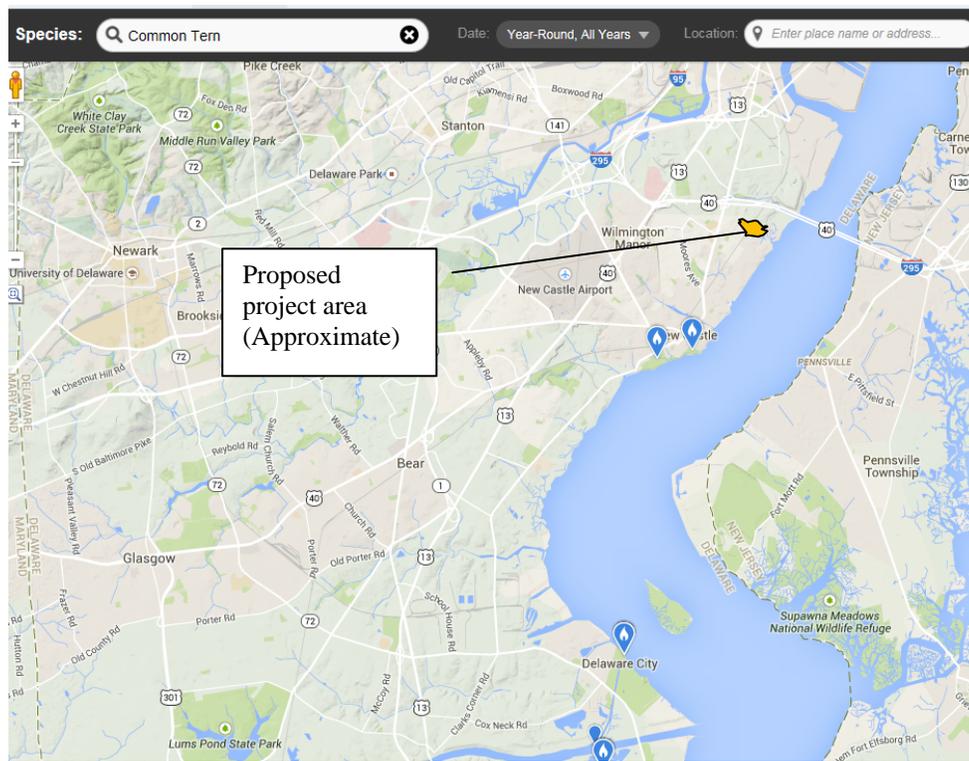
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Recent (2013-present) citizen science reports for Henslow's Sparrow (*Ammodramus henslowii*), in the vicinity of proposed project site. Source: National Audubon Society and Cornell Ornithology Lab, accessed online at www.ebird.org, February 3, 2015.



Recent (2013-present) citizen science reports for Common Tern (*Sterna hirundo*), in the vicinity of proposed project site. Source: National Audubon Society and Cornell Ornithology Lab, accessed online at www.ebird.org, February 3, 2015.

Sketches not to scale.

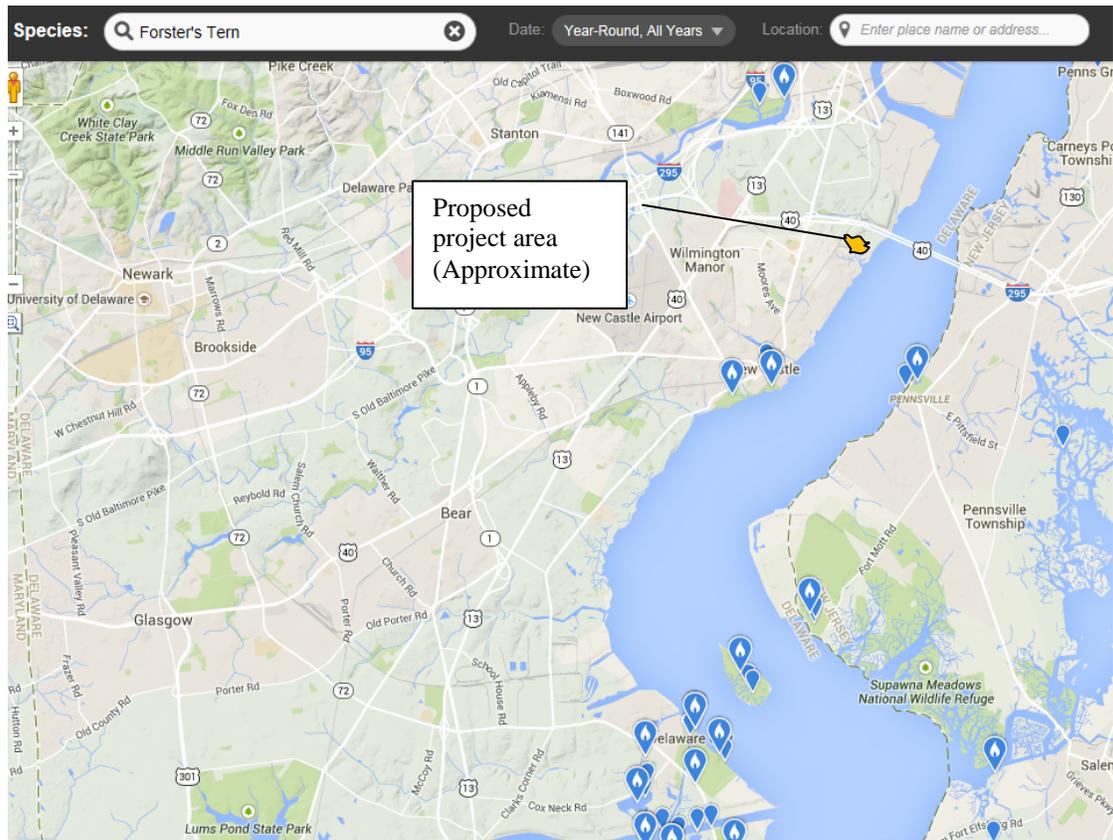
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Recent (2013-present) citizen science reports for Forster’s Tern (*Sterna forsteri*) in the vicinity of proposed project site. Source: National Audubon Society and Cornell Ornithology Lab, accessed online at www.ebird.org, February 3, 2015.

Sketch not to scale.

CRODA Mantis Project
 Delaware ESA bird reports
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Date: February, 2015

ATTACHMENT 6

ENVIRONMENTAL REVIEW LETTER



STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
& ENVIRONMENTAL CONTROL
DIVISION OF FISH & WILDLIFE
89 Kings Highway
Dover, Delaware 19901

Phone: (302) 739-9910
Fax: (302) 739-6157

OFFICE OF THE
DIRECTOR

February 3, 2015

David C. Gosse
Duffield Associates
5400 Limestone Road
Wilmington, DE 19808

Re: DUFF 2014 CRODA Atlas Point, Tax Parcel ID: 1001600007

Dear Mr. Gosse:

Thank you for contacting the Wildlife Species Conservation and Research Program (WSCR) about information on rare, threatened and endangered species, unique natural communities, and other significant natural resources as they relate to the above referenced project. Please note that our program does not have knowledge of, and does not comment on, non-renewable natural resources such as minerals and artifacts.

A review of our database indicates that there are currently no records of state-rare or federally listed plants, animals or natural communities at this project site.

We are continually updating our records on Delaware's rare, threatened and endangered species, unique natural communities and other significant natural resources. If the start of the project is delayed more than a year past the date of this letter, please contact us again for the latest information.

Please feel free to contact me if you have any questions or require additional information.

Sincerely,

Kate Fleming
Wildlife Biologist/Environmental Review Coordinator
(302) 735-8658
(302) 653-3431 fax
Kate.Fleming@state.de.us

(See invoice on next page)

*We Bring You Delaware's Great Outdoors
through Science and Service*

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CRODA Mantis Project
DNREC Environmental Review letter
New Castle County, Delaware



DUFFIELD
ASSOCIATES
Soil, Water & the Environment

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Project No. 7510.CD

Date: February, 2015

ATTACHMENT 7

NWI RESULTS

U.S. Fish and Wildlife Service
National Wetlands Inventory

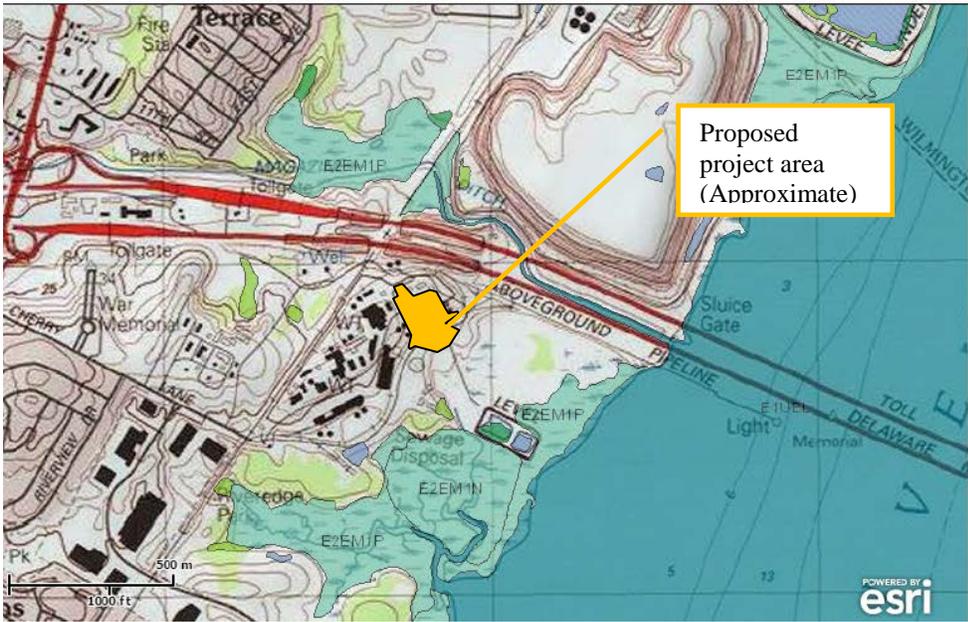
Feb 5, 2015



- Wetlands**
- Freshwater Emergent
 - Freshwater Forested/Shrub
 - Estuarine and Marine Deepwater
 - Estuarine and Marine
 - Freshwater Pond
 - Lake
 - Riverine
 - Other

U.S. Fish and Wildlife Service
National Wetlands Inventory

Feb 5, 2015



- Wetlands**
- Freshwater Emergent
 - Freshwater Forested/Shrub
 - Estuarine and Marine Deepwater
 - Estuarine and Marine
 - Freshwater Pond
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 - Riverine
 - Other

Source: USFWS National Wetlands Inventory Mapper, showing aerial photograph and USGS topographic quad map views, accessed at www.nwi.gov, February 5, 2015.
 Maps not to scale.

CRODA Mantis Project
 National Wetland Inventory results
 New Castle County, Delaware



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