11.0 WATER RESOURCES

This chapter presents information on the study corridor water resources including groundwater, surface water, wetlands and floodplains. Section 11.1 documents the legal and regulatory protections of water resources. Section 11.2 presents a discussion of impacts to these resources. Section 11.3 discusses possible mitigation measures.

11.1 Applicable Legal Authority

The Virginia Department of Environmental Quality regulates surface water quality under Section 401 of the Clean Water Act and wetlands under State Water Control Law (Section 62.1-44.15:5) and Virginia Administrative Code (9 VAC 25-210-10 et seq.). Certification is coordinated with the Army Corps of Engineers (ACOE) Section 404 Wetland permits. The Commonwealth of Virginia, State Water Control Board reviews plans for pollution discharge and elimination (VPDES) permit requirements. The Chesapeake Bay Preservation Act (CBPA) regulates activities that may impact water quality in the Chesapeake Bay. For this project, the Chesapeake Bay Local Assistance Department (CBLAD) is the reviewing agency authorized to implement CBPA regulations.

Executive Order 11988 – "Floodplain Management" requires the Federal Transit Administration to avoid impacting the base (100-year) floodplain unless that location is the only practicable alternative. It further requires, in circumstances where activities must be undertaken in the floodplain, that every effort be made to minimize the potential risks to human safety and to property, and to minimize negative effects on natural and beneficial floodplain values.

Executive Order 11990, "Protection of Wetlands", directs federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.

Under Section 404 of the Clean Water Act, the Army Corps of Engineers regulates all wetlands that are adjacent or connected to navigable waters. According to the Virginia Wetlands Act, local governments have jurisdiction over portions of tidal wetlands, from low tide inland to a point 1.5 times the mean tide range. The Virginia Marine Resources Commission (VMRC) regulates the portion of tidal wetland below the mean low tide elevation. The Department of Environmental Quality regulates both tidal and nontidal wetlands (including isolated wetlands) through the Virginal Water Protection Permit Program.

The U.S. Coast Guard and ACOE are the primary agencies involved with navigation coordination and in-river construction activities. The Coast Guard regulates bridge construction activities. A full description of federal, state and local permits that would potentially be required is included in Chapter 22.

11.2 Affected Environment

11.2.1 Groundwater

The study area is underlain by the water table, a series of aquifers, and artesian systems. The water table in the study area is fairly shallow with ground water located at the surface or a few feet below the surface. The water table strata are discontinuous and are formed of unconsolidated sand, silt, and combination gravel/sand zones. The aquifers are recharged by precipitation and have some vertical movement of groundwater between them. The aquifers are separated from the water table by confining beds of silt, clay and sand. Ground water data collection sites and monitoring are not included in the scope of this study.

11.2.2 Surface Water

Surface water resources in the project corridor include estuarine rivers and creeks, tidal and non-tidal wetlands, freshwater streams, man made ponds and intermittent drainage ways. Many of the "natural" surface water features have been altered by excavation and/or filling. Also, large flat areas at low elevations have excavated ditches that promote stormwater runoff; some of these features have taken on the characteristics of channelized streams.

All of the surface waters in the project area are part of the Chesapeake Bay watershed. The largest tributary to the Bay in proximity to the project corridor is the Eastern Branch of the Elizabeth River. Crossing predominantly perpendicular to the project corridor, are several smaller watercourses that are tributaries to the Eastern Branch of the Elizabeth River. See Table 11-1 for a summary of information on these waterways.

Water quality within each of the Chesapeake Bay tributary watersheds is related to historic land use practices. The sub-watersheds that feed them reflect similar overall water quality; however each waterway may vary somewhat regarding a particular water quality constituent. The Elizabeth River has relatively poor water quality because of the predominance of industrial land use in its watershed. It should be noted that a variety of federal, state and local projects are being conducted in an attempt to restore the water quality of the Chesapeake Bay. These projects include actions that are focused on improvements to tributary watersheds, such as the Eastern Branch of the Elizabeth River. The Virginia Department of Environmental Quality regulates surface water quality under Section 401 of the Clean Water Act. Certification is coordinated with the Army Corps of Engineers (ACOE) Section 404 Wetland permits.

The Chesapeake Bay Preservation Act (CBPA) regulates activities that may impact water quality in the Chesapeake Bay. For this project, the CBLAD is the governmental unit authorized to implement CBPA regulations. The CBLAD has designated Resource Protection Areas (RPA) and Resource Management Areas (RMA) within its jurisdiction. Typically, RPAs include tidal wetlands, non-tidal wetlands which are connected by surface flow and are contiguous to tidal wetlands or tributary streams, tidal shores, and up to a 100 foot vegetated buffer area adjacent to any of the previous components. Within the City of

Norfolk, the RPA is generally identified as that area at or below the five-foot contour (mean sea level). RMAs include additional areas, which if developed, have the potential for causing significant water quality degradation. All of the streams identified in Table 11-1 are regulated as RPAs and have RMA buffers. Figure 11-1 illustrates the locations of RPAs and RMAs within the project corridor.

Construction activities would require a Virginia Department of Environmental Quality General Construction Permit. Also, construction of the vehicle storage and maintenance facility, station facilities and parking facilities would need to comply with CBPA regulations.

Table 11-1
Surface Watercourse Summary

Name of Watercourse	Corridor Location*	Watershed
Smith Creek	84 + 00	Elizabeth
Ohio Creek	126 + 00	Elizabeth
Moseley Creek	149 + 00	Elizabeth
Broad Creek	161 + 00	Elizabeth
Mill Creek	187 + 00	Elizabeth
Unnamed tributary to Mill Creek	187 + 00	Elizabeth

Source: URS Corp., September 2003
**Location refers to Preliminary Engineering Plan and Profile Design stationing. Watercourses also shown on figure 11-3.*

11.2.3 Floodplains

The study area is bounded to the east by the Atlantic Ocean, to the north by the Chesapeake Bay, to the west by the Elizabeth River, and to the south by the East Branch of the Elizabeth and its tributaries. The elevation within most of the study corridor is less than twenty feet above sea level. The proximity to major water bodies, relatively flat topography and low elevation results in significant areas identified as 100-year floodplain. Most of the floodplain areas within the corridor are closely associated with the stream channels and tributaries crossed by the project (Figure 11-2).

National Flood Insurance Rate Maps were evaluated to determine the location of the 100-year floodplain. The most significant floodplain areas are located along Broad Creek, Ohio Creek and Smith Creek. Additional small floodplain areas are located in minor drainage ways along the rail corridor.

11.2.4 Wetlands

A. Methodology

A preliminary investigation of the corridor was performed using National Wetland Inventory (NWI) quad maps, NRCS Soil Survey and aerial photographs for the entire project corridor. The locations of potential wetlands were identified based on the presence of hydric soils, wetland mapping and observed hydrology visible on the aerial photography.

Field reviews of all potential wetlands were performed on November 11 and 12, 1997 and February 28, 2001. Wetland boundaries were staked and surveyed in January 2003. Field evaluation of wetlands was

conducted in accordance with guidelines prescribed in the Army Corps of Engineers (ACOE) 1987 Wetland Delineation Manual. Specific information regarding methods is found in the Delineation Report for the proposed project corridor (BRW, November 1999, updated October 2003).

B. Wetlands Identified within the Project Area

According to the preliminary investigation and field review, both palustrine and estuarine wetland types are located within the study corridor.

Palustrine Wetlands

Within the project corridor, palustrine (shallow freshwater) wetlands are located in drainage ways that are positioned on the upper fringe of inter-tidal estuaries (tidally influenced palustrine wetlands may have a salt concentration of up to 0.05%). Plant communities in these wetlands include mixed grasses and forbs and grasslike emergent vegetation. Surface drainage, seasonally high water table and/or tides provide the hydrology for palustrine wetlands. Soils range from fine sands to muck, with high organic soils being dominant in areas subject to extended periods of inundation.

Freshwater wetlands within and near the project corridor provide certain recognized benefits to the environment. They contribute to wildlife habitat, floodwater attenuation, improved water quality, vegetative diversity, recreational opportunities, groundwater recharge, commercial production and aesthetic values.

The function and value of a given wetland is based on benefits provided by a wetland, as well as the relative abundance, sensitivity and degree of human encroachment of and upon that wetland. The study corridor has a relatively high density of development and low abundance of natural landscapes. Thus, wetlands and open spaces would be important for wildlife habitat and vegetative diversity. Wetlands would also be relatively important for filtering sediments from storm water runoff. Commercially important fish and shellfish may utilize freshwater wetlands associated with estuaries for breeding and cover. Aesthetically, wetlands provide variety to the landscape because of their vegetative diversity. However, palustrine wetlands are common in the general area, are significantly encroached upon and have no plant or animal communities that would be considered sensitive. Therefore, the overall function and value of palustrine wetlands in the project area is expected to be low to moderate. A formal function and value assessment would be needed to assign a more detailed rating on a wetland or group of wetlands.

Estuarine Wetlands

Estuarine wetlands within the study corridor are comprised of the primary and secondary tributaries to the Chesapeake Bay. The Eastern Branch of the Elizabeth River parallels the corridor. This primary tributary and its secondary tributaries account for most of the wetlands in this portion of the project corridor.

Estuarine wetlands are tidally influenced and have an ocean-derived salt concentration greater than 0.05%. Most of the estuarine wetlands in the project corridor contain brackish water, which has salt concentrations between 2-2.5 %. The wetland surface is continuously submerged (sub-tidal) or alternately exposed and flooded by tides (inter-tidal). Vegetation in the inter-tidal wetland may be emergent, scrub-shrub, forested, or aquatic bed. Sub-tidal wetland vegetation may be aquatic bed or emergent.

Like palustrine wetlands in the study corridor, most estuarine wetlands have also been disturbed, in the form of dredge and fill activities. While the edges have often been filled to provide land for farming and/or development, the channels have often been dredged to provide for the passage of watercraft and small working vessels or for stormwater outlets.

The function and value of brackish water wetlands is related to their relative water quality, vegetative conditions, physiographic location and salinity. Primary functions include production and nutrient cycling, waterfowl and wildlife habitat, erosion buffering, water quality improvement and floodwater attenuation. According to the Marine Resources Commission, the Eastern Branch of the Elizabeth River has nutrient problems related to land use, but does contain nursery and spawning for freshwater and marine species. The overall function and value of estuarine wetlands in the project corridor is expected to be moderate. A formal function and value assessment would be needed to assign a more detailed rating to a wetland or group of wetlands.

The following is a brief description of wetlands identified within the project area.

Estuarine Wetlands

Wetland 84LR (Smith Creek) is an excavated channel connected to the Elizabeth River. The channel is identified as sub-tidal estuarine, with an unconsolidated bottom (E1UBLx). The entire channel is lined by concrete retaining walls. No wetland or emergent vegetation is present.

Area 114L (Tributary to Eastern Branch Elizabeth River) is an excavated channel that is completely lined with concrete. No vegetation is present. Most of the watershed is piped, with a small area of day-lighted channel near the intersection of Tidewater Drive and I-264. The channel is designated as sub-tidal, with unconsolidated bottom (E1UBLx). However, the area is not considered to be wetland because it is completely lined with concrete.

Wetland 126LR (Ohio Creek) is connected to the Eastern Branch Elizabeth River. The wetland has been impacted by fill activities as indicated by steep side slopes and presence of discarded building material. The portion of the wetland north of the tracks is limited to the open water channel and a long linear ditch with vegetation dominated by common reed (*Phragmites australis*). To the south of the tracks the wetland includes the open water channel, and a broad intertidal zone with saltmarsh cordgrass (*Spartina alterniflora*) and mud flat that has been partially filled. The vegetation in the upper edge of the wetland was dominated by eastern false-willow (*Baccharis halimifolia*) and common reed. This wetland is designated as inter-tidal estuarine (E2EM1P).

Wetland 149LR (Moseley Creek) is a tributary to the Eastern Branch Elizabeth River. This wetland complex includes both estuarine and palustrine components; however, the palustrine components are outside of the project site. The wetland comprises open water with an emergent fringe of saltmarsh cordgrass. Common reed is present along the upper edge of the cordgrass and dominates the ditch areas which parallel the tracks. North of the tracks is designated as inter-tidal estuarine with emergent (E2EM1P) and shrub-scrub (E2SS4P) plant communities, while south of the tracks includes a sub-tidal open water component designated as E1UBL.

Wetland 161LR (Broad Creek) is primarily an open water sub-tidal wetland with a narrow fringe of emergent vegetation. The emergent area is dominated by cordgrass in the tidal zone and coastal dog-hobble (*Leucothoe axillaris*) along the edge. The wetland is designated as sub-tidal (E1UBL).

Wetland 187R (Mill Creek) is located south of Curlew Drive, which runs parallel to and south of the existing tracks. The main channel south of Curlew Drive is designated as estuarine with unconsolidated

bottom (E1UBL), and has a vegetated fringe of cordgrass. This wetland is connected, by culvert, to Wetlands 187L and 188L which are discussed in the Freshwater Section of this report.

Freshwater Wetlands

Wetland 175R is a shallow palustrine basin located in an undeveloped parcel south of Curlew Drive and west of Military Highway. Based on an off-site review, the basin is a shallow ditch with common reed as the dominant vegetation. Trees border the southern edge of the wetland, weedy grassland to the north. The wetland is designated as temporarily flooded, PEMA. This wetland was delineated as part of a proposed development project.

Wetlands 187L and 188L are tributary to, and part of Mill Creek, respectively. The channels are relatively steeply sided. Eastern false-willow and evergreen bayberry (*Myrica heterophylla*) shrubs dominate the vegetation along the edge. The confluence of these two channels and the portion of Mill Creek that flows underneath the highway bridge have unfinished cement that serves as the bottom of the channels. This area should not be considered to be wetland. Both of these excavated stream channels are designated as PEM1Ex (Wetland 187L is based on field observation). The main channels of the creeks are tidally influenced.

Wetland 200L is a ditch that drains to Wetlands 187L and 188L, and eventually into Mill Creek. The ditch is excavated and contains shallow standing water. Trees, shrubs and common reed border the open water. The ditch is approximately ten to twenty feet wide near the Kempsville/I-264 intersection. The ditch is identified as freshwater seasonally flooded/saturated (PEM1E).

See Table 11-2 for a summary of characteristics for both palustrine and estuarine wetlands in the project corridor. Distinction between these two general wetland classifications is noted in the "Topographic Setting" column of this table. Figure 11-3 shows the location of each wetland.

Table 11-2
Summary of Wetland Characteristics and Estimated Impacts

Wetland Number	Watercourse ID	Total Wetland Area [1] (ac)	Estimated Impact Area (sq. ft.)	Cowardin Classification[2]	Topographic Setting[3]	Dominant Vegetation[3]
84LR	Smith Creek	10	0.00	E1UBLx	Sub-tidal estuarine creek	None
114L	Tributary to Eastern Branch Elizabeth River	5	NA	E1UBLx	Sub-tidal estuarine	Concrete Channel
126LR	Ohio Creek	1	32,371	E2EM1P	Inter-tidal estuarine creek	Eastern false-willow, Common reed
149LR	Moseley Creek	30	21,411	E2EM1P/E2SS4P E1UBL	Inter-tidal estuarine creek and drainage ditches	Open water/mud flat Cordgrass (fringe) Common reed (ditches)
161LR	Broad Creek	530	125	E1UBL	Sub-tidal estuarine creek	Cordgrass Coastal dog-hobble
175R	N./A. (Military Highway)	<1	2,136	PEMAx	Excavated freshwater basin	Common Reed
187R	Mill Creek	45	0.00	E1UBL	Sub-tidal estuarine creek	Open water Eastern false-willow Evergreen bayberry
187L	Tributary to Mill Creek	1	3,344	PEM1Ex	Excavated freshwater stream	Same as 187R
188L	Mill Creek	(45)	0.00	PEM1Ex	Excavated freshwater stream	Same as 187R
200L	Tributary to Mill Creek	1	0.0	PEM1Ex	Excavated freshwater ditch	Willows (fringe) Common Reed (fringe)
TOTALS		**623 acres[4]**	59,387 sq. ft. 1.36 ac			

Source: URS Corp., September 2003

Notes: [1] Estimate based on NWI quad maps and aerial photography. Includes portions extending beyond study area.
For a stream or creek, wetland area extends to its confluence with larger water body and excludes defined tributaries.
[2] Classification reflects NWI quad map notation unless noted otherwise in the individual wetland description found in the Delineation Report.
[3] Refers to the portion of the wetland adjacent to the project corridor.
[4] The figure (45) is not included in the total; it had been accounted for in a prior wetland.

11.3 Environmental Impacts

11.3.1 No-Build Alternative

The No-Build Alternative would have no impact on ground water resources, surface water resources, floodplains or wetland resources.

11.3.2 TSM Alternative

The TSM Alternative includes a variety of transit facilities and service improvements. Most of these improvements would occur within developed areas and would not impact groundwater resources, surface water resources, floodplains or wetland resources.

11.3.3 Preferred Alternative

A. Groundwater

Potential impacts to groundwater as a result of this project would be minimal. The majority of construction would take place on the surface along existing railway lines or at surface stations. There is a potential that herbicides may be used to maintain vegetation within the right-of-way, however their use would have a minimal impact on groundwater quality.

Permanent detention ponds constructed for storm water runoff would provide minimal benefits to groundwater by becoming groundwater recharge zones. The locations of permanent detention ponds will be determined during final design.

B. Surface Water

A detailed evaluation of surface water and water quality issues is provided in the *Draft Drainage Report for the Norfolk LRT Project*, which was completed in October 2003. The following is a summary of the proposed impacts to surface waters.

Potential impacts to surface waters within the project corridor include water quality as well as dredging and/or filling of surface water features. A minimal amount of dredging and/or filling in waterways associated with new bridges and wider track beds would be required. Development of the maintenance facility would require that the most northern segment of Ohio Creek be enclosed and conveyed via culvert for a distance of approximately 240 feet. The upstream watershed of Ohio Creek is currently conveyed via underground structures.

Potential water quality impacts may result from filling wetlands which function as sediment traps, removal of vegetation that filters runoff and the creation of additional impervious surface areas that increases the volume of runoff and facilitates increased pollutant transport. Potential impacts to intermittent drainage ways include culvert installation or extension of culverts with the associated filling. Some excavated channels would be relocated, especially those located adjacent to the existing rail line.

All of the stream crossings within the corridor are identified as Resource Protection Areas (RPAs), with associated Resource Management Areas (RMAs) extending 100 feet landward. Additional RPAs are

located within excavated ditches that were constructed to facilitate removal of surface water. Construction activities, such as site grading and track bed widening, have the potential to increase erosion processes and deliver increased sediment loads to RPAs. Additionally, development of the project will increase the amount of paved area/impervious surface and therefore the amount of storm water runoff. This additional runoff will have potential to increase sediment and nutrient loads to RPAs.

Overall, construction of this project would not substantially alter the existing surface water drainage system or water quality, as compared to existing conditions. All construction activities have potential to increase sediment and nutrient loads to surface waters. However, these changes would be temporary and would cease once construction is complete and graded areas are revegetated. In some locations, the area of impervious surface would decrease as compared to existing conditions. Overall, the project would increase the net new impervious surface by 7.46 acres, with potential to increase runoff volume and pollutant loads to surface waters. The proposed increase in impervious surface is extremely small in relation to the existing impervious surface in the watershed. Additionally, the project will include treatment facilities for 7.50 acres of impervious area. Thus, the project is not expected to result in a noticeable decrease in water quality as compared to existing conditions.

It should be noted that an LRT system may reduce the need for construction of future roadway lanes and reduces vehicular traffic and; therefore, is an extremely effective BMP by eliminating a significant source of pollutants, especially idling cars.

C. Floodplains

Executive Order 11988 – "Floodplain Management" requires the Federal Transit Administration to avoid impacting the base (100-year) floodplain unless that location is the only practicable alternative. It further requires, in circumstances where activities must be undertaken in the floodplain, that every effort be made to minimize the potential risks to human safety and to property, and to minimize negative effects on natural and beneficial floodplain values.

As illustrated in figure 11-2, approximately 0.5 miles of the proposed project corridor is located adjacent to or within the 100-year floodplain. These areas are scattered along the corridor in approximately 10 locations, many in areas already used for transportation purposes. Track construction within floodplain areas will match the elevation of existing rail and road facilities to minimize the potential for causing additional backwater conditions. This project is not intended to correct existing deficiencies in adjacent roadways and structures.

Little impact is anticipated due to construction of new bridges and culverts. Bridge and culvert crossings would be designed to minimize backwater conditions and rail/road profiles would minimize overtopping. Where practical, all construction shall meet local zoning requirements, which require new structures to have at least one foot of freeboard above the 100-year flood elevation. Construction in downtown Norfolk would require new structures below the floodplain. The Drainage Study will further define and identify floodplain impacts.

D. Wetlands

Wetland areas that may be impacted were identified based on proximity to the corridor and type of construction required**.** Wetlands that are within the estimated construction limits were identified as impacted. Construction impacts for the Preferred Alternative would include fill for widening the track bed, culvert requirements, bridge widening, construction of the vehicle storage and maintenance facility (VSMF), and construction of the Military Highway Station park and ride lot.

Eight wetlands and one non-wetland area were inventoried along the LRT corridor. Five wetlands would be impacted during track, VSMF and station site construction, with a total impact area of 1.36 acres. Figures 11-4 through 11-8 depict the affected wetland areas. Table 11-2 is a summary of wetland characteristics and individual impact estimates based on the preliminary conceptual design. Detailed information regarding most wetlands in the project corridor is included in the *Wetlands Delineation Report*, BRW, Inc., March 1999, updated October 2003.

11.4 Mitigation Plan

11.4.1 No-Build Alternative

There would be no impacts to water resources with the No-Build Alternative; therefore no mitigation measures are planned.

11.4.2 TSM Alternative

There would be little to no impacts on water resources associated with the TSM Alternative; therefore no mitigation measures are planned.

11.4.3 Preferred Alternative

A. Groundwater

The majority of construction for this project would not take place within the groundwater table. To comply with State of Virginia Best Management Practices (BMP's) a temporary sedimentation pond may be required for discharge during dewatering operations for excavations.

Permanent impacts to the groundwater are not anticipated. Therefore, permanent mitigation efforts would not be required.

B. Surface Water

The *Draft Drainage Report* (October 2003) prepared for this project provides a detailed analysis for surface water impacts and mitigation controls. The following is a summary of proposed mitigation.

Impact to the course and cross-section of most estuarine creek channels would occur due to culvert extension necessary for widening the bed for the railroad track. This impact is expected to be minimal; therefore, mitigation efforts for this aspect of impact are not feasible. Vertical clearances for river traffic would be maintained or improved with bridge enhancement/reconstruction, and would be coordinated with the US Coast Guard. The proposed project would require a Bridge Permit or Bridge Permit Amendment from the US Coast Guard and a Section 10 permit from the US Army Corps of Engineers.

All of the surface water features in proximity to the project corridor are considered wetlands; therefore, avoidance and minimization measures would be the same as those described in the wetland mitigation section of this chapter. Potential impacts associated with increased impervious areas would be mitigated

by installing permanent stormwater runoff controls. The following controls are proposed to mitigate for increased impervious areas:

- Norfolk State University Station – relocate VDOT dry detention basin and small extended detention basin and/or a combination of technological BMPs
- Military Highway Station and Parking Lot – proposed stormwater basin to provide quantity and quality control
- Newtown Road Station and Parking Lot - proposed stormwater basin to provide quantity and quality control
- LRT Vehicle Storage & Maintenance Facility – utilize relocated VDOT basin; reduce pollutant load by 10% as compared to pre-developed conditions.

In all, these facilities will treat 7.5 acres of impervious surface, slightly more than the 7.46 acres of net new impervious surface created for the project.

Additional BMPs such as oil/water separators will be determined based on permit requirements, and will be developed during final design.. The proposed project would require a Virginia Pollution Discharge Elimination System permit from the Virginia DEQ and a Sediment and Erosion Control permit from the City of Norfolk.

Impacts within designated RPAs and RMAs would be coordinated with the Chesapeake Bay Local Assistance Department. Approximate locations of the RPAs for the Harbor Park and Norfolk State University stations and VSMF are illustrated in Figure 11-1. Both of these areas are identified as Intensely Developed Areas. Thus, development and redevelopment within the RPA can be permitted provided that water quality impact assessments are conducted and BMPs established to achieve a 10% reduction in nonpoint source pollution. The drainage study indicates that the project will achieve the necessary nonpoint source pollution reductions.

Other RPAs and RMAs are scattered along the rail alignment. Rail construction activities at these locations meet the criteria for exception to CBPA rules as long as the construction is completed in compliance with the Virginia Erosion and Sediment Control Law and Stormwater Management Act. Implementation of BMPs for project construction will minimize potential impacts in RMAs and RPAs for the track construction.

The Stormwater Management Plan, to be completed as part of the permitting process, will protect the aquatic environment by controlling post-developed water quantity and quality as nearly as practicable, equal to or better than pre-development runoff characteristics. The plan will be in conformance with the Virginia Stormwater Management Regulations (SWMR), the Virginia Stormwater Management Handbook, the Virginia Erosion and Sediment Control Regulations, and the Chesapeake Bay Protection Act (CBPA).

C. Floodplains

The proposed stormwater management facilities are not designed to correct existing substandard conditions, including inadequate downstream facilities. The stormwater management facilities will maintain pre-developed flows or discharge to an adequate receiving facility. Opportunities to improve existing downstream hydraulic conditions will be considered in future design phases where economically feasible and desirable for the proposed LRT facilities.

Mitigation of the effects of construction of the Preferred Alternative on floodplains would be conducted in accordance with the Virginia Department of Environmental Quality Regulations and other applicable

local requirements. Stream encroachment impacts will be evaluated and mitigated as part of the Local, State and Federal Joint Permit Application for activities in waters and wetlands of the Commonwealth of Virginia.

Although channel geometry may be changed slightly, little impact is anticipated due to construction of new bridges and culverts. Bridge and culvert crossings would be designed to minimize backwater conditions and rail/road profiles would minimize overtopping. Site specific floodway studies will be prepared, as required by the local regulations, during the final design phase. The proposed project would require a Floodplain Permit from the City of Norfolk.

D. Wetlands

As outlined in Federal and State regulations, wetland impacts must be avoided, minimized or mitigated. Preliminary scoping and design have been used to identify locations of potential impacts and to shift construction activities away from these areas.

Impact Avoidance and Minimization: Approximately 0.6 acre of the proposed wetland impact is associated with track construction and expansion. Since much of the proposed off-street running sections of the LRT alignment lies within the existing Norfolk Southern South Beach Branch Line, there is little opportunity to shift the alignment to avoid wetland impacts. Construction limits were refined and shifted near Mill Creek to minimize impacts. Overall, the project will utilize steep side slopes (2:1) along the rail line to minimize and avoid wetlands while keeping within the normal design guidelines for rail structures. Consideration was given to utilizing retaining wall at the Mosely Creek site. However, this would still result in side slopes in the 1:1 to 2:1 range and would not substantially avoid or reduce wetland impacts. Given the cost and long term maintenance requirements of retaining wall and limited benefit to nearby wetlands, this technique was determined to be impracticable.

Approximately 0.7 acre of impact is associated with construction of the vehicle maintenance and storage facility. Construction of the maintenance facility would require filling the entire wetland basin (Wetland 126LR) while installing additional storm sewer to carry the water to I-264. The location of the maintenance facility has been carefully reviewed and was chosen based on location within the project corridor, configuration of the site, availability of the property, and overall usability of the site. Of all the locations reviewed for the maintenance facility, the NSU site is the only one under public or railroad ownership. The site is currently idle land that has been previously used as a railroad spur line. Development of the site will not require the relocation of any businesses or residences. This site is wedged between the interstate highway and existing rail line, and has a long narrow configuration that is most suitable for the facility. The location, configuration, ownership and existing land use at this site combine to make it the preferred location for construction of the maintenance facility. The wetland area on the site is relatively degraded due to past land use and fill activity. Additionally, the entire upstream watershed of this wetland is developed, with all water entering the site via storm sewer. Construction of the facility would pipe the water an additional 240 feet (apx.).

Installing Best Management Practices prior to construction would minimize water quality impacts to wetlands. Permanent retention ponds are included at all of the station locations where parking is proposed. Vegetated swales would be reconstructed along the tracks, where feasible, to filter runoff before it enters a wetland. Silt fences would be placed along the edge of wetland basins to minimize sedimentation during construction. Temporary construction easements and right-of-ways would be re-vegetated in a timely manner; native vegetation would be utilized as appropriate. Sediment and erosion control measures and pond sizing would be refined during final design and coordinated with the appropriate agencies. The following general principles would be followed:

- Erosion and sedimentation controls will be designed in accordance with the most current edition of the Virginia Erosion and Sediment Control Handbook. These controls will be in place prior to clearing and grading and maintained in good working order throughout the construction process.
- Machinery and construction vehicles will be operated outside of wetlands to the extent practicable
- If materials or equipment must be temporarily placed in wetlands, the contractor should install mats, geotextile fabric or use other suitable measures to minimize soil disturbance and erosion.
- Temporarily disturbed areas (including RPAs and RMAs) will be restored to pre-construction conditions and seeded with appropriate vegetation in accordance with the cover type (emergent, scrub-shrub, forested or upland). To the extent practicable, stabilization and restoration will occur immediately after the temporary disturbance is completed at each RPA and RMA.

Wetland Impact Compensation: Options for compensatory mitigation for unavoidable impacts include wetland restoration, wetland creation, purchase of mitigation bank credits, or a contribution to an approved in-lieu fee fund. The preferred methods of compensation are wetland restoration or creation. Potential sites for restoration/creation were identified using aerial photos, land use information, and through discussion with regulatory agencies. Three locations for wetland restoration/creation have been fully evaluated. An area adjacent to Mosely Creek was evaluated and concept plan presented to regulatory agencies. The agencies indicated that they had concerns with long term management of common reed grass (*Phragmites australis*) on the site. The second area considered for restoration was located adjacent to the East Branch Elizabeth River at Grandy Village. This area is proposed to be restored as part of a COE/City of Norfolk/Norfolk Redevelopment and Housing Authority partnership. Evaluation of the concept plan drawn up by the COE indicated that there would not be adequate space to develop additional wetland credits to compensate for project impacts. The third site evaluated was located on Steamboat Creek. Preliminary evaluation indicated that the site could accommodate stormwater ponding to improve water quality, upland buffers, wetland creation and wetland restoration. A more thorough review of the existing hydrology and site characteristics identified several potential problems with wetland construction, including:

- Large watershed area would require very large stormwater pond; cleanup of water entering site is not practical given site constraints
- Site contains extensive area of common reed grass; control would likely be a long term maintenance issue
- Construction access would require utilizing a narrow road within a residential neighborhood; safety of local children would be an issue as well as accelerated deterioration of the roadway
- Alternative access for construction equipment would require constructing a haul road through the existing wetland; temporary and permanent impacts to high quality vegetation, soil compaction, and erosion would be short and long term issues for the restoration

Based on these issues, the Steamboat Creek site is not a viable option for constructing wetland mitigation for the project. Other options for wetland mitigation include purchase of wetland bank credits or provision of a fee in-lieu of on-site wetland construction. Wetland bank sites are approved by the COE and wetland regulatory agencies. The COE list of available wetland bank sites currently includes only one tidal wetland area. According to the COE Public Notice for the Chesapeake Land Development Tidal Mitigation Bank (see appendix A), the 7.3 acre restoration would result in the creation of 4.9 acres of tidal wetland, 0.4 acres of forested wetland and 2.3 acres of forested upland buffer. The wetland bank site is scheduled to have 0.7 acres of advance wetland credit available during the early summer 2004. Future credits will be available upon completion of construction and agency approval, which is scheduled for September 2004.

Provision of an in-lieu fee for wetland impacts can be coordinated through the Elizabeth River Project, a non-profit agency. The COE, DEQ, Virginia Commonwealth and Elizabeth River Project recently signed an Operating Agreement that establishes the operating parameters of the Elizabeth River Restoration Trust. The Trust serves as an additional mechanism to provide compensatory mitigation for impacts requiring Section 404 permits. By providing an in-lieu fee, the project sponsor would provide needed resources for the restoration of priority areas, as identified by regulatory agencies and the Elizabeth River Project.

Provision of wetland replacement using a wetland bank and/or an in-lieu fee is the preferred method of compensatory wetland mitigation for the following reasons:

- The project sponsor has made a good faith effort to identify on-site mitigation opportunities, including numerous initial site reviews and three detailed evaluations; due to site constraints, none of the sites can practicably be utilized for mitigation.
- The project requires 1.46 acres of mitigation. The Chesapeake Land Development Tidal Mitigation Bank could immediately accommodate 0.7 acres of this mitigation, and upon final approval by the COE and Virginia wetland regulatory agencies, the remaining portion of the required mitigation.
- Conversely, contribution of an in-lieu fee could be combined with other Trust resources to restore a larger area with the net result of a more ecologically sound mitigation
- Provision of an in-lieu fee could be utilized more strategically, such that the Trust's restoration area provides higher function and value than the areas evaluated for on-site mitigation
- Through banking or in-lieu fee provision, site mitigation would be monitored and managed in the short term, until the site has met the requirements of the permit. Additionally, the wetland bank sponsor and Trust are committed to long term monitoring and maintenance of restoration sites resulting in greater long term success

Based on this review, the preferred option for wetland mitigation is the purchase of wetland credits from an approved mitigation bank and/or provision of an in-lieu fee to the Elizabeth River Restoration Trust. HRT has begun initial discussions with the owner of the Chesapeake Land Development Tidal Mitigation Bank to identify the total number of credits that are and will be available, estimated cost for the credits, and process to execute the legal transactions. Depending on the results of these discussions and timing of the LRT construction, provision of an in-lieu fee may be used for part or the entire mitigation requirement.

Discussions with the COE, in particular, have been conducted regarding the options for mitigation. The COE has indicated that the proposed project has made a good faith effort to minimize wetland impacts and to find on-site mitigation opportunities, and suggested contacting the owner of the Chesapeake Land Development Tidal Mitigation Bank. The use of wetland banking and/or in-lieu fee options are appropriate based on the level of analysis conducted for the project. Final design of wetland compensation will be completed and submitted for agency approval through the wetland permitting process.

Permitting: Coordination with the regulating agencies was initiated in 1996 and has continued through the various phases of the environmental review process. Wetland permits would be required from three government agencies. Generally, the ACOE Section 404 permit and Virginia Department of Environmental Quality Water Protection Permit would define the mitigation requirements. Based on the proposed impacts, mitigation is anticipated to require replacement at a 1:1 ratio. Wetland impacts and mitigation would also be coordinated with the Virginia Marine Resources Commission (Subaqueous /Tidal Wetland Permit) and reviewed by the City of Norfolk and CBLAD. Refer to Section 21.3 for a complete list of required permits and permitting agencies.

No Practicable Alternative Finding (Section 404(b)(1) Compliance): Based on the project need, alternatives analysis and the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands and that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use.