4.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

4.1 Preferred Alternative

The scope of the proposed undertaking is to design and construct a two-story 17,700 square foot main laboratory and administration building with a footprint of approximately 10,000 square feet. A paved parking area associated with this building will cover an area of approximately 33,000 square feet. The area of land disturbance for this project is estimated to be approximately 55,000 square feet of previously disturbed land. The area to be occupied by the new main laboratory and administration building and paved parking area will be approximately 43,000 square feet. The remaining area, approximately 2,000 square feet will be landscaped. Approximately 800 square feet of this area will be located on what is the island's original boundary, while the remaining square footage will be emplaced on man-made land. (Pivers Island originally comprised the north central, northeastern and northwestern portion of NOAA's property. Man-made land, created from dredge spoil, comprises the south and southwestern portion of NOAA's property.) Please see site sketches and photographs, which are enclosed in the appendix section of this report.

This facility will be emplaced approximately 20 feet to the west of the existing laboratory building and will occupy the footprint of the existing parking area. The front of the building will be situated facing to the west toward Bulkhead Channel. The rear of the building will be situated facing the east toward an existing grove of cedar trees. This location was chosen because: 1) The structure will be on the highest ground within vacant land available to NOAA; 2) The structure will have a minimal impingement on the 100-year floodplain; 3) The structure will be contiguous with the existing laboratory structure, which will facilitate the desired proximity to other operational areas and also increase safety and security provided by the proximity factor; 4) The structure will be in harmony with the layout of the complex; and 5) The structure will be oriented in such a way as to provide for aesthetics and to take advantage of the solar cycle and the seasonal wind directions.

The scope of work also calls for the emplacement of a small interpretive kiosk with a footprint of no more than 40-foot by 40-foot, which will be located about 20 feet landward of the eastern shoreline of NOAA's property facing Beaufort Channel. This kiosk will be emplaced within the immediate vicinity of existing structures adjacent to NOAA's building complex. This is the only portion of NOAA's property, adjacent to the NCNERR boat docks, where the Rachel Carson NCNERR may be viewed. For educational purposes, being able to view the reserve is of utmost importance.

Also included is replacement of an existing vehicle access bridge. The existing bridge will be demolished upon the completion of the new one. The new bridge will be emplaced immediately to the west of the existing bridge and will be parallel to the existing bridge. This portion of the project will have similar footprint and features as the current structure, which was constructed in the mid-1960s, replacing the wooden bridge built in the early 1930s. This bridge spans the body of water known as Old Channel, which connects NOAA's property on the northern half of Pivers

Island and the causeway to between Old Channel and State Route 1205, also known as Old US 70.

Included within the scope are smaller projects, which include upgrade of existing boat ramps and docks.

A proposed component of these upgrades involve replacement of the retaining walls and piping system of the existing turtle pen complex to include the seawater supply system. This portion of the project will remain within the same footprint as the current structure that was emplaced in this area in the late 1920s. The existing turtle pens are located on the northern shoreline of NOAA's property facing Old Channel. The existing seawater supply system is located within the channel and is located approximately 96 feet from the shoreline.

As part of this proposed project, an upgrade of the northeastern, main dock will involve removal of two fixed, piling-type finger docks and installation of floating-type docks in their stead. This portion of the project will remain within the same footprint as the current structure that was first emplaced onsite in the late 1930s. This project area is located on the northwestern shoreline of NOAA's property, adjacent to the southern bridgehead, facing Old Channel.

Expansion and upgrade of the eastern dock, which will involve additional docks to accommodate the NCNERR boats and removal of three fixed, piling-type docks and replacement with floating-type docks is also planned a part of this proposed project. This proposed project has not been designed as of the date of this report; however, based on interviews with NOAA, the expansion will remain within the existing facility's footprint. This portion of the project will involve an upgrade of the current structure built in the late 1980s. Minimal disturbance of the shoreline, tidal areas and submerged areas will occur as a result in the project area.

Included within the scope of the proposed project is an upgrade of the northeastern boat ramp and two docks, which includes widening and regrading the ramp and replacing the adjacent sea wall. The two fixed, piling-type docks will be replaced with floating-type docks. This portion of the project will remain within the same footprint as the current structure built in the 1970s. This project area is located on the northwestern shoreline of the NOAA's property, facing Old Channel.

The schedule for the proposed new building project is to begin construction by June 2004 and complete construction by December 2005. The other items, which are currently unfounded, will begin following receipt of appropriated funds, and will be completed probably later than December 2005.

The proposed new main laboratory and administration building, which will be an addition to the existing facility, will not require additional roadways. However, a new parking area will be emplaced on the eastern and southern sides of the new building. Selection of a specific footprint for this facility was driven by the desire to optimize use of previously disturbed land, reduce impacts to the surrounding area, and increase security.

The building will receive water supply and wastewater treatment via connection to the existing sewer and water systems and no expansion of water supply and wastewater treatment systems would be required. Primary electrical power will be provided via connection to the existing power service to the island with a new transformer installed for the new building. Heating and cooling systems will be designed specifically for the new building.

Careful consideration was given to upgrading the existing boat ramp and docks. Minimal disturbance of the shoreline, tidal areas and submerged areas will occur as a result in these project areas. Analysis of project impacts at the site and its vicinity, to include cumulative impacts, indicated that no significant environmental effects would occur.

According to NOAA records, the subject site is zoned industrial and is consistent with land use within the immediate vicinity and the proposed facility will be consistent with the official municipal land use plan for the outlined in the *Town of Beaufort Strategic Approach for Growth* (1999). Land use in the immediate vicinity to the north, across Old Channel, and to the east, across Gallants Channel, which encompasses the Town of Beaufort, is mixed commercial, residential and maritime. Land use to the south is dedicated to the Rachel Carson NCNERR, while land use to the west, across Bulkhead Channel, on Radio Island is mixed commercial, residential and maritime.

Development at this site meets applicable federal and state regulatory guidelines and local ordinance requirements for federally funded projects. Analysis of project impacts at the site and its vicinity, to include cumulative impacts, indicated that no significant environmental effects would occur.

4.2 Alternative Actions

NOAA analyzed five alternatives regarding the new main laboratory and administration building.

The first option would have emplaced the building to the west of the existing parking area and over 96 feet to the southwest of the existing laboratory building. This option was rejected because: 1) the structure would have been placed in a low-lying area of the island and well within the 100-year floodplain; 2) the structure would have been placed within a few feet of the existing utility easement, which would limit future utility upgrades; 3) the structure would not have been contiguous with the existing laboratory structure, which would have caused loss of the desired proximity to other operational areas and loss of the increased safety and security provided by the proximity factor; and 4) the structure would have been out of harmony with the layout of the complex.

The second option would have emplaced the building to the north of the existing parking area and approximately 14 feet to the west of the existing laboratory building. This option was rejected because: 1) the structure would have extended approximately one-half of the structure into the 100-year floodplain; 2) the structure would have been placed within a few feet of the existing utility easement; and 3) the structure would have been out of harmony with the layout of the complex.

The third option would have emplaced the building to the south of the existing parking area and over 208 feet to the south of the existing laboratory building. This option was rejected because: 1) the structure would have been placed in a low-lying area of the island and well within the 100-year floodplain; 2) the structure would not have been contiguous with the existing laboratory structure, which would have caused loss of the desired proximity to other operational areas and loss of the increased safety and security provided by the proximity factor; and 3) the structure would have been out of harmony with the layout of the complex.

The fourth option would have emplaced the building to the south of the existing parking area and over 336 feet to the south of the existing laboratory building. This option was rejected because: 1) the structure would have been placed in a low-lying area of the island and well within the 100-year floodplain; 2) the structure would have been placed within a few feet of the existing utility easement, which would limit future utility upgrades; 3) the structure would not have been contiguous with the existing laboratory structure, which would have caused loss of the desired proximity to other operational areas and loss of the increased safety and security provided by the proximity factor; and 4) the structure would have been out of harmony with the layout of the complex.

The fifth option would have emplaced the building within the footprint of the existing parking area and approximately 44 feet to the southwest of the existing laboratory building. This option was rejected because: 1) the structure would not have been contiguous with the existing laboratory structure, which would have caused loss of the desired proximity to other operational areas and loss of the increased safety and security provided by the proximity factor; and 2) the structure would have been out of harmony with the layout of the complex.

The alternative action for replacing the vehicle access bridge would be to repair the existing bridge. In order to repair the bridge, the deck would need to be removed and the girders and abutments would need to be replaced. During this period of repair, there would be no vehicle access to either the NOAA laboratory or the Duke Marine Laboratory for several months, unless a temporary bridge is also installed. A temporary bridge would require a significant structure in the water for lateral bracing due to the strong currents in the Old Channel. The bridge girders have already been repaired and reinforced in 1995; however, due to the severe effects of the marine environment, the structure is again experiencing major problems resulting from corrosion. The life of a repaired bridge would also be limited by the life of the existing concrete piles, some of which are already experiencing longitudinal cracks. The existing bridge is 40 years old. Bridge repair would hinder NOAA's ability to fulfill its purpose and missions during the period of repair, and would result in a structure that would again need to be replaced when the existing cracked piles begin to fail.

No alternative action options were available for the small interpretive kiosk, or upgrade of the existing turtle pens and boat ramps and docks.

4.3 No-Action Alternative

In addition to the preferred action and alternative actions, NOAA considered the alternative actions of taking no action, which would be not to proceed with construction of the new main laboratory and administration building, emplacement of the small interpretive kiosk, replacement of the existing vehicle access bridge, or upgrade of the existing the turtle pens and boat ramp and docks. The no-action alternative would hinder NOAA's ability to fulfill its purpose with regard to federal acts regarding coastal zones, estuaries, fisheries, protected species, etc. Therefore, NOAA rejected the no-action alternative.

5.0 ENVIRONMENTAL SETTING

5.1 Topography

The U.S. Geological Survey (USGS) topographic map, Beaufort Quadrangle, North Carolina (1949, photorevised 1983), depicted the subject site to occur at an elevation of from five to ten ± feet ASML and generally sloping from the center of the island outward in all directions. Slopes range from 0.10 percent to 1.0 percent.

5.2 Surface Water Characteristics

According to information reviewed and onsite observations surface water drainage for each portion of the proposed project is as follows:

New main laboratory and administration building (located on the western portion of NOAA's property). Surface water runoff appeared to be generally toward the west with outfall into Bulkhead Channel.

New interpretive kiosk (located on the eastern shoreline of NOAA's property). Surface water runoff appeared to be generally toward the east with outfall into Beaufort Channel.

New vehicle access bridge (the northern bridgehead is located on the southern shoreline of the causeway located on the northwestern portion of the property, or northeastern corner of NOAA's property). Runoff would be similar to that of the existing bridge. Surface water runoff from the northern bridgehead appeared to be generally toward the south with outfall into the body of water between Pivers Island and the causeway, while runoff from the southern bridgehead appeared to be generally toward the north with outfall into the same body of water.

Turtle pen and seawater supply system upgrades (located on the northern shoreline of NOAA's property). Surface water runoff appeared to be generally toward the north with outfall into the body of water between Pivers Island and the causeway.

Existing boat ramp, for which upgrades are proposed (located adjacent to the southern bridgehead on the northwestern shoreline of NOAA's property). Surface water runoff appeared to be generally toward the north with outfall into the body of water between Pivers Island and the causeway.

Existing boat docks, for which upgrades are proposed (located on the northeastern and eastern portions of NOAA's property). Surface water from these structures fall directly into Beaufort Channel.

Surface water runoff flows from Beaufort Channel to the east of the island and Bulkhead Channel to the west of the island into the Morehead City Channel located over 4,100 feet to the south of the island, then into the Beaufort Inlet, located over 1.2 miles south of the island, then into Onslow Bay and into the Atlantic Ocean, which is located over 3.9 miles to the south of the island.

According to the North Carolina Department of Water Quality (NCDWQ) map, *River Basins of North Carolina* (1997), the site is within the White Oak Watershed. The EPA online database of watershed profiles, reviewed online on 21 April 2003, Pivers Island is within the Bogue-Core Sounds portion of the White Oak Watershed. The Bogue-Core Sounds are cited by the USGS as hydrologic unit code (HUC) cataloging unit #03020106.

5.3 Soils

According to the Soil Conservation Service (SCS)*, Soil Survey of Carteret County, North Carolina* (1987), soils at this site are classified as Corrolla-Urban Land Complex series, Newhan Fine Sand Dredge series, and Wando-Urban Land Complex series. Locations of soil types area as follows:

> Corrolla-Urban Land Complex series soils are located on the two-thirds of the island (the central and southern portions of Pivers Island). The majority of the proposed new main laboratory and administration building will be within this soil series located on the southwestern portion of the property. These soils are moderately well drained sandy soils, with low shrink-swell characteristics and are considered to have low corrosion effects on both steel and concrete. These soils have a rapid permeability characteristic.
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> Newhan Fine Sand Dredge series soils are located on the causeway across the body of water to the north of Pivers Island. The northern bridgehead is emplaced in this area. These soils are moderately well drained sandy soils, with low shrink-swell characteristics and are considered to have high corrosion effects on steel, while having low corrosion effects on concrete. These soils have a rapid permeability characteristic
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> Wando-Urban Land Complex series soils are located on the northern one-third of the island. (Based on historical maps, the area where this soil series is found appears to have been the original footprint of Pivers Island.) The majority of the existing NOAA structures are located within this soil series, and most of the project areas are within this northern one-third of the island. These projects include: the new kiosk, bridge repair, turtle pen and seawater supply system upgrades, and boat ramp and dock upgrades. These soils are moderately well drained sandy soils, with low shrink-swell characteristics and are considered to have low corrosion effects on steel, while having moderate corrosion effects on concrete. These soils have a rapid permeability characteristic.

Based on historic maps and aerial photographs the area of Pivers Island composed of Corrolla-Urban Land Complex series soils appears to have been formed by dredge and fill operations within Beaufort Channel.

According to SCS, *Hydric Soils of the United States* (1991), none of the onsite soil types (Corrolla-Urban Land Complex series, Newhan Fine Sand Dredge series, and Wando-Urban Land Complex series) are listed as hydric soils.

The rapid permeability of sandy surface soils on most of the site would not be expected to inhibit the rate of vertical migration of materials from the ground surface to the water-table aquifer, although the silty subsoil and the substratum indicate a lowered risk of pollutant migration associated with subsurface contaminant sources in this soil type. It is important to recognize that some solvents may alter soil permeability, resulting in potential for atypical rapid flow velocities of solvent through clays or other soils, which normally have slow permeability rates.

5.4 Geology and Hydrogeology

The subject site is situated within the Atlantic Coastal Plain Physiographic Province of North Carolina, which consists of an eastward-thickening wedge of stratified, unconsolidated and semi-consolidated alluvial and marine deposits above a crystalline basement surface. These sediments are composed primarily of gravels, sands, silts, and clays. At the project site, depth to the crystalline basement rocks is greater than 1,600 feet.

The Suffolk Scarp is located approximately 38 miles to the north-northwest of Pivers Island; the Norfolk Arch is located approximately 48 miles to the north of the island; and the Fall Zone located over 100 miles to the northwest of the island.

The groundwater flow system in the Atlantic Coastal Plain consists of an unconfined, water-table aquifer and an underlying sequence of semi-confined to confined aquifers and intervening confining units. The aquifers are composed of permeable sands and gravels through which water readily flows. The confining layers are composed of clayey materials, which retard water flow. In the Atlantic Coastal Plain, the confining layers are often leaky, which allows exchange of water between aquifers.

The regional geologic map shows the site located on Quaternary-age deposits of the surficial deposits of the coastal plain. These materials form the surficial deposits of a broad swale and extensive lowlands bounded on the landward side by river, bay and ocean-facing scarps having toe altitudes of 20 to 25 feet. The water-table aquifer is found within these deposits, which is composed of 70 to 80 percent sand within the vicinity of the subject site.

Site-specific hydrologic reports and maps were not found to be readily available for the subject site during this investigation. Information regarding the groundwater characteristics in the vicinity of the site was obtained from published information from the USGS. The following discussion is abstracted from USGS publications.

One unconfined and three confined aquifers are present beneath the site in the interval from the ground surface to approximately 1,190 feet below ground-surface (BGS). The uppermost aquifer is the unconfined water-table aquifer. According to hydrogeologic cross sections, the water table

aquifer generally occurs in the depth interval from approximately three to four below the surface, to approximately 35 feet BGS. However, groundwater within this water-table aquifer is affected by tidal changes and, therefore, may vary. Saturated thickness of the water-table aquifer in this area is approximately 15 feet. Precipitation is the principal source of recharge for this aquifer, and averages about 56 inches per year.

The Yorktown confined aquifer system underlies the water-table aquifer. The Yorktown aquifer system is generally separated from the overlying water-table aquifer by beds of silt, clay and sandy clay, which function as an aquitard between the two aquifers. Although the Yorktown Formation is 300 to 350 feet thick, the major water-bearing zones comprising the Yorktown aquifer system are restricted to the upper portion of the Yorktown Formation. The remainder of the formation serves as aquitards between the aquifers. The top of the Yorktown aquifer system in this area occurs at an approximate depth of 45 to 55 feet BGS. The recharge to the Yorktown aquifer system is primarily through downward leakage of water from the overlying water-table aquifer.

The Pungo River confined aquifer system underlies the Yorktown aquifer. The Pungo River aquifer system is generally separated from the overlying aquifer by beds of silt, clay and sandy clay, which function as an aquitard between the two aquifers. Although the Pungo River Formation is 200 to 250 feet thick, the major water-bearing zones comprising the Pungo River aquifer system are restricted to the upper portion of the Pungo River Formation. The remainder of the formation serves as aquitards between the aquifers. The top of the Pungo River aquifer system in this area occurs at an approximate depth of 110 to 120 feet BGS. The recharge to the Pungo River aquifer system is primarily through downward leakage of water from the overlying Yorktown aquifer.

The Castle Hayne confined aquifer system underlies the Pungo River aquifer. The Castle Hayne aquifer system is generally separated from the overlying aquifer by beds of silt, clay and sandy clay, which function as an aquitard between the two aquifers. Although the Castle Hayne Formation is approximately 950 feet thick in the subject site vicinity, the major water-bearing zones comprising the Castle Hayne aquifer system are restricted to the upper portion of the Castle Hayne Limestone within the formation. The remainder of the formation serves as aquitards between the aquifers. The top of the Castle Hayne aquifer system in this area occurs at an approximate depth of 210 to 220 feet BGS. The recharge to the Castle Hayne aquifer system is primarily through downward leakage of water from the overlying Pungo River aquifer.

The Castle Hayne aquifer system is the primary drinking water supply for Carteret County. The water-bearing limestone is reported to be over 300 feet in thickness within the vicinity of Pivers Island.

The flow of shallow groundwater generally follows the regional topography. Since the topography at the subject site is generally level, recharge of the water-table aquifer by infiltration of precipitation should result in groundwater flow to the estuary in which the Pivers Island is situated. However, published reports of groundwater flow directions for the site and adjacent areas were not available, and further research and/or subsurface testing would be necessary to

confirm the flow direction and to identify the location and characteristics of deeper groundwater aquifers.

Well water will be used to provide water to the laboratory in the new building. Treated water from the Town of Beaufort, with chlorine, would adversely affect laboratory experiments. Since this is primarily a teaching laboratory, the usage would be very low and would not affect the groundwater aquifers.

5.5 Regional Climate

North Carolina's climate is classified as humid subtropical. Prevailing winds flow from southwest to northeast. According to climatological information and data compiled by the State Climate Office of North Carolina, annual precipitation in the in the Atlantic Coastal Plain Region of North Carolina ranges from 45 to 65 inches per year with an average of 55 inches. Average annual temperature is 55 degrees Fahrenheit. Extremes range from a normal daily low of 36 degrees, with the lowest daily minimum of zero degrees, to a normal daily high of 85 degrees, with the highest daily maximum of 96 degrees. According to a U.S. Environmental Protection Agency (EPA) report, the mid-Atlantic region, in which the site is located, has an average of 62 rainstorms per year, with an average duration of ten hours, intensity of 0.09 inches per hour, volume of 0.64 inches, and average time between rainstorms of six days; however, there are no distinct wet or dry seasons in the state of North Carolina. The State Climate Office of North Carolina estimates between 40 and 50 thunderstorms per year in the coastal plain.

The prevailing winds are form the southwest in the summer (April through August), and from the north-northeast in the winter (September through March).