Memorandum

To: Rhode Island Department of Transportation
Two Capitol Hill
Providence, RI 02903

Date: March 15, 2019

Project #: 72900.00

From: Peter Pavao

Re: Reconstruction of the Pell Bridge Approaches Environmental Assessment – Stormwater Technical Memorandum

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Introduction

The Claiborne Pell Newport Bridge (Pell Bridge) carries State Route 138 between Jamestown and Newport and is the only road connection between Jamestown and Aquidneck Island. The Proposed Action of the Pell Bridge Interchange Project (Project) would provide direct connection from the northern part of the City to the downtown area, reduce queued vehicle traffic onto the Pell Bridge, reduce traffic in downtown Newport, and provide a portion of the bicycle and pedestrian facilities envisioned in the Aquidneck Island Transportation Study. The Proposed Action (Project) would occur in the City of Newport and Town of Middletown, Rhode Island. In accordance with the National Environmental Policy Act (NEPA), an Environmental Assessment (EA) is being developed to evaluate the impacts of construction and operation of the re-designed interchange on environmental resources.

This technical memorandum evaluates potential direct impacts to water resources in two categories: hydrologic effects and water quality impacts. Hydrologic effects relate to the effect of slopes and surface types on the flow of water overland and into a stream or lake. Water quality impacts relate to what types of contamination may enter the receiving waters, which can range from pollutants on the ground such as oils, metals, salts, and changes in temperature due to runoff flowing across warm pavement. The discussion includes assumptions, applicable regulations, analysis methodologies, and an assessment of the Project's impacts, followed by potential mitigation for these impacts.

Water quality impacts were evaluated for the stormwater drainage area affected by the proposed Program, including areas of proposed land acquisition and the existing and proposed roadways. Each drainage area has a specific receiving water that receives runoff either via a stormwater outfall or via overland flow.

Assumptions

- Hydrologic Effects - Assumptions

Adding impervious surfaces to a watershed is known to change the hydrology by reducing infiltration and increasing the amount of runoff from precipitation. Without additional measures to control runoff, an increase in impervious surfaces can increase peak flows in surface waters: low flows during dry weather can become lower due to reduced groundwater supplies, and high flows during storms can become higher due to increased volume and rate of runoff. Increased peak flows of runoff can also promote erosion.

The amount of impervious surface within a given drainage area will be used to estimate relative increases in runoff volume and peak flow for each of the receiving wetlands and the receiving water body.[1] Roads and structures in any areas of mandatory or voluntary land acquisitions were assumed to be acquired, demolished, and planted with grass. The existing stormwater infrastructure within the project area would remain in place and be reused to the maximum extent possible.

Changes in impervious surfaces for all elements of construction were calculated based on the conceptual design plans.

- Water Quality - Assumptions

Using available data for the proposed project improvements and existing hydrology data, local water bodies were identified that could be affected by the Project. The receiving water body from the municipal stormwater system and overland flow is an unnamed Tributary to Newport Harbor (water body ID number RI0007030R-01) designated as a Class B water body (as defined by RIDEM) and is not impaired. The ultimate receiving water body is Newport Harbor/Coddington Cove designated as class SB water and is considered impaired for sediment bioassays for estuarine and marine waters. Assumptions about local stormwater systems and surface drainage patterns will be refined during final design using field-verified information on the City of Newport's stormwater system.

Changes in land use and impervious surface can affect water quality in several ways if control measures are not implemented. Replacing vegetated areas with impervious surfaces reduces the natural filtering and settling benefits provided by vegetation. Water can also flow faster off impervious surfaces which can increase erosion in receiving streams and potentially increase the amount of sediment in the water. Sediments block light from passing through the water and can also carry contaminants that attach to the surface of sediment particles. Increased sediment loads in waterways could increase pollutant concentrations by mobilizing contaminants from the streambeds.

Impervious surfaces like asphalt also absorb heat and increase the temperature of runoff, affecting the temperature of the aquatic habitat in the receiving waters. The travel of runoff through swales and surface channels prior to reaching any major water bodies would reduce the thermal impact by evaporation and infiltration.

Applicable Regulations

Federal

The United States Army Corps of Engineers (USACE) has jurisdiction over Waters of the United States, which include waterways and adjacent wetlands, through §404 of the federal Clean Water Act (CWA). Wetlands and waterways within the Study Area are addressed in accordance with the following federal requirements:

- In compliance with Executive Order 11990 of 1977 (Protection of Wetlands), federal agencies are to avoid destruction and modification of, or construction within, existing wetlands where there is a practicable alternative. If a proposed project would impact existing wetlands, this order requires federal transportation agencies to make

1Hydrologic modeling was not performed as it requires a much more complete design than is available at this stage of the study. The existing and proposed conditions will be modeled for the 2, 10, 25, and 100-year storm in the FEIS to demonstrate compliance with flood control and water quality regulations.

a finding that there is no practicable alternative. The Rhode Island Department of Transportation/ Federal Highway Administration will consult with federal, state, and local agencies. The impact analysis for unavoidable impacts will be provided in the final Environmental Assessment and will include an opinion of the proposal's "overall effect on the survival and quality of the wetlands.

- Section 401 of the CWA specifies additional requirements for permit review on the state level. Any applicant for a federal license or permit to conduct any activity that may result in a discharge into navigable waters must provide a certification from the state in which the discharge originates (401 Certification). Interstate water pollution control agencies having jurisdiction over navigable waters at the point where the discharge originates may issue a permit in lieu of the state. In Rhode Island, Water Quality Certification is obtained via application to the Rhode Island Department of Environmental Management (RIDEM) Office of Water Resources.
- Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the United States. The Section 404(b) (1) Guidelines state that no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge that would have less of an adverse impact on the aquatic ecosystem or a special aquatic site and requires that appropriate and practicable steps be taken to minimize potential adverse impacts on the aquatic ecosystem.

State

The State of Rhode Island has jurisdiction over freshwater wetlands and waterways promulgated under Rules and Regulations Governing the Administration and Enforcement of the Freshwater Wetlands Act (Rules). The Freshwater Wetlands Act is administered by the Rhode Island Department of Environmental Management (RIDEM). The Coastal Resources Management Council (CRMC) has jurisdiction over coastal wetlands and replaces freshwater regulatory jurisdiction of the RIDEM in certain coastal areas under the Rules and Regulations Governing the Protection and Management of Freshwater Wetlands in the Vicinity of the Coast (Coastal Wetland Rules). Freshwater wetlands jurisdiction falls to the CRMC in the western portions of the Study Area (generally including areas west of the existing railbed) and to the RIDEM in the eastern parts of the Study Area. Impacts to state-protected Freshwater Wetlands for the Project will require authorization from the Rhode Island Department of Environmental Management or the Rhode Island Coastal Resources Management Council. As a linear project located on both sides of the CRMC and RIDEM jurisdictional boundary, the RIDEM and CRMC shall jointly determine which agency will serve as the freshwater wetland review agency for the Project. Depending on which agency is established as the Project's freshwater wetland review agency, an Application to Alter a Freshwater Wetland will need to be filed with the RIDEM or an Application to Alter Freshwater Wetlands in the Vicinity of the Coast Application Package will need to be filed with the CRMC. Either of these applications requires public notice and will likely require a public hearing given the scope of the project and impacts. Public notices and hearings for the Freshwater Wetland Permits may be coordinated with the Section 404 and Water Quality Certification permit processes.

The following stormwater related regulations and guidelines apply to the project development:

- Rhode Island Coastal Resources Management Program and the Rhode Island Stormwater Design and Installation Standards Manual (RISDISM), (Rhode Island Department of Environmental Management and Coastal Resources Management Council 2015).

The 2015 RISDISM outlines 11 minimum standards for the performance of proposed stormwater management systems. Full compliance with the standards is required for management of stormwater generated within all new impervious surfaces. A summary of each standard, followed by an explanation of how the proposed Site stormwater management system achieves compliance with the standard, is provided below.

Minimum Standard 1, Low Impact Design (LID) Site Planning and Design Strategies: LID site planning and design strategies must be used to the maximum extent practicable in order to reduce the generation of the water runoff volume for both new and redevelopment projects.

LID practices are aimed primarily at avoiding or minimizing impacts to undeveloped land. Bioretention Areas have been incorporated into the preliminary design to treat stormwater runoff and to minimize impacts to resource areas.

Minimum Standard 2, Groundwater Recharge: Stormwater must be recharged within the same subwatershed to maintain base flow at pre-development recharge levels to the maximum extent practicable in accordance with the requirements of the RISDISM.

Recharge requirements can be met by using non- structural measures such as directing impervious surface runoff to qualified pervious areas that will naturally infiltrate runoff. The current stage of design does not utilize infiltration at the BMP's due to the presence of high groundwater.

Minimum Standard 3, Water Quality: Stormwater runoff must be treated prior to discharge.

Stormwater runoff will be treated to the maximum extent practicable. Due to the required grades, highway design elements, and other site constraints, it is not feasible to collect and route runoff from all areas of new pavement to treatment practices. Accordingly, conceptual design includes stormwater management measures to collect and treat runoff from existing paved areas within the project study area to offset areas that cannot be collected and treated. Collection and treatment of impervious surfaces (both existing and new pavements) will be provided that meets or exceeds the required treatment area to insure water quality improvements.

Minimum Standard 4, Conveyance and Natural Channel Protection: Open drainage and pipe conveyance systems must be designed to provide adequate passage for flows leading to, from, and through stormwater management facilities for at least the peak flow for the 10-year, 24-hour Type III design storm event. Protection for natural channels downstream must be supplied by providing 24-hour extended detention of the one-year, 24-hour Type III design storm event runoff volume.

The storm drain pipes and swales will be sized to convey flows from the 25-year, 24-hour Type III design storm event. Existing channels and swales will be evaluated for the 10-year design storm event.

Minimum Standard 5, Overbank Flood Protection: Downstream overbank flood protection must be provided by attenuating the post development peak discharge rate to the pre-development levels for the 10-year and 100-year, 24-hour Type III design storm events.

A HydroCAD hydrologic model of the Site and areas connected hydrologically thereto, using TR-20 methodology, will be used to developed and evaluate the existing and proposed drainage conditions. Peak runoff rates were evaluated at common design points such as the wetlands and the unnamed tributary to Newport Harbor.

Minimum Standard 6, Redevelopment and Infill Projects: For redevelopment sites with 40% or more existing impervious surface coverage and infill sites, only Standards 2, 3, and 7-11 must be addressed. Additionally, any new impervious areas over areas that are currently impervious must comply fully with all 11 minimum standards of the RISDISM.

This project is considered a redevelopment because the existing impervious surface within the Limit of Disturbance exceeds the 40%.

Minimum Standard 7, Pollution Prevention: All development sites require the use of source control and pollution prevention measures to minimize the impact that the land use may have on stormwater runoff quality.

A Source Control and Pollution Prevention Plan will be prepared in accordance with the RISDISM.

Minimum Standard 8, Land Uses with Higher Potential Pollutant Loads: Stormwater discharges from land uses with higher potential pollutant loads (LUHPPLs) require the use of specific source control and pollution prevention measures and specific stormwater BMPs approved for such use.

The project Site does not meet the definition of a LUHPPL as defined in the Manual. There is a plan for a salt storage area to be built but will be enclosed and not subject to weather. Future developments will need to reevaluate the stormwater requirements if associated with a LUHPPL.

Minimum Standard 9, Illicit Discharges: All illicit discharges to stormwater management systems are prohibited, including discharges from (Onsite Wastewater Treatment Systems) OWTS and sub-drains and French drains near OWTSs that do not meet the State's OWTS Rules.

Further investigation will be required to determine if any illicit discharges exist within the Project. The design team will work along with the City of Newport to determine the presence of illicit discharges and measures to eliminate them

Minimum Standard 10, Construction Erosion and Sedimentation Control: Soil Erosion and Sedimentation Control (SESC) practices must be utilized during the construction phase as well as during any land disturbing activities.

Soil Erosion and Sediment Control practices will need to be designed in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook (2016), and the City of Newport Soil Erosion and Sedimentation Control Ordinance. The Project's Soil Erosion and Sedimentation Control Plan will provide guidance to the contractor during the construction phase. The Plan will utilize methods and techniques for minimizing erosion and sedimentation based on the guidelines and preferred and proven technologies.

Minimum Standard 11, Stormwater Management System Operation and Maintenance: The stormwater management system, including all structural stormwater controls and conveyances, must have an operation and maintenance plan to ensure that it continues to function as designed.

A long-term Stormwater Operation and Maintenance Plan will be developed in accordance with the Rhode Island Stormwater Design and Installations Manual. The Plan will identify measures for implementing maintenance activities in a manner that minimizes stormwater runoff impacts.

Study Area and Analysis Methodology

Baseline Conditions

The Study Area is defined as a ten-foot offset from the outermost edge of the new impervious surface. See attached Existing Drainage Areas Graphic.

Wetland and waterway resources within the Study Area were mapped and characterized to identify baseline conditions using a combination of field investigation and GIS mapping.

The Natural Resource Conservation Service (NRCS) has mapped many soil types within the study area. Soils in the existing roadway network are mostly fill soils that are Udorthents – Urban Land complex and have a Hydrologic Soil Group (HSG) A rating. The areas developed with retail and parking lots are Urban Land and are not assigned a Hydrologic Soil Group. The remaining area excluding the wetlands are various Newport and Pittstown soils assigned a Hydrologic Soil Group (HSG) C rating. These soils have a slow infiltration rate when wet. They consist chiefly of soils with a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture.

Historic aerial photography from 1939 indicates that most of the Study Area was previously emergent wetlands or wetlands that had been cleared for agricultural purposes and ditched to improve drainage. Subsequent urban development has resulted in conversion of most of this former wetland area to developed urban land. Where wetlands remain within the Study Area, most are constructed linear ditches populated with invasive plant species. These wetlands function as drainage swales or remnants of more extensive wetlands. The hydrology of most of the wetlands within the Study Area is classified as saturated or seasonally flooded. Some of the excavated ditches within Study Area wetlands may be semi-permanently flooded.

The RISDISM has established requirements for projects or portions of a project where existing impervious areas will be redeveloped and for construction of new impervious areas. Stormwater requirements for redevelopment vary based upon the surface area of the site that is covered by existing impervious surface. Within the Study Area, the surface is currently comprised of 50% impervious cover. Therefore, the Redevelopment Standard, Minimum Standard 6, will apply. Minimum Standard 6 requires compliance with standard 2,3 and 7-11, specifically recharge and stormwater quality. Peak flow control will be evaluated within areas that have a history of flooding problems to prevent any increase in the frequency and magnitude of overbank flooding.

Recharge and stormwater quality shall be managed by implementing LID techniques such as grass swales, sediment forebays, bioretention areas, and directing runoff to qualified pervious areas. The current Site Plan will require collection and treatment of the first 1-inch of stormwater runoff from 9.6 acres of impervious surface.

Peak flow control will provide attenuation of the post-development peak discharge rates to pre-development levels.

Project Impacts

Direct Effects

Stormwater runoff from development and an increase in impervious surfaces can impact downstream waters by altering natural downstream channels and impacting water quality. Downstream channels can be altered by an increase in runoff volumes, increase in peak runoff discharge rates, and greater runoff velocities. Impacts to water quality may include increases in suspended and deposited sediments that adversely affect aquatic life. Sediment also transports other pollutants including nutrients, metals, and hydrocarbons. Sediment can reduce the capacity of a water body resulting in flooding.

The decrease in impervious surface within the Study Area is about 1.9 acres. See Existing Drainage Areas and Proposed Drainage Areas graphics, Appendix A.

Table 2: Site Surface Coverage Tabulation (Overall Drainage Area)

Existing Conditions		**Proposed Conditions**	
Impervious Surface	43.04 AC	Impervious Surface	41.14 AC
Pervious Surface	44.78 AC	Pervious Surface	46.68 AC

Indirect Effects

Because of the project, a significant amount of decommissioned RIDOT and City of Newport land will be redeveloped. The redeveloped land will provide positive effects to stormwater as new stormwater controls and BMPs for water quality, in adherence with RIDEM regulations, will be installed as part of the redevelopment. Based on the anticipated traffic volumes generated by new development, the new site will be defined as a land use with higher potential pollutant loads (LUHPPL). To treat this area, the RISDISM requires specific BMP's to treat the higher pollutant loading. The City of Newport intends to utilize a portion of the project area for maintenance to house a shed to store salt for icy road applications. According to RIDEM a salt storage is a LUHPPL. The City shall coordinate the construction of the shed with the project design to ensure it meets RIDEM requirements.

Cumulative Impacts

Cumulative effects to project area stormwater based on past, present and reasonably foreseeable future actions are beneficial to the surrounding area. Implementation of stormwater controls and BMPs for the project and future development will reduce pollutant loading, provide groundwater recharge and reduce the peak flows to the surrounding drainage outfalls.

Mitigation

Mitigation can be achieved through implementation of onsite post-construction stormwater management Best Management Practices (BMPs). Stormwater BMP's offset the loss of water quality that wetlands perform, including sediment/ toxicant retention and nutrient removal/ retention/ transformation. A reduction in sedimentation within wetlands and waterways would be achieved through implementation of construction of the BMPs to control erosion.

The mitigation includes LID practices such as grass swales, sedimentation forebays, and bioretention areas. Grass swales are well suited to treat highway road runoff due to their linear nature. The application of a grass channel is as a conveyance device and pretreatment device that will trap sediments. Sedimentation forebays will provide pretreatment by settling out sediment particles. This will help contain maintenance to one area and increase the longevity of the bioretention areas. Bioretention areas are shallow depressions that hold stormwater runoff and allow it to flow through a soil matrix (2' deep) consisting of 85% sand and 15% organics. The treated runoff is then transported back to the drainage system or infiltrated into the underlying soils. Initial investigation of soils and estimated groundwater elevations within the project limits will limit the ability to infiltrate treated runoff into the underlying soils. In areas of poor soils and high groundwater, the bioretention areas will be lined with an impermeable liner and under-drained.

Existing and proposed drainage plans have been developed to an extent that the change in impervious surface is identified and BMP's are sited and sized to capture and treat stormwater associated with the impervious surface. See Stormwater BMP's Plan 1 and 2. Appendix B.

Restoration and daylighting sections of the ditched and culverted stream that historically ran through the Study Area to restore stream ecology is an additional potential mitigation option. Currently, this drainage outlets into the delineated stream segment in the Study Area that drains into Newport Harbor/ Coddington Cove. Stream channel restoration and daylighting may be best suited as a potential mitigation option for wetland and waterway impacts related to future redevelopment of land divested by RIDOT and the City of Newport that will be implemented by others. The restored stream could become an attractive and functional landscape feature within the future redevelopment areas.

Table 2: Treatment Areas Provided

Bioretention Areas			
Bioretention #	**Contributing Impervious Area (SF)**	**Water Quality Volume 1" over Impervious (CF)**	**Basin Filter Area (SF)**
1	72,000 SF	6000 CF	4,130 SF
2	21,500 SF	1,792 CF	1,480 SF
3	34,000 SF	2,834 CF	1,200 SF
4	160,500 SF	12,917 CF	6,500 SF
5	60,000 SF	4,125 CF	2,100 SF
6	71000 SF	5,917 CF	3,000 SF

Total Impervious Surface Treated = 419,000 SF or 9.6 Acres

References

Rhode Island Coastal Resources Management Council (RICRMC). 2018. Rules and Regulations Governing the Protection and Management of Freshwater Wetlands in the Vicinity of the Coast. http://www.crmc.ri.gov/regulations.html.

Rhode Island Department of Environmental Management (RIDEM). Rhode Island Stormwater Design And Installation Standards Manual (RISDISM). 2015

Rhode Island Department of Environmental Management (RIDEM). 2018. Environmental Resource Map – RIDEM Water Quality Standards. http://ridemgis.maps.arcgis.com/apps/webappviewer/index.html?id=87e104c8adb449eb9f905e5f18020de5.

RIDEM. 2014. Rules and Regulations Governing the Administration and Enforcement of the Freshwater Wetlands Act.

Rhode Island Soil Erosion and Sediment Control Handbook. Updated 2016.

Appendix A

Existing Drainage Areas

Proposed Drainage Areas

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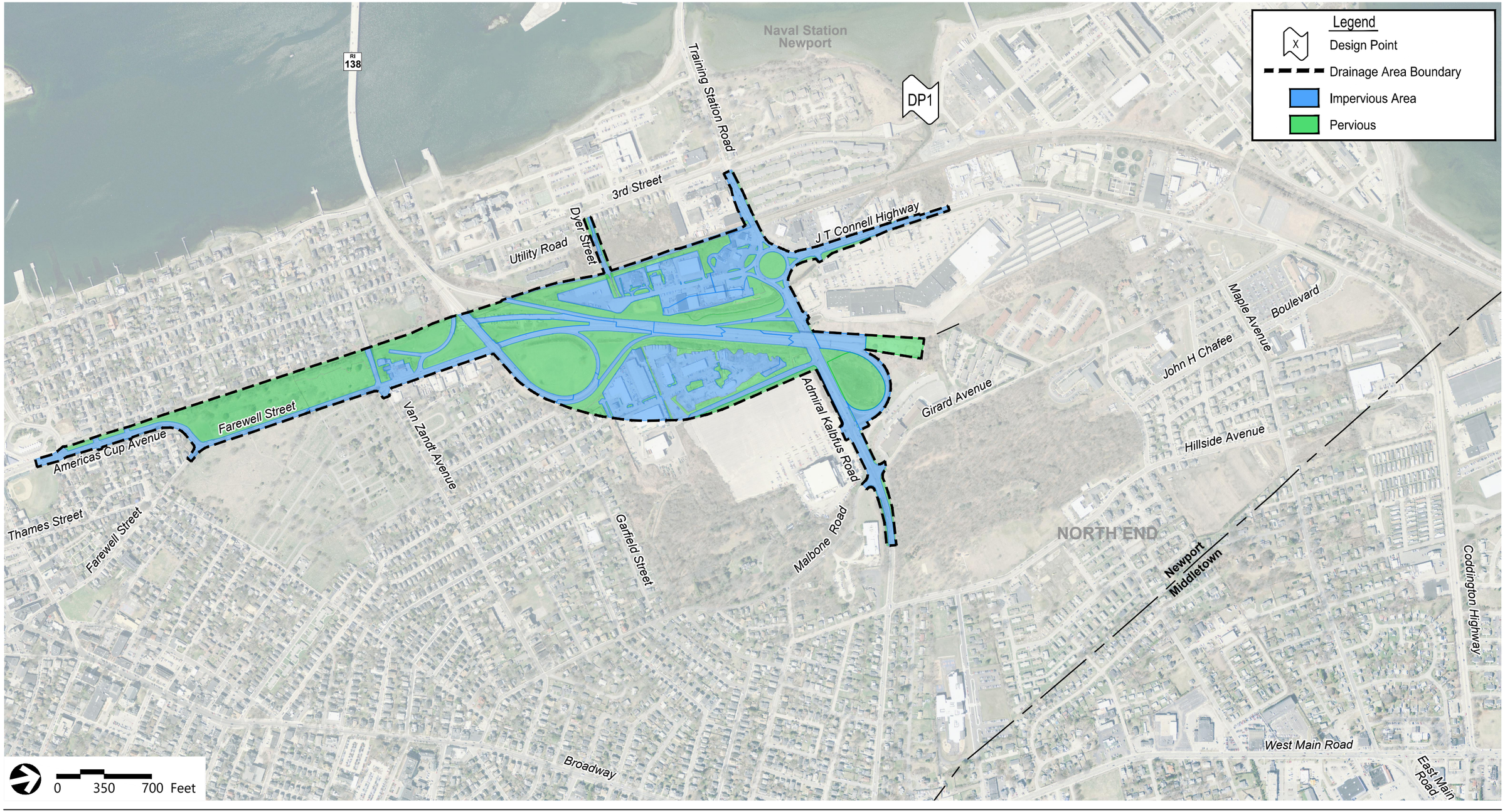

Figure 1
Existing Drainage Areas

Reconstruction of the Pell Bridge Approaches
Newport/Middletown, Rhode Island

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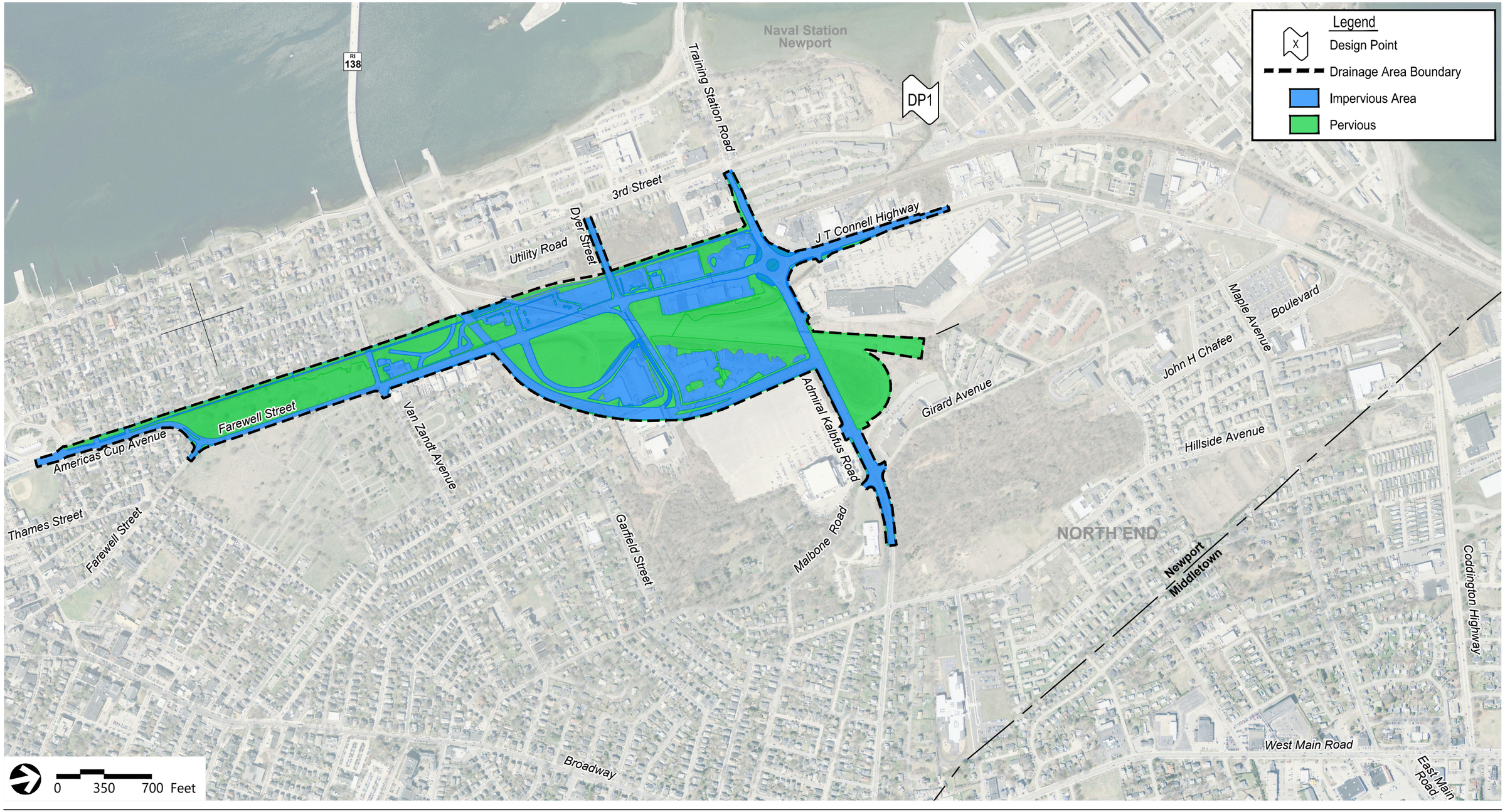

Figure 2

Proposed Drainage Areas

Reconstruction of the Pell Bridge Approaches
Newport/Middletown, Rhode Island

Appendix B

Stormwater BMP's – Key

Stormwater BMP's – Plan 1

Stormwater BMP's – Plan 2

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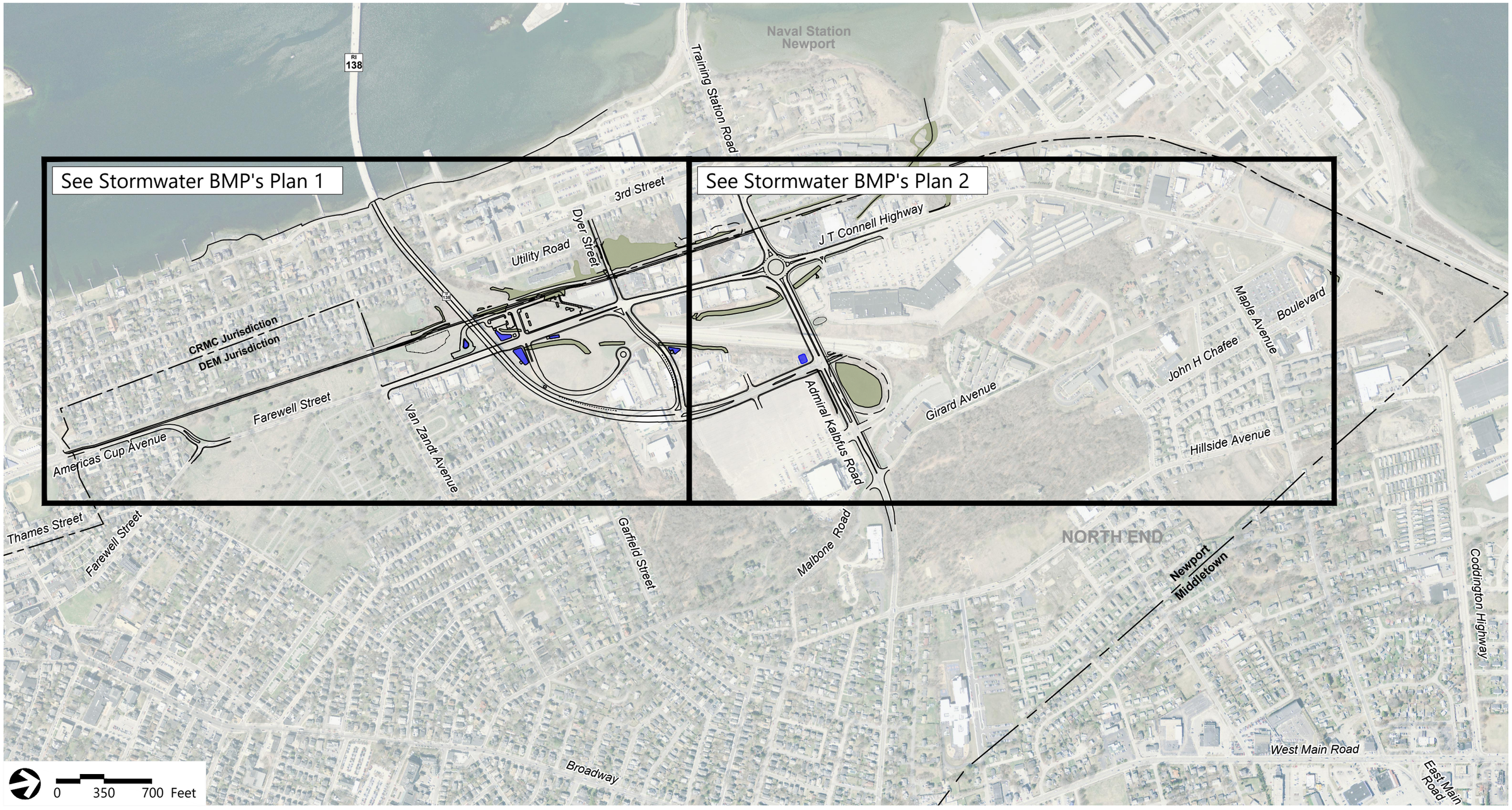

Figure 3

Stormwater BMP's Key Sheet

Reconstruction of the Pell Bridge Approaches
Newport/Middletown, Rhode Island

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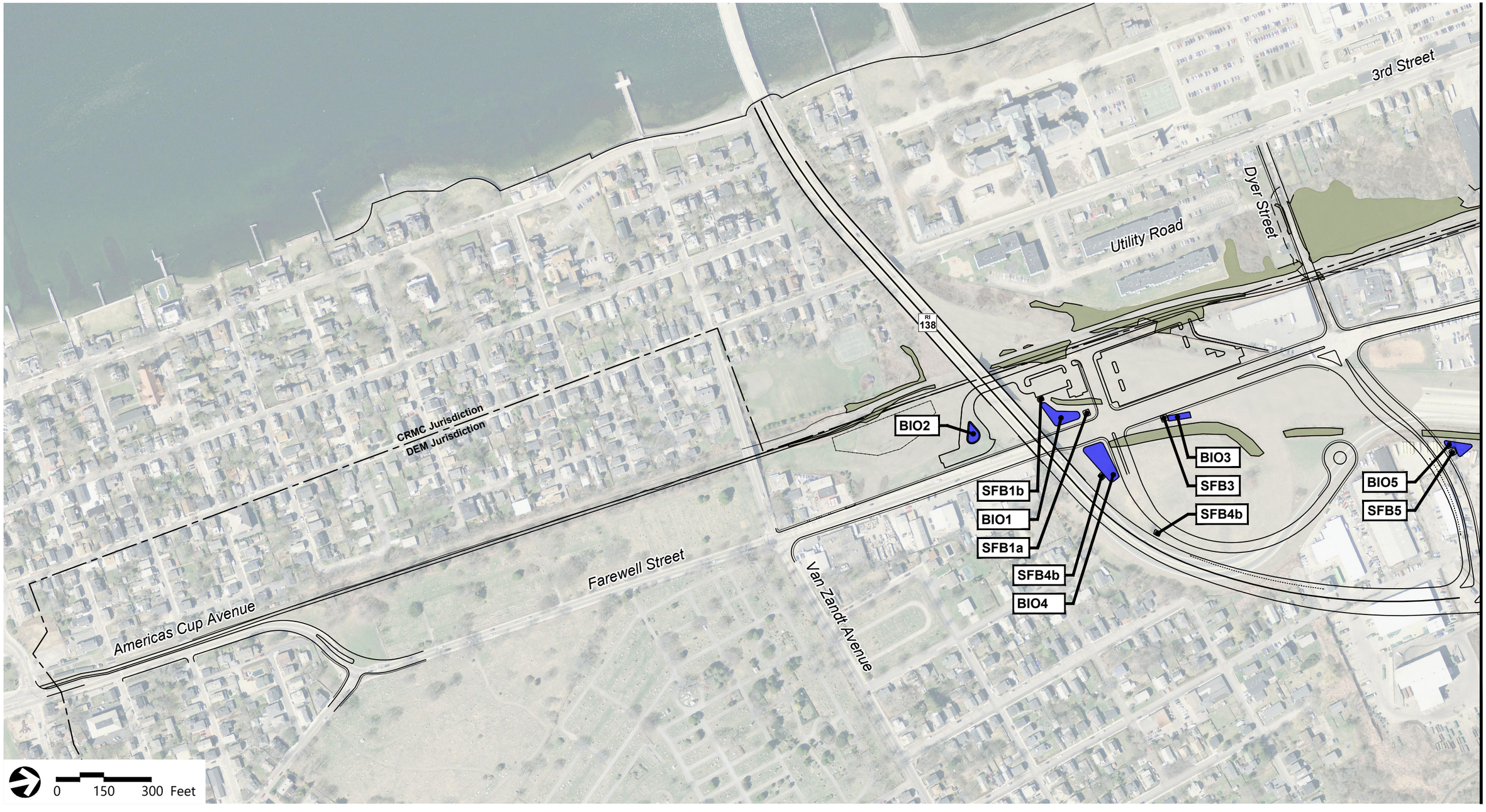

Legend

BIO	Bioretention Area
SFB	Sediment Forebay
	Wetland Area

Figure 4

Stormwater BMP's Plan 1

Reconstruction of the Pell Bridge Approaches
Newport/Middletown, Rhode Island

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Match to Stormwater BMP's Plan 1

CRMC Jurisdiction
DEM Jurisdiction
J T Connell Highway
SFB6
BIO6
Admiral Kalbfus Road
Girard Avenue
Maple Avenue
Boulevard
John H Chafee
Hillside Avenue
Newport
Middletown

0 150 300 Feet

Legend

BIO	Bioretention Area
SFB	Sediment Forebay
	Wetland Area

Figure 5
Stormwater BMP's Plan 2

Reconstruction of the Pell Bridge Approaches
Newport/Middletown, Rhode Island