Draft Environmental Assessment

Highlands and Monmouth Hills Flood Mitigation and Green Infrastructure Project

Borough of Highlands, Monmouth County, New Jersey

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ACRONYMS AND ABBREVIATIONS

APE	Area of Potential Effects
AMSL	Above Mean Sea Level
BMP	Best Management Practice
BRIC	Building Resilient Infrastructure and Communities
CAA	Clean Air Act
CAFRA	Coastal Area Facility Review Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWFNJ	Conserve Wildlife Foundation of New Jersey
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
dB	Decibel
dBA	A-weighted decibel
EA	Environmental Assessment
EFH	Essential Fish Habitat
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
ft BGS	Feet Below Ground Surface
HUC	Hydrologic Unit Code
IPaC	Information for Planning and Consultation
Ldn	Day-Night Average Sound Level
Leq	Equivalent Continuous Sound Level
LUCY	New Jersey Cultural Resources Geographic Information System
NAAQS	National Ambient Air Quality Standards
NAVD88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NJAC	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NJDFW	New Jersey Division of Fish and Wildlife
NJDOT	New Jersey Department of Transportation
NJPDES	New Jersey Pollutant Discharge Elimination System
NJHPO	New Jersey Historic Preservation Office
NMFS	National Marine Fisheries Service
NO2	Nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration

NOx	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
Pb	Lead
PhbC	Phalanx Loamy Sand 5 percent to 10 percent slopes
PhbE	Phalanx Loamy Sand 10 percent to 25 percent slopes
PM2.5	Particulate Matter Less than 2.5 Micrometers in Diameter
PM10	Particulate Matter Less than 10 Micrometers in Diameter
PM	Particulate Matter
RCP	Reinforced Concrete Pipe
SO2	Sulfur dioxide
SOI	Secretary of the Interior
SPL	Sound Pressure Level
TCB	Tricolored Bat
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USKLEA	Urban Land-Klej Complex
VOC	Volatile organic compound

1.0 INTRODUCTION

The Borough of Highlands (Highlands), the Subrecipient, has applied for funding through the Building Resilient Infrastructure and Communities (BRIC) grant program to address downgradient stormwater flooding and coastal flooding within the Borough and in the neighboring community of Monmouth Hills, in Middletown Township, Monmouth County, New Jersey (**Appendix A**, **Figure 1 Project Location**). The BRIC program is authorized under Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 United States Code § 5133, as amended by the Disaster Recovery Reform Act of 2018. Under the BRIC program, the Federal Emergency Management Agency (FEMA) provides technical and financial assistance to state, local, and tribal governments to assist in the implementation of cost-effective, predisaster hazard mitigation measures designed to reduce injuries, loss of life, and damage and destruction of property.

Highlands is proposing the Highlands and Monmouth Hills Flood Mitigation and Green Infrastructure Project (Proposed Action) to mitigate the risk of both coastal and inland flooding and debris flow from the Monmouth Hills watershed to Sandy Hook Bay. The proposed project would include installing new stormwater management infrastructure and repairing or replacing existing features with green infrastructure elements incorporated throughout. Green infrastructure would primarily consist of planted depressed areas designed to catch, filter, and slow down stormwater runoff. Flood mitigation activities associated with the Proposed Action would be implemented in four distinct project areas: Monmouth Hills, Snug Harbor, Valley Street, and North Street. The project areas are located in Highlands and in the neighboring Monmouth Hills community of Middletown Township. The proposed project would reduce flood risk and property damage by increasing stormwater storage capacity, improving floodwater conveyance and discharge, and strengthening shoreline protection infrastructure. **Appendix A**, **Figure 2 Topographical Map** shows an overview of the project area.

This Environmental Assessment (EA) is prepared in accordance with Section 102 of the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [U.S.C.] §4321 et seq.); DHS Directive 023-01-01, Rev. 01; DHS Instruction 023-01-001- 01, Rev. 01; FEMA Directive 108-1; and FEMA Instruction 108-1-1. This EA considers the potential impacts of the proposed project and alternatives, including a No Action alternative, to determine whether to prepare a Finding of No Significant Impact (FONSI), or to initiate an Environmental Impact Statement. In accordance with the above-referenced statute and FEMA guidance, FEMA is required, during decision-making, to evaluate and consider the environmental consequences of major federal actions it funds or undertakes.

2.0 PURPOSE AND NEED

The purpose of the Proposed Action is to reduce recurring and chronic flooding and debris flow issues for residents, visitors, businesses, and property owners in Highlands and Monmouth Hills.

The flooding conditions result primarily from stormwater runoff from the steep slopes surrounding the Borough's inland borders. Additionally, Highlands is particularly vulnerable to flooding from coastal storms because the existing bulkhead ranges from 4.5 to 6 feet North American Vertical Datum of 1988 (NAVD88), which is below the base flood elevation of 14 feet NAVD88.

The need for this project comes from the area's historical flooding and slope erosion, which has caused recurring damage to property along with road closures. Floodwater and associated sediments repeatedly overwhelm the stormwater system, causing flooding and debris flow that impacts access to buildings, emergency services, and utilities. The current stormwater drainage system has insufficient capacity and can only handle a 2-year storm event, which has a 50-percent annual chance of occurrence equivalent to approximately 3.31 inches of rainfall in 24 hours (Colliers Engineering & Design 2022). Most homes and businesses in Highlands are in the low-lying downtown area north of Shore Drive, which is the part of town at the highest risk of flooding.

Historically, storm events have caused flooding and sediment build up along Route 36, which serves as the primary coastal evacuation route for Highlands and surrounding communities. These conditions can impede safe egress for residents during emergencies. Surface water from Monmouth Hills flows onto Route 36, where undersized inlets and storm pipes cause water to back up through grates during heavy rainfall. Furthermore, drainage ditches along roadways in Monmouth Hills have eroded and filled with sand and silt, limiting their capacity for water retention and conveyance. Closures of Route 36 associated with inundation and sediment deposition cost Highlands tens of thousands of dollars annually and create a public safety risk. In the wake of past flood events, public agencies have reported the need to remove 50 to 100 cubic yards of silt and sand from the streets and stormwater canals.

3.0 BACKGROUND

Highlands, a coastal community in the northeastern region of Monmouth County, New Jersey, is located on the shore of Sandy Hook Bay and the Shrewsbury River, at the base of the Monmouth Hills watershed. Highlands is buffered from intense wave action from the Atlantic Ocean by the Sandy Hook barrier spit (**Appendix A**, **Figure 1 Project Location**). Route 36 runs through Highlands and serves as the coastal evacuation route that connects the community to the rest of the state.

Most homes and businesses in Highlands sit between 4.5 and 14 feet above mean sea level (AMSL), putting the community at considerable flood risk from precipitation and coastal storm surge events. The Borough's location at the base of the Monmouth Hills watershed contributes to the flood risk in the community (**Appendix A**, **Figure 2 Topographical Map)**. To date, large-scale flood mitigation infrastructure has not been implemented in Highlands. The existing stormwater infrastructure does not have sufficient capacity to effectively discharge stormwater beyond a 2-year flood event, which is the equivalent of 3.31 inches of rainfall in 24 hours.

Highlands currently collects and discharges stormwater through 25 outfall structures and two pump stations, which help reduce flooding during small storms. During larger storms, however, the system becomes overwhelmed as water levels rise above outfall elevations, breach backflow preventers, and exceed the capacity of existing conveyance infrastructure. Several localized deficiencies further reduce system performance. At Valley Street, the existing pump station was constructed on a sandy surface where shifting sand conditions have caused more than half of the force main to remain perpetually filled with sand, reducing pump efficiency. Along Bay Avenue, no drainage system currently extends west, causing runoff from that area to drain toward the North Street pump station drainage area. Because this area functions as a natural sink, additional capacity is needed to manage high-intensity storm events and rising sea levels.

Flooding is also concentrated on North Street, where adjacent private bulkheads are higher than the bulkhead at the existing pump station. During high tides and flood events, water overtops or inundates the lower pump station bulkhead, causing the pump station to shut down. These capacity constraints are compounded by erosion and sediment deposition from the Monmouth Hills watershed, which clogs Highlands' stormwater system and further reduces conveyance capacity.

Monmouth Hills, located uphill of Route 36, contributes a large volume of stormwater runoff and sedimentation into the system (**Exhibit 1**). As stormwater travels downslope toward Bay Avenue, it gains velocity and depth, eventually contributing to flooding in Snug Harbor. The area's compacted gravel roads, roadside ditches, and steep slopes further accelerate stormwater runoff and sediment transport during storm events.



Exhibit 1. Water Runoff Direction Around Highlands Borough, Captured with Google Earth, 2021

Roadside ditches, made of hard-packed gravel and small stones, are partially protected by flagstone rocks from the late nineteenth century, forming gutters for rainwater flow. However, many ditches have eroded over time and filled with sand and silt, impeding water flow. Old storm pipes are similarly clogged with debris, rendering most inoperable, and the outdated inlets offer minimal vertical inflow capacity. When ditches become blocked, surface water cascades onto the compacted gravel roads throughout Monmouth Hills, causing deep rutting and downstream flooding. To the west of Highlands, Mount Mitchill rises to an elevation of more than 250 feet and contributes significantly to the flooding in the downtown area. With 250 feet of vertical grade

change over a short 0.38 miles from top to bottom, the slopes are too steep to facilitate the comprehensive management of surface stormwater. Other contributors to the flooding problem include high tides and above average rainfall. The flooding encompasses most of Highlands from Veterans Park to Snug Harbor.

Historically, storm systems impacting the project area have been moderate to severe. However, in recent years, the increased number of severe storms and hurricanes has elevated the risk of flooding in Highlands. In New Jersey, annual precipitation from 2015-2024 was 6.6% higher on average than the long-term average between 1895-2024 (New Jersey Department of Environmental Protection [NJDEP] 2026a). Additionally, tropical storms are anticipated to intensify in the coming years. In 2012, Hurricane Sandy battered the community, causing a 190-year flood event that destroyed or damaged 73 percent of Highlands' structures (NJDEP and U.S. Army Corps of Engineers [USACE] 2020). During Tropical Storm Ida in 2021, significant flooding led to widespread road closures across New Jersey, including parts of Route 36 (Bongard 2021). Because these types of severe storms and precipitation events are expected to increase, it is necessary to improve infrastructure to reduce flooding and the loss of life, livelihood, and property damage.

4.0 ALTERNATIVES

4.1 Alternative Development (Screening Criteria)

This EA considers the No Action alternative and the reasonable alternatives that would meet the purpose and need for the Proposed Action. Reasonable alternatives must be technically and economically feasible and meet the purpose and need for the Proposed Action. To evaluate potential action alternatives for implementing the project, FEMA considered various screening criteria during the development of this EA. The screening criteria included the ability to meet the purpose and need; engineering and constructability feasibility; and cost-effectiveness and affordability, as described in greater detail below.

- Purpose and need considerations for alternatives include:
    - Provide a long-term solution that reduces flood and debris flow hazards associated with stormwater runoff in Highlands and Monmouth Hills.
    - Provide sufficient capacity to remove floodwater and stormwater from Highlands and Monmouth Hills in a short period of time to reduce damage to structures.
    - Reduce street flooding at times of simultaneous high tide and significant rainfall events.
    - Prevent excessive siltation from Monmouth Hills community roadways and surrounding lands.

- Engineering and constructability feasibility considerations for alternatives include:
    - Construction must be implemented around current groundwater and tidal conditions, avoid conflicts with existing utilities, and comply with complex permitting requirements.

    - Designs must consider practical long-term maintenance to ensure reliable operation.

- Cost and affordability considerations for alternatives include:
    - Provide a long-term cost-effective and affordable solution to increase stormwater drainage capacity and reduce the risk of flooding.

The following sections describe the No Action alternative, the Proposed Action, and one alternative that was considered but dismissed. The criteria were used in the selection of the Proposed Action over other alternatives.

4.2 Alternative 1: No Action Alternative

Under the No Action alternative, federal financial assistance would not be provided for the construction of new flood mitigation and green infrastructure. Highlands would continue to operate with undersized stormwater capacity, resulting in persistent flooding and sediment deposition during storm events. The consequences of these periodic flood events would include closures of Route 36, which serves as a coastal evacuation route, damage to structures and property within Highlands, and risks to public safety. This alternative would not meet the overall purpose and need.

4.3 Alternative 2: Proposed Action

Under the Proposed Action, Highlands would increase its stormwater management capacity from a 2-year storm event, approximately 3.31 inches of rainfall in 24 hours, to a 100-year storm event, 8.56 inches of rainfall in 24 hours, by repairing and upgrading existing systems and constructing new stormwater infrastructure to alleviate flooding and debris flow. The Proposed Action would include four distinct project areas (**Appendix A**, **Figure 3 Project Areas & Components**):

1) **Monmouth Hills** (40.402348, -73.996637) – Stormwater collection system consisting of four stormwater basins, flumes, inlets, and conveyance piping
2) **Snug Harbor** (40.408021, -73.992454) – Installation of pump station and stormwater infrastructure improvements
3) **Valley Street** (40.404293, -73.986034) – Stormwater pump station force main and drainage upgrades
4) **North Street** (40.403067, -73.984198) – Stormwater pump station, bulkhead, and drainage upgrades

Overall, the total area of ground disturbance for construction of the Proposed Action is expected to be approximately 5.7 acres. Under the Proposed Action, approximately half of the Highlands community population would benefit from reduced flooding. Furthermore, the Proposed Action would mitigate flooding in downtown areas, which include homes, local businesses, parks, recreation centers, and other community services, in addition to reducing impacts along the Route 36 evacuation route, thereby benefitting most of the community.

The Proposed Action would create a resilient stormwater management system that reduces the risk of loss of life and property resulting from flooding, both inland and coastal, and slope erosion from higher intensity storms. With an average useful life of 50 years, the project components would provide long-term protection for the community.

4.3.1 Project Area

Monmouth Hills

Monmouth Hills consists of steep, forested slopes with gravel roads and associated roadside drainage ditches. Some of these ditches have eroded over time, filling with silt and sand and limiting their capacity for water retention. Storm pipes in this area are also obstructed with sand, silt, and debris, and inlets have limited inflow capacity (**Section 2.0**). Construction in the Monmouth Hills project area **(Appendix A, Figure 4 Monmouth Hills)** would address these issues through the installation of green infrastructure flow beds, stormwater conveyance piping, inlet structures, manholes, and four large-scale stormwater basins (**Appendix B, Sheet 7, Sheet 8, and Sheet 10**). Three open-air infiltration basins (Basins 1, 2, and 3) would connect to one underground precast concrete storage basin under Kavookjian Field (Basin 4). Combined, all four basins would be capable of storing approximately 369,000 cubic feet of stormwater.

The stormwater collection system would begin with new inlets, manholes, and piping installed within existing roadside drainage features along Serpentine Drive (**Appendix B, Sheet 3**). Stormwater runoff collected by the inlets would be directed through a stilling basin to allow suspended sediments to settle out of the water column and reduce water velocity. The water would then be conveyed through a 20-foot-wide by 500-foot-long bioswale flow bed along the west side of Serpentine Drive, beginning near (40.401921, -74.000114) and extending downslope to Basin 1 at (40.403307, -74.000384) (**Appendix B, Sheet 7**). The flow bed would be designed to capture, slow down, and filter stormwater runoff, and would incorporate three vegetated bio-retention areas along the eastern and western sides. Granite rock check dams would be installed within the flow bed approximately every 100 feet to reduce flow velocities and promote infiltration. Stormwater collected by the flow bed would be discharged into Basin 1, located at the base, or northern end, of the flow bed (**Appendix B, Sheet 7**).

Basin 1 (40.403307, -74.000384) would be constructed at the northwestern terminus of Serpentine Drive, at the downhill, northern end of the flow bed. Stormwater runoff collected by the flow bed would be discharged into Basin 1, which would serve as a water detention/infiltration basin. The basin would provide approximately 20,000 cubic feet of stormwater storage. When Basin 1 reaches capacity, excess stormwater would be conveyed through an outlet pipe on the eastern side of the basin, traveling east under Serpentine Drive, and conveyed into Basin 2 (**Appendix B, Sheet 7**).

Basin 2 (40.403120, -73.999607) would be constructed between Route 36 and Fennimore Terrace. The basin would also serve as a detention/infiltration basin and provide approximately 64,000 cubic feet of stormwater storage. When Basin 2 reaches capacity, excess stormwater would be conveyed through an outlet pipe on the eastern side of the basin, and directed east into Basin 3 (**Appendix B, Sheet 8**).

Basin 3 (40.402335, -73.996541) would be located east of Basin 2 at the northern terminus of Valley Drive, an extant roadway, and south of Route 36. Basin 3 would serve as a detention/infiltration basin and would provide approximately 35,000 cubic feet of stormwater storage. Stormwater runoff would be conveyed downslope through a 20- to 30-foot-wide by 850-foot-long Flexamat-lined flume beginning at the intersection of Valley Drive and Coquette Lane near (40.400633, -73.998293) and terminating at Basin 3 (**Appendix B, Sheet 4 and Sheet 8**). The flume would incorporate granite rock check dams approximately every 100 feet to reduce flow velocities and dissipate energy. Excess stormwater captured in Basin 3 would be discharged through an outlet pipe on the eastern end of the basin and conveyed into a stilling basin and a green infrastructure basin located west of Basin 4 near (40.402205, -73.995737) before being conveyed into Basin 4 (**Appendix B, Sheet 10**).

Basin 4 (40.402064, -73.995168) would be constructed under Kavookjian Field, an existing athletic field. The basin would serve as an underground stormwater storage system capable of storing 250,000 cubic feet of captured stormwater. The basin would be integrated with the stormwater management system to the west. Additional stormwater collection systems, consisting of inlets, manholes, and piping located along the northern and eastern sides of Basin 4, would also convey captured stormwater into the storage basin. A stormwater conveyance pipe would extend from the northern side of the basin, cross under Route 36 and connect to the stormwater management system serving the Waterwitch Avenue and Shore Drive drainage network (**Appendix B, Sheet 11**).

Construction of the stormwater collection system would require the removal of 1.76 acres of vegetation, including approximately 23 mature trees. An equal or greater number of trees would be replanted in the area where trees are removed. The total area of ground disturbance within the Monmouth Hills project area is estimated at 2 to 3 acres, which would require adherence to a Soil Erosion and Sediment Control Plan in accordance with the New Jersey Soil Erosion and Sediment Control Act of 1975. Furthermore, construction activities would be conducted in accordance with a National Pollutant Discharge Elimination System (NPDES) General Permit to Discharge Stormwater from Construction into the Surface Waters of the State of New Jersey (General Construction Stormwater Permit) through NJDEP (described in **Section 5.3**) (EPA 2024c). Where possible, native vegetation would be planted in areas where ground has been disturbed to install the stormwater management facilities. No in-water activities are planned for the Monmouth Hills component of the Proposed Action.

Any lots owned by either Middletown Township or Monmouth Hills to be used for permanent storm drainage facilities would be deeded to Highlands to grant permanent rights for maintenance and operations activities. This project component would not require the acquisition or purchase of any privately owned lands. However, three lots have a land-use category of public recreation and conservation lands and, because Monmouth County previously accepted funds through the NJDEP Green Acres Program, they are subject to Green Acres restrictions, meaning they must be used solely for recreation and conservation purposes. The land-use category for these three lots may need to be changed to allow for permits to be issued that are required for implementation of the proposed project. This would be done through NJDEP Green Acres Major Diversions, if required.

Snug Harbor

The Snug Harbor project area components would be constructed within the existing streets in a residential area. Construction in this project area entails the installation of a precast concrete box culvert, a new pump station, sluice gates for flood and tide control, and new inlets and storm drains for floodwater collection and transmission to a new pump station.

A stormwater conveyance pipe would extend from the Monmouth Hills drainage system along Waterwitch Avenue and continue northwest along Bay Avenue where it would connect to the Snug Harbor drainage network. Additional stormwater collection infrastructure, including piping and inlet structures, would be installed along Central Avenue, Bay Avenue, Recreation Place, and a small portion of Cheerful Place to collect and convey stormwater to the pump station and associated drainage system (**Appendix B, Sheet 12**). Additionally, any undersized culvert pipes along Waterwitch Avenue from Linden Avenue to the Shrewsbury River would be replaced with 30- or 36-inch piping.

A precast box culvert measuring 1,230 feet long, 8 feet wide, and 4 feet high would be installed under the Snug Harbor Avenue roadway. The box culvert would start at the intersection of Snug Harbor Avenue and Bay Avenue (40.405171, -73.994459) and terminate at the bulkhead located at the northern end of Snug Harbor Avenue on the Shrewsbury River (40.408059, -73.992410). A motor-operated sluice gate would be installed on the outside of the culvert bulkhead. The new Triplex pump station would be located at the northern terminus of the box culvert (40.408008, -73.992388) and would house three vertical turbine pumps discharging directly into the river through the steel bulkhead (**Appendix B, Sheet 13**). The electrical equipment and generator for the pump station would be housed in a flood-resilient building at a finished floor elevation of 14 ft AMSL, providing protection from moisture and salt intrusion. The inlet to the pump station would be safeguarded by a stainless-steel vertical bar grate. This design would effectively trap and prevent debris from entering and potentially clogging the vertical pumps. These improvements would improve overall system capacity to convey higher volumes of stormwater into the Shrewsbury River. The pump station would have a target flow rate of 200 cubic feet per second.

No land acquisitions or easements would be required for the Snug Harbor component of the Proposed Action. This component would disturb approximately 2.2 acres of ground, with various excavation sizes for pipes, inlets, and the pump station. Once completed, Highlands would repave the entire work zone.

In-water work for the Snug Harbor component would include the installation of the new culvert bulkhead end piece and the sluice gate mounted to the end of the culvert in the Shrewsbury River, with a temporary disturbance area of approximately 200 square feet; there would be no permanent change to the channel. The Snug Harbor project area would require coordination with NJDEP and USACE for applicable permits.

Valley Street

The existing pump station is located at the end of Valley Street (40.404293, -73.986034), next to a marina and dock on the beach. Housed within a concrete block pump house at an elevation of approximately 12 feet, the station receives its stormwater from a 36-inch reinforced concrete pipe (RCP) trunk line originating at Bay Avenue.

The Valley Street project area components would involve replacing the old discharge pipe with high-density polyethylene-fused pipe and fittings, and the discharge pipe would be lifted from the ground to 10 feet elevation (**Appendix B, Sheet 15**). Implementation of these improvements would enhance the station's efficiency and outflow capacity, reduce pump head pressures, and potentially extend the system's lifespan.

In-water activities would include removing the deteriorated pipes and installing a new discharge pipe elevated by pilings, with an estimated in-water disturbance area of approximately 2,000 square feet. The Valley Street project area would require coordination with NJDEP and USACE for applicable permits.

North Street

The North Street project area components would involve replacing the old single-pump wet well at the street's end (40.403067, -73.984198) with a vertical turbine duplex station and upgrading to a larger discharge pipe. Additionally, new higher bulkheads would be installed along roughly 120 feet of the Shrewsbury River (**Appendix B, Sheet 16 and Sheet 17**). Previously, a 36-inch RCP culvert pipe was installed at a grade that limits hydraulic capacity. The project would reset the RCP with a steeper slope into a new 16-foot-deep precast concrete wet well. This project component would replace older inlets with new inlets designed to increase inflow capacity and prevent clogging from leaves, pine needles, and debris, which hinders performance. New inlets would be added to enhance vertical inflow capacity to approximately 50 cubic feet per second. Four of the eight new inlets would be installed at the lowest point of North Street to ensure sufficient inflow capacity to reach the proposed duplex pump station.

The North Street project area components would require no easements or acquisitions. Ground disturbance would encompass approximately 0.4 acres. Excavations for pipes, inlets, and the pump station would vary in size. Pipe excavations would be approximately 4 feet wide by 6 feet deep, inlet excavations would be approximately 8 feet wide, 6 feet long, and 8 feet deep, and the pump station excavation, which would require sheeting and dewatering, would be 14 feet wide, 14 feet long, and 16 feet deep.

Upon completion, Highlands would resurface the entire street. In-water activities would be limited to installing new bulkheads, which would require hammering or vibrating piles from a barge in the Shrewsbury River. The North Street project area would require coordination with NJDEP and USACE for applicable permits.

4.3.2 Equipment, Staging and Access, and Utility Coordination

Construction of the Proposed Action would involve the use of vehicles and heavy equipment, such as excavators, backhoes, loaders, dump trucks, cranes, compactors, paving equipment, and, where required for in-water work, barge-mounted pile-driving or vibratory-hammer equipment. Each work zone would have a designated safe access point with a stone construction entrance and tire-cleaning pad, and a silt fence would be installed to create staging and storage areas where appropriate.

Monmouth Hills

For Monmouth Hills, Kavookjian Field (40.401949, -73.994923), the Serpentine Lot (40.402970, -73.999755), and the traffic circle in the northwest corner of the project site (40.403715, -74.000592) would serve as staging and storage areas for contractors. The proposed drainage improvements would interfere with other utilities in Monmouth Hills, including gravity sewer laterals, gas mains and services, and water services. Utility owners would be invited to a meeting before the design phase is completed. If relocations are necessary, each public utility would be responsible for relocating at their own expense.

Snug Harbor

The Snug Harbor project area would utilize the Highlands Skatepark (40.405413, -73.994598) for staging and storage, with additional materials stored in the parking lot. This project would require the relocation of water and gas mains, and the potential relocation of sanitary sewer laterals. New Jersey American Water and New Jersey Natural Gas Company would handle water and gas relocations, while sewer relocations, owned by Highlands, would be included in the contract as a separate pay item under the FEMA grant.

All construction for the Snug Harbor project area would occur on public property. The installation of the culvert and pump station would necessitate daily road closures, but the road would be reopened each evening for residents. Additionally, alternative routes would always be available for motorists and emergency vehicles. Per the Highlands Borough local noise ordinance,

construction and renovation noise is generally permitted only between the hours of 7:00 a.m. and 8:00 p.m. Monday through Friday and 9:00 a.m. and 6:00 p.m. on Saturday and Sunday (Highlands Borough 2021). This phase would last approximately 30 days and would occur between October and May. Staging areas would be provided at the end of Snug Harbor and in the Highlands Skatepark and parking lot.

Valley Street

Staging, storage, and contractor activities would be centralized at the north end of Valley Street (40.404396, -73.985927), ensuring minimal disruption to homeowners and the marina. The Valley Street project components would disturb approximately 4,000 square feet of land.

North Street

North Street has limited open spaces for access and staging. Staging is anticipated near the north end of North Street (40.402987, -73.984259). However, the best staging and storage solutions for the North Street improvements would be determined during the design phase. Work zones would be constrained, requiring coordination with each homeowner.

Contractors would generally have access to each project site from public property without affecting residents or businesses, although special conditions would be necessary for North Street during construction.

4.4 Additional Action Alternatives Considered and Dismissed

A feasibility study was conducted to evaluate all possible alternatives. Although other concepts were considered during feasibility review, only one additional action alternative was developed sufficiently for discussion in this EA. This alternative, originally proposed by USACE, would include building 8,000 feet of floodwalls along the coast of Highlands. The floodwalls would be built to 14 feet elevation and rise above the town, which sits at 5 to 9 feet elevation.

The Subrecipient does not favor this alternative because it would come at an estimated cost of $120 million and obstruct views of Sandy Hook Bay. Additionally, this alternative does not address issues with the Monmouth Hills watershed as it would not provide additional stormwater capacity and would only protect against ocean swells. This alternative is not practical or cost effective and would not be comprehensive enough to achieve the project purpose of reducing flood and debris flow hazards associated with both stormwater runoff and coastal flooding in Highlands and Monmouth Hills.

4.5 Summary of Alternatives

The Subrecipient considered three alternatives for implementation in Highlands and the neighboring community of Monmouth Hills. One alternative, the construction of floodwalls, was

dismissed as not being practical or cost-effective in addition to not fully achieving the project purpose. Two alternatives were carried forward for detailed evaluation:

1) No Action alternative
2) Proposed Action

The following sections discuss the potential environmental impacts and proposed mitigation measures associated with the No Action alternative and the Proposed Action.

5.0 AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

This section discusses the potential impacts of the No Action alternative and the Proposed Action on environmental resources. Other reasonably foreseeable effects are discussed in Sections **5.18** and **5.19**. When possible, FEMA considers quantitative information to establish potential impacts; the potential qualitative impacts are evaluated based on the criteria listed in **Table 5.1**.

The resources listed in **Table 5.2** were removed from further evaluation in this EA. Neither the No Action alternative nor the Proposed Action would affect the following resources because they do not exist within the project area, or the alternatives would have no effect on the resource.

The study area generally includes the project area and access and staging areas needed for the alternatives. If the study area for a particular resource category is different from the project area, the appropriate subsection will provide descriptions of the differences. The area of benefit includes Highlands and Monmouth Hills.

Table 5.1 Impact Significance and Context Evaluation Criteria for Potential Impacts

Impact Scale	Criteria
No Impact	The resource area would not be affected and there would be no impact.
Negligible	Changes would either be non-detectable or, if detected, would have impacts that would be slight and local. Impacts would be well below regulatory standards, as applicable.
Minor	Changes to the resource would be measurable, but the changes would be small and localized. Impacts would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential impacts.
Moderate	Changes to the resource would be measurable and have either localized or regional-scale impacts. Impacts would be within or below regulatory standards, but historical conditions would be altered on a short-term basis. Mitigation measures would be necessary to reduce any potential impacts.
Major	Changes would be readily measurable and would have substantial consequences on a local or regional level. Impacts would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce impacts, though long-term changes to the resource would be expected.

Table 5.2 Resources Eliminated from Further Consideration

Resource	Related Law	Criteria
Prime and Unique Farmland	Farmland Protection Policy Act	The FPPA requires federal agencies to minimize the unnecessary conversion of farmland into nonagricultural uses. The project area is considered an urban area by the U.S. Census Bureau; therefore, the FPPA does not apply. In addition, the soils have been identified as not prime farmland (USDA 2024).
Wild and Scenic Rivers	Wild and Scenic Rivers Act	According to the National Wild and Scenic River System database (U.S. Forest Service [USFS] 2024), the closest wild and scenic river is the Delaware Wild and Scenic River, which is approximately 46 miles southwest of the proposed project area. Thus, the alternatives would have no effect on wild and scenic rivers.
Coastal Barrier Resources	Coastal Barrier Resources Act	The project does not intersect a Coastal Barrier Resources System unit or Otherwise Protected Area; therefore, the alternatives would have no impact on Coastal Barrier Resources Act areas. (USFWS 2024h).

5.1 Geology, Topography and Soils

This section discusses the geologic, topographic, and soil conditions of the project area as well as the potential impacts on these resources. The New Jersey Soil Erosion and Sediment Control Act of 1975 was established to protect the environment from land disturbances associated with urban development in the state (New Jersey Statutes Annotated 4:24-39 et seq.). The act establishes standards for the control of erosion and sedimentation that must be followed during any project disturbing 5,000 square feet or more, including the preparation of a Soil Erosion and Sediment Control Plan.

5.1.1 Existing Conditions

The geology in the project area (**Appendix A, Figure 5 Surficial Geology**) consists of underlying crystalline bedrock composed of Cretaceous sediments (New Jersey Geological Survey 2000). The surficial geology below the Snug Harbor, Valley Street, and North Street project areas consists of beach and nearshore marine sand (Qbs), which is characterized by sand that is very pale brown to light gray. This area has sand and gravel deposits up to 150 feet thick, but generally less than 20 feet thick, overlain by silt and clay deposits up to 10 feet thick in Sandy Hook Bay. The Monmouth Hills component overlies three surficial geology types: colluvium and alluvium (Qcal), which consists of interbedded alluvium and colluvium in headwater valleys; lower colluvium (Qcl), which consists of sand, minor silt, and pebble gravel that can be as much as 20 feet thick and forms aprons graded to lower terraces or the modern floodplain; and weathered coastal plain formations (Qwcp), which consists of exposed sand and clay of the Coastal Plain bedrock formations (NJDEP and USACE 2020). According to the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey (accessed January 2025), the depth to bedrock in the project area is greater than 6.5 feet (NRCS 2025).

The overall topography of Highlands (**Appendix A, Figure 2 Topographical Map**) is not expected to substantially change in the future and would continue to influence flooding patterns in the community. Highlands encompasses 890 acres of land and water and is positioned across the Shrewsbury River from the Sandy Hook peninsula. The relatively low-lying downtown area of Highlands extends from the shoreline to Shore Drive and is generally at an elevation lower than 10 feet NAVD88. The base flood elevation for the downtown area is more than 14 feet NAVD88, while existing bulkhead elevations range between 4.5 to 6 feet NAVD88. The flat topography of the waterfront combined with low bulkhead elevations exacerbates tidal inundation during major storm events. Additionally, the downtown area is flanked by bluffs of Monmouth Hills to the south, which rise in elevations more than 250 feet above the downtown area. Mount Mitchill is west of the downtown area in the neighboring Atlantic Highlands Borough. Its peak is also more than 250 feet in elevation higher than the downtown area. Stormwater runoff from the steep slopes surrounding Highlands' inland borders further contributes to flooding in the community (NJDEP and USACE 2020).

The mapped soil classifications in the Snug Harbor, Valley Street, and North Street project areas (**Appendix A, Figure 6 Soils**) consist of Urban Land-Klej Complex (USKLEA). Klej soils, in their natural state, are characterized as sandy fluviomarine deposits formed in coastal plains; however, urban land is characterized as surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material. The USKLEA complex soils occur on 0- to 2-percent slopes and are classified as somewhat poorly drained. The soils within the Monmouth Hills project area consist of Phalanx loamy sand (PhbE) and Phalanx loamy sand (PhbC). Phalanx loamy sand soils are characterized as sandy and/or fluviomarine deposits forming coastal plains. The PhbE soils are on 10- to 25-percent slopes and are well-drained. The PhbC soils are on 5- to 10-percent slopes and are well-drained (NJDEP 2016; NJDEP and USACE 2020; USDA 2024).

Slope stability of the project area was mapped based on grain-size, compaction, and degree of saturation of soils (**Appendix A Figure 7 Slope Stability**). South of Shore Drive, weakly cemented rock and sandy soil occur in portions of the Monmouth Hills project area. The slopes north of Route 36 contain shales and clayey soil.

5.1.2 Potential Impacts

Alternative 1: No Action

Under the No Action alternative, no construction would occur. There would be no short-term impacts on geology, topography, or soils. In the long-term, the risk of extreme flooding and soil erosion would not be reduced, and periodic flooding would occur during storm events. During these high-intensity rain events, floodwaters would continue to erode and degrade soil. Excess sand and silt would continue to limit the existing infrastructure's capacity for water retention and conveyance contributing to further flooding. Therefore, there would be moderate long-term

impacts on soils from disturbances associated with periodic flooding and the potential for impacts to topography from debris flows and slope instability associated with flooding events.

There would be no long-term impact on geology.

Alternative 2: Proposed Action

Construction of the Proposed Action would require excavation and grading, which would result in ground disturbance and temporary soil impacts within the project areas. A total of 5.7 acres of ground disturbance would occur, and excess soil would be disposed off-site at an approved location in accordance with requirements of local, state, and federal laws, regulations, and ordinances. Soil erosion associated with construction would be minimized by using silt fencing and adhering to a Soil Erosion and Sediment Control Plan in accordance with the New Jersey Soil Erosion and Sediment Control Act of 1975. Furthermore, construction activities encompassing more than one acre would be conducted in accordance with a NPDES General Permit to Discharge Stormwater from Construction into the Surface Waters of the State of New Jersey (General Construction Stormwater Permit) through NJDEP (described in Section 5.3). This permit regulates stormwater runoff from construction sites. Excavation is expected to range from 4 to 16 feet deep. The ground would be restored to original grade where pipes and the underground basin are installed. Therefore, the Proposed Action would have minor short-term impacts on topography and soils from excavation and other ground-disturbing activities.

As mentioned previously, the depth to bedrock is expected to exceed 6.5 feet below ground surface (ft BGS). However, construction in these deeper localized portions of the project area is not anticipated to affect geology or seismic hazards (USGS 2018).

The Proposed Action would reduce the risk of flooding in the long-term, which would minimize associated soil erosion. The proposed stormwater infrastructure for the Monmouth Hills project area includes inlet piping, check dams, bioswales, and stormwater basins. These components would permanently alter the topography in the areas where the basins and green infrastructure are installed but would provide long-term benefits to stormwater infrastructure. These features would attenuate, filter, and store surface water upstream of Route 36. This process would occur before the water reaches the large-scale storage basin in Kavookjian Field, effectively eliminating siltation buildup along Route 36 and down Waterwitch Avenue, into Bay Avenue and the Huddy Park Canal. The new green infrastructure and stormwater basins would settle out most silts and sediment deposits from Monmouth Hills, keeping the Snug Harbor canal and culverts free of sediment buildup, resulting in better flow capacity. The Snug Harbor and North Street project area components would stabilize the soil behind the bulkheads, as coastal floodwaters eroding the soil would be reduced. Therefore, the Proposed Action would have moderate long-term benefits on soils and topography because it would reduce the recurring sedimentation and soil disturbance that currently characterize existing conditions, while also lowering the increasing risk of sediment buildup and erosion associated with more severe storm events.

5.2 Air Quality

The Clean Air Act (CAA) of 1970 (42 U.S.C. § 7401 et seq.) is a comprehensive federal law that regulates air emissions from area, stationary, and mobile sources. The act authorized the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment. The NAAQS include standards for six criteria air pollutants: lead, nitrogen dioxide, ozone, carbon monoxide, sulfur dioxide, and particulate matter (including both particulate matter less than 10 micrometers in diameter [PM10], and fine particulate matter less than 2.5 micrometers in diameter [PM2.5]). Areas where the monitored concentration of a criteria pollutant exceeds the applicable NAAQS are designated as being in non-attainment of the standards. Areas where the monitored concentration of a criteria pollutant is below the standard are classified as being in attainment of the standards. Areas previously designated as a nonattainment area for one or more pollutants, pursuant to the Clean Air Act Amendments of 1990, and subsequently redesignated as an attainment area, are required to develop a maintenance plan under Section 175A of the Clean Air Act, as amended.

Federally funded actions in nonattainment and maintenance areas are subject to EPA conformity regulations (40 Code of Federal Regulations [CFR] Parts 51 and 93), which ensure that emissions of air pollutants from planned federally funded activities would not affect the state's ability to meet the NAAQS. Section 176(c) of the Clean Air Act requires that federally funded projects conform to the purpose of the State Implementation Plan, meaning that federally funded activities would not cause any violations of the NAAQS, increase the frequency or severity of NAAQS violations, or delay timely attainment of the NAAQS or any interim milestones.

The conformity requirements of the Clean Air Act and its regulations limit the ability of federal agencies to assist, fund, permit, and approve projects that do not conform to the applicable state implementation plan. When subject to this regulation, the federal agency is responsible for demonstrating conformity for its Proposed Action. Conformity determinations for federal actions other than those related to transportation plans, programs, and projects that are developed, funded, or approved under Title 23 U.S. Code or the Federal Transit Act (49 U.S. Code § 1601 et seq.) must be made according to the federal general conformity regulations (40 CFR 93 Subpart B). Certain actions and activities are exempted from general conformity review, including the following:

- Stationary source emissions regulated under major or minor New Source Review (air permitting) programs
- Alteration and additions of existing structures as specifically required by new or existing applicable environmental legislation
- Actions where the emissions are not reasonably foreseeable
- Actions that have been defined by the federal agency or by the state as "presumed to conform"
- Activities with total direct or indirect emissions (not including stationary source emissions regulated under New Source Review programs) below *de minimis* levels. Emissions from

construction activities are subject to air conformity review, unless they are shown to be below the applicable *de minimis* levels.

The CAA defines an air pollutant as "any air pollution agent or combination of such agents, including any physical, chemical, biological, radioactive, including source material, special nuclear material, and byproduct material, substance or matter which is emitted into or otherwise enters the ambient air."

5.2.1 Existing Conditions

EPA's Green Book provides detailed information about area NAAQS designations, classifications, and nonattainment status. According to the Green Book, Monmouth County is currently in severe nonattainment of the 2008 8-hour ozone NAAQS, serious nonattainment of the 2015 8-hour ozone NAAQS, and in maintenance of the 2006 PM2.5 NAAQS; all other criteria pollutants (sulfur dioxide, carbon monoxide, PM10, lead, and nitrogen dioxide) are in attainment of their respective NAAQS (EPA 2026).

5.2.2 Potential Impacts

Alternative 1: No Action

Under the No Action alternative, temporary construction-related criteria pollutants would not occur because there would be no federal financial assistance provided for the construction of new flood mitigation and green infrastructure. Therefore, there would be no short-term impacts on air quality.

In the long-term, stormwater drainage capacity would not be increased. Thus, the risk of flooding would not be reduced. Periodic flood events could result in road closures, causing diversion of vehicles away from the flooded areas and increasing travel distances and vehicle emissions. Emissions from heavy equipment used for flood-related repairs and additional vehicle emissions generated by flood-related road detours (i.e., longer trips result in more emissions) could result in negligible emissions of criteria pollutants within this nonattainment area. These emissions would be temporary, localized, and unlikely to result in a NAAQS exceedance. Therefore, there would be a negligible long-term impact on air quality from emissions resulting from construction equipment used for flood-related repairs and additional vehicle emissions generated by flood-related road detours.

Alternative 2: Proposed Action

During construction of the Proposed Action, on-site heavy equipment and off-site construction-related hauling, delivery, and worker commute vehicles would produce emissions that could increase the levels of some pollutants, including carbon monoxide, volatile organic compounds (VOCs), nitrogen oxides (NOx), and particulate matter. On-site heavy equipment would be predominantly diesel-fueled. EPA mandates the use of ultralow-sulfur diesel fuel for all highway

and nonroad diesel engines; thus, sulfur dioxide emitted from the Proposed Action's construction activities would be negligible (EPA 2016, 2022). On-site earthmoving, excavation, demolition, grading, and other ground-disturbing activities would generate dust and would be the primary construction-related sources of PM. Off-site hauling and delivery vehicles would be predominantly diesel-fueled, while worker commute vehicles would be predominantly gasoline-fueled. Gasoline engines produce relatively high levels of carbon monoxide as compared to other combustion sources. Construction of the Proposed Action would take up to 24 months, so vehicle and heavy equipment use and ground-disturbing activities in the project area would be temporary and localized.

Table 5.3 presents the breakdown of criteria air pollutant emissions from the anticipated construction activities for the Proposed Action. Construction of the Proposed Action would generate approximately 2 short tons of nitrogen oxides (NOx) emissions, less than 1 short ton of VOC emissions, and less than 1 short ton of PM2.5 emissions.

Table 5.3 Short-Term Construction Criteria Air Pollutant Emissions[1]

Construction Year	NOx Emissions (short ton)	VOC Emissions (short ton)	PM2.5 Emissions (short ton)
2026	1	<1	<1
2027	<1	<1	<1
Total[2]	**2**	**<1**	**<1**

Notes:

[1] *Only NOx, VOCs, and PM2.5 were analyzed since the project area is in Monmouth County, which is in nonattainment of the 8-Hour Ozone (2008) and 8-Hour Ozone (2015) NAAQS, and in maintenance of the PM-2.5 (2006) NAAQS.*

[2] *Totals may not be exact because of rounding.*

Table 5.4 presents the *de minimis* thresholds for pollutants in a nonattainment area and in a maintenance area. As shown in **Table 5.3**, the peak annual NOx and VOC emission rates are below the applicable *de minimis* thresholds for ozone in both serious and severe nonattainment areas. The peak annual PM2.5 emission rate is below the *de minimis* threshold for PM2.5 in maintenance areas.

Table 5.4 Insignificant or de minimis Emission Levels

Pollutant	Thresholds (Tons/Year)
Nonattainment Areas (NAAs)	
Ozone (VOCs or NO_x)	
Serious NAAs	50
Severe NAAs	25
Extreme NAAs	10
Other ozone NAAs outside an ozone transport region	100
Other ozone NAAs inside an ozone transport region	

VOC	50
NO_x	100
SO_2 or NO_2: All NAAs	100
PM_{10}	
Moderate NAAs	100
Serious NAAs	70
$PM_{2.5}$ (direct emissions, SO_2, NO_x, VOC, and ammonia)	
Moderate NAAs	100
Serious NAAs	70
Pb: All NAAs	25
Maintenance Areas	
Ozone (NO_x), SO_2, or NO_2	
All maintenance areas	100
Ozone (VOCs)	
Inside an ozone transport region	50
Outside an ozone transport region	100
Carbon monoxide	
All maintenance areas	100
PM_{10}	
All maintenance areas	100
$PM_{2.5}$ (direct emissions, SO_2, NO_x, VOC, and ammonia)	
All maintenance areas	100
Pb	
All maintenance areas	25

Applicable best management practices (BMPs) from EPA's Construction Emission Control Checklist (included in **Appendix C**) would be implemented to mitigate adverse air quality impacts. BMPs include, but are not limited to, the following:

- Keep vehicles and equipment idling times as short as possible.
- Regularly maintain diesel engines to keep exhaust emissions low. Follow the manufacturer's recommended maintenance schedule and procedures.
- Cover or wet areas of exposed soil to reduce fugitive dust.
- Prevent spillage of soil and excavated material and limit speeds to 15 miles per hour when hauling material and operating non-earthmoving equipment on areas of exposed soil within the project area. Limit speed of earthmoving equipment to 10 miles per hour.

Because of the short-term nature of air quality impacts and implementation of BMPs, the potential emissions of criteria pollutants from implementation of the Proposed Action would be below the *de minimis* rates for the General Conformity Rule. Therefore, the project would not require a conformity determination, and Proposed Action construction activities would have minor short-term impacts on air quality.

Implementation of the Proposed Action would include the installation of two natural gas backup generators for the Snug Harbor and North Street pump stations. Operation of the generators would contribute to long-term emissions; however, the generators are relatively small and are only intended to be used during power outages, so emissions are expected to be below *de minimis* thresholds. Therefore, there would be a minor long-term impact on air quality.

5.3 Surface Waters and Water Quality

This section analyzes surface waters (e.g., rivers, streams, bays, stormwater) and groundwater resources and quality. Wetlands are discussed in Section 5.4, floodplains in Section 5.5, and coastal resources in Section 5.6.

Congress enacted the Federal Water Pollution Control Act in 1948, which was later reorganized and expanded in 1972 and became known as the Clean Water Act (CWA) in 1977. The CWA regulates discharge of pollutants into water with sections falling under the jurisdiction of USACE and EPA. Section 404 of the CWA establishes the USACE permit requirements for discharging dredged or fill materials into Waters of the United States and traditional navigable waterways. USACE regulation of activities within navigable waters is also authorized under the 1899 Rivers and Harbors Act. Although New Jersey has formally assumed the Section 404 permitting programs for waters within the state boundaries (EPA 2024b), USACE retains authority to implement the program for tidal waters and adjacent wetlands and other waters affected by interstate and foreign commerce.

Under the NPDES, EPA regulates both point and non-point pollutant sources, including stormwater and stormwater runoff. A CWA permit is required for stormwater discharges from any construction activity disturbing:

- 1 acre or more of land, or
- Less than 1 acre of land, but that is part of a common plan of development or sale that will ultimately disturb 1 or more acres of land.

Construction activities include earth-disturbing actions such as clearing, grading, and excavating land and other construction-related activities that could generate pollutants.

A state, territory, or tribe may receive authorization for one or more of the NPDES program components. For instance, in almost all cases, EPA retains authority to implement the program on tribal lands. EPA has delegated authority to implement the NPDES permitting program to the

State of New Jersey. Therefore, NJDEP is the primary permitting authority and issues NPDES permits in accordance with the CWA, the New Jersey Water Pollution Control Act, and the New Jersey Pollutant Discharge Elimination System Rules (New Jersey Administrative Code [NJAC] 7:14A).

Section 1424(e) of the Safe Drinking Water Act of 1974 (Public Law 93–523) authorizes EPA to designate an aquifer for special protection under the sole source aquifer program if the aquifer is the sole or principal drinking water resource for an area and if its contamination would create a significant hazard to public health. The sole or principal source is defined as supplying 50 percent or more of the drinking water for a particular area. No commitment of federal financial assistance may be provided for any project that EPA determines may contaminate a sole source aquifer such that a significant hazard to public health is created. Relevant state regulations include the below:

- New Jersey Stormwater Management Rules (NJAC 7:8)
- New Jersey Surface Water Quality Standards (NJAC 7:9B)
- New Jersey Groundwater Quality Standards (NJAC 7:9C)
- New Jersey Pollutant Discharge Elimination System Rules (NJAC 7:14A)
- New Jersey Soil Erosion and Sediment Control Program (NJAC 2:90-1.3)

5.3.1 Existing Conditions

The project is within three watersheds: Shrewsbury River (Hydrologic Unit Code [HUC] 020301040304) to the east, Navesink River (HUC 020301040303) to the south, and Compton Creek-Sandy Hook Bay watershed (HUC 020301040402) to the west (EPA 2025). The Navesink River is south of the project area, and the Shrewsbury River is directly northeast of the project area. The Shrewsbury River is tidally influenced and flows northwest into Sandy Hook Bay. The Navesink River and Shrewsbury River are listed as impaired water bodies in the New Jersey 2022 303(d) list because of arsenic, dissolved oxygen, fecal coliform, and pesticides found in fish tissue such as chlordane, dieldrin, heptachlor, mercury, and polychlorinated biphenyls (EPA 2025). The Sandy Hook Bay is listed as impaired on the 2022 303(d) list because of dissolved oxygen, phosphorus, pesticides found in fish tissue, *Escherichia coli*, arsenic, and fecal coliform (EPA 2025).

The U.S. Geological Survey (USGS) National Water Information System has collected groundwater data within the project area (Site Number 402400073591201); groundwater has been identified approximately 13 ft BGS. The project is in the Northern Atlantic Coastal Plain aquifer system, a sole source aquifer (EPA 2024d). The aquifer system’s land use is 62 percent undeveloped, 24 percent agricultural, and 14 percent urban. Water quality within the aquifer comprises mostly low or undetected levels of inorganic and organic constituents. Inorganic constituents can naturally be present in groundwater. Organic constituents can be derived from human activities that are used in household, business, industrial, and agricultural products.

Appendix A, **Figure 8 Surface Waters** provides a map of surface waters and wetlands within the project area.

5.3.2 Potential Impacts

Alternative 1: No Action

Under the No Action alternative, there would be no short-term impacts on water quality associated with construction.

In the long-term, the risk of flooding would not be reduced. Street flooding would continue to occur periodically from significant rainfall events or high tides. Heavy equipment used for flood-related repairs could result in the accidental release of pollutants if equipment malfunctions or spills occur near storm drains, ditches, or water bodies, including increased sedimentation from equipment-related ground disturbance. The potential transport or release of pollutants or sediments from floodwaters and heavy equipment use could adversely affect conformance with Total Maximum Daily Loads for total coliform and other pathogens, as well as total phosphorus, in the Navesink River, the Shrewsbury River, the Sandy Hook Bay, or the Northern Atlantic Coastal Plain aquifer system. Because there is no planned comprehensive mitigation effort or management plan in place to address the recurring accumulation and transport of pollutant loads, these impacts could compound over time as repeated flood events mobilize additional contaminants and sediments into nearby surface waters and drainage systems. Therefore, there could be moderate long-term impacts on surface waters and water quality, depending on the frequency and extent of flooding and associated repairs needed because of major storms or high tides in the project area.

Alternative 2: Proposed Action

Under the Proposed Action, construction activities could affect water quality when stormwater flows over disturbed or exposed areas, picks up pollutants, and transports them directly into nearby waterways or indirectly through storm drains. Earth-disturbing activities, such as grading and excavation, as well as construction traffic, equipment movement, and improper waste management, could contribute to spills or runoff that may release contaminants into the already impaired waterways in the project area. The Proposed Action would adhere to all required permit conditions and implement BMPs to manage sediment and erosion control and avoid or minimize the potential for leaks and spills of hazardous materials. Therefore, the Proposed Action would have a negligible short-term impact on water quality.

As discussed in **Section 4.3.1**, the Snug Harbor, Valley Street, and North Street project areas would involve construction in the Shrewsbury River. Specifically, the Snug Harbor component would result in approximately 200 square feet of in-water disturbance to install the new culvert bulkhead end piece and sluice gate. The Valley Street component would result in approximately 2,000 square feet of in-water disturbance to remove the deteriorated pipes and install a new discharge pipe. The North Street component would require the installation of new bulkheads roughly 120

feet along the Shrewsbury River. In-water work could result in increased turbidity and pollutants in water, which could potentially impact water quality temporarily. The Subrecipient would comply with any conditions required by USACE and NJDEP, which could include methods to work in the dry (i.e., cofferdam, low tide) and minimize turbidity. Thus, the Proposed Action would have a minor short-term impact on water quality from construction activities.

Excavation could reach a depth of 16 feet, which exceeds the groundwater depth of approximately 13 ft BGS. Depending on site conditions, an effective method such as dewatering and/or exclusion would be used to ensure excavation stability and safe working conditions. During the dewatering, groundwater would be treated using sediment-control BMPs prior to release. This would minimize potential impacts and protect groundwater resources. Additionally, excavation that disturbs soil or creates pits, trenches, or open areas where groundwater or wastewater could enter would require a NJPDES Discharge to Ground Water permit.

Because the Shrewsbury River is tidally influenced and flows into Sandy Hook Bay, Highlands must coordinate with USACE to obtain any required permits, including Section 404 authorization, for the discharge of dredged or fill material into Waters of the United States. The Subrecipient would also develop and implement a Soil Erosion and Sediment Control Plan, Stormwater Pollution Prevention Plan, and applicable construction BMPs consistent with NPDES General Construction Stormwater Permit requirements. Therefore, minor short-term impacts on groundwater quality are anticipated.

In the long-term, the risk of flooding and associated water quality impacts, including the spread of debris and pollutants via receding floodwaters, would be reduced. Further, the basins and green infrastructure components of the Proposed Action would attenuate flows and filter sediment from floodwaters, which would decrease input via storm drains, ditches, and waterways. Therefore, there would be a minor long-term beneficial impact on water quality from the Proposed Action.

5.4 Wetlands

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (USACE 1987).

Executive Order (EO) 11990, Protection of Wetlands, requires federal agencies to consider alternatives to work in wetlands and limits potential impacts on wetlands if there are no practicable alternatives. FEMA regulation 44 CFR Part 9, Floodplain Management and Protection of Wetlands, sets forth the policy, procedures, and responsibilities to implement EO 11990 and prohibits FEMA from funding activities in a wetland unless no practicable alternatives are available. Activities that disturb wetlands also may require authorization under Section 404 of the CWA and applicable NJDEP permitting programs.

The New Jersey Wetlands Act of 1970 authorizes NJDEP to regulate dredging, filling, and other disturbances in mapped tidal wetlands, relying on official NJDEP coastal wetland maps. The law is the state's primary regulatory framework for protecting estuarine and coastal wetland resources.

5.4.1 Existing Conditions

The USFWS National Wetlands Inventory (NWI) shows that there are estuarine and marine wetlands within the project area along the Shrewsbury River (USFWS 2024a). **Appendix A**, **Figure 8 Surface Waters** provides a map of surface waters and NWI-mapped wetlands within the project areas. While the Monmouth Hills component is not near NWI-mapped wetlands, the North Street and Snug Harbor pump stations are near NWI-mapped wetlands, and the Valley Street component is within an NWI-mapped wetland (**Appendix A**, **Figure 8 Surface Waters**).

5.4.2 Potential Impacts

Alternative 1: No Action

Under the No Action alternative, there would be no construction-related impacts on wetlands in or near the project area. In the long-term, the risk of flooding would not be reduced, and periodic flooding from storm events could potentially impact wetlands due to continued sediment deposition and associated contaminants within the runoff. Therefore, the No Action alternative would result in negligible, long-term impacts on wetlands in the project area and vicinity.

Alternative 2: Proposed Action

Construction of the Proposed Action could temporarily affect estuarine wetlands along the Shrewsbury River. Specifically, Valley Street activities, including removal of the old discharge pipe and installation of a new discharge pipe adjacent to the removed pipe, would take place within an NWI-mapped wetland within the Shrewsbury River. These actions would affect less than 0.04 acres of wetlands. All work would comply with federal, state, and local wetland regulations and permits. In addition, the use of construction BMPs would minimize potential impacts. Therefore, there would be minor short-term impacts on wetlands.

In the long-term, the Proposed Action would effectively reduce the magnitude of flooding experienced during high-intensity storm events by providing improved temporary floodwater storage, enhanced floodwater pumping capacity, and green infrastructure that attenuates and filters stormwater. Thus, the volume of unprocessed stormwater flowing into wetlands would be reduced, thereby diminishing the release of contaminants and nonpoint source pollution into the wetlands. Through the reduction of surface contaminant inflow, the Proposed Action would have long-term negligible beneficial impacts on wetlands.

Additionally, FEMA conducted the 8-step decision-making process for the Proposed Action (**Appendix D**). Through this process, FEMA considered the natural environment, social concerns,

and economic features of the Proposed Action and concluded that it is the only practicable alternative, and that the scope of work is functionally tied to its location relative to wetlands.

5.5 Floodplains

Floodplains are any land area subject to flooding (44 CFR § 9.4). An area subject to a 1-percent annual chance flood is known as the 1-percent annual chance floodplain (also known as the 100-year floodplain, or base floodplain). An area subject to a 0.2-percent annual chance flood is known as the 0.2-percent annual chance floodplain (also known as the 500-year floodplain).

EO 11988, Floodplain Management, requires federal agencies to avoid, to the extent possible, short- and long-term impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect support of floodplain development wherever there is a practical alternative. FEMA regulations (44 CFR § 9.7) use the 1-percent annual chance flood as the minimal area for floodplain impact evaluation. FEMA follows an 8-step decision-making process to ensure compliance with EO 11988, which requires the evaluation of alternatives to the use of a floodplain before funding the action.

Additionally, the New Jersey Flood Hazard Area Control Act requires that projects that enact certain types of construction within a defined flood hazard area must acquire an NJDEP Flood Hazard Area Permit (NJDEP 2015a). Specifically, projects that include activities such as excavation, vegetation removal, creation of impervious surfaces, and alteration or removal of structures must acquire the appropriate permit (NJDEP 2015a). These requirements assist in ensuring that new or modified structures within flood hazard areas minimize potential flood damage and do not pose a threat to public safety, as structures in areas prone to flooding are particularly vulnerable.

The Highlands Flood Damage Prevention Ordinance (Chapter 21 Part VII) requires any development in the floodplain to obtain a Floodplain Development Permit before beginning work. This review is integrated into the construction permit application and plan review and inspection process of the Uniform Construction Code administered by the Department of Buildings and Housing.

5.5.1 Existing Conditions

FEMA uses Flood Insurance Rate Maps to identify the floodplains for the National Flood Insurance Program. According to FEMA's Flood Insurance Rate Map 34025C0088H (dated June 15, 2022), the Snug Harbor, Valley Street, and North Street project areas are almost entirely in Zone AE, an area subject to inundation by the 1-percent annual chance flood. The northernmost portions of the Snug Harbor and Valley Street project areas are within Zone VE, an area subject to the 1-percent annual chance flood and susceptible to high-velocity wave action during storm events. The Monmouth Hills project area is primarily within Zone X, an area of minimal flood risk. (**Appendix A**, **Figure 9 Flood Zones)** shows flood zones in the project area. Highlands is a

participating community in the National Flood Insurance Program; therefore, the community is eligible to receive flood insurance from the program.

Flood elevations and durations are expected to worsen because of sea-level rise and projected increases in precipitation. As discussed in Section 2, Highlands has experienced repeated flooding and slope erosion, which has damaged property and caused road closures. Floodwater and associated sediments repeatedly overwhelm the stormwater system, causing flooding that impacts access to buildings, emergency services, Route 36 as a primary evacuation route, and utilities. The floodplain in downtown Highlands is highly urbanized with over 45 percent impervious surfaces that further limit infiltration and increase the volume and velocity of runoff from storm events (NJDEP 2026b).

5.5.2 Potential Impacts

Alternative 1: No Action

Under the No Action alternative, no construction activities would occur; therefore, there would be no short-term direct effects on the floodplain. In the long-term, recurring stormwater flooding, coastal storm surge, high tides, erosion, and sediment deposition would continue to affect floodplain conditions. Increased precipitation intensity and sea-level rise could increase the extent, frequency, depth, and duration of flooding in low-lying areas and could contribute to tidal backwater effects, erosion, sediment redistribution, and changes in floodplain drainage patterns. These changes could adversely affect floodplain functions and increase flood exposure for people, property, infrastructure, and transportation routes within the floodplain. Therefore, the No Action alternative would have a moderate long-term impact on floodplain conditions and functions.

Alternative 2: Proposed Action

Construction activities for the Proposed Action, such as excavation to remove old infrastructure and install new stormwater infrastructure, would temporarily disturb the soil within the floodplain. Additionally, vegetation would be removed to construct green infrastructure and basins in Monmouth Hills, which is adjacent to the floodplain. If not properly managed, soil disturbance and vegetation removal would result in localized erosion and sedimentation within the floodplain. The Subrecipient would follow all permit conditions and BMPs required during construction to implement proper controls for preventing the release of sediments, contaminants, and debris within floodplains that could subsequently affect the water quality of adjacent waterways. Therefore, short-term impacts on the floodplain would be negligible.

In the long-term, the Proposed Action would reduce the risk of flood damage by creating increased stormwater drainage capacity throughout the project area. The Proposed Action would increase stormwater capacity from a 2-year storm event to a 100-year storm event, which would benefit approximately half of the Highlands community population by reducing flooding. Therefore, the

Proposed Action would have a moderate long-term beneficial impact on floodplain conditions and functions.

Additionally, FEMA conducted an 8-step decision-making process for the Proposed Action (**Appendix D**). Through this process, FEMA considered the natural environment, social concerns, and economic features of the Proposed Action and concluded that it is the only practicable alternative, and no practicable alternative has been identified outside of the floodplain.

5.6 Coastal Resources

Coastal resources are biological and physical features that occur within a state's coastal zone, including air, wetlands, surface and groundwater, aquatic vegetation, land and minerals, and fish and wildlife.

The Coastal Zone Management Act (CZMA) of 1972 (P.L. 92-583, 16 U.S.C. §§ 1451-1466), as amended, enables states to implement federally approved coastal programs to protect coastal areas and resources. The CZMA, administered by states with shorelines in coastal areas, requires those states to have a Coastal Zone Management Program (CZMP) to manage coastal development and protect coastal resources. Federal agencies must evaluate actions within designated coastal zones to ensure they are consistent with the state CZMP. Projects receiving federal assistance must follow the procedures outlined in 15 CFR §§ 930.90 – 930.101 for federal coastal zone consistency determinations. The New Jersey Coastal Management Program places a high priority on protecting wetlands and establishing living shorelines within the coastal zone, protecting coastal communities from hazards, and steering development away from hazardous areas (NJDEP 2015b).

As defined in the Act, the coastal zone includes coastal waters extending to the outer limit of state-submerged land title and ownership, adjacent shorelines, and land extending inward to the extent necessary to control shorelines. The New Jersey coastal zone consists of three regulatory areas: The Coastal Area Facility Review Act (CAFRA) Zone, Upland Waterfront Development Zone, and Hackensack Meadowlands District (**Appendix A, Figure 10 Coastal Resources**).

CAFRA Zones are established in accordance with CAFRA (New Jersey Statutes Annotated 13:19-1 et seq.), a state law adopted in 1973 in response to rapid suburban development along the coast. The act establishes a defined coastal zone corridor along New Jersey's Atlantic shoreline where development is subject to state-level environmental review before local construction permits can be issued. The CAFRA area is a geographical boundary that extends along the coast from Cheesequake Creek in Middlesex County to Killeohook National Wildlife Refuge in Salem County. Certain activities within these areas are exempt from coastal zone permits. For example, within the CAFRA area, the reconstruction of legally existing structures in the same footprint may be exempt pursuant to NJAC § 7:7-2.1(c)(3).

Consideration is also given to the potential loss of, or impact to, any aesthetic resources or viewshed. A viewshed is an area of land, water, or other environmental element that is visible to the human eye from a fixed vantage point. Viewsheds are areas of scenic or historical value that have been deemed worthy of preservation against development or other changes. Viewsheds are spaces that are readily visible from public areas and thoroughfares, such as from public roadways, public parks, or high-rise buildings.

5.6.1 Existing Conditions

The project site is entirely within the boundaries of the State's Coastal Zone Management area and is within the CAFRA area and tidally influenced waters (NJDEP 2026c) (**Appendix A, Figure 10 Coastal Resources**). The public can view the coast from all project areas except for Monmouth Hills, which is primarily wooded.

5.6.2 Potential Impacts

Alternative 1: No Action

Under the No Action alternative, no construction would occur, resulting in no short-term impacts. In the long-term, there would be continued risk of flooding and associated impacts from increased sedimentation and contamination on water quality, including coastal resources, such as wetlands and aquatic habitat. Additionally, surrounding land uses, which include public recreational assets and single-family residential neighborhoods, would not receive the benefit of coastal flood protection, increasing susceptibility to storm-related flood damage. Route 36, a primary coastal evacuation route, would remain at risk of closure from storm-related runoff and debris flow from Monmouth Hills. The No Action alternative would not promote the CZMP goal of safe, healthy, and well-planned coastal communities and regions because flood risk and associated risks of loss of life and property damage within the project area would not be reduced. Therefore, the No Action alternative would result in a minor long-term impact upon coastal resources.

Alternative 2: Proposed Action

Under the Proposed Action, construction activities would occur entirely in the CAFRA zone with specific actions in tidally influenced waters and coastal wetlands. Construction activities and equipment movement could release contaminants from construction vehicles and increase sediment deposition from construction-related materials. However, adherence to required permit conditions and use of BMPs for effective site management, erosion control, and pollution prevention will reduce potential impacts. Additionally, during construction, equipment and construction-related disturbances may temporarily affect views of the coast; however, these impacts would be temporary. Therefore, construction activities associated with the Proposed Action would result in negligible to minor short-term impacts on coastal resources.

In the long-term, the Proposed Action would reduce the risk of flooding. Therefore, the Proposed Action would be in conformance with the New Jersey CZMP, which aims to protect coastal communities from hazards, such as storm-related flood damage, and to protect coastal resources, including wetlands, surface water and groundwater, and fish and wildlife habitat. Specifically, the Proposed Action would lead to long-term improvements in water quality compared to existing conditions (Section 5.3.2), resulting in benefits on wetlands and aquatic habitats for fish and local wildlife. Therefore, the Proposed Action would have a moderate long-term benefit on coastal resources.

The Subrecipient must coordinate with NJDEP to obtain any coastal permits required for projects within the coastal zone and CAFRA zone.

5.7 Vegetation

Vegetation is the assemblage of plant species that are present in an area, and includes invasive species and noxious weeds, which are non-native plant species that have the potential to cause ecological or economic harm.

EO 13112 Invasive Species, as amended by EO 13751, directs federal agencies, to the extent practicable and permitted by law, to prevent the introduction of invasive species and provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause.

5.7.1 Existing Conditions

The project area is in the Inner Coastal Plain Ecoregion, which was historically characterized by mixed oak and beech-oak forests. Native upland vegetation included white (*Quercus alba*) and black oaks (*Quercus velutina*) along with American beech (*Fagus grandifolia*), pignut (*Carya glabra*), mockernut hickory (*Carya tomentosa*), black walnut (*Juglans nigra)*, tulip tree (*Liriodendron tulipifera*), and red maple (*Acer rubrum*). However, almost all natural areas have since been replaced by agriculture, urban development, and transportation land uses. Only the wettest lowlands still maintain large areas of natural vegetation. These scattered wetlands support native marsh plants such as cattails (*Typha sp*.) and wild rice (*Zizania aquatica*) (EPA 2007).

The project area is primarily developed. Monmouth Hills was established in a deciduous forest that still supports some native species. The most common species encountered in this type of forest are northern arrowwood (*Viburnum recognitum*), sweetgum (*Liquidambar styraciflua*), multiflora rose (*Rosa multiflora*), and staghorn sumac (*Rhus typhina*). Remaining forest fragments consist of sweetgum, black locust *(Robinia pseudoacacia*), oak *(Quercus sp*.), maple *(Acer sp*.), and ash *(Fraxinus sp*.). Monmouth Hills is less densely developed than Highlands, which was built on coastal lowlands. Highlands is primarily an urban ecosystem composed of introduced and invasive species; however, the beach area is sparsely vegetated with species like American beachgrass

(*Ammophila breviligulata*), sea lavender (*Limonium nashii*), and seaside goldenrod (*Solidago sempervirens)* (Colliers Engineering & Design 2022).

NJDEP lists over 50 widespread invasive plants and an even greater number of emerging invasive plants as occurring within the state (NJDEP 2024). Examples of widespread invasive plants that could occur within the project area include tree of heaven (*Ailanthus altissima*), Japanese barberry (*Berberis thunbergia*), Japanese honeysuckle (*Lonicera japonica*), and garlic mustard (*Alliaria petiolata*) (NJDEP 2024).

5.7.2 Potential Impacts

Alternative 1: No Action

Under the No Action alternative, no construction activity would occur that could result in impacts on vegetation; therefore, there would be no short-term effect on vegetation. However, the risk of flooding and erosion within the project area would not be comprehensively reduced, and periodic flood events would result in varying degrees of erosion and/or sediment deposition in vegetated areas along existing watercourses. Vegetation in areas experiencing substantial erosion and/or sediment deposition would be killed or damaged, creating disturbed conditions that are more likely to be colonized by fast-growing species, which are often invasive. Therefore, the No Action alternative would have long-term negligible to minor impacts on vegetation within the project area.

Alternative 2: Proposed Action

Under the Proposed Action, approximately 1.76 acres of vegetation would be cleared during construction of the stormwater collection system in the Monmouth Hills project area. The areas that would be cleared vary in type and density of vegetation. Approximately 23 trees with a diameter of 18 inches or larger would be removed. Therefore, there would be a short-term minor impact due to vegetation loss in the project area during construction.

Approximately 1.76 acres or more of native vegetation would be replanted within the project area. The planting plan would be developed by a licensed landscape architect with the goal of establishing an equal or greater number of trees in the disturbed area; however, planted trees would take upwards of 15 to 20 years to grow and replace mature trees. Therefore, while there would be short-term impacts from vegetation removal, there would be no long-term loss of vegetation. Species composition may even improve if vegetation removal would replace invasive species with natives. Therefore, the Proposed Action would have a negligible long-term impact on vegetation.

5.8 Wildlife, Migratory Birds, and Bald and Golden Eagles

This section focuses on wildlife species that breed, forage, rear, rest, hibernate, or migrate through the project area. Statutes relevant to wildlife include the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Threatened and endangered wildlife species are evaluated separately in Section 5.9. Wildlife refers to the undomesticated animal species that live in an area.

The Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703–711), provides protection for migratory birds and their nests, eggs, and body parts from harm, sale, or other injurious actions, except under the terms of a valid permit issued pursuant to federal regulations. The Migratory Bird Treaty Act protects all native birds, regardless of whether the population in a specific area migrates or not.

The Bald and Golden Eagle Protection Act of 1940 prohibits the take, possession, sale, or other harmful action on any Golden or Bald eagle, alive or dead, including any part, nest, or egg (16 U.S.C. § 668[a]). Bald Eagles (*Haliaeetus leucocephalus*) typically nest near water in trees taller than the surrounding forest canopy (New Jersey Division of Fish and Wildlife [NJDFW] and Conserve Wildlife Foundation of New Jersey [CWFNJ] 2015).

5.8.1 Existing Conditions

Wildlife

The project area is highly developed. Common wildlife that may occur in the project area include those adapted to living near humans, including the white-tailed deer (*Odocoileus virginianus*), raccoon *(Procyon lotor*), Rock Pigeon (*Columba livia*), green frog (*Lithobates clamitans*), and common garter snake (*Thamnophis sirtalis*) (iNaturalist 2024). Recent wildlife observations at beachside parks also include the brant goose (*Branta bernicla*) and blue mussel (*Mytilus edulis*) (iNaturalist 2024).

Migratory Birds

Several migratory bird species could occur in the project area, including species such as Blue-winged Warbler (*Vermivora pinus*), Canada Warbler (*Cardellina canadensis*) and Red-headed Woodpecker (*Melanerpes erythrocephalus*). The nesting season for migratory birds in New Jersey is generally March through October, depending on the species (USFWS 2026a). The project area is in the Atlantic Flyway.

Bald and Golden Eagles

The New Jersey Bald Eagle Project identified one Bald Eagle nest within 5 miles of the project area, which is at Hartshorne Woods Park, about 1 mile southeast of the project area (NJDFW and CWFNJ 2023). The project area does not support suitable nesting habitat; therefore, Bald Eagle nests are not anticipated to occur within the project area. However, habitats that Bald Eagles use for hunting are found in the project area, and several observations of the species have been recorded in Highlands (Cornell Lab of Ornithology 2024a; iNaturalist 2024). Golden Eagles (*Aquila chrysaetos*) are uncommon in New Jersey and are rarely observed during migration (Cornell Lab of Ornithology 2026). Only one observation of a Golden Eagle has been recorded near Highlands in Hartshorne Woods Park in 2002 (Cornell Lab of Ornithology 2024c). The

project area does not provide suitable habitat for resting or foraging; therefore, Golden Eagles are not expected to occur within the project area.

5.8.2 Potential Impacts

Alternative 1: No Action

Under the No Action alternative, no construction activity would occur that could result in impacts on wildlife species or their habitats. Therefore, the No Action alternative would have no impact on wildlife in the short-term. In the long-term, the risk of flooding and erosion would not be reduced, and floodwater could transport debris and pollutants, including potential release during flood-related remediation. This could result in the displacement of wildlife, habitat loss, mortality, water contamination, and altered food availability during flood events. Considering the urban setting and capacity for wildlife to relocate, there could be a negligible impact on wildlife in the long-term, depending on the frequency and extent of flooding and associated remediation.

Alternative 2: Proposed Action

Under the Proposed Action, construction activities could affect wildlife and their habitats, particularly in upland areas where approximately 1.76 acres of vegetation would be removed. Construction-related noise could also disturb wildlife inhabiting the adjacent forest. However, considering that most of the habitat in the proposed project area is highly developed, species in the project area are generally accustomed to urban levels of noise and activity. In-water construction activities could disrupt aquatic species resulting from increased suspended solids, turbidity, and sediment plumes as well as noise and vibration effects. However, compliance with required permit conditions and implementation of BMPs would reduce potential impacts. Therefore, the Proposed Action would have a minor impact on wildlife in the short-term.

In the long-term, the Proposed Action would reduce the risk of floodwaters transporting pollutants to nearby waterways and water quality downstream would be slightly improved. Therefore, there would be a negligible benefit to aquatic species and their habitats from improved water quality in the long-term. Additionally, the project area would be revegetated with native plants, as described in Section 5.7.2. The revegetation activities would reestablish habitat for wildlife species and might even improve habitat quality if invasive species are replaced with native species. Therefore, there would be a negligible benefit on wildlife and their habitats in the long-term.

5.9 Threatened and Endangered Species and Critical Habitat

The Endangered Species Act (ESA) of 1973 provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The lead federal agencies for implementing ESA are USFWS and the U.S. National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS). The law requires federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the

continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes a "take" of any listed species of endangered fish or wildlife.

5.9.1 Existing Conditions

The ESA defines the action area as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 CFR § 402.02). Therefore, the action area, where effects on listed species must be evaluated, may be larger than the project area where project activities would occur. The action area extends beyond the project area to encompass potential effects of noise generated during construction from the use of heavy equipment. To account for potential noise impacts, the action area includes a 200-foot buffer extending from the project area (**Appendix A, Figure 11 Endangered Species Action Area**). The action area is approximately 166 acres in total between Highlands and Monmouth Hills, comprising approximately 18 acres of upland deciduous forests, 7 acres of open water, and 141 acres of developed land. The developed land includes Route 36, public facilities, businesses, and residential housing (Multi-Resolution Land Characteristics Consortium 2024).

The USFWS Information for Planning and Consultation (IPaC) system and the NOAA ESA Section 7 Mapper were used to identify proposed, threatened, and endangered species that potentially may occur in the action area. **Table 5.5** provides a list of all ESA-listed species that may be near the action area (NOAA 2024b, USFWS 2026a). There is no designated critical habitat for any ESA-listed species within 5 miles of the project area. According to USFWS, critical habitat differs from suitable habitat in that it represents specific geographic areas containing features essential to the conservation of a threatened or endangered species, which may require special management or protection.

Table 5.5 Federally Listed Species with Potential to Occur Within or Near the Project Area

Common Name	Scientific Name	Status
Mammals		
Tricolored Bat	*Perimyotis subflavus*	Proposed Endangered
Birds		
Piping Plover	*Charadrius melodus*	Threatened
Roseate Tern	*Sterna dougallii dougallii*	Endangered
Rufa Red Knot	*Calidris canutus rufa*	Threatened
Fish		
Atlantic Sturgeon	*Acipenser oxyrinchus oxyrinchus*	Endangered
Sea Turtles		
Green Sea Turtle	*Chelonia mydas*	Threatened
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	Endangered

Common Name	Scientific Name	Status
Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered
Atlantic Large Whales		
North Atlantic Right Whale	*Eubalaena glacialis*	Endangered
Fin Whale	*Balaenoptera physalus*	Endangered
Insects		
Monarch Butterfly	*Danaus plexippus*	Proposed Threatened
Plants		
Seabeach Amaranth	*Amaranthus pumilus*	Threatened

Source: NOAA 2024b; USFWS 2026a

Tricolored Bat (TCB): During the spring, summer, and fall, TCBs typically roost among leaf clusters in live or recently dead deciduous hardwood trees. During these seasons, the TCB may also be found roosting among pine needles, Spanish moss, and within artificial roosts such as barns, eaves, and bridges (USFWS 2024e). TCBs primarily forage over waterways and forest edges, feeding opportunistically on small insects (USFWS 2021). In the winter, TCBs hibernate in caves or mines. No critical habitat has been designated for this species (USFWS 2024f). The action area occurs within the habitat range of the TCB and contains suitable forest habitat for roosting and foraging during the spring, summer, and fall. Therefore, the TCB may be present in the action area during these seasons.

Piping Plover: The Piping Plover is a small migratory shorebird with three distinct populations. The Atlantic coast population is a subspecies of Piping Plover that nests and feeds along sand and gravel beaches. During the winter, the Piping Plover uses various habitats and moves between them in response to weather and tidal conditions. These coastal habitats include small islands, sand spits, shoals, tidal flats, and sandbars with inlets. The primary foraging habitats of the Piping Plover include ephemeral pools, sandy mud flats, and emergent seagrass beds rich in invertebrates (USFWS 2024c). No critical habitat for this species occurs within 5 miles of the action area (USFWS 2024b, 2024f). Although Piping Plover has been observed near the action area on rare occasions, suitable habitat for the species does not occur in the action area (iNaturalist 2024). The Piping Plover is more regularly identified on Sandy Hook, approximately 0.5 miles east, where habitat is more suitable for the species (USFWS 2026a, iNaturalist 2024). Therefore, the Piping Plover is not expected to occur in the action area.

Roseate Tern: The North Atlantic Roseate Tern subspecies is divided into two populations in North America because they breed in two discrete areas and rarely mix. The Northeastern population, federally listed as endangered, breeds on coastal islands from Eastern Canada, in Nova Scotia and Quebec, to New York. The federally listed threatened Caribbean population breeds on islands in the Caribbean Sea from the Florida Keys to the Lesser Antilles. Both populations winter on the north and east coasts of South America. Suitable nesting habitat is limited due to the combined negative impacts from sea level rise, predation, and human development. The NJDEP Natural

Heritage Program considers the Roseate Tern to be a non-breeding species in the state and globally rare and localized throughout its range. More than 90 percent of the Northeastern population is now limited to three major breeding colonies, none of which are in New Jersey (USFWS 2026b). Based on the absence of known nearby Roseate Tern colonies, the Proposed Action is not expected to affect this species.

Rufa Red Knot: The Rufa Red Knot nests in the Canadian arctic tundra but uses marine habitats, including sandy beaches, saltmarshes, and lagoons with adequate invertebrate prey, along the New England coast for migrating and overwintering (USFWS 2024). The Atlantic horseshoe crab (*Limulus polyphemus*), which is the primary food source for migrating Rufa Red Knots, has been observed near the action area (iNaturalist 2024; USFWS 2023b). However, the existing marine habitats in the action area are patchy and of poor quality and no observations of the species have been recorded in Highlands (Cornell Lab of Ornithology 2024a; iNaturalist 2024). Instead, Rufa Red Knots are regularly identified on Sandy Hook beaches, which are, at nearest, approximately 0.5 miles east of Highlands (Cornell Lab of Ornithology 2024b). Furthermore, no critical habitat for the Rufa Red Knot is identified within 5 miles of the action area (USFWS 2023a). Therefore, the Rufa Red Knot is not expected to occur in the action area.

Atlantic Sturgeon: The Atlantic sturgeon inhabits shallow waters on the Atlantic continental shelf down to depths of 246 feet. The species migrates along the Atlantic coast between Canada and Florida and can be found in brackish waters and large tidal estuaries such as Sandy Hook Bay. When Atlantic sturgeon reach maturity, they return to spawn in the large river systems where they hatched (USFWS 2024g). Adult and subadult Atlantic sturgeon may be present in the action area year-round.

Sea Turtles: Each species of sea turtle is widely distributed within its range. Sea turtles may be found far out to sea and inshore areas such as bays, lagoons, salt marshes, ship channels, creeks, and the mouths of large rivers. Nesting occurs mainly on beaches or along bays with suitable sand (NOAA 2024e, 2024f, 2024g). On the Atlantic coast of the United States, nesting sea turtles can be found as far north as North Carolina. After nesting, sea turtles migrate north to New England foraging grounds for the summer and fall. Therefore, sea turtles could be present in the action area seasonally from May 1 to November 30 (NOAA 2024d).

Large Whales: Large whales inhabit deep marine waters but can also be found closer to the coastline along migration routes. Right whales and fin whales are baleen whales, foraging for krill and other small animals in deep, cold northern waters off the New England coast from spring through fall. Large whales migrate to warmer waters for winter calving. These species typically prefer to occupy deeper offshore habitats and are only expected to occur as transients within Sandy Hook Bay (NOAA 2024c, 2024h).

Monarch Butterfly: The Monarch Butterfly occurs in a variety of habitats across North America. The Monarch Butterfly population that summers in New Jersey undergoes multigenerational

migration, traveling over 2,000 miles from overwintering sites in Mexico. The Monarch Butterfly prefers open habitat such as grasslands and fields that contain both flowering plants for nectar foraging and the species' host plant milkweed (*Asclepias* spp.) for the larval stage (USFWS 2020). Observations of Monarch Butterfly and milkweed have been recorded within 5 miles of the action area as recently as September 2026 (iNaturalist 2026). However, these observations mostly occur in less developed areas such as on Sandy Hook and the outskirts of Highlands in Hartshorne Woods Park. Suitable habitat availability within the action area is likely limited because of urban development. There have been no observations of Monarch Butterfly or its host plant recorded within the action area (iNaturalist 2026). Furthermore, no critical habitat for the Monarch Butterfly is identified within five miles of the action area (USFWS 2023a). Therefore, the Monarch Butterfly is not expected to occur in the action area.

Seabeach Amaranth: Seabeach Amaranth is an annual plant native to U.S. Atlantic coast beaches. This plant is an indicator of a healthy beach ecosystem and contributes to coastal resiliency by helping to bind the sand. Well-adapted to its beach habitat, Seabeach Amaranth is highly tolerant of salt spray and able to grow in nearly pure sand but is intolerant of competing plants and most often occurs in areas with little other vegetation. Several important threats remain including beach stabilizing structures such as groins, jetties, seawalls, and sand fencing; mechanical beach raking; vehicle use; intensive recreation; and rapid sea level rise. Plant-eating animals such as webworms, white-tailed deer, sika deer and feral horses may harm Seabeach Amaranth plants. The only project area with the potential to support Seabeach Amaranth habitat is the Valley Street project area. However, the proposed outfall piping location at Valley Street consists of highly disturbed and eroded beach habitat and is not suitable for this species. Therefore, Seabeach Amaranth is not expected to occur within the project area.

5.9.2 Potential Impacts

Alternative 1: No Action

Under the No Action alternative, no construction activity would occur that could result in impacts on ESA-listed species or their habitats. Therefore, the No Action alternative would have no effect on ESA-listed species in the short-term. In the long-term, the risk of severe flooding and erosion would not be reduced. Floodwaters could impact TCB foraging habitat by damaging understory vegetation communities, thereby reducing the availability of vegetation-associated insects that serve as a prey source for the species. Floodwaters could also transport debris, sediments, and pollutants into Sandy Hook Bay, degrading water quality and adversely affecting listed marine species and their habitats. Heavy equipment used for flood and erosion-related repairs could also generate noise that temporarily disrupts TCB and could release pollutants that further impact water quality and marine habitat. Therefore, there could be negligible effects on ESA-listed species in the long-term, depending on the frequency and extent of flooding and associated repairs.

Alternative 2: Proposed Action

Under the Proposed Action, in the short-term, approximately 1.76 acres of vegetation would be removed. This area includes approximately 23 trees with a diameter of 18 inches or larger that could provide suitable summer roosting habitat for the TCB. Vegetation removal could kill, injure, or disturb breeding or roosting TCBs, if present in the action area. To avoid impacts on TCB from vegetation removal, tree removal would be limited to the period between August 1 through May 14, outside the pup season. Additionally, construction BMPs would limit the impact of erosion, sedimentation, and potential for accidental release of pollutants on vegetation communities and water quality. Therefore, with implementation of BMPs and species-specific avoidance and minimization measures, the Proposed Action would have a minor impact on ESA-listed species in the short-term. In the long-term, the 1.76 acres of vegetation and associated trees would be replanted with an equal or greater number of native trees and understory species. Therefore, there would be no net loss of suitable summer roosting habitat and no impact on TCB in the long-term.

For ESA-listed terrestrial species under USFWS jurisdiction, FEMA submitted a consultation to USFWS on October 10, 2024, pursuant to Section 7 of the ESA and the Migratory Bird Treaty Act. FEMA determined that the proposed project will have No Effect on the Piping Plover, Roseate Tern, Rufa Red Knot, and Seabeach Amaranth and is Not Likely to Adversely Affect the TCB and its habitat with the following conditions:

- Removal, cutting, or trimming of trees of any diameter may only occur between August 1 through May 14, outside the TCB pup season in New Jersey.
- The Subrecipient must immediately report to FEMA and the USFWS New Jersey Field Office any changes to the proposed scope of work, the results of any surveys conducted, the presence of any colonies of bats of any species, or the presence of any dead, injured, or sick bats of any species that are found during the undertaking.
- If the preceding conditions cannot be followed, the Subrecipient, or the Subrecipient's contractor(s), shall contact the USFWS New Jersey Field Office at (609) 646-9310 prior to the start of construction. Documentation of this coordination must be submitted to FEMA.

In response, USFWS provided technical assistance to FEMA to complete the Northern Long-Eared Bat and Tricolored Bat Range-wide Determination Key on IPaC, which resulted in a letter of concurrence on January 17, 2025.

Additionally, in-water construction at Snug Harbor, Valley Street, and North Street could temporarily affect marine waters used by ESA-listed species, including Atlantic Sturgeon, sea turtles, North Atlantic Right Whale, and Fin Whale, through increased turbidity, underwater noise and vibration, sedimentation, or accidental releases of pollutants. Highlands would be required to obtain the applicable USACE permit authorization and comply with all associated permit conditions, including any ESA-related conservation measures and NOAA Fisheries coordination

requirements identified through the USACE permitting process. Sediment barriers, erosion controls, spill-prevention measures, and other applicable construction BMPs would be implemented to avoid or minimize potential effects on marine waters and aquatic habitats. In the long-term, enhanced floodwater storage and pumping would reduce flood-related contaminant flows into wetlands and marine waters, resulting in minor benefits by limiting contaminant inflow.

5.10 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act fosters the long-term biological and economic sustainability of marine fisheries in the United States. Under the Magnuson–Stevens Fishery Conservation and Management Act, NMFS designates essential fish habitat (EFH), which is "those waters and substrate necessary for federally managed species to spawn, breed, feed, and/or grow to maturity." All federal agencies must assess the potential effects of proposed actions and alternatives on EFH and consult with NMFS on actions that could adversely affect EFH.

5.10.1 Existing Conditions

According to the NMFS EFH Mapper, the project area is within designated EFH for various life stages of 24 mid-Atlantic, Secretarial, and New England species, including the Atlantic cod (*Gadus morhua*), clearnose skate (*Raja eglanteria*), skipjack tuna (*Katsuwonus pelamis*), and summer flounder (*Paralichthys dentatus*) (NOAA 2024a).

Based on the NMFS EFH Mapper, the project area is within designated EFH for nine highly migratory species. Some of these species include bigeye sand tiger shark (*Odontaspis noronhai*), narrowtooth shark (*Carcharhinus brachyurus*), sixgill shark (*Hexanchus griseus*), and smooth hammerhead shark (*Sphyrna zygaena*) (NOAA 2024a).

5.10.2 Potential Impacts

Alternative 1: No Action

Under the No Action alternative, no construction activity would occur that could result in impacts on fish species or their habitats. Therefore, the No Action alternative would have no effect on EFH in the short-term. In the long-term, the risk of flooding and erosion would not be reduced, and periodic flooding could transport debris and pollutants into wetlands and marine waters and adversely impact EFH. In addition, equipment used for flood and erosion-related remediation could result in the accidental release of pollutants that could adversely affect EFH. Therefore, there could be a minor effect on EFH in the long-term, depending on the frequency and extent of flooding and associated remediation.

Alternative 2: Proposed Action

Under the Proposed Action, sediments and pollutants from construction activities could move into nearby waters and impact EFH. In-water construction could also result in EFH degradation from disturbance and potential pollution from work activities and heavy equipment. Fish species present in the action area could be disturbed by construction noise, vibration, and increased turbidity and would be expected to avoid or move away from the project area. However, in-water work would not be extensive in the action area, and Highlands will be required to coordinate with USACE and NJDEP to obtain any required permits, which would include the implementation of BMPs and measures to avoid or minimize adverse effects on EFH. Therefore, the Proposed Action could have a minor impact on EFH in the short-term. In the long-term, reducing flooding and erosion could have positive impacts on EFH. The new basins and green infrastructure would help sequester and process floodwaters and sediments, preventing pollutants from entering waterways. Over time, the cumulative reduction of pollutants entering waterways would result in minor benefits on EFH.

5.11 Cultural Resources

FEMA must consider the potential effects of its funded actions upon historic and cultural resources prior to engaging in any undertaking in accordance with Section 106 of the National Historic Preservation Act (NHPA) (54 U.S.C. 300101-300318), as amended, and implemented by 36 CFR Part 800. The NHPA of 1966 defines a historic property as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register." Eligibility criteria for listing a property on the National Register of Historic Places (NRHP) are detailed in 36 CFR Part 60.

Pursuant to 36 CFR Section 800.4(a)(1), the Area of Potential Effects (APE) is the geographic area(s) within which the undertaking may directly or indirectly affect cultural resources. Within the APE, impacts on cultural resources are evaluated for both historic structures (aboveground cultural resources) and archaeology (belowground cultural resources).

5.11.1 Existing Conditions

The APE includes both historic structures and archaeological resources that may be affected by the Proposed Action. For historic structures, including potential visual effects on viewshed, the APE includes the Water Witch Club property, bounded by Navesink Avenue to the north, North Peak Avenue to the east, Windlass Path to the south, and Serpentine Drive to the west; the Snug Harbor Avenue project area and adjacent parcels; the Valley Street project area and adjacent parcels; and the North Street project area and adjacent parcels. The archaeological APE is limited to areas of proposed ground disturbance associated with project construction (**Appendix A, Figure 12 Cultural Resources**). Cultural resources within the APE were identified through a review of the New Jersey Historic Preservation Office (NJHPO) Cultural Resources Geographic Information System, known as Look Up Cultural resources for Yourself (LUCY), the NRHP, previous cultural resource investigations, historic maps, aerial imagery, and field investigations completed in support of Section 106 consultation. Historic architectural resources were evaluated in accordance

with National Register criteria. Archaeological sensitivity within areas of proposed ground disturbance was assessed through background research, review of existing cultural resource information, and consultation with NJHPO to determine the need for additional archaeological investigations. Detailed descriptions of the proposed project areas and associated components are provided in Section 4.3.1.

Monmouth Hills

Monmouth Hills is a late nineteenth- to early twentieth-century residential community located in the Navesink Highlands on a steep, wooded slope that overlooks Sandy Hook Bay, Shrewsbury River, and the Atlantic Ocean. Located within Monmouth Hills is the Water Witch Club Historic District, which was listed on the NRHP in March 2004. The Historic District is bound by Route 36, Waterwitch Drive, Sea View Terrace, Park Way, Windlass Path, and Serpentine Drive. The community was planned around the Club Casino, which was individually listed on the NRHP in August 1990 (NRHP 1990, 2004). The Historic District's areas of significance are community planning and development, landscape architecture, architecture, and entertainment and recreation.

There are 54 contributing resources within the Historic District including: 23 buildings, 28 structures, and 3 objects. The Historic District is characterized by a roadway system of narrow gravel roads and a series of stone structures built of a distinctive rock that is unique to the area and is known locally as peanut stone. This roadway system consists of gateposts, retaining walls, walkways, paths, and staircases along heavily vegetated lots designed in a semi-wooded aesthetic with deliberate landscape features. At several locations throughout the District, peanut stone was used to construct water retention walls, drainage ditches, and culverts. The road system and landscape structures and objects are contributing resources to the Historic District.

The Monmouth Hills APE is primarily located within the boundaries of the Water Witch Club Historic District. Existing conditions within the APE consist primarily of wooded undeveloped lots, moderately to steeply sloping terrain, historic gravel roadways, peanut stone-clad drainage ditches, retaining walls, and other landscape features associated with the historic district.

Snug Harbor

The Snug Harbor project area is located between Route 36 and the Shrewsbury River. The area includes Bay Avenue, Central Avenue, Recreation Place, Snug Harbor Avenue, and adjacent roadway corridors that convey stormwater toward the Shrewsbury River. The area proposed for the Snug Harbor pump station is located near the northeastern end of Snug Harbor Avenue adjacent to the Shrewsbury River. The project area contains existing drainage infrastructure, including roadway drainage features and stormwater conveyance systems that transport stormwater toward the Shrewsbury River. This area is not located within a historic district, and no previously identified cultural resources have been documented within the APE.

Valley Street

The existing Valley Street pump station (40.404293, -73.986034) is located at the dead end of Valley Street on a beach of the Shrewsbury River next to a marina and dock. It is one of two existing pump stations that collect and discharge stormwater to the bay. This area is not in a historic district, and no cultural resources have been identified within the APE.

North Street

North Street pump station (40.403067, -73.984198) is located at the end of North Street on the shoreline of Shrewsbury River. This area is not in a historic district, and no cultural resources have been identified within the APE.

5.11.2 Section 106 Consultation

In accordance with Section 106 of the NHPA and the "Statewide Programmatic Agreement among FEMA, the New Jersey State Historic Preservation Office, the New Jersey State Office of Emergency Management, and Participating Tribes," executed on November 15, 2022, as amended, FEMA initiated consultation with NJHPO on October 2, 2024. Background research identified that the APE is within the listed Water Witch Historic Club District and contains no previously recorded archaeological sites. The Water Witch Club Casino, which is individually listed in the NRHP, is located within the Historic District, but no other aboveground historic properties were identified. Historic mapping showed limited nineteenth-century development within the APE, including one mapped structure identified as "G. Giles" on an 1889 atlas. Earlier maps primarily depicted the area as wooded hillside with limited evidence of historic occupation.

FEMA determined that the Proposed Action would result in No Adverse Effect to Historic Properties with Conditions, with the condition that "all existing peanut stone-clad ditches and culverts will be restored with peanut stone finishes." On November 1, 2024, NJHPO requested additional information to complete its review. For the Monmouth Hills project area, NJHPO requested a Phase I archaeological survey due to the site's potential sensitivity for Native American sites and historic-period archaeological deposits. NJHPO also requested that the Subrecipient submit an Application for Project Authorization to the Commissioner of NJDEP and request a formal recommendation from the Historic Sites Council for the Water Witch Club Historic District project area.

To address NJHPO's request, a FEMA Secretary of the Interior (SOI) qualified archaeologist conducted a Phase IA survey within the Monmouth Hills APE on March 7, 2025. The site visit documented the topographic setting and existing conditions and assessed the need for a Phase IB archaeological survey. Based on the Phase IA results, FEMA prepared a Phase IB Archaeological Survey Testing Plan that delineated an area within the Monmouth Hills project area with archaeological sensitivity and proposed methods to determine the presence or absence of archaeological resources pursuant to 36 CFR § 800.4. FEMA submitted the testing plan to NJHPO

and the consulting Tribal Nations, including the Delaware Nation, the Delaware Tribe of Indians, the Eastern Shawnee Tribe of Oklahoma, and the Shawnee Tribe of Oklahoma, on April 2 and April 4, 2025. On April 4, 2025, the Delaware Nation responded by email that they had no concerns and provided their Inadvertent Discovery Policy. On May 2, 2025, NJHPO responded by email that the proposed archaeological work plan was acceptable. No responses were received from the Delaware Tribe of Indians, the Eastern Shawnee Tribe of Oklahoma, or the Shawnee Tribe of Oklahoma within the 30-day review period. On June 22 and 23, 2026, an SOI-qualified archaeologist from CDM Smith, FEMA's contractor, conducted the Phase IB archaeological survey. The investigation focused on the portion of the Monmouth Hills APE proposed for archaeological testing, located south of Navesink Avenue/NJ Route 36 between Ontario Avenue and Valley Avenue, where stormwater retention basins, bioretention features, check dams, and associated drainage infrastructure are proposed. The survey included review of environmental conditions, cultural resource data, historic mapping, site reconnaissance, and subsurface archaeological testing within delineated areas of archaeological sensitivity.

A total of 25 shovel test pits were excavated on a systematic interval grid within the delineated areas of archaeological sensitivity. Excavated soils were screened and examined for cultural materials, and field documentation, provenience recording, and artifact processing were completed in accordance with NJHPO guidelines and SOI standards.

The Phase IB archaeological survey did not identify any archaeological deposits, cultural features, archaeological resources, or archaeological materials. No evidence was recorded indicating the presence of previously unrecorded pre-contact or historic period archaeological sites. Therefore, no archaeological resources eligible for listing in the NRHP were identified within the surveyed portions of the APE.

On August 27, 2026, FEMA submitted continuing Section 106 consultation to NJHPO and the consulting Tribal Nations. The continuing consultation provided the Phase IB archaeological survey results and addressed NJHPO's request for additional information regarding the extent of project effects on the Water Witch Club Historic District. FEMA determined that the proposed project would result in No Adverse Effect to Historic Properties with Conditions, as follows:

- To the greatest extent feasible, existing peanut stone-clad roadside drainage ditches and slate sidewalk stone must not be disturbed during project implementation unless absolutely necessary. If removal or disturbance is necessary, these features shall be carefully removed and preserved prior to excavation or installation and must be reinstalled in their original locations or replaced with in-kind or compatible materials if replacement is infeasible.

- Native plants shall be planted, where possible, in areas disturbed by installation of stormwater management facilities to minimize visual effects to the historic district.

On August 30, 2026, the Shawnee Tribe of Oklahoma responded to FEMA's consultation stating that the project area was outside the Tribe's area of interest. On September 23, 2026, NJHPO

concurred with FEMA's determination. No response was received from the Delaware Nation, Delaware Tribe of Indians, or the Eastern Shawnee Tribe of Oklahoma within the 30-day review period.

5.11.3 Potential Impacts

Alternative 1: No Action

The No Action alternative would have no short-term impacts on historic structures and contributing landscape features of the Water Witch Club Historic District because no construction would take place. However, without the construction of stormwater management improvements, the Water Witch Club Historic District would continue to experience severe erosion issues during rainfall events, leading to further deterioration of the roadways and increasing the risk of losing important components of the water drainage system within the Historic District. Therefore, the No Action alternative would have minor to moderate long-term impacts on historic structures and contributing landscape features of the Water Witch Club Historic District.

Alternative 2: Proposed Action

The Proposed Action would result in minor short-term impacts on historic properties during construction due to ground disturbance, construction activities, and the temporary presence of heavy equipment within and adjacent to the Water Witch Club Historic District. These impacts would be minimized through implementation of the proposed conditions as determined during the Section 106 consultation process. The Proposed Action would have moderate long-term benefits on the Water Witch Club Historic District and those areas between Route 36 and Shrewsbury River because it would reduce erosion, stormwater runoff, and sediment transport that currently contributes to the deterioration of historic roadway features, drainage systems, retaining walls, and other contributing landscape elements within the Historic District. The Proposed Action would also reduce flooding and stormwater-related damage along Route 36 and associated drainage corridors.

5.12 Noise

The Noise Control Act of 1972 (42 U.S.C. §§ 4901-4918) required EPA to create a set of noise criteria. In response, in 1974, EPA published Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, which explains the impact of noise on humans. The EPA report found that keeping the maximum 24-hour day-night noise level (Ldn) value below 70 A-weighted decibels (dBA) would protect the majority of people from hearing loss. EPA recommends an outdoor Ldn of 55 dBA (EPA 1974). According to published lists of noise sources, sound levels, and their effects, sound causes pain starting at approximately 120 to 125 dBA and can cause immediate irreparable damage at 140 dBA. The Occupational Safety and Health Administration has adopted a standard of 140 dBA for maximum impulse noise exposure.

Sound pressure level (SPL) is used to measure the magnitude of sound and is expressed in decibels (dB or dBA), with the threshold of human hearing defined as 0 dBA. The SPL increases logarithmically, so that when the intensity of a sound is increased by a factor of 10, its SPL rises by 10 dB, while a 100-fold increase in the intensity of a sound increases the SPL by 20 dB. Equivalent noise level (Leq) is the average of sound energy over time, so that one sound occurring for two minutes would have the same Leq of a sound twice as loud occurring for one minute. The Ldn is based on the Leq and is used to measure the average sound impacts to guide identification of compatible land uses. It weights the impact of sound as it is perceived at night against the impact of the same sound heard during the day. This is done by adding 10 dBA to all noise levels measured between 10:00 p.m. and 7:00 a.m. For instance, the sound of a car on a rural highway may have an SPL of 50 dBA when measured from the front porch of a house. If the measurement were taken at night, a value of 60 dBA would be recorded and incorporated into the 24-hour Ldn.

Leq and Ldn are useful measures when used to determine levels of constant or regular sounds, such as road traffic or noise from a ventilation system. However, neither represents the sound level as it is perceived during discrete events, such as fire sirens and other impulse noises. They are averages that express the equivalent SPL over a given period of time. Because the decibel scale is logarithmic, louder sounds (higher SPL) are weighted more heavily; however, loud infrequent noises such as fire sirens with short durations would not significantly increase Leq or Ldn over the course of a day.

Assessment of noise impacts includes consideration of the proximity of the Proposed Action to the nearest noise-sensitive land use. A noise-sensitive land use can be described as an area of frequent human use that would benefit from a lowered noise level. Typical noise-sensitive land uses include residences, schools, places of worship, hospitals, nursing homes, and libraries.

Ordinance O-15-21, Section 3-2.4 (Highlands Noise Ordinance), establishes local regulations relating to noise. Applicable to construction of the Proposed Action, the ordinance specifically exempts noise from construction or renovation activities between the hours of 7:00 a.m. and 8:00 p.m. on weekdays and 9:00 a.m. and 6:00 p.m. on Saturday and Sunday. At other times, any audible noise, which results in a complaint by an affected person, when evaluated at or within the property line of the complainant, is prohibited, except in the case of urgent matters (to the extent necessary to prevent further damage) and in the interest of public safety and health.

Ordinance Chapter 336, Article I, Section 336-2 (Township of Middletown Noise Ordinance), establishes local regulations relating to noise that are applicable to construction of the Proposed Action. The ordinance specifically prohibits a person or entity from operating or being allowed to operate any motorized construction or landscaping equipment, machinery, generators, compactors, or power tools outdoors upon any property in a residential zone between 9:00 p.m. and 7:00 a.m. on weekdays and 9:00 p.m. and 8:00 a.m. on Saturday, Sunday, and federally designated holidays. This prohibition does not apply to a federal, state, county or municipal, or public utility employees or contractors performing emergency repairs, or persons or contractors performing emergency

repairs on public or private property reasonably required to preserve property or safety or conduct pursuant to a waiver issued by the Township construction official. Construction or landscaping tools or equipment powered by an internal combustion engine must always have a properly functioning muffler.

5.12.1 Existing Conditions

The project area is primarily a residential area, with noise-sensitive land uses within 50 feet of the project area. There is one school within 0.10 miles of the project area. Potential sources of noise surrounding the project area include road traffic on CR-8/Linden Avenue and County Route 36/Navesink Avenue, which both intersect the project area. CR-8 has noise levels approximately at 50 dBA and Route 36 is approximately at 55 dBA—EPA's outdoor threshold linked to long-term health effects.

5.12.2 Potential Impacts

Alternative 1: No Action

Under the No Action alternative, temporary construction-related noise would not occur because there would be no federal financial assistance provided for the construction of new flood mitigation and green infrastructure. Therefore, there would be no short-term noise impacts.

In the long-term, the risk of flooding would not be reduced. Construction vehicles and heavy equipment used for flood-related repairs would temporarily increase noise levels in the immediate vicinity of their use but would comply with the requirements of the local noise ordinance. Therefore, there would be a negligible long-term impact on noise levels from periodic flood-related repair work.

Alternative 2: Proposed Action

Under the Proposed Action, construction efforts described within Section 4.3.1. would result in temporary noise associated with the use of heavy equipment and vehicles. These temporary increases to noise levels would exceed the Occupational Safety and Health Administration 8-hour permissible exposure level of 90 decibels; therefore, it would require noise abatement. **Table 5.6** provides a breakdown of the peak 8-hour construction noise level for each component of the Proposed Action, and the noise level after implementing mitigation measures. BMPs that would be implemented include use of mufflers on construction vehicles and turning off equipment when not in use. Furthermore, all construction would be conducted in compliance with the Highlands Noise Ordinance and the Township of Middletown Noise Ordinance's requirements, which include limiting construction activities to daytime hours. With these measures in place, construction of the Proposed Action would have a minor short-term impact. **Appendix C** provides the detailed breakdown of assumptions for noise calculations.

Table 5.6 Short-Term Construction Noise Levels

Project Component	Distance from Construction Activity to Nearest Receptor (feet)	8-Hour Construction Noise Level at Nearest Receptor (dBA)[1]	Daytime Unmitigated Noise Level (Construction Noise and Existing) (dBA)	Reduction from Mitigation Measure (dBA)	Daytime Mitigated Noise Level (Construction Noise + Existing) (dBA)
Monmouth Hills Basin Installation	100	83	83	3	80
Snug Harbor Pump Station	10	91	91	3	88
Valley Street Pump Station	10	91	91	3	88
North Street Pump Station	10	91	91	3	88

Note:
[1] *dBA is the logarithmic unit used to measure sound levels.*

Under the Proposed Action, operation of the pump stations could result in impacts related to noise, which would affect those near the new Snug Harbor pump station and upgraded North Street and Valley Street pump stations. The Snug Harbor pump station would house three new vertical turbine pumps, which would be enclosed underground in a wet well up to 14 feet deep. The North Street pump station upgrades would include replacing the existing old single-pump wet well with a vertical turbine duplex station. The existing pump station is fully enclosed underground, and the new wet well would reach a depth of 16 feet. The enclosed underground placement of the new and updated pumps would attenuate noise levels to be below permitted continuous and intermittent noise limits. The Snug Harbor and North Street pump stations would also include the installation of two natural gas backup generators. However, the generators would be enclosed and only be used during power outages, which would reduce and limit noise-related impacts. Improvements at the Valley Street pump station would consist of upgrading and elevating the discharge pipe, which would increase the efficiency and outflow capacity at the existing pump station. This could also increase the frequency of pumping. However, the existing pump station is fully enclosed, and the additional pumping would not significantly increase noise levels associated with operation of the pump station. Overall, noise from the operation of the pump stations under the Proposed Action would be limited through the design of the pump stations and would comply with the Highlands Noise Ordinance requirements. Therefore, there would be a minor long-term impact on noise.

5.13 Transportation

5.13.1 Existing Conditions

Route 36 is the primary evacuation route and largest road in the project vicinity. It borders the northern boundary of the Middletown Township project area. Shore Drive and Bay Avenue are the main downtown roads in the project vicinity. Project activities would occur along several roads including Central Avenue, Snug Harbor Avenue, Waterwitch Avenue, Bay Avenue, Valley Street, and North Street as shown in **Appendix A**, **Figure 3 Project Areas & Components**. As discussed in Section 2, these roads are severely flooded during storm events, as are the local roads that connect to the main roads and evacuation routes (NJDEP and USACE 2020). Highlands Ferry Terminal lies northwest of the project area and is accessed via Shore Drive.

5.13.2 Potential Impacts

Alternative 1: No Action

Under the No Action alternative, construction would not occur, and no flood mitigation measures would be implemented. There would be no construction-related traffic impacts or reroutes. Therefore, there would be no short-term impacts on transportation. In the long-term, flood risk would not be reduced. Low-lying roads in Highlands would continue to face flooding during severe storm events, restricting or completely obstructing transportation access to significant areas of the Borough. Access would be confined to the higher arterial roads, such as Bayside Drive, Linden Avenue, Route 36, and Portland Road, as local roads like Shore Drive and Bay Avenue become inundated, hindering access to evacuation routes. For example, during Hurricane Sandy and other storms, flooding limited access to and from the Borough's low-lying areas. Therefore, under the No Action alternative, flooding would prevent vehicles from accessing Route 36 as a critical evacuation route, and periodic flood-related repairs to the roads would increase traffic levels on alternate routes. Therefore, the No Action alternative would have a major long-term impact on transportation in the area.

Alternative 2: Proposed Action

Under the Proposed Action, all construction work would occur within public property. The storm sewer construction activities would generally require temporary shoulder and lane closures. The installation of the box culvert, however, would require road closures each workday, but the roadway would be reopened each night in accordance with the requirements of local ordinances. Culvert installation would take roughly 30 calendar days in the winter months. Pump station construction and upgrades would also require road closures, but alternate routes would be provided at all times for motorists and emergency vehicles. Staging areas would be provided at the end of Snug Harbor and in the Highlands Skatepark and parking lot. While there would be some additional construction traffic on the roadways surrounding the project area, these impacts would be temporary and localized, affecting only the roadways used for immediate project area access.

The Proposed Action would have a minor short-term impact on transportation in the area from detours and increased construction-related traffic.

Under the Proposed Action, the basins and green infrastructure bioswales at the foot of Monmouth Hills would lessen the downstream impacts within Highlands. By creating additional stormwater storage, the flooding of local roadways and Route 36 would be reduced, and the primary coastal evacuation route would be protected. The proposed 30-inch overflow discharge pipe, beneath Route 36, would discharge storm flows into the existing stormwater management system along Waterwitch Avenue during high-intensity rainstorms without overtopping the highway. Upon completion, the Proposed Action would have a moderate long-term benefit to transportation because roads, including evacuation routes, would be closed less frequently during storm events.

5.14 Land Use and Planning

NEPA requires an evaluation of the potential environmental effects of a project on the human environment of the project area. These considerations are incorporated into the environmental review by identifying, analyzing, and evaluating the effects a proposed project may have, either positively or negatively, on such things as the character of the area (e.g., land use patterns and compatibility, employment, demographics, and hazards and nuisances), community features (e.g., availability and capacity of services, and transportation) and resources (e.g., wildlife, vegetation, parks, and water). This section focuses on potential effects on land use and planning.

5.14.1 Existing Conditions

The project area in Highlands is zoned for single-family residential (R-2.01) and waterfront commercial (WT-C) (Highlands Borough 2018). The Monmouth Hills basin component of the Proposed Action is in a rural residential zone surrounded by forested areas and is zoned single-family residential (R-45). Within Monmouth Hills, the Kavookjian Field recreation area consists of a baseball field and soccer pitch, which are accessed from Route 36. Some of the parcels in the Monmouth project area are currently owned by the Township of Middletown. The project area that runs along Waterwitch Avenue is adjacent to several recreational land uses including Highlands Elementary School playfield and the Huddy Park of Highlands. The Snug Harbor pump station project area is in the central business district. The Snug Harbor project area is primarily surrounded by multi-dwelling residential buildings with commercial buildings concentrated along Bay Avenue. Across the canal from Snug Harbor Avenue to the west, there is recreational land designated for the Highlands Borough Community Center, which contains a skate park, basketball court, and tennis court. The Snug Harbor Avenue and Valley Street project areas also border some beaches and vegetated dunes. The Valley Street and North Street pump stations are in waterfront commercial zones. The project area along North Street is also surrounded by multi-dwelling residential land uses and commercial areas along Bay Street. Most of the project area in Highlands is within Borough-owned parcels or rights-of-way, while parcels within the Monmouth Hills project area are owned by Middletown Township.

5.14.2 Potential Impacts

Alternative 1: No Action

There would be no change to land use with the No Action alternative; therefore, there would be no impact in the short-term. In the long-term, periodic flood events would limit access to homes and businesses during periods of inundation and during efforts to remove eroded materials. Repetitive loss of access and damage to homes and businesses could limit the use of land for its intended purpose or result in the abandonment of property. Therefore, there could be a minor long-term impact on land use from periodic flooding and associated loss of access and damage to homes and businesses.

Alternative 2: Proposed Action

To implement the Monmouth Hills component of the Proposed Action, Highlands would need to complete deed transfers of specific lots at the base of Monmouth Hills, currently owned by the Township of Middletown, and intended for permanent storm drainage facilities. The lots would be deeded to Highlands, which would be responsible for conducting maintenance and operations activities in perpetuity. The deed transfer would not alter surrounding land uses and would support maintenance and operation of storm drainage facilities, as originally intended. Three lots within Monmouth Hills have a land-use category of public recreation and conservation lands and are zoned single-family residential (R-45). These lots may need to be changed as stormwater management facilities and structures are not permitted in areas zoned R-45. Because Monmouth County previously accepted funds through the NJDEP Green Acres Program, these lots are subject to Green Acres restrictions, meaning they must be used solely for recreation and conservation purposes. The land-use category for these three lots may need to be changed to allow for permits to be issued that are required for implementation of the proposed project. This would be done through NJDEP Green Acres Major Diversions, if required. Implementation of the Snug Harbor, Valley Street, and North Street pump stations would not require acquisition of land or require changes to existing land use. Implementation of the Snug Harbor component would require the use of the Highlands Skatepark and parking lot for staging and storage during construction, which would temporarily impact the recreational use of the park. Therefore, there would be minor temporary impacts on land use in the short-term.

In the long-term, the Proposed Action would reduce the risk of flooding and associated loss of access or damage to homes and businesses. Maintaining access and reducing the risk of flood damage to homes and businesses allows land to be used for its intended purposes, in alignment with the Highlands zoning. Therefore, there would be a minor to moderate long-term benefit from the reduced risk of flooding and erosion.

5.15 Public Services and Utilities

Public services and utilities generally supply goods and services that are considered essential such as water, gas, electricity, telephone, waste disposal, and other communication systems.

5.15.1 Existing Conditions

The project sites are in an urban area with utilities and public services provided via both overhead and underground infrastructure. New Jersey American Water provides water services to various areas in New Jersey, including Highlands and Monmouth Hills. The Highlands Department of Public Works is responsible for the maintenance of all public property, including roadways and sewer infrastructure, and manages the waste collection services for Highlands. The Middletown Department of Public Works is in charge of maintaining the Township roads, trees, signs, and facilities as well as waste collection for the Township. The New Jersey Highlands Council is involved in stormwater management. Jersey Central Power & Light provides electricity services, while the New Jersey Natural Gas Company provides natural gas services.

Public services (**Appendix A, Figure 13 Public Facilities)** include schools, local government, police departments, fire departments, and emergency and medical services. Public facilities include the Highlands Administrative Office, Highlands Fire Department Station, Highlands Police Department Station, Highlands First Aid Squad Station, Department of Public Works facilities, and the Highlands Elementary School and the Henry Hudson Regional High School (NJDEP and USACE 2020).

Community facilities include parks and recreational areas, hospitals, libraries, community centers, and churches. Parks include the Veterans Memorial Waterfront Park, Huddy Park, and Snug Harbor Park, which includes the Highlands Skatepark. In addition, the Highlands Borough Community Center serves as a public library. The Highlands Borough Community Center and the Veterans Memorial Waterfront Park serve as community meeting locations (NJDEP and USACE 2020).

5.15.2 Potential Impacts

Alternative 1: No Action

Under the No Action alternative, there would be no short-term construction-related impacts on public services and utilities. In the long-term, floodwaters could affect water and wastewater infrastructure and electrical facilities, resulting in short-term interruptions in utility services. Floodwater could severely damage homes, increasing the need for waste removal and emergency services. Roadways could be inundated during flood events, affecting access to community facilities or residents' ability to evacuate. In addition, public services in Highlands may be affected by flood damage and could close or relocate to a less central location outside of the floodplain,

thereby affecting the provision of services. Therefore, over the long-term, the No Action alternative would have minor impacts on utilities and public services.

Alternative 2: Proposed Action

Under the Proposed Action, there would be temporary utility conflicts during construction. Potential utility conflicts in Monmouth Hills would consist of gravity sewer laterals, gas mains, and water services. The Snug Harbor component would require water main and gas main relocations with potential sanitary sewer lateral relocations. Temporary shutoff or disruption of service of utilities would be expected during construction; however, these are typically short-term and can be mitigated through careful planning and community communication. Therefore, there would be minor short-term impacts on public services and utilities.

The Proposed Action would allow the stormwater system to withstand severe storm events and reduce flooding, which would result in reduced flood-related impacts on public services and utilities, especially in the downtown area that includes many community parks and centers, local businesses, and public services. Reduced flooding would also reduce the need for waste removal and emergency operations to respond to flood events. Therefore, the Proposed Action would have a minor to moderate long-term benefit on public services and utilities.

5.16 Public Health and Safety

Public health and safety include the exposure of the general public to conditions that would cause injury or health hazards, or that would affect the response of emergency services. This also includes worker safety, overseen by Occupational Safety and Health Administration, which has established required worker protection standards to prevent and minimize health risks. Potential hazards include toxic chemicals, excessive noise levels, mechanical dangers, failing infrastructure, or general exposure to unsafe conditions. Impacts on public health and safety may be measured by considering whether an activity would increase hazards or whether there would be a reduction in the availability of emergency services and their response times.

The adequacy of emergency health care, fire, and police services must be evaluated to determine whether the needs of residents can be met without additional infrastructure improvements.

5.16.1 Existing Conditions

The Highlands Police Department at 27 Shore Drive provides police services for the area. The Highlands Fire Department at 17-1 Shore Drive provides fire and medical services from one station. Additional emergency medical services are provided by the Highlands First Aid Squad at 32 Valley Street (**Appendix A, Figure 13 Public Facilities**). The closest hospital to the project area, Hackensack Meridian Health Riverview Medical Center, is in Red Bank.

The Highlands Office of Emergency Management is responsible for preparing for and managing any declared or other large-scale emergencies, events, or occurrences, either human-caused or natural. Their Emergency Operation Plan addresses all possible/probable emergencies that may occur (Highlands Borough 2024). Route 36 is a coastal evacuation route and serves the Highlands' downtown area (Monmouth County Sheriff's Office 2024). As discussed in Section 2.0, Route 36 has been subject to flooding and sediment buildup from storm events, resulting in periodic closures of this evacuation route.

5.16.2 Potential Impacts

Alternative 1: No Action

Under the No Action alternative, no construction would occur that would result in construction detours and traffic that could impact emergency response times. Therefore, there would be no short-term impacts on emergency access or response times affecting public health and safety.

In the long-term, under the No Action alternative, access to the low-lying downtown areas in Highlands would be blocked by floodwater runoff and silt flows from the steep grades of Monmouth Hills and Mount Mitchill during storm events. Periodic flooding would encompass most of the Borough from Veterans Memorial Waterfront Park to Snug Harbor, which may inundate public and private property and roadways (e.g., Shore Drive, Bay Avenue, and other local roads). Future flood events would pose additional risks beyond damage to property, which may cause a life and safety hazard to the community.

Many residents are dependent on the local access routes (e.g., Waterwitch Avenue, Miller Street, and Highland Avenue) in the downtown area that lead into upper arterial roadways, including Route 36, Bayside Drive, Linden Avenue, and Portland Road. During a high tide storm surge or other flood event, the roads in the downtown area are subject to flooding, thereby limiting or blocking transportation access to the higher elevation arterials. Flooding and recovery-related construction, following storm events, would result in detours or lane closures that could also reduce emergency response times and inhibit people's ability to evacuate. Emergency response services would potentially be cut off until floodwaters recede. Therefore, the No Action alternative would have a moderate impact on public health and safety from periodic flooding over the long term.

Alternative 2: Proposed Action

Under the Proposed Action, there would be construction traffic, lane and shoulder closures, and detours that could temporarily increase emergency response times. BMPs to reduce construction impacts on transportation access include the development of a traffic management plan and a construction access management plan that outline traffic control measures. Therefore, there would be a negligible short-term impact on emergency services.

The installation of basins and green infrastructure would enhance stormwater management, reducing flooding and erosion, which would benefit public safety and infrastructure longevity. As discussed in Section 2.0, the Proposed Action would reduce and store enough stormwater upstream of Route 36 to substantially reduce sediment buildup along Route 36 and down Waterwitch Avenue, into Bay Avenue and the Huddy Park Canal, and reduce the flooding across the low point on Route 36 and on local roads. Critical services, such as fire, police, and first responders, would experience improved accessibility and emergency response times during storm events compared to existing conditions as the intensity and frequency of roadway flooding would be reduced. The implementation of stormwater management measures would support the community's ability to withstand and recover from extreme weather events. By enhancing the reliability of a primary evacuation route and reducing flooding, the Proposed Action would reduce property damage and loss of life from future storms and flood events. Therefore, there would be moderate long-term benefits from the reduced flooding and associated public health and safety concerns.

5.17 Hazardous Materials

Hazardous materials are those substances defined by the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act, and the Toxic Substances Control Act. The Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, which was further amended by the Hazardous and Solid Waste Amendments, defines hazardous waste. In general, both hazardous materials and waste include substances that, because of their quantity, concentration, physical, chemical, or infectious characteristics, may present substantial danger to public health or to the environment when released or otherwise improperly managed.

5.17.1 Existing Conditions

Hazardous materials encounters may result from project generated activities or chance finds. To determine whether any hazardous waste facilities exist near or upgradient of the proposed project area, or whether there is a known and documented environmental issue or concern that could affect the proposed project area, a search for Superfund sites, toxic release inventory sites, industrial water dischargers, hazardous facilities or sites, and multiactivity sites, was conducted using EPA's NEPAssist tool (EPA 2024a). According to the database, 11 water dischargers, six hazardous waste facilities, and one air pollution discharger are present within a 0.5-mile radius of the project area (**Appendix A, Figure 14 Hazardous Materials**). Although none of the sites are within project area boundaries, two sites, a water discharger and air pollution discharger, are adjacent to the south end of the North Street project component.

5.17.2 Potential Impacts

Alternative 1: No Action

Under the No Action alternative, there would be no construction of flood reduction measures that could expose contaminated materials through ground-disturbing activities. Therefore, there would be no short-term impact from hazardous materials.

In the long-term, flood and slope erosion risk would not be reduced. Floodwaters would continue to affect sites as they have in the past, and owners would continue existing remediation and/or protective measures. Therefore, a minor long-term impact on hazardous materials and existing hazardous material sites is anticipated.

Alternative 2: Proposed Action

Since none of the identified hazardous materials sites are within the project boundaries, the Proposed Action is not expected to directly affect these sites during construction. However, excavation activities could expose or otherwise affect previously undetected subsurface hazardous materials or wastes, or those that have spread from nearby sites. Therefore, there would be negligible short-term impacts from potential exposure to previously unknown hazardous materials.

In the long-term, the Proposed Action would reduce the risk of flooding in the project areas, and the risk of flood-associated damage to facilities that generate or process hazardous waste near the project area. Therefore, the Proposed Action would result in a negligible long-term benefit related to hazardous materials.

5.18 Other Considerations

After identifying the reasonably foreseeable environmental effects of the Proposed Action in the preceding subsections of Section 5, the next step is to identify any reasonably foreseeable environmental effects which cannot be avoided should the Proposed Action be implemented. This EA considers the impacts of reasonably foreseeable actions that are related in terms of time or proximity, which are within FEMA's authority. In addition, the CWA, CAA, Section 106 of the NHPA, and Section 7 of the ESA require a similar evaluation of effects because the alternatives apply to their respective resources.

5.18.1 Reasonably Foreseeable Future Actions

There is one potential project in the vicinity of the project area: the New Jersey Department of Transportation (NJDOT) project to resurface the pavement between Clifton Avenue/James Street to Mountainview Avenue (Long Branch, Monmouth Beach, Sea Bright) along Route 36. The project would also include replacement of pavement markings and signage for bike lanes. Project construction is anticipated to start in 2026 (NJDOT 2025).

5.19 Reasonably Foreseeable Effects Analysis

The Proposed Action would reduce flood risk in Highlands and Monmouth Hills and incorporate green infrastructure opportunities. No substantial combined short-term construction effects are anticipated because the timing and location of the resurfacing project are not expected to overlap with construction of the Proposed Action. Therefore, there is little potential for short-term impacts related to construction.

As discussed in **Chapter 5.0**, the Proposed Action would result in negligible to moderate long-term benefits for several resources, including soils, surface waters and water quality, floodplains, coastal resources, transportation, land use, public services and utilities, and public health and safety. Long-term impacts on air quality and noise would be minor.

Mobility projects would improve transportation and safety along Route 36 within Monmouth County and would thus be expected to result in minor long-term benefits related to transportation and public health and safety. Because the Proposed Action would also benefit these resources in the long-term, the resurfacing project and the Proposed Action, when combined, would result in long-term benefits on transportation and public health and safety.

6.0 PERMITS AND PROJECT CONDITIONS

Any substantive change to the approved scope of work will require reevaluation by FEMA for compliance with NEPA and other laws and EOs. The Subrecipient must adhere to the following FEMA grant project conditions:

- Coordinate with USACE to determine whether a Section 404 permit or other authorization is required and comply with all applicable permit conditions. Although New Jersey State has formally assumed the Section 404 permitting programs for waters within its geographic boundaries, USACE retains authority to implement the program for tidal waters and adjacent wetlands and other waters affected by interstate and foreign commerce. Because the Shrewsbury River is tidally influenced and flows into Sandy Hook Bay, the Subrecipient must coordinate with USACE to determine the required permit authorization and follow all conditions in this permit.
- ESA Section 7 Conditions:
    - Removal, cutting, or trimming of trees of any diameter may only occur from August 1 through May 14, outside the TCB pup season in New Jersey.
    - The Subrecipient must immediately report to FEMA and the USFWS New Jersey Field Office any changes to the proposed scope of work, the results of any surveys conducted, the presence of any colonies of bats of any species, or the presence of any dead, injured, or sick bats of any species that are found during the undertaking.

  - If the preceding conditions cannot be followed, the Subrecipient, or the Subrecipient's contractor(s), shall contact the USFWS New Jersey Field Office at (609) 646-9310 prior to the start of construction. Documentation of this coordination must be submitted to FEMA.

- NHPA Section 106 Conditions:

  - To the greatest extent feasible, all existing peanut stone-clad roadside drainage ditches and the slate sidewalk stone must not be disturbed during project implementation unless absolutely necessary. If removal/disturbance is deemed necessary, these features shall be carefully removed and preserved prior to excavation/installation and must be reinstalled in their original location or replaced with in-kind/compatible material if replacement is deemed infeasible.
  - Native plants shall be planted in all areas, where possible, where land has been disturbed to install stormwater management facilities to minimize visual effects to the historic district.

Additionally, the Subrecipient is responsible for obtaining all applicable federal, state, and local permits and other authorizations for project implementation prior to construction and for adherence to all permit conditions. Permits and authorizations may include, but are not limited to, the following requirements:

- Complete state and local environmental and land-use reviews in accordance with state and local regulations.
- Use appropriate construction BMPs, including, but not limited to, sedimentation and erosion control measures, dust control, and noise abatement.
- Coordinate with NJDEP on the requirement for a NPDES General Construction Stormwater Permit and comply with all permit conditions, as applicable.
- Coordinate with NJDEP on the requirement for a NPDES Discharge to Ground Water Permit and comply with all permit conditions, as applicable.
- Comply with all permitting requirements within the NJDEP Flood Hazard Area Permit.
- Coordinate with the local floodplain administrator to obtain any permits required to conduct activities within the floodplain.
- Coordinate with NJDEP on the requirement for coastal permits for projects within the coastal zone, CAFRA zone, and tidally influenced waters.
- Obtain any identified permits through NJDEP Green Acres Major Diversions for Highlands and Monmouth Hills, if required. The current land-use category designation of public recreation and conservation lands for three lots may need to be changed to allow for permits to be issued that are required for the implementation of the proposed project.

6.1 Agency Coordination

This section summarizes the agency coordination efforts for the proposed flood mitigation and green infrastructure project. FEMA consulted with USFWS, NJHPO, and Tribal Nations. Details of agency coordination can be found in Section 5.9 for ESA Section 7 review and Section 5.11 for NHPA Section 106 review.

Appendix E provides copies of agency correspondence.

6.2 Public Participation

In accordance with FEMA's NEPA procedures, FEMA is releasing this draft EA to the public and resource agencies for a 30-day public review and comment period. Comments on this draft EA will be incorporated into the final EA, as appropriate. This draft EA reflects the evaluation and assessment of the federal government, the decision-maker for the federal action; however, FEMA will consider any substantive comments received during the public review period to inform the final decision regarding grant approval and project implementation. If no substantive comments are received from the public or agency reviewers, this draft EA will be assumed to be final, and a FONSI will be issued by FEMA.

The EA is available for public comment for 30 days from the latest posting date on the following webpage(s): Borough of Highlands Legal Notices (https://highlandsnj.gov/legal-notices/) and FEMA's NEPA Repository (https://www.fema.gov/emergency-managers/practitioners/environmental-historic/nepa-repository). Comments on the draft EA may be submitted to FEMAR2COMMENT@fema.dhs.gov (include "Highlands & Monmouth Flood Mitigation Project" in the subject line). Hard copies of the draft EA will be made available at the Borough of Highlands Municipal Office, 151 Navesink Ave, Highlands, NJ 07732. Comments also may be submitted via mail to:

Federal Emergency Management Agency Region 2
Environmental Planning and Historic Preservation
26 Federal Plaza, Suite 1802
New York, NY 10278
Attn: Highlands & Monmouth Flood Mitigation Project EA Comments

7.0 LIST OF PREPARERS

The following is a list of preparers who contributed to the development of the Highlands and Monmouth Hills Flood Mitigation and Green Infrastructure Project EA for FEMA. The individuals listed below had principal roles in the preparation of this document.

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CDM Smith prepared this document under Contract No. 70FA6023A00000006, Task Order 70FA6024F00000046.

8.0 SUMMARY OF IMPACTS

Table 8.1 Summary of Impacts and Mitigation

Resource	No Action	Proposed Action Impacts	BMPs / Mitigation
Geology, Topography, Soils	No short-term impact. No long-term impact on geology; moderate long-term impact on topography and soils.	Negligible short-term impact on geology and minor short-term impact on topography and soils. No long-term impact on geology; moderate long-term beneficial impact on topography and soils.	• Implement sediment controls prior to conducting land-disturbing activities and maintain them throughout construction. • Development of a Soil Erosion and Sediment Control Plan in accordance with the New Jersey Soil Erosion and Sediment Control Act and NPDES General Construction Stormwater Permit.
Air Quality	No short-term impact; negligible long-term impact.	Minor short-term impact; minor long-term impact.	• Apply water or use stabilization measures on areas of bare soil to minimize fugitive dust or wind-blown soil. • Cover dump trucks carrying materials that could become airborne. • Operation of construction equipment would follow EPA's Construction Emission Control Checklist (**Appendix C**).
Surface Waters and Water Quality	No short-term impact; moderate long-term impact.	Negligible to minor short-term impact; minor long-term beneficial impact.	• Coordinate with USACE to determine required authorization and comply with all applicable USACE, NJDEP, and local permit conditions. • Prepare and comply with specifications of a stormwater pollution prevention plan. • Dewater any groundwater encountered during construction. Treat dewatering discharge using sediment-control BMPs.
Wetlands	No short-term impact; negligible long-term impact.	Minor short-term impact; negligible long-term beneficial impact.	• Comply with USACE and NJDEP permit conditions as required.
Floodplains	No short-term impact; moderate long-term impact.	Negligible short-term impact; moderate long-term beneficial impact.	• Comply with Flood Hazard Area Permit and Highlands Floodplain Management Regulations, including coordinating with local floodplain administrator.

Resource	No Action	Proposed Action Impacts	BMPs / Mitigation
Coastal Resources	No short-term impact; minor long-term impact.	Negligible to minor short-term impact; moderate long-term beneficial impact.	• Obtain and comply with any coastal permits required for projects within the coastal zone and CAFRA zone.
Vegetation	No short-term impact; negligible to minor long-term impact.	Minor short-term impact from the removal of approximately 1.76 acres of vegetation and 23 trees with a diameter of 18 inches or larger. Negligible long-term impact as a result of revegetation with native plants and the reduction of flooding impacts on those plants.	• Revegetate disturbed areas with native plant species in accordance with the project planting plan developed by a licensed landscape architect.
Wildlife / Migratory Birds / Bald and Golden Eagles	No short-term impact; negligible long-term impact.	Minor short-term impact; negligible long-term beneficial impact on wildlife and habitat.	• Implement applicable construction BMPs and permit conditions to minimize effects on wildlife and their habitats. • Revegetate disturbed areas with native plant species in accordance with the project planting plan developed by a licensed landscape architect.

Resource	No Action	Proposed Action Impacts	BMPs / Mitigation
Threatened and Endangered Species and Critical Habitat	No short-term impact; negligible long-term impact	Minor short-term impact; No long-term impact on ESA-listed species. No Effect for Piping Plover, Roseate Tern, Rufa Red Knot, and Seabeach Amaranth; Not Likely to Adversely Affect TCB with conditions under Section 7 of the ESA.	• Removal, cutting, or trimming of trees of any diameter may only occur between August 1 through May 14, outside the TCB pup season in New Jersey. • The Subrecipient must immediately report to FEMA and the USFWS New Jersey Field Office any changes to the proposed scope of work, the results of any surveys conducted, the presence of any colonies of bats of any species, or the presence of any dead, injured, or sick bats of any species that are found during the undertaking. • If the preceding conditions for avoidance and minimization of impacts on bats cannot be followed, the Subrecipient, or the Subrecipient's contractor(s), shall contact the USFWS New Jersey Field Office at (609) 646-9310 prior to the start of construction. Documentation of this coordination must be submitted to FEMA.
Essential Fish Habitat	No short-term impact; minor long-term impact	Minor short-term impact; minor long-term beneficial impact on EFH.	• Coordinate with NOAA, USACE, and NJDEP as applicable and comply with permit conditions and conservation measures to avoid or minimize adverse effects on EFH.
Cultural Resources	No short-term impact; minor to moderate long-term impact on historic properties and contributing landscape features.	Minor short-term impact on historic properties during construction; moderate long-term beneficial impact. No adverse effect with conditions under Section 106 of the NHPA.	• To the greatest extent feasible, all existing peanut stone-clad roadside drainage ditches and the slate sidewalk stone must not be disturbed during project implementation unless absolutely necessary. If removal/disturbance is deemed necessary, these features shall be carefully removed and preserved prior to excavation/installation and must be reinstalled in their original location or replaced with in-kind/compatible material if replacement is deemed infeasible. • Native plants shall be planted in all areas, where possible, where land has been disturbed to install stormwater management facilities to minimize visual effects to the historic district.

Resource	No Action	Proposed Action Impacts	BMPs / Mitigation
Noise	No short-term impact; negligible long-term impact.	Minor short-term impact; minor long-term impact.	• Noise-producing equipment use would occur during daytime hours (7 a.m. to 8 p.m. weekdays; 9 a.m. to 6 p.m. weekends). • Operation of construction equipment would follow EPA's Construction Emission Control Checklist (**Appendix C**).
Transportation	No short-term impact; major long-term impact.	Minor short-term impact; moderate long-term beneficial impact.	• Develop and implement traffic management plan that outlines detours, lane closures, and traffic control measures. • Schedule construction during off-peak hours.
Land Use and Planning	No short-term impact; minor long-term impact.	Minor short-term impact; minor to moderate long-term beneficial impact.	Not applicable.
Public Services and Utilities	No short-term impact; minor long-term impact.	Minor short-term impact; minor to moderate long-term beneficial impact.	• There would be careful planning and communication with the community on utility disruptions.
Public Health and Safety	No short-term impact; moderate long-term impact.	Negligible short-term impact; moderate long-term beneficial impact.	Not applicable.
Hazardous Materials	No short-term impact; minor long-term impact.	Negligible short-term impact; negligible long-term beneficial impact.	• Develop and implement spill prevention, control, and countermeasures plan to address inadvertent releases. • Maintain spill containment and clean-up materials on-site. • Perform regular inspections and maintenance of construction equipment and vehicles.

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Appendix A – Figures

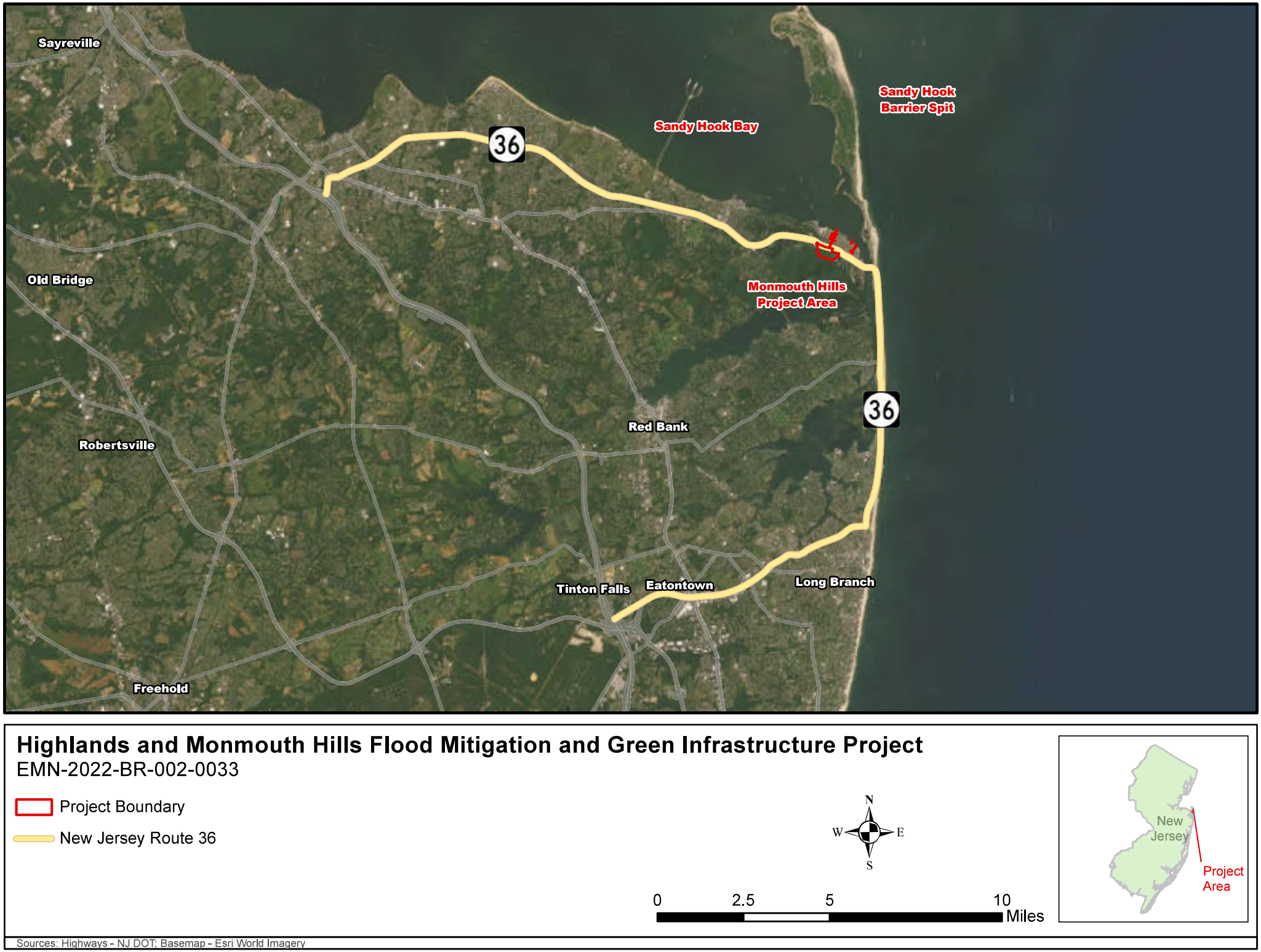


Figure 1. Project Location



Highlands and Monmouth Hills Flood Mitigation and Green Infrastructure Project

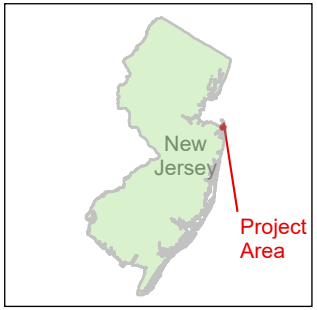
EMN-2022-BR-002-0033

Project Boundary

20 ft Elevation Contours

N
W E
S

0 0.13 0.25 0.5 Miles



Sources: Elevation Contours - USGS 2025; Basemap - Esri World Imagery

Figure 2. Topographical Map

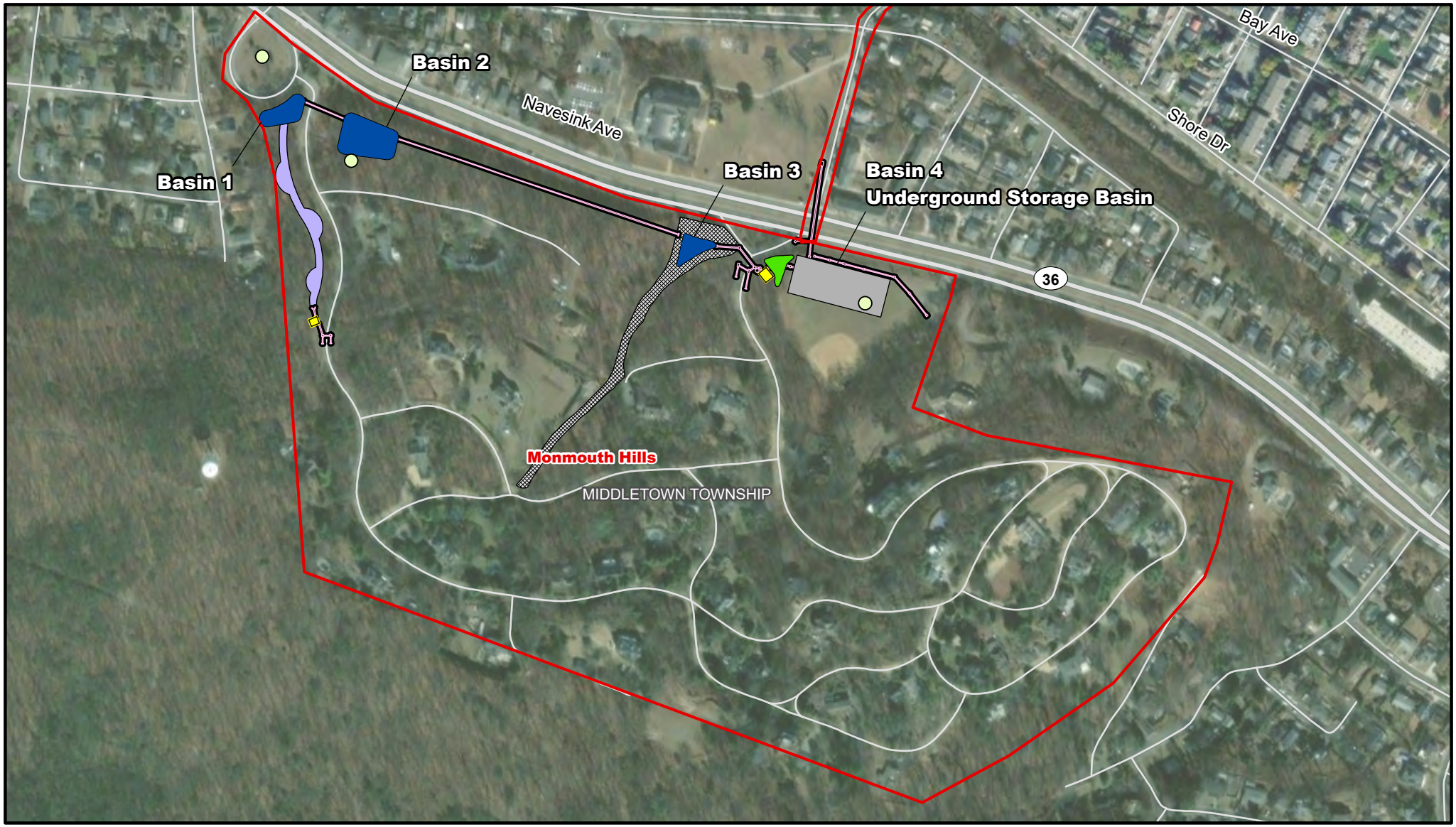


Highlands and Monmouth Hills Flood Mitigation and Green Infrastructure Project

EMN-2022-BR-002-0033

Sources: Roads - Monmouth County Division of Planning 2008; Basemap - Esri World Imagery

Figure 3. Project Areas & Components



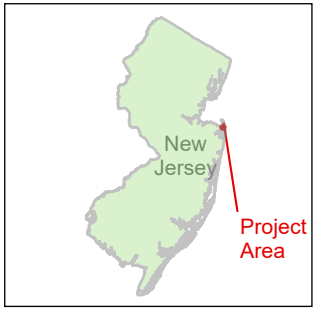
Highlands and Monmouth Hills Flood Mitigation and Green Infrastructure Project

EMN-2022-BR-002-0033

- Project Boundary
- Staging Area Location
- Basin
- Stilling Basin
- Underground Storage Basin
- Bio Swale Flow Bed
- Flexamat-Lined Flume
- Green Infrastructure & Stone Channel
- Pipes and Inlets

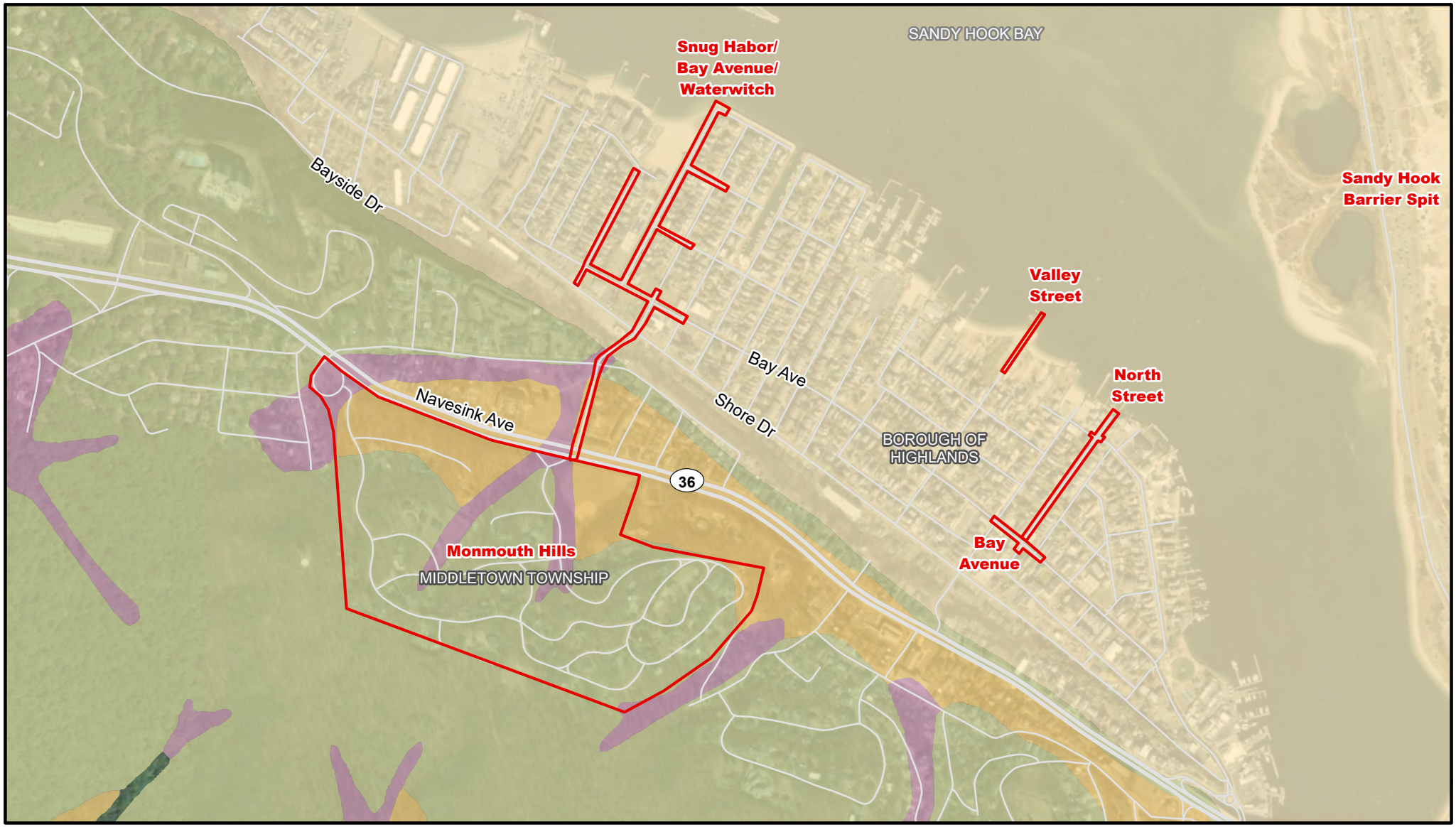
N W E S

0 0.13 0.25 Miles



Sources: Roads - Monmouth County Division of Planning 2008; Basemap - Esri World Imagery

Figure 4. Monmouth Hills



Highlands and Monmouth Hills Flood Mitigation and Green Infrastructure Project

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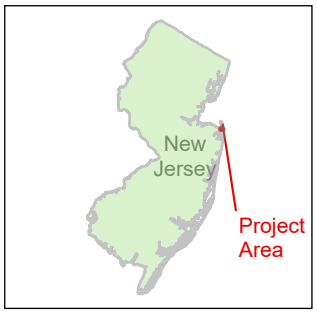
Project Boundary

Surficial Geology

Qbs	Beach and Near Shore Marine Sand (Holocene)
Qcal	Colluvium and Alluvium (Holocene and late Pleistocene)
Qcl	Lower Colluvium (late Pleistocene)
Qwcp	Weathered Coastal Plain Formations

N
W E
S

0 0.13 0.25 0.5 Miles



Sources: Surficial Geology - NJDEP/NJGS 2010; Basemap - Esri World Imagery

Figure 5. Surficial Geology



Highlands and Monmouth Hills Flood Mitigation and Green Infrastructure Project

EMN-2022-BR-002-0033

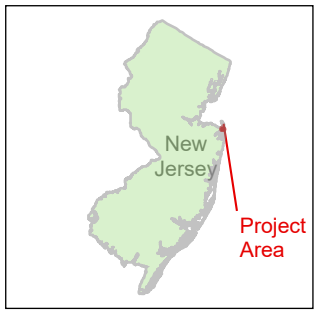
Project Boundary

Soil Types

- AptAv
- HorBr
- PHG
- PhbC
- PhbE
- USKLEA

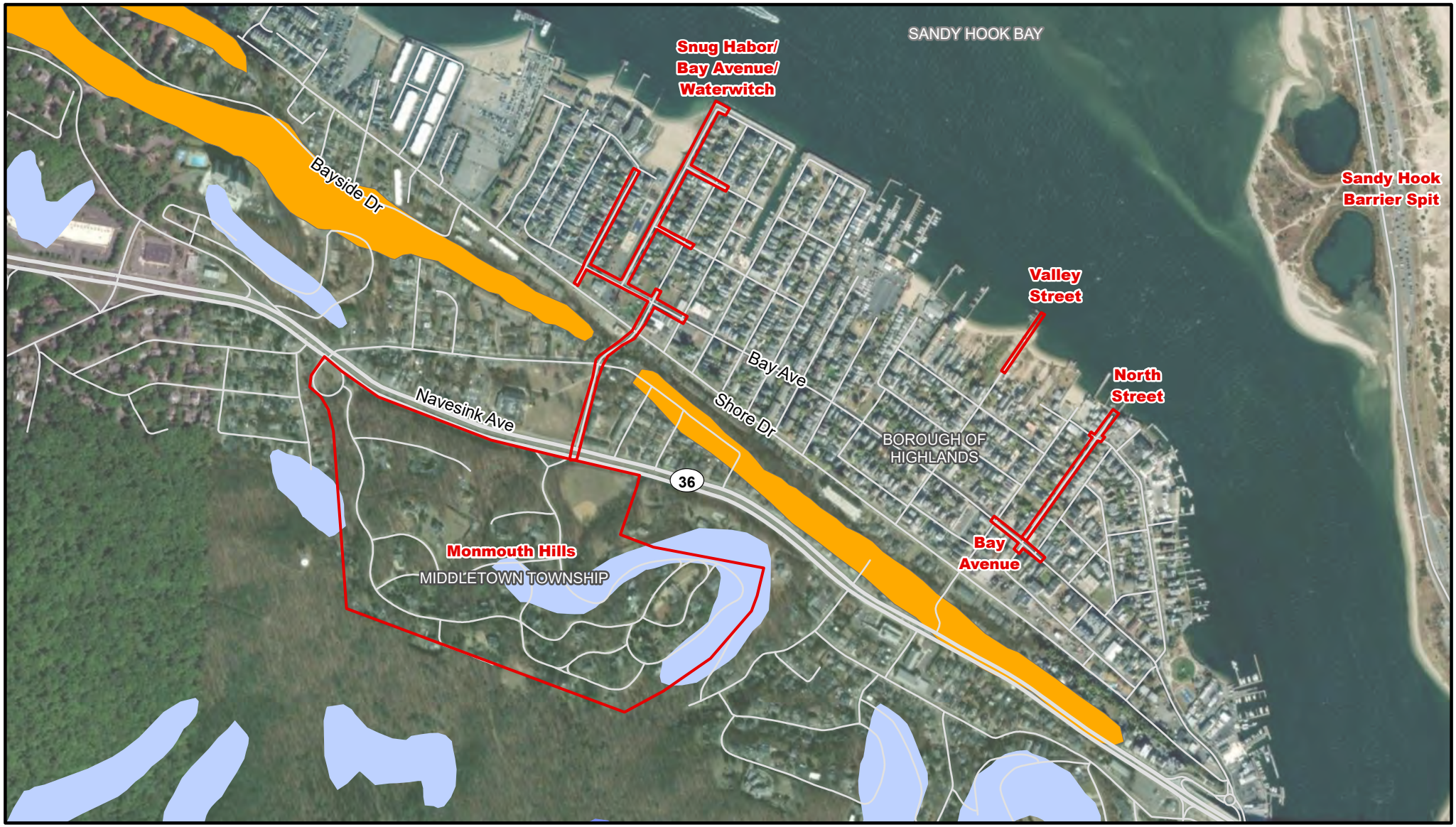
N
W E
S

0 0.13 0.25 0.5 Miles



Sources: Soils - USDA NRCS Web Soil Survey 2024; Basemap - Esri World Imagery

Figure 6. Soils



Highlands and Monmouth Hills Flood Mitigation and Green Infrastructure Project

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Project Boundary

Weakly Cemented Rock/Sandy Soil

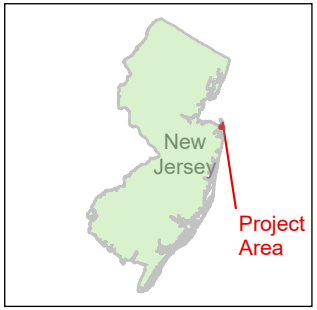
Slope angle 10-15 degrees

Shales and Clayey Soil

Slope angle >15 degrees

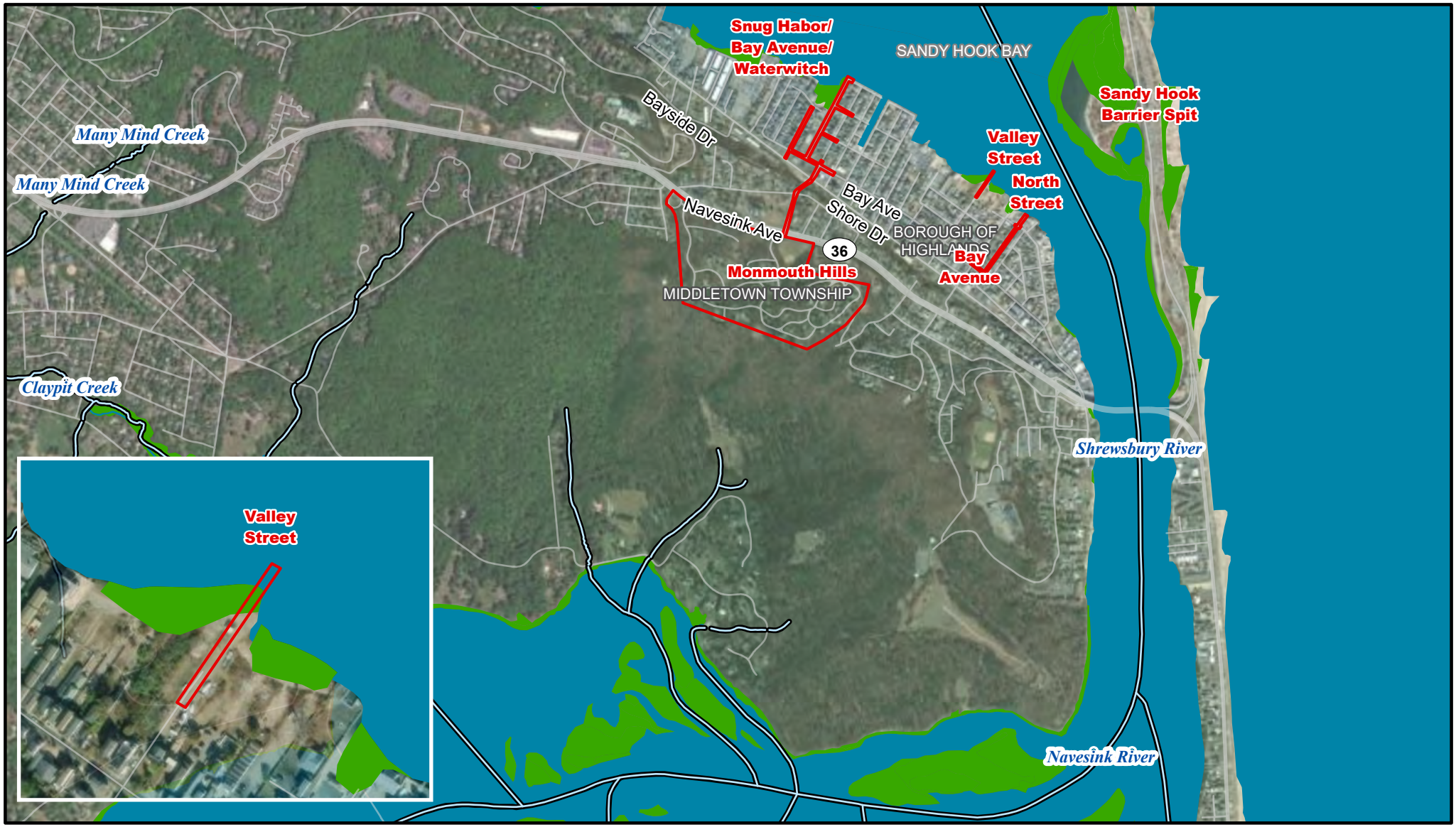
N
W E
S

0 0.13 0.25 0.5 Miles



Sources: Landslides - NJDEP/NJGWS 2016; Basemap - Esri World Imagery

Figure 7. Slope Stability

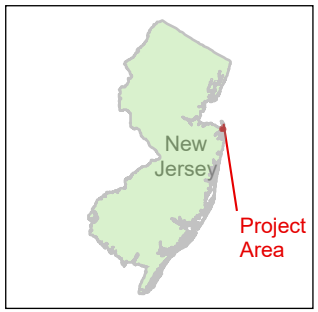


Highlands and Monmouth Hills Flood Mitigation and Green Infrastructure Project
EMN-2022-BR-002-0033

National Hydrography Dataset Flowline
Project Boundary
Surface Water
Wetlands

N
W E
S

0 0.25 0.5 1 Miles



Sources: Wetlands - USFWS NWI 2023; Basemap - Esri World Imagery

Figure 8. Surface Waters



Highlands and Monmouth Hills Flood Mitigation and Green Infrastructure Project

EMN-2022-BR-002-0033

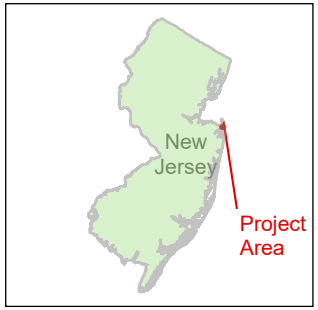
Project Boundary

Flood Zones

- Zone AE
- Zone D
- Zone VE
- Zone X, 500-year Flood
- Zone X, outside 500-year Flood

N
W E
S

0 0.13 0.25 0.5 Miles



Sources: Flood Zones - Nation Flood Hazard Layer (FEMA 2023); Basemap - Esri World Imagery

Figure 9. Flood Zones

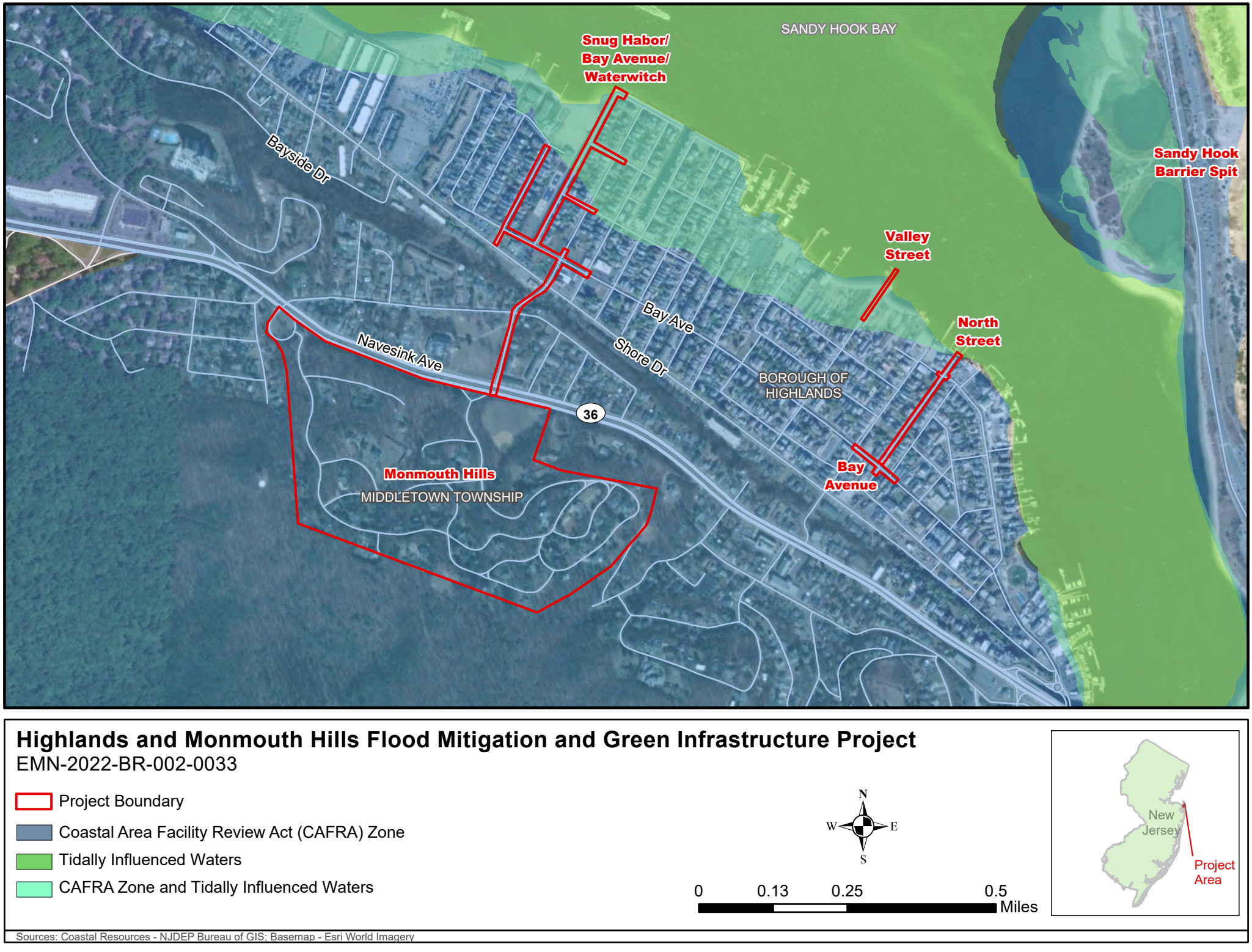


Figure 10. Coastal Resources



Highlands and Monmouth Hills Flood Mitigation and Green Infrastructure Project

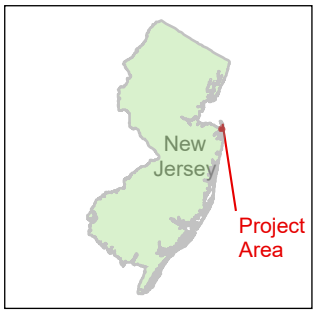
EMN-2022-BR-002-0033

Project Boundary

Endangered Species Act Action Area

N
W E
S

0 0.13 0.25 0.5 Miles



Sources: Roads - Monmouth County Division of Planning 2008; Basemap - Esri World Imagery

Figure 11. Endangered Species Action Area



Highlands and Monmouth Hills Flood Mitigation and Green Infrastructure Project

EMN-2022-BR-002-0033

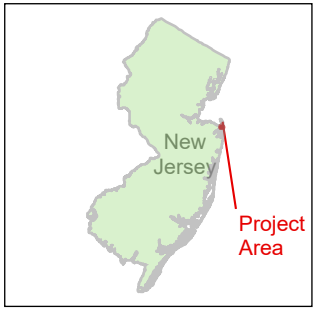
Project Boundary

Water Witch Club Casino

Water Witch Club Historic District

N
W E
S

0 0.13 0.25 0.5 Miles



Sources: Cultural Resources - Stutts, 2014; Basemap - Esri World Imagery

Figure 12. Cultural Resources

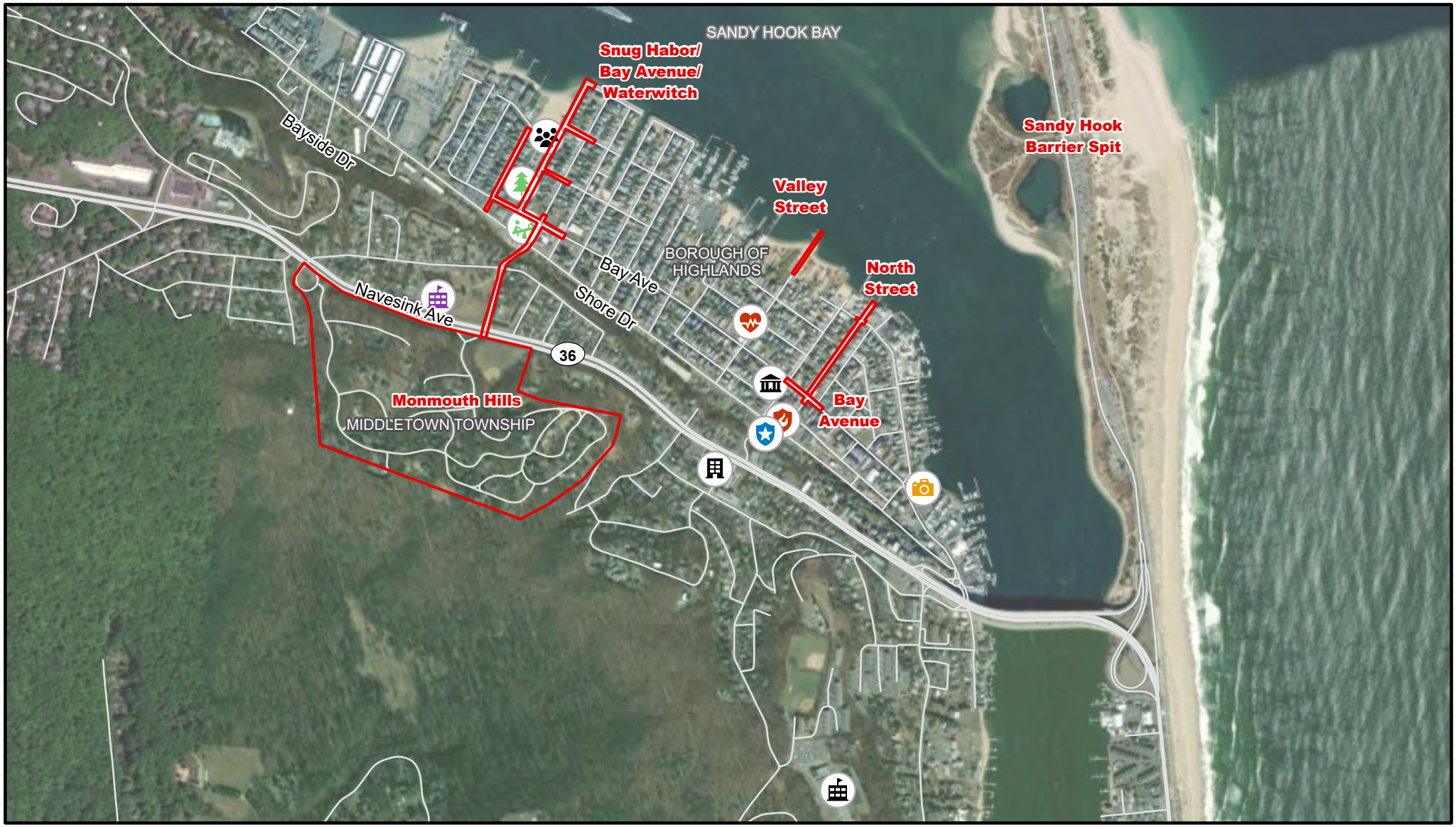


Figure 13. Public Facilities



Highlands and Monmouth Hills Flood Mitigation and Green Infrastructure Project

EMN-2022-BR-002-0033

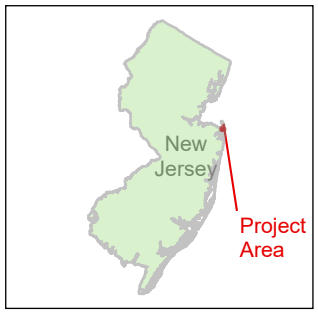
Project Boundary

EPA Facilities

- Air Pollution (ICIS-AIR)
- Water Dischargers (NPDES)
- Hazardous Waste (RCRA)

N
W E
S

0 0.13 0.25 0.5 0.75 Miles



Sources: EPA Facilities - EPA's Envirofacts; Basemap - Esri World Imagery

Figure 14. Hazardous Materials

Appendix B – Design Plans

STORMWATER REMEDIATION PLANS

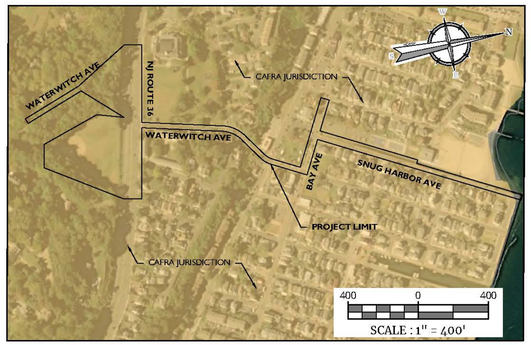
FOR

HIGHLANDS & MONMOUTH HILLS FLOOD MITIGATION PROJECT

BOROUGH OF HIGHLANDS & MIDDLETOWN TOWNSHIP

MONMOUTH COUNTY, NEW JERSEY

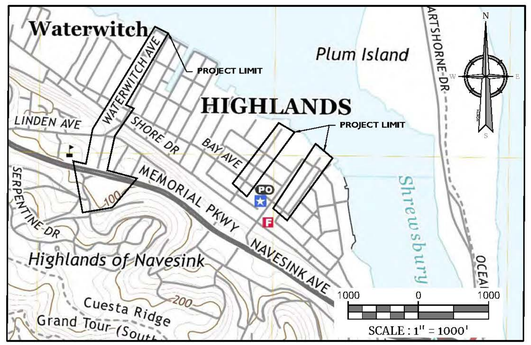
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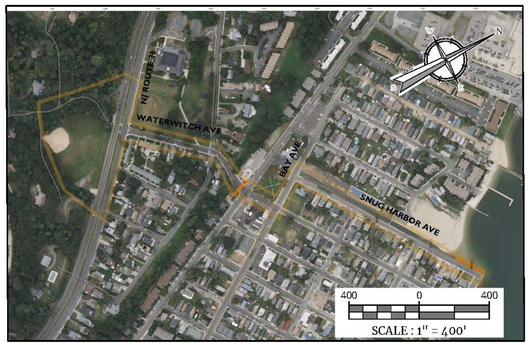
CAFRA MAP

CHESTER TOWNSHIP UTILITIES	
TELEPHONE	VERIZON COMMUNICATIONS 657 FLORIDA GROVE RD, HOPELAWN, NJ 08861 THOMAS H. YOUNG - SENIOR MANAGER (732) 683-5174 - thomas.h.young@verizon.com
CABLE	COMCAST 800 RAHWAY AVE, UNION, NJ 07083 JIM FAULKNER (201) 954-7470 - jim_faulknner@cable.comcast.com
GAS	NEW JERSEY NATURAL GAS 1415 WYCKOFF RD, PO BOX 1464, WALL, NJ 07719 MARC PANACCIONE, DIRECTOR-ENGINEERING (732) 919-8140 - mpanaccione@njng.com
ELECTRIC	JERSEY CENTRAL POWER & LIGHT OF NEW JERSEY 101 CRAWFORD'S CORNER RD, BLDG I, 5TH FL, SUITE 1-511, HOLMDEL, NJ 07733 HARVEY LOCKLEY, SENIOR PROJECT MANAGER (330) 245-5635 - hlockley@firstenergycorp.com
WATER	NEW JERSEY AMERICAN WATER COMPANY, INC. ONE WATER STREET, CAMDEN, NJ 08102 MELISSA A. HAZELTON, ENGINEERING SPECIALIST (856) 955-4403 - melissa.hazelton@amwater.com
WATER & SANITARY	BOROUGH OF ATLANTIC HIGHLANDS- WATER & SEWER DEPARTMENT 100 FIRST AVENUE, ATLANTIC HIGHLANDS, NJ 07716 JIM PHILLIPS, DPW SUPERVISOR (732) 291-0027 - jphillips@ahnj.com
SANITARY	TOWNSHIP OF MIDDLETOWN SEWERAGE AUTHORITY 100 BEVERLY WAY, BELFORD NJ JONATHAN MANNARINO, SUPERINTENDENT (732) 495-1010 - jmannarino@tomsanj.com
BAYSHORE OUTFALL AUTHORITY	MONMOUTH COUNTY BAYSHORE OUTFALL AUTHORITY P.O. BOX 184, BELFORD, NJ 07718 EDWARD TUBERION, OPERATIONS MANAGER (732) 495-2100 - etuberionjr@mcboanj.com

INDEX OF SHEETS	
SHT. No.	DESCRIPTION
1	COVER SHEET
2	GENERAL NOTES TYPICAL SECTIONS & LEGEND
3	MONMOUTH HILLS DRAINAGE PLAN
4	MONMOUTH HILLS DRAINAGE PLAN
5	MONMOUTH HILLS DRAINAGE PLAN
6	MONMOUTH HILLS DRAINAGE PLAN
7	MONMOUTH HILLS DRAINAGE PLAM
8	MONMOUTH HILLS DRAINAGE PLAN
9	VALLEY DRIVE FLUME PROFILE
10	MONMOUTH HILLS DRAINAGE PLAN
11	WATERWITCH AVE PROFILE
12	SNUG HARBOR PLAN
13	SNUG HARBOR PUMP STATION PLAN
14	NJDOT UTILITY CROSSING PLAN
15	VALLEY STREET PUMP STATION
16	NORTH STREET DRAINAGE PLAN
17	NORTH STREET DRAINAGE PLAN
18	NORTH STREET PUMP STATION PLAN



USGS QUADRANGLE MAP



SOIL MAP

THE CONTRACTOR IS NOTIFIED THAT ALL PROVISIONS OF THE HIGH-VOLTAGE PROXIMITY ACT, P.L.1948, c.249 AS AMENDED THROUGH MAY 20, 1987 SHALL BE STRICTLY ADHERED TO. THE CONTRACTOR SHALL ALSO ADHERE TO ALL PROVISIONS OF PART 1926.550, SUBPART "N" OF THE FEDERAL OCCUPATIONAL SAFETY AND HEALTH ACT OF DECEMBER, 1970. PARTICULAR ATTENTION IS DIRECTED TO THE PROVISIONS OF THE ABOVE ACT REQUIRING WARNING SIGNS, NOTIFICATION TO POWER COMPANY AND RESPONSIBILITY FOR SAFEGUARDS AND ALSO PROHIBITED ACTIVITY.

A COPY OF THE HIGH-VOLTAGE PROXIMITY ACT IS AVAILABLE IN THE OFFICE OF THE COUNTY ENGINEER OR MAY BE OBTAINED FROM THE NEW JERSEY DEPARTMENT OF LABOR, DIVISION OF WORKPLACE STANDARDS, OFFICE OF SAFETY COMPLIANCE, CN386, TRENTON, NEW JERSEY 08625-0386.

STANDARD ROADWAY CONSTRUCTION/TRAFFIC CONTROL/BRIDGE CONSTRUCTION DETAILS BOOKLET (2019) AND STANDARD ELECTRICAL DETAILS BOOKLET (2007) ARE APPLICABLE TO THIS PROJECT EXCEPT FOR THOSE DETAILS CONTAINED HEREIN.

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

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REV	DATE	DRAWN BY	DESCRIPTION
1	10/25/23	MC	REVISIONS TO SNUG HARBOR PLAN AND MONMOUTH HILLS BASIN CONFIGURATION

Theodore Wilkinson
NEW JERSEY LICENSED PROFESSIONAL ENGINEER
LICENSE NUMBER: GE39607
COLLIERS ENGINEERING & DESIGN, INC.
N.J. C.O.A. #: 24GA27986500

STORM WATER REMEDIATION PLAN

FOR

HIGHLANDS & MONMOUTH HILLS FLOOD MITIGATION PROJECT

BOROUGH OF HIGHLANDS
MONMOUTH COUNTY
NEW JERSEY

Colliers Engineering & Design
MT. LAUREL
2000 Midlantic Drive, Suite 100
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Phone: 856.797.0412
COLLIERS ENGINEERING & DESIGN, INC. DOING BUSINESS AS MASER CONSULTING

SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	11/18/2022	RNR/CT	TW

PROJECT NUMBER: 22009818G
DRAWING NAME: C-COVER

SHEET TITLE: COVER SHEET

SHEET NUMBER: 1 of 18

U:\Active_23813\C-CVER.dwg|C-01 COVER By: MAGLANA.CENTRO

NOTES:

1. EXISTING UTILITY INFORMATION SHOWN HEREON HAS BEEN COLLECTED FROM THE BEST INFORMATION AVAILABLE INCLUDING A FIELD SURVEY OF UTILITY MARKOUT. HOWEVER, NO GUARANTEE AS TO ITS ACCURACY OR COMPLETENESS IS MADE. THE CONTRACTOR SHALL CALL 1-800-272-1000 FOR A UTILITY MARK OUT PRIOR TO START OF CONSTRUCTION WORK. THE CONTRACTOR SHALL VERIFY ALL INFORMATION TO HIS SATISFACTION PRIOR TO EXCAVATION.
2. THE CONTRACTOR SHALL NOTIFY ALL UTILITIES BEFORE CONSTRUCTION BEGINS AND SHALL REQUEST A UTILITY MARK OUT.
3. ALL MATERIALS, WORKMANSHIP, AND CONSTRUCTION FOR SITE IMPROVEMENTS SHOWN HEREON SHALL BE IN ACCORDANCE WITH:

   A. N.J. DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION", AS CURRENTLY AMENDED.
   B. CURRENT, PREVAILING MUNICIPAL AND/OR COUNTY SPECIFICATIONS, STANDARDS AND REQUIREMENTS.
   C. CURRENT, PREVAILING UTILITY COMPANY/AUTHORITY SPECIFICATIONS, STANDARDS AND REQUIREMENTS.

4. THE CONTRACTOR SHALL NOTIFY THE UNDERSIGNED PROFESSIONAL IMMEDIATELY IF ANY FIELD CONDITIONS ENCOUNTERED DIFFER MATERIALLY FROM THOSE REPRESENTED HEREON, AND/OR IF SUCH CONDITIONS, IN CONTRACTOR'S OPINION, WOULD OR COULD RENDER THE DESIGNS SHOWN HEREON INAPPROPRIATE OR INEFFECTIVE.
5. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS IN THE FIELD PRIOR TO THE START OF CONSTRUCTION. ANY ERRORS OR DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY.
6. THE CONTRACTOR IS ADVISED THAT ALL TREES, STRUCTURES, AND LANDSCAPING LOCATED WITHIN LIMIT OF DISTURBANCE ARE TO BE PROTECTED AND PRESERVED WHEN NOT IN CONFLICT WITH ACCESS TO OR CONSTRUCTION OF PROPOSED FACILITIES.
7. THE CONTRACTOR SHALL USE SUITABLE EXCAVATED MATERIALS FOR BACKFILL, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
8. ALL AREAS AND STRUCTURES DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE ENGINEER.
9. THE CONTRACTOR MUST COMPLY WITH STATE AND FEDERAL CONFINED SPACE RULES.
10. IN GENERAL THE VERTICAL SEPARATION AT A CROSSING OF SEWER AND WATER SHALL BE AT LEAST 18" WITH WATER ON TOP. WHERE THIS IS NOT POSSIBLE THE SEWER SHALL BE ENCASED IN CONCRETE FOR A DISTANCE OF AT LEAST 10 FEET ON EITHER SIDE OF THE CROSSING AND IN CONFORMANCE WITH CONCRETE ENCASEMENT DETAIL. WHEN THE PROPOSED SEWER RUNS PARALLEL TO THE EXISTING WATER MAIN AND IT IS WITHIN 10 FEET HORIZONTALLY AND 18 INCH VERTICALLY OF THE SEWER, SEWER SHALL BE ENCASED IN CONCRETE OR THE WATER MAIN SHALL BE RELOCATED TO THE SATISFACTION OF THE ENGINEER AND AUTHORITY.
11. MANHOLE RIM ELEVATIONS ARE APPROXIMATE. CONTRACTOR SHALL ADJUST ELEVATIONS AS NECESSARY TO MATCH FINAL GRADES.
12. DURING CONSTRUCTION OF PROPOSED SANITARY SEWERS, CONTRACTOR SHALL ANTICIPATE LEAKING STORM LINES AND HAVE THE MEANS TO CONTROL SAME. ANY STORM DRAINAGE PIPE OR STRUCTURES DAMAGED BY THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED OR REPLACED. ALL COSTS FOR THIS WORK SHALL BE INCLUDED IN THE UNIT PRICES BID FOR THE VARIOUS PIPE ITEMS IN THE PROPOSAL.
13. ALL ELEVATIONS OF EXISTING WATER, GAS AND TELEPHONE UTILITIES SHOWN ON THE PROFILES ARE ASSUMED, AND NO CLAIMS TO THEIR ACCURACY ARE MADE.
14. THE CONTRACTOR SHALL DAILY BACKFILL AND TEMPORARILY STABILIZE TRENCH. NO TRENCH SHALL BE PERMITTED TO REMAIN OPEN OVERNIGHT.
15. CONTRACTOR TO SAW CUT ALL PAVEMENTS WHERE DIRECTED.
16. ALL ELEVATIONS BASED ON N.A.V.D. '88 DATUM.
17. SOIL EROSION AND SEDIMENT CONTROL WILL NOT BE MEASURED FOR PAYMENT AND WILL BE INCLUDED IN THE PRICE BID FOR THE APPROPRIATE ITEM.
18. THE CONTRACTOR IS ADVISED THAT A SHUTDOWN OF THE WATER SUPPLY TO THE EXISTING BUILDINGS SHALL BE LIMITED TO A MAXIMUM PERIOD OF 8 HOURS AND MUST BE COORDINATED AND SCHEDULED WITH WATER SYSTEM OPERATOR, MUNICIPAL ENGINEER AND BUILDING OWNER A MINIMUM OF 48 HOURS IN ADVANCE, WHERE REQUIRED TO FACILITATE INSTALLATION OF NEW WATER MAIN THE CONTRACTOR SHALL INSTALL AND MAINTAIN A TEMPORARY WATER SYSTEM.
19. RIGHT-OF-WAY LINES SHOWN ON THE PLANS TAKEN FROM TAX ASSESSMENT MAPS, COUNTY MAPS, N.J.D.O.T. PLANS, AND OTHER SOURCES. A ROUTE SURVEY WAS NOT PERFORMED TO LOCATE THE RIGHT-OF-WAY LINES IN THE FIELD.
20. THE DEPARTMENT OF PUBLIC WORKS SHALL LOCATE AND SHUT ALL VALVES NECESSARY TO PERFORM WATER MAIN OFFSETS WHEN NECESSARY.
21. ALL PAVED AND CONCRETE AREAS DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO A CONDITION TO AT LEAST EQUAL TO THAT WHICH EXISTED PRIOR TO THE START OF CONSTRUCTION.
22. ALL GRASSED OR WOODED AREAS DISTURBED OUTSIDE THE CONSTRUCTION LIMITS SHALL BE TOPSOILED AND SEEDED AT THE CONTRACTOR'S EXPENSE.
23. ALL FILL SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH NJDOT STANDARD SPECIFICATIONS.
24. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION AND PRESERVATION OF UNDERGROUND AND SURFACE UTILITIES AND STRUCTURES AT OR ADJACENT TO THE SITE OF CONSTRUCTION AND IT SHALL BE AT HIS OWN EXPENSE TO REPAIR OR REPLACE ANYTHING THAT HE DAMAGES.
25. A BASELINE HAS BEEN PROVIDED ON THE PLANS AND ESTABLISHED IN THE FIELD. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO LOCATE THE CONSTRUCTION LINE IN ACCORDANCE WITH THE BASELINE AND CONSTRUCTION LINE AS SHOWN ON THE PLAN. ALL CONSTRUCTION LAYOUT MUST BE DONE UNDER THE SUPERVISION OF A NEW JERSEY LICENSED SURVEYOR.
26. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING N.J.D.O.T. CONSTRUCTION AND ELECTRICAL DETAILS AND THE LATEST REVISION OF STANDARD SPECIFICATIONS.
27. ANY CONCRETE OR PAVEMENT, OR ANY STRUCTURES DISTURBED BEYOND THE LIMITS OF WORK SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
28. THE CONTRACTOR SHALL FIELD VERIFY ALL INVERTS AND DIMENSIONS WITH THE ENGINEER PRIOR TO ANY CONSTRUCTION AND ORDERING MATERIALS.
29. TEST PITS SHALL BE PERFORMED TO LOCATE EXISTING UTILITIES THAT MAY CONFLICT WITH PROPOSED WORK, IF REQUIRED. PROPOSED INVERTS MAY BE ADJUSTED ACCORDINGLY.
30. ALL TRAFFIC SIGNS AND TRAFFIC CONTROL SHALL CONFORM TO THE CURRENT MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
31. DRIVEWAYS SHALL NOT HAVE A CURB REVEAL GREATER THAN 2"
32. CONTRACTOR SHALL MAKE SURE POSITIVE DRAINAGE IS MAINTAINED AT THE GUTTER LINES.
33. ANY EXISTING HMA RAMPS AT MANHOLES, DRIVEWAYS, ETC SHALL BE REMOVED AND COSTS SHALL BE PART OF THE PROPOSED SURFACE COST.
34. ALL EDGES SHALL BE TACKED.
35. ANY BROKEN EDGES SHALL BE SAWCUT WHERE NECESSARY.
36. CONTRACTOR SHALL BE PREPARED TO FIND OLD RAILROAD TRACKS, RAILROAD TIES, AND BALLASTS ALONG HAVEN AVENUE. THE CONTRACTOR SHALL REMOVE, HAUL AWAY AND DISPOSE OF ALL DEBRIS FOUND, AT A LICENSED FACILITY. THERE IS NO SPECIFIC PAYMENT FOR THIS LABOR AND DISPOSAL COSTS, AND SAID COSTS SHALL BE INCLUDED IN VARIOUS ITEMS IN THE PROPOSAL.



MAP KEY
SCALE: 1" = 400'

LEGEND

LINEAR FEATURES

EXISTING	PROPOSED	
		WATER MAIN w/ VALVE*
		GAS MAIN w/ VALVE*
		SANITARY SEWER (O.D)*
		STORM SEWER (O.D.)*
**LABEL SIZE & MATERIAL OF UTILITY PIPES	**LABEL SIZE & MATERIAL OF UTILITY PIPES	**DRAW O.D. OF PIPE TO SCALE WHEN 12" OR GREATER
		TELEPHONE DUCTBANK w/ U.G. VAULT
		ELECTRIC CONDUIT w/ J.B.
		CABLE TV
		FIBRE OPTIC
		OVERHEAD WIRE
		PAVEMENTS (CONCRETE OR HMA)
		SHOULDERS
		CURBS
		SLOPES (CUT & FILL)
		BASE LINE
		T.W.P., CITY, COUNTY LINES
		RIGHT OF WAY LINES
		EASEMENTS
		PROPERTY LINES
		FENCE (SIZE & TYPE)
		BEAM GUIDERAIL
		NOISE WALLS
		WETLAND LINE
		SILT FENCE
		LIMIT OF DISTURBANCE LINE
		DITCH
		RAILROAD
		TREELINE

TOPOGRAPHICAL FEATURES

EXISTING	PROPOSED	
		INLETS (LABEL TYPE)
		INLET PROTECTION
		CLEANOUT
		MANHOLES (O.D.)
		RESET INLET/MH
		RECONSTRUCT INLET/MH
		FLARED END SECTION
		HEADWALLS w/ WING WALLS
		WATER GATE VALVES
		GAS GATE VALVES
		HYDRANT
		UTILITY POLE
		JUNCTION BOX
		FIBRE OPTIC JUNCTION BOX
		SIGNS
		BEAM GUIDERAIL END TREATMENT
		GUY WIRE

TOPOGRAPHICAL FEATURES

EXISTING	PROPOSED	
CM	CM	ROW MONUMENTS / MONUMENTS
IP	IP	PIN & CAP
TP–1	TP–1	TEST PIT
SB–1	SB–1	SOIL BEARING
MW	MW	MONITORING WALL
		CAP
MB	MB	MAILBOX
		CONTROL POINT
		DECIDUOUS TREE (SIZE, KIND)
		BUSH / EVERGREENS
		HEDGES
		SWAMP

MISCELLANEOUS SYMBOLS

TC100.10 / BC99.60	PROPOSED TOP OF CURB / PROPOSED BOTTOM OF CURB
100.00	SPOT ELEVATION
F100.50	FLUSH CURB ELEVATION
# ########	ITEMS WITH NO ALTERNATE
	NON-MILLING AREA / RECONSTRUCTION LIMIT
	BUILDING TO BE DEMOLISHED
	REMOVAL OF CONCRETE BASE COURSE & CONCRETE SURFACE COURSE
PROFILE / LEVEL LINE	
H.P.	HIGH POINT
L.P.	LOW POINT
BM	BENCH MARK

ABBREVIATIONS USED IN THIS CONTRACT

℄	BASELINE	EL., ELEV.	ELEVATION	MAX.	MAXIMUM	PT	POINT OF TANGENCY	SAN.	SANITARY	ME	MATCH EXISTING
BM	BENCH MARK	EXIST.	EXISTING	MIN.	MINIMUM	PVC	POLYVINYL CHLORIDE PIPE	SAN. MH.	SANITARY MANHOLE	CET	CURB END TAPER
BLDG.	BUILDING	GR.	GRATE	NO.	NUMBER	PVC	POINT OF VERTICAL CURVATURE	SDWK.	SIDEWALK	FM	FORCE MAIN
℄, C.L.	CENTERLINE	HT.	HEIGHT	N.T.S.	NOT TO SCALE	PVI	POINT OF VERTICAL INTERSECTION	SHLD.	SHOULDER	FC	FLUSH CURB
CIP	CAST IRON PIPE	HW	HEADWALL	PAV'T	PAVEMENT	PVT	POINT OF VERTICAL TANGENCY, PAVEMENT	℄, S.L.	SURVEY LINE	TW	TOP OF WALL
CMP	CORRUGATED METAL PIPE	FH	FIRE HYDRANT	PERF.	PERFORATED	R	RADIUS	S.O.D.	SUBBASE OUTLET DRAIN	BW	BOTTOM OF WALL
CONC.	CONCRETE	INV.	INVERT	P.G.L.	PROFILE GRADE LINE	RCCP	REINFORCED CONCRETE CULVERT PIPE	STY.	STORY	BOF	BOTTOM OF FOOTING
CULV.	CULVERT	IP	IRON PIN	℄, P.L.	PROPERTY LINE, PROFILE LINE	REINF	REINFORCED	ST. MH.	STORM MANHOLE	DI	DUCTILE IRON PIPE
DIA.	DIAMETER	J.B.	JUNCTION BOX	PK	PARKER KALON MASONRY NAIL	RIM	RIM ELEVATION	T, TEL.	TELEPHONE	FOC	FACE OF CURB
DC	DEPRESSED CURB	LT., RT.	LEFT, RIGHT	POC	POINT ON CURVE	RCP	REINFORCED CONCRETE PIPE	TBA	TO BE ABANDONED	DY	DOUBLE YELLOW LINE
DH	DRILL HOLE	LOP	LIMIT OF PAVEMENT (PAVING)	POL	POINT ON LINE	RMC	RIGID METALLIC CONDUIT	TBR	TO BE REMOVED	BOC	BACK OF CURB
DW	DRIVEWAY	LOM	LIMIT OF MILLING	POT	POINT ON TANGENT	RNMC	RIGID NON-METALLIC CONDUIT	TEMP.	TEMPORARY	BRK	BRICK
E.B., W.B.	EASTBOUND, WESTBOUND	MB	MAILBOX	PRC	POINT ON REVERSE CURVE	ROW	RIGHT OF WAY	TH.	THICK	PJA	POLYMERIZED JOINT ADHESIVE
N.B., S.B.	NORTHBOUND, SOUTHBOUND	M.P.	MILE POST	PROP.	PROPOSED	R.R.	RAILROAD	TYP.	TYPICAL	DGA	DENSE GRADED AGGREGATE
U.D.	UNDERDRAIN	UP	UTILITY POLE	VAR.	VARIABLE, VARIES	RT.	ROUTE	X-SECT	CROSS SECTION	DWS	DETECTABLE WARNING SURFACE

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REV	DATE	DRAWN BY	DESCRIPTION
1	10/25/23	MC	REVISIONS TO SYNC HARBOR PLAN AND MONMOUTH HILLS BASIN CONFIGURATION

Theodore Wilkinson
NEW JERSEY LICENSED PROFESSIONAL ENGINEER
LICENSE NUMBER: GE39607
COLLIERS ENGINEERING & DESIGN, INC.
N.J. C.O.A. #: 24GA27986500

STORM WATER REMEDIATION PLAN
FOR
HIGHLANDS & MONMOUTH HILLS FLOOD MITIGATION PROJECT

BOROUGH OF HIGHLANDS
MONMOUTH COUNTY
NEW JERSEY

Colliers Engineering & Design
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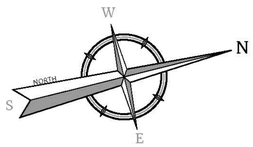
PROJECT NUMBER: 22009818G
DRAWING NAME: C-COVER

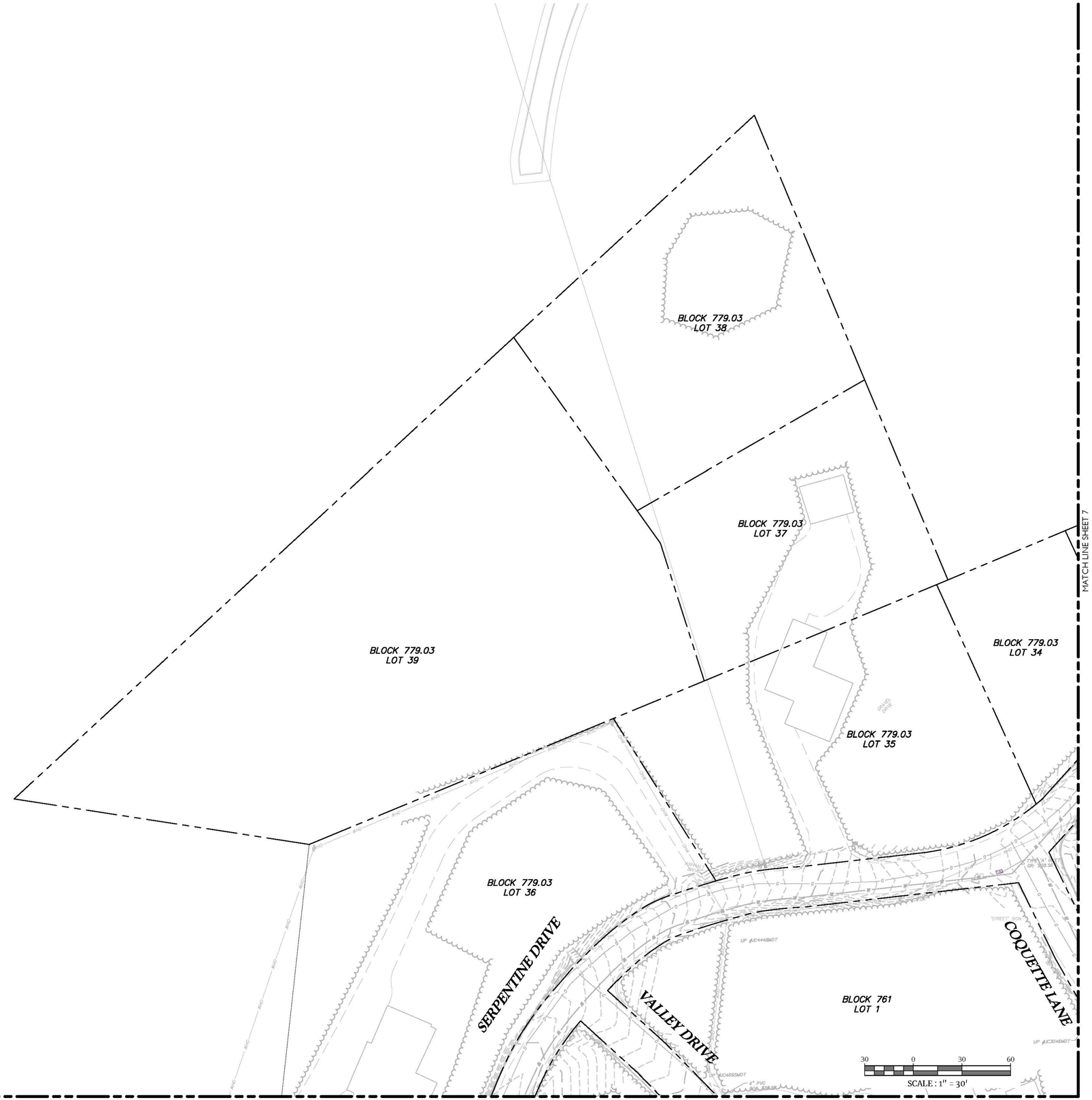
SHEET TITLE: GENERAL NOTES, TYPICAL SECTIONS & LEGEND

SHEET NUMBER: 2 of 18

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

M:\Projects\2021\22009818G\Civil\Drawings\C-02.MXD By: MARIA ANA CONTRERAS





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REV	DATE	DRAWN BY	DESCRIPTION
1	10/25/23	MC	REVISIONS TO DRAINAGE PLAN AND MONMOUTH HILLS BASIN CONFIGURATION

Theodore Wilkinson
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LICENSE NUMBER GE39607
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N.J. C.O.A. #: 24GA27986500

STORM WATER REMEDIATION PLAN

FOR

HIGHLANDS & MONMOUTH HILLS FLOOD MITIGATION PROJECT

BOROUGH OF HIGHLANDS
MONMOUTH COUNTY
NEW JERSEY

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PROJECT NUMBER:	DRAWING NAME:
22009818G	C-LAYT-MSRD

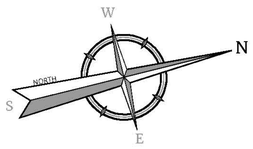
SHEET TITLE:
MONMOUTH HILLS DRAINAGE PLAN

SHEET NUMBER:
3 of 18

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M:\Jobs\h_z\98129C\LAYT-USRD.dwg|C-03 MH LAYOUT by MARIANA CENTENO

MATCH LINE SHEET 3



BLOCK 779.03
LOT 36

BLOCK 779.03
LOT 40

BLOCK 779.02
LOT 41

BLOCK 762
LOT 1

BLOCK 761
LOT 1

BLOCK 760
LOT 2

BLOCK 765
LOT 1

BLOCK 763
LOT 1

BLOCK 763
LOT 2

BLOCK 763
LOT 3

VALLEY DRIVE

COQUETTE LANE

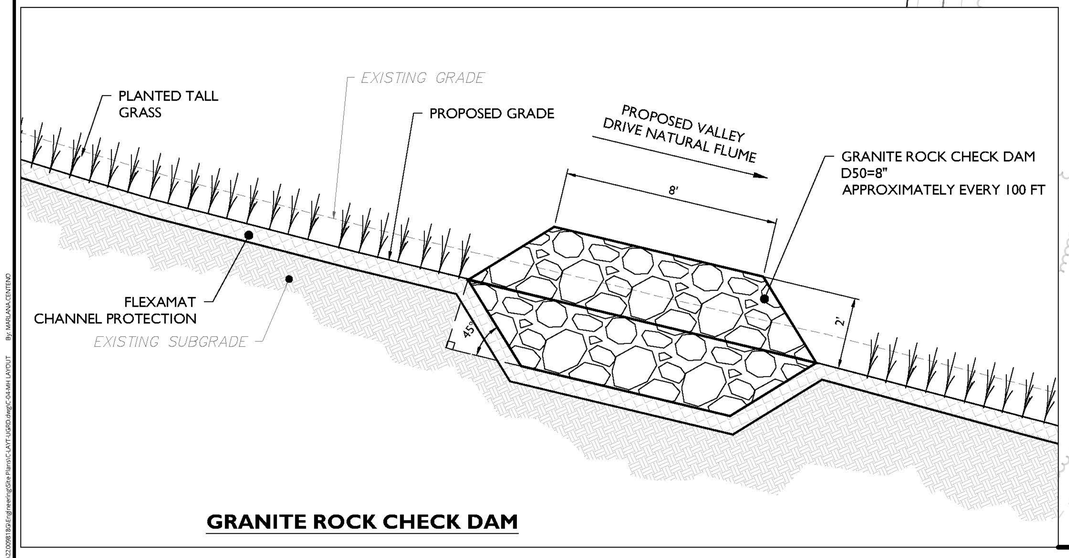
SERPENTINE DRIVE

BEGIN:
FLEXAMAT-LINED FLUME
STA. 00+00

MATCH LINE SHEET 8

MATCH LINE SHEET 5

30 0 30 60
SCALE : 1" = 30'



GRANITE ROCK CHECK DAM

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1	10/25/23	MJC	REVISIONS TO INLET/HARBOR PLAN AND MOMMOUTH HILLS BASIN CONFIGURATION

Theodore Wilkinson
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N.J. C.O.A. #: 24GA27986500

STORM WATER REMEDIATION PLAN

FOR

HIGHLANDS & MONMOUTH HILLS FLOOD MITIGATION PROJECT

BOROUGH OF HIGHLANDS
MONMOUTH COUNTY
NEW JERSEY

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PROJECT NUMBER:	DRAWING NAME:		
22009818G	C-LAYT-UGRD		

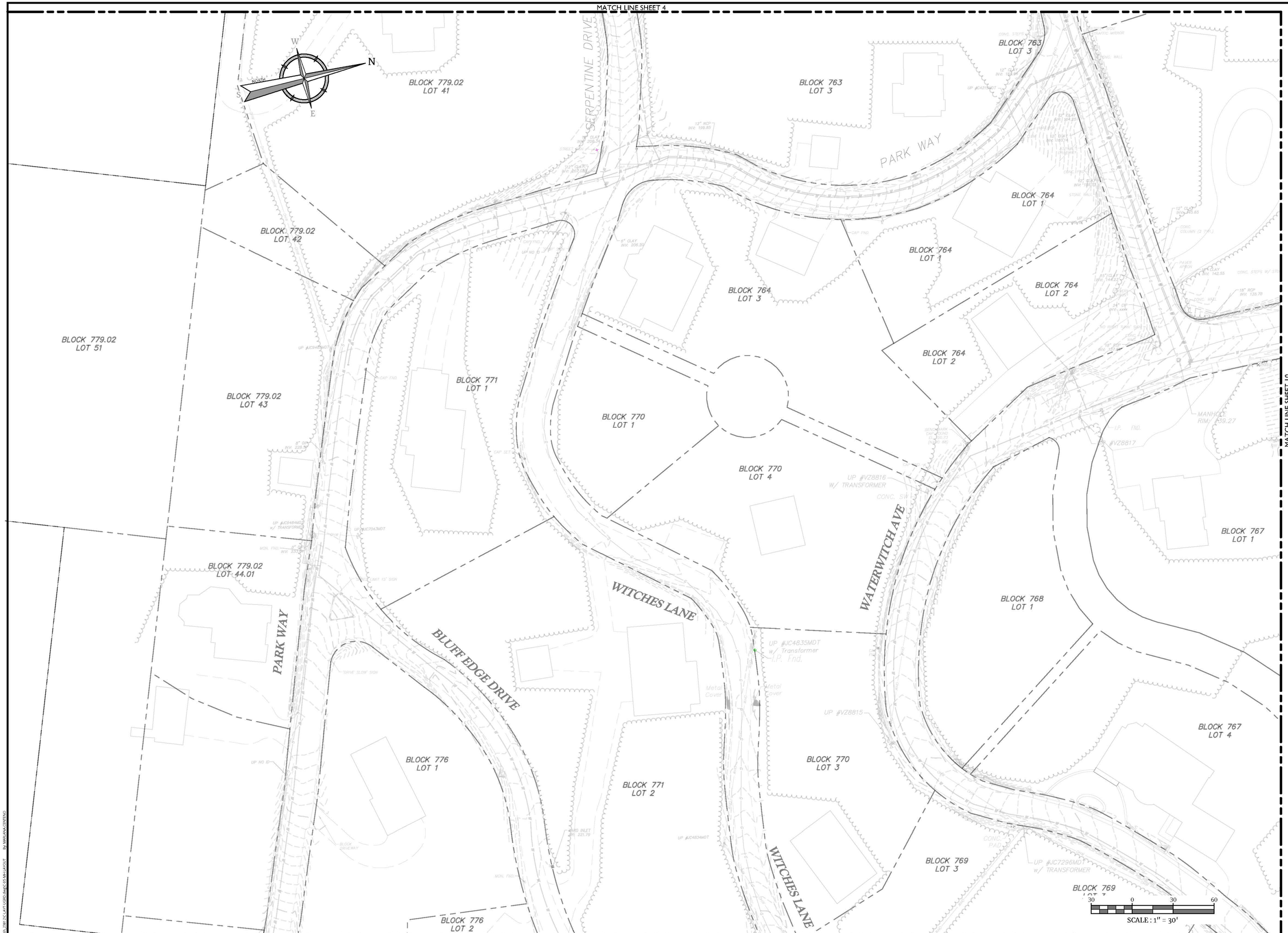
SHEET TITLE:
MONMOUTH HILLS DRAINAGE PLAN

SHEET NUMBER:
4 of 18

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2023.22009818G\Engineering\Plans\Figures\C-LAYT-UGRD.dwg|C-LAYT-UGRD LAYOUT By: MARIJANA CENTENO

MATCH LINE SHEET 4



MATCH LINE SHEET 10

MATCH LINE SHEET 6

REV	DATE	DRAWN BY	DESCRIPTION
1	10/25/23	MC	REVISIONS TO DNRC HARBOR PLAN AND MONMOUTH HILLS BASIN CONFIGURATION

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STORM WATER REMEDIATION PLAN

FOR

HIGHLANDS & MONMOUTH HILLS FLOOD MITIGATION PROJECT

BOROUGH OF HIGHLANDS
MONMOUTH COUNTY
NEW JERSEY

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PROJECT NUMBER:	DRAWING NAME:
22009818G	C-LAYT-UGRD

SHEET TITLE:
MONMOUTH HILLS DRAINAGE PLAN

SHEET NUMBER:
5 of 18

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

Plotted: 2381 2C LAYT-UGRD.dwg C-ES MH LAYOUT By: MARIANA CENTENO

MATCH LINE SHEET 5

MATCH LINE SHEET 10

BLOCK 776 LOT 1

BLOCK 776 LOT 2

BLOCK 771 LOT 2

BLUFF EDGE RD

WITCHES LANE

BLOCK 769 LOT 3

BLOCK 769 LOT 2

BLOCK 767 LOT 4

BAY VIEW TERRACE

BLOCK 767 LOT 5

BLOCK 767 LOT 3.01

BLOCK 777 LOT 6

PARK WAY

BLOCK 777 LOT 5

BLOCK 777 LOT 4

BLOCK 777 LOT 3

BLOCK 777 LOT 2

BLOCK 777 LOT 1

BLOCK 775 LOT 2

BLOCK 775 LOT 1

WEST TWIN ROAD

BLOCK 769 LOT 1

BLOCK 772 LOT 1

BLOCK 767 LOT 3.02

BLOCK 778 LOT 6

BLOCK 778 LOT 5

BLOCK 778 LOT 4

BLOCK 778 LOT 3

BLOCK 778 LOT 7

BLOCK 778 LOT 8

BLOCK 778 LOT 9

BLOCK 778 LOT 10

BLOCK 778 LOT 2

BLOCK 774 LOT 3

BLOCK 774 LOT 2

BLOCK 774 LOT 1

EAST TWIN ROAD

BLOCK 773 LOT 3

BLOCK 773 LOT 1

BLOCK 773 LOT 2

SEA VIEW TERRACE

BLOCK 767 LOT 6

BLOCK 767 LOT 9

BLOCK 778 LOT 1

TOWNSHIP OF MIDDLETOWN

BOROUGH OF HIGHLANDS

N PEAK ST

SCALE : 1" = 30'

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REV	DATE	DRAWN BY	DESCRIPTION
1	10/25/23	MC	REVISIONS TO DRAINAGE PLAN AND MONMOUTH HILLS SYSTEM CONFIGURATION

Theodore Wilkinson
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LICENSE NUMBER: GE39607
COLLIERS ENGINEERING & DESIGN, INC.
N.J. C.O.A. #: 24GA27986500

STORM WATER REMEDIATION PLAN

FOR

HIGHLANDS & MONMOUTH HILLS FLOOD MITIGATION PROJECT

BOROUGH OF HIGHLANDS
MONMOUTH COUNTY
NEW JERSEY

Colliers Engineering & Design
MT. LAUREL
2000 Midlantic Drive, Suite 100
Mt. Laurel, NJ 08054
Phone: 856.797.0412
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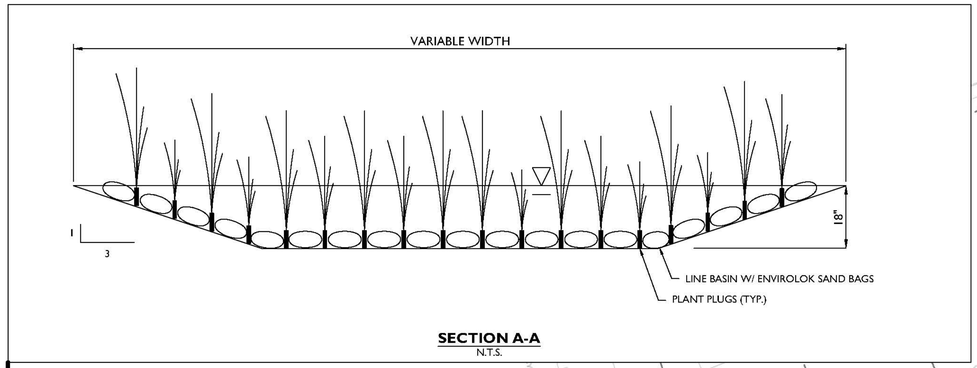
SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	11/18/2022	RNR/CT	TW

PROJECT NUMBER:	DRAWING NAME:
22009818G	C-LAYT-UGRD

SHEET TITLE:
MONMOUTH HILLS DRAINAGE PLAN

SHEET NUMBER:
6 of 18

Mon,Oct 23,2023 - 2:38:27 PM C:\LAYT-UGRD.dwg By: MARIANA CENTENO



SECTION A-A
N.T.S.

MATCH LINE SHEET 3

BASIN 1
20,000 C.F.

OCS S-134
GR: 115.00
INV.(OUT): -3.60 (P-114)

INV.(IN):107.04 (P-83)

121 L.F. 24" PP @ 0.25% (P-114)

HW S-135
GR: -0.80
INV.(IN): -3.91 (P-114)

BASIN 2
64,000 C.F.

OCS S-136
GR: 4.00
INV.(OUT): -3.60 (P-115)

ELEV. X-18"

ELEV. X

CONSTRUCT:
CLAY CORE CHECK DAM W/ RENO (TYP.)

20' WIDE
BIO-SWALE FLOW BED
LINE WITH FLEXAMAT EROSION
PROTECTION

1,500 S.F.
ENVIROLOK BIO-RETENTION BASIN (TYP.)

WW S-106

22 L.F. 30" PP @
20.00% (P-95)

34 L.F. 30" PP @
1.26% (P-82)

MH S-104
RIM: 183.40
INV.(IN): 179.09 (P-80)
INV.(IN): 179.79 (P-81)
INV.(OUT): 179.09 (P-82)

21 L.F. 24" PP @
1.00% (P-81)

HW S-105
INV.(OUT): 180.00 (P-81)

20' X 15' STILLING BASIN
2' DEEP

HW S-102
INV.(OUT): 179.50 (P-79)

20 L.F. 24" PP @
1.00% (P-79)

20 L.F. 24" PP @
1.03% (P-80)

MH S-103
RIM: 182.90
INV.(IN): 179.30 (P-79)
INV.(OUT): 179.30 (P-80)

BLOCK 779.03
LOT 31

BLOCK 779.03
LOT 32

BLOCK 779.03
LOT 33

BLOCK 758
LOT 5

BLOCK 758
LOT 1

BLOCK 758
LOT 4

BLOCK 759
LOT 1

BLOCK 759
LOT 2

BLOCK 760
LOT 1

SERPENTINE DRIVE

FENNIMORE TERRACE

COQUETTE LANE

MATCH LINE SHEET 8

30 0 30 60
SCALE : 1" = 30'

N
W
E
S
NORTH

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

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REV	DATE	DRAWN BY	DESCRIPTION
1	10/25/23	MC	REVISIONS TO ONSITE HARBOR PLAN AND MONMOUTH HILLS BASIN CONFIGURATION

Theodore Wilkinson
NEW JERSEY LICENSED PROFESSIONAL ENGINEER
LICENSE NUMBER: GE39607
COLLIERS ENGINEERING & DESIGN, INC.
N.J. C.O.A. #: 24GA27986500

STORM WATER REMEDIATION PLAN

FOR

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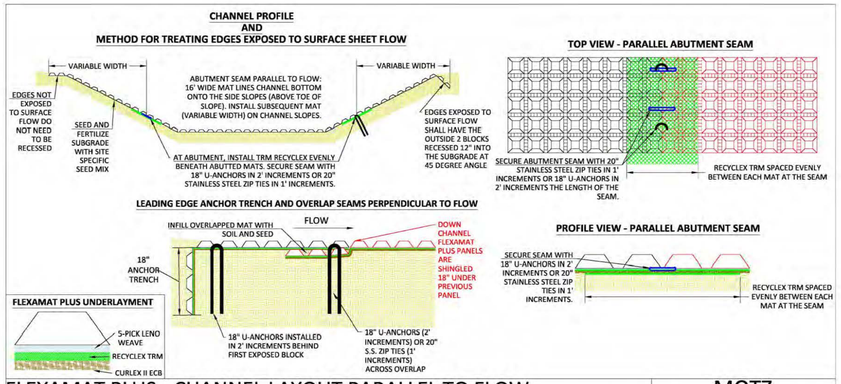
SCALE:	DATE:	DRAWN BY:	CHECKED BY:
AS SHOWN	11/18/2022	RNR/CT	TW

PROJECT NUMBER: 22009818G
DRAWING NAME: C-LAYT-UGRD

SHEET TITLE:
MONMOUTH HILLS DRAINAGE PLAN

SHEET NUMBER:
7 of 18

By: MARLANA CONTINO
\\Ad-fs\ds-238\12\C-LAYT-UGRD.dwg\C-LAYT-UGRD LAYOUT



FLEXAMAT PLUS - CHANNEL LAYOUT PARALLEL TO FLOW

CONSTRUCTION NOTES:

1. AN AUTHORIZED MANUFACTURERS REPRESENTATIVE SHALL BE ONSITE FOR THE START OF THE INSTALLATION.
2. GRADE CHANNEL SO THAT WATER WILL FLOW DOWN CENTER OF THE CHANNEL AND BE CONTAINED TO THE CHANNEL. ALL SUBGRADE SURFACES PREPARED FOR PLACEMENT OF MATS SHALL BE SMOOTH AND FREE OF ALL ROCKS, STICKS, ROOTS, OTHER PROTRUSIONS, OR DEBRIS OF ANY KIND.
3. PRIOR TO FLEXAMAT PLUS INSTALLATION, SEED AND FERTILIZE SUBGRADE WITH SITE SPECIFIC SEED MIX IN ACCORDANCE WITH THE PROJECT PLANS AND SPECIFICATIONS.
4. INSTALL FLEXAMAT PLUS ROLLS THAT ARE 16' WIDE ALONG THE CHANNEL BOTTOM. IF POSSIBLE, THE EDGES OF MAT PARALLEL TO FLOW EXTEND BEYOND THE CHANNEL TOE AND ONTO THE SLOPE.
5. INSTALL SUBSEQUENT MATS SO THEY ABUT TO THE CENTERED 16' MAT. MATS VARY IN WIDTHS AND ARE AVAILABLE IN 4', 5.5', 8', 10' AND 13' ROLLS.
   - 5.1. AT THE ABUTMENT, INSTALL RECYCLEX TRM EVENLY BENEATH THE 16' WIDE MAT AND THE SUBSEQUENT MAT. SECURE ABUTMENT SEAM WITH 18" U-ANCHORS IN 2' INCREMENTS OR 20" STAINLESS STEEL ZIP TIES IN 1' INCREMENTS.
   - 5.1. INSTALL SUBSEQUENT MATS SO THAT THE MATTING EXTENDS PAST THE CREST OF EITHER SIDE SLOPE. FOR SLOPES STEEPER THAN 2:1, EMBED EDGE IN A 12" VERTICAL ANCHOR TRENCH.
   - 5.2. FOR SLOPES LESS THAN 2:1, OUTSIDE EDGES PARALLEL TO THE CHANNEL SHALL BE EMBEDDED IN A 12" 45 DEGREE ANCHOR TRENCH, ONLY IF EXPOSED TO SURFACE FLOW.
6. INSTALL 18" U-ANCHORS IN 2' INCREMENTS BEHIND ANCHOR TRENCH. INSTALL U ANCHORS PERPENDICULAR TO FLOW DIRECTLY BEHIND FIRST BLOCK OF THE UP-CHANNEL MAT.
7. FOR ADDITIONAL SECTIONS OF FLEXAMAT PLUS ARMORING, FLIP THE ENDING EDGE OF THE UP CHANNEL MAT BACK ONTO ITSELF BY 24". DIG A SHALLOW TRENCH 2.25" DEEP AND 18" WIDE WHERE THE ENDING EDGE WAS. INSTALL THE LEADING EDGE OF THE DOWN CHANNEL MAT INTO THE SHALLOW TRENCH. FLIP UP CHANNEL MAT ENDING EDGE ONTO THE LEADING EDGE OF THE DOWN CHANNEL MAT. SECURE OVERLAP SEAM WITH 18" U-ANCHORS IN 2' INCREMENTS OR 20" STAINLESS STEEL ZIP TIES IN 1' INCREMENTS. ZIP TIE SHALL BE INSTALLED PERPENDICULAR TO FLOW AND ENCOMPASS A MINIMUM OF THREE CORDS OF GRID OF EITHER MAT AT SEAMS.
8. AT THE INITIAL LEADING EDGE OF THE ARMORED CHANNEL, EMBED MAT 18" IN A VERTICAL ANCHOR TRENCH. FILL AND COMPACT ANCHOR TRENCH WITH SUITABLE FILL AND SECURE WITH 18" U-ANCHORS IN 2' INCREMENTS ALONG THE LEADING EDGE. AT ENDING EDGE OF PROTECTION, EMBED THE MAT 18" IN A TERMINATION TRENCH. THE TRENCH SHALL BE FILLED AND COMPACTED WITH SUITABLE FILL OR OTHER, AS DETERMINED BY THE ENGINEER OF RECORD.

MOTZ ENTERPRISES, INC.
Flexamat
(513) 772-6689
Info@Flexamat.com
Flexamat.com

Flexamat PERMANENT EROSION CONTROL

REV - 1

MATCH LINE SHEET 7

MATCH LINE SHEET 4

MATCH LINE SHEET 9

BLOCK 760
TAX LOT 2
N/F TANYA EVANS & DANIEL MURPHY
DB. 9312, PG. 4838

BLOCK 765
TAX LOT 1
N/F LARSEN H FLINN
DB. 9287, PG. 8002

BLOCK 765
TAX LOT 2
N/F MATHEW & LYNN MACCIA
DB. 9018, PG. 2837

BLOCK 765
LOT 3

BLOCK 759
TAX LOT 4
N/F RACHEL & JAN BEN
DB. 9193, PG. 3097

BLOCK 766
TAX LOT 3
N/F MONMOUTH HILLS INC/ PROP MGMT
DB. N/A, PG. N/A

BLOCK 758
TAX LOT 4
N/F TWP OF MIDDLETOWN
DB. N/A, PG. N/A

BLOCK 758
LOT 1

BLOCK 758
TAX LOT 2
N/F GARY J CAMERON
DB. 7761, PG. 111

BLOCK 758
TAX LOT 3
N/F TWP OF MIDDLETOWN
DB. N/A, PG. N/A

VALLEY DRIVE

HILLSIDE ROAD

NEW JERSEY STATE HIGHWAY ROUTE 36

778 L.F. 24" PP @ 0.25% (P-115)

FLEXAMAT-LINED FLUME

CONSTRUCT:
GRANITE ROCK CHECK DAM, COMPLETE W/ RENO EVERY 100 FT;

HW S-137
???: -2.48
INV.(IN): -5.58 (P-115)

SAN. MANHOLE
RIM: 106.52
INV(A):104.07
INV(B):104.02
INV(C):103.72

END:
FLEXAMAT-LINED FLUME
STA. 6+98

CONSTRUCT:
INFILTRATION BASIN NO. 3
BOTTOM EL.: 90.00
TOP EL.: 95.00
35,000 C.F.

OCS S-74
GR: 93.10
INV.(OUT): 90.00 (P-56)

67 L.F. 30" PP @
1.00% (P-56)

W
N
S
E
NORTH

30 0 30 60
SCALE : 1" = 30'

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REV	DATE	DRAWN BY	DESCRIPTION
1	10/25/23	MC	REVISIONS TO OVAL HARBOR PLAN AND MONMOUTH HILLS BASIN CONFIGURATION

Theodore Wilkinson
NEW JERSEY LICENSED PROFESSIONAL ENGINEER
LICENSE NUMBER: GE39607
COLLIERS ENGINEERING & DESIGN, INC.
N.J. C.O.A. #: 24GA27986500

STORM WATER REMEDIATION PLAN

FOR

HIGHLANDS & MONMOUTH HILLS FLOOD MITIGATION PROJECT

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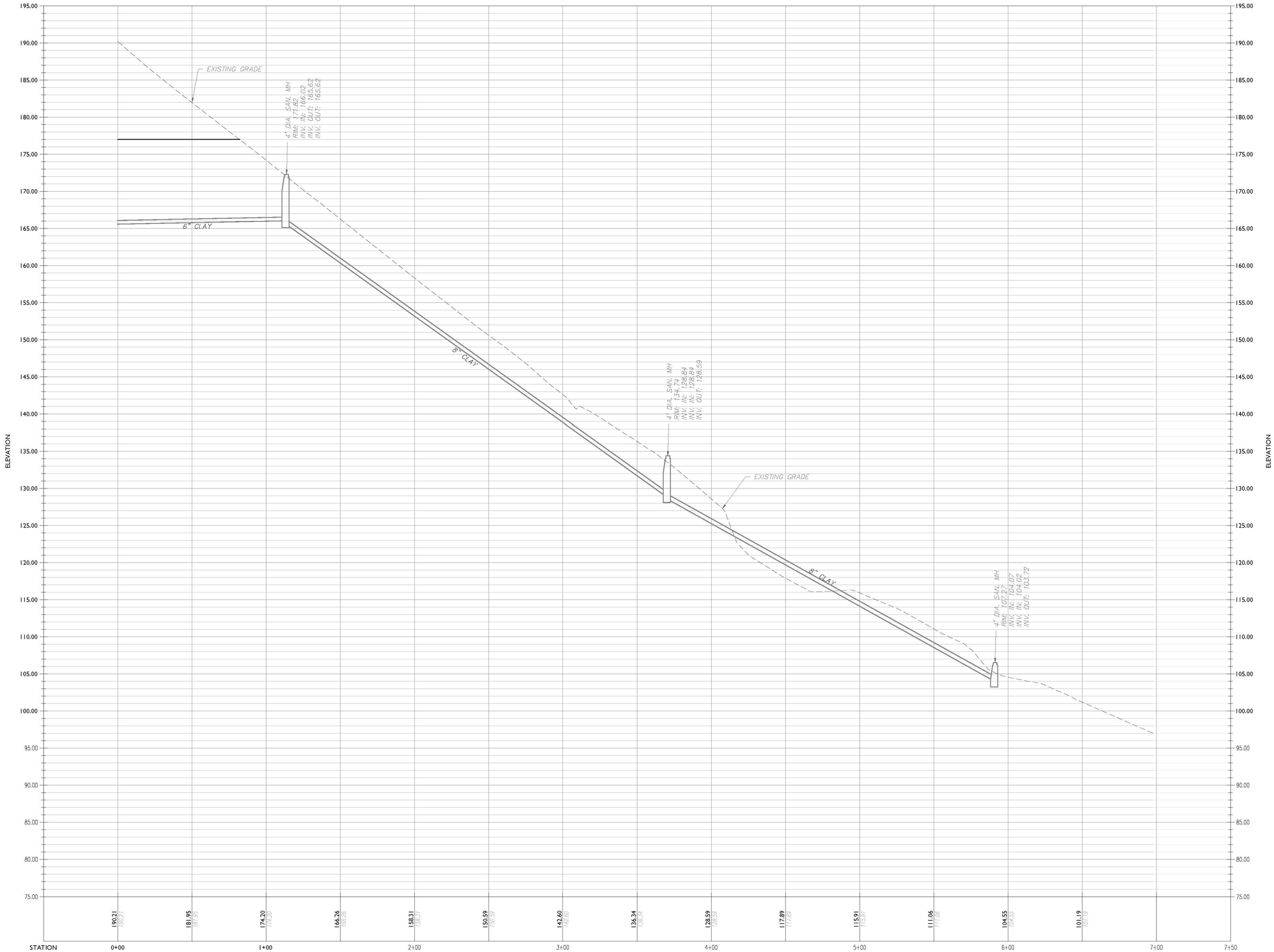
PROJECT NUMBER: 22009818G
DRAWING NAME: C-LAYT-UGRD

SHEET TITLE:
MONMOUTH HILLS DRAINAGE PLAN

SHEET NUMBER:
8 of 18

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

JACKSON_22812\C-LAYT-UGRD.dwg|C-08 MH LAYOUT By: MARK.ANA.CENTINO



PROFILE VIEW OF PROPOSED RIP-RAP CHANNEL PROFILE
HORIZONTAL SCALE: 1"=30'
VERTICAL SCALE: 1"=6'

30 0 30 60
SCALE : 1" = 30'
HORIZONTAL

6 0 6 12
SCALE : 1" = 6'
VERTICAL

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PROJECT NUMBER:	DRAWING NAME:
22009818G	C-LAYT-UGRD

SHEET TITLE:
VALLEY DRIVE FLUME PROFILE

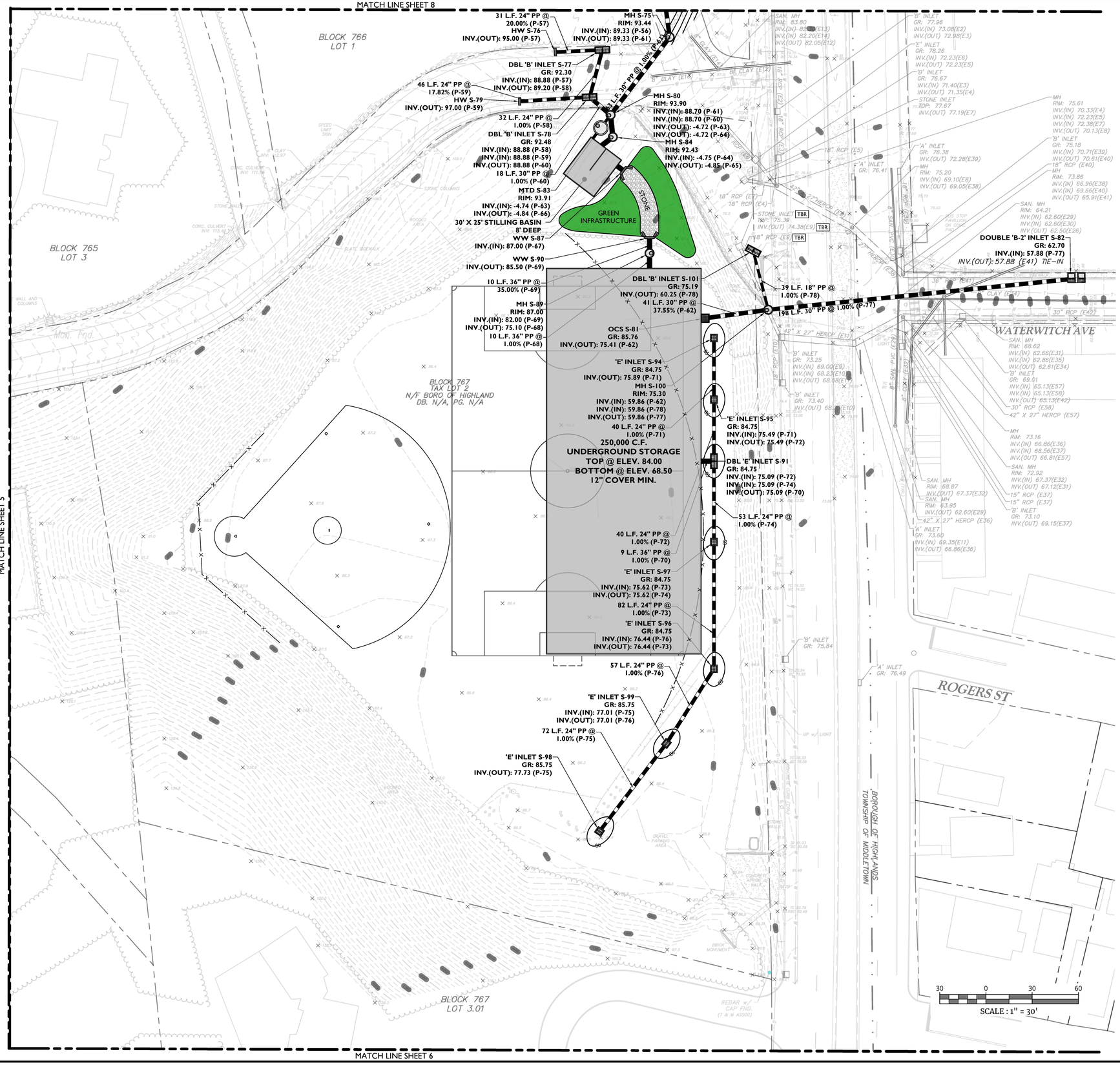
SHEET NUMBER:
9 of 18

M:\Projects_22\818G\2-CAD\C-LAYT-UGRD\22009818G-09 FLUME PROFILE By: MARIANA CENTENO

MATCH LINE SHEET 8

MATCH LINE SHEET 5

MATCH LINE SHEET 6



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LICENSE NUMBER: GE39607
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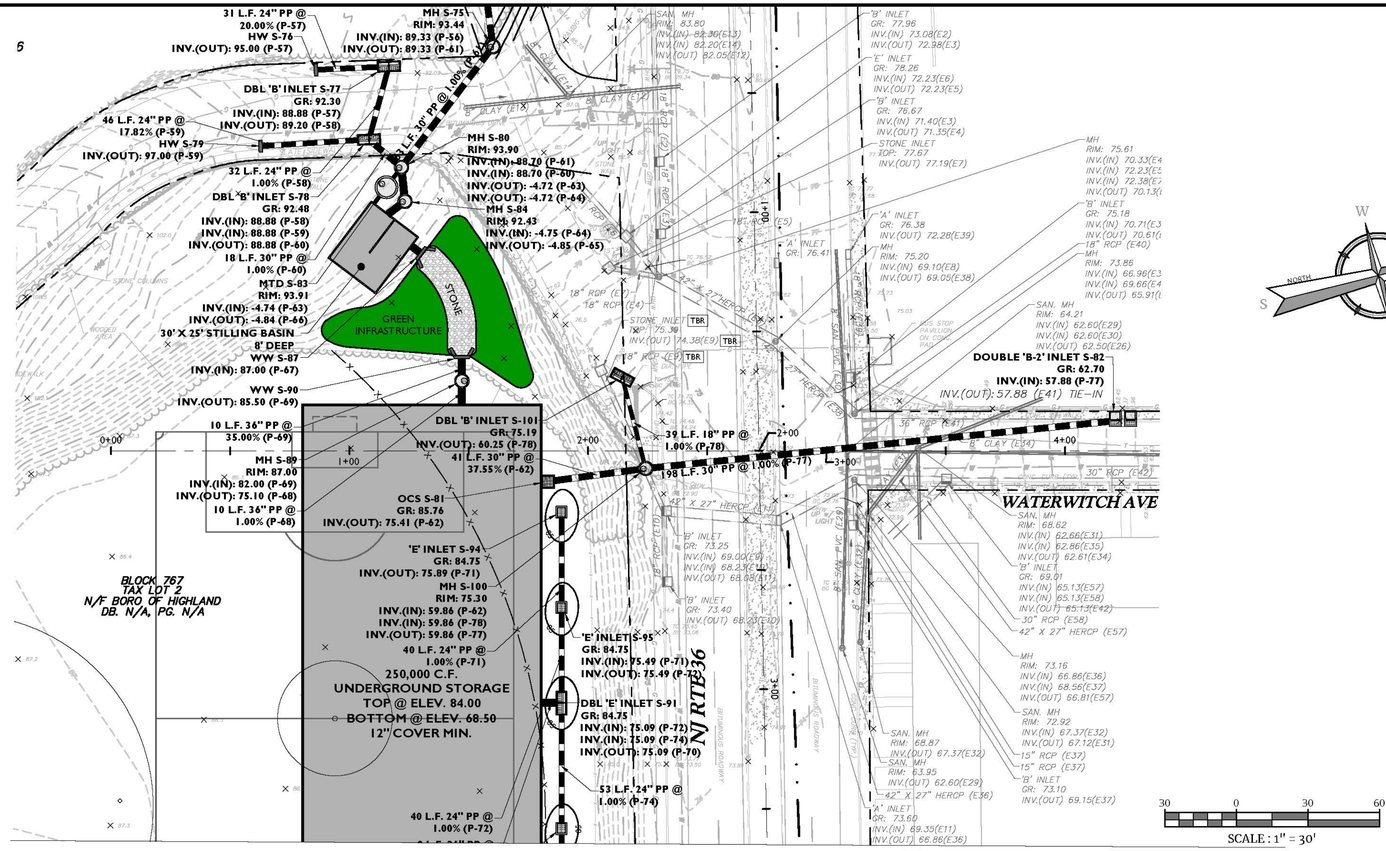
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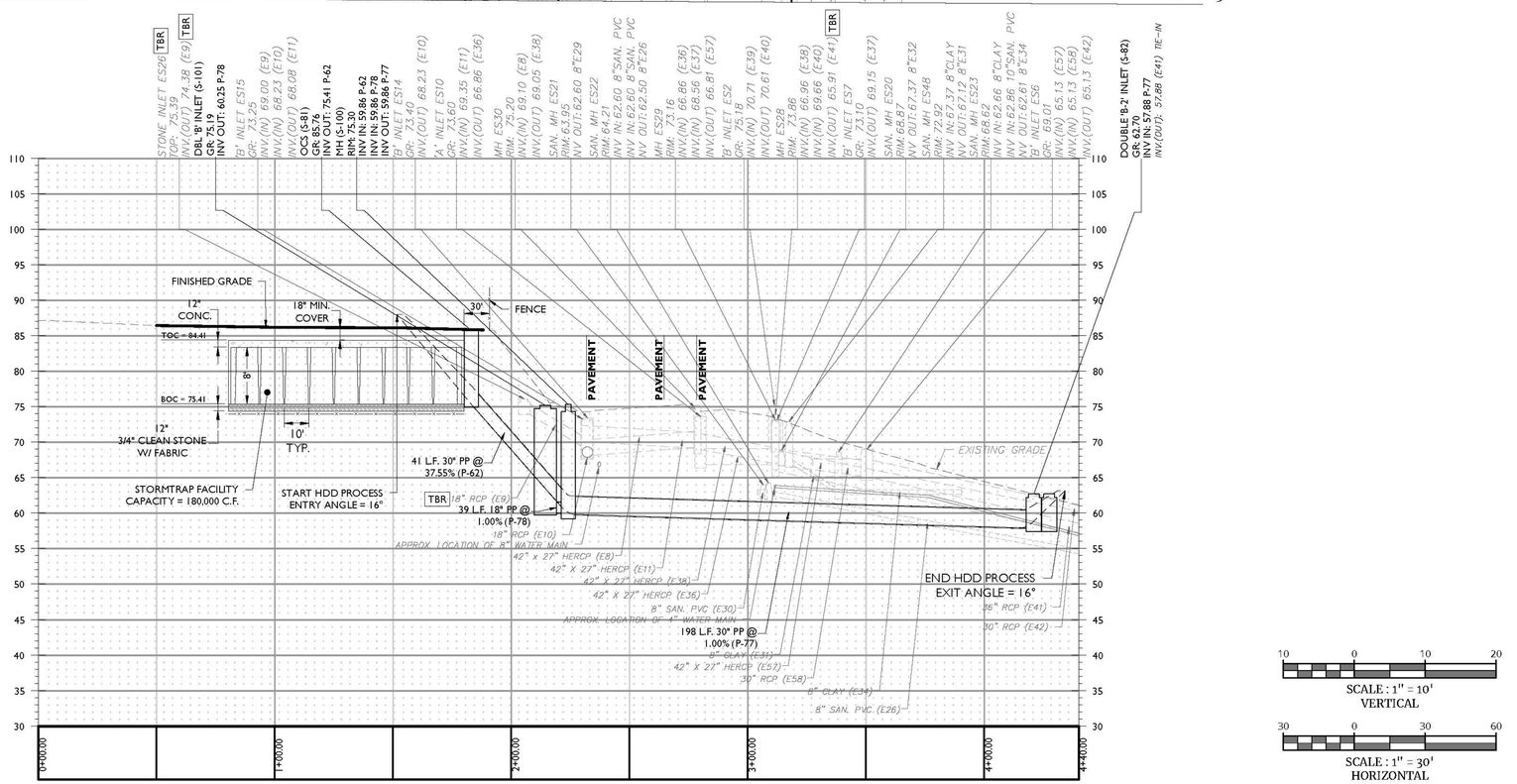
SHEET TITLE: MONMOUTH HILLS DRAINAGE PLAN

SHEET NUMBER: 10 of 18

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\\AcPublish_31215\C-LAYT-UGRD.dwg|C-10- BASIN LAYOUT By:MARIANA.CENTENO





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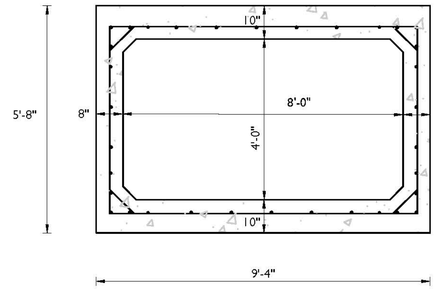
PROJECT NUMBER:	DRAWING NAME:
22009818G	C-LAYT-UGRD

SHEET TITLE:
WATERWITCH AVENUE PROFILE

SHEET NUMBER:
11 of 18

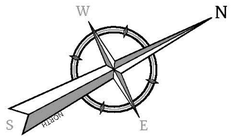
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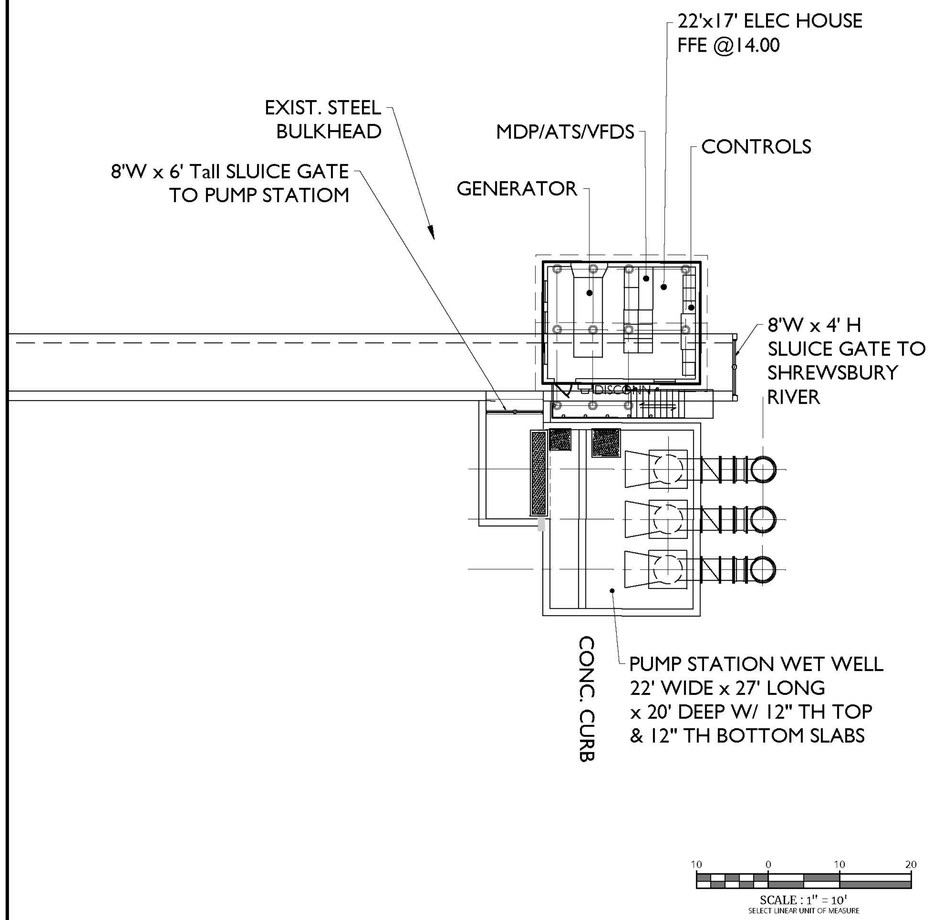
\\Acdbdisk\...\2127\C-LAYT-UGRD.dwg|C-11 WATERWITCH AVE By:MARIANA CENTENO



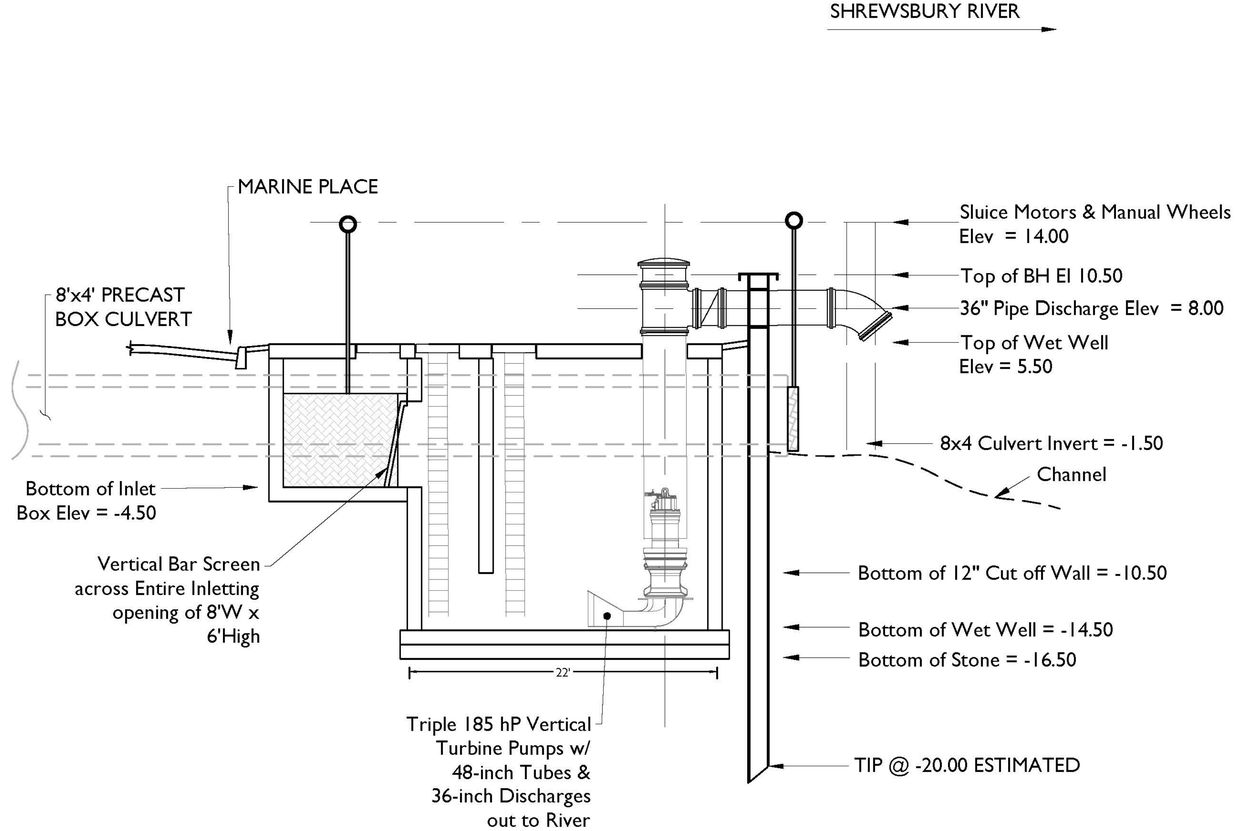
8'x4' PRECAST BOX CULVERT
SCALE 1"=2'

INLET TYPE 'DOUBLE B'
INLET TYPE 'B-2'
INV = -0.67
18" RCP
19"X30" HERCP
INLET TYPE 'DOUBLE B'
18" RCP
INLET TYPE 'B-2'
INLET TYPE 'B-2'
INLET TYPE 'B'
36" RCP
INLET TYPE 'B-2'
18" RCP
INLET TYPE 'B-2'
INLET TYPE 'B-2'
TOP = 4.16
INV = -0.67
4 DEGREE HORIZ. DEFLECTION PIECE
36"
36"
36"
PROJECT START
30"
INLET TYPE 'DOUBLE B'
INLET TYPE 'B'
30" RCP
INLET TYPE 'B-2'
INLET TYPE 'B-2'
18" RCP
INLET TYPE 'B'
INLET TYPE 'B-2'
830 LF - 100 PIECES @ 0.0010% SLOPE
TOP= 3.72
INV = -1.11
18" RCP
1230 L.F. 8'x4' PRECAST BOX CULVERT
30" RCP
INLET TYPE ' DOUBLE B'
INLET TYPE 'B'
400 L.F. - 50 PIECES @ 0.00% SLOPE
2 DEGREE HORIZ. DEFLECTION PIECE
TOP= 3.33
INV = -1.50
APPROX. WATER LINE
INV OUT = -1.50
8'x4' SLUICE GATE
PROJECT END
22'x17' ELEC
30" RCP
INLET TYPE ' DOUBLE B'
19x30 HERCP
B-2 INLET W/O BACKPLATE (TYP.)
INLET TYPE 'B'
15" RCP
INLET TYPE 'B'
INLET TYPE ' DOUBLE B'
24"
SNUG HARBOR PUMP STATION (22'x27'x20' DEPTH')
CENTRAL AVE
BEACH BLVD
SNUG HARBOR AVE
WATERWITCH AVE
HUDDY AVE
CHERRY PL
RECREATION PL
MARINE PL
BEACH
TIMBER BULKHEAD
STEEL BULKHEAD
SHREWSBURY RIVER
SAN. MH (FILLED WITH DEBRIS) INV.(IN) =3.87(E16) INV.(IN) =3.87(E15) INV.(OUT) =3.87(E17)
ST. INLET GR. 3.81 INV.(IN) 1.96(E29) INV.(OUT) 1.86(E36)
"B" INLET TC= 4.23 GR= 3.73 INV.(OUT) 1.38(E31)
"A" INLET GR= 3.88 (ALL PIPES RECESSED) INV. 0.63±
33"x53" ERCP (E22) INV. 0.65
"A" INLET GR= 3.49 INV.(IN) 1.82(E30) INV.(OUT) 1.82(E21)
"A" INLET GR= 3.30 INV.(IN) 0.65(E15) INV.(OUT) 0.55(E16)
NULL STRUCTURE ??? 0.93
15" RCP (E15)
SAN. MH INV.(IN) =4.50(E18) INV.(IN) =4.30(E19) INV.(OUT) =4.55(E30)
NULL STRUCTURE ??? 0.96
10" HDPE (E21)
36" RCP (E27) INV. 0.15
15" HDPE (E21) INV. 2.22 RIM. 4.49
"A" INLET GR. 3.69 INV.(IN) 1.29(E20) INV.(OUT) 1.19(E32)
36" FLOOD GATE THROUGH STEEL BULKHEAD
"A" INLET GR. 3.49 (ALL PIPES RECESSED) INV. 0.63±
"A" INLET GR. 3.98 INV.(IN) 1.82(E30) INV.(OUT) 1.82(E21)
"A" INLET GR. 3.49 INV.(IN) 1.82(E30) INV.(OUT) 1.82(E21)
"A" INLET GR. 3.98 (ALL PIPES RECESSED) INV. 0.63±
33"x53" ERCP (E22) INV. 0.65





SNUG HARBOR PUMP STATION PLAN VIEW



SNUG HARBOR PUMP STATION CROSS SECTION

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NEW JERSEY LICENSED PROFESSIONAL ENGINEER
LICENSE NUMBER: GE39607
COLLIERS ENGINEERING & DESIGN, INC.
N.J. C.O.A. #: 24GA27986500

STORM WATER
REMEDIATION PLAN
FOR
HIGHLANDS &
MONMOUTH HILLS
FLOOD MITIGATION
PROJECT

BOROUGH OF HIGHLANDS
MONMOUTH COUNTY
NEW JERSEY

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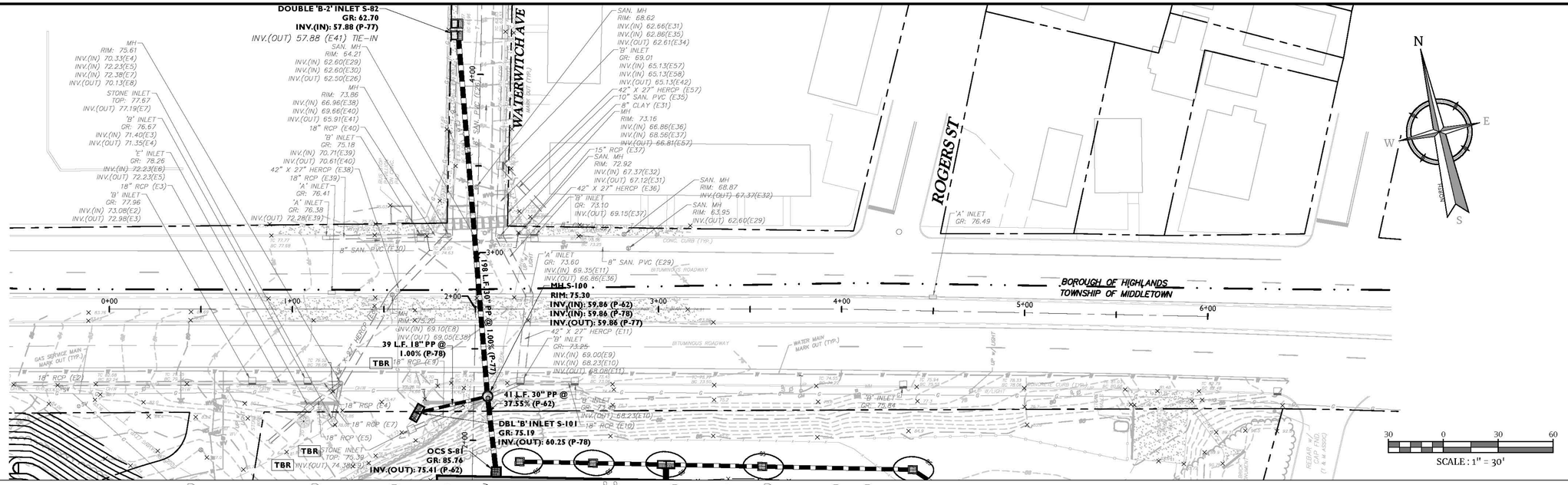
PROJECT NUMBER:	DRAWING NAME:
22009818G	C-CNPT

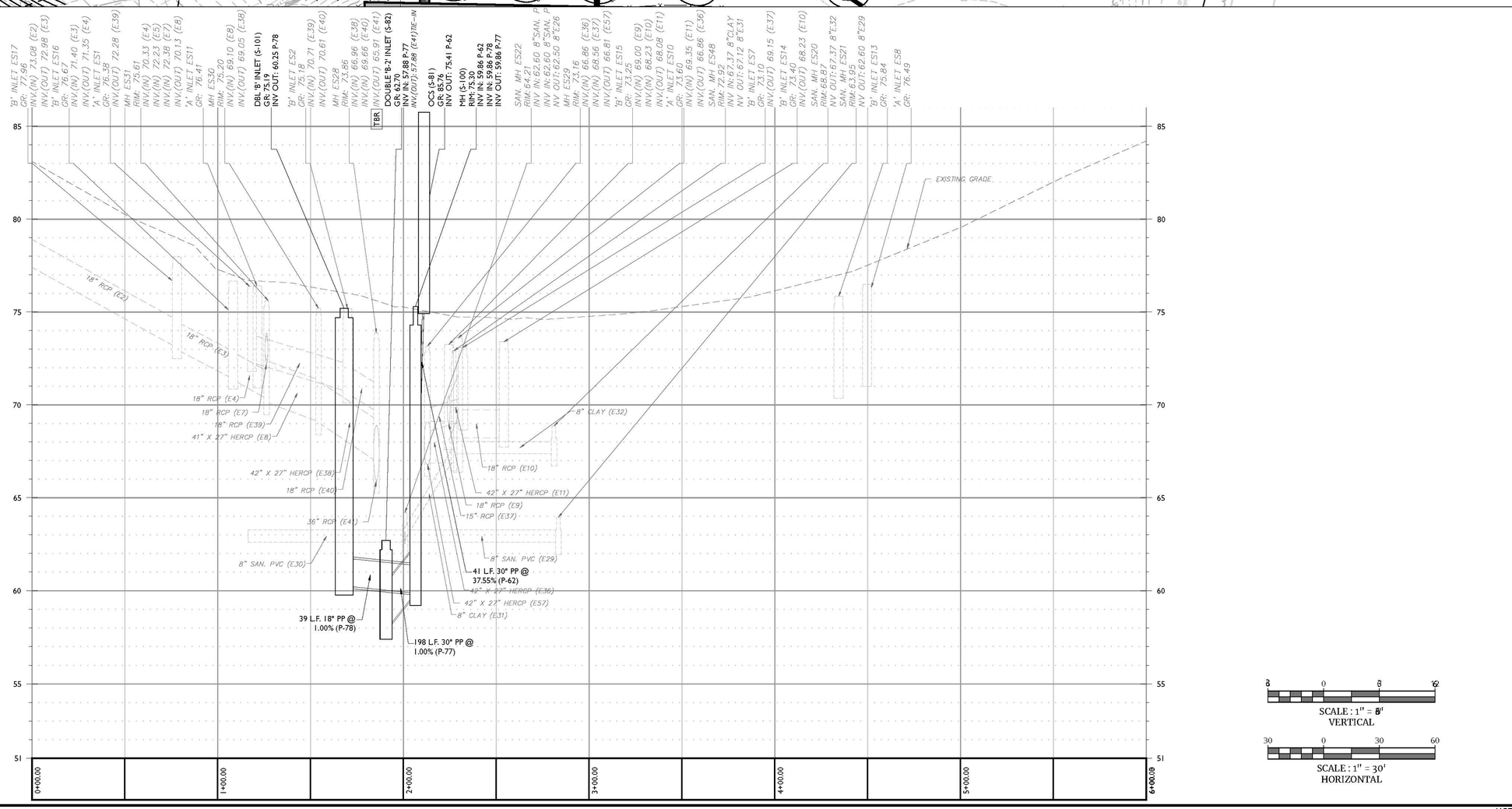
SHEET TITLE:
SNUG HARBOR PUMP
STATION PLAN

SHEET NUMBER:
13 of 18

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2023\23012539\Engineering\Concept\C-CNPT.dwg\C-13 CONCEPT By: MARLANA.CENTENO





SCALE : 1" = 6'
VERTICAL

SCALE : 1" = 30'
HORIZONTAL

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STORM WATER REMEDIATION PLAN

FOR

HIGHLANDS & MONMOUTH HILLS FLOOD MITIGATION PROJECT

BOROUGH OF HIGHLANDS
MONMOUTH COUNTY
NEW JERSEY

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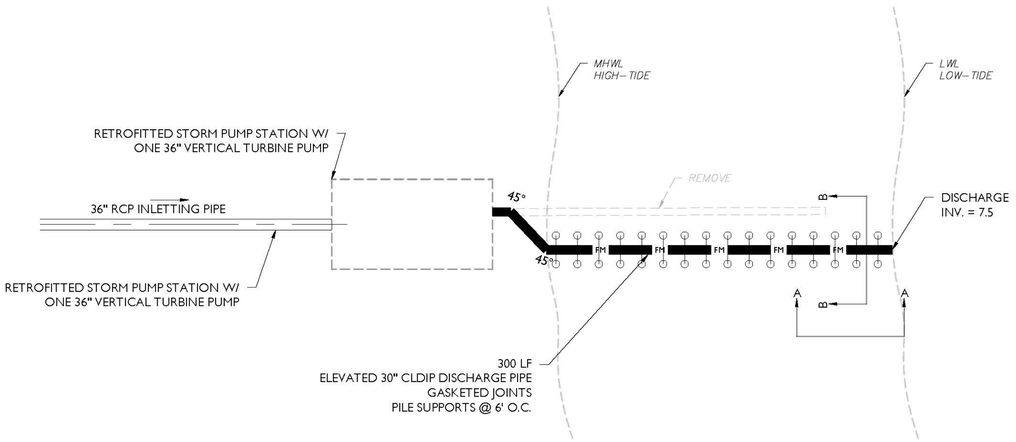
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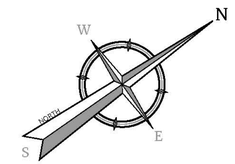
PROJECT NUMBER: 22009818G
DRAWING NAME: C-LAYT-UGRD

SHEET TITLE: NJDOT UTILITY CROSSING PLAN

SHEET NUMBER: 14 of 18

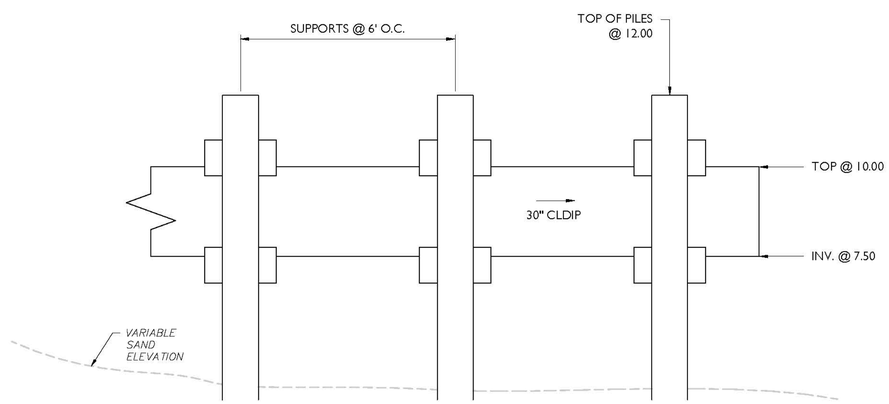
26252\2200981B\Engineering\Site Plans\C-LAYT-UGRD.dwg|C-16 NJDOT By:KARLANA.CENTENO



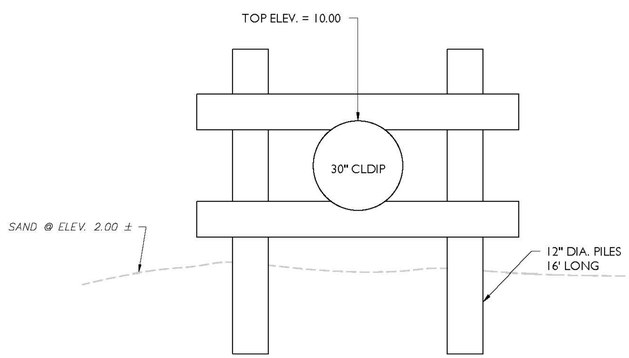


20 0 20 40

SCALE : 1" = 20'



SECTION A-A
N.T.S.



SECTION B-B
N.T.S.

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STORM WATER REMEDIATION PLAN

FOR

HIGHLANDS & MONMOUTH HILLS FLOOD MITIGATION PROJECT

BOROUGH OF HIGHLANDS
MONMOUTH COUNTY
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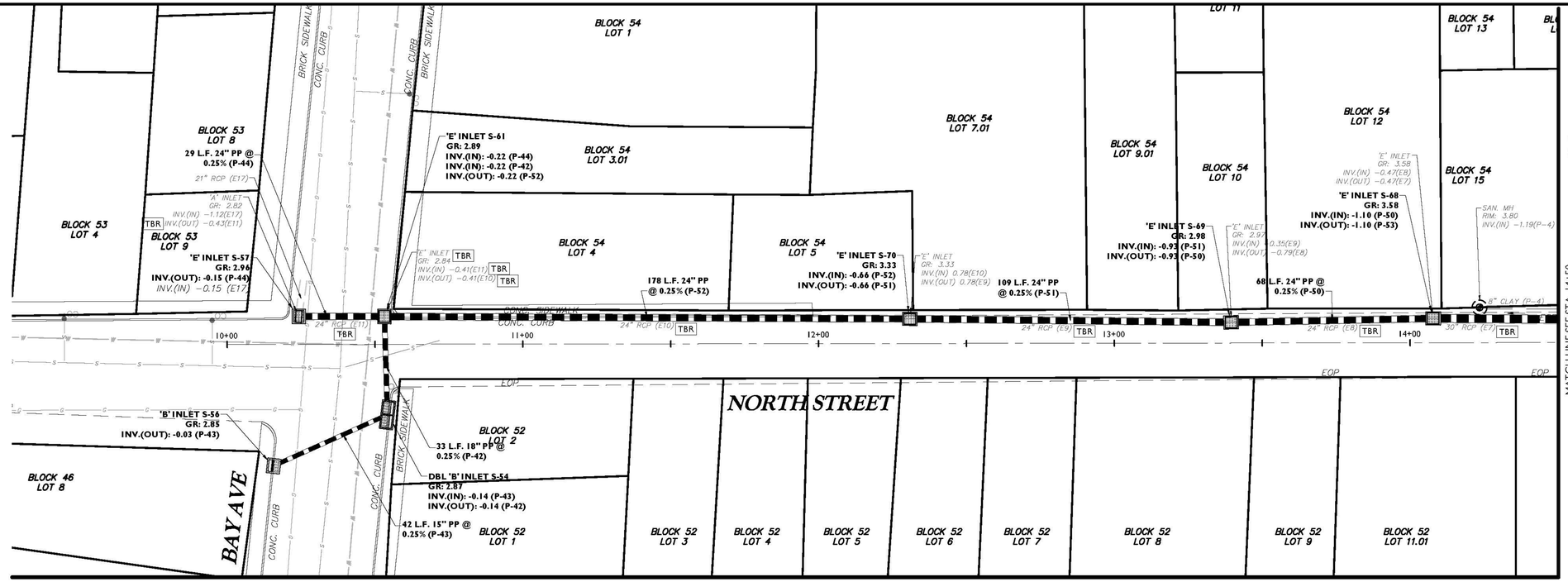
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DRAWING NAME: C-LAYT-VGRD

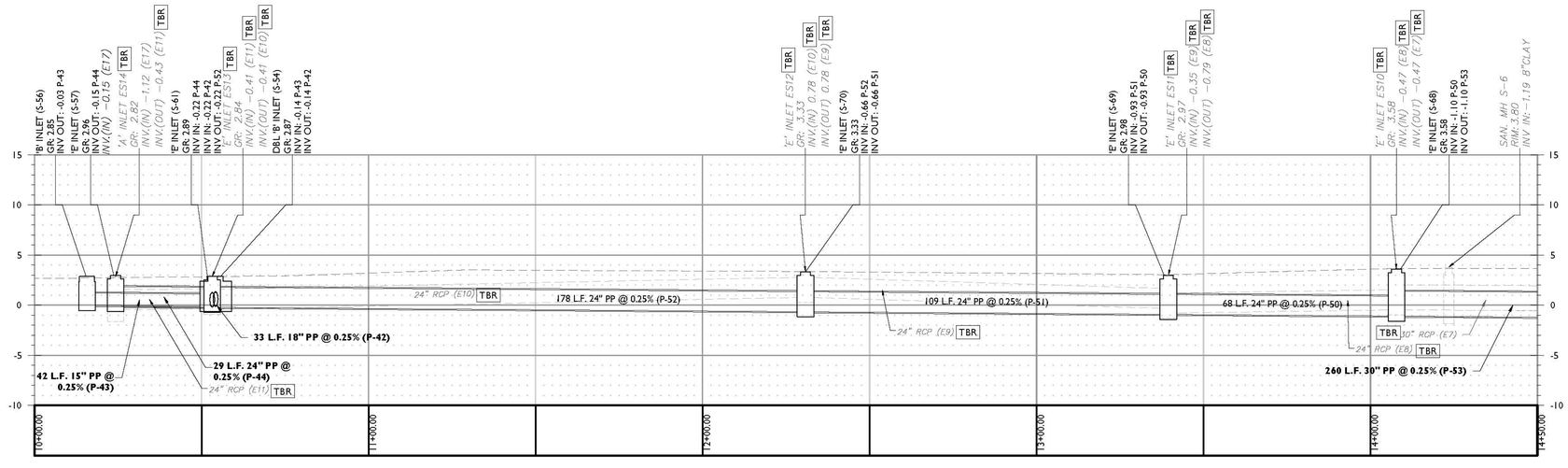
SHEET TITLE:
VALLEY STREET PUMP STATION

SHEET NUMBER:
15 of 18

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20220209B1BG\Engineering\Site Plans\C-LAYT-LGRD.dwg|C-LAYT-VALLEY By: MARLANA.CENTENO





20 0 20 40

SCALE : 1" = 20'

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STORM WATER REMEDIATION PLAN

FOR

HIGHLANDS & MONMOUTH HILLS FLOOD MITIGATION PROJECT

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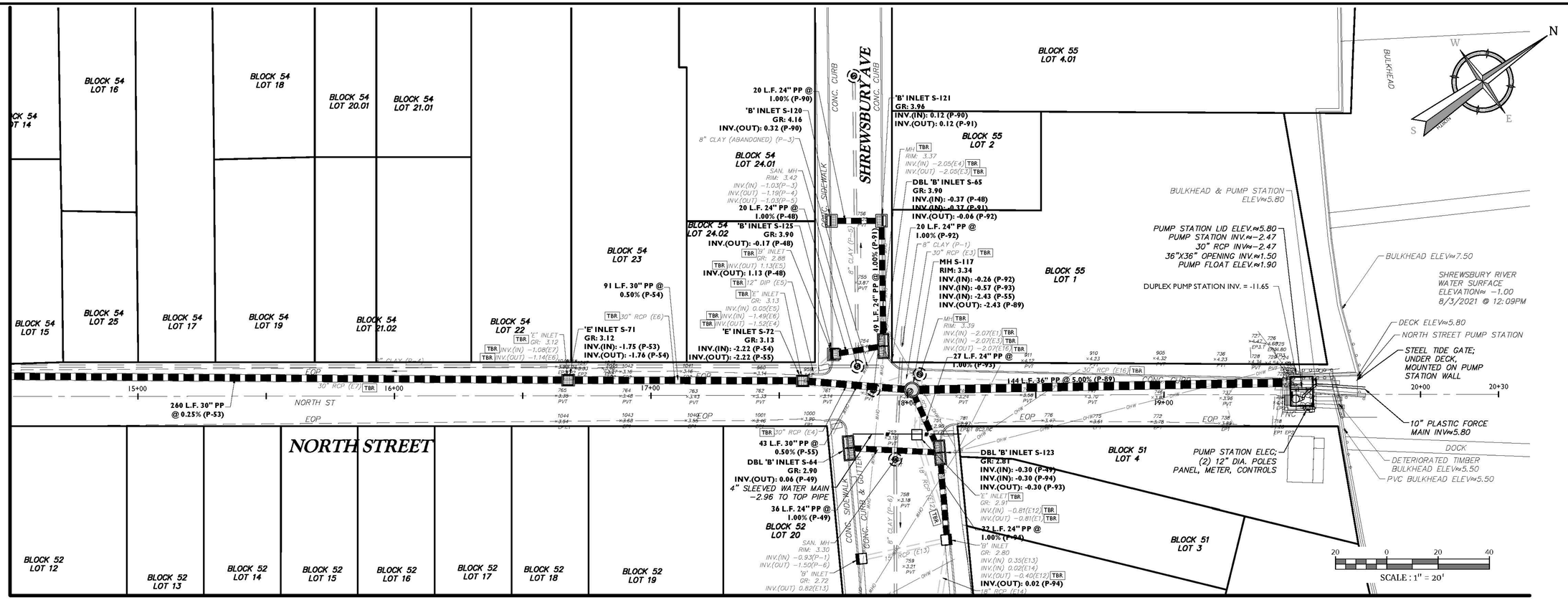
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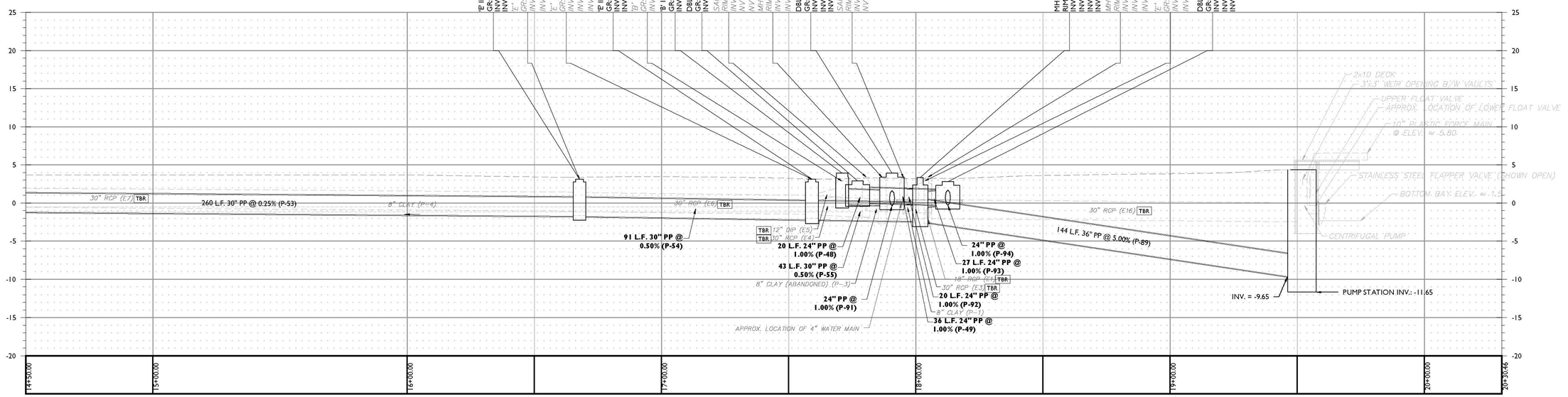
PROJECT NUMBER: 22009818G
DRAWING NAME: C-LAYT-UGRD

SHEET TITLE: NORTH STREET DRAINAGE PLAN

SHEET NUMBER: 16 of 18

2022\22009818\Engineering\Site Plans\C-LAYT-UGRD.dwg, By: MARIANA CENTENO





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STORM WATER REMEDIATION PLAN

FOR

HIGHLANDS & MONMOUTH HILLS FLOOD MITIGATION PROJECT

BOROUGH OF HIGHLANDS
MONMOUTH COUNTY
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DRAWING NAME: C-LAYT-UGRD

SHEET TITLE: NORTH STREET DRAINAGE PLAN

SHEET NUMBER: 17 of 18

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2022\22009818\Engineering\Site Plans\C-LAYT-UGRD.dwg C-LAYT-NORTH By: MIKE.RYAN.CENTRO

BENCHMARK
N: 572192.1000
E: 635769.9770
ELEV: 5.76

BULKHEAD & PUMP STATION
ELEV≈5.80

PUMP STATION LID ELEV.≈5.80
PUMP STATION INV.≈-2.47
30" RCP INV≈-2.47
36"X36" OPENING INV.≈1.50
PUMP FLOAT ELEV.≈1.90

N/F URBANSKI, JOHN
#70 SHREWSBURY AVENUE
BLOCK 55 LOT 1

BULKHEAD ELEV≈7.50

NEW 18" OUTFALL PIPE

8'x10' PUMP STATION

MOTOR OPERATED SLUICE GATE

GENERATOR

SHREWSBURY RIVER
WATER SURFACE
ELEVATION≈ -1.00
8/3/2021 @ 12:09PM

4' WIDE GENERATOR
PLATFORM

DOUBLE E' INLET TEMPORARY PUMP
CHAMBER/ PERMANENT BAR SCREEN
STRUCTURE

30" RCP (E16)

30" RCP (E16)

CONC. CURB

DECK ELEV≈5.80

GEN- 4'x12'

STEEL TIDE GATE;
UNDER DECK, MOUNTED
ON PUMP STATION WALL

PLATFORM- 4'x12'

10" PLASTIC FORCE
MAIN INV≈5.80

BULKHEAD

19+00

20+00

18" FORCE MAIN OUTFALL

18" FORCE MAIN OUTFALL

DETERIORATED TIMBER
BULKHEAD ELEV≈5.50

END TIMBER BH
START PVC BH

CONSTRUCT:
(2) 6" TRANSDUCER STILLING WELLS

PVC BULKHEAD ELEV≈5.50

FNC

EOP

PUMP STATION ELEC;
(2) 12" DIA. POLES
PANEL, METER, CONTROLS

CONC.
PAD

DECK

STAIRS

DOCK

N/F LAWRENCE, FANCIS E. JR.
#68 1/2 SHREWSBURY AVENUE
BLOCK 51 LOT 4

BLOCK 51
LOT 3

SCALE : 1" = 5'

NOTE: DO NOT SCALE DRAWINGS FOR CONSTRUCTION.

By: MARILANA.CENTENO
2022\220981BG\Engineering\Site Plans\C-LAYT-UGRD.dwg|C-29 NORTH PS

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STORM WATER REMEDIATION PLAN

FOR

HIGHLANDS & MONMOUTH HILLS FLOOD MITIGATION PROJECT

BOROUGH OF HIGHLANDS
MONMOUTH COUNTY
NEW JERSEY

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PROJECT NUMBER:	DRAWING NAME:
220981BG	C-LAYT-UGRD

SHEET TITLE:
NORTH STREET PUMP STATION PLAN

SHEET NUMBER:
18 of 18

Appendix C – Construction Emission Checklist and Air Quality and Noise Calculations

U.S. Environmental Protection Agency
Construction Emission Control Checklist

Diesel emissions and fugitive dust from project construction may pose environmental and human health risks and should be minimized. In 2002, EPA classified diesel emissions as a likely human carcinogen, and in 2012 the International Agency for Research on Cancer concluded that diesel exhaust is carcinogenic to humans. Acute exposures can lead to other health problems, such as eye and nose irritation, headaches, nausea, asthma, and other respiratory system issues. Longer term exposure may worsen heart and lung disease.[13] EPA recommends FEMA consider the following protective measures and commit to applicable measures in the FONSI.

Mobile and Stationary Source Diesel Controls

Purchase or solicit bids that require the use of vehicles that are equipped with zero-emission technologies or the most advanced emission control systems available. Commit to the best available emissions control technologies for project equipment in order to meet the following standards.

- On-Highway Vehicles: On-highway vehicles should meet, or exceed, the EPA exhaust emissions standards for model year 2010 and newer heavy-duty, on-highway compression-ignition engines (e.g., long-haul trucks, refuse haulers, shuttle buses, etc.).[14]
- Non-road Vehicles and Equipment: Non-road vehicles and equipment should meet, or exceed, the EPA Tier 4 exhaust emissions standards for heavy-duty, non-road compression-ignition engines (e.g., construction equipment, non-road trucks, etc.).[15]
- Low Emission Equipment Exemptions: The equipment specifications outlined above should be met unless: 1) a piece of specialized equipment is not available for purchase or lease within the United States; or 2) the relevant project contractor has been awarded funds to retrofit existing equipment, or purchase/lease new equipment, but the funds are not yet available.

Consider requiring the following best practices through the construction contracting or oversight process:

- Establish and enforce a clear anti-idling policy for the construction site.
- Use onsite renewable electricity generation and/or grid-based electricity rather than diesel-powered generators or other equipment.
- Use electric starting aids such as block heaters with older vehicles to warm the engine.
- Regularly maintain diesel engines to keep exhaust emissions low. Follow the manufacturer's recommended maintenance schedule and procedures. Smoke color can signal the need for maintenance (e.g., blue/black smoke indicates that an engine requires servicing or tuning).
- Where possible, retrofit older-tier or Tier 0 nonroad engines with an exhaust filtration device before it enters the construction site to capture diesel particulate matter.
- Replace the engines of older vehicles and/or equipment with diesel- or alternatively-fueled engines certified to meet newer, more stringent emissions standards (e.g., plug-in hybrid-electric vehicles, battery-electric vehicles, fuel cell electric vehicles, advanced technology

[13] Benbrahim-Tallaa, L, Baan, RA, Grosse, Y, Lauby-Secretan, B, El Ghissassi, F, Bouvard, V, Guha, N, Loomis, D, Straif, K & International Agency for Research on Cancer Monograph Working Group (2012). Carcinogenicity of diesel-engine and gasoline-engine exhausts and some nitroarenes. The Lancet. Oncology, vol. 13, no. 7, pp. 663-4. Accessed online from: https://kclpure.kcl.ac.uk/portal/files/6492297/coverBenbrahim_Tallaa_2012_Lancet_Oncology.pdf

[14] https://www.epa.gov/emission-standards-reference-guide/epa-emission-standards-heavy-duty-highway-engines-and-vehicles

[15] https://www.epa.gov/emission-standards-reference-guide/epa-emission-standards-nonroad-engines-and-vehicles

locomotives, etc.), or with zero emissions electric systems. Retire older vehicles, given the significant contribution of vehicle emissions to the poor air quality conditions. Implement programs to encourage the voluntary removal from use and the marketplace of pre-2010 model year on-highway vehicles (e.g., scrappage rebates) and replace them with newer vehicles that meet or exceed the latest EPA exhaust emissions standards, or with zero emissions electric vehicles and/or equipment.

Fugitive Dust Source Controls

- Stabilize open storage piles and disturbed areas by covering and/or applying water or chemical/organic dust palliative, where appropriate. This applies to both inactive and active sites, during workdays, weekends, holidays, and windy conditions.
- Install wind fencing and phase grading operations where appropriate and operate water trucks for stabilization of surfaces under windy conditions.
- When hauling material and operating non-earthmoving equipment, prevent spillage and limit speeds to 15 miles per hour (mph). Limit speed of earth-moving equipment to 10 mph.

Occupational Health

- Reduce exposure through work practices and training, such as maintaining filtration devices and training diesel-equipment operators to perform routine inspections.
- Position the exhaust pipe so that diesel fumes are directed away from the operator and nearby workers, reducing the fume concentration to which personnel are exposed.
- Use enclosed, climate-controlled cabs pressurized and equipped with high-efficiency particulate air (HEPA) filters to reduce the operators' exposure to diesel fumes. Pressurization ensures that air moves from inside to outside. HEPA filters ensure that any incoming air is filtered first.
- Use respirators, which are only an interim measure to control exposure to diesel emissions. In most cases, an N95 respirator is adequate. Workers must be trained and fit-tested before they wear respirators. Depending on the type of work being conducted, and if oil is present, concentrations of particulates present will determine the efficiency and type of mask and respirator. Personnel familiar with the selection, care, and use of respirators must perform the fit testing. Respirators must bear a National Institute for Occupational Safety and Health approval number.

NEPA Documentation

- Per Executive Order 13045 on Children's Health,[16] EPA recommends the lead agency and project proponent pay particular attention to worksite proximity to places where children live, learn, and play, such as homes, schools, and playgrounds. Construction emission reduction measures should be strictly implemented near these locations in order to be protective of children's health.
- Specify how impacts to sensitive receptors, such as children, elderly, and the infirm will be minimized. For example, locate construction equipment and staging zones away from sensitive receptors and fresh air intakes to buildings and air conditioners.

[16] Children may be more highly exposed to contaminants because they generally eat more food, drink more water, and have higher inhalation rates relative to their size. Also, children's normal activities, such as putting their hands in their mouths or playing on the ground, can result in higher exposures to contaminants as compared with adults. Children may be more vulnerable to the toxic effects of contaminants because their bodies and systems are not fully developed, and their growing organs are more easily harmed. EPA views childhood as a sequence of life stages, from conception through fetal development, infancy, and adolescence.

Monmouth, New Jersey

Construction Emissions Inventory

Assumptions

Construction Start Month	Aug 2025
Construction Duration (months)[1]	24
Construction Duration (days)	730
Actual Number of Work Days	521
Hours in a Work Day	8
Construction Duration (Work Hours)	4,171
Number of Worker Round Trips/Work Day	1
Worker Trip Length (miles/one-way trip)[2]	20
Worker Trip Length (miles/round-way trip)	40
Number of Waste Hauling Truck Round Trips/Project	583
Waste Hauling Truck Trip Length (miles/one-way trip)[2,3]	20
Waste Hauling Truck Trip Length (miles/round trip)	40
Number of Vendor Hauling Truck Round Trips/Project	475
Number of Asphalt/Concrete Hauling Truck Round Trips/Project	13
Number of Additional Vendor Truck Round Trips/Project	291
Total Vendor Truck Round Trips/Project	1,362
Vendor Hauling Truck Trip Length (miles/one-way trip)[2]	20
Vendor Hauling Truck Trip Length (miles/round trip)	40

On-road Equipment

Construction Equipment	MOVES5 Source Use Type	Fuel Type	Quantity[4]	Duration (Days)	2025 Duration (Months)[1,5]	2026 Duration (Months)[1,5]	2027 Duration (Months)[1,5]	NOx Emission Factor (grams/VMT)[6]	VOC Emission Factor (grams/VMT)[6]	PM2.5 Total Emission Factor (grams/VMT)6	Atmospheric CO2 Emission Factor (grams/VMT)[6]	Methane (CH4) Emission Factor (grams/VMT)[6]	N2O Emission Factor (grams/VMT)[6]
Worker Pickup Trucks	Passenger Truck	Aggregated	22	521	NA	NA	NA	<1	<1	<1	386	0.016	0.007
Flatbed Delivery Truck	Single Unit Short-haul Truck	Aggregated	---	NA	NA	NA	NA	1	<1	<1	869	0.113	0.089
Vendor Asphalt/Concrete Truck	Single Unit Short-haul Truck	Aggregated	---	NA	NA	NA	NA	1	<1	<1	869	0.113	0.089
Heavy Duty Dump Truck	Single Unit Short-haul Truck	Aggregated	---	NA	NA	NA	NA	1	<1	<1	869	0.113	0.089

On-Road Totals

General Off-road Equipment

Construction Equipment	MOVES5 Equipment	Fuel Type	Quantity[5]	Activity (Hours per unit)	2025 Duration (Months)[1]	2026 Duration (Months)[1]	2027 Duration (Months)[1]	NOx Emission Factor (g/hr)[6]	VOC Emission Factor (g/hr)[6]	PM2.5 Total Emission Factor (g/hr)[6]	Atmospheric CO2 Emission Factor (g/hr)[6]	Methane (CH4) Emission Factor (g/hr)[6]	N2O Emission Factor (g/hr)[6,8]
Construction Start (24 months)													
Segment: Monmouth Hills, basins, pipes, repairs, bio-swales													
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	3	1,564	5	4	0	37	4	4	13,060	0.208	0.194
Crawler Tractor/Dozers	Crawler Tractor/Dozers	Nonroad Diesel Fuel	3	1,564	5	4	0	104	4	4	82,744	0.354	0.330
Graders	Graders	Nonroad Diesel Fuel	2	1,564	5	4	0	32	2	2	64,859	0.143	0.133
Scrapers	Scrapers	Nonroad Diesel Fuel	1	1,564	5	4	0	114	7	7	129,654	0.593	0.552
Excavators	Excavators	Nonroad Diesel Fuel	1	1,564	5	4	0	40	2	2	54,721	0.148	0.138
Rubber Tired Dozers	Crawler Tractor/Dozers	Nonroad Diesel Fuel	1	1,564	5	4	0	104	4	4	82,744	0.354	0.330

General Off-road Equipment													
Construction Equipment	**MOVES5 Equipment**	**Fuel Type**	**Quantity[5]**	**Activity (Hours per unit)**	**2025 Duration (Months)[1]**	**2026 Duration (Months)[1]**	**2027 Duration (Months)[1]**	**NOx Emission Factor (g/hr)[6]**	**VOC Emission Factor (g/hr)[6]**	**PM2.5 Total Emission Factor (g/hr)[6]**	**Atmospheric CO2 Emission Factor (g/hr)[6]**	**Methane (CH4) Emission Factor (g/hr)[6]**	**N2O Emission Factor (g/hr)[6,8]**
Segment: Snug Harbor pump station and drains													
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	1	869	0	5	0	37	4	4	13,060	0.208	0.194
Pavers	Pavers	Nonroad Diesel Fuel	1	869	0	5	0	55	2	2	40,390	0.222	0.206
Paving Equipment	Paving Equipment	Nonroad Diesel Fuel	1	869	0	5	0	51	3	3	22,874	0.282	0.262
Rollers	Rollers	Nonroad Diesel Fuel	1	869	0	5	0	54	2	2	30,467	0.237	0.220
Cement and Mortar Mixers	Cement & Mortar Mixers	Nonroad Diesel Fuel	1	869	0	5	0	38	4	2	7,506	0.230	0.214
Segment: Valley pump station repairs													
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	1	869	0	3	2	37	4	4	13,060	0.208	0.194
Pavers	Pavers	Nonroad Diesel Fuel	2	869	0	3	2	55	2	2	40,390	0.222	0.206
Rollers	Rollers	Nonroad Diesel Fuel	1	869	0	3	2	54	2	2	30,467	0.237	0.220
Cement and Mortar Mixers	Cement & Mortar Mixers	Nonroad Diesel Fuel	1	869	0	3	2	38	4	2	7,506	0.230	0.214
Segment: North Street pump station, bulkheads, and piping													
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	1	869	0	0	5	37	4	4	13,060	0.208	0.194
Pavers	Pavers	Nonroad Diesel Fuel	1	869	0	0	5	55	2	2	40,390	0.222	0.206
Rollers	Rollers	Nonroad Diesel Fuel	1	869	0	0	5	54	2	2	30,467	0.237	0.220
Cement and Mortar Mixers	Cement & Mortar Mixers	Nonroad Diesel Fuel	1	869	0	0	5	38	4	2	7,506	0.230	0.214
Final Inspection & Project Closeout (2 months)													

On-road Equipment										
Construction Equipment	**MOVES5 Source Use Type**	**Fuel Type**	**Quantity[4]**	**2025 Project Total NOx Emissions (short tons)**	**2025 Project Total VOC Emissions (short tons)**	**2025 Project Total PM2.5 Emissions (short tons)**	**2025 Project Total CO2 Emissions (metric tons)**	**2025 Project Total CH4 Emissions (metric tons)**	**2025 Project Total N2O Emissions (metric tons)**	**2025 Project Total CO2e[7] Emissions (metric tons)**
Worker Pickup Trucks	Passenger Truck	Aggregated	22	<1	<1	<1	59	<1	<1	59
Flatbed Delivery Truck	Single Unit Short-haul Truck	Aggregated	---	<1	<1	<1	3	<1	<1	3
Vendor Asphalt/Concrete Truck	Single Unit Short-haul Truck	Aggregated	---	<1	<1	<1	<1	<1	<1	<1
Heavy Duty Dump Truck	Single Unit Short-haul Truck	Aggregated	---	<1	<1	<1	12	<1	<1	13
			On-Road Totals	**<1**	**<1**	**<1**	**75**	**<1**	**<1**	**76**

General Off-road Equipment										
Construction Equipment	**MOVES5 Equipment**	**Fuel Type**	**Quantity[5]**	**2025 Project Total NOx Emissions (short tons)**	**2025 Project Total VOC Emissions (short tons)**	**2025 Project Total PM2.5 Emissions (short tons)**	**2025 Project Total CO2 Emissions (metric tons)**	**2025 Project Total CH4 Emissions (metric tons)**	**2025 Project Total N2O Emissions (metric tons)**	**2025 Project Total CO2e[7] Emissions (metric tons)**
Construction Start (24 months)										
Segment: Monmouth Hills, basins, pipes, repairs, bio-swales										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	3	---	---	---	34	---	---	34
Crawler Tractor/Dozers	Crawler Tractor/Dozers	Nonroad Diesel Fuel	3	---	---	---	216	---	---	216
Graders	Graders	Nonroad Diesel Fuel	2	---	---	---	113	---	---	113
Scrapers	Scrapers	Nonroad Diesel Fuel	1	---	---	---	113	---	---	113
Excavators	Excavators	Nonroad Diesel Fuel	1	---	---	---	48	---	---	48
Rubber Tired Dozers	Crawler Tractor/Dozers	Nonroad Diesel Fuel	1	---	---	---	72	---	---	72
Segment: Snug Harbor pump station and drains										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Pavers	Pavers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Paving Equipment	Paving Equipment	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Rollers	Rollers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Cement and Mortar Mixers	Cement & Mortar Mixers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Segment: Valley pump station repairs										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Pavers	Pavers	Nonroad Diesel Fuel	2	---	---	---	---	---	---	---
Rollers	Rollers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Cement and Mortar Mixers	Cement & Mortar Mixers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Segment: North Street pump station, bulkheads, and piping										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Pavers	Pavers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Rollers	Rollers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Cement and Mortar Mixers	Cement & Mortar Mixers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Final Inspection & Project Closeout (2 months)										
Grant Closeout (1 months)										
			Off-Road Totals	**1**	**<1**	**<1**	**595**	**<1**	**<1**	**595**

On-road Equipment										
Construction Equipment	**MOVES5 Source Use Type**	**Fuel Type**	**Quantity[4]**	**2026 Project Total NOx Emissions (short tons)**	**2026 Project Total VOC Emissions (short tons)**	**2026 Project Total PM2.5 Emissions (short tons)**	**2026 Project Total CO2 Emissions (metric tons)**	**2026 Project Total CH4 Emissions (metric tons)**	**2026 Project Total N2O Emissions (metric tons)**	**2026 Project Total CO2e[7] Emissions (metric tons)**
Worker Pickup Trucks	Passenger Truck	Aggregated	22	<1	<1	<1	59	<1	<1	59
Flatbed Delivery Truck	Single Unit Short-haul Truck	Aggregated	---	<1	<1	<1	3	<1	<1	3
Vendor Asphalt/Concrete Truck	Single Unit Short-haul Truck	Aggregated	---	<1	<1	<1	<1	<1	<1	**<1**
Heavy Duty Dump Truck	Single Unit Short-haul Truck	Aggregated	---	<1	<1	<1	12	<1	<1	13
			On-Road Totals	**<1**	**<1**	**<1**	**75**	0	0	**76**

General Off-road Equipment										
Construction Equipment	**MOVES5 Equipment**	**Fuel Type**	**Quantity[5]**	**2026 Project Total NOx Emissions (short tons)**	**2026 Project Total VOC Emissions (short tons)**	**2026 Project Total PM2.5 Emissions (short tons)**	**2026 Project Total CO2 Emissions (metric tons)**	**2026 Project Total CH4 Emissions (metric tons)**	**2026 Project Total N2O Emissions (metric tons)**	**2026 Project Total CO2e[7] Emissions (metric tons)**
Construction Start (24 months)										
Segment: Monmouth Hills, basins, pipes, repairs, bio-swales										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	3	<1	<1	<1	27	<1	<1	27
Crawler Tractor/Dozers	Crawler Tractor/Dozers	Nonroad Diesel Fuel	3	<1	<1	<1	173	<1	<1	173
Graders	Graders	Nonroad Diesel Fuel	2	<1	<1	<1	90	<1	<1	90
Scrapers	Scrapers	Nonroad Diesel Fuel	1	<1	<1	<1	90	<1	<1	90
Excavators	Excavators	Nonroad Diesel Fuel	1	<1	<1	<1	38	<1	<1	38
Rubber Tired Dozers	Crawler Tractor/Dozers	Nonroad Diesel Fuel	1	<1	<1	<1	58	<1	<1	58
Segment: Snug Harbor pump station and drains										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	1	<1	<1	<1	11	<1	<1	11
Pavers	Pavers	Nonroad Diesel Fuel	1	<1	<1	<1	35	<1	<1	35
Paving Equipment	Paving Equipment	Nonroad Diesel Fuel	1	<1	<1	<1	20	<1	<1	20
Rollers	Rollers	Nonroad Diesel Fuel	1	<1	<1	<1	26	<1	<1	27
Cement and Mortar Mixers	Cement & Mortar Mixers	Nonroad Diesel Fuel	1	<1	<1	<1	7	<1	<1	7
Segment: Valley pump station repairs										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	1	<1	<1	<1	7	<1	<1	7
Pavers	Pavers	Nonroad Diesel Fuel	2	<1	<1	<1	42	<1	<1	42
Rollers	Rollers	Nonroad Diesel Fuel	1	<1	<1	<1	16	<1	<1	16
Cement and Mortar Mixers	Cement & Mortar Mixers	Nonroad Diesel Fuel	1	<1	<1	<1	4	<1	<1	4
Segment: North Street pump station, bulkheads, and piping										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Pavers	Pavers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Rollers	Rollers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Cement and Mortar Mixers	Cement & Mortar Mixers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Final Inspection & Project Closeout (2 months)										
Grant Closeout (1 months)										
			Off-Road Totals	**1**	**<1**	**<1**	**644**	**<1**	**<1**	**645**

On-road Equipment										
Construction Equipment	**MOVES5 Source Use Type**	**Fuel Type**	**Quantity[4]**	**2027 Project Total NOx Emissions (short tons)**	**2027 Project Total VOC Emissions (short tons)**	**2027 Project Total PM2.5 Emissions (short tons)**	**2027 Project Total CO2 Emissions (metric tons)**	**2027 Project Total CH4 Emissions (metric tons)**	**2027 Project Total N2O Emissions (metric tons)**	**2027 Project Total CO2e[7] Emissions (metric tons)**
Worker Pickup Trucks	Passenger Truck	Aggregated	22	<1	<1	<1	59	<1	<1	59
Flatbed Delivery Truck	Single Unit Short-haul Truck	Aggregated	---	<1	<1	<1	3	<1	<1	3
Vendor Asphalt/Concrete Truck	Single Unit Short-haul Truck	Aggregated	---	<1	<1	<1	<1	<1	<1	<1
Heavy Duty Dump Truck	Single Unit Short-haul Truck	Aggregated	---	<1	<1	<1	12	<1	<1	13
			On-Road Totals	**<1**	**<1**	**<1**	**75**	**<1**	**<1**	**76**

General Off-road Equipment										
Construction Equipment	**MOVES5 Equipment**	**Fuel Type**	**Quantity[5]**	**2027 Project Total NOx Emissions (short tons)**	**2027 Project Total VOC Emissions (short tons)**	**2027 Project Total PM2.5 Emissions (short tons)**	**2027 Project Total CO2 Emissions (metric tons)**	**2027 Project Total CH4 Emissions (metric tons)**	**2027 Project Total N2O Emissions (metric tons)**	**2027 Project Total CO2e[7] Emissions (metric tons)**
Construction Start (24 months)										
Segment: Monmouth Hills, basins, pipes, repairs, bio-swales										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	3	---	---	---	---	---	---	---
Crawler Tractor/Dozers	Crawler Tractor/Dozers	Nonroad Diesel Fuel	3	---	---	---	---	---	---	---
Graders	Graders	Nonroad Diesel Fuel	2	---	---	---	---	---	---	---
Scrapers	Scrapers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Excavators	Excavators	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Rubber Tired Dozers	Crawler Tractor/Dozers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Segment: Snug Harbor pump station and drains										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Pavers	Pavers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Paving Equipment	Paving Equipment	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Rollers	Rollers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Cement and Mortar Mixers	Cement & Mortar Mixers	Nonroad Diesel Fuel	1	---	---	---	---	---	---	---
Segment: Valley pump station repairs										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	1	<1	<1	<1	5	<1	<1	5
Pavers	Pavers	Nonroad Diesel Fuel	2	<1	<1	<1	28	<1	<1	28
Rollers	Rollers	Nonroad Diesel Fuel	1	<1	<1	<1	11	<1	<1	11
Cement and Mortar Mixers	Cement & Mortar Mixers	Nonroad Diesel Fuel	1	<1	<1	<1	3	<1	<1	3
Segment: North Street pump station, bulkheads, and piping										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	1	<1	<1	<1	11	<1	<1	11
Pavers	Pavers	Nonroad Diesel Fuel	1	<1	<1	<1	35	<1	<1	35
Rollers	Rollers	Nonroad Diesel Fuel	1	<1	<1	<1	26	<1	<1	27
Cement and Mortar Mixers	Cement & Mortar Mixers	Nonroad Diesel Fuel	1	<1	<1	<1	7	<1	<1	7
Final Inspection & Project Closeout (2 months)										
Grant Closeout (1 months)										
			Off-Road Totals	**<1**	**<1**	**<1**	**125**	**<1**	**<1**	**126**

On-road Equipment										
Construction Equipment	**MOVES5 Source Use Type**	**Fuel Type**	**Quantity[4]**	**Total NOx Emissions (short tons)**	**Total VOC Emissions (short tons)**	**Total PM2.5 Emissions (short tons)**	**Total CO2 Emissions (metric tons)**	**Total CH4 Emissions (metric tons)**	**Total N2O Emissions (metric tons)**	**Total CO2e Emissions (metric tons)**
Worker Pickup Trucks	Passenger Truck	Aggregated	22	<1	<1	<1	177	<1	<1	178
Flatbed Delivery Truck	Single Unit Short-haul Truck	Aggregated	---	<1	<1	<1	10	<1	<1	10
Vendor Asphalt/Concrete Truck	Single Unit Short-haul Truck	Aggregated	---	<1	<1	<1	<1	<1	<1	<1
Heavy Duty Dump Truck	Single Unit Short-haul Truck	Aggregated	---	<1	<1	<1	37	<1	<1	38
			On-Road Totals	**<1**	**<1**	**<1**	**224**	**<1**	**<1**	**227**

General Off-road Equipment										
Construction Equipment	**MOVES5 Equipment**	**Fuel Type**	**Quantity[5]**	**Total NOx Emissions (short tons)**	**Total VOC Emissions (short tons)**	**Total PM2.5 Emissions (short tons)**	**Total CO2 Emissions (metric tons)**	**Total CH4 Emissions (metric tons)**	**Total N2O Emissions (metric tons)**	**Total CO2e Emissions (metric tons)**
Construction Start (24 months)										
Segment: Monmouth Hills, basins, pipes, repairs, bio-swales										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	3	<1	<1	<1	61	<1	<1	62
Crawler Tractor/Dozers	Crawler Tractor/Dozers	Nonroad Diesel Fuel	3	1	<1	<1	388	<1	<1	389
Graders	Graders	Nonroad Diesel Fuel	2	<1	<1	<1	203	<1	<1	203
Scrapers	Scrapers	Nonroad Diesel Fuel	1	<1	<1	<1	203	<1	<1	203
Excavators	Excavators	Nonroad Diesel Fuel	1	<1	<1	<1	86	<1	<1	86
Rubber Tired Dozers	Crawler Tractor/Dozers	Nonroad Diesel Fuel	1	<1	<1	<1	129	<1	<1	130
Segment: Snug Harbor pump station and drains										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	1	<1	<1	<1	11	<1	<1	11
Pavers	Pavers	Nonroad Diesel Fuel	1	<1	<1	<1	35	<1	<1	35
Paving Equipment	Paving Equipment	Nonroad Diesel Fuel	1	<1	<1	<1	20	<1	<1	20
Rollers	Rollers	Nonroad Diesel Fuel	1	<1	<1	<1	26	<1	<1	27
Cement and Mortar Mixers	Cement & Mortar Mixers	Nonroad Diesel Fuel	1	<1	<1	<1	7	<1	<1	7
Segment: Valley pump station repairs										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	1	<1	<1	<1	11	<1	<1	11
Pavers	Pavers	Nonroad Diesel Fuel	2	<1	<1	<1	70	<1	<1	70
Rollers	Rollers	Nonroad Diesel Fuel	1	<1	<1	<1	26	<1	<1	27
Cement and Mortar Mixers	Cement & Mortar Mixers	Nonroad Diesel Fuel	1	<1	<1	<1	7	<1	<1	7
Segment: North Street pump station, bulkheads, and piping										
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	1	<1	<1	<1	11	<1	<1	11
Pavers	Pavers	Nonroad Diesel Fuel	1	<1	<1	<1	35	<1	<1	35
Rollers	Rollers	Nonroad Diesel Fuel	1	<1	<1	<1	26	<1	<1	27
Cement and Mortar Mixers	Cement & Mortar Mixers	Nonroad Diesel Fuel	1	<1	<1	<1	7	<1	<1	7
Final Inspection & Project Closeout (2 months)										
Grant Closeout (1 months)										
			Off-Road Totals	**2**	**<1**	**<1**	**1,364**	**<1**	**<1**	**1,366**

Global Warming Potentials to Convert to CO2e			
Greenhouse Gas	**CO2**	**CH4**	**N2O**
100-Year Global Warming Potential[9]	1	28	265

Source: IPCC Fifth Assessment Report Global Warming Potentials (Box 3.2, Table 1)

https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf

Notes:

1. Construction schedule was provided in the EMN-2022-BR-002-0033_FEMAGO - Subapplication.pdf file.
2. 20 miles is the industry standard for trip distance. This is conservative considering the location of the project is within an urbanized area.
3. The project area does not contain any known contaminated materials. There are 5 hazardous waste facilities present within a 0.5-mile radius of the project area. Assume 20 miles for waste hauling trip distance.
4. Quantities of equipment were based on best engineering judgment.
5. The annual duration of each construction phase has been provided to reflect the corresponding emissions factor, where applicable. No detailed schedule was provided for Worker Pickup Trucks, Flatbed Delivery Trucks, Vendor Asphalt/Concrete Trucks, or Heavy Duty Dump Trucks. The duration was assumed to be evenly distributed throughout the project duration
6. The 2025 emission factors were used to conservatively estimate the project GHG emissions, as well as to represent the earliest year construction could commence.
7. CO2e is the mass of CO2 emissions with the same global warming potential as one unit of mass of another greenhouse gas.
8. MOVES does not calculate N2O Factors for off-road (non-road) equipment. Estimated N2O emission values are based on EPA 2024 GHG Emission Factors Hub, Table 5 Mobile Construction CH4 and N2O for Non-Road Vehicles.
9. The EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks complies with international GHG reporting standards under the United Nations Framework Convention on Climate Change (UNFCCC). UNFCCC guidelines now require the use of the GWP values from the IPCC's Fifth Assessment Report (AR5), published in 2013. Available at: https://www.epa.gov/ghgemissions/understanding-global-warming-potentials
10. Social Cost of Greenhouse Gases was calculated using the EPA's online calculator tool. Available at: https://www.epa.gov/environmental-economics/scghg

Monmouth, New Jersey

Hauling Truck Trips

Estimate of Costs - Amended - FEMA Response[1]								
Pay Item	Description	Quantity		Unit Price	Cost	Trip Category	Round-Trip Count	Notes
I. Monmouth Hills Storm Water Structures & Non-structural Features including three basins, rip rap flume w/bio-retention, and multiple GI Efforts:							Count	
1	INLET PROTECTION	10	EACH	$75.00	$750.00	N/A	N/A	No significiant trips associated with line item
2	HEAVY DUTY SILT FENCE	1200	LF	$4.00	$4,800.00	Additional Vendor Trip	1	
3	TRAFFIC CONTROL, COMPLETE	1	EACH	$15,000.00	$15,000.00	N/A	N/A	Not applicable
4	TRAFFIC CONTROL OFFICERS	80	HOUR	$95.00	$7,600.00	N/A	N/A	Not applicable
5	NO ITEM	0		---	$0.00	N/A	N/A	Not applicable
6	NO ITEM				$0.00	N/A	N/A	Not applicable
7	CLEARING SITE	1	EACH	$70,000.00	$70,000.00	N/A	N/A	Not applicable
8	TREE CLEARING, FLUME & BASIN Nos. 1, 2 & 3	8	AC	$8,000.00	$64,000.00	N/A	N/A	Assume cleared trees are reused/disposed on site
9	FUEL PRICE ADJUSTMENT	1	EACH	$5,000.00	$5,000.00	N/A	N/A	Not applicable
10	EXCAVATION, TEST PITS	20	CY	$100.00	$2,000.00	Waste Hauling	2	
11	EXCAVATION, UNCLASSIFIED	200	CY	$40.00	$8,000.00	Waste Hauling	13	
12	NO ITEM	0	CY	---	$0.00	N/A	N/A	Not applicable
13	NO ITEM	0	CY	---	$0.00	N/A	N/A	Not applicable
14	BASIN EXCAVATION, BASIN No. 1	1500	CY	$20.00	$30,000.00	Waste Hauling	94	
15	BASIN EXCAVATION, BASIN No. 2	1400	CY	$20.00	$28,000.00	Waste Hauling	88	
16	BASIN EXCAVATION, BASIN No. 3	2200	CY	$20.00	$44,000.00	Waste Hauling	138	
17	CLEARING/EXCAVATION, VALLEY DRIVE FLUME *	3800	CY	$50.00	$190,000.00	Waste Hauling	238	
18	NO ITEM	0	-	---	$0.00	N/A	N/A	Not applicable
19	FINE GRADING, BASINS & FLUME *	15000	SY	$12.00	$180,000.00	N/A	N/A	No significiant trips associated with line item
20	SELECT FILL (IAWD)	100	CY	$25.00	$2,500.00	Vendor Hauling	7	
21	STONE BEDDING, PIPE	200	CY	$40.00	$8,000.00	Vendor Hauling	13	
22	DENSE GRADED AGGREGATE BASE COURSE, 6" THICK	200	SY	$22.00	$4,400.00	Vendor Hauling	3	
23	MILLING, 3" OR LESS	500	SY	$40.00	$20,000.00	N/A	N/A	No significiant trips associated with line item
24	HOT MIX ASPHALT 25M64 BASE COURSE, 6" THICK	500	SY	$60.00	$30,000.00	Vendor Hauling	9	Asphalt/Concrete
25	HOT MIX ASPHALT 9.5M64 SURFACE COURSE, 2" THICK	500	SY	$50.00	$25,000.00	Vendor Hauling	3	Asphalt/Concrete
26	FLEXA-MAT SWALE STABILIZATION, FLUMES *	7500	SY	$20.00	$150,000.00	Additional Vendor Trip	88	Assumed 4 mats were stacked per trip
27	ENVIRO-BAG SLOPE / SURFACE STABILIZATION *	5000	SF	$40.00	$200,000.00	Additional Vendor Trip	27	Assumed 9 bags were stacked per trip
28	GRANITE ROCK CHECK DAMS, FLUME, COMPLETE *	5	EACH	$3,000.00	$15,000.00	N/A	N/A	No significiant trips associated with line item
29	RIP-RAP CHANNEL PROTECTION, D50=8", 18" TH	350	SY	$100.00	$35,000.00	N/A	N/A	No significiant trips associated with line item
30	BIO-SWALE STABILIz MATTING - SERPENTINE SWALE *	1200	SY	$25.00	$30,000.00	Additional Vendor Trip	15	Assumed 4 mats were stacked per trip
31	STABILIZED ACCESS SURFACE, 4" TH	250	SY	$30.00	$7,500.00	Additional Vendor Trip	1	
32	PIPE BEDDING, TYPE C (IF WARRANTED)	600	CY	$25.00	$15,000.00	Vendor Hauling	38	
33	16" DI CULVERT PIPE	200	LF	$200.00	$40,000.00	Additional Vendor Trip	2	
34	24" DI CULVERT PIPE	250	LF	$220.00	$55,000.00	Additional Vendor Trip	3	
35	24" POLYPROPYLENE CULVERT PIPE	1000	LF	$160.00	$160,000.00	Additional Vendor Trip	11	
36	36" POLYPROPYLENE CULVERT PIPE	400	LF	$240.00	$96,000.00	Additional Vendor Trip	7	
37	STILLING BASIN, PRE-CAST CONCRETE	1	EACH	$22,000.00	$22,000.00	Additional Vendor Trip	1	
38	STORM MANHOLES, 5' DIA.	4	EACH	$10,000.00	$40,000.00	Additional Vendor Trip	4	
39	INLETS, TYPE 'B'	6	EACH	$6,500.00	$39,000.00	Additional Vendor Trip	1	
40	INLETS, TYPE 'DOUBLE B'	4	EACH	$9,000.00	$36,000.00	Additional Vendor Trip	2	
41	MTD UNIT, TSS REMOVAL SYSTEM *	1	EACH	$40,000.00	$40,000.00	Additional Vendor Trip	1	
42	24" CONCRETE HEADWALLS	6	EACH	$3,500.00	$21,000.00	Additional Vendor Trip	6	Assumed headwalls are precast.
43	36" CONCRETE HEADWALLS	4	EACH	$5,000.00	$20,000.00	Additional Vendor Trip	4	Assumed headwalls are precast.
44	OUTLET CONTROL STRUCTURES, COMPLETE	3	EACH	$8,000.00	$24,000.00	Additional Vendor Trip	1	
45	R/R CONCRETE SIDEWALK, 4" THICK	200	SY	$100.00	$20,000.00	Waste Hauling	5	R/R = Remove and Replace
46	DETECTABLE WARNING SURFACE (IAWD)	40	SF	$80.00	$3,200.00	Additional Vendor Trip	1	
47	CRUSHED STONE	250	TON	$30.00	$7,500.00	Vendor Hauling	12	Assumed density of stone 1.4 tons/cubic yards
48	6"X8"X18 CONCRETE VERTICAL CURB	150	LF	$50.00	$7,500.00	Vendor Hauling	1	Asphalt/Concrete
49	R/R CONCRETE DRIVEWAY, REINFORCED, 6" THK	80	SY	$120.00	$9,600.00	Waste Hauling	3	R/R = Remove and Replace
50	R/R 6" x 8"x 18" CONCRETE VERTICAL CURB	100	LF	$60.00	$6,000.00	Waste Hauling	2	R/R = Remove and Replace
51	K-5 SAND DRAINAGE LAYER	4000	SY	$8.00	$32,000.00	Vendor Hauling	84	Assumed 1 foot drainage layer
52	TALL GRASSES - VALLEY DRIVE FLUME STABILIZATION *	2000	EACH	$15.00	$30,000.00	Additional Vendor Trip	84	
53	3-RAIL POST & RAIL FENCING, PVC, 48" HIGH	800	LF	$20.00	$16,000.00	Additional Vendor Trip	17	
54	GATES, PVC, 48" HIGH	4	EACH	$300.00	$1,200.00	Additional Vendor Trip	1	
55	TOPSOIL, 5" TH., SEED & MULCHING	35000	SY	$6.00	$210,000.00	Vendor Hauling	304	
56	SHRUBS, 4 FT- 6 FT HEIGHT	50	EACH	$200.00	$10,000.00	Additional Vendor Trip	13	
57	BIO-RETENTION PLANT MATERIAL, COMPLETE	6000	SF	$10.00	$60,000.00	Vendor Hauling	14	
58	RESTORATION, COMPLETE	1	EACH	$40,000.00	$40,000.00	N/A	N/A	No significiant trips associated with line item
59	AS-BUILTS	1	EACH	$8,000.00	$8,000.00	N/A	N/A	No significiant trips associated with line item
60	FINAL CLEANUP	1	EACH	$5,000.00	$5,000.00	N/A	N/A	No significiant trips associated with line item
I. Monmouth Hills Storm Water Structures & Non-Structural:					$2,250,550.00			

Notes:

1. Estimate of Costs are found in the "231027 estimate for FEMA.pdf" file.
2. 16 cubic yards is the industry standard for hauling truck capacity.
3. 10 cubic yards is the industry standard for asphalt/concrete truck capacity.

Assumptions:

16 Volume of Hauling Truck[2] (cubic yards)

10 Volume of Concrete/Asphalt Truck[3] (cubic yards)

MOVES Onroad

Calendar_Year	State	County	Vehicle_Type	Fuel_Type	Pollutant	Emission_Factor	Units
2025	NJ	Monmouth County	Passenger Truck	Aggregated	Atmospheric CO2	3.86E+02	g/mi
2025	NJ	Monmouth County	Passenger Truck	Aggregated	CO2 Equivalent	3.88E+02	g/mi
2025	NJ	Monmouth County	Passenger Truck	Aggregated	Methane (CH4)	1.64E-02	g/mi
2025	NJ	Monmouth County	Passenger Truck	Aggregated	N2O	7.47E-03	g/mi
2025	NJ	Monmouth County	Passenger Truck	Aggregated	NOx	2.24E-01	g/mi
2025	NJ	Monmouth County	Passenger Truck	Aggregated	PM2.5 Total Exh	5.87E-03	g/mi
2025	NJ	Monmouth County	Passenger Truck	Aggregated	PM2.5 Brakewear	1.37E-03	g/mi
2025	NJ	Monmouth County	Passenger Truck	Aggregated	PM2.5 Tirewear	1.11E-03	g/mi
2025	NJ	Monmouth County	Passenger Truck	Aggregated	VOC	2.25E-01	g/mi
2025	NJ	Monmouth County	Single Unit Short-haul Truck	Aggregated	Atmospheric CO2	8.69E+02	g/mi
2025	NJ	Monmouth County	Single Unit Short-haul Truck	Aggregated	CO2 Equivalent	8.96E+02	g/mi
2025	NJ	Monmouth County	Single Unit Short-haul Truck	Aggregated	Methane (CH4)	1.13E-01	g/mi
2025	NJ	Monmouth County	Single Unit Short-haul Truck	Aggregated	N2O	8.89E-02	g/mi
2025	NJ	Monmouth County	Single Unit Short-haul Truck	Aggregated	NOx	1.01E+00	g/mi
2025	NJ	Monmouth County	Single Unit Short-haul Truck	Aggregated	PM2.5 Total Exh	2.53E-02	g/mi
2025	NJ	Monmouth County	Single Unit Short-haul Truck	Aggregated	PM2.5 Brakewear	8.35E-03	g/mi
2025	NJ	Monmouth County	Single Unit Short-haul Truck	Aggregated	PM2.5 Tirewear	1.85E-03	g/mi
2025	NJ	Monmouth County	Single Unit Short-haul Truck	Aggregated	VOC	3.32E-01	g/mi

MOVES Nonroad

yearID	stateAb	countyName	equipDescription	fuelTypeName	pollutantName	emissionRate	emissionRateUnits
2025	NJ	Monmouth County	Air Compressors	Compressed Natural Gas (CNG)	Atmospheric CO2	2.99E+04	g/hr
2025	NJ	Monmouth County	Air Compressors	Compressed Natural Gas (CNG)	Brake Specific Fuel Consumption (BSFC)	1.15E+04	g/hr
2025	NJ	Monmouth County	Air Compressors	Compressed Natural Gas (CNG)	Methane (CH4)	1.23E+02	g/hr
2025	NJ	Monmouth County	Air Compressors	Compressed Natural Gas (CNG)	Non-Methane Hydrocarbons	1.58E+01	g/hr
2025	NJ	Monmouth County	Air Compressors	Compressed Natural Gas (CNG)	Oxides of Nitrogen (NOx)	6.17E+01	g/hr
2025	NJ	Monmouth County	Air Compressors	Compressed Natural Gas (CNG)	Primary Exhaust PM2.5 - Total	3.61E+00	g/hr
2025	NJ	Monmouth County	Air Compressors	Compressed Natural Gas (CNG)	Total Gaseous Hydrocarbons	1.39E+02	g/hr
2025	NJ	Monmouth County	Air Compressors	Compressed Natural Gas (CNG)	Volatile Organic Compounds	2.66E+01	g/hr
2025	NJ	Monmouth County	Air Compressors	Gasoline	Atmospheric CO2	6.49E+03	g/hr
2025	NJ	Monmouth County	Air Compressors	Gasoline	Brake Specific Fuel Consumption (BSFC)	2.06E+03	g/hr
2025	NJ	Monmouth County	Air Compressors	Gasoline	Methane (CH4)	3.76E+00	g/hr
2025	NJ	Monmouth County	Air Compressors	Gasoline	Non-Methane Hydrocarbons	3.24E+01	g/hr
2025	NJ	Monmouth County	Air Compressors	Gasoline	Oxides of Nitrogen (NOx)	1.35E+01	g/hr
2025	NJ	Monmouth County	Air Compressors	Gasoline	Primary Exhaust PM2.5 - Total	9.53E-01	g/hr
2025	NJ	Monmouth County	Air Compressors	Gasoline	Total Gaseous Hydrocarbons	3.62E+01	g/hr
2025	NJ	Monmouth County	Air Compressors	Gasoline	Volatile Organic Compounds	3.32E+01	g/hr
2025	NJ	Monmouth County	Air Compressors	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	1.94E+04	g/hr
2025	NJ	Monmouth County	Air Compressors	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	6.48E+03	g/hr
2025	NJ	Monmouth County	Air Compressors	Liquefied Petroleum Gas (LPG)	Methane (CH4)	9.04E-01	g/hr
2025	NJ	Monmouth County	Air Compressors	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	4.09E+00	g/hr
2025	NJ	Monmouth County	Air Compressors	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	3.33E+01	g/hr
2025	NJ	Monmouth County	Air Compressors	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	2.03E+00	g/hr
2025	NJ	Monmouth County	Air Compressors	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	5.00E+00	g/hr
2025	NJ	Monmouth County	Air Compressors	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	3.95E+00	g/hr
2025	NJ	Monmouth County	Air Compressors	Nonroad Diesel Fuel	Atmospheric CO2	2.05E+04	g/hr
2025	NJ	Monmouth County	Air Compressors	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	6.41E+03	g/hr
2025	NJ	Monmouth County	Air Compressors	Nonroad Diesel Fuel	Methane (CH4)	2.34E-01	g/hr
2025	NJ	Monmouth County	Air Compressors	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	2.04E+00	g/hr
2025	NJ	Monmouth County	Air Compressors	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	5.94E+01	g/hr
2025	NJ	Monmouth County	Air Compressors	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	2.09E+00	g/hr
2025	NJ	Monmouth County	Air Compressors	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	2.28E+00	g/hr
2025	NJ	Monmouth County	Air Compressors	Nonroad Diesel Fuel	Volatile Organic Compounds	2.46E+00	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Gasoline	Atmospheric CO2	3.06E+03	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Gasoline	Brake Specific Fuel Consumption (BSFC)	9.73E+02	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Gasoline	Methane (CH4)	2.02E+00	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Gasoline	Non-Methane Hydrocarbons	1.84E+01	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Gasoline	Oxides of Nitrogen (NOx)	8.19E+00	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Gasoline	Primary Exhaust PM2.5 - Total	5.86E-01	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Gasoline	Total Gaseous Hydrocarbons	2.04E+01	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Gasoline	Volatile Organic Compounds	1.88E+01	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	3.54E+04	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	1.18E+04	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Liquefied Petroleum Gas (LPG)	Methane (CH4)	9.63E+00	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	4.36E+01	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	2.02E+02	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	3.49E+00	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	5.32E+01	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	4.20E+01	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Nonroad Diesel Fuel	Atmospheric CO2	4.07E+04	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	1.28E+04	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Nonroad Diesel Fuel	Methane (CH4)	5.14E-01	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	8.25E+00	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	1.62E+02	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	6.90E+00	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	8.76E+00	g/hr
2025	NJ	Monmouth County	Bore/Drill Rigs	Nonroad Diesel Fuel	Volatile Organic Compounds	9.48E+00	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Gasoline	Atmospheric CO2	4.81E+03	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Gasoline	Brake Specific Fuel Consumption (BSFC)	1.53E+03	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Gasoline	Methane (CH4)	3.22E+00	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Gasoline	Non-Methane Hydrocarbons	3.56E+01	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Gasoline	Oxides of Nitrogen (NOx)	9.74E+00	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Gasoline	Primary Exhaust PM2.5 - Total	6.49E-01	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Gasoline	Total Gaseous Hydrocarbons	3.88E+01	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Gasoline	Volatile Organic Compounds	3.63E+01	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Nonroad Diesel Fuel	Atmospheric CO2	7.51E+03	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	2.36E+03	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Nonroad Diesel Fuel	Methane (CH4)	2.30E-01	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	3.23E+00	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	3.81E+01	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	2.10E+00	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	3.46E+00	g/hr
2025	NJ	Monmouth County	Cement & Mortar Mixers	Nonroad Diesel Fuel	Volatile Organic Compounds	3.78E+00	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Gasoline	Atmospheric CO2	4.67E+03	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Gasoline	Brake Specific Fuel Consumption (BSFC)	1.60E+03	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Gasoline	Methane (CH4)	4.83E+00	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Gasoline	Non-Methane Hydrocarbons	1.36E+02	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Gasoline	Oxides of Nitrogen (NOx)	1.01E+01	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Gasoline	Primary Exhaust PM2.5 - Total	1.83E+01	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Gasoline	Total Gaseous Hydrocarbons	1.41E+02	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Gasoline	Volatile Organic Compounds	1.43E+02	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	1.97E+04	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	6.58E+03	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Liquefied Petroleum Gas (LPG)	Methane (CH4)	9.24E-01	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	4.18E+00	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	3.34E+01	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	2.10E+00	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	5.11E+00	g/hr

MOVES Nonroad

yearID	stateAb	countyName	equipDescription	fuelTypeName	pollutantName	emissionRate	emissionRateUnits
2025	NJ	Monmouth County	Concrete/Industrial Saws	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	4.04E+00	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Nonroad Diesel Fuel	Atmospheric CO2	1.66E+04	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	5.20E+03	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Nonroad Diesel Fuel	Methane (CH4)	2.84E-01	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	2.19E+00	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	6.02E+01	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	2.09E+00	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	2.47E+00	g/hr
2025	NJ	Monmouth County	Concrete/Industrial Saws	Nonroad Diesel Fuel	Volatile Organic Compounds	2.68E+00	g/hr
2025	NJ	Monmouth County	Cranes	Gasoline	Atmospheric CO2	1.71E+04	g/hr
2025	NJ	Monmouth County	Cranes	Gasoline	Brake Specific Fuel Consumption (BSFC)	5.39E+03	g/hr
2025	NJ	Monmouth County	Cranes	Gasoline	Methane (CH4)	3.57E+00	g/hr
2025	NJ	Monmouth County	Cranes	Gasoline	Non-Methane Hydrocarbons	3.27E+01	g/hr
2025	NJ	Monmouth County	Cranes	Gasoline	Oxides of Nitrogen (NOx)	4.10E+01	g/hr
2025	NJ	Monmouth County	Cranes	Gasoline	Primary Exhaust PM2.5 - Total	1.59E+00	g/hr
2025	NJ	Monmouth County	Cranes	Gasoline	Total Gaseous Hydrocarbons	3.63E+01	g/hr
2025	NJ	Monmouth County	Cranes	Gasoline	Volatile Organic Compounds	3.34E+01	g/hr
2025	NJ	Monmouth County	Cranes	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	1.96E+04	g/hr
2025	NJ	Monmouth County	Cranes	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	6.54E+03	g/hr
2025	NJ	Monmouth County	Cranes	Liquefied Petroleum Gas (LPG)	Methane (CH4)	1.70E+00	g/hr
2025	NJ	Monmouth County	Cranes	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	7.71E+00	g/hr
2025	NJ	Monmouth County	Cranes	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	4.72E+01	g/hr
2025	NJ	Monmouth County	Cranes	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	2.04E+00	g/hr
2025	NJ	Monmouth County	Cranes	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	9.41E+00	g/hr
2025	NJ	Monmouth County	Cranes	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	7.44E+00	g/hr
2025	NJ	Monmouth County	Cranes	Nonroad Diesel Fuel	Atmospheric CO2	5.30E+04	g/hr
2025	NJ	Monmouth County	Cranes	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	1.66E+04	g/hr
2025	NJ	Monmouth County	Cranes	Nonroad Diesel Fuel	Methane (CH4)	2.91E-01	g/hr
2025	NJ	Monmouth County	Cranes	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	2.77E+00	g/hr
2025	NJ	Monmouth County	Cranes	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	6.47E+01	g/hr
2025	NJ	Monmouth County	Cranes	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	2.74E+00	g/hr
2025	NJ	Monmouth County	Cranes	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	3.07E+00	g/hr
2025	NJ	Monmouth County	Cranes	Nonroad Diesel Fuel	Volatile Organic Compounds	3.30E+00	g/hr
2025	NJ	Monmouth County	Crawler Tractor/Dozers	Nonroad Diesel Fuel	Atmospheric CO2	8.27E+04	g/hr
2025	NJ	Monmouth County	Crawler Tractor/Dozers	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	2.59E+04	g/hr
2025	NJ	Monmouth County	Crawler Tractor/Dozers	Nonroad Diesel Fuel	Methane (CH4)	3.54E-01	g/hr
2025	NJ	Monmouth County	Crawler Tractor/Dozers	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	3.52E+00	g/hr
2025	NJ	Monmouth County	Crawler Tractor/Dozers	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	1.04E+02	g/hr
2025	NJ	Monmouth County	Crawler Tractor/Dozers	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	4.17E+00	g/hr
2025	NJ	Monmouth County	Crawler Tractor/Dozers	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	3.88E+00	g/hr
2025	NJ	Monmouth County	Crawler Tractor/Dozers	Nonroad Diesel Fuel	Volatile Organic Compounds	4.19E+00	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Gasoline	Atmospheric CO2	7.13E+03	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Gasoline	Brake Specific Fuel Consumption (BSFC)	2.28E+03	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Gasoline	Methane (CH4)	5.18E+00	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Gasoline	Non-Methane Hydrocarbons	4.90E+01	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Gasoline	Oxides of Nitrogen (NOx)	1.50E+01	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Gasoline	Primary Exhaust PM2.5 - Total	2.87E+00	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Gasoline	Total Gaseous Hydrocarbons	5.42E+01	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Gasoline	Volatile Organic Compounds	5.06E+01	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	2.95E+04	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	9.85E+03	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Liquefied Petroleum Gas (LPG)	Methane (CH4)	2.35E+00	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	1.06E+01	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	6.72E+01	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	3.08E+00	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	1.30E+01	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	1.03E+01	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Nonroad Diesel Fuel	Atmospheric CO2	3.58E+04	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	1.12E+04	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Nonroad Diesel Fuel	Methane (CH4)	3.26E-01	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	2.61E+00	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	7.70E+01	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	2.33E+00	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	2.94E+00	g/hr
2025	NJ	Monmouth County	Crushing/Proc. Equipment	Nonroad Diesel Fuel	Volatile Organic Compounds	3.15E+00	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Gasoline	Atmospheric CO2	4.15E+03	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Gasoline	Brake Specific Fuel Consumption (BSFC)	1.32E+03	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Gasoline	Methane (CH4)	2.72E+00	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Gasoline	Non-Methane Hydrocarbons	3.05E+01	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Gasoline	Oxides of Nitrogen (NOx)	8.83E+00	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Gasoline	Primary Exhaust PM2.5 - Total	4.64E-01	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Gasoline	Total Gaseous Hydrocarbons	3.33E+01	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Gasoline	Volatile Organic Compounds	3.11E+01	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Nonroad Diesel Fuel	Atmospheric CO2	4.76E+03	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	1.49E+03	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Nonroad Diesel Fuel	Methane (CH4)	1.64E-01	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	3.01E+00	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	2.33E+01	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	2.20E+00	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	3.17E+00	g/hr
2025	NJ	Monmouth County	Dumpers/Tenders	Nonroad Diesel Fuel	Volatile Organic Compounds	3.45E+00	g/hr
2025	NJ	Monmouth County	Excavators	Nonroad Diesel Fuel	Atmospheric CO2	5.47E+04	g/hr
2025	NJ	Monmouth County	Excavators	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	1.72E+04	g/hr
2025	NJ	Monmouth County	Excavators	Nonroad Diesel Fuel	Methane (CH4)	1.48E-01	g/hr
2025	NJ	Monmouth County	Excavators	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	1.54E+00	g/hr
2025	NJ	Monmouth County	Excavators	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	3.97E+01	g/hr
2025	NJ	Monmouth County	Excavators	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	1.61E+00	g/hr

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yearID	stateAb	countyName	equipDescription	fuelTypeName	pollutantName	emissionRate	emissionRateUnits
2025	NJ	Monmouth County	Excavators	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	1.69E+00	g/hr
2025	NJ	Monmouth County	Excavators	Nonroad Diesel Fuel	Volatile Organic Compounds	1.79E+00	g/hr
2025	NJ	Monmouth County	Gas Compressors	Compressed Natural Gas (CNG)	Atmospheric CO2	4.64E+04	g/hr
2025	NJ	Monmouth County	Gas Compressors	Compressed Natural Gas (CNG)	Brake Specific Fuel Consumption (BSFC)	1.79E+04	g/hr
2025	NJ	Monmouth County	Gas Compressors	Compressed Natural Gas (CNG)	Methane (CH4)	2.22E+02	g/hr
2025	NJ	Monmouth County	Gas Compressors	Compressed Natural Gas (CNG)	Non-Methane Hydrocarbons	2.85E+01	g/hr
2025	NJ	Monmouth County	Gas Compressors	Compressed Natural Gas (CNG)	Oxides of Nitrogen (NOx)	9.94E+01	g/hr
2025	NJ	Monmouth County	Gas Compressors	Compressed Natural Gas (CNG)	Primary Exhaust PM2.5 - Total	6.12E+00	g/hr
2025	NJ	Monmouth County	Gas Compressors	Compressed Natural Gas (CNG)	Total Gaseous Hydrocarbons	2.50E+02	g/hr
2025	NJ	Monmouth County	Gas Compressors	Compressed Natural Gas (CNG)	Volatile Organic Compounds	4.79E+01	g/hr
2025	NJ	Monmouth County	Generator Sets	Compressed Natural Gas (CNG)	Atmospheric CO2	2.77E+04	g/hr
2025	NJ	Monmouth County	Generator Sets	Compressed Natural Gas (CNG)	Brake Specific Fuel Consumption (BSFC)	1.10E+04	g/hr
2025	NJ	Monmouth County	Generator Sets	Compressed Natural Gas (CNG)	Methane (CH4)	5.20E+02	g/hr
2025	NJ	Monmouth County	Generator Sets	Compressed Natural Gas (CNG)	Non-Methane Hydrocarbons	6.69E+01	g/hr
2025	NJ	Monmouth County	Generator Sets	Compressed Natural Gas (CNG)	Oxides of Nitrogen (NOx)	1.93E+02	g/hr
2025	NJ	Monmouth County	Generator Sets	Compressed Natural Gas (CNG)	Primary Exhaust PM2.5 - Total	3.18E+00	g/hr
2025	NJ	Monmouth County	Generator Sets	Compressed Natural Gas (CNG)	Total Gaseous Hydrocarbons	5.87E+02	g/hr
2025	NJ	Monmouth County	Generator Sets	Compressed Natural Gas (CNG)	Volatile Organic Compounds	1.12E+02	g/hr
2025	NJ	Monmouth County	Generator Sets	Gasoline	Atmospheric CO2	7.38E+03	g/hr
2025	NJ	Monmouth County	Generator Sets	Gasoline	Brake Specific Fuel Consumption (BSFC)	2.35E+03	g/hr
2025	NJ	Monmouth County	Generator Sets	Gasoline	Methane (CH4)	4.90E+00	g/hr
2025	NJ	Monmouth County	Generator Sets	Gasoline	Non-Methane Hydrocarbons	5.01E+01	g/hr
2025	NJ	Monmouth County	Generator Sets	Gasoline	Oxides of Nitrogen (NOx)	1.51E+01	g/hr
2025	NJ	Monmouth County	Generator Sets	Gasoline	Primary Exhaust PM2.5 - Total	1.07E+00	g/hr
2025	NJ	Monmouth County	Generator Sets	Gasoline	Total Gaseous Hydrocarbons	5.50E+01	g/hr
2025	NJ	Monmouth County	Generator Sets	Gasoline	Volatile Organic Compounds	5.11E+01	g/hr
2025	NJ	Monmouth County	Generator Sets	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	2.22E+04	g/hr
2025	NJ	Monmouth County	Generator Sets	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	7.44E+03	g/hr
2025	NJ	Monmouth County	Generator Sets	Liquefied Petroleum Gas (LPG)	Methane (CH4)	4.35E+00	g/hr
2025	NJ	Monmouth County	Generator Sets	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	1.97E+01	g/hr
2025	NJ	Monmouth County	Generator Sets	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	1.18E+02	g/hr
2025	NJ	Monmouth County	Generator Sets	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	2.17E+00	g/hr
2025	NJ	Monmouth County	Generator Sets	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	2.40E+01	g/hr
2025	NJ	Monmouth County	Generator Sets	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	1.90E+01	g/hr
2025	NJ	Monmouth County	Generator Sets	Nonroad Diesel Fuel	Atmospheric CO2	1.21E+04	g/hr
2025	NJ	Monmouth County	Generator Sets	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	3.80E+03	g/hr
2025	NJ	Monmouth County	Generator Sets	Nonroad Diesel Fuel	Methane (CH4)	2.97E-01	g/hr
2025	NJ	Monmouth County	Generator Sets	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	4.62E+00	g/hr
2025	NJ	Monmouth County	Generator Sets	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	6.12E+01	g/hr
2025	NJ	Monmouth County	Generator Sets	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	3.55E+00	g/hr
2025	NJ	Monmouth County	Generator Sets	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	4.92E+00	g/hr
2025	NJ	Monmouth County	Generator Sets	Nonroad Diesel Fuel	Volatile Organic Compounds	5.34E+00	g/hr
2025	NJ	Monmouth County	Graders	Nonroad Diesel Fuel	Atmospheric CO2	6.49E+04	g/hr
2025	NJ	Monmouth County	Graders	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	2.03E+04	g/hr
2025	NJ	Monmouth County	Graders	Nonroad Diesel Fuel	Methane (CH4)	1.43E-01	g/hr
2025	NJ	Monmouth County	Graders	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	1.66E+00	g/hr
2025	NJ	Monmouth County	Graders	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	3.24E+01	g/hr
2025	NJ	Monmouth County	Graders	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	1.97E+00	g/hr
2025	NJ	Monmouth County	Graders	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	1.81E+00	g/hr
2025	NJ	Monmouth County	Graders	Nonroad Diesel Fuel	Volatile Organic Compounds	1.91E+00	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Gasoline	Atmospheric CO2	6.30E+03	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Gasoline	Brake Specific Fuel Consumption (BSFC)	2.01E+03	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Gasoline	Methane (CH4)	4.49E+00	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Gasoline	Non-Methane Hydrocarbons	3.75E+01	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Gasoline	Oxides of Nitrogen (NOx)	1.33E+01	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Gasoline	Primary Exhaust PM2.5 - Total	1.23E+00	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Gasoline	Total Gaseous Hydrocarbons	4.20E+01	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Gasoline	Volatile Organic Compounds	3.85E+01	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	1.53E+04	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	5.12E+03	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Liquefied Petroleum Gas (LPG)	Methane (CH4)	7.32E-01	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	3.31E+00	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	2.67E+01	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	1.60E+00	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	4.04E+00	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	3.20E+00	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Nonroad Diesel Fuel	Atmospheric CO2	1.54E+04	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	4.82E+03	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Nonroad Diesel Fuel	Methane (CH4)	2.28E-01	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	1.95E+00	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	5.02E+01	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	1.72E+00	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	2.18E+00	g/hr
2025	NJ	Monmouth County	Hydro Power Units	Nonroad Diesel Fuel	Volatile Organic Compounds	2.37E+00	g/hr
2025	NJ	Monmouth County	Off-Highway Tractors	Nonroad Diesel Fuel	Atmospheric CO2	2.29E+05	g/hr
2025	NJ	Monmouth County	Off-Highway Tractors	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	7.19E+04	g/hr
2025	NJ	Monmouth County	Off-Highway Tractors	Nonroad Diesel Fuel	Methane (CH4)	1.86E+00	g/hr
2025	NJ	Monmouth County	Off-Highway Tractors	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	1.84E+01	g/hr
2025	NJ	Monmouth County	Off-Highway Tractors	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	6.31E+02	g/hr
2025	NJ	Monmouth County	Off-Highway Tractors	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	1.87E+01	g/hr
2025	NJ	Monmouth County	Off-Highway Tractors	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	2.02E+01	g/hr
2025	NJ	Monmouth County	Off-Highway Tractors	Nonroad Diesel Fuel	Volatile Organic Compounds	2.21E+01	g/hr
2025	NJ	Monmouth County	Off-highway Trucks	Nonroad Diesel Fuel	Atmospheric CO2	2.48E+05	g/hr
2025	NJ	Monmouth County	Off-highway Trucks	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	7.77E+04	g/hr
2025	NJ	Monmouth County	Off-highway Trucks	Nonroad Diesel Fuel	Methane (CH4)	1.09E+00	g/hr
2025	NJ	Monmouth County	Off-highway Trucks	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	1.09E+01	g/hr
2025	NJ	Monmouth County	Off-highway Trucks	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	6.50E+02	g/hr

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yearID	stateAb	countyName	equipDescription	fuelTypeName	pollutantName	emissionRate	emissionRateUnits
2025	NJ	Monmouth County	Off-highway Trucks	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	9.04E+00	g/hr
2025	NJ	Monmouth County	Off-highway Trucks	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	1.20E+01	g/hr
2025	NJ	Monmouth County	Off-highway Trucks	Nonroad Diesel Fuel	Volatile Organic Compounds	1.31E+01	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Compressed Natural Gas (CNG)	Atmospheric CO2	2.41E+04	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Compressed Natural Gas (CNG)	Brake Specific Fuel Consumption (BSFC)	9.39E+03	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Compressed Natural Gas (CNG)	Methane (CH4)	2.16E+02	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Compressed Natural Gas (CNG)	Non-Methane Hydrocarbons	2.78E+01	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Compressed Natural Gas (CNG)	Oxides of Nitrogen (NOx)	7.83E+01	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Compressed Natural Gas (CNG)	Primary Exhaust PM2.5 - Total	2.89E+00	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Compressed Natural Gas (CNG)	Total Gaseous Hydrocarbons	2.44E+02	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Compressed Natural Gas (CNG)	Volatile Organic Compounds	4.67E+01	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Gasoline	Atmospheric CO2	4.17E+04	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Gasoline	Brake Specific Fuel Consumption (BSFC)	1.31E+04	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Gasoline	Methane (CH4)	6.20E+00	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Gasoline	Non-Methane Hydrocarbons	5.96E+01	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Gasoline	Oxides of Nitrogen (NOx)	1.14E+02	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Gasoline	Primary Exhaust PM2.5 - Total	3.75E+00	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Gasoline	Total Gaseous Hydrocarbons	6.58E+01	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Gasoline	Volatile Organic Compounds	6.08E+01	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	3.37E+04	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	1.13E+04	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Liquefied Petroleum Gas (LPG)	Methane (CH4)	3.51E+00	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	1.59E+01	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	9.15E+01	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	3.47E+00	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	1.94E+01	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	1.53E+01	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Nonroad Diesel Fuel	Atmospheric CO2	1.04E+05	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	3.27E+04	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Nonroad Diesel Fuel	Methane (CH4)	8.16E-01	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	8.89E+00	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	1.98E+02	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	1.07E+01	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	9.71E+00	g/hr
2025	NJ	Monmouth County	Other Construction Equipment	Nonroad Diesel Fuel	Volatile Organic Compounds	1.05E+01	g/hr
2025	NJ	Monmouth County	Pavers	Gasoline	Atmospheric CO2	9.24E+03	g/hr
2025	NJ	Monmouth County	Pavers	Gasoline	Brake Specific Fuel Consumption (BSFC)	2.94E+03	g/hr
2025	NJ	Monmouth County	Pavers	Gasoline	Methane (CH4)	5.40E+00	g/hr
2025	NJ	Monmouth County	Pavers	Gasoline	Non-Methane Hydrocarbons	4.19E+01	g/hr
2025	NJ	Monmouth County	Pavers	Gasoline	Oxides of Nitrogen (NOx)	1.87E+01	g/hr
2025	NJ	Monmouth County	Pavers	Gasoline	Primary Exhaust PM2.5 - Total	1.03E+00	g/hr
2025	NJ	Monmouth County	Pavers	Gasoline	Total Gaseous Hydrocarbons	4.73E+01	g/hr
2025	NJ	Monmouth County	Pavers	Gasoline	Volatile Organic Compounds	4.30E+01	g/hr
2025	NJ	Monmouth County	Pavers	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	1.74E+04	g/hr
2025	NJ	Monmouth County	Pavers	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	5.82E+03	g/hr
2025	NJ	Monmouth County	Pavers	Liquefied Petroleum Gas (LPG)	Methane (CH4)	8.35E-01	g/hr
2025	NJ	Monmouth County	Pavers	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	3.78E+00	g/hr
2025	NJ	Monmouth County	Pavers	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	3.00E+01	g/hr
2025	NJ	Monmouth County	Pavers	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	1.83E+00	g/hr
2025	NJ	Monmouth County	Pavers	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	4.61E+00	g/hr
2025	NJ	Monmouth County	Pavers	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	3.65E+00	g/hr
2025	NJ	Monmouth County	Pavers	Nonroad Diesel Fuel	Atmospheric CO2	4.04E+04	g/hr
2025	NJ	Monmouth County	Pavers	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	1.27E+04	g/hr
2025	NJ	Monmouth County	Pavers	Nonroad Diesel Fuel	Methane (CH4)	2.22E-01	g/hr
2025	NJ	Monmouth County	Pavers	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	1.73E+00	g/hr
2025	NJ	Monmouth County	Pavers	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	5.55E+01	g/hr
2025	NJ	Monmouth County	Pavers	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	2.02E+00	g/hr
2025	NJ	Monmouth County	Pavers	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	1.95E+00	g/hr
2025	NJ	Monmouth County	Pavers	Nonroad Diesel Fuel	Volatile Organic Compounds	2.08E+00	g/hr
2025	NJ	Monmouth County	Paving Equipment	Gasoline	Atmospheric CO2	5.46E+03	g/hr
2025	NJ	Monmouth County	Paving Equipment	Gasoline	Brake Specific Fuel Consumption (BSFC)	1.74E+03	g/hr
2025	NJ	Monmouth County	Paving Equipment	Gasoline	Methane (CH4)	3.84E+00	g/hr
2025	NJ	Monmouth County	Paving Equipment	Gasoline	Non-Methane Hydrocarbons	3.75E+01	g/hr
2025	NJ	Monmouth County	Paving Equipment	Gasoline	Oxides of Nitrogen (NOx)	1.11E+01	g/hr
2025	NJ	Monmouth County	Paving Equipment	Gasoline	Primary Exhaust PM2.5 - Total	1.60E+00	g/hr
2025	NJ	Monmouth County	Paving Equipment	Gasoline	Total Gaseous Hydrocarbons	4.13E+01	g/hr
2025	NJ	Monmouth County	Paving Equipment	Gasoline	Volatile Organic Compounds	3.85E+01	g/hr
2025	NJ	Monmouth County	Paving Equipment	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	1.29E+04	g/hr
2025	NJ	Monmouth County	Paving Equipment	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	4.30E+03	g/hr
2025	NJ	Monmouth County	Paving Equipment	Liquefied Petroleum Gas (LPG)	Methane (CH4)	1.42E+00	g/hr
2025	NJ	Monmouth County	Paving Equipment	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	6.41E+00	g/hr
2025	NJ	Monmouth County	Paving Equipment	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	3.63E+01	g/hr
2025	NJ	Monmouth County	Paving Equipment	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	1.33E+00	g/hr
2025	NJ	Monmouth County	Paving Equipment	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	7.83E+00	g/hr
2025	NJ	Monmouth County	Paving Equipment	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	6.19E+00	g/hr
2025	NJ	Monmouth County	Paving Equipment	Nonroad Diesel Fuel	Atmospheric CO2	2.29E+04	g/hr
2025	NJ	Monmouth County	Paving Equipment	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	7.17E+03	g/hr
2025	NJ	Monmouth County	Paving Equipment	Nonroad Diesel Fuel	Methane (CH4)	2.82E-01	g/hr
2025	NJ	Monmouth County	Paving Equipment	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	2.47E+00	g/hr
2025	NJ	Monmouth County	Paving Equipment	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	5.08E+01	g/hr
2025	NJ	Monmouth County	Paving Equipment	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	2.51E+00	g/hr
2025	NJ	Monmouth County	Paving Equipment	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	2.76E+00	g/hr
2025	NJ	Monmouth County	Paving Equipment	Nonroad Diesel Fuel	Volatile Organic Compounds	3.01E+00	g/hr
2025	NJ	Monmouth County	Plate Compactors	Gasoline	Atmospheric CO2	3.22E+03	g/hr
2025	NJ	Monmouth County	Plate Compactors	Gasoline	Brake Specific Fuel Consumption (BSFC)	1.03E+03	g/hr
2025	NJ	Monmouth County	Plate Compactors	Gasoline	Methane (CH4)	2.46E+00	g/hr
2025	NJ	Monmouth County	Plate Compactors	Gasoline	Non-Methane Hydrocarbons	2.49E+01	g/hr

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yearID	stateAb	countyName	equipDescription	fuelTypeName	pollutantName	emissionRate	emissionRateUnits
2025	NJ	Monmouth County	Plate Compactors	Gasoline	Oxides of Nitrogen (NOx)	6.65E+00	g/hr
2025	NJ	Monmouth County	Plate Compactors	Gasoline	Primary Exhaust PM2.5 - Total	1.39E+00	g/hr
2025	NJ	Monmouth County	Plate Compactors	Gasoline	Total Gaseous Hydrocarbons	2.73E+01	g/hr
2025	NJ	Monmouth County	Plate Compactors	Gasoline	Volatile Organic Compounds	2.56E+01	g/hr
2025	NJ	Monmouth County	Plate Compactors	Nonroad Diesel Fuel	Atmospheric CO2	1.91E+03	g/hr
2025	NJ	Monmouth County	Plate Compactors	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	5.99E+02	g/hr
2025	NJ	Monmouth County	Plate Compactors	Nonroad Diesel Fuel	Methane (CH4)	1.91E-01	g/hr
2025	NJ	Monmouth County	Plate Compactors	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	1.77E+00	g/hr
2025	NJ	Monmouth County	Plate Compactors	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	1.31E+01	g/hr
2025	NJ	Monmouth County	Plate Compactors	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	7.00E-01	g/hr
2025	NJ	Monmouth County	Plate Compactors	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	1.96E+00	g/hr
2025	NJ	Monmouth County	Plate Compactors	Nonroad Diesel Fuel	Volatile Organic Compounds	2.18E+00	g/hr
2025	NJ	Monmouth County	Pressure Washers	Gasoline	Atmospheric CO2	7.05E+03	g/hr
2025	NJ	Monmouth County	Pressure Washers	Gasoline	Brake Specific Fuel Consumption (BSFC)	2.25E+03	g/hr
2025	NJ	Monmouth County	Pressure Washers	Gasoline	Methane (CH4)	4.90E+00	g/hr
2025	NJ	Monmouth County	Pressure Washers	Gasoline	Non-Methane Hydrocarbons	4.76E+01	g/hr
2025	NJ	Monmouth County	Pressure Washers	Gasoline	Oxides of Nitrogen (NOx)	1.46E+01	g/hr
2025	NJ	Monmouth County	Pressure Washers	Gasoline	Primary Exhaust PM2.5 - Total	1.10E+00	g/hr
2025	NJ	Monmouth County	Pressure Washers	Gasoline	Total Gaseous Hydrocarbons	5.25E+01	g/hr
2025	NJ	Monmouth County	Pressure Washers	Gasoline	Volatile Organic Compounds	4.86E+01	g/hr
2025	NJ	Monmouth County	Pressure Washers	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	1.83E+04	g/hr
2025	NJ	Monmouth County	Pressure Washers	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	6.12E+03	g/hr
2025	NJ	Monmouth County	Pressure Washers	Liquefied Petroleum Gas (LPG)	Methane (CH4)	2.10E+00	g/hr
2025	NJ	Monmouth County	Pressure Washers	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	9.52E+00	g/hr
2025	NJ	Monmouth County	Pressure Washers	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	5.30E+01	g/hr
2025	NJ	Monmouth County	Pressure Washers	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	1.87E+00	g/hr
2025	NJ	Monmouth County	Pressure Washers	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	1.16E+01	g/hr
2025	NJ	Monmouth County	Pressure Washers	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	9.18E+00	g/hr
2025	NJ	Monmouth County	Pressure Washers	Nonroad Diesel Fuel	Atmospheric CO2	1.26E+04	g/hr
2025	NJ	Monmouth County	Pressure Washers	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	3.94E+03	g/hr
2025	NJ	Monmouth County	Pressure Washers	Nonroad Diesel Fuel	Methane (CH4)	2.96E-01	g/hr
2025	NJ	Monmouth County	Pressure Washers	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	5.54E+00	g/hr
2025	NJ	Monmouth County	Pressure Washers	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	6.45E+01	g/hr
2025	NJ	Monmouth County	Pressure Washers	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	3.53E+00	g/hr
2025	NJ	Monmouth County	Pressure Washers	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	5.83E+00	g/hr
2025	NJ	Monmouth County	Pressure Washers	Nonroad Diesel Fuel	Volatile Organic Compounds	6.31E+00	g/hr
2025	NJ	Monmouth County	Pumps	Compressed Natural Gas (CNG)	Atmospheric CO2	3.76E+04	g/hr
2025	NJ	Monmouth County	Pumps	Compressed Natural Gas (CNG)	Brake Specific Fuel Consumption (BSFC)	1.46E+04	g/hr
2025	NJ	Monmouth County	Pumps	Compressed Natural Gas (CNG)	Methane (CH4)	3.70E+02	g/hr
2025	NJ	Monmouth County	Pumps	Compressed Natural Gas (CNG)	Non-Methane Hydrocarbons	4.76E+01	g/hr
2025	NJ	Monmouth County	Pumps	Compressed Natural Gas (CNG)	Oxides of Nitrogen (NOx)	1.50E+02	g/hr
2025	NJ	Monmouth County	Pumps	Compressed Natural Gas (CNG)	Primary Exhaust PM2.5 - Total	4.43E+00	g/hr
2025	NJ	Monmouth County	Pumps	Compressed Natural Gas (CNG)	Total Gaseous Hydrocarbons	4.17E+02	g/hr
2025	NJ	Monmouth County	Pumps	Compressed Natural Gas (CNG)	Volatile Organic Compounds	7.99E+01	g/hr
2025	NJ	Monmouth County	Pumps	Gasoline	Atmospheric CO2	3.91E+03	g/hr
2025	NJ	Monmouth County	Pumps	Gasoline	Brake Specific Fuel Consumption (BSFC)	1.26E+03	g/hr
2025	NJ	Monmouth County	Pumps	Gasoline	Methane (CH4)	3.16E+00	g/hr
2025	NJ	Monmouth County	Pumps	Gasoline	Non-Methane Hydrocarbons	4.89E+01	g/hr
2025	NJ	Monmouth County	Pumps	Gasoline	Oxides of Nitrogen (NOx)	8.64E+00	g/hr
2025	NJ	Monmouth County	Pumps	Gasoline	Primary Exhaust PM2.5 - Total	3.89E+00	g/hr
2025	NJ	Monmouth County	Pumps	Gasoline	Total Gaseous Hydrocarbons	5.20E+01	g/hr
2025	NJ	Monmouth County	Pumps	Gasoline	Volatile Organic Compounds	5.04E+01	g/hr
2025	NJ	Monmouth County	Pumps	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	1.70E+04	g/hr
2025	NJ	Monmouth County	Pumps	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	5.70E+03	g/hr
2025	NJ	Monmouth County	Pumps	Liquefied Petroleum Gas (LPG)	Methane (CH4)	1.57E+00	g/hr
2025	NJ	Monmouth County	Pumps	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	7.11E+00	g/hr
2025	NJ	Monmouth County	Pumps	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	4.80E+01	g/hr
2025	NJ	Monmouth County	Pumps	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	1.74E+00	g/hr
2025	NJ	Monmouth County	Pumps	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	8.68E+00	g/hr
2025	NJ	Monmouth County	Pumps	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	6.86E+00	g/hr
2025	NJ	Monmouth County	Pumps	Nonroad Diesel Fuel	Atmospheric CO2	1.29E+04	g/hr
2025	NJ	Monmouth County	Pumps	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	4.04E+03	g/hr
2025	NJ	Monmouth County	Pumps	Nonroad Diesel Fuel	Methane (CH4)	3.18E-01	g/hr
2025	NJ	Monmouth County	Pumps	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	5.11E+00	g/hr
2025	NJ	Monmouth County	Pumps	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	6.53E+01	g/hr
2025	NJ	Monmouth County	Pumps	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	4.12E+00	g/hr
2025	NJ	Monmouth County	Pumps	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	5.42E+00	g/hr
2025	NJ	Monmouth County	Pumps	Nonroad Diesel Fuel	Volatile Organic Compounds	5.89E+00	g/hr
2025	NJ	Monmouth County	Rollers	Gasoline	Atmospheric CO2	9.09E+03	g/hr
2025	NJ	Monmouth County	Rollers	Gasoline	Brake Specific Fuel Consumption (BSFC)	2.89E+03	g/hr
2025	NJ	Monmouth County	Rollers	Gasoline	Methane (CH4)	5.59E+00	g/hr
2025	NJ	Monmouth County	Rollers	Gasoline	Non-Methane Hydrocarbons	4.19E+01	g/hr
2025	NJ	Monmouth County	Rollers	Gasoline	Oxides of Nitrogen (NOx)	1.88E+01	g/hr
2025	NJ	Monmouth County	Rollers	Gasoline	Primary Exhaust PM2.5 - Total	1.00E+00	g/hr
2025	NJ	Monmouth County	Rollers	Gasoline	Total Gaseous Hydrocarbons	4.75E+01	g/hr
2025	NJ	Monmouth County	Rollers	Gasoline	Volatile Organic Compounds	4.30E+01	g/hr
2025	NJ	Monmouth County	Rollers	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	1.86E+04	g/hr
2025	NJ	Monmouth County	Rollers	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	6.22E+03	g/hr
2025	NJ	Monmouth County	Rollers	Liquefied Petroleum Gas (LPG)	Methane (CH4)	8.62E-01	g/hr
2025	NJ	Monmouth County	Rollers	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	3.90E+00	g/hr
2025	NJ	Monmouth County	Rollers	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	3.15E+01	g/hr
2025	NJ	Monmouth County	Rollers	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	1.97E+00	g/hr
2025	NJ	Monmouth County	Rollers	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	4.76E+00	g/hr
2025	NJ	Monmouth County	Rollers	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	3.76E+00	g/hr
2025	NJ	Monmouth County	Rollers	Nonroad Diesel Fuel	Atmospheric CO2	3.05E+04	g/hr
2025	NJ	Monmouth County	Rollers	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	9.55E+03	g/hr
2025	NJ	Monmouth County	Rollers	Nonroad Diesel Fuel	Methane (CH4)	2.37E-01	g/hr

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yearID	stateAb	countyName	equipDescription	fuelTypeName	pollutantName	emissionRate	emissionRateUnits
2025	NJ	Monmouth County	Rollers	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	1.92E+00	g/hr
2025	NJ	Monmouth County	Rollers	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	5.41E+01	g/hr
2025	NJ	Monmouth County	Rollers	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	2.23E+00	g/hr
2025	NJ	Monmouth County	Rollers	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	2.16E+00	g/hr
2025	NJ	Monmouth County	Rollers	Nonroad Diesel Fuel	Volatile Organic Compounds	2.34E+00	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Gasoline	Atmospheric CO2	2.87E+04	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Gasoline	Brake Specific Fuel Consumption (BSFC)	9.00E+03	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Gasoline	Methane (CH4)	2.39E+00	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Gasoline	Non-Methane Hydrocarbons	2.78E+01	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Gasoline	Oxides of Nitrogen (NOx)	5.29E+01	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Gasoline	Primary Exhaust PM2.5 - Total	2.62E+00	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Gasoline	Total Gaseous Hydrocarbons	3.02E+01	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Gasoline	Volatile Organic Compounds	2.83E+01	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	2.29E+04	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	7.67E+03	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Liquefied Petroleum Gas (LPG)	Methane (CH4)	1.12E+00	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	5.05E+00	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	3.98E+01	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	2.40E+00	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	6.17E+00	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklift	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	4.88E+00	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklifts	Nonroad Diesel Fuel	Atmospheric CO2	3.25E+04	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklifts	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	1.02E+04	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklifts	Nonroad Diesel Fuel	Methane (CH4)	2.22E-01	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklifts	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	1.89E+00	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklifts	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	6.64E+01	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklifts	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	3.47E+00	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklifts	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	2.11E+00	g/hr
2025	NJ	Monmouth County	Rough Terrain Forklifts	Nonroad Diesel Fuel	Volatile Organic Compounds	2.29E+00	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Gasoline	Atmospheric CO2	3.53E+04	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Gasoline	Brake Specific Fuel Consumption (BSFC)	1.11E+04	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Gasoline	Methane (CH4)	2.50E+00	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Gasoline	Non-Methane Hydrocarbons	3.06E+01	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Gasoline	Oxides of Nitrogen (NOx)	6.37E+01	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Gasoline	Primary Exhaust PM2.5 - Total	3.25E+00	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Gasoline	Total Gaseous Hydrocarbons	3.31E+01	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Gasoline	Volatile Organic Compounds	3.11E+01	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	2.78E+04	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	9.30E+03	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Liquefied Petroleum Gas (LPG)	Methane (CH4)	1.29E+00	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	5.82E+00	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	4.70E+01	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	2.94E+00	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	7.10E+00	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	5.61E+00	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Nonroad Diesel Fuel	Atmospheric CO2	7.73E+04	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	2.42E+04	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Nonroad Diesel Fuel	Methane (CH4)	4.67E-01	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	4.52E+00	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	1.22E+02	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	5.58E+00	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	4.99E+00	g/hr
2025	NJ	Monmouth County	Rubber Tire Loaders	Nonroad Diesel Fuel	Volatile Organic Compounds	5.40E+00	g/hr
2025	NJ	Monmouth County	Scrapers	Nonroad Diesel Fuel	Atmospheric CO2	1.30E+05	g/hr
2025	NJ	Monmouth County	Scrapers	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	4.06E+04	g/hr
2025	NJ	Monmouth County	Scrapers	Nonroad Diesel Fuel	Methane (CH4)	5.93E-01	g/hr
2025	NJ	Monmouth County	Scrapers	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	5.60E+00	g/hr
2025	NJ	Monmouth County	Scrapers	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	1.14E+02	g/hr
2025	NJ	Monmouth County	Scrapers	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	7.02E+00	g/hr
2025	NJ	Monmouth County	Scrapers	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	6.19E+00	g/hr
2025	NJ	Monmouth County	Scrapers	Nonroad Diesel Fuel	Volatile Organic Compounds	6.61E+00	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Gasoline	Atmospheric CO2	5.38E+03	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Gasoline	Brake Specific Fuel Consumption (BSFC)	1.72E+03	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Gasoline	Methane (CH4)	4.07E+00	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Gasoline	Non-Methane Hydrocarbons	3.19E+01	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Gasoline	Oxides of Nitrogen (NOx)	1.14E+01	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Gasoline	Primary Exhaust PM2.5 - Total	1.24E+00	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Gasoline	Total Gaseous Hydrocarbons	3.60E+01	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Gasoline	Volatile Organic Compounds	3.28E+01	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Nonroad Diesel Fuel	Atmospheric CO2	6.06E+03	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	1.90E+03	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Nonroad Diesel Fuel	Methane (CH4)	2.67E-01	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	2.41E+00	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	3.42E+01	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	1.35E+00	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	2.67E+00	g/hr
2025	NJ	Monmouth County	Signal Boards/Light Plants	Nonroad Diesel Fuel	Volatile Organic Compounds	2.96E+00	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Gasoline	Atmospheric CO2	1.46E+04	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Gasoline	Brake Specific Fuel Consumption (BSFC)	4.63E+03	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Gasoline	Methane (CH4)	5.57E+00	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Gasoline	Non-Methane Hydrocarbons	4.63E+01	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Gasoline	Oxides of Nitrogen (NOx)	3.27E+01	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Gasoline	Primary Exhaust PM2.5 - Total	1.40E+00	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Gasoline	Total Gaseous Hydrocarbons	5.19E+01	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Gasoline	Volatile Organic Compounds	4.74E+01	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	1.63E+04	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	5.46E+03	g/hr

MOVES Nonroad

yearID	stateAb	countyName	equipDescription	fuelTypeName	pollutantName	emissionRate	emissionRateUnits
2025	NJ	Monmouth County	Skid Steer Loaders	Liquefied Petroleum Gas (LPG)	Methane (CH4)	1.40E+00	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	6.35E+00	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	3.91E+01	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	1.70E+00	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	7.76E+00	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	6.13E+00	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Nonroad Diesel Fuel	Atmospheric CO2	7.99E+03	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	2.51E+03	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Nonroad Diesel Fuel	Methane (CH4)	2.20E-01	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	4.52E+00	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	3.83E+01	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	4.01E+00	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	4.74E+00	g/hr
2025	NJ	Monmouth County	Skid Steer Loaders	Nonroad Diesel Fuel	Volatile Organic Compounds	5.14E+00	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Gasoline	Atmospheric CO2	4.97E+03	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Gasoline	Brake Specific Fuel Consumption (BSFC)	1.58E+03	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Gasoline	Methane (CH4)	3.52E+00	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Gasoline	Non-Methane Hydrocarbons	2.83E+01	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Gasoline	Oxides of Nitrogen (NOx)	1.04E+01	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Gasoline	Primary Exhaust PM2.5 - Total	6.99E-01	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Gasoline	Total Gaseous Hydrocarbons	3.18E+01	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Gasoline	Volatile Organic Compounds	2.90E+01	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	1.08E+04	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	3.60E+03	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Liquefied Petroleum Gas (LPG)	Methane (CH4)	5.48E-01	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	2.48E+00	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	1.91E+01	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	1.13E+00	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	3.03E+00	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	2.39E+00	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Nonroad Diesel Fuel	Atmospheric CO2	3.53E+04	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	1.11E+04	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Nonroad Diesel Fuel	Methane (CH4)	4.49E-01	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	4.73E+00	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	1.09E+02	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	4.94E+00	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	5.18E+00	g/hr
2025	NJ	Monmouth County	Surfacing Equipment	Nonroad Diesel Fuel	Volatile Organic Compounds	5.63E+00	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Gasoline	Atmospheric CO2	1.44E+03	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Gasoline	Brake Specific Fuel Consumption (BSFC)	5.71E+02	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Gasoline	Methane (CH4)	2.33E+00	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Gasoline	Non-Methane Hydrocarbons	1.20E+02	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Gasoline	Oxides of Nitrogen (NOx)	3.15E+00	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Gasoline	Primary Exhaust PM2.5 - Total	1.76E+01	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Gasoline	Total Gaseous Hydrocarbons	1.23E+02	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Gasoline	Volatile Organic Compounds	1.27E+02	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Nonroad Diesel Fuel	Atmospheric CO2	1.06E+03	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	3.34E+02	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Nonroad Diesel Fuel	Methane (CH4)	1.30E-01	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	1.22E+00	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	7.60E+00	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	4.37E-01	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	1.35E+00	g/hr
2025	NJ	Monmouth County	Tampers/Rammers	Nonroad Diesel Fuel	Volatile Organic Compounds	1.50E+00	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Gasoline	Atmospheric CO2	9.61E+03	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Gasoline	Brake Specific Fuel Consumption (BSFC)	3.06E+03	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Gasoline	Methane (CH4)	6.44E+00	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Gasoline	Non-Methane Hydrocarbons	4.73E+01	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Gasoline	Oxides of Nitrogen (NOx)	1.98E+01	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Gasoline	Primary Exhaust PM2.5 - Total	1.03E+00	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Gasoline	Total Gaseous Hydrocarbons	5.37E+01	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Gasoline	Volatile Organic Compounds	4.86E+01	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	1.55E+04	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	5.16E+03	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Liquefied Petroleum Gas (LPG)	Methane (CH4)	7.14E-01	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	3.23E+00	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	2.61E+01	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	1.63E+00	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	3.95E+00	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	3.12E+00	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	Atmospheric CO2	1.31E+04	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	4.10E+03	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	Methane (CH4)	2.08E-01	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	3.42E+00	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	3.74E+01	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	3.94E+00	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	3.63E+00	g/hr
2025	NJ	Monmouth County	Tractors/Loaders/Backhoes	Nonroad Diesel Fuel	Volatile Organic Compounds	3.95E+00	g/hr
2025	NJ	Monmouth County	Trenchers	Gasoline	Atmospheric CO2	7.92E+03	g/hr
2025	NJ	Monmouth County	Trenchers	Gasoline	Brake Specific Fuel Consumption (BSFC)	2.52E+03	g/hr
2025	NJ	Monmouth County	Trenchers	Gasoline	Methane (CH4)	4.83E+00	g/hr
2025	NJ	Monmouth County	Trenchers	Gasoline	Non-Methane Hydrocarbons	3.75E+01	g/hr
2025	NJ	Monmouth County	Trenchers	Gasoline	Oxides of Nitrogen (NOx)	1.62E+01	g/hr
2025	NJ	Monmouth County	Trenchers	Gasoline	Primary Exhaust PM2.5 - Total	1.09E+00	g/hr
2025	NJ	Monmouth County	Trenchers	Gasoline	Total Gaseous Hydrocarbons	4.23E+01	g/hr
2025	NJ	Monmouth County	Trenchers	Gasoline	Volatile Organic Compounds	3.85E+01	g/hr
2025	NJ	Monmouth County	Trenchers	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	1.96E+04	g/hr

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yearID	stateAb	countyName	equipDescription	fuelTypeName	pollutantName	emissionRate	emissionRateUnits
2025	NJ	Monmouth County	Trenchers	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	6.55E+03	g/hr
2025	NJ	Monmouth County	Trenchers	Liquefied Petroleum Gas (LPG)	Methane (CH4)	9.21E-01	g/hr
2025	NJ	Monmouth County	Trenchers	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	4.17E+00	g/hr
2025	NJ	Monmouth County	Trenchers	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	3.34E+01	g/hr
2025	NJ	Monmouth County	Trenchers	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	2.06E+00	g/hr
2025	NJ	Monmouth County	Trenchers	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	5.09E+00	g/hr
2025	NJ	Monmouth County	Trenchers	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	4.02E+00	g/hr
2025	NJ	Monmouth County	Trenchers	Nonroad Diesel Fuel	Atmospheric CO2	2.58E+04	g/hr
2025	NJ	Monmouth County	Trenchers	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	8.10E+03	g/hr
2025	NJ	Monmouth County	Trenchers	Nonroad Diesel Fuel	Methane (CH4)	3.66E-01	g/hr
2025	NJ	Monmouth County	Trenchers	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	2.78E+00	g/hr
2025	NJ	Monmouth County	Trenchers	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	8.51E+01	g/hr
2025	NJ	Monmouth County	Trenchers	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	2.83E+00	g/hr
2025	NJ	Monmouth County	Trenchers	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	3.14E+00	g/hr
2025	NJ	Monmouth County	Trenchers	Nonroad Diesel Fuel	Volatile Organic Compounds	3.37E+00	g/hr
2025	NJ	Monmouth County	Welders	Gasoline	Atmospheric CO2	1.16E+04	g/hr
2025	NJ	Monmouth County	Welders	Gasoline	Brake Specific Fuel Consumption (BSFC)	3.68E+03	g/hr
2025	NJ	Monmouth County	Welders	Gasoline	Methane (CH4)	7.23E+00	g/hr
2025	NJ	Monmouth County	Welders	Gasoline	Non-Methane Hydrocarbons	6.12E+01	g/hr
2025	NJ	Monmouth County	Welders	Gasoline	Oxides of Nitrogen (NOx)	2.41E+01	g/hr
2025	NJ	Monmouth County	Welders	Gasoline	Primary Exhaust PM2.5 - Total	1.27E+00	g/hr
2025	NJ	Monmouth County	Welders	Gasoline	Total Gaseous Hydrocarbons	6.85E+01	g/hr
2025	NJ	Monmouth County	Welders	Gasoline	Volatile Organic Compounds	6.27E+01	g/hr
2025	NJ	Monmouth County	Welders	Liquefied Petroleum Gas (LPG)	Atmospheric CO2	2.48E+04	g/hr
2025	NJ	Monmouth County	Welders	Liquefied Petroleum Gas (LPG)	Brake Specific Fuel Consumption (BSFC)	8.28E+03	g/hr
2025	NJ	Monmouth County	Welders	Liquefied Petroleum Gas (LPG)	Methane (CH4)	1.19E+00	g/hr
2025	NJ	Monmouth County	Welders	Liquefied Petroleum Gas (LPG)	Non-Methane Hydrocarbons	5.37E+00	g/hr
2025	NJ	Monmouth County	Welders	Liquefied Petroleum Gas (LPG)	Oxides of Nitrogen (NOx)	4.25E+01	g/hr
2025	NJ	Monmouth County	Welders	Liquefied Petroleum Gas (LPG)	Primary Exhaust PM2.5 - Total	2.59E+00	g/hr
2025	NJ	Monmouth County	Welders	Liquefied Petroleum Gas (LPG)	Total Gaseous Hydrocarbons	6.55E+00	g/hr
2025	NJ	Monmouth County	Welders	Liquefied Petroleum Gas (LPG)	Volatile Organic Compounds	5.18E+00	g/hr
2025	NJ	Monmouth County	Welders	Nonroad Diesel Fuel	Atmospheric CO2	6.42E+03	g/hr
2025	NJ	Monmouth County	Welders	Nonroad Diesel Fuel	Brake Specific Fuel Consumption (BSFC)	2.02E+03	g/hr
2025	NJ	Monmouth County	Welders	Nonroad Diesel Fuel	Methane (CH4)	2.33E-01	g/hr
2025	NJ	Monmouth County	Welders	Nonroad Diesel Fuel	Non-Methane Hydrocarbons	4.26E+00	g/hr
2025	NJ	Monmouth County	Welders	Nonroad Diesel Fuel	Oxides of Nitrogen (NOx)	3.31E+01	g/hr
2025	NJ	Monmouth County	Welders	Nonroad Diesel Fuel	Primary Exhaust PM2.5 - Total	3.28E+00	g/hr
2025	NJ	Monmouth County	Welders	Nonroad Diesel Fuel	Total Gaseous Hydrocarbons	4.49E+00	g/hr
2025	NJ	Monmouth County	Welders	Nonroad Diesel Fuel	Volatile Organic Compounds	4.86E+00	g/hr

8-Hour Construction Noise Level Summary at the Receptor (dBA) during Basin Installation

Noise-Sensitive Use	Distance from Loudest Construction Activity to a Receptor (ft)	8-Hour Construction Noise Level at the Receptor (dBA)	Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	Daytime Increase Over Existing (dBA)	Reduction from Mitigation Measure (dBA)	Daytime Mitigated Leq (Construction Noise + Existing + Mitigation) (dBA)
Rural Residential	100	83	83	43	3	80

8-Hour Construction Noise Level Summary at the Receptor (dBA) during Snug Harbor Pump Station Installation

Noise-Sensitive Use	Distance from Loudest Construction Activity to a Receptor (ft)	8-Hour Construction Noise Level at the Receptor (dBA)	Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	Daytime Increase Over Existing (dBA)	Reduction from Mitigation Measure (dBA)	Daytime Mitigated Leq (Construction Noise + Existing + Mitigation) (dBA)
Normal Suburban Residential	10	91	91	36	3	88

8-Hour Construction Noise Level Summary at the Receptor (dBA) during Valley Pump Station Repairs

Noise-Sensitive Use	Distance from Loudest Construction Activity to a Receptor (ft)	8-Hour Construction Noise Level at the Receptor (dBA)	Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	Daytime Increase Over Existing (dBA)	Reduction from Mitigation Measure (dBA)	Daytime Mitigated Leq (Construction Noise + Existing + Mitigation) (dBA)
Normal Suburban Residential	10	91	91	36	3	88

8-Hour Construction Noise Level Summary at the Receptor (dBA) during North Street Pump Station Upgrades

Noise-Sensitive Use	Distance from Loudest Construction Activity to a Receptor (ft)	8-Hour Construction Noise Level at the Receptor (dBA)	Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	Daytime Increase Over Existing (dBA)	Reduction from Mitigation Measure (dBA)	Daytime Mitigated Leq (Construction Noise + Existing + Mitigation) (dBA)
Normal Suburban Residential	10	91	91	36	3	88

Note: With the application of EPA's Construction Control Checklist, dust mitigation windfencing will serve as the noise barrier to break the line-of-sight between the noise source and the receptor.

8-Hour Construction Noise Level during Basin Installation at the Receptor (dBA) - Residential

Parameter	Data
Distance from Construction Activity to a Receptor (ft)	100
8-Hour Construction Noise Level at 50 ft (dBA)	89
Distance Divergence (dBA)	6.0
Atmospheric Attenuation (dBA)	0.09
8-Hour Construction Noise Level at the Receptor (dBA)	83
Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	83
Daytime Increase Over Existing (dBA)	43

Existing Noise Levels

Land Use Type	Rural Residential
Background Noise (dBA)	40

8-Hour Construction Noise Level during Snug Harbor Pump Station Installation at the Receptor (dBA) - Residential

Parameter	Data
Distance from Construction Activity to a Receptor (ft)	10
8-Hour Construction Noise Level at 50 ft (dBA)	77
Distance Divergence (dBA)	-14.0
Atmospheric Attenuation (dBA)	0.01
8-Hour Construction Noise Level at the Receptor (dBA)	91
Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	91
Daytime Increase Over Existing (dBA)	36

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise (dBA)	55

8-Hour Construction Noise Level during Valley Pump Station Repairs at the Receptor (dBA) - Residential

Parameter	Data
Distance from Construction Activity to a Receptor (ft)	10
8-Hour Construction Noise Level at 50 ft (dBA)	77
Distance Divergence (dBA)	-14.0
Atmospheric Attenuation (dBA)	0.01
8-Hour Construction Noise Level at the Receptor (dBA)	91
Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	91
Daytime Increase Over Existing (dBA)	36

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise (dBA)	55

8-Hour Construction Noise Level during North Street Pump Station Upgrades at the Receptor (dBA) - Residential

Parameter	Data
Distance from Construction Activity to a Receptor (ft)	10
8-Hour Construction Noise Level at 50 ft (dBA)	77
Distance Divergence (dBA)	-14.0
Atmospheric Attenuation (dBA)	0.01
8-Hour Construction Noise Level at the Receptor (dBA)	91
Daytime Unmitigated Leq (Construction Noise + Existing) (dBA)	91
Daytime Increase Over Existing (dBA)	36

Existing Noise Levels

Land Use Type	Normal Suburban Residential
Background Noise (dBA)	55

Construction - Equipment Noise

8-Hour Construction Noise Level during Basin Installation at 50 Feet (dBA)

Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
Flatbed Delivery Truck	Flat Bed Truck	40%	74	70	1	0	74	70
Vendor Asphalt/Concrete Truck	Concrete Mixer Truck	40%	79	75	2	3	82	78
Heavy Duty Dump Truck	Dump Truck	40%	76	72	1	0	76	72
Tractors/Loaders/Backhoes	Front End Loader	40%	79	75	3	5	84	80
Crawler Tractor/Dozers	Dozer	40%	82	78	3	5	87	83
Graders	Grader	40%	85	81	2	3	88	84
Scrapers	Scraper	40%	84	80	1	0	84	80
Excavators	Excavator	40%	81	77	1	0	81	77
Rubber Tired Dozers	Dozer	40%	82	78	1	0	82	78
						Total	**93**	**89**

8-Hour Construction Noise Level during Snug Harbor Pump Station Installation at 50 Feet (dBA)

Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
Flatbed Delivery Truck	Flat Bed Truck	40%	74	70	1	0	74	70
Vendor Asphalt/Concrete Truck	Concrete Mixer Truck	40%	79	75	1	0	79	75
Heavy Duty Dump Truck	Dump Truck	40%	76	72	1	0	76	72
Tractors/Loaders/Backhoes	Front End Loader	40%	79	75	1	0	79	75
Pavers	Paver	50%	77	74	1	0	77	74
Paving Equipment	Paver	50%	77	74	1	0	77	74
Rollers	Roller	20%	80	73	1	0	80	73
Cement and Mortar Mixers	Drum Mixer	50%	80	77	1	0	80	77
						Max	**80**	**77**

Construction of the pump station occurs in a restricted roadway. The maximum noise level emission was asssumed for these sites.

8-Hour Construction Noise Level during Valley Pump Station Repairs at 50 Feet (dBA)

Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
Flatbed Delivery Truck	Flat Bed Truck	40%	74	70	1	0	74	70
Vendor Asphalt/Concrete Truck	Concrete Mixer Truck	40%	79	75	1	0	79	75
Heavy Duty Dump Truck	Dump Truck	40%	76	72	1	0	76	72
Tractors/Loaders/Backhoes	Front End Loader	40%	79	75	1	0	79	75
Pavers	Paver	50%	77	74	1	0	77	74
Rollers	Roller	20%	80	73	1	0	80	73
Cement and Mortar Mixers	Drum Mixer	50%	80	77	1	0	80	77
						Max	**80**	**77**

Construction of the pump station occurs in a restricted roadway. The maximum noise level emission was asssumed for these sites.

8-Hour Construction Noise Level during North Street Pump Station Upgrades at 50 Feet (dBA)

Equipment Description	RCNM Equipment Types	Usage Factor	Equipment Lmax @ 50'	Equipment Leq(h) @ 50'	Number of Equipment	Add to Single Source Level (dBA)	Total Lmax @ 50'	Total Leq(h) @ 50'
Flatbed Delivery Truck	Flat Bed Truck	40%	74	70	1	0	74	70
Vendor Asphalt/Concrete Truck	Concrete Mixer Truck	40%	79	75	1	0	79	75
Heavy Duty Dump Truck	Dump Truck	40%	76	72	1	0	76	72
Tractors/Loaders/Backhoes	Front End Loader	40%	79	75	1	0	79	75
Pavers	Paver	50%	77	74	1	0	77	74
Rollers	Roller	20%	80	73	1	0	80	73
Cement and Mortar Mixers	Drum Mixer	50%	80	77	1	0	80	77
						Max	**80**	**77**

Construction of the pump station occurs in a restricted roadway. The maximum noise level emission was asssumed for these sites.

Construction - Distance to Receptors

Receptor	Distance (ft.) [A]
Normal Suburban Residential	10
Rural Residential	100

Note(s):
A. Receptor distances of 5 ft. and 100 ft. were estimated from the center of the pump stations and the center of the basins, respectively, to the nearest noise sensitive land use identified in the Highlands noise ordinance (residence).

Atmospheric Attenuation

Assumptions	Monmouth Beach, New Jersey
Ambient pressure (kPa)	101.3
Temperature (F)	68
Relative humidity (%)	70
Frequency of noise source (Hz)	500
Air Attenuation Coefficient (α, dB/km)	2.8
Air Attenuation Coefficient (α, dB/ft)	0.0009

$A_{air} = \alpha d$

Note: Human ears are most sensitive to noise at 500 Hz or higher and A-weighting removes all frequencies below 500 Hz. Therefore, 500 Hz was selected as the frequency at which the average person would hear noise.

Air Attenuation Coefficient by Frequency (Hz), dB/km, for an Ambient Pressure of 101.3 kPa

(One Standard Sea-Level Atmosphere) for Sound Propogation in Open Air

Temperature (°F)	Relative Humidity, %	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
86	10	0.96	1.8	3.4	8.7	29	96
86	20	0.73	1.9	3.4	6.0	15	47
86	30	0.54	1.7	3.7	6.2	12	33
86	50	0.36	1.3	3.6	7.0	12	25
86	70	0.26	0.96	3.1	7.4	13	23
86	90	0.20	0.78	2.7	7.3	14	24
68	10	0.78	1.6	4.3	14	45	109
68	20	0.71	1.4	2.6	6.5	22	74
68	30	0.62	1.4	2.5	5.0	14	49
68	50	0.45	1.3	2.7	4.7	9.9	29
68	70	0.34	1.1	2.8	5.0	9.0	23
68	90	0.27	0.97	2.7	5.3	9.1	20
50	10	0.79	2.3	7.5	22	42	57
50	20	0.58	1.2	3.3	11	36	92
50	30	0.55	1.1	2.3	6.8	24	77
50	50	0.49	1.1	1.9	4.3	13	47
50	70	0.41	1.0	1.9	3.7	9.7	33
50	90	0.35	1.0	2.0	3.5	8.1	26
32	10	1.3	4.0	9.3	14	17	19
32	20	0.61	1.9	6.2	18	35	47
32	30	0.47	1.2	3.7	13	36	69
32	50	0.41	0.82	2.1	6.8	24	71
32	70	0.39	0.76	1.6	4.6	16	56
32	90	0.38	0.76	1.5	3.7	12	43

Source(s):

Harris, Cyril M. 1998. Handbook of Acoustical Measurements and Noise Control. 3rd ed. - Chapter 3 Calculation of Attenuation

Weather in Monmouth Beach, New Jersey

Variable	Temperature	Unit
Average temperature	54.6	°F
Average relative humidity	67.8	%

Source(s):
Climate-data.org. 2024. Weather by Month, Monmouth Beach. Accessed September 3, 2024, https://en.climate-data.org/north-america/united-states-of-america/new-jersey/monmouth-beach-141945/#climate-table.
Note: Monmouth Beach was used as a surrogate location to represent the Monmouth Highlands weather as it is approximately 6 miles south of the Highlands.

WEATHER BY MONTH // WEATHER AVERAGES MONMOUTH BEACH

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	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	0.7 °C (33.2) °F	1.6 °C (34.8) °F	5.1 °C (41.1) °F	10.6 °C (51.1) °F	15.9 °C (60.5) °F	21.1 °C (70) °F	24.3 °C (75.8) °F	23.7 °C (74.7) °F	20.5 °C (68.8) °F	14.6 °C (58.2) °F	8.8 °C (47.9) °F	4 °C (39.2) °F
Min. Temperature °C (°F)	-2.1 °C (28.2) °F	-1.5 °C (29.3) °F	1.8 °C (35.3) °F	7.2 °C (45) °F	12.7 °C (54.8) °F	18.1 °C (64.5) °F	21.3 °C (70.4) °F	21 °C (69.8) °F	17.8 °C (64.1) °F	11.9 °C (53.4) °F	6.2 °C (43.2) °F	1.5 °C (34.8) °F
Max. Temperature °C (°F)	4.3 °C (39.8) °F	5.7 °C (42.2) °F	9.3 °C (48.8) °F	15.1 °C (59.1) °F	19.9 °C (67.9) °F	24.9 °C (76.7) °F	27.8 °C (82.1) °F	27.1 °C (80.8) °F	23.7 °C (74.7) °F	18 °C (64.4) °F	12.3 °C (54.1) °F	7.3 °C (45.1) °F
Precipitation / Rainfall mm (in)	99 (3)	88 (3)	117 (4)	98 (3)	97 (3)	98 (3)	93 (3)	108 (4)	101 (3)	107 (4)	85 (3)	119 (4)
Humidity(%)	64%	62%	64%	65%	70%	72%	70%	71%	72%	69%	68%	67%
Rainy days (d)	7	7	8	8	8	8	8	8	7	7	6	8
avg. Sun hours (hours)	6.2	7.2	7.7	8.7	9.0	10.3	11.1	10.0	8.1	6.9	6.7	5.8

Data: 1991 - 2021 Min. Temperature °C (°F), Max. Temperature °C (°F), Precipitation / Rainfall mm (in), Humidity, Rainy days. Data: 1999 - 2019: avg. Sun hours

Equipment noise emissions and acoustical usage factors database

Equipment Description	Impact Device?	Acoustical Use Factor [A]	Spec 721.560 Lmax @ 50ft (dBA, slow)	Actual Measured Lmax @ 50 ft (dBA, slow)
All Other Equipment > 5 hp	No	50%	85	N/A
Auger Drill Rig	No	20%	85	84
Backhoe	No	40%	80	78
Bar Bender	No	20%	80	N/A
Blasting	Yes	1%	94	N/A
Boring Jack Power Unit	No	50%	80	83
Chain Saw	No	20%	85	84
Clam Shovel (dropping)	Yes	20%	93	87
Compactor (ground)	No	20%	80	83
Compressor (air)	No	40%	80	78
Concrete Batch Plant	No	15%	83	N/A
Concrete Mixer Truck	No	40%	85	79
Concrete Pump Truck	No	20%	82	81
Concrete Saw	No	20%	90	90
Crane	No	16%	85	81
Dozer	No	40%	85	82
Drill Rig Truck	No	20%	84	79
Drum Mixer	No	50%	80	80
Dump Truck	No	40%	84	76
Excavator	No	40%	85	81
Flat Bed Truck	No	40%	84	74
Front End Loader	No	40%	80	79
Generator	No	50%	82	81
Generator (<25KVA, VMS signs)	No	50%	70	73
Gradall	No	40%	85	83
Grader	No	40%	85	N/A
Grapple (on backhoe)	No	40%	85	87
Horizontal Boring Hydr. Jack	No	25%	80	82
Hydra Break Ram	Yes	10%	90	N/A
Impact Pile Driver	Yes	20%	95	101
Jackhammer	Yes	20%	85	89
Man Lift	No	20%	85	75
Mounted Impact Hammer (hoe ram)	Yes	20%	90	90
Pavement Scarifier	No	20%	85	90
Paver	No	50%	85	77
Pickup Truck	No	40%	55	75
Pneumatic Tools	No	50%	85	85
Pumps	No	50%	77	81
Refrigerator Unit	No	100%	82	73
Rivit Buster/Chipping Gun	Yes	20%	85	79
Rock Drill	No	20%	85	81
Roller	No	20%	85	80
Sand Blasting (Single Nozzle)	No	20%	85	96
Scraper	No	40%	85	84
Shears (on backhoe)	No	40%	85	96
Slurry Plant	No	100%	78	78
Slurry Trenching Machine	No	50%	82	80
Soil Mix Drill Rig	No	50%	80	N/A
Tractor	No	40%	84	N/A
Vacuum Excavator (vac-truck)	No	40%	85	85
Vacuum Street Sweeper	No	10%	80	82
Ventilation Fan	No	100%	85	79
Vibrating Hopper	No	50%	85	87
Vibratory Concrete Mixer	No	20%	80	80
Vibratory Pile Driver	No	20%	95	101
Warning Horn	No	5%	85	83
Welder/Torch	No	40%	73	74

Note(s):

A. Usage factor is the percentage of time during a construction noise operation that a piece of construction equipment is operating at full power. In case of construction blasting, the equipment gives a very short duration blast and can be quantified by using a 1% usage factor in the RCNM to allow for some prediction.

Source(s):

Federal Highway Administration. 2006. Roadway Construction Noise Model User's Guide. Table 1: CA/T equipment noise emissions and acoustical usage factors database. Accessed February 22, 2024, https://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/rcnm.pdf.

Average Ambient Noise Levels for Various Land Uses

Land Use Description	Average Ldn (dBA)	Daytime Leq (dBA)	Nighttime Leq (dBA)
Wilderness	35	35	25
Rural Residential	40	40	30
Quiet Suburban Residential	50	50	40
Normal Suburban Residential	55	55	45
Urban Residential	60	60	50
Noisy Urban Residential	65	65	55
Very Noisy Urban Residential	70	70	60

Source(s):

U.S. Environmental Protection Agency. 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* . 550/9-74-004. Washington, DC: U.S. Environmental Protection Agency, Office of Noise Abatement and Control.

U.S. Department of Agriculture, Forest Service. 1975. *Guidelines for Roadless Area Campsite Spacing to Minimize Impact of Human-Related Noises* . General Technical Report PNW-35. Portland, Oregon: Pacific Northwest Forest and Range Experiment Station.

Noise Reductions from Mitigation Measures

Mitigation Type	Reduction (dBA)
Noise barrier or other obstruction just barely breaks the line-of-sight between the noise source and the receptor	3
Noise source completely shielded by a building	15
Noise source completely enclosed or completely shielded with solid barrier located close to the source	8
Enclosure and/or barrier with some gaps	5
Noise source completely enclosed and completely shielded with a solid barrier located close to the source	10
Noise source enclosed or shielded with heavy vinyl noise curtain material	5

Source(s):

Federal Highway Administration. 2006. Roadway Construction Noise Model User's Guide. Appendix A: Best Practices for Calculating Estimated Shielding for Use in the RCNM. Accessed February 22, 2024, https://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/rcnm.pdf

Appendix D – 8-Step Decision-Making Process

Highlands and Monmouth Hills Flood Mitigation and Green Infrastructure Project
Borough of Highlands, Monmouth County, New Jersey
EMN-2022-BR-002-0033

Executive Order 11988 – FLOODPLAIN MANAGEMENT
Executive Order 11990 – WETLAND PROTECTION

8-STEP PROCESS SUMMARY

Date: 04/27/2026

Prepared By: Mindy Yang, Environmental Protection Specialist

Project: The Borough of Highlands (subrecipient) has applied for financial assistance from the U.S. Department of Homeland Security (DHS) - Federal Emergency Management Agency (FEMA), for the installation of flood mitigation infrastructure in the Borough of Highlands and Middletown Township, Monmouth County, New Jersey through Building Resilient Infrastructure and Communities (BRIC) Grant Program funds. The purpose of the BRIC Grant Program is to support states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards.

The proposed scope of work entails the repair, replacement, and upgrade of existing stormwater management systems and the construction of new drainage infrastructure to increase stormwater capacity from a 2-year storm event to a 100-year storm event. The Proposed Action would include four distinct project component areas:

1) Monmouth Hills
    - Basin 1, along Serpentine Drive (40.403323, -74.000424)
        - Bioswales/small-scale infiltration basins connecting to Basin 1
    - Basin 2, between Route 36 and Fennimore Terrace (40.403122, -73.999692)
    - Basin 3, off Route 36 next to Kavookjian Field (40.402441, -73996430)
        - Check dams beginning at the intersection of Coquette Lane and Valley Drive (40.400633, -73.998293) connecting downslope to Basin 3
    - Basin 4, beneath Kavookjian Field (40.402037, -73.995080)
        - Areas of green infrastructure and stilling basin west of Basin 4
2) Snug Harbor (40.408021, -73.992454)
3) Valley Street (40.404293, -73.986034)
4) North Street (40.403067, -73.984198)

Overall, the total area of ground disturbance for the Proposed Action construction is expected to be approximately 5.7 acres. Under the Proposed Action, approximately half of the Highlands population would benefit from reduced flooding. This would include the protection of downtown areas like local businesses, parks, recreation centers, and other community services, in addition to reducing impacts along Route 36, thereby benefitting most of the community.

This project must be conducted in accordance with conditions for federal actions in the floodplain as set forth in Presidential Executive Order (EO) 11988 (Floodplain Management), EO 11990 (Protection of Wetlands), the implementing regulations found in 44 Code of Federal Regulations (CFR) Part 9, *Floodplain Management and Protection of Wetlands*. These regulations apply to all Agency actions which have the potential to affect floodplains or wetlands or their occupants, or which are subject to potential harm by location in floodplains or wetlands.

Projects conducted with BRIC funds must be carried out in accordance with the local floodplain management plan and ordinance and shall utilize Flood Insurance Rate Map (FIRM) Panels as "best available data," as a minimum standard. Exceptions to this requirement shall be reported to FEMA Environmental and Historic Preservation and the local floodplain administrator before undertaking the action.

STEP 1 - Determine whether the proposed actions are located in a wetland and or the 100year floodplain (500-year floodplain for critical action [44 CFR 9.4]) or whether they have the potential to affect or be affected by a floodplain or a wetland (44 CFR 9.7).

__X__ The project sites are located in relation to the floodplains as mapped by:

FIRM Map: 34025C0088H dated June 15, 2022
Special Flood Hazard Area: AE

Brief description of work: The Snug Harbor, Valley Street, and North Street project components are in Zone AE.

__X__ The Project is located in the wetland as identified by:

A review of the U.S. Fish and Wildlife National Wetland Inventory (NWI) data on 04/08/2026 indicates that there are estuarine and marine wetlands within the project area along Shrewsbury River.

STEP 2 - Notify the public at the earliest possible time of the intent to carry out an action in a floodplain or wetland and involve the affected and interested public in the decision-making process (see 44 CFR 9.8).

_____ Not applicable - Project is not located in a floodplain or wetland.

__X__ Applicable - Notice will be or has been provided by:

Public notice will be provided in the public comment period for the Environmental Assessment for this project.

STEP 3 - Identify and evaluate practicable alternatives to locating the proposed action in a floodplain or wetland (including alternative sites, actions, and the "No Action" option) [see 44 CFR 9.9]. If a practicable alternative exists outside of the floodplain or wetland, FEMA must locate the action at the alternative site.

_____ Not applicable – Project is not located in a floodplain or in a wetland.

__X__ Applicable – Alternative identified in the EA Document or as described below:

Alternative 1: No Action – The *No Action* alternative would leave the project area with undersized stormwater capacity, resulting in persistent flooding and sediment deposition in the area during storm events. The consequences of these periodic flooding events would include closures of Route 36, which serves as an emergency evacuation route, damage to structures and property within the Highlands, and risks to public safety. This alternative would not meet the overall purpose and need.

Alternative 2: Construction of Floodwalls – This alternative, originally proposed by USACE, would include building 8,000 feet of floodwalls along the coast of Highlands. The floodwalls would be built at 14 feet elevation and rise above the town, which sits at 5 to 9 feet elevation. The subrecipient dismissed this alternative due to impracticality of the cost and engineering.

Alternative 3: Proposed Action – Under the Proposed Action, Highlands and Monmouth Hills would increase stormwater capacity from a 2-year storm event (approximately 3.31 inches of rainfall in 24 hours) to a 100-year storm even (8.56 inches of rainfall in 24 hours) by repairing and upgrading existing systems and constructing new stormwater infrastructure to alleviate flooding.

In order to mitigate downstream impacts of drainage from the steep slopes of Monmouth Hills, a comprehensive approach of intercepting, cleansing, and slowing water runoff is needed. This is achieved through the installation of various water collection systems such as check dams and bio-swales, which will contribute to a greater series of bio-retention ponds to increase filtration and water quality, where the water will then enter an underground stormwater storage system at Kavookjian field.

This project also includes stormwater infrastructure improvements within the Borough of Highlands, which consists of installation of a stormwater pump station at Snug Harbor. The pump station will be located in a new pump house along with an elevated electric room and generator at the end of a man-made canal adjacent to Bay Avenue. The pump station will consist of a pre-cast vertical column and will include triplex pumps. The pump station, electric room and generator housing will be set on timber pilings, with a single 36-inch PVC discharge pipe from the pump station to the Shrewsbury River. There will also be the installation of a precast box culvert from Huddy Park to the Shrewsbury River along Snug Harbor Avenue.

Further stormwater infrastructure improvements within the Borough of Highlands include upgrades to the Valley Street stormwater pump station and the North Street stormwater pump station. The Valley Street pump station upgrades only include the removal of the old force main and installation of a new force main that is substantially raised above the sand line and supported

with piles. Upgrades to the North Street pump station include upgrading the existing station to a duplex station along with new composite bulkheading.

These pump stations and drainage improvements are functionally tied to their location in the floodplain due to their purpose of being made to drain both coastal and inland floodwaters.

STEP 4 - Identify the full range, or potential direct or indirect impacts, associated with the occupancy or modification of floodplains and wetlands and the potential direct and indirect support of floodplain and wetland development that could result from the proposed action (see 44 CFR 9.10).

_____ Not applicable – Project is not located in a floodplain or in a wetland.

__X__ Applicable – Alternative identified in the EA document or as described below:

Alternative 3: Proposed Action – Construction activities for the Proposed Action would involve excavation and grading, resulting in ground disturbance and temporary impacts to soil within the project area. Approximately 5.7 acres would be disturbed, with excess soil transported off-site for disposal. During construction, the use of vehicles and equipment could temporarily release hazardous materials and increase sedimentation within the floodplain. However, the implementation of required permits and best management practices (BMPs) would minimize effects from sedimentation and pollutant discharge. As a result, the construction is expected to have negligible to minor short-term impacts on the floodplain.

The Snug Harbor, Valley Street, and North Valley Street components would involve construction adjacent to the Shrewsbury River. In Monmouth Hills, vegetation removal could expose soils to erosion within the floodplain. The project area would be replanted with native vegetation to reduce erosion risks. All activities within the floodplain are required to comply with the Flood Hazard Area Permit and Highlands' floodplain management regulations. Highlands would also coordinate with the local floodplain administrator(s) to secure any necessary permits for floodplain activities.

The Proposed Action aims to reduce the risk of long-term flood damage by enhancing stormwater drainage capacity throughout the project area. Infiltration basins and green infrastructure elements would help attenuate and filter pollutants from floodwaters, supporting water quality, habitat, and essential floodplain functions. An evaluation of the natural environment, social considerations, and economic factors indicates that the proposed stormwater infrastructure improvements at the selected locations are the only practicable alternative, with no feasible options identified outside the special flood hazard area.

STEP 5 - Minimize the potential adverse impacts and support to or within floodplains and wetlands to be identified under Step # 4, restore and preserve the natural and beneficial values served by floodplains, and preserve and enhance the natural and beneficial values served by wetlands (see 44 CFR 9.11).

____ Not applicable – Project is not located in a floodplain or in a wetland.

__X__ Applicable – Mitigation measures identified in the EA document or as described below:

The purpose of this project is to mitigate the risk of flooding and erosion to adjacent communities. BMPs will be followed along with all applicable permits obtained.

Alternative 3: Proposed Action – Soil erosion associated with construction would be minimized by using silt fencing and adhering to a Soil Erosion and Sediment Control Plan in accordance with the New Jersey Soil Erosion and Sediment Control Act of 1975. Further, construction activities more than one acre would be conducted in accordance with a New Jersey Pollutant Discharge Elimination System (NPDES) General Permit to Discharge Stormwater from Construction into the Surface Waters of the State of New Jersey (General Construction Stormwater Permit) through NJDEP. This permit regulates both point and nonpoint pollutant sources, including stormwater and stormwater runoff from construction sites.

The Highlands Flood Damage Prevention Ordinance (Chapter 21 Part VII) requires any development in the floodplain to obtain a Floodplain Development Permit before beginning work. This review is integrated into the construction permit application by the Department of Buildings and Housing.

STEP 6 - Re-evaluate the proposed action to determine first, if it is still practicable in light of its exposure to flood hazards, the extent to which it will aggravate the hazards to others and its potential to disrupt floodplain and wetland values, and second, if alternatives preliminarily rejected at Step #3 are practicable in light of the information gained in Steps #4 and #5. FEMA shall not act in a floodplain or wetland unless it is the only practicable location.

_____ Not applicable – Project is not located in a floodplain or in a wetland.

__X__ Applicable – Action proposed is located in the only practicable location as described below:

The proposed action is the chosen practicable alternative based upon a review of possible adverse effects on the floodplain/wetlands and community/socioeconomic expectations.

STEP 7 - Prepare and provide the public with a finding and public explanation of any final decision that the floodplain or wetland is the only practicable alternative (see 44 CFR 9.12).

_____ Not applicable – Project is not located in a floodplain or in a wetland.

__X__ Applicable – Finding is or will be prepared as described below:

Step 7 requires that the FEMA provide the public with an explanation of any final decisions that the Proposed Action in a floodplain and wetlands is the only practicable alternative, potential impacts of the Proposed Action on floodplains and wetlands, and associated mitigation measures. In accordance with 44 CFR 9.12, FEMA will provide this notice with the notice of availability of the draft Environmental Assessment for public review and comment.

STEP 8 - Review the implementation and post-implementation phases of the proposed action to ensure the requirements of the Order are fully implemented. Oversight responsibility shall be integrated into the existing process.

_____ Not applicable – Project is not located in a floodplain or in a wetland.

__X__ Applicable – Approval is conditioned on review of implementation and post-implementation phases to ensure compliance with the order(s).

Implementation of the project will include applicable permits and any related conditions, requirements from consultations, and those discussed in the environmental assessment as a condition of the grant.

__X__ Applicable – Oversight responsibility shall be integrated into existing processes and project completion in accordance with all applicable floodplain ordinances and codes and standards shall be verified at project completion.

Appendix E – Agency Correspondence

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Jersey Ecological Services Field Office
4 E. Jimmie Leeds Road, Suite 4
Galloway, NJ 08205
Phone: (609) 646-9310

In Reply Refer To: 01/17/2025 16:33:49 UTC
Project code: 2024-0118065
Project Name: Monmouth Highlands

Federal Nexus: yes
Federal Action Agency (if applicable): Federal Emergency Management Agency

Subject: Federal agency coordination under the Endangered Species Act, Section 7 for 'Monmouth Highlands'

Dear Mindy Yang:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on January 17, 2025, for 'Monmouth Highlands' (here forward, Project). This project has been assigned Project Code 2024-0118065 and all future correspondence should clearly reference this number. **Please carefully review this letter. Your Endangered Species Act (Act) requirements may not be complete.**

Ensuring Accurate Determinations When Using IPaC

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat and Tricolored Bat Range-wide Determination Key (DKey), invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid. Note that conservation measures for northern long-eared bat and tricolored bat may differ. If both bat species are present in the action area and the key suggests more conservative measures for one of the species for your Project, the Project may need to apply the most conservative measures in order to avoid adverse effects. If unsure which conservation measures should be applied, please contact the appropriate Ecological Services Field Office.***

Determination for the Northern Long-Eared Bat and Tricolored Bat

Based on your IPaC submission and a standing analysis completed by the Service, you determined the proposed Project will have the following effect determinations:

Species	Listing Status	Determination
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	NLAA

Federal agencies must consult with U.S. Fish and Wildlife Service under section 7(a)(2) of the Endangered Species Act (ESA) when an action *may affect* a listed species. Tricolored bat is proposed for listing as endangered under the ESA, but not yet listed. For actions that may affect a proposed species, agencies cannot consult, but they can *confer* under the authority of section 7(a)(4) of the ESA. Such conferences can follow the procedures for a consultation and be adopted as such if and when the proposed species is listed. Should the tricolored bat be listed, agencies must review projects that are not yet complete, or projects with ongoing effects within the tricolored bat range that previously received a NE or NLAA determination from the key to confirm that the determination is still accurate.

Unless the Service advises you within 15 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that consultation on the Action is complete for northern long-eared bat and/or tricolored bat and no further action is necessary unless either of the following occurs:

- new information reveals effects of the action that may affect the northern long-eared bat or tricolored bat in a manner or to an extent not previously considered; or,
- the identified action is subsequently modified in a manner that causes an effect to the northern long-eared bat or tricolored bat that was not considered when completing the determination key.

15-Day Review Period

As indicated above, the Service will notify you within 15 calendar days if we determine that this proposed Action does not meet the criteria for a “may affect, not likely to adversely affect” (NLAA) determination for the northern long-eared bat and/or tricolored bat. If we do not notify you within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here. This verification period allows the identified Ecological Services Field Office to apply local knowledge to evaluation of the Action, as we may identify a small subset of actions having impacts that we did not anticipate when developing the key. In such cases, the identified Ecological Services Field Office may request additional information to verify the effects determination reached through the Northern Long-eared Bat and Tricolored Bat DKey.

Other Species and Critical Habitat that May be Present in the Action Area

The IPaC-assisted determination key for the northern long-eared bat and tricolored bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Monarch Butterfly *Danaus plexippus* Proposed Threatened

- Piping Plover *Charadrius melodus* Threatened
- Roseate Tern *Sterna dougallii dougallii* Endangered
- Rufa Red Knot *Calidris canutus rufa* Threatened
- Seabeach Amaranth *Amaranthus pumilus* Threatened

You may coordinate with our Office to determine whether the Action may affect the species and/or critical habitat listed above. Note that reinitiation of consultation would be necessary if a new species is listed or critical habitat designated that may be affected by the identified action before it is complete.

If you have any questions regarding this letter or need further assistance, please contact the New Jersey Ecological Services Field Office and reference Project Code 2024-0118065 associated with this Project.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Monmouth Highlands

2. Description

The following description was provided for the project 'Monmouth Highlands':

> SOW: Construction of two (2) bio-swales to be lined with Flexmat Plus reinforcement. Swales will contain clay-core and concrete check dams at roughly 100’ intervals. Basin 2 will be tied directly into existing stormwater infrastructure along Rt 36. Basin 3 outlet will be piped across Waterwitch Ave, where it will enter a stilling basin to settle out suspended solids then outlets into an additional bio-retention swale leading into a 180,000 C.F. capacity underground stormwater storage system at Kavookjian Field. From there water will be piped across Rt 36 to connect with the existing 30” stormwater pipe running down Waterwitch Ave into the Borough.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@40.4032275,-73.99962826327291,14z



DETERMINATION KEY RESULT

Based on the answers provided, the proposed Action is consistent with a determination of “may affect, but not likely to adversely affect” for a least one species covered by this determination key.

QUALIFICATION INTERVIEW

1. Does the proposed project include, or is it reasonably certain to cause, intentional take of listed bats or any other listed species?

   Note: Intentional take is defined as take that is the intended result of a project. Intentional take could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered or proposed species?

   No

2. Is the action area wholly within Zone 2 of the year-round active area for northern long-eared bat and/or tricolored bat?

   Automatically answered
   No

3. Does the action area intersect Zone 1 of the year-round active area for northern long-eared bat and/or tricolored bat?

   Automatically answered
   No

4. Does any component of the action involve leasing, construction or operation of wind turbines? Answer 'yes' if the activities considered are conducted with the intention of gathering survey information to inform the leasing, construction, or operation of wind turbines.

   Note: For federal actions, answer ‘yes’ if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

   No

5. Is the proposed action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

   Yes

6. Is the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), or Federal Transit Administration (FTA) funding or authorizing the proposed action, in whole or in part?

   No

7. Are you an employee of the federal action agency or have you been officially designated in writing by the agency as its designated non-federal representative for the purposes of Endangered Species Act Section 7 informal consultation per 50 CFR § 402.08?

   Note: This key may be used for federal actions and for non-federal actions to facilitate section 7 consultation and to help determine whether an incidental take permit may be needed, respectively. This question is for information purposes only.

   Yes

8. Is the lead federal action agency the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC)? Is the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC) funding or authorizing the proposed action, in whole or in part?

   No

9. Is the lead federal action agency the Federal Energy Regulatory Commission (FERC)?

   No

10. [Semantic] Is the action area located within 0.5 miles of a known bat hibernaculum?

    Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency.

    Automatically answered
    No

11. Does the action area contain any winter roosts or caves (or associated sinkholes, fissures, or other karst features), mines, rocky outcroppings, or tunnels that could provide habitat for hibernating bats?

    No

12. Will the action cause effects to a bridge?

    Note: Covered bridges should be considered as bridges in this question.

    No

13. Will the action result in effects to a culvert or tunnel at any time of year?

    Yes

14. Does the culvert or tunnel equal or exceed 23 feet (7.0 meters) in length?

    Yes

15. Do the interior dimensions of the culvert or tunnel **equal or exceed 3.0 feet (0.9 meters) in height (minimum height for tricolored bat)**?

    Yes

16. Has a site-specific culvert assessment following USFWS guidelines been completed?

    Note: For information on conducting a bridge/structure assessment, please see Appendix K in the USFWS' Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines at:https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines Additional resources can be found at: https://www.fws.gov/media/bats-and-transportation-structures-references-and-additional-resources and a training video is located at: https://www.youtube.com/watch?v=iuFwkT7q8Ws.

    Yes

    SUBMITTED DOCUMENTS

    - *NJ-FWS-Concurrence 01132025.pdf https://ipac.ecosphere.fws.gov/project/SGQHS3YYLBGPZAKLNPBDSCU6WU/projectDocuments/155697123*

17. Was evidence of bat use found during the bridge/structure (e.g., culvert) assessment?

    No

18. Did you coordinate with your local Ecological Services Field Office (ESFO) and receive approval of culvert assessment results? If NO, please contact the appropriate local ESFO before completing this determination key.

    Yes

19. Are trees present within 1000 feet of the action area?

    Note: If there are trees within the action area that are of a sufficient size to be potential roosts for bats answer "Yes". If unsure, additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    Yes

20. Does the action include the intentional exclusion of bats from a building or structure?

    Note: Exclusion is conducted to deny bats' entry or reentry into a building. To be effective and to avoid harming bats, it should be done according to established standards. If your action includes bat exclusion and you are unsure whether northern long-eared bats or tricolored bats are present, answer "Yes." Answer "No" if there are no signs of bat use in the building/structure. If unsure, contact your local Ecological Services Field Office to help assess whether northern long-eared bats or tricolored bats may be present. Contact a Nuisance Wildlife Control Operator (NWCO) for help in how to exclude bats from a structure safely without causing harm to the bats (to find a NWCO certified in bat standards, search the Internet using the search term "National Wildlife Control Operators Association bats"). Also see the White-Nose Syndrome Response Team's guide for bat control in structures.

    No

21. Does the action involve removal, modification, or maintenance of a human-made structure (barn, house, or other building) **known or suspected to contain roosting bats?**

    No

22. Will the action cause construction of one or more new roads open to the public?

    For federal actions, answer ‘yes’ when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.).

    No

23. Will the action include or cause any construction or other activity that is reasonably certain to increase average daily traffic permanently or temporarily on one or more existing roads?

    Note: For federal actions, answer ‘yes’ when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.). .

    No

24. Will the action include or cause any construction or other activity that is reasonably certain to increase the number of travel lanes on an existing thoroughfare?

    For federal actions, answer ‘yes’ when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.).

    No

25. Will the proposed Action involve the creation of a new water-borne contaminant source (e.g., leachate pond, pits containing chemicals that are not NSF/ANSI 60 compliant)?

    Note: For information regarding NSF/ANSI 60 please visit https://www.nsf.org/knowledge-library/nsf-ansi-standard-60-drinking-water-treatment-chemicals-health-effects

    No

26. Will the proposed action involve the creation of a new point source discharge from a facility other than a water treatment plant or storm water system?

    No

27. Will the action include drilling or blasting?

    No

28. Will the action involve military training (e.g., smoke operations, obscurant operations, exploding munitions, artillery fire, range use, helicopter or fixed wing aircraft use)?

    No

29. Will the proposed action involve the use of herbicides or other pesticides other than herbicides (e.g., fungicides, insecticides, or rodenticides)?

    No

30. Will the action include or cause activities that are reasonably certain to cause chronic or intense nighttime noise (above current levels of ambient noise in the area) in suitable summer habitat for the northern long-eared bat or tricolored bat during the active season?

    Chronic noise is noise that is continuous or occurs repeatedly again and again for a long time. Sources of chronic or intense noise that could cause adverse effects to bats may include, but are not limited to: road traffic; trains; aircraft; industrial activities; gas compressor stations; loud music; crowds; oil and gas extraction; construction; and mining.

    Note: Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    No

31. Does the action include, or is it reasonably certain to cause, the use of permanent or temporary artificial lighting within 1000 feet of suitable northern long-eared bat or tricolored bat roosting habitat?

    Note: Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    No

32. Will the action include tree cutting or other means of knocking down or bringing down trees, tree topping, or tree trimming?

    Yes

33. Will the proposed action occur exclusively in an already established and currently maintained utility right-of-way?

    No

34. Does the action include emergency cutting or trimming of hazard trees in order to remove an imminent threat to human safety or property? See hazard tree note at the bottom of the key for text that will be added to response letters

    Note: A "hazard tree" is a tree that is an immediate threat to lives, public health and safety, or improved property.

    No

35. Does the project intersect with the 0- 9.9% forest density category?

    Automatically answered
    Yes

36. Does the project intersect with the 10.0- 19.9% forest density category map?

    Automatically answered
    No

37. Does the project intersect with the 20.0- 29.9% forest density category map?

    Automatically answered
    Yes

38. Does the project intersect with the 30.0- 100% forest density category map?

    Automatically answered
    No

39. Will the action cause trees to be cut, knocked down, or otherwise brought down across an area greater than 0.5 acre in total extent?

    No

40. Will the action cause trees to be cut, knocked down, or otherwise brought down across an area greater than 40 acres in total extent?

    No

41. Will the proposed action result in the use of prescribed fire?

    Note: If the prescribed fire action includes other activities than application of fire (e.g., tree cutting, fire line preparation) please consider impacts from those activities within the previous representative questions in the key. This set of questions only considers impacts from flame and smoke.

    No

42. Does the action area intersect the tricolored bat species list area?

    Automatically answered
    Yes

43. [Semantic] Is the action area located within 0.25 miles of a culvert that is known to be occupied by northern long-eared or tricolored bats?

    Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency.

    Automatically answered
    No

44. Is suitable summer habitat for the tricolored bat present within 1000 feet of project activities?
    (If unsure, answer ""Yes."")

    Note: If there are trees within the action area that may provide potential roosts for tricolored bats (e.g., clusters of leaves in live and dead deciduous trees, Spanish moss (Tillandsia usneoides), clusters of dead pine needles of large live pines) answer ""Yes."" For a complete definition of suitable summer habitat for the tricolored bat, please see Appendix A in the Service's Range-wide Indiana Bat and Northern long-eared Bat Survey Guidelines.

    Yes

45. Do any of the trees proposed for cutting or other means of knocking down, bringing down, topping, or trimming provide potential roosts for tricolored bats (e.g., clusters of leaves in live and dead deciduous trees, Spanish moss (*Tillandsia usneoides*), clusters of dead pine needles of large live pine trees)?

    Note: Additional information defining suitable summer habitat for the northern long-eared bat and tricolored bat can be found in Appendix A of the USFWS' Range-wide Indiana Bat and Northern long-eared bat Survey Guidelines at: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

    No

46. Do you have any documents that you want to include with this submission?

    No

PROJECT QUESTIONNAIRE

Enter the extent of the action area (in acres) from which trees will be removed - round up to the nearest tenth of an acre. For this question, include the entire area where tree removal will take place, even if some live or dead trees will be left standing.

IPAC USER CONTACT INFORMATION

Agency: Federal Emergency Management Agency
Name: Mindy Yang
Address: 285 Fulton St, New York, NY 10007
City: New York
State: NY
Zip: 10007
Email mindy.yang@fema.dhs.gov
Phone: 2026157258

From: Crestol, Sarah R <sarah_crestol@fws.gov>
Sent: Monday, January 13, 2025 2:44 PM
To: Yang, Mindy
Subject: RE: [EXTERNAL] FEMA-USFWS Consultation: EMN-2022-BR-002-0033 Highlands & Monmouth Hills Flood Mitigation and Green Infrastructure Project
Attachments: DKey example.png

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Hi Mindy,

Please proceed according to the rest of this message. For reference, I'm attaching a screenshot of the culvert-related questions in the NLEB/TCB Determination Key. Please let me know if you have any questions.

While there is no requirement to consult with the Service regarding species that are proposed for federal listing, FEMA proactively assessed the potential impacts of the proposed project on the tricolored bat and requested to conference with the Service. In turn, the Service recommended that the project implement the following conservation measure:

- The removal, cutting, or trimming of trees (of any diameter) that may contain potential roost substrate for tricolored bats (e.g., clusters of leaves in live and dead deciduous trees, Spanish moss [*Tillandsia usneoides*], beard lichen [*Usnea trichodea*], or clusters of dead pine needles of large live pines) must not be conducted during the tricolored bat's pup season in New Jersey (May 15–July 31).

Additionally, the Service determined that although the proposed project will involve effects to a culvert with the appropriate dimensions to provide suitable habitat for the tricolored bat, a culvert survey is not warranted. Work will not be performed on an existing culvert. The project will install a new culvert, devoid of roosting bats. Therefore, the Service is directing FEMA to answer "Yes" to the following questions in the Northern Long-Eared Bat and Tricolored Bat Range-Wide Determination Key:

- "Has a site-specific culvert assessment following USFWS guidelines been completed?"
- "Did you coordinate with your local Ecological Services Field Office (ESFO) and receive approval of culvert assessment results? If NO, please contact the appropriate local ESFO before completing this determination key."

The Service is also directing the action agency to answer "No" to the following question in the Determination Key:

- "Was evidence of bat use found during the bridge/structure (e.g., culvert) assessment?"

In lieu of culvert assessment results, the project proponent will upload a copy of this email, dated 1/13/25, as evidence that FEMA has coordinated with the Service to receive approval for these responses regarding the culvert in question. In this way, FEMA will be able to proceed through additional questions in the Determination Key. FEMA has previously indicated that the project will abide by a time-of-year restriction on the removal of suitable roost trees for the tricolored bat. Thus, the Determination Key is expected to generate a consistency letter stating that the project will be consistent with a "may affect, not likely to adversely affect" (NLAA) determination for the tricolored bat.

Sincerely,
Sarah

Sarah Crestol
Endangered Species Biologist
U.S. Fish & Wildlife Service, New Jersey Field Office
4 E Jimmie Leeds Rd, Suite 4, Galloway, NJ 08205
609-382-5271 (office)
https://www.fws.gov/office/new-jersey-ecological-services/new-jersey-field-office-project-review-guide

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From: Yang, Mindy <mindy.yang@fema.dhs.gov>
Sent: Monday, January 13, 2025 7:51 AM
To: Crestol, Sarah R <sarah_crestol@fws.gov>
Subject: RE: [EXTERNAL] FEMA-USFWS Consultation: EMN-2022-BR-002-0033 Highlands & Monmouth Hills Flood Mitigation and Green Infrastructure Project

Hi Sarah,

I hope you had a good holiday vacation and I really appreciate this update, thanks so much for working on this and I'll look forward to your response!

Mindy Yang
Environmental Protection Specialist | Mitigation Division | Region 2
Mobile: (202) 615-7258
mindy.yang@fema.dhs.gov

Federal Emergency Management Agency
fema.gov

FEMA

From: Crestol, Sarah R <sarah_crestol@fws.gov>
Sent: Friday, January 10, 2025 5:29 PM
To: Yang, Mindy <mindy.yang@fema.dhs.gov>
Subject: RE: [EXTERNAL] FEMA-USFWS Consultation: EMN-2022-BR-002-0033 Highlands & Monmouth Hills Flood Mitigation and Green Infrastructure Project

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Hi Mindy,

I'm sorry for my extended delay due to my holiday vacation. I received confirmation from a senior biologist that if the project is only installing a new culvert, a culvert survey will not be required. She said I should just check that the new culvert isn't tying into an existing culvert.

Otherwise, the conservation measure that the Service would recommend would be – "The removal, cutting, or trimming of trees (of any diameter) that may contain potential roost substrate for tricolored bats (e.g., clusters of leaves in live and dead deciduous trees, Spanish moss [*Tillandsia usneoides*], beard lichen [*Usnea trichodea*], and clusters of dead pine needles of large live pines) must not be conducted during the tricolored bat's pup season in New Jersey (May 15 – July 31)."

If the project can implement that conservation measure, then I am hoping we can process this conference request via the NLEB and TCB Determination Key. My plan is to write a message that you can upload to the Determination Key as evidence that you coordinated with the NJFO and received a confirmation of bats being absent from the culvert in question (since it is a new culvert).

Thank you for your patience. I'll try to conclude this conference request early next week.

Sincerely,
Sarah

Sarah Crestol
Endangered Species Biologist
U.S. Fish & Wildlife Service, New Jersey Field Office
4 E Jimmie Leeds Rd, Suite 4, Galloway, NJ 08205
609-382-5271 (office)
https://www.fws.gov/office/new-jersey-ecological-services/new-jersey-field-office-project-review-guide

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From: Yang, Mindy <mindy.yang@fema.dhs.gov>
Sent: Thursday, January 2, 2025 10:13 AM
To: Crestol, Sarah R <sarah_crestol@fws.gov>
Subject: RE: [EXTERNAL] FEMA-USFWS Consultation: EMN-2022-BR-002-0033 Highlands & Monmouth Hills Flood Mitigation and Green Infrastructure Project

Good morning Sarah,

Hope you are doing well! I just wanted to follow up and see if you have any updates for us?

Thank you,

Mindy Yang
Environmental Protection Specialist | Mitigation Division | Region 2
Mobile: (202) 615-7258
mindy.yang@fema.dhs.gov

Federal Emergency Management Agency
fema.gov

FEMA

From: Crestol, Sarah R <sarah_crestol@fws.gov>
Sent: Tuesday, December 10, 2024 4:07 PM
To: Yang, Mindy <mindy.yang@fema.dhs.gov>
Subject: RE: [EXTERNAL] FEMA-USFWS Consultation: EMN-2022-BR-002-0033 Highlands & Monmouth Hills Flood Mitigation and Green Infrastructure Project

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Hi Mindy,

Thank you for the clarification!

I will be in touch.

Sarah Crestol
Endangered Species Biologist
U.S. Fish & Wildlife Service
New Jersey Field Office
4 E Jimmie Leeds Rd, Suite 4, Galloway, NJ 08205
609-382-5271 (office)
https://www.fws.gov/office/new-jersey-ecological-services/new-jersey-field-office-project-review-guide

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From: Yang, Mindy <mindy.yang@fema.dhs.gov>
Sent: Friday, December 6, 2024 11:36 AM
To: Crestol, Sarah R <sarah_crestol@fws.gov>
Subject: RE: [EXTERNAL] FEMA-USFWS Consultation: EMN-2022-BR-002-0033 Highlands & Monmouth Hills Flood Mitigation and Green Infrastructure Project

Hey Sarah,

There will be both installation of a 1,230 linear feet long precast concrete box culvert from Huddy Park to the Shrewsbury River. For Valley pump station repairs there will be removal and replacement of an old discharge pipe, and at the North Street pump station there is removal of old single pump wet well and upgrading to a larger discharge pipe.

Let me know if you need any other information!

Thank you,

Mindy Yang
Environmental Protection Specialist | Mitigation Division | Region 2
Mobile: (202) 615-7258
mindy.yang@fema.dhs.gov

Federal Emergency Management Agency
fema.gov

From: Crestol, Sarah R <sarah_crestol@fws.gov>
Sent: Wednesday, November 13, 2024 4:45 PM
To: Yang, Mindy <mindy.yang@fema.dhs.gov>
Subject: RE: [EXTERNAL] FEMA-USFWS Consultation: EMN-2022-BR-002-0033 Highlands & Monmouth Hills Flood Mitigation and Green Infrastructure Project

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Hi Mindy,

Thanks for your responses! And thanks for your patience. It's good to hear that the project will not have impacts near suitable habitat for piping plover or red knot. I didn't realize roseate tern and seabeach amaranth were on the species list, so if you want to check your project against our screening questions, that would probably be the most effective way to check if a No Effect determination is appropriate for them. If you choose to make a No Effect determination for those four species, you can save our No Effect Letter for your records.

For tricolored bat, we can do Section 7 informal conference – it sounds like that would fit well with the proactive approach you're taking. I was wondering, is the project only installing a new culvert and not performing work on an existing culvert?

Thank you,
Sarah

Sarah Crestol
Endangered Species Biologist
U.S. Fish & Wildlife Service
New Jersey Field Office
4 E Jimmie Leeds Rd, Suite 4, Galloway, NJ 08205
609-382-5271 (office)
https://www.fws.gov/office/new-jersey-ecological-services/new-jersey-field-office-project-review-guide

From: Yang, Mindy <mindy.yang@fema.dhs.gov>
Sent: Thursday, November 7, 2024 11:06 AM
To: Crestol, Sarah R <sarah_crestol@fws.gov>
Subject: RE: [EXTERNAL] FEMA-USFWS Consultation: EMN-2022-BR-002-0033 Highlands & Monmouth Hills Flood Mitigation and Green Infrastructure Project

Good morning Sarah!

1. Please see attached for the most up to date official species list for this project.
2. For this projects scope, the only work that is close to the bay is bulkhead replacements and force main installations, and they appear to be within highly developed areas so it does not appear to have unstabilized dune, dry beach, wrack line, or intertidal habitat. Please see the aerial map in the consultation package.

3. Regarding the IPaC Beta and the Tricolor bat species, we got stuck on the culvert question and decided to consult with conditions in order to mitigate for any potential impact to bats or their habitat. The timing restrictions and immediate reporting requirement for the presence of any bat will be a condition of grant funding for our subapplicant.

Let me know if you need anything else.

Thank you,

Mindy Yang
Environmental Protection Specialist | Mitigation Division | Region 2
Mobile: (202) 615-7258
mindy.yang@fema.dhs.gov

Federal Emergency Management Agency
fema.gov

From: Crestol, Sarah R <sarah_crestol@fws.gov>
Sent: Monday, November 4, 2024 11:57 AM
To: Yang, Mindy <mindy.yang@fema.dhs.gov>
Subject: RE: [EXTERNAL] FEMA-USFWS Consultation: EMN-2022-BR-002-0033 Highlands & Monmouth Hills Flood Mitigation and Green Infrastructure Project

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Hi Mindy,

Could you help me with these steps to complete your consultation package?

1. Please send me the Official Species List from IPaC.
2. Please answer these questions:
    a. For piping plover: Does the project include activity in or within 500 feet of an unstabilized dune, dry beach, wrack line, or intertidal habitat (e.g., beach “swash” zone, sand or mud flat)?
    b. For red knot: Does the project include activity in or within 500 feet of an unstabilized dune, dry beach, wrack line, or sparsely vegetated intertidal habitat of any kind (e.g., beach “swash” zone, sand flat, mud flat, algal flat, shoal, sand spit, islet, peat bank, tidal marsh blowout/pan)?
    c. These questions are from our NJFO Project Screening Questions document – just making sure we account for indirect effects (e.g., disturbing the birds) to areas adjacent to the project area, even if the project area itself does not contain suitable habitat.
3. Thank you for evaluating the project’s impacts on the tricolored bat with the determination key in IPaC Beta. In submitting the project to the NJFO, were you seeking technical assistance for this species? Could you please clarify what you had in mind?
    a. For more info, please see https://www.fws.gov/media/endangered-species-status-tricolored-bat-new-jersey
    b. Following up on the question “Has a site-specific culvert assessment following USFWS guidelines been completed?” from the determination key, the project could proactively coordinate with our office to plan and perform a culvert assessment. Please let me know if this is what you had in mind.

Thank you,
Sarah

Sarah Crestol
Endangered Species Biologist
U.S. Fish & Wildlife Service
New Jersey Field Office
4 E Jimmie Leeds Rd, Suite 4, Galloway, NJ 08205

609-382-5271 (office)

From: Yang, Mindy <mindy.yang@fema.dhs.gov>
Sent: Thursday, October 17, 2024 9:40 AM
To: Crestol, Sarah R <sarah_crestol@fws.gov>
Subject: RE: [EXTERNAL] FEMA-USFWS Consultation: EMN-2022-BR-002-0033 Highlands & Monmouth Hills Flood Mitigation and Green Infrastructure Project

Thanks Sarah, I'll look forward to your response!

Mindy Yang
Environmental Protection Specialist | Mitigation Division | Region 2
Mobile: (202) 615-7258
mindy.yang@fema.dhs.gov

Federal Emergency Management Agency
fema.gov

From: Crestol, Sarah R <sarah_crestol@fws.gov>
Sent: Thursday, October 17, 2024 9:38 AM
To: Yang, Mindy <mindy.yang@fema.dhs.gov>
Subject: RE: [EXTERNAL] FEMA-USFWS Consultation: EMN-2022-BR-002-0033 Highlands & Monmouth Hills Flood Mitigation and Green Infrastructure Project

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Hi Mindy,

I wanted to let you know that this consultation has been assigned to me, and when I'm able to start my review of the project, I'll let you know any questions that come up.

Thank you,
Sarah Crestol

Sarah Crestol
Endangered Species Biologist
U.S. Fish & Wildlife Service
New Jersey Field Office
4 E Jimmie Leeds Rd, Suite 4, Galloway, NJ 08205
609-382-5271 (office)

From: Yang, Mindy <mindy.yang@fema.dhs.gov>
Sent: Thursday, October 10, 2024 4:10 PM
To: NJFO Project Review, FW5 <NJFO_ProjectReview@fws.gov>
Cc: Weisman, Bessie <bessie.weisman@fema.dhs.gov>
Subject: [EXTERNAL] FEMA-USFWS Consultation: EMN-2022-BR-002-0033 Highlands & Monmouth Hills Flood Mitigation and Green Infrastructure Project

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To Eric Schrading or delegated reviewer,

The Federal Emergency Management Agency (FEMA) is proposing to provide financial assistance to the Borough of Highlands for their flood mitigation and green infrastructure project under the Building Resilient Infrastructure and Communities grant program; please see attached letter for section 7 consultation for the work proposed under this grant.

We kindly request your response to this consultation within 30 calendar days. Please let me know if you have any questions or concerns.

Thank you,

Mindy Yang
Environmental Protection Specialist | Mitigation Division | Region 2
Mobile: (202) 615-7258
mindy.yang@fema.dhs.gov

Federal Emergency Management Agency
fema.gov



U.S. Department of Homeland Security
Federal Emergency Management Agency
One World Trade Center
285 Fulton Street
New York, New York 10007

October 10, 2024

Mr. Eric Schrading, Field Office Supervisor
U.S. Fish and Wildlife Service
New Jersey Field Office
Atlantic Professional Park
4 East Jimmie Leeds Road
Galloway, New Jersey 08205

Re: **Section 7 Review of Effects –** Building Resilient Infrastructure and Communities Grant
Grant Name and Number: BRIC 22: Highlands & Monmouth Hills Flood Mitigation and Green Infrastructure Project, EMN-2022-BR-002-0033
Locations:

- Snug Harbor pump station: (40.405230, -73.994367)
- Valley Street pump station: (40.404066, -73.986180)
- North Street pump station: (40.403067, -73.984198)
- Basin 1, along Waterwitch Drive: (40.400391, -73.995276)
- Basin 2, next to Route 36 along serpentine Drive: (40.403416, -74.000220)
- Basin 3, off route 36 next to Kavookjian Field (40.402443, -73.996346)
- Basin 4, beneath Kavookjian Field (40.402037, -73.995080)

Subrecipient: Borough of Highlands
Undertaking: Flood mitigation activities including installation of infiltration basins, pump and drains, culverts, bulkheads, and piping.
Determination of Effect: Not Likely to Adversely Affect with Conditions

Dear Mr. Schrading,

Highlands Borough (Subrecipient) has applied for financial assistance from the U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA) to implement flood mitigation activities in Monmouth County, New Jersey using Building Resilient Infrastructure and Communities (BRIC) funds. The purpose of BRIC is to support states, local governments, tribes and territories in reducing their hazard risk. The intent is to support communities as they build capability and capacity, encourage innovation, help grow partnerships, support infrastructure projects, and foster flexibility and consistency.

Background

Highlands Borough in Monmouth County, New Jersey will be the primary beneficiary of the proposed flood mitigation activities that aim to reduce flooding in the low-lying downtown area north of Shore Drive, which is where most homes and businesses are located in this community. Neighboring towns, like Middletown Township, will also benefit from the improvements because the proposed project will address the issue of sediment build-up that causes the closure of Route 36, which is an evacuation route. The mitigation proposal will effectively collect and treat floodwaters as a priority. Most of the downtown area of the Highlands Borough is well below +10 feet in elevation, while the Base Flood Elevation (BFE) for the area is +14 feet. Existing bulkheading is aligned at +4.5 feet to +6.0 feet, which leaves the Borough particularly vulnerable to flooding from coastal storms as well as flooding from Middletown. The plans attached show how the construction of structural and non-structural features inside Monmouth Hills could attenuate, cleanse, and store enough surface water, upstream of Route 36 (Attachment A).

Proposed Work

The scope of work is broken down into the following four parts:

1. **Snug Harbor Pump Station and Drains**: Installation of a 1,230 linear feet long precast concrete box culvert from Huddy Park to the Shrewsbury River, a new Triplex Pumping Station, sluice gates for flood and tide control, and new inlets and storm drains to collect and transmit floodwaters to the pump station. Ground disturbance equals roughly 95,000 S.F. In-water work includes installation of a new culvert bulkhead end piece and sluice gate, located at the end of the Shrewsbury River.
2. **Monmouth Hills Basins, Pipes, Repairs, Bio-Swales:** Installation of four large scale infiltration basins at the foot of the Hill, five bio-swales, stilling basins, and TSS removal filter units and the stabilization of Valley Drive ravine. The total area of ground disturbance for the infiltration basins is estimated to be at approximately two to three acres.
3. **Valley Pump Station Repairs:** Removal and replacement of the old discharge pipe. Ground disturbance will equal roughly 4,000 sq ft. In-water work is limited to removing rotted pipe and the installation of new discharge pipe with pilings.
4. **North Street Pump Station, Bulkheads, And Piping**: Removal of an old single pump wet well at the end of North Street and upgrade to a vertical turbine duplex station with a larger discharge pipe, coupled with new higher bulkheads for roughly 120 linear feet along Shrewsbury River. Ground disturbance will be approximately 18,500 S.F. In-water work is limited to new bulkheads.

Discussion

The Action Area is located in the neighborhood of Monmouth Hills in Middletown Township and Highlands Borough, New Jersey where flood mitigation activities will occur. According to the BETA Information for Planning and Consultation (IPaC) system, the Action Area may potentially support the Tricolor bat (*Perimyotis subflavus*), currently proposed endangered, and the federally listed Piping plover (*Charadrius melodus*), and Red knot (*Calidris canutus rufa*) (Attachment B). BETA IPaC also lists 23 migratory bird species that may be present in the Action Area.

Tricolor bat
The trees throughout Monmouth Hills and Highlands Borough may present suitable conditions for Tricolor bat roosting. The Subrecipient estimates that approximately 15 mature specimen trees, ranging in 18 – 24 inches in diameter, and eight mature specimen trees, ranging in 27 – 36 inches in diameter, would be removed from the Monmouth Hills site. The proposed project may create temporary disturbance during construction, but no long-term effects are anticipated from trenching or installation. The Subrecipient will then replant trees with the goal of recuperating an amount greater than or equal to the final number of trees to be removed. This action will have a minimal effect on the overall suitability of the area to support foraging and roosting after the winter hibernation period.

Piping Plover
Piping plover (Charadrius melodus) is a small migratory shorebird that nests and feeds along coastal sand and gravel beaches in North America. There are three populations of Piping plover: subspecies C. m. circumcinctus which has one population that occurs on the shorelines of the Great Lakes and another population that occurs along the rivers and lakes in the Northern Great Plains, as well as subspecies C. m. melodus that occurs along the Atlantic Coast. The project location does not overlap with the final critical habitat for this species. Wintering Piping plovers use a variety of habitats and move among these patches in response to local weather and tidal conditions. Coastal habitats include sand spits, small islands, tidal flats, shoals and sandbars with inlets. Primary foraging habitats include sandy mud flats, ephemeral pools and seasonally emergent seagrass beds with abundant invertebrates, as documented in the USFWS draft recovery plan of 2015. Also noted in the draft recovery plan of 2015, the following factors have negative impacts to Piping plovers: agricultural development, insecticide use, increases in invasive species and intraspecific aggression that results from increasing densities in populations. The proposed project locations do not contain suitable habitat for this shorebird species. The

bulkhead work will be close to Sandy Hook Bay; however, since the proposed action is for bulkhead reconstruction and replacements, the work is to be done on pre-developed locations.

Red Knot
Rufa red knot (Calidris canutus rufa) wintering areas include the Atlantic coasts of Argentina and Chile; the northern coast of South America; the western Gulf of Mexico from the Tamaulipas through Texas to Mississippi and extending south along both coasts of Central America; and the Southeast United States from Alabama to North Carolina with additional birds throughout the Caribbean. The Rufa red knot breeds in the central Canadian Arctic, from the islands of northern Hudson Bay to the Foxe Basin shorelines of Prince Charles and Baffin Islands, and west to Victoria Island. The proposed project location does not contain suitable habitat as a stopover location for this long-distance migratory shorebird.

Determination

Pursuant to Section 7 of the Endangered Species Act and the Migratory Bird Treaty Act, FEMA has determined that the proposed project will have ***No Effect*** to the Piping plover and Rufa red knot, and is ***Not Likely to Adversely Affect*** the Tricolor bat and its habitat with the following conditions:

1. Removal of trees ≥3 inches diameter-at-breast-height (DBH) may only occur during the inactive season for bats between November 16 and March 31.
2. Subrecipient must immediately report to FEMA and the USFWS New Jersey Field Office any changes to the proposed scope of work, the results of any surveys conducted, the presence of any colonies of bats of any species, or the presence of any dead, injured or sick bats of any species that are found during the undertaking.
3. If the above conditions cannot be followed, the Subrecipient, or the Subrecipient's contractor(s), shall contact the U.S. Fish and Wildlife Service New Jersey Field Office at 609-646-9310 prior to the start of construction. Documentation of this coordination must be submitted to FEMA.

FEMA has determined that the proposed action will not violate the Migratory Bird Treaty Act as project activities are not anticipated to take, kill, or possess migratory birds or their parts unlawfully.

Approval of federal funding will require that the Subrecipient, or the Subrecipient's contractor, adhere to the above conditions. FEMA will also condition approval of the grant application with the requirement that all applicable federal, state, and local permits have been issued prior to initiating work.

We value your time and appreciate your continuing cooperation in the review of FEMA's federally funded grant projects. Should you have any questions or require additional information, please contact Mindy Yang at 202-615-7258 or by email at Mindy.Yang@fema.dhs.gov.

We thank you in advance for your timely consideration and look forward to your response within thirty (30) days.

Sincerely,

BESSIE A WEISMAN
Digitally signed by BESSIE A WEISMAN
Date: 2024.10.10 15:55:01 -04'00'

Bessie Weisman
EHP BRIC Supervisor
FEMA EHP, Region 2

Attachments:
Attachment A: Proposed Project Map and Designs
Attachment B: BETA IPaC Species List
Attachment C: Northern Long-eared Bat and Tricolor Bat Range-wide Determination Key

Attachments available upon request to FEMA.

Kirby, Alexandra

From: Gerlica, Scott [DEP] <Scott.Gerlica@dep.nj.gov>
Sent: Friday, November 1, 2024 4:51 PM
To: Audin, Michael
Cc: Brown, Michael; Kirby, Alexandra; Marcopul, Kate [DEP]; West-Rosenthal, Jesse [DEP]
Subject: HPO Porject #25-0056-1; Highlands-Monmouth Hills Flood Mitigation

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HPO Project #25-0056-1
Doc ID: HPO-K2024-024

Borough of Highlands, Monmouth County
Highlands-Monmouth Hills Flood Mitigation
Federal Emergency Management Agency (FEMA)

Dear Michael,

The New Jersey Historic Preservation Office (HPO) is in receipt of your letter initiating Section 106 for the proposed above-referenced undertaking.

Based on the information provided, the HPO does not have sufficient information to evaluate FEMA's finding at this time. While the HPO concurs that no consideration of archaeological resources is necessary in conjunction with Project Areas 2, 3, and 4, the HPO respectfully disagrees with the assessment that no archaeological survey is necessary within Project Area 1. Based on the documentation submitted, Project Area 1 is located along the Highlands of Navesink, a prominent geologic feature above Sandy Hook Bay, the Atlantic Ocean, and the Navesink River. Previous research conducted within New Jersey and consultation with Native American Tribal representatives have identified features, such as these, to hold the potential for the presence of Native American archaeological and ceremonial sites. Additionally, while the HPO acknowledges that FEMA's background research did not identify any map-documented historic structures along Navesink Avenue/NJ Route 36, the subject roadway still represents an historic transportation corridor and therefore exhibits a high sensitivity for the presence of historic period archaeological resources warranting further evaluation. While the HPO appreciates map documentation cited and acknowledges that it is helpful in identifying specific noted historic structures, they do not identify all potential structures that may be present. Therefore, the absence of noted structures does not negate the need for further consideration.

In consequence, based on the site sensitivity for Native American and historic-period archaeological deposits, and in order to comply with 36 CFR § 800.4 -Identification of Historic Properties, a Phase I archaeological survey, must be conducted within the area of potential effects (APE) for Project Area 1 to identify the presence of archaeological historic properties within the APE. This information is also a requirement of the Application for Project Authorization, pursuant to the New Jersey Register of Historic Places Act (see below). No further archaeological consideration is necessary for Basin 4 within the boundaries of Kavookjian Field, however, based on the provided geotechnical information.

All phases of the archaeological survey and reporting will need to be in keeping with the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation*, 1983. Survey efforts shall comply with the New Jersey Historic Preservation Office Requirements for Phase I Archaeological Survey at N.J.A.C. 7:4-8.4. Reports of

archaeological survey results shall conform to the Requirements for Archaeological Survey Reports – Standards for Report Sufficiency at N.J.A.C. 7:4-8.5. Evaluations to determine the National Register eligibility of archaeological sites shall be in keeping with the National Park Service's 2000 National Register Bulletin, *Guidelines for Evaluating and Registering Archeological Properties*. The individual(s) conducting the work shall need to meet the Secretary of the Interior's Professional Qualifications Standards for Archaeology (48 FR 44738-9).

If potential human burials or human skeletal remains are encountered, all ground disturbing activities in the vicinity shall cease immediately and the Historic Preservation Office shall be contacted, as well as any appropriate legal officials. The potential burials shall be left in place unless imminently threatened by human or natural displacement.

Additionally, the HPO has insufficient information to understand the extent of the effects to the Water Witch Historic District at this time. As your letter states, Project Area 1 is located within the boundaries of the Water Witch Club Historic District, which is listed on the National and New Jersey Registers of Historic Places. Specifically, the HPO requests further information regarding methods and locations of the gravel road and ditch stabilization, which are not demonstrated on the submitted plans; the appearance of the infiltration and stilling basins, including the incorporation of "compatible organic designs" and their visual effects on the heavily vegetated landscape; and specifically where historic materials, especially the peanut stone, will be replaced and specifications of the replacement materials.

Furthermore, pursuant to the New Jersey Register of Historic Places Act, state, county, and municipal undertakings that may encroach upon properties listed on the New Jersey Register of Historic Places require prior written authorization from the Commissioner of the Department of Environmental Protection (DEP). Therefore, the Borough of Highlands, as the subrecipient of the FEMA funds, must submit an Application for Project Authorization prior to project commencement. Despite having insufficient information to complete our review, upon initial review, the HPO finds that the project may constitute an encroachment to the Water Witch Club Historic District and require submission to the Historic Sites Council for its formal recommendation to the Commissioner of DEP. Consequently, the HPO recommends the Borough of Highlands submit its Application for Project Authorization and complete it's review pursuant to the New Jersey Register of Historic Places Act before FEMA continues its Section 106 consultation.

If you have any questions, please feel free to contact me regarding historic architecture or Jesse West-Rosenthal at jesse.west-rosenthal@dep.nj.gov regarding archaeology.

Sincerely,
Scott Gerlica

Scott Gerlica

Program Specialist 1 | Historic Preservation Office
Community Investment & Economic Revitalization
scott.gerlica@dep.nj.gov
609-940-5172



U.S. Department of Homeland Security
Federal Emergency Management Agency
One World Trade Center
285 Fulton Street
New York, New York 10007

October 2, 2024

Ms. Kate Marcopol
Administrator and Deputy State Historic Preservation Officer
Mail Code 501-04B
New Jersey Department of Environmental Protection
Historic Preservation Office
P.O. Box 420
Trenton, New Jersey 08625-0404

Re: Initiation of Section 106 Consultation
Grant Number and Name: EMN-2022-BR-002-0033 Highlands-Monmouth Hills
Subapplicant: Borough of Highlands, New Jersey Inc.
Location: Borough of Highlands, Monmouth County, New Jersey
Undertaking: Flood Mitigation Activities
Determination of Effect: No Adverse Effect to Historic Properties

Dear Ms. Marcopol:

The Building Resilient Infrastructure and Communities (BRIC) grant program of the Department of Homeland Security-Federal Emergency Management Agency (DHS-FEMA) is proposing to administer BRIC funds to Borough of Highlands, New Jersey Inc. [Subapplicant] for proposed flood mitigation measures in the Borough of Highlands, Monmouth County, New Jersey. The purpose of the BRIC grant program is to proactively invest in hazard mitigation projects, reducing the risks that communities face from disasters and natural hazards, such as the severe flooding that has occurred in Highlands, New Jersey. FEMA is initiating Section 106 consultation for the proposed Undertaking in accordance with Stipulation II.C, Standard Project Review, of FEMA's New Jersey Statewide Programmatic Agreement executed on November 15, 2022 (Agreement).

Undertaking

FEMA is proposing to provide BRIC funds to the Borough of Highlands and Township of Middletown for four flood mitigation measures in areas of the Borough of Highlands that have faced recurring flooding.

The work is centered around four Project Areas:

1. Monmouth Hills: retention basins, pipes, repairs, rip-rap lined bio-swales and associated roadway repairs. This scope is located in the Water Witch Club, a private mixed-use property listed on the National Register as a Historic District.
2. New Snug Harbor Avenue Pump Station: includes main discharge pipes, pump station emergency generators, inlets and storm drains, bulkhead improvements and culverts. Located along Snug Harbor Avenue and Central Avenue between Bay Avenue and the waterfront.

3. Valley Street Pump Station repairs: Located along Valley Street between Bay Avenue and the waterfront.
4. New North Street Pump Station, Bulkheads & Piping: Located along North Street between Bay Avenue and the waterfront.

The proposed pump station repairs at the existing Valley Street Pump Station meet Programmatic Allowance Tier II: IV.A.6 of FEMA's New Jersey Statewide Programmatic Agreement executed on November 15, 2022. The entirety of the Monmouth Hills project scope and new pump stations at Snug Harbor and North Street do not meet any of the Programmatic Allowances and therefore are the subject of this consultation.

Area of Potential Effects

Pursuant to 36 CFR 800.4(a)(1), the Area of Potential Effects (APE) is defined as the geographic area within which the Undertaking may directly or indirectly affect historic resources. Based on the proposed scope of work, FEMA has determined that the aboveground APE consists of the entire Water Witch Club property, bounded by Navesink Avenue to the north, North Peak Avenue to the east, Windless Path to the south and Serpentine Drive to the west; the Snug Harbor Avenue roadway and all immediately surrounding parcels; and the North Street roadway and all adjacent parcels. No potential indirect impacts associated with the proposed Undertaking are anticipated. The archaeological APE is limited to the areas of ground disturbing activities depicted on project plans. See Attachment A for more information.

Identification and Evaluation

Architecture

A review of the New Jersey Historic Preservation Office (NJHPO's) Cultural Resources Geographic Information System (LUCY) and the National Register of Historic Places (NRHP) database revealed that the proposed Monmouth Hills Basins, Pipes, Repairs, Bio-swales (Project Area 1) are located within the Water Witch Club Historic District (NRHP Reference No. 04000147). No additional previously recorded or newly identified, historic resources were discovered within the project APE. The remaining three scopes of work are not located in proximity to additional identified historic resources, and there are two previously identified properties within 1,000 feet of the project areas: 254 Navesink Avenue (NJEMS ID: 77110668) and 197 Bay Avenue (NJEMS PI ID: 99134769), neither of which are listed on the State or National Registers. The proposed Undertaking will have no adverse impact on the historic district or individual resources.

The proposed scope of work within the Water Witch Club Historic District includes the following:

- Stabilizing the gravel roads and ditches;
- Installing four large-scale infiltration basins at the foot of Monmouth Hill ranging from 20,000 to 65,000 cubic feet;
- Stabilizing the Valley Drive ravine with an upgraded channel lined in Flexamat with granite rock check dams every 100 feet and new vegetation;
- Installing two stilling basins.

The character-defining features of the historic district include the curvilinear gravel roadways, gateposts, retaining walls, walks, gutters, and staircases, many of which are clad in local "peanut

stone."[1] The proposed scope of work would retain the existing curvilinear street pattern and leave the layout of the roadbeds intact while improving drainage by rerouting runoff. The proposed channel and flume would be set in the landscape in a compatible manner and would reduce future damage from severe storms. The check dams, which would measure eight feet in width would read as features within the natural landscape and will develop a patina to further blend into the scenery. The proposed infiltration and stilling basins would not pose an adverse impact to the landscape as they would incorporate compatible organic design and vegetation to blend into the naturalistic sloped site.

According to the project consultant, CDM Smith:

> *"A majority of the project is located at the foot of Monmouth Hills, which is free from historic features and residential buildings. CED [engineering firm] has identified the locations of historic shale stone used as sidewalk, stone lined gutters, walls, and other various historic features located within Monmouth Hills and shall be shown on the plans. These historic features shall not be disturbed during construction unless absolutely necessary to complete the project. If disturbed, these features shall be carefully removed during the project and preserved, then reinstated in their original location or replaced to match existing."*
>
> *"The check dams proposed are to be constructed of rip rap with granite stone of approximately 8" in width, to reduce the velocity of runoff flowing through the channelized slope… The granite stone will blend seamlessly in with the surrounding environment, maintaining the natural aesthetic of Monmouth Hills when compared to concrete. CED will ensure that the granite stone used in the proposed check dam design will match the surrounding aesthetic of the district."*[2]

With these considerations, the proposed flood mitigation measures would not pose an adverse impact to the historic district or its individual components.

The remaining scope of work in Project Areas 2, 3, and 4 would occur within the previously developed roadway and does not pose any impacts to the surrounding properties. The Snug Harbor Pump Station would be located at the north corner of the intersection of Snug Harbor Avenue and Bay Avenue within Jones Creek (the existing water drainage channel) with a new pumphouse structure and associated culverts, inlets and below-grade improvements under the existing Snug Harbor Avenue and Bay Avenue roadbeds. The pump station would bear approximately 16 feet below existing site grade and will have a footprint of 20 feet by 30 feet in area at a height of 26 feet above grade. Approximately 1,000 sf of Jones Creek is to be filled-in to construct the pump station. Additionally, non-historic timber bulkheads along Jones Creek at Snug Harbor Avenue would be replaced with PVC bulkheads.

The construction of a new pump station at the northern terminus of North Street would involve bearing down approximately 16 feet below existing grade with a footprint area of approximately 230 square feet. The improvements would include upgrading drainage infrastructure below the roadbed. The existing Valley Street pump station would be upgraded with a retrofitted pump in place with improvements to below grade drainage systems.

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[1] National Register Registration Form: https://npgallery.nps.gov/AssetDetail/NRIS/04000147

[2] Letter from Colliers Engineering & Design (CED) dated July 25, 2024, in response to a FEMA request for information inquiry.

While the Borough of Highlands has a rich history and numerous landmarks, the residential area surrounding the Project Areas 2, 3, and 4 on Snug Harbor Avenue, North Street, and Valley Street do not appear to be representative of a particular period nor do they demonstrate a high degree of design or integrity, as many were heavily impacted by Hurricane Sandy in 2012. The scope of work would be limited to the public right of way, which is a typical example of modern roadway design that has been upgraded over the years to meet modern standards. The retaining walls along Jones Creek appears to have been installed in the 1970s during the creation of Snug Harbor Park. Therefore, the proposed pumphouses and associated drainage improvements would not impact any above-ground historic resources.

Archaeology

A review of the LUCY database revealed that the only the North Street Project Area is in Archaeological Site Grid FH133. A review of archaeological site files revealed that there are no known archaeological sites within the APE, and two known archaeological sites within one mile of the APE. The Woodward/Schenck Tavern/House (Mo-329) is a late 18th-early 19th century tavern site identified by RBA Group/Leonard Bianchi in 2004 during the NJ Route 36/Highlands Bridge Replacement Project. The site is located approximately 0.4 miles southeast of North Street on the western bank of the Shrewsbury River. Archaeological remains of a possible privy and sheet midden were identified during the survey. Portland Place (28-Mo-401) is a 18th-20th century farmhouse site excavated by Richard Veit. The site is located approximately one mile southwest of Navesink Avenue/NJ Route 36 on the northern bank of the Navesink River. Excavations at the farmhouse recovered historic artifacts such as ceramics, window glass, glass bottles and nails along with two pre-contact bifaces.

The USDA Web Soil Survey maps three types of soil within the APE. The Snug Harbor Avenue, Valley Street and North Street Project Areas are located in the Highlands (in between the northern foot of Monmouth Hills and the south shore of Sandy Hook Bay). The entirety of the Highlands is mapped as Urban land-Klej complex, 0 to 2 percent slopes (USKLEA). Urban land is described as "surface covered by pavement, concrete, buildings and other structures underlain by disturbed and natural soil material". Klej soils, in their natural state, are somewhat poorly drained and form on broad interstream divides from sandy fluviomarine deposits parent material. Most of the Monmouth Hills Project Area (south of Navesink Avenue/NJ Route 36) is mapped as Phalanx loamy sand, 10 to 25 percent slopes (PhbE) with some sections that have a lesser slope mapped as Phalanx loamy sand, 5 to 10 percent slopes (PhbC). Phalanx sand soils are well drained and form on hills from sandy and/or fluviomarine deposits parent material. A typical profile consists of a loamy sand A horizon (0 to 2 inches) overlying a loamy sand E horizon (2 to 7 inches) which overlies a loamy sand BA horizon (7 to 17 inches). The BA horizon than overlies two types of B horizon subsoils, a sandy loam Bt horizon (17 to 21 inches) and a sandy loam Bm horizon (21 to 29 inches). The B horizons overlie a sandy loam BC horizon (29 to 38 inches) which then overlies a very flaggy loamy sand C horizon (38 to 60 inches). The Monmouth Hills/Highlands peninsula is bordered on the north by Sandy Hook Bay, on the east by the Shrewsbury River (which flows into Sandy Hook Bay) and on the south by the Navesink River. The sections of the APE within 500 feet of these water courses are the entirety of the Valley Street Project Area and the northern 500 feet of the North Street and Snug Harbor Avenue Project Areas which are located along the southern bank of Sandy Hook Bay.

A review of the 1836 United States Costal Survey *Map of the North shore of the State of New Jersey from the Highlands of Navesink to South Amboy* by Charles Renard (see Figure 2 in Attachment B) depicts the Highlands as an undeveloped beach. Some sections of the beach are depicted as a tidal marsh. The 1855 United States Coastal Survey *Map of the Shore of Sandy Hook and Vicinity* by A.M. Harrison (see Figure 3 in Attachment B) depicts one road that travels along this stretch of beach. The road is the precursor of present-day Bay Avenue. No structures are depicted along the roadway. The 1889 map of Parts of Middletown and Eatontown Townships in *Wolverton's Atlas of Monmouth County New Jersey* by Chester Wolverton and Forsey Breou (see Figure 4 in Attachment B) depicts the development of two roads that stem from the northern side of Bay Ave and travel northwards towards Sandy Hook Bay. These roads follow the alignment of present-day Valley Street and Miller Street. One road is depicted north of Bay Avenue that connects Valley Street to Miller Street which follows the alignment of present-day 4th Street. The Wolverton map depicts multiple structures along Valley Street and Miller Street north of Bay Avenue. There is only one structure depicted on the western side of Valley Street, and the area northwest of the intersection of Valley Street and Bay Avenue is depicted as undeveloped beach/marshland. The 1918 Sandy Hook, NJ topographic map (see Figure 5 in Attachment B) depicts further road expansion along the Highlands beach. 4th Street is depicted expanding further west and another east-west aligned road (present-day 5th Street) is also depicted traveling west from Valley Street. 4th Street and 5th Street intersect with a north-south orientated road traveling north from Bay Avenue which is present-day Cedar Street. The area northwest of the intersection of Bay Avenue and Cedar Street is depicted as undeveloped beach and marshland. The 1931 aerial image (historicaerials.com) and 1947 Sandy Hook, NJ topographic map (see Figure 6 in Attachment B) depicts the formation of land west of Cedar Street. The beach/marshland that was depicted northwest of the Cedar Street and Bay Avenue intersection is depicted in the 1931 aerial as residentially developed roadways which is bound by Snug Harbor Avenue on the west and Sea Drift Avenue on the east. The 1953 aerial image depicts the Highlands as residentially and commercially developed. The 1995 aerial image (Google Earth) depicts no major changes within the Highlands section of the APE. 2019 Google Streetview images and the existing conditions project plans depicts the roadways with multiple utilities such as gas, sewer and water lines along with drainage grates and manholes.

The Monmouth Hills Project Area is located within the Water Witch Historic District neighborhood. The neighborhood is located on the south side of Navesink Avenue/NJ Route 36. The 1836 Charles Renard map (see Figure 2 in Attachment B) depicts a road traveling from west to east at the northern foot of Monmouth Hills above the beach. This road is the precursor of Navesink Avenue/NJ Route 36. No structures are depicted along the road within the approximate boundaries of the APE. The 1851 *Map of Monmouth County: from original surveys* published by J.B Shields (see Figure 7 in Attachment B) depicts Navesink Avenue/NJ Route 36 traveling along the northern side of Monmouth Hills where it terminates at a "dock" on the western bank of the Shrewsbury River. The map depicts the Navesink Light House (predecessor of the Twin Lights Lighthouse) and two structures along the southern side of the road. The structures are annotated as P.W. Schanck" and "J. I. Thompson" and are located at the western terminus of the roadway. No structures are depicted within the Monmouth Hills section of the APE on the 1851 map. The 1873 map of Portions of Middletown and Ocean Townships in *The Atlas of Monmouth Co. New Jersey* published by F.W. Beers (see Figure 8 in Attachment B) depicts a new road on the northern side of Navesink Avenue/NJ Route 36 which follows the alignment of present-day Linden Avenue.

There are no structures depicted along the southside of Navesink Avenue/NJ Route 36 within the APE in the 1873 map. The 1888 Sandy Hook, NJ topographic map (see Figure 9 in Attachment B) depicts the expansion of the road network along Navesink Avenue/NJ Route 36, however the Monmouth Hills Project Area is depicted as a steeply sloping hillside and no roads are depicted along the southside of Navesink Avenue/NJ Route 36. The 1889 Wolverton and Breou map (see Figure 4 in Attachment B) depicts two structures along Navesink Avenue/NJ Route 36. One structure annotated as "G. Giles" is depicted on the southside of the roadway; however, on the 1873 Beers map a structure annotated as "G. Giles" was depicted on the northside of the roadway. A review of the 1907 *Sanborn Fire Insurance Map from New Jersey Coast, New Jersey Coast, New Jersey* (Vol. 1, 1907) Plate 89 (see Figure 10 in Attachment B) depicts the development of "Water Witch Park" on the south side of Navesink Avenue/NJ Route 36 along the northern slope of Monmouth Hills. Notably, the Sanborn map depicts one dwelling on the northside of Navesink Ave/NJ Route 36. The location of this dwelling matches the location of the structure annotated as "G. Giles" in the 1873 Beers map. No dwelling is depicted on the Sanborn map in the location of the structure annotated as "G. Giles" on the 1889 Wolverton and Breou map. The Sanborn map depicts a network of roads, dwellings, a casino, a stable, a hose house and the water pipe network within the streets of Water Witch Park . The majority of the structures are located in the southern and eastern part of the neighborhood. There is only one dwelling depicted along the western side of Serpentine Drive, annotated as "E. Ziegler", located in between the intersections of Serpentine Drive with Coquette Lane and Hillside Road. The lots on the western side of Serpentine Drive north of the Ziegler dwelling are depicted as undeveloped. Additionally, the lots along the southern side of Navesink Avenue/NJ Route 36, in between its intersections with Waterwitch Drive and Linden Avenue, are also depicted as undeveloped. There is one building depicted on the 1907 Sanborn map just east of Waterwitch Drive in the location of what is now Kavookjian Field. The structure, not annotated with a name, is located in the southern corner of the field and not within the area of ground disturbance for the proposed Undertaking. The 1931 aerial image (historicaerials.com) depicts Monmouth Hills as a mixture of residential development and woodland south of a small dirt road that is Navesink Ave/NJ Route 36. The 1940 aerial image depicts Kavookjian Field as an undeveloped section of woodland. Additionally, the 1940 aerial depicts Navesink Ave/NJ Route 36 expanded to a large four-lane highway. The earlier 1931 aerial depicts Navesink Ave/NJ Route 36 as smaller dirt roadway. The 1953 aerial image depicts the creation of Kavookjian Field as the area has been cleared of woodland. The 1979 aerial depicts Kavookjian Field in use as a baseball field. The 1979 aerial depicts the other sections of Monmouth Hills APE as woodland or residentially developed. The 1995 aerial image (Google Earth) depicts no major changes within the Monmouth Hills APE as the area is still depicted as a mixture of residential development and woodland. 2013 Google Streetview images depict the sloping topography of the Monmouth Hill landscape.

Based on this review, the Highlands section of the APE (location of the Snug Harbor Avenue, Valley Street and North Street Project Areas) has no to low sensitivity for pre-contact or historic archaeological resources. The landscape was an undeveloped beach and marshland until the late 19th century when the area was developed with roadways and residences. The area of land bound by Snug Harbor Avenue and Sea Drift Avenue was not created until the 1930s as the 1888 and 1918 topographic maps depicted this area as beach and marshland. Additionally, the LUCY database "Historic Fill of New Jersey" layer depicts the whole beach of the Highlands as "historic fill". Soil borings carried out within the Highlands section of the APE also noted that there is about

two to eight feet of fill overlying marshland-type soils which extend to a depth of 13.5 to 23.5 feet below surface (see Attachment C for more details). The Monmouth Hills Project Area contains no to low sensitivity for pre-contact or historic archaeological resources. The landscape is steeply sloped based on the USDA Web Soil Survey soil classification and the topographic maps. The steep topography and the lack of a water course within Monmouth Hills gives the APE a low potential of containing pre-contact archaeological resources. The area was not developed until the late 19th century to early 20th century based on the historic map review. The reviewed historic maps depict the sections of Monmouth Hills that will be excavated as part of the Undertaking were not historically developed and have remained as undeveloped vacant lots to the present day. Additionally, Kavookjian Field is also depicted as "historic fill" in the LUCY database indicating this area has experienced substantial terraforming and grading in order to transform the landscape from a steeply sloping hillside to a level recreational field. Soil borings conducted in Kavookjian Field depict that there is two feet of an orange-brown and red topsoil (see Attachment C for more details). The USDA Web Soil Survey indicates that this area should have a brown A horizon from 0-2 inches overlying a reddish-brown E horizon from 2 to 7 inches. The discrepancy between the soil boring logs and the USDA Web Soil Survey indicate that this area has been subjected to disturbance from soil grading and terraforming activities. Therefore, the proposed Undertaking has a low potential to encounter intact archaeological resources.

Assessment of Effects

The APE contains no to low sensitivity for archaeological resources. The Project Areas within the Highlands were undeveloped beach and marshland until they were developed during the late 19th century and early 20th century. All work of the proposed Undertaking is contained within the roadways which have been subjected to disturbance from the installation of utilities and other modern infrastructure development. The work within the Monmouth Hills Project Area is contained to lots which have been depicted to be undeveloped from the creation of Water Witch Park in the late 19th century to the present day. Therefore, the APE has been determined to have a low potential to contain intact archaeological deposits.

Based on the research and information provided above, FEMA finds that the proposed flood mitigation measures discussed in this consultation will result in ***No Adverse Effect to Historic Properties with Conditions***.

Conditions:

1. All existing peanut stone-clad drainage ditches and culverts will be restored with peanut stone finishes.

FEMA is submitting this Undertaking for your review and comment. FEMA requests your comments within thirty (30) days. Should you have any questions or need additional information regarding this Undertaking, please contact Alexandra Kirby, Historic Preservation Specialist, at alexandra.kirby@fema.dhs.gov or (202) 714-9210 or Michael C. Brown, Archaeologist, at michael.brown@fema.dhs.gov / (202) 394-3429.

Sincerely,

Michael Audin, RPA
Deputy Regional Environmental Officer
FEMA Region 2

Attachments: A: Project Plans
B: Historic Maps
C: Soil Borings Logs



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Figure 1. 2023 Aerial Map View of the APE (red outline) Subject to Consultation in Monmouth and Highlands New Jersey, proposed retention basins and pumphouses location noted in blue. Map courtesy: GoogleEarth (USGS).