

May 30, 1997

Colonel Robert H. Reardon, Jr.
District Engineer
Norfolk District, Corps of Engineers
Fort Norfolk, 803 Front Street
Norfolk, Virginia 23510-1096

Attn: Ms. Pam Painter
Regulatory Branch

Re: CENAO-CO-R 88-0707-12,
Southeastern Public Service Authority
Regional Landfill, Suffolk, Virginia

Dear Colonel Reardon:

The U.S. Fish and Wildlife Service has reviewed the Department of the Army permit application, 88-0707-12, submitted by the Southeastern Public Service Authority (SPSA), to expand their regional landfill located on U.S. Route 13/58/460 in Suffolk, Virginia. Your March 29, 1996 request for formal consultation was received on April 3, 1996. This document represents the Service's biological opinion on the effects of that action on the Dismal Swamp southeastern shrew (*Sorex longirostris fisheri*) in accordance with Section 7 of the Endangered Species Act of 1973, as amended, (16 U.S.C. 1531 et seq.). A complete administrative record of this consultation is on file in this office.

I. CONSULTATION HISTORY

The consultation history regarding this project is provided in Appendix A.

II. BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The permit applicant proposes to expand its existing regional landfill facility, located on U.S. Route 13/58/460 in Suffolk, Virginia, onto an adjacent parcel of land that is part of the Great Dismal Swamp (Figure 1). SPSA was established in 1973 under the Virginia Water and Sewer Authorities Act to

develop a regional water supply system. In 1976, its responsibilities were amended to include the development of a regional solid waste disposal and recovery system. SPSA's 2,000-square mile service area includes the Cities of Chesapeake, Franklin, Norfolk, Portsmouth, Suffolk, and Virginia Beach and the Counties of Isle of Wight and Southampton. SPSA manages all of the municipal waste generated in each participating community, with the exception of some non-processible bulky items and major household appliances, and currently serves a population of just over one million people.

The existing regional landfill site in the Great Dismal Swamp was constructed following a study conducted by SPSA in 1982 to locate a landfill site that would meet the short-term and long-term disposal needs of the service area. "The existing landfill site was selected because of its remoteness from residential areas, suitable geologic conditions, excellent transportation access and most notably, its expansion potential" (SPSA 1996). The existing 308-acre regional landfill site in Suffolk, Virginia was determined to meet short-term disposal needs and provide long-term expansion potential. The Corps of Engineers identified the area of the existing landfill as outside Federal jurisdiction with regard to wetlands in 1982. At the time of SPSA's purchase of the existing regional landfill site, SPSA also set aside one million dollars to fund purchase of adjacent property for future expansion needs. The purchase of the adjacent property has not occurred; however, SPSA currently has an option on the 525 acres for the proposed expansion.

The proposed project will consist of a 525-acre horizontal expansion to the existing 308-acre regional landfill. The expansion site is located within the Great Dismal Swamp, directly north of the Great Dismal Swamp National Wildlife Refuge, and within the known range of the Dismal Swamp southeastern shrew. The Service's National Wetland Inventory map depicts the expansion site as supporting seasonally flooded/saturated palustrine broad-leaved deciduous and/or needle-leaved evergreen forested wetlands. Habitats within the expansion site consist of approximately 40 acres of recent clearcut (less than 1 year), 74 acres of early successional clearcut (1 to 5 years), 140 acres of mid-successional clearcut (6 to 25 years), 163 acres of mid-successional high-grade cut (6 to 25 years), and 103 acres of mature mixed deciduous/evergreen forest (greater than 50 years). SPSA has indicated the current owner of the expansion site is harvesting the remaining marketable timber on the property and that such logging is likely to have been completed by the time SPSA would purchase the property (Dan Miles, pers. comm. 1997).

Approximately 310 acres of landfill space will be dedicated fill area, 190 acres will be utilized as borrow area, and 25 acres will accommodate a leachate management area. Maximum fill height of the terraced area mound landfill, limited by its proximity to the Hampton Roads Airport in Chesapeake, Virginia, will be approximately 145 feet above the existing ground surface. Figure 2 illustrates the general location of the proposed facilities. A natural gas pipeline easement transects the southwest corner of the proposed expansion site and the eastern edge of the property is bounded by a 150-foot wide high-voltage power line easement. Encroachment on these easements will not be permitted (Final Environmental Impact Statement, May 1995). A 150-foot wide natural vegetative buffer will extend around the perimeter of the expansion area to serve as a visual and noise buffer.

Site clearing, subgrade preparation, and liner and leachate collection system installation will be conducted and filled with waste, one cell at a time in a sequential manner. Construction will begin within the areas closest to the existing landfill and extend eastward. Initial clearing operations will involve approximately 60 acres of land, the area of the first operational cell. Subsequent clearing for landfill space will occur in 50-acre increments. As filling operations near completion in the first cell, site clearing of the next cell will commence. Areas within the limits of construction will be cleared and grubbed of all vegetation including trees, stumps, brush, vines, hedgerows, grass, downed timber, logs, rotten wood, roots, rubbish, and other debris. Stumps, roots, and other vegetative debris will be removed to a minimum depth of two feet below grade. All depressions caused by clearing will be filled, unless further earthwork or excavation is required, and compacted to the density of the surrounding material. Commercially suitable timber will be sold and all other cleared material will be mulched or disposed of on site. Topsoil will be stripped and stockpiled on site. Where the groundwater table is near the surface, the subgrade will be built up vertically with soil to maintain separation between landfilled waste and the seasonal high groundwater table. In order to ensure that this separation is preserved, an underdrain system would be placed within the subbase beneath the liner system.

A composite landfill liner system will provide a physical separation between the deposited waste and the underlying groundwater to prevent leachate contamination. The lower liner will consist of two feet of compacted clay with a hydraulic conductivity less than or equal to 1×10^{-7} centimeters per second (cm/sec), and graded to a minimum of two percent slope for leachate drainage. The upper component of the liner will be a leachate-resistant 60-millimeters thick high-density polyethylene liner placed in direct and uniform contact with the clay liner. A two-foot thick layer of sand with a permeability of 1×10^{-3} cm/sec will be placed on top of the synthetic liner. The leachate collection zone will be installed within this sand layer.

Collection and removal of leachate generated from within the landfill will be accomplished by a network of perforated plastic pipes installed in stone aggregate trenches within the sand layer. The leachate collection system will be designed to carry stormwater runoff generated by a 25-year rainfall event. Prior to its ultimate discharge into the sanitary sewer system, landfill leachate will be collected in on-site aeration ponds and treated in accordance with pre-treatment standards specified by the Hampton Roads Sanitation District (HRSD). Two aeration ponds will measure 55 square feet at the base and 12.5 feet deep, with a storage capacity of approximately 875,000 gallons. Pumping of leachate through a force main into the HRSD sewer system is required when the leachate-collection ponds approach capacity. A pump station will be located at a collection point near the new fill area to pump leachate to the new leachate management area, which will be located adjacent to the existing leachate management facility.

All solid-waste deposited and compacted each day will be covered with a minimum of six inches of well-compacted soil. Cover material will be obtained from dewatered on-site borrow areas, stockpiled in designated areas adjacent to the borrow pits and transported as needed to active fill areas. Any

landfill cell or area within that cell anticipated to be left idle for six months or more will be covered with 12 inches of compacted soil. When the maximum elevation of each major cell is reached or when an area will not receive waste for a year or more, a minimum of two feet of well-compacted impermeable soil (permeability of 10^{-7} cm/sec or less) will be placed over the compacted area. A six inch drainage layer consisting of soil with a permeability of 1×10^{-3} cm/sec will be placed on top of the impermeable soil and covered with at least six inches of topsoil.

Two on-site areas, one covering an area of approximately 140 acres and the other approximately 50 acres (Figure 2), will provide the daily, intermediate, and final cover material required for the operation of the landfill expansion throughout its estimated life. Only one borrow area will be used at a time. Approximately 50 acres of borrow area will be cleared during the first phase of development and subsequent clearings for borrow material will occur in 25-acre increments until year 23 of the project when a clearing of approximately 40 acres will occur. The borrow areas will yield approximately 9.2 million cubic yards of cover material, assuming excavation to a depth of 30 feet. As is currently in practice at the existing landfill, localized pumping of the upper groundwater aquifers will be necessary to dewater soil to be used in cover operations. In the existing dewatering operation, a trench with an invert elevation approximately 10 feet below the elevation of material being excavated collects water draining from areas of excavation. The collected water is then pumped to an adjoining low lying area on the property. Pumping occurs two to three hours every few days and discharges, when it occurs, approximately 100,000 to 200,000 gallons per day.

A gas management system will be required to control methane and other non-methane organic compounds produced at the landfill expansion. The existing gas collection and combustion system at the regional landfill will be extended to the expansion area. Existing facilities at the regional landfill that can be used for the proposed expansion site include administration and maintenance buildings, utilities (water, sewer, and power), scales, a ferrous metals recovery facility, a tire shredding facility, a household hazardous waste facility, a methane gas recovery system, access and haul roads, and buffer areas. At the existing landfill facility, a well with a rated capacity of 50,000 gallons per day is used to supply water for the office/maintenance complex and to wash trucks and equipment. An average of 33,000 gallons per day are currently used for these operations. No appreciable increase over current water demand is anticipated for the proposed landfill expansion.

A vegetative cover will be established and maintained on all exposed final cover material as soon as possible after placement. Once the final cap is placed over a landfill cell, stabilization terraces will be constructed. Gently sloping 10-foot wide terraces will be interspersed with areas having a steeper slope of 4 horizontal to 1 vertical. After closure of the landfill, the site will accommodate recreational uses such as hiking trails, picnic facilities, canoe and paddleboat rentals, and fishing. The permit applicant has established an agreement with the City of Suffolk to turn over the existing landfill to the City for a recreational facility or park. Final site closure will also include a 30-year post-closure program for environmental monitoring systems, including groundwater, leachate, and gas-collection systems.

SPSA has determined that the 525-acre landfill has a projected life expectancy of 23 to 37 years. SPSA is currently investigating its ability to implement several alternative landfill construction designs to increase the life expectancy of the landfill to 37 years or more. The landfill construction height could be raised from 140 feet to 160 feet to yield approximately 1.75 years of added life. A “wedge expansion,” which involves construction of additional disposal cells between and on the side slopes of two landfills located adjacent to one another, could add an additional six years of disposal capacity. The “Inward-Gradient” liner system is another construction design that could extend the life of the landfill to 37 years. Under this design, the landfill is constructed by excavating and placing the base below the elevation of the naturally occurring groundwater table. Water seeping into the open excavation through the sidewalls and base is collected through a series of pipes. The site is dewatered during construction and during initial placement of waste. After receiving sufficient waste to offset buoyancy, dewatering measures are stopped. This results in localized depression of the groundwater table, creating a hydraulic gradient toward the landfill. Instead of leachate escaping from the liner system if a leak develops, it is contained by the hydraulic gradient toward the landfill. With an average depth of 40 feet below ground level, the added landfill life would be 14 years.

The permit applicant has submitted a compensation plan to the Corps, by letter dated March 14, 1996, to compensate for the 377 acres of jurisdictional wetland impacts resulting from the proposed landfill expansion. Under this plan, SPSA intends to purchase a 3,650 acre parcel of land, known as the “Williams Farm,” adjacent to U.S. Route 17 in Chesapeake, Virginia (Figures 1 and 3). The entire parcel is currently in agricultural production. SPSA has since changed these plans as outlined in its letter dated December 3, 1996 to the Corps. SPSA now plans to purchase a 3,650-acre parcel of the Williams Farm with the assistance of the Virginia Department of Transportation (VDOT). SPSA would then conduct wetland restoration on 1,000 acres of the parcel and VDOT would restore wetlands on a 1,500-acre portion of the site. SPSA would then donate the entire 3,650-acre parcel to the Service. SPSA has obtained a “firm” commitment from the Virginia Department of Transportation to assist with the land purchase and restoration.

However, the Virginia Department of Transportation has not provided any information on this commitment in writing and SPSA’s offer to donate the Williams Farm to the Service is based on VDOT’s assistance and use of the 1,500 acres of restoration as a compensation bank. Therefore, the mitigation plan is somewhat ambiguous at the present time.

Most of the Williams Farm was historically forested wetlands. National Wetland Inventory maps indicate that seasonally flooded/saturated palustrine broad-leaved deciduous and needle-leaved evergreen forested wetlands occurred on the property. This land was cleared for agriculture in the 1970s and early 1980s. The site is mapped by the Natural Resources Conservation Service (NRCS) as prior-converted cropland. Large drainage ditches were constructed on the property prior to 1953. SPSA and VDOT are proposing to restore 2,500 acres of the Williams Farm by blocking ditches, installing adjustable flashboard risers, and constructing shallow berms, where necessary. The focus of SPSA and VDOT’s vegetation restoration efforts will be to plant the site with heavy-seeded, mast and

fruit-producing tree species such as oaks (*Quercus* spp.), blackgum (*Nyssa sylvatica*), and persimmon (*Diospyros virginiana*). A yet to be determined percentage of loblolly pine (*Pinus taeda*) will be intermixed with hardwood species.

RANGEWIDE STATUS OF THE SPECIES

Life History

The Dismal Swamp southeastern shrew is a small, long-tailed shrew, weighing less than 0.2 ounces and measuring approximately four inches in length, with a brown back, slightly paler underparts, buffy feet, and a relatively short, broad nose (Handley 1980). The Dismal Swamp southeastern shrew was discovered in 1895 by A. K. Fisher, a leader of a team of scientists sent into the Dismal Swamp by the U.S. Department of Agriculture, Bureau of Biological Surveys. The species was listed as threatened by the U.S. Fish and Wildlife Service pursuant to Section 4 of the Endangered Species Act in 1986.

Apart from a litter of five young found in a nest in the Dismal Swamp in 1905, little is known about reproduction or other life history features of the Dismal Swamp southeastern shrew (U.S. Fish and Wildlife Service 1995). However, the species' life history is likely similar to that of the more common southeastern shrew (*S. l. longirostris*). Based on a few studies, it appears that southeastern shrews average approximately four young per litter (U.S. Fish and Wildlife Service 1995). Pregnant southeastern shrews have been found in Indiana from April 8 to September 25 and in Alabama and Georgia from March 31 to October 6 (U.S. Fish and Wildlife Service 1995). This information suggests that the southeastern shrew has a six-month breeding season. Shrews of the genus *Sorex* usually have at least two litters per year (Churchfield 1990). It is likely that young shrews remain in the nest for their entire period of growth and development and are nearly adult size when they leave the nest (U.S. Fish and Wildlife Service 1995). After leaving the nest, their early wanderings may be in association with the mother. Southeastern shrews undergo two molts, the first in spring (late March to early June) and the second in autumn (October). Old hair is first replaced on the back, then on the sides, venter, and rump.

Southeastern shrews feed mainly on small-size invertebrates, but consume some vegetation (U.S. Fish and Wildlife Service 1995). Typically, shrews forage intermittently throughout the day and night in all seasons and seem to have the highest levels of activity associated with rainfall and periods of high humidity. Much of their foraging occurs in leaf litter or in tunnels in the upper layers of the soil (U.S. Fish and Wildlife Service 199). Predators include barred and barn owls, cats, dogs, opossums, and occasionally snakes (French 1980).

The Dismal Swamp southeastern shrew is found in a range of habitats in the Dismal Swamp including recent clearcuts, regenerating forests, young pine plantations, grassy and brushy roadsides, young forests with shrubs and saplings, and mature pine and deciduous forests (U.S. Fish and Wildlife Service 1995). The shrew is likely to exist at highest densities in early successional wetland habitats, such as

cane stands; shrub-dominated areas; and young, open forests that retain a fairly dense herbaceous understory. The shrew also occurs at high densities within cleared rights-of-way, such as those used for utility lines, since these areas often contain early successional habitats such as scrub-shrub wetlands. Although supporting lower densities, mature wetland forests provide habitat diversity important to the integrity and dynamic structure of shrew populations across their entire range and are likely to be important to the survival of these shrews during periods of drought and fire. Rose (1983) found that the shrew was most abundant in mid-successional, 12 to 15 year old regenerating forests having a dense understory, moist organic soils, and moderate leaf litter. It is presumed that the Dismal Swamp southeastern shrew developed its distinctive size and coloration while geographically or ecologically isolated within the Great Dismal Swamp during the Holocene epoch (Handley 1979). Therefore, the Dismal Swamp southeastern shrew is most likely adapted to environmental conditions that favor retention of wetland qualities (flooding, organic soils, high humidity, and slow rates of leaf litter and organic soil decomposition).

Status of the Species Within its Range

The distribution of the Dismal Swamp southeastern shrew is considered coincidental with the boundaries of the historic Great Dismal Swamp, an extensive contiguous wetland complex that once occupied most of the low-lying land between the Elizabeth and Nansemond Rivers in Virginia and the Albemarle Sound in North Carolina. Historically, this wetland complex was maintained in a variety of successional stages (such as marshes, canebrakes, pocosins, and forests) by natural fires. The two main reasons cited as causing the present threatened status of the shrew are (1) habitat loss and alteration, and (2) possible loss of genetic integrity through interbreeding with *S. l. longirostris* (U.S. Fish and Wildlife Service 1995). Only 15 percent of the Dismal Swamp acreage that was present at the turn of the century currently exists. The original Dismal Swamp ecosystem has been greatly reduced in size because of urban development and the clearing and draining of land for agriculture and silviculture. At the beginning of the 20th century, the Dismal Swamp still occupied 2,000 to 2,200 square miles. Today, however, fewer than 320 square miles of the original Swamp remain, amounting to a reduction of over 85 percent since the turn of the century (U.S. Fish and Wildlife Service 1982). Approximately, 189 square miles of habitat are protected within the Great Dismal Swamp National Wildlife Refuge, in Virginia and North Carolina, and within the Dismal Swamp State Natural Area in North Carolina. There are additional areas of protected shrew habitat such as the North Landing River Preserve and the Northwest River Park in Virginia and Elizabeth City State University's Dismal Swamp Wetland in North Carolina.

The loss of those palustrine forested and scrub-shrub wetlands that support Dismal Swamp southeastern shrews is reflected in the national figures on wetland loss in the United States. From the 1780s to the 1980s, 42 and 49 percent of wetlands were destroyed in Virginia and North Carolina, respectively (Dahl 1990). These losses were shown to continue during the mid-1970s and the mid-1980s (Dahl and Johnson 1991). However, with increased awareness of the ecological significance of wetlands and the administration of wetland protection measures through such legislation as the Clean

Water Act and the Food Security Act, wetlands losses were expected to slow following the mid-1980s (Dahl and Johnson 1991). Outside of the protected areas of the Dismal Swamp, this expectation has not been realized as remnants of the Dismal Swamp are rapidly disappearing in southeastern Virginia due to development associated with the Hampton Roads metropolitan area (U.S. Fish and Wildlife Service 1995). In review of 12 large-scale (1:24,000) U. S. Geological Survey topographic quadrangles within 545 square miles of the Norfolk/Hampton region of southeastern Virginia, including a large portion of the Dismal Swamp southeastern shrew's range within Virginia, Tiner and Foulis (1994) documented significant losses of palustrine wetlands from 1982 to 1989/90. The study area specifically encompassed twelve U.S. Geological Survey topographic quadrangles: Bowers Hill, Deep Creek, Fentress, Hampton, Kempsville, Mulberry Island, Newport News North, Norfolk South, Poquoson East, Poquoson West, Princess Anne, and Yorktown. During the study period, over 4,400 acres of palustrine forested and scrub-shrub wetlands were converted to uplands. The primary causes of the conversion of palustrine vegetated wetlands to uplands was housing development, agriculture, and landfill expansion. More specific to Dismal Swamp southeastern shrew habitat in Virginia, a comparison of U.S. Geological Survey topographic maps to recent aerial photography revealed a collective loss of some 2,600 acres of forested land, scattered over four maps portraying the Dismal Swamp (S. Martin, U.S. Army Corps of Engineers, pers. comm. 1993 in U.S. Fish and Wildlife Service 1995). The significance of this destruction of forested and scrub-shrub wetlands in the Hampton Roads area is illustrated by comparison with wetlands losses observed in two other regions of Virginia during the same general study period. Within a 402 square mile area of the Chickahominy River Watershed and within a 348 square mile area in Northern Virginia, just under 100 acres of palustrine forested and scrub-shrub wetlands were converted to uplands (Tiner and Foulis 1994, 1994). In North Carolina, agriculture and silviculture are the main causes of habitat loss within the Dismal Swamp. For example, in the vicinity of Elizabeth City, North Carolina, two tracts totaling approximately 32,000 acres of swamp have been cleared and drained within the past 20 years. Besides these contiguous tracts, many smaller areas within the historic Dismal Swamp of North Carolina have been ditched and cleared in a piecemeal fashion.

Even within the Refuge, extensive habitat alteration has occurred. Since the late 1700s, approximately 250 miles of ditches have been built inside the boundaries of the Refuge. The effect of these ditches has been to lower the water table significantly, thus changing the vegetational characteristics of the Great Dismal Swamp. Furthermore, naturally occurring fires that once maintained sections of the original Swamp in various stages of biological succession have been prevented or suppressed since the establishment of the Refuge in 1974. As a consequence, the former Dismal Swamp, a heterogeneous mosaic of large tracts of bald cypress, Atlantic white cedar, and canebrake, has been supplanted by a more homogeneous, mesic wetland dominated by a rapidly maturing red maple and blackgum forest (Laderman 1989). The Service is attempting to restore some of the vegetational and successional diversity to the portion of the Dismal Swamp ecosystem within the Refuge.

Threats to the Species

With continued habitat loss, Dismal Swamp southeastern shrews are also threatened by habitat fragmentation and isolation. As wetlands supporting the shrew are converted to uplands for urban development and drained for agricultural and silvicultural purposes, barriers impermeable to the shrew, such as highways, commercial and residential structures, and upland habitats, prohibit the movement of shrews between available habitats. This fragmentation of wetland habitats supporting the Dismal Swamp southeastern shrew serves to create isolated populations of the species. Persistence of the species will depend on the persistence of populations within these isolated habitats. The probability of extirpation of these isolated populations is, in turn, dependent on such factors as population size, population variability, chance events, or additional environmental disturbance.

The recent human-induced progression toward a homogeneous mature hardwood forest in the Swamp, more representative of habitat conditions of the surrounding region, leads to the possibility that the more common and presumably more generally adapted subspecies could invade the Dismal Swamp and genetically overwhelm the existing populations of the Dismal Swamp southeastern shrew (U.S. Fish and Wildlife Service 1995).

Recovery Goals and Accomplishments

New morphometric and genetic findings recently submitted to the U.S. Fish and Wildlife Service (Webster et al. 1996) indicate that *Sorex longirostris fisheri* has a much broader geographic distribution than previously believed, extending along the outer coastal plain from Isle of Wight County in southeastern Virginia to southeastern North Carolina as far south as New Hanover, Brunswick, and Columbus Counties. However, until this can be substantiated through peer review of the study's findings and, if needed, additional work accomplished, the shrew will remain on the Services's list of endangered and threatened wildlife and plants. As such, the shrew, and its habitat, will continue to receive protection pursuant to the ESA.

Under the scenario that assumes that the Dismal Swamp southeastern shrew is a Dismal Swamp endemic, slowing or reversing changes in the wetland habitat is the cornerstone of the recovery process for this subspecies. Recovery actions will focus on restoring and maintaining the original character of the Dismal Swamp. Within Refuge boundaries, recovery will focus on restoring the original hydrologic regime of the Swamp and restoring or maintaining the habitat mosaic nature of the original swamp through controlled burns or certain forestry practices. Outside Refuge boundaries, recovery efforts will focus on maintaining unfragmented tracts of existing shrew habitat that might otherwise be developed or altered. Protection of relatively large, contiguous tracts of habitat is considered essential to the survival and recovery of the shrew.

ENVIRONMENTAL BASELINE

As defined in 50 CFR 402.02 "action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States or upon the high seas. The

"action area" is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. The direct and indirect effects of the actions and activities resulting from the federal action must be considered in conjunction with the effects of other past and present federal, state, or private activities, as well as the cumulative effects of reasonably certain future state or private activities within the action area. The Service has determined that the action area for this project includes the area under consideration for the proposed regional landfill expansion, encompassing 525 acres adjacent to the existing regional landfill (Figure 2). The action area also includes the proposed 3,600 acre wetland compensation area known as the Williams Farm (Figure 3).

Status of the Species in the Action Area - The action area, including the 525-acre landfill expansion site, is located within the western third of a large, contiguous tract of 6,500 acres of relatively undisturbed forested wetlands (Figure 5). This contiguous tract, including the action area, is located within the historic boundaries of the Great Dismal Swamp. However, wetland habitats supporting the Dismal Swamp southeastern shrew within this 6,500-acre tract have been physically isolated from the majority and remainder of the Dismal Swamp to the south.

Initial isolation of this portion of the Great Dismal Swamp most likely occurred with construction of the Portsmouth and Roanoke Railroad around the mid-1800s (Stewart 1979). Isolation was further solidified with construction and expansion to six lanes of U. S. Routes 13, 58, and 460 adjacent to the railroad. The Service's National Wetland Inventory maps indicate that the majority of this contiguous habitat is broad-leaved deciduous and/or needle-leaved evergreen palustrine forested and scrub-shrub wetlands. Much of the area is owned by the Kirk Timber and Farming Company and is actively logged. The water regime of this contiguous tract appears to grade from wetter seasonally flooded/saturated wetlands on the west side to seasonally flooded to temporarily flooded wetlands on the east side. Review of the Natural Resources Conservation Service Soil Survey for the City of Suffolk, Virginia (U.S.D.A. Soil Conservation Service 1981) indicates that the majority of this area is underlain by hydric soils, including the Tomotley, Torhunta, Deloss, and Belhaven series. Review of the Natural Resources Conservation Service Soil Survey for Nansemond County, Virginia (U.S.D.A. Soil Conservation Service 1959) indicates that the remaining portion of this area within the City of Chesapeake is also underlain by hydric soils, including Portsmouth, Othello-Fallsington, and Fallsington.

Being located within the Great Dismal Swamp, the predominant forest community types are those typical of this swamp forest. In areas underlain by organic soils, the forest community composed of red maple (*Acer rubrum*) and black gum. Those areas with mineral soils support a mixed deciduous swamp including ash species (*Fraxinus* spp.) and sweet gum (*Liquidambar styraciflua*), with loblolly pine in the drier areas. The scrub-shrub communities are vegetated with giant cane (*Arundinaria gigantea*), wax myrtle (*Myrica cerifera*), sweet pepperbush (*Clethra alnifolia*), sweet bay magnolia (*Magnolia virginiana*), and red bay (*Persea borbonia*). The surrounding landscape, to the west, north, and east of the 6,500-acres, is primarily mixed agriculture/silviculture and residential

development.

The recent rate and extent of wetland losses resulting from residential, agricultural, and commercial development within this contiguous tract mirrors that known for the surrounding Norfolk/Hampton region of southeastern Virginia (Tiner and Foulis 1994), as described in the "Status of the Species Within its Range" section. Tiner and Foulis (1994) documented the permanent conversion of over 350 acres of palustrine forested and scrub-shrub wetlands to uplands, from 1982 to 1989/90, within the U.S. Geological Survey topographic quadrangle "Bowers Hill." This U.S. Geological Survey topographic quadrangle encompasses a majority of the 6,500 acre wetland complex containing the action area.

The Service's National Wetland Inventory map depicts the 525-acre landfill expansion portion of the action area as supporting wetland habitat including temporarily flooded to seasonally flooded/saturated palustrine broad-leaved deciduous and/or needle-leaved evergreen forested and scrub-shrub wetlands. These wetlands are adjacent to Burnett's Mill Creek, a tributary to the Nansemond River. The Natural Resources Conservation Service Soil Survey for the City of Suffolk, Virginia (U.S.D.A. Soil Conservation Service 1981) indicates that soils within the landfill expansion site are similar to those found throughout the larger contiguous tract and include Tomotley, Torhunta, Deloss, Belhaven, Dragston, Pactolus, Levy, and Rains. All of these soil series, except the Dragston and Pactolus series, are listed as hydric soils in Hydric Soils of the United States (U.S.D.A. Soil Conservation Service 1991). The hydric soils present in the landfill expansion site are described as having a high groundwater table from one foot above the surface to 1.5 feet below the surface from November to April or May, with the exception of the Levy series, which has a high groundwater table one to two feet above the surface from January to December.

More specifically, habitats within the 525-acre landfill expansion site consist of 40 acres of recent clearcut (less than 1 year), 74 acres of early successional clearcut (1 to 5 years), 140 acres of mid-successional clearcut (6 to 25 years), 163 acres of mid-successional high-grade cut (6 to 25 years), and 103 acres of mature mixed deciduous/evergreen forest (greater than 50 years). Clear-cutting is the practice of removing all trees during a harvest. High-grade cutting is the practice of cutting the marketable timber and leaving a residual stand of commercially undesirable trees. Throughout the landfill expansion site, the tree stratum is predominately vegetated with red maple, sweetgum, yellow poplar (*Liriodendron tulipifera*), various oak species, American holly (*Ilex opaca*), blackgum, and loblolly pine. The shrub and herbaceous strata support a predominance of wetland species such as giant cane, wax myrtle, wool-grass (*Scirpus cyperinus*), sweet bay magnolia, red bay, and sweet pepperbush.

A 1,600-acre land parcel (Figures 4) encompasses lands surrounding the existing SPSA regional landfill and the proposed 525-acre landfill expansion site. This acreage and area was conservatively estimated by the Service to comprise those lands within which SPSA could continue to expand their regional landfill facility, taking into consideration current state and federal landfill siting criteria. The wetland,

soil, and vegetation characteristics of this 1,600 acres are not demonstrably different from those previously described for the 6,500-acre contiguous tract.

The entire 6,500-acre area has been identified as being within the range of the Dismal Swamp southeastern shrew by the Recovery Team. The Dismal Swamp southeastern shrew has been documented at the Hampton Roads Airport (Rose 1988) along the eastern edge of this large, contiguous wetland tract. Also, the shrew has been documented within forested wetlands along the western edge of this tract. SPSA arranged for a portion of the 525-acre landfill expansion site, at the western edge of the 6,500 acres, to be surveyed for the Dismal Swamp southeastern shrew. From May to June 1994, Dr. Robert K. Rose of Old Dominion University, Department of Biological Sciences, conducted a survey using pitfall traps placed on 0.6 acre grids at six locations within 69 acres of the expansion site, as shown in Figure 2 (Rose 1994). The study area was limited to the mature mixed deciduous/evergreen forest. Nine specimens of five species of small mammals were collected in the pitfall traps, including one specimen of the Dismal Swamp southeastern shrew. This shrew was trapped within a mixed forest of loblolly pine, sweetgum, red maple, and tulip poplar with an average tree diameter of less than 11.8 inches at breast height. The sub-canopy and shrub strata, within the area where the Dismal Swamp southeastern shrew was trapped, consisted of sparse giant cane, American holly, red maple, paw paw (*Asimina triloba*), and red bay. Vines present include greenbrier (*Smilax* sp.), Japanese honeysuckle (*Lonicera japonica*), Virginia creeper (*Parthenocissus quinquefolia*), and poison ivy (*Toxicodendron radicans*). There are no grasses present within this area and very little ground cover. Dr. Rose indicated in his final report that the estimated density of Dismal Swamp southeastern shrews in the forested habitat is about 1 to 4 shrews per hectare (or, approximately, a maximum of 2 shrews per acre). SPSA has chosen to assume that the Dismal Swamp southeastern shrew is present throughout the remainder of the expansion site rather than conduct more extensive surveys. The Service agrees that this species is likely to occur throughout the expansion site at densities consistent with other typical densities throughout the species range.

Since the 3,600-acre proposed compensation site is currently in agricultural production, the Service believes that it does not support the Dismal Swamp southeastern shrew. It is contiguous to forested wetlands known to support the shrew.

Effects of the Action - Direct impacts to the shrew will occur over the projected 23 to 37 year life expectancy of the project as the 525-acre landfill expansion site is cleared, graded, filled, and excavated for each phased development of landfill and borrow area. Dismal Swamp southeastern shrews will be crushed by vehicles and heavy equipment, resulting in injury or death, while vegetation is cleared, grubbed, mulched, and removed from the expansion site. Heavy equipment used to remove stumps and strip the topsoil will also crush shrews. Following vegetation and topsoil removal, death or injury will occur to any remaining shrews as the land is manipulated to create borrow area, through excavation, or landfill, through filling and compacting. Similar impacts will occur as a result of construction of the landfill expansion infrastructure, including roads, erosion and sedimentation control measures, leachate management facilities, gas collection and combustion systems, and land drainage.

SPSA is proposing a 150-foot wide natural vegetative buffer along the outer perimeter of the landfill expansion site, in which no construction or other activities will occur (Figure 2). Due to dewatering operations associated with the landfill, the Service is unsure what impact this will have on the hydrology of the buffer area and the habitat suitability of the buffer for Dismal Swamp southeastern shrews. The total buffer area of 51 acres located within the 525-acre landfill expansion site will not be destroyed by landfill operations but could be indirectly affected by changes in hydrology, as discussed under the “Indirect Effects” section of this biological opinion. Consequently, approximately 474 acres of habitat for the Dismal Swamp southeastern shrew will be directly impacted by the proposed action and the additional 51-acre buffer could be indirectly affected by dewatering. The following provides the estimated schedule of landfill and borrow area construction over the life of the project and the corresponding loss of habitat (in acres) appropriate to the Dismal Swamp southeastern shrew:

YEAR	LANDFILL & BUFFER	BORROW & BUFFER	HABITAT LOSS
1	50	50	100
3	50	0	50
6	50	25	75
10	50	25	75
14	50	25	75
19	60	25	85
23	0	40	40
TOTAL	310	190	500
LEACHATE MANAGEMENT SYSTEM			25
TOTAL SHREW HABITAT LOSS			525

As discussed on page 5 under the “Description of Proposed Action,” the permit applicant submitted a wetland compensation plan to the Corps, by letter dated March 14, 1996, which proposed the purchase of a 3,650 acre parcel of land, known as the Williams Farm, located approximately 14 miles south of the proposed regional landfill expansion site (Figures 1 and 3). SPSA has since changed these plans as outlined in its letter dated December 3, 1996 to the Corps. SPSA now plans to purchase a 3,650-acre parcel of the Williams Farm and conduct wetland restoration with VDOT on 2,100 acres of the parcel, and then donate the entire 3,650-acre parcel to the Service. SPSA has obtained a “firm” commitment from VDOT to assist with the purchase and restoration of the property. For their assistance, VDOT would use 1,500 acres of the site for their ongoing wetland compensation needs.

However, VDOT has not provided any information on this commitment in writing and SPSA's offer to donate the 3,650-acre Williams Farm is based on VDOT's assistance.

This entire 3,650-acre parcel is currently in agricultural production and therefore, assumed not to support the Dismal Swamp southeastern shrew. The focus of SPSA's vegetation restoration efforts will be to plant a 1,000-acre portion of the site with heavy-seeded, mast and fruit-producing tree species such as oaks, blackgum, and persimmon. A yet to be determined percentage of loblolly pine will be intermixed with the hardwoods. VDOT plans to restore their entire 1,500-acre parcel to forested, scrub-shrub, and emergent wetlands.

The Corps has indicated in their biological assessment (Corps of Engineers 1996) that "The proposed wetland compensation will also serve to mitigate shrew impacts. Shrews are found, or assumed to occur, on wooded properties adjacent to the compensation site. As the site becomes vegetated, shrews will likely migrate into and colonize the restored wetlands."

The Service finds that the proposed wetland compensation plan will not serve to minimize the adverse effects of the proposed 525-acre landfill expansion on the Dismal Swamp southeastern shrew or its habitat. The restoration of prior-converted cropland to forested wetlands at a site 14 miles away from the action area will not reduce take of individual shrews or the permanent destruction of their habitat at the expansion site. SPSA's offer to restore 2,500 acres of shrew habitat and to donate 3,650 acres of land to the Service is apparently contingent upon VDOT's financial assistance with purchase and restoration of the parcel. Each component of the "compensation plan" is contingent on the other component receiving approvals. It is thus difficult to predict how much shrew habitat will be restored in this section of the "action area." Using average shrew densities of six shrews per acre, if SPSA and VDOT restore 2,500 acres of forested wetlands at the Williams Farm, the Service estimates that habitat for approximately 15,000 shrews would be created. Since there are no current schedules or commitments for this compensation plan, the Service cannot determine when this creation of shrew habitat would occur.

Indirect effects are defined as those that are caused by the proposed action and are later in time, but still are reasonably certain to occur (50 CFR 402.02). An indirect effect will be the modification of the natural hydrologic regime of wetlands surrounding the expansion site as a result of the borrow operation and use of the "Inward-Gradient" liner system. Land within the site buffer zone and surrounding the expansion site to the east and north is dominated by nontidal forested wetlands that provide habitat appropriate for the Dismal Swamp southeastern shrew. Soils on these lands are described as hydric and as having a high groundwater table within one foot above the surface to 1.5 feet below the surface from November to April or May or within one to two feet above the surface from January to December. Landfill operations will require that cover material be obtained from dewatered, on-site borrow areas, stockpiled in designated areas adjacent to the borrow pits, and transported as needed to active fill areas. Borrow areas will range in size from 25 acres to 50 acres, for initial development, with a total area over the life of the project of 190 acres. Localized pumping of the upper groundwater

aquifers will be necessary to dewater soil to be used in cover operations. In the existing dewatering operation, a trench with an invert elevation approximately 10 feet below the elevation of material being excavated collects water draining from areas of excavation. Borrow material for the expansion site will be excavated to a depth of 30 feet; therefore, the ultimate depth of the dewatering operation will be 40 feet. The collected water will then be pumped to an adjoining low lying area on the property. Pumping occurs two to three hours every few days and discharges, when it occurs, approximately 100,000 to 200,000 gallons per day.

The groundwater hydrology of the surrounding wetlands will also be affected by the “Inward-Gradient” liner system. If SPSA is successful in receiving authorization to implement the “Inward-Gradient” liner system to extend the life of the landfill approximately 14 years, the landfill will be constructed by excavating and placing the base below the elevation of the groundwater table. The added landfill life of 14 years will be achieved through excavation 40 feet below the ground level within 60 acre intervals. This design will require that the site be continuously dewatered during construction and during initial placement of waste. Dewatering measures will cease after receiving sufficient waste to offset buoyancy. This operation will result in a localized depression of the groundwater table, creating a hydraulic gradient toward the landfill.

As the natural hydrologic regime, such as groundwater depths and durations, are modified within areas adjacent to the 525-acre landfill expansion site, the habitat characteristics of those adjacent wetlands may be altered. Dewatering operations and subsequent lowering of the water table in adjacent forested and scrub-shrub wetlands could alter the specific characteristics of those wetlands, thereby changing the presence and duration of water below and above the ground surface, altering the vegetation composition, and causing decomposition of the organic layer. Conditions favorable for the Dismal Swamp southeastern shrew, including a “high water table, winter flooding, certain plant associations, particular soil types, ample litter layer, and other conditions needed to produce both the invertebrate foods eaten by these shrews and the necessary features of their microhabitat” (Rose 1994) could be affected as a result of modifications in the local groundwater aquifer. The extent of such habitat changes, if any, have not been determined. Therefore, it is not possible to determine if there will be any significant impacts to the Dismal Swamp southeastern shrew associated with these hydrologic modifications.

As indicated in the “Status of the Species” section, the 525-acre landfill expansion site is located within the western third of a large, contiguous tract of 6,500 acres of relatively undisturbed wetlands (Figure 5). While this 6,500-acre contiguous tract is located within the historic boundaries of the Great Dismal Swamp, it has been isolated from the majority and remainder of the Dismal Swamp to the south, as a result of human activities. Thus, this 6,500-acre contiguous tract supports populations of the Dismal Swamp southeastern shrew that are physically isolated from other populations of this subspecies further to the south. The direct and indirect adverse effects of the proposed landfill expansion will contribute, individually and cumulatively, to a significant reduction of Dismal Swamp southeastern shrews and their habitat within this isolated region of the Dismal Swamp. The proposed Federal action will constitute a

major loss of an isolated component of this subspecies. The proposed wetland compensation plan, located on a site 14 miles to the south, will not serve to minimize the anticipated take or restore this loss of individual animals once the shrews and habitat are eliminated at the landfill site. Recovery of the Dismal Swamp southeastern shrew will rely on protection and restoration of a number of shrew conservation areas that are sufficiently large and unfragmented to incorporate all of the shrew's ecological requirements and to allow shrew movement and genetic interchange. Of particular importance to management of the Dismal Swamp southeastern shrew, is survival of populations that are not interbreeding with the more common southeastern shrew (*Sorex longirostris longirostris*). Dr. Rose (1994) indicated in his report of the field study on a portion of the proposed SPSA landfill site that the large size of the Dismal Swamp southeastern shrew discovered during the survey illustrated that the Federally-threatened subspecies was not interbreeding with *S. l. longirostris* in this area.

Mature wetland forests support densities of Dismal Swamp southeastern shrews at approximately 2 shrews per acre. Densities of Dismal Swamp southeastern shrews in early to mid-successional stage habitats are approximately 12 shrews per acre (Rose 1983, 1994). Considering that the 525-acre landfill expansion site provides a mosaic of early to late-successional stage habitat, and that most of the area is likely to have been logged by the time SPSA acquires it, the Service will use an average density of 12 shrews per acre in determining the level of incidental take. Therefore, over the 23 to 37-year life of the currently proposed expansion project, approximately 6,300 shrews will be taken and 525 acres of habitat appropriate for the Dismal Swamp southeastern shrew will be permanently lost. The incidental take of Dismal Swamp southeastern shrews as a result of dewatering operations cannot be quantified due to the lack of site specific information necessary to estimate the exact extent or influence of such effects.

Cumulative Effects - Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA. After closure of the landfill, the site will become a public recreational facility accommodating such uses as hiking trails, picnic facilities, canoe and paddleboat rentals, and fishing. SPSA will implement an established agreement with the City of Suffolk to turn over the regional landfill to the City for a recreational facility or park. Final closure of the landfill will also include a 30-year post-closure program for environmental monitoring systems, including groundwater, leachate, and gas-collection systems. These future activities may result in the loss of Dismal Swamp southeastern shrews if any manipulations of the buffer along the eastern and northern boundaries of the expansion site occur.

CONCLUSION

After reviewing the current status of the Dismal Swamp southeastern shrew throughout its range, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that expansion of the SPSA regional landfill, as proposed, is not

likely to jeopardize the continued existence of the Dismal Swamp southeastern shrew. No critical habitat has been designated for this species, therefore, none will be affected.

III. INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of the ESA, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

AMOUNT OR EXTENT OF TAKE

As discussed in the “Effects of the Action” section, the Service anticipates that the project will result in the take of 6,300 shrews over a period of 23 to 37 years as a result of the proposed landfill expansion. The project will also result in the loss of 525 acres of shrew habitat over this period. The incidental take is expected to be in the form of direct killing or harm.

REASONABLE AND PRUDENT MEASURES

The measures described below are nondiscretionary, and must be implemented by the Corps so that they become binding conditions of any permit issued to the applicant in order for the exemption in Section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse. The Service considers the following reasonable and prudent measure to be necessary and appropriate to minimize take of the Dismal Swamp southeastern shrew:

- o Implementation of a site management program that avoids the use of herbicides and pesticides that could adversely affect the shrew.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of Section 9 of the ESA, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline the required reporting/monitoring requirements. These terms and conditions are nondiscretionary.

1. Site management will not utilize broad-spectrum aerial herbicide or pesticide applications.
2. SPSA or the Corps is required to notify the Service before initiation of construction and upon completion of the project at the address given below. All additional information to be sent to the Service should be sent to the following address:

Virginia Field Office
U.S. Fish and Wildlife Service
P.O. Box 99
6669 Short Lane
Gloucester, VA 23061
Phone: (804) 693-6694
Fax: (804) 693-9032

3. Care must be taken in handling any dead specimens of the Dismal Swamp southeastern shrew that are found in the project area to preserve biological material in the best possible state. In conjunction with the preservation of any dead specimens, the finder has the responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead specimens does not imply enforcement proceedings pursuant to the ESA. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure that the terms and conditions are appropriate and effective. Upon locating a dead specimen, initial notification must be made to the following Service Law Enforcement office:

Division of Law Enforcement
U.S. Fish and Wildlife Service
P.O. Box 187
1005 Moorehouse Road
Yorktown, VA 23690
(757) 890-0003

IV. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species.

Conservation recommendations are discretionary agency activities to further minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans and other recovery activities, or to develop information to benefit the species.

Recommendation 1 - Alternative Project Location to Avoid Take of Shrews

Although the proposed project is not likely to jeopardize the continued existence of the Dismal Swamp southeastern shrew, it will result in the largest single permitted habitat loss for this species that the Service is aware of since the species was listed. In light of the significant impact that this Federal action will have on the Dismal Swamp southeastern shrew, the Service has identified an alternative site for the landfill that would avoid the projected loss of up to 2,125 acres of shrew habitat.

During the review of the proposed action required by the National Environmental Policy Act and Section 404(b)(1) of the Clean Water Act, several alternative landfill sites within SPSA's service area were evaluated, including an alternative location (IW-12) off U.S. Route 258 north of Windsor in Isle of Wight County, Virginia. The Final Environmental Impact Statement (May 1995) indicates that there are approximately 109 acres of wetlands within the impact area of the IW-12 site. The Natural Resources Conservation Service Soil Survey for Isle of Wight County, Virginia (U.S.D.A. Soil Conservation Service 1986) indicates that soils within the IW-12 site are, almost exclusively, Myatt. Myatt is listed as a hydric soil in Hydric Soils of the United States (U.S.D.A. Soil Conservation Service 1991) with a high groundwater table at the surface to one foot below from November to April. The U.S. Geological Survey topographic map indicates the site is within an area called the "String of Logs Pocosin." The IW-12 site drains to Nuby Run and Carbell Swamp, both tributaries of the Nansemond River. The landscape surrounding the IW-12 site consists primarily of agriculture and silviculture, with limited rural residential development. The IW-12 site has been heavily impacted by ongoing silviculture activities, resulting in a forest habitat consisting of monotypic loblolly pine and sweetgum plantations. In many areas the shrub layer is dominated by giant cane; however, other species such as wax myrtle, red maple saplings, sourwood (*Oxydendrum arboreum*), horsesugar (*Symplocos tinctori*), red bay, and sweet pepperbush (*Clethra alnifolia*) occur within the IW-12 site.

Construction of a landfill at this alternate site will not adversely affect any Federally listed threatened or endangered species. The Corps and SPSA have indicated that use of the IW-12 site is a practicable alternative to the preferred expansion site. The Service has indicated in comments dated December 8, 1993 on the Draft Environmental Impact Statement (September 1993) that, of the three alternative landfill sites reviewed, the IW-12 site is the least environmentally damaging.

The Service recommends that the Corps deny SPSA's permit application to expand their regional landfill into 525 acres of habitat appropriate for the Dismal Swamp southeastern shrew, as there is a lesser damaging alternative available at the IW-12 site. Utilization of the IW-12 site in lieu of SPSA's

preferred expansion site will completely eliminate the taking of Dismal Swamp southeastern shrews and their habitat and, thus, serve to further the recovery of this subspecies. As indicated in the Dismal Swamp southeastern shrew recovery plan (U.S. Fish and Wildlife Service 1995), slowing or reversing changes in wetland habitat is the cornerstone of the recovery process for this subspecies. Recovery actions have focused on restoring and maintaining the original character of the Dismal Swamp within the Great Dismal Swamp National Wildlife Refuge. Outside the Refuge, recovery effects have focused specifically on maintaining unfragmented tracts of existing shrew habitat that might otherwise be developed or altered. Protection of relatively large, contiguous tracts of habitat is considered essential to the survival and recovery of the shrew.

Recommendation 2 - Preclude Future Landfill Expansion to Avoid Future Take of Shrews

The Service is concerned that issuance of a Department of the Army permit for the proposed project will result in the continued future expansion of the regional landfill within 1,600 additional acres of habitat appropriate for the Dismal Swamp southeastern shrew surrounding the current 525 acre expansion site. Current state and federal landfill siting criteria and restrictions indicate that further expansion of the SPSA regional landfill would be limited to 1,600 acres of the surrounding landscape, primarily due to its proximity to the Hampton Roads Airport and residential development. While the Service recognizes that future landfill expansion may require Section 7 consultation, the effects of such an expansion on the Dismal Swamp southeastern shrew are considered herein because the pending Federal action will strongly influence the outcome of future Federal actions. As SPSA has indicated in the Final Environmental Impact Statement (May 1995) and in the more recent "Minimization Plan for the Regional Landfill Expansion Project" (SPSA 1996), the existing regional landfill site was selected, in part, "because of remoteness from residential areas, suitable geologic conditions, excellent transportation access, and, most notably, its expansion potential" (emphasis added). Such conditions will not change in the future, thus indicating that SPSA is likely to continue to expand at its present location as long as it can obtain permits to do so. Other major factors that are influencing the Corps' indication of its tentative approval of expansion of the regional landfill, such as reduced transportation and infrastructure facility development costs, will gain more significance once the landfill is expanded at its current location. Authorization of the proposed activity by the Corps, in consideration of the fact that lesser environmentally damaging, practicable alternatives currently exist, will establish the Federal precedent that the use of additional wetlands surrounding the expansion site for future landfill expansion is acceptable and will be permitted. Future expansion into this 1,600 acre area will likely result in the take of the Dismal Swamp southeastern shrew through killing and harm during construction and operation of the landfill, as described above, and loss of an additional 1,600 acres of occupied habitat.

If the Corps does not deny SPSA's permit application, then the Service recommends that the Corps require the perpetual preservation of the 1,600 acres of forested and scrub-shrub wetlands that support the Dismal Swamp southeastern shrew surrounding and directly adjacent to the current 525-acre landfill expansion site, as shown in Figure 4. We also recommend perpetual preservation of the 150 foot natural vegetative buffer within the landfill expansion site. These actions should be made a condition of

the Department of the Army permit. They will serve to reduce the adverse effects of the proposed Federal action on the species by precluding any future expansion of the landfill within 1,600 acres of wetlands surrounding the current expansion site and the 150 foot vegetated buffer. The method of preservation should be established and implemented prior to the conversion of any of the 525 acres of shrew habitat to landfill operation. The Service would be pleased to assist the Corps in developing the details of such a permit condition.

Recommendation 3 - Eliminate Inward-Gradient System to Protect Shrew Habitat

The Service recommends elimination of the “Inward-Gradient” liner system as part of the landfill design. This measure could significantly reduce adverse effects of the action by minimizing the potential for modification of shrew habitat surrounding the landfill. The borrow operation should be implemented in a manner minimizing or eliminating drainage of wetlands surrounding the expansion site.

If the “Inward-Gradient” liner system is not eliminated, to assess the impacts of landfill hydrology modifications on adjacent wetlands and Dismal Swamp southeastern shrew habitat, the Service recommends that the Corps require SPSA to conduct a detailed hydrological study utilizing groundwater monitoring wells and vegetational transects. The Service would be pleased to assist the Corps in developing the details of such a permit condition.

By adopting the above conservation recommendations, the Corps will be supporting the intent of the interagency Memorandum of Understanding on the implementation of the Endangered Species Act signed by John H. Zirschky, Acting Assistant Secretary of the U.S. Army Corps of Engineers, on September 28, 1994.

In order for the Service to be kept informed of actions that minimize or avoid adverse effects or benefit listed species or their habitats, the Service requests notification of the implementation of these conservation recommendations by the Corps.

V. REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action outlined in the Corps’ request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Unless information in this biological opinion is protected by national security or contains confidential business information, the Service recommends that you forward a copy to the following agency:

Virginia Department of Game and Inland Fisheries
Environmental Services
P.O. Box 11104
Richmond, VA 23230

If this opinion is not provided by the Corps and does not contain national security or confidential business information, the Service will provide a copy to this State agency ten business days after the date of this opinion.

The Service appreciates this opportunity to work with the Corps in fulfilling our mutual responsibilities under the ESA. Please contact this office at (804) 693-6694 if you have any questions or require additional information.

Sincerely,

Karen L. Mayne
Supervisor
Virginia Field Office

Enclosures

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Appendix A - Consultation History

- 04-03-96 The Service received the Corps' request for initiation of formal consultation.
- 05-03-96 The Service provided the Corps with comments on the Corps' biological assessment. The Service did not concur with the findings of the Corps' biological assessment.
- 05-23-96 The Service and the Corps met to discuss the proposed project.
- 07-12-96 The Service provided the Corps and Southeastern Public Service Authority (SPSA) with a draft assessment of project impacts to the Dismal Swamp southeastern shrew and draft recommendations for potential reasonable and prudent measures to minimize incidental take.
- 07-23-96 The Service received comments from SPSA regarding the Service's 7/12/96 letter.
- 08-01-96 The Service, the Corps, and SPSA met to discuss the Service's draft assessment and recommendations. The parties agreed to a 60-day extension of the formal consultation process to obtain more information on hydrological impacts.
- 08-12-96 The Service received the Corps' letter, dated 8/7/96, acknowledging extension of the formal Section 7 consultation period until October 16, 1996 and requesting a draft of the biological opinion.
- 09-16-96 SPSA requested an additional 60-day extension of the formal Section 7 consultation.
- 09-19-96 The Corps extended the formal consultation period until December 16, 1996.
- 11-21-96 Service submits draft biological opinion to the Corps.
- 12-3-96 Corps submits comments on draft biological opinion, recommending substantial changes.
- 12-5-97 The Service requests an extension on the finalization of formal

Section 7 consultation until January 30, 1997.

- 12-10-97 SPSA and the Corps extended the formal consultation period until January 30, 1997.
- 1-24-97 SPSA and Corps agree to grant an extension to the Service on submission of a second draft biological opinion. Deadlines for the draft and final were set for February 20, 1997 and March 3, 1997 respectively.
- 2-27-97 Service submits second draft biological opinion.
- 5-6-97 Corps of Engineers submits comments to the Service on draft biological opinion.

bcc: ARD-South, Region 5
Endangered Species Coordinator, Region 5
Supervisor, CBFO
Endangered Species Biologist, CBFO
Law Enforcement, Yorktown, VA
(Attn: Dan Hurt)
Law Enforcement, Richmond
(Attn: Senior Resident Agent)
Endangered Species Biologist, Raleigh Field Office
Refuge Manager, Great Dismal Swamp National Wildlife Refuge

10 business days after the date of this letter, mail copies to:

VDGIF, Richmond, VA
(Attn: Environmental Services)
DNH, Richmond, VA
(Attn: Tom Smith)

(Whester: 5-30-97)
(filename: SPSABI14)