



# APPENDIX – T

# STORMWATER FACILITIES

I-64 Hampton Roads Bridge-Tunnel Expansion Project

Hampton Roads Connector Partners

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*Hampton-Norfolk, Virginia*

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# T.1 STORMWATER FACILITIES

## T.1.1 STORMWATER MANAGEMENT

### T.1.1.1 UPLAND STORMWATER MANAGEMENT FACILITIES

Upland Stormwater Management (SWM), to meet stormwater quality and quantity requirements, will be accomplished through the use of the off-site nutrient credit purchase and the construction of SWM facilities to control post-construction discharge rates.

For quality and quantity control, three SWM Best Management Practices (BMPs) will be constructed throughout the Project area as shown in Appendix G on the JPA Impact Plates and the JPA Roadway Plan Set and captured in the figures below. BMP-1 will be located at the Mallory Street Interchange in Hampton while BMP-2 and BMP-4B will be located at the 4<sup>th</sup> View Interchange in Norfolk. During the initial design BMPs 1, 2, 3A, 3B, 4A, and 4B were proposed. BMPs 3A, 3B, and 4A were removed during design refinement. The naming sequence remained the same in the event these BMPs are incorporated during future design refinements. Table T-1 describes the BMP Plan References. Refer to the following plan sheets outlined in Table T-1 for each BMP and plan excerpts shown in Figures T-1 and T-2:

Table T-1: BMP Plan References

Proposed BMP	JPA Impact Plate	JPA Roadway Plan Sheet
<b>BMP-1</b>	Sheet 3 of 38	Sheet 5 of 50
<b>BMP-2</b>	Sheet 26 of 38	Sheet 28 of 50
<b>BMP-4B</b>	Sheet 27 of 38	Sheet 28 of 50

*All SWM facilities for this project will discharge to existing outfall locations throughout the area and no new outfalls are proposed for upland SWM. Additional details related to these BMPs are described in Table 2, Table 3, and Table 4.*

These tables follow the format of Section 22 of the Standard JPA form and have been presented in a Table format for each BMP for ease of answering and incorporating into Section 22 of the JPA. The Tables list the questions in Section 22 with the applicable answers. The questions are generic and not specific to this Project. Questions that are not applicable to this project were answered with a Not Applicable (N/A).

The BMPs described above also provide a portion of the stormwater quality required for this Project. The remaining quality requirements will be satisfied through the purchase of off-site nutrient credits as approved by Virginia Department of Environmental Quality (VDEQ) for this Project. Approximately 20%

of the required nutrient credits will be generated through the use of on-site BMPs and the remainder will be purchased as off-site nutrient credits.

Figure T-1 BMP 1

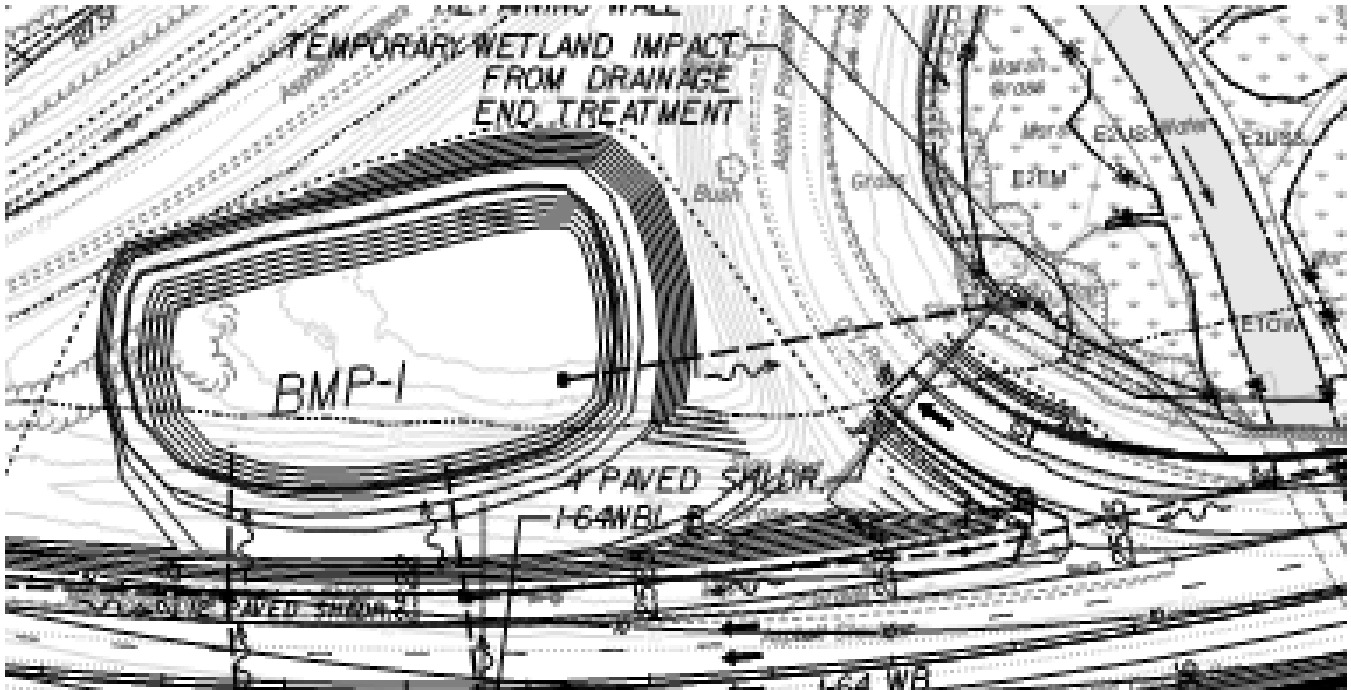


Figure T-2: BMPs 2 & 4B

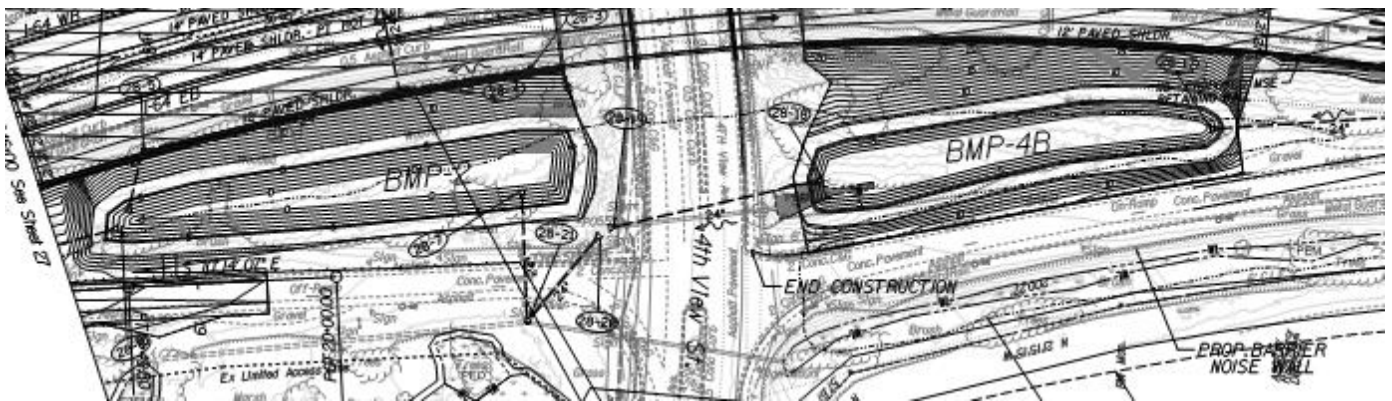


Table T-2: Stormwater Management Facilities –BMP-1

<b>Will the proposed impoundment, dam, or stormwater management facility be used for agricultural purposes?</b>	No
<b>What type of materials will be used in the construction?</b>	Soil, vegetation, concrete
<b>What is the source of these materials?</b>	Reusable materials on-site and off-site clean material
<b>Provide the dimensions of the proposed impoundment, dam, or stormwater management facility, including the height and width of all structures.</b>	Length = 223 feet Width= 133 feet Height= 5 feet
<b>Storage capacity of impoundment:</b>	1.84 acre-feet
<b>Surface area of impoundment:</b>	19,913 ft <sup>2</sup>
<b>Is the proposed Project excluded from the Virginia Dam Safety Regulations?</b>	Yes
<b>If not excluded, does your proposed Project comply with the Virginia Dam Safety Regulations?</b>	N/A
<b>Does the proposed design include a vegetation management area per 10.1-609.2?</b>	Yes
<b>Design storm event:</b>	10-Year, 24-Hour
<b>Retention time:</b>	39 hours (hrs.)
<b>Current average flow (flow rate under normal rainfall conditions):</b>	11.22 ft <sup>3</sup> /second (cfs)
<b>Method used to derive average flow:</b>	SCS Method
<b>Proposed peak outflow for the design storm provided above:</b>	10.29 cfs
<b>Has the facility been designed as an Enhanced Extended Detention Basin or an Extended Detention Basin in accordance with the Minimum Standard 3.07 of the Virginia Stormwater Management Handbook, Volume I, or in accordance with the latest version of this handbook?</b>	Yes
<b>Will the impoundment structure be designed to pass a minimum flow at all times?</b>	No
<b>If so, please give the minimum rate of flow:</b>	

<b>What is the drainage area upstream of the proposed impoundment?</b>	0.012 Miles <sup>2</sup>
<b>How much of your proposed impoundment structure will be located on the stream bed?</b>	0 ft <sup>2</sup>
<b>What is the area of vegetated wetlands that will be excavated and/or back-flooded by the impoundment?</b>	0 ft <sup>2</sup>
<b>What is the area and length of streambed that will be excavated and/or back-flooded by the impoundment?</b>	0 ft <sup>2</sup> and linear feet (If)
<b>Are fish ladders being proposed to accommodate the passage of fish?</b>	No

Table T-3: Stormwater Management Facilities - BMP-2

<b>Will the proposed impoundment, dam, or stormwater management facility be used for agricultural purposes?</b>	No
<b>What type of materials will be used in the construction?</b>	Soil, vegetation, concrete
<b>What is the source of these materials?</b>	Reusable materials on-site and off-site clean material
<b>Provide the dimensions of the proposed impoundment, dam, or stormwater management facility, including the height and width of all structures.</b>	Length = 360 feet Width = 70 feet Height = 5 feet
<b>Storage capacity of impoundment:</b>	1.20 acre-feet
<b>Surface area of impoundment:</b>	15,839 ft <sup>2</sup>
<b>Is the proposed Project excluded from the Virginia Dam Safety Regulations?</b>	Yes
<b>If not excluded, does your proposed Project comply with the Virginia Dam Safety Regulations?</b>	N/A
<b>Does the proposed design include a vegetation management area per 10.1-609.2?</b>	Yes
<b>Design storm event:</b>	10-Year, 24-Hr
<b>Retention time:</b>	20 hrs.

<b>Current average flow (flow rate under normal rainfall conditions):</b>	6.462 cfs
<b>Method used to derive average flow:</b>	SCS Method
<b>Proposed peak outflow for the design storm provided above:</b>	3.145 cfs
<b>Has the facility been designed as an Enhanced Extended Detention Basin or an Extended Detention Basin in accordance with the Minimum Standard 3.07 of the Virginia Stormwater Management Handbook, Volume I, or in accordance with the latest version of this handbook?</b>	Yes
<b>Will the impoundment structure be designed to pass a minimum flow at all times?</b>	No
<b>If so, please give the minimum rate of flow:</b>	
<b>What is the drainage area upstream of the proposed impoundment?</b>	0.007 Miles <sup>2</sup>
<b>How much of your proposed impoundment structure will be located on the stream bed?</b>	0 ft <sup>2</sup>
<b>What is the area of vegetated wetlands that will be excavated and/or back-flooded by the impoundment?</b>	0 ft <sup>2</sup>
<b>What is the area and length of streambed that will be excavated and/or back-flooded by the impoundment?</b>	0 ft <sup>2</sup> and 1f
<b>Are fish ladders being proposed to accommodate the passage of fish?</b>	No

Table T-4: Stormwater Management Facilities - BMP-4B

<b>Will the proposed impoundment, dam, or stormwater management facility be used for agricultural purposes?</b>	No
<b>What type of materials will be used in the construction?</b>	Soil, Vegetation, concrete
<b>What is the source of these materials?</b>	Reusable materials on-site and off-site clean material
<b>Provide the dimensions of the proposed impoundment, dam, or stormwater management facility, including the height and width of all structures.</b>	Length = 336 feet Width = 75 feet Height = 5 feet
<b>Storage capacity of impoundment:</b>	1.32 acre-feet

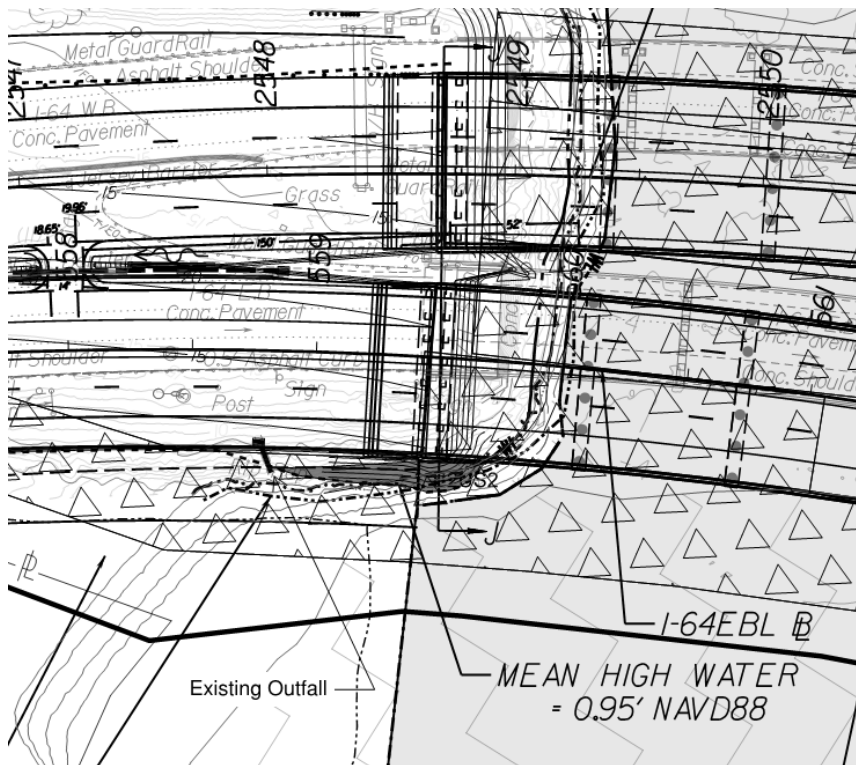
<b>Surface area of impoundment:</b>	16,437 ft <sup>2</sup>
<b>Is the proposed Project excluded from the Virginia Dam Safety Regulations?</b>	Yes
<b>If not excluded, does your proposed Project comply with the Virginia Dam Safety Regulations?</b>	N/A
<b>Does the proposed design include a vegetation management area per 10.1-609.2?</b>	Yes
<b>Design storm event:</b>	10-Year, 24-Hr
<b>Retention time:</b>	28 hrs.
<b>Current average flow (flow rate under normal rainfall conditions):</b>	7.749 cfs
<b>Method used to derive average flow:</b>	SCS Method
<b>Proposed peak outflow for the design storm provided above:</b>	7.582 cfs
<b>Has the facility been designed as an Enhanced Extended Detention Basin or an Extended Detention Basin in accordance with the Minimum Standard 3.07 of the Virginia Stormwater Management Handbook, Volume I, or in accordance with the latest version of this handbook?</b>	Yes
<b>Will the impoundment structure be designed to pass a minimum flow at all times?</b>	No
<b>If so, please give the minimum rate of flow:</b>	
<b>What is the drainage area upstream of the proposed impoundment?</b>	0.01 Miles <sup>2</sup>
<b>How much of your proposed impoundment structure will be located on the stream bed?</b>	0 ft <sup>2</sup>
<b>What is the area of vegetated wetlands that will be excavated and/or back-flooded by the impoundment?</b>	0 ft <sup>2</sup>
<b>What is the area and length of streambed that will be excavated and/or back-flooded by the impoundment?</b>	0 ft <sup>2</sup> and lf
<b>Are fish ladders being proposed to accommodate the passage of fish?</b>	No



### T.1.1.2 UPLAND STORMWATER OUTFALLS

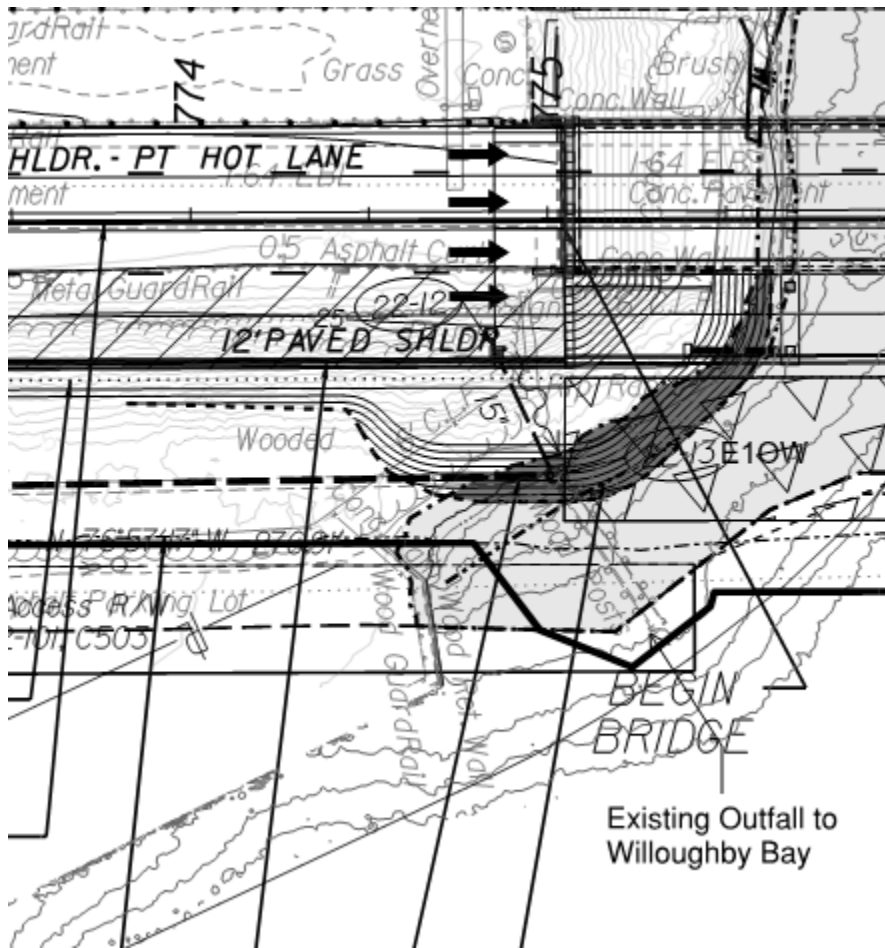
The Project proposes to reuse existing outfall locations. The first is an outfall that discharges to the Chesapeake Bay/James River near the North Trestle in Hampton. Refer to Sheet 5 of 50 of the JPA Roadway Plan Set and Figure T-3 below. The existing 24-inch Reinforced Concrete Pipe (RCP) outfall will be video inspected and repaired/reused if found to be in an acceptable condition. If video inspection determines replacement is required, it is proposed to replace the outfall in kind. An increase in discharge flow rate is not anticipated.

Figure T-3: Hampton/Chesapeake Bay Existing Outfall



The second is an existing outfall that discharges to Willoughby Bay (east of 13<sup>th</sup> View Street) as depicted in Figure T-4. Refer to Sheet 28 of 50 of the JPA Roadway Plan Set and Figure T-4 below. The existing 24-inch RCP outfall will be video inspected and repaired/reused if found to be in an acceptable condition. If video inspection determines replacement is required, it is proposed to replace the outfall in kind. An increase in discharge flow rate is not anticipated.

Figure T- 4: Willoughby Bay Existing Outfall



### T.1.1.3 ISLAND STORMWATER MANAGEMENT FACILITIES

Stormwater runoff from North Island, South Island, and the connecting tunnels, are captured and discharged at five outfalls as described below.

The existing North Island (south side) and South Island (north side) tunnel stormwater outfalls will be used as combined outfalls for discharging surface flows from the islands and drainage from the existing tunnels. The existing outfalls will be modified to provide a 36-inch RCP at the North Island and a 42-inch RCP at the South Island to accommodate the increase in discharge. Additionally, a new stormwater outfall is also proposed to the north of North Island for stormwater run-off from the north side of North Island.

The site surface stormwater management system for the islands are separate from the Tunnels and Approach Structures (TAS) drainage system. Two new outfalls are proposed for the new tunnel drainage system, one each at the North and South Islands. Locations of all existing and proposed outfalls are described in Table T-5 below.

The Virginia Pollutant Discharge Elimination System (VPDES) permit application for the proposed permanent stormwater outfalls is currently pending until inspections are completed. Associated outfall discharge rates are provided in Section 23 of the Standard JPA form.

The North Island and South Island stormwater management systems do not control stormwater quantity. Collected stormwater will be discharged directly to the Chesapeake Bay/James River without retention/impoundment of flows. The proposed stormwater management design for the islands does not include water quality control BMPs. Stormwater quality requirements at the North Island and South Island will be satisfied through the purchase of off-site nutrient credits as approved by VDEQ for this Project.

Table T-5: Island Outfall Locations

Island Outfall	Approximate Location
North Island (south side) existing outfall	36°59'56.00"N, 76°19'1.00"W
South Island (north side) existing outfall	36°59'8.00"N, 76°18'16.00"W
North Island (north side) new outfall	37° 0'11.30"N, 76°19'10.45"W
North Island TAS outfall	37° 0'5.11"N, 76°19'11.37"W
South Island TAS outfall	36°58'59.02"N, 76°18'16.47"W

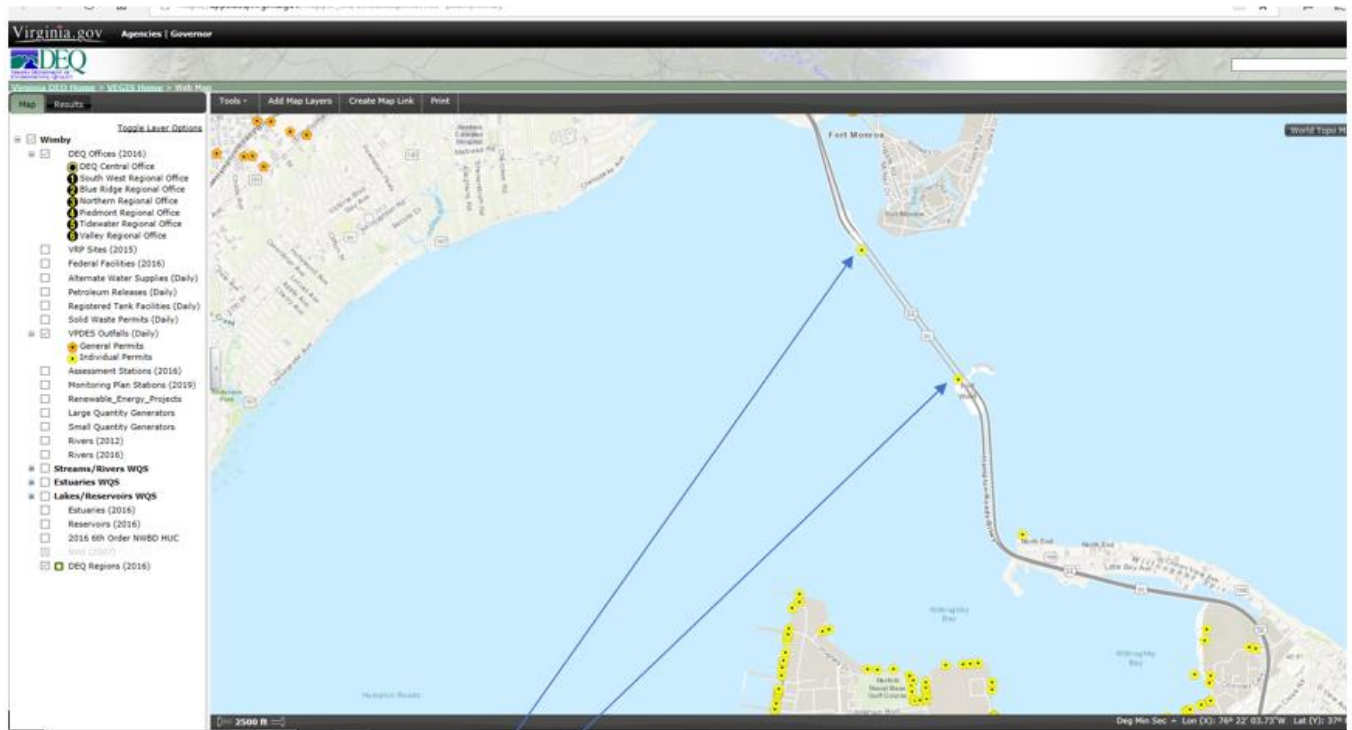
#### T.1.1.4 ISLAND & TUNNEL OUTFALLS – VPDES

##### 1.1.4.1 EXISTING HRBT ISLAND VPDES STORMWATER FACILITIES

Currently HRBT has two outfalls (001 and 002) permitted under VPDES for tunnel stormwater discharges. VPDES Permits numbered VA0005657001 North Island, and VA0005657002 South are for discharge of stormwater that is collected by the tunnel facility and discharged to the James River. These permits are existing and are classified as industrial minor. Both permits have design flow of 0.06 million gallons per day (mgd).

The following Figure T-5 shows the location of these two outfalls.

Figure T- 5: Existing Island Outfalls



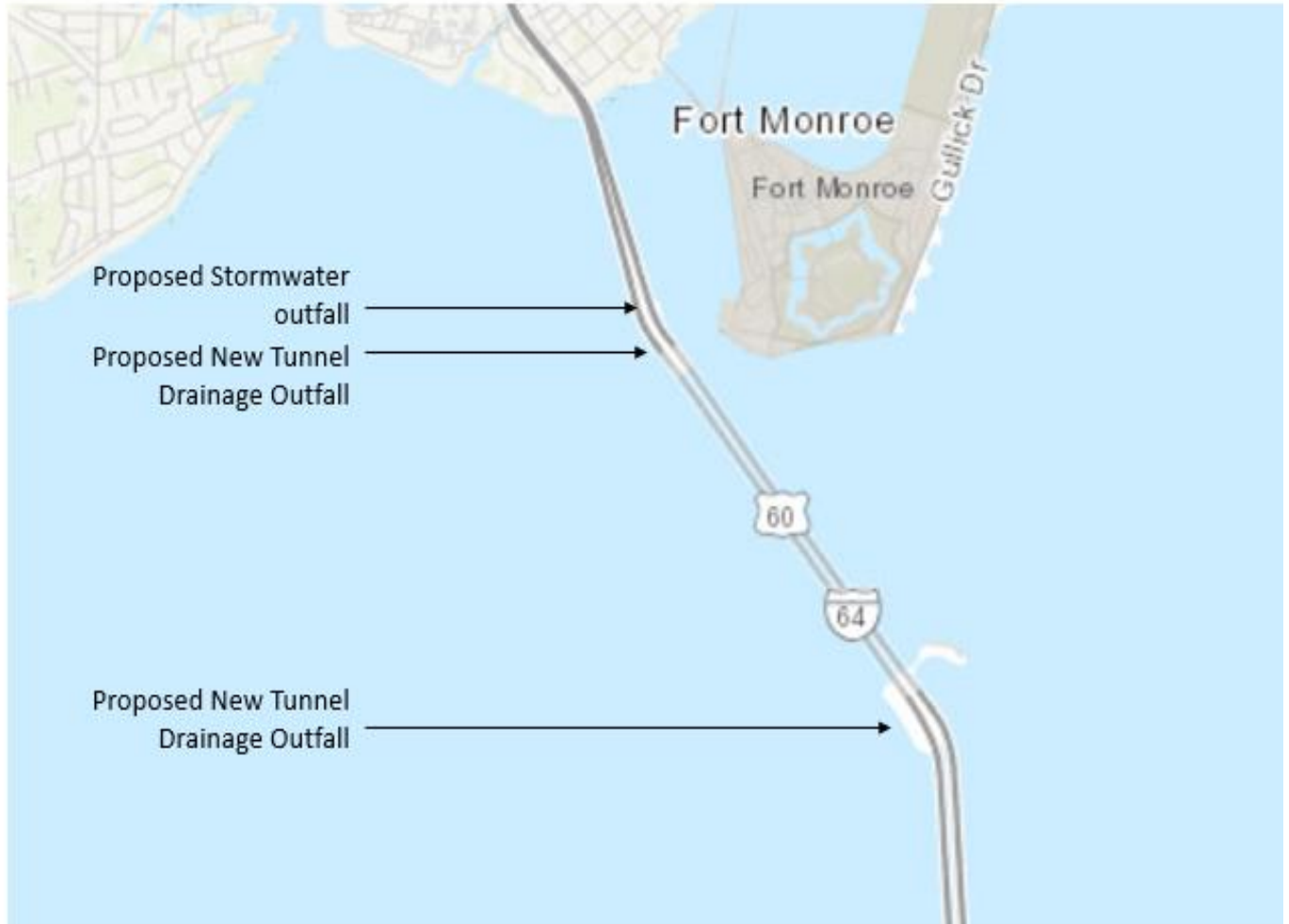
Permit No. VA0005657  
 North Island Discharge: Outfall: VA0005657001  
 South Island Discharge: Outfall: VA0005657002

Current VPDES outfalls for HRBT

#### 1.1.4.2 PROPOSED HRBT ISLAND VPDES STORMWATER FACILITIES

Prior to full commissioning of the new constructed I-64 HRBT and bridge structure, new outfalls for stormwater discharges are to be permitted through VPDES for the expanded facilities. The new facilities will have new outfalls installed or will have the existing outfalls modified as described in section T.1.3. Water will be treated in a grit and oil separation systems prior to discharge. The VPDES permit will be similar to, or a modification of, the existing outfall permits that currently handle the stormwater collected in the tunnel facility structures and subsequently discharged. Figure T-6 below shows the location of these outfalls.

Figure T- 6: Proposed Island Outfalls



Map Source: VDEQ VEGIS Data Set

Table T-6: Island Required Design Discharge Rates

Island Outfall	Required Design Discharge Rates
<b>North Island (south side) existing outfall</b>	25 cfs
<b>South Island (north side) existing outfall</b>	60 cfs
<b>North Island (north side) new outfall</b>	35 cfs
<b>North Island TAS outfall*</b>	7.9 mgd
<b>South Island TAS outfall*</b>	7.9 mgd

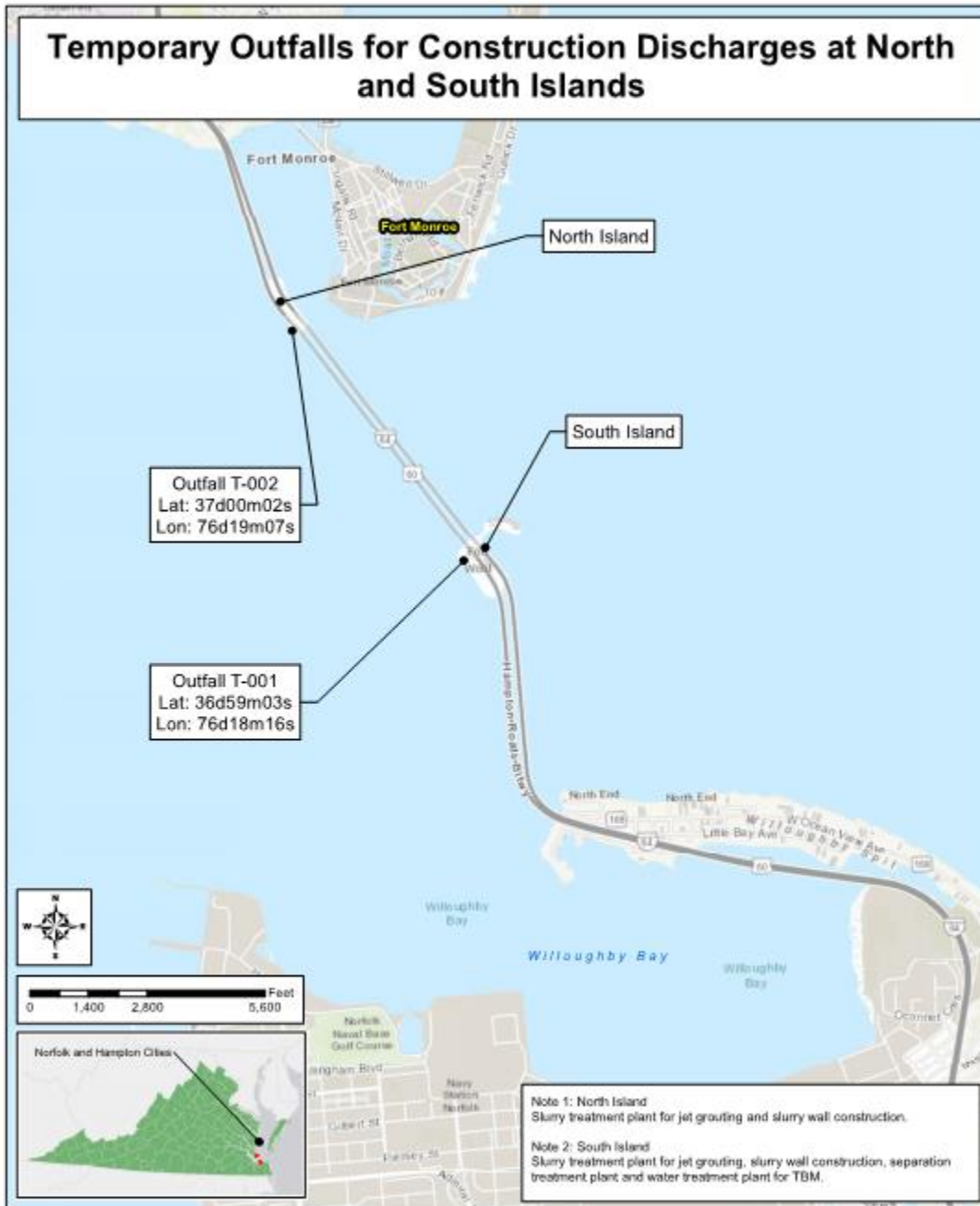
*\*This discharge rate for each tunnel outfall considers one pump running at full capacity for the design storm (100-year) and assuming fire suppression is in operation concurrently.*

### T.1.1.5 TEMPORARY HRBT ISLAND CONSTRUCTION OUTFALLS – VPDES

Two new temporary outfalls are to be utilized to facilitate the disposal of waste waters generated during the construction phases of jet grouting, slurry wall construction, boring of the tunnel with the Tunnel Boring Machine (TBM), handling intermittent Non-Contact Coolant Water (NCCW), and minor intermittent discharges of excavation water from precipitation events or seepage. These two outfalls are proposed as shown in Figure T- 7. The process water will be treated by temporary Water Treatment Units (WTU) constructed on the islands before discharge under a VPDES process wastewater permit.



Figure T- 7: Temporary Construction Island Outfalls



**Description**

Overall view of project area depicting temporary outfalls for construction discharges at North Island and South Island. TBM support treatment plant and associated appurtenances will be located on South Island.

Location: \\sfr\proj\600\Documents\Ac\GIS\HRBT\15521100819\_HRBT\_VPDES\_Outfalls.mxd

This map was developed using publicly-available digital data, but its secondary product has not been verified by regulatory authorities and is not state-authorized.

				I-64 HRBT EXPANSION NORFOLK & HAMPTON CITIES, VIRGINIA VPDES PERMIT APPLICATION TEMPORARY OUTFALL MAP										
420 Corporate Boulevard, Norfolk, Virginia 23502, Suite 300				<table border="1"> <tr> <td>Prepared</td> <td>Drawn</td> <td>Checked</td> <td>Approved</td> <td>Scale</td> </tr> <tr> <td>000</td> <td></td> <td></td> <td></td> <td>As Shown</td> </tr> </table>	Prepared	Drawn	Checked	Approved	Scale	000				As Shown
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