Southeastern Public Service Authority of Virginia (SPSA) Landfill Expansion

Draft Environmental Impact Statement

PREPARED FOR

Norfolk District, US Army Corps of Engineers
803 Front Street
Norfolk, VA 23510

PREPARED BY

351 McLaws Circle, Suite 3
Williamsburg, VA 23185
757.220.0500

JUNE 2023

Table of Contents

List of Figures

List of Tables

Chapter 1: Purpose and Need

Introduction

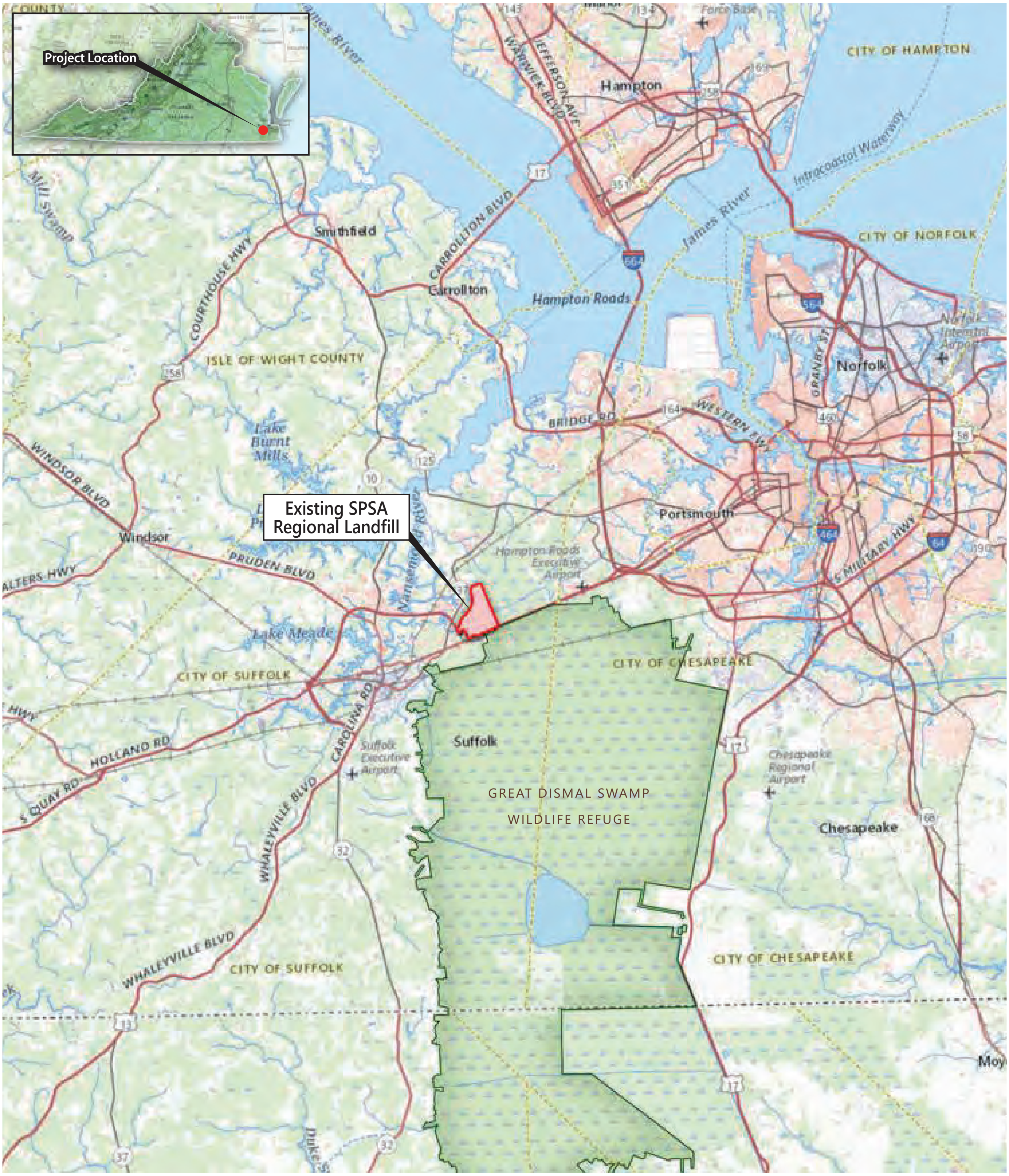
The U.S. Army Corps of Engineers (Corps) Norfolk District (Norfolk District), has prepared this Draft Environmental Impact Statement (DEIS) to assess the potential environmental impacts of permitting and constructing the proposed expansion of the Southeastern Public Service Authority's (SPSA) Regional Landfill in the City of Suffolk, Virginia (proposed action). Because the proposed expansion has the potential to affect over 100 acres of wetlands regulated under Section 404 of the Clean Water Act (33 USC 1344) (CWA), a Department of the Army Individual Permit would be required for the proposed action. The granting of the permit would be a major federal action by the Norfolk District. Accordingly, and as required by Section 102(2)(C) of the National Environmental Policy Act (NEPA), as amended (42 USC 4321, *et seq.*), the proposed expansion requires an EIS to be prepared under the Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508) and Corps regulations (33 CFR 325).

SPSA was created in 1973 pursuant to the Virginia Water and Waste Authorities Act (formerly, the Water and Sewer Authorities Act), and is governed by a Board of Directors consisting of 2 representatives from each of the following member localities: cities of Chesapeake, Franklin, Norfolk, Portsmouth, Suffolk, and Virginia Beach, and counties of Isle of Wight and Southampton, all located in southeastern Virginia.

One of the purposes of SPSA, as stated in its articles of incorporation, is to acquire, finance, construct, operate, and maintain a garbage and refuse collection and disposal system. SPSA's mission is to manage and operate a safe, cost effective, and environmentally responsible solid waste management system to satisfy the waste-disposal needs of its member localities, recognizing that different member localities have different waste-disposal needs. SPSA is a not-for-profit entity whose operations are bound by federal, state, and local laws and regulations, as well as its operating agreements with its members and other stakeholders.

The implementation of a regional waste management system began in 1985 with development of the Regional Landfill in Suffolk, Virginia (Figures 1-3). Since that date, SPSA has served as the regional solid waste management authority for the member localities. SPSA serves nearly 1.2 million residents, who generate more than 1 million tons of municipal solid waste per year. SPSA's waste management system includes the Regional Landfill and 9 transfer stations, accompanied by a transportation operation, a fleet maintenance facility, a tire shredder facility, a white goods program (refrigerators, washing machines and other large household appliances), and a household hazardous waste program (Figure 4). Some member communities operate their own recycling program.

Service: ESRI Basemap USGS The National Map; USFWS GIS Data - National Wildlife Refuge Boundaries



LEGEND

🟥 Potential Project Location

🟩 Great Dismal Swamp

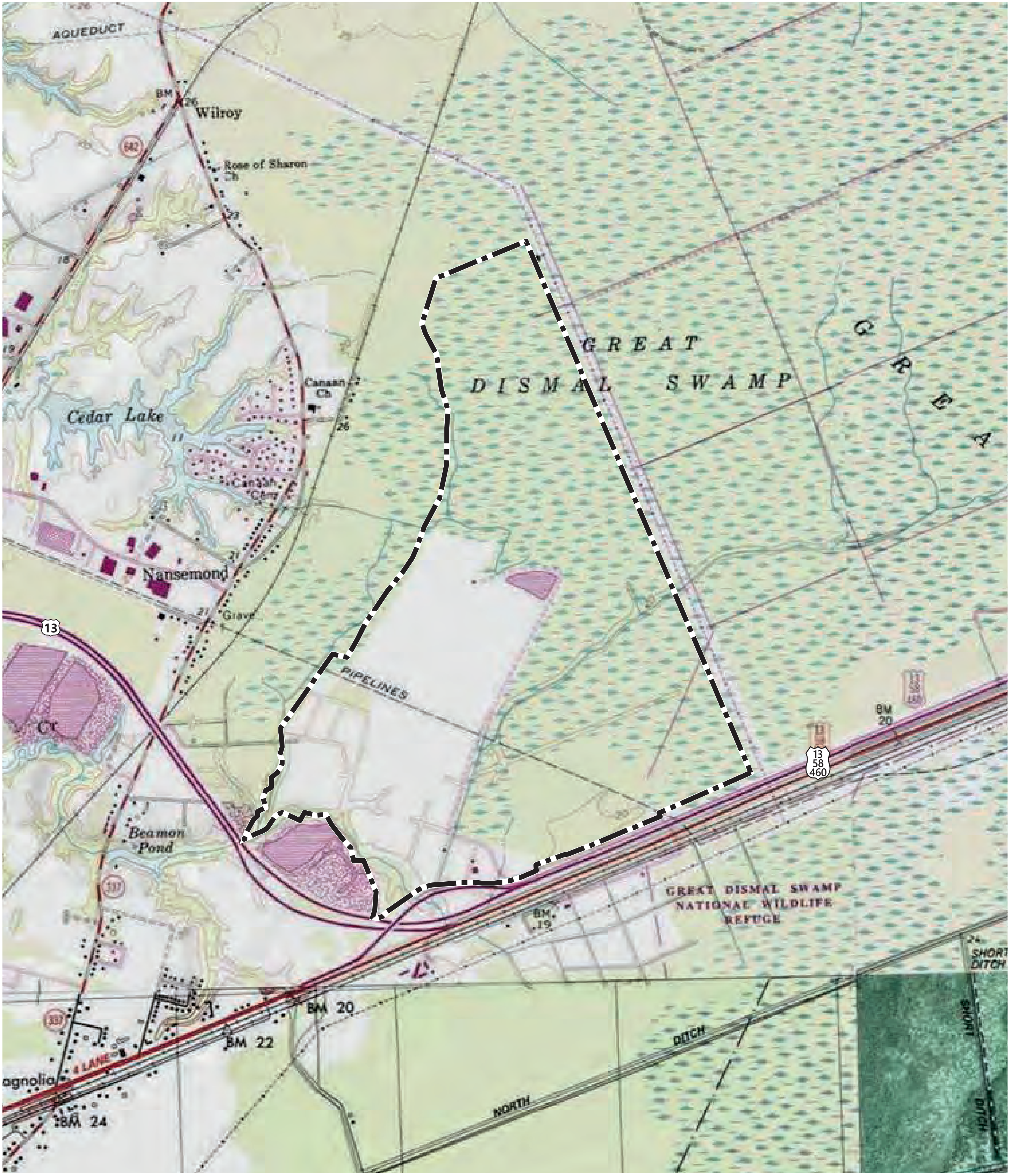
US Army Corps of Engineers

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

FIGURE 1

SPSA Regional Landfill Project Location Map

Service: USGS 7.5 minute Chuckatuck, Virginia Quadrangle



LEGEND

▭ SPSA Property Boundary

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

N

0 2,000 Feet

FIGURE 2

SPSA Regional Landfill
Project Location Map (Quadrangle)

Source: Nearmap Imagery Dated February 10, 2022

LEGEND

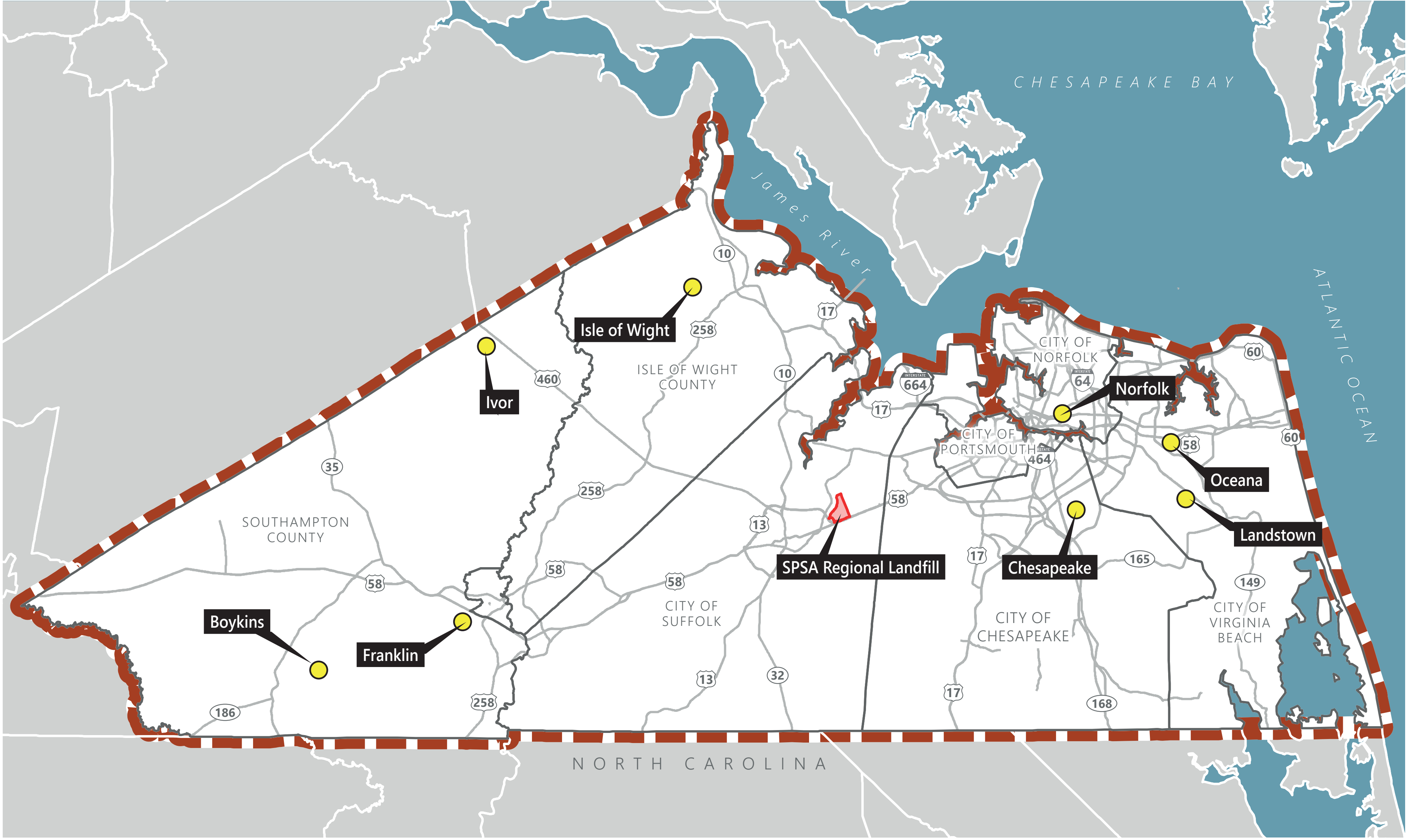
SPSA Property Boundary

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

FIGURE 3

SPSA Regional Landfill Project Location Map (Aerial)

Source: VGIN/VBMP GIS Data



LEGEND

🟥 Existing Regional Landfill
Service Area Boundary
● Transfer Station

US Army Corps of Engineers

Environmental Impact Statement for
Proposed Expansion of SPSA Landfill

FIGURE 4

SPSA Service Area Map

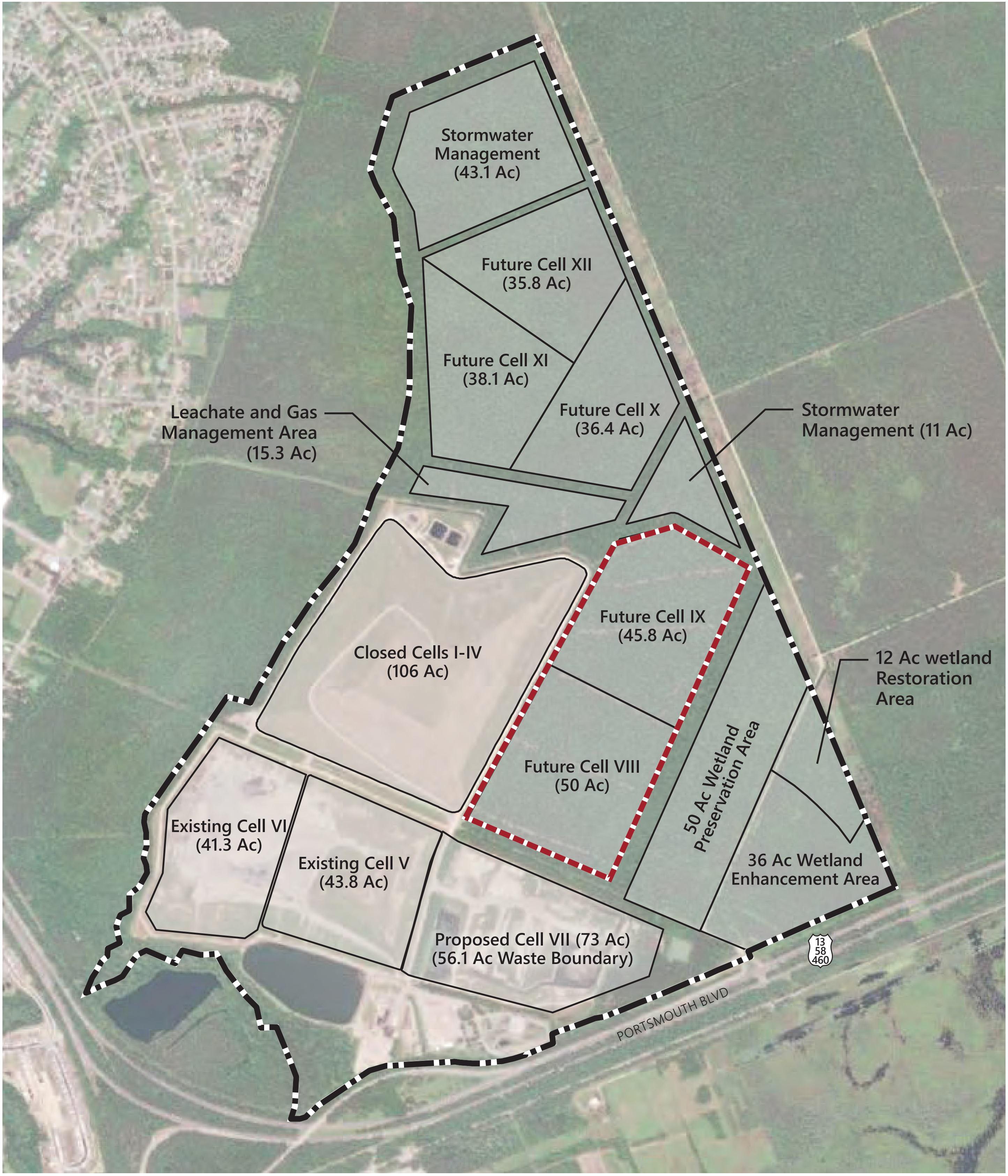
This page intentionally left blank.

In order to be adequately prepared to meet the needs of its member communities, SPSA has determined that it needs to increase the solid waste disposal capacity at the Regional Landfill by incorporating an additional 16 million cubic yards (CY) of capacity within the active facility boundary (identified as Cells[1] VIII and IX and the airspace between Cells V and VII). The proposed expansion into Cells VIII and IX is part of SPSA's long-term plan for providing critical disposal capacity for the region and is consistent with the *Regional Solid Waste Management Plan (RSWMP) for Southeastern Virginia*, which identifies the need for future expansion of the active facility (HRPDC 2020). SPSA's long-term plan previously included expansion of waste disposal areas on the site to include Cells X, XI, and XII (Figure 5). In June of 2023, SPSA proposed to preserve the 168-acre future expansion area through a declaration of restrictions. Preservation of the 168-acre area, including the standing timber, is part of SPSA's mitigation proposal.

---

[1] A landfill cell is an area of the landfill where solid waste is deposited.

Source: Nearmap Imagery Dated February 10, 2022



LEGEND

- ▬ SPSA Property Boundary
- ▬ Proposed Expansion Cells VIII & IX
- ☐ Landfill Cell Boundary

US Army Corps of Engineers

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

N

0 1,250 Feet

FIGURE 5

SPSA Regional Landfill Master Plan

SPSA's proposed use of Cells VIII and IX would require approvals and permits from federal, state, and local agencies prior to any ground disturbance or construction. SPSA intends to apply for an amendment to its Virginia Department of Environmental Quality (VDEQ) Solid Waste Part A permit for expansion of the landfill operations to incorporate Cells VIII and IX. SPSA also intends to submit a Joint Permit Application (JPA) to the Norfolk District U.S. Army Corps of Engineers for work in Waters of the United States (WOTUS), including wetlands. The proposed construction of Cells VIII and IX, as well as the airspace between Cells V and VII, would require the disturbance of more than 100 acres of jurisdictional wetlands, regulated under Section 404 of the CWA. The JPA would also be used to apply for corresponding permits from the Virginia Marine Resources Commission, the VDEQ, and/or local wetlands boards.

The SPSA Regional Landfill Expansion project has involved coordination with the public, as well as with local, state, and federal officials. This coordination has taken place to ensure the public and all stakeholders remain informed and engaged throughout the project to satisfy requirements under NEPA and other agency requirements. Additional scoping details are provided in Chapter 4, "Consultation and Coordination," of this DEIS.

Project Location

The SPSA Regional Landfill is located at 1 Bob Foeller Drive in Suffolk, Virginia (see Figures 1-3). SPSA's service area includes approximately 2,000 square miles located in the Virginia cities of Chesapeake, Franklin, Norfolk, Portsmouth, Suffolk, and Virginia Beach, and the counties of Isle of Wight and Southampton, as illustrated on Figure 4. More than 1 million tons of municipal solid waste is generated within the service area per year. SPSA's Regional Landfill property is comprised of approximately 833 acres, of which 376 acres are within the active facility boundary currently permitted by the VDEQ under Solid Waste Permit No. 417.

Project Background

SPSA's operations are determined in part by the RSWMP, which provides an overview and analysis of solid waste management by SPSA and its member localities in the geographic territory served by SPSA. The RSWMP is prepared by the Hampton Roads Planning District Commission (HRPDC) in coordination with SPSA and its member localities. The HRPDC serves as the regional solid waste planning agency and provides a framework for coordinating solid waste and recycling programs in the region. The planning horizon identified in the current 2016 RSWMP, developed by the HRPDC, is through 2030. In August 2022, SPSA submitted a request for amendment to the RSWMP to include the additional landfill capacity through the development of Cells VIII and IX.

In April 1984, SPSA initiated the acquisition and construction of a landfill located in Suffolk (the Regional Landfill), 7 transfer stations and supporting equipment, truck and tractor fleets and heavy equipment, and ancillary facilities. SPSA subsequently financed a refuse derived fuel plant, fuel delivery system, and a waste-to-energy power plant located on federally owned land (U.S. Navy) in Portsmouth, Virginia (collectively, the RDF Plant), as well as a solid waste transfer station located in Suffolk, Virginia, and certain related equipment, truck and tractor fleets, and ancillary facilities. The RDF Plant takes in municipal and commercial solid waste, separates out materials unsuitable for burning as fuel, and then burns the refuse derived fuel to fire large boilers, providing steam and electricity to the Norfolk Naval Shipyard. Excess electricity produced is sold back to the electric grid. Collectively, these facilities and equipment formed the basis of SPSA's solid waste management system, providing an environmentally sound method for disposal of solid waste in SPSA's service area.

In April 2010, SPSA sold its RDF Plant and affiliated power plant to Wheelabrator Technologies, Inc. (Wheelabrator), a company then affiliated with Waste Management, Inc. Effective upon the sale of the RDF Plant, SPSA entered into an agreement with Wheelabrator Portsmouth, Inc. for solid waste disposal services until January 24, 2018, followed by an extension to January 31, 2019. Following a competitive negotiation process in 2018, a new agreement was formed between SPSA and Wheelabrator for continuing solid waste disposal services from February 1, 2019, through June 30, 2027, with the option to renew for up to 2 5-year periods. Under the terms of the agreement, SPSA delivers some of the municipal solid waste it receives to Wheelabrator for conversion to fuel. The RDF Plant processes approximately 83% of the waste that comes through SPSA facilities. The waste is then burned at the RDF Plant, resulting in 211,236 megawatts of electricity being sold to the grid and 360,024 thousand pounds of steam being sold to the U.S. Navy (SPSA 2021d). The ash residue is transported to the Regional Landfill for use as an alternative daily cover or for disposal, depending on its quality. In 2021, WIN Waste Innovations, a waste management company, acquired Wheelabrator Portsmouth's assets, while also consolidating with 9 other waste management firms to form WIN Waste Innovations. A fire at the Wheelabrator facility occurred in December 2022 and although repairs were performed, the plant is operating at a reduced capacity.

The U.S. Navy has developed plans, received approvals, and broke ground to construct a natural gas-powered steam and energy plant at the Naval Shipyard in Portsmouth. Once the plant is constructed, the U.S. Navy will no longer purchase steam from Wheelabrator, a loss in revenue of nearly $10 million dollars per year. The loss in steam revenue combined with the cost to replace and repair the nearly 35-year-old aging infrastructure is forcing Wheelabrator to close its facility in July 2024. Upon its closure, all waste will then be directed to the Regional Landfill until another alternative disposal method is available. In anticipation of Wheelabrator's closure, SPSA will issue a Request for Proposal (RFP) for alternate disposal options. At the time of writing, there is no reliable off-taker for the approximately 83% of the waste that Wheelabrator currently processes.

SPSA’s Solid Waste Management System

SPSA’s solid waste management system transports and disposes of municipal solid waste (MSW), construction and demolition debris (CDD), and ash from the Wheelabrator RDF plant. Municipal solid waste is the bulk of the waste entering SPSA’s management system and includes typical household solid waste and commercial/industrial solid (nonhazardous) waste as defined by 9 VAC (Virginia Administrative Code) 20-81. Most of the municipal solid waste delivered to SPSA’s transfer stations is taken to Wheelabrator’s RDF Plant for processing and incineration as fuel. Non-processible wastes unsuited for burning in the RDF Plant are separated at the RDF Plant and taken for disposal to a non-SPSA landfill outside of the service area.

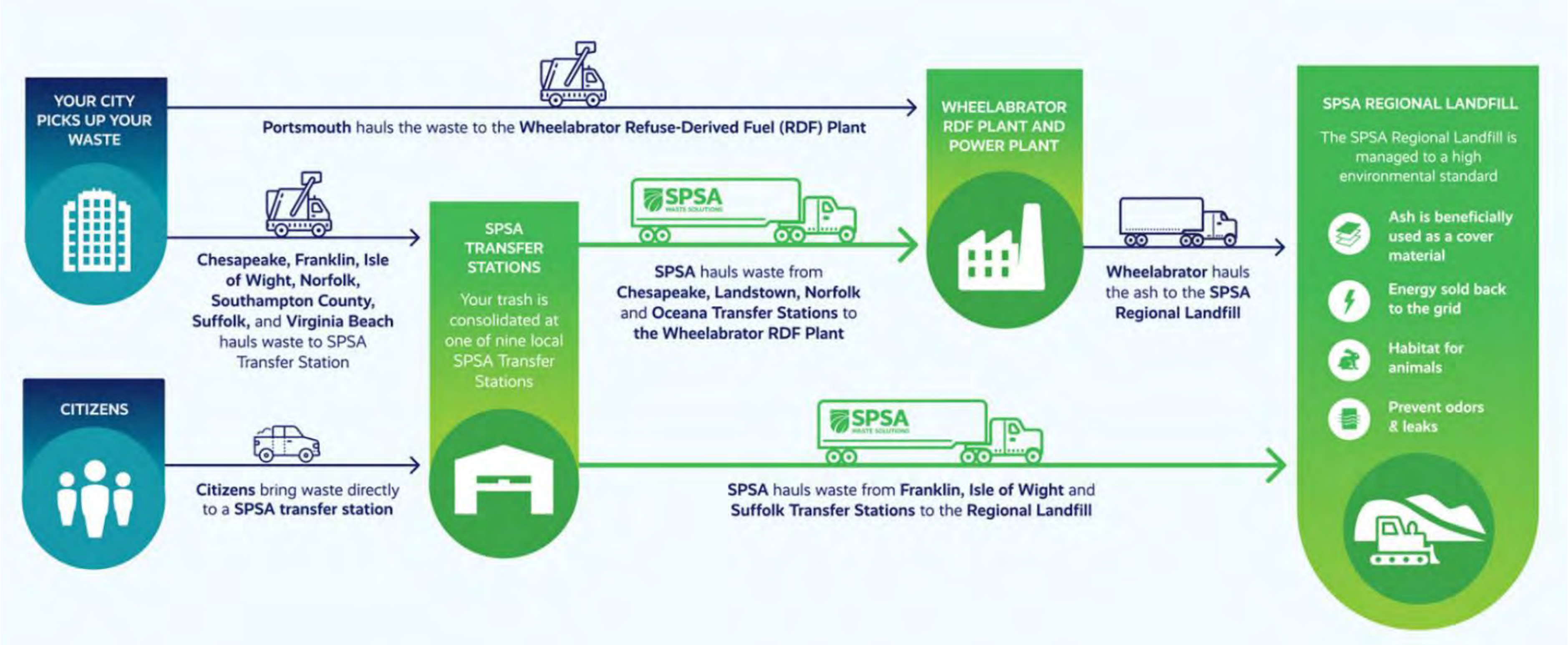
Yard waste is managed through a variety of means to include recycling at the point of origin (residents recycle or compost their own yard waste), while some municipalities collect grass, clippings, and leaves at the curb. The majority of collected yard waste is then either sent for composting at a community or a private facility. Yard waste from Suffolk is taken to SPSA transfer stations for disposal at the Regional Landfill. As of May 2023, the SPSA Board of Directors has considered running a yard waste, composting, and organics program. Successful implementation of the program would require extensive cooperation from SPSA’s member communities. In previous years, SPSA did not manage such a program due to its extreme debt situation which was considered, in part, to be caused by overextension into non-core services such as recycling and composting. See “Alternative Technologies” in Chapter 2, below, for additional detail about SPSA’s waste diversion efforts.

SPSA provides CDD disposal services at the Regional Landfill, although typically, most CDD generated in the region is sent directly to private CDD landfills, both within and outside the area served by SPSA. Privately-owned collection firms provide CDD collection services, and construction contractors are responsible for procuring CDD collection containers (e.g., dumpsters or roll-offs) and services at their respective job sites.

General household recyclables include aluminum, steel, or tin cans, plastic bottles, cardboard, mixed paper, and glass. Franklin, Norfolk, Portsmouth, Suffolk, Virginia Beach, and some areas of Southampton County operate a curbside recycling collection program. The municipalities deliver the collected materials to local material recovery facilities for processing and distribution to market. SPSA does not operate a household recyclable processing facility. In the other localities served by SPSA, recyclables are brought to drop-off locations by residents or private contractors.

This page intentionally left blank.

Figure 6. SPSA's Waste Management Process



Portsmouth hauls the waste to the **Wheelabrator Refuse-Derived Fuel (RDF) Plant**

Chesapeake, Franklin, Isle of Wight, Norfolk, Southampton County, Suffolk, and **Virginia Beach** hauls waste to SPSA Transfer Station

Citizens bring waste directly to a **SPSA transfer station**

Your trash is consolidated at one of nine local SPSA Transfer Stations

SPSA hauls waste from **Chesapeake, Landstown, Norfolk** and **Oceana Transfer Stations** to **the Wheelabrator RDF Plant**

Wheelabrator hauls the ash to the **SPSA Regional Landfill**

SPSA hauls waste from **Franklin, Isle of Wight** and **Suffolk Transfer Stations** to the **Regional Landfill**

The SPSA Regional Landfill is managed to a high environmental standard

- **Ash is beneficially used as a cover material**
- **Energy sold back to the grid**
- **Habitat for animals**
- **Prevent odors & leaks**

Source: SPSA 2021e

This page intentionally left blank.

Regional Landfill Capacity

SPSA began disposing of solid waste in Cell I of the Regional Landfill in 1985. Cells I-IV were closed in the summer of 2009. SPSA is currently operating in Cells V and VI. Prior to 2008, the SPSA Regional Landfill was receiving over 1.2 million tons of waste and consuming 1.4 million CY of disposal airspace per year. Landfill disposal airspace is defined as the volume of space on a landfill site which is permitted for the disposal of waste, including both space excavated below ground and space above ground that was initially occupied by air and will eventually be displaced by disposed waste. Tonnage is a weight measurement (how much does the material weigh?) while cubic yards measures volume (how much space is filled?). Disposal airspace, measured in cubic yards is the available volume to be filled and varies depending on the efficiency of the landfill operation. Each year SPSA publishes an *Airspace Management Report* (SPSA 2022a) which provides a detailed update on how much airspace remains at the Regional Landfill. In response to the disposal needs of the member communities, SPSA applied for a solid waste permit amendment to add Cell VII for disposal of approximately 10.8 million CY of waste. VDEQ issued an amended permit for the future expansion of the landfill into Cell VII in 2011.

SPSA’s service area currently generates approximately 450,000 tons of MSW per year. Of this, approximately 350,000 tons is taken to Wheelabrator’s RDF plant for conversion to energy, and approximately 100,000 tons is taken directly to the Regional Landfill. Wheelabrator’s RDF plant produces approximately 180,000 tons of ash each year after converting a total of almost 650,000 tons of MSW and commercial waste to energy, some of which is outside of SPSA’s waste stream. The 180,000 tons of ash remaining from the waste to energy conversion is taken to the Regional Landfill for use as daily cover or disposal, depending on the quality of the ash. Solid waste disposed at the landfill consists of MSW, CDD, ash for alternative daily cover, and other wastes as well as clean fill which is used daily as cover material to support landfill operations. Since 2015, the SPSA Regional Landfill has been used for the disposal of approximately 300,000 tons of waste per year which consumed about 350,000 CY per year of disposal airspace.

The current contract between SPSA and Wheelabrator is through June 2027. However, the U.S. Navy will no longer purchase steam from Wheelaborator after June of 2024, resulting in immediate closure of all Wheelaborator operations. Therefore, SPSA’s contract with Wheelabrator will end 3 years earlier than anticipated in June 2024. In accordance with SPSA’s Strategic Operating Plan, the SPSA Board of Directors and Executive Staff would undertake a comprehensive review of the Designated Disposal Mechanism (DDM) being utilized and assess its viability for the future. This assessment may include exploration of alternative waste disposal options. Due to the uncertainties regarding Wheelabrator’s future operations, and prior to expiration of the contract with Wheelabrator, the SPSA Board of Directors will complete this assessment and determine the most appropriate method of waste disposal, which could include disposal of all member localities' solid waste at the Regional Landfill, beginning in July 2024. If the Regional Landfill were selected as the sole disposal location, or DDM, the total incoming waste would exceed 450,000 tons annually. This would result in the available airspace being consumed at a much higher rate, and the remaining capacity in Cells V and VI would be consumed by March 2027, or sooner. SPSA intends to issue an RFP for system-wide disposal methods around the summer or fall of 2023 with the goal of having a solution that would coincide with Wheelabrator's June 30, 2024 closure date. Issuing an RFP prior to this time could be speculative, given the volatility of the waste-to-energy market. SPSA would consider proposals for any and all alternative technologies and/or disposal methods that are proven to be safe, viable, and cost effective. SPSA remains interested in waste diversion and stays apprised of industry innovation and regularly takes meetings with companies like IBC Renewables and AMP Robotics to keep abreast of technological developments on the horizon.

Based on the above projections for Cells V and VI running out of airspace by 2027, construction of Cell VII would need to start no later than 2024 to ensure Cell VII capacity is available. Construction of Cell VII would require excavation and stockpiling of 1.5 million CY of soil material. Cell VII would be excavated to a level generally consistent with that of Cells V and VI, approximately 15 to 40 feet (ft) below grade. The soil borrow area currently being operated in the Cell VII area is providing the soil cover materials required for daily facility operations and is being conducted in a manner that establish the subgrade elevations of the proposed Cell VII. If the Regional Landfill is selected as the sole DDM beginning in July 2024, the volume of waste disposed of at the Regional Landfill would increase substantially, reducing its life to less than 20 years. Depending on the actual volume of waste delivered to the Regional Landfill, additional capacity beyond Cell VII could be needed between 2036 and 2038. In order to meet SPSA's contractual obligations to the member localities, SPSA needs to proceed assuming that these conditions may occur and begin the permitting of additional disposal capacity at the Regional Landfill.

Previous Regulatory Context

In 1982, the Hampton Roads region conducted a study to evaluate the environmental and economic aspects of developing a regional landfill. The location of the existing Regional Landfill in Suffolk was chosen following a siting study (USACE 1995). According to the Norfolk District's 1977 aerial photographs, the location of the administration buildings, entrance roads, and the majority of Cell VI and approximately one-quarter of Cell V were previously active agricultural fields when the landfill property was purchased by SPSA (USACE 1977). This equates to slightly more than 100 acres of agricultural fields that were used for the Regional Landfill. Prior to its development, the remaining 275 acres of the current active landfill space was within varying stages of a silvicultural operation owned by the Kirk Lumber Company. Logging on Cells I-IV began in 1977. By March 1982, Kirk Lumber Company had completely clearcut the area that now encompasses Cells I-IV, a small portion of Cell VI, and the majority of Cell V

(USACE 1982). The proposed expansion area (Cells VIII and IX) was clearcut or selectively cut in 1991 or 1992. The remaining property within the future cells was also clearcut or selectively cut around that same time.

Of the 270 acres of forested area that was previously developed into the Regional Landfill, approximately 200 acres may have once been wetlands. Much of the land that was previously agricultural may have been wetlands that were historically part of the Great Dismal Swamp. In the early 1980s, the Norfolk District made the determination that if there were any wetlands on the Regional Landfill property, they were not subject to regulation under the Clean Water Act and did not require a permit from the Corps for any land disturbance or filling activity. Therefore, no permits were required for Cells I-VI or any of the other supporting infrastructure.

In 1988, SPSA began considering expansion options. The Norfolk District reviewed the future expansion areas using the 1987 Corps of Engineers *Wetland Delineation Manual* and determined that wetlands regulated under Section 404 of the Clean Water Act were present within Cells VII, VIII, and IX. Based on this determination, a permit from the Corps would be required for future landfill expansion work. SPSA applied for a Section 404 permit from the Norfolk District to impact 377 acres of forested wetlands within the 525-acre parcel. The Norfolk District prepared and published a DEIS for the expansion project on September 24, 1993, and the Final Environmental Impact Statement (FEIS) was published on May 26, 1995. During the extended comment period for the FEIS, SPSA submitted an alternative wetland mitigation plan. The Norfolk District announced its plan to develop a Supplement to the FEIS, which was published in July 1999 (USACE 1999). SPSA subsequently revised its long-range plan for the landfill expansion to incorporate new methods to increase landfill capacities at the existing site, as well as new landfill design options that could extend the life of the landfill beyond previous estimates.

SPSA subsequently submitted a modified permit application that reduced the proposed expansion footprint to a 69-acre portion of the acquired 525-acre parcel, resulting in approximately 12 acres of wetland impact. The Norfolk District determined that environmental impacts of the modified application could be evaluated under an Environmental Assessment and terminated efforts associated with the preparation of the Final Supplement to the FEIS. On September 27, 2002, the Norfolk District authorized impacts to 12 acres of forested wetlands under an Individual Permit for the development of Cell VII. As compensatory mitigation for the 12 acres of wetland impacts, SPSA was required to restore hydrology to a 12-acre area, enhance the hydrology in a 36-acre adjoining parcel, and preserve a 50-acre forested wetland area within the Regional Landfill property boundaries. The City of Suffolk issued a conditional use permit for Cell VII in 2017. A condition of their permit is that SPSA must construct a new landfill entrance off of Rt. 58 to improve safety.

Project Authorization and Regulatory Framework

For the proposed construction of Cells VIII and IX, SPSA intends to submit a permit application to the Norfolk District for a permit to authorize impacts to approximately 110 acres of forested wetlands regulated under Section 404 of the CWA. The granting of the permit would be a major federal action by the Norfolk District. Section 102(2)(C) of NEPA requires an EIS to be completed prior to issuing the permit.

Compliance with Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (36 CFR Part 800), and Section 7 of the Endangered Species Act of 1973 (ESA) is being completed separately from but concurrently with the NEPA process. While applicable cultural and species resource information, including potential impacts associated with the proposed alternatives is documented in this DEIS, the DEIS is not intended for Section 106 or Section 7 compliance purposes. Compliance would occur through the Section 404 permit process.

Purpose of and Need for Action

As described above, although the HRPDC is the agency responsible for preparing the solid waste management plan, SPSA was designated as the Regional Solid Waste Management Agency and charged with implementation of the regional solid waste management plan. The solid waste management plan was prepared to meet the requirements of the Virginia “Solid Waste Planning and Recycling Regulations” detailed in 9 VAC Section 20-130-10 *et seq*. and establishes a framework by which the region can meet the state-mandated planning requirements and recycling goals, as well as the long-term waste management needs of the region.

Therefore, the purpose of and need for the project are developed and refined in association with the RSWMP for southeastern Virginia. As required by state regulations, the RSWMP provides background information on population and development patterns in southeastern Virginia, providing the context in which solid waste management occurs in the region. These principles combine projected economic growth and anticipated waste projections at the existing Regional Landfill when planning for available disposal capacity.

Purpose of the Project

The purpose of the proposed project is to allow SPSA to continue to meet its core mission for the next 40 years including planning, permitting, construction, and a 20-year operating window. As stated in the Code of Virginia Section 15.2-5102.1, SPSA is responsible for the management of the safe and environmentally sound disposal of regional waste for its member localities: the cities of Chesapeake, Franklin, Norfolk, Portsmouth, Suffolk, and Virginia Beach, and the counties of Isle of Wight and Southampton. Member localities require a dependable, economically secure, and environmentally responsible solution for their residual post-recycling municipal solid waste.

Need for the Project

The project is needed because, based on current and anticipated municipal waste generated from its member localities and the resulting tonnages to be processed by SPSA, the currently constructed landfill area at SPSA's Regional Landfill (Suffolk, Virginia), Cells V and VI, will run out of capacity in 2027. An additional landfill area, Cell VII, has been permitted but is not yet constructed. Once in operation, Cell VII will provide approximately 10 additional years of disposal capacity.

Although there are multiple programs and management plans in place to divert the amount of waste going into the SPSA landfill, the amount of waste generated within the SPSA service area will change over time with population growth.

Airspace life estimations based on the anticipated incoming volume of waste have been developed by SPSA to support their landfill planning process. The expansion area (Cells VIII and IX) provides approximately 16 million CY of waste disposal capacity. This additional capacity is needed for SPSA to adequately manage the region's projected solid waste disposal needs, per its state mandate, for a 40-year planning horizon beginning in 2020 through the year 2060.

SPSA's service area currently generates approximately 450,000 tons of MSW per year and manages 50,000-100,000 tons of other waste materials from local generators (construction demolition debris, sludge and special wastes) that are disposed at the Regional Landfill. Based on a total of 500,000 to 550,000 tons per year and a density of 1,400 lbs/CY, the airspace of Cell VII (8.6 million CY) could be filled by 2038. The 16 million CY of disposal capacity created by Cells VIII and IX would provide about 22-25 years of disposal capacity depending on the density achieved through daily operations. Waste in-place density measures the weight of waste per CY and is a measure of how efficiently a landfill uses its airspace. Higher densities mean more waste by weight can be disposed in the same airspace compared to waste with lower densities.

Proposed Action Timeline

Activities associated with the development of the proposed expansion area (Cells VIII and IX, as well as the airspace between Cells V and VII), the applicant's preferred alternative, would begin in 2024 with clearing and grubbing Cell VIII Phase 1 and 2 areas of the proposed on-site expansion. Construction of Cell VII, which is already permitted, would proceed as planned. Expansion of the Regional Landfill into Cells VII-IX would provide capacity on-site through 2060. A timeline of activities related to the proposed on-site expansion is provided in Figure 7 and described below. This timeline does not include the approximate 5 years required to complete the DEQ solid waste permitting process and the Sections 401 and 404 permitting processes.

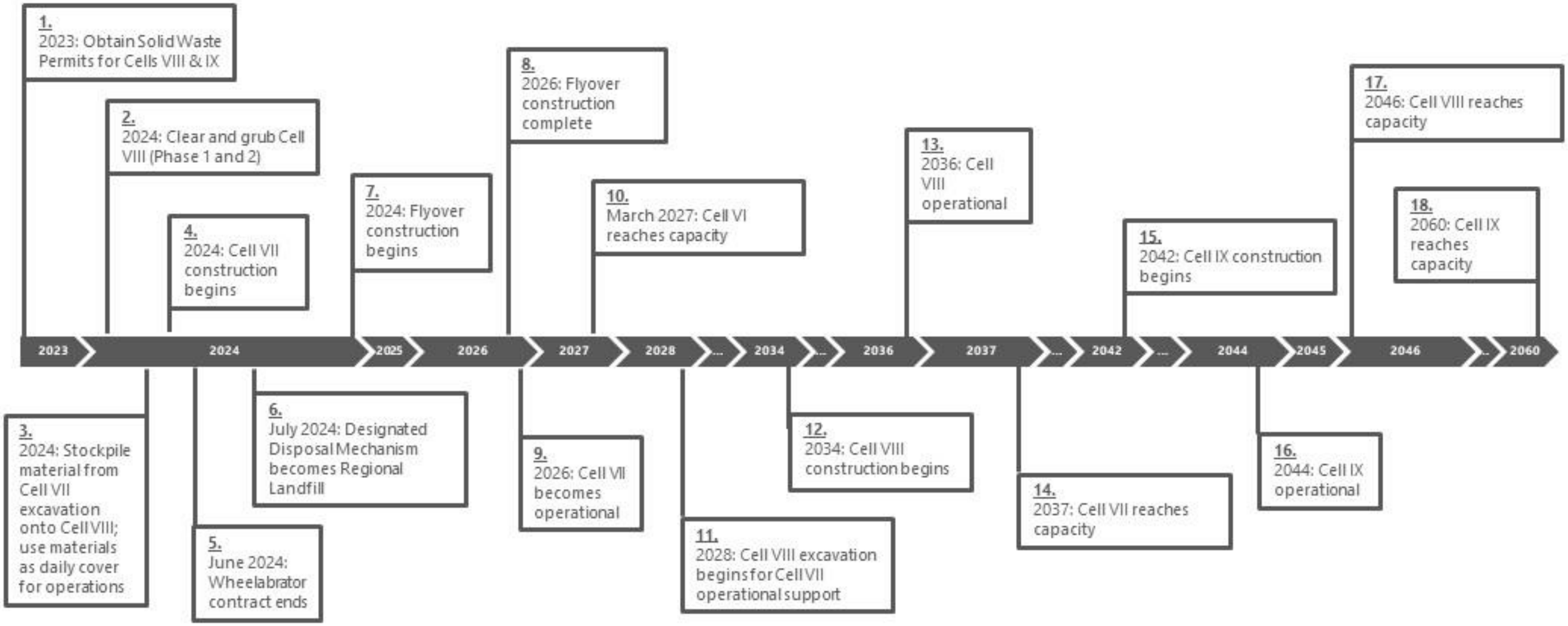
Development of Cells VIII and IX would occur in 4 stages. The initial stages of development of the expansion area require dewatering, followed by clearing and grubbing. If permitted, these activities would begin in early 2024 and Cell VIII could possibly serve as a soil stockpile area during construction of Cell VII by the middle of 2024. Separate from this project, prior to Cell VII operation, SPSA would fund construction of a grade-separated interchange, or “flyover,” to eliminate left turns from U.S. Routes 13/58/460 into the Regional Landfill. SPSA’s Conditional Use Permit (CUP) with the City of Suffolk requires that this flyover be completed before waste is deposited in Cell VII (SPSA 2020). The flyover would be constructed by the Virginia Department of Transportation (VDOT) and would cost approximately $40 million to construct. Construction of the flyover would begin in late 2024. The first phase of Cell VII is anticipated to become operational concurrent with the completion of the flyover construction in April 2026.

Excavation of the expansion area in Cell VIII Phases 1 and 2 would begin in 2028. Cell VIII construction and Cell IX construction would begin in 2034 and 2042, respectively. SPSA has indicated that Cells VIII and IX would be developed as an inward gradient landfill, similar to development of Cell VI and the VDEQ-approved plans for Cell VII. An inward gradient landfill occurs when the base liner is below the groundwater table, in order to establish a stable foundation for the landfill to optimize disposal quantity, while providing an environmentally sound containment system. Cell VII is projected to reach capacity by 2037. Its construction will generate over 1.5 million CY of soil materials, which would be used to support its operation if they can be stockpiled on-site. Landfill operations require a substantial quantity of soil materials for use in landfill expansion and closure construction, daily soil cover, and intermediate soil cover needs. Soil materials can comprise between 10 to 20% of the total permitted airspace, depending on the availability and use of alternate daily cover materials.

In order to construct Cell VII and retain the soil materials from the excavation for use at the site, SPSA would need to develop a soil borrow and stockpile area. As part of the proposed action, SPSA is proposing to use the Cell VIII footprint for the storage and supply of soil materials generated from Cell VII construction, and then subsequently use the Cell IX footprint for storage and supply of soil materials for Cell VIII construction and operation. Alternatively, SPSA could use an off-site stockpile area and transport the soil materials by truck from Cell VII to the off-site location and then transport back to Cell VII for use as cover. SPSA has indicated that, while feasible, this transfer of soil would substantially increase their operating costs and reduce operating efficiency. Even without the expansion of the landfill into Cells VIII and IX, SPSA has indicated that they plan to construct and utilize Cell VII, which is already permitted. The timeline associated with construction and operation of Cell VII would not change even if permits are not issued to authorize the construction of Cells VIII and IX.

If permits are issued to authorize the construction of Cells VIII and IX, the life of the Regional Landfill would be extended through 2060 to achieve a 40-year planning horizon. Cell VIII is projected to reach capacity in 2046, and Cell IX is not anticipated to reach capacity until 2060.

Figure 7. Illustrated Project Timeline



This page intentionally left blank.

Chapter 2: Alternatives

This chapter describes the various actions that could be implemented to address SPSA's need for additional landfill capacity for a 40-year planning horizon, requiring 16 million CY of capacity. CEQ and Corps regulations (40 CFR § 1508 and 33 CFR Part 325 Appendix B) require the Corps to evaluate alternatives to the project that are considered reasonable. Reasonable alternatives must be those that are feasible, and such feasibility must focus on the accomplishment of the underlying purpose and need (of the applicant or the public) that would be satisfied by the proposed federal action (permit issuance). The alternatives analysis should be thorough enough to use for both the public interest review and the 404(b)(1) guidelines where applicable.

In addition to alternatives for taking action, this chapter describes a "no-action" alternative, as prescribed by 40 CFR § 1502.14. The No-Action Alternative would not require a permit action by the Corps. Under the No-Action Alternative, SPSA would continue current landfilling activities and utilize all previously permitted capacity within the SPSA Regional Landfill until this capacity is consumed. Subsequently, waste would be hauled to existing for-profit landfills for processing and disposal.

In accordance with the section 404(b)(1) guidelines (guidelines) at 40 CFR § 230.10(a), a permit cannot be issued if a practicable alternative exists that would have less adverse impact on the aquatic ecosystem (known as the Least Environmentally Damaging Practicable Alternative [LEDPA]), provided that the LEDPA does not have significant adverse environmental consequences to other natural ecosystem components. An analysis was conducted to determine whether reasonable alternatives would also be practicable under the guidelines. "Practicable" means that the alternative is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the overall project purpose (40 CFR § 230.10(a)).

The action alternatives were developed by the Norfolk District's interdisciplinary team and incorporate feedback received during the agency pre-scoping meeting and public and agency scoping process, as appropriate. These alternatives meet the overall purpose of and need for taking action, which for this EIS, is available waste disposal capacity to meet the needs of the SPSA service area for a 40-year planning horizon.

The District has considered Virginia law in developing alternatives. In particular, Virginia state law prohibits new sanitary landfills or expansions of existing landfills if there would be an impact of 2 or more acres to nontidal wetlands (see 9 VAC 20-81-120 (E); VAC 10.1-1408.5 (D)). As specified in subsection A of Virginia statute section 10.1-1408.5, this prohibition shall not apply to the expansion of an existing municipal solid waste landfill located in the cities of Danville, VA or Suffolk, VA "when the owner or operator of the landfill is an authority created pursuant to § 15.2-5102 that has applied for a permit under § 404 of the federal Clean Water Act prior to January 1, 1989, and the owner or operator has received a permit under § 404 of the federal Clean Water Act and the Virginia Water Resources and Wetlands Protection Program, Article 2.2 (§ 62.1-

44.15:20 et seq.).” Thus, this language exempts expansion of the SPSA Regional Landfill within the City of Suffolk from the 2-acre limitation on wetland impacts.

Subsection F of section § 10.1-1408.5 also provides a broader exemption:

> There shall be no additional exemptions granted from this section unless (i) the proponent has submitted to the Department an assessment of the potential impact to wetlands, the need for the exemption, and the alternatives considered and (ii) the Department has made the information available for public review for at least 60 days prior to the first day of the next Regular Session of the General Assembly.

Thus, offsite alternatives with greater than 2 acres of wetland impacts could potentially be approved through the foregoing process. Furthermore, NEPA’s implementing regulations contemplate that federal agencies may consider proposed actions that are inconsistent with state or local plans or laws, provided agencies describe the extent to which such inconsistencies would be reconciled (40 CFR § 1506.2). For these reasons, Virginia’s general prohibition on development of new or expanded landfills with wetland impacts over 2 acres was not included as a criterion for the screening of alternatives.

The Corps recognizes that the exemption F of section § 10.1-1408.5 may be procedurally unclear or difficult and that additional information concerning this exemption process may more narrowly define the off-site alternative’s practicability.

This chapter also includes alternative management concepts that were considered but dismissed from further analysis, as well as the rationale for their dismissal.

Alternatives Screening Process

On-site Alternatives Screening Process

Ten alternatives located at the existing SPSA Regional Landfill were analyzed in support of the project purpose and need, to establish 16 million CY of waste disposal volume necessary to meet the 40-year planning horizon. All on-site alternatives require expansion into proposed Cells VIII & IX in varying amounts to meet the project need. Several factors were considered when developing on-site alternatives; these include the following:

- traditional landfill construction and operations
    - effective soil management allows SPSA to utilize soil on-site rather than obtain or dredging material from elsewhere
- location of an existing natural gas main that bisects the SPSA Regional Landfill
    - the timeframe of the effort to relocate this is beyond the scope of when additional capacity is needed and would cost more than $34 million to relocate

- existing leachate and landfill gas infrastructure
    - relocating or extending this system would be difficult to complete; the addition of over 200 feet of riser pipe would be subject to stresses from the waste materials placed over and around them; the additional riser pipe would also increase the difficulty in removing and reinstalling submersible leachate pumps for maintenance
    - in some cases, sump risers would need to be decommissioned which can only happen when leachate generation has ceased; leachate generation is likely to continue for over 30 years after cell closure which pushes the timeframe of this effort beyond the scope of when additional capacity is needed
- floodplain considerations
    - in some cases, the capacity gained from connecting two cells would be limited due to their geometries and having to avoid the 100-year floodplain
- Federal Aviation Administration (FAA) height limitations due to the nearby Hampton Roads Executive Airport
- structural retaining walls
    - these were considered in multiple areas to support increased waste disposal volumes by building higher instead of wider, therefore reducing the required landfill footprint and wetland impacts. A mechanically stabilized earth (MSE) retaining wall alternates layers of geosynthetic materials and soil to create a near vertical exterior wall, which are usually precast concrete panels or wire mesh. The inboard slope of the MSE wall would include an expansion of the base liner system at stable slopes. A photo of an example MSE wall is shown in Figure 8 below.
- permitting/design and operation
    - approval for some alternatives and modifications to the existing leachate management system to support some alternatives is not certain
    - MSE wall design and permitting would be complicated and regulatory approval is not certain
    - operation would be challenging and would increase safety risks
- perimeter access and waste filling
    - access around the site perimeter would be constrained with the narrow roadway at the top of an MSE; this would complicate the process for filling landfill cells with waste
    - widening the perimeter road to aid in filling landfill cells would add to wetland impacts along the perimeter

- stormwater infrastructure
    - for alternatives that include an MSE component, stormwater runoff from existing side slopes would need to be diverted away from active filling areas below to reduce run-on and leachate production in the MSE wall area
    - for alternatives that include an MSE component, runoff from completed side slopes would require a new perimeter channel and large vertical drain manholes through the berm to discharge collected stormwater

Figure 8. MSE wall

Source: McMahon & Mann Consulting Engineering and Geology, P.C. 2023

Table 1 describes the design considerations that were analyzed as on-site alternatives. A summary of factors considered for each alternative is provided in the comments column. A detailed *On-site Alternatives Technical Memo* is provided in Appendix B and provides additional clarity and detail specific to each design.

Table 1. On-site Alternatives

On-Site Alt #	Alternatives	Net Wetland Savings (AC)	Total Lined Area (AC)	Reduction Volume of Cells VIII & IX	Total Cell Expansion Disposal Volume (CY)	Comments
1	Cells VIII & IX Expansion	-	92.9	-	16,000,000	Conventional design/construction/operation, leachate pump depth manageable, coordinates w/ Cell VII operations, generates soil for operation/construction, straightforward permitting/above confining layer
2	Relocate Natural Gas Main and Overlap onto closed Cells I-IV	16.8	104.3	2,870,000	13,130,000	Timeframe associated with relocating the natural gas main, closure of active cells, and leachate cessation does not meet the Purpose and Need; requires impacts to leachate collection and maintenance and to landfill gas system operation
3	MSE Wall Around South and West Boundary of Cells V & VI	-2.0	89.1	2,200,000	13,800,000	An increase in wetland impacts, impacts to leachate and stormwater infrastructure, perimeter access and waste filling difficult, loss of operating soil for MSE wall build
4	MSE Wall and Gas Main Relocation and fill to 200 ft.	15.5	99.7	5,200,000	10,800,000	Timeframe associated with relocating the natural gas main, closure of active cells, and leachate cessation does not meet the Purpose and Need; requires impacts to leachate and stormwater infrastructure; perimeter access and waste filling difficult; loss of operating soil for MSE wall build
5	MSE Wall and Gas Main Relocation and Fill to 240 ft.	21.3	93.9	6,200,000	9,800,000	Timeframe associated with relocating the natural gas main, closure of active cells, and leachate cessation does not meet the Purpose and Need; requires impacts to leachate and stormwater infrastructure; perimeter access and waste filling difficult; loss of operating soil for MSE wall build
6	Capture Airspace Between Cell V and VII	8.9	87.3	1,520,000	14,480,000	Permitted for construction by DEQ, wetland impact reduction of 8.9 acres, impacts to Cell V leachate and landfill gas infrastructure
7	MSE Wall Around Cells V, VI, and VII	17.3	79.1	5,500,000	10,500,000	Impacts to leachate and stormwater infrastructure, complicated permitting/design and operation, impacts to Cell V leachate and landfill gas infrastructure, loss of operating soil for MSE wall build

On-Site Alt #	Alternatives	Net Wetland Savings (AC)	Total Lined Area (AC)	Reduction Volume of Cells VIII & IX	Total Cell Expansion Disposal Volume (CY)	Comments
8	Construct Cell VIII and Overlap onto Cell VII with Gas Main Relocation	62.4	84.9	9,760,000	6,240,000	Timeframe associated with relocating the natural gas main, closure of active cells, and leachate cessation does not meet the Purpose and Need; requires impacts to leachate and stormwater infrastructure; little overlap available due to floodplain; loss of operating soil for MSE wall build
9	MSE Wall Around Cells V-VII and Gas Main Relocation and Fill to 200 ft.	64.1	85.5	10,360,000	5,640,000	Timeframe associated with relocating the natural gas main, closure of active cells, and leachate cessation does not meet the Purpose and Need; MSE wall on Cell VII provides little value; requires impacts to leachate and stormwater infrastructure; loss of operating soil for MSE wall build
10	10 – 20 ft. High Soil Berm Around Cells VIII - IX	3.2	90.0	-	16,000,000	Conventional design/construction, leachate pump depth at limit of manageable, operational difficulty with safety concerns, loss of operating soil for berm build

Off-site Alternatives Screening Process

An off-site alternatives analysis was performed to support the development of a reasonable range of alternatives by identifying sites other than the existing Regional Landfill that could potentially meet SPSA’s need for expanded waste disposal capacity.

Potential off-site alternatives were evaluated in 4 phases, including the following:

- Phase I – identifying parcels greater than 300 acres (an estimate of parcel size needed to support landfill disposal boundary geometries and supporting infrastructure such as roadways, stormwater management facilities, a scale facility, and operations and vehicle maintenance buildings), along accessible roadways, outside the 100-year floodplain.
- Phase II – evaluating fatal flaws (detailed below) in the sites identified in Phase I.
- Phase III – ranking the remaining sites based on general development criteria.
- Phase IV – further screening the remaining sites based on site-specific development criteria and scoping comments.

Phase I though Phase IV screening analyses were all carried out based on desktop reviews, using the best existing information available at the time of the analysis. The Phase I-III analyses identified 6 sites to be carried forward for further analysis. The Phase IV analysis evaluated and ranked these 6 sites based on site-specific characteristics. Details of the analysis and selection process are documented in the sections below.

Phase I Analysis – Potential Site Identification

Phase I consisted of the identification of parcels that could potentially suit SPSA's needed use and therefore should be carried forward for Phase II analysis. The following criteria were used to locate potentially suitable sites:

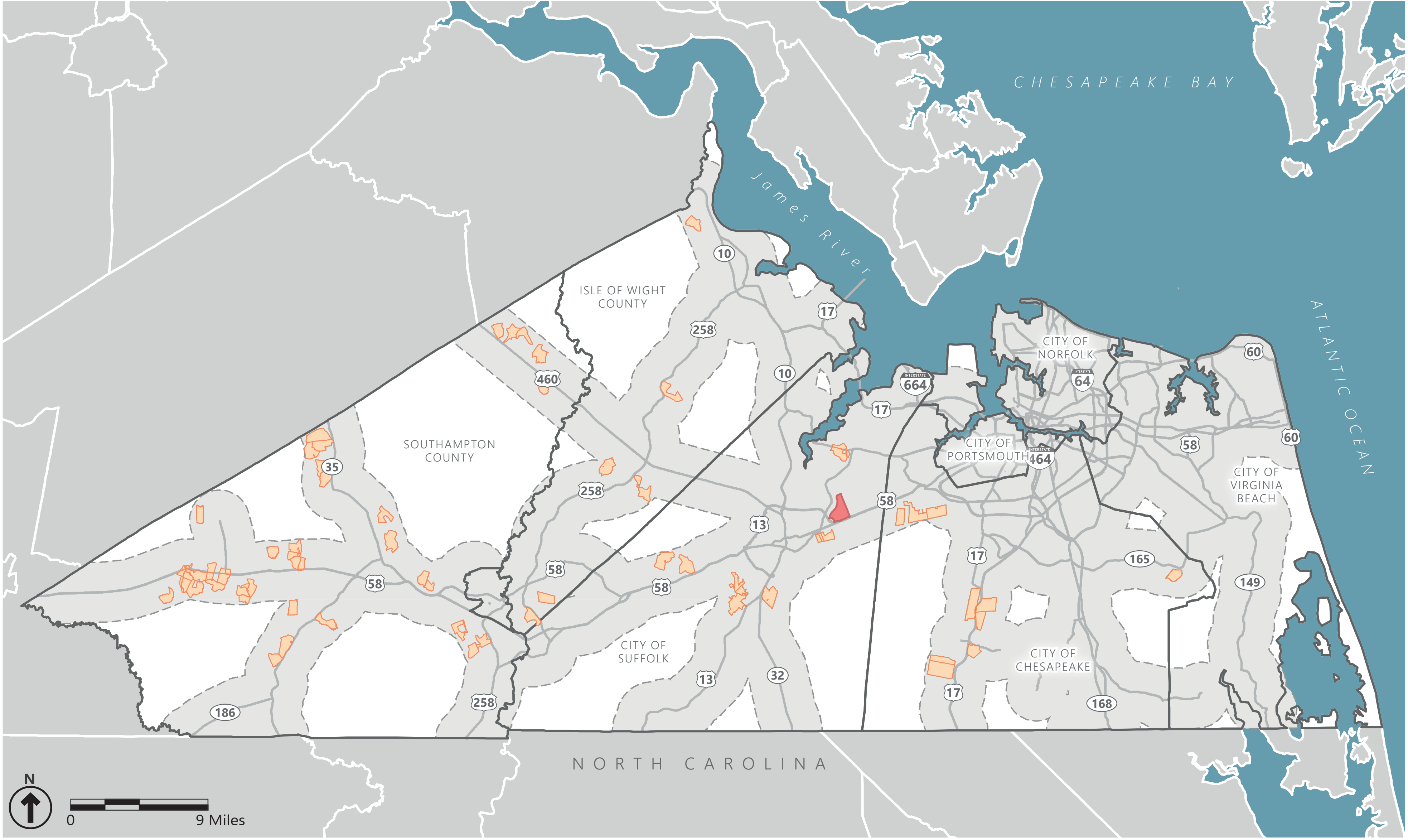
- At least 300 acres of contiguous undeveloped land (can consist of multiple parcels with multiple owners and should be reasonably compact)
- Within the SPSA service area
- Within 2 miles of a major highway corridor (defined as Primary Roads and interstates)
- Outside of the 100-year Floodplain

This selection process identified 58 sites (not including the existing Regional Landfill site) to carry forward into Phase II analysis. The detailed analysis process is provided in the *Off-Site Alternatives Analysis Technical Memo* in Appendix A.

The SPSA service area and 58 sites are shown in Figure 9.

This page intentionally left blank.

Source: VGIN/VBMP GIS Data



LEGEND

▭ County Boundaries within Service Area

🟥 Existing Landfill

🟧 Undeveloped Parcels Larger than 300 Acres (58 Sites)

▨ Search Area

— Roads

🟦 Primary Waterbodies

US Army Corps of Engineers

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

Suffolk, Virginia

FIGURE 9

Phase I Criteria Results

This page intentionally left blank.

Phase II Analysis – Fatal Flaws

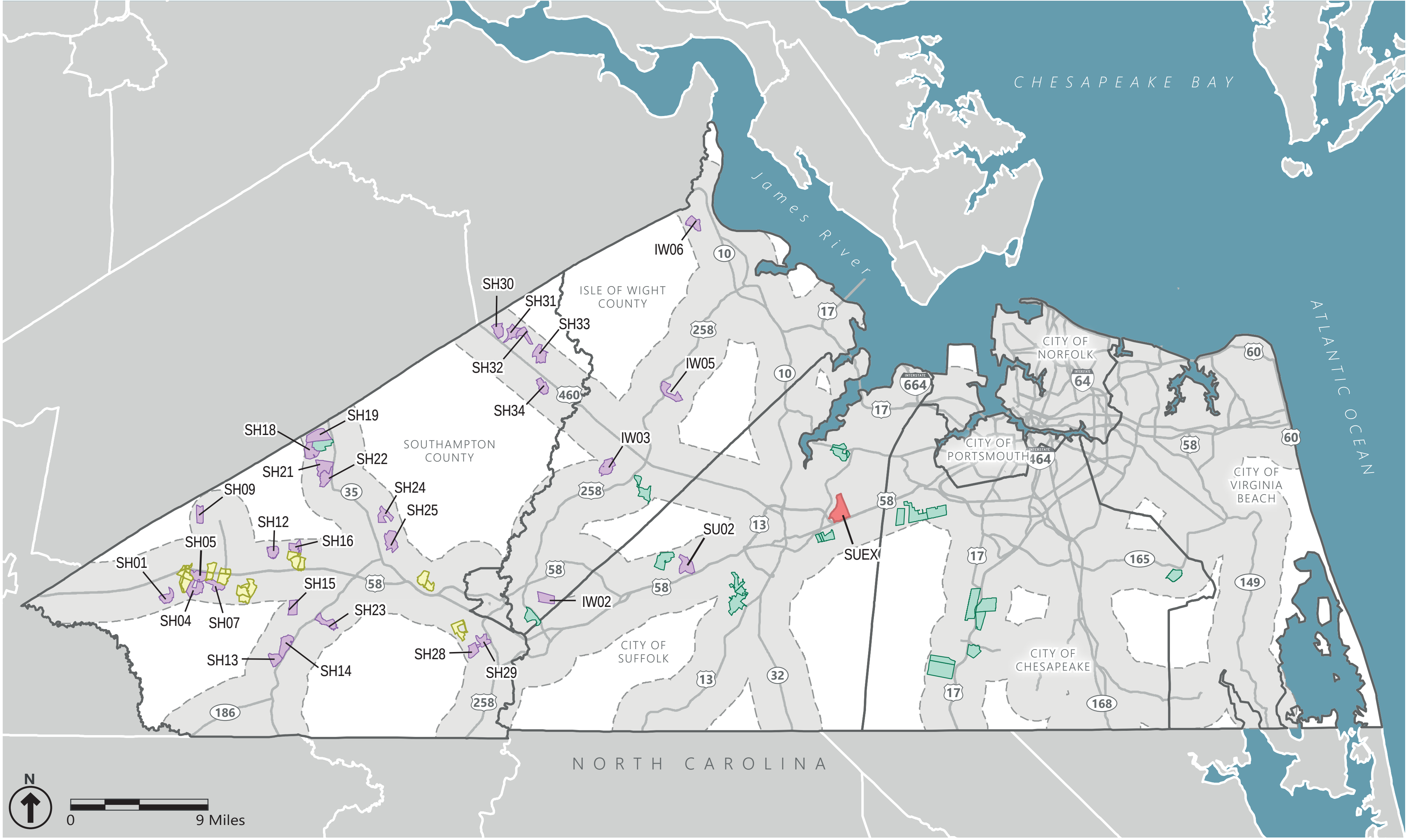
During the Phase II analysis, each of the 58 sites identified in Phase I was then examined for the following fatal flaws:

- Whether it was the current location of an airport or airfield
- Had greater than 124 acres of wetlands based on National Wetland Inventory mapping (the amount of wetlands potentially impacted by SPSA's original proposed action)
- Was bisected by a road or other linear infrastructure

Sites that had at least 1 fatal flaw were removed from further analysis. These eliminated sites are shown in Figure 10, color coded by elimination criteria. Phase II analysis resulted in 29 parcels being carried forward into Phase III of the analysis. These 29 parcels are shown in purple and with an identified site number in Figure 10.

This page intentionally left blank.

Source: VGIN/VBMP GIS Data



LEGEND

- ▭ County Boundaries within Service Area
- 🟥 Existing Landfill
- 🟪 Undeveloped Parcels Larger than 300 acres (58 Sites)
- 🟨 Fatal Flaw - Bisected by Road or Other Linear Infrastructure
- 🟩 Fatal Flaw - Wetlands > 124 acres
- ▨ Search Area
- — Roads
- 🟦 Primary Waterbodies

US Army Corps of Engineers

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

FIGURE 10

Phase II Criteria Results

This page intentionally left blank.

Phase III Analysis – General development criteria analysis

Based on the results of the Phase I and II analyses, 29 sites were carried forward for analysis in Phase III. A system of 14 weighed criteria was used in Phase III to rank these 29 sites. The criteria were based on those identified in the Alternative Landfill Siting Study conducted in 1989 and 1990 by Environmental Engineering & Technology, Inc, supplemented through recent coordination with regulatory agencies. The following 14 criteria were used for Phase III ranking:

- Land use compatibility
- Roadway capacity
- Natural visual screening
- Zoning consistency
- Site configuration
- Site ownership
- Sewer availability
- Wetland impacts (based on estimated total area of wetlands on-site)
- Transportation costs
- Ease of development
- Proximity to airport or airfield
- Cultural resources
- Natural resources
- Environmental justice

Each criterion was assigned a weight reflecting its importance when considering the suitability of a site. Weights ranged from 1 to 5, with 5 being the greatest importance and 1 being the lowest importance. A numeric input was then assigned to the site, using a scale of highly acceptable (+1), acceptable (0), or unfavorable (-1). Finally, a score was assigned to the site by multiplying the weight by the numeric input. Weighted inputs for all 14 categories were then summed and sites were ranked by their total weighted scores (see matrix in Appendix A). The highest possible score that a site could attain is 47.

Additional information on the specifics of each of the criteria reviewed and the assigned weighted values can be found in the *Off-Site Alternatives Analysis Technical Memo* in Appendix A.

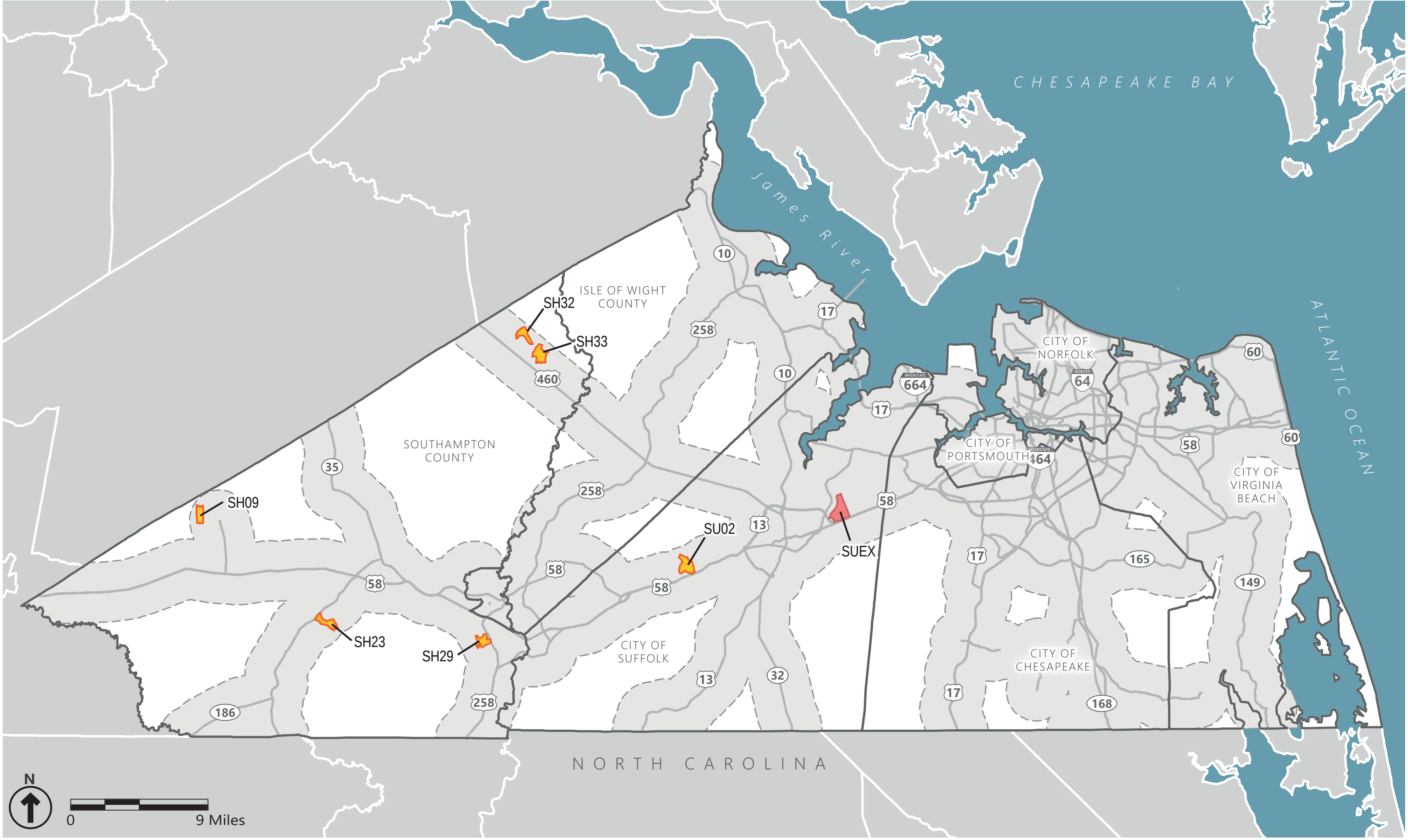
Upon completion of the analysis, 6 sites scored 20 or more points (detailed in Table 2, below). Based on the analysis of the off-site parcels during Phase III, these 6 highest scoring sites were advanced for further study. They are summarized below, ordered by total score in Table 2, and illustrated in Figure 11.

This page intentionally left blank.

Table 2. Top Six Favorability Rankings

Site	Land Use Compatibility	Roadway Capacity	Natural Screening	Zoning Consistency	Site Configuration	Site Ownership	Sewer Availability	Wetland Impact	Transportation Costs	Ease of Development	Proximity to Airport/ Airfield	Historic Site	Natural Resources	Environmental Justice	Total Score
SU02	5	3	3	3	3	1	2	5	2	2	3	-5	5	-5	**27**
SH33	0	0	3	3	3	1	-2	0	2	2	3	5	5	0	**25**
SH23	5	0	0	3	0	1	-2	5	0	2	3	5	5	-5	**22**
SH32	5	0	3	3	0	1	-2	-5	2	2	3	5	5	0	**22**
SH09	5	0	0	3	3	1	-2	5	0	-2	3	5	5	-5	**21**
SH29	5	0	0	3	0	1	-2	5	0	0	3	5	5	-5	**20**

Source: VGIN/VBMP GIS Data



LEGEND

☐ County Boundaries within Service Area

🟥 Existing Landfill

🟨 Parcels Resulting from Phase III Analysis (6 Sites)

▨ Search Area

— Roads

🟦 Primary Waterbodies

US Army Corps of Engineers

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

FIGURE 11

Phase III Criteria Results

Phase IV Analysis – Site-specific criteria analysis

Following the completion of Phase III, further analysis and ranking of the 6 remaining sites were conducted based on site-specific operational opportunities or constraints afforded by each of them. The criteria were selected with consideration of technical landfill siting engineering and design principles. This was performed in 2 steps, Phases IVa and IVb, separated by a period of public scoping, as described below. The following 9 criteria were used for Phase IV ranking:

- Wetland impacts (based on conceptual landfill footprint)
- Stream impacts
- Proximity to residential land uses
- Soil balance
- Leachate management
- Development flexibility
- Waste hauling
- Landowner, community, or local government concerns
- Site access

Phase IVa – Conceptual Footprint Analysis

As a first step, the analysis evaluated whether each site could accommodate a landfill of sufficient size to meet the proposed expansion's purpose and need (16 million CY capacity), while minimizing impacts on wetlands. Towards that end, wetlands on each site were mapped using the best available mapping and data including National Wetlands Inventory (NWI), soils, aerial color infrared, true color aerial photography, and data pertaining to topography (LiDAR) survey (some limited, high-level ground-truthing was conducted for Site SU02 only; owners denied access to all other sites). Next, high-level conceptual landfill footprints were developed and overlain on each site in a manner that minimized wetland impacts. The conceptual footprints included waste disposal footprint, supporting facilities, borrow and stockpiling areas, stormwater management areas, and access roads.

The high-level concept drawings are available in the *Off-Site Alternatives Analysis Technical Memo* in Appendix A. Phase IVa screening showed that all 6 sites could accommodate a landfill of the requisite size with less impact to wetlands than the proposed expansion at the existing SPSA landfill. Therefore, none of the 6 sites were eliminated at this stage.

Comments were received from multiple parties during 2 30-day scoping periods, from July 24, 2020, through September 8, 2020, followed by an alternatives-focused scoping period from December 17, 2020, through January 18, 2021. The alternatives scoping period included information described in Phase I through Phase IVa. After the alternatives scoping period concluded, the Phase IVb screening was performed.

Phase IVb – Site Ranking Analysis

During Phase IVb, the 6 sites were evaluated and ranked according to the following criteria:

- Total wetland impacts – estimates of wetland impacts developed through Phase IVa analysis were ranked from the lowest (ranked first) to the highest (ranked last) acreage of impacted wetlands.
- Stream impacts – estimates of stream impacts were measured based on the conceptual footprint analysis in Phase IVa, ranked from shortest (ranked first) to longest (ranked last) length of stream affected.
- Proximity to residential land uses – the number of residential parcels within a 1-mile radius of a central point located within the conceptual disposal footprint.
- Soil balance – an estimate of the amount of soil needed to operate the landfill (estimated at approximately 20% of total landfill capacity; soil is used as cover material to build up the cells as waste is added) compared to the amount of borrowed soil each site is anticipated to yield.
- Leachate management – the distance in miles from each site to the nearest potentially usable leachate discharge point.
- Development flexibility – sites with additional areas of upland that can be used to provide design flexibility.
- Waste hauling – measured in million truck miles traveled every year to transport waste from its origin to the alternative sites.
- Landowner, community, or local government concerns – scoping comments and feedback from site owners were organized into 3 broad categories: supportive, cautionary, or hostile, with sites receiving supportive comments ranking higher than those that elicited hostile comments.
- Site access – measured in miles to the nearest 4-lane roadway, with sites ranked from closest to a 4-lane roadway (ranked first) to farthest (ranked last).

Phase IV Analysis Results

A point system was used to obtain a total ranking for each site. When ranked first, a site was awarded 6 points; when ranked second, it was awarded 5 points; when ranked third, it was awarded 4 points; and so on. When ranked sixth, a site was awarded 1 point.

The points assigned for each criterion were then added together to generate a total score for each site. The sites were then assigned a final rank based on the score, as shown in Table 3 below. With a score of 49, Site SU02 ranked first.

Table 3. Phase IV Ranked Summary Results

Site	Total Score	Rank
SU02	49	1

Site	Total Score	Rank
SH33	33	3
SH23	37	2
SH09	29	6
SH32	30	5
SH29	31	4

Upon the conclusion of the off-site Phase I-IV alternatives analyses, the Norfolk District decided that all 6 identified top sites should be considered reasonable alternatives. Subsequent to Phase IVb screening, more detailed analyses were performed, including more comprehensive field reviews where site access was allowed. Progressions in landfill design and accommodations for wetland avoidance supported a greater understanding of the total amount of wetland potentially impacted.

Property Owner Outreach and Municipal Response

Initial Outreach

The Norfolk District also undertook an effort to confirm the availability, and thus the practicability, of each site via property owner outreach. The Norfolk District sent 2 rounds of letters to property owners via certified mail to enable certified receipt. All letters were documented as received through the certified mail process. The first round of letters was sent to the owners of Sites SU02, SH33, SH23, SH09, SH32, and SH29 in September 2020, notifying them that their property met the Norfolk District's Phase IV criteria based on an initial desktop review. These letters also requested short-term access to the properties to conduct high-level walkover surveys of wetlands. The second round of letters was sent in November 2021 to landowners who did not have an opposing reaction to the first round of letters and whom the Norfolk District had not already confirmed an interest in selling (i.e., Site SU02). This second round of letters specifically requested information about the property owner's interest in and willingness to sell their property for potential landfill expansion. During the outreach period, the Norfolk District also tried to follow up with unresponsive property owners by phone.

During the scoping process, all municipalities in which one of the top 6 sites were located were contacted for comment. Municipal feedback was documented in scoping comments received. The City of Suffolk provided additional feedback via letter in March 2022, expressing its concern over the Corps' consideration of Site SU02 as an alternative site. Table 4 below outlines site characteristics, county input received during public scoping as well as outside of the scoping periods, and property owner responses for each off-site alternative.

This page intentionally left blank.

Table 4. Off-site Alternatives Characteristics and Outreach Details

Alternative Name	Zoning District	Parcel Size (acres)	Total Wetland Impacts (acres)	County Comments	Property Owner Response
Site SU02	Agricultural	~546.0	~74.9 Based on desktop and limited field review	› Site is not located in the proper zoning district for a landfill. In order to develop landfill, site needs to be rezoned and a CUP approved for the landfill (see letter for specific requirements of the conditional use). › Selection of site does not eliminate the necessity of condemnation proceedings, which could displace families from their homes. › It is not reasonable to assume that Suffolk's city council would approve an amendment to the Comprehensive Plan, a rezoning, and a CUP. › The existing road configuration is not sufficient for traffic associated with a landfill; thus, extensive road improvements would be necessary to mitigate traffic conflicts and ensure safety.	› Provided access to property › Interested in the property being considered as an alternative landfill site and likely willing to sell

Alternative Name	Zoning District	Parcel Size (acres)	Total Wetland Impacts (acres)	County Comments	Property Owner Response
Site SH23	Agricultural A-1	~391	~10.1 Based on desktop review only	› Landfills are permitted, with CUP › A landfill at this site is generally inconsistent with the county's future plans and current ordinances › County administrator noted that site has a very low probability of obtaining necessary approvals	› Norfolk District sent certified mail access request letter in September 2020 – no response received*, thus, property access not granted › Norfolk District sent scoping letter in December 2020 – no response received* › Norfolk District sent follow-up access request letter in May 2021 – no response received* › Norfolk District unable to contact via phone or leave message (voice mailbox full) › Norfolk District sent landowner interest and willingness letter in November 2021 – no response received*

Alternative Name	Zoning District	Parcel Size (acres)	Total Wetland Impacts (acres)	County Comments	Property Owner Response
Site SH09	Agricultural A-1	~324	~18.7 Based on desktop review only	› Landfills are permitted, with CUP › A landfill at this site is generally inconsistent with the county's future plans and current ordinances › County administrator noted that site has a very low probability of obtaining necessary approvals	› Norfolk District sent access request letter in September 2020 – owner denied access to property in writing › For further consideration, owner required Norfolk District to outline its legal support for the request to access the site, as owner considered request to access property an invasion of property rights › Norfolk District unable to contact via phone (number not in service) › Norfolk District sent landowner interest and willingness letter in November 2021 – no response received*

Alternative Name	Zoning District	Parcel Size (acres)	Total Wetland Impacts (acres)	County Comments	Property Owner Response
Site SH33	Agricultural A-2	~474	~9.0 Based on desktop review only	› This zoning designation is intended to provide for gradual extension of single family residential and other appropriate development where urban services are planned › Part of a Voluntary Agricultural and Forestal District › Landfill at this site would require amendment to the Comprehensive Plan and zoning map, issuance of a CUP, and prior approval to develop property to a use more intensive than existing use › A landfill at this site is wholly inconsistent with the county's future plans and current ordinances › County administrator noted that site has an extremely low probability of obtaining necessary approvals	› Norfolk District sent access request letter in September 2020 – owner denied access to property in writing and verbally › Concern about threatened and endangered species implications › Did not want Norfolk District to consider property as an alternative site for the landfill › Only way for Norfolk District to obtain land is through eminent domain › Threatened legal action if Norfolk District entered land › Obtained legal counsel and committed to keeping the Norfolk District off of property

Alternative Name	Zoning District	Parcel Size (acres)	Total Wetland Impacts (acres)	County Comments	Property Owner Response
Site SH32	Agricultural A-1	~311	~38.6 Based on desktop review only	› Borders an Agricultural A-2 district which is intended to provide for gradual extension of single family residential and other appropriate development where urban services are planned › Landfills are permitted, with CUP › A landfill at this site is generally inconsistent w/the county's future plans and current ordinances › County administrator noted that site has a very low probability of obtaining necessary approvals	› Norfolk District sent access request letter in September 2020 – owner denied access to property in writing › Norfolk District unable to contact via phone or leave message (no answering machine) › Norfolk District sent landowner interest and willingness letter in November 2021 – no response received*

Alternative Name	Zoning District	Parcel Size (acres)	Total Wetland Impacts (acres)	County Comments	Property Owner Response
Site SH29	Agricultural A-1	~176	~51.0 Based on desktop review only	› Landfills are permitted, with CUP › A landfill at this site is generally inconsistent with the county's future plans and current ordinances › County administrator noted that site has a very low probability of obtaining necessary approvals › Generally encompassed by the Riverdale Voluntary Agricultural and Forestal District › Approximately 1 mile southwest of the corporate limits of the City of Franklin and its accompanying centers of commerce and residential subdivisions › Prevailing winds in Southampton county are generally from the west-southwest	› Norfolk District sent access request letter in September 2020 – owner denied access to property in writing › Norfolk District left detailed voice message – no response* › Norfolk District sent landowner interest and willingness letter in November 2021 – received written response indicating not willing to sell property in support of a landfill expansion project

* If no response was received from the property owner, the Norfolk District interpreted this to mean that the property owner was not interested in providing access or selling.

Subsequent Property Owner Outreach

Throughout the environmental review process, the Corps consulted with the U.S. Environmental Protection Agency (EPA) regarding its approach for analyzing alternatives. After further analysis of Site SU02, the Norfolk District determined that development of this site would result in greater wetland impacts than that of the proposed action (see "Site SU02 Analysis and Dismissal" section below). Because property owners of the 5 other sites that were analyzed in Phase IV did not grant access to their property or were non-responsive, EPA recommended that the Corps identify additional sites for consideration, by revisiting sites that were considered in Phase III of the off-site alternatives screening process. Therefore, in an effort to identify a site with fewer wetland impacts than the proposed action, the Corps reconsidered 10 additional sites that received lower scores than the initial top 6 ranked sites, in order to understand landowner interest and willingness to potentially sell their property in support of a regional landfill expansion project. Certified letters were sent in May 2022 to sites identified as SH01, SH13, SH19, SH24, IW02, SH30, SH25, SH05, SH31 and SH07, illustrated on Figure 10.

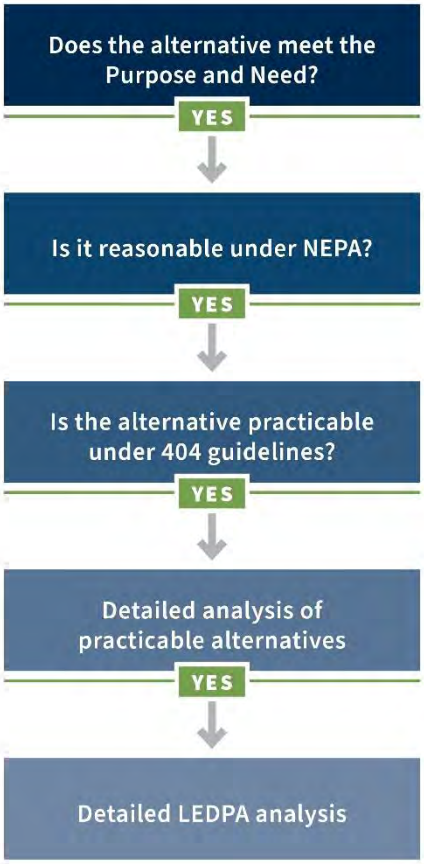
The property owner of site SH30 responded and expressed an interest in selling. Access to the property was allowed and more comprehensive field reviews were conducted. In total, 16 property owners were contacted via certified mail and 2 responded with an interest in selling during the initial and subsequent outreach periods.

Alternatives Refined

As specified in 40 CFR 1502.14(a) and Corps regulations (40 CFR 1508 and 33 CFR Part 325 Appendix B) the Corps is required to evaluate alternatives to the project that are considered reasonable. Through the alternatives analysis, the Norfolk District determined that all 10 on-site alternatives were considered reasonable. Of the 58 sites originally identified in the off-site Phase I screening, only those that were carried forward into Phase IV screening were considered reasonable. Reasonable alternatives are defined as those that are technically and economically feasible, meet the purpose and need for the proposed action, and, where applicable, meet the goals of the applicant (40 CFR 1508). The Phase III analysis was used to determine which sites could be technically and economically feasible.

A sequential process was developed in conjunction with CEQ, Corps NEPA Implementation Procedures for the Regulatory Program, and 404(B)(1) guidelines to eliminate alternatives from further evaluation. The sequence of steps to refine alternatives to carry forward into detailed analysis are illustrated in Figure 12 below.

Figure 12. Alternatives Refinement Flowchart



Each step in the flowchart in Figure 12 must be met before a site can continue through to the next stage of evaluation. The practicability analysis section below further defines practicability and describes why some alternatives were eliminated from further review.

Practicability Analysis

The Corps 404 (b)(1) guidelines (guidelines) state that an alternative is practicable if it is “available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.”

As described in the property owner outreach subsections above, only 2 landowners are willing to potentially sell their property to support regional landfilling needs. Unwillingness to sell alone, however, does not render an alternative impractical. The guidelines state that if it “is an otherwise practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered.”

SPSA is a semi-governmental agency that has the authority to acquire property for public use through eminent domain. In order to construct a landfill on property acquired through eminent domain, the construction must also be consistent with local zoning ordinances and SPSA must obtain any necessary local approvals.

Construction of a landfill at any of the off-site alternatives in Southampton County would require at minimum, the issuance of a CUP, and—for several sites—additional approvals or zoning changes would be required before a CUP could be granted. Outreach responses received from Southampton County state that construction of a landfill at the off-site locations in question would be inconsistent with future plans and current ordinances. The Southampton County administrator has noted in writing that there is a very low probability of obtaining necessary approvals at the municipal level.

Similarly, in the City of Suffolk, even if SPSA used its eminent domain authority, rezoning approval and issuance of a CUP would be required. Like Southampton County, the City of Suffolk's outreach responses state that construction of a landfill at the off-site locations in question would be inconsistent with future plans and current ordinances. The Suffolk City Manager's office has stated in writing that the City would not support development of a second landfill within its municipal boundaries. The Norfolk District has evaluated the considerable time and costs associated with SPSA's use of eminent domain authority, the lack of project support for off-site locations within the City of Suffolk and Southampton County, and the need to obtain a CUP, zoning changes, or other approvals for construction, and determined that the off-site locations without a landowner that is willing to sell are impractical and may therefore be eliminated from further analysis. Though SPSA could conceivably obtain off-site locations through eminent domain, these locations could not reasonably be expected to fulfill the purpose of the proposed activity without support by local government.

Table 5 provides a summary of considerations applied to determine which alternatives should be eliminated.

This page intentionally left blank.

Table 5. Alternatives Considered Summary

Alternative	P&N?	Reasonable?[2]	Practicable?[3]	Reason
Original Proposed (On-site Alt #1)	Y	Y	Y	Conventional design/construction/operation, leachate pump depth manageable, coordinates w/ Cell VII operations, generates soil for operation/construction, straightforward permitting/above confining layer. Retained for analysis in the EIS
On-site Alt #2	N	Y	N	Timeframe associated with relocating the natural gas main, closure of active cells, and leachate cessation does not meet the Purpose and Need; requires impacts to leachate collection and maintenance and to landfill gas system operation
On-site Alt #3	Y	Y	N	An increase in wetland impacts, impacts to leachate and stormwater infrastructure, perimeter access and waste filling difficult, loss of operating soil for MSE wall build

---

[2] Reasonable alternatives means a reasonable range of alternatives that are technically and economically feasible, meet the purpose and need for the proposed action, and, where applicable, meet the goals of the applicant (40 CFR 1508).

[3] Practicable is defined as meaning the alternative is available, and capable of being done after taking into consideration cost, existing technology, and/or logistics in light of the overall project purpose (40 CFR 230.10(a)).

Alternative	P&N?	Reasonable?[2]	Practicable?[3]	Reason
On-site Alt #4	N	Y	N	Timeframe associated with relocating the natural gas main, closure of active cells, and leachate cessation does not meet the Purpose and Need; requires impacts to leachate and stormwater infrastructure; perimeter access and waste filling difficult; loss of operating soil for MSE wall build
On-site Alt #5	N	Y	N	Timeframe associated with relocating the natural gas main, closure of active cells, and leachate cessation does not meet the Purpose and Need; requires impacts to leachate and stormwater infrastructure; perimeter access and waste filling difficult; loss of operating soil for MSE wall build
Airspace between Cells V and VI (On-site Alt #6 – Applicant's Preferred)	Y	Y	Y	Permitted for construction by DEQ, wetland impact reduction of 8.9 acres, impacts to Cell V leachate and landfill gas infrastructure. Retained for analysis in the EIS
On-site Alt #7	Y	Y	N	Impacts to leachate and stormwater infrastructure, complicated permitting/design and operation, impacts to Cell V leachate and landfill gas infrastructure, loss of operating soil for MSE wall build
On-site Alt #8	N	Y	N	Timeframe associated with relocating the natural gas main, closure of active

Alternative	P&N?	Reasonable?[2]	Practicable?[3]	Reason
				cells, and leachate cessation does not meet the Purpose and Need; requires impacts to leachate and stormwater infrastructure; little overlap available due to floodplain; loss of operating soil for MSE wall build
On-site Alt #9	N	Y	N	Timeframe associated with relocating the natural gas main, closure of active cells, and leachate cessation does not meet the Purpose and Need; MSE wall on Cell VII provides little value; requires impacts to leachate and stormwater infrastructure; loss of operating soil for MSE wall build
On-site Alt #10	Y	Y	N	Conventional design/construction; leachate pump depth at limit of manageable; operational difficulty with safety concerns; loss of operating soil for berm build
Alternative technologies	N	N	N	This as a standalone alternative would not provide adequate waste disposal capacity[4]
SU02	Y	Y	Y	Considered but dismissed from detailed analysis in the EIS

---

[4] Additional discussion describing why this alternative was dismissed is provided in the sections following this table.

Alternative	P&N?	Reasonable?[2]	Practicable?[3]	Reason
SH01	Y	N	N	Did not pass Phase III analysis
SH02	Y	N	N	Did not pass Phase II analysis
SH03	Y	N	N	Did not pass Phase II analysis
SH04	Y	N	N	Did not pass Phase III analysis
SH05	Y	N	N	Did not pass Phase III analysis
SH09	Y	Y	N	Eliminated through practicability analysis
SH06	Y	N	N	Did not pass Phase II analysis
SH07	Y	N	N	Did not pass Phase III analysis
SH08	Y	N	N	Did not pass Phase II analysis
SH10	Y	N	N	Did not pass Phase II analysis
SH11	Y	N	N	Did not pass Phase II analysis
SH12	Y	N	N	Did not pass Phase III analysis
SH13	Y	N	N	Did not pass Phase III analysis
SH14	Y	N	N	Did not pass Phase III analysis

Alternative	P&N?	Reasonable?[2]	Practicable?[3]	Reason
SH15	Y	N	N	Did not pass Phase III analysis
SH16	Y	N	N	Did not pass Phase III analysis
SH17	Y	N	N	Did not pass Phase II analysis
SH18	Y	N	N	Did not pass Phase III analysis
SH19	Y	N	N	Did not pass Phase III analysis
SH20	Y	N	N	Did not pass Phase II analysis
SH21	Y	N	N	Did not pass Phase III analysis
SH22	Y	N	N	Did not pass Phase III analysis
SH23	Y	Y	N	Eliminated through practicability analysis
SH24	Y	N	N	Did not pass Phase III analysis
SH25	Y	N	N	Did not pass Phase III analysis
SH26	Y	N	N	Did not pass Phase II analysis
SH27	Y	N	N	Did not pass Phase II analysis
SH28	Y	N	N	Did not pass Phase III analysis

Alternative	P&N?	Reasonable?[2]	Practicable?[3]	Reason
SH29	Y	Y	N	Eliminated through practicability analysis
SH30	Y	Y	Y	Conventional design/construction/operation, leachate pump depth manageable; landowner willing to sell property Retained for analysis in the EIS
SH31	Y	N	N	Did not pass Phase III analysis
SH32	Y	Y	N	Eliminated through practicability analysis
IW01	Y	N	N	Did not pass Phase II analysis
SH33	Y	Y	N	Eliminated through practicability analysis
SH34	Y	N	N	Did not pass Phase III analysis
IW02	Y	N	N	Did not pass Phase III analysis
IW03	Y	N	N	Did not pass Phase III analysis
IW04	Y	N	N	Did not pass Phase II analysis
SU01	Y	N	N	Did not pass Phase II analysis

Alternative	P&N?	Reasonable?[2]	Practicable?[3]	Reason
IW05	Y	N	N	Did not pass Phase III analysis
IW06	Y	N	N	Did not pass Phase III analysis
SU03	Y	N	N	Did not pass Phase II analysis
SU04	Y	N	N	Did not pass Phase II analysis
SU05	Y	N	N	Did not pass Phase II analysis
SU06	Y	N	N	Did not pass Phase II analysis
SU07	Y	N	N	Did not pass Phase II analysis
CH01	Y	N	N	Did not pass Phase II analysis
CH02	Y	N	N	Did not pass Phase II analysis
CH03	Y	N	N	Did not pass Phase II analysis
CH04	Y	N	N	Did not pass Phase II analysis
CH05	Y	N	N	Did not pass Phase II analysis
CH06	Y	N	N	Did not pass Phase II analysis
CH07	Y	N	N	Did not pass Phase II analysis

Alternative	P&N?	Reasonable?[2]	Practicable?[3]	Reason
CH08	Y	N	N	Did not pass Phase II analysis
CH09	Y	N	N	Did not pass Phase II analysis
CH10	Y	N	N	Did not pass Phase II analysis
VB01	Y	N	N	Did not pass Phase II analysis

Source: SPSA 2021e

Practicable alternatives are analyzed in detail in Chapter 3[5].

---

[5] Site SU02 is not further analyzed in Chapter 3 because it was dismissed from detailed analysis. The rationale for this dismissal is described in the subsequent section, “Alternatives Considered but Dismissed.”

Alternatives Considered but Dismissed

Alternatives or alternative elements that were considered but are not technically or economically feasible, do not meet the purpose of and need for taking action, or create unnecessary or excessive adverse impacts on resources were dismissed from detailed analysis. These alternatives or alternative elements are discussed below.

Additionally, state laws as they relate to solid waste management strategy were reviewed and are described herein. The laws of Virginia mandate the development and adoption of a solid waste management plan by all local governments in the Commonwealth. The HRPDC is the agency responsible for preparing the solid waste management plan in southeastern Virginia. A regional solid waste management plan has been prepared and subsequently amended by the HRPDC in cooperation with SPSA and the member local governments. The *Regional Solid Waste Management Plan for Southeastern Virginia* (HRPDC 2020) establishes a framework by which this region can meet the state-mandated planning requirements and recycling goals as well as the long-term waste management needs of this region. The solid waste management plan must address six policy areas specified in state law. These six policy areas include:

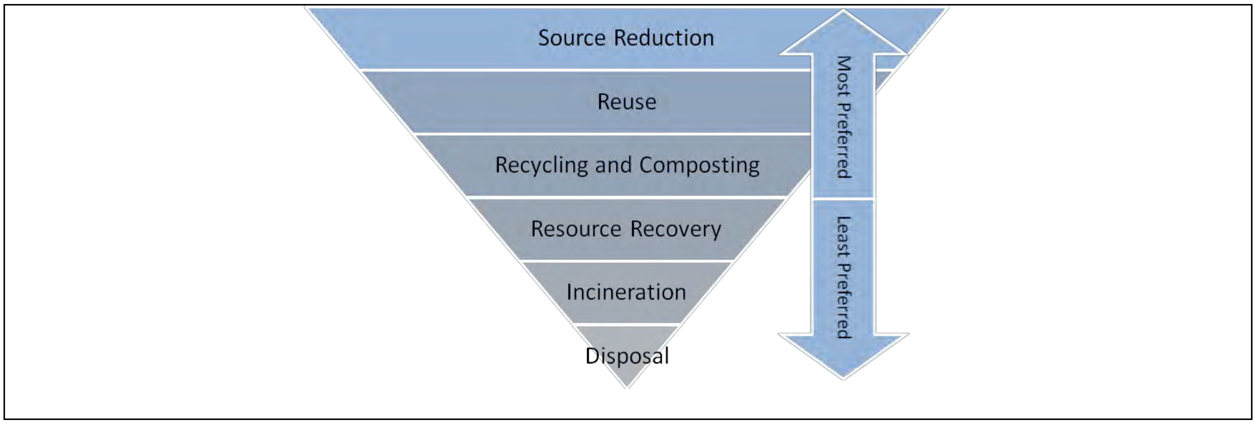
1. Source Reduction
2. Reuse
3. Recycling
4. Resource Recovery (Waste to Energy)
5. Incineration
6. Landfilling

The plan must give preference to lower numbered policy areas over higher numbered policy areas. These policy areas are based upon the widely accepted waste management hierarchy, originally conceived by the U.S. Environmental Protection Agency and embodied in the Virginia Solid Waste Management Regulations. The hierarchy encourages communities to develop policies that rank the most environmentally sound strategies for management of solid waste (see Figure 13):

- First, Reduce and Reuse – Efforts to prevent the creation of waste should precede other waste management options that deal with the waste after it is generated, as in recycling. The underlying thought is that solid waste that is not produced does not require management.
- Second, Recycle and Compost – This level includes recycling and composting. These techniques have the potential to divert large amounts of waste from disposal and turn them into valuable products. Through these techniques, waste materials can potentially go through several cycles of use, conserving raw materials and energy in the process.

- Third, Recover Energy – This level of the hierarchy also uses waste as a resource, but essentially the material can only be used once. The highest use becomes energy production.
- Finally, Dispose – After the first levels of the hierarchy are maximized, there may be residual solid waste left to manage. This material must be disposed of in an environmentally safe manner, through incineration or landfilling at a permitted facility.

Figure 13. Waste Management Hierarchy



Source: HRPDC 2020

In addition to addressing these policy areas, the plan must develop future estimates of waste generation and present how the region anticipates meeting future solid waste needs.

Alternative Technologies

The alternative waste management technologies listed below will continue in operation and are supplemental to landfilling (see the “Elements Common to All Alternatives” section). They cannot, however, either alone or in combination with one another, meet the project Purpose and Need as standalone alternatives because they do not provide SPSA with sufficient waste disposal capacity for the next 40 years (16 million CY of waste disposal capacity). As illustrated in Figure 13, disposal capacity is a necessary component of waste management planning.

SPSA continues to seek alternative technologies to reduce the volume of waste that is ultimately landfilled. Contractual examples include its relationship with Wheelabrator and the multiple RFPs it has issued over the last 10 years in an effort to partner with private enterprises to reduce landfill waste volume. After selling its waste-to-energy plant to Wheelabrator in 2010, SPSA contracted with Wheelabrator for their services and continued to deliver the bulk of the waste it received to the plant (HRPDC 2020). In 2016, SPSA issued an RFP for waste disposal services post-2018 in order to provide its member communities with additional options, in anticipation of new Use and Support

Agreements. The intent of the RFP was to establish a contract for the processing, recycling, and/or disposal of 100% of the waste received at SPSA beginning in 2018 and with the possibility of entering in contract with more than one vendor. SPSA's Board elected to enter into a contract with Re-Power South, but discovered during contract negotiations that Re-Power did not have a viable off-taker for the end product of their process. Thus, the contract was never executed due to Re-Power's inability to meet its obligation. SPSA issued another RFP for waste disposal services in 2017, designed to reduce waste entering the landfill. Wheelabrator and Republic Landfill were the only respondents (Republic Landfill does not offer any alternative form of waste disposal other than landfilling). SPSA re-negotiated with Wheelabrator to continue to process more than 80% of the area's MSW under a contract through 2027 with two renewal terms. However, due to the U.S. Navy ending its contract for steam, Wheelabrator will be closing its facility in 2024. As discussed under the "Regional Landfill Capacity" section above, SPSA will issue another RFP in anticipation of this closing, seeking alternative options. SPSA continues to seek relationships with providers of innovative technologies and is willing to explore any and all viable opportunities to use alternative solutions to landfilling. In 2021, the SPSA Board of Directors invited Mr. Ray Crabbs, President and CEO of Chesapeake IBC Renewables, to present a new, never been used technology for converting waste to biofuels. The SPSA Board remains open to updates regarding new technology development and progress on implementation (SPSA 2021f).

Although the following waste management technologies were eliminated from detailed analysis as standalone options, SPSA will continue to implement and support (e.g., for recycling and composting programs it does not manage) these technologies as often as possible in order to reduce the volume of its incoming waste stream and preserve the life of existing cells for as long as possible.

Source reduction and materials reuse

This approach reduces the amount of waste requiring disposal, which can help prolong the life of the existing landfill cell (Cell VI) and conserving airspace. According to the *Regional Solid Waste Management Plan for Southeastern Virginia* (HRPDC 2020), source reduction has typically been used for industrial and hazardous waste applications. Reuse assumes the reuse of a material in a manner identical to its original use. Source reduction and materials reuse, however, do not eliminate the need for other waste disposal options. The SPSA Board of Directors is in the beginning stages of considering a yard waste, composting, and organics program, which could reduce the total amount of waste entering the Regional Landfill. Successful implementation of the program would require extensive cooperation from SPSA's member communities. Another method for source reduction is by diverting food waste from the waste stream. This is currently a function of the HRPDC, but as noted above, SPSA has begun to consider a composting and organics program. Previously, it has been in the best financial interest of member communities to manage these programs at the municipal level because it generated revenue for the locality and reduced the waste tonnage amount provided to SPSA, thereby reducing the municipality's costs for disposal.

Recycling and composting

Recycling and composting help divert large volumes of waste from disposal. Recycling allows materials to go through several cycles of use. This approach also helps conserve raw materials and energy in the process and reduces the amount of solid waste requiring disposal. Composting is also a useful alternative for managing yard and food waste and turning them into useful products. Residential recycling programs are managed and administered by member localities and are not under SPSA's jurisdiction. Specifically, the Use and Support Agreements that SPSA holds with each of its 8 member localities—which dictate the type of services SPSA provides for its member communities—stipulate that SPSA is responsible for managing municipal solid waste, the definition of which excludes recyclable waste. SPSA previously provided recycling services for its member localities but discontinued this service in 2010, at which time this service was transitioned to the localities (HRPDC 2016). SPSA discontinued its recycling programs in order to cut its costs and streamline operations (Harper 2010). At the time, member localities were incentivized to maintain recycling programs in order to keep as much out of the waste stream as possible, given SPSA's high disposal fees (Harper 2010). The more trash generated by a municipality, the higher the fee it pays to SPSA because municipalities are charged by the ton for solid waste. Fees paid to SPSA cover the increased number of trucks and sanitation workers needed to haul the waste away. With higher waste disposal fees from SPSA, municipalities pass these costs onto taxpayers; therefore, localities were incentivized to reduce the waste stream as much as possible to keep their waste fees to a minimum. For instance, in 2014, the city of Portsmouth saved $1.2 million in disposal fees by encouraging recycling. Even if SPSA could resume this responsibility, it would still need to pursue landfill expansion to address the need for 40 years of capacity for post-recycling waste disposal. While increases in recycling tonnages would potentially reduce the need for landfill space, it would not eliminate it entirely. Furthermore, the market for certain recyclable goods has dwindled in recent years. Specifically, the market for plastics is nearly non-existent and not economical; it is often cheaper for manufacturing companies to buy new plastic than it is to buy recycled plastic (ABC News 2022). Of 51 million tons of plastic produced by U.S. households in 2021, only 2.4 million tons (or less than 5%) of that volume was actually recycled (ABC News 2022). This is partially attributable to changing market conditions in China, which, along with many Southeast Asian countries, was the primary off-taker of U.S. recyclable material (DelBel 2022). These countries would process the recyclables and the U.S. would then buy them back as raw goods; however, due to Chinese policy changes, this market is no longer viable (DelBel 2022). Thus, the City of Chesapeake discontinued its curbside recycling program in 2022, giving residents the option to instead dispose of their recyclables in household garbage, contract with a private recycling company for pickup, or take their recyclables to drop-off sites located throughout the city. Nevertheless, SPSA strongly supports recycling initiatives, composting, and innovations to reduce the amount of waste to be landfilled. As noted above, SPSA's Board of Directors is in the beginning stages of considering a yard waste, composting, and organics program, which could reduce the total amount of waste entering the Regional Landfill.

SPSA operates a Tire Processing Facility at the Regional Landfill that recycles used tires from community members and commercial sources. Tires are cut up in a shredder and can then be repurposed as daily cover at the Regional Landfill or to repair access roads. SPSA also offers scrap metal collection on-site, where metal parts and appliances can be dropped off for recycling. Scrap metal is stored at the Regional Landfill until it is eventually transported to recycling facilities.

Resource recovery (including waste incineration)

Resource recovery approaches use waste as a resource, often for energy production. Combustible items are burned as a fuel to produce steam or electricity. As described in Chapter 1, under the terms of SPSA's agreement with Wheelabrator, SPSA delivers some of the municipal solid waste it controls to the RDF plant for conversion to fuel. Approximately 83% of all the waste that comes through SPSA facilities is processed through the Wheelabrator plant where the waste is incinerated. The process results in 211,236 megawatts of electricity which can be sold to the grid and 360,024 pounds of steam which is currently being sold to the U.S. Navy (SPSA 2022b). This process has dramatically extended the availability of airspace in Cells V and VI. Noncombustible items such as the ash residue, is transported to the Regional Landfill for beneficial use as an alternative daily cover or for disposal, depending on its quality. Although the Wheelabrator plant reduces the volume of waste requiring disposal, it does not eliminate the need for landfilling entirely. Landfill gas is also extracted from waste that is placed in the landfill. The resultant energy provides fuel for local processing plants and creates electricity that can be sold back to the grid.

Recyclable materials, typically glass, ferrous metals, and aluminum, are recycled following separation. Recycling and source reduction programs may enhance the effectiveness of the combustion alternatives.

With the anticipated closure of Wheelabrator in 2024 (as described above under "Project Background"), SPSA has considered the option of buying the Wheelabrator plant back or potentially building a new waste-to-energy (WTE) facility that it could operate. Ultimately, SPSA concluded that this approach is not a practicable alternative for several reasons. The Wheelabrator plant itself has been in operation since 1988 and much of the equipment in the facility is nearing the end of its useful life. The reliability of the equipment has dramatically decreased in recent years, while capital costs and expenses to maintain the equipment have sharply increased. A fire at the Wheelabrator plant occurred in December 2022 and although repairs remain ongoing, as of March 2023 the plant continues to operate at a reduced capacity. Furthermore, the technology employed by Wheelabrator to turn refuse into fuel is not used in new WTE plants; rather, new plants utilize mass burn technology which is more cost efficient to operate and more reliable. In addition, building and operating a new WTE plant is cost prohibitive as the financial strategies previously used to operate the Wheelabrator plant are no longer available. Specifically, the Power Purchase Agreement (PPA) with Dominion Power, which helped secure the lucrative sale of electricity, has since ended. Although electricity is still sold to the grid, it is sold at market price which is now much lower per kilowatt hour than it was under the PPA. Considering lower electricity sales, along with the large amount of capital needed to upgrade the existing facility, SPSA assuming and operating the plant would result in over $14 million dollars in increased tipping fees per year across the region (SPSA 2022c). Of this amount, $10 million represents the amount WIN Waste Solutions will lose in revenue on an annual basis without having a buyer for the steam (i.e., the U.S. Navy). The remaining $4 million is the amount WIN Waste Solutions anticipates would be needed to upgrade and maintain Wheelabrator equipment and operations. Thus, if SPSA were to purchase and operate the plant, it would need to increase tipping fees for each of its member communities by $14 million dollars each year in order to keep the plant operational and financially viable.

Furthermore, operating a WTE facility requires special expertise that SPSA is currently not equipped to provide. SPSA engaged in discussions with WIN Waste Innovations to discuss WIN Waste operating Wheelabrator through the current contract term of 2027. One of WIN Waste's conditions for municipal waste, however, required SPSA to increase the "gate rate" paid to WIN Waste, which would result in a higher tip fee for member communities. The SPSA Board of Directors in an open session with member communities rejected this rate increase in March 2022 (SPSA 2022c). As part of its discussions with WIN Waste, SPSA attempted to pursue a public-private partnership to construct and operate a new mass burn facility. Upon further discussions, however, WIN Waste's corporate office decided not to pursue the project due to the uncertainty surrounding the future viability of WTE plants in the U.S and the varying levels of success in recent years. In the past 13 years, the number of WTE plants in the U.S. has dropped from 87 to 75, citing restraints such as low electricity costs, regulatory requirements, and community opposition to this type of technology (Karidis 2019). Alternatively, Palm Beach County, Florida launched a new mass burn facility in 2015 to expand its waste capacity in light of a population boom. The plant took 15 years to construct and cost $672 million. Key factors which contributed to the success of the project included the development team's 20-plus-year history with operating an existing WTE facility and the Solid Waste Authority's ability to maintain assessment rates and raise capital through bond issues (Karidis 2019).

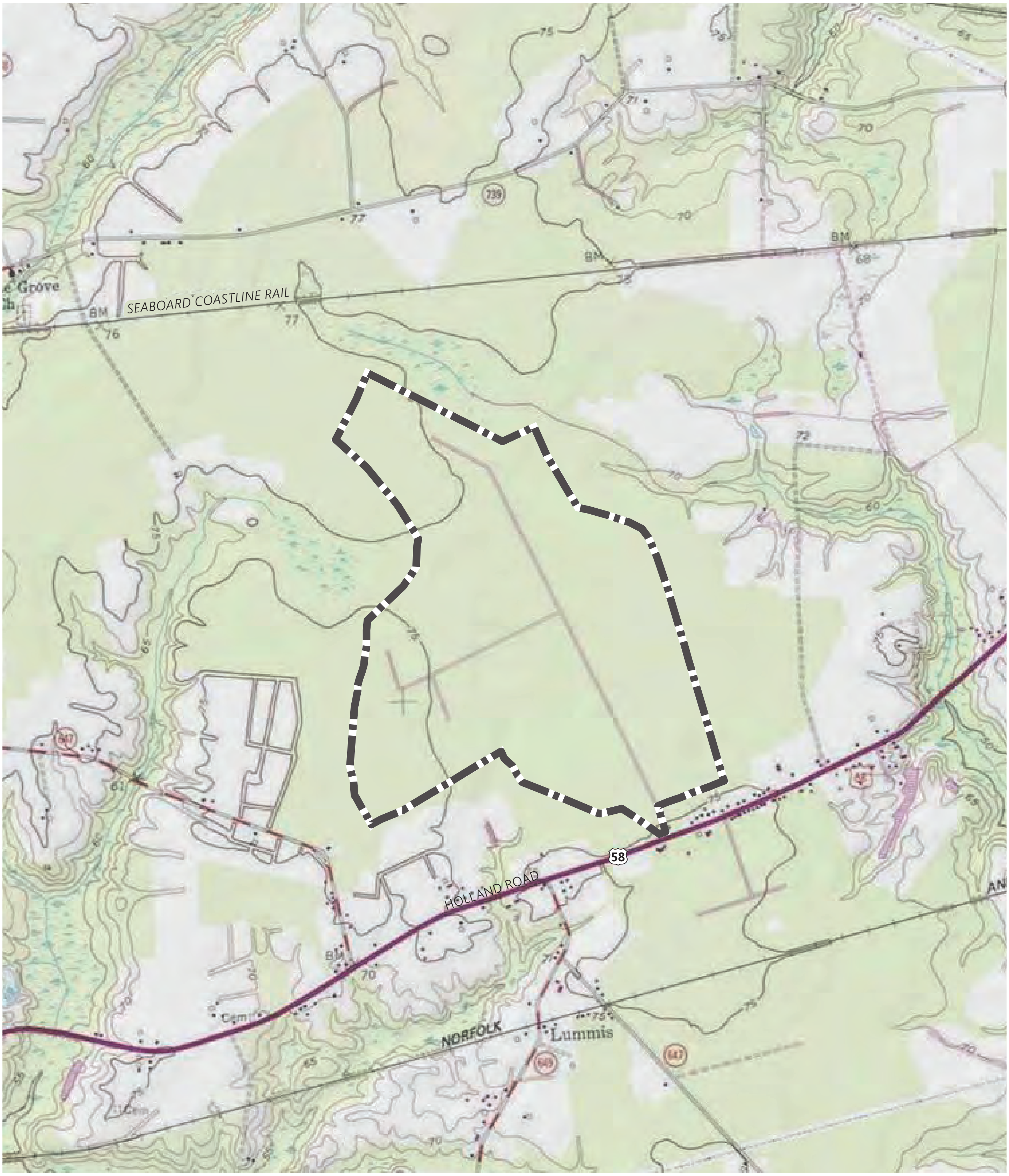
Anticipated cost to construct a new WTE facility in the region is approximated between $250-$300 million. This cost, combined with the uncertainty over environmental and health impacts, lack of a viable steam off-taker, and the low revenue resulting from the sale of electricity indicates that this alternative technology is not a reasonable disposal option for SPSA to pursue.

Site SU02 Analysis and Dismissal

Site SU02 is a 546.9-acre site in Suffolk, Virginia (Figure 14), located approximately 10 miles west of the existing landfill. Because of the landowner's interest in selling, access was provided to the Norfolk District team to better understand the extent of wetlands on the site.

Prior to beginning fieldwork, VHB scientists conducted a preliminary off-site analysis of publicly available reports and data pertaining to topography (LiDAR), soils, hydrology, and current and historical aerial photography for Site SU02. Datasets and mapping were downloaded for each of these datasets and overlaid onto the proposed alternative study area. Layers were processed using ESRI's ArcMap 10.6.1 and included as base maps for mobile data collection using ESRI's Fieldmaps for ArcGIS. Once the above data was analyzed, VHB created a map depicting areas that were potential wetlands. The wetlands within Site SU02 were quantified using the techniques outlined in Chapter 5 of the *Atlantic and Gulf Coast Plain (AGCP) Supplement* describing the methodology for delineation and wetland determination of wetland/non-wetland mosaics.

Source: USGS 7.5 minute Buckhorn, Virginia Quaddrangle



LEGEND

▬ ▪ ▬ Site SU02 Site Boundary (546.9 acres)

0 2,000 Feet

N

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

Suffolk, Virginia

FIGURE 14

Site SU02 Location Map (Quadrangle)

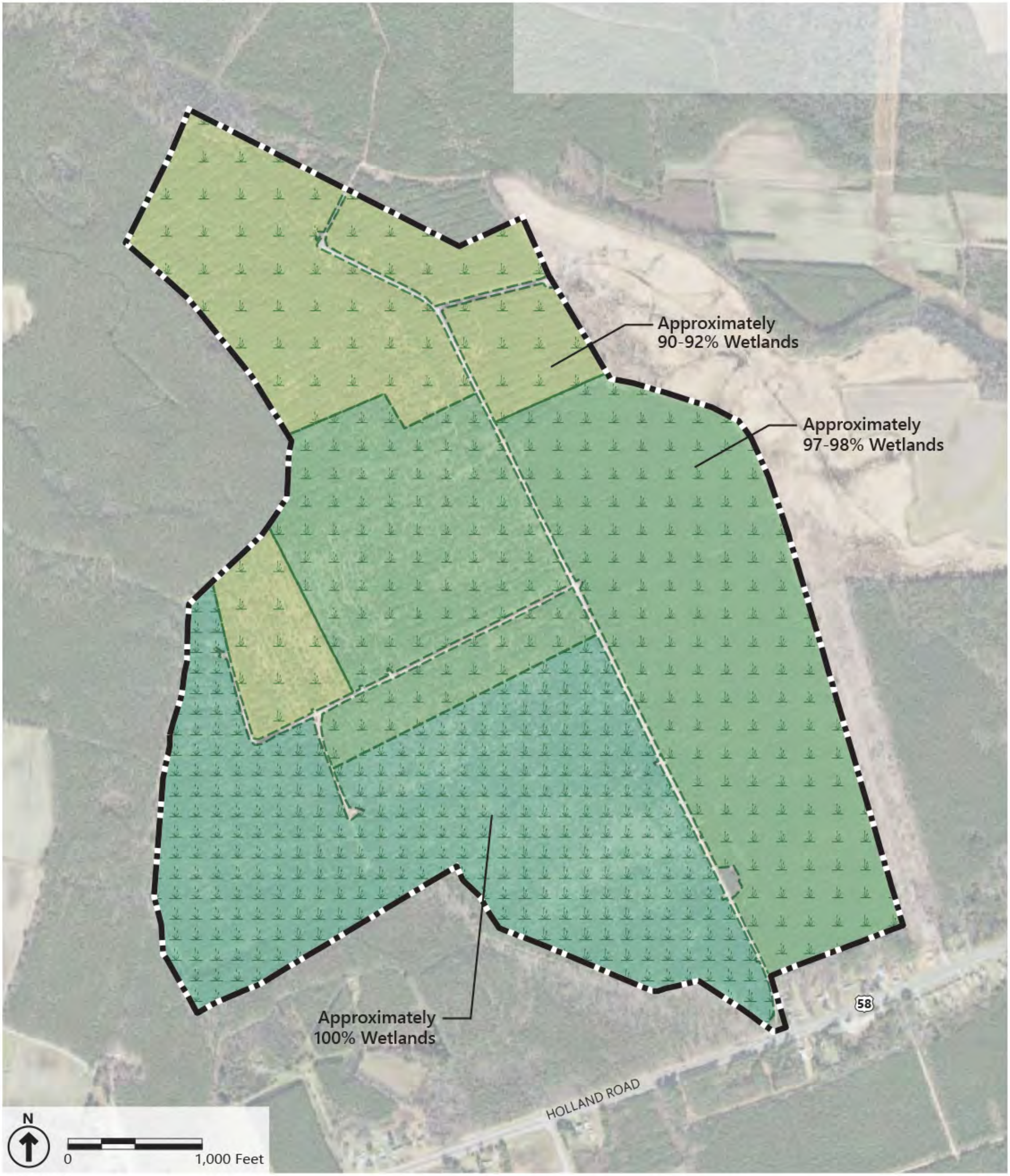
The boundaries of linear non-wetland features (silvicultural bedding and furrows) were delineated using a combination of mapping strategies and ground truthing with a transect-based sampling approach (e.g., GPS location of boundaries, true color and infrared aerial interpretation, LiDAR interpretation, etc. combined with transect results). Along each transect, regularly spaced wetland data points were collected to determine the presence of wetland characteristics. However, because these features were numerous, irregular, and discontinuous, the task of detailed mapping on silviculture bedding was potentially subject to inaccuracies related to the scale of the features and the resolution of off-site reference materials. The transect-length procedure for wetland/non-wetland mosaics provided the most defensible, accurate, and efficient approach to complete this study. Given that its use is sanctioned as an approved method in Chapter 5 (Difficult Wetland Situations) of the AGCP Regional Supplement, incorporating the wetland/non-wetland mosaics procedure is an appropriate methodology for completing the delineation on SU02.

Site SU02 consists primarily of non-riverine flatwoods and swamps (VDCR 2021a), with ditches excavated throughout the property and several upland dirt roads composed of fill material. The site is a pine plantation and has been regularly timbered since around the 1950s, with the last harvest occurring around 2010. Signs of past harvesting events are evident throughout the site, including gouges from skidding and tire tracks that are visible on aerial photography. Pine trees are planted in rows on bedding with furrows between each row. Large ditches line the roads and drain the site to the north and south, and smaller ditches are scattered between the rows in wetter areas. A large dirt road bisects the property into northeastern and southwestern halves, and 2 perpendicular roads provide access to other areas of Site SU02.

The U.S. Geological Survey (USGS) Quadrangle Map for Buckhorn, Virginia indicates that Site SU02 lies at an elevation between 70 and 75 ft. above mean sea level, and the parcel exhibits little change in elevation. The map indicates that a large portion of Site SU02 is wetland, and it indicates that Speights Run is located near and adjacent to the property. Ditches are shown oriented north-south and east-west through the center of the site, with the eastern ditch draining water from the on-site wetland(s) directly into Speights Run (USGS 2019b).

The wetland delineation conducted in February 2022 determined that there are 4 different wetland and upland areas at Site SU02, designated as Area 1, Area 2, Area 3, and Area 4 (Figure 15). Area 1 includes 2 areas on the north end of the site totaling 112.9 acres. The habitat in Area 1 consists of a wetland and upland mosaic that is approximately 90.83% wetland. Area 2 includes central portions of the property, as well as most of the area located northeast of the central access road. This area totals 237.1 acres in size, and it consists of a wetland and upland mosaic that is approximately 98.62% wetland. Area 3, located in the southwest quadrant of the site, consists of 174.4 acres of land that is entirely wetland. Lastly, Area 4 is 11.1 acres in size and consists of roadways and other contiguous uplands.

Source: VGIN/VBMP Most Recent Orthoimagery (2017-2019)



LEGEND

- ▬ Offsite Alternative Site Boundary (546.9 acres)
- 🟩 Area 1: 124.3 acres (112.9 acres of Wetland)
- 🟩 Area 2: 237.1 acres (233.8 acres of Wetland)
- 🟩 Area 3: 174.4 acres (174.4 acres of Wetland)
- ☐ Area 4: 11.1 acres (Roadways and Contiguous Non-Wetlands)

Total Wetlands = 521.1 acres

US Army Corps of Engineers

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

FIGURE 15

Site SU02 Wetland Delineation Map

In general, these areas consist of pine plantation with 60 to 70% canopy closure. The primary canopy species is loblolly pine, with some water oak (*Quercus nigra*) and sweetbay (*Magnolia virginiana*). Shrub and sapling cover are moderate and consist of sweet pepperbush, inkberry (*Ilex glabra*), wax myrtle, and prickly blackberry (*Rubus pensylvanicus*). Groundcover is sparse due to canopy cover and thick pine duff, ranging from 10 to 30% cover. It is dominated by switch cane, hairy bluestem (*Andropogon glomeratus* var. *hirsutior*), and warty panic grass (*Panicum verrucosum*). Hydrology ranges from saturated soils to up to several inches of inundation.

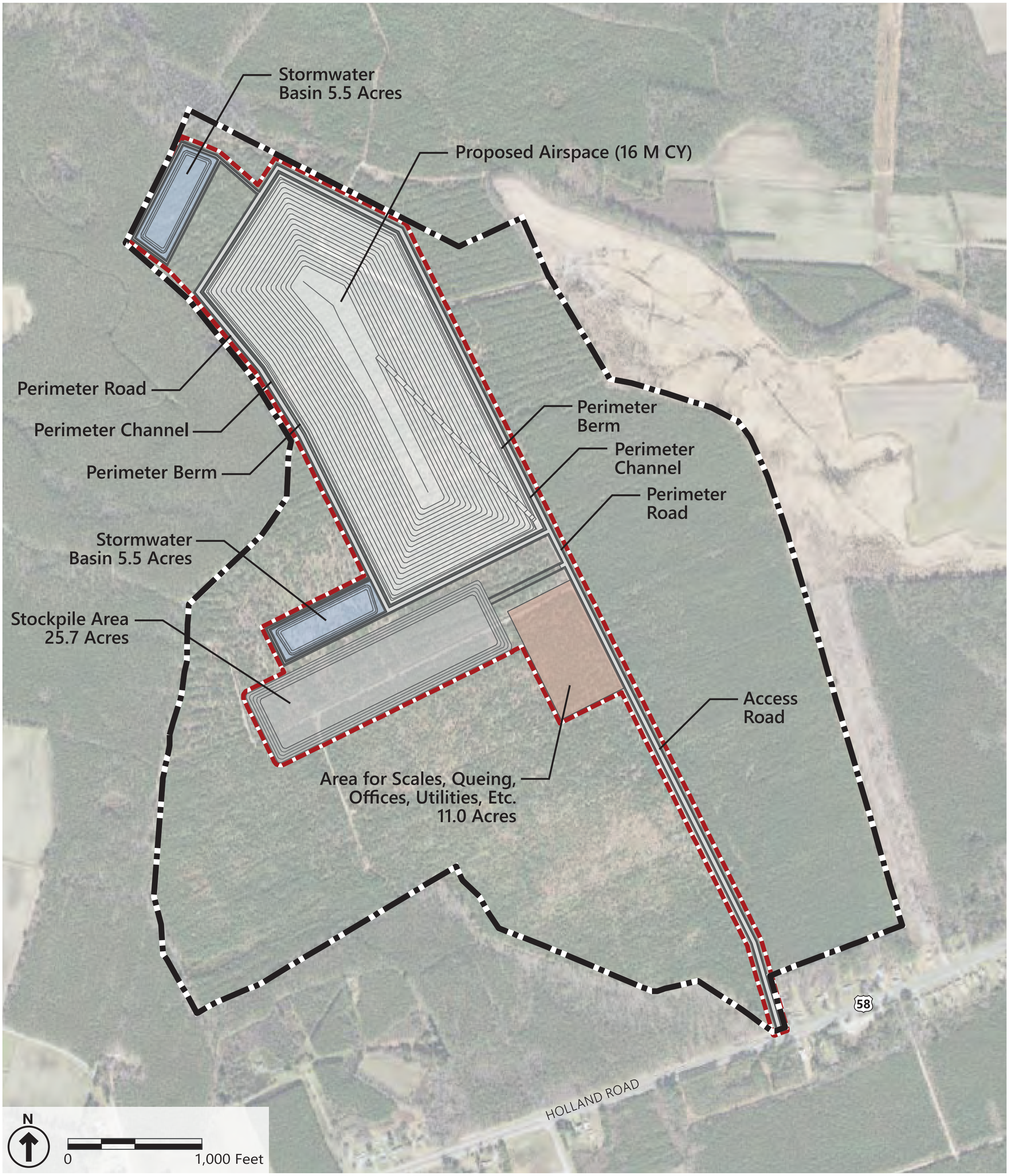
Soils map units present within Site SU02 include Lynchburg fine sandy loam, Rains fine sandy loam, and Eunola loamy fine sand, 0 to 2% slopes (USDA NRCS 2021). Rains fine sandy loam is the only hydric soil, and it makes up a large percentage of the area of the site. The soils consist of loamy sand to sandy loam and generally exhibit hydric soil indicators, including depleted matrix, thick dark surface, umbric surface, redox dark surface, and depleted dark surface.

A conceptual landfill development plan was developed for Site SU02. The concept plan detailed a total of 86.1 acres needed to develop the cell disposal footprint (which would stand 178 ft high), with the total developed area (which includes support infrastructure) amounting to 167.2 acres (Figure 16). Support infrastructure would be constructed at the new site, including facilities similar to those at the existing Regional Landfill. These may include administration and maintenance buildings, utilities (water, sewer, and power), scales, a tire shredding facility, a household hazardous waste facility, access and haul roads, leachate sewer disposal surface drainage systems, and gas management recovery systems.

In addition, an access road would need to be constructed for vehicles entering the landfill from U.S. Route 58. This new road would provide the only vehicle access to the site and would transect the landfill from north to south. U.S. Route 58 would also need to be upgraded to add a left turn lane in the eastbound direction, for trucks turning into the landfill.

Development of the landfill on this site would result in approximately 164.2 acres of total wetland impacts (Figure 17). The conceptual design was developed with wetland avoidance as a top priority and minimization efforts were implemented to the greatest extent practicable by maximizing us of available uplands. Since the conceptual development plan for Site SU02 would result in greater wetland impacts than that of the proposed action, it has been dismissed from further consideration.

Source: VGIN/VBMP Most Recent Orthoimagery (2017-2019)



LEGEND

▬ Site SU02 Site Boundary (546.9 acres)

▬ Landfill Limits of Work

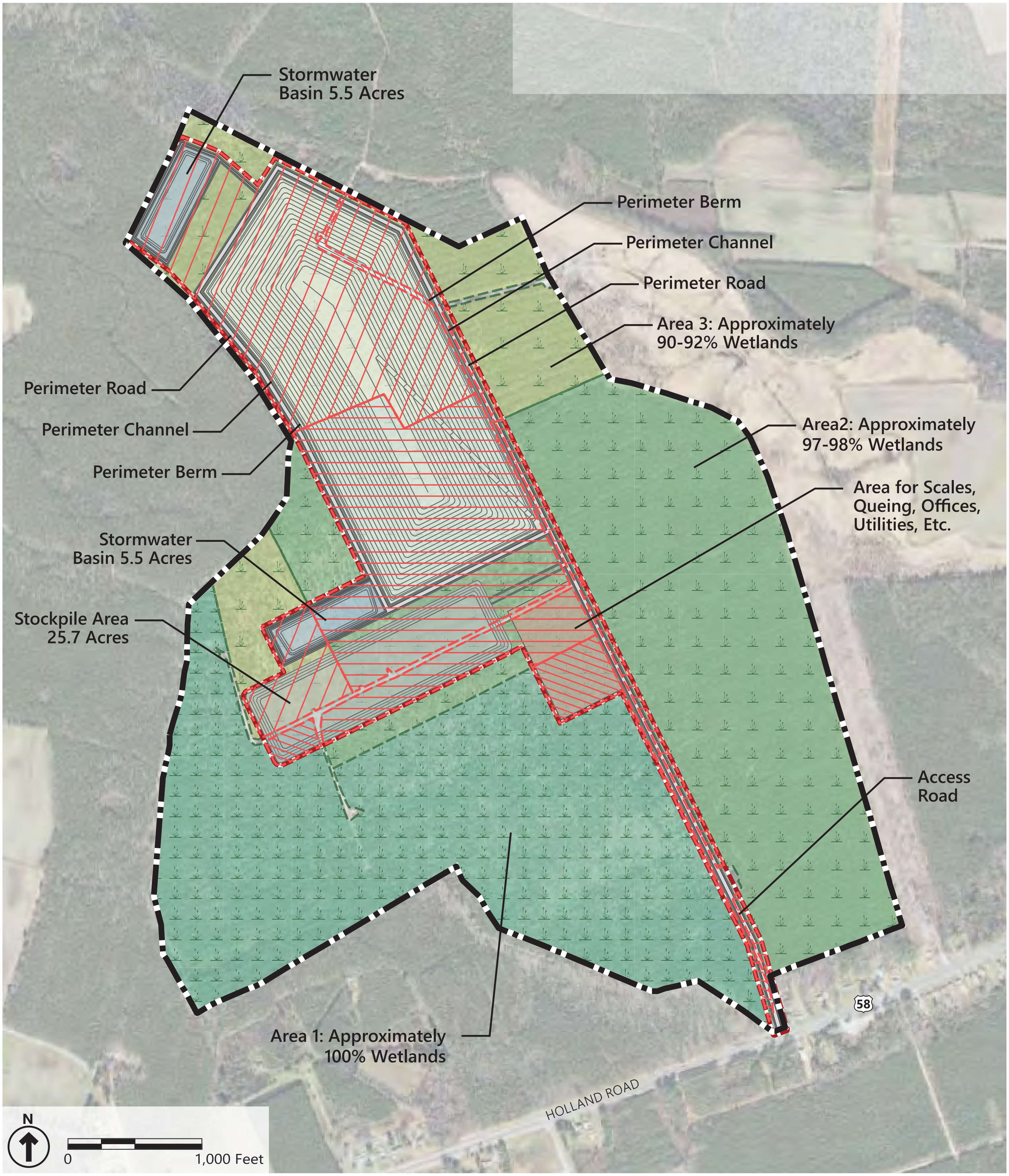
US Army Corps of Engineers

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

FIGURE 16

Site SU02 Conceptual Development Plan

Source: VGIN/VBMP Most Recent Orthoimagery (2017-2019)



LEGEND

- Offsite Alternative Site Boundary (546.9 acres)
- Landfill Limit of Work
- Area 1 – 82.9 acres (75.4 acres of Wetlands)
- Area 2 – 81.3 acres (79.7 acres of Wetlands)
- Area 3 – 9.1 acres (9.1 acres of Wetlands)
- Area 4: 11.1 acres (Roadways and Contiguous Non-Wetlands)

Total Wetlands Impacts = 164.2 acres

US Army Corps of Engineers

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

FIGURE 17

Site SU02 Wetland Impacts

Elements Common to All Alternatives

While 3 different approaches for landfill expansion are presented in the action alternatives described below, there are some alternative waste management technologies that will continue in operation and are supplemental to landfilling, regardless of the alternative selected by the Norfolk District (including the No-Action Alternative). Technologies include source reduction, materials reuse, recycling, composting, and resource recovery (waste to energy). SPSA actively seeks alternative technologies to reduce the volume of waste that is ultimately landfilled. SPSA works with its member localities and the HRPDC to continue to examine various alternative technologies for managing solid waste.

Elements of the different alternative waste management technologies are described in more detail in the “Alternative Technologies” section above.

Alternative A: No-Action Alternative

Under Alternative A, SPSA would not expand its landfill operations into Cells VIII and IX and no construction requiring a Corps permit would occur (Figure 18). Landfill operations would continue to utilize the currently permitted capacity available through Cell VII, which is expected to last until approximately 2037. Cell VII would be constructed according to SPSA’s development plans. To retain the soil generated from the excavation of Cell VII, SPSA would transport soil by truck to an off-site stockpile area. When the soil is needed for cover on Cell VII, SPSA would transport it back from the stockpile area for its use at the site. To prolong capacity available at Cell VII, SPSA would issue RFPs to establish a new program for waste disposal at one or more waste facilities while maintaining available airspace at the Regional Landfill.

After Cell VII reaches capacity and is closed with a final cover system, waste would be hauled to other area landfills for processing and disposal. Potential receiver facilities are listed below with the total remaining permitted capacity as of 2020 (HRPDC 2020):

- Atlantic Waste Disposal (private landfill owned by Waste Management in Waverly, Virginia)
    - Distance from Regional Landfill: 45 miles
    - Total remaining permitted capacity (tons): 45,497,743
    - Remaining reported permitted life: 74 years
- Bethel Landfill (private landfill owned by Waste Management in Hampton, Virginia)
    - Distance from Regional Landfill: 35 miles
    - Total remaining permitted capacity (tons): 22,467,607
    - Remaining reported permitted life: 80 years
- Brunswick Waste Management Facility (municipal landfill in Lawrenceville, Virginia)

    - Distance from Regional Landfill: 80 miles
    - Total remaining permitted capacity (tons): 9,982,220
    - Remaining reported permitted life: 72 years
- Shoosmith Sanitary Landfill (municipal landfill in Chester, Virginia)
    - Distance from Regional Landfill: 75 miles
    - Total remaining permitted capacity (tons): 20,050,000
    - Remaining reported permitted life: 30 years
    - The Suffolk transfer station and maintenance facility would remain operational following Cell VII closure. Operational practices surrounding groundwater and surface water monitoring, as well as leachate and landfill gas management, would also continue following Cell VII closure. SPSA would shift its infrastructure to support waste transport to private disposal facilities and would potentially need to increase the existing transfer system network.

As previously noted, prior to Cell VII operation, SPSA would fund construction of a grade-separated interchange (“flyover”) to eliminate left turns from U.S. Routes 13/58/460 into the Regional Landfill. SPSA’s CUP with the City of Suffolk requires that this flyover be completed before waste is deposited in Cell VII (SPSA 2020). The flyover would be constructed by the Virginia Department of Transportation (VDOT) and would cost approximately $40 million to construct. In order to fund this construction, SPSA would increase municipal tipping fees beginning in fiscal year (FY) 2022, which would enable SPSA to secure the funds needed to begin construction in FY 2023 (SPSA 2020). The flyover would be constructed between eastbound and westbound U.S. Routes 13/58/460 and would provide solid waste and residential traffic in Suffolk an alternative to entering the landfill without using the median crossing on this road (HDR 2016).

This page intentionally left blank.

Source: ESRI Orthoimagery (2020)

LEGEND

- SPSA Property Boundary
- Landfill Cell Boundary
- Potential Future Buildout
- VDOT Constructed Flyover
- Expansion Area (137.18 acres)
- Wetlands (133.79 acres; Confirmed on 08.24.2022 (NAO-2016-00765))
- Ditch (0.93 acres; Confirmed on 08.24.2022 (NAO-2016-00765))
- Wetland Preservation Area (50 acres)
- Wetland Enhancement Area (36 acres)
- Wetland Restoration Area (12 acres)

N

0 1,000 Feet

US Army Corps of Engineers

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

Suffolk, Virginia

FIGURE 18

Alternative A: No-Action Alternative

Alternative B: Original Proposed Alternative

Under Alternative B, SPSA would expand its existing landfill operations into an expansion site, within which 2 new contiguous waste disposal cells (Cells VIII and IX) would be constructed over time, in phases (Figure 19; see detailed description of construction stages below). Cell VIII would be constructed first, followed by Cell IX. This new expansion site would incorporate an additional 117.36 acres (identified as Cells VIII and IX, plus the support areas for roadways and stormwater management) of landfill property within the active facility boundary. Landfill cells within this site would provide 16 million CY of new waste capacity. Existing facilities at the Regional Landfill—including administration and maintenance buildings, utilities (water, sewer, and power), scales, a tire shredding facility, a household hazardous waste facility, a methane gas recovery system, access and haul roads, leachate sewer disposal surface drainage systems, and gas management recovery systems—would continue to be used.

Landfilling operations at the expansion site would begin following the end of the operational phase of Cell VII, which is anticipated to reach capacity between 2027-2037. Thus, landfilling operations at the expansion site would be expected to occur between approximately 2036-2060.

The construction and operation of Cell VII is described in the “Construction Stages” section below, along with the construction plans for Cells VIII and IX.

This page intentionally left blank.

Source: ESRI Orthoimagery (2020)

LEGEND

SPSA Property Boundary
Landfill Cell Boundary
Borrow Area and Stormwater Management Area
Limit of Disturbance
Expansion Area (137.18 acres)
Wetlands (133.79 acres; Confirmed on 08.24.2022 (NAO-2016-00765))
Ditches (0.93 acres)
Wetland Impacts (117.36 acres)
Wetland Avoided (16.43 acres)

US Army Corps of Engineers

Environmental Impact Statement for
Proposed Expansion of SPSA Landfill

Suffolk, Virginia

FIGURE 19

Alternative B: Original Proposed Alternative

Construction Stages

Stage 1: Use Portion of Expansion Site for Stockpiling and Borrow Material for Cell VII (Optional)

Material from Cell VII is currently being excavated for use as daily cover on Cell VI. The ongoing excavation of Cell VII would help expedite the later development of Cell VII as an inward gradient landfill. However, the total material to be removed from Cell VII for its design use as a landfill exceeds the amount of material necessary to provide daily and intermediate and final cover for Cell VI. This excess material excavated from Cell VII would be used to provide daily and intermediate cover for Cell VII after construction of the cell is complete and disposal of waste begins. The excavated material needs to be stored until applied as cover. If the expansion site is permitted by the time SPSA needs space to store the excavated material, SPSA may choose to store the material in Cell VIII until applied as daily and intermediate cover during routine operation of Cell VII. Under this scenario, SPSA would erect an earthen berm or other approved method to contain the stockpiled material within Cell VIII, to prevent erosion and runoff. Alternatively, soil borrow material may be stockpiled off-site and trucked to and from the landfill as needed.

In preparation for this stage, SPSA would initiate dewatering of the site, followed by clearing and grubbing within the expansion site waste limits and areas to be used for access roads and stormwater control features. Dewatering through drainage ditches, sumps, and pumps would be conducted to draw down the groundwater to a level sufficient for clearing and grubbing activities and stockpiling of excavated material from Cell VII. Dewatering would require a Special Exception Permit from the VDEQ Office of Groundwater Characterization and Supply.

Clearing and grubbing would include the excavation and removal of all vegetation including trees not indicated to remain, stumps, brush, vines, hedgerows, heavy growths of grass, downed timber, rotten wood, roots, rubbish, and other debris. All material resulting from clearing and grubbing would be disposed of. Topsoil within the area being cleared would be stripped and stockpiled on-site.

Stage 2: Construct Cell VIII within Expansion Site and Operate Cell

Cell VIII would be constructed in the southern part of the expansion site, closest to Cell VII as illustrated in the phasing plans shown on Figures 20 and 21. Construction would be accomplished in 4 main phases. The initial phase would include excavating the cell to a depth of 20 to 40 ft to an inward gradient landfill. Excavation would consist of the removal and disposal of materials located on-site, including the cutting and shaping of slopes necessary for the preparation of roadbeds and landfill subgrades, removal of root mat, ditch cutting, sediment basin installation, and other related work. Suitable excavated materials would be stockpiled within the future phases of the site footprint, to be used later as daily and intermediate cover. Additional site dewatering would occur during the excavation of cover material.

Cell VIII would be developed as an inward gradient landfill, with the facility bottom below the water table. The cell would be developed with a double composite liner system, with leachate collection and a groundwater dewatering system. The floor would be graded to direct any generated leachate toward the leachate collection system(s). Collected leachate would be transferred to the on-site leachate holding lagoons or to a storage tank prior to treatment on-site through heat assisted evaporation or discharge to the Hampton Roads Sanitation District (HRSD) for treatment.

Groundwater removed during the dewatering process would be routinely monitored, and if uncontaminated, released into the on-site stormwater management system and discharged off-site. If the groundwater exceeds the maximum contaminant level requirements of the Virginia Solid Waste Management Regulations (VSWMR), it would be treated on-site as leachate and discharged to HRSD.

Waste disposal would begin once one or more phases of Cell VIII are completed.

Wastes entering the Regional Landfill are primarily MSW, soils, and construction and demolition debris. This waste would be directed to the cell and placed in successive layers. Solid waste would first be heavily compacted so that it takes up as little room as possible in the cell (SPSA 2021a). At the end of each day, a 6-inch (in) layer of cover material would be spread over newly deposited waste to suppress odors; every 14 days, SPSA would place a 12-in. layer of soil over the landfill to serve as intermediate cover (SPSA 2021a). As waste levels reach a certain point, operations would move into adjacent phases of Cell VIII and be repeated, before moving into Cell IX.

Stage 3: Construct Cell IX within Expansion Site and Operate Cell

Cell IX would be constructed in the northern part of the expansion site. Construction would be accomplished in 4 main phases. The initial phase would include excavating the cell to a depth of 20 to 40 ft to an inward gradient landfill. Excavation would consist of the removal and disposal of materials located on-site, including the cutting and shaping of slopes necessary for the preparation of roadbeds and landfill subgrades, removal of root mat, ditch cutting, sediment basin installation, and other related work. Suitable excavated materials would be stockpiled within the future phases of the site footprint, to later be used as daily and intermediate cover. Additional site dewatering would occur during the excavation of cover material.

Similar to Cell VIII, Cell IX would be developed as an inward gradient landfill, with the facility bottom below the water table. The leachate management and groundwater monitoring processes would be the same for Cell IX as for Cell VIII, described under Stage 2, above.

Waste disposal would begin once one or more phases of Cell IX are completed. Operation of the cell would be the same as described under Stage 2, above.

Stage 4: Establish Stormwater Management Area

Following the construction of a portion of Cell VIII at the expansion site, SPSA would establish the stormwater management pond to the northeast of this site. The area would be constructed to support landfill construction and operation.

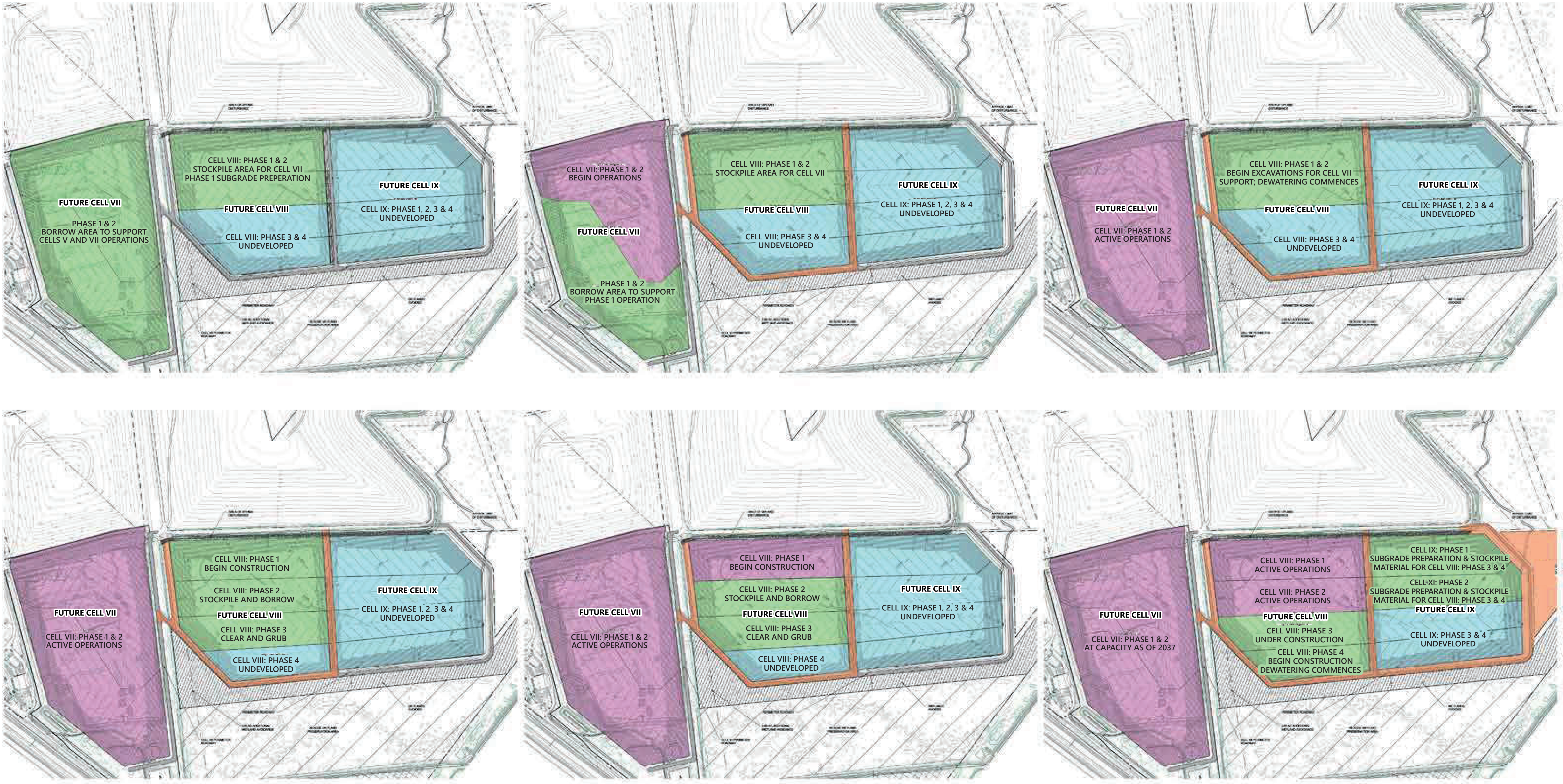
Stage 5: Closure and Long-term Monitoring/Maintenance

Once Cells VIII and IX reach their design capacity for solid waste, the cells would be provided a final cover and closed in accordance with VDEQ permit requirements and SPSA's Operating Plan. Closed landfill cells have a flat top and are covered with grass. Completed cells have stabilized roads which provide access for routine maintenance and monitoring. SPSA would be responsible for providing long-term monitoring and maintenance of the cells similar to other closed areas of the landfill.

The stages of construction and associated succession of development are illustrated in sequence on supporting Figures 20 and 21.

At the time of writing, SPSA is not planning additional expansion beyond what is proposed at the existing landfill in this EIS. However, as part of a 2016 Conditional Use Permit Application package, SPSA developed a Master Plan (as described in the "Cumulative Actions Considered" section below). The 2016 Master Plan illustrates future development of Cells X-XII in the future to further expand landfill capacity. SPSA is currently considering placing these future cells into a conservation easement as part of a mitigation package in support of the Applicant's Preferred Alternative.

This page intentionally left blank.



LEGEND

- 🟪 Active or Full Phase
- 🟩 Cleared, Stockpile, or Prepped
- 🟦 Undeveloped
- 🟧 Transportation

N

0 400 800 feet

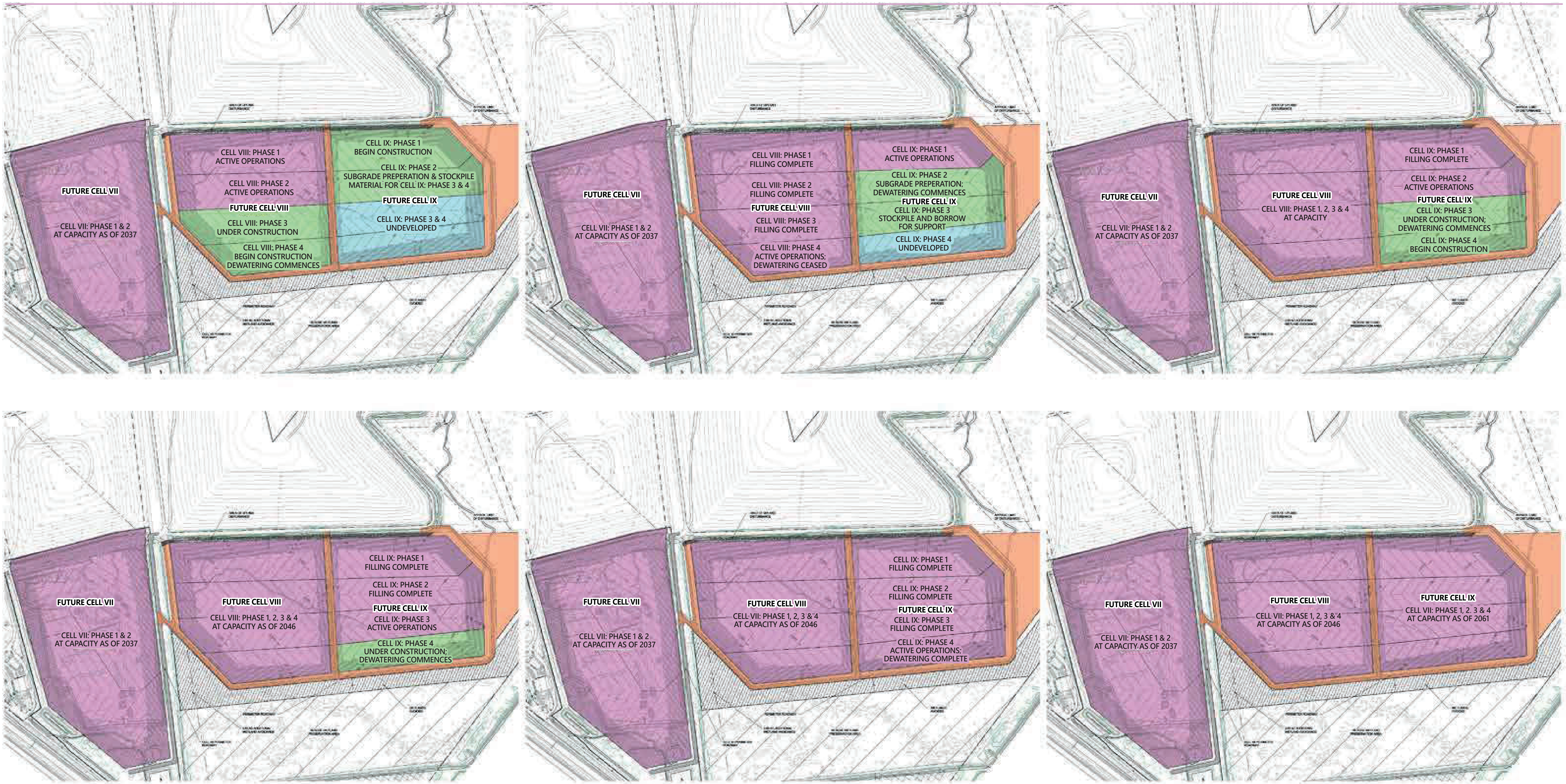
US Army Corps of Engineers

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

Suffolk, Virginia

FIGURE 20

Phasing Plans



LEGEND

🟪 Active or Full Phase
🟩 Cleared, Stockpile, or Prepped
🟦 Undeveloped
🟧 Transportation

N

0 400 800 feet

Environmental Impact Statement for
Proposed Expansion of SPSA Landfill

Suffolk, Virginia

FIGURE 21

Phasing Plans (continued)

Alternative C: Proposed Action (Applicant's Preferred)

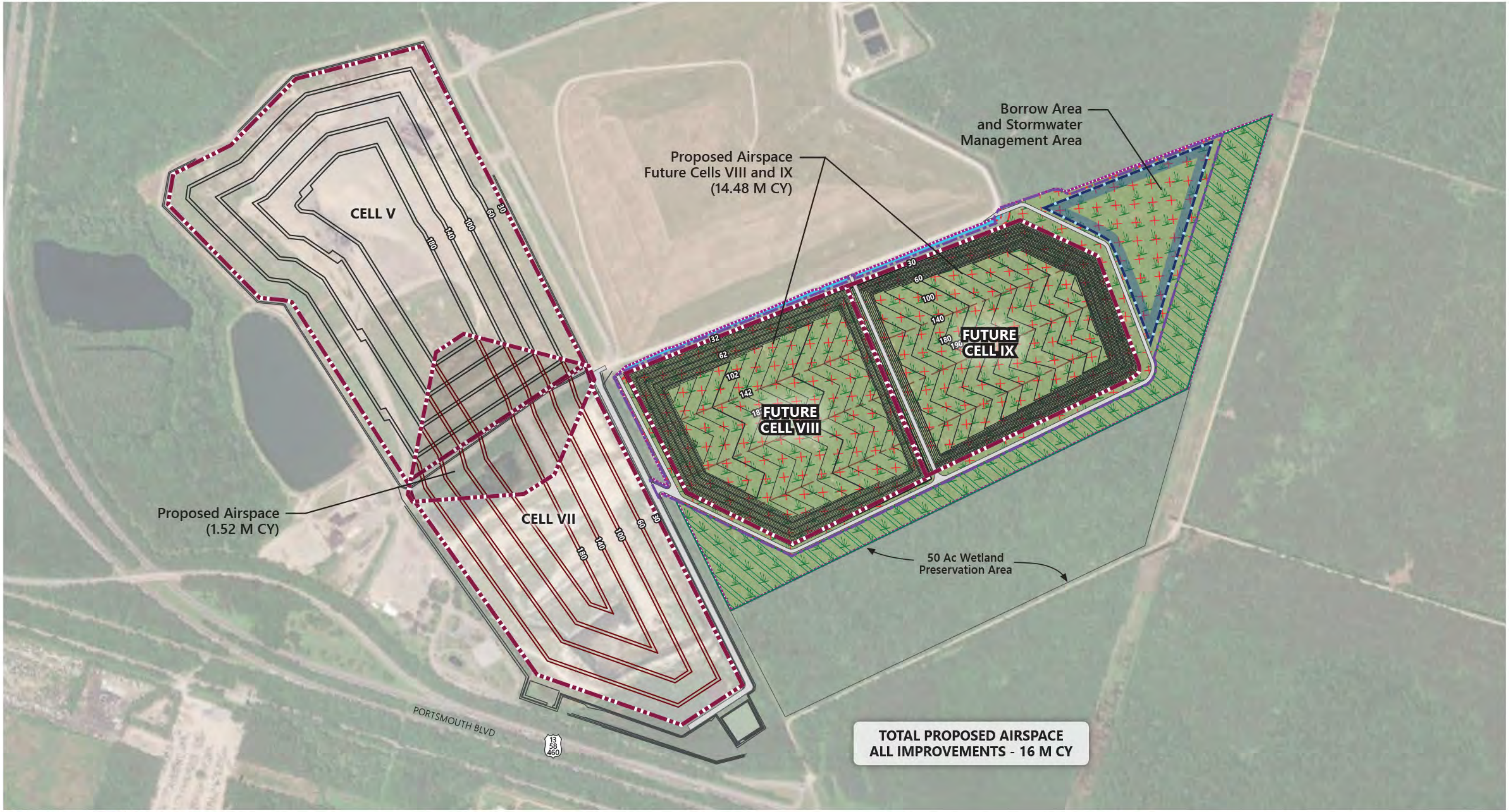
Under Alternative C, Cells VIII and IX would be developed as described under Alternative B; however, the airspace between Cells V and VII would also be utilized for landfilling operations (Figure 22). Infilling this airspace would secure an additional 1.52 million CY of disposal capacity, reducing the need for capacity provided by the expansion site to 14.48 million CY. Developing and utilizing this airspace would require the relocation of the pump station and underground utilities, as well as infrastructure for Cell V leachate, landfill gas, and stormwater management.

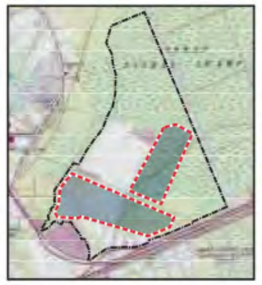
Filling in this airspace, which is already permitted by VDEQ, would most likely occur following the construction and operation of Cells VIII and IX. Delaying its construction would allow the continued use of the landfill access roadway and leachate infrastructure until the disposal capacity is required to maintain landfill operations. It reduces the footprint of Cell IX by approximately 9 acres compared to Alternative B because the airspace provided between Cells V and VII would be utilized for landfill capacity.

Similar to Alternative B, the expansion site could be used for stockpiling and borrowing during the construction and operation of Cell VII (expected to be operational from 2027-2037) if the expansion site is permitted by the time SPSA needs space to store the excavated material. Landfilling operations in the expansion site would begin by 2036, and the 11-acre borrow and stormwater management area would be used for stockpiling and borrowing during the development and operation of Cell IX. Alternatively, soil borrow material may be stockpiled off-site and trucked to and from the landfill as needed.

This page intentionally left blank.

Source: ESRI Orthoimagery (2020)





LEGEND

- SPSA Property Boundary
- Landfill Cell Boundary
- Borrow Area and Stormwater Management Area
- Limits of Disturbance
- Expansion Area (137.18 acres)
- Wetlands (133.79 acres; Confirmed on 08.24.2022 (NAO-2016-00765))
- Ditches (0.93 acres)
- Wetland Impacts (109.64 acres)
- Wetland Avoided (24.15 acres)

N

0 400 Feet

US Army Corps of Engineers

Environmental Impact Statement for
Proposed Expansion of SPSA Landfill

Suffolk, Virginia

FIGURE 22

Alternative C : Proposed Action (Applicant's Preferred)

Alternative D: Off-site Alternative (Site SH30)

Under Alternative D, the existing Regional Landfill would close for landfill operations once Cell VII reached capacity (anticipated around 2037) but would continue to operate as a transfer station for the region. During the operation of Cell VII, soil stockpiling and borrowing would be done off-site, with material trucked in and out so that Cell VIII would not be used. Following the Regional Landfill's closure, a new landfill would be developed and operated from approximately 2037-2060 on Site SH30, a 330-acre site in Southampton County, Virginia (Figures 23 and 24).

Of the 330 acres available on Site SH30, 85 acres would be utilized for the cell disposal footprint (which would stand 260 ft. high), with the total developed area (which includes support infrastructure) amounting to 138 acres (Figure 25). Support infrastructure would be constructed at the new site, including facilities similar to those at the existing Regional Landfill. These may include administration and maintenance buildings, utilities (water, sewer, and power), scales, a tire shredding facility, a household hazardous waste facility, access and haul roads, leachate sewer disposal, stormwater management, and gas management recovery systems.

Permitting and construction of the new landfill would take approximately 10 years and would consist of the stages described above under Alternative B. Operations at this new landfill would also be similar to those practices described under Alternative B.

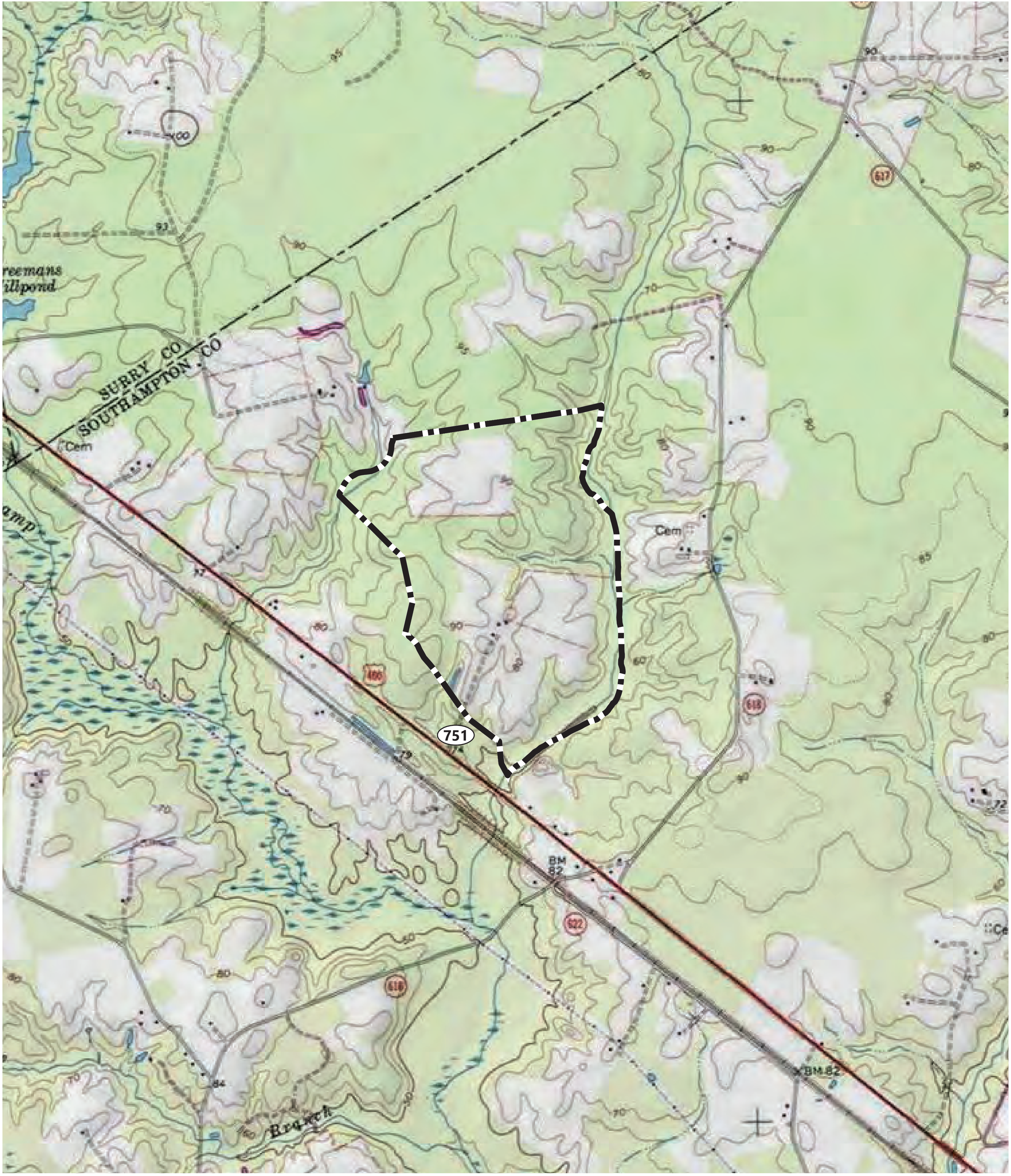
The proposed development of Site SH30 would result in approximately 8 acres of wetland impact. Since the placement of a landfill would bisect the existing wetland drainage on SH30, additional wetland impacts could be required to reroute and maintain continuity of the wetlands on the west of the property with wetlands on the east side of the property. The estimated wetland impacts also do not include potential wetland impacts or impacts to other Waters of the United States that could be required for an entrance road upgrade. The entrance to SH30 appears to be a state road; however, the property on either side of the entrance road is not under the same ownership as SH30 and that property was not reviewed for the presence of wetlands.

As discussed earlier in this chapter, the wetland impacts at SH30 would be inconsistent with title 9, section 20-81-120 of the Virginia Code and section 10.1-1408.5 of the Code, which prohibits new sanitary landfills or expansions of existing landfills with greater than 2 acres of wetland impact. Due to the possibility of utilizing the exemption outlined in subsection F of Virginia statute § 10.1-1408.5, and because NEPA permits consideration of proposed actions that may be inconsistent with state or local plans or laws, the Corps decided to carry this alternative through the NEPA process for further review.

According to correspondence received from the Southampton County Planning Director, development of a landfill at Site SH30 is "…generally inconsistent with the county's future plans and current ordinances." (from letter to the Norfolk District dated July 5, 2022). Specifically, the county's Comprehensive Plan designates Site SH30 as

“Industrial” and “places a strong emphasis on job creation in areas noted as Industrial.” Also, Site SH30 “has a zoning designation of A-1, Agricultural, district. Within the County’s current zoning regulations, sanitary landfills in the A-1 zoning designation require approval of a Conditional Use Permit by the Board of Supervisors after review and recommendation from the Planning Commission.” (from letter to the Norfolk District dated July 5, 2022).

Source: ESRI Basemap Orthoimagery (2020)



LEGEND

▬ ▪ ▬ Site SH30 Site Boundary (330 acres)

US Army Corps of Engineers

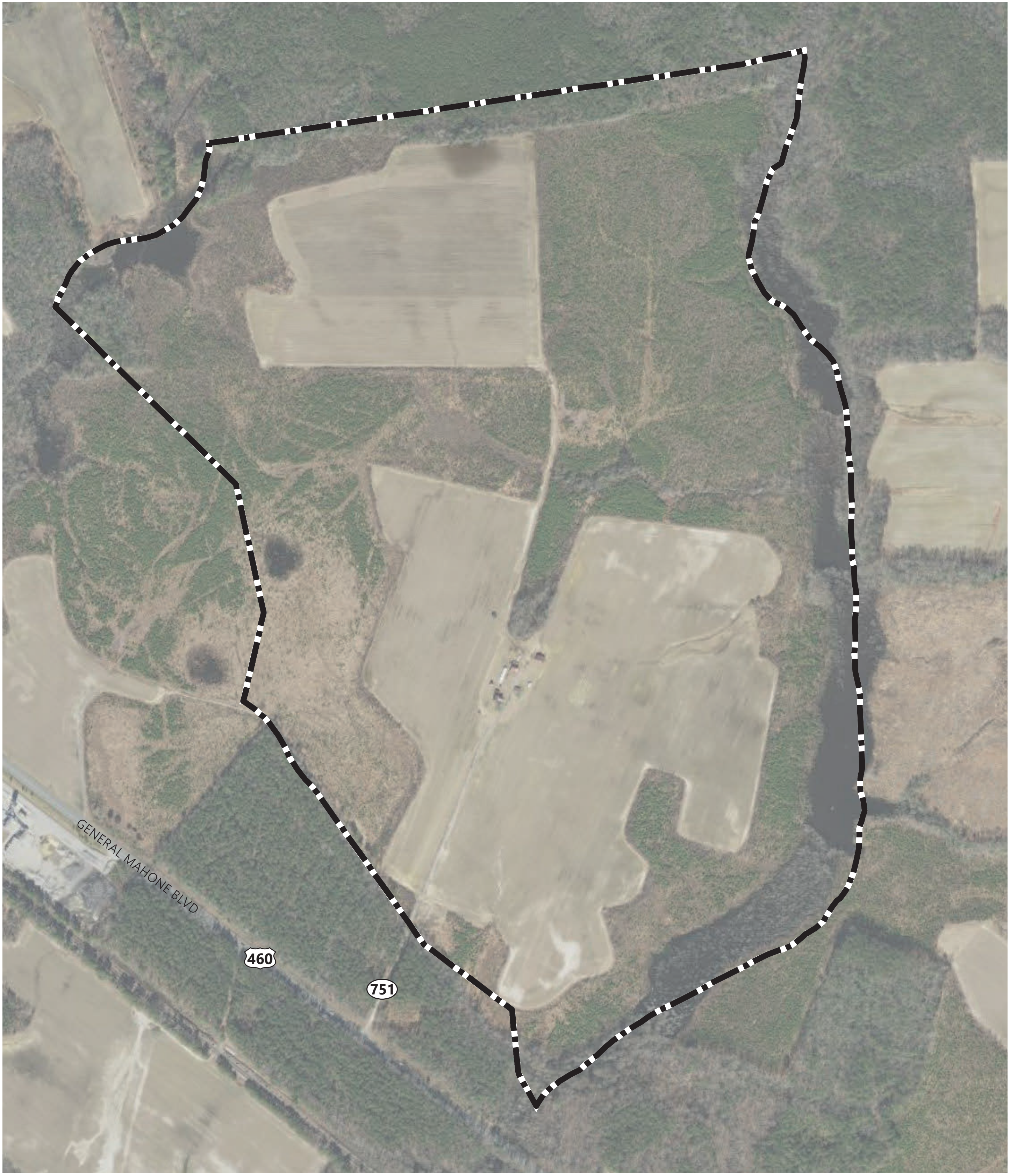
Environmental Impact Statement for Proposed Expansion of SPSA Landfill

Southampton County, Virginia

FIGURE 23

Alternative D (Site SH30) Project Location Map (Quad)

Source: VGIN/VBMP 2021 Orthoimagery



LEGEND

▬ ▪ ▬ Site SH30 Site Boundary (330 acres)

US Army Corps of Engineers

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

Southampton County, Virginia

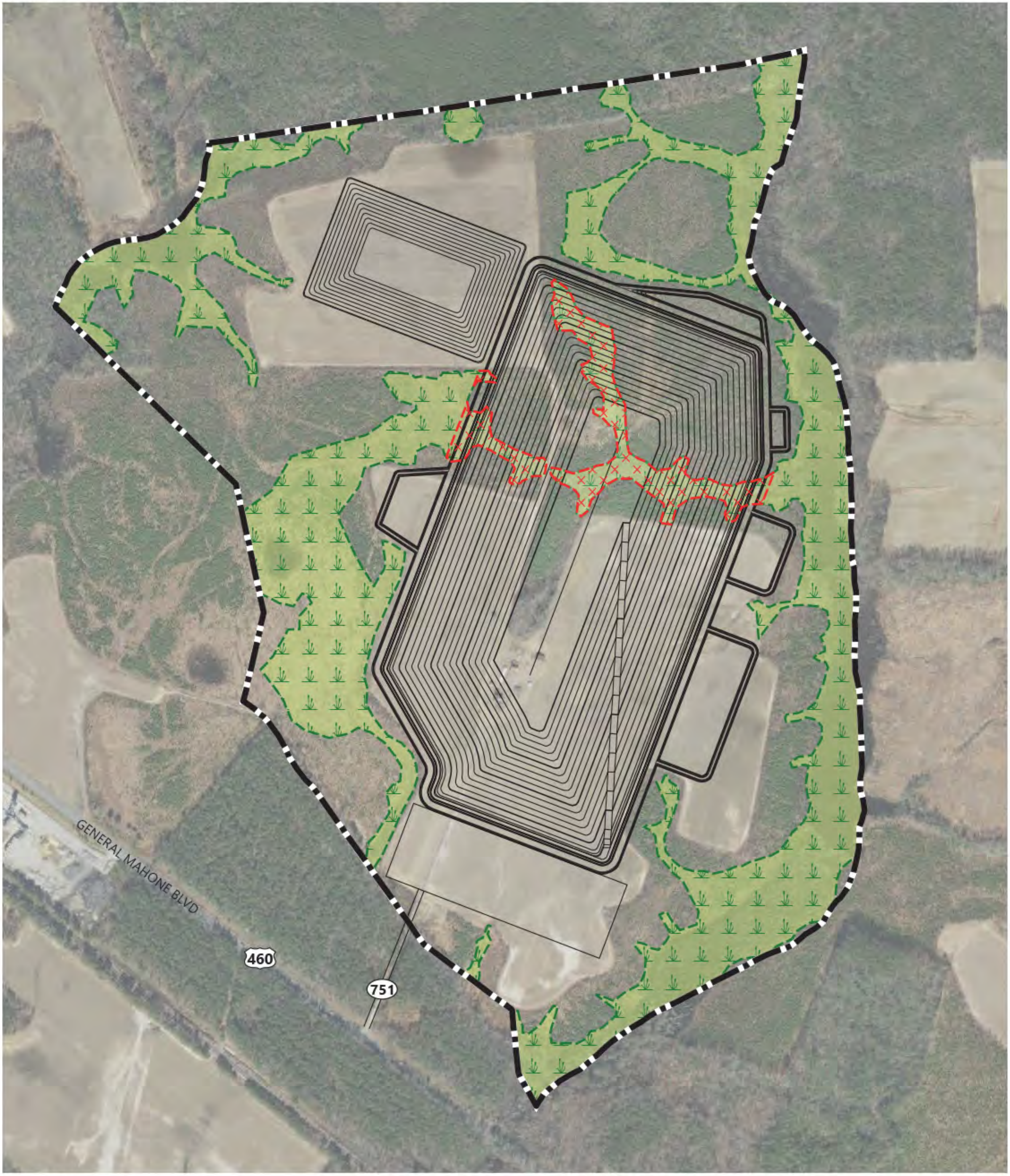
FIGURE 24

Alternative D (Site SH30) Project Location Map (Aerial)

N

0 700 Feet

Source: VGIN/VBMP 2021 Orthoimagery



LEGEND

▬ Site SH30 Site Boundary (330 acres)

🟩 Approximate Extent of Onsite Wetlands (approx. 83 acres)

🟥 Potential Wetland Impacts (8 acres)

N

0 700 Feet

US Army Corps of Engineers

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

Southampton County, Virginia

FIGURE 25

Alternative D: Off-site Alternative (SH30)

Mitigation

Federal Standing for Mitigation

In 1972, Congress passed amendments to the federal Water Pollution Control Act, commonly known as the CWA, establishing a new section of the act and a new regulatory program. This section, Section 404, requires landowners to secure a permit from the Corps for activities that would lead to a discharge of dredged or fill material into waters of the U.S., including wetlands.

Two national goals guide the operation of the Section 404 program. The first is the CWA's goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. The second is the goal to have no overall net loss of wetland acreage and functions. This "no net loss goal" has been reaffirmed multiple times and most significantly through what is commonly referred to as "The Compensatory Mitigation Rule," issued by the Department of Defense and EPA in 2008 (U.S. Code 2008). The agencies' commitment to the no net loss goal is key to understanding their attitude toward the mechanisms and methods which qualify as acceptable mitigation.

The partners to the Chesapeake Bay Watershed Agreement committed to the goal of creating or reestablishing 85,000 acres of wetlands and enhancing an additional 150,000 acres of degraded wetlands by 2025. According to the Chesapeake Bay progress report, 16,000 acres of wetlands have been created or restored on agricultural lands between 2010 and 2021, representing only 18.8% of the 85,000-acre goal set for 2025. The partners of the Chesapeake Bay Watershed Agreement are currently not on target to meet this 2025 goal, given the inadequate rate of acreage gained through wetland restoration and creation within the watershed. Further, despite wetland creation and restoration, wetland acreage across the watershed also continues to decrease due to subsidence, climate change, and development. The Chesapeake Bay Program also acknowledges that all acreages of enhanced wetlands are not recorded due, in part, to the lack of a comprehensive Bay Program definition of enhancement. The Bay Program is therefore seeking additional resources to meet their 2025 goal (Chesapeake Bay Program 2023a, 2023b).

The Mitigation Sequence

The Section 404 program allows permittees to fill wetlands and streams while continuing to achieve the standards of the CWA and the no net loss goal, primarily through compensatory mitigation. The Corps must follow a 3-part sequence, referred to as the mitigation sequence, when evaluating permits. The mitigation sequence provides that, prior to issuing a Section 404 permit, the Corps needs to make a determination that potential impacts have been avoided "to the maximum extent practicable" and minimized "to the extent appropriate and practicable." The remaining impacts must be offset or compensated. This third step of the mitigation sequence is known as compensatory mitigation.

When an applicant submits a permit application to the Corps, that applicant must provide an explanation of how impacts to aquatic resources would be avoided and minimized by the project. The applicant must also provide a brief description of how it proposes to compensate for any remaining impacts to wetlands, streams, or other aquatic resources. The section below provides a general overview of mitigation options and credit availability.

Compensatory Mitigation Mechanisms

There are generally 3 acceptable mechanisms in common practice to satisfy compensatory mitigation obligations: mitigation banking, in-lieu fee mitigation, and permittee-responsible mitigation.

These 3 mechanisms are detailed below.

Mitigation Bank

A mitigation bank is a site, or a suite of sites, where resources (e.g., wetlands, streams, riparian areas) are restored, established, enhanced, or preserved for the purpose of providing compensatory mitigation for impacts authorized by Corps permits. In general, a mitigation bank sells compensatory mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the mitigation bank sponsor. The operation and use of a mitigation bank are governed by a mitigation banking instrument.

In-Lieu Fee Mitigation

In-lieu fee mitigation is a program involving the restoration, establishment, enhancement, or preservation of aquatic resources through funds paid to a governmental or non-profit natural resources management entity to satisfy compensatory mitigation requirements for Corps permits. Similar to a mitigation bank, an in-lieu fee program sells compensatory mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the in-lieu program sponsor. The operation and use of an in-lieu fee program is governed by an in-lieu fee program instrument.

Permittee-Responsible Mitigation

Permittee-responsible mitigation is an aquatic resource restoration, establishment, enhancement, or preservation activity undertaken by the permittee to provide compensatory mitigation in which the permittee retains full responsibility for the completion and success of the mitigation effort.

Mitigation Methods

There are generally 4 methods in common practice to satisfy compensatory mitigation obligations: restoration, creation, enhancement, and preservation. The no net loss goal relates to the replacement of area and functions, and these different compensation methods differ in their ability to replace these targets. These methods have variable contributions to the no net loss goal. Restoration approaches, which are expected to provide a net increase in both area and function, are often preferred to offset impacts. However, preservation may be preferable for resources which are not likely to be replaced or impacts that may create significant temporal loss, such as impacts to high quality or mature forested wetlands.

In order to ensure an equal replacement of or increase in wetland functions or values, the Corps requires that a wetland functions and values assessment be conducted both before impacts and after mitigation activities. Although many different functional assessment methodologies that are regularly used in other Corps districts have been developed over the years, the Norfolk District recommends using the Wetland Attribute Form. The Wetland Attribute Form was developed by the Norfolk District in conjunction with the EPA (USACE 2020), and it is based on the New England Highway Methodology (USACE 1993). This methodology assesses wetland functions and values through a descriptive approach using both wetland science and judgment in the field.

The 4 mitigation methods are detailed as follows:

Restoration

Restoration is the manipulation of the physical, chemical, or biological characteristics of a site, with the goal of returning natural and historical functions to a former or degraded aquatic resource. Restoration is generally preferred as the first mitigation option considered under permittee-responsible mitigation, mitigation banks, and in-lieu fee programs because the likelihood of success is greater compared to establishment, and the potential gains in terms of aquatic resource functions are greater compared to enhancement and preservation. Restoration is sub-divided into the categories of re-establishment and rehabilitation.

Re-establishment is the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural and historical functions to a former aquatic resource. Re-establishment results in a gain in aquatic resource area and functions.

Rehabilitation is the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural and historical functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function but does not necessarily result in a gain in aquatic resource area.

Establishment

Establishment, also known as creation, is the manipulation of the physical, chemical, or biological characteristics on an upland site to develop an aquatic resource that did not previously exist. When successfully completed, establishment results in a gain in aquatic resource area and functions.

Enhancement

Enhancement is the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve the functions of a specific aquatic resource. Enhancement results in the gain of selected aquatic resource functions but may also lead to a decline in other aquatic resource functions. Enhancement does not result in a gain in aquatic resource area.

Preservation

Preservation is the removal of a threat to, or prevention of the decline of, aquatic resources by an action in or near those aquatic resources. Preservation includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical protection mechanisms.

Project-Specific Mitigation Options

SPSA purchased 83 credits from the Chesapeake Mitigation Bank, which is approximately 6.5 miles east of the proposed expansion site. Like the proposed expansion site, the Chesapeake Mitigation Bank was constructed within historic Great Dismal Swamp, but now drains north to the Elizabeth River. The mitigation is within the same overall watershed (Hampton Roads) as the expansion site but would also provide benefits to the Great Dismal Swamp since the bank involved restoration of wetlands previously associated with the Great Dismal Swamp. SPSA also purchased 76 wetland credits from the Davis Wetlands Bank, which is approximately 15 miles southeast of the expansion site. This bank also restored wetlands within historic Great Dismal Swamp area. The bank's service area includes most portions of the historic Great Dismal Swamp; however, it does not drain north towards the Hampton Roads watershed. SPSA proposes to place a conservation easement over the approximately 168-acre area that was to be developed as Cells X, XI, and XII and their related stormwater management features. At a 10:1 ratio for wetland preservation, this mitigation measure would generate 16.8 wetland credits. SPSA proposes another 17 wetland mitigation credits to be generated through preservation of 175.41 acres of forested wetlands on the adjoining Nahra property, which was recently purchased by SPSA. To achieve 220-acres worth of mitigation, SPSA is in the process of releasing an RFP for other permittee-responsible mitigation within the primary hydrologic unit code (HUC) to generate the additional 27 credits.

Alternatives B and C are located in the Hampton Roads Watershed (HUC 02020208), a contributing watershed to the James River. Alternative D is located in HUC 03010202 which drains to the Blackwater River. The 2008 Compensatory Mitigation Rule (Rule) establishes an understood preference hierarchy for mitigation mechanisms. The Rule outlines the 3 generally acceptable mitigation avenues (U.S. Code 2008), in order of preference, as:

- mitigation banks,
- in-lieu fee funds, and
- permittee-responsible mitigation

Mitigation availability on a per mechanism basis at the time of this report are as follows:

Mitigation Banks

Alternatives B and C would be located on the existing SPSA landfill site, and these alternatives would incur 117.36 and 109.64 acres of forested wetland, respectively. At a minimum, these impacts would require 234.72 and 219.28 non-tidal wetland credits. As described in the previous section, SPSA has purchased wetland mitigation credits and has proposed preservation on greater than 168 acres of forested wetland.

Development of the SH30 site (Alternative D) would impact 8 acres of forested wetland, requiring a total of 16 non-tidal wetland credits to mitigate the impacts. There are a total of 4 active mitigation banks servicing the host watershed for Alternative D. Approved but yet to be released, non-tidal wetland credits could potentially support the development of a landfill on the SH30 alternative site.

In-Lieu Fee Fund Sites

The Virginia Aquatic Resource Trust Fund (VARTF) holds available and approved, but yet to be released acre-based non-tidal wetland credits, available to serve the SPSA project service area (Alternatives B and C). There are 7 active in-lieu fee VARTF mitigation sites which serve the project’s host watershed.

For the SH30 site, the VARTF also holds available and approved, but yet to be released acre-based non-tidal wetland credits, available to serve the SH30 project service area (Alternative D). There are 6 active in-lieu fee VARTF mitigation sites which serve the project’s host watershed.

Permittee-Responsible Mitigation

Although the Rule establishes permittee-responsible mitigation as the least preferable compensation mechanism, the uniqueness of the proposed action’s geographical location and the scale of the mitigation needs present ample means and opportunity to complete effective permittee-responsible mitigation actions.

Geographically, the proposed action’s regional location in the southeastern Virginia coastal plain creates an opportunity to provide mitigation to valuable wetland resources that have been systematically impacted to support agriculture, forestry, and development since the inception of Virginia’s colonial era. The opportunity to identify restoration-type projects having the potential to realize gains in both aquatic resource area and functions is high. Further, the amount and scale at which compensatory mitigation would be required to support SPSA’s proposed action and alternatives would likely be greater than the mitigation credit yield of most currently approved individual mitigation banks and in-lieu fee fund sites within the project service area.

The wetland impacts of the proposed project or alternatives, and the resulting compensatory mitigation requirements, exceed other recent projects in the host watershed service area. As a result, the project provides a unique opportunity to target a permittee-responsible mitigation project (or combination of projects) of substantial size with exceptional potential for long-term ecological success and value.

SPSA's Proposed Mitigation Plan

SPSA has purchased 83 wetland mitigation credits the Chesapeake Mitigation Bank and 76 credits from the Davis Wetlands Bank. SPSA proposes to place a conservation easement over the approximately 168-acre area that was to be developed as Cells X, XI and XII and their related stormwater management features. At a 10:1 ratio for wetland preservation, this mitigation measure would generate 16.8 wetland credits. SPSA proposes another 17 wetland mitigation credits to be generated through preservation of 175.41 acres of forested wetlands on the adjoining Nahra property, which was recently purchased by SPSA. The Norfolk District anticipates receipt of formal mitigation proposal from SPSA as a component of their Section 404 permit application package.

Chapter 3: Affected Environment and Environmental Consequences

Introduction

This chapter describes the current environmental conditions in and surrounding the project as they relate to each impact topic retained for analysis. These conditions serve as a baseline for understanding the resources that could be impacted by implementing the project. This chapter also analyzes the beneficial and adverse impacts that would result from implementing any of the alternatives considered in this DEIS. This chapter includes direct, indirect, and cumulative impacts, as well as the methods used in these analyses.

General Analysis Approach

In accordance with CEQ regulations for implementation of NEPA, direct and indirect impacts are described under each impact topic (40 CFR 1502.16), and the impacts are assessed in terms of context and intensity (40 CFR 1508.27). Cumulative impacts for all topics, where applicable, are described at the end of the chapter. Where appropriate, mitigating measures for adverse impacts are also described and incorporated into the evaluation of impacts. The specific methods used to assess impacts for each resource may vary; therefore, these methodologies are described under each impact topic.

The CEQ regulation (40 CFR 1500-1508) provides the following definitions (CEQ 2005):

- Direct effects are caused by the action and occur at the same time and place. Direct effects are analyzed in each resource section.
- Indirect effects are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems. Indirect effects are analyzed in each resource section.
- Cumulative impact is the full impact on the environment that results from the compilation of the incremental impact of the action when added to other actions. This type of impact analysis and the cumulative actions identified are described in more detail below.

The analysis for each resource considers the duration and significance of the effects, and whether effects are beneficial or adverse, as defined below:

- *Duration*: Short-term effects are those that may occur only during a specific phase of the project, such as during construction activities. Long-term effects are those that would occur over a longer duration, such as the lifetime of the project.

- *Significance*: Minor effects are those that may be perceptible but are of very low intensity and may be too small to measure. Moderate effects are those that are more perceptible and typically are more amenable to quantification or measurement. Major effects are those that, in their context and due to their intensity, have the potential to meet the thresholds for significance set forth in the CEQ regulations (40 CFR 1508.27).
    - Significance requires consideration of both context and intensity. Depending on the nature of the topic, relevant contexts include society as a whole (human, national), the affected region, the affected interests, and the locality. Intensity refers to the severity of impact and includes consideration of beneficial and adverse impacts, and a wide range of criteria. Among these criteria are public health and safety, unique characteristics of the geographic locale, the level of public controversy, whether the action threatens to violate other laws, and other considerations.
- *Beneficial* or *Adverse*: A beneficial effect may cause positive outcomes to the natural or human environment. An adverse effect may cause unfavorable or undesirable outcomes to the natural or human environment.

Cumulative Impacts Methodology

Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR 1508.7). As stated in the CEQ (1997) handbook, *Considering Cumulative Effects under the National Environmental Policy Act*, cumulative impacts need to be analyzed in terms of the specific resource, ecosystem, and human community being affected and should focus on impacts that are truly meaningful. In addition, CEQ guidance states that future actions can be excluded from the analysis of cumulative effects if the action will not affect resources that are the subject of the cumulative effects analysis. Cumulative impacts are considered for all alternatives, including the No-Action Alternative.

The evaluation of the cumulative impacts is based on a general description of the projects. These actions were identified through the internal and external project scoping processes, and through a desktop review of online sources, including municipal planning meeting minutes, local news articles, and other planning resources. The following descriptions include present and reasonably foreseeable projects or actions that may contribute to cumulative impacts. These actions are summarized below.

Cumulative impacts result from the incremental environmental impact of an action when added to all other past, present, and reasonably foreseeable future actions. They can result from individually minor but collectively substantial actions taking place over a period of time. Cumulative effects consider direct and indirect (secondary impacts).

Indirect impacts result from actions that occur later in time or are farther removed in distance from the original action, but still reasonably foreseeable.

Issues and Impact Topics Considered but Dismissed

Land Use

On-site

None of the on-site alternatives have the potential to result in adverse impacts on land use, as each would take place within the boundaries of the existing landfill. Over the operational life of each on-site alternative, the area of active disposal would move from the current active area (Cells V and VI) to Cell VII (under Alternative A), and then to Cells VIII and IX (under Alternatives B and C). This would be consistent with the property's past and present use as a municipal waste management facility. There is no potential for any of the on-site alternatives to cause new land use incompatibilities either within or adjacent to the landfill. It is important to note however, that all on-site alternatives would require approval from the City of Suffolk through its Conditional Use Permitting process regardless of their current zoning.

Although not immediately adjacent, the Hampton Roads Executive Airport is located less than 5 miles from the existing landfill. Because municipal waste landfills are bird attractants, the FAA Advisory Circular 150/5200-33C (2020) recommends that the following minimum distances be maintained between airports and landfills: 5,000 ft. for airports serving piston-powered aircraft; 10,000 ft. for airports serving turbine-powered aircraft; and 5 miles for all airports. By the time Cell IX is operational, the active landfill area would be approximately 4,000 ft. closer to the airport than it is today, but it would remain well outside the 5,000-ft and 10,000-ft radii. Additionally, the size of the working face of the landfill, which is what attracts birds, would remain approximately the same. Therefore, the landfill would not attract significantly more birds than is currently the case. Finally, the FAA would be provided with the opportunity to review and comment on the proposed expansion as part of the waste disposal permitting process. Based on the above, none of the on-site alternatives are anticipated to have an impact on Hampton Roads Executive Airport.

Off-site

The off-site alternative, SH30, is currently zoned as "Industrial." It also has a zoning designation of A-1, Agricultural, district. Similar to on-site alternatives, all off-site alternatives would require approval from Southampton County through its Conditional Use Permitting process regardless of their current zoning.

Topics Retained for Detailed Analysis

Impact topics identify resources within the project area that could be affected, either beneficially or adversely, by the range of alternatives. Under Alternative A, SPSA would not expand its landfill operations into the expansion area and no construction requiring a Corps permit would occur. Landfill operations would continue to utilize the currently permitted capacity available and would haul to other area landfills for processing and disposal once the currently permitted space reached capacity. Under Alternative B, SPSA would expand existing landfill operations into an expansion site (contiguous Cells VIII and IX), which would be constructed over time. Under Alternative C, SPSA would expand into Cells VIII and IX, similar to Alternative B, but would also utilize the airspace between Cells V and VII for landfilling operations. This would secure an additional 1.52 million CY of disposal capacity, reducing the need for capacity provided by the expansion site to 14.48 million CY. Alternative D would entail developing a new landfill at Site SH30, a 330-acre site in Southampton County, Virginia. The total developed area (including the cell disposal footprint and support infrastructure) would comprise 138 acres. Under this alternative, the existing Regional Landfill would close for landfill operations once Cell VII reached capacity but would continue to operate as a transfer station for the region.

Topics retained for detailed analysis in this section include water resources, biological resources, transportation and traffic, air quality and greenhouse gas, noise, cultural resources, socioeconomics, and environmental justice. Potential cumulative impacts are also examined.

Water Resources

Surface Water/Hydrology

Methodology

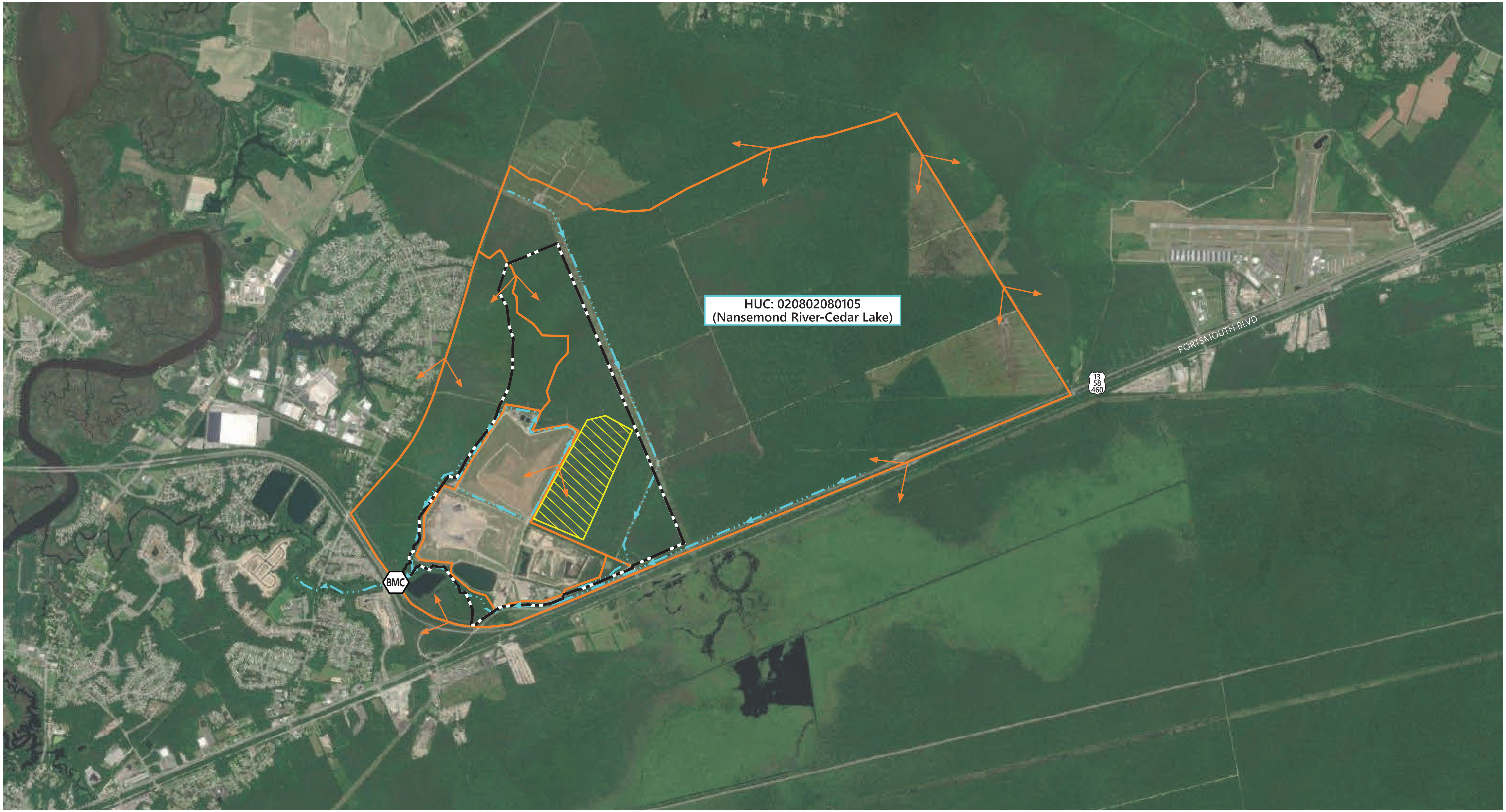
Available topographic surveys of the subject property, Geographic Information System (GIS) elevation data, and hydrologic and hydraulic studies completed in the region were used to identify and characterize waterways within the project area with regards to hydrology and surface water flow. Further, national and regional data, studies, and projection tools were referenced to provide context on sea level rise and storm surge risk due to the region’s susceptibility to the effects of climate change and land subsidence.

Affected Environment

Surface Hydrology

The project area for Alternatives B and C is located north of U.S. Route 58, and the Great Dismal Swamp National Wildlife Refuge (NWR) lies immediately south of the site on the opposite side of the road. Although the NWR lies entirely south of the road, a portion of the Great Dismal Swamp lies north of U.S. Route 58, immediately adjacent to SPSA on the east side. The project area and surrounding areas are generally flat, with elevations ranging from approximately 20 to 22 ft (NAVD88 datum). Surface water within most of this northern portion of the Great Dismal Swamp (approximately 2,500 acres, per a June 2019 floodplain study provided by SPSA's consultant, HDR) flows slowly across nearly level land toward the southwest and in ditches that flow north to south and east to west. Eventually, surface waters are intercepted by a ditch that flows north to south along an existing powerline just east of the project area. This ditch then discharges into another drainage ditch that runs immediately north of U.S. Route 58 and south of the SPSA property until it discharges into Burnetts Mill Creek. Runoff from the area west of the powerline ditch flows in a southeasterly direction until it too is intercepted by the powerline ditch. Runoff from the area immediately west of the SPSA property flows to the southwest and into Burnetts Mill Creek to the southwest of the SPSA property (see Figure 26).

Source: ESRI Basemap The National Map; NOAA/NW/NHC Storm Surge Unit



LEGEND

- SPSA Property Boundary
- ▨ Expansion Area
- Existing Drainage Feature
- Drainage Area Boundary
- BMC Burnetts Mill Creek (pt. of analysis)
(Drainage Area = approx. 5.3 sq mi.)

N

0 6,000 Ft

US Army Corps of Engineers

Environmental Impact Statement for
Proposed Expansion of SPSA Landfill

Suffolk, Virginia

FIGURE 26

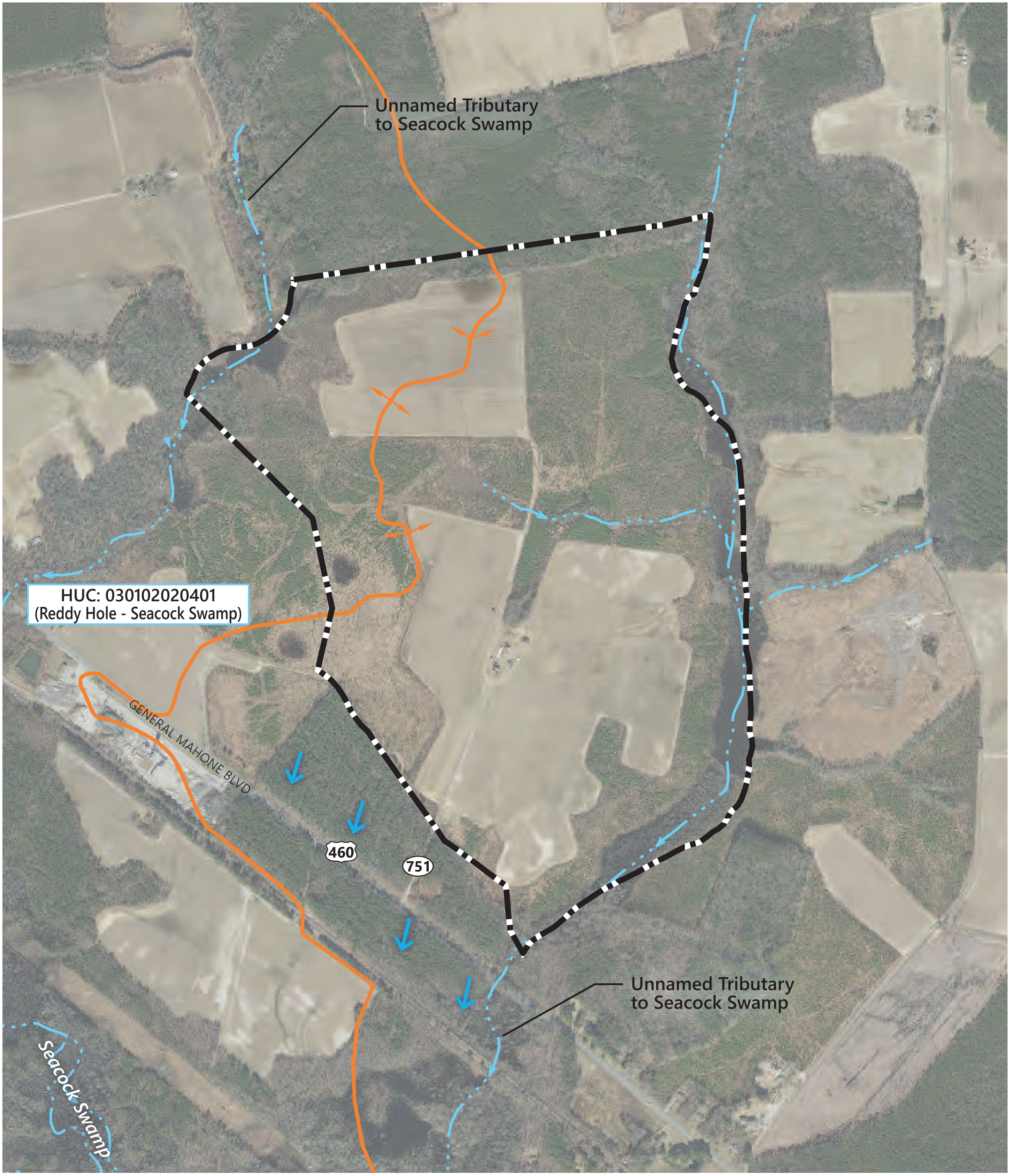
Burnetts Mill Creek Drainage

Portions of the Great Dismal Swamp NWR south of U.S. Route 58 but north of the CSX Railroad also drain toward Burnetts Mill Creek in a similar fashion, via shallow flat surface flow and concentrated flow within ditches that run east to west and south to north. This eventually flows into an unnamed tributary that flows north, under Portsmouth Boulevard, just west of its intersection with U.S. Routes 13/58/460, and into Burnetts Mill Creek at Beamon Pond. Portions of the land in the northern portion of the larger contiguous area of the Great Dismal Swamp NWR, just south of the CSX railroad, flow northeast toward Deep Creek and the Southern Branch of the Elizabeth River, and northwest toward Shingle Creek and the Nansemond River.

At the SPSA property, the surface hydrology consists of surface runoff that is directed into a combination of perimeter drainage ditches and on-site stormwater management facilities and sediment basins. For landfill Cells I through IV, which are capped and no longer in service, surface runoff is collected in an existing perimeter sedimentation and drainage control ditch. These are flat, grassed ditches with gravel dikes intermittently spaced to provide settling time for water and sediment as it flows from the base of the cells to a drainage point at Burnetts Mill Creek in the southwest corner of the property. This discharge point is listed as Outfall #1 in the current VDEQ Virginia Pollutant Discharge Elimination System (VPDES) permit # VA0090034 (VDEQ 2020). Surface hydrology in the remaining active portions of the SPSA landfill consists of runoff into perimeter ditches and on-site stormwater management facilities as per their VPDES permit and Stormwater Pollution Prevention Plan (SWPPP), before draining to the south and eventually into Burnetts Mill Creek via 1 of 3 other outfalls listed as Outfalls #2, 3, and 4 in the current VPDES permit.

Site SH30, the site associated with Alternative D, is located north of U.S. Route 460, approximately 28 miles northwest of the existing Regional Landfill. Site SH30 and its surrounding areas are gently sloping, with elevations ranging from approximately 60 to 90 ft. (NAVD88). In general, the site topography is elevated in the center of the site where farming activities have been conducted. Surface waters drain primarily to the east and west down forested slopes to existing unnamed tributaries of Seacock Swamp, which is located south of U.S. Route 460. Seacock Swamp continues to the south and drains into the Blackwater River, the Chowan River, and Albemarle Sound in North Carolina (Figure 27).

Source: VGIN/VBMP 2021 Orthoimagery; USGS NHD Geodatabase for HUC 0301



LEGEND

- ▬ ▬ Site SH30 Site Boundary (330 acres)
- ━ Drainage Area Boundary
- -·- Existing Drainage Feature
- → Assumed Groundwater Flow Direction

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

Southampton County, Virginia

FIGURE 27

Site SH30 Drainage Map

Sea Level Rise

According to the Corps Sea Level Change Curve Calculator (Version 2021.12), sea level rise has increased at a rate of 4.44 millimeters (mm) per year (from 1927 to 2007) at the Sewells Point tidal gage, located downstream of the project area on the James River in Norfolk, Virginia (USACE 2021). The National Oceanic and Atmospheric Administration's (NOAA) relative sea level trend has been updated since 2006 to a rate of 4.75 mm/year, with a 95% confidence interval of +/- 0.21 mm/year. This estimate is based on monthly mean sea level data from 1927 to 2020, which is equivalent to a change of 1.56 ft. in 100 years. By comparison, global average sea levels have been rising at a rate of approximately 1.7 mm/year. The difference between the average sea level rise computed from the 4 NOAA tidal stations in the region (3.9 mm/year) and the benchmark global rate (1.7 mm/year) is 2.2 mm/year, an estimate of the average rate of land subsidence at the 4 NOAA stations (see Table 6 below). These numbers indicate that land subsidence has been responsible for more than half the relative sea level rise measured in the southern Chesapeake Bay region (USGS 2013).

Table 6. Relative Sea Level Rise at Selected NOAA Tidal Stations in the Southern Chesapeake Bay Region

			Rate of relative sea-level rise	
ID	**Site Name**	**Period**	**Measured, (mm/yr)**	**95% Confidence Interval (CI)**
8632200	Kiptopeke, Virginia	1951-2006	3.5	+0.42
8637624	Gloucester Point, Virginia	1950-2006	3.8	+0.47
8638610	Sewells Point, Virginia	1927-2006	4.4	+0.27
8638660	Portsmouth, Virginia	1935-2006	3.8	+0.45
	Average		**3.9**	**+0.40**

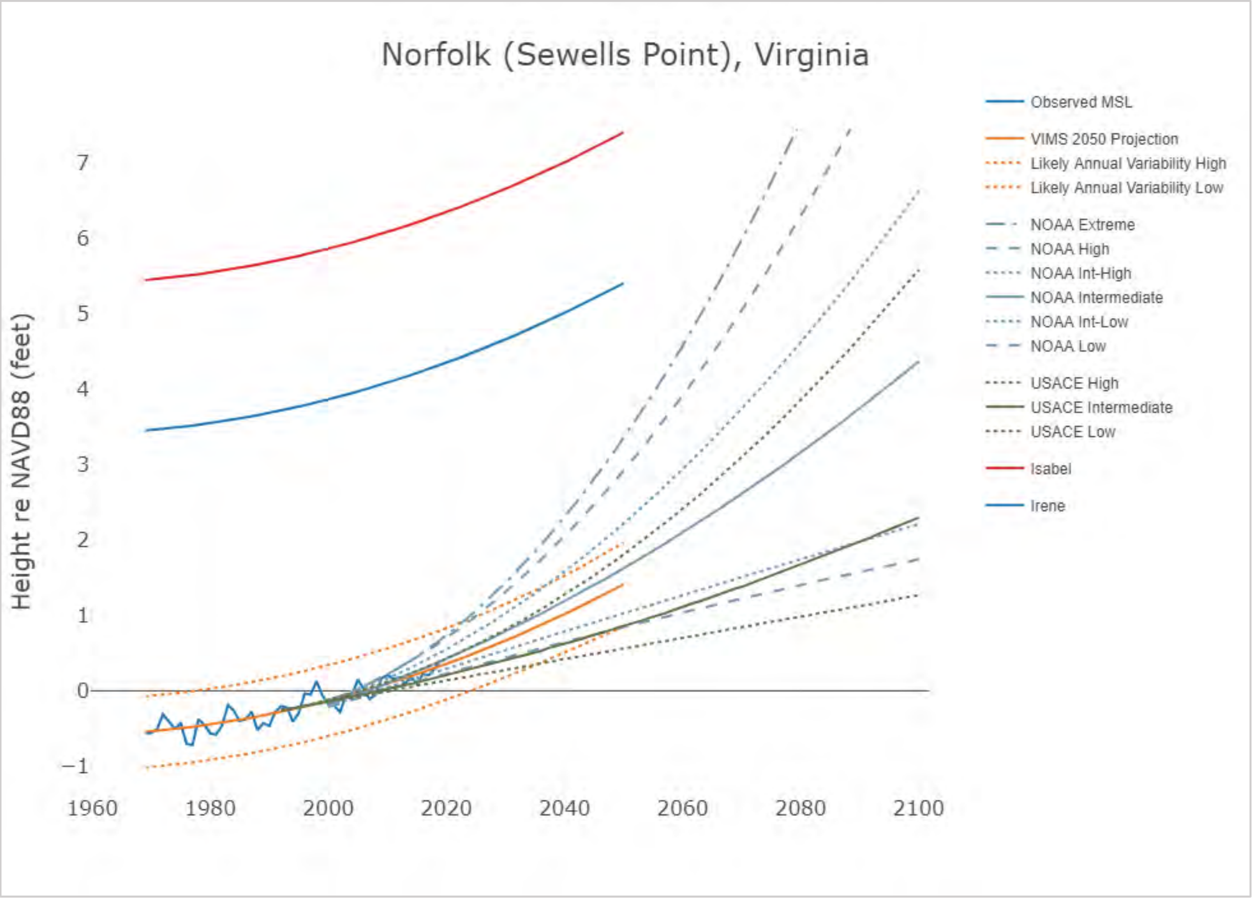
Source: Zervas 2009

Sea level rise is not a linear progression, but rather increases in rate each year. It is predicted to continue to increase at accelerating rates due to increasing ice melt, thermal expansion, and a slowing gulf stream, in addition to ongoing land subsidence. Regional sea level rise scenarios have been developed by the Corps, NOAA, the Virginia Institute of Marine Science (VIMS)6, and other entities to help communities plan for the risk of rising sea levels. Figure 28 displays some of these scenarios and projections, in addition to observed Mean Sea Levels and flood heights of Hurricane Isabel (2003) and Irene (2011). Figure 28 shows these scenarios and projections at Sewells Point, Virginia, which is located approximately 17 miles northeast of the project area.

---

[6] VIMS 2022 Sea Level Report Card issued on March 7, 2023 shows that the sea level rise rate is now 5.38 mm/yr at Sewells Point, Virginia (VIMS 2023).

Figure 28. Sea Level Rise Scenarios and Projections at Sewells Point, Virginia



Source: Center for Coastal Resources Management, VIMS 2018

Corps-projected sea level rise ranges from 0.58 to 1.83 ft. by 2050 and from 1.31 to 5.64 ft. by the year 2100 (Table 7). Note that these projected sea level values represent mean sea level, thus it should be expected that elevations would be higher at high tide. NOAA’s currently published data for the Sewells Point tidal gauge lists the mean high tide elevation at 0.94 ft., with a tidal range between low and high tide of 2.43 ft.; high tide is therefore approximately 1.21 ft. higher than mean sea level (NAVD 88 datum; USACE 2021). These currently published elevations are based upon data collected and processed from the 1983 to 2001 tidal epoch; data collected since that range show that sea levels are increasing more rapidly than predicted in 2006, and current rates match closely to the intermediate scenario listed above (USACE 2021). Thus, it is reasonable to assume that the currently published mean sea level of -0.26 ft. and the mean high water of 0.94 ft. (NAVD 88 datum) for the Sewells Point gauge are below the actual existing condition expected by the intermediate projected rise for 2021 of 0.24 ft. (USACE 2021).

Table 7. Predicted Sea Level Rise at Sewells Point, Virginia (8638610; Epoch 1983–2001)

USACE Sea Level Rise Rate (ft./year relative to NAVD88)*			
Year	**Low**	**Intermediate**	**High**
2021	0.16	0.24	0.47
2025	0.22	0.32	0.62
2030	0.29	0.42	0.83
2035	0.37	0.53	1.05
2040	0.44	0.64	1.29
2045	0.51	0.76	1.55
2050	0.59	0.88	1.83
2055	0.66	1.01	2.13
2060	0.73	1.14	2.44
2065	0.8	1.28	2.78
2070	0.88	1.42	3.13
2075	0.95	1.56	3.5
2080	1.02	1.71	3.89
2085	1.1	1.86	4.3
2090	1.17	2.02	4.73
2095	1.24	2.18	5.17
2100	1.31	2.35	5.64

*NOAA's 2006 Published Rate: 0.01457 ft./year

Source: USACE 2021

Note also that source material from tidal gauges, sea level rise projections, and topographic mapping elevations are all referenced to the NAVD88 vertical datum within this report. Typical default datums for tidal gauges and sea level rise projections are either Mean Lower-Low Water or Mean Higher-High Water and must be adjusted to match the same datum. Topographic datums are either National Geodetic Vertical Datum of 1929 (NGVD 29) or North American Vertical Datum of 1988 (NAVD 88), which for the project area have a vertical discrepancy of 1.35 ft. USGS topographic maps typically use NGVD 29, whereas current Digital Elevation Models or field or aerial photographic topography would use NAVD88. A USGS topographic map with a contour of 20 ft. in the NGVD 29 datum is equivalent to an elevation of 18.65 ft. on a NAVD 88 map.

Sea level rise would impact tidal waters downstream of the existing SPSA property and its proposed development under Alternatives B and C. Those downstream tidal waters include the Nansemond River and Burnetts Mill Creek up to Nansemond Parkway (SR 337) where a vertical weir exists and form the downstream end of Beamon Pond. The specific elevation of the weir and whether it will be overtopped by the effects of sea level rise is unknown. However, further upstream at the crossing of Burnetts Mill Creek and Interstate 58 (at the lowest point adjacent to the SPSA property), the culvert at this location has an invert elevation of 7 feet (based on an HDR floodplain study referenced later in the floodplain portion of this chapter). A tidal elevation of 7 feet or more is not expected based on sea level rise projections listed in Table 7, and thus no impacts from sea level rise are expected on-site. Furthermore, the project area has ground surface elevations above 19 feet (NAVD88).

Site SH30 is not located adjacent to the tidal shore. SH30 is located on elevated land generally between 60 and 90 ft. (NAVD 88), well above the effects of projected sea level rise.

Storm Surge

The Corps completed the *North Atlantic Coast Comprehensive Study: Resilient Adaptation to Increasing Risk* (2015) in the wake of Hurricane Sandy to address coastal flood risks and provide communities with a planning-level framework to analyze flooding risks and identify possible solutions. Mapping efforts presented in Appendix D of this study identify areas of low to high risk of exposure from various flooding sources, including the 1% annual chance flood plus 3 ft. of freeboard, the 10% annual chance flood, and the Category 4 Sea, Lake, and Overland Surges from Hurricanes (SLOSH) modeling conducted by NOAA (USACE 2015). The extent of the Category 4 SLOSH event represents the maximum storm tide levels caused by extreme hurricane scenarios across the region. It therefore provides a reasonable approximation of the most extreme flooding event. Mapping for that analysis was completed at the scale of the project area by the Corps in February 2014 using the best available data at the time.

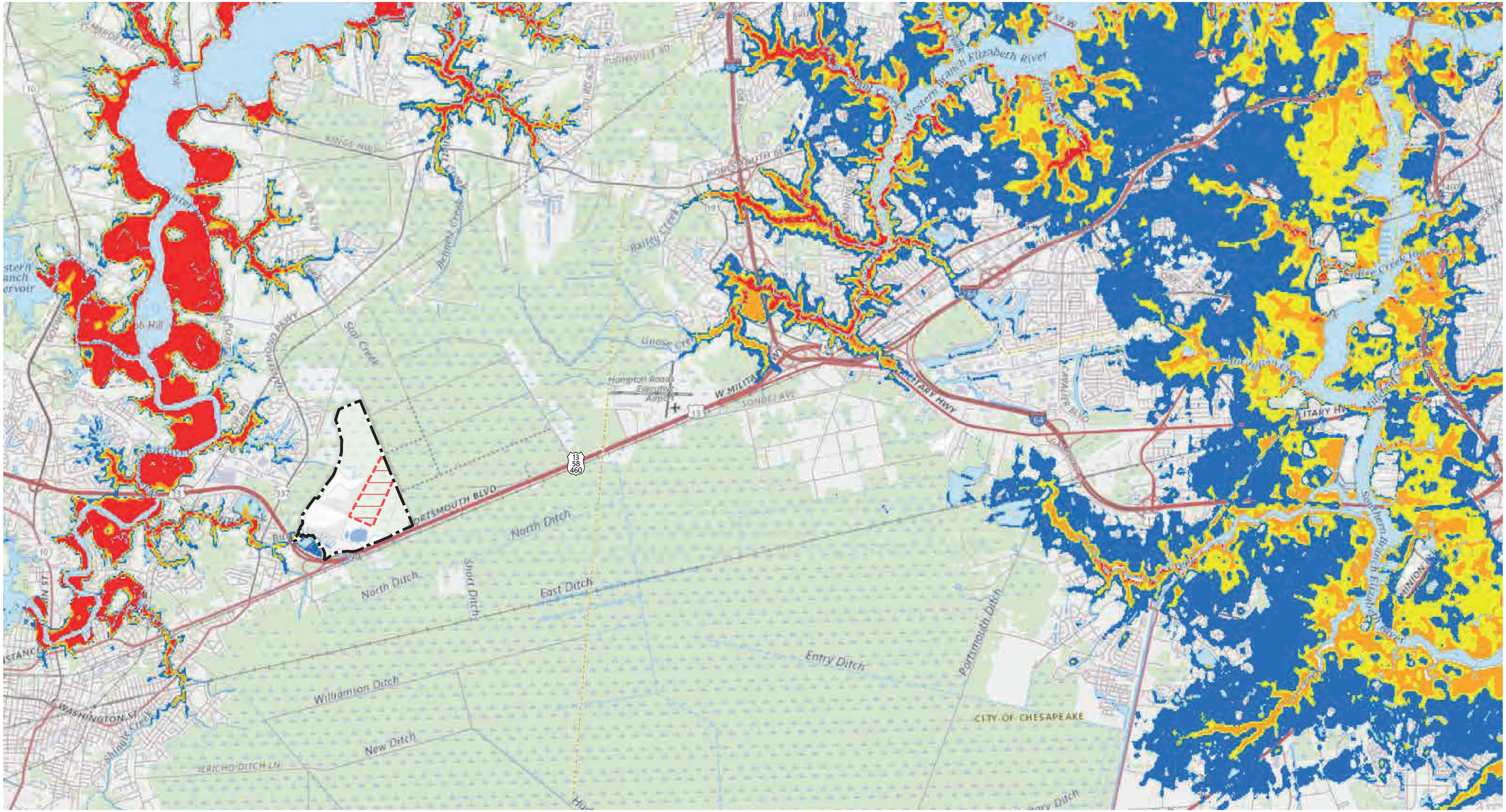
Examination of the current digitally available SLOSH mapping using the National Storm Surge Hazard Maps presented by NOAA, the National Weather Service, and the National Hurricane Center Storm Surge Unit indicates no risk at the project area for Alternatives B and C under Category 3 (Figure 29). Under Category 4 (Figure 30), the risk boundary is similar to the risk area map presented in the Corps' *North Atlantic Coast Comprehensive Study*, with the addition of the potential for less than 3 ft. of flooding at the project area and greater than 6 ft. of flooding at Cell VII, due to its excavation. NOAA SLOSH mapping is based on an unspecified Digital Elevation Model source, and the maps also indicate that local features such as construction walls, levees, berms, pumping systems, or other mitigation systems found at the local level may not be included in the analysis. Interpretation of the mapping within the undeveloped forested area east of the project area indicates that the storm surge hazard boundary for flooding less than 3 ft. above ground is likely based on the 20 ft. elevation contour. The mapping does not take into consideration existing ditch lines, such as the major ditch that runs north to south along the powerline easement just east of the subject property, or the topography produced for the project area using aerial photography in 2016.

Regardless, this mapping is intended to indicate potential worst case scenario storm surge flooding vulnerability so that communities can evaluate their risk for the storm surge hazard. The project area has ground elevations ranging from 19 to 21 ft., and almost all land areas north, south, and east of this location, extending to the shorelines of the James River and Atlantic Ocean, are at lower elevations. Thus, the project area represents a fraction of the entire area projected to be impacted, and localized impacts are projected to be 3 ft. or less in depth.

Regionally, flooding would be expected to be widespread due to the landscape position and severity of Category 3 or 4 hurricanes, whether resulting from storm surge, precipitation, or the combination of both. For Alternatives B and C, hurricane wind and precipitation pose the greatest risk for power outages and flooding of facilities, the stormwater management facilities and downstream receiving waters. Virginia Solid Waste Management Regulations set the standards for siting, design, construction, operation, and closure of facilities, including requirements for the management of stormwater run-on (flow into the active portion of the landfill) and runoff, and to collect and control, at a minimum, the water volume resulting from a 24-hour, 25-year storm. Collection and treatment of water volumes for larger precipitation events consistent with hurricanes is typically prohibitive due to the amount of land necessary for such facilities.

This page intentionally left blank.

Source: ESRI Basemap The National Map; NOAA/NW/NHC Storm Surge Unit



LEGEND

SPSA Property Boundary

Expansion Area

🟦 Depth of water less than 3 feet above ground

🟨 Depth of water greater than 3 feet above ground

🟧 Depth of water greater than 6 feet above ground

🟥 Depth of water greater than 9 feet above ground

N

0 6,000 Ft

US Army Corps of Engineers

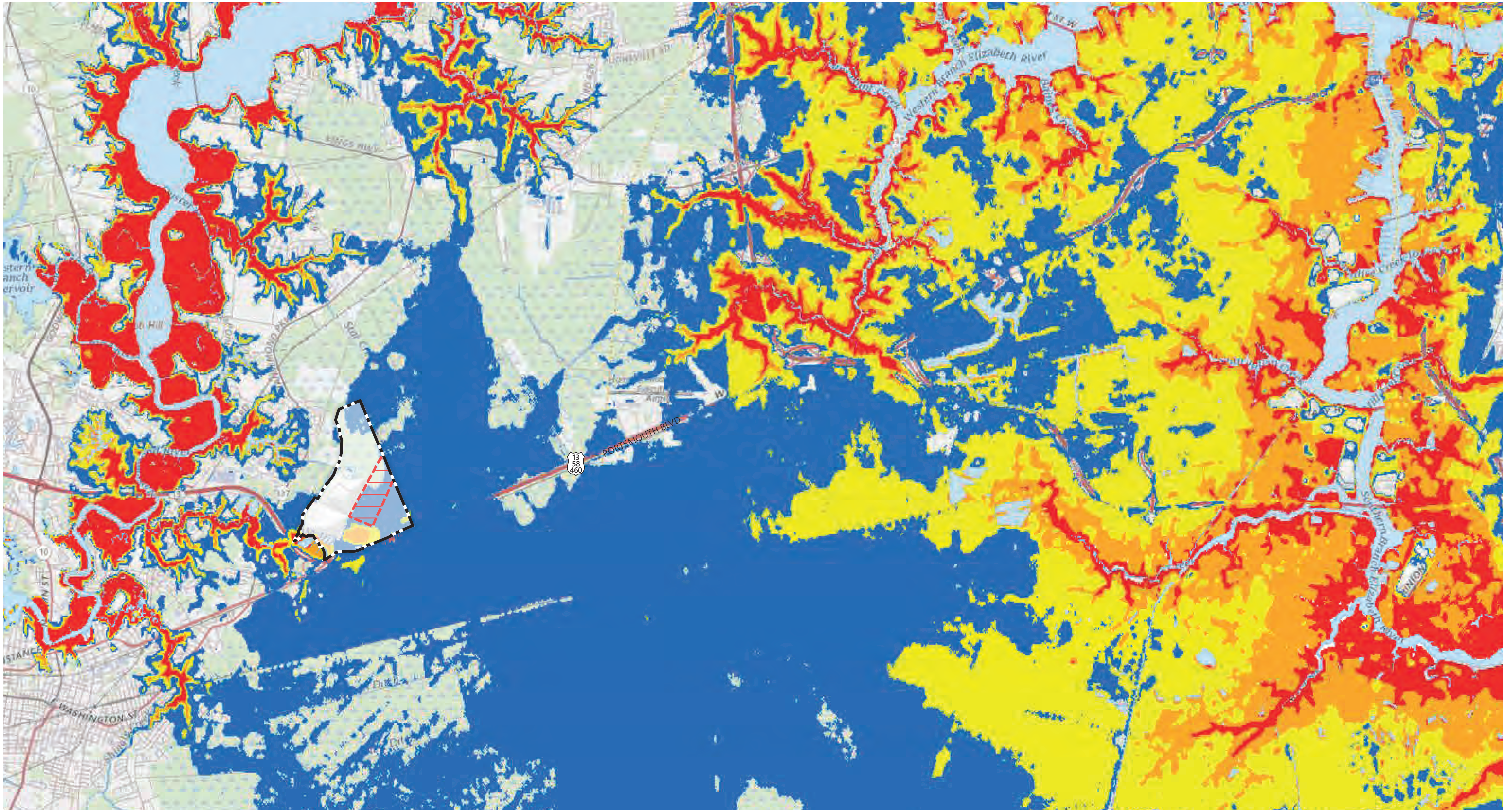
Environmental Impact Statement for
Proposed Expansion of SPSA Landfill

Southampton County, Virginia

FIGURE 29

SPSA Regional Landfill National Storm Surge Hazard Maps – Category 3

Source: ESRI Basemap The National Map; NOAA/NW/NHC Storm Surge Unit



LEGEND

- SPSA Property Boundary
- Expansion Area

🟦	Depth of water less than 3 feet above ground
🟨	Depth of water greater than 3 feet above ground
🟧	Depth of water greater than 6 feet above ground
🟥	Depth of water greater than 9 feet above ground

N

0 6,000 Ft

US Army Corps of Engineers

Environmental Impact Statement for
Proposed Expansion of SPSA Landfill

Southampton County, Virginia

FIGURE 30

SPSA Regional Landfill National Storm Surge Hazard Maps – Category 4

Site SH30 is located at elevations generally between 60 and 90 ft. (NAVD 88). Projected storm surge is not expected to impact this property even under the most extreme scenarios due to the property elevation. This site is located outside the currently available SLOSH maps; thus no storm surge events are mapped at the site.

Environmental Consequences

Alternative A

Under Alternative A, long-term adverse effects to surface hydrology are not anticipated, nor is an effect from sea level rise or risk of storm surge or impacts therefrom.

Alternative B

Under Alternative B, long-term adverse effects to surface hydrology are not anticipated. Surface water hydrology in the project area is primarily driven by direct precipitation, with very little contributing watershed upslope beyond the footprint of Alternative B. Further, the volume of direct precipitation is a fraction of the total surface hydrology that is generated by the contributing watershed that drains to Burnetts Mill Creek, to the southwest of the SPSA property. Direct precipitation onto the proposed expansion area would be intercepted by best management practices appropriate to the stage of the cell development, whether in the borrow pit phase, landfill development phase, operational phase, or upon the completion and capping phase per Virginia state regulations. That intercepted and treated surface water would be directed to eventually discharge into Burnetts Mill Creek, likely in the same hydroperiod or longer than it would under Alternative A.

The SPSA project area does not have tidally influenced waters under current conditions, however downstream portions of Burnetts Creek are tidally influenced. Both sea level rise and storm surge risk originate from the tidal water bodies to the north, east, and west of the project area. Given the site’s landscape position at the headwaters of Burnetts Mill Creek and that it is higher in elevation than most land leading to the tidal shoreline to the north, east, and west, most adjacent lands would be affected by sea level rise and potential storm surges well before the project area; further, no amount of flood storage lost would improve flooding impacts at lower elevations in a storm surge event where flooding originates from the surrounding tidal water bodies. Thus, no adverse effect is anticipated under Alternative B.

Alternative C

Under Alternative C, the airspace between Cells V and VII would be filled in and utilized for landfilling operations to secure an additional 1.52 million CY of disposal capacity and reduce the size of Cell IX by approximately 9 acres compared to Alternative B. Long-term adverse effects to surface water are not anticipated under Alternative C and are similar in nature to that described in Alternative B.

Alternative D

Under Alternative D, long-term adverse effects to surface hydrology are not anticipated. Surface water hydrology in the project area is primarily driven by direct precipitation, with no contributing watershed upslope due to the project location at the top of a watershed divide. Development of the site would require stormwater best management practices compliant with Virginia stormwater management regulations to treat water quantity and quality from the increase in runoff generated by the increase in developed land and impervious cover. Intercepted and treated surface water would be discharged to the current receiving watersheds, likely in the same hydroperiod or longer than it would under Alternative A. Further, due to the property elevation (generally between 90 and 60 ft [NAVD 88]), projected storm surge and regional sea level rise through the year 2100 are not anticipated to impact Site SH30.

Floodplains

Methodology

Floodplains are regulated by local, state, and federal rules and regulations. Executive Order (EO) 11988, Floodplain Management (The White House 1979), requires federal agencies to "avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative."

The Federal Emergency Management Agency (FEMA) has primary federal jurisdiction over the administration of EO 11988. FEMA guidance for compliance with EO 11988 is found at 44 CFR 9. EO 13690, *Establishing a Federal Flood Risk Management Standard (FFRMS) and a Process for Further Soliciting and Considering Stakeholder Input* (The White House 2015), amended EO 11988 and established the FFRMS, to improve the nation's resilience to current and future flood risks, which are anticipated to increase over time due to the effects of climate change and other threats. EO 13690 and the FFRMS encourage the consideration of natural systems, ecosystem processes, and nature-based approaches when development alternatives are considered (The White House 2015). This is consistent with recommendations and findings of the *North Atlantic Coast Comprehensive Study* (USACE 2015), which is aimed at reducing risk and increasing communities' abilities to withstand and rapidly recover from storm damages. EO 13690 and the FFRMS expand upon these tenets by calling for agencies to use higher design flood elevations than the base flood for federally funded projects, to address current and future flood risk so that projects last as long as intended.

The Virginia Flood Damage Reduction Act of 1989 was enacted to improve Virginia's flood protection programs and place related programs under one agency, the Virginia Department of Conservation and Recreation (VDCR) (Code of Virginia 1989). The VDCR is the manager of Virginia's floodplain program, serving as coordinator for all flood protection programs and activities in Virginia, as well as the designated coordinating agency of the National Flood Insurance Program. Under Virginia statute

§10.1-602 (Floodplain Code), VDCR works with localities to establish and enforce floodplain management zoning (Code of Virginia 1989).

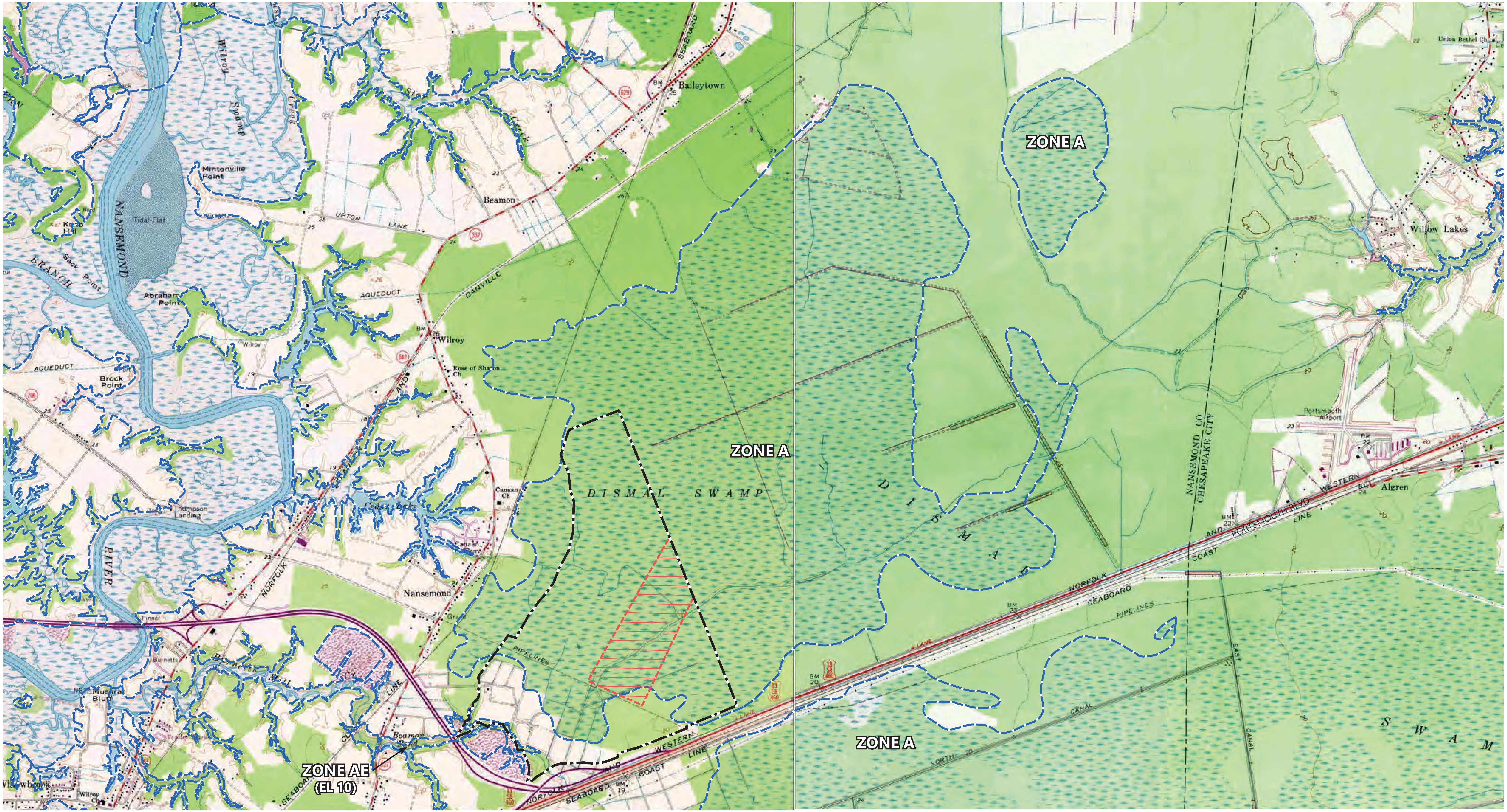
Virginia Solid Waste Management Regulations, detailed in 9 VAC 20-81-120, regulate the siting of new sanitary, CDD, and industrial waste landfills, as well as the expansion of those landfills with regard to floodplains, groundwater, receiving surface waters, and wetlands, among others (Code of Virginia 2011). The City of Suffolk Zoning Ordinance, Section 31-416.2 Floodplain Overlay district, regulates uses, activities, and development within the floodplain. Its primary goals are to prevent the loss of property and life, the creation of health and safety hazards, the disruption of commerce and governmental services, the extraordinary and unnecessary expenditure of public funds for flood protection and relief, and the impairment of the tax base (City of Suffolk 2015). Part c.1, Establishment of Zoning Districts, regulates the development of land within the various floodplain zones, as designated by FEMA.

Affected Environment

The area susceptible to flooding within the project area for Alternatives B and C is identified on the current FEMA Flood Insurance Rate Map (FIRM) as Zone A (FIRM 5101560119E, dated August 3, 2015, for the City of Suffolk), which includes approximate study areas with no base flood elevation (1% annual chance or the 100-year flood). Most of the study area, including the Regional Landfill, and adjacent lands to the north and east, are within this flood zone, which is centered over the portion of the Great Dismal Swamp NWR north of U.S. Routes 13/58/460. This flood zone was established by FEMA in its first issuance of FIRMs for the City of Suffolk on March 24, 1978. It has continued to be shown as the same area and designation in all subsequent FIRM issuances. A November 16, 1990 Flood Insurance Study stated that approximate Zone A floodplain areas were mapped based on either a study completed by Benatec Associates of Columbus, Ohio (FEMA 1990) using the 1965 (photo revised 1979) Chuckatuck and Bowers Mill, Virginia USGS 7.5-minute topographic maps with a contour interval of 5 and 10 ft., or the U.S. Department of Housing and Urban Development (HUD), Federal Insurance Administration Flood Hazard Boundary Map for the City of Suffolk, dated March 1978 (a copy of which has not been located). However, examination of the referenced topographic maps and more recent releases shows that the boundary of the FEMA Zone A floodplain in the project area matches the exact boundary of the wetland hatch shown on the topographic map. Thus, it is unlikely that any hydrologic or hydraulic analysis was prepared to determine this flood boundary. Figure 31 provides a composite view of the USGS topographic maps and the digital FEMA floodplain boundary, which displays the direct correlation between the floodplain and wetland hatch boundaries.

This page intentionally left blank.

Source: USGS 7.5 minute Chuckatuck (1972) and Bowers Hill (1970), Virginia Quadrangles



LEGEND

- SPSA Property Boundary
- Expansion Area
- FEMA Mapped Floodplain Boundary

N

0 2,000 4,000 Feet

Environmental Impact Statement for
Proposed Expansion of SPSA Landfill

Suffolk, Virginia

FIGURE 31

SPSA Regional Landfill FEMA Floodplain Mapping (1970 and 1972 USGS Quadrangles)

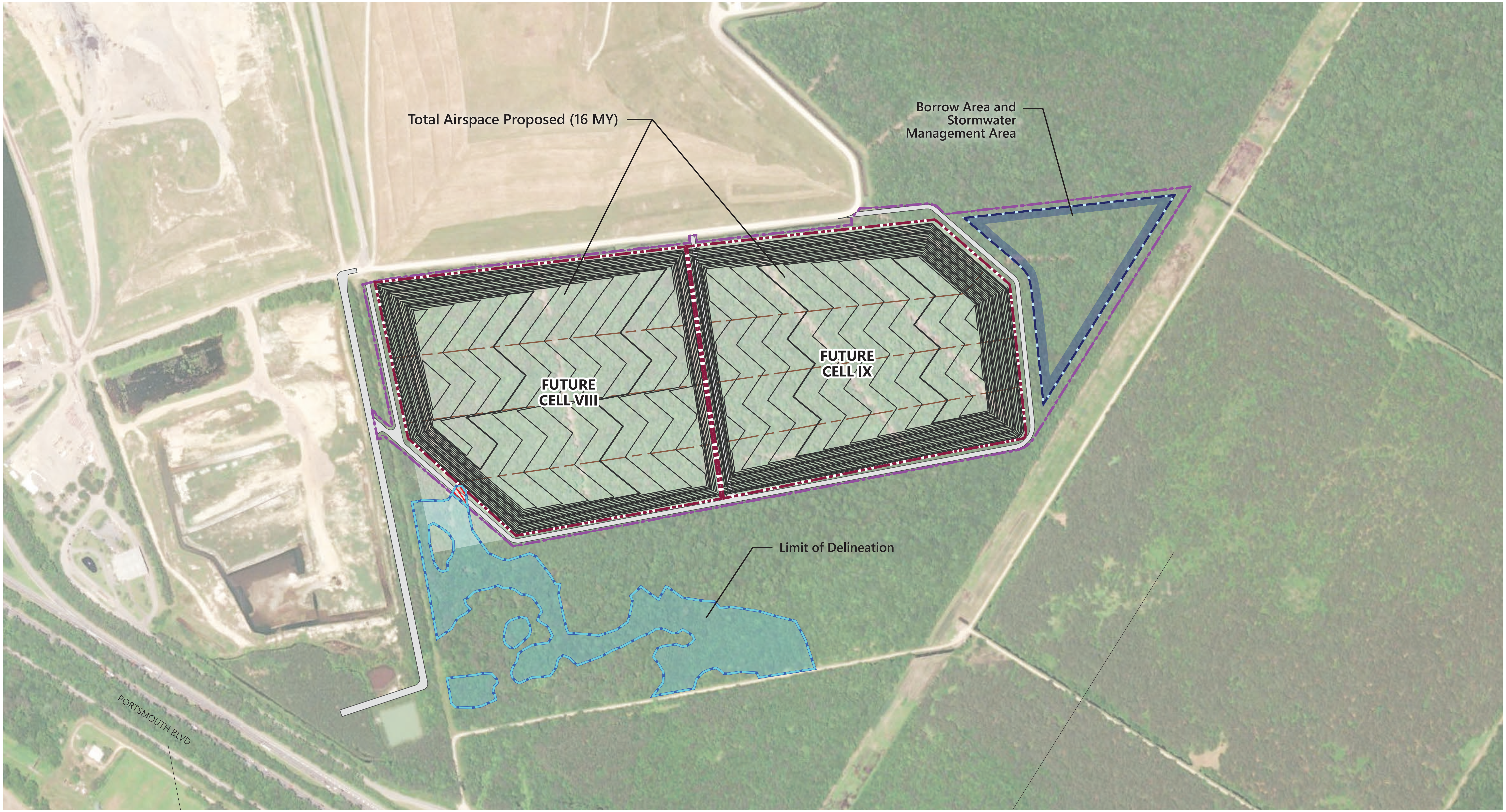
Per the 2015 City of Suffolk zoning ordinance for Zone A floodplain boundaries, the City Floodplain Administrator reserves the right to require a hydrologic and hydraulic analysis for any development. When such base flood elevation data are utilized, the lowest floor shall be elevated to or above the base flood level. Thus, for the development of the proposed cells, SPSA's consultant, HDR, prepared an analysis using the FEMA-approved ICPR4 model, an unsteady state model that is ideal for flat basins interconnected by weir and ditch flow and where hydrologic residence times are more difficult to calculate than those with steady flow. The model simulations provide base flood elevations for each designated basin. For future Cells VIII and IX, the base flood elevation was determined to be 19.7 ft.

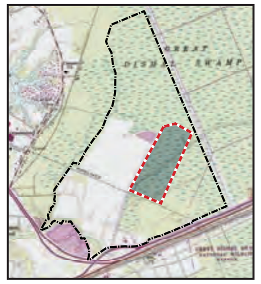
Delineation of the flood boundary at elevation 19.7 feet using topographic data generated from aerial photography dated March 22, 2016, significantly reduces the floodplain footprint at the study area (Figure 32) in comparison to the approximate FEMA Zone A boundary (Figure 31). Based on the FEMA mapped floodplain boundary, there is a proposed impact of 109.64 acres; however, use of the ICPR4 model and more recent topography reduces the proposed impact to 0.11 acre along the southeastern corner of the project area as a result of the proposed perimeter roadway, not the landfill cells (Figure 32). Most of the project area has ground surface elevations between 20 and 22 ft. in elevation (NAVD88 datum). Comparison of this delineated floodplain boundary with the boundary published by the First Street Foundation and their online resource, FloodFactor (2021), shows a similar boundary determination at the project area and in the larger wetland area to the east, which was determined in the HDR analysis to have a flood elevation of 21 ft. The FloodFactor floodplain boundary is based on county and nationally available digital elevation models, which provide a greater level of accuracy in depicting the boundary than a USGS topographic map with 5 to 10 ft. contour intervals (First Street Foundation 2021).

Climate change projections indicate a likelihood for greater frequency and intensity of precipitation events. As a result, the precipitation and intensity associated with the 100-year storm is likely to increase, thereby increasing the 100-year flood depths and boundary. Given the landscape position of the project site in relation to the contributing watershed it is unlikely that the flood elevation of 21 feet is going to rise appreciably.

This page intentionally left blank.

Source: ESRI Orthoimagery (2020)





LEGEND

- SPSA Property Boundary
- Landfill Cell Boundary
- Borrow Area and Stormwater Management Area
- Limits of Disturbance
- 100-Year Floodplain Elevation 19.7′
- Floodplain Impacts (0.11 acres)

N

0 300 Ft

US Army Corps of Engineers

Environmental Impact Statement for
Proposed Expansion of SPSA Landfill

Suffolk, Virginia

FIGURE 32

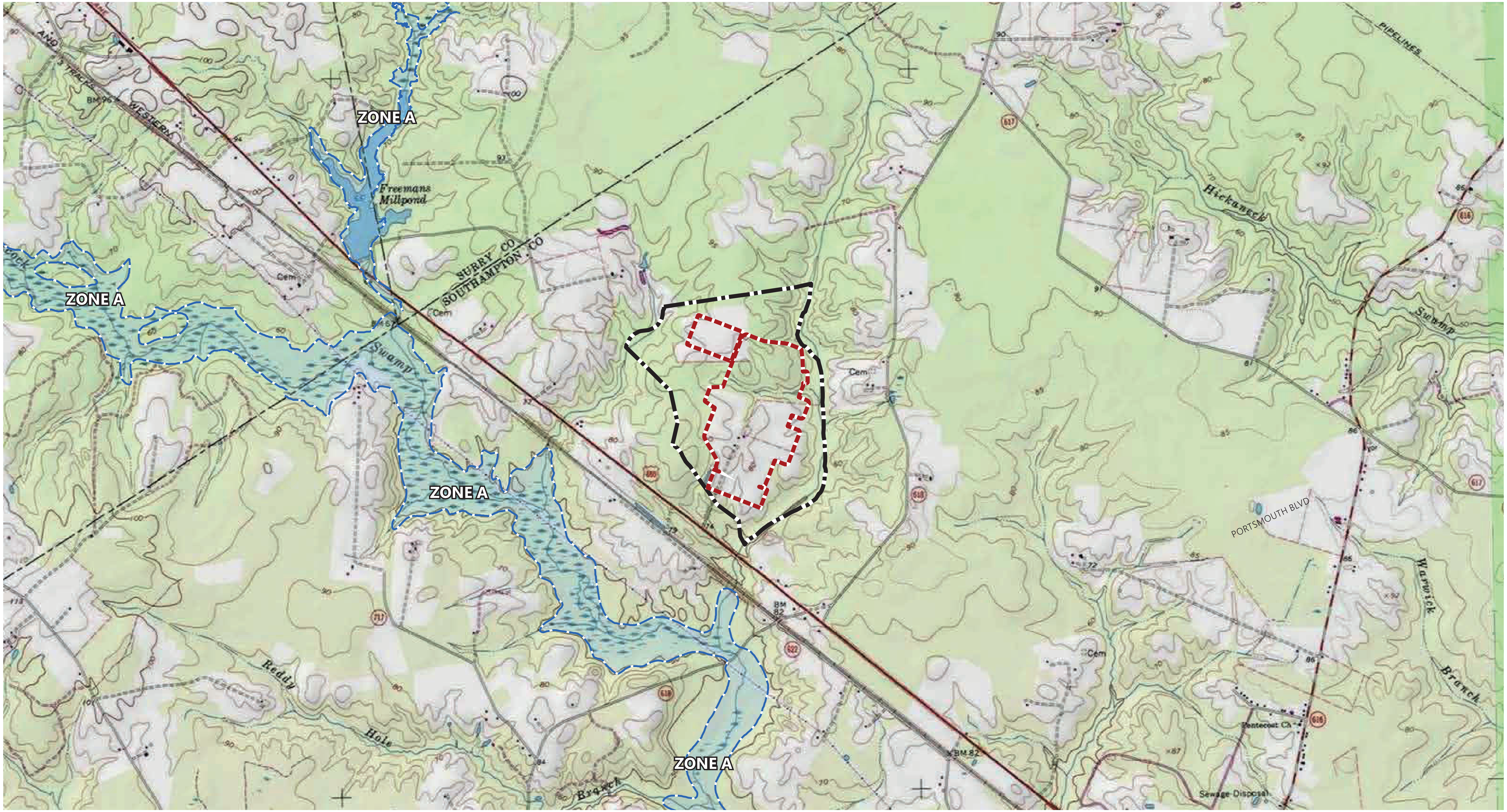
SPSA Regional Landfill
HDR 100-Year Floodplain Delineation

Note that HDR previously prepared a similar analysis of the watershed for the development of Cell VII that relied on the same unsteady state model (release version 3) using a rainfall distribution of 8.5 in. The current Atlas 14 published 100-year recurrence interval rainfall distribution has since increased, based on an updated 9.3 in. of rainfall over 24 hours, per NOAA's National Weather Service Hydrometeorological Design Studies Center, Atlas 14 Point Precipitation Frequency Estimates (2017). For comparison, Hurricane Floyd dropped 9.19 in. of rain in 24 hours on September 15, 1999. This updated rainfall distribution, which relies on 40 additional years of rainfall data, was established by NOAA in 2006 with the issuance of the NOAA Atlas 14, Volume 2, Version 3.0 for Delaware, District of Columbia, Illinois, Indiana, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia. Comparison of the 2 models shows that the floodplain elevation increased by 0.3 ft. as a result of the 0.8 in. increase in rainfall distribution.

Site SH30 has no 100-year floodplain delineated. Off-site, FEMA has a mapped Zone A floodplain, which includes approximate study areas with no base flood elevation (1% annual chance or the 100-year flood) for Seacock Swamp south of the site (FEMA FIRM 51175C0050C, dated September 4, 2002, for Southampton County; Figure 33). The site is gently sloped with approximately 30 ft. in elevation difference between the central high ground and the lower stream valleys to the east and west. Flooding, although not mapped by FEMA, would be limited to the lower lying perimeter stream valleys.

This page intentionally left blank.

Source: USGS 7.5 minute Chuckatuck (1972) and Bowers Hill (1970), Virginia Quadrangles



LEGEND

- SH30 Property Boundary
- Limits of Disturbance
- FEMA Mapped Floodplain Boundary

N

0 2,000 4,000 Feet

US Army Corps of Engineers

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

Southampton County, Virginia

FIGURE 33

Site SH30 FEMA Floodplain Mapping

Environmental Consequences

Alternative A

Under Alternative A, long-term adverse effects to the base flood elevation or to the floodplain are not anticipated. The FEMA-mapped floodplain is a Zone A, approximated floodplain boundary with no base flood elevation determined. Review of the source material for the floodplain determination shows that it was likely a map-based decision, which mirrored the wetland hatch area in the central portion of the Great Dismal Swamp NWR north of U.S. Routes 13/58/460. This floodplain and wetland system sits on land that is flat, with elevations generally in the range of 19 to 21 ft. (NAVD88 vertical datum). This system generally drains to the southwest, but at its outer edges also drains to the north, east, and west to other drainage systems. For the project area, the wetland and floodplain system drains southwest and into Burnetts Mill Creek and ultimately to the Nansemond and James Rivers. Modeling of the floodplain watershed in the project area determined a base flood elevation of 19.7 ft. The No-Action Alternative would not drain runoff into this base elevation floodplain and flood storage area. Thus, adverse effects are not anticipated.

Alternative B

Under Alternative B, long-term adverse effects to the base flood elevation are not anticipated. Approximately 0.11 acres of floodplain are anticipated to be affected by the construction of perimeter roadways, located beyond the extent of the disposal area. The base elevation floodplain and flood storage at the project area is driven solely by direct precipitation within the same footprint as the project area (there is no upstream or upslope contributing watershed) and downslope controls and contribution from the off-site watershed to the east. Thus, due to the nature of the proposed action, it is anticipated that future direct precipitation would be intercepted and drained into on-site stormwater management facilities, depending on the life cycle of Alternative B, to be discharged in accordance with Virginia stormwater management regulations with no adverse downstream effects.

Adverse effects to the base flood elevation are most commonly caused by land use changes, in which increases in impervious area and reductions in ground absorption result in increased runoff volume. The increase in impervious area under Alternative B is nominal, with the only addition coming from the construction of the gravel perimeter road. The landfill itself consists of primarily dirt and grass cover materials which are considered pervious. Although considered an impervious cover based on Chesapeake Bay regulations, this gravel road is not completely impervious, providing some absorption. On-site stormwater management, mostly in the form of sediment basins during the construction phase and perimeter channels during operational phases, would collect and slow the release of the runoff volume to an extent comparable to the release of runoff from the existing condition.

Alternative C

Under Alternative C, the airspace between Cells V and VII would be filled in and utilized for landfilling operations to secure an additional 1.52 million CY of disposal capacity, reducing the size of Cell IX by approximately 9 acres compared to Alternative B. Long-term adverse effects to the floodplain are not anticipated under Alternative C. Similar to Alternative B, approximately 0.11 acres of floodplain are anticipated to be affected by Alternative C, due to the construction of perimeter roadways beyond the extent of the disposal area. The base elevation floodplain and flood storage at the project area is driven solely by direct precipitation within the same footprint as the project area (there is no upstream or upslope contributing watershed) and downslope controls and contribution from the off-site watershed to the east. Thus, due to the nature of Alternative C, it is anticipated that future direct precipitation would be intercepted and drained into on-site leachate and stormwater management facilities, depending on the life cycle of the proposed action, to be discharged in accordance with Virginia stormwater management regulations with no adverse effect downstream.

The base elevation floodplain and flood storage provided by the greater portion of the Great Dismal Swamp NWR north of U.S. Routes 13/58/460, in general, flows toward the southwest before being intercepted by a ditch running north to south along an existing powerline, and then discharging into a ditch along the north side of U.S. Routes 13/58/460 and eventually into Burnetts Mill Creek.

Alternative D

Under Alternative D, adverse effects to floodplains are not anticipated. The SH30 property has no 100-year floodplain delineated. Due to the nature of the development of Alternative D, it is anticipated that future direct precipitation would be intercepted and drained into on-site leachate and stormwater management facilities, depending on the life cycle of the proposed action, to be discharged in accordance with Virginia stormwater management regulations with no adverse effect downstream.

Groundwater

Methodology

Groundwater resources were characterized based on a review of available reports and data, such as hydrologic and hydrogeologic studies of the project area that were produced as part of the engineering analyses and groundwater monitoring. Geologic and hydrogeologic USGS mapping, reports produced by the USGS, and publicly available GIS data were also reviewed.

Affected Environment

Groundwater Management Areas are defined and managed in the state under Virginia Code 9 VAC 25-600-20 (Code of Virginia 2014), and groundwater in the vicinity of landfills is protected under Virginia Code 9 VAC 20-81-250 (Code of Virginia 2019).

According to regional geologic mapping performed by the USGS (2006) and soil boring logs generated at the Regional Landfill (HDR 2019a), groundwater is present within several principal aquifers in the subsurface of the project area. The surface of the site is capped with approximately 7 ft. of organic clays that ubiquitously cover the area; below the clay is a 25-50 ft. thick layer of unconsolidated sediments consisting of sand, silt, and to a lesser extent peat and clay that were deposited during the Pleistocene epoch and that make up the surficial water-bearing groundwater aquifer. Other principal aquifers underlying the surface aquifer (as observed by the USGS in the nearby well 58 C10) are shown in Table 8. Over 30 ft. of sandy clay separate the surface aquifer from the underlying Yorktown-Eastover aquifer and prevent groundwater flow between the 2 units. Fine-grained, low-permeability confining units also separate the lower 3 aquifers and prevent water exchange between them.

Table 8. Principal Aquifer Systems Observed in the Vicinity of the Regional Landfill

Principal Aquifer Systems	Depth to Top of Aquifer (ft. below Mean Sea Level)
Yorktown- Eastover Aquifer	90
Piney Point Aquifer	255
Aquia Aquifer	330
Potomac Aquifer	430

Groundwater in the surficial aquifer generally flows from northeast to southwest across the Regional Landfill site before discharging to Burnetts Mill Creek. Based on a water level monitoring event performed in January 2021, groundwater under the vicinity of the expansion area flows toward the south-southeast before discharging to a drainage ditch along the powerline easement that extends from the northeast boundary of the site to a swampy area adjacent to the U.S. Routes 13/58/460 bypass (HDR 2021b). As shown in Figure 34, the drainage ditches flow through a culvert beneath the bypass and into Beamon Pond, which is located at the headwaters of Burnetts Mill Creek, a tributary to the Nansemond River. According to regional groundwater level modeling performed by the USGS, groundwater in the deeper Yorktown-Eastover and Piney Point aquifers flows to the northeast toward the mouth of the James River; groundwater in the Aquia aquifer flows to the northwest; and water in the Potomac aquifer flows to the west toward Franklin, Virginia (USGS 2009).

This page intentionally left blank.

Source: DEQ, 2021. Office of Water Supply, VA Department of Environmental Quality; HDR, 2021. January 2021 Groundwater Surface Map. SPSA Regional Landfill; Base map imagery from ESRI/Maxar (2020).

LEGEND

- - - Surface Drainage Feature

— Groundwater Contour (1 ft; HDR)

····· Liner/Boundary Interiors (HDR)

▨ Expansion Site Including Cells VIII and IX

⊕ Manufacturing/Industrial Well (DEQ)

☐ Maximum Potential Dewatering Radius of Influence

☐ SPSA Property Boundary

→ Surface Water Flow Direction

→ Groundwater Flow Direction

N

0 1,000 2,000 feet

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

Suffolk, Virginia

FIGURE 34

SPSA Regional Landfill Groundwater Flow and Drainage Features

As part of the existing operating permit at the Regional Landfill, and in accordance with the Detection and Assessment Monitoring Programs (9 VAC 20-81-250) and Corrective Action Program (9 VAC 20-81-260), SPSA collects groundwater samples for quarterly analysis from 25 monitoring wells and 14 surface water sites. No substantial increases above background levels have been observed to indicate landfilling practices have negatively impacted groundwater (HDR 2021a).

Groundwater and surface water downgradient of these compliance wells are monitored as outlined in Table 9 below and monitoring results to date do not indicate cadmium or cobalt are migrating within the groundwater or surface water at concentrations above groundwater protection standards. If affected groundwater or surface water migrated off-site in the future, SPSA would notify all persons who own the land or reside on the land that directly overlies any part of the release, as required by 9 VAC 20-81-260 C.1.b. If groundwater contamination were detected at the Regional Landfill, per the Good Neighbor Agreement SPSA holds with Suffolk, communities would be notified of an exceedance of any kind.

Table 9. Groundwater and Surface Water Monitoring Program Summary

Monitoring Program	# of Monitoring Locations	Monitoring Frequency	Monitoring Parameters
Detection	2 Monitoring Wells	Quarterly	Table 3.1 Column A of 9 VAC 20-81-250
Assessment	1 Monitoring Well	1st Quarter	Table 3.1 Column B of 9 VAC 20-81-250
		2nd – 4th Quarters	Table 3.1 Column A of 9 VAC 20-81-250 Historical Column B Detects
Assessment and Corrective Action	15 Monitoring Wells	1st Quarter	Table 3.1 Column B of 9 VAC 20-81-250 Site Specific Speciation/Attenuation Parameters
		2nd and 4th Quarter	Table 3.1 Column A of 9 VAC 20-81-250 Historical Column B Detects
		3rd Quarter	Table 3.1 Column A of 9 VAC 20-81-250 Historical Column B Detects Site Specific Speciation/Attenuation Parameters
Corrective Action	2 Monitoring Wells	Quarterly	Constituents of Concern (Cadmium and Cobalt)
	4 Monitoring Wells	Semi-Annually	Constituents of Concern (Cadmium and Cobalt)

Monitoring Program	# of Monitoring Locations	Monitoring Frequency	Monitoring Parameters
			Site Specific Speciation/Attenuation Parameters
	14 Surface Water Locations	Semi-Annually	Constituents of Concern (Cadmium and Cobalt)

According to regional geologic and hydrogeologic mapping outlined in a 2006 USGS report, *The Virginia Coastal Plain Hydrogeologic Framework*, groundwater is present within several principal aquifers in the subsurface of Site SH30 (USGS 2006), though only the surficial aquifer is anticipated to be affected by the landfill expansion. USGS borehole 55D 5, which was advanced approximately 3 miles southeast of the SH30 site (USGS 2006), was used in the absence of site-specific data to determine the geologic and hydrogeologic features of the SH30 site subsurface.

The surficial water-bearing groundwater aquifer is comprised of an approximately 20 ft. thick package of unconsolidated sediments consisting of sand, silt, and to a lesser extent peat and clay that were deposited during the Pleistocene epoch. A confining unit of approximately 80 ft. of sandy clay separates the surficial aquifer from the underlying Yorktown-Eastover aquifer and retards groundwater flow between the 2 units; fine-grained, low-permeability confining units also separate the lower 3 aquifers and retards water exchange between them (USGS 2006).

Groundwater flow is best determined using site-specific groundwater elevation data and may be affected by surface topography, hydrology, and characteristics of the soil and nearby wells. In lieu of site-specific groundwater data, localized groundwater in the vicinity of Site SH30 is assumed to flow south towards Seacock Swamp, consistent with surface topography. Groundwater elevation at Site SH30 is therefore assumed to be slightly higher than Seacock Swamp.

Environmental Consequences

Alternative A

Under Alternative A, long-term adverse effects to groundwater are not anticipated. Based on groundwater monitoring reports for the current SPSA permit, the leachate management system in place for the Regional Landfill is effective, and no contamination of major groundwater aquifers is occurring under the site. Continued operation under the current configuration of the Regional Landfill is not anticipated to alter this record.

Under Alternative A, sea level rise may raise groundwater levels higher than present elevations but would not significantly alter groundwater flow directions, velocities, or discharge locations. Climate change has the potential to cause extreme heat conditions that result in drought. In a drought, local aquifer levels would be impacted by an increase in water being pumped out of local wells as well as decrease in recharge by precipitation.

Alternative B

Under Alternative B, long-term adverse effects to groundwater are not anticipated. Excavation to the design depth of 20-40 ft. below grade for cell construction would penetrate the full thickness of the surface aquifer along most of the extent of the expansion area and extend into the underlying dense, confining unit in deeper portions of the excavation. As indicated in Chapter 2, groundwater in the surface aquifer would temporarily be displaced from the zone of excavation due to phased dewatering activities during construction. The dewatering system would be installed separately from the leachate collection system to control pressure on the bottom and sides of the expansion site liners, to induce an inward gradient. Based on the radius of influence of sumps used for dewatering Cells V and VI during construction, which were constructed on similar geologic materials, the maximum anticipated radius of influence for dewatering Cells VIII and IX is approximately 1,400 ft. from sumps (HDR 2007, 2008). Once sufficient ballast (waste) is added to the cells, dewatering would cease, and the lined bases of Cells VIII and IX would lie within the surface aquifer and displace groundwater locally. To date, hydrology of wetlands in the area has not shown a discernible impact from dewatering other area cells. If needed, monitoring could be required as a condition of the Section 404 permit to determine potential permanent impacts.

At the regional scale, however, groundwater flow would be largely unaltered, with no impact on flow toward and discharge to Burnetts Mill Creek, as shown in Figure 34.

Development of the expansion area is not anticipated to adversely affect groundwater in the Great Dismal Swamp NWR to the south or penetrate the deeper principal aquifers. Groundwater flow simulations performed by the USGS indicate that groundwater in the northern portions of the NWR flow toward the north (i.e., toward the Regional Landfill) (USGS 2018), such that site groundwater is not anticipated to reach the NWR. Similarly, surficial groundwater at the site should not mix with groundwater in lower aquifers. Based on a nearby soil boring collected by the USGS and several other existing borings on the SPSA site, up to 70 ft. of low-permeability sandy clay currently separate the surficial groundwater aquifer from the underlying Yorktown-Eastover aquifer in the vicinity of the expansion site; approximately 50 ft. of that material would remain as a significant hydraulic buffer between the excavation base and the top of the Yorktown-Eastover aquifer. By extension, development of the expansion area is also not anticipated to have adverse impacts on the deeper Piney Point, Aquia, or Potomac aquifer systems, nor hydraulically connect them with the surface aquifer.

Alternative B would not cause adverse effects to public or private water supply wells. As indicated previously, dewatering activities associated with developing the expansion area are not anticipated to influence the surface aquifer beyond 1,400 ft. from sumps, the locations of which are yet to be determined. Figure 34 shows the locations of all permitted, non-permitted, and private active water wells near the project area on file with the VDEQ. All of these wells are registered as industrial or manufacturing wells, and none are located within the 1,400-ft. distance of the proposed expansion area. Water supply in this area is provided by public utility. According to water well inventory records, the wells shown in Figure 34 supply water from the Piney Point aquifer, over 300 ft. below ground surface; there are no known supply wells in the surface aquifer in the vicinity of the project area.

Under Alternative B, sea level rise may raise groundwater levels higher than present elevations but would not significantly alter groundwater flow directions, velocities, or discharge locations. Climate change has the potential to cause extreme heat conditions that result in drought. In a drought, local aquifer levels would be impacted by an increase in water being pumped out of local wells as well as a decrease in recharge by precipitation.

Alternative C

Under Alternative C, the airspace between Cells V and VII would be filled in and utilized for landfilling operations, to secure an additional 1.52 million CY of disposal capacity and reduce the size of Cell IX by approximately 9 acres compared to Alternative B. Long-term adverse effects to groundwater are not anticipated under Alternative C. Similar to Alternative B, excavation for cell construction would penetrate the full thickness of the surface aquifer along most of the extent of the expansion area and extend into the underlying dense, confining unit in deeper portions of the excavation. Groundwater in the surface aquifer would be temporarily displaced from the zone of excavation due to phased dewatering activities during construction. Once sufficient ballast is added to the cells, dewatering would cease and the lined bases of Cells VIII and IX would lie within the surface aquifer and displace groundwater locally.

Similar to Alternative B, development of the expansion area under Alternative C is not anticipated to adversely affect groundwater in the Great Dismal Swamp NWR, the deeper principal aquifers, or public or private water supply wells.

Under Alternative C, sea level rise may raise groundwater levels higher than present elevations but would not significantly alter groundwater flow directions, velocities, or discharge locations. Climate change has the potential to cause extreme heat conditions that result in drought. In a drought, local aquifer levels would be impacted by an increase in water being pumped out of local wells as well as a decrease in recharge by precipitation.

Alternative D

Under Alternative D, long-term adverse effects to groundwater are not anticipated. The geology and hydrogeology of Site SH30 are generally consistent with the SPSA sites. In addition, under Alternative D, excavation would follow the same general procedures as those outlined for Alternative B.

Excavation to the design depth of 20-40 ft. below grade would penetrate the full thickness of the surficial aquifer and extend into the underlying dense Yorktown confining unit in deeper portions of the excavation. Groundwater in the surficial aquifer would be temporarily displaced from the zone of excavation due to phased dewatering activities during construction. The dewatering system would be installed separately from the leachate collection system to control pressure on the bottom and sides of the expansion site liners and induce an inward gradient. Based on the radius of influence of sumps used for dewatering during construction of the SPSA site, outlined in 2 hydrogeologic and geotechnical investigations performed by HDR Engineering, Inc. (HDR 2007, 2008), the maximum radius of influence for dewatering would be approximately 1400 ft from potential dewatering sumps, assuming consistent geology and hydrogeology between Site SH30 and the SPSA site. Once sufficient ballast is added to the excavated area, dewatering would cease and the lined bases of the cell would lie within the surficial aquifer (and possibly the Yorktown confining unit), locally altering groundwater flow patterns. At the scale of the site, however, groundwater flow would be largely unaltered, with no impact on flow toward and discharge to Seacock Swamp, as shown in Figure 27.

Development of Site SH30 is not anticipated to adversely affect regional groundwater or penetrate the deeper principal aquifers, as there are no conduits between surficial groundwater at the site and lower aquifers. Based on USGS borehole 55D 5, which was advanced approximately 3-miles southeast of the SH30 site, approximately 40 ft. of low-permeability sandy clay currently separates the surficial aquifer from the underlying Yorktown-Eastover aquifer in the vicinity of Site SH30; approximately 30 ft. of that material would remain as a significant hydrogeologic buffer between the excavation base and the top of the Yorktown-Eastover aquifer. By extension, development of Site SH30 would also have no adverse impacts on the deeper Piney Point, Aquia, or Potomac aquifer systems, nor hydraulically connect them with the surficial aquifer.

Alternative D would not cause adverse effects to public or private water supply wells. Dewatering activities associated with developing the expansion area are not anticipated to influence the surficial aquifer beyond 1,400 ft. The nearest permitted, non-permitted, or private active water well to the project area on file with the VDEQ is more than 2.8

miles from Site SH30. This site is not supplied by public water and relies on individual groundwater wells.

Under Alternative D, sea level rise may raise groundwater levels higher than present elevations but would not significantly alter groundwater flow directions, velocities, or discharge locations. Climate change has the potential to cause extreme heat conditions that result in drought. In a drought, local aquifer levels would be impacted by an increase in water being pumped out of local wells in a as well as decrease in recharge by precipitation.

Water Quality

Methodology

Water quality is enforced at the state level, based on standards set by both the state and the EPA. States can choose to adopt national water quality standards or to revise these and adopt state-specific standards. National Pollutant Discharge Elimination System permits are issued by states with EPA approval. The existing facility and proposed action must demonstrate compliance with the Virginia Chesapeake Bay Preservation Act, Virginia Stormwater Management Act, Erosion and Sediment Control Law, Water Quality Standards, Erosion and Sediment Control Regulations, Solid Waste Management Regulations, City of Suffolk Unified Development Ordinance, Southampton County Erosion and Sediment Control and Stormwater Ordinances and HRSD Industrial Wastewater Discharge Regulations.

Affected Environment

SPSA's consultant issued a Major and Minor Water Quality Impact Assessment, dated June 2016, revised in September 2016, for the application with the City of Suffolk for a CUP and Conditional Rezoning Application associated with the proposed action (specifically the use of Cells VIII and IX as borrow pits for the landfill development of Cell VII).

The project area is located within a Chesapeake Bay Preservation Resource Management Area; thus, the proposed action must be in compliance with stormwater standards in the post-development condition. As proposed, the post-development condition, as a landfill, has an average impervious cover less than the 16% threshold for new development, thus no post-development best management practices are required, However, under state Solid Waste Management Regulations, surface runoff management during operations is required for the run-on (flow into the active portion of the landfill) and runoff. Due to the varying land use and cover from initial excavation through final cover installation, state regulations require, at a minimum, run-on flow prevention of the 24-hour, 25-year storm peak discharge and runoff collection and treatment of the 24-hour, 25-year storm water volume. The post-development condition would have limited impervious areas, consisting of gravel roadways used for access to the new cells with post-development conditions consisting of grass as final cover. Prior to the post-development condition, the land disturbance associated with clearing and grubbing of existing vegetation and removal of soils as a borrow pit would incorporate drainage channels and sediment basins for treatment under the Virginia Erosion and Sediment Control regulations to manage water quality (sediment, phosphorus, and nitrogen) and water quantity (peak runoff control) within the footprint of the proposed action.

Management, maintenance, and monitoring of the erosion and sediment controls, permitted outfall locations, best management practices, and wastes, fluids, and pollutants on-site would be conducted under the guidance of a SWPPP and VPDES Permit and state Solid Waste Management Regulations. The existing cells are currently managed by a VPDES permit (#VA0090034) issued on October 1, 2020, with an expiration of September 30, 2025. This permit requires the monitoring and reporting of effluent characteristics at the permitted outfall locations on a quarterly basis. The VPDES outlines specific limitations on discharges for pH, total suspended solids, biochemical oxygen demand (5-day), ammonia, alpha terpineol, p-Cresol, phenol, total recoverable zinc, total petroleum hydrocarbons, total organic carbon, and total kjeldahl nitrogen.

Leachate

In addition to the management of potential pollutants generated on-site and discharged at the authorized outfalls, the Regional Landfill must also manage the treatment and discharge of leachate from the capped and active landfill operation. In January 2017, SPSA notified VDEQ of the presence of elevated leachate levels over the liner system in Cells V and VI of the landfill. Measurements indicated that the leachate had remained fully contained within the base liner system and anchor trench elevations. It was determined that leachate had accumulated above normal levels due to the existing pump infrastructure not removing and disposing of leachate at a sufficient rate. Factors contributing to the insufficient pump rates included restrictions on daily volumes of leachate that could be discharged to the HRSD, manual operation of the leachate system, the physical condition of some of the pump systems, and operator inattentiveness.

As a result, VDEQ issued a Consent Order, and SPSA issued a Leachate Corrective Action Plan, dated July 2017, and revised on August 25 and September 21, 2017. As of 2018, the corrective actions had been completed. These actions most notably included the installation of a new Supervisory Control and Data Acquisition (SCADA) system that controls and monitors the leachate system in real time. Leachate disposal strategies were also revised, whereby leachate from the low flow pump is still being discharged to HRSD’s Nansemond Treatment Plant, which is in the Sustainable Water Initiative for Tomorrow (SWIFT) program (and therefore is restricted to 28,800 gallons per day) while any remaining gallons are hauled and discharged to HRSD’s Atlantic Treatment Plant in Virginia Beach, which is not in the SWIFT program. SPSA has contracted with Heartland Water Technology to install a heat assisted leachate evaporation plant capable of treating up to 60,000 gallons of leachate per day. This technology will reduce the need for reliance on HRSD for treatment of the landfill leachate. The plant will be constructed at the Regional Landfill and should be operational by the end of 2023 or early 2024.

EPA Waterbody Quality Assessment

Burnetts Mill Creek is listed by the EPA as an impaired waterbody and has been since 2002. As of reporting year 2014, Burnetts Mill Creek is listed as impaired for the following designated uses: aquatic life, fish consumption, open-water aquatic life, shallow water submerged aquatic vegetation, and shell fishing.

Causes of impairment include the presence of noxious aquatic plants, dissolved oxygen depletion, and the presence of fecal coliform and polychlorinated biphenyls (PCBs). Sources listed include agriculture, atmospheric deposition nitrogen, industrial point source discharge, internal nutrient recycling, loss of riparian habitat, and municipal point source discharges. The Nansemond River, both upstream and downstream of the confluence with Burnetts Mill Creek, is listed as having the same impairments for the same duration, but the presence of enterococcus bacteria is also listed as a cause of impairment for the Nansemond River only.

Findings of the Nansemond River Preservation Alliance (NRPA), as reported in their 2018 *State of the Nansemond River and its Tributaries Report Card*, were that the overall health of the waterway is declining, with the river impaired by excess bacteria (fecal coliform), sediment, and phosphorus (NRPA 2018). Recommendations are primarily focused on staffing and enforcement needed to establish achievable goals and corrective actions where development or land disturbers are not in compliance with land disturbance permits. Leachate management systems and permit requirements are designed to protect downstream waterbodies from impairments. Monitoring and reporting support these efforts further.

Environmental Consequences

Alternative A

Under Alternative A, short and long-term adverse effects to water quality are not anticipated. The landfill is associated with ground disturbing activity, with lands under various stages of development, including completed cells that are capped and vegetated, open excavated cells with active disposal activities, and cells for borrow soils. This activity has proceeded under the appropriate state water quality and quantity regulations, as specified and permitted under the Virginia Stormwater Management Act, Erosion and Sediment Control Law, Water Quality Standards, Erosion and Sediment Control Regulations, Solid Waste Management Regulations, City of Suffolk Unified Development Ordinance, Southampton County Erosion and Sediment Control and Stormwater Ordinances, and HRSD Industrial Wastewater Discharge Regulations. The landfill has operated for many decades in compliance with its permits and regularly meets its obligations for monitoring and maintenance of facilities and its discharges.

Alternative B

Under Alternative B, long-term adverse effects to water quality are not anticipated. The Regional Landfill is an established facility with the necessary permits, infrastructure, and systems in place to continue to manage and monitor its water quality discharges as existing cells are capped and new cells are opened, developed, and eventually also capped. The stages of operation would continue with implementation of the proposed action. Cells VIII and IX would initially provide borrow soils for Cell VII as it is converted from borrow pit to disposal area and Cell VI is capped and vegetated. This activity would all be performed under the appropriate state water quality and quantity regulations, as specified and permitted under the Virginia Stormwater Management Act, Erosion and Sediment Control Law, Water Quality Standards, Erosion and Sediment Control Regulations, Solid Waste Management Regulations, City of Suffolk Unified Development Ordinance, and HRSD Industrial Wastewater Discharge Regulations. The landfill has operated for many decades in compliance with its permits and regularly meets it obligations for monitoring and maintenance of facilities and its discharges.

Alternative C

Under Alternative C, the airspace between Cells V and VII would be filled in and utilized for landfilling operations, to secure an additional 1.52 million CY of disposal capacity and reduce the size of Cell IX by approximately 9 acres compared to Alternative B. Long-term adverse effects to water quality are not anticipated under Alternative C and are similar in nature to that described in Alternative B.

Alternative D

Under Alternative D, a single cell landfill and supporting infrastructure would be built on the previously undeveloped SH30 site. Long-term adverse effects to water quality are not anticipated under Alternative D. Much like Alternatives B and C, this new landfill operation would employ modern technology, equipment, and processes to comply with local and state codes on water quality, thereby limiting potential impacts to water quality. However, this off-site alternative would not have the benefits of the advanced systems currently in place at the Regional Landfill which are above and beyond minimum standards. The existing Regional Landfill collects more leachate due to its larger size and landfilling history. Each of the previously permitted cells produces leachate which increases the operational need to collect and manage leachate. Because of the volume of leachate collected at the Regional Landfill, SPSA invested in a SCADA system which is a highly sophisticated monitoring system that controls leachate discharge based on monitoring parameters. The SCADA system is state of the art and would not be a worthwhile infrastructure investment for leachate collection for 16 million CY of landfill space because of the lower anticipated volume of leachate produced.

Biological Resources

Wetlands

Methodology

Wetlands within the study area are regulated and protected under state and federal regulatory programs. Within the Commonwealth of Virginia, activities conducted in wetlands are regulated by the Virginia Wetlands Act of 1972 and Virginia Code Sections 62.1-44.2 *et seq*. The Corps administers Section 404 of the CWA, which regulates discharges of fill into wetlands and other WOTUS. Wetlands as defined by the Corps in 33 CFR 328.3 and by the EPA in 40 CFR 230.3 are “those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils” (U.S. Code 2000).

EO 11990, *Protection of Wetlands*, discourages direct or indirect support of new construction impacting wetlands wherever there is a practicable alternative (The White House 1977). Wetlands under EO 11990 include isolated and non-jurisdictional wetlands. The process for compliance would be accomplished through completion of the FEIS for this project.

Under the EPA and Corps definition, a wetland requires the presence of the following 3 parameters:

- Hydric soil: a soil formed under conditions of saturation or flooding long enough to develop anaerobic, or low oxygen, conditions in the upper part;
- A dominance of hydrophytic vegetation: plants adapted for life in habitats with saturated or inundated soils for prolonged periods of time;
- Wetland hydrology: the presence of water at or above the ground surface for a significant duration during the growing season.

This determination is tied to Section 404 of the CWA, which provides for the protection of water quality in WOTUS, including wetlands, and instructs the Corps to issue permits for activities that result in the discharge of dredged or fill material into these areas. Alternatively, the U.S. Fish and Wildlife Service (USFWS) uses the Cowardin definition, which defines wetlands as:

“…lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have 1 or more of the following 3 attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year.” (Cowardin et al. 1979)

The USFWS definition is more comprehensive than the EPA and Corps definition, acknowledging that physical or chemical conditions such as wave action, current, or high salinity may prevent development of hydric soils or hydrophytic vegetation in some wetland types. Therefore, some unvegetated or non-hydric soil sites, such as mudflats or high-energy shorelines, may not exhibit all 3 attributes but are still classified as wetlands.

Wetland Delineation – Alternatives B & C

On January 19 and 26, 2022, environmental scientists from HDR performed a formal field delineation of an approximate 137.8-acre study area within the proposed expansion area, including Cells VIII and IX, for wetlands and waterways regulated under Sections 401 and 404 of the CWA (Figure 35). This field investigation was conducted according to the methodologies and guidance described in the Corps' *1987 Wetland Delineation Manual* and the *Atlantic Gulf and Coastal Plain (AGCP) Regional Supplement (Version 2.0)* (USACE 2010). Prior to beginning the on-site fieldwork, scientists conducted a preliminary off-site analysis of publicly available reports and data pertaining to topography, soils, and hydrology at the site. While on site, wetland scientists collected data describing hydrology, soil, and vegetation parameters throughout the study area. Data point locations represented transitions between non-wetland communities and jurisdictional wetlands and other WOTUS. The results of this delineation effort were submitted to the Corps. On August 24, 2022, the Corps approved the wetland boundaries or Preliminary Jurisdictional Determination and confirmed that the 137.8-acre Cells VIII and IX expansion area included approximately 133.79 acres of wetlands and 0.93 acres of ditch.

Wetland Delineation – Alternative D

Prior to the on-site investigation of Site SH30, VHB wetland scientists conducted a desktop analysis using the following data sources:

- Natural Resources Conservation Service (NRCS) Web Soil Survey,
- USFWS NWI,
- USGS Quadrangle Maps for Ivor, VA,
- Virginia Geographic Information Network (VGIN)/Virginia Base Mapping Program's most recent color infrared Imagery, and
- VGIN LiDAR.

Datasets and mapping were downloaded from each of these sources and overlaid onto the project area mapping. Layers were processed using ArcMap 10.8.2 and included as base maps for mobile data collection using ESRI's Fieldmaps for ArcGIS. Once the data were analyzed, VHB created a map depicting areas that could potentially be wetlands (Figure 36). VHB scientists then performed a site walkover on June 22, 23, and 24, 2022 to ground truth the wetland limits and confirmed that the site included approximately 83 acres of wetlands (see Figure 36). The site visit focused on the upper extents of the larger wetland systems to determine their limits. Wetland scientists thoroughly investigated farm fields and other assumed uplands to determine if any wetlands were present. Streams and ditches within approximate wetland lines were not located unless they extended outside of the wetland boundary.

Source: Nearmap Imagery Dated February 10, 2022

LEGEND

▭ SPSA Property Boundary

🟥 Proposed Expansion Cells VIII & IX

🟩 Wetlands (133.79 acres; Confirmed on 08.24.2022 (NAO-2016-00765))

▬ Ditches (0.93 acres)

FIGURE 35

SPSA Regional Landfill Wetland Delineation

Source: VGIN/VBMP 2021 Orthoimagery

LEGEND

▨ Site SH30 Site Boundary (330 acres)

🟩 Approximate Extent of On-site Wetlands (approx. 83 acres)

■ Culvert

N

0 700 Feet

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

Southampton County, Virginia

FIGURE 36

Alternative D (Site SH30) Wetland Walkover Map

Wetland Functions

The evaluation of wetland functions and values is an integral part of project review, impacts analysis, and compensatory mitigation planning. The Corps and EPA have long held the policy that the assessment of impacts and the determination of mitigation to achieve a no net loss of wetlands should be based on the functions and values of the impacted wetlands (Dahl 2006).

The assessment of wetland functions and values is founded on the understanding that wetlands differ in their value (to wildlife, listed species, water quality, etc.), differ in the functions they provide, and vary in quality. The degree to which the functional integrity of wetlands differ can often be a matter of opinion. Biases due to personal preferences, perceptions, and individual experiences can also influence comparisons between different wetland types (e.g., emergent marsh versus hardwood swamp). In order to make unbiased comparisons of function and value, wetland scientists have developed assessment methodologies using a wide variety of techniques. The Norfolk District developed a technique called the Wetland Attribute Form (USACE 2020) that is based on the New England Highway Methodology (USACE 1993). This methodology assesses 9 functions and values through a "descriptive approach" using both wetland science and judgment in the field. The 9 functions and values include:

- Groundwater recharge/discharge;
- Floodflow alteration (storage and desynchronization);
- Fish and shellfish habitat;
- Sediment/pollutant retention;
- Nutrient removal, retention, and transformation;
- Production export (nutrients);
- Streambank erosion/shoreline stabilization;
- Wildlife habitat; and
- Rare/threatened/endangered species.

The Corps guide to the Wetland Attribute Form provides a listing of such characteristics that can be easily referenced on a data form based on "yes" or "no" responses to questions about the wetland being evaluated (USACE 2020). The data form then provides an "unbiased record of the wetland, including its location, function, appearance, and relationship to its adjacent land use" (USACE 2020). If, in the judgment of the evaluator, a particular function is present, justification for identifying that function is documented using descriptive characteristics. This method was applied to the wetlands within the proposed construction footprints for the landfill expansion (Alternatives B and C) and the new landfill (Alternative D).

Affected Environment

The proposed SPSA expansion area consists primarily of coastal plain hardwood forested wetlands. Timber harvesting has historically and repeatedly occurred on the

SPSA expansion area, most recently around 1992 just prior to SPSA's purchasing of the property, and signs such as old cut stumps are apparent. Additionally, individual cypress trees are scattered on the site and were identified during the field visit with the Corps and EPA. Approximately 133.79 acres of contiguous wetland area and 0.93 acres of ditches were identified within the SPSA expansion area during the field wetland delineation that was approved by the Corps on August 24, 2022 (see Figure 35). Approximately 117.36 acres of the wetland would be located within the proposed construction footprint under Alternative B, and 109.64 acres of the wetland would be located within the footprint for Alternative C.

The USGS Quadrangle Map for Chuckatuck, Virginia indicates that the proposed SPSA expansion area lies at an elevation of approximately 20 ft. above mean sea level and that the site has little change in elevation. The map indicates that the entire site is wetland, and there are no named or USGS mapped streams on site. Ditches are shown along the northeastern boundary of the proposed expansion area and to the southeast of the site (USGS 2019a).

The wetland is composed primarily of hardwood mineral flats. These areas consist of mature hardwood canopy with at least 90% closure. The primary canopy species include swamp chestnut oak (*Quercus michauxii*), red maple (*Acer rubrum*), and sweetgum (*Liquidambar styraciflua*). Shrub and sapling cover are low to moderate and consist of sweet pepperbush (*Clethra alnifolia*), American holly (*Ilex opaca*), and highbush blueberry (*Vaccinium fuscatum*). Groundcover is moderate, ranging from 40 to 60% cover, and it is dominated by netted chain fern (*Woodwardia areolata*), switch cane (*Arundinaria tecta*), and cinnamon fern (*Osmundastrum cinnamomeum*), with some areas of Japanese stiltgrass (*Microstegium vimineum*).

Several small pine stands are scattered within the hardwood forest wetland. These areas are dominated by loblolly pine (*Pinus taeda*) with wax myrtle (*Morella cerifera*) and common greenbriar (*Smilax rotundifolia*). Groundcover is low due to a thick layer of pine needle detritus. Hydrology in these areas is similar to the hardwood wetland areas and consists of saturated to inundated soils.

In 2020, SPSA cleared 5 corridors (authorized under Nationwide Permit 6), each approximately 25 ft. in width, to provide access for the installation and sampling of piezometers to measure the depth of groundwater for wetlands. Impacts associated with this effort were temporary in nature. The hydrology remains unchanged in these corridors, and the vegetation is dominated by bushy bluestem (*Andropogon glomeratus*), dogfennel (*Eupatorium capillifolium*), Japanese stiltgrass, and other weedy pioneer species.

Soils map units present within the SPSA expansion area include Deloss Mucky Loam, Tomotley Loam, and Torhunta Loam (USDA NRCS 2021), all of which are considered hydric. The soils consist of loamy sand to sandy loam and generally exhibit hydric soil indicators, including loamy mucky mineral, depleted matrix, redox dark surface, or depleted dark surface.

Deloss mucky loam is typically found on marine terraces with 0 to 2% slope, and it is composed of loamy marine deposits. It covers approximately 2.5 acres, or 1.9%, of the study area under Alternative A. The hydrologic soil group for Deloss mucky loam is B/D, and the frequency of flooding is rated as none. The soil is very poorly drained with moderate permeability, and the depth to the water table is about 0 in.

Tomotley loam is generally found on nearly level terraces with 0 to 2% slope located in the coastal plain and is composed of loamy marine and fluvial sediments. Tomotley loam covers approximately 63.8 acres, or 48.4%, of the study area. Its hydrologic soil group is B/D, and the frequency of flooding is rated as none. The soil is poorly drained with moderate to moderately slow permeability, and the depth to the water table is typically 0 to 12 in.

Torhunta loam is typically found in swamps with 0 to 2% slope, and it is composed of loamy fluvimarine deposits. It covers approximately 65.4 acres, or 49.7%, of the proposed SPSA expansion site under Alternative A. The hydrologic soil group for Torhunta loam is A/D, and the frequency of flooding is rated as none or frequent. The soil is very poorly drained with moderately rapid permeability, and the depth to the water table is between 6 and 18 in.

Water levels range from saturated soils to up to 4 in. of inundation. In areas that did not exhibit surface water, a high water table was observed, with water levels less than 6 in. below the soil surface. Water-stained leaves are present throughout the wetland. Soils also exhibit oxidized rhizospheres on living roots. Secondary hydrology indicators include geomorphic position and Facultative (FAC)-neutral test.

NWI identified 4 wetland types and two surface waters located within the proposed expansion site under Alternatives A, B, and C, including the following:

- PFO1Cd accounts for 29.7 acres, 22.6%, of the study area. This classification is defined as a palustrine (P) forested (FO) wetland dominated by broad-leaved deciduous (1) trees or shrubs. The water regime is seasonally flooded (C), and the wetland is partially drained or ditched (d).
- PFO4Cd accounts for 8.5 acres, 6.4%, of the study area. It is a palustrine (P) forested (FO) wetland dominated by needle leaved evergreen (4) trees. The water regime is seasonally flooded (C), and the wetland is partially drained or ditched (d).
- PFO1/4Cd accounts for 26.8 acres, 20.4%, of the study area. It is a palustrine (P) forested (FO) wetland with a broad-leaved deciduous (1) and needle-leaved pine (4) mixed canopy or shrub layer. The water regime is seasonally flooded (C), and the wetland is partially drained or ditched (d).
- PFO1Ed accounts for 63.4 acres, 48.2%, of the study area. It is a palustrine (P) forested (FO) wetland dominated by broad-leaved deciduous (1) trees or shrubs. The water regime is seasonally flooded or saturated (E), and the wetland is partially drained or ditched (d).

- R4SBCx accounts for 0.3 acres, 0.2%, of the study area. It is a riverine (R) intermittent (4) stream system with a streambed (SB) substrate. The water regime is seasonally flooded (C), and the stream is excavated (x).
- R5UBH accounts for 0.05 acres, 0.03%, of the study area. It is a riverine (R) unknown perennial (5) stream system with an unconsolidated bottom (UB) substrate. The water regime is permanently flooded (H).

The wetland system is directly connected to similar wetlands to the north and ditches along the eastern, southeastern, and western boundaries. Adjacent wetlands are approximately the same elevation, so all areas receive water and fill at the same rate. Excess water from the wetlands drains to the ditches and eventually flows to the Nansemond River.

The wetland assessment, which was conducted using the Wetland Attribute Form, indicated that the wetland located on the SPSA expansion area provides multiple wetland functions and values and that there is no difference between the wetland area that would be impacted by Alternative B compared to Alternative C. Ditches bordering the wetland provide a means for groundwater discharge and recharge, and sandy soils contribute to this function (Function 1). Due to its large size and water storage capacity, the wetland provides substantial floodflow attenuation (Function 2). The ditches associated with the wetland can also provide some fish and shellfish habitat. However, the wetland itself is seasonally inundated and the pools that form when the wetland floods are shallow. Therefore, minimal habitat for fish and shellfish is present (Function 3). The herbaceous vegetation and sheet flow through the wetland remove sediment from the surface water (Function 4), and the vegetation, trees in particular, remove nutrients (Function 5). Production export occurs through wildlife foraging and migration to areas outside the wetland. The wetland has also been logged historically which provided production export, but future logging is not proposed (Function 6). The wetland does not provide protection against streambank and shoreline erosion (Function 7). The complete tree canopy, moderate shrub cover, ample groundcover, and large size provide high-quality nesting and foraging habitat for wildlife. The wetland is also part of a larger contiguous and undeveloped habitat complex that functions as a corridor for migration (Function 8). No protected species were observed during wetland field work, although database searches for state and federally listed species in the area indicated that canebrake rattlesnake (*Crotalus horridus*) has been documented on the site, and Mabee’s salamander (*Ambystoma mabeei*) and tri-colored bat (*Perimyotis subflavus*) were documented within 2 miles of the SPSA site. Also, northern long-eared bat (*Myotis septentrionalis*) has the potential to occur on-site per the USFWS’ Information for Planning and Consultation (IPaC) search. The SPSA expansion site has no designated critical habitat within its boundaries (Function 9) (USFWS 2021; VDWR 2021; VDCR 2021a). A summary of wetland functions and values for the footprint of the SPSA expansion site is provided in Table 10.

Table 10. Wetland Functions and Values of the SPSA Expansion Site and Site SH30

Function	SPSA Expansion Site		Site SH30	
	Present	Principal Function	Present	Principal Function
Groundwater Recharge/Discharge	●			
Floodflow Alteration/Attenuation	●		●	
Fish and Shellfish Habitat	●			
Sediment/Toxicant Removal	●	X	●	
Nutrient Removal/Retention/ Transformation	●	X		
Production Export	●		●	
Sediment/Shoreline Stabilization				
Wildlife Habitat	●	X	●	
Endangered Species Habitat	●			

Site SH30 is an approximately 330-acre parcel located off State Route 460 (General Mahone Boulevard). The site primarily consists of two fields of row crops bordered by timberlands harvested within the last 5 years. These timberlands lie in areas of the parcel with higher elevations, flat topography, and severe rutting due to silvicultural practices. There are 2 large bottomland drainages bordering the property on the eastern and western sides, along with a smaller system flowing between the two farm fields. These bottomland areas are composed of mixed hardwoods with dense understory vegetation, and the streams flowing through these systems are unnamed tributaries to Seacock Swamp.

The USGS Quadrangle Map for Ivor, Virginia indicates that Site SH30 lies at an elevation between 50 and 93 ft. above mean sea level. The map indicates stream systems with their associated floodplain swamps along the east and west boundaries of the property, and a stream partially bisecting the site into north and south halves (USGS 2019c).

Based on the off-site investigation coupled with the preliminary site walkover, VHB estimates that there are approximately 83 acres of potential wetlands and approximately 848 linear ft. of ditches on Site SH30. Three separate wetland habitat types comprise the wetland system present on-site: bottomland hardwoods, hardwood flats, and pine flats. American sycamore (*Platanus* occidentalis), bald cypress (*Taxodium* distichum), and red maple dominate the canopy community of the bottomland hardwood habitats. The pine flats consist of 5-year-growth pine stands dominated by loblolly pine and prickly blackberry, with some sweetgum, slender wood-oats (*Chasmanthium laxum*), and velvet panic grass (*Dichanthelium scoparium*). Hardwood flats found on-site consist of American sycamore, sweetgum, and water oak in the canopy and scattered roundleaf greenbriar in the understory throughout.

Soils map units present within Site SH30 are provided in Table 11 below. The soils consist of loamy sand to sandy loam and generally exhibit hydric soil indicators, including depleted matrix, sandy redox, and redox dark surface. Upland soils present on-site were typically lacking redoximorphic features and consisted of bright matrix colors.

Table 11. Soils Map Units and Hydric Designations on Site SH30

Map Unit Symbol	Map Unit Name	Hydric Soil Designation	Approx. Area (acres)
4A	Bibb sandy loam, 0 to 2% slopes, frequently flooded	Hydric	54.7
10A	Craven fine sandy loam, 0 to 2% slopes	Non-hydric	4.8
13A	Emporia fine sandy loam, 0 to 2% slopes	With hydric inclusions	33.2
13B	Emporia fine sandy loam, 2 to 6% slopes	With hydric inclusions	24.7
17B	Nansemond loamy fine sand, 2 to 6% slopes	Non-hydric	24.4
24B	Rumford, Kenansville, and Uchee soils, 0 to 6% slopes	With hydric inclusions	20.4
26A	Slagle fine sandy loam, 0 to 2% slopes	With hydric inclusions	48.2
26B	Slagle fine sandy loam, 2 to 6% slopes	With hydric inclusions	103.4
26C	Slagle fine sandy loam, 6 to 10% slopes	With hydric inclusions	15.9
30B	Uchee loamy sand, 0 to 6% slopes	Non-hydric	0.3

Source:USDA NRCS 2022

Bibb sandy loam, 0 to 2% slopes (4A), frequently flooded is typically found in floodplains and drainageways with 0 to 2% slope, and it is composed of sandy and loamy alluvium. It covers approximately 54.7 acres, or 16.6%, of the proposed Site SH30 under Alternative D. The hydrologic soil group for Bibb sandy loam is B/D, and the frequency of flooding is rated as frequent. The soil is poorly drained, and the depth to the water table is about 0 to 12 in. This is considered a hydric soil in Southampton County.

Craven fine sandy loam, 0 to 2% slopes (10A), is generally found on nearly level marine terraces with 0 to 2% slope located in the coastal plain. It is composed primarily of clayey marine deposits. Craven fine sandy loam covers approximately 4.8 acres, or 1.4%, of the study area. Its hydrologic soil group is D, and the frequency of flooding is rated as none. The soil is moderately well drained, and the depth to the water table is typically 24 to 36 in.

Emporia fine sandy loam, 0 to 2% slopes (13A), is found on nearly level marine terraces with 0 to 2% slope, and it is composed of loamy marine deposits. It covers approximately 33.2 acres, or 10.1%, of the study area under Alternative D. The hydrologic soil group for this soil map unit is C, and the frequency of flooding is rated as none. The soil is well drained, and the depth to the water table is 36 to 54 in.

Emporia fine sandy loam, 2 to 6% slopes (13B), is found on marine terraces with a convex slope, and it is composed of clayey marine deposits. It covers approximately 24.7 acres, or 7.5%, of the study area under Alternative D. The hydrologic soil group for this soil map unit is D, and the frequency of flooding is rated as none. The soil is moderately well drained, and the depth to the water table is 24 to 36 in.

Nansemond loamy fine sand, 2 to 6% slopes (17B), is found on marine terraces and stream terraces with a convex slope, and it is composed of loamy marine deposits, sandy marine deposits, and alluvium. It covers approximately 24.4 acres, or 7.4%, of the study area under Alternative D. The hydrologic soil group for this soil map unit is B, and the frequency of flooding is rated as none. The soil is moderately well drained, and the depth to the water table is 18 to 30 in.

Rumford, Kenansville, and Uchee soils, 0 to 6% slopes (24B), is found on marine terraces and stream terraces with a convex slope, and it is composed of loamy marine deposits, sandy marine deposits, and alluvium. It covers approximately 20.4 acres, or 6.2%, of the SH30 study area under Alternative D. The hydrologic soil group for this soil map unit is A, and the frequency of flooding is rated as none. The soil is well drained, and the depth to the water table is more than 80 in.

Slagle fine sandy loam, 0 to 2% slopes (26A), is found on marine terraces on side slopes, base slopes, and head slopes with a convex shape; and it is composed of loamy marine deposits. It covers approximately 48.2 acres, or 14.6%, of the SH30 study area. The hydrologic soil group for this soil map unit is C, and the frequency of flooding is rated as none. The soil is moderately well drained, and the depth to the water table is 18 to 36 in.

Slagle fine sandy loam, 2 to 6% slopes (26B), is found at the summit or shoulder of marine terraces with a convex shape; and it is composed of loamy marine deposits. It covers approximately 103.4 acres, or 31.3%, of the SH30 study area. The hydrologic soil group for this soil map unit is C, and the frequency of flooding is rated as none. The soil is moderately well drained, and the depth to the water table is 18 to 36 in.

Slagle fine sandy loam, 6 to 10% slopes (26C), is found on the side slope or head slope of marine terraces, and it is composed of loamy marine deposits. It covers approximately 15.9 acres, or 4.8%, of the SH30 study area under Alternative D. The hydrologic soil group for this soil map unit is C, and the frequency of flooding is rated as none. The soil is moderately well drained, and the depth to the water table is 18 to 36 in.

Uchee loamy sand, 0 to 6% slopes (30B), is found on marine terraces, and it is composed of loamy marine deposits, sandy marine deposits. It covers approximately 0.3 acres, or 0.1%, of the SH30 study area under Alternative D. The hydrologic soil group for this soil map unit is C, and the frequency of flooding is rated as none. The soil is moderately well drained, and the depth to the water table is 18 to 36 in.

Hydrology within the wetland areas ranges from dry soils to up to 2 in. of inundation. Primary hydrology indicators include surface water, saturated soils, water-stained leaves, oxidized rhizospheres on living roots, algal mat or crust. Secondary hydrology indicators include geomorphic position, crayfish burrows, dry-season water table, saturation visible on aerial, and FAC-neutral test.

NWI identified 8 wetland types and 4 waterbodies located within Site SH30 under Alternative D including the following:

- PFO1A accounts for 0.1 acres, 0.02%, of the study area. This classification is defined as a palustrine (P) forested (FO) wetland dominated by broadleaved deciduous (1) trees or shrubs. The water regime is temporarily flooded (A).
- PFO1C accounts for 1.8 acres, 0.5%, of the study area. This classification is defined as a palustrine (P) forested (FO) wetland dominated by broadleaved deciduous (1) trees or shrubs. The water regime is seasonally flooded (C).
- PFO1E accounts for 2.5 acres, 0.8%, of the study area. This classification is defined as a palustrine (P) forested (FO) wetland dominated by broadleaved deciduous (1) trees or shrubs. The water regime is seasonally flooded/saturated (E).
- PFO1Eb accounts for 3.6 acres, 1.1%, of Site SH30. This classification is defined as a palustrine (P) forested (FO) wetland dominated by broadleaved deciduous (1) trees or shrubs. The water regime is seasonally flooded/saturated (E), and the wetland was created or modified by beaver (b).
- PFO5Fb accounts for 6.3 acres, 1.9%, of the study area. This classification is defined as a palustrine (P) forested (FO) wetland dominated by dead (5) woody vegetation. The water regime is semi-permanently flooded (F), and the wetland was created or modified by beaver (b).

- PFO1/SS1Eb accounts for 3.1 acres, 0.9%, of the study area. This classification is defined as a palustrine (P) forested (FO) and scrub-shrub wetland dominated by broadleaved deciduous (1) trees or shrubs. The water regime is seasonally flooded/saturated (E), and the wetland was created or modified by beaver (b).
- PSS1Eb accounts for 0.6 acres, 0.2%, of the study area. This classification is defined as a palustrine (P) scrub-shrub (SS) wetland dominated by broadleaved deciduous (1) trees or shrubs. The water regime is seasonally flooded/saturated (E), and it was created or modified by beaver (b).
- PSS1Fb accounts for 3.6 acres, 1.1%, of Site SH30. This classification is defined as a palustrine (P) scrub-shrub (SS) wetland dominated by broadleaved deciduous (1) trees or shrubs. The water regime is semi-permanently flooded (F), and it was created or modified by beaver (b).
- PUB/FO5Fb accounts for 6.9 acres, 2.1%, of the study area. This classification is defined as a palustrine (P) waterbody or pond with an unconsolidated bottom (UB) substrate; and forested (FO) wetland dominated by dead (5) woody vegetation. The water regime is semi-permanently flooded (F), and it was created or modified by beaver (b).
- PUBFb accounts for 6.5 acres, 2%, of the study area. This classification is defined as a palustrine (P) waterbody or pond with an unconsolidated bottom (UB) substrate. The water regime is semi-permanently flooded (F), and it was created or modified by beaver (b).
- R4SBC accounts for 0.01 acres, 0.003%, of Site SH30. This classification is defined as a riverine (R) intermittent (4) stream with a streambed (SB) substrate. The water regime is seasonally flooded (C).
- R5UBH accounts for 0.3 acres, 0.1%, of the study area. This classification is defined as a riverine (R) unknown perennial (5) stream with an unconsolidated bottom (UB) substrate. The water regime is permanently flooded (H).

The wetland assessment, which was conducted using the Wetland Attribute Form, indicated that the wetland located within the proposed development footprint on Site SH30 provides several wetland functions and values. The wetland consists of a ditch through which water flows from upstream and upland areas to the floodplain on the east boundary of the property. Little or no opportunity for groundwater discharge or recharge is present within the wetland (Function 1). The wetland receives overland flow from upstream and adjacent upland areas, and it has an excavated ditch that directs flood waters directly to the downstream floodplains. This provides floodflow alternation functions (Function 2). The ditch within the wetland has inconsistent flow and no suitable habitat for fish or shellfish (Function 3). The wetland that borders the ditch is densely vegetated and may remove some sediment and nutrients from surface runoff water, but this is not a principal function of the wetland (Functions 4 and 5). Production export occurs through regular logging, and the wetland would be logged again prior to the development proposed by Alternative D. However, this activity does not serve as a principal function of production export within the identified wetlands (Function 6). The wetland provides no protection against streambank and shoreline erosion (Function 7).

The wetland provides some low quality foraging and nesting habitat for wildlife, but this is not a principle function of the wetland (Function 8). No protected species were observed during wetland field work, and searches of the USFWS, VDWR, and VDCR databases indicated that no occurrence of a protected species has been documented on the property. No designated critical habitat lies on Site SH30 (Function 9) (USFWS 2021; VDWR 2021; VDCR 2021a). A summary of the wetland functions and values provided by the wetlands on Site SH30 is included in Table 10.

Environmental Consequences

Alternative A

Under Alternative A, no wetland filling would occur. Once capacity in Cell VII is achieved in 2037, the landfill would be closed and capped. Waste would then be diverted to other disposal sites. Therefore, no wetland impacts would occur at the Regional Landfill location and no permit action from the Norfolk District would be required.

Alternative B

Under Alternative B, Cells VIII and IX of the landfill and their associated infrastructure would be developed, permanently removing approximately 117.36 acres of forested wetland (see Figure 19). To balance this loss, a combination of mitigation strategies would be used. The design would minimize wetland impacts to the extent practicable, and compensatory mitigation could include a combination of in-lieu fee programs, wetland creation, wetland restoration, wetland enhancement, wetland preservation, purchase of credits from a mitigation bank, etc. Compensatory mitigation in the form of mitigation bank credits at a 2:1 ratio would replace wetland acreage and address some of the temporal loss of wetland functions. Preservation of on-site wetlands within the area that was slated as future expansion would prevent future cumulative impacts, provide a buffer, and serve as wildlife habitat. The on-site preservation would also prevent future silvicultural operations, allowing for continued growth of the forest and long-term habitat benefits. The preservation of the adjoining property, which contains wetlands and uplands, would provide similar benefits.

Alternative C

Under Alternative C, the airspace between Cells V and VII would be filled in and utilized for landfilling operations (see Figure 22), which would secure an additional 1.52 million CY of disposal capacity, plus 14.48 million CY provided by the expansion site. Using this airspace would result in approximately 9 fewer acres of wetland impact than Alternative B. Under this alternative, approximately 109.64 acres of wetlands would be removed. Alternative C would reduce wetland impacts compared to Alternative B. Potential mitigation would be similar to that described under Alternative B and would include a combination of mitigation strategies.

Alternative D

Under Alternative D, a new landfill would be created off-site, on the approximately 330-acre parcel of land called Site SH30, located in Southampton County, Virginia, near the western boundary of the SPSA service area. Development of the landfill on this site would remove approximately 8 acres of wetlands (Figure 25). The design would minimize wetland impacts to the extent practicable by using uplands and low quality wetland habitats. To offset wetland impacts, mitigation would likely occur through the purchase of wetland credits from a mitigation bank or in-lieu fee program located within the watershed.

Indirect and Secondary Impacts

The Section 404(b)(1) guidelines state that "secondary effects are effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material." (40 CFR 230.11). Although not specifically addressing impacts to aquatic resources, the CEQ regulations define indirect effects as "effects, which are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include related effects on air and water and other natural systems, including ecosystems" (40 CFR part 1508.8; CEQ 2005).

Therefore, indirect effects are the consequences of the direct effects of a proposed action. For example, while the direct effect of filling a wetland would be the loss of the filled wetland area and the functions and values provided by that habitat, the indirect effects to the remaining area would result from the associated changes in wetland size, hydrology, vegetation cover, or degree of habitat fragmentation. These types of effects could adversely affect the ability of the wetland to provide functions and values or could reduce the functions and values to a greater degree than the loss of the portion of wetland area.

Indirect effects would change the ability of an aquatic resource to provide functions and would not affect the adjacent wetlands uniformly, except for some small resources (Forman and Deblinger 2000, Eigenbrod et al. 2009). These functional effects would occur as gradients, with the highest intensity occurring closest to the disturbance and decreasing with distance. The affected wetland areas would also experience the effects differently. For example, canopy gaps would not affect the wetlands and species in the same way or at the same distance. As another example, adverse effects on the ability of the wetlands to support wildlife habitat would be different in type and location than effects on the ability of a wetland to provide sediment or toxicant retention or nutrient transformation.

Indirect effects have been documented to extend more than 300 ft. and up to 900 ft. from roads and other development. There are numerous published studies documenting that development could adversely affect the hydrology of adjacent wetlands and the movement of nutrients, sediment, or wildlife between and within wetlands (Fahrig and Rytwinski 2009, Forman and Deblinger 2000, Van der Ree et al. 2011).

Loss of part of a wetland due to development associated with the project could create a new ecotone at the wetland-fill boundary, causing an “edge effect.” An ecotone is a zone which lies at the boundary between 2 biomes, or habitats, and typically contains plant species characteristic of both habitats (Senft 2009). Community composition of this ecotone would vary due to interspecific competition, which could open these areas to generalist species tolerant of fluctuating conditions, typically consisting of weedy and invasive exotic species. The introduction of a new edge could also reduce biodiversity, which is a function of the length of the edge of the habitat versus the area of the habitat within the wetland. A change in the light regime could also cause a shift in the understory community from species requiring shade to species more tolerant of direct sunlight.

Placing fill within a wetland could also result in alterations in hydrology. Because fill reduces the volume of available storage across the wetland, water levels within adjacent wetland areas that are not directly affected could increase. The water level increase would be a function of the volume of fill placed in the wetland and the size of the remaining wetland. Increased water levels could impact wetlands by shifting the composition of the vegetation community to species tolerant of deeper water, causing hydrologic stress to trees that are less tolerant of fluctuations in water level. Increased water levels could also provide opportunities for invasive exotic wetland vegetation to recruit into areas where the vegetation is reduced by hydrologic stress.

Because the SPSA landfill expansion area is contiguous with very large wetland areas, it is anticipated that water level increases under Alternatives B and C would be negligible. To date, hydrology of wetlands in the area has not shown a discernable impact from dewatering nearby developed cells. The introduction of fill into a wetland could also cause an alteration in the flow regime and drainage patterns of adjacent wetlands. However, as discussed above in the Surface Water/Hydrology section, construction of the project would not adversely affect adjacent wetlands to a large degree. The on-site ditches would intercept surface water flow from the project area and the adjacent wetlands. Also, the perimeter ditch system that would be constructed to prevent runoff from the landfill entering the adjacent areas would capture water that runs off the project area. To better understand the extent and duration of potential indirect and secondary impacts, monitoring and reporting conditions could be considered during the Section 404 permitting process. These conditions could be included as a mitigative measure of the permit requirements.

Building a new landfill on Site SH30 (Alternative D) would likely increase water levels seasonally over Alternative A depending on precipitation. In addition, the construction of the landfill would disrupt west to east flow of water on the site, which could affect water levels in the on-site wetlands. The stream systems on the east and west sides of Site SH30 are directedly connected to Seacock Swamp. Therefore, it is anticipated that increases in water levels would be temporary. However, the streams have been dammed by beavers, and this would likely delay the exit of excess water from the site. As stated in the "Surface Water/Hydrology" section above, the wetlands would drain through the streams to larger waterways and wetland systems over the same hydroperiod or longer than it would under Alternative A.

Under Alternatives B, C, and D, landfill development would require dewatering of the project footprint during preliminary phased construction activities. The removal of groundwater from the SPSA expansion site or Site SH30 could also artificially lower water levels in adjacent wetland areas. This hydrologic change has been shown to reduce plant species richness and shift the community from wetland species to species that are more drought tolerant (Perkins et al. 1984, Patton et al. 2007), as well as reducing overall vegetation cover (Sorenson et al. 1991). In general, plant species that are more tolerant of fluctuations in hydrology would remain or colonize the existing wetland areas, but dewatering the project area would reduce the numbers of species that require consistent wetland hydrology (Patton et al. 2007). The extent and magnitude of drawdown effects is difficult to predict, and they would be dependent on the locations of sumps, cumulative effects of withdrawal, and the rate of groundwater recharge (Winter 1988). Rapid alterations in hydrology may also result in the colonization of the wetland by invasive exotic species, while slower, more progressive changes, or temporary changes, could allow the community to naturally adjust (Bartholomew et al. 2020).

Protected Species

Methodology

Pursuant to the ESA, an endangered species is defined as "any species which is in danger of extinction throughout all or a significant portion of its range," and a threatened species is defined as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (U.S. Code 2016). The ESA protects threatened and endangered species at the federal level, while the Virginia Endangered Species Act (Code of Virginia 2021) and Virginia Endangered Plant and Insect Species Act (Code of Virginia 2020) protect state threatened and endangered species. The federal Bald and Golden Eagle Protection Act of 1940 protects eagles from take or disturbance, requiring a 660-foot buffer zone between any development or construction and an active eagle nest during nesting season (U.S. Code 2004a). In compliance with these regulations, searches were conducted to determine the presence or potential occurrence of the following: federally and state listed species, active eagle nests and roosts, and suitable habitat for rare, threatened, and endangered species.

Resources used to identify rare, threatened, and endangered species and their preferred habitat within the project area included the USFWS Information for Planning and Consultation (IPaC) system; the VDWR Virginia Fish and Wildlife Information Service (VaFWIS); the VDCR Natural Heritage Data Explorer (NHDE), and The Center for Conservation Biology (CCB) Virginia Bald Eagle Nest Locator. The IpaC (USFWS 2021), VaFWIS (VDWR 2021), and NHDE (VDCR 2021b) databases were used to identify rare, threatened, and endangered species that have been reported or have the potential to occur on or near the SPSA expansion area (Alternatives B and C). Separate searches, using the same databases, identified rare, threatened, and endangered species observed or with the potential to occur on or near Site SH30 (Alternative D). This information was also used to identify suitable habitat for any rare, threatened, and endangered species, as well as designated critical habitat. The CCB Virginia Bald Eagle Nest Locator was used to identify the locations of nearby bald eagle (*Haliaeetus leucocephalus*) nests and roosts and to ensure there is, at a minimum, a buffer of 660 ft. between active eagle nests and the SPSA expansion area and Site SH30.

Affected Environment

Table 12 below provides a list of federal and state protected species based on the results of the searches described above. It is divided into species that have suitable habitat within the expansion area or Site SH30 and those with limited or no habitat within these study areas.

The VaFWIS database indicated that the canebrake rattlesnake (state Endangered) was reported within the SPSA expansion site. Mabee’s salamander (state Threatened) and tri-colored bat (state Endangered) have been documented within 2 miles of the SPSA expansion site. The VaFWIS search and the IpaC search identified 2 additional species, the northern long-eared bat (state and federally Threatened) and the red-cockaded woodpecker (state and federally Endangered), that have the potential to occur within the SPSA expansion site. Both species are of high priority to federal and state wildlife conservation. The red-cockaded woodpecker in particular is in imminent danger of extinction in the Commonwealth of Virginia, and the nearby Great Dismal Swamp NWR contains suitable and occupied habitat. The other 15 species identified by the search have neither been observed on or near the SPSA expansion area nor is there suitable habitat within or adjacent to the expansion area.

The VaFWIS database indicated that 1 listed species, blackbanded sunfish (state Endangered) has been documented within 2 miles of Site SH30 in Seacock Swamp. Both unnamed streams that flow through SH30 converge with Seacock Swamp southwest of the alternative site, so there is a strong potential that the blackbanded sunfish could occur within these tributaries. The VaFWIS search and the IpaC search identified 3 additional species, the northern long-eared bat, the red-cockaded woodpecker, and Mabee’s salamander, that have the potential to occur within the study area. The other 15 species identified by the search have neither been observed on or near Site SH30 nor is there suitable habitat within or adjacent to the alternative study area.

Table 12. Federal and State Listed Wildlife Species Potentially Occurring Within the Alternative Study Areas

Listed Species	Scientific Name	Federal Status	State Status	Confirmed on SPSA Site	Confirmed on SH30
Species with Potential Habitat within the Alternative Study Areas					
Blackbanded sunfish	*Enneacanthus chaetodon*		SE		Confirmed
Canebrake rattlesnake	*Crotalus horridus*		SE	Confirmed	
Mabee’s salamander	*Ambystoma mabeei*		ST		
Northern long-eared bat	*Myotis septentrionalis*	FE	ST		
Red-cockaded woodpecker	*Picoides borealis*	FE	SE		
Tri-colored bat	*Perimyotis subflavus*		SE		
Species with Limited or No Suitable Habitat within the Alternative Study Areas					
Atlantic sturgeon	*Acipenser oxyrinchus*	FE	SE		
Bachman’s sparrow	*Peucaea aestivalis*		ST		
Dwarf Wedgemussel	*Alasmidonta heterodon*	FE	SE		
Eastern black rail	*Laterallus jamaicensis*	FT	SE		
Henslow’s sparrow	*Centronyx henslowii*		ST		
Kemp’s Ridley sea turtle	*Lepidochelys kempii*	FE	SE		
Little brown bat	*Myotis lucifugus*		SE		

Listed Species	Scientific Name	Federal Status	State Status	Confirmed on SPSA Site	Confirmed on SH30
Loggerhead sea turtle	*Caretta caretta*	FT	ST		
Loggerhead shrike	*Lanius ludovicianus*		ST		
Peregrine falcon	*Falco peregrinus*		ST		
Piping plover	*Charadrius melodus*	FT	ST		
Rafinesque's eastern big-eared Bat	*Corynorhinus rafinesquii macrotis*		SE		
Red knot	*Calidris canutus rufa*	FT	ST		
Roanoke logperch	*Percina rex*	FE	SE		
Yellow lance	*Eliptio lanceolata*	FT	ST		

FE = Federally Endangered; FT = Federally Threatened; SE = State Endangered; ST = State Threatened

Source: USFWS IpaC (2021), VDWR VaFWIS database (2021), VDCR NHDE (2021b)

Blackbanded Sunfish

According to the VaFWIS search, there are several documented occurrences of the blackbanded sunfish in Seacock Swamp near Site SH30, and the 2 unnamed tributaries that flow through the site are predicted habitat for the sunfish. However, the appropriate stream habitat is not present on the SPSA site. The blackblanded sunfish is a member of the family Centrarchidae, which includes sunfish, crappy, and black basses; and it is listed as Endangered in the Commonwealth of Virginia. The blackbanded sunfish is not federally listed. In Virginia, its range includes the Blackwater and Nottoway River watersheds (FishMap.org 2022).

The blackbanded sunfish Is a small fish, with a maximum length of 10 centimeters (Fishbase 2022). It has a compressed body with a small mouth. There are 6 black bars along the body, the first of which runs through the eye and the sixth on the base of the tail. Its dorsal, anal, and tail fins are mottled with black. Its sides have yellow speckles, and its ear flap has a black spot. The dorsal fin usually has 10 spines and 11-12 rays (Natureserve 2022).

The blackbanded sunfish typically inhabits acidic, blackwater swamps and beaver ponds that are tannic, or stained but not turbid, acidic waters (Jenkins and Burkhead 1994). Therefore, the beaver modified ponds and streams on Site SH30 are ideal habitat for the species. The sunfish typically prefers the shallow margins of the swamps or ponds that have dense submerged or floating vegetation, and adults often migrate into beaver ponds to spawn. The eggs are laid in nests the male builds in weed beds.

Canebrake Rattlesnake

According to the VaFWIS, there are several documented sightings of canebrake rattlesnake, or canebrake, in the SPSA expansion area, with the most recent occurring in 2009. The canebrake rattlesnake also has the potential to occur on Site SH30, although there are no documented observations of this species at this site. The canebrake is a snake in the viper family that is native to southeastern Virginia, and it is listed as endangered by the Commonwealth of Virginia. The canebrake is not federally listed. Although technically the same species, the mountainous population of timber rattlesnakes is considered distinct from the southeastern canebrake population, and only the southeastern canebrake is designated as endangered. Therefore, only the southeastern canebrake population is discussed in this analysis.

The VaFWIS indicates that canebrakes occupy a wide range of habitats, including swamps, cane fields, low pine flatwoods, moist woodlands, floodplains, open areas, creek bottoms, rocky ridges, fallow agricultural fields, thickly wooded areas, and areas full of fallen logs (VDWR 2011, 2021). In a coastal plain population in Hampton County, South Carolina, canebrakes exhibited seasonal and sex-based variation in habitat selection (Waldron et al. 2006a). The snakes observed had 3 behaviorally based seasons: the foraging season (April-July), breeding season (August-October), and hibernation (November-March). During the foraging season, when snakes emerged from hibernation and began foraging, males favored bottomland hardwood forests, whereas females preferred pine-hardwood forests. However, both sexes tended to associate with fields during the breeding season and pine-hardwood forests during hibernation (Waldron et al. 2006a).

Across their range, canebrakes maintain large home ranges. Male snakes in Hampton County are estimated to inhabit home ranges of approximately 48 hectares, with females occupying closer to 30 hectares (Waldron et al. 2006b). It is anticipated that the South Carolina population, which is not state listed, behaves similarly to the endangered canebrakes in Virginia (Waldron et al. 2006a).

The snakes' foraging habitat includes live trees, fallen logs, and other cover types near small mammal runways. Canebrakes are ambush predators, and in southeastern Virginia, they primarily consume small mammals, including eastern gray squirrels (Sciurus carolinensis) and cotton rats (Sigmodon hispidus) (Goetz et al. 2016; VDWR 2011).

In its current condition, the SPSA expansion area provides suitable habitat for canebrakes. The area contains hardwoods, cane, and piles of fallen trees, as well as moist woodlands and swamps, all potential canebrake habitat. With more than 133 acres of contiguous forested wetlands, the site is also large enough to support the vast home ranges of numerous individuals. Given the presence of suitable habitat and previous on-site observations of canebrakes, this species is likely to be found within the SPSA expansion area.

The currently known range of the canebrake does not include Site SH30 (VDWR 2011). Therefore, the canebrake is unlikely to occur on Site SH30, even though there is suitable habitat located on the property.

Mabee's Salamander

The Mabee's salamander has been previously observed adjacent to the SPSA expansion area, with 1 sighting documented by VaFWIS from 1900 (VDWR 2021). VaFWIS also indicates that it could occur on Site SH30, although none have been documented on the site. These small, stout ambystomatid salamanders, or mole salamanders, are listed as threatened in the Commonwealth of Virginia but are not federally listed (VDWR 2021). Recent occupancy data suggest that they are declining in southeastern Virginia (Fairman et al. 2013). Although the exact cause of this decline is unknown, potential contributing factors include habitat loss, habitat fragmentation, and range reductions due to climate change (Sevin and Kleopfer 2015; Sutton et al. 2015). A study indicated that human activity and land development from 1992 to 2001 caused a loss of suitable habitat in southeastern Virginia that presumably had adverse effects on Mabee's salamander populations (Niccoli and Kleopfer 2013), and those adverse effects are likely to have increased as development has continued to increase.

The VaFWIS states that Mabee's salamanders breed from late fall to early spring in fish-free vernal pools, in which young larval salamanders remain until they metamorphose, or develop, into juveniles. Juveniles and adults live a terrestrial life outside of the breeding season (VDWR 2021). They tend to inhabit savannas, bog and pond edges, low wet woods, and swamps, where they are often found in burrows or under logs (VDWR 2021). Although adults are terrestrial, Mabee's salamander reproduction is aquatic. During the breeding season, these salamanders favor large ponds with a higher proportion of grass and a relatively low number of trees and shrubs (Fairman et al. 2013).

The SPSA expansion area and Site SH30 contain swamps with logs and other refugia required by this species, as well as hydrology that ranges from saturated to shallowly inundated, all of which could support terrestrial juvenile and adult salamanders. However, Mabee's salamanders prefer large ponds surrounded by more grass than trees and scrub (Fairman et al. 2013). Further, the salamanders require grassy, fish-free vernal pools for breeding (VDWR 2021). Vernal pools were not identified on-site during wetland delineations and pedestrian surveys, although Site SH30 has permanent ponds created or modified by beaver. A diverse fish community likely inhabits these ponds making them unsuitable for Mabee's salamanders. It is unlikely that Mabee's salamanders would migrate the required distance from their breeding habitat to use the SPSA expansion area or Site SH30. Because no breeding habitat is available on-site, Mabee's salamanders are not anticipated to be present within the SPSA expansion area or Site SH30.

Tri-colored Bat

Although it is not federally listed, the tri-colored bat is listed as Endangered by the Commonwealth of Virginia. It has been reported near the SPSA expansion area, with a documented observation from 1996 (VDWR 2021). According to the VaFWIS database, even though it was not indicated as potential in the VaFWIS search, there is appropriate forging and nesting habitat in Site SH30. According to VaFWIS, these bats can be found in caves, trees, vegetation, cliffs, barns, and sometimes in buildings and in wooded and cleared areas (VDWR 2021).

Tri-colored bats hibernate in caves throughout their range, and some roost in caves year-round (VDWR 2021). As a result, tri-colored bats have been impacted by White-nose Syndrome (WNS), a fungus first identified in 2006 that has caused widespread mortality of cave-hibernating bat species (Blehert et al. 2009). In 2012, a marked decline in tri-colored bat abundance was reported in West Virginia after WNS infected the population (Francl et al. 2012). A comparison of data from 2003-2004, pre-WNS, to data from 2016-2018, post-WNS, determined there was a significant reduction in both the distribution and abundance of tri-colored bats in the National Capitol Region (i.e., the area around Washington, D.C.) (Deeley et al. 2021). White-nose Syndrome infection of cave-hibernating bats poses the main threat to this species.

There is suitable roosting and foraging habitat for the tri-colored bat within the SPSA expansion area and Site SH30, as there are abundant trees and vegetation. According to the VDWR, during the winter, tri-colored bats hibernate in caves exclusively in the western region of Virginia (2020a). These bats then disperse after hibernation, sometimes migrating long distances, and can be found across the entire

Commonwealth of Virginia in the summer (VDWR 2020a). Thus, tri-colored bats may be present within the SPSA expansion area and Site SH30 during the warmer months while they are nesting and foraging.

Northern Long-eared Bat

The northern long-eared bat was identified by several searches as having the potential to occur on or near the SPSA expansion and Site SH30, although there are no confirmed observations on record for either site. These bats are listed as Threatened at both the state and federal level. On November 29, 2022 the USFWS published a final rule to reclassify the northern long-eared bats as endangered under the Endangered Species Act. The effective date to reclassify the species from threatened to endangered was subsequently delayed from January 30, 2023, to March 31, 2023. According to VaFWIS, northern long-eared bats inhabit forested areas, foraging in hillsides and ridge forests and frequenting the space in the forest just above shrub level (VDWR 2021). During the spring and summer, males typically roost in caves, while females can be found under tree bark. There is evidence that northern long-eared bats often roost under the bark of pine snags (Rojas et al. 2017). Across their range, northern long-eared bats have been observed roosting in a number of different tree species, including black locust (*Robinia pseudo-acacia*; Menzel et al. 2002), shortleaf pine (*Pinus echinata*; Perry and Thill 2007), white pine (*Pinus strobus*; Rojas et al. 2017), and some hardwoods (Perry and Thill 2007). Like the tri-colored bat, both males and females hibernate in caves in western Virginia during the winter, dispersing across the state during the summer (VDWR 2020b).

As a cave-hibernating species, the northern long-eared bat is also impacted by WNS (Blehert et al. 2009), which has led to significant declines in their numbers. In western Virginia, the rate of capture of northern long-eared bats in 2011-2013, after WNS onset, was markedly lower than it was between 1990 and 2009, before the bats were impacted by WNS, suggesting population declines as a result of WNS (Reynolds et al. 2016). Further, the proportion of juveniles declined by nearly 77% over this period, evidence that WNS not only caused population declines but also impacted the future viability of northern long-eared bats in the area (Reynolds et al. 2016). According to USFWS (2020), WNS is by far the most pressing threat to this species. However, loss or degradation of winter hibernacula and summer roosting habitat has exacerbated these declines, as they further impact population viability.

Since there are pines and hardwoods in the SPSA expansion area, there is suitable northern long-eared bat roosting habitat within the SPSA expansion site. Site SH30 has both pine plantation, upland forest, and hardwood wetland so there is also suitable habitat within that site. However, given their widespread dispersal after winter hibernation, there may be northern long-eared bats present on or near the SPSA expansion site or Site SH30.

Red-cockaded Woodpecker

The final species of concern identified by this search was the red-cockaded woodpecker. According to VaFWIS, there are no recorded observations of this species on or adjacent to the SPSA expansion area. The red-cockaded woodpecker is listed as Endangered at both the state and federal level, and it has been in imminent danger of extinction in Virginia since the 1980s (Watts and Harding 2007). This species is included in this analysis because of the expansion area's proximity to the Great Dismal Swamp NWR, which is a site of ongoing active red-cockaded woodpecker management.

According to VaFWIS, this highly specialized woodpecker is found strictly in open pinewoods, with a preference towards longleaf pines. The birds excavate nesting cavities in mature to overmature live pines, often selecting trees that have been infected with a fungus causing red heart disease. In southeastern Virginia, loblolly pine is most often used for cavity excavation (VDWR 2021). The excavated roost and nest trees, often used for several generations, are directly linked to woodpecker distribution, group size, and reproductive success (Ligon 1970). Thus, they are critical to the birds' survival in a given area. These birds tend to forage in large, live pines (VDWR 2021). High quality foraging and nesting habitat, determined based on preferences of the more abundant North Carolina population, consists of medium to large, old-growth pines at intermediate densities with little to no pine or hardwood midstory (Walters et al. 2002).

In Virginia, destruction of red-cockaded woodpecker habitat by the timber industry has led to marked population declines over the past several decades (Watts and Harding 2007). The entire known breeding population of red-cockaded woodpeckers in Virginia is in the Piney Grove Preserve in Sussex County, where 13 breeding groups are now being actively managed (Watts et al. 2020). This highly restricted distribution leaves the species extremely vulnerable to local extinction due to unpredictable catastrophic events such as storms or disease. As a result, beginning in 2015, several woodpeckers were translocated into the Great Dismal Swamp NWR, which also contains suitable habitat (Watts et al. 2020). As of 2019, 3 potential breeding groups of red-cockaded woodpeckers were identified in the Great Dismal Swamp NWR (Watts et al. 2020). The endangered red-cockaded woodpecker is still incredibly rare in the state. The expansion area is adjacent to the Great Dismal Swamp NWR, the site of continued active red-cockaded woodpecker management, and only 18 individuals were recorded in the NWR in 2019 (Watts et al. 2020).

While some dispersal has been reported (Watts and Harding 2007), it is very unlikely that red-cockaded woodpeckers would be found in the SPSA expansion site or Site SH30. This is especially true because the SPSA site is separated from the Great Dismal Swamp NWR by several roads and infrastructure for an active landfill, fragmenting any potential wildlife corridor. The SPSA expansion area harbors a few stands of loblolly pine, the woodpecker's preferred tree species. However, hardwoods dominate the site, and it has moderate groundcover, making it less than ideal habitat for this highly specialized bird. Based on habitat characteristics and the species' rarity, it is unlikely to be present in the SPSA expansion site.

Forested habitats in Site SH30 include pine plantation, upland hardwood forest, wetland hardwood forest. The pine plantation consists of loblolly pine, but it undergoes regular timber harvesting, which is likely to prevent red-cockaded woodpeckers from inhabiting the site. Hardwoods dominate the natural forest systems including bottomland forest within the floodplains, which are littered with beaver ponds, and generally undisturbed hardwood upland buffers. Additionally, a large portion of the site is row crops. None of these habitats are suitable for red-cockaded woodpeckers. In addition, Site SH30 is approximately 7.5 miles east of Piney Grove and 25.5 miles northwest of Great Dismal Swamp NWR. Therefore, it is unlikely that red-cockaded woodpeckers would inhabit Site SH30.

Protected Eagle Species

According to the CCB Virginia Eagle Nest Locator, there is a bald eagle roost approximately 1 mile to the southeast of the SPSA expansion site. The nearest active bald eagle nest is located approximately 2.5 miles west of the SPSA expansion area. For Site SH30, the nearest bald eagle nest is approximately 2.2 miles to the west of the study area (CCB 2021).

Environmental Consequences

Alternative A

Under Alternative A, there would be no adverse effects to protected species and habitats.

Alternative B

Alternative B involves the development of the expansion area (Cells VIII and IX) to increase the footprint of the landfill. This alternative would remove all existing wildlife habitat from the expansion area, including approximately 117 acres of wetlands. It would require the clearing of trees and vegetation and the draining of water features across the entire expansion area. This would lead to adverse effects for several of the species of concern identified here.

Direct, temporary effects to some species identified here would be anticipated during activities associated with construction of the landfill expansion. As construction occurs, collisions with work vehicles or crushing could occur. Other project actions could also cause injury or mortality to wildlife on-site. The canebrake rattlesnake and Mabee's salamander, if present on-site, are anticipated to be the most affected by these temporary impacts since they are less mobile. Northern long-eared bats and tri-colored bats could also be affected by these temporary impacts. However, they would be less likely to be injured or killed during development because they could fly out of the affected area. Also, time-of-year restrictions may be required for the project; these limitations would minimize the direct impact of construction activities on bat species.

The same is true of the red-cockaded woodpecker, although it is very unlikely that this species is present in the project area given its rarity throughout the state.

Additional indirect, temporary effects include disturbance due to noise, vibration, and human presence during construction, both within and adjacent to the expansion area. This disturbance could cause wildlife on or near the expansion area to disperse or potentially abandon breeding attempts, foraging opportunities, or shelter from predators. It could also cause stress for wildlife, which could have adverse behavioral and physical impacts that could lead to injury or mortality.

Alternative B would also cause indirect, permanent adverse effects to the species identified here, as suitable habitat would be lost when the forested wetlands within the expansion area are cleared and drained to expand the landfill. Suitable habitat for canebrake rattlesnakes, Mabee's salamanders, tri-colored bats, and northern long-eared bats would be lost. Once construction is completed, the project area could no longer support these species. Also, as described above in the "Wetlands" section, development associated with Alternative B would create a new ecotone at the edge of the adjacent wetland areas, and the hydrology of nearby wetland areas could be adversely affected by on-site dewatering activities. This could lead to changes in the vegetation community composition, which could alter the use of the habitat by protected species.

Eagle roosts and nests in the vicinity of the Alternative B expansion area are well outside the required 660-ft. buffer. Therefore, no disturbance to protected eagles or their nests would occur as a result of this project.

Alternative C

Under Alternative C, the airspace between the existing Cells V and VI would be utilized for waste disposal, reducing the footprint of the new development and the area of wetland cleared by approximately 9 acres. Under Alternative C, temporary, permanent, and indirect effects to protected species and their habitats would be very similar to the effects that would be incurred by Alternative B, although 9 fewer acres of habitat would be impacted.

The nearest active eagle nest is closer to the proposed expansion area under Alternative C than to that of Alternative B. However, at approximately 2 miles from the project site, it is still well outside of the required 660-ft. buffer. Therefore, no adverse impacts to protected eagle species are anticipated.

Alternative D

Under Alternative D, the footprint of the existing landfill would remain the same. Therefore, the wildlife habitat that would be impacted by the landfill expansion proposed under Alternative B would not be affected. Instead, a new landfill would be created off-site, on an approximately 330-acre parcel of land called Site SH30 located in Southampton County, Virginia, approximately 28 miles northwest of the existing landfill. This would require the clearing of trees and vegetation and the draining of some water features adjacent to agricultural fields in Site SH30. This would lead to adverse effects for several of the species of concern identified here.

Direct, temporary effects to some species identified here would be anticipated during activities associated with the landfill construction. As construction occurs, collisions with work vehicles, crushing, and other project actions could cause injury and mortality to animals on-site. These impacts would be similar to impacts incurred under Alternatives B and C, except that under Alternative D, considerably less moderate and high quality habitat would be impacted since much of Site SH30 consists of row crops with little value as wildlife habitat.

Additional indirect, temporary effects include disturbance due to noise, vibration, and human presence during construction, both within and adjacent to the expansion area. This disturbance could cause wildlife on or near the expansion area to disperse or potentially abandon breeding attempts, foraging opportunities, or shelter from predators. It could also cause stress for wildlife, which could have adverse behavioral and physical impacts that could lead to injury or mortality.

Alternative D would also cause indirect, permanent adverse effects to the species identified here, as suitable habitat within the footprint of the landfill proposed at SH30 would be lost when forested uplands and wetlands within the site are cleared and drained to construct the landfill. Suitable habitat for canebrake rattlesnakes, Mabee’s salamanders, tri-colored bats, and northern long-eared bats would be lost. Also, as described above in the “Wetlands” section, development associated with Alternative D would create new ecotones at the edges of adjacent upland and wetland areas, and the hydrology of nearby wetland areas could be adversely affected by on-site dewatering activities. This could lead to changes in the vegetation community composition, which could alter the use of the habitat by protected species.

Eagle roosts and nests in the vicinity of Site SH30 are well outside the required 660-ft. buffer. Therefore, no disturbance to protected eagles or their nests would occur as a result of this project.

Migratory Birds

Methodology

The Migratory Bird Treaty Act of 1918 (MBTA) protects migratory birds, their parts, nests, and eggs from take, kill, capture, transport, sale, and several other actions detrimental to these species, except when authorized by the USFWS (U.S. Code 1989). The MBTA provides protection for a variety of bird species native to the U.S. that are not listed at the state or federal level and are therefore not protected by the ESA.

Virginia is on the Atlantic flyway, a major migratory route spanning more than 3,000 miles from Baffin Island in Canada to northern South America (Ducks Unlimited 2021). A diverse array of bird species travel this route every fall and spring. Common migratory species that pass through Virginia on the Atlantic flyway include waterfowl such as gadwall (*Mareca strepera*), blue-winged teal (*Spatula discors*), northern shoveler (*Spatula clypeata*), northern pintail (*Anas acuta*), and American coot (*Fulica americana*); raptors such as northern harrier (*Circus hudsonius*), American kestrel (*Falco sparverius*), and sharp-shinned hawk (*Accipiter striatus*); shorebirds such as semipalmated plover (*Charadrius semipalmatus*), greater yellowlegs (*Tringa melanoleuca*), least sandpiper (*Calidris minutilla*), and short-billed dowitcher (*Limnodromus griseus*); and terrestrial songbirds such as eastern phoebe (*Sayornis phoebe*), palm warbler (*Setophaga palmarum*), gray catbird (*Dumetella carolinensis*), American robin (*Turdus migratorius*), ruby-crowned kinglet (*Regulus calendula*), chipping sparrow (*Spizella passerine*), and Baltimore oriole (*Icterus galbula*). Migratory songbirds (also called passerines) are found in hardwood and pine forested habitats; waterfowl on lakes and impoundments; shorebirds on beaches and flooded agricultural fields; and raptors across a wide variety of habitats including forests, fields, urban areas, and shorelines.

In compliance with the MBTA, searches were conducted to determine the presence or potential occurrence of the following within or near the SPSA expansion site and Site SH30: migratory bird species (including passerines, raptors, shorebirds, and others), waterbird nesting colonies, shorebird roosts, osprey nests, heron pairs, and suitable habitat for any migratory birds.

Resources used to identify migratory shorebirds, waterfowl, raptors, and passerines and their preferred habitat included the VDWR VaFWIS and The Cornell Lab of Ornithology eBird database (eBird). Several resources from the CCB Mapping Portal were also used to screen for known nests and roosts on or near the project area, including CCB Shorebird Roost Registry, CCB Colonial Waterbirds mapping tool, CCB Chesapeake Bay Herons mapping tool, and CCB Osprey Watch Nest mapper.

This section discusses birds protected by the MBTA only. Federally and state listed bird species covered by the federal or state ESA, as well as protected eagle species covered by the Bald and Golden Eagle Protection Act, are discussed in the previous "Protected Species" section. These species will not be discussed further here.

Affected Environment

The CCB Mapping Portal identified no waterbird colonies, shorebird roosts, or heron pairs on or near the expansion area for Alternatives B and C. However, 1 osprey nest was identified approximately 5,000 ft. from the SPSA expansion site. The identified nest was documented by Osprey Watch, a global reporting program through which volunteers monitor and document breeding osprey (CCB 2019).

According to VaFWIS, the expansion area search radius (which included a 2-mile radius around the approximate project center) intersects 2 Breeding Bird Survey (BBS) blocks – the Suffolk Block and the Chuckatuck Block. The BBS occurs annually within set blocks across North America. Volunteers skilled in avian identification walk an assigned route within a BBS block during the breeding season, identifying and documenting all birds observed along the way (USGS 2021). This provides a valuable estimate of the variety and abundance of birds in a specific area. While the Suffolk and Chuckatuck Blocks do not completely overlap the project area, the BBS data from these blocks provides information on the types of birds likely to occur on-site.

The Chuckatuck Block overlaps over two-thirds of the search area. Within this block, 63 species were observed, including a number of species that are anticipated to occur in the forested wetland habitat within the expansion area, such as belted kingfisher (*Megaceryle alcyon*), black-and-white warbler (*Mniotilta varia*), red-winged blackbird (*Agelaius phoeniceus*), and green heron (*Butorides virescens*) (VDWR 2021). The Suffolk Block, which intersects only less than one-quarter of the search area, contains data on 76 species, some of which overlap with those observed in the Chuckatuck Block. These included a number of species anticipated to occur in forested wetland habitat, such as northern flicker (*Colaptes auratus*), fish crow (*Corvus ossifragus*), wood duck (*Aix sponsa*), and ovenbird (*Seiurus aurocapilla*; VDWR 2021). It should be noted, however, that the observations registered within both BBS blocks all occurred during the 1980s.

Publicly available data from eBird, a database that compiles bird species and abundance data reported by citizen scientists from around the globe, revealed no records within the expansion area. This is likely due to the limited public access to SPSA-owned land. The nearest eBird “hotspot,” a location with several submitted eBird user observation lists, is the “Great Dismal Swamp NWR – Williamson Ditch” site. Seven eBird checklists have been submitted from this hotspot, which is centered around a point approximately 2 miles to the southeast of the expansion area (The Cornell Lab of Ornithology 2021). A total of 58 bird species were observed across the 7 lists submitted from this site, with the most recent observations recorded in April 2021 (The Cornell Lab of Ornithology 2021). Many of the species reported here were similar to those recorded by the BBS. Data from eBird must be treated more cautiously, however, as observations are reported from approximate locations by everyday citizens with varying skills in avian identification and count estimation. Migratory species reported at the Williamson Ditch hotspot that are anticipated to occur in forested wetlands like those on-site include prothonotary warbler (*Protonotaria citrea*), red-eyed vireo (*Vireo olivaceus*), great blue heron (*Ardea herodias*), and great crested flycatcher (*Myiarchus crinitus*) (The Cornell Lab of Ornithology 2021).

In total, the CCB Mapping Portal, eBird, and BBS data combined identified 101 distinct bird species that have been observed on or near the project area. A complete list of all species identified through these databases is provided in Table 13. The CCB Mapping Portal identified only 1 MBTA-protected species, the osprey (2021). As a result, the source databases indicated for each species in Table 13 consist of either the Chuckatuck Breeding Bird Survey block (CBBS), the Suffolk Breeding Bird Survey block (SBBS), or eBird; CCB Mapping Portal was not included. Of the 101 species listed in Table 13, only 4 species are not covered by MBTA protections. These are the European starling (*Sturnus vulgaris*), the house sparrow (*Passer domesticus*), the northern bobwhite (*Colinus virginianus*), and the rock pigeon (*Columba livia*). All others are protected by the MBTA and have some likelihood of being found in forested wetland habitat.

Table 13. Migratory Birds Observed on or Near the SPSA Expanion Site

Species	Scientific Name	MBTA Protection	Source Database(s)		
Acadian flycatcher	*Empidonax virescens*	Yes	CBBS	SBBS	
American coot	*Fulica americana*	Yes		SBBS	
American crow	*Corvus brachyrhynchos*	Yes	CBBS	SBBS	eBird
American goldfinch	*Spinus tristis*	Yes	CBBS	SBBS	eBird
American kestrel	*Falco sparverius*	Yes	CBBS	SBBS	eBird
American robin	*Turdus migratorius*	Yes	CBBS	SBBS	eBird
Bald eagle	*Haliaeetus leucocephalus*	Yes		SBBS	
Baltimore oriole	*Icterus galbula*	Yes		SBBS	
Barn swallow	*Hirundo rustica*	Yes	CBBS	SBBS	
Barred owl	*Strix varia*	Yes		SBBS	
Belted kingfisher	*Megaceryle alcyon*	Yes	CBBS	SBBS	eBird
Black vulture	*Coragyps atratus*	Yes	CBBS	SBBS	eBird
Black-and-white warbler	*Mniotilta varia*	Yes	CBBS	SBBS	
Black-throated green warbler	*Dendroica virens*	Yes		SBBS	eBird
Blue grosbeak	*Passerina caerulea*	Yes	CBBS		
Blue jay	*Cyanocitta cristata*	Yes	CBBS	SBBS	eBird
Blue-gray gnatcatcher	*Polioptila caerulea*	Yes	CBBS	SBBS	eBird
Brown creeper	*Certhia americana*	Yes			eBird
Brown thrasher	*Toxostoma rufum*	Yes	CBBS	SBBS	eBird
Brown-headed cowbird	*Molothrus ater*	Yes	CBBS	SBBS	
Brown-headed nuthatch	*Sitta pusilla*	Yes		SBBS	
Carolina chickadee	*Poecile carolinensis*	Yes	CBBS	SBBS	eBird
Carolina wren	*Thryothorus ludovicianus*	Yes	CBBS	SBBS	eBird
Cedar waxwing	*Bombycilla cedrorum*	Yes		SBBS	eBird
Chimney swift	*Chaetura pelagica*	Yes	CBBS		eBird
Chipping sparrow	*Spizella passerina*	Yes		SBBS	eBird
Common grackle	*Quiscalus quiscula*	Yes	CBBS	SBBS	
Common yellowthroat	*Geothlypis trichas*	Yes	CBBS	SBBS	eBird
Dark-eyed junco	*Junco hyemalis*	Yes			eBird
Double-crested cormorant	*Phalacrocorax auritus*	Yes		SBBS	
Downy woodpecker	*Picoides pubescens*	Yes	CBBS	SBBS	eBird
Eastern bluebird	*Sialia sialis*	Yes	CBBS	SBBS	eBird
Eastern meadowlark	*Sturnella magna*	Yes	CBBS		
Eastern phoebe	*Sayornis phoebe*	Yes			eBird

Species	Scientific Name	MBTA Protection	Source Database(s)		
Eastern screech owl	*Megascops asio*	Yes	CBBS		
Eastern towhee	*Pipilo erythrophthalmus*	Yes	CBBS	SBBS	eBird
Eastern whip-poor-will	*Antrostomus vociferus*	Yes	CBBS		
Eastern wood-pewee	*Contopus virens*	Yes	CBBS	SBBS	
European starling	*Sturnus vulgaris*	**No**	CBBS	SBBS	eBird
Field sparrow	*Spizella pusilla*	Yes			eBird
Fish crow	*Corvus ossifragus*	Yes		SBBS	
Golden-crowned kinglet	*Regulus satrapa*	Yes			eBird
Gray catbird	*Dumetella carolinensis*	Yes		SBBS	eBird
Great black-backed gull	*Larus marinus*	Yes		SBBS	
Great blue heron	*Ardea herodias*	Yes	CBBS	SBBS	eBird
Great crested flycatcher	*Myiarchus crinitus*	Yes	CBBS	SBBS	eBird
Green heron	*Butorides virescens*	Yes	CBBS	SBBS	eBird
Hairy woodpecker	*Picoides villosus*	Yes		SBBS	eBird
Hermit thrush	*Catharus guttatus*	Yes			eBird
Hooded warbler	*Wilsonia citrina*	Yes	CBBS	SBBS	eBird
House finch	*Carpodacus mexicanus*	Yes		SBBS	
House sparrow	*Passer domesticus*	**No**	CBBS	SBBS	
Indigo bunting	*Passerina cyanea*	Yes	CBBS		
Killdeer	*Charadrius vociferus*	Yes	CBBS	SBBS	
Laughing gull	*Leucophaeus atricilla*	Yes	CBBS	SBBS	
Louisiana waterthrush	*Parkesia motacilla*	Yes	CBBS	SBBS	
Marsh wren	*Cistothorus palustris*	Yes	CBBS		
Mourning dove	*Zenaida macroura*	Yes	CBBS	SBBS	eBird
Northern bobwhite	*Colinus virginianus*	**No**	CBBS		
Northern cardinal	*Cardinalis cardinalis*	Yes	CBBS	SBBS	eBird
Northern flicker	*Colaptes auratus*	Yes	CBBS	SBBS	eBird
Northern harrier	*Circus hudsonius*	Yes			eBird
Northern mockingbird	*Mimus polyglottos*	Yes	CBBS		
Northern parula	*Parula americana*	Yes		SBBS	
Northern rough-winged swallow	*Stelgidopteryx serripennis*	Yes	CBBS		
Orchard oriole	*Icterus spurius*	Yes	CBBS		
Osprey	*Pandion haliaetus*	Yes		SBBS	
Ovenbird	*Seiurus aurocapillus*	Yes	CBBS	SBBS	eBird
Pileated woodpecker	*Dryocopus pileatus*	Yes	CBBS	SBBS	eBird
Pine warbler	*Dendroica pinus*	Yes	CBBS	SBBS	
Prairie warbler	*Dendroica discolor*	Yes		SBBS	eBird
Prothonotary warbler	*Protonotaria citrea*	Yes		SBBS	eBird
Red-bellied woodpecker	*Melanerpes carolinus*	Yes	CBBS	SBBS	eBird

Species	Scientific Name	MBTA Protection	Source Database(s)		
Red-eyed vireo	*Vireo olivaceus*	Yes	CBBS	SBBS	eBird
Red-shouldered hawk	*Buteo lineatus*	Yes		SBBS	eBird
Red-tailed hawk	*Buteo jamaicensis*	Yes	CBBS	SBBS	eBird
Red-winged blackbird	*Agelaius phoeniceus*	Yes	CBBS	SBBS	eBird
Ring-billed gull	*Larus delawarensis*	Yes			eBird
Rock pigeon	*Columba livia*	**No**	CBBS	SBBS	eBird
Royal tern	*Thalasseus maximus*	Yes		SBBS	
Ruby-crowned kinglet	*Regulus calendula*	Yes			eBird
Ruby-throated hummingbird	*Archilochus colubris*	Yes	CBBS	SBBS	
Scarlet tanager	*Piranga olivacea*	Yes		SBBS	
Song sparrow	*Melospiza melodia*	Yes	CBBS		
Spotted sandpiper	*Actitis macularius*	Yes		SBBS	
Summer tanager	*Piranga rubra*	Yes	CBBS	SBBS	
Swainson's warbler	*Limnothlypis swainsonii*	Yes		SBBS	eBird
Tufted titmouse	*Baeolophus bicolor*	Yes	CBBS	SBBS	eBird
Turkey vulture	*Cathartes aura*	Yes	CBBS	SBBS	eBird
White-breasted nuthatch	*Sitta carolinensis*	Yes	CBBS	SBBS	eBird
White-eyed vireo	*Vireo griseus*	Yes	CBBS	SBBS	eBird
White-throated sparrow	*Zonotrichia albicollis*	Yes			eBird
Wood duck	*Aix sponsa*	Yes		SBBS	eBird
Wood thrush	*Hylocichla mustelina*	Yes	CBBS	SBBS	
Worm-eating warbler	*Helmitheros vermivorus*	Yes		SBBS	
Yellow-bellied sapsucker	*Sphyrapicus varius*	Yes			eBird
Yellow-billed cuckoo	*Coccyzus americanus*	Yes	CBBS	SBBS	
Yellow-breasted Chat	*Icteria virens*	Yes	CBBS		
Yellow-rumped warbler	*Dendroica coronata*	Yes			eBird
Yellow-throated vireo	*Vireo flavifrons*	Yes		SBBS	
Yellow-throated warbler	*Dendroica dominica*	Yes			eBird

CBBS = Chuckatuck Breeding Bird Survey Block; SBBS = Suffolk Breeding Bird Survey Block
eBird = Cornell Lab of Ornithology eBird Database
Sources: VDWR VaFWIS database (2021), The Cornell Laboratory of Ornithology eBird database (2021)

Similar searches were conducted to identify migratory bird species at Site SH30. The CCB Mapping Portal identified no waterbird colonies, shorebird roosts, osprey nests, or heron pairs on or near Site SH30 (2021).

The Ivor, SE Block overlaps a small portion of the search area. Within this block, 65 species were observed, including a number of species that are anticipated to occur in the forested wetland habitat within Site SH30, such as eastern kingbird (*Tyrannus tyrannus*), Acadian flycatcher (*Empidonax virescens*), downy woodpecker (*Picoides pubescens*), and red-shoulder hawk (*Buteo lineatus lineatus*) (VDWR 2022). These observations were documented in the 1980s and may have limited value in predicting birds that may be present on-site.

Publicly available data were also collected from eBird at hotspots near Site SH30. There are no eBird hotspots in Site SH30 or immediately adjacent to it, but there are 2 hotspots that are reasonably nearby. The closest, "Brittles Mill Pond" hotspot, is approximately 4.7 miles to the northeast of the site. Ten checklists have been submitted for this site, generally from 2017 to 2022 with 1 list from 1981, and observers identified 42 species of birds. Examples include hooded merganser (*Lophodytes cucullatus*), northern rough-winged swallow (*Stelgidopteryx serripennis*), and eastern meadowlark (*Sturnella magna*). The next closest hotspot is the "Southeast 4-H Educational Center" that is located approximately 5.9 miles from Site SH30. At this hotspot, observers submitted 83 complete checklists from 2009 to 2022 identifying a total of 108 species of birds. Typical species observed include Baltimore oriole (*Icterus galbula*), Summer tanager (*Piranga rubra*), and wood duck (*Aix sponsa*). Ponds on these sites allow for a more diverse community of birds, and a direct comparison to Site SH30 is appropriate because of the beaver ponds located on-site.

In total, 114 distinct species have been observed on or near Site SH30, and a complete list of all species identified through the Virginia Breeding Bird Atlas and eBird is provided in Table 14. Of the numerous species listed in Table 14, only 2 species are not covered by MBTA protections, the European starling and the house sparrow.

Table 14. Migratory Birds Observed on or Near the Off-site Alternative, Site SH30

Species	Scientific Name	MBTA Protection	Source Databases		
Acadian Flycatcher	*Empidonax virescens*	Yes	BBS	ebird-4-H	
American Black Duck	*Anas rubripes*	Yes		ebird-4-H	
American Crow	*Corvus brachyrhynchos*	Yes	BBS	ebird-4-H	ebird-BMP
American Goldfinch	*Spinus tristis*	Yes	BBS	ebird-4-H	ebird-BMP
American Robin	*Turdus migratorius*	Yes	BBS	ebird-4-H	ebird-BMP
Baltimore Oriole	*Icterus galbula*	Yes	BBS	ebird-4-H	
Barn Swallow	*Hirundo rustica*	Yes	BBS	ebird-4-H	
Belted Kingfisher	*Megaceryle alcyon*	Yes		ebird-4-H	ebird-BMP
Black-and-White Warbler	*Mniotilta varia*	Yes		ebird-4-H	
Black Vulture	*Coragyps atratus*	Yes	BBS	ebird-4-H	ebird-BMP
Blue-gray Gnatcatcher	*Polioptila caerulea*	Yes	BBS	ebird-4-H	ebird-BMP
Blue Grosbeak	*Passerina caerulea*	Yes	BBS	ebird-4-H	
Blue Jay	*Cyanocitta cristata*	Yes	BBS	ebird-4-H	ebird-BMP

Species	Scientific Name	MBTA Protection	Source Databases		
Brown Thrasher	*Toxostoma rufum*	Yes	BBS	ebird-4-H	
Brown-headed Cowbird	*Molothrus ater*	Yes	BBS	ebird-4-H	ebird-BMP
Brown-headed Nuthatch	*Sitta pusilla*	Yes		ebird-4-H	ebird-BMP
Canada Goose	*Branta canadensis*	Yes		ebird-4-H	ebird-BMP
Carolina Chickadee	*Poecile carolinensis*	Yes	BBS	ebird-4-H	ebird-BMP
Carolina Wren	*Thryothorus ludovicianus*	Yes	BBS	ebird-4-H	ebird-BMP
Cedar Waxwing	*Bombycilla cedrorum*	Yes		ebird-4-H	
Chimney Swift	*Chaetura pelagica*	Yes	BBS	ebird-4-H	ebird-BMP
Chipping Sparrow	*Spizella passerina*	Yes	BBS	ebird-4-H	ebird-BMP
Chuck-will's-widow	*Antrostomus carolinensis*	Yes	BBS		
Common Grackle	*Quiscalus quiscula*	Yes	BBS	ebird-4-H	
Common Yellowthroat	*Geothlypis trichas*	Yes	BBS	ebird-4-H	
Cooper's Hawk	*Accipiter cooperii*	Yes		ebird-4-H	ebird-BMP
Dark-eyed Junco	*Junco hyemalis*	Yes		ebird-4-H	ebird-BMP
Double-crested Cormorant	*Phalacrocorax auritus*	Yes		ebird-4-H	
Downy Woodpecker	*Picoides pubescens*	Yes	BBS	ebird-4-H	
Eastern Bluebird	*Sialia sialis*	Yes	BBS	ebird-4-H	ebird-BMP
Eastern Kingbird	*Tyrannus tyrannus*	Yes	BBS	ebird-4-H	
Eastern Meadowlark	*Sturnella magna*	Yes	BBS		ebird-BMP
Eastern Phoebe	*Sayornis phoebe*	Yes	BBS	ebird-4-H	
Eastern Towhee	*Pipilo erythrophthalmus*	Yes	BBS	ebird-4-H	
Eastern Whip-poor-will	*Antrostomus vociferus*	Yes	BBS		
Eastern Wood-pewee	*Contopus virens*	Yes	BBS	ebird-4-H	ebird-BMP
European Starling	*Sturnus vulgaris*	**No**	BBS	ebird-4-H	
Field Sparrow	*Spizella pusilla*	Yes	BBS	ebird-4-H	
Fish Crow	*Corvus ossifragus*	Yes	BBS	ebird-4-H	
Fox Sparrow	*Passerella iliaca*	Yes		ebird-4-H	
Golden-crowned Kinglet	*Regulus satrapa*	Yes		ebird-4-H	
Gray Catbird	*Dumetella carolinensis*	Yes		ebird-4-H	
Great Blue Heron	*Ardea herodias*	Yes		ebird-4-H	ebird-BMP
Great Crested Flycatcher	*Myiarchus crinitus*	Yes	BBS	ebird-4-H	

Species	Scientific Name	MBTA Protection	Source Databases		
Great Egret	*Ardea alba*	Yes		ebird-4-H	
Green Heron	*Butorides virescens*	Yes	BBS	ebird-4-H	
Hairy Woodpecker	*Dryobates villosus*	Yes		ebird-4-H	
Hermit Thrush	*Catharus guttatus*	Yes		ebird-4-H	
Hooded Merganser	*Lophodytes cucullatus*	Yes		ebird-4-H	ebird-BMP
Hooded Warbler	*Setophaga citrina*	Yes	BBS	ebird-4-H	ebird-BMP
House Finch	*Carpodacus mexicanus*	Yes		ebird-4-H	ebird-BMP
House Sparrow	*Passer domesticus*	**No**	BBS	ebird-4-H	
Indigo Bunting	*Passerina cyanea*	Yes	BBS	ebird-4-H	
Kentucky Warbler	*Geothlypis formosa*	Yes	BBS	ebird-4-H	
Killdeer	*Charadrius vociferus*	Yes	BBS	ebird-4-H	
Least Sandpiper	*Calidris minutilla*	Yes		ebird-4-H	
Louisiana Waterthrush	*Parkesia motacilla*	Yes		ebird-4-H	
Mallard	*Anas platyrhynchos*	Yes		ebird-4-H	
Mourning Dove	*Zenaida macroura*	Yes	BBS	ebird-4-H	ebird-BMP
Northern Bobwhite	*Colonis Virginianus*	**No**	BBS		
Northern Cardinal	*Cardinalis cardinalis*	Yes	BBS	ebird-4-H	ebird-BMP
Northern Flicker	*Colaptes auratus*	Yes	BBS	ebird-4-H	ebird-BMP
Northern Mockingbird	*Mimus polyglottos*	Yes	BBS	ebird-4-H	
Northern Parula	*Setophaga americana*	Yes		ebird-4-H	
Northern Rough-Winged Swallow	*Stelgidopteryx serripennis*	Yes			ebird-BMP
Orchard Oriole	*Icterus spurius*	Yes	BBS	ebird-4-H	ebird-BMP
Osprey	*Pandion haliaetus*	Yes		ebird-4-H	
Ovenbird	*Seiurus aurocapilla*	Yes	BBS	ebird-4-H	ebird-BMP
Palm Warbler	*Setophaga palmarum*	Yes		ebird-4-H	
Pied-billed Grebe	*Podilymbus podiceps*	Yes		ebird-4-H	
Pileated Woodpecker	*Dryocopus pileatus*	Yes	BBS	ebird-4-H	ebird-BMP
Pine Siskin	*Spinus pinus*	Yes		ebird-4-H	
Pine Warbler	*Dendroica pinus*	Yes	BBS	ebird-4-H	ebird-BMP
Prairie Warbler	*Setophaga discolor*	Yes	BBS	ebird-4-H	
Prothonotary Warbler	*Protonotaria citrea*	Yes	BBS	ebird-4-H	
Purple Finch	*Haemorhous purpureus*	Yes		ebird-4-H	
Purple Martin	*Progne subis*	Yes	BBS	ebird-4-H	

Species	Scientific Name	MBTA Protection	Source Databases		
Red-bellied Woodpecker	*Melanerpes carolinus*	Yes	BBS	ebird-4-H	ebird-BMP
Red-Breasted Nuthatch	*Sitta canadensis*	Yes		ebird-4-H	
Red-eyed Vireo	*Vireo olivaceus*	Yes	BBS	ebird-4-H	
Red-headed Woodpecker	*Melanerpes erythrocephalus*	Yes	BBS	ebird-4-H	
Red-shouldered Hawk	*Buteo lineatus lineatus*	Yes	BBS	ebird-4-H	
Red-tailed Hawk	*Buteo jamaicensis*	Yes		ebird-4-H	
Red-winged Blackbird	*Agelaius phoeniceus*	Yes		ebird-4-H	
Ring-necked Duck	*Aythya collaris*	Yes		ebird-4-H	
Rock Pigeon	*Columba livia*	**No**	BBS		
Ruby-crowned Kinglet	*Regulus calendula*	Yes		ebird-4-H	
Ruby-throated Hummingbird	*Archilochus colubris*	Yes	BBS	ebird-4-H	
Ruddy Duck	*Oxyura jamaicensis*	Yes		ebird-4-H	
Rusty Blackbird	*Euphagus carolinus*	Yes		ebird-4-H	
Savannah Sparrow	*Passerculus sandwichensis*	Yes		ebird-4-H	
Scarlet Tanager	*Piranga olivacea*	Yes		ebird-4-H	
Song Sparrow	*Melospiza melodia*	Yes		ebird-4-H	ebird-BMP
Spotted Sandpiper	*Actitis macularius*	Yes		ebird-4-H	
Summer Tanager	*Piranga rubra*	Yes	BBS	ebird-4-H	
Swamp Sparrow	*Melospiza georgiana*	Yes		ebird-4-H	
Tree Swallow	*Tachycineta bicolor*	Yes		ebird-4-H	ebird-BMP
Tufted Titmouse	*Baeolophus bicolor*	Yes	BBS	ebird-4-H	ebird-BMP
Turkey Vulture	*Cathartes aura*	Yes	BBS	ebird-4-H	ebird-BMP
Veery	*Catharus fuscescens*	Yes		ebird-4-H	
White-eyed Vireo	*Vireo griseus*	Yes	BBS	ebird-4-H	
White-breasted Nuthatch	*Sitta carolinensis*	Yes	BBS	ebird-4-H	ebird-BMP
White-throated Sparrow	*Sitta pusilla*	Yes		ebird-4-H	ebird-BMP
Wild Turkey	*Meleagris gallopavo silvestris*	**No**	BBS	ebird-4-H	ebird-BMP
Winter Wren	*Troglodytes hiemalis*	Yes		ebird-4-H	
Wood Duck	*Aix sponsa*	Yes		ebird-4-H	ebird-BMP
Wood Thrush	*Hylocichla mustelina*	Yes	BBS	ebird-4-H	
Yellow Warbler	*Setophaga petechia*	Yes		ebird-4-H	
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Yes		ebird-4-H	
Yellow-billed Cuckoo	*Coccyzus americanus*	Yes	BBS	ebird-4-H	

Species	Scientific Name	MBTA Protection	Source Databases		
Yellow-breasted Chat	*Icteria virens virens*	Yes	BBS		
Yellow-rumped Warbler	*Setophaga coronata*	Yes		ebird-4-H	ebird-BMP
Yellow-throated Vireo	*Vireo flavifrons*	Yes	BBS	ebird-4-H	
Yellow-throated Warbler	*Setophaga dominica*	Yes		ebird-4-H	ebird-BMP

BBS = Virginia Breeding Bird Atlas Survey

eBird = Cornell Lab of Ornithology eBird Database; 4-H = Southeast 4-H Educational Center; BMP = Brittles Mill Pond

Sources: VDWR VaFWIS (2022); The Cornell Laboratory of Ornithology eBird database (2022)

Environmental Consequences

Alternative A

Under Alternative A, there would be no land clearing, construction, or operation of new landfill area. Therefore, no adverse effects to migratory bird species or their habitats would occur.

Alternative B

Under Alternative B, 2 new landfill cells would be developed to increase the disposal capacity of the existing landfill. Existing forested wildlife habitat would be removed from the expansion area, including approximately 117 acres of forested wetlands. Alternative B necessitates the clearing of trees and vegetation across the expansion area, which would lead to adverse impacts to the migratory bird species identified here.

Direct, temporary impacts on migratory birds include incidental take due to collisions with construction equipment, crushing, and other injuries or death directly related to ongoing project activities. Birds are better protected from construction-related incidental take than mammals, reptiles, and amphibians, as they can fly to disperse and avoid equipment and obstacles. However, some injury and death are anticipated.

Indirect, temporary impacts on migratory birds are also anticipated as a result of the destruction of nests, eggs, and chicks during construction activities. Since this project requires the clearance of trees and vegetation, any nests, eggs, or chicks present in the areas cleared might be inadvertently taken, resulting in chick or egg mortality or injury, or abandonment of suitable breeding sites.

Additional indirect, temporary effects include disturbance of birds due to noise, vibration, and human presence during construction. This would cause birds to disperse, abandoning territories, breeding attempts, foraging opportunities, or shelter. Birds migrating over the area might not stop on-site for rest and fuel, which could delay or impede their migration. Further, disturbance may induce stress, leading to behavioral and physical impacts that can cause injury or death.

Indirect, permanent impacts are also anticipated as a result of habitat destruction. The clearance of forested wetlands on-site would leave many migratory birds with less habitat available for breeding, foraging, stopping over on migration, over-wintering, or territory establishment. After development of the new landfill cells is completed, the existing habitat would be gone. This would cause migratory birds dependent on the habitat within the project area to disperse to new habitat or perish.

Potential adverse impacts would be coordinated between the Norfolk District and the USFWS. This consultation process would occur during the Section 404 permitting process. Appropriate mitigative measures would be considered and agreed upon during the Section 7 consultation process.

Alternative C

Under Alternative C, the airspace between the existing landfill Cells V and VI would be utilized for waste disposal, reducing the footprint of the new development and the area of wetland cleared by approximately 9 acres. Under Alternative C, temporary and permanent effects to migratory bird species and their habitats would be very similar to the effects that would be incurred by Alternative B, although approximately 9 fewer acres of habitat would be impacted.

Alternative D

Under Alternative D, a new landfill would instead be created off-site on the approximately 330-acre Site SH30. This would require the clearing of trees and vegetation and the draining of water features within Site SH30. This would lead to adverse effects for several of the migratory bird species identified here.

Under Alternative D, temporary and permanent effects to migratory bird species and their habitats would be very similar to the effects that would be incurred by Alternatives B and C, although they would instead impact a different area with a large proportion of agricultural land (row crops) and a lower amount of moderate to high quality habitat. Thus, the species and magnitude of the impacts may differ compared to the impacts at the SPSA expansion area, but the impacts would be nearly identical.

Potential adverse impacts would be coordinated between the Norfolk District and the USFWS. This consultation process would occur during the Section 404 permitting process. Appropriate mitigative measures would be considered and agreed upon during the Section 7 consultation process.

Wildlife Resources

Methodology

The Fish and Wildlife Coordination Act (as amended, 16 U.S.C. §§ 661-665, 665a, 666, 666a, 666c) requires government agencies, including the Corps, to consider effects on fish and wildlife resources. The Corps initially engaged with federal and state agencies during the scoping process and further coordination will occur throughout the permitting process. Detailed on-site studies of fish and wildlife resources on the proposed expansion site were not conducted. However, the fish and wildlife species known to occur in the Hampton Roads region, and in particular, the Great Dismal Swamp, have been widely studied. Species lists for the Great Dismal Swamp NWR were obtained from both the Great Dismal Swamp NWR page on the USFWS website (USFWS 2023), as well as the “Great Dismal Swamp National Wildlife Refuge Check List” from iNaturalist, a joint initiative of the California Academy of Sciences and the National Geographic Society (2023a) that provides data from visitors to the Great Dismal Swamp NWR. Both lists were reviewed as part of this analysis.

Affected Environment

The Great Dismal Swamp NWR is known to host 47 species of mammals, 200 bird species, and 96 species of butterflies (USFWS 2023). The diversity found in the Great Dismal Swamp helps these species thrive. While the SPSA property does not contain the same degree of species diversity, many of the same species could be expected to live on or traverse the SPSA property. Table 15 below lists common species of mammals, amphibians, reptiles, and fish that are known to occur in the Great Dismal Swamp NWR and are therefore likely to occur at the proposed expansion site; however, the list is not exhaustive. This list was generated based on data from iNaturalist and USFWS. The iNaturalist website for Southampton County was also reviewed to determine animal species that might be present on or near the off-site alternative, Site SH30. Protected species and migratory birds are covered in more detail in previous sections and are therefore not considered here.

Table 15. Wildlife Species in the Great Dismal Swamp NWR

Species	Scientific Name	Species Occurrence
Mammals		
American beaver	*Castor candensis*	Dismal Swamp; Southampton County
American black bear	*Ursus americanus*	Dismal Swamp; Southampton County
American mink	*Neogale vison*	Dismal Swamp; Southampton County
American red squirrel	*Tamiasciurus hudsonicus*	Southampton County
Big brown bat	*Eptesicus fuscus*	Suitable habitat in Southampton County
Bobcat	*Lynx rufus*	Dismal Swamp; Southampton County
Brown rat	*Rattus norvegicus*	Dismal Swamp; Southampton County
Common racoon	*Procyon lotor*	Dismal Swamp; Southampton County
Cotton mouse	*Peromyscus gossypinus*	Dismal Swamp; Southampton County
Coyote	*Canis latrans*	Dismal Swamp; Southampton County
Coypu	*Myocastor coypus*	Dismal Swamp; Southampton County
Eastern cottontail	*Sylvilagus floridanus*	Dismal Swamp; Southampton County
Eastern gray squirrel	*Sciurus carolinensis*	Dismal Swamp; Southampton County

Species	Scientific Name	Species Occurrence
Eastern mole	*Scalopus aquaticus*	Dismal Swamp; Southampton County
Evening bat	*Nycticeius humeralis*	Suitable habitat in Dismal Swamp and Southampton County
Fox squirrel	*Sciurus niger*	Southampton County
Golden mouse	*Ochrotomys nuttalli*	Dismal Swamp; Southampton County
Gray fox	*Urocyon cinereoargenteus*	Dismal Swamp; Southampton County
Groundhog	*Marmota monax*	Dismal Swamp; Southampton County
Hispid cotton rat	*Sigmodon hispidus*	Southampton County
Hoary bat	*Lasiurus cinereus*	Suitable habitat in Dismal Swamp and Southampton County
Little brown bat	*Myotis lucifugus*	Suitable habitat in Dismal Swamp and Southampton County
Long-tailed weasel	*Mustela frenata*	Dismal Swamp; Southampton County
Marsh rabbit	*Sylvilagus palustris*	Dismal Swamp; Southampton County
Marsh rice rat	*Oryzomys palustris*	Dismal Swamp; Southampton County
Meadow vole	*Microtus pennsylvanicus*	Dismal Swamp; Southampton County
Muskrat	*Onadatra zibethicus*	Dismal Swamp; Southampton County
North American least shrew	*Blarina carolinensis*	Dismal Swamp; Southampton County
North American river otter	*Lontra canadensis*	Dismal Swamp; Southampton County
Northern long-eared bat	*Myotis septentriolalis*	Suitable habitat in Southampton County
Northern short-tailed shrew	*Blarina brevicauda*	Dismal Swamp; Southampton County
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	Suitable habitat in Southampton County
Red bat	*Lasiurus borealis*	Suitable habitat in Dismal Swamp and Southampton County
Red fox	*Vulpes vulpes*	Southampton County
Silver-haired bat	*Lasionycteris noctivagans*	Suitable habitat in Southampton County
Southern bog lemming	*Synaptomys cooperi*	Dismal Swamp; Southampton County
Southern flying squirrel	*Glaucomys volans*	Dismal Swamp; Southampton County
Star-nosed mole	*Condyhura cristata*	Dismal Swamp; Southampton County
Striped skunk	*Mephitis mephitis*	Southampton County
Virginia opossum	*Didelphis virginiana*	Dismal Swamp; Southampton County
White-footed mouse	*Peromyscus leucopus*	Dismal Swamp; Southampton County
White-tailed deer	*Odocoileus virginianus*	Dismal Swamp; Southampton County
Woodland vole	*Microtus pinetorum*	Dismal Swamp; Southampton County
Amphibians		
American bullfrog	*Lithobates catesbeianus*	Dismal Swamp; Southampton County
American toad	*Anaxyrus americanus*	Dismal Swamp
Atlantic coast leopard frog	*Lithobates kauffeldi*	Dismal Swamp; Southampton County
Atlantic coast slimy	*Plethodon glutinosus*	Dismal Swamp; Southampton County

Species	Scientific Name	Species Occurrence
salamander		
Barking treefrog	*Hyla gratiosa*	Southampton County
Brimley’s chorus frog	*Pseudacris brimleyi*	Southampton County
Bronze frog	*Lithobates clamitans clamitans*	Dismal Swamp
Carpenter frog	*Lithobates virgatipes*	Dismal Swamp; Southampton County
Cope’s gray treefrog	*Hyla chrysoscelis*	Dismal Swamp; Southampton County
Dwarf waterdog	*Necturus punctatus*	Southampton County
Eastern American toad	*Anaxyrus americanus americanus*	Dismal Swamp
Eastern narrow-mouthed toad	*Gastrophryne carolinensis*	Dismal Swamp; Southampton County
Eastern newt	*Notophthalmus viridescens*	Dismal Swamp; Southampton County
Eastern red-backed salamander	*Plethodon cinereus*	Dismal Swamp; Southampton County
Eastern spadefoot	*Scaphiopus holbrookii*	Dismal Swamp; Southampton County
Fowler’s toad	*Anaxyrus fowleri*	Southampton County
Gray treefrog	*Hyla versicolor*	Dismal Swamp; Southampton County
Greater siren	*Siren lacertina*	Southampton County
Green frog	*Lithobates clamitans*	Dismal Swamp; Southampton County
Green treefrog	*Hyla cinerea*	Dismal Swamp; Southampton County
Little grass frog	*Pseudocris ocularis*	Dismal Swamp; Southampton County
Mabee’s salamander	*Ambystoma mabeei*	Southampton County
Many-lined salamander	*Sterochilus marginatus*	Dismal Swamp; Southampton County
Marbled salamander	*Ambystoma opacum*	Dismal Swamp; Southampton County
Northern cricket frog	*Acris crepitans*	Southampton County
Northern dusky salamander	*Desmognathus fuscus*	Southampton County
Oak toad	*Anaxyrus quercicus*	Southampton County
Pickerel frog	*Lithobates palustris*	Southampton County
Pine woods tree frog	*Hyla femorals*	Dismal Swamp; Southampton County
Red salamander	*Pseudotriton ruber*	Southampton County
Rocky Mountain toad	*Anaxyrus quericus*	Dismal Swamp
Southern chorus frog	*Pseudacris nigrita*	Southampton County
Southern cricket frog	*Acris gryllus*	Dismal Swamp; Southampton County
Southern dusky salamander	*Desmognathus auriculatus*	Occurs in Dismal Swamp
Southern leopard frog	*Lithobates sphenocephalus*	Dismal Swamp; Southampton County
Southern toad	*Anaxyrus terrestris*	Dismal Swamp; Southampton County
Southern two-lined salamander	*Eurycea cirrigera*	Southampton County
Spotted salamander	*Ambystoma maculatum*	Dismal Swamp; Southampton County
Spring peeper	*Pseudacris crucifer*	Dismal Swamp; Southampton County

Species	Scientific Name	Species Occurrence
Squirrel treefog	*Hyla squirella*	Dismal Swamp; Southampton County
Striped chorus frog	*Pseudacris triseriata*	Dismal Swamp
Three-lined salamander	*Eurycea guttolineata*	Southampton County
Tiger salamander	*Ambystoma tigrinum*	Southampton County
Two-toed amphiuma	*Amphiuma means*	Dismal Swamp; Southampton County
Reptiles		
Broad-headed skink	*Plestiodon laticeps*	Dismal Swamp; Southampton County
Common five-lined skink	*Plestiodon fasciatus*	Dismal Swamp; Southampton County
Common garter snake	*Thamnophis sirtalis*	Dismal Swamp; Southampton County
Common ribbon snake	*Thamnophis saurita*	Dismal Swamp; Southampton County
Common snapping turtle	*Chelydra serpentina*	Dismal Swamp; Southampton County
Common watersnake	*Nerodia sipedon*	Southampton County
Dekay’s brownsnake	*Storeria dekayi*	Dismal Swamp; Southampton County
Eastern box turtle	*Terrapene carolina*	Dismal Swamp; Southampton County
Eastern copperhead	*Adkistrodon contortrix*	Dismal Swamp; Southampton County
Eastern earth snake	*Virginia valeriae valeriae*	Dismal Swamp
Eastern fence lizard	*Scleroporus undulatus*	Dismal Swamp; Southampton County
Eastern hognose snake	*Heterodon platirhinos*	Dismal Swamp; Southampton County
Eastern kingsnake	*Lampropeltis getula*	Dismal Swamp; Southampton County
Eastern milk snake	*Lampropeltis triangulum*	Dismal Swamp
Eastern mud turtle	*Kinosternon subrubrum*	Dismal Swamp; Southampton County
Eastern musk turtle	*Sternotherus odoratus*	Dismal Swamp; Southampton County
Eastern rat snake	*Pantherophis alleghaniensis*	Dismal Swamp; Southampton County
Eastern ribbon snake	*Thamnophis sauritus*	Dismal Swamp
Eastern worm snake	*Carphophis amoenus*	Dismal Swamp; Southampton County
Little brown skink	*Scincella lateralis*	Dismal Swamp; Southampton County
Mudsnake	*Farancia abacura*	Dismal Swamp; Southampton County
North American racer	*Coluber constrictor*	Dismal Swamp; Southampton County
Northern cottonmouth	*Agkistrodon piscivorus*	Dismal Swamp; Southampton County
Northern red-bellied cooter	*Pseudemys rubriventris*	Dismal Swamp; Southampton County
Northern redbelly snake	*Storeria occipitomaculata occipitomaculata*	Dismal Swamp
Northern water snake	*Nerodia sipedon sipedon*	Dismal Swamp
Painted turtle	*Chrysemys picta*	Dismal Swamp; Southampton County
Plain-bellied water snake	*Nerodia erthrogaster*	Dismal Swamp; Southampton County
Pond slider	*Trachemys scripta*	Dismal Swamp; Southampton County
Rainbow snake	*Farancia erytrogramma*	Dismal Swamp; Southampton County
Ring-necked snake	*Diadophis punctatus*	Dismal Swamp; Southampton County

Species	Scientific Name	Species Occurrence
Rough greensnake	*Opheodrys aestivus*	Dismal Swamp; Southampton County
Scarletsnake	*Cemophora coccinea*	Southampton County
Six-lined racerunner	*Aspidoscelis sexlineatus*	Southampton County
Slender glass lizard	*Ophisaurus attenuates*	Dismal Swamp; Southampton County
Southeastern crowned snake	*Tantilla coronate*	Southampton County
Southeastern five-lined skink	*Plestiodon inexpectatus*	Dismal Swamp; Southampton County
Fishes		
American eel	*Anguilla rostrata*	Dismal Swamp
American pickerel	*Esox americanus*	Southampton County
American shad	*Alosa sapidissima*	Southampton County
Banded sunfish	*Enneacanthus obesus*	Dismal Swamp
Black crappie	*Pomoxis nigromaculatus*	Southampton County
Bluegill	*Lepomis macrochirus*	Southampton County
Bluespotted sunfish	*Enneacanthus gloriosus*	Dismal Swamp; Southampton County
Chain pickerel	*Esox niger*	Dismal Swamp; Southampton County
Channel catfish	*Ictalurus punctatus*	Dismal Swamp
Creek chubsucker	*Erimyzon oblongus*	Dismal Swamp
Eastern mosquitofish	*Gambusia holbrooki*	Southampton County
Eastern mudminnow	*Umbra pygmaea*	Dismal Swamp
Flier	*Centrarchus macropterus*	Dismal Swamp; Southampton County
Golden shiner	*Notemigonus crysoleucas*	Dismal Swamp
Largemouth bass	*Micropterus salmoides*	Southampton County
Longnose gar	*Lepisosteus osseus*	Dismal Swamp; Southampton County
Mud sunfish	*Acantharchus pomotis*	Dismal Swamp
Pirate perch	*Aphredoderus sayanus*	Dismal Swamp; Southampton County
Redbreast sunfish	*Lepomis auritus*	Dismal Swamp; Southampton County
Redear sunfish	*Lepomis microlophis*	Southampton County
Redfin pickerel	*Esox americanus*	Dismal Swamp
Rosefin shiner	*Lythrurus ardens*	Southampton County
Ruddy bowfin	*Amia calva*	Dismal Swamp; Southampton County
Sawcheek darter	*Etheostoma serrifer*	Southampton County
Striped bass	*Morone saxatilis*	Southampton County
Swallowtail shiner	*Notropis procne*	Southampton County
Swamp darter	*Etheostoma fusiforme*	Southampton County
Swampfish	*Chologaster cornuta*	Occurs in Dismal Swamp
Tessellated darter	*Etheostoma olmstedi*	Southampton County
Warmouth	*Lepomis gulosus*	Southampton County
White catfish	*Ameiurus catus*	Dismal Swamp

Species	Scientific Name	Species Occurrence
Yellow perch	*Perca flavescens*	Dismal Swamp; Southampton County

Sources: USFWS 2023; California Academy of Sciences and the National Geographic Society 2023a, 2023b

Environmental Consequences

Alternative A

Under Alternative A, there would be no adverse effects to wildlife resources.

Alternative B

Under Alternative B, the proposed expansion area (Cells VIII and IX) would be developed to increase the footprint of the landfill. This would result in the removal of all existing wildlife habitat from the expansion area, including approximately 117 acres of wetlands. Over a period of time, all trees and vegetation would be removed, and the wetlands would be drained. This would lead to adverse effects for several of the wildlife species identified here (listed in Table 15).

Direct, temporary effects to some of the species included in Table 15 are anticipated during activities associated with construction of the landfill expansion. As construction occurs, collisions with work vehicles or crushing could occur. Other project actions could also cause injury or mortality to wildlife on-site. If present, the amphibians, reptiles, and small mammals identified here are anticipated to be the most affected by these impacts, as they are less mobile than other species. Although they are more capable of dispersal, bats could also be affected by these temporary impacts due to loss of roosting trees. However, they are less likely to be injured or killed during development since they could fly out of the affected area.

Additional indirect, temporary effects include disturbance due to noise, vibration, and human presence during construction, both within and adjacent to the expansion area. This disturbance could cause wildlife on or near the expansion area to disperse or potentially abandon breeding attempts, foraging opportunities, or shelter from predators. It could also induce stress in wildlife, which could have adverse behavioral and physical impacts that could lead to injury or mortality.

Alternative B would also cause indirect, permanent adverse effects to the species identified, as suitable habitat would be lost when the forested wetlands within the expansion area are cleared and drained to expand the landfill. Suitable habitat for most of the species listed would be lost and the project area would no longer be able to support these species. Some species could find shelter within the surrounding preserved wetlands or the nearby Great Dismal Swamp NWR.

As described above in the “Wetlands” section, development associated with Alternative B would create a new ecotone at the edge of the adjacent wetland areas, and the hydrology of nearby wetland areas could be adversely affected by on-site dewatering activities. This could lead to changes in the vegetation community composition, which could alter the use of the habitat by some species. Climate change could further impact species diversity due to changes in temperature and precipitation patterns.

Alternative C

Under Alternative C, the airspace between the existing Cells V and VI would be utilized for waste disposal, reducing the footprint of the new proposed expansion area and the area of wetland cleared by approximately 9 acres. Under Alternative C, temporary, permanent, and indirect effects to wildlife species and their habitats would be very similar to the effects that would be incurred by Alternative B, although 9 fewer acres of habitat would be impacted.

Alternative D

Under Alternative D, the footprint of the existing landfill would remain the same. Therefore, the wildlife habitat that would be impacted by the landfill expansion proposed under Alternative B would not be affected by development, but the area would be subject to ongoing silvicultural operations. Instead of developing the proposed expansion area, a new landfill would be created off-site, on an approximately 330-acre parcel of land called Site SH30. This site is located in Southampton County, Virginia, approximately 28 miles northwest of the existing landfill. Development of this off-site alternative would require the clearing of trees and vegetation from Site SH30, as well as the draining of some water features adjacent to agricultural fields in Site SH30. This would lead to adverse effects for several of the species of concern identified here, summarized in Table 15.

Direct, temporary effects to some species identified here are anticipated during activities associated with the landfill construction. During construction, collisions with work vehicles, crushing, and other project actions could cause injury and mortality to animals on-site. These impacts would be similar to impacts incurred under Alternatives B and C, except that under Alternative D, considerably less moderate and high-quality habitat would be impacted, since much of Site SH30 consists of row crops with little value as wildlife habitat.

Additional indirect, temporary effects include disturbance due to noise, vibration, and human presence during construction, both within and adjacent to Site SH30. This disturbance could cause wildlife on or near Site SH30 to disperse or potentially abandon breeding attempts, foraging opportunities, or shelter from predators. It could also induce stress in wildlife, which could have adverse behavioral and physical impacts that could lead to injury or mortality.

Alternative D would also lead to indirect, permanent adverse effects to the species identified here, as suitable habitat within the footprint of the landfill proposed at SH30 would be lost. Development of Site SH30 would necessitate the clearance of forested uplands and wetlands within the site to construct the off-site landfill.

As described above in the “Wetlands” section, development associated with Alternative D would create new ecotones at the edges of adjacent upland and wetland areas, and the hydrology of nearby wetland areas could be adversely affected by on-site dewatering activities. This could lead to changes in the vegetation community composition, which could alter the use of the habitat by protected species. Climate change could also impact species diversity due to changes in temperature and precipitation patterns.

Transportation and Traffic

Methodology

The traffic affected environment was analyzed using available traffic count data from VDOT, the Hampton Roads Transportation Planning Organization (HRTPO), and previous studies for the proposed flyover (HDR 2016).

Affected Environment

The expansion area is located northeast of Suffolk, along Bob Foeller Drive, north of U.S. Routes 13/58/460, and adjacent to the Great Dismal Swamp NWR. It is currently served by 1 entrance at the intersection of Bob Foeller Drive/Welch Parkway and U.S. Routes 13/58/460. To access this entrance, westbound vehicles are provided a 310 ft. right turn lane and eastbound vehicles are provided a 265 ft. left turn lane at an unsignalized median opening.

Site SH30 is located northwest of Suffolk along State Route 751/Drews Avenue, north of U.S. Route 460.

Vehicular Transportation

U.S. Routes 13/58/460 is a 6-lane, median-divided freeway that serves as a bypass around Suffolk for vehicles traveling east towards Norfolk and Virginia Beach or traveling west towards Richmond and Emporia. The current posted speed limit on U.S. Routes 13/58/460 within the study area is 60 mph. According to VDOT (2020), the Average Annual Daily Traffic (AADT) on U.S. Routes 13/58/460 was 76,000 vehicles per day (vpd) in 2019. Traffic is projected to grow to 93,900 vpd by 2045.

Bob Foeller Drive is a 2-lane, undivided roadway that serves as the entrance to the existing landfill. There is a posted speed limit of 15 mph at the entrance to the existing landfill. Based on peak hour counts and forecasts conducted by others in 2021, Bob Foeller Drive carried almost 600 vpd. This volume is projected to grow to 800 vpd by 2040.The forecast estimates 43% of facility trips will be heavy trucks in 2040, which would consist of approximately 350 truck trips per day. A traffic study was conducted at the Regional Landfill entrance and is provided in Appendix F.

U.S. Route 460 near Site SH30 is a 4-lane undivided roadway with a speed limit of 55 mph within the study area. According to VDOT (2020), the AADT was 11,000 vpd in 2021 and consists of 14% truck volume. Traffic is expected to increase to 15,500 vpd in 2037, which is when the new landfill would open under Alternative D.

If Alternative D is built, all facility traffic would move from the existing site (U.S. Routes 13/58/460) to the new location at SH30, resulting in 350 additional truck trips on U.S. 460. If vehicle class percentages remain consistent in the forecast conditions, new large truck trips would increase the truck volume from 14% in 2021 to an estimated 16% of forecast 2037 daily traffic volume. Since the U.S. 460 corridor already carries significant truck traffic in this region, impacts on the roadway are negligible.

Questions have been raised about adding a turn lane on U.S. 460 to support development of Site SH-30, and the need for signalization at Alternative D. Current and forecasted future traffic volumes do not warrant addition of a left turn lane, but perceived safety or operational impacts from Site SH30 may result in requests from the county for this modification. U.S. 460 would need to be widened to add a right turn lane westbound into the facility based on projected volumes. Forecasted 2040 traffic volumes at this location do not meet any warrants for addition of a traffic signal.

Therefore, development of Site SH30 (Alternative D) results in no measurable operational impacts on U.S. 460 facility in forecasted conditions.

State Route 751/Drews Avenue is a two-lane, undivided gravel roadway that serves as the entrance to Site SH30.

Traffic Safety

Between 2016 and 2020, there were approximately 58 total crashes around the Regional Landfill proposed expansion project site entrance, including 1 fatal crash and 2 serious injury crashes. The fatal crash involved an SPSA employee attempting to make a left turn into the entrance from the eastbound direction. A traffic study from 2016 found that there were 30 vehicles making that eastbound left turn across 3 lanes of traffic carrying over 3,200 vehicles in the afternoon peak hour (HDR 2016).

This safety concern has led VDOT to develop a project to construct a new flyover east of the entrance. Eastbound vehicles would make a right-hand exit, travel over U.S. Routes 13/58/460, then merge into westbound traffic from the right, making a right turn into the Regional Landfill.

A desktop review of the crash history within 0.1 miles of the entrance to Site SH30 found 1 crash between 2016 and 2020. This crash history, combined with the reduced traffic speed and traffic volumes along the section of U.S. Route 460 near Site SH30, indicate that there is not a significant safety concern at Site SH30.

Other Transportation

There are no existing pedestrian, bicycle, or public transportation facilities in the project area, nor near Site SH30.

Environmental Consequences

Prior to beginning operation of Cell VII, a flyover will be constructed to eliminate left turns from U.S. Routes 13/58/460 into the Regional Landfill. This will significantly increase safety around the intersection with Bob Foeller Drive leading to the Regional Landfill entrance, reducing injury crashes by approximately 50%. There will be no changes to pedestrian, bicycle, or public transportation within the expansion area.

When Cell VII is expected to reach capacity in 2037, traffic on U.S. Routes 13/58/460 is expected to increase from approximately 81,800 vpd to 89,800 vpd. With construction of the flyover, approximately 55 vehicles will access the Regional Landfill without conflicting with 3,700 vehicles traveling westbound on U.S. Routes 13/58/460 during the afternoon peak hour.

Alternative A

Under Alternative A, SPSA would not expand its landfill operations into Cells VIII and IX and no new off-site landfill would be constructed. Landfill operations would continue to utilize the permitted capacity available through Cell VII.

After Cell VII reaches capacity and is closed with a final cover system, the landfill would close and traffic that was utilizing this facility would be diverted to other facilities around the state for processing and disposal. While there would likely not be an increase in the number of trucks traveling between transfer stations and other facilities, this would result in trucks traveling further to dispose of waste at these other facilities. The adverse impacts associated with the additional miles traveled to haul waste are described in the "Air Quality, Greenhouse Gases, and Climate Change" section.

Alternative B

Under Alternative B, SPSA would expand its landfill operations into an expansion area, within which 2 new waste disposal cells (contiguous Cells VIII and IX) would be constructed over time, in phases.

There is no anticipated increase in operations at the landfill that would cause an increase in traffic to and from the project area beyond the projected traffic volume. Therefore, there would be no adverse effect on the surrounding transportation system.

Alternative C

Under Alternative C, the airspace between Cells V and VII would be filled in and utilized for landfilling operations, which would secure an additional disposal capacity on top of the capacity provided by the expansion area.

The impact under Alternative C would be similar to Alternative B in that there would be no adverse effect on the surrounding transportation system.

Alternative D

Under Alternative D, the existing Regional Landfill would close for landfill operations once Cell VII reached capacity (anticipated around 2037) but would continue to operate as a transfer station for the region. Following the Regional Landfill's closure, a new landfill would be developed and operated from approximately 2037-2060 on parcel SH30, a 330-acre site in Southampton County, Virginia.

There is no anticipated increase in operations under this alternative so the projected traffic volume accessing the current landfill would shift to the new landfill. This is expected to be approximately 55 vehicles in the afternoon peak hour in 2037. This traffic volume is not high enough to warrant construction of a traffic signal nor trigger a full traffic impact analysis per VDOT's Traffic Analysis Regulations. A detailed traffic analysis may still be required to procure an entrance permit per VDOT's Access Management Regulations.

However, due to the size of the vehicles most often accessing the landfill and the direction they will be traveling, a right turn lane will need to be constructed to allow for safe deceleration to make the turn into the site. The right turn lane should be approximately 400 ft. long to match the right turn lane at the existing site. This would impact one neighboring property, including stormwater impacts.

Air Quality, Greenhouse Gases, and Climate Change

Methodology

The air quality and greenhouse gas (GHG) affected environment was established by reviewing regulatory context, describing pollutants and emissions, and establishing current attainment statuses of the counties or cities in which the project area is located. Additionally, a review of the existing air permit for the Regional Landfill is provided. The air quality and GHG environmental consequences were assessed by evaluating and comparing emissions associated with construction and operation activities for the various alternatives.

To analyze the impacts of GHG emissions on climate change that would occur under the alternatives, the Corps used CEQ's *National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change*, which provides direction on how to apply NEPA to the analysis of GHG emissions and climate change (2023). Per CEQ's guidance, the Corps considered GHG emissions as a proxy for assessing the alternatives' impact on climate change. For its analysis, the Corps also evaluated the amount of GHG emissions per year that it projects would occur under the action alternatives as well as the No-Action Alternative. GHG emissions associated with hauling activity, landfill material, and land alteration were estimated for each alternative. Further explanation of the methodology used to assess GHG emissions is presented in Appendix C.

Affected Environment

The Clean Air Acts (CAA) of 1970 and 1990 require EPA to set National Ambient Air Quality Standards (NAAQS) (40 CFR 50) for 6 air pollutants, known as criteria pollutants. These include carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), and sulfur dioxide (SO_2). National Ambient Air Quality Standards are based on human health criteria for the protection of public health (primary standards) and on environmental criteria to prevent environmental and property damage and for the protection of public welfare (secondary standards; USEPA 2021d).

Virginia has established Air Quality Control Regions to monitor air quality as required by EPA under the provisions of the federal CAA. The affected environment is located in the City of Suffolk, where the existing Regional Landfill is located. SPSA also serves the cities of Chesapeake, Franklin, Norfolk, Portsmouth, and Virginia Beach, and the counties of Isle of Wight and Southampton. These counties and cities are designated as being in attainment (i.e., meeting NAAQS) for criteria pollutants (USEPA 2021c, 2021e).[7]

SPSA has a Title V Air Permit issued by VDEQ for the existing Regional Landfill. SPSA filed permit renewals with VDEQ in 2017 and 2022. Upon receiving these renewals, VDEQ requested that SPSA continue to operate under its 2012 permit. The renewals that SPSA filed would cover operations until 2027. The existing air permit describes required control measures for landfill operations, the landfill gas collection and control system, fugitive dust, and the combustion equipment that uses the collected landfill gas (4 generators and a flare). As the landfill generates more than 50 megagrams per year of non-methane organic compounds, the landfill is required to operate a landfill gas collection and control system in each cell in which solid waste has been placed for a period for 5 years or while active and for 2 years or more if closed. The permit also requires multiple fugitive dust mitigation measures, including wetting or covering of stockpiled materials; use of asphalt, water, or chemical stabilization on haul roads; and prevention of dust exiting the facility to public roads through wheel washing, wetting, and sweeping. Compliance with the provisions of the air permit is deemed as compliance with applicable regulations, including 40 CFR 60 Subpart CC, 40 CFR 60 Subpart WWW, 40 CFR 63 Subpart AAAA, 40 CFR 63 Subpart ZZZZ, and 40 CFR 60 Subpart JJJJ.

Greenhouse Gases

In nature, carbon dioxide (CO_2) is exchanged continually between the atmosphere, plants, and animals through the processes of photosynthesis, respiration, and decomposition, and between the atmosphere and the ocean through gas exchange. Billions of tons of carbon in the form of CO_2 are absorbed by oceans and living biomass (i.e., sinks) and are emitted to the atmosphere annually through natural and man-made

---

[7] Note that while the study area is currently in attainment of all NAAQS, the Norfolk-Virginia Beach-Newport News (Hampton Roads), VA area was previously in nonattainment of 1-Hour Ozone (1979)-NAAQS revoked and 8-Hour Ozone (1997) - NAAQS Revoked.

processes (i.e., sources) (NOAA 2021a, 2021b). Carbon dioxide, however, constitutes less than 0.1% of the total atmospheric gases (NASA 2019).

Similar to the glass in a greenhouse, certain gases, primarily CO2, N2O, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, absorb heat that is radiated from the surface of the Earth. Increases in the atmospheric concentrations of these gases can cause the Earth to warm by trapping more heat (USEPA 2021f). The common term for this phenomenon is the "greenhouse effect," and these gases are typically referred to as "greenhouse gases." GHG emissions have effects at both the regional and global scale and are thus reviewed at a regional scale. The EPA has not established ambient air standards for GHGs like they have for the criteria pollutants under the NAAQS.

Per CEQ guidance, the Corps acknowledges that climate change "results from the incremental addition of GHG emissions from millions of individual sources, which collectively have a large impact on a global scale" and that "the totality of climate change impacts is not attributable to any single action…" (CEQ 2016). With this understanding, the Corps considered GHG emissions as a proxy for assessing the alternatives' impact on climate change in the U.S.

Environmental Consequences

Alternative A

Under Alternative A, SPSA would not expand its landfill operations into Cells VIII and IX. Landfill operations would continue to utilize the permitted capacity available through Cell VII, which is expected to last until approximately 2037. After Cell VII reaches capacity and is closed with a final cover system, waste would be hauled to another landfill for processing and disposal.

Construction Impacts

Under Alternative A, Cell VII and the U.S. Routes 13/58/460 flyover ramp would be constructed according to SPSA's development plans. This construction would also occur under all other alternatives. As such, all emissions from construction activities in Alternative A are also expected to occur under the other alternatives as well. Because no further construction would occur beyond Cell VII and the flyover ramp and waste would be hauled to existing off-site landfills, Alternative A is expected to result in the least construction-related emissions of the alternatives.

Operational Impacts

Landfill operations would continue to utilize the permitted capacity available through Cell VII. After Cell VII reaches capacity, waste would be hauled to other area landfills for processing and disposal. Potential receiver facilities are listed in Table 16, along with their approximate distance from the Regional Landfill.

Table 16. Distance to Potential Receiver Facilities in the No-Action Alternative

Facility	Location	Distance from SPSA Regional Landfill
Atlantic Waste Disposal	Waverly, VA	45 miles
Bethel Landfill	Hampton, VA	35 miles
Brunswick Waste Management Facility	Lawrenceville, VA	80 miles
Shoosmith Sanitary Landfill	Chester, VA	75 miles

Best management practices would be employed to reduce emissions from Cell VII to ensure adherence to permit requirements until its closure in 2037. After 2037, waste would be hauled to other existing off-site landfill facilities. As these potential receiver facilities are further from the SPSA service area than the SPSA Regional Landfill, this alternative would result in higher emissions associated with waste hauling than the other alternatives. Emissions associated with hauling would generally be proportional to the distances outlined in Table 16, with the Bethel Landfill being the closest and having the lowest hauling emissions, and the Brunswick Waste Management Facility being the farthest and having the highest hauling emissions. Waste would degrade and emit landfill gases at these off-site locations. Therefore, emissions would be reduced within the immediate SPSA service area but would increase in other areas as the waste travels to and decomposes at the potential receiver facilities.

Greenhouse Gases

GHG emissions were evaluated for each of the four potential landfills that may accept waste once the SPSA Regional Landfill is closed. Emissions estimations included the hauling emissions associated with travel to each of the alternative landfills and emissions from the degrading landfill material. Landfill emissions accounted for the varying control system efficiencies at each of the alternative landfills. The resulting emissions are presented in Table 17. Depending on the chosen landfill, emissions under Alternative A would range from 1.2 million metric tons of CO_2E to 1.7 million metric tons of CO_2E. Since the exact landfill that would be used in the No-Action Alternative is unknown and for purposes of comparison to other alternatives, an average Alternative A total emission of 1,404,78 metric tons of CO_2E was calculated.

Table 17. Alternative A Estimated GHG Emissions (MT CO_2E)

Facility	Hauling Emissions	Landfill Emissions	Total Emissions
Atlantic Waste Disposal	7,300	1,696,430	1,703,730
Bethel Landfill	3,600	1,201,638	1,205,238
Brunswick Waste Management Facility	11,300	1,413,693	1,424,993
Shoosmith Sanitary Landfill	10,900	1,272,323	1,283,223
		Average Alternative A Emissions	**1,404,478**

Source SCS Engineers (2023)

Alternative B

Under Alternative B, SPSA would expand its landfill operations into an expansion area, within which 2 new waste disposal cells (contiguous Cells VIII and IX) would be constructed. Cell VIII would be constructed first, followed by Cell IX. Existing facilities at the Regional Landfill – including administration and maintenance buildings, utilities (water, sewer, and power), scales, a tire shredding facility, a household hazardous waste facility, a landfill gas recovery system, access and haul roads, leachate sewer disposal surface drainage systems, and gas management recovery systems – would continue to be used.

Construction Impacts

Before the construction of the proposed Cells VIII and IX, the land would be used to store cut material from Cell VII, to later be used as cover material for Cell VII. Under this scenario, SPSA would erect an earthen berm or other approved method to contain the stockpiled material within Cell VIII, prevent erosion, and reduce fugitive dust emissions. Use of Cell VII for storage of the material on-site would result in lower emissions than the alternative in which borrow material would be stockpiled off-site and trucked to and from the landfill as needed, increasing emissions associated with the hauling of the material.

Towards the end of Cell VII's capacity, construction of Cell VIII would begin in phases, starting with excavation to create an inward gradient landfill. Excavated materials would be stored on-site for future use as cover material, avoiding emissions associated with the hauling of material to and from an off-site storage location. Construction of the proposed landfill cells and their associated haul road would require the use of earthmoving, compacting, and paving equipment, as well as trucks for hauling materials. All construction activities would be carried out on-site, and no off-site activities are anticipated. These activities would generate fugitive dust (i.e., particulate matter) during active construction periods. Wet suppression and other management practices would be utilized to reduce fugitive dust emissions. These techniques have been shown to reduce fugitive dust emissions by as much as 95% and are required by SPSA's air permit.

Typical equipment expected to be used for the cell construction includes excavators, bulldozers, a water truck, a loader, pickup trucks, and semi-trailers. All equipment would be used on-site, and any air quality impacts would be limited to the immediate project area. Emissions associated with the combustion of gas and diesel fuels by internal combustion engines would generate local emissions of PM, NO_2, CO, volatile organic compounds, SO_2, and GHGs during the construction period. Equipment emissions would be reduced through idling restrictions; the use of Ultra Low Sulfur Diesel fuel; proper maintenance of all motor vehicles, machinery, and equipment; and proper fitting of equipment with mufflers or other regulatory-required emissions control devices. These measures help ensure that SPSA meets all emissions requirements. Other steps SPSA has taken to reduce its emissions and carbon footprint include consideration of electric vehicles as part of its vehicle fleet and replacing its landfill gas collection system to improve collection efficiency. SPSA is doing this by boring where it knows gas occurs and will also include electronic devices on each gas well head to enable real-time monitoring of temperature, gas content, and pressure, which will all be diverted to its renewable natural gas facility on-site, operated by Terreva Renewables. These measures will optimize the collection process by making it as efficient as possible.

Given the relatively low number and types of equipment that would be used for the initial construction activities and the intermittent nature of construction, emissions from construction equipment would be minor and temporary in nature. Note that the equipment and activity required to complete the construction of the new landfill cells is expected to be similar to the emissions from proposed construction activity associated with Cell IX.

Operational Impacts

During the operation of the proposed Cells VIII and IX, waste would be directed to each cell and placed in successive layers. Solid waste would first be heavily compacted so that it takes up as little room as possible in the cell. At the end of each day, a 6-in. layer of cover material would be spread over newly deposited waste. Every 14 days, SPSA would place a 12-in. layer of soil over the landfill to serve as intermediate cover. As waste levels reach a certain point, operations would move into adjacent phases of the cell and be repeated until the capacity has been reached.

Operation of the proposed landfill would comply with state regulations for fugitive emissions and air operating permit conditions. Handling, transport, and placement activities would utilize methods similar to ongoing landfill operations, resulting in similar emissions. In order to minimize fugitive dust from landfill operations, the landfill would be moisture-conditioned and the use of heavy-duty dump trucks on access roads would be contained within the boundaries of the expansion area. Other measures to control dust inside the limits of the project area may include wind breaks and barriers, wetting, and cover as permitted by the air permit. Equipment used for landfill operations would be similar to what is currently in use at the existing landfill. Therefore, there would be no substantive change in criteria pollutant and GHG emissions associated with operational equipment as compared to the existing conditions, since the existing landfill would close/cease operations and operations would be relocated to proposed Cells VIII and IX.

Alternative B is not expected to increase operational traffic to and from the site compared to the existing conditions. It is estimated that in 2037, approximately 500 site trips would occur per day. Since fleet emissions decrease with time and operational traffic is not expected to increase, mobile source emissions in the future would likely be lower than Alternative A, which would result in an increase in hauling distance as waste is taken to the potential receiver facilities.

Landfill gases emitted by the decomposing waste are controlled under the current air permit. The air permit would be amended as necessary to accommodate the proposed expansion into Cells VIII and IX. Obtaining and complying with the air permit would demonstrate compliance with all applicable federal and state air regulations. The landfill is required to operate a landfill gas collection and control system in each cell in which solid waste has been placed for a period for 5 years or while active and for 2 years or more if closed. As noted above, SPSA is replacing its landfill gas collection system to improve collection efficiency. The air permit also requires multiple fugitive dust mitigation measures, including wetting or covering of stockpiled materials; use of asphalt, water, or chemical stabilization on haul roads; and prevention of dust exiting the facility to public roads through wheel washing, wetting, and sweeping. Control measures for equipment that combusts the landfill gases would also be required by the air permit. Operational emission control measures that are currently in use are expected to be continued for the proposed expansion, such that emissions would be similar to the existing operations.

Greenhouse Gases

Greenhouse gas emissions for hauling, landfilling, and land alteration were estimated in Table 18 for action Alternative B in which the full expansion at the SPSA Regional Landfill would occur. Under this alternative, hauling emissions would be less than Alternative A due to the proximity of the existing landfill to regional transfer stations and landfill emissions would be equal to or less than all Alternative A landfills due to the high efficiency of the existing SPSA Regional Landfill's gas collection system. However, expansion of the Regional Landfill into the new cells would result in GHG emissions associated with land alteration. In total, the estimated Alternative B GHG emissions are 1,237,129 metric tons of CO_2E. As such, Alternative B would result in a net benefit of 167,349 metric tons of CO_2E relative to the average Alternative A emissions.

Table 18. Alternative B Estimated GHG Emissions (MT CO_2E)

Scenario	Hauling Emissions	Landfill Emissions	Land Alteration Emissions	Total Emissions
Alternative B	2,500	1,201,650	32,991	1,237,129
			Average Alternative A Emissions	1,404,478
			Alternative B Increment	**-167,349**

Source: SCS Engineers (2023)

Alternative C

Under Alternative C, the airspace between Cells V and VII would be filled in and utilized for landfilling operations. Construction and operation of Cells VIII and IX would still occur, but the footprint of Cell IX would be reduced relative to Alternative B.

Construction Impacts

Construction of the Cells VIII and IX would be largely similar to Alternative B, with the exception of the reduction of Cell IX's footprint. This smaller footprint would result in slightly lower emissions associated with the excavation of the area. However, Alternative C would also utilize the filled in area between Cells V and VII to dispose of waste. Developing and utilizing this airspace would require the relocation of the pump station and underground utilities, as well as infrastructure for Cell V leachate, landfill gas, and stormwater management. The relocation of these items would result in pollutant and GHG emissions from construction equipment that would not occur in the construction associated with Alternative B. Similar to Alternative B, the expansion area could be used for stockpiling and borrowing during the construction and operation of Cell VII, which would reduce emissions associated with the hauling of these materials to off-site storage locations.

Operational Impacts

Once construction to capture the airspace between Cells V and VII is complete, operational activities and site trips are expected to be similar to those described in Alternative B and associated with existing activities, resulting in similar pollutant and GHG emissions profiles. Similar control measures to those described in Alternative B would be used to reduce landfill and equipment emissions. The landfill's air permit would be modified as necessary to accommodate Alternative C. Obtaining and complying with the air permit would demonstrate compliance with all applicable federal and state air regulations.

Greenhouse Gases

Greenhouse gas emissions for hauling, landfilling, and land alteration were estimated for Alternative C in Table 19 in which the partial expansion at the SPSA Regional Landfill would occur. Under this alternative, hauling emissions would be less than Alternative A due to the proximity of the existing landfill to regional transfer stations and landfill emissions would be equal or less than all Alternative A landfills due to the high efficiency of the existing landfill's gas collection system. Also, as discussed earlier, SPSA is replacing its landfill gas collection system to improve collection efficiency even more. Hauling and Landfill emissions in Alternative C are similar to those in Alternative B. Expansion of the Regional Landfill into the new cells would result in GHG emissions associated with land alteration. These land alteration emissions in Alternative C would be slightly less than those in Alternative B due to a reduced expansion footprint. In total, the estimated Alternative C GHG emissions are 1,235,165 metric tons of CO2E. As such, Alternative C would result in a net benefit of 169,313 metric tons of CO2E relative to the average Alternative A emissions and results in slightly less emissions than Alternative B.

Table 19. Alternative C Estimated GHG Emissions (MT CO_2E)

Scenario	Hauling Emissions	Landfill Emissions	Land Alteration Emissions	Total Emissions
Alternative C	2,500	1,201,650	31,017	1,235,165
Average Alternative A Emissions				1,404,478
Alternative C Increment				**-169,313**

Source: SCS Engineers (2023)

Alternative D

Under Alternative D, the existing Regional Landfill would close for landfill operations once Cell VII reaches capacity (anticipated around 2037) but would continue to operate as a transfer station for the region. During the operation of Cell VII, soil stockpiling and borrowing would be done off-site, with material being trucked in and out so that Cell VIII is not used. Following the Regional Landfill's closure, a new landfill would be developed and operated from approximately 2037-2060 on Site SH30.

Construction Impacts

Construction associated with Alternative D would be the most emissions-intensive of all the alternatives, as it would require the development of a completely new landfill site with all new infrastructure, as well as extensive land clearing activities, which would result in pollutant and GHG emissions from clearing equipment and fugitive dust from land alteration. Permitting and construction of the new landfill would take approximately 10 years. Once the site is cleared, the characteristics of construction of the landfill cell would be largely similar to the construction methodologies and emissions sources described in Alternative B. The area of new landfill cells in Alternatives B and C are comparable because they require development of similar acreage. As such, emissions associated specifically with the construction of the waste disposal areas are expected to be comparable between Alternatives B and C.

In addition to the new landfill cells, construction associated with Alternative D would likely require building new administration and maintenance buildings, utilities (water, sewer, and power), scales, a tire shredding facility, a household hazardous waste facility, a landfill gas recovery system, access and haul roads, leachate sewer disposal surface drainage systems, and gas management recovery systems. Emissions from construction equipment associated with these items would exceed the emissions associated with the construction of infrastructure items in Alternatives A, B, and C as these items are not currently in place on Site SH30 but are already present at the Regional Landfill.

Operational Impacts

Before Site SH30 would be used as a landfill, Cell VII at the Regional Landfill would be used until capacity is reached. As no new construction and landfilling would be completed at the Regional Landfill, soil stockpiling for Cell VII would need to be done off-site. The pollutant and GHG emissions associated with movement of soil to and from the off-site stockpiling area would exceed the emissions associated with the same activities under Alternatives B and C, as the stockpiling would occur on-site under these alternatives.

Once landfilling transitions to Site SH30, emissions from refuse trucks travelling to and from the landfill are expected to be slightly higher than under Alternatives B and C. The majority of refuse originates east of the site in the more densely populated regions of the landfill service area. Since Site SH30 is 30 miles west of the Regional Landfill, refuse trucks from these areas would have to travel approximately 30 miles down Route 460 to reach the Alternative D landfill. This increased traveling distance would result in slightly more mobile source pollutants and GHG emissions. Operational landfilling activities on Site SH30 are expected to be similar to those described in Alternatives B and C and existing activities, resulting in similar emissions profiles. Fugitive dust control measures and equipment usage would be similar to those described in Alternative B.

The Alternative D landfill would need to obtain a new air permit to operate. Conditions of operation would likely be similar to the existing landfill's air permit and the conditions required under modifications to allow for Alternatives B and C. The Alternative D air permit would likely require landfill gases emitted by the decomposing waste to be controlled by means of a newly constructed landfill gas collection and control system and flare. Obtaining and complying with the air permit would demonstrate compliance with all applicable federal and state air regulations.

Greenhouse Gases

Greenhouse gas emissions for hauling, landfilling, and land alteration were estimated for Alternative D in Table 20 in which a new off-site landfill would be opened. Under this alternative, hauling emissions would generally be less than Alternative A but more than Alternatives B and C due to the location of the off-site landfill relative to regional transfer stations. Landfill emissions under Alternative D would be larger than all alternatives, as the off-site landfill would not be required to install a gas collection system until a minimum of 6 years after opening. The required efficiency of that collection system was calculated using the EPA default collection efficiency of 75% for new landfills which would be less than the existing landfill's efficiency. As a result, combined hauling and landfill emissions in Alternative D are the most of all alternatives. Construction of the new offsite landfill would also result in GHG emissions associated with land alteration. These land alteration emissions in Alternative D would be less than those in Alternatives B and C due to reduced construction footprint. In total, the estimated Alternative D GHG emissions are 1,789,243 metric tons of CO_2E. As such, Alternative D would result in a net emissions increase of 384,765 metric tons of CO_2E relative to the average Alternative A emissions and results in more emissions than both Alternatives B and C.

Table 20. Alternative D Estimated GHG Emissions (MT CO_2E)

Scenario	Hauling Emissions	Landfill Emissions	Land Alteration Emissions	Total Emissions
Alternative D	5,200	1,784,043	16,918	1,789,243
Average Alternative A Emissions				1,404,478
Alternative D Increment				**384,765**

Source: SCS Engineers (2023)

The new landfill under Alternative D would also not be required to utilize collected landfill gas for beneficial purposes like landfill gas to energy or renewable natural gas. At the Regional Landfill, a third-party business collects and converts landfill gas to renewable energy. The size of the landfill (overall volume of waste collected) and the associated amount of gas generated makes it a worthwhile business venture for third-party companies. These companies are profitable when there is a nearby market for gas and electricity. Alternative D proposes a smaller volume of landfill waste than the larger Regional Landfill. Since there is no certainty that a landfill gas to energy facility would be constructed, a conservative assumption was implemented.

Most facilities in Alternative A and the existing Regional Landfill in Alternatives B and C have the capabilities to use captured landfill gas for energy. Alternative D may result in up to 5,487,585 $MTCO_2E$ of “additional emissions” not presented in Table 20 since the controlled landfill gases in Alternative D would not be used to offset energy production or natural gas use elsewhere, as they are in the other alternatives. Further discussion of landfill gas to energy is presented in Appendix C.

Noise

Methodology

Sound is the rapid fluctuations in air pressure above and below ambient pressure levels. Noise is defined as unwanted or excessive sound. Sound becomes unwanted when it interferes with normal activities such as sleep, work, communication, or recreation. Noise was predicted based on typical equipment used during construction and operation. Potential noise impacts were assessed based on the calculated noise levels (Leq) at the closest noise-sensitive receptors (i.e., residences), according to applicable federal noise guidelines and local noise ordinances (City of Suffolk 2016, USEPA 1974).

A variety of sound level descriptors can be used for environmental noise analyses. These descriptors relate to the way sound varies in level over time. The following sound level descriptors were used to assess potential noise impact for the alternatives:

- *Energy-average Sound Level (Leq)*: Leq is a single value, which represents the same acoustic energy as the fluctuating levels that exist over a given period of time. The Leq takes into account how loud noise events are during the period, how long they last, and how many times they occur. Leq is commonly used to describe environmental noise and relates well to human annoyance. An Leq over an 8-hour period is commonly used to evaluate construction noise and is denoted Leq[8hr] (VDOT 2015).
- *Day-night Average Sound Level (Ldn)*: Ldn is a single value that represents the same acoustic energy as the fluctuating levels that exist over a 24-hour period. The Ldn takes into account how loud sound events are, how long they last, how many times they occur over a 24-hour period, and whether they occur during the day (7:00 AM to 10:00 PM) or night (10:00 PM to 7:00 AM). Sound that occurs during the night is given a 10-decibel (dB) penalty to account for the increased human sensitivity to noise at night. If sound levels are constant over a 24-hour period, the Ldn level is 6.4 dB greater than the Leq level due to the 10-dB nighttime penalty (FTA 2018).

Affected Environment

Federal Noise Guideline

The Noise Control Act of 1972 authorized federal agencies to adequately control noise that may endanger the health and welfare of the nation's population (U.S. Code 2004b). In 1974, the EPA conducted a study on noise impacts relative to public health and safety (USEPA 1974). This EPA study provides guidance on the potential effects of noise that can be considered by federal, state, and local agencies; however, it does not constitute a standard or regulation.

As shown in Table 21, the EPA study concluded that a day-night average sound level of 55 A-weighted decibels (dBA; Ldn) or less for outdoor residential areas, or 55 dBA (Leq[24]) or less for outdoor areas where people spend limited amounts of time, such as schools and playgrounds, would protect public health and welfare related to potential interference with outdoor activity and annoyance (USEPA 1974). The study also concluded that a sound level of 45 dBA (Ldn) or (Leq[24]) or less for indoor residential uses and schools, respectively, would protect public health and welfare related to potential interference and annoyance (USEPA 1974). Since most buildings with windows closed provide 20 dB or more, and buildings with windows open provide 10 dB of outdoor-to-indoor sound attenuation, the exterior criteria are more stringent. Noise from the alternatives in this DEIS will therefore be evaluated according to the outdoor criteria.

The EPA noise guidelines are based on the evaluation of pervasive long-term noise. Therefore, they are applied to future operational noise conditions and are not typically applied to short-term construction-period activities.

Table 21. EPA Noise Levels Identified to Protect Public Health and Welfare

Receptor	Noise Level	Description
Outdoor	L_{dn} 55 dBA	Outdoor areas that are residential; farms; areas where people spend varying amounts of time; or places in which quiet is a basis of use
	$L_{eq(24)}$ 55 dBA	Outdoor areas of limited time of use; school yards, playgrounds; parks; etc.
Indoor	L_{dn} 45 dBA	Indoor residential areas
	$L_{eq(24)}$ 45 dBA	Indoor areas such as schools, etc.

Source: USEPA (1974)

Local Noise Code

The noise chapters of the Code of Ordinances for the City of Suffolk and Southampton County both prohibit unnecessary, excessive, and irritating noise from all sources, to reduce the overall noise in the community (City of Suffolk 2016, Southampton County 1984). Noise can be detrimental to the health, welfare, safety, and quality of life of citizens and should therefore be restricted. This policy applies to exhaust noise, commercial or industrial businesses, and construction noise. Exhaust noise is declared excessive if discharging into the open except through a muffler or other device that will effectively prevent loud or explosive noise from various types of engines (City of Suffolk 2016). For commercial or industrial businesses, operating, loading, or unloading any vehicle outdoors in zones other than industrial within 100 yards of a residential area between the hours of 10:00 PM and 6:00 AM is prohibited (City of Suffolk 2016). Construction noise outdoors in any zoning district within 100 yards of a lawfully occupied dwelling occurring between the hours of 10:00 PM and 6:00 AM is also prohibited (City of Suffolk 2016). This includes operating or causing to be operated any equipment used for construction, repair, alteration, or demolition work on buildings, structures, alleys, or appurtenances.

Existing Noise Conditions

The proposed expansion project area includes noise-sensitive receptors (i.e., residences) to the west of the Regional Landfill on roads such as Dabney Lane, Raven Street, and recently constructed residences on Petersen Way and to the northwest of the Regional Landfill on roads such as Nansemond Parkway, Monticello View, and Cherry Blossom Drive.

Table 22 presents the closest noise receptors to each of the project alternatives, including the distance between the receptors and the location of proposed construction and operations in the Regional Landfill. The closest receptors are typically 2,500 to 5,150 ft. away from the proposed landfill cells.

Table 22. Noise Receptors

Alternative	Landfill Cell	Closest Residential Receptors and Orientation to SPSA	Distance to Landfill Cell (ft.)
A	Operations activity in Cell VII	Dabney Lane, west of SPSA	4,250
B	Future Cell VIII	Nansemond Parkway, northwest of SPSA	5,150
	Future Cell IX	Nansemond Parkway, northwest of SPSA	4,750
C	Airspace between Cell V and Cell VI	Dabney Lane, west of SPSA	2,500
D	Off-site Alternative (Site SH30)	Crumpler Road, east of Site SH30	2,700

The existing noise conditions at these residential receptors primarily include sound contributions from transportation sources, including U.S. Routes 13/58/460 and other local roadways, and natural sources of sound such as birds and wind blowing through the trees and ground cover. Noise complaints have not been made about the Regional Landfill itself. The receptors are separated from the operating landfill cells by 200 ft of forest and woodlands. Existing noise conditions have been estimated based on the Federal Transit Administration's (FTA) 2018 guidance manual, *Transit Noise and Vibration Impact Assessment Manual*.

This methodology estimates existing noise conditions according to the proximity of receptors to major transportation sources such as highways or general background noise levels based on population density (FTA 2018). The residences closest to the Regional Landfill on Dabney Lane, Raven Street, and Petersen Way are generally within approximately 150 ft of U.S. Routes 13/58/460. The residences closest to the off-site alternative, Site SH30, are greater than 150 ft. off U.S. Route 460. As such, the estimated existing noise levels at these residences are a daytime Leq and average Ldn of 65 dBA. The estimated existing noise levels for residences northwest of the Regional Landfill are 40 dBA (Leq and Ldn) based on a population density of Suffolk of between 100 and 300 people per square mile.

Environmental Consequences

The 2 alternatives proposed for the Regional Landfill both include the construction of new landfill cells. Construction of a new landfill cell typically includes bulldozers, excavators, loaders, pick-up trucks, semi-trailers, and water trucks. For each alternative, as described above in the construction phasing section, each proposed cell would be constructed one at a time, starting with the proposed Cell VII. Operation of a SPSA landfill cell typically includes using compactors, dozers, mobile cranes, scrappers, skid steers, trucks, and wheel loaders. As stated in the "Transportation and Traffic" section, the increase in truck traffic in the region is negligible because of the significant truck traffic that already exists, therefore there would be no substantial change in the traffic noise condition.

Construction noise is evaluated at noise-sensitive locations based on the maximum sound emissions of equipment, distance from the source to noise-sensitive receptors, and the presence of intervening objects such as buildings. Sound propagation has been assumed to propagate as a point source from the construction area, assuming a 7.5-dB reduction for every doubling of distance (assuming soft ground).

Table 23 presents a list of typical equipment used during the construction and operation of landfills, including the maximum sound level at 50 ft. and utilization factors (the percentage of time the equipment would be operating at full load), as well as the energy-average noise level of equipment at distances of 50, 500, 2,000, and 5,000 ft.

Noise levels from most construction equipment would be 50 to 55 dBA (Leq) at a distance of 500 ft, 35 to 40 dBA (Leq) at a distance of 2,000 ft., and from 25 to 30 dBA (Leq) at a distance of 5,000 ft. Conservatively assuming that all construction equipment may operate simultaneously, the cumulative noise level at 5,000 ft. would be 38 dBA (Leq) during construction and 37 dBA (Leq) during operations.

Table 23. Operation and Construction Noise Levels

Activity	Equipment	L_{max} at 50 ft. (dBA)	Utilization Factor (%)	Noise Level (Leq, dBA)			
				50 ft.	500 ft.	2,000 ft.	5,000 ft.
Construction	Bulldozer	85	40	81	56	41	31
	Excavator	85	40	81	56	41	31
	Loader	80	40	76	51	36	26
	Pick-up Truck	55	40	51	26	11	1
	Semi-Trailers	84	40	80	55	40	30
	Water Truck	84	40	80	55	40	30
Operation	Compactor	80	20	73	48	33	23
	Dozer	85	40	81	56	41	31
	Mobile Crane	85	16	77	52	37	27
	Scrapper	85	40	81	56	41	31
	Skid Steer	85	40	81	56	41	31
	Trucks	84	40	80	55	40	30
	Wheel Loader	84	40	80	55	40	30
Construction Noise (Cumulative Leq)				88	63	48	38
Operations Noise (Cumulative Leq)				87	62	47	37

Sources: USDOT (2006), FTA (2018)

Construction activities are expected to be intermittent and occur in phases for each alternative. Each alternative would be expected to have similar equipment and used a similar amount of time during construction and operation. Table 24 presents the results of the noise impact assessment at the closest receptor locations to the west and northwest for each alternative at the Regional Landfill, as well as the closest receptor locations south of the off-site alternative, Site SH30.

Table 24. Noise Impact Assessment

Alternative	Closest Receptors	Distance (ft.)	Construction Noise Level (dBA, Leq)	Operational Noise Level (dBA, Leq)	Estimated Daytime Ambient Noise Level (dBA, Leq)
A	Dabney Lane	4,250	39	40	65
	Nansemond Parkway	5,200	37	38	40
B	Dabney Lane	6,250	36	38	65
	Nansemond Parkway	4,750	37	39	40
C	Dabney Lane	2,500	44	46	65
	Nansemond Parkway	3,000	42	44	40
D	Crumpler Road	2,700	44	45	50
	General Mahone Boulevard (U.S. Route 460)	3,600	41	42	70

The following presents the noise impact assessment for each alternative.

Alternative A

Under Alternative A, SPSA would not expand its landfill operations into Cells VIII and IX. Landfill operations would continue to utilize the currently permitted capacity available through Cell VII, which is expected to last until approximately 2037. After Cell VII reaches capacity and is closed, the existing Regional Landfill would remain operational as a transfer station and waste would be hauled to other area landfills. As shown in Table 24, cumulative construction and operational noise would be 37 to 39 dBA at receptors to the northwest near Nansemond Parkway and 39 to 40 dBA at receptors to the west near Dabney Lane. Noise levels would be substantially lower than ambient conditions at receptors to the west and slightly lower than ambient conditions at receptors to the northwest. Operational noise conditions would be well below the EPA noise guideline of 55 dBA. Therefore, there would be no noise impact under Alternative A and no need for mitigation.

Alternative B

Under Alternative B, SPSA would expand its existing landfill operations into 2 new contiguous waste disposal cells (Cells VIII and IX) which would be constructed over time. As shown in Table 24, cumulative construction and operational noise would be 36 to 38 dBA at receptors to the northwest near Nansemond Parkway and 37 to 39 dBA at receptors to the west near Dabney Lane. Noise levels would be substantially lower than ambient conditions at receptors to the west and slightly lower than ambient conditions at receptors to the northwest. Operational noise conditions would be well below the EPA noise guideline of 55 dBA. Therefore, there would be no noise impact in conjunction with Alternative B and no need for mitigation.

Alternative C

Similar to Alternative B, Alternative C would include expansion into Cells VIII and IX but would also include utilizing the airspace between Cells V and VII for landfilling operations. As shown in Table 24, cumulative construction and operational noise would be 44 to 46 dBA at receptors to the northwest near Nansemond Parkway and 42 to 44 dBA at receptors to the west near Dabney Lane. Noise levels would be substantially lower than ambient conditions at receptors to the west and slightly higher than (up to 4 dBA) ambient conditions at receptors to the northwest.

Operational noise conditions would be well below the EPA noise guideline of 55 dBA. Therefore, there would be no noise impact under Alternative C and no need for mitigation.

Alternative D

For Alternative D, the Regional Landfill would close operations once Cell VII reached capacity and continue operation as a transfer station for the region. The new municipal waste landfill would be developed and operated on Site SH30. Construction efforts would be required to develop the land for supporting infrastructure, similar to the facilities and utilities found at the existing Regional Landfill. Construction of an access road would also take place for truck entry from U.S. Route 460. It is assumed that the construction efforts would be consistent with the proposed new construction under Alternative B.

As shown in Table 24, cumulative construction and operational noise at the location of the Alternative D landfill would result in sound levels of 41 to 42 dBA at residential receptors to the southeast near General Mahone Boulevard (U.S. Route 460) and 44 to 45 dBA at residential receptors to the east near Crumpler Road. Noise levels would be substantially lower than ambient conditions at receptors to the southeast and lower than ambient conditions at receptors to the southwest. Operational noise conditions would be well below the EPA noise guideline of 55 dBA.

Due to the proximity of residential receptors to the entrance of the Alternative D landfill on U.S. Route 460, the estimated sound level due to the increase in truck traffic from the operations of the Alternative D landfill would be 69 dBA. This is above the criteria (Leq) of 67 dBA for residential homes according to VDOT (2022) highway noise guidance. Additional analysis can be done during the final designs if Alternative D is chosen, in order to determine whether levels exceed VDOT thresholds and mitigation is required. There is no significant impact on these nearby receptors at the entrance of Site SH30 because the increase over ambient is less than 5 dBA, and therefore no mitigation is required (VDOT 2018). The traffic volume for this analysis is based on the *Daily Traffic Volume Estimates Special Locality Report 320* by VDOT for the City of Wakefield (VDOT 2020) and the operational vehicle classification is based on the *Traffic Impact Study* for the SPSA Regional Landfill (HDR 2016).

Cultural Resources

Methodology

Potential impacts on cultural resources were evaluated based on changes to the character-defining features of the resources, which are the characteristics of a historic property that qualify it for inclusion in the National Register of Historic Places (National Register). This approach is derived from the Secretary of the Interior's Standards for the Treatment of Historic Properties and the regulations of the Advisory Council on Historic Preservation implementing provisions of the NHPA. Character-defining features contribute to a property's integrity, which is composed of its location, design, setting, materials, workmanship, feeling, and association.

The data collected through the methods described below for each alternative location were used to identify cultural resources present in the project area and to establish their baseline condition. The existing conditions of these resources were then compared with the alternatives described in Chapter 2 to determine the impacts on cultural resources within the project area. The Norfolk District has initiated consultation with Virginia

Department of Historic Resources (VDHR). Compliance with Section 106 of the NHPA is ongoing.

Alternatives B & C

In July 2021, the James River Institute for Archaeology, Inc. (JRIA) completed a preliminary Phase IA cultural resources assessment to support development of this DEIS (JRIA 2021). The area studied by JRIA for the expansion of the existing landfill site, as defined in the Phase IA report, consists of approximately 143 acres to the north and east of the existing landfill area, including the expansion area (Cells VIII and IX) and a proposed borrow and stormwater management area (Figure 5). The project area is located adjacent to the Great Dismal Swamp NWR; historically, land encompassing the project area was part of the Great Dismal Swamp.

As part of the cultural resources assessment, JRIA researched the archival resources of the VDHR to compile documentation on all previously inventoried historic resources, including archaeological sites, historic structures, and historic districts within the study area vicinity (JRIA 2021). A regional archaeological context specific to the Great Dismal Swamp NWR was developed, and documentary research and analysis of historic maps and aerial photographs was conducted to determine which portions of the study area have the highest sensitivity for both prehistoric and historic archaeological resources. The documentary research was then followed by a pedestrian survey of the study area to determine current site conditions and assess the potential for archaeological resources.

Archaeologists from JRIA conducted a pedestrian survey of the project area on July 20, 2021, to assess general site conditions (soil wetness, vegetative cover, etc.); identify visible artifact deposits, architectural remains, and landscape features; and evaluate the potential for mesic islands or other areas of slightly elevated topography within the typical swamp landscape that might have proved attractive to prehistoric or historic occupation, particularly by Native Americans and escaped African American maroon communities (JRIA 2021).

Alternative D

In July-August 2022, JRIA completed a preliminary Phase IA cultural resources assessment of Site SH30 to support this project. Site SH30 consists of a proposed off-site landfill expansion area, which is located approximately 28 miles to the northwest of the existing Regional Landfill, at 33411 Drews Avenue in Southampton County, between Wakefield and Ivor. The study area, which is currently owned by Jeffrey V. Pulley and Robert H. Pulley, Jr., encompasses approximately 330 acres.

Prior to conducting any fieldwork, JRIA researched the archival resources of VDHR to compile documentation on all previously inventoried historic resources including archaeological sites, historic structures, and historic districts within the boundaries of Site SH30 and its vicinity. A regional archaeological context was developed, and documentary research and analysis of historic maps and aerial photographs was conducted to determine which portions of Site SH30 have the highest sensitivity for both prehistoric and historic archaeological resources. The documentary research was then followed by a pedestrian survey of the study area, including judgmental shovel testing, to determine current site conditions and assess the potential for archaeological resources (JRIA 2022).

Archaeologists from JRIA conducted a pedestrian survey of Site SH30 on August 9, 2022. The survey was intended to assess general site conditions; identify visible artifact deposits, architectural remains, and landscape features; and evaluate the potential for prehistoric and historic archaeological sites (JRIA 2022).

Affected Environment

There are no historic structures, buildings, or districts within or immediately adjacent to the expansion area for Alternatives B and C, as confirmed by VDHR's Virginia Cultural Resource Information System (V-CRIS) database. Two historic districts and 9 individual historic properties are documented within a 1-mile radius; however, due to topography and dense vegetation, the project area is not within the viewshed of these historic properties (VDHR 2013).

To date, no documented archaeological investigations have been conducted within the project area, and no archaeological sites have been recorded in the VDHR V-CRIS database either on the property or in close proximity to it (Figure 37). Five archaeological sites have been recorded within a 1-mile radius of the project area, 3 of which were within the Regional Landfill property but outside of the study area for cultural resources (VDHR 2013). Only 1 site has been evaluated and determined eligible for listing in the National Register, although it is located well outside of the study area for cultural resources (VDHR 2013).

Documentary research indicated that the project area was part of a relatively large plantation property throughout the nineteenth and early twentieth centuries. During this time, the project area remained forested, undeveloped, and unoccupied, although it was repeatedly timbered. This relative absence of historic activity was confirmed by the pedestrian survey, which identified no visible evidence of surface artifact concentrations, architectural remains, or historic landscape features (JRIA 2021).

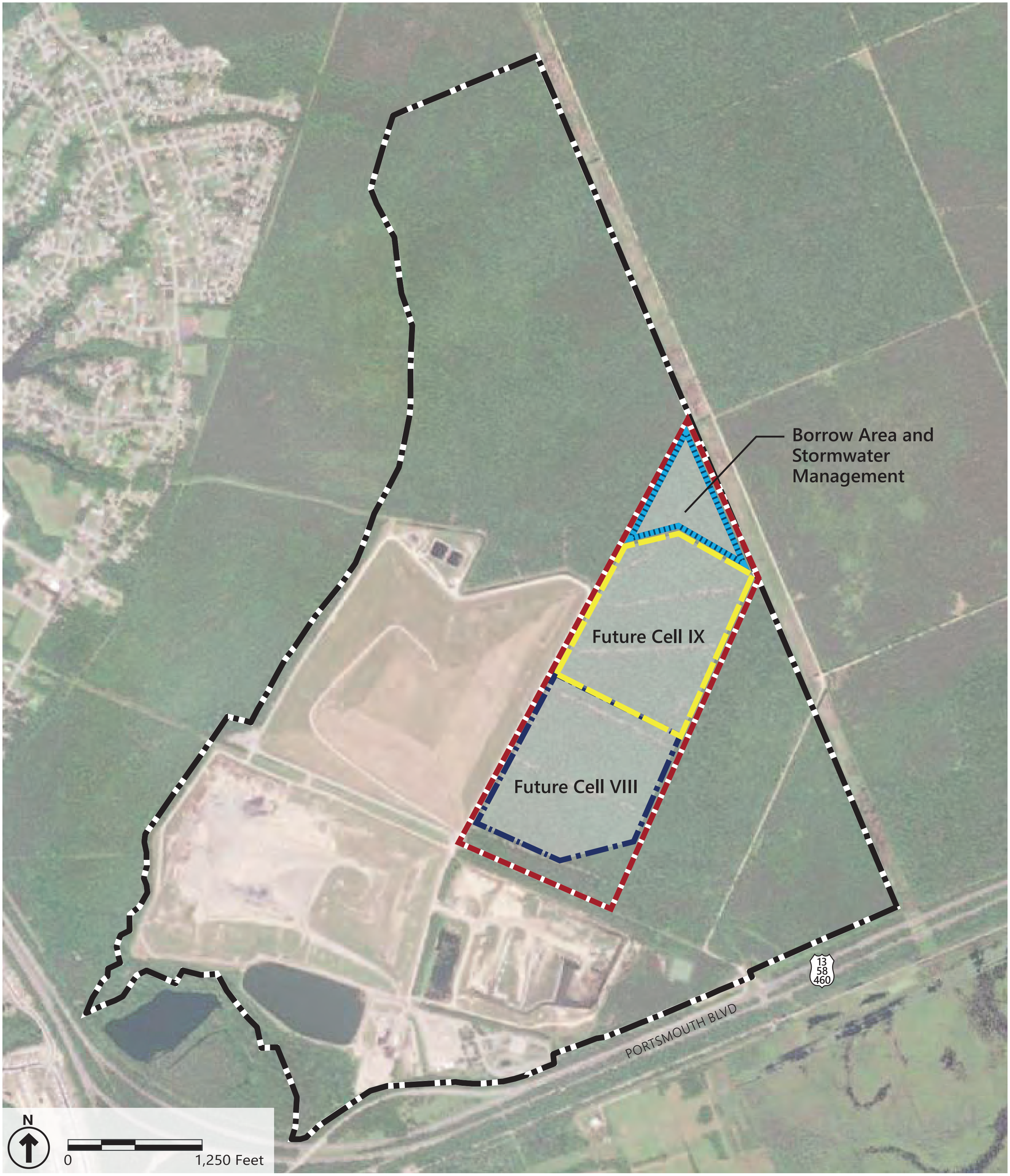
The archaeological research context and predictive modeling for prehistoric and historic sites within the Great Dismal Swamp NWR suggests that the areas of highest probability for prehistoric and historic-period sites within the study area would consist of areas of slightly greater elevation, which would have been the most attractive occupation and activity areas for the various groups associated with the Great Dismal Swamp NWR over time. The pedestrian survey did not identify any areas of slightly higher elevation sizeable enough to have supported more than a limited, temporary prehistoric or historic use or occupation (JRIA 2021).

A desktop analysis of topographic survey data indicated that 2 areas totaling approximately 44 acres within the study area for cultural resources are somewhat more elevated than the rest of the land. As a result, these 2 areas could reasonably be assumed to offer moderate potential for archaeological resources. These would most likely consist of small, temporary Native American resource procurement campsites dating to the Archaic through Early Woodland periods, or historic sites associated with timbering or other ephemeral uses. By virtue of their lower elevation, the hydric soils within the remainder of the study area (approximately 99 acres) can be assumed to have low probability for archaeological sites. In the Phase IA report, JRIA concluded that there are no areas which could be considered to have high archaeological potential within the study area for cultural resources (JRIA 2021).

Although it is evident that there are no areas within the project area with high potential for archaeological resources to occur, additional archaeological surveys are required within the project area to determine if any intact archaeological resources exist within the project area (JRIA 2021).

In accordance with the Great Dismal Swamp National Heritage Area Act, which was signed into law in January 2023, the Secretary of Interior is directed to assess the suitability and feasibility of designating the Great Dismal Swamp and its associated sites as a National Heritage Area (Kaine 2022). This study is to be done in consultation with state and local organizations and governmental agencies, tribal governments, non-profit organizations, and other appropriate entities (Kaine, no date). National Heritage Areas are private-public partnerships that support historic preservation, conservation, recreation, tourism, and educational projects. This study process is currently underway and, if designated, the Great Dismal Swamp would receive technical and limited financial assistance from the National Park Service (Kaine, no date).

Source: Nearmap Imagery Dated February 10, 2022



LEGEND

- SPSA Property Boundary
- Cultural Resources Study Area
- Proposed Cell VIII
- Proposed Cell IX
- Proposed Borrow Area and Stormwater Management

US Army Corps of Engineers

Environmental Impact Statement for
Proposed Expansion of SPSA Landfill

FIGURE 37

Study Area for Cultural Resources - SPSA Regional Landfill Proposed Expansion Area

As documented in VDHR’s V-CRIS database, one architectural resource was previously surveyed within the boundaries of Site SH30: the Drew Farm (DHR ID 087-5493), which is a ca. 1880 farmstead situated roughly 2,000 ft. from the north side of US Route 460; however, this resource was determined to be not eligible for listing in the National Register by VDHR due to a loss of integrity. There were no other resources previously identified within the boundaries of Site SH30. Within a 1-mile buffer of Site SH30, a total of 17 architectural resources and 1 archaeological resource were identified in V-CRIS as previously surveyed. Of those resources, 2 are considered eligible for listing in the National Register; the rest were determined to be not eligible for listing by DHR.

Immediately adjacent to Site SH30 to the northwest is the Leclare Griffin Brittle House (DHR ID 087-5492), which is a ca. 1800 farmstead located on rural farmland, surrounded by cropland and woodland. The house sits roughly 0.25 miles from the boundary of Site SH30. According to the VDHR Architectural Survey Form for the resource, the house was determined to be eligible for listing in the National Register by VDHR in 2005 as a good example of a late eighteenth-century Georgian-style house that maintains a high degree of overall integrity. The interior retains a high degree of integrity of original materials and retains the original floor plan. On the exterior, the only substantial alterations to its appearance are an entry porch on the east elevation and the addition of a small 1-story kitchen on the south elevation. This house is significant at the local level for architecture for the period of 1780 to the 1950s, when the Brittle family made the last changes to the house. Although the property has been part of a productive farm for over 200 years, none of the original outbuildings are extant; therefore, the overall farm is not considered eligible as an agricultural resource. The surrounding wooded land located on the parcel is not considered a feature that contributes to the significance of the house because it was never part of the associated farming operation.

The second property eligible for listing in the National Register within 1 mile of Site SH30 is the Norfolk Southern Railway (DHR ID 091-5098), which runs parallel to Route 460, roughly 0.2 miles to the southwest of the boundary of Site SH30. Throughout its history, this rail line was part of several railroads including the Norfolk & Petersburg Railroad; the Norfolk & Western Railroad; and the Atlantic, Mississippi and Ohio Railroad (AM&O) Railroad. The Norfolk and Petersburg Railroad was constructed in the 1850s and served as an economic stimulus in the region, both as a regional market road and as a transportation facility. It was important during the Civil War as a supply line, and both sides attempted to maintain control. It was associated with William Mahone, who as chief engineer, was an innovator in design and maintained high standards for construction and equipment. After the war, the railroad was rebuilt as part of a larger system with linkages to the Mississippi Valley. In 1870 it became part of the AM&O, which was reorganized as the Norfolk and Western in 1881. In the late nineteenth and twentieth centuries, the Norfolk and Western was a principal transporter of coal from the Appalachians to the ports of the Chesapeake Bay. The AM&O Railroad was determined eligible by DHR in 2014 for its contribution to the development of

Southside Virginia during the late nineteenth and early twentieth centuries and for its association with William Mahone, the railroad's first Chief Engineer, Civil War general for the Confederate army, and United States Senator.

Archaeologists from JRIA identified surface artifact deposits and possible landscape features within 2 former house locations which were projected from historic maps and aerial photographs. These sites included artifacts such as brick fragments, nails, ceramics, and glass. Relatively small depressions in the ground were also observed that could indicate former historic features. They concluded that Site SH30 has a high probability for archaeological resources related to domestic farmsteads dating from the mid-eighteenth through mid-nineteenth centuries. Conditions of Site SH30 indicate that there is a low to moderate potential for prehistoric archaeological deposits; however, much of the site has been timbered in the recent past, and disturbance of the soil may have reduced this potential (JRIA 2022).

Environmental Consequences

Alternative A

Under Alternative A, there would be no impact on cultural resources as a result of continued permitted landfill use into Cell VII because the area has been previously disturbed for landfill facilities; therefore, no intact archaeological resources would occur within the project area. Additionally, there would be no impacts on cultural resources as a result of closing and covering Cell VII and transporting waste to another existing landfill because these actions would also occur in areas already disturbed. No historic buildings or structures exist within the project area; therefore, there would be no impacts on historic buildings or structures. When considered as a whole, Alternative A would not result in any impacts on cultural resources within the vicinity of the project area because it would take place on land that was previously disturbed, where no intact archaeological resources would occur.

Alternative B

Under Alternative B, there would be no impact on historic buildings or structures because none exist within the vicinity of the project area. Implementation of Alternative B has the potential to impact the ancestral tribal lands that were once part of the Great Dismal Swamp region. If necessary, additional studies will be undertaken to determine the impacts on traditional cultural landscapes and ethnographic resources of this region in coordination with Virginia Indian Tribes and other interested parties during the Section 404 permitting process. Implementation of Alternative B would require substantial ground disturbance in an undeveloped area, including excavation to a depth of 20 to 40 ft. This action carries a risk of affecting intact archaeological resources, if any exist, particularly in the areas determined to have a moderate archaeological potential. However, as recommended in the Phase IA report, additional archaeological surveys would be conducted prior to implementation that would identify if and where these resources may exist (JRIA 2021). If intact archaeological resources were identified via the additional survey, they would be preserved *in situ* (in place) to the extent practicable. If the resources could not be preserved *in situ*, an appropriate mitigation strategy (e.g., the excavation, documentation, and mapping of cultural remains prior to disturbance to ensure the recovery of archaeological data that otherwise would be lost) would be developed in consultation with VDHR, associated Virginia Indian Tribes, and consulting parties, as appropriate. An archaeological monitor may be used during ground disturbing activities to mitigate the potential for adverse impacts during construction. If previously unknown archaeological resources were discovered during construction, all work in the immediate vicinity of the discovery would be halted until the resources were identified and documented and an appropriate mitigation strategy developed in consultation with VDHR, associated Virginia Indian Tribes and consulting parties, as appropriate.

Alternative C

Under Alternative C, the impacts would be the same as described under Alternative B. Implementation of Alternative C has the potential to impact the ancestral tribal lands that were once part of the Great Dismal Swamp region. If necessary, additional studies will be undertaken to determine the impacts on traditional cultural landscapes and ethnographic resources of this region in coordination with Virginia Indian Tribes and other interested parties during the Section 404 permitting process. If intact archaeological resources were identified via the additional survey, they would be preserved *in situ* (in place) to the extent practicable. If the resources could not be preserved *in situ*, an appropriate mitigation strategy (e.g., the excavation, documentation, and mapping of cultural remains prior to disturbance to ensure the recovery of archaeological data that otherwise would be lost) would be developed in consultation with VDHR, associated Virginia Indian Tribes, and consulting parties, as appropriate. Therefore, the impacts would be the same as described under Alternative B.

Alternative D

Implementation of Alternative D at Site SH30 would not result in any direct impact on historic properties within the boundaries of Site SH30. It would, however, result in changes to the setting of the Leclare Griffin Brittle House (DHR ID 087-5492) due to its proximity to Site SH30. The Brittle House is currently located on rural farmland, surrounded by cropland and woodland. Construction of a new landfill site on the adjacent property would alter the setting by introducing a new land use that is of an industrial character, rather than agricultural. This change in adjacent land use may result in an increase in industrial traffic and noise during construction and operation of the landfill. While these changes would somewhat alter the setting of the Brittle House, the surrounding wooded land is not part of the historic significance of the house and is not considered a contributing feature of the historic property. Therefore, though there may be indirect visual and noise impacts on the Brittle House, the impacts would not alter any characteristics that qualify the property for inclusion in the National Register and would not diminish the overall historic integrity of the property. The Brittle House would retain its historic significance and integrity, and it would remain eligible for listing in the National Register.

Implementation of Alternative D at Site SH30 would not result in any impact to the Norfolk Southern Railway. The setting of the railroad through this area is generally rural agricultural and the construction of a landfill would alter the land use in the vicinity of Site SH30. However, this would be a very small portion of the overall rail line, and dense vegetation would visually screen Alternative D from view from the railroad. There would be no physical impacts on the Railway as a result of implementation of Alternative D. There would be no impacts that would not alter any characteristics that qualify the Railway for inclusion in the National Register, and Alternative D would not diminish the overall historic integrity of the property. The Norfolk Southern Railway would retain its historic significance and integrity, and it would remain eligible for listing in the National Register.

A portion of Site SH30 has a high potential for archaeological deposits related to domestic farmsteads of the mid-eighteenth to mid-nineteenth centuries. Implementation of Alternative D at Site SH30 has the potential to result in adverse impacts on these resources due to ground disturbance required for construction and landfill operation. Some of the sites identified by JRIA during their pedestrian survey could potentially be avoided due to their location on the outskirts of Site SH30. If Alternative D is selected for implementation, additional archaeological testing of Site SH30 may be required to determine the occurrence of any intact deposits and their eligibility for listing in the National Register. This would be determined in consultation with VDHR and associated Virginia Indian Tribes and consulting parties, as appropriate.

If previously unknown archaeological resources are discovered during construction, all work in the immediate vicinity of the discovery would be halted until the resources are identified and documented and an appropriate mitigation strategy is developed in consultation with VDHR, associated Virginia Indian Tribes and consulting parties, as appropriate.

Socioeconomics

The proposed expansion into Cells VIII and IX is part of SPSA's long-term plan for providing critical disposal capacity for the region and is consistent with the RSWMP for southeastern Virginia, which identifies the need for future expansion of the active facility (HRPDC 2020). New landfill development at an off-site location would also address needed disposal capacity. This section considers the alternatives' potential to impact the socioeconomic environment.

Methodology

The study area for socioeconomics is SPSA's service area, which includes approximately 2,000 square miles located in the Virginia cities of Chesapeake, Franklin, Norfolk, Portsmouth, Suffolk, and Virginia Beach, and the counties of Isle of Wight and Southampton. SPSA serves a population of 1,195,613 residents, which generate over 1 million tons of municipal solid waste per year. SPSA's Regional Landfill property comprises approximately 833 acres, of which 376 acres are within the active facility boundary currently permitted by VDEQ. Demographic and population data were obtained from HRPDC's RSWMP for southeastern Virginia (2020). Capital and operational expenses associated with developing, closing, and operating a landfill were estimated for each alternative. Additional information related to the methodology of the cost analysis is available in Appendix D.

Affected Environment

Economic forecasts by the HRPDC indicate expected future economic growth and development for the SPSA planning area. The region is expected to grow nearly 21%, from 1,193,014 to 1,445,300 people, from 2016 to 2040 (HRDPC 2020). This equates to an average annual growth rate of 0.88%, or approximately 10,512 people per year (HRDPC 2020).

The largest city in the region is Virginia Beach, with over 38% of the population (HRDPC 2020). Norfolk is the second most populated, with almost 21% of the population, but the city has the highest population density in the region (HRDPC 2020). The City of Suffolk and Isle of Wight County are projected to experience the greatest average annual growth rate from 2010 to 2040, at 2.6% and 1.9%, respectively (HRDPC 2020). The population growth rate is significant for planning purposes since the amount of waste generated increases as population increases.

As stated in the HRPDC's RSWMP (2020), projections of population growth, regional employment, and number of households can help define what kinds and amounts of waste the region would generate.

Effective solid waste management is necessary not only from an environmental standpoint, but also from an economic standpoint. The purpose of the project is to allow SPSA to continue meeting its core mission for a 40-year planning horizon. SPSA is responsible for the management of the safe and environmentally sound disposal of regional waste for its member localities. Therefore, land use, environmental impacts and long-term economic impacts are important factors. Insufficient landfill space or high costs due to property acquisitions, long-haul transport of waste, and private market rate disposal fees (a negotiated dollar per ton fee paid to regional private landfills to accept SPSA's incoming waste) could negatively impact economic stability within the SPSA service area. Negative economic impacts could also include increased operating costs which are passed on to citizens living in SPSA's member communities.

Because SPSA currently owns and operates the Regional Landfill, 7 transfer stations, and all associated assets, it has control over operating and use efficiencies. These efficiencies enable SPSA to minimize costs, reducing the economic burden passed down to citizen members. For example, tipping fees are calculated by adding the cost of transfer stations plus the cost of transporting the waste plus the cost of disposing the waste and then divided by the tonnage of waste managed. Therefore, there are inherent efficiencies to be obtained throughout the process that reduce the tipping fee amount.

Additional detail is discussed in the Environmental Consequences section below and detailed in Appendix D which provides an in-depth analysis of operational and capital costs for each alternative.

Employment

According to HRPDC's RSWMP (2020), employment is expected to increase at an average annual rate of approximately 0.9% through 2040, resulting in an overall increase of 29.8%. Employment is projected to increase in each locality. Isle of Wight County is projected to experience the greatest percentage growth in employment, followed by Southampton County and the City of Suffolk. Employment is an important forecasting variable because growth reflects an increase in economic activity, which in turn leads to increased consumption and waste generation.

Households

According to projections by the HRPDC, the number of households in the region is expected to increase by about 27.6% through 2040 at an average annual rate of 0.8% (HRPDC 2020). The largest percentage expansion in population and households is forecasted for the City of Suffolk and Isle of Wight County. Generally, each home, regardless of the number of residents, contributes a certain amount of waste, such as junk mail and yard waste. Additional detail on waste generation per capita is provided in Appendix E.

Environmental Consequences

Alternative A

Under Alternative A, SPSA would not expand its landfill operations. Landfill operations would continue to utilize the permitted capacity available through Cell VII, which is expected to last until approximately 2037. After Cell VII reaches capacity the Regional Landfill would be closed with a final cover system and waste would be hauled to 1 of 4 other private regional landfills for processing and disposal.

Landfill capital and operational costs were evaluated for all alternatives considered. Costs associated with this alternative are passed directly to the citizens living in SPSA's member communities. For Alternative A, the cost analysis included the 4 private regional landfills that may accept SPSA's waste once the Regional Landfill is closed. Capital expenses for Alternative A range from $35,442,000 to $56,534,000, depending on the selected landfill, and include:

- Net present value of transfer equipment purchase/replacement costs

Operational expenses for Alternative A range from $34,893,000 to $35,462,000 per year, depending on the selected landfill, and include:

- Individual departments' costs for SPSA's operating system such as the accounting department, purchasing department, human resources, information technology, fleet maintenance and operation, and the cost of operating each transfer station, etc.
- Annual hauling costs (estimated for 4 private regional landfills)
- Contract disposal costs (a negotiated dollar per ton fee paid to regional private landfills to accept SPSA's incoming waste)

As described in Chapters 1 and 2, SPSA determined that solid waste capacity should be increased by incorporating an additional 16 million CY of capacity to meet the project purpose and need. Based on an annual depletion rate of 460,000 tons per year at an in-place density of 1,400 pounds per cubic yard, SCS Engineers (a landfill engineering company) estimates that 657,100 cubic yards per year would be consumed. Therefore, the approximate 16 million CY of capacity would provide roughly 25 years of disposal life.

Since operating costs are incurred each year that the landfill is in operation, the operating costs were multiplied across a 25-year timeframe. Cost estimates are presented in Table 25, capital expenses plus 25 years of operating expenses range between $915,711,000 and $951,028,000 depending on which of 4 off-site private landfills would accommodate SPSA's waste. Since the exact landfill that would be used in Alternative A is unknown and for purposes of comparison to other alternatives, an average Alternative A total cost of $940,352,250 was calculated.

Table 25. Alternative A Estimated Capital and Operational Expenses ($)

Facility	**Total Capital Costs**	**Total Operational Costs per year**	**Annualized Operational Costs**	**Post Closure Care Cost for Regional Landfill**	**Total Costs**
Atlantic Waste Disposal	53,019,000	35,381,000	884,525,000	7,944,000	945,488,000
Bethel Landfill	35,442,000	34,893,000	872,325,000	7,944,000	915,711,000
Brunswick Waste Management Facility	55,363,000	35,435,000	885,875,000	7,944,000	949,182,000
Shoosmith Sanitary Landfill	56,534,000	35,462,000	886,550,000	7,944,000	951,028,000
Average Alternative A Costs					**940,352,250**

Source: SCS Engineers (2023)

Alternative B

Under Alternative B, SPSA would expand its landfill operations into an expansion area, within which 2 new waste disposal cells (contiguous Cells VIII and IX) would be constructed. Cell VIII would be constructed first, followed by Cell IX. Existing facilities at the Regional Landfill – including administration and maintenance buildings, utilities (water, sewer, and power), scales, a tire shredding facility, a household hazardous waste facility, a landfill gas recovery system, access and haul roads, leachate sewer disposal, stormwater management systems, and gas management recovery systems – would continue to be used. Alternative B would not have an impact on population or housing trends. Employment opportunities and the “ripple effect” from businesses that follow the development are expected to be minor.

Capital costs for Alternative B are $134,808,800 and include the following items:

- Landfill cell development and closure costs (cost of closing a landfill once it reached capacity, primarily including construction of final cover system and environmental controls)
- Transfer equipment purchase/replacement costs
- Associated wetland mitigation credit purchase, estimated at a 2:1 ratio, assuming $40,000 per credit

Operational costs for Alternative B are $21,619,000 per year and include:

- Individual departments’ costs for SPSA’s operating system such as the accounting department, purchasing department, human resources, information technology, fleet maintenance and operation, and the cost of operating each transfer station, etc.
- Annual hauling costs (similar to the existing RLF hauling costs, primarily associated with moving waste from the transfer station network to the Regional Landfill)

The expansion area would increase landfill capacity by 16 million CY to meet the project purpose and need. Based on anticipated depletion and density rates, SCS Engineers anticipates that the expansion would provide roughly 25 years of disposal life. Since operating costs are incurred each year that the landfill is in operation, the operating costs were multiplied across a 25-year timeframe. Costs associated with this alternative are passed directly to the citizens living in SPSA’s member communities. Cost estimates are presented in Table 26. Capital expenses plus 25 years of operating expenses total $683,227,800.

Table 26. Alternative B Estimated Capital and Operational Expenses ($)

Scenario	Total Capital Costs	Total Operational Costs per year	Annualized Operational Costs	Post Closure Care Cost for Regional Landfill	Total Costs
Alternative B	134,808,800	21,619,000	540,475,000	7,944,000	683,227,800
Average Alternative A Costs					940,352,250
Alternative B Increment					**-257,124,450**

Source: SCS Engineers (2023)

Under Alternative B, the calculated cost estimates would be less than Alternative A because of the proximity of the existing Regional Landfill to transfer stations. Alternative

B proposes expansion of the Regional Landfill to develop new cells. The expansion results in impacts to wetlands and therefore requires the purchase of mitigation credits. Alternative A requires increased hauling and a larger vehicle fleet to manage the hauling need. Because SPSA operates as a not-for-profit, semi-governmental landfill, they can establish their own fee structure whereas Alternative A requires paying private market rate disposal fees. Therefore, Alternative B would result in a net cost benefit of $257,124,450 relative to the average cost for Alternative A and the overall impact to the local economy would be minimal.

Alternative C

Under Alternative C, the airspace between Cells V and VII would be filled in and utilized for landfilling operations. Construction and operation of Cells VIII and IX would still occur, but the footprint of Cell IX would be reduced relative to Alternative B. All other impacts from Alternative C would be very similar to impacts from Alternative B, as the impacts would occur in the same location but with a reduced wetland footprint, achieved by utilizing the site differently. Similar to Alternative B, there would be no impact on population or housing trends, and the impact on employment opportunities is expected to be minor.

Similar to capital and operational costs calculated for Alternative B, capital costs for Alternative C total $134,191,200 and include the following:

- Landfill cell development and closure costs (cost of closing a landfill once it reached capacity, primarily including construction of final cover system and environmental controls)
- Transfer equipment purchase/replacement costs
- Associated wetland mitigation credit purchase, estimated at a 2:1 ratio, assuming $40,000 per credit

Operational expenses for Alternative C total $21,619,000 per year and include:

- Individual departments' costs for SPSA's operating system such as the accounting department, purchasing department, human resources, information technology, fleet maintenance and operation, and the cost of operating each transfer station, etc.
- Annual hauling costs (similar to the existing RLF hauling costs, primarily associated with moving waste from the transfer station network to the Regional Landfill)

The expansion area would increase landfill capacity by 16 million cubic yards to meet the project purpose and need. Based on anticipated depletion and density rates, SCS Engineers anticipates that the expansion would provide roughly 25 years of disposal life. Since operating costs are incurred each year that the landfill is in operation, the operating costs were multiplied across a 25-year timeframe. Costs associated with this alternative are passed directly to the citizens living in SPSA's member communities.

Cost estimates are presented in Table 27. Capital expenses plus 25 years of operating expenses total $682,610,200.

Table 27. Alternative C Estimated Capital and Operational Expenses ($)

Scenario	Total Capital Costs	Total Operational Costs per year	Annualized Operational Costs	Post Closure Care Cost for Regional Landfill	Total Costs
Alternative C	134,191,200	21,619,000	540,475,000	7,944,000	682,610,200
Average Alternative A Costs					940,352,250
Alternative C Increment					**-257,742,050**

Source: SCS Engineers (2023)

Under Alternative C, the calculated cost estimates would be similar to those in Alternative B. Expansion of the Regional Landfill into the new cells would result in wetland impacts requiring purchase of mitigation credits. The associated mitigation credit purchase for Alternative C would be slightly less than Alternative B due to a reduced expansion footprint. Alternative C would result in a net reduced cost of $257,742,050 relative to Alternative A which would require increased hauling and a larger vehicle fleet to manage the hauling need. SPSA operates as a not-for-profit semi-governmental landfill and manages their own fee structure. Alternative A requires paying private market rate disposal fees. The overall impact to the local economy would be minimal under this alternative.

Alternative D

Under Alternative D, the existing Regional Landfill would close for landfill operations once Cell VII reached capacity (anticipated around 2037) but would continue to operate as a transfer station for the region. During the operation of Cell VII, soil stockpiling and borrowing would be done off-site, with material trucked in and out so that Cell VIII would not be used. Following the Regional Landfill's closure, a new landfill would be developed and operated from approximately 2037-2060 on Site SH30, a 330-acre site in Southampton County, Virginia.

Site SH30 is located in the westernmost section of the SPSA service area, which is the furthest from the main population centers, where the majority of the waste heading towards the landfill is generated.

Capital costs for Alternative D are $172,179,000 and include the following expenses:

- Landfill cell development and closure costs (cost of closing a landfill once it reached capacity, primarily including construction of final cover system and environmental controls)
- Net present value of transfer equipment purchase/replacement costs
- Associated wetland mitigation credit purchase, estimated at a 2:1 ratio
- Land acquisition cost

Operational costs for Alternative D are $23,867,000 per year and include the following expenses:

- Individual departments' costs for SPSA's operating system such as the accounting department, purchasing department, human resources, information technology, fleet maintenance and operation, and the cost of operating each transfer station, etc.
- Annual hauling costs
- Site SH30 post-closure care costs (annualized over the 25-year period that the landfill will be operational)

Development of Site SH30 would create 16 million CY of capacity to meet the project purpose and need. Based on anticipated depletion and density rates, SCS anticipates that new landfill would provide roughly 25 years of disposal life. Since operating costs are incurred each year that the landfill is in operation, the operating costs were multiplied across a 25-year timeframe. Costs associated with this alternative are passed directly to the citizens living in SPSA's member communities. Cost estimates are presented in Table 28. Capital expenses plus 25-years of operating expenses total $776,798,000.

Table 28. Alternative D Estimated Capital and Operational Expenses ($)

Scenario	Total Capital Costs	Total Operational Costs per year	Annualized Operational Costs	Post Closure Care Cost for Regional Landfill	Total Costs
Alternative D	172,179,000	23,867,000	596,675,000	7,944,000	776,798,000
Average Alternative A Costs					940,352,250
Alternative D Increment					**-163,554,250**

Source: SCS Engineers (2023)

Under this alternative, cost estimates would be less than Alternative A but more than Alternatives B and C due to the site location relative to regional transfer stations. Alternative D would require land acquisition and the purchase of wetland mitigation credits as a result of development. Development of a new landfill would also require an additional post-closure care cost since the site must be maintained for a 30-year period. These factors make Alternative D the second highest in total cost behind Alternative A, resulting in a net cost benefit of $163,554,250 relative to Alternative A.

Environmental Justice

The environmental justice (EJ) analysis has been prepared to identify and evaluate potential disproportionate and adverse project impacts on minority, low-income, and linguistically isolated populations. The concept of performing an EJ analysis is related to the establishment of EO 12898, entitled *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* and issued on February 11, 1994. The order requires federal agencies to identify and address any disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations (The White House 1994). Executive Order 12898 also requires federal agencies to work to ensure greater public participation in the decision-making process. In consideration of other applicable laws and regulations, Title VI of the Civil Rights Act of 1964 prohibits discrimination on the basis of race, color, and national origin (including individuals with limited English proficiency) in programs and activities receiving federal financial assistance (U.S. Code 1986).

Methodology

Environmental justice is defined by the EPA as the fair treatment and meaningful involvement of all people regardless of race, color, faith, national origin, or income, in the development, implementation, and enforcement of environmental laws, regulations, and policies (USEPA 2015). Guidance on addressing EJ and providing analysis to determine potential effects to communities is also outlined by the CEQ under NEPA (USEPA 2015). The guidelines intend to encourage meaningful public participation by minority or low-income communities in the environmental review process. The methodology to identify populations of concern primarily follows the approach identified in EPA's *Promising Practices for EJ Methodologies in NEPA Reviews* (Federal Interagency Working Group on Environmental Justice 2016). The VDOT's *Consultant Resource Guidance Document on Socioeconomics and Environmental Justice* (2016) for VDOT NEPA studies was also used in developing the EJ analysis methodologies described in detail below.

The assessment of EJ for the project involved the following:

- Identification of potential adverse environmental impacts and the area to be affected (i.e., establishing the EJ study area).
- Determination of whether potential adverse environmental impacts are likely to affect a potential EJ area (i.e., assessing whether low-income, minority, or linguistically isolated communities are present in the EJ study area).
- Evaluation of any significant adverse environmental impact on the potential EJ study area.
- Avoidance or minimization of any adverse environmental impact to the greatest extent practicable.

Delineation of the Environmental Justice Study Area (EJ Study Area)

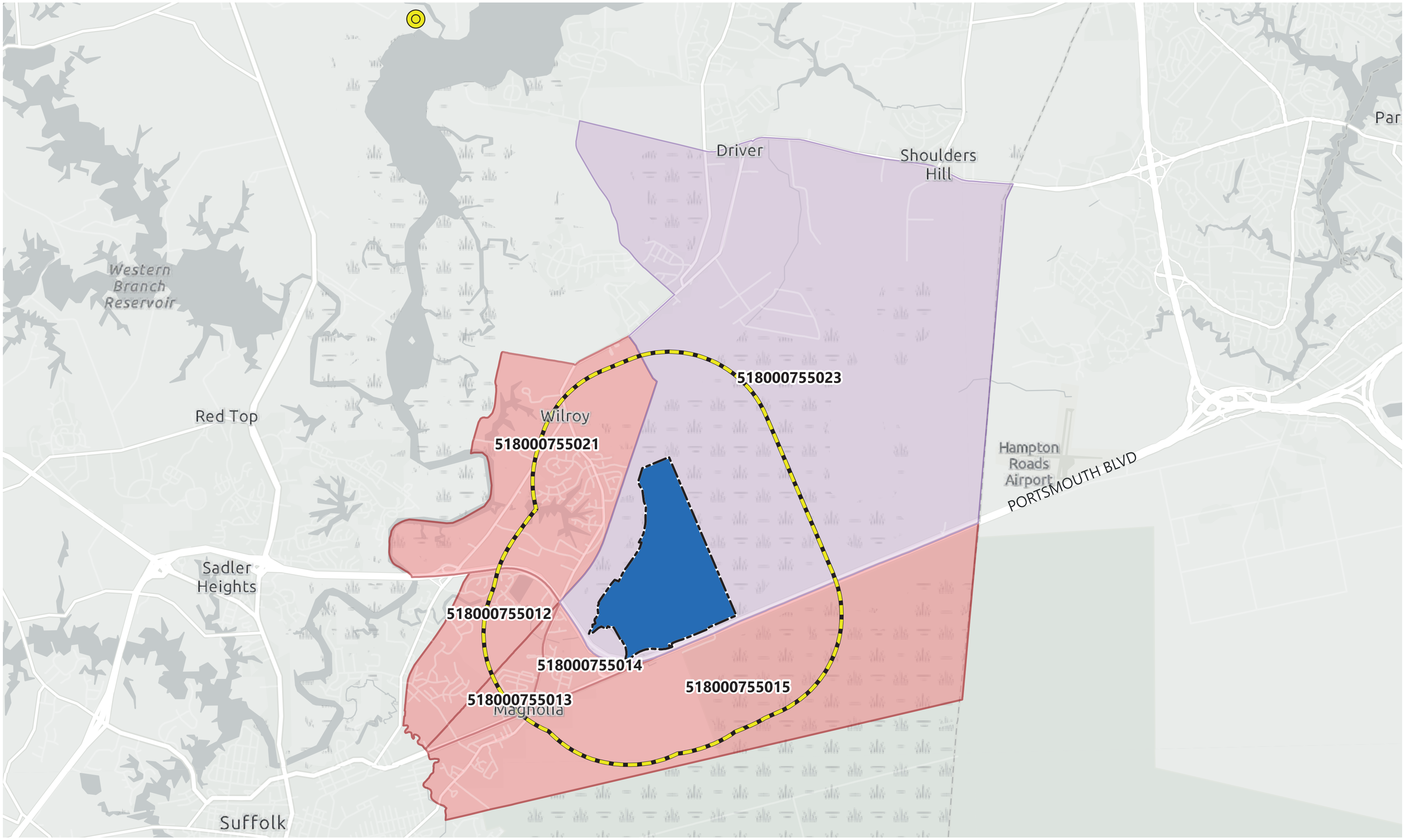
Modern landfills are well-engineered and managed facilities designed to responsibly manage the disposal of solid waste. They are located, designed, and monitored to protect the environment from contaminants which are present in the waste stream. Monitoring systems are required to identify signs of groundwater contamination and landfill gas through the requirements established under the Resource Conservation and Recovery Act (RCRA), Subtitle D (USEPA 2021a). Because of design and monitoring requirements defined in RCRA Subtitle D regulations, solid waste landfills are carefully regulated, managed, and designed to protect the environment from contaminants often found in the waste stream (USEPA 2021a). Restrictions associated with Virginia Solid Waste Management Regulations, detailed in 9 VAC 20-81-120, restrict siting a landfill disposal unit or leachate storage unit within 200 ft. of any residence, school, daycare center, hospital, nursing home, or recreational park area.

The EJ study area is intended to encompass the area most likely to be affected by the proposed project. A reasonable approach to defining the EJ study area involves including all existing groundwater and surface water monitoring wells within the EJ study area, as well as defining a geographic boundary to accommodate demographic characteristic data. Two EJ study areas were defined for analysis in this DEIS: 1 associated with Alternatives B and C, and another associated with Alternative D.

For the EJ analysis associated with Alternatives B and C, the EJ study area included all existing monitoring wells and all census block groups located within 1 mile of the project boundary of the expansion area on the Regional Landfill property. The 1-mile radius is consistent with the study areas employed for technical analyses associated with landfill practices, such as odor and aesthetics. For the purposes of this EJ analysis, U.S. Census Bureau block group data were determined appropriate as a unit of data to represent the potential presence of EJ populations. Block groups are the smallest census geography with data available for this analysis. As shown in Figure 38, the study area included 6 census block groups. Block groups with EJ communities are highlighted in this figure. A community is considered to be an EJ community if minority, low-income, or linguistically isolated populations are present (Federal Interagency Working Group on Environmental Justice 2016; VDOT 2016), all of which are defined in further detail below. The EJ study area depicted in Figure 38, associated with Alternatives B and C, is referred to as the SPSA Regional Landfill EJ study area.

This page intentionally left blank.

Source: ESRI Basemap Grey Canvas; EJSCREEN: ACS 2015-2019



LEGEND

🟦 SPSA Property Boundary (546.9 acres)

🟨 1 Mile Radius

🟪 Block Group

🟥 Environmental Justice Community

◎ VA Tribe Point

N

0 1 Miles

US Army Corps of Engineers

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

FIGURE 38

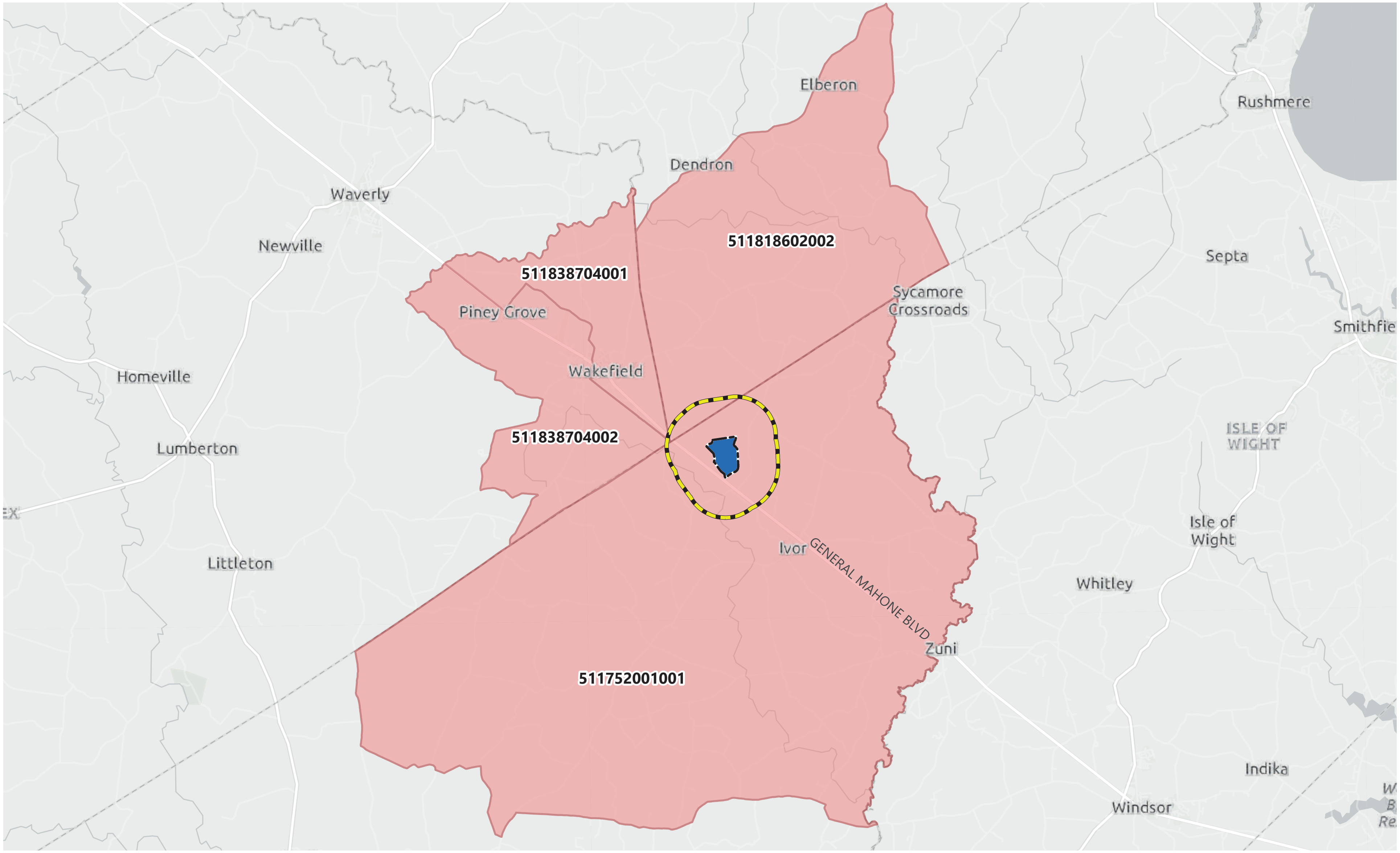
Study Area for Environmental Justice Analysis - SPSA Regional Landfill

This page intentionally left blank.

An EJ study area was also generated encompassing the project area associated with Alternative D, referred to in this section as the “Site SH30 EJ study area.” Under Alternative D, the existing landfill would be used until Cell VII reached capacity, and a new landfill would be developed off-site. This new off-site landfill would be located on a 330-acre parcel of land called Site SH30, in Southampton, Virginia, approximately 28 miles northwest of the existing landfill. Another search was therefore conducted to identify EJ communities on or near Site SH30, using the same methods described above. The EJ study area included Site SH30 and a 1-mile radius around the project boundary, as illustrated in Figure 39. The Site SH30 EJ study area included 4 census block groups. The block groups containing EJ communities are highlighted in Figure 39.

This page intentionally left blank.

Source: ESRI Basemap Grey Canvas; EJSCREEN: ACS 2015-2019



US Army Corps of Engineers

Environmental Impact Statement for Proposed Expansion of SPSA Landfill

FIGURE 39

Study Area for Environmental Justice Analysis - Site SH30

This page intentionally left blank.

Identifying Potential EJ Communities within the EJ Study Area

Potentially vulnerable or underserved communities, including minority, low-income and linguistically isolated populations, were considered in this analysis. Minority and low-income communities were defined in accordance with the strategies identified in the Federal Interagency Working Group on Environmental Justice's *Promising Practices for EJ Methodologies in NEPA Reviews* (2016) and in the VDOT *Consultant Resource Guidance Document on Socioeconomics and Environmental Justice* (2016). Additionally, the Norfolk District considered linguistically isolated populations for this EJ analysis, defined in accordance with *Promising Practices for EJ Methodologies in NEPA Reviews* (Federal Interagency Working Group on Environmental Justice 2016). The definitions used in this analysis are described as follows:

- *Minority Population*: Minority populations are defined as all individuals who list their racial status as a race other than white alone, list their ethnicity as Hispanic or Latino, or a combination of the two. This analysis defined a minority community as a census block group with a minority population equal to or greater than 50%, or a minority population, by percentage, that is "meaningfully greater" than the Virginia state average of 38%. The minority population for a census block group was be found to be "meaningfully greater" than the Virginia state average when the percentage of minority individuals within the census block group was 10% greater than the percentage of minorities residing within the state of Virginia (38%). Thus, census block groups with equal to or greater than 41.8% of people identifying as minorities were considered minority populations. All census block groups in the EJ study areas were evaluated using this threshold, and minority populations were identified by block group. Associated data is detailed as the percent minority in Table 29.
- *Low-Income Population*: Guiding principles in both the *Promising Practices for EJ Methodologies in NEPA Reviews* (Federal Interagency Working Group on Environmental Justice 2016), as well as the EPA's EJSCREEN web tool (USEPA 2022) were utilized to identify low-income populations in the EJ study areas. A low-income household was defined as a household with an income less than or equal to twice the federal poverty level (USEPA 2019). The federal poverty level thresholds vary based on household size. For example, the 2021 U.S. Census Bureau federal poverty level was defined as $26,500 for a family of 4 (ASPE 2021). The benchmark used by EJSCREEN to determine low-income status for 4-person households was therefore $53,000, twice the federal poverty level for a household of 4 (USEPA 2019). The percentage of low-income households within the EJ study area was compared with the percentage of low-income communities in the state of Virginia (25%) to determine which block groups in the study area contained low-income populations. Thus, for the purpose of this EJ analysis, a low-income community was defined as a census block group having a low-income population equal to or greater than 25% of the total population. All census block groups in the EJ study areas were evaluated using this threshold, and low-income populations were identified. Associated data are detailed as the percent low-income in Table 29.

- *Linguistically Isolated Populatio*n: A linguistically isolated population consists of households in which all members aged 14 years and older have difficulty speaking English proficiently. This analysis defined linguistically isolated populations as a census block group with a linguistically isolated population equal to or greater than 5% of the total population. All census block groups in the EJ study areas were evaluated using this threshold, and linguistically isolated populations were identified by block group. Associated data is detailed as percent linguistically isolated in Table 29.
- *Community of Concern:* A population was designated a "community of concern" if it was determined to be a potential EJ community based on the available data. An EJ community or community of concern in this analysis was defined as any census block group that was identified as a minority population, a low-income population, a linguistically isolated population, or some combination, based on the definitions provided here. Communities of concern identified during this analysis are listed in Table 29.

Affected Environment-Identification of Populations of Concern within the EJ Study Area

Demographic information was derived from the U.S. Census Bureau 2015-2019 American Community Survey (ACS) 5-year profile (U.S. Census Bureau 2019) and the EPA webtool EJSCREEN (USEPA 2021b). The first step in the process was the identification of minority, low-income, and linguistically isolated populations within the EJ SPSA Regional Landfill study area and the Site SH30 study area. Block groups with demographic data that met the thresholds for minority, low-income, and linguistically isolated communities, as described above, were identified as communities of concern and are therefore potential EJ communities.

Six block groups overlap the SPSA Regional Landfill EJ study area associated with Alternatives B and C. Demographic data from these 6 block groups was analyzed for the presence of potential EJ communities. Based on the methodology described above, the data describing the population in 5 of the study area's 6 block groups exceeded the threshold for definition as minority populations; and 3 of the study area's 6 block groups exceeded the threshold for definition as low-income populations. None of the EJ study area's 6 census block groups exceeded the threshold for definition as a linguistically isolated population. As shown in Table 29, all census block groups in the Regional Landfill study area, with the exception of the block group in which the existing Regional Landfill is located (Block Group 518000755023), were identified as communities of concern.

Four block groups overlap the Site SH30 EJ study area associated with Alternative D. Data from these 4 block groups was also analyzed to determine the presence of any potential EJ communities in the vicinity of this off-site alternative. Two of the 4 block groups met the demographic criteria for definition as a minority population. Data from all 4 block groups met or exceeded the threshold for definition as low-income populations. One block group in the Site SH30 study area was defined as linguistically isolated based on the definitions described above. As illustrated in Table 29, all 4 of the block groups in the study area were identified as communities of concern, including the block group in which Site SH30 lies (Block Group 511752001001).

Table 29. Communities of Concern

Alternatives B and C: On-site Landfill Expansion					
Census Block Group	**Population**	**Percent Minority**	**Percent Low-Income**	**Percent Linguistically Isolated**	**Community of Concern?**
518000755023*	883	36%	11%	0%	No
518000755015	949	**92%**	**64%**	0%	Yes
518000755014	667	**46%**	**32%**	2%	Yes
518000755013	1,085	**51%**	**63%**	0%	Yes
518000755012	1,786	**52%**	14%	1%	Yes
518000755021	1,948	**59%**	13%	0%	Yes
Total	**6,946**				
Alternative D: Off-site Landfill Expansion					
Census Block Group	**Population**	**Percent Minority**	**Percent Low-Income**	**Percent Linguistically Isolated**	**Community of Concern?**
511752001001*	2,585	35%	**40%**	0	Yes
511818602002	1,100	36%	**27%**	0%	Yes
511838704001	1,078	**51%**	**37%**	1%	Yes
511838704002	849	**50%**	**43%**	**5%**	Yes
Total	**5,612**				

Source: U.S. Census Bureau (2019)

*Block Group containing the project area

Gray shading indicates a percentage greater than or equal to the definitions set for minority, low-income, or linguistically isolated populations; see "Identifying Potential EJ Communities within the EJ Study Area" for additional information on definitions.

Environmental Consequences

One key criterion for an EJ analysis is whether adverse impacts identified in each of the environmental analysis categories studied would be disproportionately greater within communities of concern. In other words, would the impacts within minority, low-income, and linguistically isolated populations identified in the EJ study areas be appreciably more severe or greater in magnitude than those that would be experienced in non-minority, non-low-income, or non-linguistically isolated communities? Data as presented above and as verified using an EJSCREEN Report for each census block group indicate there are higher rates of presence of minority and low-income populations within the EJ study areas than the state averages of 38% and 25%, respectively (USEPA 2021b).

Alternative A

Under Alternative A, there would be no land clearing, construction, or operation of new landfill area. The existing Regional Landfill, located within Census Block Group

518000755023, would remain in operation as a transfer station but no landfilling activities would occur. Traffic and noise would be reduced from its current state as the primary function of the site would shift from an active landfill to a transfer station. No EJ communities of concern were identified within the Regional Landfill census block group. Therefore, no adverse impacts to any communities of concern are anticipated but community feedback would be considered before a final impact determination was made.

Alternatives B & C

The expansion area, where Cells VIII and IX would be constructed, located in Census Block Group 518000755023, is the area that would be most affected by the project, as all proposed work would occur within that area. There were no EJ communities identified in the Regional Landfill census block group. Public input would be considered in making final determinations on the potential occurrence of an EJ community located within the block group. The potential effects associated with the proposed on-site expansion are not anticipated to result in high and adverse impacts on the surrounding EJ communities in in a way that would be more severe or greater in magnitude than non-EJ community areas. However, the on-site expansion proposed under Alternatives B and C would consider community feedback in determining whether a disproportionate burden would occur.

Alternative D

Site SH30, the proposed location of the off-site landfill expansion alternative, lies within Census Block Group 511752001001. All proposed work associated with this alternative would occur within this block group. As illustrated in Table 29, Block Group 511752001001 is considered an EJ community, based on the criteria outlined above. The improvements proposed at SH30 under Alternative D would comply with the design and monitoring requirements defined in RCRA Subtitle D. Thus, the off-site landfill expansion is not anticipated to be a major source of pollution. Alternative D is therefore not anticipated to have any potential high and adverse impacts on the EJ community identified within Block Group 511752001001 or on any of the other surrounding EJ communities in a manner that would be appreciably more severe or greater in magnitude than non-EJ communities. The off-site expansion proposed under Alternative D would consider community feedback in determining whether a disproportionate burden would occur.

Cumulative Actions Considered

Historic Fill of Wetlands

Virginia has lost approximately 40% of its pre-colonial wetlands (USGS 1996). A study of wetland trends in southeastern Virginia between 1994 and 2000 showed a net loss of 2,100 acres (1.3%). More acres of vegetated wetlands were actually lost, but that loss was partially offset by gains in constructed pond and open water areas. The loss of palustrine wetlands was primarily due to conversion to uplands, while estuarine wetlands were lost through conversion to open water (Tiner et al. 2005). Several major causes of wetland loss in Virginia include conversion to other land cover types, climate change, hydrologic alterations, fragmentation, agriculture, transportation projects, and shoreline stabilization and armoring.

Urbanization in the Hampton Roads region of Virginia has adversely affected wetlands and other WOTUS by destroying and degrading wetlands, streams, rivers, ponds, or lakes, many of which were likely historic Great Dismal Swamp features. Development in the region has progressed over time, and streams have been channelized and cleared of meanders that were once available storage for periodic overflow. Stormwater detention ponds and roadside drainage conveyances were also constructed to help prevent flooding but created wetland conditions in historically dry areas.

In the reasonably foreseeable future, wetlands and other WOTUS will be most threatened in southeast Virginia on undeveloped lands that are under development pressure. The condition of wetlands and other WOTUS in urbanized areas east of the Great Dismal Swamp National Wildlife Refuge (NWR), which lies a few miles south of the Regional Landfill, is not expected to change dramatically in the future, as these areas are highly urbanized.

The Hampton Roads drainage basin, HUC 02080208 was the geographic scope considered for Alternatives B and C. This geographic area was selected because it is large enough to predict development trends and valid permit data is available. Approximately 35.24% of the watershed area in HUC 02080208 / Hampton Roads is wetland. The watershed contains over 113,000 acres of wetlands and approximately 1,348 stream miles, comprised of perennial, intermittent, and ephemeral tributaries.

The temporal scope covers 10 years of Corps permit data from ORM2, the Corps' database. During the period of August 2, 2012, through August 2, 2022, Norfolk District issued 1,886 permits in the Hampton Roads watershed (02080208). These permits consisted of 1 letter of permission, 788 nationwide permits, 1,027 regional permits, and 44 individual permits. Over the past 10 years, Norfolk District authorized 117 acres of permanent wetland impacts and 36,715 linear ft. of stream impacts. Norfolk District required 329 acres of wetland mitigation credits, 3,718 linear ft. of stream mitigation credits, and an additional 3,866 credits, which are most likely linear ft. based, within HUC 02080208 during this 10-year review period.

During the last 10 years, the largest wetland impacts were due to individual permits, such as for the Western Branch Reservoir Dam project, the Warehouse and Fulfillment Center on Northgate Commerce Parkway, the Virginia Regional Commerce Park, Centerpoint Intermodal Center, the widening of a 3.5-mile corridor of Route 58, Old Mill Road Bridge replacement, and the Copeland Road electric substation. These projects individually impacted less than 10 acres of wetlands and waters, and mostly less than 2 acres. Impacts to wetlands and waters were compensated at approved wetland mitigation banks or in-lieu fee programs within the watershed.

Future impacts are expected due to the proposed SPSA flyover, which is a VDOT project currently being reviewed. The Virginia Department of Transportation is the applicant, and their preferred alternative would permanently impact 4.33 acres of WOTUS. The wetlands impacts would be compensated with bank credits, as discussed above.

A proposed transportation project at Bowers Hill in Chesapeake would potentially impact over 100 acres of wetlands. This project is still being designed and could change through the permitting process. The applicant would be required to provide compensatory mitigation for all impacts.

The proposed Port 460 Logistics Center would permanently impact 0.27 acres of emergent wetlands, 0.84 acres of forested wetlands, 1.03 acres of open water, and 1,472 linear feet of non-tidal ditch/stream. It would also temporarily impact 0.12 square feet of forested wetlands. Approximately 3,279 linear feet of former streams that were impounded decades ago would be restored as on-site mitigation. The other impacts to WOTUS would be compensated through mitigation bank credit purchase.

Other future projects within the watershed would include commercial developments, residential subdivisions, warehouse and other storage lots, as well as infrastructure upgrades to utility lines and roadways. These projects would have the potential to individually and cumulatively impact wetlands and WOTUS in the watershed. Project impacts would be minimized to the greatest extent practicable and then compensatory mitigation would be used to offset the impacts. The projection for this watershed is that authorizations will continue at the current rate or potentially increase, because development has occurred continuously in the projects study area and is expected to continue. Natural resource issues of particular concern from Corps-authorized activities and other activities not authorized by the Corps are habitat loss, land-clearing, and hardening of surfaces, which contribute to increased runoff and sediment inputs to streams and wetlands.

For a review of the alternative site (SH30), the Blackwater River drainage basin, HUC 03010202 was the geographic scope considered for this action. This geographic area was selected because it is large enough to predict development trends and valid permit data is available. Approximately 15.63% of the watershed area in HUC 03010202 / Blackwater River is wetland. The watershed contains over 74,061 acres of wetlands and approximately 1,825 stream miles, comprised of perennial, intermittent, and ephemeral tributaries. The temporal scope covers 10 years of Corps permit data from ORM2, the Corps' database. During the period of May 11, 2013, through May 11, 2023, the Norfolk District issued 90 permits in the Blackwater River watershed (03010202). These permits consisted of 86 nationwide permits, 2 state program general permits, and 2 individual permits. Over the past 10 years, the Norfolk District authorized 36 acres of permanent wetland impacts and 17,000 linear ft. of stream impacts. The Norfolk District required 57.8 acres of wetland mitigation credits, 10,200 linear ft. of stream mitigation credits within HUC 03010202 during this 10-year review period. The impacts associated with authorization under the Nationwide permits were for road crossings, utility lines, single-family home construction, maintenance work, and construction of commercial and industrial developments. The state program general permits generally cover residential subdivisions or commercial and industrial developments. The individual permits were associated with a medical facility and for a roadway project.

Future impacts within the Blackwater River watershed will most likely be similar to past impacts. However, this corridor has seen an increase in development and additional pressures due to available land, which could equate to an increase in wetland and WOTUS impacts. Future commercial and industrial developments could result in wetland impacts, but careful adherence to avoidance and minimization practices could minimize future impacts, especially within this watershed where the large majority of the wetlands are present within swamps or ravines that are lower in topography than the adjoining developable land.

Previous Cell Construction at the Regional Landfill

According to the Norfolk District's 1977 aerial photographs, the location of the Regional Landfill's administration buildings, entrance roads, and the majority of Cell VI and approximately one-quarter of Cell V were previously active agricultural fields when the landfill property was purchased by SPSA (USACE 1977). This equates to slightly more than 100 acres of agricultural fields that were used for the Regional Landfill. Of the 270 acres of forested area that was previously developed into cells at the Regional Landfill, approximately 200 acres may have once been wetlands. Much of the land that was previously agricultural may have been wetlands that were historically part of the Great Dismal Swamp. Cell VII has already been permitted and its construction resulted in 12 acres of wetland impact, and material from Cell VII is currently being excavated to be used as cover on Cell VI (SPSA 2019). As compensation for 12 acres of wetland impacts related to the development of Cell VII, SPSA preserved 50 acres of forested wetlands, enhanced 36 acres of recently clearcut wetlands, and restored 12 acres of forested wetlands in the southeastern corner of the Regional Landfill property. Cell VII is anticipated to be operational between 2027 and 2037. Cell VII will be constructed according to SPSA's development plans. Once it reaches capacity, it will be closed with a final cover system. Cell VII, located immediately south of the proposed expansion site, will span 73 acres, with a 56.1-acre waste boundary (SPSA 2019). Previous cell construction has the potential to affect water resources, biological resources, transportation and traffic, cultural resources, and air quality and greenhouse gases.

VDOT Flyover Project

The VDOT flyover project is intended to alleviate safety issues for vehicles turning into the Regional Landfill. The flyover is anticipated to be constructed between eastbound and westbound U.S. Routes 13/58/460, to eliminate left turns into the Regional Landfill and to provide an alternative for traffic to enter the landfill without using the median crossing on this road (HDR 2016). This route is a high-speed corridor and the intersection at the entrance of the landfill also serves as the first point for a U-turn for vehicles traveling from the west (SPSA 2021c). Furthermore, this new flyover is a requirement of SPSA's 2017 CUP from the City of Suffolk, which requires a "grade separated entrance" into the landfill before Cell VII can be filled with waste (SPSA 2021c). Without the flyover, SPSA will not be able to expand the Regional Landfill into Cell VII. SPSA has indicated it would need the flyover regardless of whether the expansion into Cells VIII and IX are authorized and constructed, since the flyover is required for Cell VII.

The proposed location for the flyover is near the intersection of U.S. Routes 13/58/460, approximately 3,000 ft. east of the landfill entrance at the intersection of Bob Foeller Drive and Welsh Parkway (Suffolk News Herald 2021). The flyover design includes an eastbound exit ramp for traffic entering the landfill from the east, while traffic exiting the landfill will continue to use existing roads (Suffolk News Herald 2021). The design speed for the flyover will be 35 miles per hour (mph) (Suffolk News Herald 2021). It is likely the project will affect rights-of-way to 4 properties and that utilities in the area will need to be relocated (Suffolk News Herald 2021).

Construction is scheduled to begin in FY 2023 (SPSA 2020), with completion anticipated in April 2026 (SPSA 2021b). SPSA's cost for constructing the new flyover will be approximately $40 million, which it plans to fund by increasing municipal tipping fees beginning in FY 2022. This individual project has the potential to affect transportation and traffic, biological resources (wetlands), noise, and socioeconomics.

The VDOT flyover project is anticipated to permanently impact 2.98 acres of forested wetlands, 0.15 acre of emergent wetlands, 0.16 acre of scrub-shrub wetlands, and 1.04 acres of roadside ditches. Temporary impacts would include 1.68 acres of forested wetlands, 0.08 acre of emergent wetlands, 0.25 acres of scrub-shrub wetlands, and 1.2 acres of roadside ditches. The work would convert 6.3 acres of forested and scrub-shrub wetlands to emergent wetlands. VDOT would minimize wetland impacts by incorporating a 2:1 slope for the fill embankments and by tightening the footprint of the exit loop to the maximum allowable. Culverts placed within the embankment slopes would maintain hydrology on both sides of the embankment. Tree clearing would be avoided within the center of the exit loop. VDOT has proposed to mitigate for the permanent forested wetlands impacts at a 2:1 ratio, the scrub-shrub wetland impacts at a 1.5:1 ratio, the emergent wetland impacts at a 1:1 ratio, and the temporary forested wetland impacts at a 1:1 ratio for temporal loss. No mitigation is proposed for impacts to the roadside ditches. As proposed, 13.7 acres of mitigation would be provided for the project.

Columbia Gas Transmission Line Project – Proposed Virginia Reliability Project and Commonwealth Energy Connector Project

Staff of the Federal Energy Regulatory Commission (FERC) published a Notice of Intent (NOI) on November 1, 2022, to Prepare an Environmental Impact Statement that will review environmental impacts resulting from proposed pipeline replacement and expansion project. The project involves the replacement of approximately 49.2 miles of existing 12-inch-diameter VM-107 and VM-108 pipelines with 24-inch diameter pipeline. This would mostly occur within Columbia's existing right-of-way in Sussex, Surry, Southampton, and Isle of Wight Counties, as well as the Cities of Suffolk and Chesapeake, Virginia. The project would require clearing and trenching through wetlands in some locations, although many of the larger crossings would be directionally drilled to avoid wetland and WOTUS impacts. The Columbia Gas Transmission Line project is located within the James River, Chowan River, and Dismal Swamp basins. The project is anticipated to convert 18.94 acres of forested and scrub-shrub wetlands into emergent wetlands throughout the affected watersheds. Work within the Nansemond River watershed would temporarily impact 0.34 acres of wetlands and 2,752 linear feet of WOTUS during construction. Natural resource impacts are therefore likely to occur as a result of the proposed project and the potential for impacts is being assessed, as described in the NOI published on November 1, 2022.

SPSA Proposed Master Plan

As part of SPSA's CUP with the City of Suffolk for the construction of Cell VII, it provided a master plan to identify all potential future phases of development at the existing landfill. This plan is illustrated in Figure 5 (SPSA 2019). The areas proposed for Cells X-XII are predominantly wetlands and comprise approximately 168 acres. SPSA has proposed to preserve the 168-acre future expansion area through a declaration of restrictions. Preservation of the 168-acre area, including the standing timber, is part of SPSA's mitigation proposal and this preservation precludes these future cumulative impacts.

Potential Cumulative Impacts

Water Resources

Past, present, or reasonably foreseeable actions considered with the potential to affect water resources in the vicinity of the Regional Landfill include the historic filling of wetlands, Columbia Gas pipeline replacement and expansion project, the VDOT flyover project, the SPSA proposed master plan, and the Cell VII construction at the Regional Landfill. Implementation of Alternative A would not further contribute to the loss of water resources or to the degradation of water quality stemming from prior filling of wetlands associated with previous development of the Regional Landfill. Implementation of the VDOT flyover project and construction of Cell VII would not put water resources at greater risk of degradation with continued operation of the Regional Landfill under Alternative A, provided the landfill liner and leachate management systems continue to operate as designed.

Alternatives B and C are similar with respect to their potential impacts to water resources and would not add to adverse cumulative impacts associated with further development of the VDOT flyover project, the SPSA master plan, or the development of

Cell VII. The development of additional landfill cells would further alter local surface water and groundwater flow patterns that were initially altered by historic filling operations at the Regional Landfill, but it would not adversely affect surface water resources or groundwater quality. As noted in previous sections of Chapter 3, only a small portion of floodplain area is anticipated to be affected by the proposed action from the construction of perimeter roadways. The anticipated change in flood storage capacity resulting from development of Cells VIII and IX would be minimal, and landfill runoff would be conducted to the on-site stormwater management system. SPSA has proposed to preserve the 168-acre future expansion area through a declaration of restrictions. Preservation of the 168-acre area, including the standing timber, would provide a beneficial impact to downstream resources.

Under Alternative C, sea level rise may raise groundwater levels higher than present elevations but would not significantly alter surface water or groundwater flow directions, velocities, or discharge locations. Preservation of SPSA's future expansion area would provide additional flood storage which could mitigate the effects of sea level rise.

Alternative D would not contribute to other cumulative impacts since it is not in close proximity to where the cumulative actions would occur or have occurred.

Biological Resources

Wetlands

Past, present, or reasonably foreseeable actions that would affect wetlands include the VDOT flyover project, SPSA proposed master plan, historic fill of wetlands, and landfill development in Cell VII. Because Alternative A does not result in wetland impacts, it would not contribute to the incremental loss of wetlands from urbanization and development when added to past development of the SPSA facility and future development including the VDOT flyover project. The past, present, and reasonably foreseeable future actions described in this cumulative impacts analysis would continue to adversely affect wetlands. For example, past agricultural practices, such as clearing, draining, and filling, have impacted wetlands and other WOTUS throughout the region. Similarly, suburban sprawl has resulted in the filling of wetlands, impacting wetland functions on local and regional scales.

Alternative B would impact wetlands by removing wetlands, similar to past construction and operation at the landfill facility. To the extent that the cumulative impacts occur within the same watershed as the SPSA facility, there could be a cumulative loss of wetland function on a watershed scale. Cumulative impacts are expected to be minimized through compliance with state and federal laws and regulations that protect wetlands (e.g., CWA, Section 404), which mandate avoidance and minimization of wetland impacts and compensatory mitigation. Future actions that directly and indirectly affect these wetlands and other WOTUS would also be subject to mitigation as regulated by the federal Water Pollution Control Act of 2002, CWA, and EO 11990

(1977). SPSA purchased 83 credits from the Chesapeake Mitigation Bank, which is approximately 6.5 miles east of the expansion site. Like the proposed expansion site, the Chesapeake Mitigation Bank was constructed within historic Great Dismal Swamp, but now drains north to the Elizabeth River. The mitigation is within the same overall watershed (Hampton Roads) as Alternative B but would also provide benefits to the Great Dismal Swamp since the bank involved restoration of wetlands associated with the Great Dismal Swamp. Additionally, SPSA purchased 76 wetland credits from the Davis Wetlands Bank, which is approximately 15 miles southeast of the proposed expansion site. This bank also restored wetlands within historic Great Dismal Swamp area. The bank's service area includes most portions of the historic Great Dismal Swamp; however, it does not drain north towards the Hampton Roads watershed.

Preservation of 168 acres of on-site forested wetlands and preservation of 175.41 acres of the adjoining Nahra property, which contains wetlands and uplands, would help minimize future cumulative impacts from any future landfill expansion or from other commercial/industrial development. Conservation easements on the subject acreage would ensure that the areas remain forested providing wildlife habitat and the other benefits provided by forested wetlands.

Alternative C would also remove wetlands, but it would remove a smaller area of wetland than Alternative B. Therefore, it would not contribute as much to cumulative wetland impacts. Mitigation as described above in Alternative B would be similar for Alternative C and would utilize a combination of approaches.

Alternative D would also impact wetlands by developing a landfill facility requiring construction and operation over many years. Cumulative impacts would be minimized through compliance with state and federal laws and regulations that protect wetlands (e.g., CWA, Section 404), and mandate avoidance and minimization of wetland impacts with compensatory mitigation for unavoidable wetland impacts. Future actions that directly and indirectly affect these wetlands and other WOTUS would also be subject to mitigation as regulated by the federal Water Pollution Control Act of 2002, CWA, and EO 11990 (1977), *Protection of Wetlands*. Under Alternative D, SPSA would achieve wetland mitigation with a combination of approaches that could include wetland preservation, establishment of conservation easements, wetland restoration and enhancement, wetland creation, and in-lieu fee programs.

Protected Species

Past, present, or reasonably foreseeable actions that would impact protected species on or near the project area include the historic fill of wetlands, the VDOT flyover project, and the SPSA proposed master plan. These actions all have similar impacts – incidental take of protected species, as well as the destruction or degradation of suitable habitat for these species.

Historically, forested wetlands like the habitat on-site have been lost or fragmented to accommodate the development of roads, buildings, and infrastructure. The development of wetlands has restricted the range of many species that depend on this habitat type, reducing the area they can inhabit and restricting mobility between sites by fragmenting existing parcels of land. The construction of Cells VIII and IX requires the clearance of over 120 acres of forested wetlands. Implementation of the SPSA master plan, contingent upon the development of these first 2 cells, would eventually lead to the clearance of even more forested wetlands. Thus, both actions would further reduce the area of suitable forested wetland habitat available to protected species. The VDOT flyover project would also disrupt and fragment habitat, as well as increase the area of impervious surfaces near the site, which may increase stormwater runoff and pollutant loading into nearby wetlands. However, the impact of flyover construction is anticipated to be minimal compared to historic wetland fill and the on-site action alternatives.

Alternative A would not contribute to the loss of protected species, nor to the destruction or degradation of their habitat. Alternatives B and C would have very similar cumulative impacts, with Alternative C impacting 9 fewer acres of wetland habitat than Alternative B. Both alternatives would impact protected species through incidental take and habitat destruction and degradation. Alternatives B and C would result in a cumulative loss of forested wetland habitat and a reduction in the numbers of protected species anticipated on or near the project area. The cumulative impacts of Alternatives B and C, as well as the SPSA master plan, would be mitigated by compliance with the ESA, state threatened and endangered species regulations (Code of Virginia 2020, 2021), the Bald and Golden Eagle Protection Act, and the MBTA. Further, if either alternative is pursued, SPSA would explore mitigation options to offset these cumulative impacts. This might include wetland preservation, restoration, enhancement, or creation, all of which would increase the amount of suitable habitat available to protected species.

Alternative D would not contribute to other cumulative impacts since it is not in close proximity to where the cumulative actions would occur or have occurred.

Transportation and Traffic

Alternative A would divert traffic that had been using the Regional Landfill facility to other facilities around the state for processing and disposal. However, the VDOT Flyover Project would eliminate traffic safety concerns at the entrance to the Regional Landfill. Cumulative actions considered would have the potential to result in beneficial impacts to the existing transportation system in the project area.

Cumulative actions considered in association with Alternatives B and C are similar to those described in Alternative A and would result in beneficial impacts on the surrounding transportation system through the alleviation of safety concerns at the Regional Landfill entrance.

Alternative D would not contribute to other cumulative impacts since it is not in close proximity to where the cumulative actions would occur or have occurred.

Air Quality, Greenhouse Gas, and Climate Change

Alternative A would likely result in the least construction-related emissions because no further construction would occur beyond the development of Cell VII and the flyover. On the operational side, best management practices would have to be employed to reduce landfill gas emissions from Cell VII, in order to adhere to permit requirements until its closure in 2037. Following its closure, waste would need to be hauled to other area landfills for processing and disposal under this alternative, which would result in higher emissions associated with waste hauling, compared to other alternatives. However, cumulative actions considered would not have the potential to result in impacts to air in the project area. Therefore, there would be no cumulative impacts on air quality, greenhouse gases, and climate change under Alternative A.

Alternatives B and C would result in some adverse impacts to air quality due to construction activities. SPSA has proposed to preserve the 168-acre future expansion area through a declaration of restrictions. Preservation of the 168-acre area, including the standing timber, provides a beneficial impact. However, the other cumulative actions considered would not have the potential to result in impacts to air quality, greenhouse gases, and climate change. Therefore, there would be no cumulative impacts to this resource under Alternatives B and C.

Alternative D would not contribute to other cumulative impacts since it is not in close proximity to where the cumulative actions would occur or have occurred.

Noise

Alternative A would not result in cumulative impacts on noise. The cumulative actions considered would not have the potential to result in cumulative impacts that would add to the noise impacts associated with Alternatives B and C.

Alternative D would not contribute to other cumulative impacts since it is not in close proximity to where the cumulative actions would occur or have occurred.

Cultural Resources

There would be no cumulative impacts on cultural resources under Alternative A. Because Alternative A would have no impacts on cultural resources, it would not contribute to any impacts that would result from the cumulative actions considered.

The actions considered have the potential to result in cumulative impacts to cultural resources under Alternatives B, C, and D as described below.

The historic fill of wetlands through development and urbanization within the Hampton Roads region since the colonial period has resulted in a loss of the ancestral lands of Virginia Indian Tribes. This historic fill and development of Cells I through VI into an area that was once part of the Great Dismal Swamp region has resulted in a loss of the traditional cultural landscape that was a place of refuge during the colonial violence and expansion in the 17th century as well as a crucial region for resources and settlements well into the 19th century. Previous cell construction at the Regional Landfill also contributes to the further loss of this landscape. During this previous development, two archaeological sites (VDHR IDs 44SK0119 and 44SK0121) affiliated with the pre-contact Native American period were impacted in the area where Cells V and VI currently exist (VDHR 2020a, 2020b, 2020c). The SPSA Proposed Master Plan would contribute beneficial impacts to the overall cumulative impact on cultural resources if the conservation easement is established. A conservation easement would protect the ancestral lands of the Virginia Indian Tribes from further loss due to development in this area. Though the benefit would be limited to the conservation easement area, it would offset a portion of the adverse impact from the historic fill of wetlands in the vicinity of the Regional Landfill. Additional studies will be undertaken to determine the full cumulative impacts in coordination with Virginia Indian Tribes and other interested parties during the Section 404 permitting process.

VDOT assessed the impacts the flyover project would have on cultural resources during planning for that project. As documented in the Joint Permit Application for the VDOT flyover project dated February 14, 2023, it was determined that there would be no adverse effect on cultural resources (VDOT 2023); VDHR concurred with that determination on October 22, 2021. Therefore, the VDOT flyover project would not result in any cumulative impacts on cultural resources.

Socioeconomics

Implementation of Alternative A would put existing socioeconomic factors at risk of increased cost to residents to manage waste. Factors include increased tipping fees, high costs due to increased hauling distance, purchasing of long-haul equipment and the cost to construct the VDOT flyover project. Tipping fees would be increased to fund the flyover project and then reduced to cover normal operating and capital costs. Since costs are ultimately passed on to citizens, these factors could result in temporary adverse cumulative impacts on the economic stability of the SPSA service area.

Cumulative actions considered would result in higher costs to residents due to temporary increased tipping fees for the construction of the VDOT flyover project. All other cumulative actions considered are consistent and complementary with Alternatives B and C and would have the potential to result in beneficial cumulative impacts to socioeconomics because they are the most cost-efficient alternatives considered over the life of the landfill.

Cumulative actions considered would result in higher costs to residents due to temporary increased tipping fees for the construction of the VDOT flyover project. All other cumulative actions considered are consistent and complementary with Alternative D. Therefore, there would be no cumulative impacts on socioeconomics under Alternative D.

Environmental Justice

Cumulative impacts on environmental justice under all alternatives considered would remain open to feedback received during the public comment process and forthcoming meetings. After public input is received, a statement of impact would be developed accordingly.

The Environmental Justice Index (EJI) was referenced to better understand community burden in the census tracts where proposed action would occur. The EJI utilizes data from several national sources and ranks each census tract based on 36 environmental, social, and health factors. In accordance with the Centers for Disease Control and Prevention, each census tract receives a percentile ranking that represents the proportion of tracts that are equal to or lower than a tract of interest in environmental burden. For example, a EJI ranking of 0.85 signifies that 85% of tracts in the nation likely experience less severe cumulative impacts from environmental burden than the tract of interest, and that 15% of tracts in the nation likely experience more severe cumulative impacts from environmental burden.

The Regional Landfill census tract has an overall EJI rank of 0.29 indicating that 29% of tracts in the nation likely experience less severe cumulative impacts of community burden and that 71% of tracts in the nation likely experience more severe cumulative impacts from environmental burden than the tract in which the Regional Landfill occurs. Adverse factors contributing to the overall ranking include proximity to a Risk Management Plan site, lack of walkability, and the presence of a nearby airport.

The EJI rank of the census tract in which site SH30 is situated is 0.49 indicating that 49% of tracts in the nation likely experience less severe cumulative impacts of community burden and that 51% of tracts in the nation likely experience more severe cumulative impacts from environmental burden than the tract in which site SH30 occurs. Adverse factors contributing to the overall ranking include the lack of nearby recreational parks, lack of community walkability, and a high percentage of mobile homes in the tract. Two out of 5 health parameters were also contributing factors and include high estimates of increased blood pressure and high estimates of the prevalence of diabetes (CDC 2023).

Chapter 4: Consultation and Coordination

Project coordination involved collaboration with the public, as well as with local, state, and federal officials. Coordination took place to ensure the public and all stakeholders remain well informed and engaged throughout the project, and to satisfy requirements under NEPA and other agency requirements. This chapter describes the public involvement and agency consultation undertaken leading up to and during the preparation of this DEIS. A combination of activities, including alternatives development and planning workshops, public scoping, and agency briefings, helped to guide the project team in developing this DEIS. This chapter provides a detailed list of the various consultations initiated during the development of the DEIS.

The project team has made a diligent effort to involve the interested and affected public in this planning and NEPA process. This involvement, known as scoping, occurs at the beginning of the process to identify the range of issues, resources, and alternatives to address in the environmental assessment. Public scoping is conducted to address these elements. State and federal agencies were contacted to uncover any additional planning issues and to fulfill statutory requirements, as described below.

Public Scoping

NEPA requires an early and open process for identifying the significant issues related to a proposed action and determining the scope of issues to be addressed in NEPA documentation. This process is referred to as scoping and is one of several public involvement aspects of the NEPA EIS process.

Initial public scoping for the EIS was conducted from July 31 through September 14, 2020. In accordance with the Corps' *Interim Army Procedures for National Environmental Policy Act (NEPA)* in response to the coronavirus (COVID-19) pandemic, the Norfolk District conducted the scoping on a virtual platform allowing continuous online access throughout the scoping period.

The Notice of Intent for the DEIS was issued on July 27, 2020, in the *Federal Register* (Vol. 85, No. 144). In this notice, the Norfolk District invited the public to participate in scoping for the DEIS and announced the accessibility of the project's virtual meeting room.

Subsequently, based on comments received and further analysis, the Norfolk District refined the preliminary range of alternatives and identified 2 on-site alternatives, as well as 6 potential off-site alternatives for potential evaluation in the EIS. The Norfolk District then invited members of the public to visit the virtual public scoping room during an additional scoping period held from December 17, 2020, through January 18, 2021.

Agency and Tribal Coordination

Consultation took place with a number of federal, state, and local agencies, as well as interested federally recognized Indian tribes in Virginia. Coordination with agencies helped identify necessary compliance, relevant guiding regulations, as well as required permits. Coordination is ongoing. Below is a list of agencies consulted before and during the process of preparing this DEIS.

Federal

- USACE: Permitting of the proposed improvements will be required under Section 404 of the CWA and under Sections 10 and 14 (408 compliance) of the Rivers and Harbors Act.
- USFWS: Given that this project may affect but is not likely to adversely affect federally threatened or endangered species or designated critical habitat, informal consultation is required under Section 7 of the ESA to acquire concurrence with this determination from the Corps. The Corps will reinitiate consultation if the project area changes or if federally listed species are encountered.
- NOAA National Marine Fisheries Service (NMFS): Given that this project may affect, but is not likely to adversely affect, federally threatened or endangered species or designated critical habitat, informal consultation will be required under Section 7 of the ESA to acquire concurrence with this determination from NMFS for species under their jurisdiction. Given that no essential fish habitat is designated within the project area, consultation will not be required under the Magnuson-Stevens Fishery Conservation and Management Act.
- FEMA: FEMA review is anticipated for confirmation of no net rise based on fill from the waste disposal footprint within the floodplain.
- NHPA: Section 106 of the NHPA requires a consultative process to identify historic properties; assess project impacts to historic properties; and avoid, minimize, or mitigate adverse effects prior to approval to use federal funds. Consultation under Section 106 remains ongoing and is conducted concurrently to but separately from this DEIS. The Norfolk District is consulting and coordinating with the State Historic Preservation Officer and federally recognized Indian tribes in Virginia who have requested consulting party status. Section 106 consultation may be completed during the Section 404 permit process.

State

- VDEQ: The project may require various approvals from VDEQ to demonstrate compliance with several acts and authorities, such as the Virginia Coastal Zone Management Program (EO 35, 2014), Stormwater Management (9 VAC 25-880), Section 401 of the CWA, and Solid Waste Compliance Program. According to 9 VAC 20-81-120, landfill development impacting greater than 2 acres of wetlands is prohibited. Special exemptions in subsection A(i) of Virginia statute § 10.1-1408.5 would allow SPSA to expand the Regional Landfill in the City of Suffolk even if wetland impacts are greater than 2 acres. Relatedly, the exemption in Virginia statute § 10.1-1408.5.F also applies to this project, which grants an exemption to 9 VAC 20-81-120. Thus, offsite alternatives with greater than 2 acres of wetland impacts could potentially be approved through the subsection F exemption process. The Corps recognizes that the exemption F of section § 10.1-1408.5 may be procedurally unclear or difficult and that additional information concerning this exemption process may more narrowly define the off-site alternative's practicability.

- Virginia Marine Resources Commission (VMRC): The project may require approval from VMRC for activities occurring over, under, or on state-owned land (4 VAC 20-1330-10 et seq).
- VDHR: Consultation will take place under Section 106 of the NHPA, as described above.

Local

- Suffolk Wetlands Board: The project may require review and approval from the Suffolk Wetlands Board, in accordance with Chapter 13 of Title 28.2 of the Code of Virginia.
- Suffolk Chesapeake Bay Preservation Act: A Chesapeake Bay Preservation Area (CBPA) is defined as any land designated by the city, pursuant to Part III of the management regulations, 9 VAC 10-20-70, and Virginia statute § 10.1-2107. A CBPA consists of a resource protection area and a resource management area. There are CBPAs located throughout the proposed project area. Coordination and compliance efforts with Suffolk's Environmental Services office are anticipated.
- Southampton County Environmental Services Division: the Environmental Services Division is responsible for administering local Erosion and Sediment Control and Stormwater Management programs to ensure compliance with state and federal regulations. Coordination and compliance with this division are anticipated.

Tribal Nations

- Chickahominy Indian Tribe
- Chickahominy Indian Tribe – Eastern Division
- Monacan Indian Nation
- Nansemond Indian Nation
- Pamunkey Tribe
- Rappahannock Tribe, Inc.
- Upper Mattaponi Tribe

Dates of specific tribal coordination efforts are provided below, including the nature of the coordination/correspondence:

- July 31, 2020: correspondence concerning scoping for the DEIS
- January 12, 2021: correspondence concerning scoping for off-site alternatives
- February 26, 2021: Consulting Party Meeting #1 with Tribes

- June 23, 2021: Consulting Party Meeting #2 with Tribes
- October 13, 2021: Consulting Party Meeting #3 with Tribes
- December 7, 2021: Regional Landfill site visit with Tribes, VDEQ, and EPA
- January 3, 2022: Government-to-Government consultation to discuss specific tribal concerns
- March 15, 2022: Consulting Party Meeting #4 to discuss environmental concerns with Tribes
- April 25, 2023: meeting to discuss preliminary DEIS

Public review

Scoping letters received to date are available on the website detailed below. The SPSA Landfill Expansion Project DEIS will be available for public and agency review for 60 days and has been distributed to interested individuals, agencies, and organizations. It is also available on the internet at the following link: http://projects.vhb.com/spsa-eis/.

List of Preparers

VHB

Staff	Title
Neville Reynolds	Principal
Kimberly Blossom	Project Manager, Senior Environmental Scientist
Kara Opel	Project Coordinator, Environmental Planner
Sean Murray	Senior Environmental Scientist
Doug DeBerry	Senior Environmental Scientist
Margaret Beavers	Environmental Scientist
Heidi Richards	Director, Air Quality and Noise Services
Mark Arnoldy	Air Quality Engineer
Ian Pike	Multimodal Engineer
Sean Becker	Senior Traffic Engineer
Ian Smith	Senior Water Resources Engineer
Erin Leatherbee	Preservation Planner
Kirsten Tynch	Managing Director, Virginia Beach
Laurent Cartayrade	Environmental Planner
Donny Goris-Kolb	Senior Sustainability Planner
Gina Martini	Senior Project Manager
Casey McLaughlin	Biologist
Ben DeJong	Senior Geologist
J.D. Hines	Senior Project Manager
Lizzy Duffy	Air Quality and Noise Analyst
Jason Ross	Director, Noise and Vibration Services
Candice Andre	Senior Project Planner
Donald Brown	Senior Project Planner
Clay Robertson	Environmental Scientist

U.S. Army Corps of Engineers

Staff	Title
Melissa Nash	Environmental Scientist, Project Manager
Peter Kube	Chief, Eastern Virginia Regulatory Section
John Everett	Attorney

Contributors

SCS Engineers

Staff	Title
Bob Gardner	Senior Vice President
Keith Matteson	Project Director
Ray Huff	Vice President

HDR

Staff	Title
Jeff Murray	Landfill Practice Leader
Josh Mace	Wetland Scientist

James River Institute for Archaeology (JRIA)

Staff	Title
Matthew Laird	Partner & Senior Researcher

Literature Cited

ABC News. 2022. Greenpeace report finds plastics recycling is a dead-end street. October 27, 2022.

Bartholomew, M.K., C.J. Anderson, and J.F. Berkowitz. 2020. Wetland vegetation response to groundwater pumping and hydrologic recovery. Wetlands Restoration 40: 2609-2619.

Blehert, D.S., A.C. Hicks, M. Behr, C.U. Meteyer, B.M. Berlowski-Zier, E.L. Buckles, J.T.H. Coleman, S.R. Darling, A. Gargas, R. Niver, J.C. Okoniewski, R.J. Rudd, and W.B. Stone. 2009. Bat white-nose syndrome: An emerging fungal pathogen? Science 323: 227.

California Academy of Sciences and the National Geographic Society. 2023a. iNaturalist: Great Dismal Swamp National Wildlife Refuge Check List. https://www.inaturalist.org/check_lists/567823-Great-Dismal-Swamp-National-Wildlife-Refuge-Check-List?iconic_taxon=40151. Accessed 31 May 2023.

California Academy of Sciences and the National Geographic Society. 2023b. iNaturalist: Southampton County, US, VA. https://www.inaturalist.org/places/southampton-county#taxon=40151. Accessed 31 May 2023.

Center for Coastal Resources Management, Virginia Institute of Marine Science (VIMS). 2018. Forecasting Coastal Water Levels in Virginia. Virginia Institute of Marine Science, College of William and Mary, Gloucester, Virginia, USA.

VIMS. 2023. U.S. Sea-Level Report Cards. https://www.vims.edu/research/products/slrc/index.php. March 7, 2023.

Centers for Disease Control and Prevention, Agency for Toxic Substances and Disease Registry (ATSDR). 2023. Environmental Justice Index. 2 June 2023. https://www.atsdr.cdc.gov/placeandhealth/eji/index.html. Accessed 5 Junee 2023.

Chesapeake Bay Program. 2023a. Wetlands. https://www.chesapeakebay.net/issues/whats-at-risk/wetlands#:~:text=Current%20restoration%20goals,of%20degraded%20wetlands%20by%202025. Accessed 31 May 2023.

Chesapeake Bay Program. 2023b. Chesapeake Progress: Wetlands. https://www.chesapeakeprogress.com/abundant-life/wetlands. Accessed 31 May 2023.

City of Suffolk. 2015. Zoning: Floodplain Overlay District (F). Sec. 4(a-f).

City of Suffolk. 2016. Code of Ordinances: Noise, Sec. 34(186-190).

Code of Virginia. 1989. Virginia Flood Damage Reduction Act of 1977, as amended by the 1989 Session of the Virginia General Assembly, Sec. 6(1). Virginia Department of Conservation and Recreation (VDCR), Richmond, Virginia, USA.

Code of Virginia. 2011. Landfill Siting Requirements, as amended by the 2011 Session of the Virginia General Assembly, Sec. 81(9 VAC 20-81-120).

Code of Virginia. 2014. Declaration of Groundwater Management Areas of 1989, as amended by the 2014 Session of the Virginia General Assembly, Sec. 600(9 VAC 25-600-20).

Code of Virginia. 2019. Groundwater Monitoring Program of 2011, as amended by the 2019 Session of the Virginia General Assembly, Sec. 81(9 VAC 20-81-250).

Code of Virginia. 2020. Virginia Endangered Plant and Insect Species Act of 1985, as amended by the 2020 Session of the Virginia General Assembly, Sec. 320(2 VAC 5-320-10). Virginia Board of Agriculture and Consumer Services, Chesapeake, Virginia, USA.

Code of Virginia. 2021. Virginia Endangered Species Act of 1973, as amended by the 2021 Session of the Virginia General Assembly, Sec. 20(4 VAC 15-20-130).

Council on Environmental Quality (CEQ). 1997. Considering Cumulative Effects Under the National Environmental Policy Act (NEPA). Council on Environmental Quality, Washington, D.C., USA.

CEQ. 2005. 1978 CEQ regulations for implementing NEPA – effects, as amended. Sec. 40 (1500-1508).

CEQ. 2023. National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change. Executive Office of the President. Washington, D.C., USA. January 9, 2023.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Department of the Interior, Washington, D.C., and U.S. Fish and Wildlife Service, Office of Biological Services, Gloucester, Virginia, USA.

Dahl, T.E. 2006. Status and trends of wetlands in the conterminous United States 1998 to 2004. U.S. Department of the Interior, Washington, D.C., and U.S. Fish and Wildlife Service, Office of Biological Services, Gloucester, Virginia, USA.

Deeley, S., J.B. Johnson, W.M. Ford, and J.E. Gates. 2021. White-nose syndrome-related changes to Mid-Atlantic bat communities across an urban-to-rural gradient. BMC Zoology 6: 1-11.

DelBel, A. 2022. Is recycling a waste? Hampton Roads cities weigh the high cost of recycling. WTKR. 17 August 2022.

Ducks Unlimited. 2021. DU Projects: Atlantic Flyway. <http://www.ducks.org/conservation/where-we-work/flyways/du-projects-atlantic-flyway>. Accessed 8 September 2021.

Eigenbrod, F., S.J. Hecnor, and L. Fahrig. 2009. Quantifying the road-effect zone: Threshold effects of a motorway on anuran populations in Ontario, Canada. Ecology and Society 14: 24.

Fahrig, L., and T. Rytwinski. 2009. Effects of roads on animal abundance: An empirical review and synthesis. Ecology and Society 14: 21.

Fairman, C.M., L.L. Bailey, R.M. Chambers, T.M. Russel, and W.C. Funk. 2013. Species-specific effects of acidity on pond occupancy in ambystoma salamanders. Journal of Herpetology 47: 346-353.

Federal Aviation Administration (FAA). 2020. Advisory Circulars 150/5200-33C: Hazardous Wildlife Attractants on or near Airports. Office of Airport Safety and Operations – Airport Safety & Operations Division, Washington, D.C., USA.

Federal Emergency Management Agency (FEMA). 2021. FEMA Flood Map Service Center. <https://msc.fema.gov/portal/home>. Accessed September 2021.

FEMA. 1990. Flood Insurance Study for City of Suffolk, Virginia, Independent City. Federal Emergency Management Agency, Hyattsville, Maryland, USA.

Federal Interagency Working Group on Environmental Justice. 2016. Promising Practices for EJ Methodologies in NEPA Reviews. United States Environmental Protection Agency (USEPA), Washington, D.C., USA.

Federal Transit Administration (FTA). 2018. Transit noise and vibration impact assessment manual, Report No. 0123. John A. Volpe National Transportation Systems Center, Cambridge, Massachusetts, USA.

First Street Foundation. 2021. FloodFactor. <https://floodfactor.com/>. Accessed September 2021.

Fishbase. 2022. *Enneacanthus chitodon*: Blackbanded Sunfish. <https://www.fishbase.se/Summary/SpeciesSummary.php?ID=3367&AT=blackbanded+sunfish/>. Accessed 8 Aug 2022.

FishMap.org. 2022. Blackbanded Sunfish – *Enneacanthus chaetodon*. <https://fishmap.org/species/Blackbanded-Sunfish.html>. Accessed 27 Sept 2022.

Forman, Richard T., and R.D. Deblinger. 2000. The ecological road-effect zone of a Massachusetts (USA) suburban highway. Conservation Biology 14, 36-46.

Francl, K.E., W.M. Ford, D.W. Sparks, and V. Brack, Jr. 2012. Capture and reproductive trends in summer bat communities in West Virginia: Assessing the impact of white-nose syndrome. Journal of Fish and Wildlife Management 3: 33-42.

Goetz, S M., C.E. Petersen, R.K. Rose, J.D. Kleopfer, and A.H. Savitzky. 2016. Diet and foraging behaviors of timber rattlesnakes, *Crotalus horridus*, in Eastern Virginia. Journal of Herpetology 50: 520-526.

Hampton Roads District Planning Commission (HRDPC). 2020. Regional Solid Waste Management Plan for Southeastern Virginia, last amended August 2020.

HRPDC. 2016. Regional Solid Waste Management Plan for Southeastern Virginia, last amended August 2016.

Harper, S. 2010. Localities still recycled after SPSA dropped service. The Virginian-Pilot. 23 March, 2010.

HDR Engineering, Incorporated (HDR). 2007. Hydrogeologic & geotechnical investigation of Cell VII, Southeastern Public Service Authority Regional Landfill. HDR Engineering, Incorporated, Norfolk, Virginia, USA.

HDR. 2008. Aquifer test report SPSA Regional Landfill Cell VII Suffolk, Virginia. HDR Engineering, Incorporated, Norfolk, Virginia, USA.

HDR. 2016. Traffic Impact Study: Conditional Use Permit and Conditional Rezoning Application. HDR Engineering, Incorporated, Virginia Beach, Virginia, USA.

HDR. 2019a. Hydro-geo investigation Cells VIII & IX. HDR Engineering, Incorporated, Virginia Beach, Virginia, USA.

HDR. 2019b. Preliminary base flood elevation establishment: SPSA Regional Landfill. HDR Engineering, Incorporated, Raleigh, North Carolina, USA.

HDR. 2021a. Detection, Assessment and Corrective Action Water Quality Monitoring Report: 4th Quarter & Annual Report 2020 for Southeastern Public Service Authority Regional Landfill. HDR Engineering, Incorporated, Raleigh, North Carolina, USA.

HDR. 2021b. SPSA Regional Landfill January 2021 Groundwater Surface Map. HDR Engineering, Incorporated, Virginia Beach, Virginia, USA.

Karidis, A. 2019. The State of Waste-to-Energy in the U.S. Waste 360. 26 March 2019. https://www.waste360.com/waste-energy/state-waste-energy-us. Accessed 16 September 2022.

James River Institute for Archaeology, Incorporated (JRIA). 2021. Phase 1A Cultural Resources Assessment of the Proposed SPSA Regional Landfill Expansion Area, Suffolk, Virginia, USA. DHR File No. 2021-3845; NAO-1988-00021.

JRIA. 2022. Phase 1A Cultural Resources Assessment of the Proposed SPSA Regional Landfill SH30 Alternative, Southampton County, Virginia. DHR File No. 2021-3845; NAO-1988-00021.

Jenkins, R.E. and N.M. Burkhead. 1994. Freshwater Fishes of Virginia. American Fisheries Society. Bethesda, Maryland. 1,079 pp.

Kaine, T. 2022. Warner & Kaine Applaud Passage of Legislation to Protect the Great Dismal Swamp. 21 December 2022. https://www.kaine.senate.gov/press-releases/warner-and-kaine-applaud-passage-of-legislation-to-protect-the-great-dismal-swamp. Accessed 2 June 2023.

Kaine, T. No Date. The Great Dismal Swamp National Heritage Area Act. https://www.kaine.senate.gov/imo/media/doc/the_great_dismal_swamp_national_heritage_area_act_one_pager.pdf. Accessed 2 June 2023.

Ligon, J.D. 1970. Behavior and breeding biology of the red-cockaded woodpecker. The Auk 87: 255-278.

McMahon & Mann Consulting Engineering and Geology, P.C. 2023. Chaffee MSE Wall. https://www.mmce.net/specialties/retaining-wall-design/chaffee-mse-wall. Accessed February 2023.

Menzel, A.M., F. O. Sheldon, W.M. Ford, J.W. Edwards, P.B. Wood, B.R. Chapman, and K.V. Miller. 2002. Roost tree selection by northern long-eared bat (*Myotis septentrionalis*) maternity colonies in an industrial forest of the central Appalachian Mountains. Forest Ecology and Management 155: 107-114.

Nansemond River Preservation Alliance (NRPA). 2018. State of the Nansemond River Report & Report Card. Nansemond River Preservation Alliance, Suffolk, Virginia, USA.

National Aeronautics and Space Administration (NASA). 2019. The atmosphere: Getting a handle on carbon dioxide. <https://climate.nasa.gov/news/2915/the-atmosphere-getting-a-handle-on-carbon-dioxide/>. Accessed September 2021.

National Oceanic and Atmospheric Association's (NOAA) National Weather Service. 2017. NOAA Atlas 14-point Precipitation frequency estimates. <https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html>. Accessed September 2021.

NOAA. 2021a. Basics of the carbon cycle and the greenhouse effect. <https://gml.noaa.gov/education/carbon_toolkit/>. Accessed September 2021.

NOAA. 2021b. Teacher background: Carbon dioxide and the carbon cycle. <https://gml.noaa.gov/education/info_activities/pdfs/TBI_co2_and_the_carbon_cycle.pdf>. Accessed September 2021.

Natureserve. 2022. *Enneacanthus chitodon*: Blackbanded Sunfish. < https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.100892/Enneacanthus_chaetodon/>. Accessed 8 Aug 2022.

Niccoli, J.R., and J.D. Kleopfer. 2013. Status of Mabee's salamander, Ambystoma mabeei, in Virginia: A spatial comparison of habitat condition at sites of known occurrence. Banisteria 41: 85-92.

Office of the Assistant Secretary for Planning and Evaluation (ASPE). 2021. Poverty guidelines. <https://aspe.hhs.gov/topics/poverty-economic-mobility/poverty-guidelines>. Accessed 9 September 2021.

Patton, D.T., L. Rouse, and J.C. Stromberg. 2007. Isolated spring wetlands in the Great Basin and Mojave Deserts, USA: Potential response of vegetation to groundwater withdrawal. Environmental Management 41(3): 398-413.

Perkins, D.J., B.N. Carlsen, M. Fredstrom, R.H. Miller, C.M. Rofer, G.T. Ruggerone, and C.S. Zimmerman. 1984. The effects of groundwater pumping on natural spring communities in Owens Valley. In: Warner RE, Hendrix KM (eds). California riparian systems; ecology, conservation, and productive management. University of California Press, Berkeley, California, USA.

Perry, R.W., and R.E. Thill. 2007. Roost selection by male and female northern long-eared bats in a pine-dominated landscape. Forest Ecology and Management 247: 220-226.

Reynolds, R.J., K.E. Powers, W. Orndoff, W.M. Ford, and C.S. Hobson. 2016. Changes in rates of capture and demographics of *Myotis septentrionalis* (northern long-eared bat) in Western Virginia before and after onset of White-nose Syndrome. Northeastern Naturalist 23: 195-204.

Rojas, V.G., J.M. O’Keefe, and S.C. Loeb. 2017. Baseline capture rates and roosting habits of *Myotis septentrionalis* (northern long-eared bat) prior to White-nose Syndrome selection in the Southern Appalachians. Southeastern Naturalist 16: 140-148.

SCS Engineers. 2023. Analysis of Potential Hauling and Landfill Operations Greenhouse Gas (GHG) Impacts for the SPSA Regional Landfill and Alternative Landfill Sites.

Senft, A.R. 2009. Species diversity patterns at ecotones. Thesis, University of North Carolina, Chapel Hill, North Carolina, USA.

Sevin, J., and J.D. Kleopfer. 2015. Virginia's amphibians: Status, threats and conservation. Virginia Journal of Science 66: 277-207.

Sorenson S.K., P.D. Dileanis, and F.A. Branson. 1991. Soil water and vegetation responses to precipitation and changes in depth to environmental management 123 groundwater in Owens Valley, California. U.S. Geological Survey, Reston, Virginia, USA.

Southampton County. 1984. Section 10-31 – Interference with peace and quiet. §11-41. Southampton County, Virginia Code of Ordinances.

Southampton County Department of Community Development. Letter regarding Site SH30 as a potential landfill site. July 5, 2022.

Southeastern Public Service Authority (SPSA). 2019. Preliminary draft purpose and need. Southeastern Public Service Authority, Suffolk, Virginia, USA.

SPSA. 2020. Minutes of the Board of Directors of the Southeastern Public Service Authority of Virginia. June 24, 2020, Virginia, USA.

SPSA. 2021a. Regional Landfill: "What is a landfill?". <https://spsa.com/what-we-do/regional-landfill>. Accessed 14 April 2021.

SPSA. 2021b. Minutes of the Board of Directors of the Southeastern Public Service Authority of Virginia. Southeastern Public Service Authority, 26 May 2021, Virginia, USA.

SPSA. 2021c. “SPSA Flyover” Presentation to the Hampton Roads Transportation Planning Organization. Southeastern Public Service Authority, January 15, 2021, Virginia, USA.

SPSA. 2021d. Regional Landfill Expansion webpage. <https://spsa.com/stay-updated/active-projects/regional-landfill-expansion>. Accessed 7 September 2021.

SPSA. 2021e. Regional Landfill Home Page. <https://spsa.com/>. Accessed 22 December 2021.

SPSA. 2021f. Minutes of the Board of Directors of the Southeastern Public Service Authority of Virginia. Southeastern Public Service Authority, 28 September 2022, Virginia, USA.

SPSA. 2022a. Airspace Management Report: Regional Landfill, Cells V and VI. Southeastern Public Service Authority, 14 January 2022. https://spsa.com/application/files/8716/6083/1792/SPSA_2022_Airspace_Manangement_Report.pdf. Accessed 23 May 2023.

SPSA. 2022b. Waste-to-Energy webpage. https://spsa.com/what-we-do/waste-energy. Accessed 19 December 2022.

SPSA. 2022c. Minutes of the Board of Directors of the Southeastern Public Service Authority of Virginia. Southeastern Public Service Authority, 23 March 2022, Virginia, USA.

Suffolk News Herald. 2021. SPSA agrees to $39.3 million Route 58 flyover project. <https://www.suffolknewsherald.com/2021/05/28/spsa-agrees-to-39-3-million-route-58-flyover-project/>. Accessed 12 August 2021.

Sutton, W.B., K. Barrett, A.T. Moody, C.S. Loftin, P.G. deMaynadier, and P. Nanjappa. 2015. Predicted changes in climatic niche and climate refugia of conservation priority salamander species in the Northeastern United States. Forests 6: 1-26.

The Center for Conservation Biology (CCB). 2021. CCB Mapping Portal. <https://ccbbirds.org/maps/#eagles>. Accessed 3 August 2021.

CCB. 2019. Osprey Watch. <http://www.osprey-watch.org/>. Accessed 7 August 2021.

The Cornell Lab of Ornithology. 2021. eBird. <https://ebird.org/home>. Accessed 7 August 2021.

The Cornell Lab of Ornithology. 2022. eBird. <https://ebird.org/home>. Accessed 27 July 2022.

The White House. 1977. Executive Order 11990 of May 24, 1977: Protection of Wetlands. Vol. 42(26961).

The White House. 1979. Executive Order 11988 of May 24, 1977: Floodplain Management. Vol. 42(26951).

The White House. 1994. Executive Order 12898 of February 11, 1994: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Vol. 59(32).

The White House. 2015. Executive Order 13690 of January 30, 2015: Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input. Vol. 80(23).

Tiner, R.W., J.Q. Swords, and H.C. Bergquist. 2005. Recent wetland trends in southeastern Virginia: 1994-2000. U.S. Fish and Wildlife Service, Washington, D.C., and National Wetlands Inventory Program, Northeast Region, Hadley, Massachusetts, USA. <https://www.fws.gov/wetlands/documents/Recent-Wetland-Trends-in-Southeastern-Virginia-1994-2000.pdf>. Accessed 30 August 2021.

U.S. Army Corps of Engineers (USACE). 1977. Aerial Photo of SPSA Regional Landfill property. 11 September 1977.

USACE. 1982. Aerial Photo of SPSA Regional Landfill property. 8 March 1982.

USACE. 1987. Corps of Engineers Wetland Delineation Manual: Wetlands Research Program Technical Report Y-87-1. Environmental Laboratory, Vicksburg, Mississippi, USA.

USACE. 1993. The Highway Methodology Workbook. U.S. Army Corps of Engineers New England District, Concord, Massachusetts, USA.

USACE. 1995. Final Environmental Impact Statement: Southeastern Public Service Authority of Virginia Regional Landfill Project. May 1995.

USACE. 1999. The Highway Methodology Workbook Supplement. Wetland Functions and Values: A Descriptive Approach. U.S. Army Corps of Engineers New England District, Concord, Massachusetts, USA.

USACE. 2010. Regional supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region, version 2.0. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi, USA.

USACE. 2015. North Atlantic Coast comprehensive study: Resilient adaptation to increasing risk. National Planning Center for Coastal Storm Risk Management, U.S. Army Corps of Engineers North Atlantic Division, New York, New York, USA.

USACE. 2020. U.S. Army Corps of Engineers wetland attribute form: Procedures manual, version 1.0. U.S. Army Corps of Engineers, Norfolk District, Norfolk, Virginia, USA. <https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/14233>. Accessed 14 August 2021.

USACE. 2021. Sea Level Change Calculator. <https://www.usace.army.mil/corpsclimate/Climate_Preparedness_and_Resilience/App_Flood_Risk_Reduct_Sandy_Rebuild/SL_change_curve_calc/>. Accessed September 2021.

U.S. Census Bureau. 2019. American community survey 2014-2018 5-year estimates. U.S. Census Bureau, Washington, D.C., USA.

U. S. Code. 1986. Title VI, Civil Rights Act of 1964, as amended through the 99th Congress. Sec. 42(D *et seq*.). U.S. Department of Labor, Washington, D.C., USA.

U.S. Code. 1989. Migratory Bird Treaty Act of 1918, as amended through the 101st Congress. Sec. 703(a). U. S. Fish and Wildlife Service, Washington, D.C., USA.

U.S. Code. 1990. Memorandum of Agreement between the Department of the Army and the Environmental Protection Agency: The determination of mitigation under the Clean Water Act. Sec. 404(B1). U.S. Environmental Protection Agency, Washington, D.C., USA.

U.S. Code. 2000. Clean Water Act of 1972, as amended through the 106th Congress. Sec. 33(a-t). U.S. Environmental Protection Agency, Washington, D.C., USA.

U.S. Code. 2004a. Bald and Golden Eagle Protection Act of 1940, as amended through the 92nd Congress. Sec. 16(a, b, c). U. S. Fish and Wildlife Service, Washington, D.C., USA.

U.S. Code. 2004b. Noise Control Act of 1972, as amended through the 108th Congress. Sec. 42(1-19).

U.S. Code. 2008. Compensatory Mitigation Rule. Sec. 33(332).

U.S. Code. 2016. Endangered Species Act of 1973, as amended through the 100th Congress. Sec. 1532(6, 20). U.S. Department of the Interior.

U.S. Code. 2020. National Environmental Policy Act Definitions. Sec. 40(1508). Council on Environmental Quality, Washington, D.C., USA.

U.S. Department of Agriculture (USDA). 2021. Natural Resources Conservation Service (NRCS) web soil survey. <https://websoilsurvey.sc.egov.usda.gov/ App/WebSoilSurvey.aspx>. Accessed 14 August 2021.

USDA. 2022. Natural Resources Conservation Service (NRCS) web soil survey. <https://websoilsurvey.sc.egov.usda.gov/ App/WebSoilSurvey.aspx>. Accessed 27 July 2022.

U.S. Department of Transportation (USDOT). 2006. Roadway construction noise model user's guide. Federal Highway Administration (FHWA), Washington, D.C., USA.

U.S. Environmental Protection Agency (USEPA). 1974. Information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety. U.S. Environmental Protection Agency Office of Noise Abatement and Control, Washington, D.C., USA.

USEPA. 2015. Guidance on considering environmental justice during the development of regulatory actions. U.S. Environmental Protection Agency, Washington, D.C., USA.

USEPA. 2019. EJSCREEN Environmental Justice Mapping and Screening Tool: EJSCREEN Technical Documentation. U.S. Environmental Protection Agency, Washington, D.C., USA.

USEPA. 2021a. Basic information about landfills. <https://www.epa.gov/landfills/basic-information-about-landfills>. Accessed 9 September 2021.

USEPA. 2021b. EJSCREEN: Environmental justice screening and mapping tool. <https://www.epa.gov/ejscreen>. Accessed 9 September 2021.

USEPA. 2021c. Green Book: Current nonattainment counties for all criteria pollutants. <https://www3.epa.gov/airquality/greenbook/ancl.html.> Accessed September 2021.

USEPA. 2021d. NAAQS Table, U.S. Environmental Protection Agency: Criteria Air Pollutants. <https://www.epa.gov/criteria-air-pollutants/naaqs-table>. Accessed September 2021.

USEPA. 2021e. Non-attainment areas for criteria pollutants (Green Book) map: Counties designated ‘Non-attainment’ for Clean Air Act’s National Ambient Air Quality Standards (NAAQS). <https://www3.epa.gov/airquality/greenbook/map/mapnpoll.pdf.> Accessed September 2021.

USEPA. 2021f. Overview of greenhouse gases. <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>. Accessed September 2021.

USEPA. 2022. EJSCREEN: Environmental justice screening and mapping tool. <https://www.epa.gov/ejscreen>. Accessed August 2022.

U.S. Fish and Wildlife Service (USFWS). 2020. Northern Long-Eared Bat *Myotis septentrionalis.* <https://www.fws.gov/midwest/endangered/mammals/nleb/nlebFactSheet.html>. Accessed 30 August 2021.

USFWS. 2021. Information for planning and consultation. <https://ecos.fws.gov/ipac/>. Accessed 3 August 2021.

USFWS. 2021. National Wetland Inventory (NWI) wetlands mapper. <https://www.fws.gov/wetlands/data/mapper.html>. Accessed 14 August 2021.

USFWS. 2023. Great Dismal Swamp National Wildlife Refuge. https://www.fws.gov/refuge/great-dismal-swamp/species. Accessed 31 May 2023.

U.S. Geological Survey (USGS). 1996. National water summary on wetland resources. Water-Supply Paper 2425. U.S. Geological Survey, Washington, D.C., USA. <https://pubs.usgs.gov/wsp/2425/report.pdf>. Accessed 30 August 2021.

USGS. 2006. The Virginia Coastal Plain hydrogeologic framework: U.S. Geological Survey Professional Paper 1731. U.S. Geological Survey, Washington, D.C., USA.

USGS. 2009. Simulation of groundwater flow in the Coastal Plain aquifer system of Virginia. U.S. Geological Survey Scientific Investigations Report 2009–5039.

USGS. 2013. Land subsidence and relative rea-level rise in the Southern Chesapeake Bay region. Geological Survey Circular 1392. U.S. Geological Survey, Washington, D.C., USA.

USGS. 2018. Hydrologic conditions and simulation of groundwater and surface water in the Great Dismal Swamp of Virginia and North Carolina. U.S. Geological Survey Scientific Investigations Report 2018-5056.

USGS. 2019a. Chuckatuck 7.5-minute quadrangle map. <https://apps.nationalmap.gov/viewer/>. Accessed 14 August 2021.

USGS. 2019b. Buckhorn 7.5-minute quadrangle map. <https://apps.nationalmap.gov/viewer/>. Accessed 14 August 2021.

USGS. 2019c. Ivor 7.5-minute quadrangle map. <https://apps.nationalmap.gov/viewer/>. Accessed 26 July 2022.

USGS. 2021. North American Breeding Bird Survey. <https://www.usgs.gov/centers/eesc/science/north-american-breeding-bird-survey?qt-science_center_objects=0#qt-science_center_objects>. Accessed 7 August 2021.

Van der Ree, R., J.A. Jaeger, E.A. Van der Grift, and A.P. Clevenger. 2011. Effects of roads and traffic on wildlife populations and landscape function: Road ecology is moving toward larger scales. Ecology and Society 16, 48.

VDCR. 2021a. The natural communities of Virginia classification of ecological groups and community types, third approximation (version 3.3): Non-riverine flatwoods and swamps. <https://www.dcr.virginia.gov/natural-heritage/natural-communities/ncpc2>. Accessed 15 June 2021.

VDCR. 2021b. Natural Heritage Data Explorer. <https://vanhde.org/>. Accessed 3 August 2021.

Commonwealth of Virginia Department of Environmental Quality (VDEQ). 2020. Permit Number VA0090034: Authorization to discharge under the Virginia pollutant discharge elimination system and the Virginia State Water Control Law. Department of Environmental Quality Tidewater Regional Office, Richmond, Virginia, USA.

Virginia Department of Historic Resources (VDHR). 2013. V-CRIS Virginia cultural resource information system, version 2.0.0. <https://vcris.dhr.virginia.gov/VCRIS/>. Accessed January 2022.

VDHR. 2020a. V-CRIS. SPSA Regional Landfill. 28 April 2020.

VDHR. 2020b. Archaeological Site Record: DHR ID 44SK0121. 28 April 2020.

VDHR. 2020c. Archaeological Site Record: DHR ID 44SK0119. 23 October 2020.

Virginia Department of Transportation (VDOT). 2023. Joint Permit Application, Permit #23-4011. 14 February 2023.

VDOT. 2020. Daily Traffic Volume and Estimates Including Vehicle Classification Estimates. Special Locality Report 133, City of Suffolk. Virginia Department of Transportation, Richmond, Virginia, USA.

VDOT. 2018. Highway traffic noise impact analysis guidance manual, effective July 13, 2011. Version 8. Virginia Department of Transportation, Richmond, Virginia, USA.

VDOT. 2016. Socioeconomics and Environmental Justice. <https://virginiadot.org/projects/resources/NEPA/VDOT_SocioeconomicsEJ_ConsultantGuidance_201611.pdf> Accessed 9 September 2021.

VDOT 2015. Noise Report Development and Guidance Document and Guidance Document. Department of Transportation, Richmond, Virginia, USA.

Virginia Department of Wildlife Resources (VDWR). 2011. Canebrake Rattlesnake Conservation Plan. Bureau of Wildlife Resources. VDWR, Richmond, VA. 25 pp.

VDWR. 2020a. Tri-colored bat. <https://dwr.virginia.gov/wildlife/information/tri-colored-bat/>. Accessed 27 August 2021.

VDWR. 2020b. Northern long-eared bat. <https://dwr.virginia.gov/wildlife/information/northern-long-eared-bat/>. Accessed 27 August 2021.

VDWR. 2021. Virginia Fish and Wildlife Information Service (VaFWIS). <https://vafwis.dgif.virginia.gov/fwis/>. Accessed 3 August 2021.

VDWR. 2022. Virginia Bird Breeding Atlas, Ivor, SE. <https://vafwis.dgif.virginia.gov/fwis/?Content_URL=NewPages/VaFWIS_report_bba.asp&ID=55046&tn=.0&pf=2&target=Report&version=19214/>. Accessed 10 August 2022.

Waldron, J.L., S.H. Bennet, S.M. Welch, M.E. Dorcas, J.D. Lanham, W. Kalinowsky. 2006a. Habitat specificity and home-range size as attributes of species vulnerability to extinction: A case study using sympatric rattlesnakes. Animal Conservation 9: 414-420.

Waldron, J.L., J.D. Lanham, and S.H. Bennett. 2006b. Using behaviorally-based seasons to investigate canebrake rattlesnake (*Crotalus horridus*) movement patterns and habitat selection. Herpetologica 62: 389-398.

Walters, J.R., S.J. Daniels, J.H. Carter, III, and P.D. Doerr. 2002. Defining quality of red-cockaded woodpecker foraging habitat based on habitat use and fitness. The Journal of Wildlife Management 66: 1064-1082.

Watts, B.D., and S.R. Harding. 2007. Virginia red-cockaded woodpecker conservation plan. CCB Technical Reports 1-39.

Watts, B.D., C. Hones, L. Duval, B.J. Paxton, and J. Wright. 2020. Investigation of red-cockaded woodpeckers within the Great Dismal Swamp National Wildlife Refuge: 2019 report. CCB Technical Reports 1-18.

Winter, T.C. 1988. A conceptual-framework for assessing cumulative impacts on the hydrology of nontidal wetlands. Environmental Management 12:605–620.

Zervas, C. 2009. Sea Level Variations of the United States 1854-2006. NOAA Technical Report NOS CO-OPS 053. December 2009.

Appendix A: Off-Site Alternatives Analysis Technical Memo

This page intentionally left blank.

To: U.S. Army Corps of Engineers
Date: April 13, 2022
Project #: 34602.00

From: VHB
Re: Off-Site Alternatives Analysis

This memorandum was prepared in support of the environmental impact statement (EIS) process for the proposed expansion of the Southeastern Public Service Authority (SPSA) Regional Landfill in Suffolk, Virginia. It documents analysis conducted to support the development of a reasonable range of alternatives by identifying sites other than the existing Regional Landfill that could potentially meet SPSA's need for expanded landfilling capacity.

Potential sites were evaluated in four phases:

1. Phase I – identifying parcels greater than 300 acres, along accessible roadways, outside the 100-year floodplain.
2. Phase II – evaluating fatal flaws (detailed below) in the sites identified in Phase I.
3. Phase III – ranking the remaining sites based on general development criteria.
4. Phase IV – further screening the remaining sites based on site-specific development criteria and scoping comments.

Site Selection Criteria by Phase			
Phase I	Phase II (Fatal Flaws)	Phase III	Phase IV
300 acres of undeveloped land	Has an airport/airfield on it	Land Use Compatibility	Wetland Impacts (based on conceptual landfill footprint)
Within SPSA Service Area	Has more than 129 acres of wetlands (i.e., the amount of wetlands potentially impacted by the proposed action)	Roadway Capacity	Stream Impacts
Within two miles on either side of a major highway corridor	Is split by a road	Natural Visual Screening	Proximity to Residential Land Uses
Outside of the 100-year floodplain		Zoning Consistency	Soil Balance
		Site Configuration	Leachate Management
		Site Ownership	Development Flexibility
		Sewer Availability	Waste Hauling
		Wetland Impacts (based on estimated total area of wetlands on site)	Owners, Community, or Local Government Concerns
		Transportation Costs	Site Access
		Ease of Development	
		Proximity to Airport/Airfield	
		Cultural Resources	
		Natural Resources	
		Environmental Justice	

The Phase I-III analysis identified six sites to be carried forward for further analysis. The Phase IV analysis evaluated and ranked these 6 sites based on site-specific characteristics. Details of the analysis and selection process are documented in the sections below.

PHASE I ANALYSIS – POTENTIAL SITE IDENTIFICATION

Phase I consisted of the identification of parcels that could potentially suit SPSA's needed use and should be carried forward for Phase II analysis. The following criteria were used to locate potentially suitable sites:

- At least 300 acres of contiguous undeveloped land. The area can consist of multiple parcels with multiple owners and should be reasonably compact.
- Within the SPSA Service Area
- Within 2 miles of a major highway corridor (defined as Primary Roads and interstates)
- Outside of the 100-year Floodplain

This selection process identified 58 sites to carry forward into Phase II analysis. These 58 sites are shown in Figure 1 in the appendix.

PHASE II ANALYSIS – FATAL FLAWS

Each of the 58 sites identified in Phase I were examined for the following fatal flaws:

1. Current location of an airport/airfield
2. Greater than 129 acres of wetlands based on National Wetland Inventory (NWI) mapping (the amount of wetlands potentially impacted by SPSA's proposed action)
3. Is bisected by a road or other linear infrastructure

Sites that had at least one fatal flaw were removed from further analysis. These eliminated sites are shown in Figure 2 in the appendix, color coded by elimination criteria. Phase II analysis resulted in 29 parcels being carried forward for Phase III of the analysis. These 29 parcels are illustrated in purple and with an identified site number in Figure 2.

PHASE III ANALYSIS – FAVORABILITY RANKING APPROACH

Based on the results of the Phase I and II analyses, 29 sites were carried forward for analysis in Phase III, illustrated in Figure 2 in the appendix. A system of 14 weighed criteria was used in Phase III to rank these 29 sites. The categories were identified in the Alternative Landfill Siting Study conducted in 1989 and 1990 and supplemented through recent coordination with regulatory agencies. These categories were used for the Phase III ranking.

Each criterion was assigned a weight reflecting the importance granted to it when considering the suitability of a site. Weights ranged from one to five, with five being the greatest importance and one being the least importance. A numeric input was then assigned to the site, using a scale of highly acceptable (+1), acceptable (0), or unfavorable (-1). Finally, a score was assigned to the site by multiplying the weight by the numeric input. Weighted inputs for all 14 categories were then summed and sites were ranked by their total weighted scores (see matrix in Attachment A). The highest possible score that a site could attain is 47.

The following paragraphs describe each of the criteria (with the assigned weight in parentheses), and how the 29 sites ranked under each criterion.

Land Use Compatibility (5)

Existing and future land use mapping as defined in the comprehensive plan for the relevant jurisdiction was used to determine whether a site's land use was suitable for landfill construction. Vacant or agricultural uses were rated highly acceptable; predominantly vacant, predominantly agricultural, or industrial uses were rated acceptable; residential/commercial/office uses were rated unfavorable. Of the 29 sites analyzed in Phase III, all but 2 were rated highly acceptable. The 2 remaining sites were low-density residential (future land use, and thus do not contain any residential uses currently), thus rated acceptable. No sites were rated unfavorable.

Zoning Consistency (3)

Zoning was separated into categories that were either desirable or undesirable. As such there were no zoning categories that were rated only acceptable. Agricultural and Industrial zoning districts were rated highly acceptable and Residential/Commercial/Office zoning districts were rated unfavorable. All but 4 sites were found to be highly acceptable under this criterion. The 4 remaining sites were zoned for a rural agricultural conservation district, and as such, rated unfavorable.

Roadway Capacity (3)

Sites with existing direct access from a 4-lane or more primary road were rated highly acceptable. Parcels with direct access from a 2-lane primary road were rated acceptable. Parcels with direct access from anything else was rated unfavorable. Two of the 29 sites were rated highly acceptable, 1 site was rated unfavorable, and the remaining 26 sites were rated acceptable.

Natural Visual Screening (3)

This category refers to the availability of a forested visual and auditory buffer around the site. The evaluation of each site was conducted using aerial photography. One site had no existing screening and was deemed unfavorable. Ten sites have existing screening and were rated highly acceptable. Eighteen parcels have some level of mixed screening and were rated acceptable.

Site Configuration (3)

Fifteen of the 29 sites were single-parcel and had a compact shape (rectangular) generally appropriate for use as a landfill site. As such, they were rated highly acceptable. The other 14 parcels were noted as having a complex shape, a U shape, or a long side facing a major road that would make development as a landfill more challenging. Such sites were rated only acceptable. No sites were rated unfavorable.

Site Ownership (1)

Each site's ownership - privately or publicly owned – was reviewed. Because all the sites in the Phase III analysis were privately owned, site ownership was not a differentiator among them in this phase of the analysis. All sites were rated highly acceptable.

Sewer Availability (2)

The approximate distance to the nearest municipal sanitary sewer system was calculated for each of the 29 sites. The distance from one site is less than 2 miles (rated highly acceptable); the distance from 3 sites is between 2 and 4 miles (rated acceptable); and the distance to each of the remaining 25 sites is more than 4 miles (rated unfavorable).

Wetland Impact (5)

By definition, all sites in Phase III of the analysis contain 129 acres of wetland or less based on NWI mapping. Among the 29 sites, those made up of no more than 25 percent hydric soils and no more than 10 percent NWI wetlands were given a highly favorable rating. Sites made up of between 25 and 50 percent hydric soils and no more than 20 percent NWI wetlands were given an acceptable rating. Sites made up of more than 50 percent hydric soils or more than 20 percent NWI wetlands were given an unfavorable rating. Using this approach, 11 sites were highly acceptable, 14 were acceptable, and 4 were unfavorable.

Transportation Costs (2)[1]

A high-level conceptual analysis of the costs associated with hauling waste from SPSA's transfer station network to each of the 29 sites was conducted. Estimated hauling costs ranged from $5 million per year to just over $8 million per year depending on the site. Sites with hauling costs of $6 million per year or more were rated acceptable and sites with hauling costs under $6 million per year were rated highly acceptable. This approach resulted in 20 sites being given an acceptable rating for transportation cost and 9 sites receiving a highly acceptable rating. No sites were rated unfavorable.

Ease of Development (2)

Site topography; existing structures that would have to be demolished; and underground/other utilities that may have to be relocated influence how easily a site could be developed and are included in this category. None of the 29 sites contained slopes greater than 10 percent. Aerial imagery, supplemented by a windshield survey, was used to determine the presence of utilities and existing structures. Sites without buildings or utilities were rated highly acceptable, sites without buildings but possibly contained utilities were rated acceptable, and sites that had buildings and likely had utilities (would need to be confirmed on site) were rated unfavorable. Using this approach, 10 sites were rated highly acceptable; 6 were rated acceptable; and 13 parcels were rated unfavorable.

Proximity to Airport/Airfield (3)

US Environmental Protection Agency landfill siting criteria establish a threshold of within 10,000 feet of any airport runway used by turbojet aircraft, or within 5,000 feet of any runway end used by piston-type aircraft only for requirements pertaining to bird strike hazards. Sites located outside of the applicable distance threshold were rated highly acceptable. Sites outside of 75 percent of that threshold were rated acceptable. Any site closer than that was rated unfavorable. Because all the sites in the Phase III analysis were outside of the applicable distance threshold, proximity to an airport/airfield was not a differentiator among them in this phase of the analysis. All sites in this phase of the analysis were rated highly acceptable.

Cultural Resources (5)

Any site with a known historic property (based on a search of the Virginia Cultural Resources Information System [VCRIS]) on it was given an unfavorable rating. Sites that do not contain a known historic property and are adjacent to one were rated highly favorable. Sites adjacent to a known historic property were rated acceptable. On this basis, 10 sites were rated highly acceptable, 8 sites were rated acceptable, and 11 sites were rated unfavorable.

Natural Resources (5)

Each of the 29 sites was reviewed for the documented presence of conservation easements or conservation sites based on publicly available resources (using Critical Habitat as defined by USFWS and the Natural Heritage Mapping Site). Sites that did not contain, or were not adjacent to, a conservation easement or site were rated highly acceptable; sites that were adjacent to conservation sites or stream conservation units were rated acceptable; and sites that overlapped a conservation easement or site were rated unfavorable. Using this approach, 20 parcels were not in a conservation easement or site and were rated highly acceptable. Another 3 parcels were adjacent to conservation easements and rated acceptable. The remaining 6 parcels were rated unfavorable as some portion of the site was in a conservation easement or site.

---

[1] This analysis used SPSA's current budgeted personnel and truck/trailer census, as well as personnel, materials, and expenses from the Fleet Maintenance and Transportation departments as the basis for the cost evaluation. The additional personnel and equipment that would be needed to support hauling operations for each site were estimated and added to existing expenses to generate a total conceptual hauling cost for each site. Total average yearly capital expenses for a 10-year period were also considered. These variables were applied to the total mileage from each site to each existing transfer station to determine the annual hauling cost associated with the site.

Environmental Justice (5)

This category included sites that were in block groups that were identified as containing minority or low-income populations based on Census data (American Community Survey, 2014-2018). Minority includes all races that are non-white and Hispanic populations that are white. Minority was determined for any block group where 50% or more of the population is minority or any block group where minority population is at least 10 percentage points higher than the county average. Low income includes any block group where the percentage of the population in any of the poverty categories – Below Poverty Level, Very Poor or Near Poor equals or exceeds 25% of the total population of that block group. Low income also includes any block group where the percentage of the population in any of the poverty categories – Below Poverty Level, Very Poor or Near Poor - exceeds the county average by five percentage points or more.

Using this approach, 17 of the sites were found to be in block groups with high minority population and all 29 sites were found to be in block groups with high low-income populations. The 12 parcels that were in low-income block groups but not in minority block groups were rated acceptable, while the remaining 17 parcels were rated unfavorable. No sites were rated highly acceptable.

RESULTS OF PHASE III ANALYSIS – FAVORABILITY RANKING

Upon completion of the analysis, 6 sites scored greater than 20 points (27, 25, 22, 22, 21, and 20 points). Based on the analysis of the off-site parcels during Phase III, the 6 selected sites for further study are summarized below by the following favorability characteristics, in order of total score, and illustrated in Figure 3 in the appendix. A figure for each site is also shown in the appendix.

Top Six Favorability Rankings

Site	Total Score
SU02	27
SH33	25
SH23	22
SH32	22
SH09	21
SH29	20

SU02 (Rank #1)

Site SU02, illustrated on Figure 4 in the appendix, was rated highly acceptable for 12 of the 14 criteria and unfavorable for 2 of the criteria. The favorability ratings for this site are summarized in the table below. Based on the weighting of the criteria, the parcel had a total score of 27. The cultural resource, a road corridor, associated with this property overlaps a very small portion of the southern edge of the property.

Ratings for SU02		
Highly Acceptable (1)	Acceptable (0)	Unfavorable (1)
Land Use Compatibility (5)		Cultural Resources (5)
Roadway Capacity (3)		Environmental Justice (5)
Natural Screening (3)		
Zoning Consistency (3)		
Site Configuration (3)		
Site Ownership (1)		
Sewer Availability (2)		
Wetland Impact (5)		
Transportation Costs (2)		
Ease of Development (2)		
Proximity to Airport/Airfield (3)		
Natural Resources (5)		

SH33 (Rank #2)

Site SH33, illustrated on Figure 5 in the appendix, was rated highly acceptable for 10 of the criteria, acceptable for 3 of the criteria, and unfavorable for 1 of the criteria. The favorability ratings for this site are summarized in the table below. Based on the weighting of the criteria, the parcel had a total score of 25.

Ratings for SH33		
Highly Acceptable (1)	Acceptable (0)	Unfavorable (1)
Natural Screening (3)	Land Use Compatibility (5)	Sewer Availability (2)
Zoning Consistency (3)	Roadway Capacity (3)	
Site Configuration (3)	Environmental Justice (5)	
Site Ownership (1)		
Wetland Impact (5)		
Transportation Costs (2)		
Ease of Development (2)		
Proximity to Airport/Airfield (3)		
Cultural Resources (5)		
Natural Resources (5)		

SH23 (Rank #3)

Site SH23, illustrated on Figure 6 in the appendix, was rated highly acceptable for 8 of the criteria, acceptable for 4 of the criteria, and unfavorable for 2 of the criteria. The favorability ratings for this site are summarized in the table below. Based on the weighting of the criteria, the parcel had a total score of 22.

Ratings for SH23		
Highly Acceptable (1)	Acceptable (0)	Unfavorable (1)
Land Use Compatibility (5)	Roadway Capacity (3)	Sewer Availability (2)
Zoning Consistency (3)	Natural Screening (3)	Environmental Justice (5)
Site Ownership (1)	Site Configuration (3)	
Wetland Impact (5)	Transportation Costs (2)	
Ease of Development (2)		
Proximity to Airport/Airfield (3)		
Cultural Resources (5)		
Natural Resources (5)		

SH32 (Rank #4)

Site SH32, illustrated on Figure 7 in the appendix, was rated highly acceptable for 10 of the criteria, acceptable for 3 of the criteria, and unfavorable for 1 of the criteria. The favorability ratings for this site are summarized in the table below. Based on the weighting of the criteria, the parcel had a total score of 22.

Ratings for SH32		
Highly Acceptable (1)	Acceptable (0)	Unfavorable (1)
Land Use Compatibility (5)	Roadway Capacity (3)	Sewer Availability (2)
Natural Screening (3)	Site Configuration (3)	
Zoning Consistency (3)	Environmental Justice (5)	
Site Ownership (1)		
Wetland Impact (5)		
Transportation Costs (2)		
Ease of Development (2)		
Proximity to Airport/Airfield (3)		
Cultural Resources (5)		
Natural Resources (5)		

SH09 (Rank #5)

Site SH09, illustrated on Figure 8 in the appendix, was rated highly acceptable for 8 of the criteria, acceptable for 3 of the criteria, and unfavorable for 3 of the criteria. The favorability ratings for this site are summarized in the table below. Based on the weighting of the criteria, the parcel had a total score of 21.

Ratings for SH09		
Highly Acceptable (1)	Acceptable (0)	Unfavorable (1)
Land Use Compatibility (5)	Roadway Capacity (3)	Sewer Availability (2)
Zoning Consistency (3)	Natural Screening (3)	Ease of Development (2)
Site Configuration (3)	Transportation Costs (2)	Environmental Justice (5)
Site Ownership (1)		
Wetland Impact (5)		
Proximity to Airport/Airfield (3)		
Cultural Resources (5)		
Natural Resources (5)		

SH29 (Rank #6)

Site SH29, illustrated on Figure 9 in the appendix, was rated highly acceptable for 7 of the criteria, acceptable for 5 of the criteria, and unfavorable for 2 of the criteria. The favorability ratings for this site are summarized in the table below. Based on the weighting of the criteria, the parcel had a total score of 20.

Ratings for SH29		
Highly Acceptable (1)	Acceptable (0)	Unfavorable (1)
Land Use Compatibility (5)	Roadway Capacity (3)	Sewer Availability (2)
Zoning Consistency (3)	Natural Screening (3)	Environmental Justice (5)
Site Ownership (1)	Site Configuration (3)	
Wetland Impact (5)	Transportation Costs (2)	
Proximity to Airport/Airfield (3)	Ease of Development (2)	

Cultural Resources (5)		
Natural Resources (5)		

PHASE IV ANALYSIS – SITE-SPECIFIC CRITERIA ANALYSIS

Following the completion of Phase III, further analysis and ranking of the 6 remaining sites were conducted based on site-specific operational opportunities or constraints afforded by each of them. This was performed in 2 steps, separated by a period of public scoping, as described below.

Phase IVa – Conceptual Footprint Analysis.

As a first step, the analysis evaluated whether each site could accommodate a landfill of sufficient size to meet the proposed expansion's purpose and need (16-million-cubic-yard capacity) while minimizing impacts on wetlands. To that end:

- Wetlands on each site were mapped using the best available mapping and data (some limited, high-level ground-truthing was conducted for SU02 only; owners denied access to all the other sites).
- High-level conceptual landfill footprints were developed and overlain on each site in a manner that minimized wetland impacts. The conceptual footprints included waste disposal footprint, supporting facilities, borrow and stockpiling areas, stormwater management areas, and access roads.

Sites that could not adequately accommodate a conceptual footprint without resulting in wetland impacts greater than, or equal to, the proposed expansion at the existing landfill would be eliminated from further consideration.

The result of this analysis is shown in the appendix (Figures 10 to 15). Phase IVa screening showed that all 6 sites could accommodate a landfill of the requisite size with less impact to wetlands than the proposed expansion at the existing SPSA landfill. Therefore, no sites were eliminated at this stage. The following table shows the wetland area each layout would affect.

Phase IVa	**Potential Wetland Impacts**
Site	Estimated Wetland Impacts (Acres)
SU02	4.9*
SH33	9.0
SH23	10.1
SH09	18.7
SH32	38.6
SH29	51.0

* VHB conducted only limited, high-level ground-truthing for SU02, based primarily on desktop review with limited field investigation.

Following the completion of Phase IVa, the 6 sites and updated information on the alternatives development process to date were made available for public review and comment during a 30-day scoping period (from December 17, 2020 through January 18, 2021). Comments received were considered, as applicable, during the next phase. After comments were reviewed, a Phase IVb ranking system was developed to help further refine the alternatives analysis.

Phase IVb – Site Ranking Analysis

In Phase IVb, the 6 sites were evaluated and ranked according to the following criteria:

- **Total Wetland Impacts.** This criterion ranks the sites according to the estimates shown in the above table from the lowest (ranked first) to the highest (ranked last) acreage of impacted wetlands. While, as explained above, this criterion alone was not sufficient to eliminate any of the sites, it is an important consideration when ranking them for purposes of further screening. Rankings are shown in the table below.

Site	Estimated Wetland Impacts (Acres)	Rank
SU02	4.9	1
SH33	9.0	2
SH23	10.1	3
SH09	18.7	4
SH32	38.6	5
SH29	51.0	6

- **Stream Impacts.** This criterion measures potential impacts on streams based on the linear length of stream within the conceptual landfill footprint for each site. The sites were ranked from shortest (ranked first) to longest (ranked last) length of stream affected. Rankings are shown in the table below. For this criterion, the sites fall in only 2 categories.

Site	Estimated Stream Impacts (Linear Feet)	Rank
SU02	0	1
SH33	1,960	2
SH23	1,960	2
SH09	0	1
SH32	0	1
SH29	0	1

- **Proximity to Residential Land Uses**. This criterion consists of the number of residential parcels within a 1-mile radius of the site. Parcel use was identified using publicly available real property or tax records. The criteria are generally conservative because the administrative designation of a parcel detailed as in residential use does not necessarily mean it is actually used as such. The sites were ranked based on the total number of residential parcels within the radius, from smallest (ranked first) to greatest (ranked last). Rankings are shown in the table below.

Site	Number of Residential Parcels within 1 Mile Radius	Rank
SU02	110	6
SH33	98	5
SH23	14	1
SH09	20	2
SH32	31	4
SH29	24	3

- **Soil Balance**. This criterion is an estimate of the amount of soil needed to operate the landfill (estimated at approximately 20 percent of total landfill capacity; soil is used as cover material to build up the cells as waste is added) compared to the amount of borrowed soil each site can be anticipated to yield. The latter amount was estimated based on the following assumptions: all suitable upland areas within each site could be used for borrow (or cover) material and could be excavated to a depth of 60 feet. The sites were ranked based on what proportion of the needed soil could be borrowed from the site, from the greatest percentage (ranked first) to the smallest (ranked last). Rankings are shown in the table below.

Site	Percentage of Soil Potentially Available on Site	Rank
SU02	100%	1
SH33	63%	5
SH23	99%	2
SH09	79%	3
SH32	47%	6
SH29	69%	4

- **Leachate Management**. Leachate from the operation of the landfill would have to be transported to an existing discharge point for conveyance to an appropriate treatment facility. This criterion measures the distance from each site to the nearest potentially usable discharge point. The sites were ranked from closest (ranked first) to a potential discharge point to farthest (ranked last). Rankings are shown in the table below.

Site	Distance to Nearest Available Discharge Point (Miles)	Rank
SU02	1.6	1
SH33	20.7	5
SH23	6.8	2
SH09	17	4
SH32	21.4	6
SH29	8.1	3

- **Development Flexibility**. Although, as noted above, all sites have sufficient room to construct an adequately sized landfill with less impact on wetlands than the proposed expansion at the existing landfill, sites with additional areas of potentially usable uplands can provide added flexibility for the design of the new facility. Therefore, this criterion estimates the total area of uplands potentially usable outside the conceptual landfill footprint. Potentially usable areas were identified taking into account size, configuration, and relationship to the conceptual landfill footprint. The sites were ranked from greatest total area of potentially usable uplands (ranked first) to smallest (ranked last). Rankings are shown in the table below.

Site	Potentially Available Uplands (Acres)	Rank
SU02	89	1
SH33	58	3
SH23	49	4
SH09	38	5
SH32	67	2
SH29	19	6

- **Waste Hauling**. The greater the distance a facility is from the source of waste production (i.e., population centers), the less economically and environmentally efficient the landfill becomes. Hauling waste to a landfill distant from main population centers would result in more truck miles traveled and associated impacts, such as greenhouse gas emissions. Therefore, this criterion estimates the total number of miles waste disposal trucks would travel every year to transport waste from SPSA's various transfer stations to the landfill. The sites were ranked from fewest annual truck miles traveled (ranked first) to most annual truck miles traveled (ranked last). Rankings are shown in the table below.

Site	Waste Hauling Mileage (Million Miles per Year)	Rank
SU02	1.30	1
SH33	1.77	2
SH23	2.38	5
SH09	2.83	6
SH32	1.84	3
SH29	1.93	4

- **Owners, Community, or Local Government Concerns.** This criterion ranks sites based on public scoping comments, including feedback from the site owners and from local governments, if received. For each site, comments were organized in 3 broad categories (as applicable): supportive; cautionary; or hostile. Sites that elicited supporting comments were ranked higher than those that elicited cautionary comments, which in turn were ranked higher than those that elicited hostile comments. Rankings are shown in the table below. The main basis for each ranking is summarized in the "Notes" column. For this criterion, sites fall into 3 categories only.

Site	Notes	Rank
SU02	Owner allowed access to the site and is potentially open to selling.	1
SH33	Owner refused access to the site and strongly stated a lack of interest in the property being considered. County stated that getting the needed permits may be challenging.	3
SH23	Owner refused access to the site with no further comment. County stated that getting the needed permits may be challenging.	2
SH09	Owner refused access to the site in terms that suggest a lack of interest in the property being considered. County stated that getting the needed permits may be challenging.	2
SH32	Owner refused access to the site with no further comment. County stated that getting the needed permits may be challenging.	2
SH29	Owner refused access to the site with no further comment. County stated that getting the needed permits may be challenging.	2

- **Site Access**. With one exception (SU02), direct vehicular access to the potential sites is through small, unstriped or 2-lane rural roads. Landfill construction and operation would substantially increase truck traffic along these roads. This criterion measures the length of rural road that would be affected by this change. It was calculated by measuring the distance from the site entrance to the nearest 4-lane roadway. The sites were ranked from closest to a 4-lane roadway (ranked first) to farthest (ranked last). Rankings are shown in the table below.

Site	Distance to Nearest 4 Lane roadway (Miles)	Rank
SU02	0	1
SH33	0.64	2
SH23	3.5	5
SH09	4.8	6
SH32	2.9	4
SH29	1.8	3

Phase IV Analysis Results

A point system was used to obtain a summary total ranking for each site. When ranked first, a site was awarded 6 points; when ranked second, it was awarded 5 points; when ranked third, it was awarded 4 points; and so on. When ranked sixth, a site was awarded 1 point.

The points assigned for each criterion were then added to generate a total score for each site. The sites were then assigned a final rank based on the score, as shown in the table below.

Site	Total Score	Rank
SU02	49	1
SH33	33	3
SH23	37	2
SH09	29	6
SH32	30	5
SH29	31	4

With a score of 49, Site SU02 ranked first across all criteria but 1. It ranked last for the Proximity to Residential Land Uses criterion because the number of residential parcels within 1 mile of it is substantially higher than for any of the other sites. Additionally, some of these residences are immediately adjacent to the site.

The second ranking site, SH23, had a score of 37. It was less consistently ranked across the criteria than Site SU02 but ranked highest for the Proximity to Residential Land Uses criterion and second for the Leachate Management and Soil Balance criteria.

The other sites had substantially lower scores. Although SH33, with a score of 33, was a close third to SH23 and ranked second for Wetland Impacts, it had some significant shortcomings. In particular, it ranked last for the Owners, Community, or Local Government Concerns criterion due to strongly worded opposition from the owner to being considered. It also ranked last but one for the Proximity to Residential Land Uses criterion, the Leachate Management criterion, and the Soil Balance criteria.

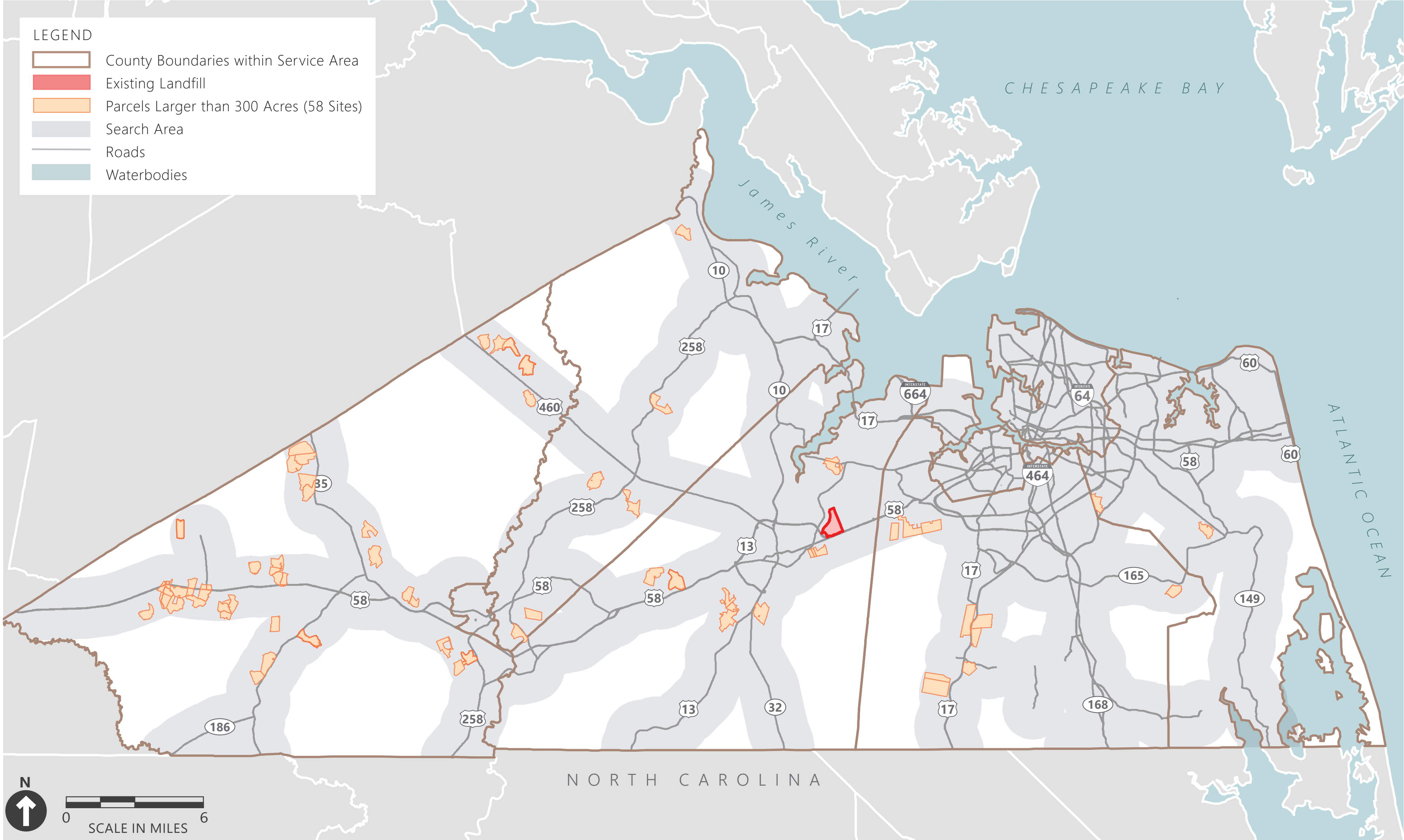
After discussing the results of Phase IV of the Alternatives Analysis, the Corps decided to carry the top 6 sites into the Draft EIS for further analysis.

The analyses presented in this memorandum were conducted based on desktop reviews using existing information available at the time of the analysis. VHB conducted only limited, high-level ground-truthing for SU02. The more detailed analyses to be conducted as part of Draft EIS preparation, including more comprehensive field reviews if allowed by the property owners, may result in further refinement of some of the metrics used in the present analysis, including the total amount of wetland potentially affected. If so, this will be documented in the Draft EIS.

Off-Site Alternatives Appendix

DRAFT

05/11/21



US Army Corps of Engineers®

OFF-SITE ALTERNATIVES ANALYSIS

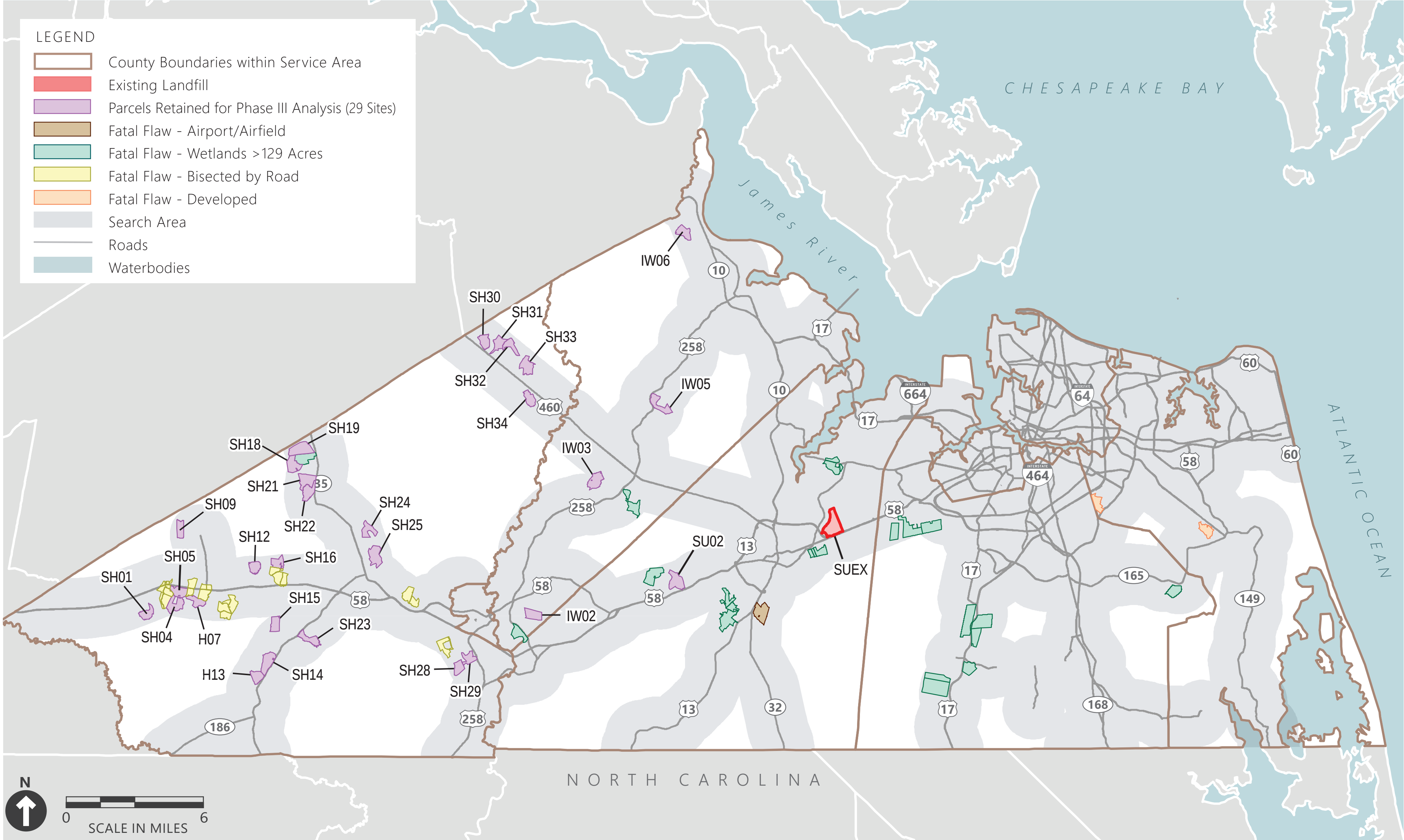
Environmental Impact Statement for Expansion of SPSA Landfill

FIGURE 1

Phase I Analysis Results

DRAFT

05/11/21



US Army Corps of Engineers

OFF-SITE ALTERNATIVES ANALYSIS

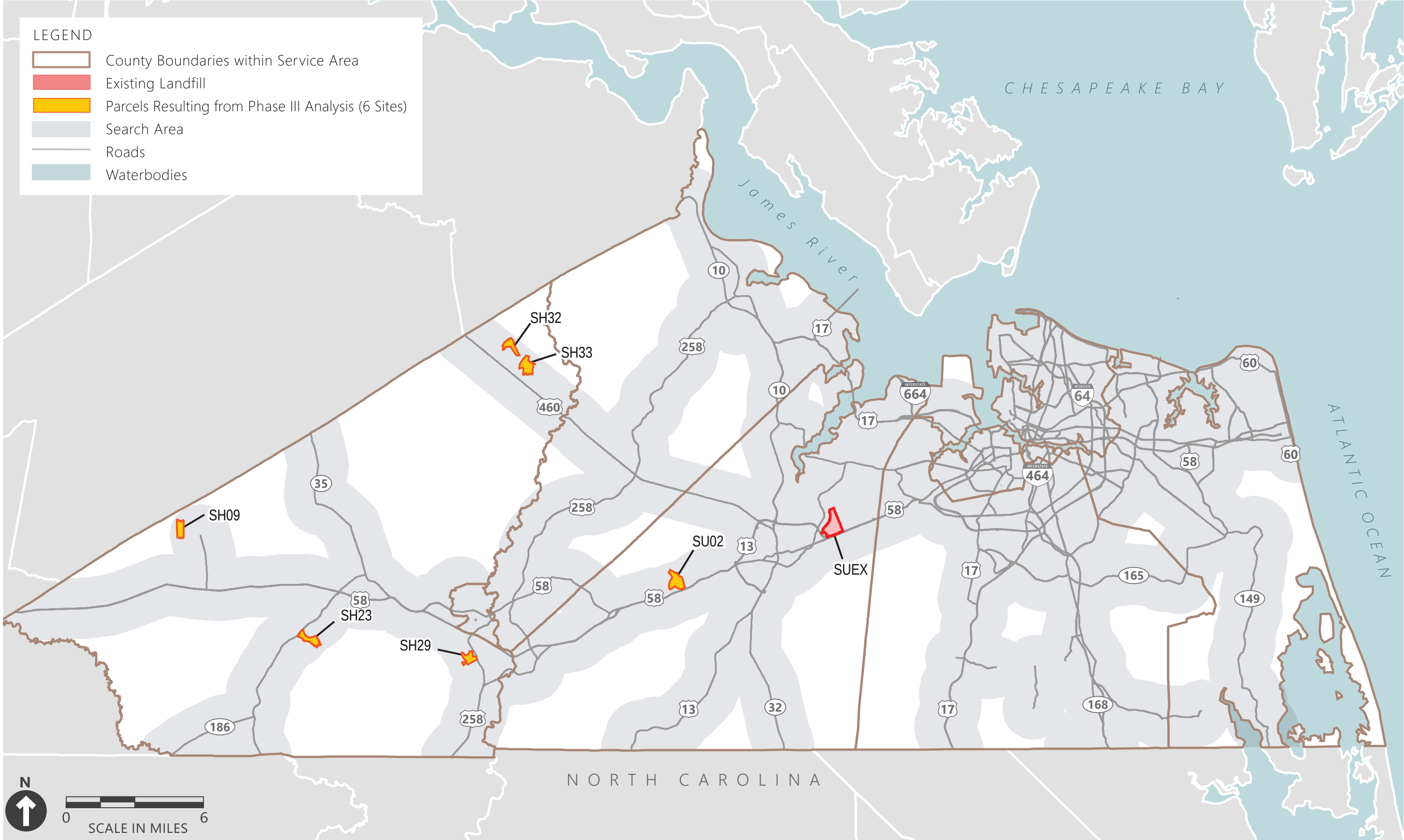
Environmental Impact Statement for Expansion of SPSA Landfill

FIGURE 2

Phase II Analysis Results

DRAFT

05/11/21



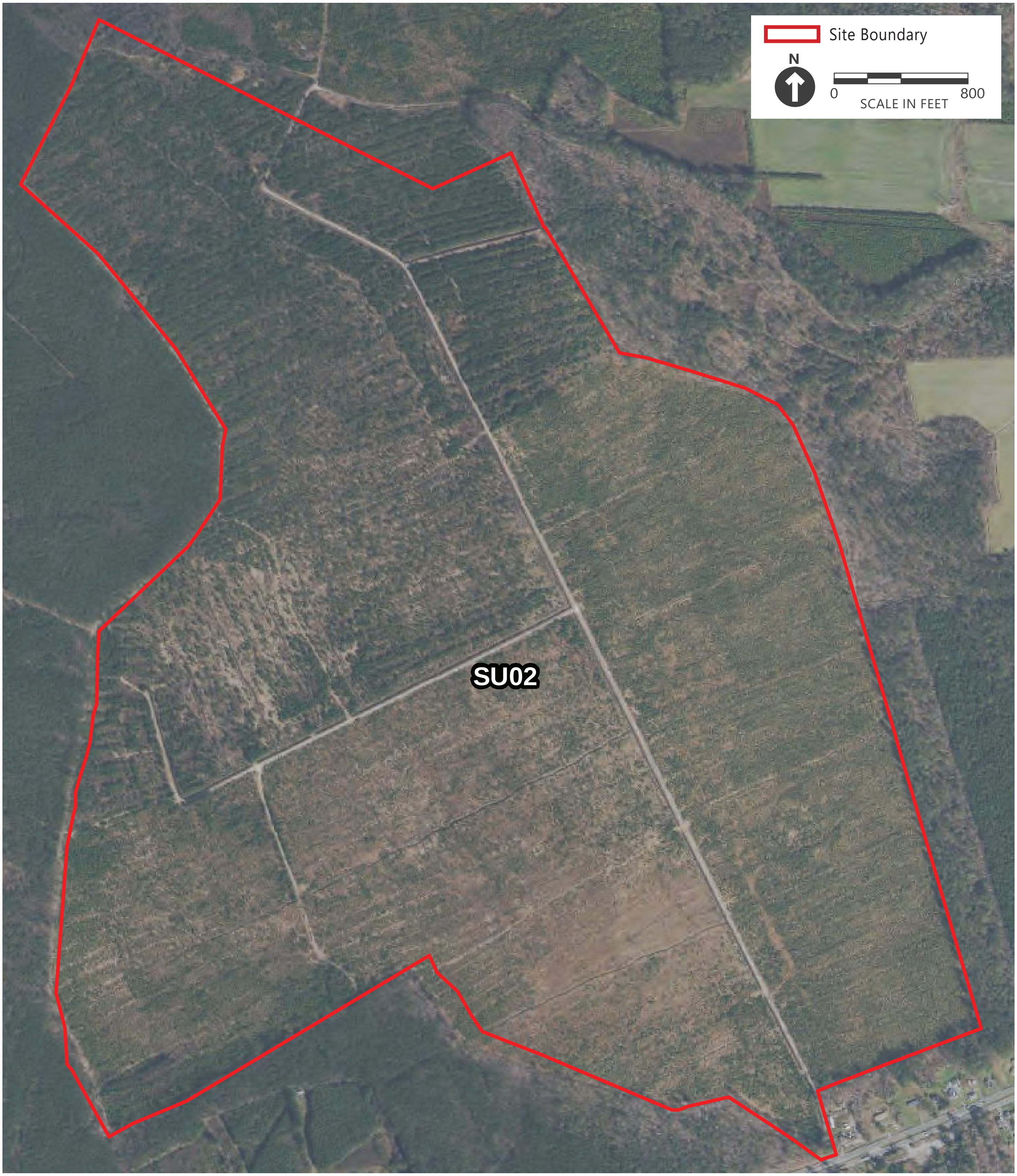
US Army Corps of Engineers®

OFF-SITE ALTERNATIVES ANALYSIS

Environmental Impact Statement for Expansion of SPSA Landfill

FIGURE 3

Phase III Analysis Results



US Army Corps of Engineers®

OFF-SITE ALTERNATIVES ANALYSIS

Environmental Impact Statement for Expansion of SPSA Landfill

FIGURE 4

Site SU02

US Army Corps of Engineers®

OFF-SITE ALTERNATIVES ANALYSIS

Environmental Impact Statement for Expansion of SPSA Landfill

FIGURE 5

Site SH33

US Army Corps of Engineers®

OFF-SITE ALTERNATIVES ANALYSIS

Environmental Impact Statement for Expansion of SPSA Landfill

FIGURE 6

Site SH23

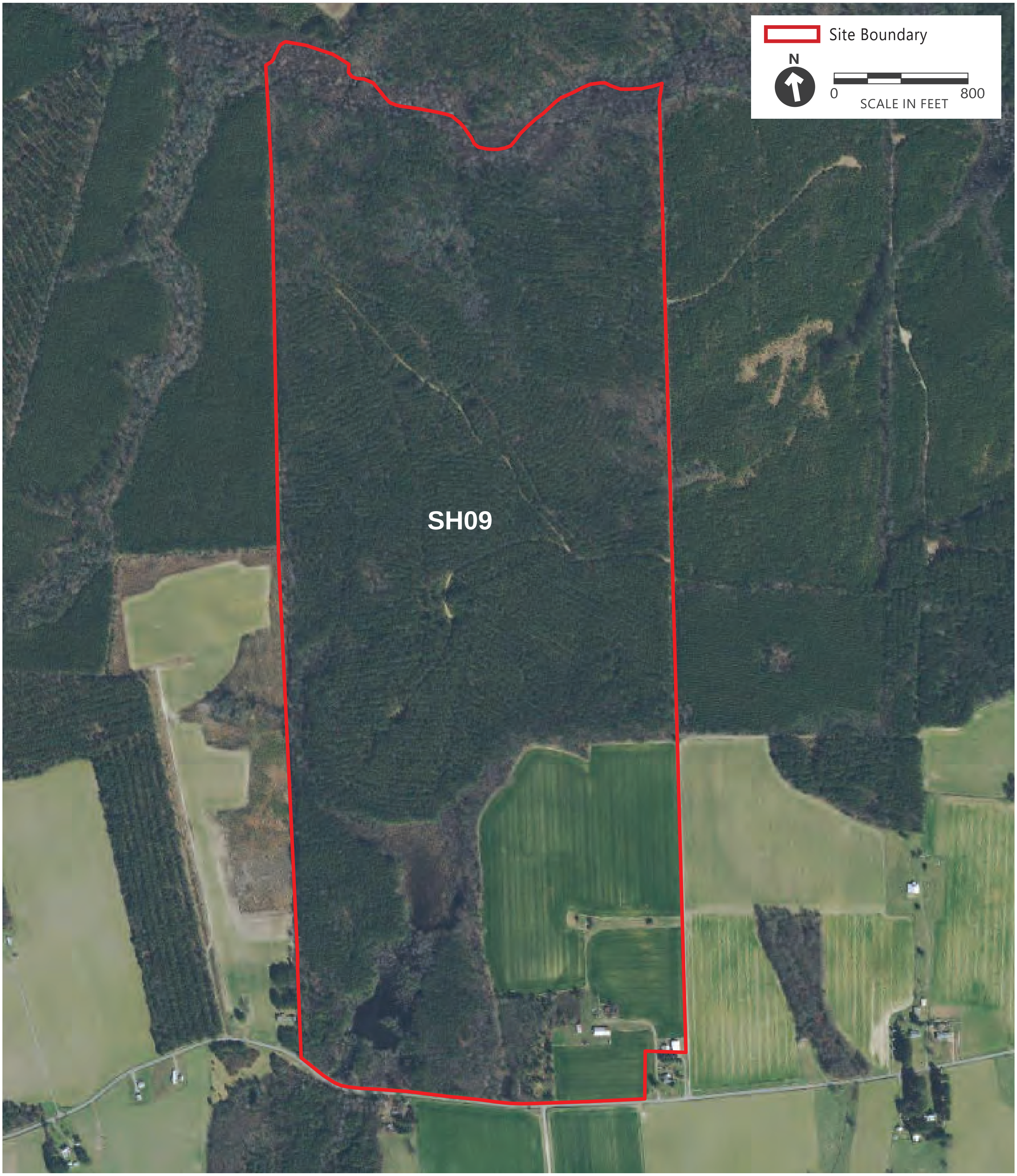
US Army Corps of Engineers

OFF-SITE ALTERNATIVES ANALYSIS

Environmental Impact Statement for Expansion of SPSA Landfill

FIGURE 7

Site SH32



OFF-SITE ALTERNATIVES ANALYSIS

Environmental Impact Statement for Expansion of SPSA Landfill

FIGURE 8

Site SH09

US Army Corps of Engineers®

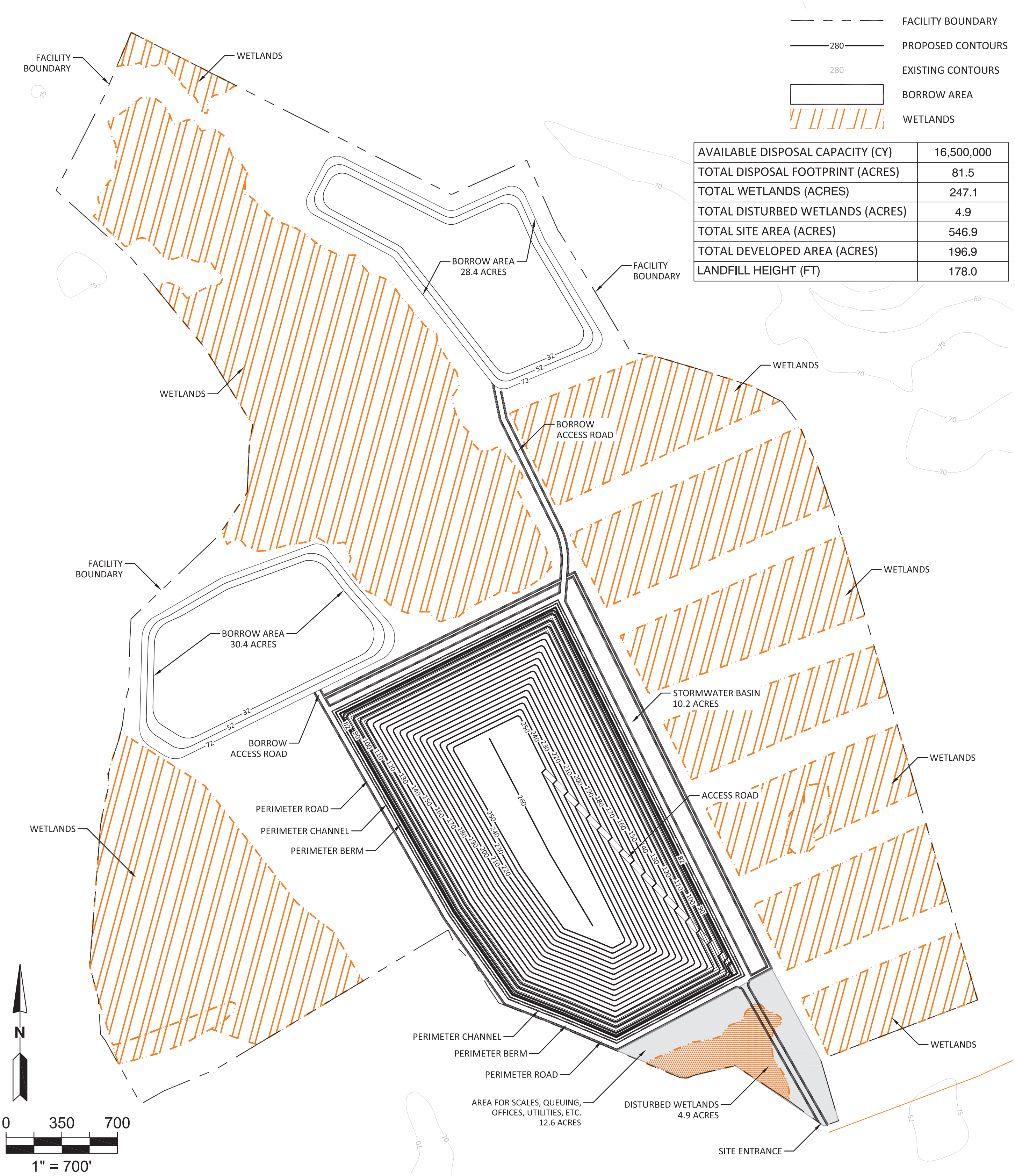
US Army Corps of Engineers®

OFF-SITE ALTERNATIVES ANALYSIS

Environmental Impact Statement for Expansion of SPSA Landfill

FIGURE 9

Site SH29



AVAILABLE DISPOSAL CAPACITY (CY)	16,500,000
TOTAL DISPOSAL FOOTPRINT (ACRES)	81.5
TOTAL WETLANDS (ACRES)	247.1
TOTAL DISTURBED WETLANDS (ACRES)	4.9
TOTAL SITE AREA (ACRES)	546.9
TOTAL DEVELOPED AREA (ACRES)	196.9
LANDFILL HEIGHT (FT)	178.0

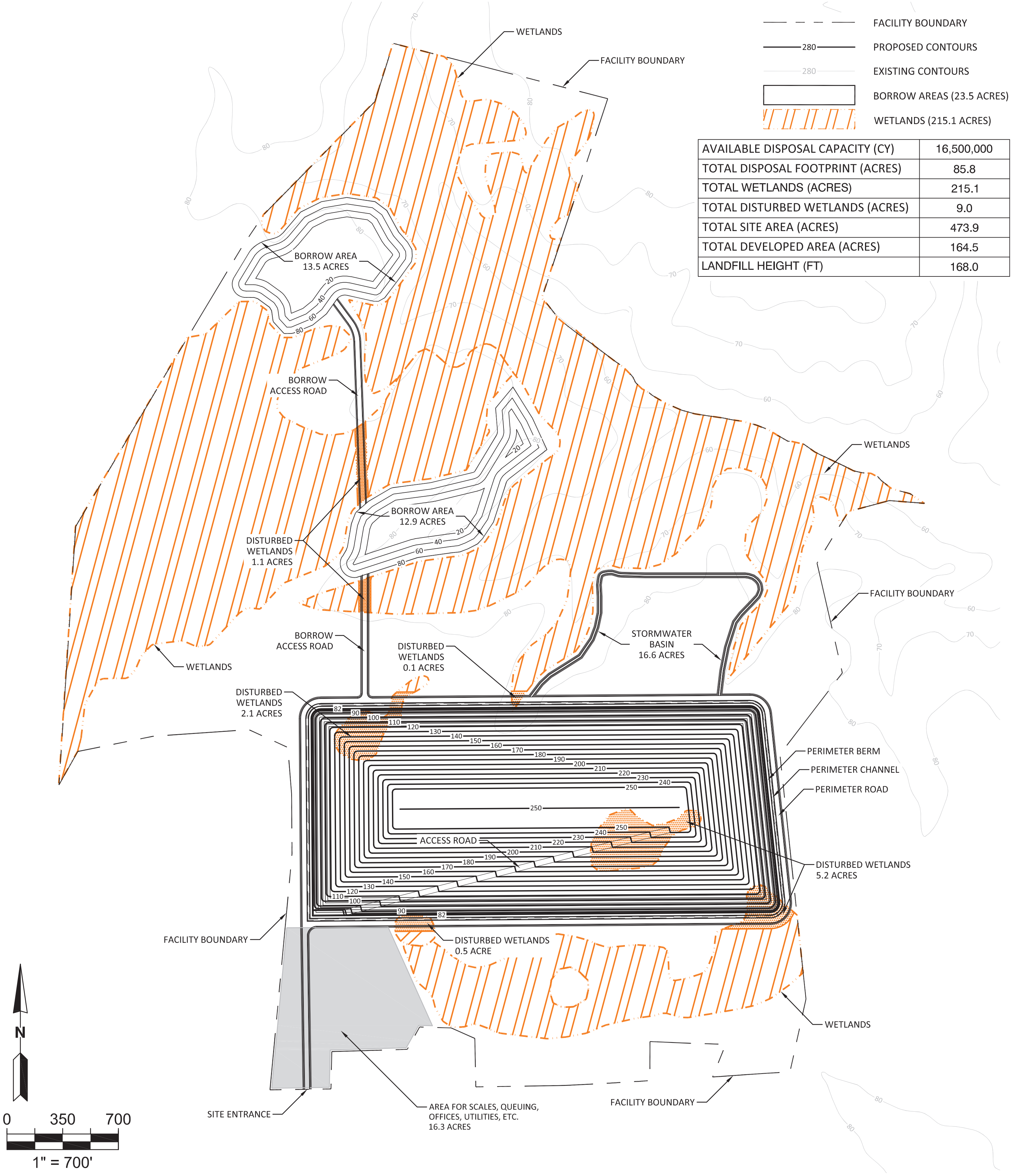
OFF-SITE ALTERNATIVES ANALYSIS

Environmental Impact Statement for Expansion of SPSA Landfill

US Army Corps of Engineers®

FIGURE 10

Site SU02 - SPSA Alternative Site Plan



AVAILABLE DISPOSAL CAPACITY (CY)	16,500,000
TOTAL DISPOSAL FOOTPRINT (ACRES)	85.8
TOTAL WETLANDS (ACRES)	215.1
TOTAL DISTURBED WETLANDS (ACRES)	9.0
TOTAL SITE AREA (ACRES)	473.9
TOTAL DEVELOPED AREA (ACRES)	164.5
LANDFILL HEIGHT (FT)	168.0

OFF-SITE ALTERNATIVES ANALYSIS

Environmental Impact Statement for Expansion of SPSA Landfill

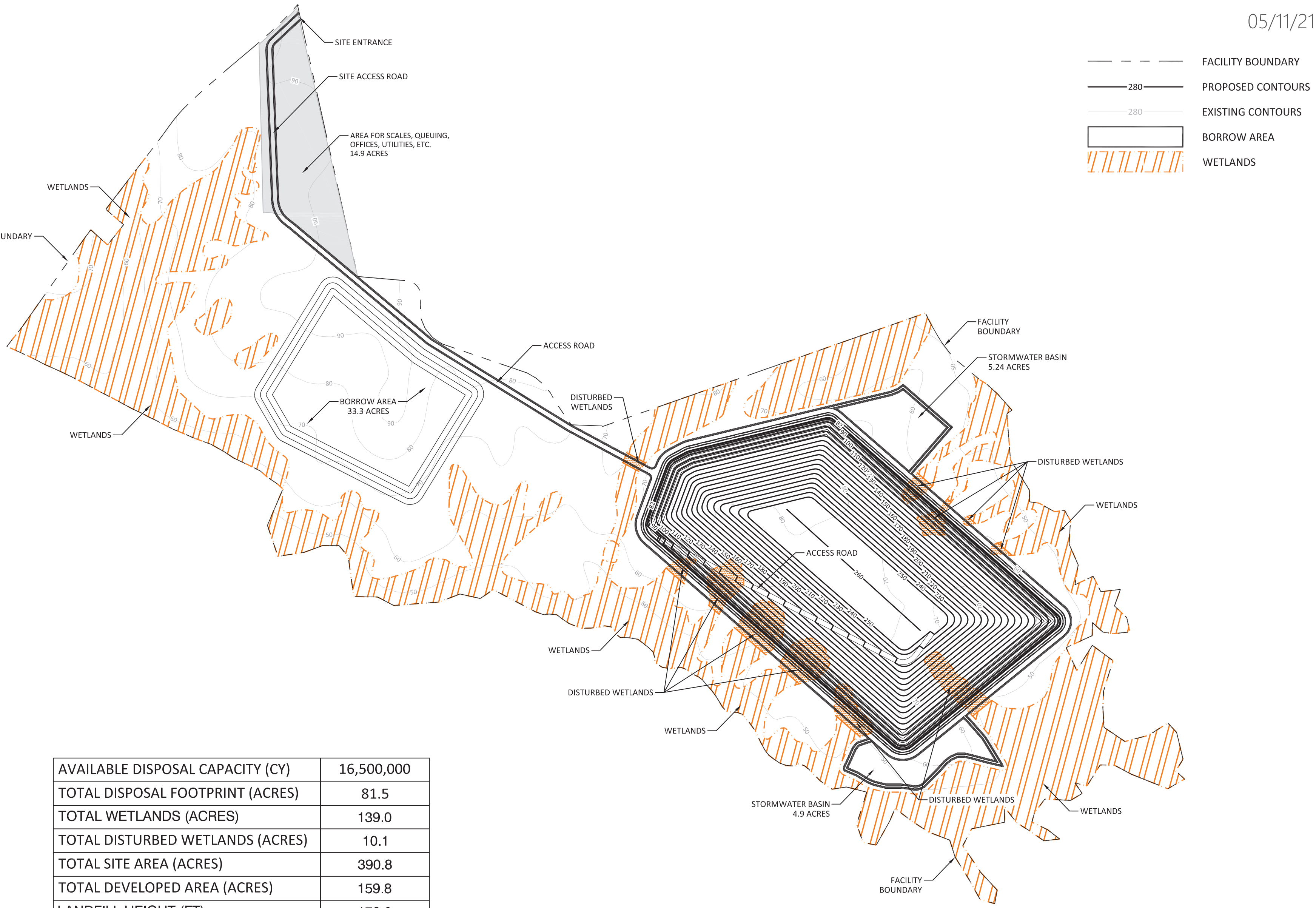
US Army Corps
of Engineers®

FIGURE 11

Site SH33 - SPSA Alternative Site Plan

DRAFT

05/11/21



AVAILABLE DISPOSAL CAPACITY (CY)	16,500,000
TOTAL DISPOSAL FOOTPRINT (ACRES)	81.5
TOTAL WETLANDS (ACRES)	139.0
TOTAL DISTURBED WETLANDS (ACRES)	10.1
TOTAL SITE AREA (ACRES)	390.8
TOTAL DEVELOPED AREA (ACRES)	159.8
LANDFILL HEIGHT (FT)	178.0

OFF-SITE ALTERNATIVES ANALYSIS

Environmental Impact Statement for Expansion of SPSA Landfill

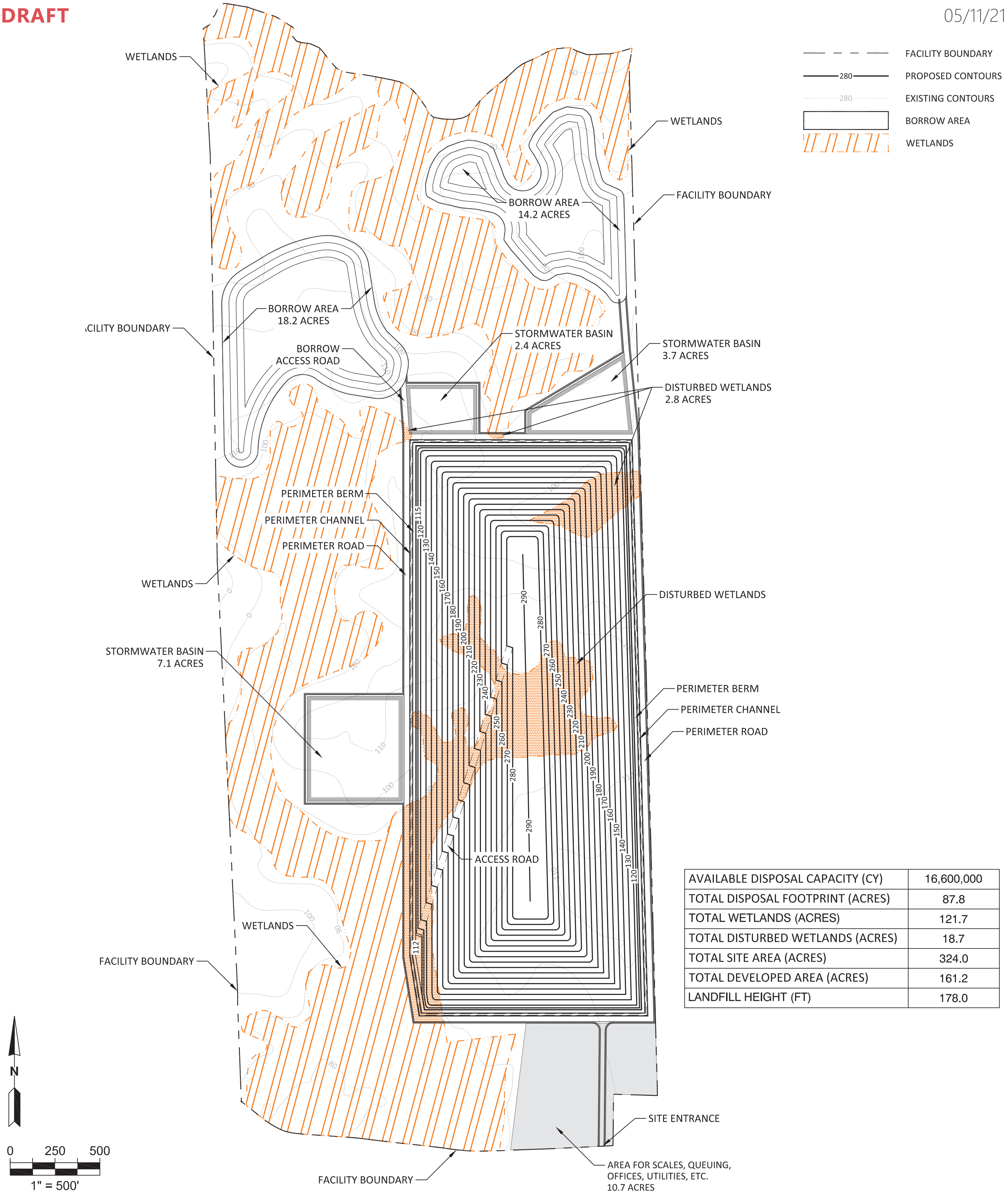
US Army Corps of Engineers®

FIGURE 12

Site SH23 - SPSA Alternative Site Plan

DRAFT

05/11/21



AVAILABLE DISPOSAL CAPACITY (CY)	16,600,000
TOTAL DISPOSAL FOOTPRINT (ACRES)	87.8
TOTAL WETLANDS (ACRES)	121.7
TOTAL DISTURBED WETLANDS (ACRES)	18.7
TOTAL SITE AREA (ACRES)	324.0
TOTAL DEVELOPED AREA (ACRES)	161.2
LANDFILL HEIGHT (FT)	178.0

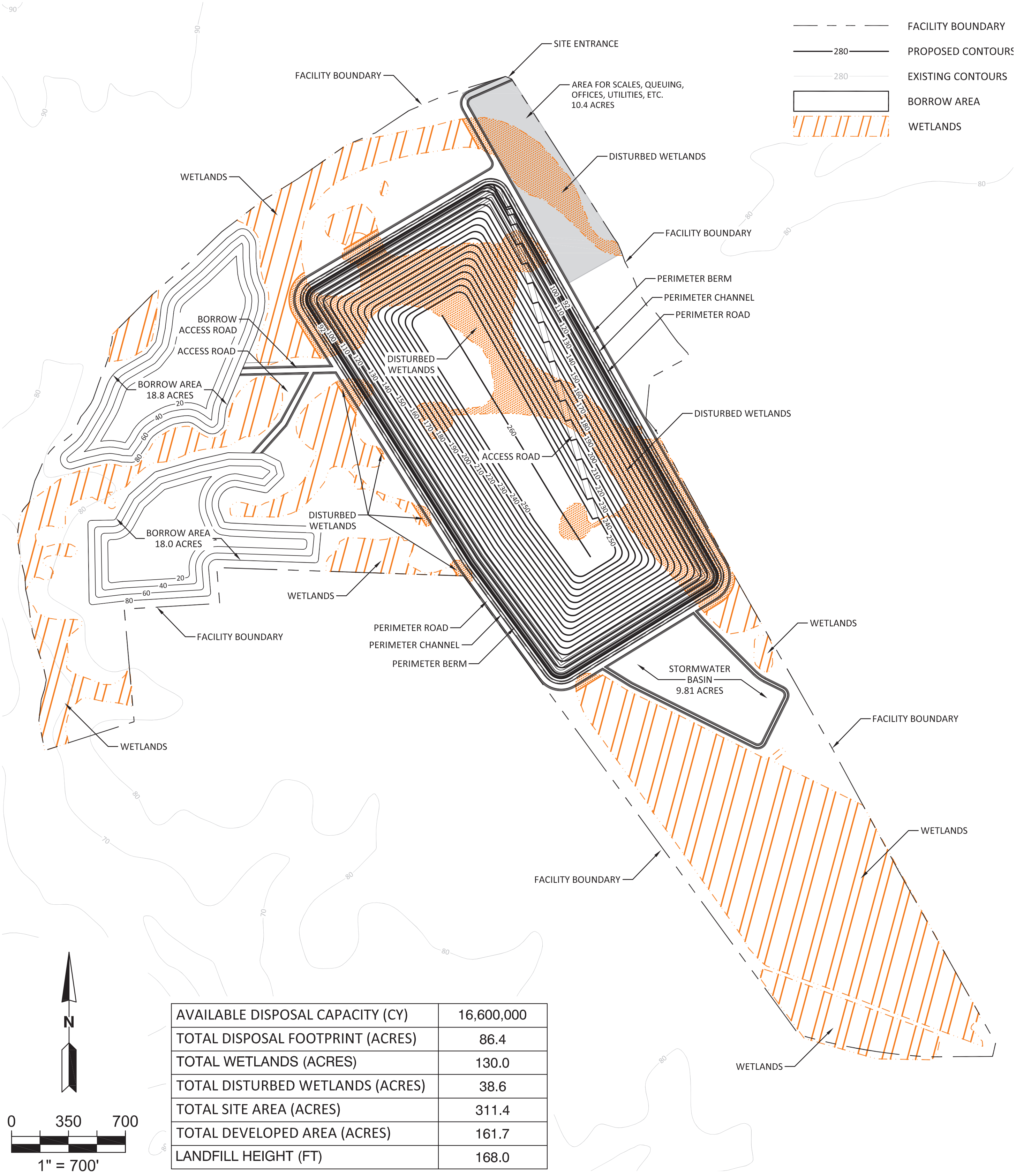
US Army Corps of Engineers®

OFF-SITE ALTERNATIVES ANALYSIS

Environmental Impact Statement for Expansion of SPSA Landfill

FIGURE 13

Site SH09 - SPSA Alternative Site Plan



AVAILABLE DISPOSAL CAPACITY (CY)	16,600,000
TOTAL DISPOSAL FOOTPRINT (ACRES)	86.4
TOTAL WETLANDS (ACRES)	130.0
TOTAL DISTURBED WETLANDS (ACRES)	38.6
TOTAL SITE AREA (ACRES)	311.4
TOTAL DEVELOPED AREA (ACRES)	161.7
LANDFILL HEIGHT (FT)	168.0

OFF-SITE ALTERNATIVES ANALYSIS

Environmental Impact Statement for Expansion of SPSA Landfill

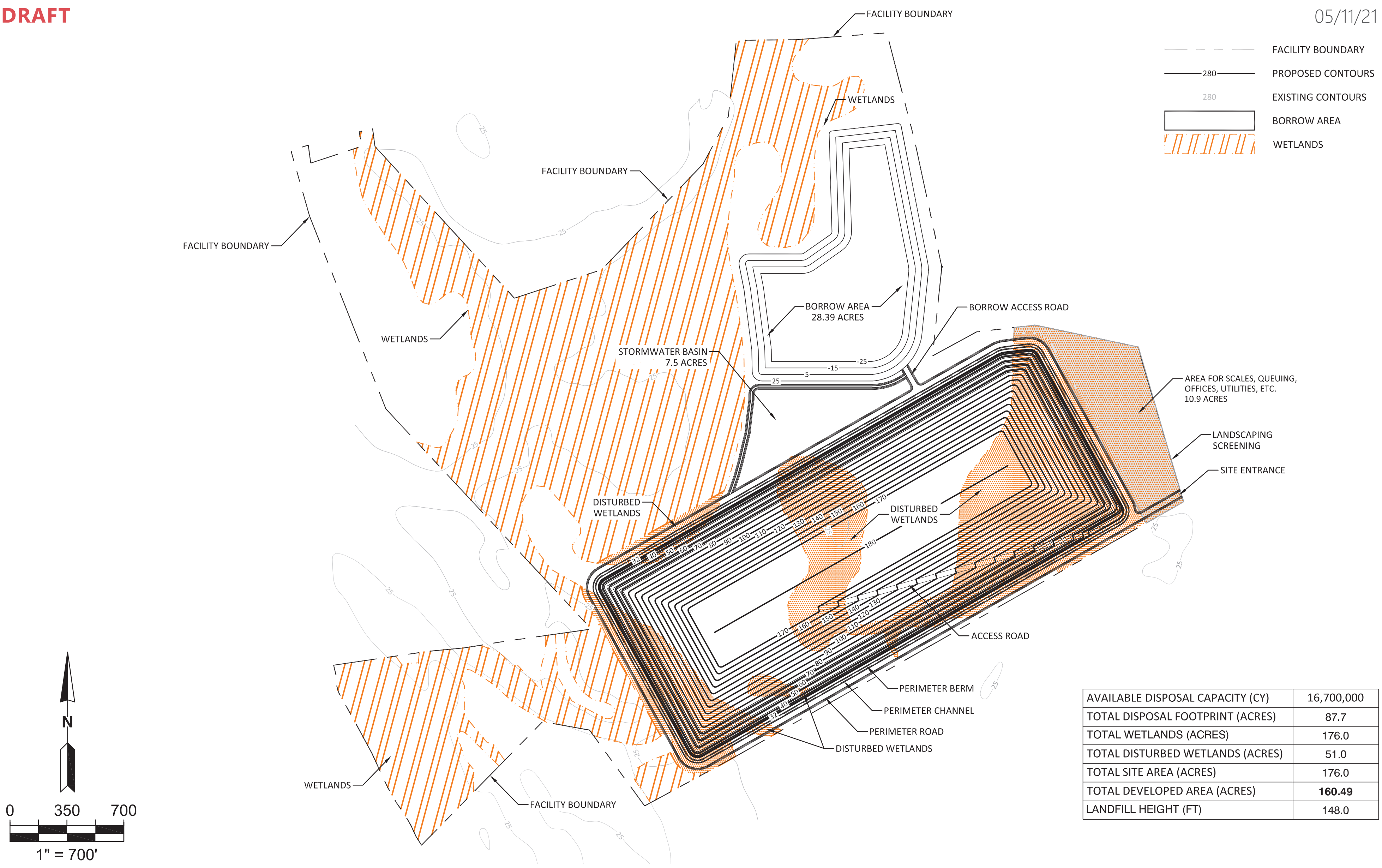
US Army Corps of Engineers®

FIGURE 14

Site SH32 - SPSA Alternative Site Plan

DRAFT

05/11/21



AVAILABLE DISPOSAL CAPACITY (CY)	16,700,000
TOTAL DISPOSAL FOOTPRINT (ACRES)	87.7
TOTAL WETLANDS (ACRES)	176.0
TOTAL DISTURBED WETLANDS (ACRES)	51.0
TOTAL SITE AREA (ACRES)	176.0
TOTAL DEVELOPED AREA (ACRES)	**160.49**
LANDFILL HEIGHT (FT)	148.0

US Army Corps of Engineers®

OFF-SITE ALTERNATIVES ANALYSIS

Environmental Impact Statement for Expansion of SPSA Landfill

FIGURE 15

SiteSH29 - SPSA Alternative Site Plan

Appendix B: On-Site Alternatives Technical Memo

This page intentionally left blank.

On-Site Alternatives Analysis Technical Memorandum

Regional Landfill - Cells VIII and IX Landfill Expansion

Draft Environmental Impact Statement

Southeastern Public Service Authority

Suffolk, Virginia
August 2022

Contents

Figures

Appendices

1 Background and Purpose

To be adequately prepared to meet the needs of its member communities, it is necessary for the Southeastern Public Service Authority (SPSA) to increase the solid waste disposal capacity at the Regional Landfill by incorporating an additional 129 acres (identified as Cells VIII and IX and support areas for roadway and stormwater management) of the landfill property within the active facility boundary. The proposed expansion into Cells VIII and IX is part of SPSA's long-term plan for providing critical disposal capacity for the region and is consistent with the Regional Solid Waste Management Plan (RSWMP) for Southeastern Virginia which identifies the need for future expansion of the active facility. The proposed expansion will impact wetland areas and is subject to federal and state wetland permitting for the over 100 acres of proposed disturbance.

The development and use of Cells VIII and IX will require a Joint Permit from the U.S. Army Corps of Engineers (USACE) and Virginia Department of Environmental Quality (VDEQ) under the Clean Water Act Section 401 and 404. Due to the scope of the proposed impacts, an Environmental Impact Statement (EIS) is required to be prepared. The EIS requires the development and analysis of potential on-site and off-site alternatives to the proposed development. HDR has completed an analysis of nine on-site alternatives, including a proposed 129-acre solid waste boundary expansion. The purpose of this memorandum is to summarize the alternatives evaluated, including the advantages and disadvantages of each, whether the alternative is practicable, potential wetlands avoided, and estimated costs.

The nine alternatives developed in coordination with USACE-Norfolk District are:

1. Cells VIII and IX Expansion
2. Relocate Natural Gas Main and Overlap onto Closed Cells I-IV
3. Mechanically Stabilized Earthen (MSE) Wall around South and West Boundary of Cells V & VI
4. MSE Wall and Gas Main Relocation and fill to 200′
5. MSE Wall and Gas Main Relocation and Fill to 240′
6. Capture Airspace between Cell V and VII
7. MSE Wall around Cells V, VI and VII
8. Relocate Gas Main and Fill between Cells VII and VIII
9. Relocate Gas Main and Construct 30′ High MSE Wall around Cells V, VI, VII, and VIII

Site Plan sketches and cross sections for each alternative are included in Appendix A.

2 Alternatives Assessment

2.1 Cells VIII and IX Expansion (Alternative 1)

The proposed base alternative is for the horizontal expansion of 92.9 acres of lined area that would be comprised of Cells VIII and IX. The proposed expansion area including stormwater management area, perimeter berms, and roadway would comprise129 acres of land. The proposed expansion would be north of the 56-acre Cell VII and the Columbia Natural Gas Pipeline Easement, east of the 100-acre Closed Cells I–IV, west of the existing 50 acres of preserved wetlands, and south of the existing electric transmission line. The proposed eastern boundary of the landfill cells is offset from the preserved wetland area by 200 feet to minimize disturbance of the wetland as a result of temporary dewatering required to construct the expansions. It is anticipated that each of the cells would be developed in four phases. See Figure 1 for a conceptual site plan for the proposed expansion.

The proposed expansion would provide an estimated 16M cubic yards (CY) of capacity which would extend the life of the Regional Landfill to about 2060 based on estimated waste acceptance rates and in place waste densities. The landfill cells would be permitted and constructed as an inward gradient landfill similar to Cells V and VI and the planned Cell VII. In this design, the base liner system is constructed below the groundwater table through temporary dewatering. After construction and initial operation, the groundwater dewatering system is ceased and groundwater is permitted to come in contact with the underside of the base liner system, establishing pressure beneath the liner and preventing any leachate from migrating out of the containment system should there be a defect undetected during construction and operations.

2.1.1 Advantages

- Coordinates well with Cell VII operations and utilization of access roads and leachate and stormwater infrastructure
- Provides area in close proximity for stockpile storage and borrow area to support Cell VII construction, operations, and closure
- Could be completed and operated using conventional construction and operational methods and be readily permittable by VDEQ
- Would not impact any existing infrastructure on-site
- Could be sequenced in a manner to utilize on-site soil resources for construction and operation through phased expansion in each cell
- Provides a location away from existing residences and buffered by existing wetland areas to the east

2.1.2 Disadvantages

- Would impact approximately 119 acres of forested wetlands, which would require a comprehensive mitigation plan to offset

To compare the proposed wetland impacts of the proposed alternative with other on-site alternatives, HDR determined an approximate landfill capacity per acre of wetland impact. The airspace provided by a 100-foot-wide cross section through the middle of Cell VII is calculated to be 573,260 CY over the 3.35-acre area. This is equivalent to 171,046 CY/acre of landfill footprint or wetland disturbance (Figure 2). The calculated wetland offset for other on-site alternatives was based on the estimated disposal airspace provided be each alternate and the resulting volume and area reduction in the proposed 92.9-acre expansion of Cells VIII and IX, while still maintaining 16M CY of capacity. A summary of the potential wetland avoidance for each alternative is included in Appendix B.

2.1.3 Costs to Implement

The estimated cost to construct the proposed 92.9-acre Cell VIII and IX landfill expansion, including soil excavation, based liner system, leachate collection and management system, and engineering permitting and design in 2022 dollars is $72.6M. Assuming a wetland mitigation ratio of 2:1 and a cost of $30,000 per acre, the mitigation costs for the estimated 119.03 acres of impact is $7.1M. The total cost for Alternative 1 is estimated to be $79.8M at a cost of $4.99/CY of waste disposal capacity.

The cost estimates for construction of landfill expansion on a per acre basis was calculated from HDR's Class III Cell VII Construction Cost Estimate prepared in 2019 and inflated to 2022 dollars utilizing the VDEQ inflation indices for solid waste financial assurance. Detailed construction cost estimates for each alternative were also prepared, including mitigation and engineering costs. A summary of the alternative costs and the detailed estimates referenced for each alternative is included in Appendix C.

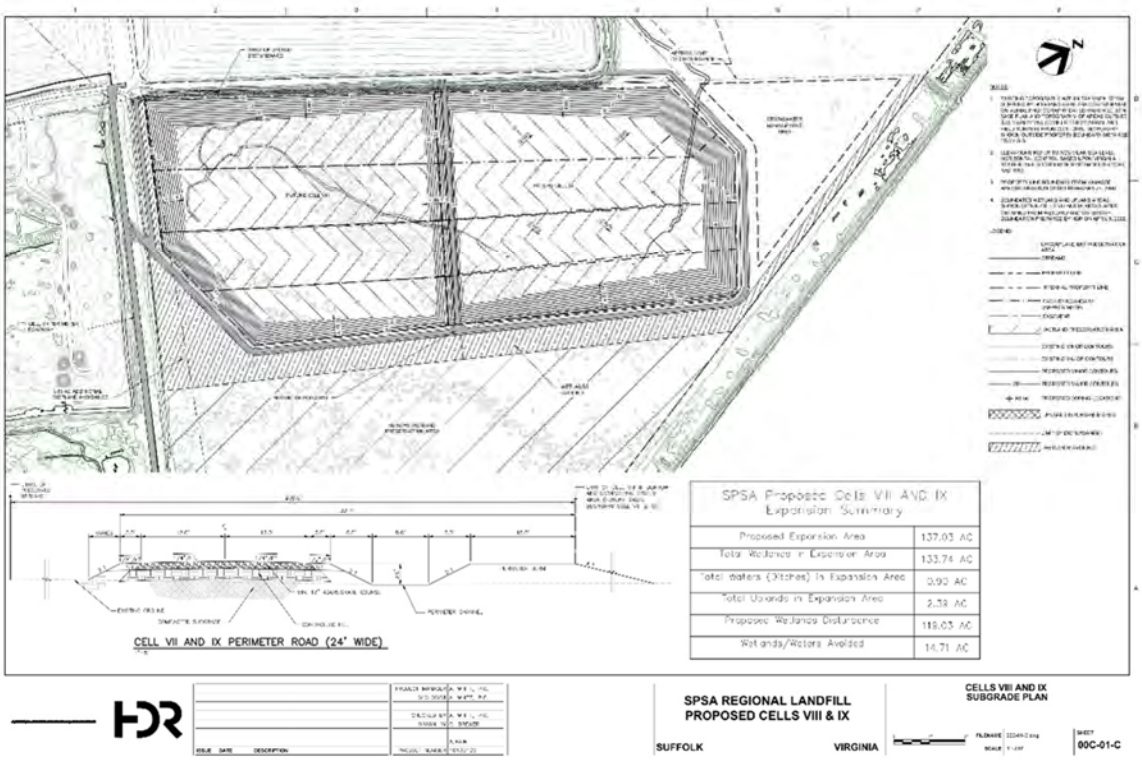


Figure 1 Alternative 1 Site Plan

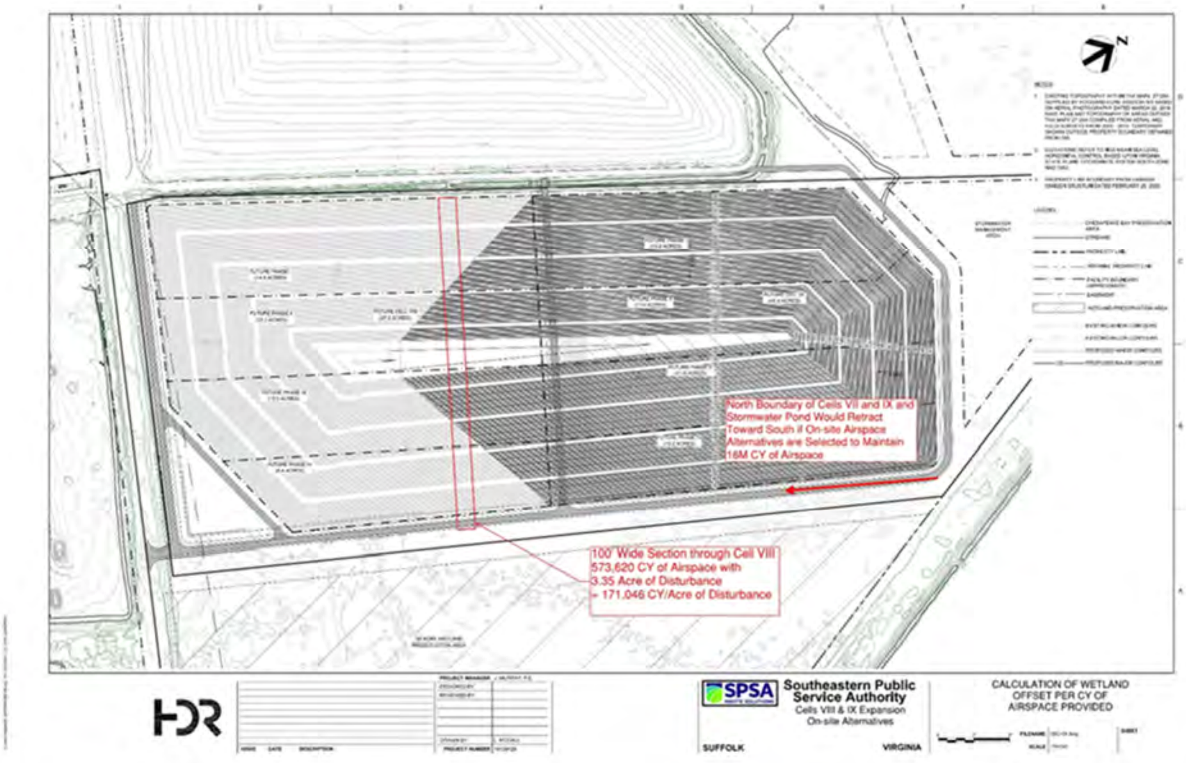


Figure 2 Wetland Offset Calculation

2.2 Relocate Natural Gas Main and Overlap onto the Closed Cells I–IV (Alternative 2)

This proposed alternative is for construction of a piggy-back landfill onto the southern portion of closed Cells I–IV that faces Cells V and VI (Figure 3). The proposed expansion would include an 8.5-acre base liner system in the area to the north of Cells V and VI and 19.5-acre overlay liner system constructed atop the final cover system of the Cells I–IV and a 17.8-acre overlay liner system on the northern slopes of Cells V and VI. This alternative would provide an estimated 2.87M CY in capacity. The existing base liner system of Cells I–IV is an older design and would not meet current regulatory requirements; therefore, any new waste placed in this footprint would be required to have a new base liner and leachate collection system. The impacts of the additional weight of the new waste and liner and final cover system on the existing base liner and leachate collection system would need to be evaluated and issuance of a permit for a piggy-back landfill at this location is not a certainty. In addition to a new base liner, this alternative would require relocation of the existing Columbia Natural Gas Main, reconstruction of the existing landfill gas collection system beneath the piggy-back landfill and significant modifications to the existing leachate collection system side risers (two total) on the north side of Cells V and VI to maintain operation and maintenance access for these submersible pumps, or abandonment of the leachate collection system and constructing an impermeable cover (final cover and overlay liner) over the waste to preclude additional leachate generation to these sumps.

The relocation or extension of the leachate collection system side risers through the proposed waste filling would be very difficult to complete, adding over 200 feet of riser pipe, and would not guarantee long-term access for leachate removal from the existing Cell V and VI sumps. The extensions of the risers and leachate forcemain and pump connections during filling operations would be subject to stresses from the waste materials placed over and around them, that could jeopardize the integrity of the access riser piping and maintenance of the pumps. Further, the additional 200 feet or more riser pipe would increase the difficulty in removing and reinstalling the submersible leachate pumps for periodic maintenance.

With these challenges, we do not consider this alternative to be practical until the Cell V and VI leachate generation rate is reduced to a point where the leachate removal is no longer necessary, and the pumps can be decommissioned. The time required for the leachate generation rate to essentially cease is anticipated to be well over 30 years and beyond the time frame required for providing waste disposal capacity. To preclude leachate from entering the collection areas and sumps that are abandoned, an overlay liner system would need to be constructed over the Cells V and VI final grades the overlap area and final closure constructed in areas adjacent to the overlap area.

2.2.1 Advantages

- Would not require impacts to wetlands and could result in a net reduction of 16.8 acres of wetland impacts with a reduced Cells VIII and IX footprint
- Construction and operation of filling of waste materials in this area could be done using conventional methods and not require special provisions for access of equipment to deliver waste materials
- Stormwater run-off could be directed to existing infrastructure to the west and east
- Leachate management from new lined 19.7-acre and 17.8-acre slopes and 8.5-acre base area could be managed with two additional leachate sumps and side riser pumps

2.2.2 Disadvantages

- Would require relocation of the existing Columbia Natural Gas Main (36-inch diameter pipe) at an estimated cost in excess of $22M.
- Would require extension of two leachate pump station riser pipes and controls in Cells V and VI to either outside the landfill waste surface footprint or up through the waste filling with a vertical manhole to maintain access to the submersible pump in the sump. These extensions would require an additional 200 feet or more of riser pipe, which would make it very difficult if not impractical to continue to maintain these sump pumps that would be 400 linear feet away from the access point. This is a significant challenge with this alternative.
- The practicality of extending the leachate sump risers and providing assurance that the pumps can continue to be maintained is low. This alternative would require that the Cell V and Cell VI sump risers be decommissioned. This would only be viable if the leachate generation had ceased in their respective leachate collection system areas following construction of closure system above, and several years for generation to cease. Leachate generation reis likely to continue for more than 30 years after closure. This would also require that an overlay liner system be installed/maintained beneath the

waste disposal area to preclude leachate from entering the Cell V and VI leachate collection system that is abandoned.

- Existing LFG collection system on Closed Cells I–IV in the areas of the overlay liner system would need to be modified to lower the vertical well and move well head control to outside the limits of the liner system. This would prohibit maintenance of these well locations in future and may lead to abandonment of these collection points.
- Existing LFG collection header from Cells V and VI currently connects to the header on the closed Cells I–IV in the middle of the proposed base liner area of this alternative. This header pipe and condensate trap would require relocation and modification of collection line locations that connect to it.
- Enhanced LFG collection system would be required beneath and at the edges of the piggy-back landfill liner to capture LFG and relieve pressure from beneath the liner system
- Regulatory approval of this piggy-back alternative and modifications to the existing leachate management system in Cells V and VI is not a certainty

2.2.3 Costs to Implement

The estimated cost to construct the proposed base liner and overlay liner systems is $28.6M. The cost to relocate the natural gas main is estimated to be $22.2M. With this alternative, Cells VIII and IX could be reduced by 16.8 acres to 76.12 acres and would cost $59.53M to construct. Assuming a wetland mitigation ratio of 2:1 and a cost of $30,000 per acre, the mitigation costs for the estimated 102.25 acres of impact is $6.1M. The total cost for Alternative 2 is estimated to be $116.4M at a cost of $7.28/CY of waste disposal capacity or 48% higher than Alternative 1. The cost for wetland avoidance is estimated to be $2.18M per acre.

2.2.4 Practicality

This alternative is not practical due to the significant impacts it would have on the existing leachate collection system on the north side of Cells V and VI. Extensions of the side riser pipes to maintain access would render these impractical to maintain following construction of the base liner system and after vertical extensions of manhole up through the waste. The vertical extension would require re-connection of power, controls, supervisory control and data acquisition (SCADA), LFG collection, and leachate forcemains with each lift of waste placement. The decommissioning of the leachate collection system in the areas of Cells V and VI would make this alternative constructable but would require that closure be constructed and several years, likely well over 30 years, for the leachate generation to cease so that the side risers and pump stations could be removed. The length of time required for cessation of leachate generation is well beyond the time that additional disposal capacity is required and therefore this alternative is not practical.

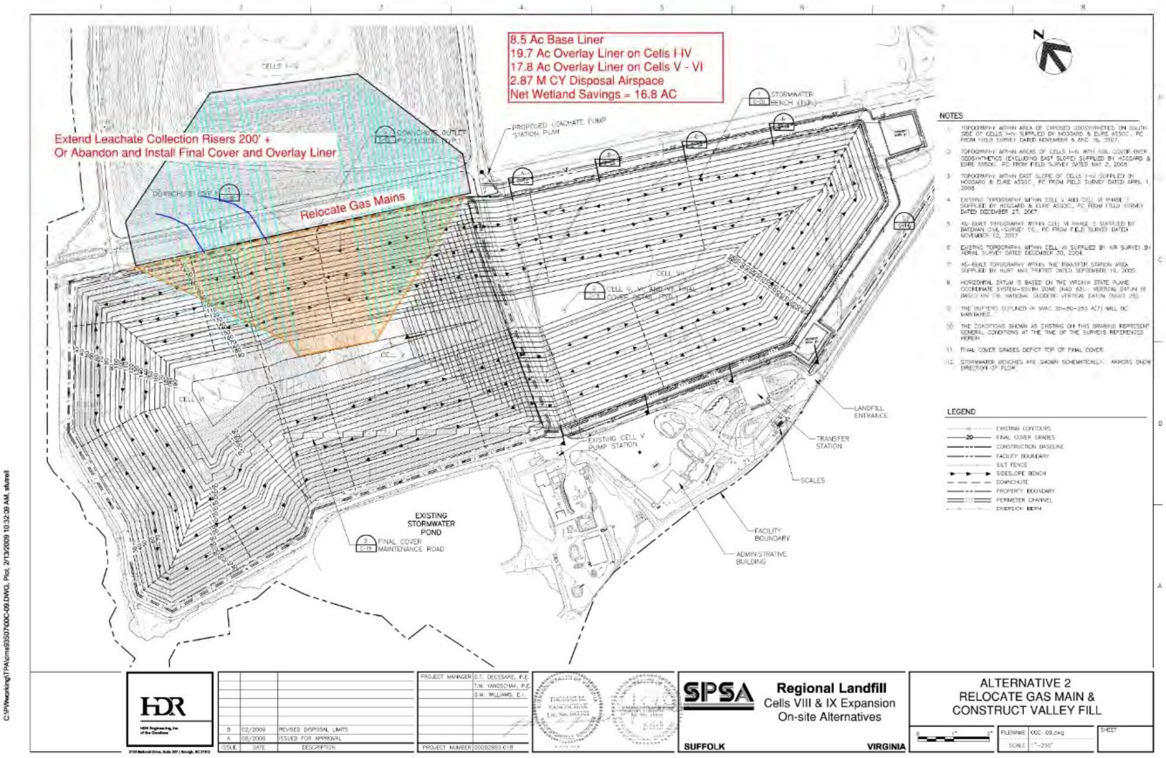


Figure 3 Alternative 2 Site Plan

2.3 MSE Wall around South and West Boundary of Cells V and VI (Alternative 3)

This proposed alternative is for construction of an MSE wall around the western and southern limits of Cells V and VI. MSE walls are frequently utilized in transportation projects to provide vertical grade adjustment in a narrow footprint (bridge abutment) where conventional soil berms are restricted due to site constraints. Application of MSE walls for solid waste landfill expansions has been permitted by some state regulatory agencies to avoid disturbance of existing infrastructure or wetlands or to confirm with regulatory setbacks of waste boundary lines from property lines when horizontal expansion is not a viable option. There is limited experience with permitting of MSE walls at Virginia solid waste landfills. The MSE wall would include a conventional inboard slope of 3:1 that the base landfill liner system can be constructed on, and the outboard slope would be 0.5:1 (Figure 4). Due to constraints of existing stormwater pond and property line and wetlands on the western side of Cell VI, the berm is limited to 30 feet in height, which would require a 140-foot-wide impact along its length for an impact of 14.9 acres of wetlands.

The berm would be constructed with structural fill and many layers of geotextile fabrics to provide the stability required to withstand the lateral forces of the landfill on the inside. See Figure 5 for a typical section of MSE Wall in a landfill application.

Figure 4 MSE Wall
Source: Pinnacle Design Build

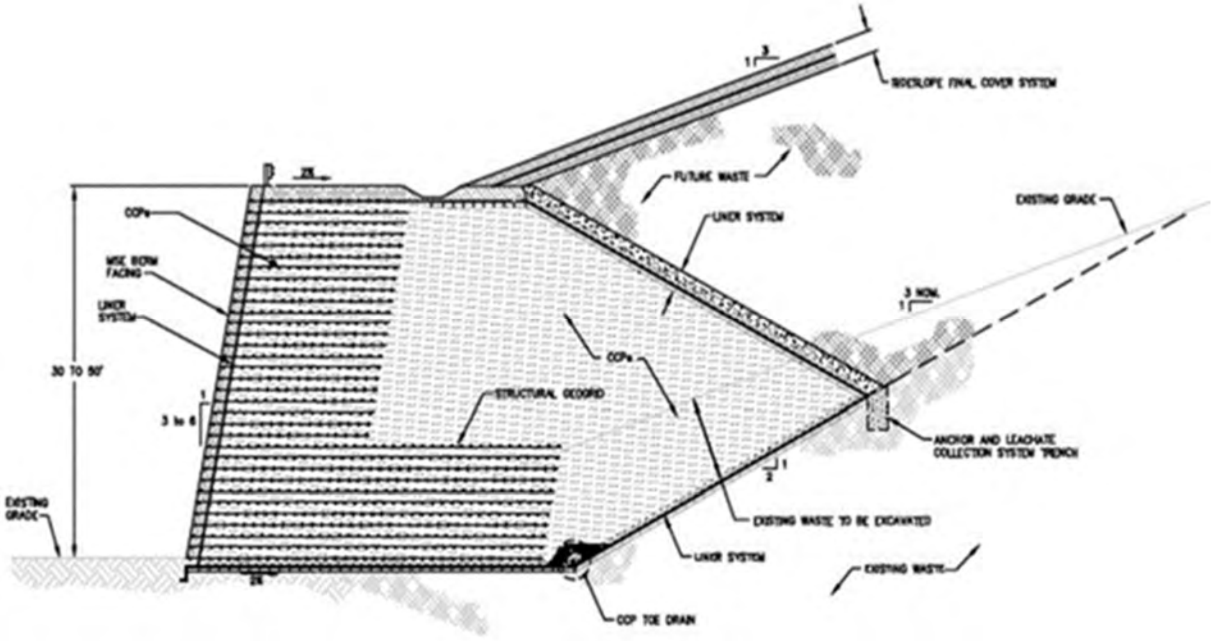


Figure 5 MSE Wall Section
Source: WOCA 2013

This alternative would include construction of a 9.0-acre base liner system on the inboard slope of the MSE wall that would be connected to the existing base liner system of Cell VI. This alternative would provide an estimated 2.2M CY of capacity through the 30 vertical feet of additional filling over the existing final waste grades of Cell VI (Figure 6 and Figure 7). The final elevation of the waste filling and final cover for this alternative with operating equipment would be Elevation 220 per the current Federal Aviation Administration (FAA) requirements for the permitted Cells V, VI, and VII. To comply with this requirement SPSA has established a maximum waste and final cover elevation of 200. The construction of the MSE wall would result in wetland impacts on the western and southern boundaries where the area to support the 30-foot-high berm would extend into wetland and pond area by an estimated 14.9 acres. Lowering the height by 10 to 15 feet to eliminate any wetland impacts would significantly reduce the airspace volume provided to where it would not be a consideration to complete.

2.3.1 Advantages

- Base liner system would be connected to existing base liner and leachate from new 9.0-acre area would drain into existing leachate collection systems and sumps.
- Leachate side slope riser pipes would be extended 90 linear feet and pump stations relocated to the new limit of waste. Access to leachate sumps is reasonably maintained with this configuration

2.3.2 Disadvantages

- Would have a net impact to wetlands over and above the wetlands avoided for the same disposal volume for Alternative 1 and result in an additional 2 acres of wetland impact
- Construction of the MSE wall would require the use of operational cover soil from the site borrow area or import of approximately 450,000 CY of structural fill materials.
- Additional capacity provided with this alternative would be constrained by the geometry of the slope filling as well as the top elevation of 200 restricted by the FAA.
- Waste filling operations would be more difficult than a horizontal expansion as filling would initially be in a valley and the horizontal tipping pad would be limited to less than 200 feet due to slope geometries.
- Stormwater run-off from existing exterior side slopes would need to be diverted away from active filling areas below to reduce run-on and leachate production.
- Stormwater run-off from completed side slopes would be managed with new perimeter channel and large vertical (30-foot+) drain manholes through the berm to discharge the collected stormwater.
- Existing leachate forcemain, underground electric and SCADA communication lines would need to be relocated to atop the MSE wall following construction.
- Access around the perimeter of the site would be constrained with the narrow roadway at the top of the MSE. A wider perimeter road would require additional MSE wall width and additional wetland impacts along the perimeter, further negating any wetland offset for this alternative.
- Permitting and design for this alternative would be complicated and regulatory approval of the MSE wall and modifications to the existing leachate management system in Cells V and VI is not a certainty.

2.3.3 Costs to Implement

The estimated cost to construct the proposed MSE wall is $21.1M. With this alternative, Cells VIII and IX could be reduced by 12.9 acres to 80.04 acres and would cost $62.6M to construct. Assuming a wetland mitigation ratio of 2:1 and a cost of $30,000 per acre, the mitigation costs for the estimated 121.05 acres of impact is $7.26M. The total cost for Alternative 3 is estimated to be $90.97M at a cost of $5.69/CY of waste disposal capacity or 14% higher than Alternative 1, without any benefit of wetlands avoided.

2.3.4 Practicality

This alternative is not practical due to the significant costs for construction of the MSE wall and relocation of existing infrastructure relative to the airspace that it provides. In addition, this alternative would result in greater net wetland impacts than proposed Alternative 1.

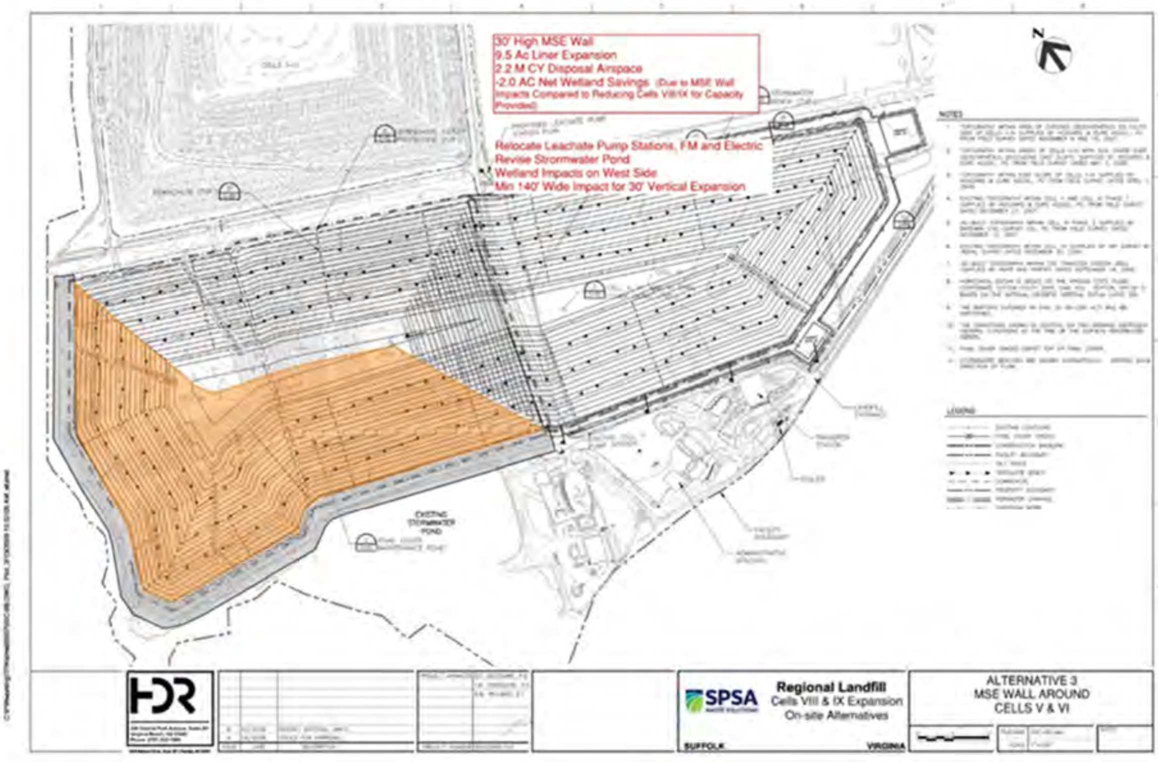


Figure 6 Alternative 3 Site Plan

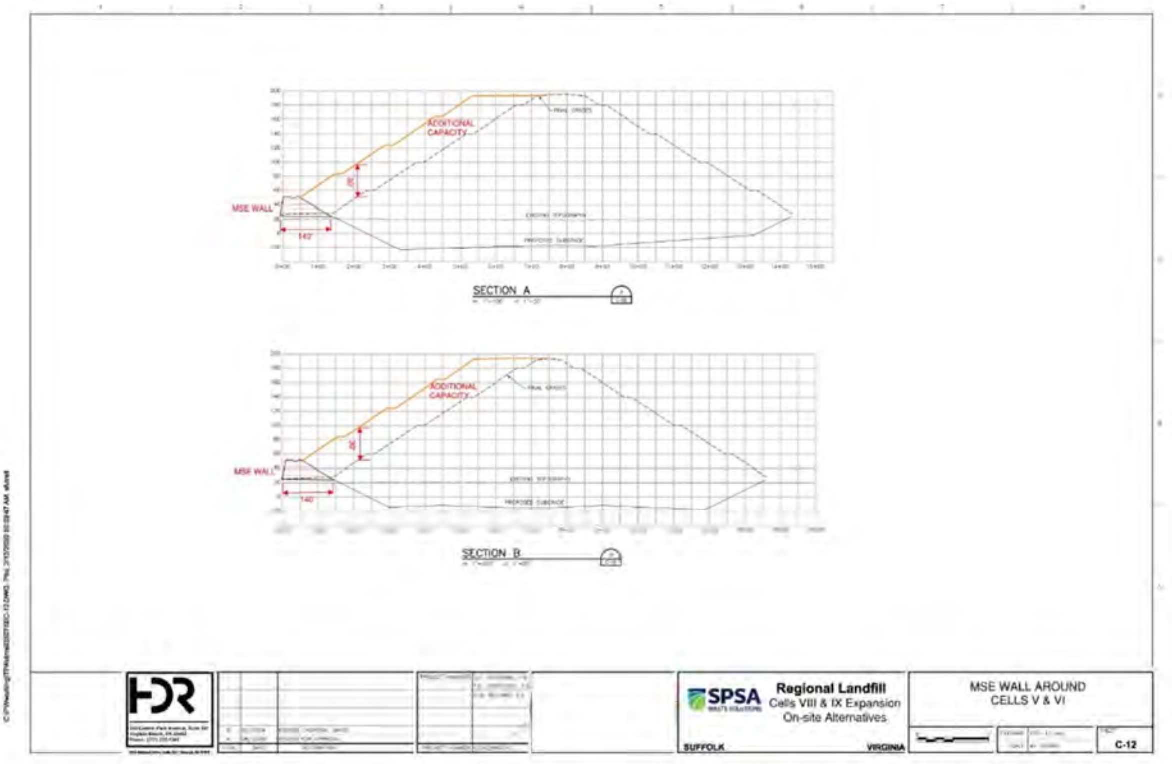


Figure 7 Alternative 3 Section

2.4 MSE Wall and Relocate Gas Main, Fill to 200′ (Alternative 4)

This proposed alternative is a combination of Alternatives 2 and 3 and includes construction of a 8.5-acre base liner system in the area to the north of Cells V and VI, 19.5-acre overlay liner system constructed atop of the final cover system of the Cells I–IV, a 17.8-acre overlay liner system on the northern slopes of Cells V and VI, and a 9.0-acre base liner system on the inboard slope of the MSE wall that would connect to the existing base liner system of Cell VI and an MSE wall around the western and southern limits of Cells V and VI (Figure 8 and Figure 9).

The proposed expansion would include. This alternative would provide an estimated 5.2M CY of capacity through the piggy-back landfill and 30 vertical feet of additional filling over the existing final waste grades of Cell VI. The final elevation of the waste filling and final cover for this alternative would be Elevation 200 per the current FAA requirements for the permitted Cells V, VI, and VII.

2.4.1 Advantages

- Would not require impacts to wetlands and could result in a net reduction of 15.5 acres of wetland impacts with a reduced Cells VIII and IX footprint.
- Construction and operation of filling of waste materials on the northern area could be done using conventional methods and not require special provisions for access of equipment to deliver waste materials. Filling on the west and south would be more difficult.

- Leachate management from new 19.5-acre and 17.8-acre lined slopes and 8.5-acre base area of the piggy-back landfill could be managed with two additional leachate sumps and side riser pumps.
- Base liner system of the MSE wall would be connected to existing base liner and leachate from new 9.0-acre area would drain into existing leachate collection systems and sumps.
- Leachate side slope riser pipes at the MSE wall would be extended 90 linear feet and pump stations relocated to the new limit of waste. Access to leachate sumps is reasonably maintained with this configuration in the MSE wall locations.

2.4.2 Disadvantages

- Would require relocation of the existing Columbia Natural Gas Main (36-inch diameter pipe) at an estimated cost in excess of $22M
- Would require extension of two leachate pump station riser pipes and controls in Cells V and VI to either outside the landfill waste surface footprint or up through the waste filling with a vertical manhole to maintain access to the submersible pump in the sump. These extensions would require an additional 200 feet or more of riser pipe, which would make it very difficult if not impractical to continue to maintain these sump pumps that would be 400 linear feet away from the access point. This is a significant challenge with this alternative.
- The practicality of extending the leachate sump risers and providing assurance that the pumps can continue to be maintained is low. This alternative would require that the Cell V and Cell VI sump risers be decommissioned. This would only be viable if the leachate generation had ceased in their respective leachate collection system areas following construction of closure system above, and several years for generation to cease. Leachate generation reis likely to continue for more than 30 years after closure. This would also require that an overlay liner system be installed/maintained beneath the waste disposal area to preclude leachate from entering the Cell V and VI leachate collection system that is abandoned.
- Existing LFG collection system on Closed Cells I–IV in the areas of the piggy-back liner system would need to be modified to lower the vertical well and move well head control to outside the limits of the liner system. This would prohibit maintenance of these well locations in future and may lead to abandonment of these collection points.
- Existing LFG collection header from Cells V and VI currently connects to the header on the closed Cells I–IV in the middle of the proposed base liner area of this alternative. This header pipe and condensate trap would require relocation and modification of collection line locations that connect to it.
- Enhanced LFG collection system would be required beneath and at the edges of the piggy-back landfill liner to capture LFG and relieve pressure from beneath the liner system
- Would have a net impact to wetlands over and above the wetlands avoided for the same disposal volume for Alternative 1 and result in an additional 2 acres of wetland impact
- Construction of the MSE wall would require the import of approximately 450,000 CY of structural fill materials.

- Additional capacity provided with this alternative would be constrained by the geometry of the slope filling as well as the top elevation of 200 restricted by the FAA.
- Waste filling operations in the MSE wall area would be more difficult than a horizontal expansion as filling would initially be in a valley and the horizontal tipping pad would be limited to less than 200 feet due to slope geometries.
- Stormwater run-off from existing exterior side slopes would need to be diverted away from active filling areas below to reduce run-on and leachate production in the MSE wall area.
- Stormwater run-off from completed side slopes would be managed with new perimeter channel and large vertical (30-foot +) drain manholes through the berm to discharge the collected stormwater.
- Existing leachate forcemain, underground electric and SCADA communication lines would need to be relocated to atop the MSE wall following construction.
- Access around the perimeter of the site would be constrained with the narrow roadway at the top of the MSE. A wider perimeter road would require additional MSE wall width and additional wetland impacts along the perimeter, further negating any wetland offset for this alternative.
- Permitting and design for this alternative would be complicated and regulatory approval of the piggy-back alternative and modifications to the existing leachate management system in Cells V and VI, and the MSE wall and modifications to the existing leachate management system in Cells V and VI is not a certainty.

2.4.3 Costs to Implement

The estimated cost to construct the proposed base liner, overlay liners and MSE wall is $49.7M. The cost to relocate the natural gas main is estimated to be $22.2M. With this alternative, Cells VIII and IX could be reduced by 30.4 acres to 62.5 acres and would cost $48.8M to construct. Assuming a wetland mitigation ratio of 2:1 and a cost of $30,000 per acre, the mitigation costs for the estimated 103.6 acres of impact is $6.2M. The total cost for Alternative 4 is estimated to be $127.0M at a cost of $7.93/CY of waste disposal capacity or 59% higher than Alternative 1. The cost for wetland avoidance is estimated to be $3.04M per acre.

2.4.4 Practicality

This alternative is not practical due to the significant impacts it would have on the existing leachate collection system on the north side of Cells V and VI. Extensions of the side riser pipes to maintain access would render these impractical to maintain following construction of the base liner system and after vertical extensions of manhole up through the waste. The vertical extension would require re-connection of power, controls, supervisory control and data acquisition (SCADA), LFG collection, and leachate forcemains with each lift of waste placement. The decommissioning of the leachate collection system in the areas of Cells V and VI would make this alternative constructable but would require that closure be constructed and several years, likely well over 30 years, for the leachate generation to cease so that the side risers and pump stations could be removed. The length of time required for cessation of leachate generation is well beyond the time that additional disposal capacity is required and therefore this alternative is not practical. This alternative is also not practical due to the significant capital costs for the overlay liners, base liner, and MSE wall, relative to the airspace generated and the time required to abandon the northern Cell V and VI leachate infrastructure. In addition, this alternative is reliant on receiving relief from the FAA for the maximum fill height of the landfill.

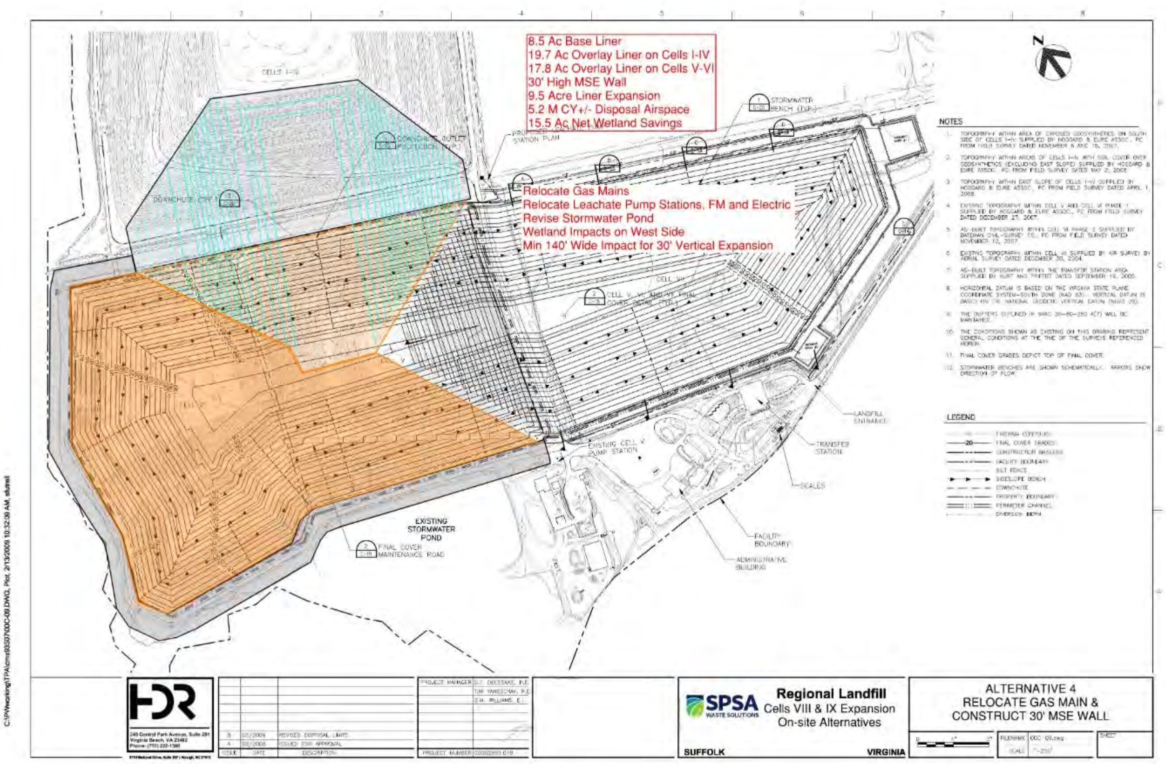


Figure 8 Alternative 4 Site Plan

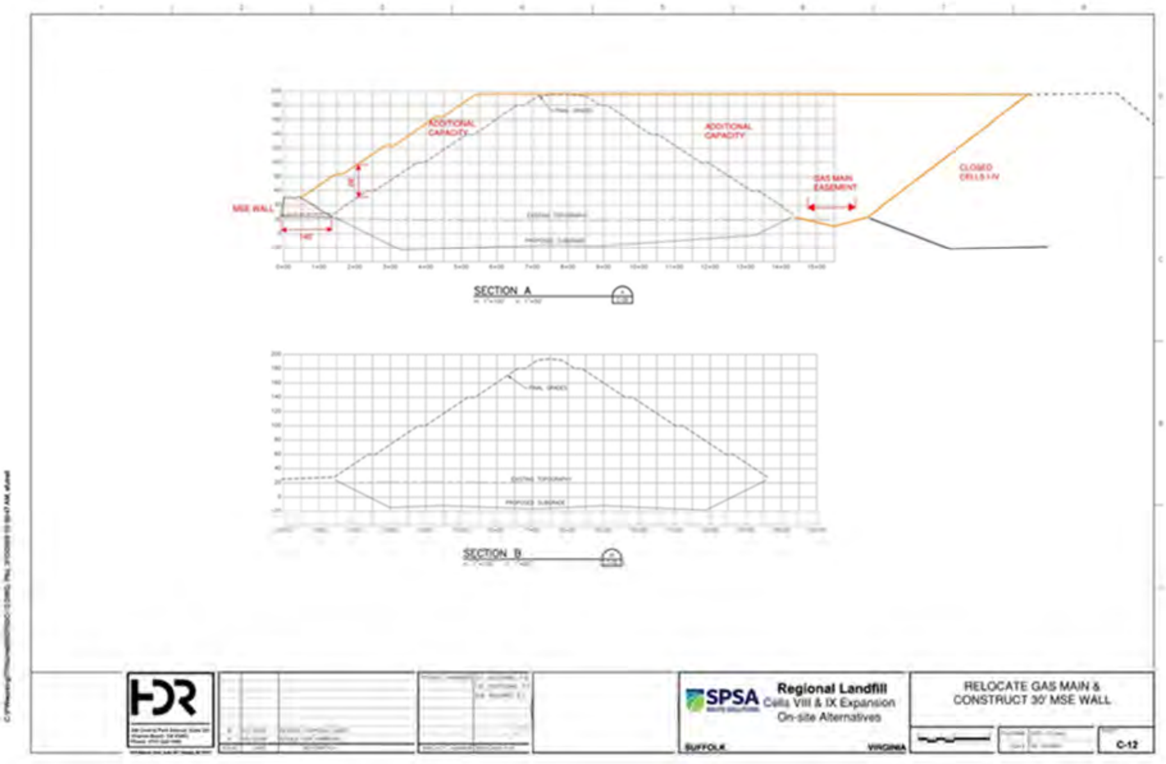


Figure 9 Alternative 4 Section

2.5 MSE Wall and Relocate Gas Main, Fill to 240′ (Alternative 5)

This proposed alternative is Alternative 4 with an increase in the fill height to elevation 240. This would require approval from FAA as it exceeds the 220-foot elevation currently stipulated in their approval for Cells V, VI, and VII (with equipment on top of landfill). This alternative would include construction of a 8.5-acre base liner system in the area to the north of Cells V and VI, 19.5 acres of overlay liner system constructed atop of the final cover system of the Cells I–IV, a 17.8-acre overlay liner system on the northern slopes of Cells V and VI, and a 9.0-acre base liner system on the inboard slope of the MSE wall that would be connected to the existing base liner system of Cell VI an overlay liner onto the southern portion of closed Cells I–IV, an overlay liner system on the northern slopes of Cells V and VI, and an MSE wall around the western and southern limits of Cells V and VI (Figure 10 and Figure 11).

This alternative would provide an estimated 6.2M CY of capacity through the piggy-back landfill and 30 vertical feet of additional filling over the existing final waste grades on the slope of Cell VI, and 40 vertical feet of filling over the permitted waste grades of Elevation 200 on the top deck of Cell VI. The final elevation of the waste filling and final cover for this alternative would be Elevation 240 and would require special approval from FAA, which may not be achievable.

2.5.1 Advantages

- Would not require impacts to wetlands and could result in a net reduction of 21.3 acres of wetland impacts with a reduced Cells VIII and IX footprint.

- Construction and operation of filling of waste materials on the northern area and top deck could be done using conventional methods and not require special provisions for access of equipment to deliver waste materials. Filling on the west and south would be more difficult.
- Leachate management from new 19.5-acre and 17.8-acre lined slopes and 8.5-acre base area of the landfill could be managed with two additional leachate sumps and side riser pumps.
- Base liner system of the MSE wall would be connected to existing base liner and leachate from new 9.0-acre area would drain into existing leachate collection systems and sumps.
- Leachate side slope riser pipes at the MSE wall would be extended 90 linear feet and pump stations relocated to the new limit of waste. Access to leachate sumps is reasonably maintained with this configuration in the MSE wall locations.

2.5.2 Disadvantages

- Would require relocation of the existing Columbia Natural Gas Main (36-inch diameter pipe) at an estimated cost in excess of $22M.
- Would require extension of two leachate pump station riser pipes and controls in Cells V and VI to either outside the landfill waste surface footprint or up through the waste filling with a vertical manhole to maintain access to the submersible pump in the sump. These extensions would require an additional 240 feet or more of riser pipe, which would make it very difficult if not impractical to continue to maintain these sump pumps that would be 440 linear feet away from the access point. This is a significant challenge with this alternative.
- The practicality of extending the leachate sump risers and providing assurance that the pumps can continue to be maintained is low. This alternative would require that the Cell V and Cell VI sump risers be decommissioned. This would only be viable if the leachate generation had ceased in their respective leachate collection system areas following construction of closure system above, and several years for generation to cease. Leachate generation reis likely to continue for more than 30 years after closure. This would also require that an overlay liner system be installed/maintained beneath the waste disposal area to preclude leachate from entering the Cell V and VI leachate collection system that is abandoned.
- Existing LFG collection system on Closed Cells I–IV in the areas of the overlay liner system would need to be modified to lower the vertical well and move well head control to outside the limits of the liner system. This would prohibit maintenance of these well locations in future and may lead to abandonment of these collection points.
- Existing LFG collection header from Cells V and VI currently connects to the header on the closed Cells I–IV in the middle of the proposed base liner area of this alternative. This header pipe and condensate trap would require relocation and modification of collection line locations that connect to it.
- Enhanced LFG collection system would be required beneath and at the edges of the piggy-back landfill liner to capture LFG and relieve pressure from beneath the liner system

- Construction of the MSE wall would require the import of approximately 450,000 CY of structural fill materials.
- Additional capacity provided with this alternative would be constrained by the geometry of the slope filling. The filling on the top deck of an additional 40 vertical feet is possible with the geometry of the fille slopes but would require relief from FAA to increase the maximum height 40 feet above the 200-foot elevation stipulated by the FAA.
- Waste filling operations in the MSE wall area would be more difficult than a horizontal expansion as filling would initially be in a valley and the horizontal tipping pad would be limited to less than 200 feet due to slope geometries.
- Stormwater run-off from existing exterior side slopes would need to be diverted away from active filling areas below to reduce run-on and leachate production in the MSE wall area.
- Stormwater run-off from completed side slopes would be managed with new perimeter channel and large vertical (30-foot +) drain manholes through the berm to discharge the collected stormwater.
- Existing leachate forcemain, underground electric and SCADA communication lines would need to be relocated to atop the MSE wall following construction.
- Access around the perimeter of the site would be constrained with the narrow roadway at the top of the MSE. A wider perimeter road would require additional MSE wall width and additional wetland impacts along the perimeter, further negating any wetland offset for this alternative.
- Permitting and design for this alternative would be complicated and regulatory approval of the piggy-back alternative and modifications to the existing leachate management system in Cells V and VI, and the MSE wall and modifications to the existing leachate management system in Cells V and VI is not a certainty.
- Approval from the FAA to increase the fill height to Elevation 240 is not a certainty.

2.5.3 Costs to Implement

The estimated cost to construct the proposed overlay liners and MSE wall is $49.68M. The cost to relocate the natural gas main is estimated to be $22.2M. With this alternative, Cells VIII and IX could be reduced by 36.2 acres to 56.65 acres and would cost $44.3M to construct. Assuming a wetland mitigation ratio of 2:1 and a cost of $30,000 per acre, the mitigation costs for the estimated 97.7 acres of impact is $5.8M. The total cost for Alternative 5 is estimated to be $122.0M at a cost of $7.63/CY of waste disposal capacity or 53% higher than Alternative 1. The cost for wetland avoidance is estimated to be $1.98M per acre.

2.5.4 Practicality

This alternative is not practical due to the significant impacts it would have on the existing leachate collection system on the north side of Cells V and VI. Extensions of the side riser pipes to maintain access would render these impractical to maintain following construction of the base liner system and after vertical extensions of manhole up through the waste. The vertical extension would require re-connection of power, controls, supervisory control and data acquisition (SCADA), LFG collection, and leachate forcemains with each lift of waste placement. The decommissioning of the leachate collection system in the areas of Cells V and VI would make this alternative constructable but would require that closure be constructed and several years, likely well over 30 years, for the leachate generation to cease so that the side risers and pump stations could be removed. The length of time required for cessation of leachate generation is well beyond the time that additional disposal capacity is required and therefore this alternative is not practical. In addition, this alternative is also not practical due to the significant capital costs for the overlay liners, base liner, and MSE wall, relative to the airspace generated and it is reliant on receiving relief from the FAA for the maximum fill height of the landfill.

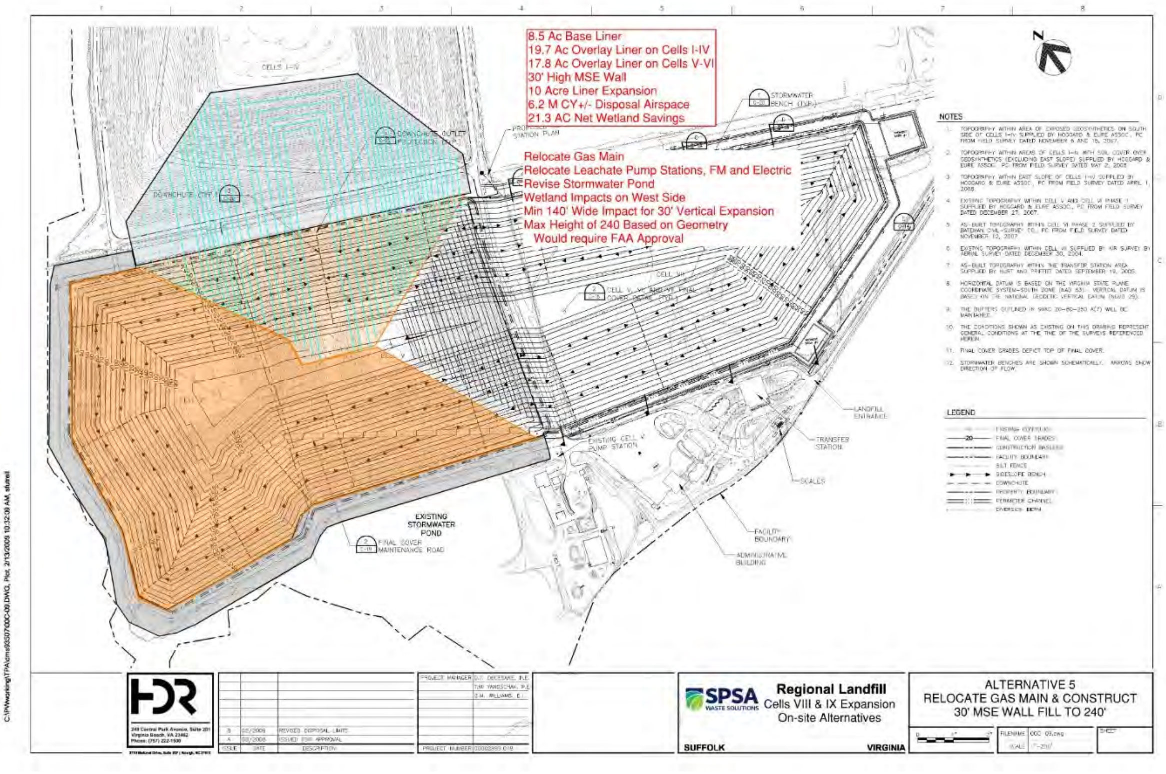


Figure 10 Alternative 5 Site Plan

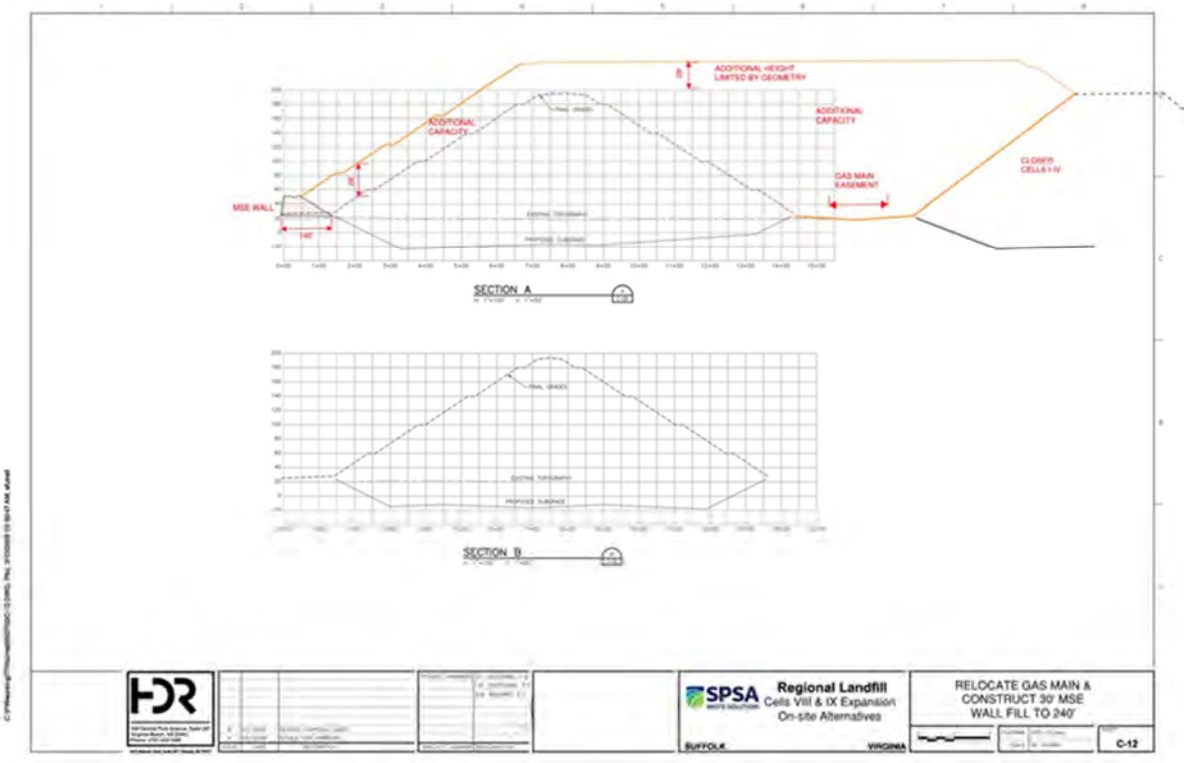


Figure 11 Alternative 5 Section

2.6 Capture Airspace between Cell V and VII (Alternative 6)

This proposed alternative is for modification of the design of Cell VIII to include a Phase 3 between Cell V and Cell VII that could be constructed subsequent to operations in Cell VIII or IX. Cell VII is permitted to be constructed to connect with Cell V and utilize the overlap filling against the final slopes of Cell V for disposal capacity. The area immediately to the east of Cell V contains a number of underground utilities and the perimeter roadway serves for the primary access for trucks to the leachate lagoons. This alternative would defer the relocation of the infrastructure and abandonment of the access roadway for a number of years. A major modification to the Cell VII solid waste permit would be required to modify the base grading plan so that Phases 1 and 2 could be constructed and operated without overlap onto Cell V fill slopes. The proposed alterative would include construction of an approximate 5.35-acre base liner system to the east of Cell V that would connect with the western boundary of Cell VII, Phase 1 (Figure 12 and Figure 13). This alternative would result in deferring approximately 1.52M CY of waste materials.

2.6.1 Advantages

- Would not require impacts to wetlands and could result in a net reduction of 8.9 acres of wetland impacts with a reduced Cells VIII and IX footprint.
- Construction and operation of filling of waste materials in this area could be done using conventional methods and not require special provisions for access of equipment to deliver waste materials

- Leachate management from new lined slope and base area could be managed with connection into one or two of the leachate sumps and side riser pumps planned for Cell VII.

2.6.2 Disadvantages

- Would require extension of the Cell V – Quad 2 leachate pump station riser pipes and their controls to outside the landfill footprint. This extension would require an additional 200 feet or more of riser pipe, which would make it very difficult, and likely not practical to continue to maintain these sump pumps that would then be 400 linear feet away from the access point. This is a significant challenge with this alternative.
- Existing leachate forcemain to and from the Cell V lift station would need to be relocated to outside the expansion area.
- Regulatory approval of the modification to Cell VII should be achievable.
- Once constructed, access around the site and to the borrow area would be impacted.

2.6.3 Costs to Implement

The estimated cost to construct the base liner in this area and relocate the infrastructure is $5.25M. With this alternative, Cells VIII and IX could be reduced by 8.9 acres to 84.0 acres and would cost $65.71M to construct. Assuming a wetland mitigation ratio of 2:1 and a cost of $30,000 per acre, the mitigation costs for the estimated 110.15 acres of impact is $6.6M. The total cost for Alternative 6 is estimated to be $77.6M at a cost of $4.85/CY of waste disposal capacity or 3 percent lower than Alternative 1 due to the benefit this alternative has with reliance on existing infrastructure in Cell VII that reduces its cost. The cost for wetland avoidance is estimated to be ($251,295) per acre.

2.6.4 Practicality

This alternative is practical, as it is located with the area already permitted for landfill expansion and would not require relocation of natural gas main or additional wetland impacts.

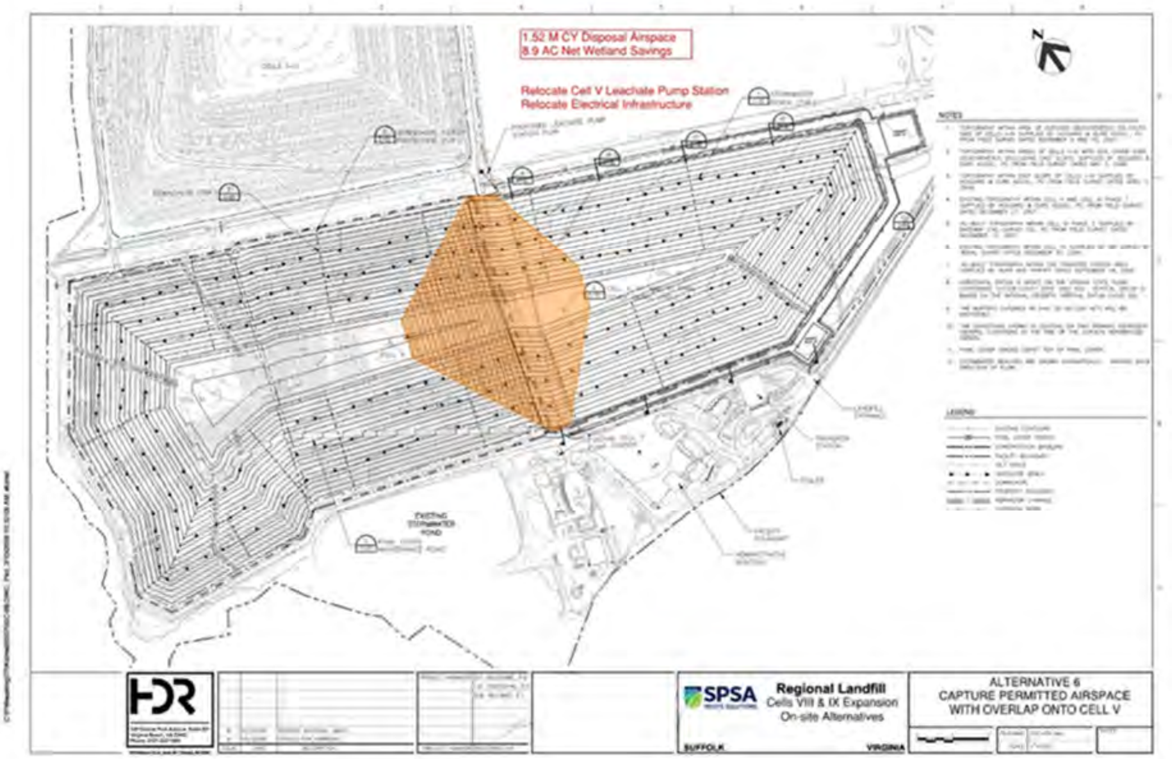


Figure 12 Alternative 6 Site Plan

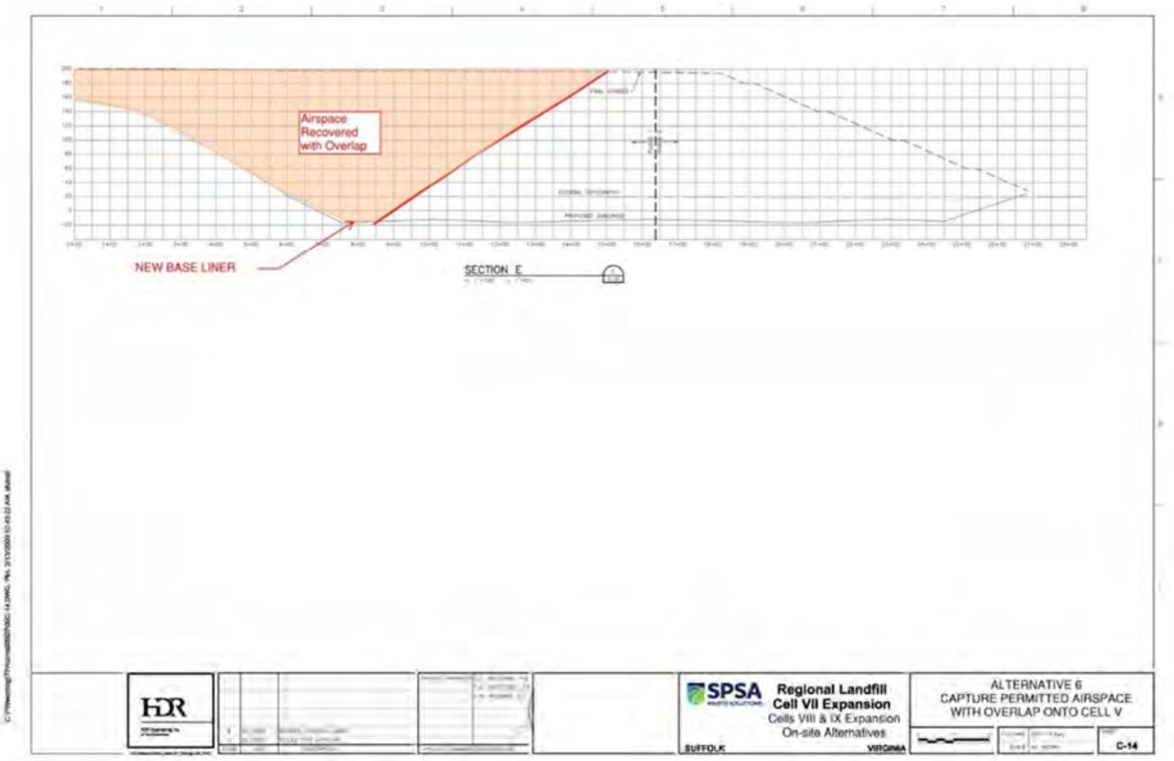


Figure 13 Alternative 6 Section

2.7 MSE Wall Around Cells V, VI, and VII (Alternative 7)

This proposed alternative is a combination of Alternatives 3 and 6 and includes construction of an MSE wall around the western and southern limits of Cells V, VI and VII (Figure 14 and Figure 15).

The proposed expansion would include a 15.0-acre base liner system on the inboard slope of the MSE wall that would be connected to the existing base liner system of Cells V, VI, and VII as well as the 5.35-acre base liner are for Alternative 6. This alternative would provide an estimated 5.5M CY of capacity through the vertical feet of additional filling over the existing final waste grades of Cell V, VI and VII. The final elevation of the waste filling and final cover for this alternative would be Elevation 200 per the current FAA requirements for the permitted Cells V, VI, and VII.

2.7.1 Advantages

- Would result in a net reduction of 17.3 AC of wetland impacts with a reduced Cells VIII and IX footprint.
- Base liner system of the MSE wall would be connected to existing base liner and leachate from new 15.0-acre area would drain into existing leachate collection systems and sumps.
- Would require extension of seven leachate pump station riser pipes in Cells V, VI, and VII and their controls on the base liner of the MSE wall. The risers would be extended 90 linear feet and pump stations relocated to the new limit of waste. Access to leachate sumps is reasonably maintained with this configuration in the MSE wall locations.

2.7.2 Disadvantages

- Construction of the MSE wall would require the use of operational cover soil from the site borrow area or import of approximately 750,000 CY of structural fill materials.
- Additional capacity provided with this alternative would be constrained by the geometry of the slope filling as well as the top elevation of 200 restricted by the FAA.
- Waste filling operations would be more difficult than a horizontal expansion as filling would initially be in a valley and the horizontal tipping pad would be limited to less than 200 feet due to slope geometries.
- Stormwater run-off from existing exterior side slopes would need to be diverted away from active filling areas below to reduce run-on and leachate production.
- Stormwater run-off from completed side slopes would be managed with new perimeter channel and large vertical (30-foot +) drain manholes through the berm to discharge the collected stormwater.
- Existing leachate forcemain, underground electric, and SCADA communication lines would need to be relocated to atop the MSE wall following construction.
- Access around the perimeter of the site would be constrained with the narrow roadway at the top of the MSE. A wider perimeter road would require additional MSE wall width and additional wetland impacts along the perimeter, further negating any wetland offset for this alternative.

- Permitting and design for this alternative would be complicated and regulatory approval of the MSE wall and modifications to the existing leachate management system in Cells V, VI, and VII is not a certainty.
- Stormwater run-off from existing exterior side slopes would need to be diverted away from active filling areas below to reduce run-on and leachate production in the MSE wall area.
- Stormwater run-off from completed side slopes would be managed with new perimeter channel and large vertical (30-foot +) drain manholes through the berm to discharge the collected stormwater.
- Existing leachate forcemain, underground electric, and SCADA communication lines would need to be relocated to atop the MSE wall following construction.
- Access around the perimeter of the site would be constrained with the narrow roadway at the top of the MSE. A wider perimeter road would require additional MSE wall width and additional wetland impacts along the perimeter, further negating any wetland offset for this alternative.

2.7.3 Costs to Implement

The estimated cost to construct the proposed MSE wall and the Alternative 6 base liner is $33.63M. With this alternative Cells VIII and IX could be reduced by 32.2 acres to 60.7 acres and would costs $47.5M to construct. Assuming a wetland mitigation ratio of 2:1 and a cost of $30,000 per acre, the mitigation costs for the estimated 101.75 acres of impact is $6.1M. The total cost for Alternative 7 is estimated to be $87.25M at a cost of $5.45/CY of waste disposal capacity or 9 percent higher than Alternative 1. The cost for wetland avoidance is estimated to be $431,000 per acre.

2.7.4 Practicality

This alternative is not practical due to the complications to site access for operational filling and the significant costs for the construction of the MSE wall, complications on filling operations and the relocation of existing infrastructure relative to the airspace that it provides.

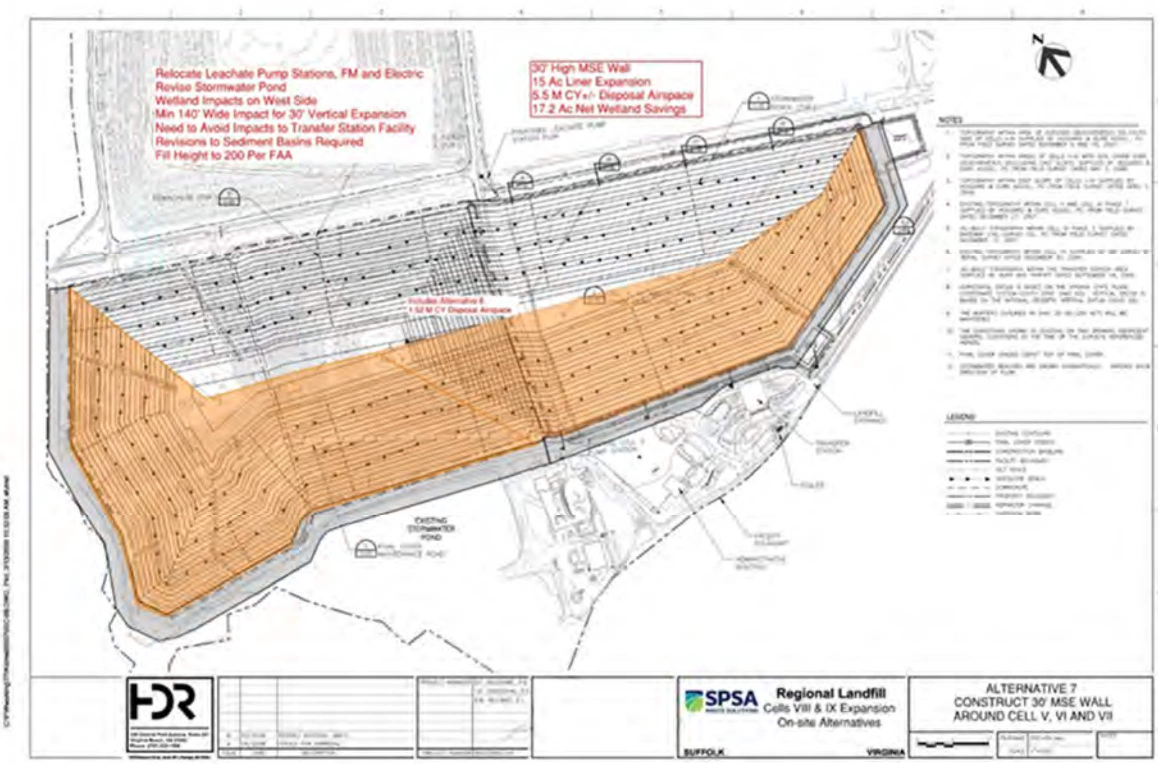


Figure 14 Alternative 7 Site Plan

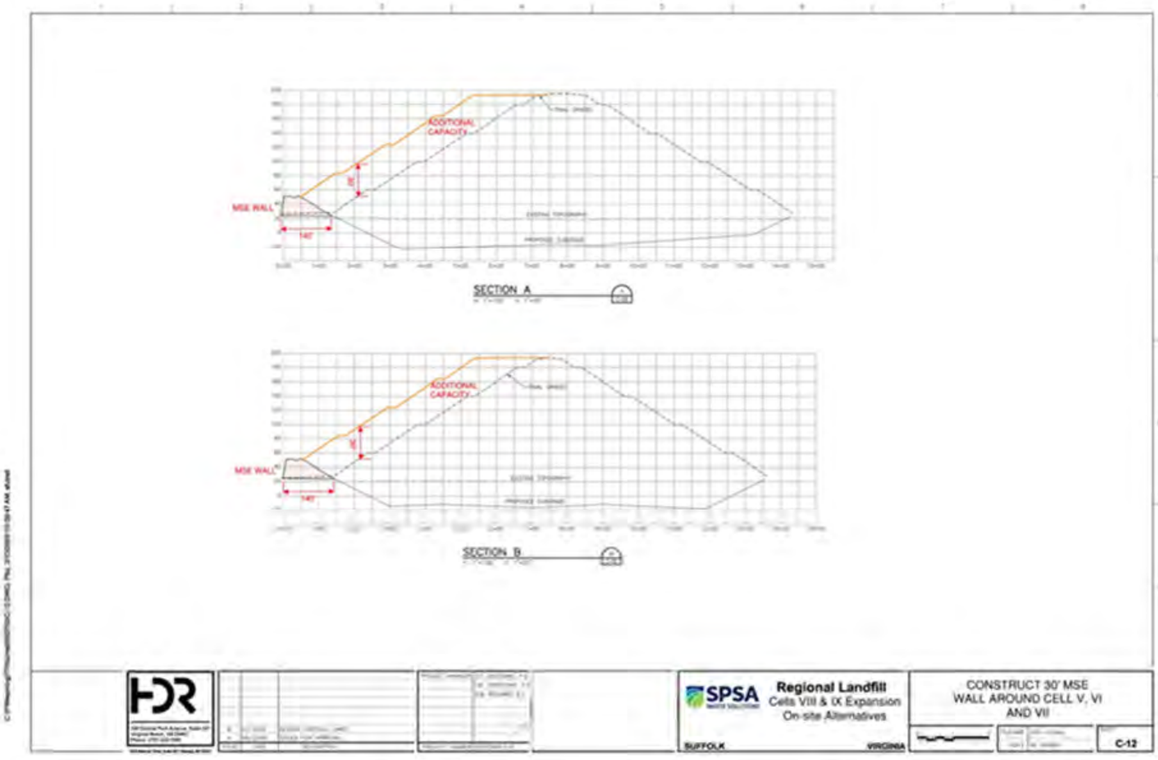


Figure 15 Alternative 7 Section

2.8 Relocate Natural Gas Main and Fill between Cells VII and VIII (Alternative 8)

This proposed alternative is a combination of Alternatives 2 and 7 with construction of a base liner system between Cells VIII and VIII. This alternative would include construction of a 8.5-acre base liner system in the area to the north of Cells V and VI, 19.5-acre piggy-back liner system constructed atop of the final cover system of the Cells I–IV, an 17.8-acre overlay liner system on the northern slopes of Cells V and VI, a 15.0-acre base liner system on the inboard slope of the MSE wall that would be connected to the existing base liner system of Cells V, VI, and VII and a 4.7-acre base liner between Cells VII and VII (Figure 16 and Figure 14).

This alternative would provide an estimated 9.76M CY of capacity through the overlay landfill and MSE wall with 30 vertical feet of additional filling over the existing final waste grades on the slope of Cells V, VI, and VII and the valley fill between Cells VII and VIII. The final elevation of the waste filling and final cover for this alternative would be Elevation 200 per the current FAA requirements for the permitted Cells V, VI, and VII.

2.8.1 Advantages

- Would result in a net reduction of 62.4 AC of wetland impacts with a reduced Cells VIII and IX footprint.
- Construction and operation of filling of waste materials on the northern area and top deck could be done using conventional methods and not require special provisions for access of equipment to deliver waste materials. Filling on the west and south would be more difficult.
- Leachate management from new 19.5-acre lined slope, 18.7-acre overlay liner and new base areas could be managed with three additional leachate sumps and side riser pumps.
- Base liner system of the MSE wall would be connected to existing base liner and leachate from new 15.0-acre area would drain into existing leachate collection systems and sumps.
- Leachate side slope riser pipes at the MSE wall would be extended 90 linear feet and pump stations relocated to the new limit of waste. Access to leachate sumps is reasonably maintained with this configuration in the MSE wall locations.
- Leachate management from the 4.7-acre area between Cells VII and VIII could be managed with a single side slope riser pump station.

2.8.2 Disadvantages

- Would require relocation of the existing Columbia Natural Gas Main (36-inch diameter pipe) at an estimated cost in excess of $22M.
- Would require extension of two leachate pump station riser pipes and controls in Cells V and VI to either outside the landfill waste surface footprint or up through the waste filling with a vertical manhole to maintain access to the submersible pump in the sump. These extensions would require an additional 240 feet or more of riser pipe, which would make it very difficult if not impractical to continue to maintain these sump pumps that would be

440 linear feet away from the access point. This is a significant challenge with this alternative.

- The practicality of extending the leachate sump risers and providing assurance that the pumps can continue to be maintained is low. This alternative would require that the Cell V and Cell VI sump risers be decommissioned. This would only be viable if the leachate generation had ceased in their respective leachate collection system areas following construction of closure system above, and several years for generation to cease. Leachate generation reis likely to continue for more than 30 years after closure. This would also require that an overlay liner system be installed/maintained beneath the waste disposal area to preclude leachate from entering the Cell V and VI leachate collection system that is abandoned.
- Existing LFG collection system on Closed Cells I–IV in the areas of the piggy-back liner system would need to be modified to lower the vertical well and move well head control to outside the limits of the liner system. This would prohibit maintenance of these well locations in future and may lead to abandonment of these collection points.
- Existing LFG collection header from Cells V and VI currently connects to the header on the closed Cells I–IV in the middle of the proposed base liner area of this alternative. This header pipe and condensate trap would require relocation and modification of collection line locations that connect to it.
- Enhanced LFG collection system would be required beneath and at the edges of the piggy-back landfill liner to capture LFG and relieve pressure from beneath the liner system
- Construction of the MSE wall would require the import of approximately 750,000 CY of structural fill materials.
- Additional capacity provided with this alternative would be significantly constrained by the geometry of the slope filling and top deck elevations and the available footprint for base liner area between Cells VII and VIII.
- Waste filling operations in the MSE wall area would be more difficult than a horizontal expansion as filling would initially be in a valley and the horizontal tipping pad would be limited to less than 200 feet due to slope geometries.
- Stormwater run-off from existing exterior side slopes would need to be diverted away from active filling areas below to reduce run-on and leachate production in the MSE wall area.
- Stormwater run-off from completed side slopes would be managed with new perimeter channel and large vertical (30-foot +) drain manholes through the berm to discharge the collected stormwater.
- Existing leachate forcemain, underground electric, and SCADA communication lines would need to be relocated to atop the MSE wall following construction.
- Access around the perimeter of the site would be constrained with the narrow roadway at the top of the MSE. A wider perimeter road would require additional MSE wall width and additional wetland impacts along the perimeter, further negating any wetland offset for this alternative.

- Permitting and design for this alternative would be complicated and regulatory approval of the piggy-back alternative and modifications to the existing leachate management system in Cells V, VI and VI and the MSE wall is not a certainty.
- Capacity gained from connection of Cells VII and VIII would be limited due to their geometries and the avoidance of the existing 100-year floodplain. It would only provide an estimated 1.39M CY additional capacity above what Alternative 7 could provide.

2.8.3 Costs to Implement

The estimated cost to construct the proposed overlay liners, MSE wall and new base liner areas is $67.1M. The cost to relocate the natural gas main is estimated to be $22.2M. With this alternative, Cell IX could be eliminated and the total expansion area reduced by 62.4 acres to 33.72 acres and would cost $26.37M to construct. Assuming a wetland mitigation ratio of 2:1 and a cost of $30,000 per acre, the mitigation costs for the estimated 56.6 acres of impact is $3.4M. The total cost for Alternative 8 is estimated to be $119.0M at a cost of $7.44/CY of waste disposal capacity or 49% higher than Alternative 1. The cost for wetland avoidance is estimated to be $628,374 per acre.

2.8.4 Practicality

This alternative is not practical due to the significant impacts it would have on the existing leachate collection system on the north side of Cells V and VI. Extensions of the side riser pipes to maintain access would render these impractical to maintain following construction of the base liner system and after vertical extensions of manhole up through the waste. The vertical extension would require re-connection of power, controls, supervisory control and data acquisition (SCADA), LFG collection, and leachate forcemains with each lift of waste placement. The decommissioning of the leachate collection system in the areas of Cells V and VI would make this alternative constructable but would require that closure be constructed and several years, likely well over 30 years, for the leachate generation to cease so that the side risers and pump stations could be removed. The length of time required for cessation of leachate generation is well beyond the time that additional disposal capacity is required and therefore this alternative is not practical. In addition, this alternative is also not practical due to the significant capital costs for the overlay liners, base liner, and MSE wall, relative to the airspace it provides.

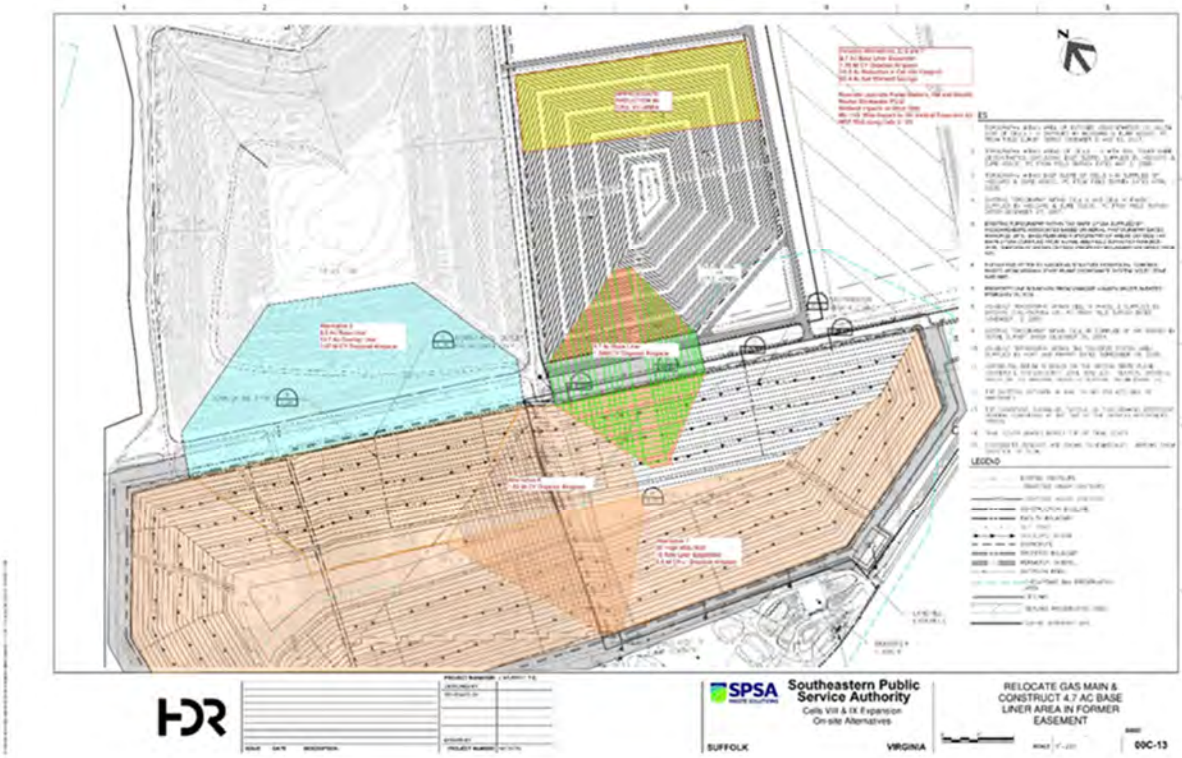


Figure 16 Alternative 8 Site Plan

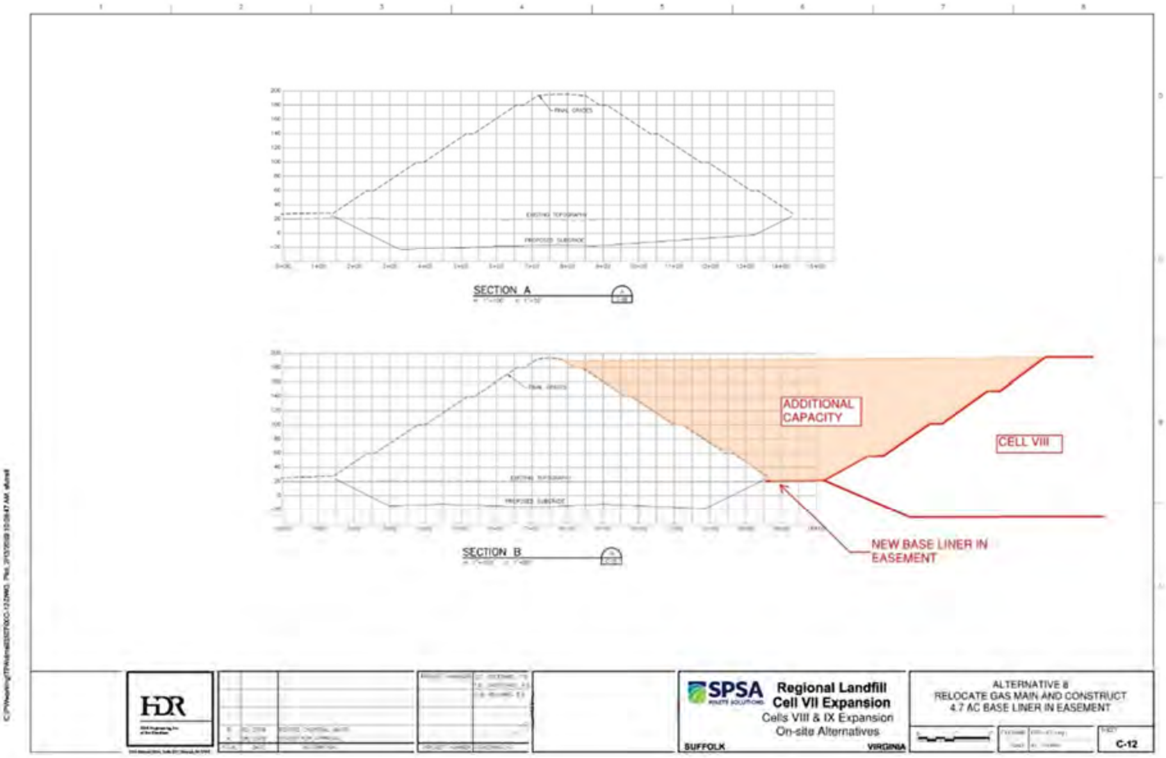


Figure 17 Alternative 8 Section

2.9 Relocate Natural Gas Main and Construct 30′ High MSE Wall around Cells V, VI, VII and VIII (Alternative 9)

This proposed alternative is similar to Alternative 8 with the addition of an MSE wall on the eastern boundary of Cell VIII. This alternative would include construction of a piggy-back landfill and an MSE wall around the western and southern limits of Cells V, VI, and VII and eastern limits of Cells VII and VIII and connection of Cells VII and VIII (Figure 18).

The proposed expansion would include the 8.5-acre base liner system in the area to the north of Cells V and VI, 19.5-acres overlay liner system constructed atop of the final cover system of the Cells I–IV, a 17.8-acre overlay liner on Cells V and VI, a 15.0-acre base liner system on the inboard slope of the MSE wall that would be connected to the existing base liner system of Cells V, VI, and VII and a 4.7-acre base liner between Cells VII and VII. This alternative would provide an estimated 9.76M CY of capacity through the piggy-back landfill and 30 vertical feet of additional filling over the existing final waste grades on the slope of Cells V, VI, and VII and the valley fill between Cells VII and VIII. The final elevation of the waste filling and final cover for this alternative would be Elevation 200 per the current FAA requirements for the permitted Cells V, VI, and VII.

2.9.1 Advantages

- Would result in a net reduction of 62.4 acres of wetland impacts with a reduced Cells VIII and IX footprint.
- Construction and operation of filling of waste materials on the northern area and top deck could be done using conventional methods and not require special provisions for access of equipment to deliver waste materials. Filling on the west and south would be more difficult.
- Leachate management from new 19.5-acre lined slope, 17.8 acre overlay liner and new base areas could be managed with three additional leachate sumps and side riser pumps.
- Base liner system of the MSE wall would be connected to existing base liner and leachate from new 17.6-acre area would drain into existing leachate collection systems and sumps.
- Leachate side slope riser pipes at the MSE wall would be extended 90 linear feet and pump stations relocated to the new limit of waste. Access to leachate sumps is reasonably maintained with this configuration in the MSE wall locations.
- Leachate management from the 4.7-acre area between Cells VII and VIII could be managed with a single side slope riser pump station.

2.9.2 Disadvantages

- Would require relocation of the existing Columbia Natural Gas Main (36-inch diameter pipe) at an estimated cost in excess of $22M.
- Would require extension of two leachate pump station riser pipes and controls in Cells V and VI to either outside the landfill waste surface footprint or up through the waste filling with a vertical manhole to maintain access to the submersible pump in the sump. These extensions would require an additional 240 feet or more of riser pipe, which would make

it very difficult if not impractical to continue to maintain these sump pumps that would be 440 linear feet away from the access point. This is a significant challenge with this alternative.

- The practicality of extending the leachate sump risers and providing assurance that the pumps can continue to be maintained is low. This alternative would require that the Cell V and Cell VI sump risers be decommissioned. This would only be viable if the leachate generation had ceased in their respective leachate collection system areas following construction of closure system above, and several years for generation to cease. Leachate generation reis likely to continue for more than 30 years after closure. This would also require that an overlay liner system be installed/maintained beneath the waste disposal area to preclude leachate from entering the Cell V and VI leachate collection system that is abandoned.
- Existing LFG collection system on closed Cells I–IV in the areas of the piggy-back liner system would need to be modified to lower the vertical well and move well head control to outside the limits of the liner system. This would prohibit maintenance of these well locations in future and may lead to abandonment of these collection points.
- Existing LFG collection header from Cells V and VI currently connects to the header on the closed Cells I–IV in the middle of the proposed base liner area of this alternative. This header pipe and condensate trap would require relocation and modification of collection line locations that connect to it.
- Enhanced LFG collection system would be required beneath and at the edges of the piggy-back landfill liner to capture LFG and relieve pressure from beneath the liner system.
- Construction of the MSE wall would require the import of approximately 980,000 CY of structural fill materials.
- Additional capacity provided with this alternative would be significantly constrained by the geometry of the slope filling and top deck elevations and the available footprint for base liner area between Cells VII and VIII.
- Waste filling operations in the MSE wall area would be more difficult than a horizontal expansion as filling would initially be in a valley and the horizontal tipping pad would be limited to less than 200 feet due to slope geometries.
- Stormwater run-off from existing exterior side slopes would need to be diverted away from active filling areas below to reduce run-on and leachate production in the MSE wall area.
- Stormwater run-off from completed side slopes would be managed with new perimeter channel and large vertical (30-foot +) drain manholes through the berm to discharge the collected stormwater.
- Existing leachate forcemain, underground electric, and SCADA communication lines would need to be relocated to atop the MSE wall following construction.
- Access around the perimeter of the site will be constrained with the narrow roadway at the top of the MSE. A wider perimeter road would require additional MSE wall width and additional wetland impacts along the perimeter, further negating any wetland offset for this alternative.

- Permitting and design for this alternative would be complicated and regulatory approval of the piggy-back alternative and modifications to the existing leachate management system in Cells V, VI, and VI and the MSE wall is not a certainty.
- Capacity gained from connection of Cells VII and VIII would be limited due to their geometries and the avoidance of the existing 100-year floodplain. It would only provide an estimated 1.39M CY additional capacity above what Alternative 7 can provide.
- The MSE wall construction on eastern side of Cell VIII would only provide an additional 600,000 CY of disposal volume.

2.9.3 Costs to Implement

The estimated cost to construct the proposed overlay liners, MSE wall and new base liner areas is $73.1M. The cost to relocate the natural gas main is estimated to be $22.2M. With this alternative, Cell IX could be eliminated, and the total expansion area reduced by 64.1 acres to 32.02 acres and would cost $25.05M to construct. Assuming a wetland mitigation ratio of 2:1 and a cost of $30,000 per acre, the mitigation costs for the estimated 54.9 acres of impact is $3.3M. The total cost for Alternative 9 is estimated to be $123.6M at a cost of $7.72/CY of waste disposal capacity or 55% higher than Alternative 1. The cost for wetland avoidance is estimated to be $682,736 per acre.

2.9.4 Practicality

This alternative is not practical due to the significant impacts it would have on the existing leachate collection system on the north side of Cells V and VI. Extensions of the side riser pipes to maintain access would render these impractical to maintain following construction of the base liner system and after vertical extensions of manhole up through the waste. The vertical extension would require re-connection of power, controls, supervisory control and data acquisition (SCADA), LFG collection, and leachate forcemains with each lift of waste placement. The decommissioning of the leachate collection system in the areas of Cells V and VI would make this alternative constructable but would require that closure be constructed and several years, likely well over 30 years, for the leachate generation to cease so that the side risers and pump stations could be removed. The length of time required for cessation of leachate generation is well beyond the time that additional disposal capacity is required and therefore this alternative is not practical. In addition, this alternative is also not practical due to the significant capital costs for the overlay liners, base liner, and MSE wall, relative to the airspace it provides.

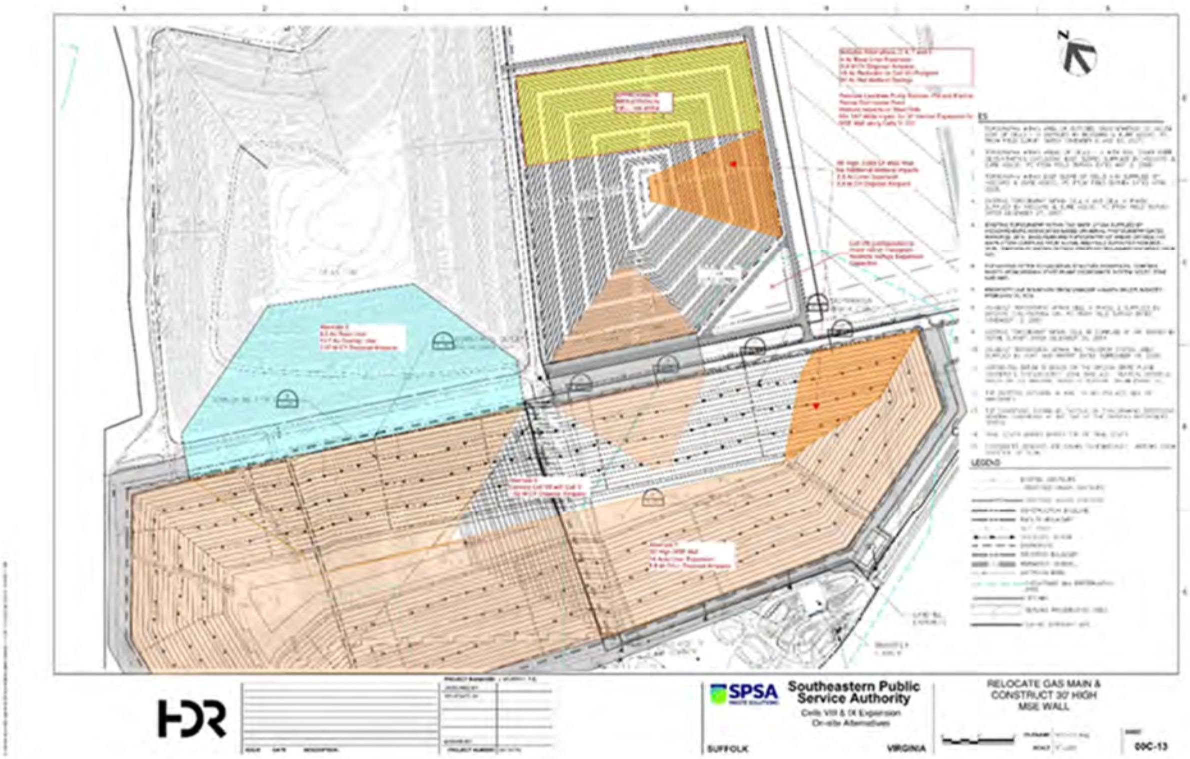


Figure 18 Alternative 9 Site Plan

3 Conclusions and Recommendations

While Alternative 1 is the preferred alternative by SPSA to provide 16M CY of waste disposal capacity, SPSA recognizes that that the 119 acres of forested wetland impacts required to develop the 92.9-acre Cell VIII and IX landfill area are substantial. HDR evaluated eight on-site landfill expansion alternatives to assess the potential for reducing wetland impacts associated with developing the 16M CY of waste disposal capacity being sought by SPSA. Each of the other alternatives evaluated, while technically constructable, present significant challenges for permitting, operation of existing leachate and landfill gas infrastructure, and landfill operations. Existing Cells V, VI, and VIII have previously been permitted and constructed within the constraints presented by the site. Vertical and horizontal expansions to these disposal areas are severely constrained due to presence of property lines, existing wetlands, or existing underground utility infrastructure, as highlighted in the analysis. When reviewing the costs to construct additional capacity with these alternatives, the relative cost per acre of wetland avoided ranged from over $400,000 to $2.5M per acre. These costs are substantial and when considering the cost to develop wetlands of equivalent ecological value to those being disturbed, a public authority like SPSA would have difficulty justifying these additional project costs to its member communities.

Alternative 6 is the one viable and practical alternative that could be considered. The approximate 1.5M CY of disposal capacity provided by this alternative is part of the 10.8M CY currently permitted disposal capacity for Cell VII. Alternative 6 would simply defer the construction of the base liner and filling in this area to a later date. Deferring this capacity would allow SPSA to comply with their objective to provide 40 years of disposal capacity for the region and would reduce the proposed footprint of Cells VIII and IX by 8.9 acres. This alternative would require a major permit modification to the Cell VII permitted design to incorporate a third phase of development. The total cost to construct this alternative in combination with a reduced Cell VIII and IX footprint, provides a slight reduction in the cost per CY of disposal from the implementation costs for Alternative 1 ($4.85 vs $4.99/CY) since the disposal capacity associated with this base liner area takes advantage of capacity available over slope of existing areas constructed or to be constructed.

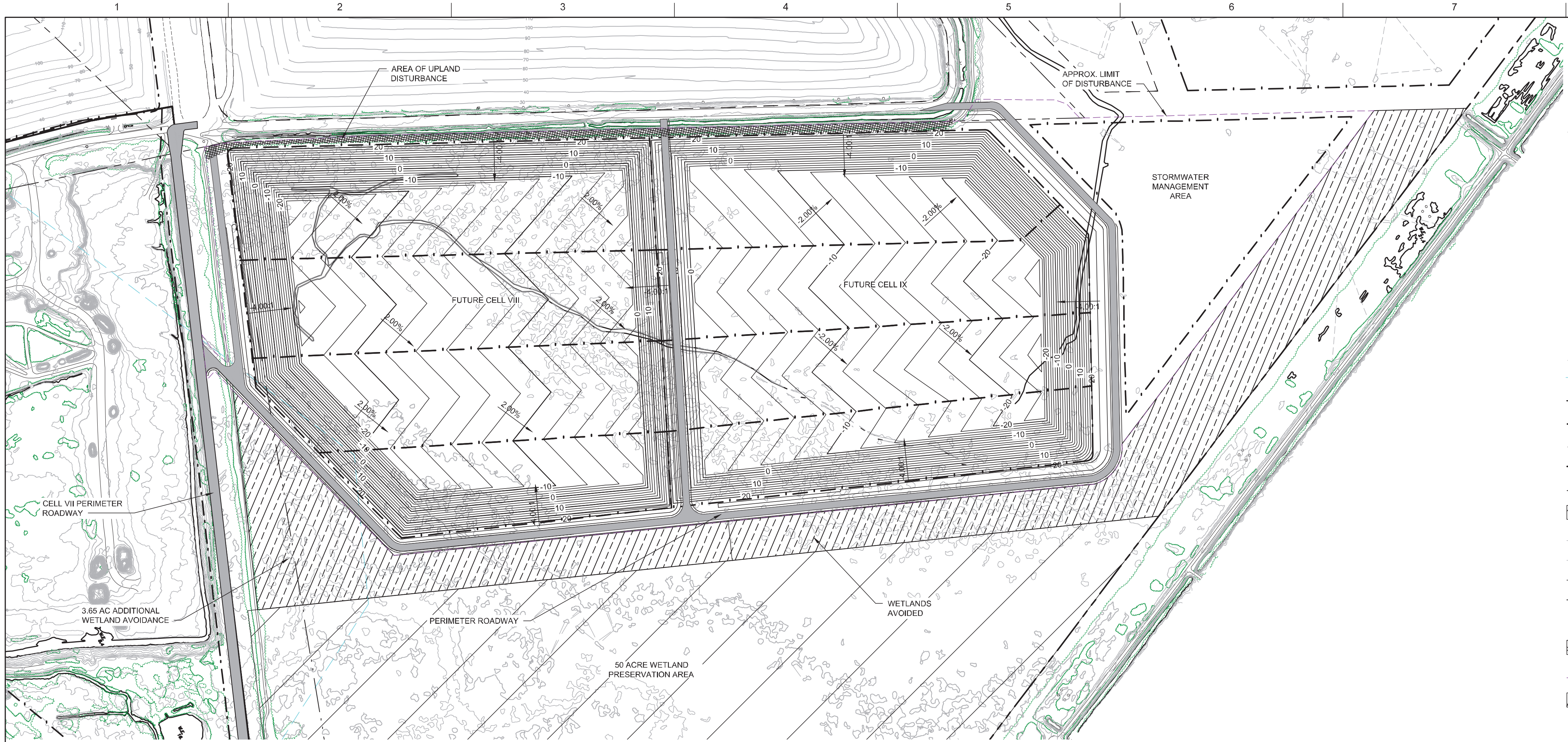
In order to incorporate practical solutions to reduce the proposed wetland impact, HDR recommends the Draft EIS incorporate the development of a reduced Cells VIII and IX area of approximately 84 acres and the work associated with Alternative 6 as the Least Environmentally Damaging Practicable Alternative.

This page intentionally left blank.

A

Appendix A Alternative Site Plans and Section

This page intentionally left blank.

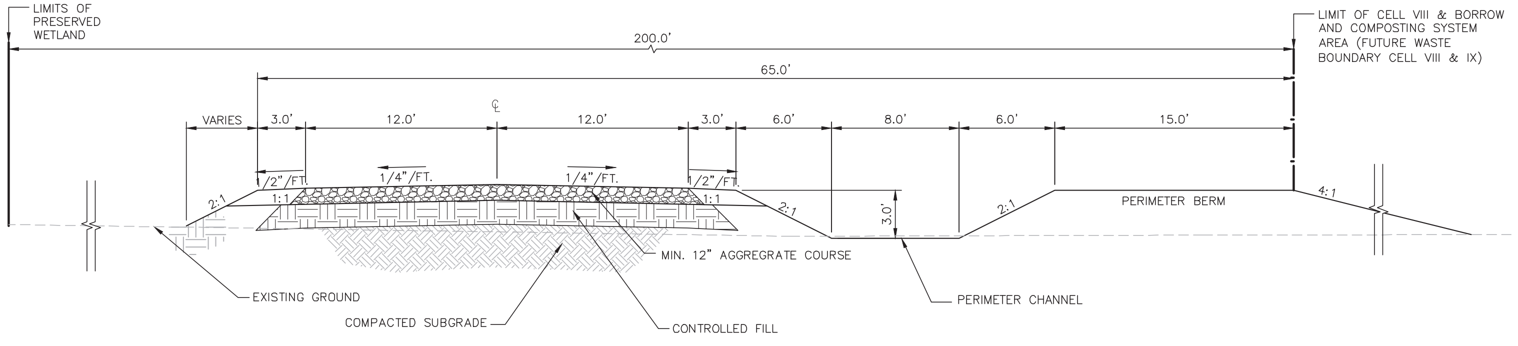


NOTES:

1. EXISTING TOPOGRAPHY WITHIN TAX MAP# 27*28A SUPPLIED BY HOGGARD-EURE ASSOCIATES BASED ON AERIAL PHOTOGRAPHY DATED MARCH 22, 2016. BASE PLAN AND TOPOGRAPHY OF AREAS OUTSIDE TAX MAP# 27*28A COMPILED FROM AERIAL AND FIELD SURVEYS FROM 2005 - 2015. TEMPORARY SHOWN OUTSIDE PROPERTY BOUNDARY OBTAINED FROM GIS.
2. ELEVATIONS REFER TO NGS MEAN SEA LEVEL HORIZONTAL CONTROL BASED UPON VIRGINIA STATE PLANE COORDINATE SYSTEM SOUTH ZONE NAD 1983.
3. PROPERTY LINE BOUNDARY FROM VANASSE HANGEN BRUSTLIN DATED FEBRUARY 29, 2000.
4. DELINEATED WETLAND AND UPLAND AREAS SHOWN WITHIN CELLS VIII AND IX AREAS WERE OBTAINED FROM WETLAND AND WATERWAY DELINEATION PREPARED BY HDR ON APRIL 5, 2022.

LEGEND:

CHESAPEAKE BAY PRESERVATION AREA
STREAMS
PROPERTY LINE
INTERNAL PROPERTY LINE
FACILITY BOUNDARY (APPROXIMATE)
EASEMENT
▨ WETLAND PRESERVATION AREA
EXISTING MINOR CONTOURS
20 EXISTING MAJOR CONTOURS
PROPOSED MINOR CONTOURS
-20 PROPOSED MAJOR CONTOURS
⌖ PZ-06 PROPOSED BORING LOCATIONS
▩ UPLAND DISTURBANCE AREA
LIMIT OF DISTURBANCE
▨ WETLANDS AVOIDED



CELL VII AND IX PERIMETER ROAD (24' WIDE)
1"=5'

SPSA Proposed Cells VIII AND IX Expansion Summary	
Proposed Expansion Area	137.03 AC
Total Wetlands in Expansion Area	133.74 AC
Total Waters (Ditches) in Expansion Area	0.90 AC
Total Uplands in Expansion Area	2.39 AC
Proposed Wetlands Disturbance	109.96 AC
Wetlands/Waters Avoided	23.78 AC

HDR

	PROJECT MANAGER	J. MURRAY, P.E.
	DESIGNED BY	
	REVIEWED BY	
	DRAWN BY	A. FAIR
ISSUE DATE DESCRIPTION	PROJECT NUMBER	10139129

SPSA WASTE SOLUTIONS

Regional Landfill
Cells VIII & IX Expansion
On-site Alternatives

SUFFOLK **VIRGINIA**

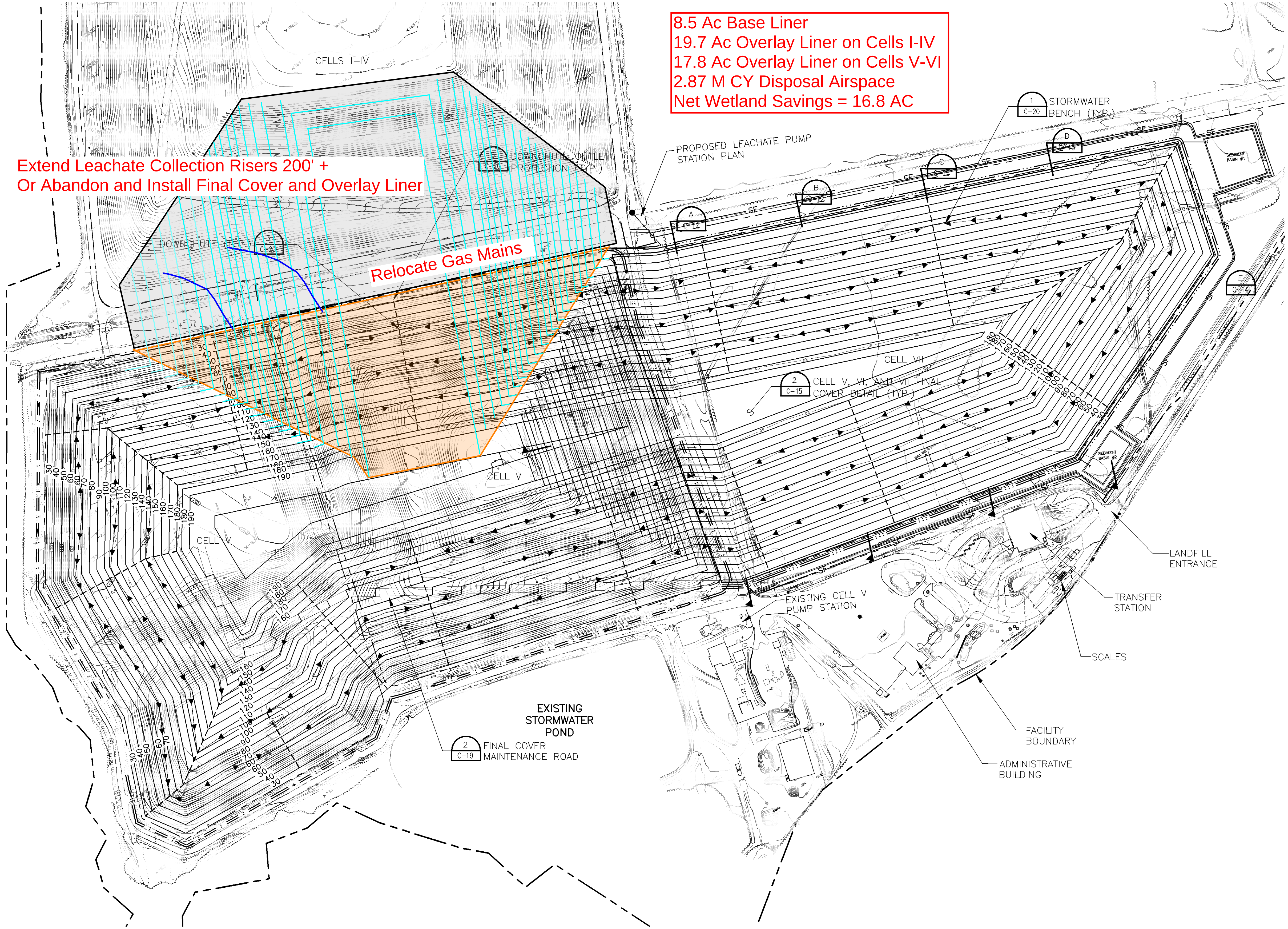
ALTERNATIVE 1
PROPOSED CELLS VIII AND IX
WITH REVISED ACCESS ROAD FOR
ADDITIONAL WETLAND AVOIDANCE

0 1" 2"

FILENAME 00C-01-B.dwg
SCALE 1"=200'

SHEET
00C-01-B

8.5 Ac Base Liner
19.7 Ac Overlay Liner on Cells I-IV
17.8 Ac Overlay Liner on Cells V-VI
2.87 M CY Disposal Airspace
Net Wetland Savings = 16.8 AC



N

NOTES

1. TOPOGRAPHY WITHIN AREA OF EXPOSED GEOSYNTHETICS ON SOUTH SIDE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED NOVEMBER 6 AND 15, 2007.
2. TOPOGRAPHY WITHIN AREAS OF CELLS I–IV WITH SOIL COVER OVER GEOSYNTHETICS (EXCLUDING EAST SLOPE) SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED MAY 2, 2008.
3. TOPOGRAPHY WITHIN EAST SLOPE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED APRIL 1, 2008.
4. EXISTING TOPOGRAPHY WITHIN CELL V AND CELL VI PHASE 1 SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED DECEMBER 27, 2007.
5. AS–BUILT TOPOGRAPHY WITHIN CELL VI PHASE 2 SUPPLIED BY BATEMAN CIVIL–SURVEY CO., PC FROM FIELD SURVEY DATED NOVEMBER 12, 2007.
6. EXISTING TOPOGRAPHY WITHIN CELL VII SUPPLIED BY AIR SURVEY BY AERIAL SURVEY DATED DECEMBER 30, 2004.
7. AS–BUILT TOPOGRAPHY WITHIN THE TRANSFER STATION AREA SUPPLIED BY HURT AND PRIFFITT DATED SEPTEMBER 19, 2005.
8. HORIZONTAL DATUM IS BASED ON THE VIRGINIA STATE PLANE COORDINATE SYSTEM–SOUTH ZONE (NAD 83). VERTICAL DATUM IS BASED ON THE NATIONAL GEODETIC VERTICAL DATUM (NGVD 29).
9. THE BUFFERS OUTLINED IN 9VAC 20–80–250 A(7) WILL BE MAINTAINED.
10. THE CONDITIONS SHOWN AS EXISTING ON THIS DRAWING REPRESENT GENERAL CONDITIONS AT THE TIME OF THE SURVEYS REFERENCED HEREIN.
11. FINAL COVER GRADES DEPICT TOP OF FINAL COVER.
12. STORMWATER BENCHES ARE SHOWN SCHEMATICALLY. ARROWS SHOW DIRECTION OF FLOW.

LEGEND

—40—	EXISTING CONTOURS
—20—	FINAL COVER GRADES
—·—·—	CONSTRUCTION BASELINE
—··—··—	FACILITY BOUNDARY
—x—x—	SILT FENCE
▶—▶—▶	SIDESLOPE BENCH
— — —	DOWNCHUTE
—·—·—	PROPERTY BOUNDARY
═:::═	PERIMETER CHANNEL
—DB—DB—	DIVERSION BERM

C:\PWworking\TPA\dms93507\00C-09.DWG, Plot, 2/13/2009 10:32:09 AM, sfutrell

HDR
HDR Engineering, Inc.
of the Carolinas
3733 National Drive, Suite 207 | Raleigh, NC 27612

ISSUE	DATE	DESCRIPTION
B	02/2009	REVISED DISPOSAL LIMITS
A	08/2008	ISSUED FOR APPROVAL

PROJECT MANAGER	D.T. DECESARE, P.E. T.M. YANOSCHAK, P.E. G.M. WILLIAMS, E.I.
PROJECT NUMBER	00002889.018

THOMAS M. YANOSCHAK
Lic. No. 043303
2/13/09

Lic. No. 35556
2-13-09

SPSA

Regional Landfill
Cells VIII & IX Expansion
On-site Alternatives

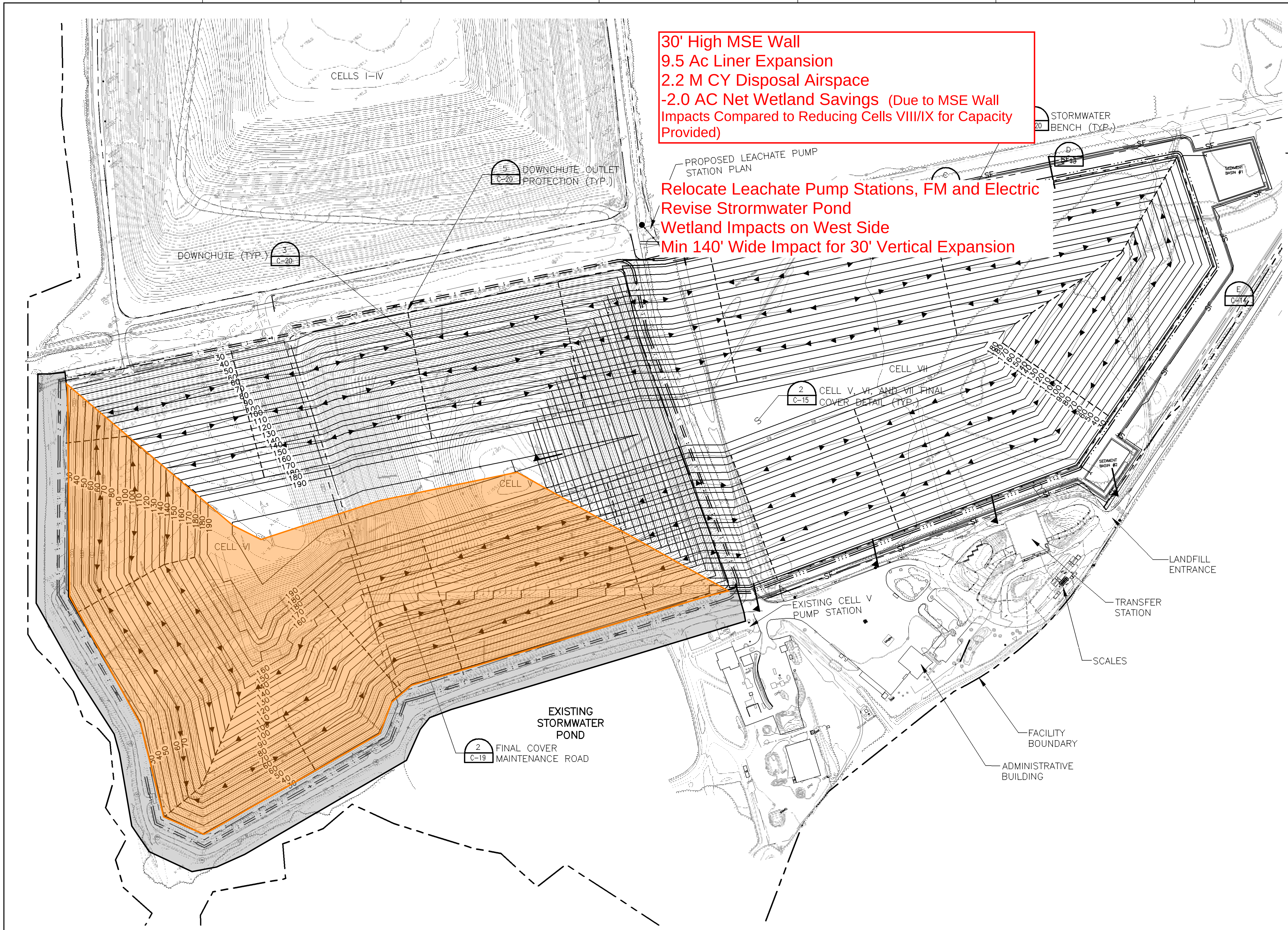
SUFFOLK **VIRGINIA**

ALTERNATIVE 2
RELOCATE GAS MAIN &
CONSTRUCT VALLEY FILL

0 1" 2"

FILENAME	00C–09.dwg
SCALE	1"=200'

SHEET



NOTES

1. TOPOGRAPHY WITHIN AREA OF EXPOSED GEOSYNTHETICS ON SOUTH SIDE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED NOVEMBER 6 AND 15, 2007.
2. TOPOGRAPHY WITHIN AREAS OF CELLS I–IV WITH SOIL COVER OVER GEOSYNTHETICS (EXCLUDING EAST SLOPE) SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED MAY 2, 2008.
3. TOPOGRAPHY WITHIN EAST SLOPE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED APRIL 1, 2008.
4. EXISTING TOPOGRAPHY WITHIN CELL V AND CELL VI PHASE 1 SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED DECEMBER 27, 2007.
5. AS–BUILT TOPOGRAPHY WITHIN CELL VI PHASE 2 SUPPLIED BY BATEMAN CIVIL–SURVEY CO., PC FROM FIELD SURVEY DATED NOVEMBER 12, 2007.
6. EXISTING TOPOGRAPHY WITHIN CELL VII SUPPLIED BY AIR SURVEY BY AERIAL SURVEY DATED DECEMBER 30, 2004.
7. AS–BUILT TOPOGRAPHY WITHIN THE TRANSFER STATION AREA SUPPLIED BY HURT AND PRIFFITT DATED SEPTEMBER 19, 2005.
8. HORIZONTAL DATUM IS BASED ON THE VIRGINIA STATE PLANE COORDINATE SYSTEM–SOUTH ZONE (NAD 83). VERTICAL DATUM IS BASED ON THE NATIONAL GEODETIC VERTICAL DATUM (NGVD 29).
9. THE BUFFERS OUTLINED IN 9VAC 20–80–250 A(7) WILL BE MAINTAINED.
10. THE CONDITIONS SHOWN AS EXISTING ON THIS DRAWING REPRESENT GENERAL CONDITIONS AT THE TIME OF THE SURVEYS REFERENCED HEREIN.
11. FINAL COVER GRADES DEPICT TOP OF FINAL COVER.
12. STORMWATER BENCHES ARE SHOWN SCHEMATICALLY. ARROWS SHOW DIRECTION OF FLOW.

LEGEND

—40—	EXISTING CONTOURS
—20—	FINAL COVER GRADES
— - —	CONSTRUCTION BASELINE
— - - —	FACILITY BOUNDARY
—x—x—	SILT FENCE
▶—▶—▶	SIDESLOPE BENCH
— — —	DOWNCHUTE
——	PROPERTY BOUNDARY
═:::═	PERIMETER CHANNEL
—DB—DB—	DIVERSION BERM

C:\PWworking\TPA\dms93507\00C-09.DWG, Plot, 2/13/2009 10:32:09 AM, sfutrell

HDR

249 Central Park Avenue, Suite 201
Virginia Beach, VA 23462
Phone: (757) 222-1500

3733 National Drive, Suite 207 | Raleigh, NC 27612

ISSUE	DATE	DESCRIPTION
B	02/2009	REVISED DISPOSAL LIMITS
A	08/2008	ISSUED FOR APPROVAL

PROJECT MANAGER	D.T. DECESARE, P.E. T.M. YANOSCHAK, P.E. G.M. WILLIAMS, E.I.
PROJECT NUMBER	00002889.018

SPSA WASTE SOLUTIONS

Regional Landfill
Cells VIII & IX Expansion
On-site Alternatives

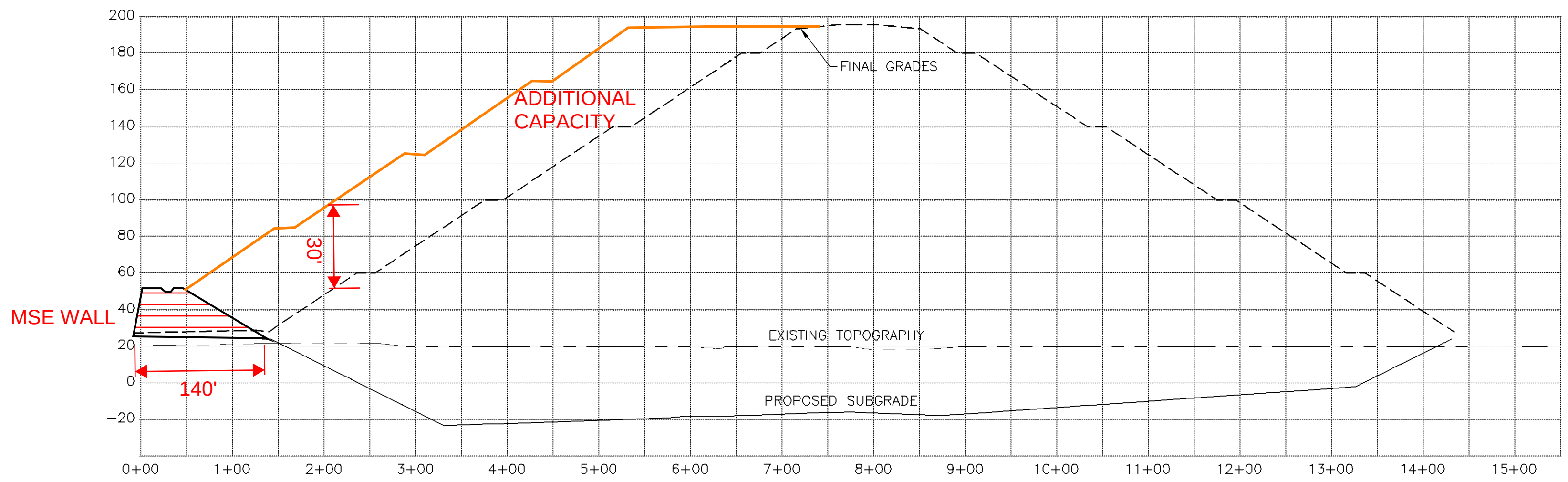
SUFFOLK **VIRGINIA**

ALTERNATIVE 3
MSE WALL AROUND
CELLS V & VI

0 1" 2"

FILENAME	00C–09.dwg
SCALE	1"=200'

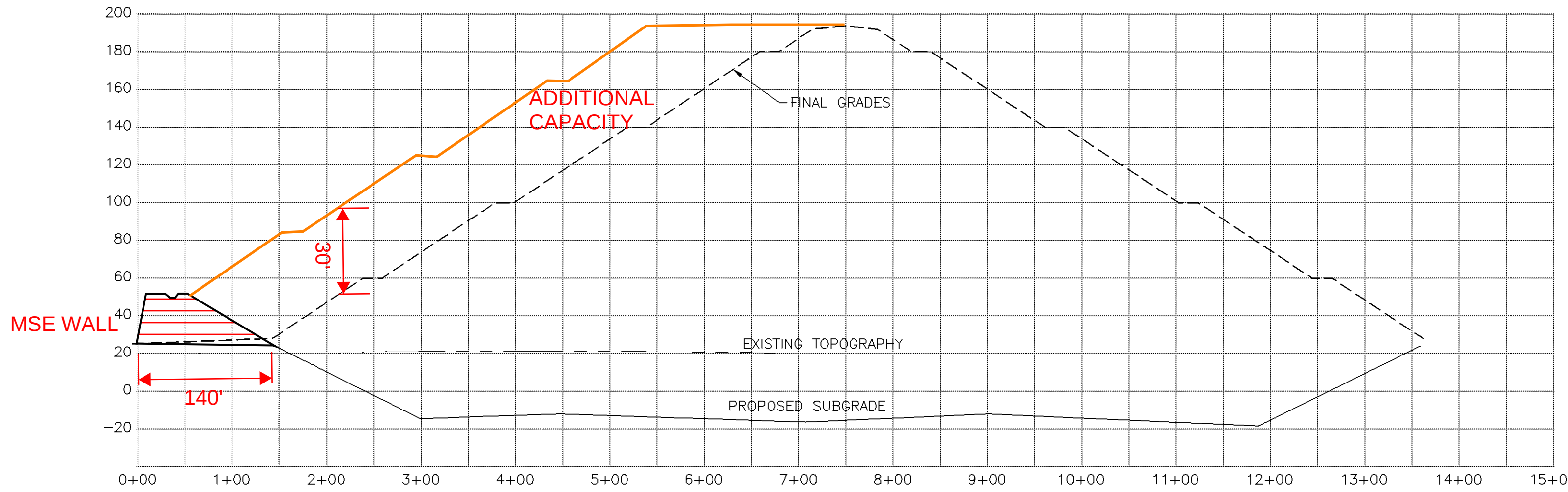
SHEET



SECTION A

H: 1"=100' V: 1"=50'

A
C-09



SECTION B

H: 1"=100' V: 1"=50'

B
C-09

HDR
249 Central Park Avenue, Suite 201
Virginia Beach, VA 23462
Phone: (757) 222-1500
3733 National Drive, Suite 207 | Raleigh, NC 27612

ISSUE	DATE	DESCRIPTION
B	02/2009	REVISED DISPOSAL LIMITS
A	08/2008	ISSUED FOR APPROVAL

PROJECT MANAGER	D.T. DECESARE, P.E. T.M. YANOSCHAK, P.E. G.M. WILLIAMS, E.I.
PROJECT NUMBER	00002889.018

SPSA WASTE SOLUTIONS

Regional Landfill
Cells VIII & IX Expansion
On-site Alternatives

SUFFOLK VIRGINIA

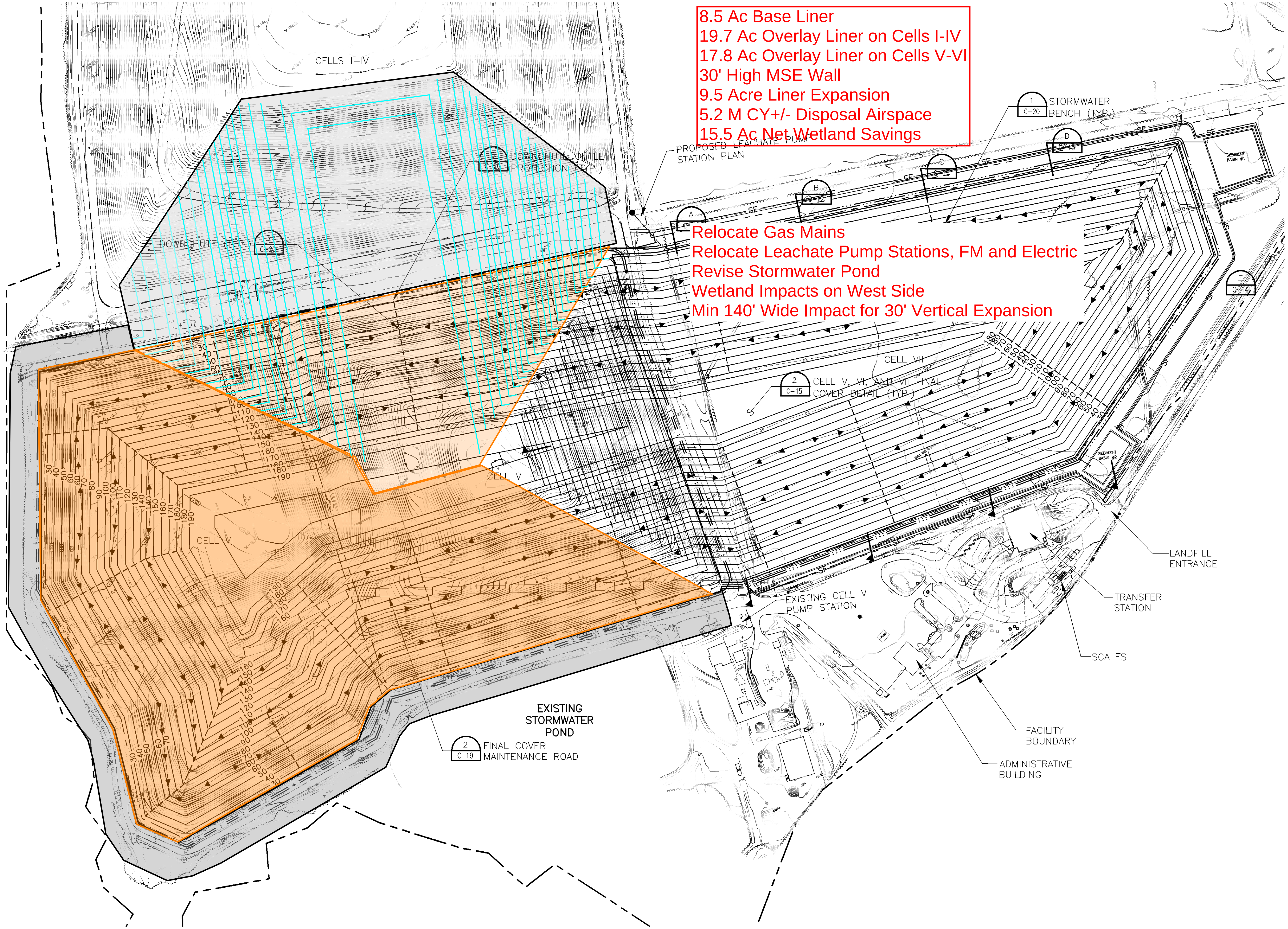
MSE WALL AROUND CELLS V & VI

0 1" 2"

FILENAME	00C–12.dwg
SCALE	AS SHOWN

SHEET
C-12

C:\PWworking\TPA\dms93507\00C-12.DWG, Plot, 2/13/2009 10:39:47 AM, sfutrell



8.5 Ac Base Liner
19.7 Ac Overlay Liner on Cells I-IV
17.8 Ac Overlay Liner on Cells V-VI
30' High MSE Wall
9.5 Acre Liner Expansion
5.2 M CY+/- Disposal Airspace
15.5 Ac Net Wetland Savings

Relocate Gas Mains
Relocate Leachate Pump Stations, FM and Electric
Revise Stormwater Pond
Wetland Impacts on West Side
Min 140' Wide Impact for 30' Vertical Expansion

NOTES

1. TOPOGRAPHY WITHIN AREA OF EXPOSED GEOSYNTHETICS ON SOUTH SIDE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED NOVEMBER 6 AND 15, 2007.
2. TOPOGRAPHY WITHIN AREAS OF CELLS I–IV WITH SOIL COVER OVER GEOSYNTHETICS (EXCLUDING EAST SLOPE) SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED MAY 2, 2008.
3. TOPOGRAPHY WITHIN EAST SLOPE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED APRIL 1, 2008.
4. EXISTING TOPOGRAPHY WITHIN CELL V AND CELL VI PHASE 1 SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED DECEMBER 27, 2007.
5. AS–BUILT TOPOGRAPHY WITHIN CELL VI PHASE 2 SUPPLIED BY BATEMAN CIVIL–SURVEY CO., PC FROM FIELD SURVEY DATED NOVEMBER 12, 2007.
6. EXISTING TOPOGRAPHY WITHIN CELL VII SUPPLIED BY AIR SURVEY BY AERIAL SURVEY DATED DECEMBER 30, 2004.
7. AS–BUILT TOPOGRAPHY WITHIN THE TRANSFER STATION AREA SUPPLIED BY HURT AND PRIFFITT DATED SEPTEMBER 19, 2005.
8. HORIZONTAL DATUM IS BASED ON THE VIRGINIA STATE PLANE COORDINATE SYSTEM–SOUTH ZONE (NAD 83). VERTICAL DATUM IS BASED ON THE NATIONAL GEODETIC VERTICAL DATUM (NGVD 29).
9. THE BUFFERS OUTLINED IN 9VAC 20–80–250 A(7) WILL BE MAINTAINED.
10. THE CONDITIONS SHOWN AS EXISTING ON THIS DRAWING REPRESENT GENERAL CONDITIONS AT THE TIME OF THE SURVEYS REFERENCED HEREIN.
11. FINAL COVER GRADES DEPICT TOP OF FINAL COVER.
12. STORMWATER BENCHES ARE SHOWN SCHEMATICALLY. ARROWS SHOW DIRECTION OF FLOW.

LEGEND

40 EXISTING CONTOURS
20 FINAL COVER GRADES
CONSTRUCTION BASELINE
FACILITY BOUNDARY
SILT FENCE
SIDESLOPE BENCH
DOWNCHUTE
PROPERTY BOUNDARY
PERIMETER CHANNEL
DIVERSION BERM

HDR
249 Central Park Avenue, Suite 201
Virginia Beach, VA 23462
Phone: (757) 222-1500
3733 National Drive, Suite 207 | Raleigh, NC 27612

ISSUE	DATE	DESCRIPTION
B	02/2009	REVISED DISPOSAL LIMITS
A	08/2008	ISSUED FOR APPROVAL

PROJECT MANAGER	D.T. DECESARE, P.E.
	T.M. YANOSCHAK, P.E.
	G.M. WILLIAMS, E.I.
PROJECT NUMBER	00002889.018

SPSA WASTE SOLUTIONS

Regional Landfill
Cells VIII & IX Expansion
On-site Alternatives

SUFFOLK **VIRGINIA**

ALTERNATIVE 4
RELOCATE GAS MAIN &
CONSTRUCT 30' MSE WALL

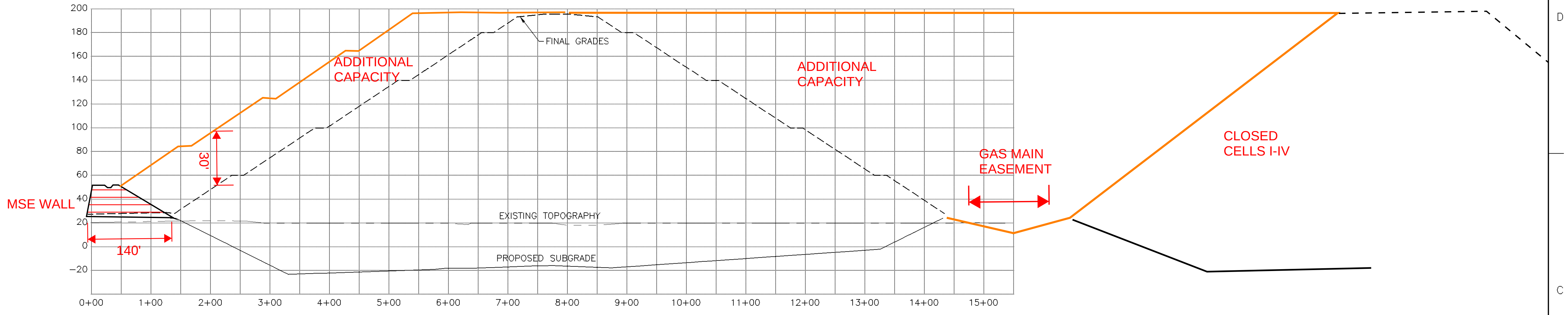
0 1" 2"

FILENAME 00C–09.dwg
SCALE 1"=200'
SHEET

C:\PWworking\TPA\dms93507\00C-09.DWG, Plot, 2/13/2009 10:32:09 AM, sfutrell

1 2 3 4 5 6 7 8

D

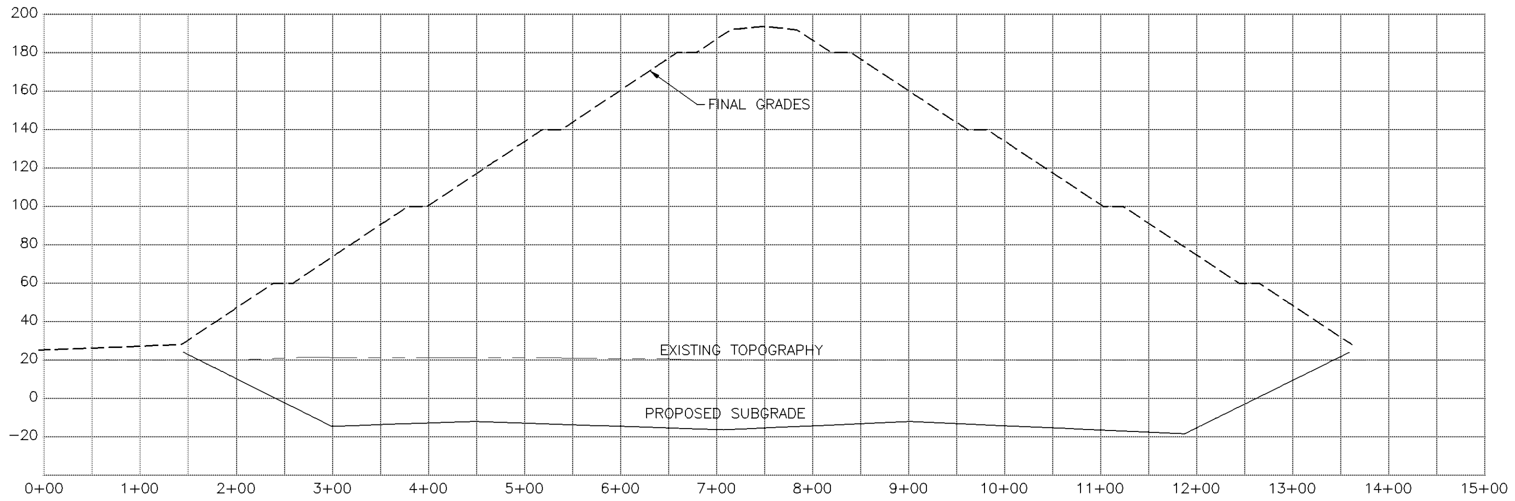


SECTION A

H: 1"=100' V: 1"=50'

A
C-09

C



SECTION B

H: 1"=100' V: 1"=50'

B
C-09

B

A

C:\PWworking\TPA\dms93507\00C-12.DWG, Plot, 2/13/2009 10:39:47 AM, sfutrell

249 Central Park Avenue, Suite 201
Virginia Beach, VA 23462
Phone: (757) 222-1500

3733 National Drive, Suite 207 | Raleigh, NC 27612

ISSUE	DATE	DESCRIPTION
B	02/2009	REVISED DISPOSAL LIMITS
A	08/2008	ISSUED FOR APPROVAL

PROJECT MANAGER	D.T. DECESARE, P.E.
	T.M. YANOSCHAK, P.E.
	G.M. WILLIAMS, E.I.
PROJECT NUMBER	00002889.018

Regional Landfill
Cells VIII & IX Expansion
On-site Alternatives

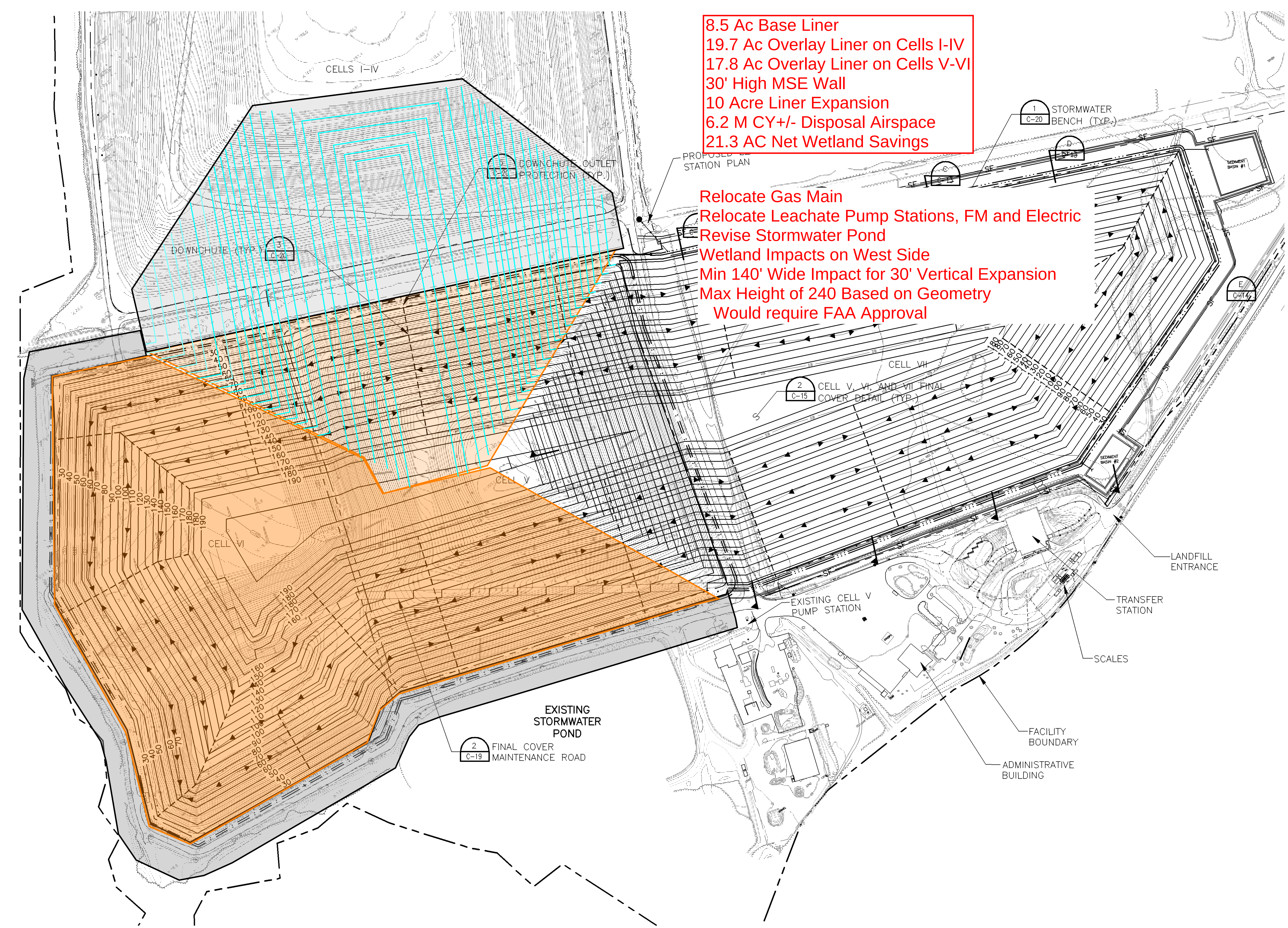
SUFFOLK **VIRGINIA**

RELOCATE GAS MAIN &
CONSTRUCT 30' MSE WALL

0 1" 2"

FILENAME	00C–12.dwg
SCALE	AS SHOWN

SHEET
C-12



8.5 Ac Base Liner
19.7 Ac Overlay Liner on Cells I-IV
17.8 Ac Overlay Liner on Cells V-VI
30' High MSE Wall
10 Acre Liner Expansion
6.2 M CY+/- Disposal Airspace
21.3 AC Net Wetland Savings

Relocate Gas Main
Relocate Leachate Pump Stations, FM and Electric
Revise Stormwater Pond
Wetland Impacts on West Side
Min 140' Wide Impact for 30' Vertical Expansion
Max Height of 240 Based on Geometry
Would require FAA Approval

NOTES

1. TOPOGRAPHY WITHIN AREA OF EXPOSED GEOSYNTHETICS ON SOUTH SIDE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED NOVEMBER 6 AND 15, 2007.
2. TOPOGRAPHY WITHIN AREAS OF CELLS I–IV WITH SOIL COVER OVER GEOSYNTHETICS (EXCLUDING EAST SLOPE) SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED MAY 2, 2008.
3. TOPOGRAPHY WITHIN EAST SLOPE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED APRIL 1, 2008.
4. EXISTING TOPOGRAPHY WITHIN CELL V AND CELL VI PHASE 1 SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED DECEMBER 27, 2007.
5. AS–BUILT TOPOGRAPHY WITHIN CELL VI PHASE 2 SUPPLIED BY BATEMAN CIVIL–SURVEY CO., PC FROM FIELD SURVEY DATED NOVEMBER 12, 2007.
6. EXISTING TOPOGRAPHY WITHIN CELL VII SUPPLIED BY AIR SURVEY BY AERIAL SURVEY DATED DECEMBER 30, 2004.
7. AS–BUILT TOPOGRAPHY WITHIN THE TRANSFER STATION AREA SUPPLIED BY HURT AND PRIFFITT DATED SEPTEMBER 19, 2005.
8. HORIZONTAL DATUM IS BASED ON THE VIRGINIA STATE PLANE COORDINATE SYSTEM–SOUTH ZONE (NAD 83). VERTICAL DATUM IS BASED ON THE NATIONAL GEODETIC VERTICAL DATUM (NGVD 29).
9. THE BUFFERS OUTLINED IN 9VAC 20–80–250 A(7) WILL BE MAINTAINED.
10. THE CONDITIONS SHOWN AS EXISTING ON THIS DRAWING REPRESENT GENERAL CONDITIONS AT THE TIME OF THE SURVEYS REFERENCED HEREIN.
11. FINAL COVER GRADES DEPICT TOP OF FINAL COVER.
12. STORMWATER BENCHES ARE SHOWN SCHEMATICALLY. ARROWS SHOW DIRECTION OF FLOW.

LEGEND

—40—	EXISTING CONTOURS
—20—	FINAL COVER GRADES
— - —	CONSTRUCTION BASELINE
— - - —	FACILITY BOUNDARY
—x—x—	SILT FENCE
▶——▶	SIDESLOPE BENCH
— — —	DOWNCHUTE
— - - —	PROPERTY BOUNDARY
═ ::: ═	PERIMETER CHANNEL
—DB—DB—	DIVERSION BERM

HDR

249 Central Park Avenue, Suite 201
Virginia Beach, VA 23462
Phone: (757) 222-1500

3733 National Drive, Suite 207 | Raleigh, NC 27612

ISSUE	DATE	DESCRIPTION
B	02/2009	REVISED DISPOSAL LIMITS
A	08/2008	ISSUED FOR APPROVAL

PROJECT MANAGER	D.T. DECESARE, P.E.
	T.M. YANOSCHAK, P.E.
	G.M. WILLIAMS, E.I.
PROJECT NUMBER	00002889.018

SPSA WASTE SOLUTIONS

Regional Landfill
Cells VIII & IX Expansion
On-site Alternatives

SUFFOLK **VIRGINIA**

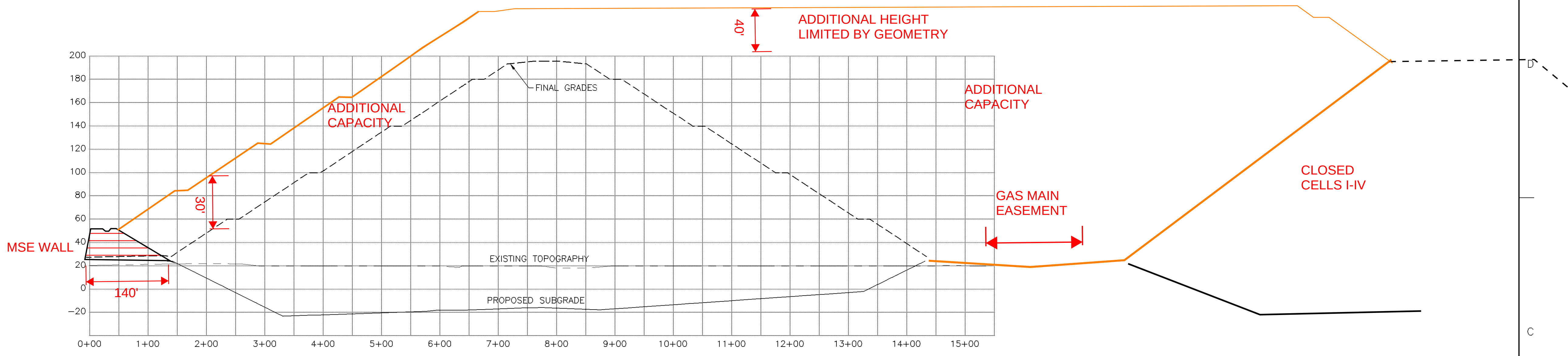
ALTERNATIVE 5
RELOCATE GAS MAIN & CONSTRUCT
30' MSE WALL FILL TO 240'

0 1" 2"

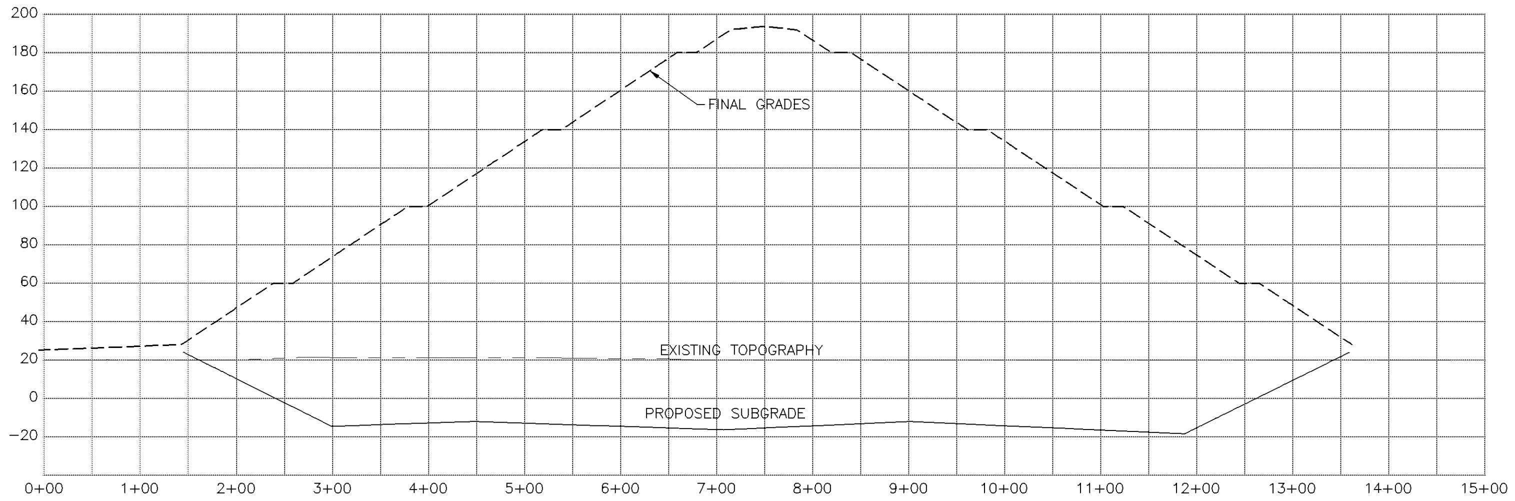
FILENAME	00C–09.dwg
SCALE	1"=200'

SHEET

C:\PWworking\TPA\dms93507\00C-09.DWG, Plot, 2/13/2009 10:32:09 AM, sfutrell



SECTION A
H: 1"=100' V: 1"=50'
A
C-09



SECTION B
H: 1"=100' V: 1"=50'
B
C-09

HDR
249 Central Park Avenue, Suite 201
Virginia Beach, VA 23462
Phone: (757) 222-1500
3733 National Drive, Suite 207 | Raleigh, NC 27612

ISSUE	DATE	DESCRIPTION
B	02/2009	REVISED DISPOSAL LIMITS
A	08/2008	ISSUED FOR APPROVAL

PROJECT MANAGER	D.T. DECESARE, P.E.
	T.M. YANOSCHAK, P.E.
	G.M. WILLIAMS, E.I.
PROJECT NUMBER	00002889.018

SPSA
WASTE SOLUTIONS

Regional Landfill
Cells VIII & IX Expansion
On-site Alternatives

SUFFOLK **VIRGINIA**

RELOCATE GAS MAIN &
CONSTRUCT 30' MSE
WALL FILL TO 240'

0 1" 2"

FILENAME 00C-12.dwg
SCALE AS SHOWN

SHEET
C-12

NOTES

1. TOPOGRAPHY WITHIN AREA OF EXPOSED GEOSYNTHETICS ON SOUTH SIDE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED NOVEMBER 6 AND 15, 2007.
2. TOPOGRAPHY WITHIN AREAS OF CELLS I–IV WITH SOIL COVER OVER GEOSYNTHETICS (EXCLUDING EAST SLOPE) SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED MAY 2, 2008.
3. TOPOGRAPHY WITHIN EAST SLOPE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED APRIL 1, 2008.
4. EXISTING TOPOGRAPHY WITHIN CELL V AND CELL VI PHASE 1 SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED DECEMBER 27, 2007.
5. AS–BUILT TOPOGRAPHY WITHIN CELL VI PHASE 2 SUPPLIED BY BATEMAN CIVIL–SURVEY CO., PC FROM FIELD SURVEY DATED NOVEMBER 12, 2007.
6. EXISTING TOPOGRAPHY WITHIN CELL VII SUPPLIED BY AIR SURVEY BY AERIAL SURVEY DATED DECEMBER 30, 2004.
7. AS–BUILT TOPOGRAPHY WITHIN THE TRANSFER STATION AREA SUPPLIED BY HURT AND PRIFFITT DATED SEPTEMBER 19, 2005.
8. HORIZONTAL DATUM IS BASED ON THE VIRGINIA STATE PLANE COORDINATE SYSTEM–SOUTH ZONE (NAD 83). VERTICAL DATUM IS BASED ON THE NATIONAL GEODETIC VERTICAL DATUM (NGVD 29).
9. THE BUFFERS OUTLINED IN 9VAC 20–80–250 A(7) WILL BE MAINTAINED.
10. THE CONDITIONS SHOWN AS EXISTING ON THIS DRAWING REPRESENT GENERAL CONDITIONS AT THE TIME OF THE SURVEYS REFERENCED HEREIN.
11. FINAL COVER GRADES DEPICT TOP OF FINAL COVER.
12. STORMWATER BENCHES ARE SHOWN SCHEMATICALLY. ARROWS SHOW DIRECTION OF FLOW.

LEGEND

- EXISTING CONTOURS
- FINAL COVER GRADES
- CONSTRUCTION BASELINE
- FACILITY BOUNDARY
- SILT FENCE
- SIDESLOPE BENCH
- DOWNCHUTE
- PROPERTY BOUNDARY
- PERIMETER CHANNEL
- DIVERSION BERM

HDR
249 Central Park Avenue, Suite 201
Virginia Beach, VA 23462
Phone: (757) 222-1500
3733 National Drive, Suite 207 | Raleigh, NC 27612

ISSUE	DATE	DESCRIPTION
B	02/2009	REVISED DISPOSAL LIMITS
A	08/2008	ISSUED FOR APPROVAL

PROJECT MANAGER	D.T. DECESARE, P.E. T.M. YANOSCHAK, P.E. G.M. WILLIAMS, E.I.
PROJECT NUMBER	00002889.018

SPSA WASTE SOLUTIONS

Regional Landfill
Cells VIII & IX Expansion
On-site Alternatives

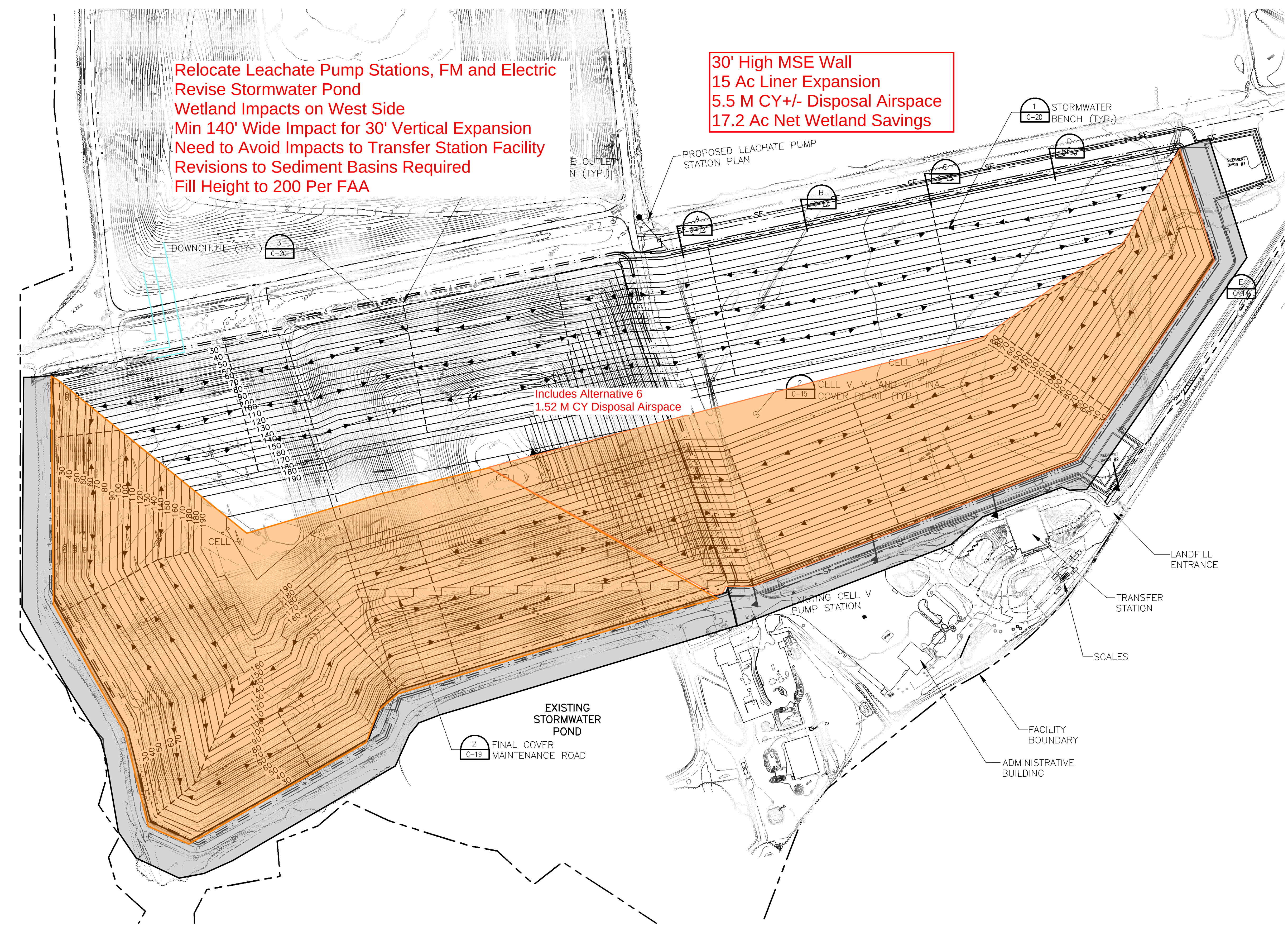
SUFFOLK **VIRGINIA**

ALTERNATIVE 6
CAPTURE PERMITTED AIRSPACE
WITH OVERLAP ONTO CELL V

0 1" 2"

FILENAME	00C–09.dwg
SCALE	1"=200'

SHEET



Relocate Leachate Pump Stations, FM and Electric
Revise Stormwater Pond
Wetland Impacts on West Side
Min 140' Wide Impact for 30' Vertical Expansion
Need to Avoid Impacts to Transfer Station Facility
Revisions to Sediment Basins Required
Fill Height to 200 Per FAA

30' High MSE Wall
15 Ac Liner Expansion
5.5 M CY+/- Disposal Airspace
17.2 Ac Net Wetland Savings

Includes Alternative 6
1.52 M CY Disposal Airspace

NOTES

1. TOPOGRAPHY WITHIN AREA OF EXPOSED GEOSYNTHETICS ON SOUTH SIDE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED NOVEMBER 6 AND 15, 2007.
2. TOPOGRAPHY WITHIN AREAS OF CELLS I–IV WITH SOIL COVER OVER GEOSYNTHETICS (EXCLUDING EAST SLOPE) SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED MAY 2, 2008.
3. TOPOGRAPHY WITHIN EAST SLOPE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED APRIL 1, 2008.
4. EXISTING TOPOGRAPHY WITHIN CELL V AND CELL VI PHASE 1 SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED DECEMBER 27, 2007.
5. AS–BUILT TOPOGRAPHY WITHIN CELL VI PHASE 2 SUPPLIED BY BATEMAN CIVIL–SURVEY CO., PC FROM FIELD SURVEY DATED NOVEMBER 12, 2007.
6. EXISTING TOPOGRAPHY WITHIN CELL VII SUPPLIED BY AIR SURVEY BY AERIAL SURVEY DATED DECEMBER 30, 2004.
7. AS–BUILT TOPOGRAPHY WITHIN THE TRANSFER STATION AREA SUPPLIED BY HURT AND PRIFFITT DATED SEPTEMBER 19, 2005.
8. HORIZONTAL DATUM IS BASED ON THE VIRGINIA STATE PLANE COORDINATE SYSTEM–SOUTH ZONE (NAD 83). VERTICAL DATUM IS BASED ON THE NATIONAL GEODETIC VERTICAL DATUM (NGVD 29).
9. THE BUFFERS OUTLINED IN 9VAC 20–80–250 A(7) WILL BE MAINTAINED.
10. THE CONDITIONS SHOWN AS EXISTING ON THIS DRAWING REPRESENT GENERAL CONDITIONS AT THE TIME OF THE SURVEYS REFERENCED HEREIN.
11. FINAL COVER GRADES DEPICT TOP OF FINAL COVER.
12. STORMWATER BENCHES ARE SHOWN SCHEMATICALLY. ARROWS SHOW DIRECTION OF FLOW.

LEGEND

—40—	EXISTING CONTOURS
—20—	FINAL COVER GRADES
— - —	CONSTRUCTION BASELINE
— - - —	FACILITY BOUNDARY
—x—x—	SILT FENCE
►—►—►	SIDESLOPE BENCH
— — —	DOWNCHUTE
— - —	PROPERTY BOUNDARY
═:::═	PERIMETER CHANNEL
—DB—DB—	DIVERSION BERM

C:\PWworking\TPA\dms93507\00C-09.DWG, Plot, 2/13/2009 10:32:09 AM, sfutrell

HDR
249 Central Park Avenue, Suite 201
Virginia Beach, VA 23462
Phone: (757) 222-1500
3733 National Drive, Suite 207 | Raleigh, NC 27612

ISSUE	DATE	DESCRIPTION
B	02/2009	REVISED DISPOSAL LIMITS
A	08/2008	ISSUED FOR APPROVAL

PROJECT MANAGER	D.T. DECESARE, P.E. T.M. YANOSCHAK, P.E. G.M. WILLIAMS, E.I.
PROJECT NUMBER	00002889.018

SPSA WASTE SOLUTIONS

Regional Landfill
Cells VIII & IX Expansion
On-site Alternatives

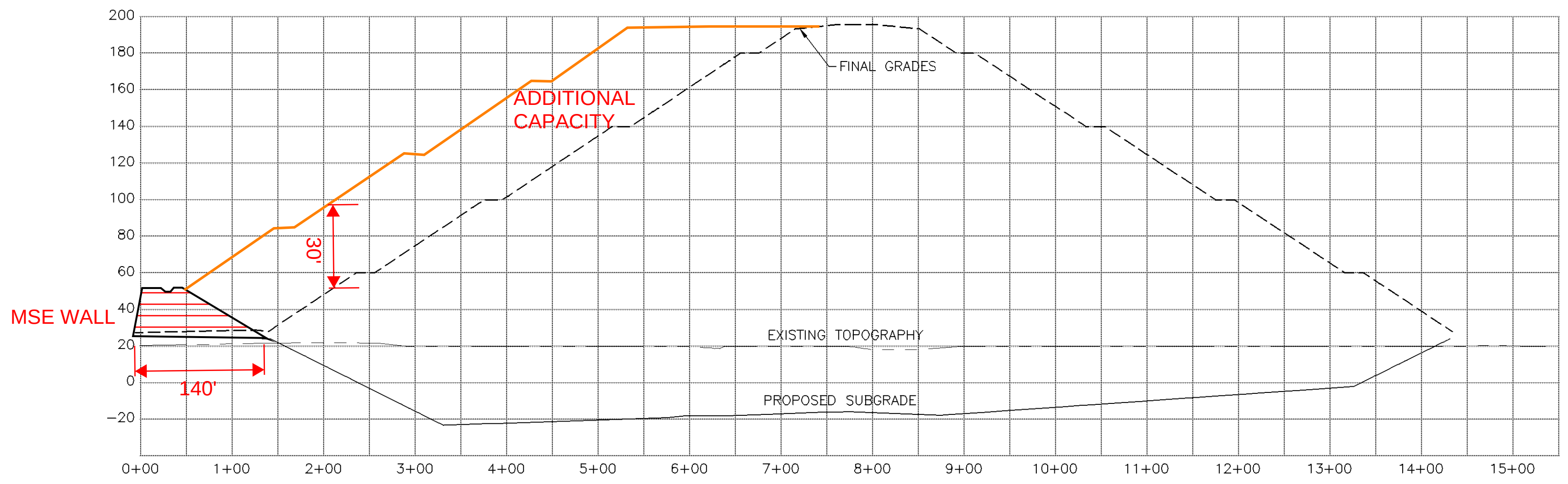
SUFFOLK **VIRGINIA**

ALTERNATIVE 7
CONSTRUCT 30' MSE WALL
AROUND CELL V, VI AND VII

0 1" 2"

FILENAME	00C–09.dwg
SCALE	1"=200'

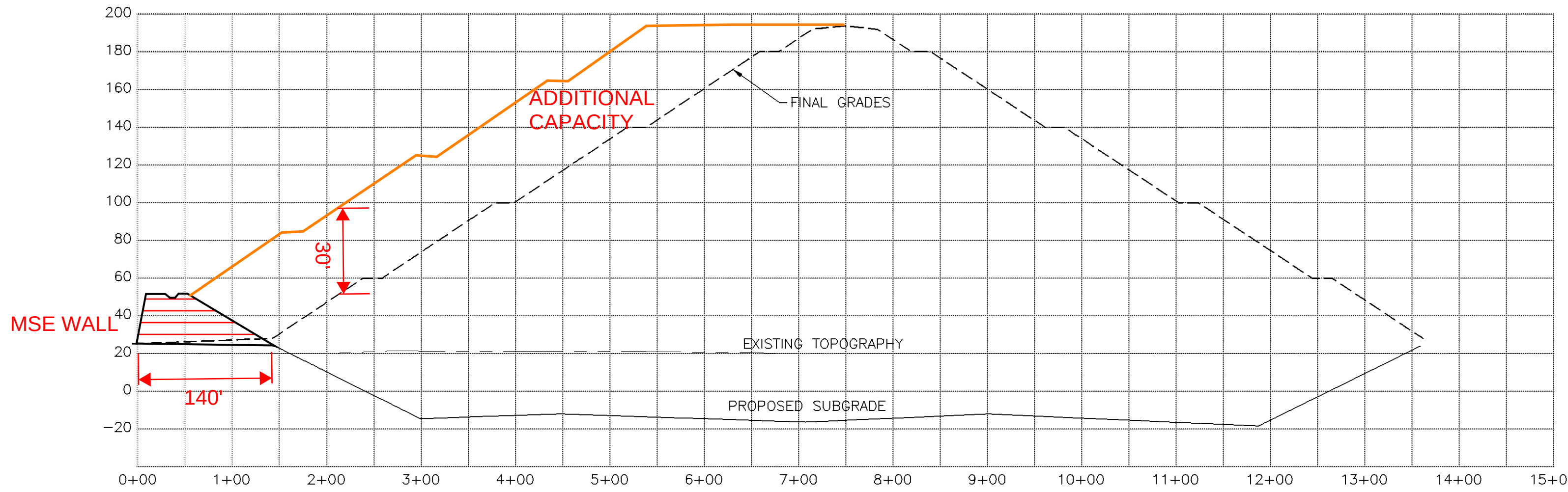
SHEET



SECTION A

H: 1"=100' V: 1"=50'

A
C−09



SECTION B

H: 1"=100' V: 1"=50'

B
C−09

C:\PWworking\TPA\dms93507\00C-12.DWG, Plot, 2/13/2009 10:39:47 AM, sfutrell

HDR

249 Central Park Avenue, Suite 201
Virginia Beach, VA 23462
Phone: (757) 222-1500

3733 National Drive, Suite 207 | Raleigh, NC 27612

ISSUE	DATE	DESCRIPTION
B	02/2009	REVISED DISPOSAL LIMITS
A	08/2008	ISSUED FOR APPROVAL

PROJECT MANAGER	D.T. DECESARE, P.E.
	T.M. YANOSCHAK, P.E.
	G.M. WILLIAMS, E.I.
PROJECT NUMBER	00002889.018

SPSA WASTE SOLUTIONS

Regional Landfill
Cells VIII & IX Expansion
On-site Alternatives

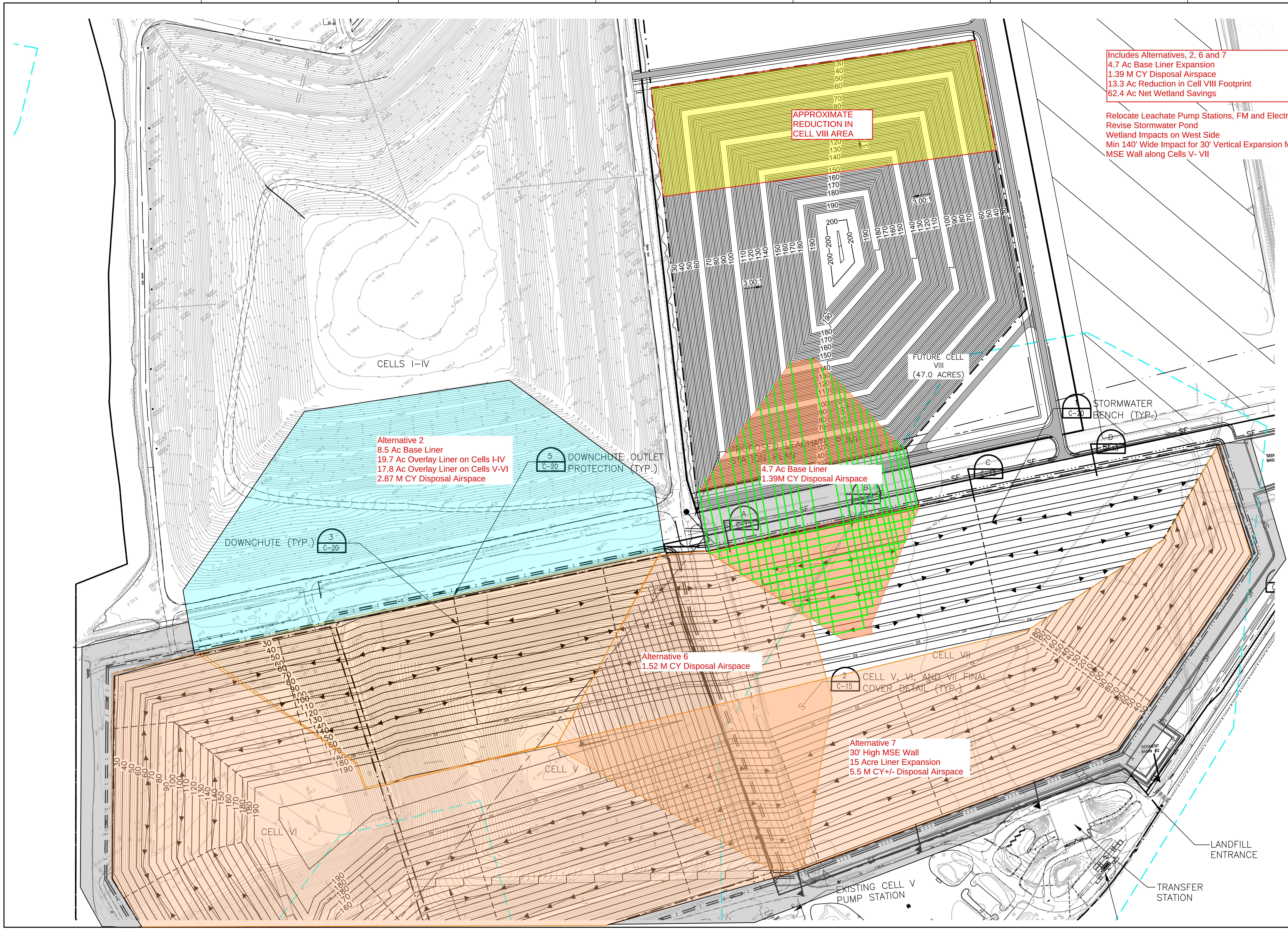
SUFFOLK **VIRGINIA**

CONSTRUCT 30' MSE
WALL AROUND CELL V, VI
AND VII

0 1" 2"

FILENAME	00C−12.dwg
SCALE	AS SHOWN

SHEET
C-12



ES

1. TOPOGRAPHY WITHIN AREA OF EXPOSED GEOSYNTHETICS ON SOUTH SIDE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED NOVEMBER 6 AND 15, 2007.
2. TOPOGRAPHY WITHIN AREAS OF CELLS I–IV WITH SOIL COVER OVER GEOSYNTHETICS (EXCLUDING EAST SLOPE) SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED MAY 2, 2008.
3. TOPOGRAPHY WITHIN EAST SLOPE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED APRIL 1, 2008.
4. EXISTING TOPOGRAPHY WITHIN CELL V AND CELL VI PHASE 1 SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED DECEMBER 27, 2007.
5. EXISTING TOPOGRAPHY WITHIN TAX MAP# 27*28A SUPPLIED BY HOGGARD-EURE ASSOCIATES BASED ON AERIAL PHOTOGRAPHY DATED MARCH 22, 2016. BASE PLAN AND TOPOGRAPHY OF AREAS OUTSIDE TAX MAP# 27*28A COMPILED FROM AERIAL AND FIELD SURVEYS FROM 2005 - 2015. TEMPORARY SHOWN OUTSIDE PROPERTY BOUNDARY OBTAINED FROM GIS.
6. ELEVATIONS REFER TO NGS MEAN SEA LEVEL HORIZONTAL CONTROL BASED UPON VIRGINIA STATE PLANE COORDINATE SYSTEM SOUTH ZONE NAD 1983.
7. PROPERTY LINE BOUNDARY FROM VANASSE HANGEN BRUSTLIN DATED FEBRUARY 29, 2000.
8. AS–BUILT TOPOGRAPHY WITHIN CELL VI PHASE 2 SUPPLIED BY BATEMAN CIVIL–SURVEY CO., PC FROM FIELD SURVEY DATED NOVEMBER 12, 2007.
9. EXISTING TOPOGRAPHY WITHIN CELL VII SUPPLIED BY AIR SURVEY BY AERIAL SURVEY DATED DECEMBER 30, 2004.
10. AS–BUILT TOPOGRAPHY WITHIN THE TRANSFER STATION AREA SUPPLIED BY HURT AND PRIFFITT DATED SEPTEMBER 19, 2005.
11. HORIZONTAL DATUM IS BASED ON THE VIRGINIA STATE PLANE COORDINATE SYSTEM–SOUTH ZONE (NAD 83). VERTICAL DATUM IS BASED ON THE NATIONAL GEODETIC VERTICAL DATUM (NGVD 29).
12. THE BUFFERS OUTLINED IN 9VAC 20–80–250 A(7) WILL BE MAINTAINED.
13. THE CONDITIONS SHOWN AS EXISTING ON THIS DRAWING REPRESENT GENERAL CONDITIONS AT THE TIME OF THE SURVEYS REFERENCED HEREIN.
14. FINAL COVER GRADES DEPICT TOP OF FINAL COVER.
15. STORMWATER BENCHES ARE SHOWN SCHEMATICALLY. ARROWS SHOW DIRECTION OF FLOW.

LEGEND

——40——	EXISTING CONTOURS
————	PROPOSED MINOR CONTOURS
——180——	PROPOSED MAJOR CONTOURS
━━ ━ ━ ━━	CONSTRUCTION BASELINE
━━ ━ ━ ━━	FACILITY BOUNDARY
——x——x——	SILT FENCE
▶——▶——▶	SIDESLOPE BENCH
— — — —	DOWNCHUTE
━━ ━ ━ ━━	PROPERTY BOUNDARY
═══ ::: ═══	PERIMETER CHANNEL
——DB——DB——	DIVERSION BERM
— — — —	CHESAPEAKE BAY PRESERVATION AREA
————	STREAMS
▨	WETLAND PRESERVATION AREA
━━━━	129–AC BOUNDARY LINE

PROJECT MANAGER	J. MURRAY, P.E.
DESIGNED BY	
REVIEWED BY	
DRAWN BY	
PROJECT NUMBER	10139129

ISSUE	DATE	DESCRIPTION

Southeastern Public Service Authority
Cells VIII & IX Expansion
On-site Alternatives

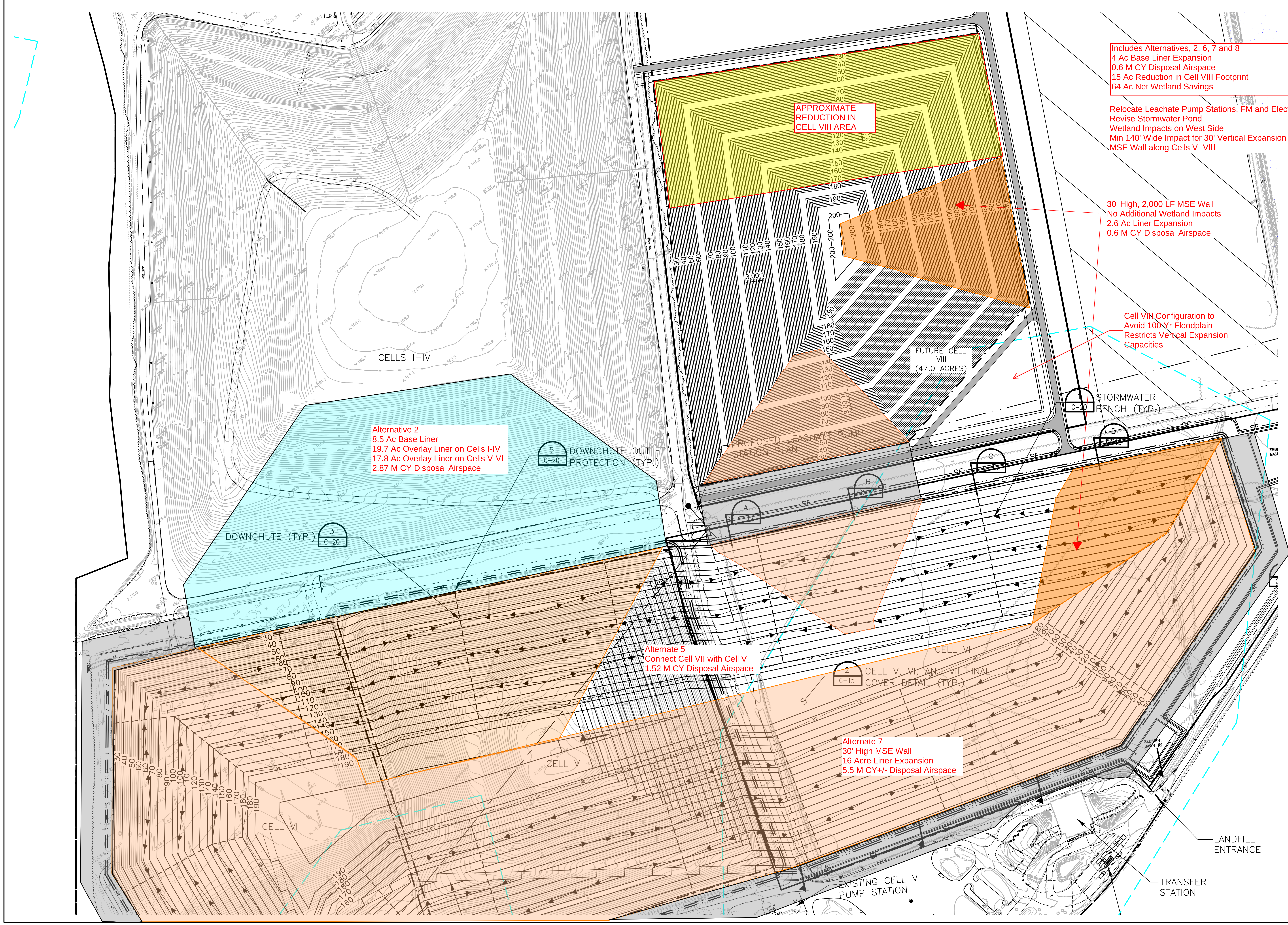
SUFFOLK **VIRGINIA**

RELOCATE GAS MAIN &
CONSTRUCT 4.7 AC BASE
LINER AREA IN FORMER
EASEMENT

0 1" 2"
SCALE 1"=200'

SHEET
00C-13

C:\Users\emtucker\Documents\SPSA\Part A Application\New folder\00C-13.DWG, Plot, 4/20/2020 12:16:31 PM, EMTUCKER



APPROXIMATE REDUCTION IN CELL VIII AREA

Includes Alternatives, 2, 6, 7 and 8
4 Ac Base Liner Expansion
0.6 M CY Disposal Airspace
15 Ac Reduction in Cell VIII Footprint
64 Ac Net Wetland Savings

Relocate Leachate Pump Stations, FM and Electric
Revise Stormwater Pond
Wetland Impacts on West Side
Min 140' Wide Impact for 30' Vertical Expansion for
MSE Wall along Cells V- VIII

30' High, 2,000 LF MSE Wall
No Additional Wetland Impacts
2.6 Ac Liner Expansion
0.6 M CY Disposal Airspace

Cell VIII Configuration to
Avoid 100 Yr Floodplain
Restricts Vertical Expansion
Capacities

Alternative 2
8.5 Ac Base Liner
19.7 Ac Overlay Liner on Cells I-IV
17.8 Ac Overlay Liner on Cells V-VI
2.87 M CY Disposal Airspace

Alternate 5
Connect Cell VII with Cell V
1.52 M CY Disposal Airspace

Alternate 7
30' High MSE Wall
16 Acre Liner Expansion
5.5 M CY+/- Disposal Airspace

ES

1. TOPOGRAPHY WITHIN AREA OF EXPOSED GEOSYNTHETICS ON SOUTH SIDE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED NOVEMBER 6 AND 15, 2007.
2. TOPOGRAPHY WITHIN AREAS OF CELLS I–IV WITH SOIL COVER OVER GEOSYNTHETICS (EXCLUDING EAST SLOPE) SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED MAY 2, 2008.
3. TOPOGRAPHY WITHIN EAST SLOPE OF CELLS I–IV SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED APRIL 1, 2008.
4. EXISTING TOPOGRAPHY WITHIN CELL V AND CELL VI PHASE 1 SUPPLIED BY HOGGARD & EURE ASSOC., PC FROM FIELD SURVEY DATED DECEMBER 27, 2007.
5. EXISTING TOPOGRAPHY WITHIN TAX MAP# 27*28A SUPPLIED BY HOGGARD-EURE ASSOCIATES BASED ON AERIAL PHOTOGRAPHY DATED MARCH 22, 2016. BASE PLAN AND TOPOGRAPHY OF AREAS OUTSIDE TAX MAP# 27*28A COMPILED FROM AERIAL AND FIELD SURVEYS FROM 2005 - 2015. TEMPORARY SHOWN OUTSIDE PROPERTY BOUNDARY OBTAINED FROM GIS.
6. ELEVATIONS REFER TO NGS MEAN SEA LEVEL HORIZONTAL CONTROL BASED UPON VIRGINIA STATE PLANE COORDINATE SYSTEM SOUTH ZONE NAD 1983.
7. PROPERTY LINE BOUNDARY FROM VANASSE HANGEN BRUSTLIN DATED FEBRUARY 29, 2000.
8. AS–BUILT TOPOGRAPHY WITHIN CELL VI PHASE 2 SUPPLIED BY BATEMAN CIVIL–SURVEY CO., PC FROM FIELD SURVEY DATED NOVEMBER 12, 2007.
9. EXISTING TOPOGRAPHY WITHIN CELL VII SUPPLIED BY AIR SURVEY BY AERIAL SURVEY DATED DECEMBER 30, 2004.
10. AS–BUILT TOPOGRAPHY WITHIN THE TRANSFER STATION AREA SUPPLIED BY HURT AND PRIFFITT DATED SEPTEMBER 19, 2005.
11. HORIZONTAL DATUM IS BASED ON THE VIRGINIA STATE PLANE COORDINATE SYSTEM–SOUTH ZONE (NAD 83). VERTICAL DATUM IS BASED ON THE NATIONAL GEODETIC VERTICAL DATUM (NGVD 29).
12. THE BUFFERS OUTLINED IN 9VAC 20–80–250 A(7) WILL BE MAINTAINED.
13. THE CONDITIONS SHOWN AS EXISTING ON THIS DRAWING REPRESENT GENERAL CONDITIONS AT THE TIME OF THE SURVEYS REFERENCED HEREIN.
14. FINAL COVER GRADES DEPICT TOP OF FINAL COVER.
15. STORMWATER BENCHES ARE SHOWN SCHEMATICALLY. ARROWS SHOW DIRECTION OF FLOW.

LEGEND

——40——	EXISTING CONTOURS
————	PROPOSED MINOR CONTOURS
——180——	PROPOSED MAJOR CONTOURS
——‑ ‑——	CONSTRUCTION BASELINE
——‑ ‑——	FACILITY BOUNDARY
——x——x——	SILT FENCE
▶——▶——▶	SIDESLOPE BENCH
— — — —	DOWNCHUTE
——‑ ‑——	PROPERTY BOUNDARY
══ ::: ══	PERIMETER CHANNEL
——DB——DB——	DIVERSION BERM
— — — —	CHESAPEAKE BAY PRESERVATION AREA
————	STREAMS
▨	WETLAND PRESERVATION AREA
━━━━	129–AC BOUNDARY LINE

PROJECT MANAGER J. MURRAY, P.E.
DESIGNED BY
REVIEWED BY
DRAWN BY
PROJECT NUMBER 10139129

ISSUE DATE DESCRIPTION

Southeastern Public Service Authority

Cells VIII & IX Expansion
On-site Alternatives

SUFFOLK VIRGINIA

RELOCATE GAS MAIN & CONSTRUCT 30' HIGH MSE WALL

0 1" 2"

FILENAME 00C–13.dwg
SCALE 1"=200'

SHEET
00C-13

C:\Users\emtucker\Documents\SPSA\Part A Application\New folder\00C-13.DWG, Plot, 4/20/2020 12:16:31 PM, EMTUCKER

B

Appendix B Wetland Impacts and Avoidance Calculation Summary

This page intentionally left blank.

Wetlands Recovery

#	OPTION	Disposal Volume (CY)	Area (AC)*	Wetland Impact (CY/AC)
1	Cells VIII and IX Expansion	573,620	3.35	171,046
		*includes eastern berm and roadway		

#	OPTION	Disposal Volume (CY)	Potential Wetland Savings (AC)	Additional Wetlands Impact (AC)	**Net Wetland Savings (AC)**	**Cell VIII & IX Total Area (AC)**	Notes
2	Relocate Natural Gas Main and Overlap onto Closed Cells I-IV	2,870,000	16.8	0	**16.8**	**76.12**	Cell IX reduced
3	MSE Wall Around South and West Boundary of Cells V & VI	2,200,000	12.9	14.9	**-2.0**	**80.04**	Cell IX reduced
4	MSE Wall and Gas Main Relocation and fill to 200’	5,200,000	30.4	14.9	**15.5**	**62.50**	Cell IX reduced
5	MSE Wall and Gas Main Relocation and Fill to 240’	6,200,000	36.2	14.9	**21.3**	**56.65**	Cell IX reduced
6	Capture Airspace Between Cell V and VII*	1,520,000	8.9	0	**8.9**	**84.01**	Cell IX reduced
7	MSE Wall Around Cells V, VI and VII	5,500,000	32.2	14.9	**17.3**	**60.74**	Cell IX not constructed, Cell VIII expanded
8	Construct Cell 8 and Overlap onto Cell VII with Gas Main Relocation	16,000,000	93.5	72.1	**62.4**	**33.72**	Cell IX not constructed, Cell VIII reduced
9	MSE Wall Around Cells V-VII and Gas Main Relocation and Fill to 200'	16,000,000	93.5	74.1	**64.1**	**32.02**	Cell IX not constructed, Cell VIII reduced

*Already permitted

C

Appendix C Estimated Cost for Each Alternative

This page intentionally left blank.

ALTERNATIVES SUMMARY

#	Alternatives	Net Wetland Savings (AC)	Cells VIII/IX Total Area (AC)	Total Lined Area (AC)	Captial Cost ($)	Wetland Mitigation Cost ($)	Total Cost ($)	Deviation (%)	Net Cost per Acre of Net Wetland Savings ($/AC)	Reduction Volume of Cells VIII/IX (CY)	Total Cell Expansion Disposal Volume (CY)	Comments
1	Cells VIII & IX Expansion	-	92.9	92.9	$72,659,120	$7,141,800	$79,800,920		-	-	16,000,000	Practicable Conventional Design/Construction/Operation Leachate Pump Depth Managable Coordinates with Cell VII Operations Generates Soil for Operation/Construction Straight Forward Permitting/Above Confining Layer
2	Relocate Natural Gas Main and Overlap onto Closed Cells I-IV	16.8	76.1	122.1	$110,292,800	$6,135,052	$116,427,853	46%	$2,182,887	2,870,000	13,130,000	Not Practicable Relies on Cooperation of Columbia Gas No Wetland Impact for 16.8 Ac of Savings Significant Impacts to Leachate Collection and Maintenance Impacts to LFG System Operation
3	MSE Wall Around South and West Boundary of Cells V & VI	-2.0	80.0	89.1	$83,707,065	$7,263,949	$90,971,014	14%	-	2,200,000	13,800,000	Not Practicable No Net Savings in Wetlands Impacts to Leachate and Stormwater Infrastructure Perimeter Access and Waste Filling Difficult Loss of Operating Soil for MSE Wall Build
4	MSE Wall and Gas Main Relocation and fill to 200’	15.5	62.5	99.7	$120,746,295	$6,211,599	$126,957,895	59%	$3,041,729	5,200,000	10,800,000	Not Practicable Relies on Cooperation of Columbia Gas Significant Impacts to Leachate and Stormwater Infrastructure Perimeter Access and Waste Filling Difficult Loss of Operating Soil for MSE Wall Build
5	MSE Wall and Gas Main Relocation and Fill to 240’	21.3	56.7	93.9	$116,173,599	$5,860,816	$122,034,415	53%	$1,978,175	6,200,000	9,800,000	Not Practicable Relies on Cooperation of Columbia Gas and FAA Significant Impacts to Leachate and Stormwater Infrastructure Perimeter Access and Waste Filling Difficult Loss of Operating Soil for MSE Wall Build
6	Capture Airspace Between Cell V and VII	8.9	84.0	89.4	$70,959,178	$6,608,610	$77,567,788	-3%	-$251,295	1,520,000	14,480,000	Practicable Permitted for Construction by DEQ No Wetland Impact for 8.9 Ac of Savings Impacts to Cell V Leachate and LFG
7	MSE Wall Around Cells V, VI and VII	17.3	60.7	81.1	$81,140,494	$6,106,364	$87,246,858	9%	$431,467	5,500,000	10,500,000	Not Practicable Impacts to Leachate and Stormwater Infrastructure Complicated Permitting/Design and Operation Impacts to Cell V Leachate and LFG Loss of Operating Soil for MSE Wall Build
8	Construct Cell VIII and Overlap onto Cell VII with Gas Main Relocation	62.4	33.7	87.0	$115,632,709	$3,396,142	$119,028,850	49%	$628,374	9,760,000	6,240,000	Not Practicable Relies on Cooperation of Columbia Gas and FAA Significant Impacts to Leachate and Stormwater Infrastructure Little Overlap Available Due to Floodplain Loss of Operating Soil for MSE Wall Build
9	MSE Wall Around Cells V-VII and Gas Main Relocation and Fill to 200'	64.1	32.0	87.9	$120,289,033	$3,294,142	$123,583,175	55%	$682,736	10,360,000	5,640,000	Not Practicable Relies on Cooperation of Columbia Gas MSE Wall on Cell VII of Little Value Impacts to Leachate and Stormwater Infrastructure Loss of Operating Soil for MSE Wall Build

Engineering Opinion of Probable Construction Cost

SPSA Regional Landfill

Cell VII - Phase 1

		30.8 Acre Cell				
	ITEM DESCRIPTION	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**	**TOTAL PRICE/AC**
1	Mobilization	4%	of WORK		$ 628,185	$ 20,396
2	Surveying and Control	1	LS	$ 178,289	$ 178,289	$ 5,789
3	Sedimentation & Erosion Control	1	LS	$ 20,620	$ 20,620	$ 669
4	Soil Excavation*	945,000	CY	$ 4.62	$ 4,367,131	$ 141,790
5	Undercut, Transport, Stockpile, and Backfill Unsuitable Soils	17,040	CY	$ 12.65	$ 215,552	$ 6,998
6	Structural Fill Placement	19,790	CY	$ 6.59	$ 130,449	$ 4,235
7	Geologic Buffer Layer	49,667	CY	$ 10.99	$ 545,648	$ 17,716
8	Geocomposite	2,697,400	SF	$ 1.13	$ 3,048,068	$ 98,963
9	40-mil HDPE Geomembrane	1,348,700	SF	$ 0.80	$ 1,079,524	$ 35,049
10	60-mil HDPE Geomembrane	1,348,700	SF	$ 0.94	$ 1,397,689	$ 45,380
10	GCL	1,348,700	SF	$ 1.07	$ 1,587,811	$ 51,552
11	Protective Cover Layer (Off-site)	74,800	CY	$ 47.31	$ 3,538,760	$ 114,895
12	20-mil LLDPE Rain Cover	674,350	SF	$ 0.71	$ 476,260	$ 15,463
13	Groundwater Collection Trenches	1	LS	$ 675,679	$ 675,679	$ 21,938
15	Leachate Collection System	1	LS	$ 1,798,222	$ 1,798,222	$ 58,384
16	Cell VII Leachate Pump Station	1	LS	$ 381,391	$ 381,391	$ 12,383
17	Gravel Perimeter Road	1	LS	$ 512,321	$ 512,321	$ 16,634
18	Groundwater/Leachate Enclosures	3	EA	$ 152,494	$ 457,482	$ 14,853
19	Groundwater/Leachate Pumps & Controls/SCADA	3	EA	$ 201,770	$ 605,309	$ 19,653
20	Groundwater/Leachate Enclosure Electrical Controls	3	EA	$ 142,552	$ 427,656	$ 13,885
21	Leachate Tanks	2	EA	$ 1,224,169	$ 2,448,339	$ 79,492
22	Relocate Cell V-2 Pump Station	1	LS	$ 349,987	$ 349,987	$ 11,363
23	Site & Misc.	1	LS	$ 15,427	$ 15,427	$ 501
				TOTAL	**$ 24,885,800**	**$ 807,981**

*Total excavation quantity remaining for Cell VII is 1.89M CY
as of March 2016. We have assumed that 1.5M CY excavation
will be funded through the Cell VII construction contracts
Inflation Adjustment 2018 to 2022 is 1.1013 per VDEQ

Engineering Opinion of Probable Construction Cost

SPSA Regional Landfill

Cell VII - Phase 2

		25.3	Acre Cell			
	ITEM DESCRIPTION	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**	**TOTAL PRICE/AC**
1	Mobilization	4%	of WORK		$ 464,353	$ 18,354
2	Surveying and Control	1	LS	$ 138,343	$ 138,343	$ 5,468
3	Sedimentation & Erosion Control	1	LS	$ 7,216	$ 7,216	$ 285
4	Soil Excavation*	555,000	CY	$ 4.68	$ 2,597,640	$ 102,674
5	Undercut, Transport, Stockpile, and Backfill Unsuitable Soils	12,960	CY	$ 12.55	$ 162,691	$ 6,430
6	Structural Fill Placement	14,256	CY	$ 6.55	$ 93,361	$ 3,690
7	Geologic Buffer Layer	37,775	CY	$ 10.89	$ 411,297	$ 16,257
8	Geocomposite	2,199,870	SF	$ 1.15	$ 2,536,133	$ 100,242
9	40-mil HDPE Geomembrane	1,099,935	SF	$ 0.82	$ 898,214	$ 35,503
10	60-mil HDPE Geomembrane	1,099,935	SF	$ 0.96	$ 1,162,904	$ 45,965
10	GCL	1,099,935	SF	$ 1.09	$ 1,320,381	$ 52,189
11	Protective Cover Layer (Off-site)	61,100	CY	$ 48.15	$ 2,941,935	$ 116,282
12	20-mil LLDPE Rain Cover	549,968	SF	$ 0.72	$ 396,271	$ 15,663
13	Groundwater Collection Trenches	1	LS	$ 503,854	$ 503,854	$ 19,915
15	Leachate Collection System	1	LS	$ 1,150,952	$ 1,150,952	$ 45,492
16	Cell VII Leachate Pump Station	0	LS	-	$ -	$ -
17	Gravel Perimeter Road	0	LS	-	$ -	$ -
18	Groundwater/Leachate Enclosures	2	EA	$ 151,455	$ 302,909	$ 11,973
19	Groundwater/Leachate Pumps & Controls/SCADA	2	EA	$ 222,710	$ 445,421	$ 17,606
20	Groundwater/Leachate Enclosure Electrical Controls	2	EA	$ 200,907	$ 401,814	$ 15,882
21	Leachate Tanks	0	EA	-	$ -	$ -
22	Relocate Cell V-2 Pump Station	0	LS	-	$ -	$ -
23	Site & Misc.	0	LS	-	$ -	$ -
				TOTAL	**$ 15,935,686**	**$ 629,869**

*Total excavation quantity remaining for Cell VII is 1.89M CY
as of March 2016. We have assumed that 1.5M CY excavation
will be funded through the Cell VII construction contracts
Inflation Adjustment 2018 to 2022 is 1.1013 per VDEQ

Engineering Opinion of Probable Construction Cost

SPSA Regional Landfill

Cell VII - Average of Phases 1 & 2

	ITEM DESCRIPTION	UNIT PRICE PHASE 1	UNIT PRICE PHASE 2	AVG UNIT PRICE	TOTAL PRICE/AC PHASE 1	TOTAL PRICE/AC PHASE 2	AVERAGE TOTAL PRICE/AC - ADJUSTED FOR INFLATION
1	Mobilization				$ 20,396	$ 18,354	$ 19,375
2	Surveying and Control	$ 178,289	$ 138,343	$ 158,316	$ 5,789	$ 5,468	$ 5,628
3	Sedimentation & Erosion Control	$ 20,620	$ 7,216	$ 13,918	$ 669	$ 285	$ 477
4	Soil Excavation*	$ 4.62	$ 4.68	$ 4.65	$ 141,790	$ 102,674	$ 122,232
5	Undercut, Transport, Stockpile, and Backfill Unsuitable Soils	$ 12.65	$ 12.55	$ 12.60	$ 6,998	$ 6,430	$ 6,714
6	Structural Fill Placement	$ 6.59	$ 6.55	$ 6.57	$ 4,235	$ 3,690	$ 3,963
7	Geologic Buffer Layer	$ 10.99	$ 10.89	$ 10.94	$ 17,716	$ 16,257	$ 16,986
8	Geocomposite	$ 1.13	$ 1.15	$ 1.14	$ 98,963	$ 100,242	$ 99,603
9	40-mil HDPE Geomembrane	$ 0.80	$ 0.82	$ 0.81	$ 35,049	$ 35,503	$ 35,276
10	60-mil HDPE Geomembrane	$ 0.94	$ 0.96	$ 0.95	$ 45,380	$ 45,965	$ 45,672
10	GCL	$ 1.07	$ 1.09	$ 1.08	$ 51,552	$ 52,189	$ 51,871
11	Protective Cover Layer (Off-site)	$ 47.31	$ 48.15	$ 47.73	$ 114,895	$ 116,282	$ 115,588
12	20-mil LLDPE Rain Cover	$ 0.71	$ 0.72	$ 0.71	$ 15,463	$ 15,663	$ 15,563
13	Groundwater Collection Trenches	$ 675,679	$ 503,854	$ 589,767	$ 21,938	$ 19,915	$ 20,926
15	Leachate Collection System	$ 1,798,222	$ 1,150,952	$ 1,474,587	$ 58,384	$ 45,492	$ 51,938
16	Cell VII Leachate Pump Station	$ 381,391	$ -	$ 190,696	$ 12,383	$ -	$ 6,191
17	Gravel Perimeter Road	$ 512,321	$ -	$ 256,161	$ 16,634	$ -	$ 8,317
18	Groundwater/Leachate Enclosures	$ 152,494	$ 151,455	$ 151,974	$ 14,853	$ 11,973	$ 13,413
19	Groundwater/Leachate Pumps & Controls/SCADA	$ 201,770	$ 222,710	$ 212,240	$ 19,653	$ 17,606	$ 18,629
20	Groundwater/Leachate Enclosure Electrical Controls	$ 142,552	$ 200,907	$ 171,729	$ 13,885	$ 15,882	$ 14,883
21	Leachate Tanks	$ 1,224,169	$ -	$ 612,085	$ 79,492	$ -	$ 39,746
22	Relocate Cell V-2 Pump Station	$ 349,987	$ -	$ 174,993	$ 11,363	$ -	$ 5,682
23	Site & Misc.	$ 15,427	$ -	$ 7,714	$ 501	$ -	$ 250
						TOTAL ($/AC)	**$ 718,925**

Inflation Adjustment 2018 to 2022 is 1.1013 per VDEQ

Engineering Opinion of Probable Construction Cost

SPSA Regional Landfill

Cell VIII Construction

		47.0 Acre Cell			
	ITEM DESCRIPTION	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
1	Mobilization	4%	of WORK		$ 1,285,336
2	Surveying and Control	47.0	AC	$ 5,628	$ 264,533
3	Sedimentation & Erosion Control	47.0	AC	$ 477	$ 22,435
4	Soil Excavation*	837,377	CY	$ 4.65	$ 3,894,527
5	Undercut, Transport, Stockpile, and Backfill Unsuitable Soils	10,000	CY	$ 12.60	$ 126,015
6	Structural Fill Placement	30,000	CY	$ 6.57	$ 197,108
7	Geologic Buffer Layer	189,659	CY	$ 10.94	$ 2,074,319
8	Geocomposite	4,094,640	SF	$ 1.14	$ 4,673,741
9	40-mil HDPE Geomembrane	2,047,320	SF	$ 0.81	$ 1,655,283
10	60-mil HDPE Geomembrane	2,047,320	SF	$ 0.95	$ 1,945,978
10	GCL	2,047,320	SF	$ 1.08	$ 2,210,082
11	Protective Cover Layer (Off-site)	113,740	CY	$ 47.73	$ 5,428,761
12	20-mil LLDPE Rain Cover	2,047,320	SF	$ 0.71	$ 1,460,543
13	Groundwater Collection Trenches	47.0	AC	$ 20,926	$ 983,541
15	Leachate Collection System	47.0	AC	$ 51,938	$ 2,441,087
16	Leachate Pump Station	47.0	AC	$ 6,191	$ 290,997
17	Gravel Perimeter Road	47.0	AC	$ 8,317	$ 390,895
18	Groundwater/Leachate Enclosures	47.0	AC	$ 13,413	$ 630,411
19	Groundwater/Leachate Pumps & Controls/SCADA	47.0	AC	$ 18,629	$ 875,573
20	Groundwater/Leachate Enclosure Electrical Controls	47.0	AC	$ 14,883	$ 699,522
21	Leachate Tanks	47.0	AC	$ 39,746	$ 1,868,051

*Assumes 50% of total excavation of required is remaining to be completed at the time construction commences.

SUBTOTAL	**$ 33,418,737**
10% PERMITTING AND DESIGN CONTINGENCY	**$ 3,341,874**
TOTAL	**$ 36,760,611**
COST PER ACRE	**$ 782,141**

Engineering Opinion of Probable Construction Cost

SPSA Regional Landfill

Alternative 2 - Base Liner

		8.5		Acre		
	ITEM DESCRIPTION	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**	**TOTAL PRICE (w/o Gas Main Relocation)**
1	Mobilization	4%	of WORK		$ 980,689	$ 270,894
2	Surveying and Control	8.5	AC	$ 5,628	$ 47,841	$ 47,841
3	Sedimentation & Erosion Control	8.5	AC	$ 477	$ 4,057	$ 4,057
4	Soil Excavation	137,133	CY	$ 4.65	$ 637,789	$ 637,789
5	Undercut, Transport, Stockpile, and Backfill Unsuitable Soils	8.5	AC	$ 6,714	$ 57,073	$ 57,073
6	Structural Fill Placement	8.5	AC	$ 3,963	$ 33,683	$ 33,683
7	Geologic Buffer Layer	8.5	AC	$ 16,986	$ 144,384	$ 144,384
8	Geocomposite	8.5	AC	$ 99,603	$ 846,624	$ 846,624
9	40-mil HDPE Geomembrane	8.5	AC	$ 35,276	$ 299,846	$ 299,846
10	60-mil HDPE Geomembrane	8.5	AC	$ 45,672	$ 388,212	$ 388,212
10	GCL	8.5	AC	$ 51,871	$ 440,900	$ 440,900
11	Protective Cover Layer (Off-site)	8.5	AC	$ 115,588	$ 982,501	$ 982,501
12	20-mil LLDPE Rain Cover	8.5	AC	$ 15,563	$ 132,285	$ 132,285
13	Groundwater Collection Trenches	8.5	AC	$ 20,926	$ 177,874	$ 177,874
15	Leachate Collection System	8.5	AC	$ 51,938	$ 441,473	$ 441,473
18	Groundwater/Leachate Enclosures	1	EA	$ 151,974	$ 151,974	$ 151,974
19	Groundwater/Leachate Pumps & Controls/SCADA	1	EA	$ 212,240	$ 212,240	$ 212,240
20	Groundwater/Leachate Enclosure Electrical Controls	1	EA	$ 171,729	$ 171,729	$ 171,729
22	Relocate Cell V-4 & Cell VI-8 Pump Stations	2	EA	$ 349,987	$ 699,973	$ 699,973
22	Relocate Electrical/Comm Infrastrucutre	1	LS	$ 899,769	$ 899,769	$ 899,769
24	Site & Misc.	8.5	AC	$ 250	$ 2,129	$ 2,129
25	Gas Main Transmission Line Relocation	1	LS	$ 17,744,868	$ 17,744,868	$ -
				SUBTOTAL	**$ 25,497,916**	**$ 7,043,253**
				25% ENGINEERING & PROJECT CONSTRUCTION CONTINGENCY	**$ 6,374,479**	**$ 1,760,813**
				TOTAL	**$ 31,872,395**	**$ 8,804,066**
				COST PER ACRE	**$ 3,749,694**	**$ 1,035,773**

Engineering Opinion of Probable Construction Cost

SPSA Regional Landfill

Alternative 2 - Overlay Liner

19.7 Acre

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	4%	of WORK		$ 355,608
2	Surveying and Control	19.7	AC	$ 5,628	$ 110,879
3	Sedimentation & Erosion Control	1	LS	$ 50,000	$ 50,000
4	Soil Excavation	63,565	CY	$ 4.65	$ 295,634
8	Geocomposite	858,132	SF	$ 1.14	$ 979,497
10	60-mil HDPE Geomembrane	858,132	SF	$ 0.95	$ 815,654
10	GCL	858,132	SF	$ 1.08	$ 926,353
11	Protective Cover Layer (Off-site)	47,674	CY	$ 47.73	$ 2,275,459
12	20-mil LLDPE Rain Cover	858,132	SF	$ 0.71	$ 612,185
15	Leachate Collection System	19.7	AC	$ 51,938	$ 1,023,179
18	Groundwater/Leachate Enclosures	2	EA	$ 151,974	$ 303,949
19	Groundwater/Leachate Pumps & Controls/SCADA	2	EA	$ 212,240	$ 424,480
20	Groundwater/Leachate Enclosure Electrical Controls	2	EA	$ 171,729	$ 343,459
21	Leachate Tanks	1	EA	$ 306,042	$ 306,042
24	Landfill Gas Modification	1	LS	$ 423,421	$ 423,421
				SUBTOTAL	**$ 9,245,799**
	25% ENGINEERING & PROJECT CONSTRUCTION CONTINGENCY				**$ 2,311,450**
				TOTAL	**$ 11,557,249**
				COST PER ACRE	**$ 586,662**

Engineering Opinion of Probable Construction Cost

SPSA Regional Landfill

Alternative 2 - Overlay Liner on V and VI

		17.8	Acre		
	ITEM DESCRIPTION	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
1	Mobilization	4%	of WORK		$ 252,767
2	Surveying and Control	17.8	AC	$ 5,628	$ 100,185
3	Sedimentation & Erosion Control	1	LS	$ 50,000	$ 50,000
4	Soil Excavation	0	CY	$ 4.65	$ -
8	Geocomposite	775,368	SF	$ 1.14	$ 885,028
10	60-mil HDPE Geomembrane	775,368	SF	$ 0.95	$ 736,987
10	GCL	775,368	SF	$ 1.08	$ 837,010
11	Protective Cover Layer (Off-site)	43,076	CY	$ 47.73	$ 2,055,999
12	20-mil LLDPE Rain Cover	0	SF	$ 0.71	$ -
15	Leachate Collection System	17.8	AC	$ 51,938	$ 924,497
18	Groundwater/Leachate Enclosures	0	EA	$ 151,974	$ -
19	Groundwater/Leachate Pumps & Controls/SCADA	0	EA	$ 212,240	$ -
20	Groundwater/Leachate Enclosure Electrical Controls	0	EA	$ 171,729	$ -
21	Leachate Tanks	1	EA	$ 306,042	$ 306,042
24	Landfill Gas Modification	1	LS	$ 423,421	$ 423,421
				SUBTOTAL	**$ 6,571,935**
				25% ENGINEERING & PROJECT CONSTRUCTION CONTINGENCY	**$ 1,642,984**
				TOTAL	**$ 8,214,918**
				COST PER ACRE	**$ 461,512**

Engineering Opinion of Probable Construction Cost

SPSA Regional Landfill

Alernative 3 - MSE Wall Southern and Western Berm

9.0 Acre

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	4%	of WORK		$ 624,493
2	Surveying and Control	9.0	AC	$ 5,628	$ 50,737
3	Sedimentation & Erosion Control	1	LS	$ 200,000	$ 200,000
7	Geologic Buffer Layer	14,543	CY	$ 10.94	$ 159,062
10	60-mil HDPE Geomembrane	392,670	SF	$ 0.95	$ 373,233
10	GCL	392,670	SF	$ 1.08	$ 423,887
11	Protective Cover Layer (Off-site)	21,815	CY	$ 47.73	$ 1,041,220
12	20-mil LLDPE Rain Cover	392,670	SF	$ 0.71	$ 280,128
15	Leachate Collection System	9.0	AC	$ 51,938	$ 468,193
18	Groundwater/Leachate Enclosures	5	EA	$ 151,974	$ 759,872
19	Groundwater/Leachate Pumps & Controls/SCADA	5	EA	$ 212,240	$ 1,061,200
20	Groundwater/Leachate Enclosure Electrical Controls	5	EA	$ 171,729	$ 858,647
22	Relocate Electical/Comm Infrastructure	1	LS	$ 1,058,552	$ 1,058,552
24	MSE Wall Materials (per SF of wall face)	130,890	SF	$ 21.17	$ 2,771,077
25	MSE Wall Labor	130,890	SF	$ 21.17	$ 2,771,077
26	MSE Wall Structural Fill	445,996	CY	$ 6.35	$ 2,832,657
27	MSE Wall Access Road	9,696	SY	$ 11.52	$ 111,664
28	MSE Wall Guard Rail	4,363	LF	$ 47.32	$ 206,445
29	MSE Wall Seeding	3.00	AC	$ 1,694	$ 5,089
30	MSE Wall Catch Basin	5	EA	$ 17,373	$ 86,865
31	MSE Wall Drainage Pipe	400	LF	$ 232	$ 92,729
				SUBTOTAL	**$ 16,236,829**
				30% ENGINEERING & PROJECT CONSTRUCTION CONTINGENCY	**$ 4,871,049**
				TOTAL	**$ 21,107,877**
				COST PER ACRE	**$ 2,341,557**

Engineering Opinion of Probable Construction Cost

SPSA Regional Landfill

Alternative 7 - MSE Wall Cells V-VII

15.0 Acre

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	Mobilization	4%	of WORK		$ 839,664
2	Surveying and Control	15.0	AC	$ 5,628.36	$ 84,565
3	Sedimentation & Erosion Control	15.0	AC	$ 477.34	$ 7,172
7	Geologic Buffer Layer	24,240	CY	$ 10.94	$ 265,115
10	60-mil HDPE Geomembrane	654,480	SF	$ 0.95	$ 622,083
10	GCL	654,480	SF	$ 1.08	$ 706,511
11	Protective Cover Layer (Off-site)	36,360	CY	$ 47.73	$ 1,735,447
12	20-mil LLDPE Rain Cover	654,480	SF	$ 0.71	$ 466,901
15	Leachate Collection System	15.0	AC	$ 51,938.01	$ 780,358
18	Groundwater/Leachate Enclosures	5	EA	$ 151,974.35	$ 759,872
19	Groundwater/Leachate Pumps & Controls/SCADA	5	EA	$ 212,239.97	$ 1,061,200
20	Groundwater/Leachate Enclosure Electrical Controls	5	EA	$ 171,729.38	$ 858,647
22	Relocate Electical/Comm Infrastructure	1	LS	$ 1,058,552.00	$ 1,058,552
24	MSE Wall Materials (per SF of wall face)	218,160	SF	$ 16.05	$ 3,500,955
25	MSE Wall Labor	218,160	SF	$ 16.05	$ 3,500,955
26	MSE Wall Structural Fill	743,360	CY	$ 6.35	$ 4,721,311
27	MSE Wall Access Road	16,160	SY	$ 11.52	$ 186,115
28	MSE Wall Guard Rail	7,272	LF	$ 47.32	$ 344,091
29	MSE Wall Seeding	5.01	AC	$ 1,693.68	$ 8,482
30	MSE Wall Catch Basin	9	EA	$ 17,372.96	$ 156,357
31	MSE Wall Drainage Pipe	720	LF	$ 231.82	$ 166,912
				SUBTOTAL	**$ 21,831,267**
				30% ENGINEERING & PROJECT CONSTRUCTION CONTINGENCY	**$ 6,549,380**
				TOTAL	**$ 28,380,647**
				COST PER ACRE	**$ 1,888,921**

Engineering Opinion of Probable Construction Cost

SPSA Regional Landfill

Alternative 9 - MSE Wall Cell VIII

		2.6	Acre		
	ITEM DESCRIPTION	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**
1	Mobilization	4%	of WORK		$ 177,100
2	Surveying and Control	2.6	AC	$ 5,628	$ 14,652
3	Sedimentation & Erosion Control	2.6	AC	$ 477	$ 1,243
7	Geologic Buffer Layer	4,200	CY	$ 10.94	$ 45,936
10	60-mil HDPE Geomembrane	113,400	SF	$ 0.95	$ 107,787
10	GCL	113,400	SF	$ 1.08	$ 122,415
11	Protective Cover Layer (Off-site)	6,300	CY	$ 47.73	$ 300,696
12	20-mil LLDPE Rain Cover	113,400	SF	$ 0.71	$ 80,899
15	Leachate Collection System	2.6	AC	$ 51,938	$ 135,211
24	MSE Wall Materials (per SF of wall face)	60,000	SF	$ 16.05	$ 962,859
25	MSE Wall Labor	60,000	SF	$ 16.05	$ 962,859
26	MSE Wall Structural Fill	231,911	CY	$ 6.35	$ 1,472,940
27	MSE Wall Access Road	4,444	SY	$ 11.52	$ 51,187
28	MSE Wall Guard Rail	2,000	LF	$ 47.32	$ 94,635
29	MSE Wall Seeding	1.38	AC	$ 1,694	$ 2,333
30	MSE Wall Catch Basin	2	EA	$ 17,373	$ 34,746
31	MSE Wall Drainage Pipe	160	LF	$ 232	$ 37,092
				SUBTOTAL	**$ 4,604,587**
				30% ENGINEERING & PROJECT CONSTRUCTION CONTINGENCY	**$ 1,381,376**
				TOTAL	**$ 5,985,964**
				COST PER ACRE	**$ 2,299,370**

ALTERNATIVE 1 - Cells VIII & IX Expansion

Alt. 1

Components	Lined Acreage (AC)	Cost per Acre ($/AC)	Total Cost ($)	Disposal Volume (CY)	Cost per CY ($/CY)
Cells VIII & IX Construction	92.9	$782,141	$72,659,120		$4.54
Wetland Mitigation	238.1	$30,000	$7,141,800		$0.45
TOTAL			**$79,800,920**	**16,000,000**	**$4.99**

Total Wetland Impact Assumed 119.03 AC
Cost Estimate Based on Cell VII BOE
Mitigation Assumed 2:1 Ratio

ALTERNATIVE 2 - Relocate Natural Gas Main and Overlap onto Closed Cells I-IV

	Components	Acreage (AC)	Cost per Acre ($/AC)	Total Cost ($)	Disposal Volume (CY)	Cost per CY ($/CY)
Alt. 1	Cells VIII & IX Construction	76.1	$782,141	$59,535,482	13,130,000	$4.53
Alt. 2	Gas Main Relocation			$22,181,085		$7.73
Alt. 2	Base Liner	8.5	$1,035,773	$8,804,066	2,870,000	$9.96
Alt. 2	Overlay Liner I - IV	19.7	$586,662	$11,557,249		
Alt. 2	Overlay Liner V - VI	17.8	$461,512	$8,214,918		
	Total Lined Acres	*122.1*				
	Wetland Mitigation	204.5	$30,000	$6,135,052		$0.38
	TOTAL			**$116,427,853**	**16,000,000**	**$7.28**

Assumptions:

8.5 AC Base Liner
19.7 AC Overlay Liner on Cells I - IV
17.8 AC Overlay Liner on Cells V - VI
2.87 MCY Disposal Airspace
Cost Estimate Based on Cell VII BOE
Mitigation Assumed 2:1 Ratio
Relocate Gas Main
Relocate Leachate Pump Stations and Electrical/Comm (covered in Base Liner cost est.)
Relocate LFG Infrastructure (Covered in Overlay Cost est)

ALTERNATIVE 3 - MSE Wall Around S and W Boundary of Cells V & VI

	Components	Acreage (AC)	Cost per Acre ($/AC)	Total Cost ($)	Disposal Volume (CY)	Cost per CY ($/CY)
Alt. 1	Cells VIII & IX Construction	80.0	$782,141	$62,599,188	13,800,000	$4.54
Alt. 3	MSE Wall - S&W	9.0	$2,341,557	$21,107,877	2,200,000	$9.59
	Total Lined Acres	*89.1*				
	Wetland Mitigation	242.1	$30,000	$7,263,949		$0.45
	TOTAL			**$90,971,014**	**16,000,000**	**$5.69**

Assumptions:
30' High MSE Wall
9.0 AC Liner Expansion
2.2 MCY Disposal Airspace
Cost Estimate Based on Cell VII BOE
Mitigation Assumed 2:1 Ratio
Relocate Leachate Pump Stations, FM and Electric (covered in MSE Wall)
Revise Stormwater Pond
Wetland Impacts on West Side
Min. 140' Wide Impact for 30' Vertical Expansion

ALTERNATIVE 4 - MSE Wall and Gas Main Relocation and fill to 200’

	Components	Acreage (AC)	Cost per Acre ($/AC)	Total Cost ($)	Disposal Volume (CY)	Cost per CY ($/CY)
Alt. 1	Cells VIII & IX Construction	62.5	$782,141	$48,881,100	10,800,000	$4.53
Alt. 2	Gas Main Relocation			$22,181,085		$7.73
Alt. 2	Base Liner	8.5	$1,035,773	$8,804,066	2,870,000	$9.96
Alt. 2	Overlay Liner I - IV	19.7	$586,662	$11,557,249		
Alt. 2	Overlay Liner V - VI	17.8	$461,512	$8,214,918		
Alt. 3	MSE Wall - S&W	9.0	$2,341,557	$21,107,877	2,330,000	$9.06
	Total Lined Acres	*117.5*				
	Wetland Mitigation	207.1	$30,000	$6,211,599		$0.39
	TOTAL			**$126,957,895**	**16,000,000**	**$7.93**

Assumptions:

8.5 AC Base Liner
19.7 AC Overlay Liner on Cells I - IV
17.8 AC Overlay Liner on Cells V - VI
30' High MSE Wall
9.0 AC Liner Expansion
5.2 M CY Total Disposal Capacity Provided
Cost Estimate Based on Cell VII BOE
Mitigation Assumed 2:1 Ratio

Relocate Gas Main
Relocate Leachate Pump Stations, FM and Electric (covered in MSE Wall)
Revise Stormwater Pond
Wetland Impacts on West Side
Min. 140' Wide Impact for 30' Vertical Expansion

ALTERNATIVE 5 - MSE Wall and Gas Main Relocation and Fill to 240’

	Components	Acreage (AC)	Cost per Acre ($/AC)	Total Cost ($)	Disposal Volume (CY)	Cost per CY ($/CY)
Alt. 1	Cells VIII & IX Construction	56.7	$782,141	$44,308,403	9,800,000	$4.52
Alt. 2	Gas Main Relocation			$22,181,085		$7.73
Alt. 2	Base Liner	8.5	$1,035,773	$8,804,066	2,870,000	$9.96
Alt. 2	Overlay Liner I - IV	19.7	$586,662	$11,557,249		
Alt. 2	Overlay Liner V - VI	17.8	$461,512	$8,214,918		
Alt. 3	MSE Wall - S&W	9.0	$2,341,557	$21,107,877	3,330,000	$6.34
	Total Lined Acres	*111.7*				
	Wetland Mitigation	195.4	$30,000	$5,860,816		$0.37
	TOTAL			**$122,034,415**	**16,000,000**	**$7.63**

Assumptions:

8.5 AC Base Liner
19.7 AC Overlay Liner on Cells I - IV
17.8 AC Overlay Liner on Cells V - VI
30' High MSE Wall
9.0 AC Liner Expansion
6.2 MCY Disposal Airspace Provided
Requires FAA Approval
Cost Estimate Based on Cell VII BOE
Mitigation Assumed 2:1 Ratio

Relocate Gas Main
Relocate Leachate Pump Stations, FM and Electric (covered in MSE Wall)
Revise Stormwater Pond
Wetland Impacts on West Side
Min. 140' Wide Impact for 30' Vertical Expansion
Max. Height of 240' Based on Geometry (would require FAA approval)

ALTERNATIVE 6 - Capture Airspace Between Cell V and VII

	Components	Acreage (AC)	Cost per Acre ($/AC)	Total Cost ($)	Disposal Volume (CY)	Cost per CY ($/CY)
Alt. 1	Cells VIII & IX Construction	84.0	$782,141	$65,708,622	14,480,000	$4.54
Alt. 6	Base Liner	5.35	$800,516	$ 4,282,762	1,520,000	$3.45
Alt. 6	Relocate Infrastructure			$650,000		
Alt. 6	Relocate Pump Station V-2			$317,794		
	Total Lined Acres	*89.4*				
	Wetland Mitigation	220.3	$30,000	$6,608,610		$0.41
	TOTAL			**$ 77,567,788**	**16,000,000**	**$4.85**

Assumptions:

1.52 M CY Disposal Airspace Provided
Cost Estimate Based on Cell VII BOE
Mitigation Assumed 2:1 Ratio
Base Liner Costs from Alternative 2 without LFG or pump station relocation
Relocate Cell V Leachate Pump Station
Relocate Electrical Infrastructure

ALTERNATIVE 7 - MSE Wall Around Cells V, VI and VII

	Components	Acreage (AC)	Cost per Acre ($/AC)	Total Cost ($)	Disposal Volume (CY)	Cost per CY ($/CY)
Alt. 1	Cells VIII & IX Construction	60.7	$782,141	$47,509,291	10,500,000	$4.52
Alt. 6	Base Liner	5.35	$800,516	$4,282,762	1,520,000	$3.45
Alt. 6	Relocate Electrical Infrastructure			$650,000		
Alt. 6	Relocate Pump Station V-2			$317,794		
Alt. 7	MSE Wall - Cells V-VII	15.0	$1,888,921	$28,380,647	3,980,000	$7.13
	Total Lined Acres	*81.1*				
	Wetland Mitigation	203.5	$30,000	$6,106,364		$0.38
	TOTAL			**$ 87,246,858**	**16,000,000**	**$5.45**

Assumptions:
Includes Alt 6
30' High MSE Wall
15 AC Liner Expansion
5.5 M CY Total Disposal Airspace Provided
Cost Estimate Based on Cell VII BOE
Mitigation Assumed 2:1 Ratio

Relocate Leachate Pump Stations, FM and Electric
Revise Stormwater Pond
Wetland Impacts on West Side
Min. 140' Wide Impact for 30' Vertical Expansion
Will Need to Avoid Impacts to Transfer Station Facility
Revisions to Sediment Basins Required
Fill Height to 200' per FAA

ALTERNATIVE 8 - RELOCATE GAS MAIN & CONSTRUCT 4.7 AC BASE LINER IN AREA IN FORMER EASEMENT

	Components	Acreage (AC)	Cost per Acre ($/AC)	Total Cost ($)	Disposal Volume (CY)	Cost per CY ($/CY)
Alt. 1	Cell VIII Construction	33.7	$782,141	$26,376,056	6,240,000	$4.23
Alt. 2	Gas Main Relocation			$22,181,085		$7.73
Alt. 2	Base Liner	8.5	$1,035,773	$8,804,066	2,870,000	$9.96
Alt. 2	Overlay Liner I - IV	19.7	$586,662	$11,557,249		
Alt. 2	Overlay Liner V - VI	17.8	$461,512	$8,214,918		
Alt. 6	Base Liner	5.35	$800,516	$4,282,762	1,520,000	$3.25
Alt. 6	Relocate Infrastructure			$650,000		
Alt. 6	Relocate Pump Station V-2			$317,794		
Alt. 7	MSE Wall - Cells V-VII	15.0	$1,888,921	$28,380,647	3,980,000	$7.13
Alt. 8	Base Liner	4.7	$1,035,773	$4,868,131	1,390,000	$3.50
	Total Lined Acres	*104.8*				
	Wetland Mitigation	113.2	$30,000	$3,396,142		$0.21
	TOTAL			**$119,028,850**	**16,000,000**	**$7.44**

Assumptions:

Includes Alternative Scenarios 2, 6, and 7
Cost Estimate Based on Cell VII BOE
Mitigation Assumed 2:1 Ratio

Relocate Leachate Pump Stations, FM and Electric
Revise Stormwater Pond
Wetland Impacts on West Side
Min. 140' Wide Impact for 30' Vertical Expansion
Will Need to Avoid Impacts to Transfer Station Facility
Revisions to Sediment Basins Required

ALTERNATIVE 9 - RELOCATE GAS MAIN & CONSTRUCT 30' HIGH MSE WALL

	Components	Acreage (AC)	Cost per Acre ($/AC)	Total Cost ($)	Disposal Volume (CY)	Cost per CY ($/CY)
Alt. 1	Cell VIII Construction	32.0	$782,141	$25,046,417	5,640,000	$4.44
Alt. 2	Gas Main Relocation			$22,181,085		$7.73
Alt. 2	Base Liner	8.5	$1,035,773	$8,804,066	2,870,000	$9.96
Alt. 2	Overlay Liner I - IV	19.7	$586,662	$11,557,249		
Alt. 2	Overlay Liner V - VI	17.8	$461,512	$8,214,918		
Alt. 6	Base Liner	5.35	$800,516	$4,282,762	1,520,000	$3.45
Alt. 6	Relocate Infrastructure			$650,000		
Alt. 6	Relocate Pump Station V-2			$317,794		
Alt. 7	MSE Wall - Cells V-VII	15.0	$1,888,921	$28,380,647	3,980,000	$7.13
Alt. 8	Base Liner	4.7	$1,035,773	$4,868,131	1,390,000	$3.50
Alt. 9	MSE Wall - Cells VII & VIII	2.6	$2,299,370	$5,985,964	600,000	$9.98
	Total Lined Acres	*105.7*				
	Wetland Mitigation	109.8		$3,294,142		$0.21
	TOTAL			**$123,583,175**	**16,000,000**	**$7.72**

Assumptions:
Includes Alternative Scenarios 2, 6, 7, and 8.
Cost Estimate Based on Cell VII BOE
Mitigation Assumed 2:1 Ratio
MSE Wall Only Provides 0.6 M CY Due to Geoemetries

Relocate Leachate Pump Stations, FM and Electric
Revise Stormwater Pond
Wetland Impacts on West Side
Min. 140' Wide Impact for 30' Vertical Expansion
Will Need to Avoid Impacts to Transfer Station Facility
Revisions to Sediment Basins Required
Fill Height to 200' per FAA

555 Fayetteville Street, Suite 900
Raleigh, NC 27601-3034
919.232.6600

hdrinc.com

Appendix C: Analysis of Potential Hauling and Landfill Operations Greenhouse Gas (GHG) Impacts for the SPSA Regional Landfill and Alternative Landfill Sites

This page intentionally left blank.

SCS ENGINEERS Environmental Consultants & Contractors

February 20, 2023
File No. 02220102.00

MEMORANDUM

TO: Kimberly Blossom, Neville Reynolds, VHB

FROM: Bob Gardner, PE, BCEE
Ray Huff
Keith Matteson, PE

SUBJECT: Analysis of Potential Hauling and Landfill Operations Greenhous Gas (GHG) Impacts for the SPSA Regional Landfill and Alternative Landfill Sites

SCS Engineers (SCS) prepared high-level conceptual analyses of the potential greenhouse gas (GHG) impacts associated with alternatives to the proposed expansion of SPSA's Regional Landfill. The expansion involves developing what is referred to as Cells VIII/IX with a total expansion waste disposal capacity of approximately 16 million cubic yards. The analysis uses SPSA's reported Federal GHG Reporting Program (GHGRP) data and budgeted truck/trailer census for its Fleet Maintenance and Transportation departments as the basis for the GHG impact evaluations.

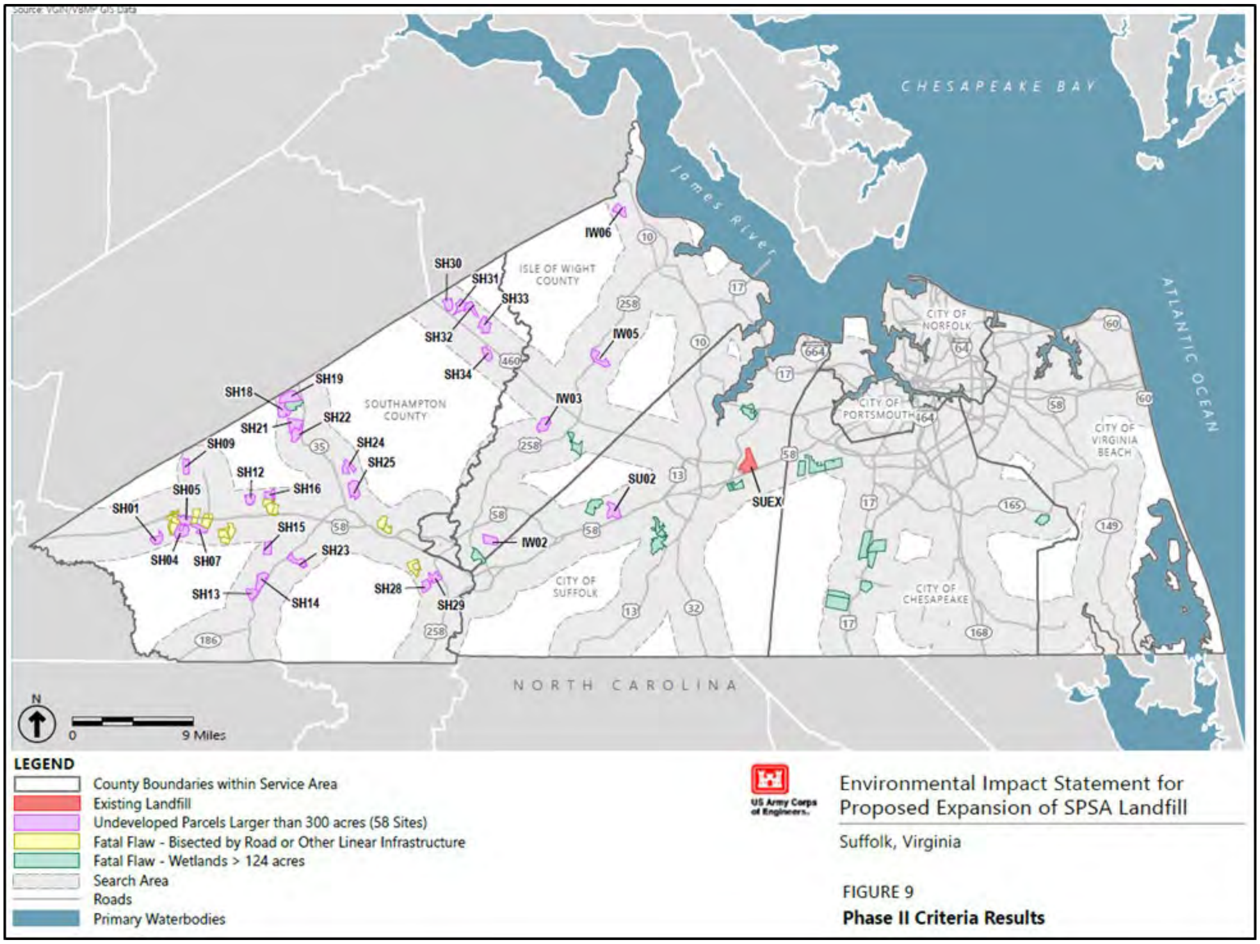
This analysis has been performed as part of the Environmental Impact Statement (EIS) currently being developed by the US Army Corps of Engineers (USACE) associated with mitigation of wetlands that will be disturbed due the proposed Regional Landfill expansion. The waste hauling GHG impact analysis includes all the alternative landfill sites considered in the EIS while the landfill operations GHG impact analysis compares impacts of four alternative potential waste disposal scenarios.

WASTE HAULING GHG IMPACT ANALYSIS

The additional equipment resources that would be needed to support waste hauling operations for each alternative landfill site scenario were estimated and added to existing resources to evaluate the total conceptual hauling GHG impacts associated with each alternative site. Total mileage was estimated and GHG impacts calculated for each alternative based on the estimated gallons of diesel fuel consumed. The primary purpose of the analysis is to provide estimated conceptual GHG impacts related to waste hauling to support the screening evaluation of the alternative sites.

The hauling analysis assumes that all the municipal waste from SPSA member communities (cities of Chesapeake, Franklin, Norfolk, Portsmouth, Suffolk and Virginia Beach, and Southampton and Isle of Wight Counties) would be collected at and transferred from SPSA's existing network transfer stations and/or, in the case of Portsmouth, the refuse derived fuel (RDF) tipping floor at the WIN Waste waste to energy facility, and then transferred for final disposal.

Figure 1. SPSA's Transfer Station Network and Alternative Landfill Site Locations

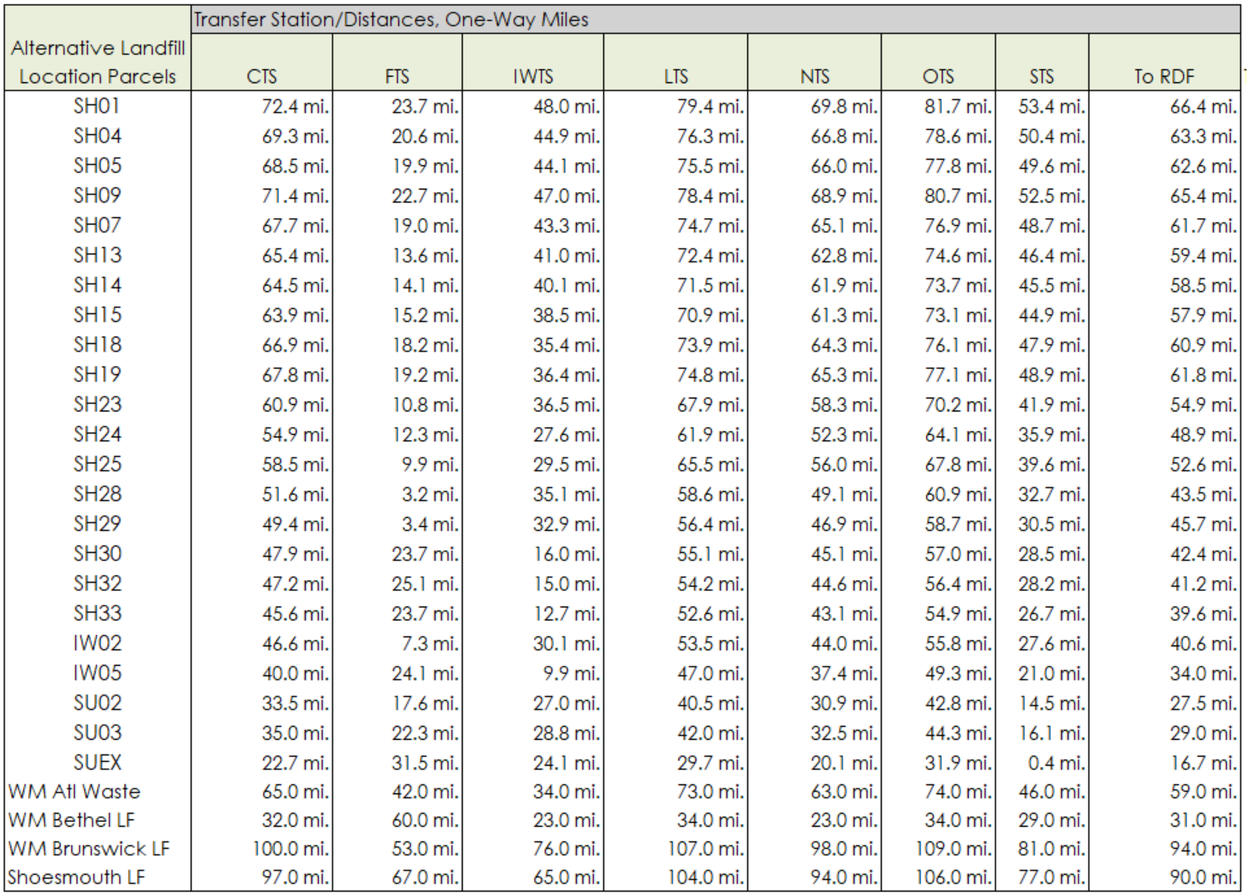


The waste distribution from each of the member communities to each of the transfer station facilities was estimated, and, for this analysis, it was assumed that all the municipally collected waste would be hauled to one of the alternative sites being evaluated.

The locations of the majority of potential alternative sites being considered in this analysis are shown in **Figure 1.** Site SUEX is an on-site alternative (Regional Landfill expansion Cells VIII/IX) included for comparison to off-site alternative locations. Four existing off-site alternative disposal facility locations (private landfills) were also included in the analysis, again for comparison to off-site alternative locations. **Table 1** provides one-way distance from each SPSA transfer station to the off-site alternative landfill locations.

The estimated annual (transfer) hauling mileage and GHG impacts for each off-site alternative landfill location are presented in **Table 2.**

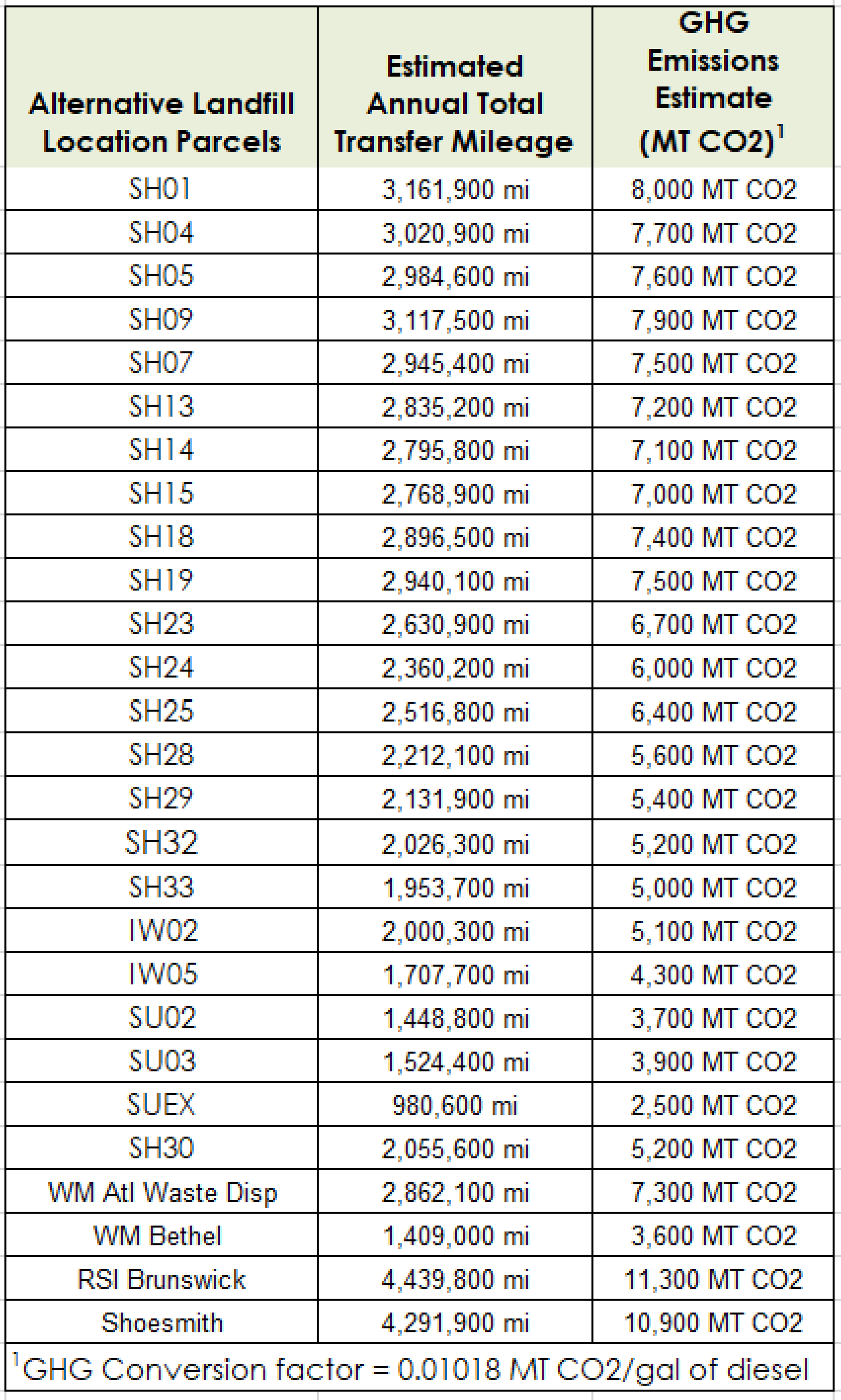
Table 1. One-Way Travel Distance from Transfer Stations to Alternative Landfill Site Locations



Alternative Landfill Location Parcels	Transfer Station/Distances, One-Way Miles							
	CTS	FTS	IWTS	LTS	NTS	OTS	STS	To RDF
SH01	72.4 mi.	23.7 mi.	48.0 mi.	79.4 mi.	69.8 mi.	81.7 mi.	53.4 mi.	66.4 mi.
SH04	69.3 mi.	20.6 mi.	44.9 mi.	76.3 mi.	66.8 mi.	78.6 mi.	50.4 mi.	63.3 mi.
SH05	68.5 mi.	19.9 mi.	44.1 mi.	75.5 mi.	66.0 mi.	77.8 mi.	49.6 mi.	62.6 mi.
SH09	71.4 mi.	22.7 mi.	47.0 mi.	78.4 mi.	68.9 mi.	80.7 mi.	52.5 mi.	65.4 mi.
SH07	67.7 mi.	19.0 mi.	43.3 mi.	74.7 mi.	65.1 mi.	76.9 mi.	48.7 mi.	61.7 mi.
SH13	65.4 mi.	13.6 mi.	41.0 mi.	72.4 mi.	62.8 mi.	74.6 mi.	46.4 mi.	59.4 mi.
SH14	64.5 mi.	14.1 mi.	40.1 mi.	71.5 mi.	61.9 mi.	73.7 mi.	45.5 mi.	58.5 mi.
SH15	63.9 mi.	15.2 mi.	38.5 mi.	70.9 mi.	61.3 mi.	73.1 mi.	44.9 mi.	57.9 mi.
SH18	66.9 mi.	18.2 mi.	35.4 mi.	73.9 mi.	64.3 mi.	76.1 mi.	47.9 mi.	60.9 mi.
SH19	67.8 mi.	19.2 mi.	36.4 mi.	74.8 mi.	65.3 mi.	77.1 mi.	48.9 mi.	61.8 mi.
SH23	60.9 mi.	10.8 mi.	36.5 mi.	67.9 mi.	58.3 mi.	70.2 mi.	41.9 mi.	54.9 mi.
SH24	54.9 mi.	12.3 mi.	27.6 mi.	61.9 mi.	52.3 mi.	64.1 mi.	35.9 mi.	48.9 mi.
SH25	58.5 mi.	9.9 mi.	29.5 mi.	65.5 mi.	56.0 mi.	67.8 mi.	39.6 mi.	52.6 mi.
SH28	51.6 mi.	3.2 mi.	35.1 mi.	58.6 mi.	49.1 mi.	60.9 mi.	32.7 mi.	43.5 mi.
SH29	49.4 mi.	3.4 mi.	32.9 mi.	56.4 mi.	46.9 mi.	58.7 mi.	30.5 mi.	45.7 mi.
SH30	47.9 mi.	23.7 mi.	16.0 mi.	55.1 mi.	45.1 mi.	57.0 mi.	28.5 mi.	42.4 mi.
SH32	47.2 mi.	25.1 mi.	15.0 mi.	54.2 mi.	44.6 mi.	56.4 mi.	28.2 mi.	41.2 mi.
SH33	45.6 mi.	23.7 mi.	12.7 mi.	52.6 mi.	43.1 mi.	54.9 mi.	26.7 mi.	39.6 mi.
IW02	46.6 mi.	7.3 mi.	30.1 mi.	53.5 mi.	44.0 mi.	55.8 mi.	27.6 mi.	40.6 mi.
IW05	40.0 mi.	24.1 mi.	9.9 mi.	47.0 mi.	37.4 mi.	49.3 mi.	21.0 mi.	34.0 mi.
SU02	33.5 mi.	17.6 mi.	27.0 mi.	40.5 mi.	30.9 mi.	42.8 mi.	14.5 mi.	27.5 mi.
SU03	35.0 mi.	22.3 mi.	28.8 mi.	42.0 mi.	32.5 mi.	44.3 mi.	16.1 mi.	29.0 mi.
SUEX	22.7 mi.	31.5 mi.	24.1 mi.	29.7 mi.	20.1 mi.	31.9 mi.	0.4 mi.	16.7 mi.
WM Atl Waste	65.0 mi.	42.0 mi.	34.0 mi.	73.0 mi.	63.0 mi.	74.0 mi.	46.0 mi.	59.0 mi.
WM Bethel LF	32.0 mi.	60.0 mi.	23.0 mi.	34.0 mi.	23.0 mi.	34.0 mi.	29.0 mi.	31.0 mi.
WM Brunswick LF	100.0 mi.	53.0 mi.	76.0 mi.	107.0 mi.	98.0 mi.	109.0 mi.	81.0 mi.	94.0 mi.
Shoesmouth LF	97.0 mi.	67.0 mi.	65.0 mi.	104.0 mi.	94.0 mi.	106.0 mi.	77.0 mi.	90.0 mi.

See Figure 1 for Transfer Station Key.

Table 2. Analysis Summary of Annual Hauling Mileage and GHG Impacts



Alternative Landfill Location Parcels	Estimated Annual Total Transfer Mileage	GHG Emissions Estimate (MT CO2)[1]
SH01	3,161,900 mi	8,000 MT CO2
SH04	3,020,900 mi	7,700 MT CO2
SH05	2,984,600 mi	7,600 MT CO2
SH09	3,117,500 mi	7,900 MT CO2
SH07	2,945,400 mi	7,500 MT CO2
SH13	2,835,200 mi	7,200 MT CO2
SH14	2,795,800 mi	7,100 MT CO2
SH15	2,768,900 mi	7,000 MT CO2
SH18	2,896,500 mi	7,400 MT CO2
SH19	2,940,100 mi	7,500 MT CO2
SH23	2,630,900 mi	6,700 MT CO2
SH24	2,360,200 mi	6,000 MT CO2
SH25	2,516,800 mi	6,400 MT CO2
SH28	2,212,100 mi	5,600 MT CO2
SH29	2,131,900 mi	5,400 MT CO2
SH32	2,026,300 mi	5,200 MT CO2
SH33	1,953,700 mi	5,000 MT CO2
IW02	2,000,300 mi	5,100 MT CO2
IW05	1,707,700 mi	4,300 MT CO2
SU02	1,448,800 mi	3,700 MT CO2
SU03	1,524,400 mi	3,900 MT CO2
SUEX	980,600 mi	2,500 MT CO2
SH30	2,055,600 mi	5,200 MT CO2
WM Atl Waste Disp	2,862,100 mi	7,300 MT CO2
WM Bethel	1,409,000 mi	3,600 MT CO2
RSI Brunswick	4,439,800 mi	11,300 MT CO2
Shoesmith	4,291,900 mi	10,900 MT CO2

[1] GHG Conversion factor = 0.01018 MT CO2/gal of diesel

LANDFILL OPERATIONS GHG IMPACT ANALYSIS

SCS evaluated landfill operations GHG impacts associated with the following scenarios:

- **Alternative A – No Action Alternative/Divert Waste to an Existing Off-Site Landfill.** Under this scenario, SPSA would re-route waste to another existing (private) landfill following reaching permitted capacity in Cell VII in 2037.
- **Alternative B – Full Expansion.** Under this scenario, SPSA would expand its landfill operations into a 134-acre expansion area, which would accommodate two additional landfill cells, designated Cells VIII/IX. Under this scenario, approximately 117 acres of forested wetlands would be impacted.
- **Alternative C – Partial Expansion.** Under this scenario, construction of Cells VIII/IX would still occur, but the footprint of Cell IX would be smaller than proposed under Alternative B. Under this scenario, approximately 110-acres of forested wetlands would be impacted.
- **Alternative D – Closure and Conversion to Just a Transfer Station Operation Only with New Off-Site Landfill.** Under this scenario, the Regional landfill would stop accepting waste in 2037, and all waste would be diverted to a new SPSA landfill site (SH30).

A summary and the results of each scenario analysis are presented in the sections below.

Key components of the GHG impact analysis for the alternative scenarios are landfill GHG emissions. Hauling/transportation costs and associated GHG impacts were addressed in the Hauling Analysis Section.

Alternative A - No Action Alternative/Divert Waste to an Existing Off-Site Landfill Emissions Estimate

In this scenario, once the Regional Landfill reaches capacity, waste will be re-routed to one of four existing private landfills (see **Table 3**):

Table 3. Potential Receiver Facilities in the No-Action Alternative

Facility	Location
Atlantic Waste Disposal	Waverly, VA
Bethel Landfill	Hampton, VA
Brunswick Waste Management Facility	Lawrenceville, VA
Shoosmith Sanitary Landfill	Chester, VA

Each of the alternative landfills listed in **Table 3** are known to have a landfill gas (LFG) collection and control system (GCCS), capable of collecting landfill gas generated from the waste disposed at each facility.

Landfill GHG Emissions

In order to calculate the GHG emissions impact SCS developed a first-order decay GHG landfill emissions estimation model using the estimated waste capacity volume for the proposed project (approximately 16 million cubic yards).

Assuming a waste density of 1,400 lbs per cubic yard, 16 million cubic yards equates to 11.2 million tons of waste to be disposed. Using an anticipated waste acceptance rate of 460,000 tons per year, this results in a lifespan of 24.35 years in order to place 11.2 million tons of waste in any of the five landfills (SPSA and the four alternative sites). Therefore, SCS developed a GHG model with a 24.35-year lifespan, for comparative purposes.

Using rainfall information from the SPSA GHGRP as a regional input for each landfill, SCS developed a first-order decay model based on the GHGRP, Equation HH-1[1] to develop methane generation estimates for the proposed waste mass for the five sites (all values are the same for each landfill). The results of the first-order decay model are presented in **Table 4**.

Table 4. Landfill Gas Generation Estimate

Year Following SPSA Closure	Annual Waste Input (tons)	Waste in Place (tons)	Methane Generation ($MTCH_4/yr$)	Methane Generation Adjusted for 10% Oxidation ($MTCH_4/yr$)	Total LFG Production[1] (scf/yr)
Year 1	460,000	460,000	0	0	0
Year 2	460,000	920,000	1,541	1,387	317
Year 3	460,000	1,380,000	2,997	2,698	616
Year 4	460,000	1,840,000	4,373	3,935	898
Year 5	460,000	2,300,000	5,672	5,105	1,165
Year 6	460,000	2,760,000	6,899	6,209	1,417
Year 7	460,000	3,220,000	8,058	7,252	1,655
Year 8	460,000	3,680,000	9,153	8,238	1,880
Year 9	460,000	4,140,000	10,187	9,169	2,092
Year 10	460,000	4,600,000	11,164	10,048	2,293
Year 11	460,000	5,060,000	12,087	10,879	2,482
Year 12	460,000	5,520,000	12,959	11,663	2,661
Year 13	460,000	5,980,000	13,782	12,404	2,830
Year 14	460,000	6,440,000	14,560	13,104	2,990
Year 15	460,000	6,900,000	15,295	13,765	3,141

---

[1] 40 CFR 98.343(a)(1), https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-HH#p-98.343(a)(1).

Table 4. Landfill Gas Generation Estimate

Year Following SPSA Closure	Annual Waste Input (tons)	Waste in Place (tons)	Methane Generation (MTCH_4/yr)	Methane Generation Adjusted for 10% Oxidation (MTCH_4/yr)	Total LFG Production[1] (scf/yr)
Year 16	460,000	7,360,000	15,989	14,390	3,283
Year 17	460,000	7,820,000	16,644	14,980	3,418
Year 18	460,000	8,280,000	17,264	15,537	3,545
Year 19	460,000	8,740,000	17,848	16,064	3,665
Year 20	460,000	9,200,000	18,401	16,561	3,779
Year 21	460,000	9,660,000	18,923	17,031	3,886
Year 22	460,000	10,120,000	19,416	17,474	3,987
Year 23	460,000	10,580,000	19,881	17,893	4,083
Year 24	460,000	11,040,000	20,321	18,289	4,173
Year 25	160,000	11,200,000	20,737	18,663	4,258
	Totals	**11,200,000**	**314,154**	**282,738**	**64,513**

[1]Total LFG Production is based on methane generation estimate, without Oxidation.

It is assumed that the Methane Generation Adjusted for Oxidation[2] value would be what is emitted to the atmosphere from a municipal solid waste landfill over the approximate 25-year duration of the project. However, the SPSA Regional Landfill, as well as the other four alternative landfills, are known to have GCCSs installed (oxidation is assumed to occur both with and

Table 5. 2021 Reported GHGRP GCCS Information

Landfill Name	Status	GCCS?	Control Device(s)	GCCS Collection Efficiency (CE) (%)
SPSA Regional Landfill	Open	Yes	Flares – 1 LFGTE[1] - 1	83%
Atlantic Waste Disposal	Open	Yes	Flares - 6	76%
Bethel Landfill	Open	Yes	Flares – 2 LFGTE - 5	83%
Brunswick Waste Management Facility	Open	Yes	Flares – 2 LFGTE - 1	80%
Shoosmith Sanitary Landfill	Open	Yes	Flares – 3 LFGTE - 1	82%

[1]LFGTE – Landfill Gas to Energy (electricity, renewable natural gas, etc.)

---

[2] As methane migrates through the landfill it undergoes some oxidation in the cover of the landfill. The default EPA value used in the GHGRP is 10%.

without a GCCS). A summary of the key factors of the existing GCCS at each facility are presented in **Table 5.** Using this information, SCS applied the GCCS Collection Efficiency value to the methane generation estimates from **Table 4** by reducing the generation amount by the Collection Efficiency value. SCS then applied a 10 percent methane oxidation factor to the remaining value to provide an estimate of the comparative landfill only emissions over the project lifespan. This summary is provided in **Table 6** which provides the results of this analysis.

Table 6. Project Lifespan Landfill Emissions Estimate

Comparative Item	SPSA Regional Landfill	Atlantic Waste Disposal	Bethel Landfill	Brunswick Waste Management Facility	Shoosmith Sanitary Landfill
Methane Generation ($MTCH_4$) (from Table 4)	314,153.70				
Collection Efficiency (%)	83	76	83	80	82
Uncontrolled Methane ($MTCH_4$)	53,406	75,397	53,406	62,831	56,548
Uncontrolled Methane Adjusted for 10% OX ($MTCH_4$)	48,066	67,857	48,066	56,548	50,893
Net GHG Impacts ($MTCO_2e$)	1,201,650	1,696,430	1,201,638	1,413,693	1,272,323

As shown in **Table 6**, using the global warming potential for methane of 25x, the resulting carbon dioxide equivalent ($MTCO_2e$) emissions for this alternative range from 1,201,638 (SPSA Regional Landfill and Bethel Landfill) to 1,696,430 (Atlantic Waste Disposal) $MTCO_2e$. Since this alternative involves waste transport to more than one alternate landfill, the GHG impacts from the alternative can be presented as a range. Combining the ranges of GHG emissions presented in **Table 6**, provides the total alternative emissions, which are presented in **Table 7**.

As shown in **Table 7**, the alternative has a net GHG impact that ranges from 1,201,638 to 1,696,430 $MTCO_2e$ over the lifespan of the project. Summing the averages of the landfill emissions from the four landfill options considered under Alternative A results in an average Alternative A GHG impact of 1,396,203 $MTCO_2e$.

Table 7. Alternative A – GHG Impacts Summary in $MTCO_2e$

Landfill Destination	Landfill GHG Impact ($MTCO_2e$)
Atlantic Waste Disposal	1,696,430
Bethel Landfill	1,201,638
Brunswick Waste Management Facility	1,413,693
Shoosmith Sanitary Landfill	1,272,323
Average	**1,396,203**

Alternative B – Full Expansion Alternative Emissions Estimate

In the “full expansion” alternative, SPSA would expand its landfill operations into a 134-acre expansion area, which would accommodate two additional landfill cells, designated Cells VIII/IX. Under this scenario, 117 acres of forested wetlands would be impacted. No off-site landfills are considered under Alternative B. However, as Alternative B involves the disturbance of approximately 117 acres of wetlands, the GHG impacts from the sequestration of carbon in the wetlands are considered as a component of the GHG impact analysis.

Since this analysis is a high-level conceptual evaluation, a full GHG sequestration analysis was not performed. As an alternative, SCS researched several recent Forestry Sequestration carbon credit projects on-file with the American Carbon Registry, for a site in the regional area. Based on a review of four projects in nearby states (OH, NY, PA, and MA), the carbon sequestered per year, per acre ranged from 1.69 to 21.20 $MTCO_2e$/acre, with an average value of 11.58 $MTCO_2e$/acre of forested land.[3]

Using the average value from sites researched, SCS multiplied the average per acre $MTCO_2e$ for forestry project by the 117-acre footprint of the area to be impacted by Alternative B development. This value was then multiplied by the project lifespan of 24.35 years, assuming that once the landfill was closed, it could be developed with trees and grasses that would allow for future carbon sequestration. The results of these calculations are presented in **Table 8.**

---

[3] Sequestered carbon per acre calculated from reported information from the following four American Carbon Registry (ACR) projects and reporting years (in parentheses): ACR586 (2021), ACR424 (RY 2020-2021), ACR375 (2020-2021), and ACR376 (2019-2020).

Table 8. Alternative B – Carbon Not Sequestered

Impacted Acreage	Average CO_2 Emissions per Acre	Project Lifespan	CO_2 Not Sequestered
117	11.58 $MTCO_2e$	24.35 years	32,991 $MTCO_2e$

As shown in **Table 8**, Alternative B has a net GHG impact of 32,991 $MTCO_2e$ in carbon not sequestered from the eradication of 117 acres of wetland forest. When added to the GHG Impacts from just placing waste in the proposed expansion area of the Regional Landfill (see **Table 6**) the Net GHG Impacts of this Alternative is **1,234,629** MTCO2e.

Alternative C – Partial Expansion Alternative Emissions Estimate

In the "partial expansion" alternative, construction of Cells VIII/IX would still occur (see Alternative B), but the footprint of Cell IX would be smaller than proposed under Alternative B. Under this scenario, approximately 110-acres of forested wetlands would be impacted. Similar to alternative B, no off-site landfills are considered under Alternative C. In addition, since there is no off-site alternative, there are no hauling GHG impacts to evaluate under Alternative C.

Since Alternative C involves impact to the wetland forested area, SCS calculated the avoided sequestration of 110-acres of development, using the same methodology outlined in the previous section. **Table 9** contains the results of the additional analysis for Alternative C.

Table 9. Alternative C – Carbon Not Sequestered

Impacted Acreage	Average CO_2 Emissions per Acre	Project Lifespan	CO_2 Not Sequestered
110	11.58 $MTCO_2e$	24.35 years	31,017 $MTCO_2e$

As shown in **Table 9**, Alternative C has a net GHG impact of 31,017 $MTCO_2e$ in carbon not sequestered from the eradication of 110 acres of wetland forest. When added to the GHG Impacts from just placing waste in the proposed expansion area of the Regional Landfill (see **Table 6**) the Net GHG Impacts of this Alternative is **1,232,665** MTCO2e (assumes that approximately the same amount of waste will be disposed of as in Alternative B even though the landfill expansion footprint would be slightly smaller).

Alternative D – Closure and Conversion of Landfill to Just a Transfer Station Operation – Hauling to a New Landfill

In the "closure and conversion" alternative, the Regional Landfill would stop accepting waste in 2037, and all waste would be diverted to a new SPSA landfill site (SH30). The SH30 site is approximately 28.5 miles away from the SPSA Regional Landfill.

Since SH30 would be a new landfill, under federal New Source Performance Standards (NSPS) regulation, the new landfill would have a minimum of six years prior to being required to install a GCCS. In evaluating the potential emissions from an uncontrolled landfill for the first six years, SCS assumed the same waste placement, but with no GCCS installation. Thereafter, SCS assumed a

75% Collection Efficiency with no LFGTE, as this is the minimum required under NSPS. The results of these calculations are presented in **Table 10.**

Table 10. GHG Emission Estimate for SH30

Year Following SPSA Closure	Annual Waste Input (tons)	Methane Generation ($MTCH_4$/yr)	LFG Collection Efficiency (%)	Uncontrolled Methane ($MTCH_4$)	Methane Emissions Adjusted for 10% Oxidation ($MTCH_4$/yr)	Total LFG Production[1] (scfm)
Year 1	460,000	0.00	0	-	-	0.00
Year 2	460,000	1,541	0	1,541	1,387	317
Year 3	460,000	2,997	0	2,997	2,698	616
Year 4	460,000	4,373	0	4,373	3,936	898
Year 5	460,000	5,672	0	5,672	5,105	1,165
Year 6	460,000	6,899	0	6,899	6,209	1,417
Year 7	460,000	8,058	75	2,015	1,813	1,655
Year 8	460,000	9,153	75	2,288	2,060	1,880
Year 9	460,000	10,187	75	2,547	2,292	2,092
Year 10	460,000	11,164	75	2,791	2,512	2,293
Year 11	460,000	12,087	75	3,022	2,720	2,482
Year 12	460,000	12,959	75	3,240	2,916	2,661
Year 13	460,000	13,782	75	3,447	3,101	2,830
Year 14	460,000	14,560	75	3,640	3,276	2,990
Year 15	460,000	15,295	75	3,824	3,441	3,141
Year 16	460,000	15,989	75	3,997	3,598	3,283
Year 17	460,000	16,644	75	4,161	3,745	3,418
Year 18	460,000	17,264	75	4,316	3,884	3,545
Year 19	460,000	17,849	75	4,462	4,016	3,665
Year 20	460,000	18,401	75	4,600	4,140	3,779
Year 21	460,000	18,923	75	4,731	4,258	3,886
Year 22	460,000	19,416	75	4,854	4,369	3,987
Year 23	460,000	19,882	75	4,970	4,473	4,083
Year 24	460,000	20,321	75	5,080	4,572	4,173
Year 25	160,000	20,737	75	5,184	4,666	4,258
	Totals	**314,154**		**94,650**	**85,185**	

[1]Total LFG Production is based on methane generation estimate, without Oxidation.

In addition, for the development of SH30, we assumed 60 acres of forested woodlands would need to be cleared. Using the same factors from Alternatives B and C (see **Tables 8 and 9**), the non-sequestered carbon that would result from removal of 60-acres of forested area is presented in **Table 11** below.

Table 11. Alternative D – Carbon Not Sequestered

Impacted Acreage	Average CO_2 Emissions per Acre	Project Lifespan	Total CO_2 Not Sequestered
60	11.58 $MTCO_2e$	24.35 years	16,918 $MTCO_2e$

Similar to the Alternative A analysis, SCS used the Collection Efficiency- and oxidation-adjusted methane values as potential methane emissions to the atmosphere. Using information from **Tables 10 and 11**, the results of the analysis for Alternative D are shown in **Table 12.**

Table 12. Alternative D - Project Lifespan Landfill Emissions Estimate

Comparative Item	Landfill at SH30
Methane Generation ($MTCH_4$) (from Table 10)	314,154
Collection Efficiency (%)	75
Uncontrolled Methane ($MTCH_4$)	78,538
Uncontrolled Methane Adjusted for 10% OX ($MTCH_4$)	70,685
Total GHG Impacts from Landfill Operations ($MTCO_2e$)	1,767,125
Carbon Not Sequestered ($MTCO_2e$)	16,918
Net GHG Impacts ($MTCO_2e$)	1,784,043

As shown in **Table 12**, using the global warming potential for methane of 25x, the resulting carbon dioxide equivalent ($MTCO_2e$) emissions for Alternative D is 1,784,043 $MTCO_2e$.

In addition, under Alternative D, the SH30 landfill will not be required to utilize the collected LFG for beneficial purposes (like LFGTE), as is the case with the existing SPSA Regional Landfill (or three of the four alternative landfills examined under Alternative A). Considering that the SPSA Regional Landfill and the majority of the Alternative A landfills have beneficial use of LFG integrated, the impacts of non-beneficial reuse of LFG are relevant. As shown in **Table 10**, the potential methane production for SH30 over the project lifespan is 314,154 $MTCH_4$. The portion collected and controlled by a GCCS is approximately 219,503 $MTCH_4$ (314,154 - 94,650 $MTCH_4$ from **Table 10**) which will not be put to beneficial reuse (electricity generation, renewable natural gas, etc.) and displacement of the burning of fossil fuels. Over the lifespan of the proposed project, this results in an excess of GHG impacts equivalent to more than 30,000 railcars of coal burned, more than 600 million gallons of gasoline consumed, or 5,487,585 $MTCO_2e$ (25x the amount of methane collected).

SUMMARY AND CONCLUSIONS

A summary of the hauling and landfill operational GHG impacts from the various alternatives evaluated is presented in **Table 13.**

Table 13. Alternative GHG Impacts Summary – Landfill Operational and Hauling Analysis

Project Alternative	Operational GHG Impacts ($MTCO_2e$)	Hauling GHG Impacts ($MTCO_2$)	Total GHG Impacts ($MTCO_2e$)
Alternative A - No Action Alternative/Transfer Waste to a Private Landfill Emissions Estimate (Baseline)	1,396,203	8,275	1,404,478
Alternative B – Full Expansion Alternative Emissions Estimate	1,234,629	2,500	1,237,129
Alternative C – Partial Expansion Alternative Emissions Estimate	1,232,665	2,500	1,235,165
Alternative D – Closure and Conversion of Landfill to a Transfer Station – Hauling to a New Landfill	1,784,043	5,200	1,789,243

As can be seen in **Table 12**, Alternative D (building a new landfill at SH30) would have by far the greatest total GHG impact of all the scenarios (387,840 $MTCO_2e$ greater, or the equivalent of over 43 million gallons of gasoline consumed, than the next lowest Alternative). Alternative B and C have the lowest GHG impacts, while Alternative A has an impact a small amount greater than Alternatives B and C. Also, the current SPSA Regional Landfill has an RNG facility, which provides additional GHG benefits (credits) equivalent to an estimated 5,487,585 $MTCO_2e$. This benefit could also accrue for the private landfill alternatives that have landfill gas to energy or renewable natural gas facilities.

Other Considerations

Carbon Sequestration

There is a net zero difference in the amount of carbon sequestered from landfilling operations under all the Alternatives. Within a landfill, Carbon Sequestration is represented as the fraction of organic carbon in the waste stream that is not converted to methane or carbon dioxide via methanogensis. This sequestered carbon is stored in the landfill. SCS calculated carbon sequestration for the project lifespan waste (11.2 million tons) following the USEPA calculation methodologies for carbon storage calculations and used a carbon storage factor (CSF) value specific to a given waste type and presented in metric tons carbon equivalent (MTCE) which is then multiplied by the number of short tons of waste received within a given waste category.

SCS utilized USEPA default waste composition values in order to get the waste-specific composition for the 11.2 million tons of MSW. The resulting USEPA-aligned waste composition percentages were then multiplied by the total project waste volume to obtain a tonnage distribution of the waste accepted. The result of the distribution is presented in **Table 14**.

Table 14. Alternative A – Carbon Sequestration

Waste Type	Percentage in MSW Stream	Carbon storage Factor (MTCE/ton)	Sequestered Carbon (MTCE)
Newspapers	2.17%	0.395	96,068
Office Paper	1.92%	0.047	10,115
Mixed Paper	3.65%	0.226	92,198
Magazines/Catalogs	0.76%	0.254	21,634
Cardboard/Kraft Paper	6.61%	0.247	182,773
Remainder/Comp Paper	5.57%	0.235	146,545
Textiles	6.29%	0.009	6,336
Wood	8.88%	0.304	302,418
Food Waste	18.59%	0.024	49,959
Yard Trimmings	6.96%	0.136	105,968
Misc. Organics	5.28%	0.135	79,800
Other waste	33.33%	-	-
Total	**100%**		**1,093,812**
		Conversion Factor ($MTCO_2e$/MTCE)	**3.67**
		Total Sequestered Carbon ($MTCO_2e$)[1]	**4,014,290**

[1] Conversion factor for sequestered carbon equivalents to sequestered carbon dioxide equivalents by using relative molecular weight ratio of carbon dioxide to carbon (44/12 = 3.67 $MTCO_2E$)/MTCE.

Appendix D: Analysis of Potential Hauling and Landfill Capital and Operational Cost Impacts for Alternative Landfill Sites to Support SPSA's Environmental Impact Statement

This page intentionally left blank.

SCS ENGINEERS Environmental Consultants & Contractors

February 27, 2023
File No. 022220102.00

MEMORANDUM

TO: Kimberly Blossom, Neville Reynolds, VHB

FROM: Bob Gardner, PE, BCEE
Keith Matteson, PE

SUBJECT: Analysis of Potential Hauling and Landfill Capital and Operational Cost Impacts for Alternative Landfill Sites to Support SPSA's Environmental Impact Statement

The purpose of this memorandum is to present the analysis of the operational and capital cost impacts of the site alternatives (scenarios) evaluated as part of the Environmental Impact Statement (EIS) related to the proposed expansion of the SPSA Regional Landfill. This memorandum supersedes all previous drafts.

ALTERNATIVES EVALUATED

SCS evaluated the capital and operational expenses for following alternatives:

- **Alternative A – No Action Alternative/Transfer Waste to Private Landfill.** Under this alternative, SPSA would re-route waste to another private landfill following reaching permitted capacity in 2037.

- **Alternative B – Full Expansion.** Under this alternative, SPSA would expand its landfill operations into a 134-acre expansion area, which would accommodate two additional landfill cells, designated Cells VII and IX. Under this alternative, 117 acres of forested wetlands would be impacted.

- **Alternative C – Partial Expansion.** Under this alternative, construction of Cells VII and IX would still occur, but the footprint of Cell IX would be smaller than proposed under Alternative B. Under this alternative, approximately 110-acres of forested wetlands would be impacted.

- **Alternative D – Closure and Conversion to Just a Transfer Station Operation with New Off-Site Landfill.** Under this alternative, the landfill would close in 2037, and all waste would be diverted to a new SPSA landfill site (SH30).

The location of the alternatives are presented in Figure 1. Under Alternative A, we evaluated the hauling and disposal costs for four private regional landfills. Alternative B and C represents expansion at the existing Regional Landfill site (Site SUEX). For the purpose of this cost analysis, we considered Alternative B and C together (Alternative B-C). SH30 is the top site identified in Southampton County for Alternative D.

CAPITAL COSTS

The following capital expenses were considered in the analysis:

- **Landfill cell development and closure costs** for either expansion into Cells VIII and IX or siting, constructing, and closing a new regional landfill. SCS used the estimates prepared by HDR for Cell VIII and IX, and estimates prepared by SCS for siting, constructing, and closing a new regional landfill.

- **Transfer equipment purchase/replacement costs** for trucks and trailers needed to transfer waste from SPSA's transfer stations to the selected disposal alternative.

- **Land acquisition costs for Alternative D (SH30).** The assumed land acquisition costs for SH30 is based on the Virginia Mass Appraisal Network estimate of $582,000 (rounded to a thousand dollars) for the property which is zoned Zoned A-1. Southampton County indicated that the assessed value is based on fair market value of the property.

OPERATIONAL COSTS

The operational expenses include the individual Department costs for SPSA's system as shown in Table 1. Some of the department costs will change, be eliminated, or stay the same depending on the alternative selected. Table 1 provides a matrix of the logic used to allocate costs for each alternative, and our estimate of the annual operating expenses for each. For example, in the case of Alternative A (transferring to a private landfill and ceasing the Regional Landfill operations), there would be significant added costs for transfer fleet operations, contract disposal costs, and post-closure care. We based the contracted disposal rate ($/ton) on SPSA's current contract with various private landfills. The operational costs presented in this memorandum are SPSA's full-system costs.

If a new landfill is constructed (SH30 site alternative), we assume that the existing Regional Landfill in Suffolk would close (although waste transfer operations would continue), and post-closure costs would begin. We use the post-closure care costs presented in SPSA's annual financial assurance documentation divided by the 25 years to estimate the annual post-closure care cost accrual that would result. We eliminated the capital cost reserve line item for the alternatives evaluated because we account for the capital expenses separately for the purpose of this analysis.

SPSA estimates that Cells VIII and IX have an estimated airspace capacity of 16,600,000 cubic yards and an annual depletion rate of 460,000 tons per year at an in-place density of 1,400 pounds per cubic yard (657,100 cubic yards per year). The conceptual design for the new regional landfill site was configured to provide approximately the same capacity. The 16.6 million cubic yards of capacity will provide approximately 25 years of disposal site life.

The fleet operations include the transfer trucks and trailers and drivers, and maintenance tasks that support the transfer fleet. The fleet operations cost estimates were prepared for the four alternatives. The analysis is based on a time and motion calculations considering the quantities of municipal solid waste that would be transferred from each transfer station in the SPSA network (see Table 2) to the final disposal location (see Figure 1 and Table 3). We assume a 20-ton per load for each transfer trailer in calculating the total number of loads and the roundtrip mileage that would result from transferring the 460,000 tons per year of municipal solid waste to each of the alternative disposal locations. The costs are based on SPSA's current fleet operations budgets and modified to increase hauling costs based on estimated labor, fuel, and maintenance costs. Our original analysis was done considering inflation, so we calculated the net present value (NPV) of the series of operational costs over the 25-year analysis period. The NPV calculation discounts future cash flow projections accounting for the time value of money. We assumed a 3 percent inflation rate for the NPV calculation. .

Other key assumptions for the financial analysis are as follows:

- In-place waste density: 1,400 pounds per cubic yard
- Annual disposal rate: 460,000 tons per year
- Tip fee for disposal at a private landfill: $35/ton
- Capacity of future landfill expansion: 16,600,000 cubic yards, provides approximately 25 years of disposal capacity
- Consumer Price Index and Gas Escalation Index: 3%
- Diesel fuel costs: $5/gallon
- Closure costs: When a landfill reaches capacity, it must be "closed". The primary capital cost of closure is construction of the final cover system and other environmental controls that may be needed. SPSA estimates closure costs $206,813/acre for the Regional Landfill (SPSA 2022 Closure/Post-Closure Care estimate).
- Post-closure care (Cells I-VII): SPSA has a 30-year obligation to maintain the site after closure for 30 years. This is referred to as the post-closure care period. SPSA estimates its post-closure care liability for the Regional Landfill is $7.944 million. We assume this cost will be applied to all the alternatives, but for Alternative D, which involves constructing a new regional landfill at SH30, we assume an additional annual accrual of $318,000/year ($7.944 million/25) is included in the yearly operational costs to cover this liability for a new landfill site.
- Equipment costs (7 year replacement schedule):
  - Trucks: $129,500
  - Trailers: $85,000

WETLANDS MITIGATION COSTS

Alternatives B, C and D have varying projected impacts to forested wetlands. SPSA estimates a $40,000/acre cost per credit for the wetlands mitigation. The cost of wetland credits is market driven and shifts when buyers begin negotiating with bankers. However, we believe the

$40,000/acre is a reasonable estimate for cost comparison purposes. The following table summarizes the projected wetlands impacts and mitigation costs for each alternative.

Alternative	Description	Est. Wetlands Impact	Assumed Mitigation Ratio	Total Credits Needed	Wetlands Credit $/ac	Estimated Wetlands Mitigation Costs
A	Hauling and Diposal at Private LF	0.00 ac				$0
B	Regional Landfill Expansion	117.36 ac	2:1	234.72 ac	$40,000 /ac	$9,388,800
C	Regional Landfill Expansion	109.64 ac	2:1	219.28 ac	$40,000 /ac	$8,771,200
D	SH30	8.00 ac	2:1	16.00 ac	$40,000 /ac	$640,000

FINDINGS AND CONCLUSIONS

SCS evaluated the projected SPSA system operational and capital costs for each of the EIS site alternatives. Operational and capital costs vary for each alternative. For example, with the expansion of the existing Regional Landfill and the siting of a new regional landfill having cell development and other associated capital and operational expenses, while transferring waste to a private landfill would include hauling and disposal costs, plus continued SPSA administrative and environmental activities associated with the closed Regional Landfill. Table 4 presents a summary of the capital and operational costs over a 25-year period. For comparative analysis, these costs were developed by summing the projected capital costs and 25-year operational costs (2023 dollars/year times 25). The total 25-year system costs are as follows:

Alternative	Description	Total 25-year System Costs ($million)
Alternative A	Close Regional Landfill and transfer waste to a private landfill (WM Atlantic for this analysis)	$915.7 - $951.0 (depending on disposal site)
Alternative B	Expansion into Cells VIII and IX at the existing Regional Landfill, wetlands impact of 117.36 acres.	$683.2
Alternative C	Expansion into Cells VIII and IX at the existing Regional Landfill, wetlands impact of 109.64 acres.	$682.6

Alternative	Description	Total 25-year System Costs ($million)
Alternative D	Develop new regional Landfill at SH30	$776.8

The alternatives associated with expanding into Cells VIII and IX (Alternatives B and C) at the existing Regional Landfill are the lowest cost alternatives by a wide margin compared to the other alternatives considered. This is primarily because the other alternatives have higher hauling and disposal costs, in the case of Alternative A, or higher transportation and development costs, in the case of Alternative D.

Figure 1. SPSA’s Transfer Station Network and Alternative Landfill Site Locations

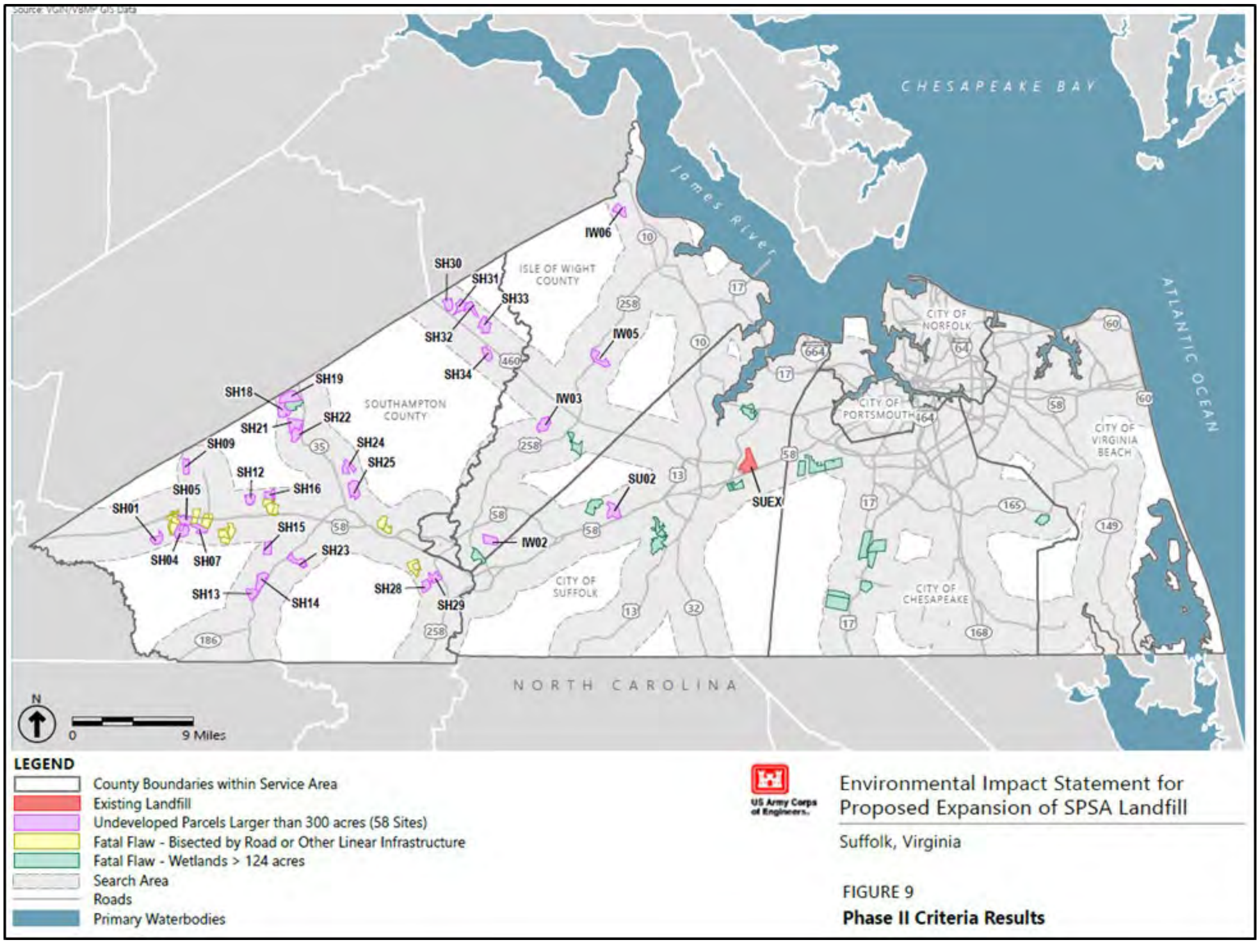
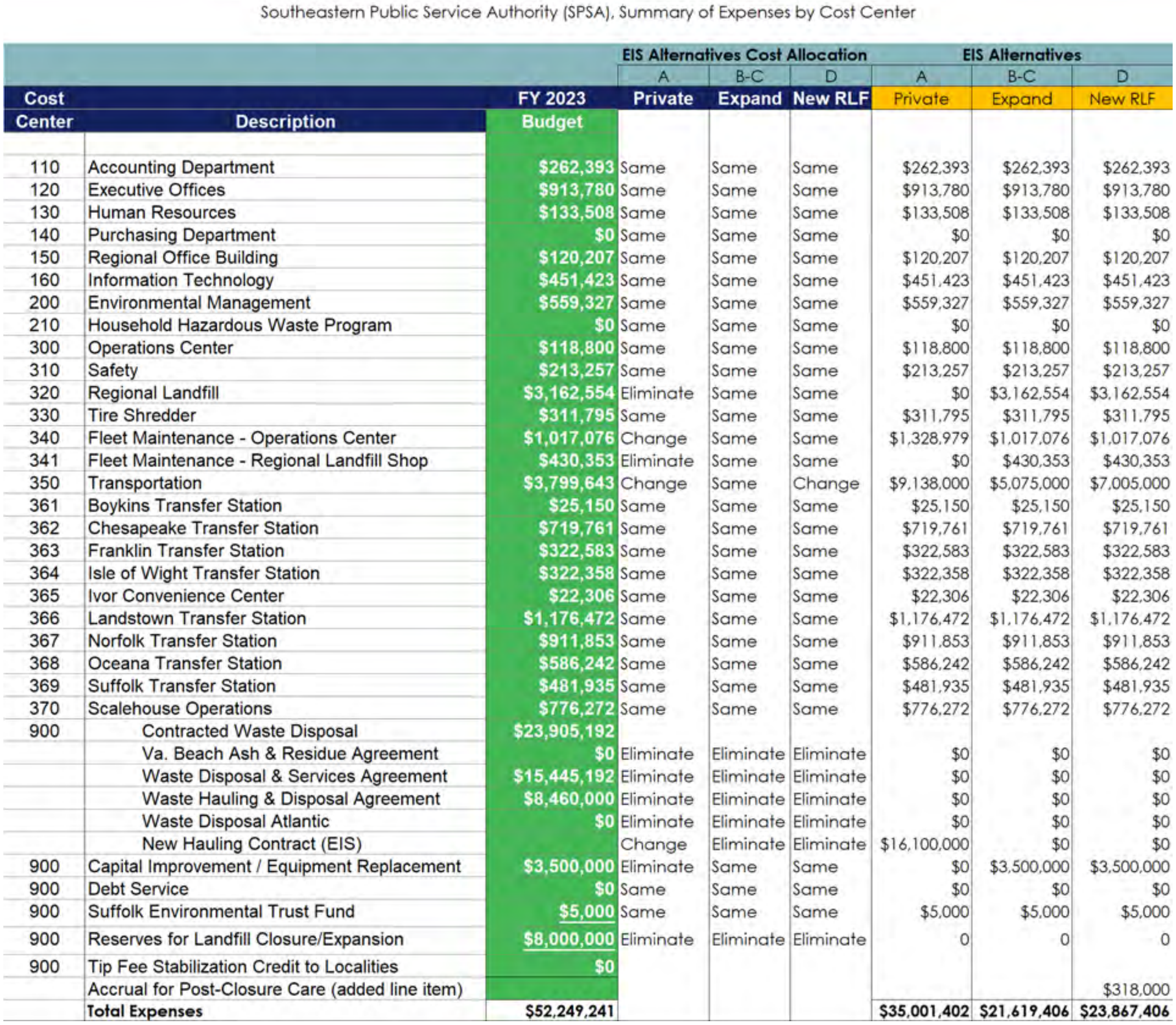


Table 1. Southeastern Public Service Authority (SPSA), Summary of Projected Operational Expenses by Cost Center for EIS Alternatives



Southeastern Public Service Authority (SPSA), Summary of Expenses by Cost Center

			EIS Alternatives Cost Allocation			EIS Alternatives		
			A	B-C	D	A	B-C	D
Cost Center	Description	FY 2023 Budget	Private	Expand	New RLF	Private	Expand	New RLF
110	Accounting Department	$262,393	Same	Same	Same	$262,393	$262,393	$262,393
120	Executive Offices	$913,780	Same	Same	Same	$913,780	$913,780	$913,780
130	Human Resources	$133,508	Same	Same	Same	$133,508	$133,508	$133,508
140	Purchasing Department	$0	Same	Same	Same	$0	$0	$0
150	Regional Office Building	$120,207	Same	Same	Same	$120,207	$120,207	$120,207
160	Information Technology	$451,423	Same	Same	Same	$451,423	$451,423	$451,423
200	Environmental Management	$559,327	Same	Same	Same	$559,327	$559,327	$559,327
210	Household Hazardous Waste Program	$0	Same	Same	Same	$0	$0	$0
300	Operations Center	$118,800	Same	Same	Same	$118,800	$118,800	$118,800
310	Safety	$213,257	Same	Same	Same	$213,257	$213,257	$213,257
320	Regional Landfill	$3,162,554	Eliminate	Same	Same	$0	$3,162,554	$3,162,554
330	Tire Shredder	$311,795	Same	Same	Same	$311,795	$311,795	$311,795
340	Fleet Maintenance - Operations Center	$1,017,076	Change	Same	Same	$1,328,979	$1,017,076	$1,017,076
341	Fleet Maintenance - Regional Landfill Shop	$430,353	Eliminate	Same	Same	$0	$430,353	$430,353
350	Transportation	$3,799,643	Change	Same	Change	$9,138,000	$5,075,000	$7,005,000
361	Boykins Transfer Station	$25,150	Same	Same	Same	$25,150	$25,150	$25,150
362	Chesapeake Transfer Station	$719,761	Same	Same	Same	$719,761	$719,761	$719,761
363	Franklin Transfer Station	$322,583	Same	Same	Same	$322,583	$322,583	$322,583
364	Isle of Wight Transfer Station	$322,358	Same	Same	Same	$322,358	$322,358	$322,358
365	Ivor Convenience Center	$22,306	Same	Same	Same	$22,306	$22,306	$22,306
366	Landstown Transfer Station	$1,176,472	Same	Same	Same	$1,176,472	$1,176,472	$1,176,472
367	Norfolk Transfer Station	$911,853	Same	Same	Same	$911,853	$911,853	$911,853
368	Oceana Transfer Station	$586,242	Same	Same	Same	$586,242	$586,242	$586,242
369	Suffolk Transfer Station	$481,935	Same	Same	Same	$481,935	$481,935	$481,935
370	Scalehouse Operations	$776,272	Same	Same	Same	$776,272	$776,272	$776,272
900	Contracted Waste Disposal	$23,905,192						
	Va. Beach Ash & Residue Agreement	$0	Eliminate	Eliminate	Eliminate	$0	$0	$0
	Waste Disposal & Services Agreement	$15,445,192	Eliminate	Eliminate	Eliminate	$0	$0	$0
	Waste Hauling & Disposal Agreement	$8,460,000	Eliminate	Eliminate	Eliminate	$0	$0	$0
	Waste Disposal Atlantic	$0	Eliminate	Eliminate	Eliminate	$0	$0	$0
	New Hauling Contract (EIS)		Change	Eliminate	Eliminate	$16,100,000	$0	$0
900	Capital Improvement / Equipment Replacement	$3,500,000	Eliminate	Same	Same	$0	$3,500,000	$3,500,000
900	Debt Service	$0	Same	Same	Same	$0	$0	$0
900	Suffolk Environmental Trust Fund	$5,000	Same	Same	Same	$5,000	$5,000	$5,000
900	Reserves for Landfill Closure/Expansion	$8,000,000	Eliminate	Eliminate	Eliminate	0	0	0
900	Tip Fee Stabilization Credit to Localities	$0						
	Accrual for Post-Closure Care (added line item)							$318,000
	Total Expenses	**$52,249,241**				**$35,001,402**	**$21,619,406**	**$23,867,406**

Notes:

1. PCC = Post closure care
2. "New RLF" refers to site SH30, "Expand" refers to expansion of the existing regional landfill (i.e., SUEX), and "Private" refers to transferring waste for disposal at a private landfill
3. "Alternatives" A, B, C, and D are defined above. Alternative B and C are grouped together and labeled "B-C" because operational costs would be the same; the only difference being the number of wetlands impacted.
4. Cost shown for this example for the private landfill disposal alternative is for the WM Atlantic Waste Landfill.

Table 2. Assumed Waste Transfer Quantities by Transfer Station and SPSA Community Members

	Transfer Station Waste Quanties (Tons Per Year)									
Customer	CTS FY 2018	FTS FY 2018	IWTS FY 2018	LTS FY 2018	NTS FY 2018	OTS FY 2018	STS FY 2018	TOTALS FY 2018	RDF FY 2018	Grand Total
CHESAPEAKE	87,000	0	0	0	3,000	0	11,000	101,000	2,000	103,000
FRANKLIN	0	3,000	0	0	0	0	0	3,000	0	3,000
ISLE OF WIGHT	0	2,000	16,000	0	0	0	0	18,000	0	18,000
NORFOLK	0	0	0	0	89,000	0	0	89,000	0	89,000
PORTSMOUTH	0	0	0	0	0	0	1,000	1,000	38,000	39,000
SOUTHAMPTON	0	9,000	1,000	0	0	0	0	10,000	0	10,000
SUFFOLK	0	0	0	0	0	0	46,000	46,000	0	46,000
VIRGINIA BEACH	5,000	0	0	106,000	11,000	30,000	0	152,000	0	152,000
OTHER	0	0	0	0	0	0	0	0	0	0
TOTAL MUNICIPAL	**92,000**	**14,000**	**17,000**	**106,000**	**103,000**	**30,000**	**58,000**	**420,000**	**40,000**	**460,000**

Table 3. Transfer Distances from SPSA Transfer Stations to Various Disposal Locations

	Transfer Station/Distances, One-Way Miles									
Alternative Landfill Location Parcels	Boykins	CTS	FTS	IWTS	Ivor	LTS	NTS	OTS	STS	To RDF
SH30	31	47.9	23.7	16	4.2	55.1	45.1	57	28.5	42.4
SUEX	44.9	20.5	32	24.6	25.6	28.3	18.3	32.4	0.9	15.1
WM Atl Waste, Sussex Co.	45	65	42	34	73	73	63	74	46	59
WM Bethel LF, Hampton	73	32	60	23	34	34	23	34	29	31
Shoesmouth LF	71	97	67	65	104	104	94	106	77	90
Republic Brunswick LF	51	99	52	75	107	107	97	109	63	93

Notes:

SUEX = SPSA Regional LF

SH30 = Alternative SPSA landfill site in Southampton County

CTS = Chesapeake Transfer Station

FST = Franklin Transfer Station

IWTS = Isle of Wight Transfer Station

LTS = Landstown Transfer Station (Virginia Beach)

NTS = Norfolk Transfer Station

OTS = Oceana Transfer Station (Virginia Beach)

STS = Suffolk Transfer Station

RDF = Refuse Derived Fuel Facility (Portsmouth)

Table 4. Summary of Capital and Operational Cost Impacts for SPSA Disposal Alternatives Supporting the EIS

Summary Table

Summary Item	Scenarios						
	22	23	24	25	26	27	28
Disposal Location	SUEX	SUEX	SH30	WM Atl Waste Disp	WM Bethel	RSI Brunswick	Shoesmith
EIS Alternative Label	B	C	D	A	A	A	A
Impacted Wetlands Area	117.36 ac	109.64 ac	8.00 ac				
Estimated Wetlands Credits Needed	234.72 ac	219.28 ac	16.00 ac				
Hauling Ops Cost	$5,075,000/yr	$5,075,000/yr	$7,005,000/yr	$9,138,000/yr	$5,861,000/yr	$11,325,000/yr	$11,213,000/yr
Cost Summary							
NPV 25-year capex for Transfer Fleet	$31,927,000	$31,927,000	$38,958,000	$53,019,000	$35,442,000	$55,363,000	$56,534,000
Landfill Capex	**$102,881,800**	**$102,264,200**	**$133,221,000**				
Purchase Property			**$582,000**				
Cells VIIII and IX Site Development/Cell Development/Closure	$93,493,000	$93,493,000					
New Landfill Site Development and Closure			$131,999,000				
Wetlands Mitigation Costs	$9,388,800	$8,771,200	$640,000				
Post Closure Care Cost for Existing Regional Landfill	$7,944,000	$7,944,000	$7,944,000	$7,944,000	$7,944,000	$7,944,000	$7,944,000
Operational Costs	$21,619,000/yr	$21,619,000/yr	$23,867,000/yr	$35,381,000/yr	$34,893,000/yr	$35,435,000/yr	$35,462,000/yr
Total Capex + 25-year Opex	**$683,227,800**	**$682,610,200**	**$776,798,000**	**$945,488,000**	**$915,711,000**	**$949,182,000**	**$951,028,000**
Post Closure Care Costs for Existing Regional LF	$7,944,000	$7,944,000	$7,944,000	$7,944,000	$7,944,000	$7,944,000	$7,944,000
NPV of Transfer Fleet Capex + Landfill Capex	$134,808,800	$134,191,200	$172,179,000	$53,019,000	$35,442,000	$55,363,000	$56,534,000
Annual Ops Cost x 25 years	$540,475,000	$540,475,000	$596,675,000	$884,525,000	$872,325,000	$885,875,000	$886,550,000

Notes:
SUEX - Existing Suffolk Regional Landfill located in Suffolk, VA
SH30 - Potential new landfill site in Southampton County
Red highlighting in the table header above distinguishes between SPSA disposal location and private disposal location alternatives.
NPV = Net Present Value, NPV used because Transfer analysis included inflated costs.
Post Closure Care Liability based on HDR's 2022 financial assurance estimates.
The Hauling Costs are included in the Table 1 yearly operational costs for each alternative.

Appendix E: HRPDC Regional Solid Waste Management Plan

This page intentionally left blank.

Regional Solid Waste Management Plan for Southeastern Virginia

Prepared on behalf of the:

SOUTHEASTERN PUBLIC SERVICE AUTHORITY OF VIRGINIA

This amended RSWMP is based on
a plan originally prepared by:

SCS ENGINEERS
6330 North Center Drive
Building 13, Suite 100
Norfolk, VA
(757) 466-3361

September 15, 2011
Last Amended by the HRPDC: August 2020
Accepted by Virginia DEQ: August 13, 2020

Table of Contents

List of Figures

List of Tables

Appendices

EXECUTIVE SUMMARY

The **Regional Solid Waste Management Plan for Southeastern Virginia (RSWMP)** provides an overview and analysis of solid waste management in the Cities of Chesapeake, Franklin, Norfolk, Portsmouth, Suffolk and Virginia Beach, the Counties of Isle of Wight and Southampton, and the Towns of Boykins, Branchville, Capron, Courtland, Ivor, Newsoms, Smithfield and Windsor. As required by the state regulations, the RSWMP presents background information on population and development patterns in southeastern Virginia, providing the context in which solid waste management occurs in the region. It also provides an inventory and projection of current solid waste management programs and current and future solid waste quantities generated in the region and the characteristics of those wastes. Finally, it discusses and presents available options for meeting the long-term solid waste management needs of the region in the form of a series of goals and objectives and an implementation plan.

The structure of the RSWMP is as follows:

Chapter 1.0 - Introduction. This chapter provides a history of solid waste management planning in Southeastern Virginia and a description of the planning area. Information is included on the regional transportation system, land use patterns, economic development and markets for recycling.

Chapter 2.0 - Existing Solid Waste Management System. This chapter presents regional solid waste generation quantities and disposal statistics, and the various solid waste processing, recycling, and disposal facilities in the planning area. In addition, a synopsis of solid waste handling practices is provided for each of the cities and counties in the planning area.

Chapter 3.0 - Special Wastes. This chapter addresses the management of additional waste streams generated in the Region such as medical waste and construction and demolition debris.

Chapter 4.0 - Waste Management Summary. This chapter provides a summary of the existing waste management system in the region and an overview of the future of solid waste management based on the sale of the RDF plant.

Chapter 5.0 - Future Solid Waste Management Needs. This chapter presents projections and characterization of the future solid waste stream for the planning area. National trends are presented and solid waste generation is provided by locality. Existing landfill and transfer station capacity is analyzed in light of the projections.

Chapter 6.0 - Recycling Rate. This chapter summarizes the mandatory state recycling rate and a historic overview of regional recycling performance.

Chapter 7.0 - Litter Control. This chapter summarizes existing litter control programs in the Region.

Chapter 8.0 - Solid Waste Needs Assessment. This chapter discusses the waste management hierarchy as it relates to regional solid waste management practices. The hierarchy includes source reduction, reuse, recycling, resource recovery, incineration and land filling. This chapter includes a summary of current conditions and an overview of potential actions for consideration.

Chapter 9.0 - Implementation Plan. This chapter presents an implementation plan for options selected during the planning process. This Chapter also includes a discussion of public/private partnerships and financing.

Chapter 10.0 - Public Participation. This chapter discusses opportunities for public participation at SPSA board meetings, various public education programs and media events.

Chapter 11.0 - RSWMP Amendment Procedures. This chapter provides an overview of the procedures to amend the RSWMP.

1.0 INTRODUCTION

The **Regional Solid Waste Management Plan for Southeastern Virginia (RSWMP)** provides a guide for the short and long-term management of the solid waste system within the planning area. This Plan documents the existing solid waste management programs and facilities, describes the opportunities for improvement to the existing system, evaluates alternatives and recommends programs and facilities which will achieve the region's goals, and describes the strategy for implementing the recommended programs. This Plan's 20-year planning period is through 2035.

The format of this Plan is as follows:

- Section 1: Introduction and Background of the Planning Area
- Section 2: Existing Solid Waste Management System
- Section 3: Special Waste
- Section 4: Waste Management Summary
- Section 5: Future Municipal Solid Waste Management Needs
- Section 6: Recycling Rate
- Section 7: Litter Control
- Section 8: Solid Waste Needs Assessment
- Section 9: Implementation Plan
- Section 10: Public Participation
- Section 11: Plan Amendment Procedures

As required by the regulations, this Plan presents background information on population and development patterns in southeastern Virginia, while providing the context in which solid waste management occurs in the region. It also provides an inventory and projection of current solid waste management programs and current and future solid waste quantities generated in the region and the characteristics of those wastes. Finally, it discusses and presents available options for meeting the long-term solid waste management needs of the region in the form of a series of goals and objectives and an implementation plan.

1.1 SOLID WASTE MANAGEMENT PLANNING IN SOUTHEASTERN VIRGINIA

1.1.1 Historical Perspective

Southeastern Virginia has a long history of cooperation and innovation in solid waste management. Beginning in the early 1970s, the Region's eight cities and counties recognized the need to develop alternative solid waste management approaches. A regional study process was instituted under the auspices of the Southeastern Virginia Planning District Commission (SVPDC) to examine technological and institutional approaches to management of the region's solid waste. This effort culminated in the identification of a regional waste-to-energy project as a viable solution to this issue and the establishment of the Southeastern Public Service Authority (SPSA) of Virginia as the entity to implement the proposed regional system. Startup of the regional system occurred in 1985 with development of the Regional Landfill. The Refuse Derived Fuel and Waste to Energy Facility (RDF WTE Facility) began operation in 1988 as part of SPSA's waste-to-energy system. The search for additional management options preceded the startup date and is continuing.

Concurrent with the creation of a regional solid waste management system, the two regional agencies and the member local governments examined other aspects of the regional solid waste management issue and developed approaches to dealing with its various aspects. Studies have been undertaken and regional programs implemented in the areas of hazardous waste management and recycling. The local governments have instituted innovations in the collection system (e.g. automated collection), have undertaken components of the regional recycling program, and have implemented measures to better control environmental contaminants, such as landfill gas and leachate, at their own disposal facilities.

In 1989, the Virginia General Assembly enacted legislation requiring that localities, or regional agencies on behalf of the localities, prepare solid waste management plans. These plans were to focus on how the locality or region would achieve recycling goals. Regulations to implement this legislation and to outline common procedures for preparation of these plans were developed by the Virginia Department of Waste Management (VDWM). They were promulgated and became effective on May 15, 1990.

The SVPDC and SPSA acted jointly in March 1990, in accordance with these regulations, to recommend that the boundaries of the Southeastern Virginia Planning District should be designated as the solid waste planning region; that the SVPDC should be responsible for developing the solid waste management plan; and that SPSA should be designated as the Regional Solid Waste Management Agency and charged with implementation of the regional solid waste management plan. The VDWM formally concurred with these recommendations on February 20, 1991. Following the creation of the Hampton Roads Planning District Commission (HRPDC) by the merger of the Southeastern Virginia and Peninsula Planning District Commissions, the HRPDC became the agency responsible for preparing the solid waste management plan. In addition, the VDWM no longer exists and the authority for administering the solid waste management regulations now rests with the Virginia Department of Environmental Quality (VDEQ).

In 1991, the HRPDC, in cooperation with SPSA and its member local governments completed the RSWMP for Southeastern Virginia, which was approved by the VDWM. On August 1, 2001, the regulations were amended to require that solid waste management plans be developed or amended to conform to new plan requirements. To comply with the amended regulations, the RSWMP was revised and adopted by the HRPDC and SPSA in 2005. At that time, it is understood that SPSA accepted responsibility for making future updates to the RSWMP as needed. However, in March 2010, the local governments designated the HRPDC as the regional solid waste planning agency while SPSA remains the regional solid waste management agency. This revised solid waste management plan has been prepared by the HRPDC in cooperation with SPSA and the member local governments to meet the requirements of the Virginia "Solid Waste Planning and Recycling Regulations" (9 VAC § 20-130-10 et seq.). It builds upon the previous solid waste management planning efforts in southeastern Virginia and establishes a framework by which this region can meet the state-mandated planning requirements and recycling goals as well as the long-term waste management needs of this region.

1.1.2 SPSA Goals and Objectives

The SPSA Board of Directors and staff annually adopt a Strategic Operating Plan to address the future of solid waste management functions performed by SPSA in the Region for its member communities, and define guiding principles for the organization.

The Strategic Operating Plan includes SPSA's:

- **Core Purpose:** Management of safe and environmentally sound disposal of regional waste.
- **Philosophy:** SPSA will be a service-oriented, quality-focused organization that continually seeks improvement and cost effectiveness.
- **Cores Values:** Integrity, Excellence, Accountability, Cooperation, Teamwork.
- **Core Business.** Create, manage, and maintain an infrastructure for the disposal of regional waste, including through the operation and management of the regional landfill and all transfer stations and other delivery points, and provide for the transportation of waste.
- **Guiding Principles:** The Strategic Operating Plan, including a detailed statement of SPSA's guiding principles, are available at https://www.spsa.com/about-spsa/reports-publications.

1.2 SOLID WASTE MANAGEMENT PLAN REQUIREMENTS

The laws of Virginia mandate the development and adoption of a solid waste management plan by all local governments in the Commonwealth. To facilitate regional coordination of solid waste services, rather than develop an individual plan for each locality, the law allows local governments within a designated region to develop one plan for the region. HRPDC and SPSA are coordinating the development of the solid waste management plan for the local governments in southeastern Virginia.

Under state solid waste planning regulations, no permit for a new sanitary landfill, incinerator, or waste-to-energy facility or for an expansion of an existing sanitary landfill, incinerator, or waste-to-energy facility will be issued until the solid waste planning unit within which the facility is located has developed a solid waste management plan that has been approved by the Virginia Department of Environmental Quality (VDEQ). Regulations governing the development and submittal of solid waste management plans are provided in 9 VAC 20-130-10 et seq.

In addition, the solid waste management plan must be considered in the permitting process in three ways. First, VDEQ must review a proposed solid waste management facility for its consistency with the solid waste management plan. Second, permit applicants must certify that sufficient disposal capacity will be available to allow local governments in the region to comply with the solid waste management plan. Finally, VDEQ may impose permit conditions to allow local governments to contract and reserve disposal capacity in the new facility in accordance with the solid waste management plan.

The solid waste management plan must address six policy areas specified in state law. These six policy areas include:

1. Source Reduction
2. Reuse
3. Recycling
4. Resource Recovery (Waste to Energy)
5. Incineration
6. Landfilling

The plan must give preference to lower numbered policy areas over higher numbered policy areas. These policy areas are based upon the widely accepted waste management hierarchy, originally conceived by the U.S. Environmental Protection Agency and embodied in the Virginia Solid Waste Management Regulations. The hierarchy encourages communities to develop policies that rank the most environmentally sound strategies for management of solid waste (see Figure 1):

- First, Reduce and Reuse – Efforts to prevent the creation of waste should precede other waste management options that deal with the waste after it is generated, as in recycling. The underlying thought is that solid waste that is not produced does not require management.

- Second, Recycle and Compost – This level includes recycling and composting. These techniques have the potential to divert large amounts of waste from disposal and turn them into valuable products. Through these techniques, waste materials can potentially go through several cycles of use, conserving raw materials and energy in the process.

- Third, Recover Energy – This level of the hierarchy also uses waste as a resource, but essentially the material can only be used once. The highest use becomes energy production.

- Finally, Dispose – After the first levels of the hierarchy are maximized, there may be residual solid waste left to manage. This material must be disposed of in an environmentally safe manner, through incineration or landfilling at a permitted facility.

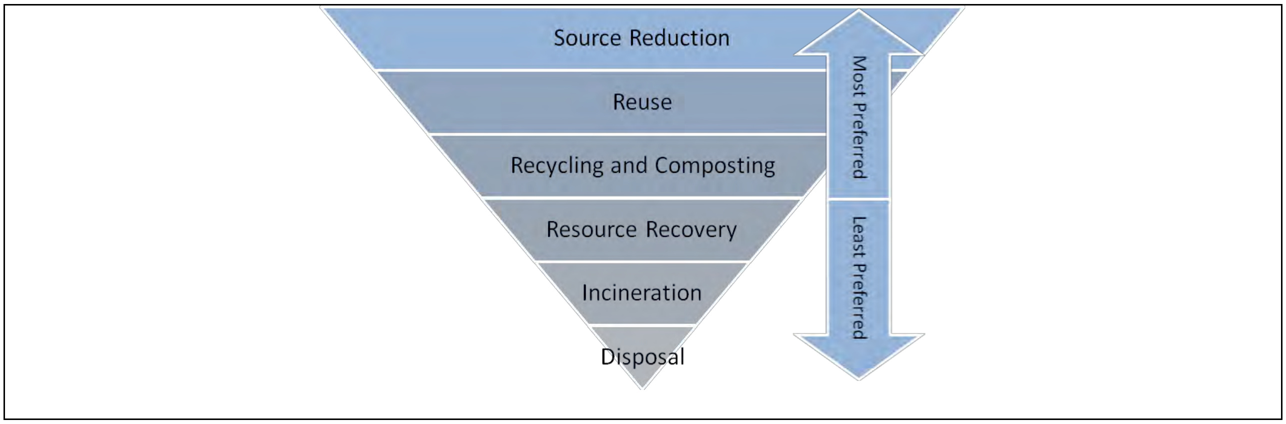


Figure 1. Waste Management Hierarchy

In addition to addressing these policy areas, the plan must provide an integrated waste management strategy with objectives and an implementation plan. The plan must also address achieving the established minimum recycling rate, funding, strategies for public education and public involvement, and public-private partnerships.

The strategies of the solid waste management plan must be supported by descriptions and analysis of urban development, population, transportation system condition, and waste generation estimates in the planning area. Further, the plan must develop future estimates of waste generation and present how the region anticipates meeting future solid waste needs. This plan addresses all of the regulatory requirements and serves as the solid waste management plan for the communities of southeastern Virginia.

1.3 DESCRIPTION OF PLANNING AREA

SPSA is the regional solid waste management organization for eight southeastern Virginia communities with a total land area of nearly 2,000 square miles and a population of 1,195,613 (Weldon Cooper, 2019). The SPSA member localities are the cities of Chesapeake, Franklin, Norfolk, Portsmouth, Suffolk, and Virginia Beach, and the Counties of Isle of Wight and Southampton. Additional localities covered by this plan are the towns within Isle of Wight and Southampton Counties, including the following: Smithfield and Windsor in Isle of Wight County and Branchville, Boykins, Capron, Courtland, Ivor, and Newsoms in Southampton County. With the exception of Franklin and Southampton County, the SPSA communities are a part of the Norfolk-Virginia Beach-Newport News Metropolitan Statistical Area. Figure 2 illustrates the SPSA service area.

The SPSA area is bordered to the north by the James River and the Chesapeake Bay, with the Atlantic Ocean to the east. To the south is the North Carolina state line, while the Virginia Counties of Greensville, Sussex, and Surry border the region to the west.

The SPSA service area is located in the coastal plain of Virginia. The region is blessed with numerous waterways and wetlands, including the Elizabeth, Lynnhaven, Nansemond, Pagan, North Landing, Blackwater, Nottoway, and Meherrin Rivers, the Great Dismal Swamp, Back Bay, and the Intracoastal Waterway.

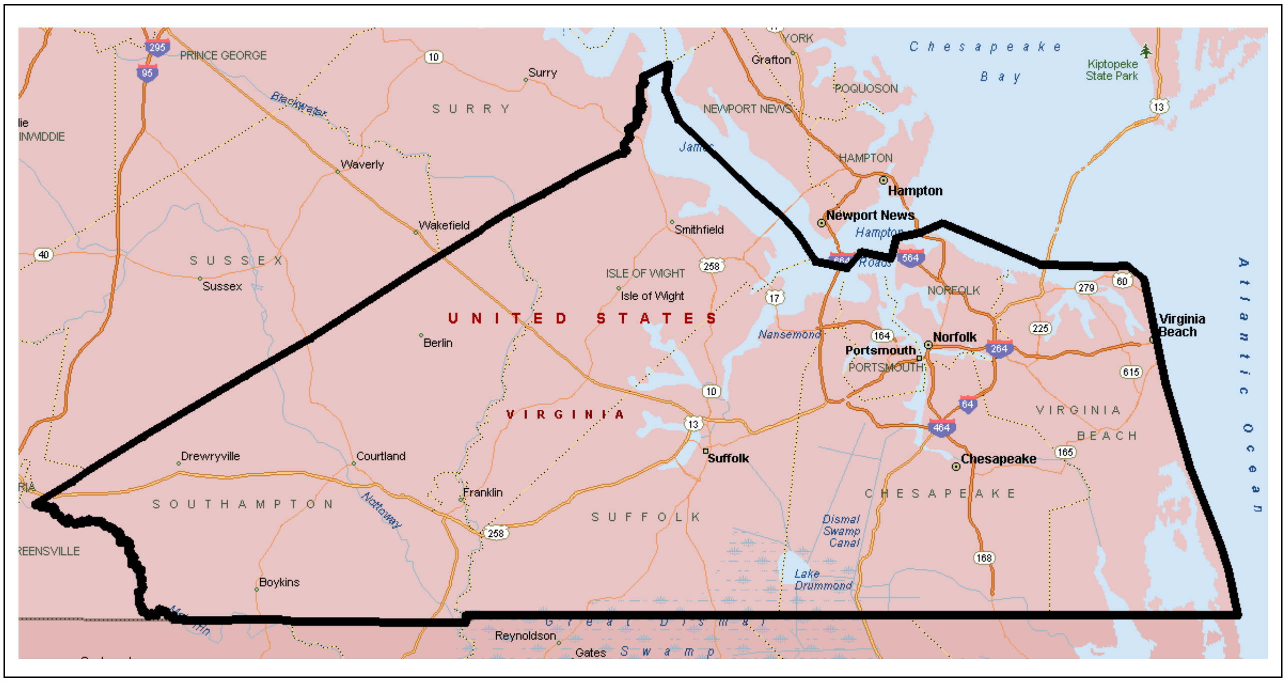


Figure 2. SPSA Service Area

1.3.1 Transportation

The location and topography of the SPSA planning area makes its transportation system unique. Due to the vast number of waterways in the planning area, bridges and tunnels are vital components of the surface transportation system. Four major bridges and tunnels serve major geographic areas of the region: the Hampton Roads Bridge-Tunnel, the Monitor-Merrimac Memorial Bridge Tunnel, the Downtown Tunnel, and the Midtown Tunnel. Other major bridges in the area include the Berkley Bridge, the High Rise Bridge, and the James River Bridge. These bridges and tunnels are significant traffic congestion points. The major interstates in the area consist of I-64 and I-664, which collectively serve as the beltway for the region; I-264 connecting Chesapeake, Portsmouth, Norfolk and Virginia Beach from west to east; and I-464 connecting the cities of Chesapeake and Norfolk. Significant U.S. Routes in the area include U.S. 13, 17, 58, and 460.

Transportation congestion is a major issue in the Region. The collection, transfer, and disposal of solid waste make extensive use of the road transportation network. Transportation to and from the Region is controlled in large part by the various tunnels and bridges that connect to the West and North. The HRPDC has focused much effort over the last several years to facilitate approaches to solving the Region's most vexing transportation problems, and these problems are not easy to solve. According to studies conducted by the HRPDC, travel growth has outpaced roadway capacity improvements in the Region. The Hampton Roads Bridge Tunnel (HRBT), the Monitor-Merrimac Memorial Bridge Tunnel (MMMBT), the Downtown Tunnel, the Midtown Tunnel and the "Highrise" Bridge are major system constraints, and congestion is routinely evident on all the Region's interstates, affecting the movement of people, goods and services. The constraints imposed by the Region's roadway network affect the planning, siting, implementation, and operation of the Region's solid waste system in the following ways.

- **Collection Efficiency.** Solid waste is collected by public and private operations in the Region. Traffic congestion affects the efficiency of these collection operations. Travel time from collection routes to transfer stations, the Regional Landfill, or the RDF WTE facility are extended during congestion periods, which means that the per day collection rate of each collection vehicle is reduced, more collection vehicles are needed to service collection routes, and overall operational costs are increased.

- **Collection and Transfer Scheduling.** Collection routes and transfer station operations are routinely scheduled to avoid peak congestion periods; however, this is not always practical, and these operations are negatively affected during congestion periods.

- **Location of Facilities.** The Region's current solid waste system is transportation intensive. The Region's transfer station, landfill, and RDF WTE facilities are the primary delivery points for solid waste disposal involving a significant number of collection and transfer vehicles. The capacity of the road networks to and from these facilities and any future facilities is an important consideration.

All solid waste in the Region is collected and transferred by public or private collection vehicles and equipment. Currently, no solid waste is transported to or from the Region by rail or barge, although previous proposals for barging in out-of-state waste have been considered, but ultimately rejected for various political reasons.

1.3.2 Urban Concentration

Within the Region, urban development is primarily concentrated within the beltway formed by the loop of I-64 and I-664 and to the area east of the beltway. Thus, the majority of urban development is concentrated in the cities of Norfolk and Portsmouth and in northern Virginia Beach and Chesapeake. This area contains more than three-quarters of the planning area's population and also the vast majority of the area's employment.

Waste transfer stations in the Region are located to serve existing areas of urban development. Five of the nine existing transfer stations are located in the area within the beltway and northern Virginia Beach and Chesapeake. The location of future transfer stations will need to take into account forecasted growth within the region. Further discussion of future needs can be found in Chapter 5.0, Hierarchy and Implementation.

1.3.3 Economic Growth and Development

Economic forecasts by the HRPDC indicate expected future economic growth and development for the SPSA planning area. In 2016, the member jurisdictions of SPSA had an estimated total population of 1,193,014. The largest city in the Region was Virginia Beach with over 38 percent of the population. Norfolk is the second most populated, but the city has the highest population density in the Region.

Population change since 2010 is shown in Table 1. Overall, the Region has experienced growth from 2010 to 2016. However, some jurisdictions experienced a decline in population during this period.

From 2016 to 2040, the Region is expected to grow nearly 21 percent to 1,445,300 people. This equates to an average annual growth rate of 0.88% or approximately 10,512 people per year. Suffolk and Isle of Wight are projected to experience the greatest increase in total population (on a percentage basis). The population growth rate is significant for planning purposes since the amount of waste generated increases as population increases.

Projections about population growth, regional employment, and number of households can help define what kinds and amounts of waste the Region will generate. A brief summary of projections for other key planning variables is presented here:

- **Employment:** Employment is expected to increase at an average annual rate of about 0.9 percent through 2040, resulting in an overall increase of 29.8 percent (Table 3). Employment is projected to increase in each locality. Isle of Wight County is projected to experience the greatest percentage growth in employment followed by Southampton County and Suffolk. Employment is an important forecasting variable because growth reflects an increase in economic activity, which in turn leads to increased consumption and waste generation.

- **Households:** The number of households in the region is expected to increase by about 27.6 percent through 2040 at an average annual rate of 0.8 percent. The largest percentage expansion in population and households is forecasted for the City of Suffolk and Isle of Wight County. Generally, each home, regardless of the number of residents, contributes a certain amount of waste such as junk mail and yard waste.

Table 1. SPSA Population 2010 - 2016

	2010	2011	2012	2013	2014	2015	2016	Growth (2010 2016)
Chesapeake	222,209	225,898	228,210	232,977	235,638	238,283	240,485	8.22%
Franklin	8,582	8,680	8,839	8,655	8,560	8,535	8,597	0.17%
Norfolk	242,803	243,985	245,803	246,392	246,394	247,189	247,087	1.76%
Portsmouth	95,535	96,368	97,450	96,871	96,802	96,874	96,179	0.67%
Suffolk	84,585	85,692	86,463	87,831	89,586	90,426	91,722	8.44%
Virginia Beach	437,994	441,246	447,489	449,628	451,672	453,500	453,628	3.57%
Isle of Wight	35,270	35,457	36,180	36,462	36,172	36,438	37,074	5.11%
Southampton	18,570	18,714	18,678	18,872	18,783	18,551	18,242	-1.79%
Total	1,145,548	1,156,040	1,169,112	1,177,688	1,183,607	1,189,796	1,193,014	4.14%

Sources: 2010 Census - U.S. Census Bureau and 2010-2017 Estimates Weldon Cooper Center for Public Service, Demographics & Workforce Group, January 30, 2017

Table 2. SPSA Estimated Population Growth by Community

	2010 Census	2020 Population Projection	2030 Population Projection	2040 Population Projection	Average Annual Growth Rate (2010 2040)
Chesapeake	222,209	249,513	280,173	314,600	1.2%
Franklin	8,582	9,265	10,003	10,800	0.8%
Norfolk	242,803	246,220	249,686	253,200	0.1%
Portsmouth	95,535	96,415	97,304	98,200	0.1%
Suffolk	84,585	109,339	141,337	182,700	2.6%
Virginia Beach	437,994	456,993	476,817	497,500	0.4%
Isle of Wight	35,270	42,749	51,813	62,800	1.9%
Southampton	18,570	20,641	22,942	25,500	1.1%
Total	1,145,548	1,237,832	1,330,075	1,445,300	0.8%

Sources: 2030-2040 Population Projection - HRPDC

Table 3. SPSA Employment Projections, 2020 - 2040

	2010	2020 Projection	2030 Projection	2040 Projection	Percent Growth Projection (2010 2040)	Average Annual Change (2010 2040)
Chesapeake	122,265	135,656	150,515	167,000	36.6%	1.0%
Franklin	6,182	6,874	7,644	8,500	37.5%	1.1%
Norfolk	210,037	217,801	225,852	234,200	11.5%	0.4%
Portsmouth	57,414	61,452	65,774	70,400	22.6%	0.7%
Suffolk	33,914	41,668	51,195	62,900	85.5%	2.1%
Virginia Beach	240,070	261,901	285,718	311,700	29.8%	0.9%
Isle of Wight	15,347	19,400	24,523	31,000	102.0%	2.4%
Southampton	5,454	6828	8,547	10,700	96.2%	2.3%
Total	690,683	751,580	819,768	896,400	29.8%	0.9%

Sources: 2020-2040 Projection (HRPDC)

Table 4. SPSA Household Projections, 2020 - 2040

	2010	2020 Projection	2030 Projection	2040 Projection	Percent Growth Projection (2010 2040)	Average Annual Change (2010 2040)
Chesapeake	79,574	89,783	101,303	114,300	43.6%	1.2%
Franklin	3,530	3,828	4,150	4,500	27.5%	0.8%
Norfolk	86,485	88,125	89,797	91,500	5.8%	0.2%
Portsmouth	37,324	37,777	38,236	38,700	3.7%	0.1%
Suffolk	30,868	40,125	52,158	67,800	119.6%	2.7%
Virginia Beach	165,089	172,764	180,795	189,200	14.6%	0.5%
Isle of Wight	13,718	16,689	20,303	24,700	80.1%	2.0%
Southampton	6,719	7,541	8,464	9,500	41.4%	1.2%
Total	423,307	456,632	495,206	540,200	27.6%	0.8%

Sources: 2020-2040 Projection - HRPDC

2.0 EXISTING SOLID WASTE MANAGEMENT SYSTEM

Solid waste generated in the planning area is managed through a combination of services and service providers. Generally, municipal solid waste is collected by local governments and private haulers and is taken to either a SPSA transfer station or to Wheelabrator's RDF WTE Facility (Portsmouth). The collection of MSW from single-family homes has remained the responsibility of the local governments. Each locality handles its collection systems differently, although almost all are on a weekly/automated system. Some localities also serve multi-family residences and small commercial businesses.

All localities in the region provide recycling services. SPSA continues to operate regional programs for white goods recycling (including Freon extraction), household hazardous waste, tire processing, used oil collection, and battery recycling.

2.1 RECYCLING PROGRAMS

2.1.1 Municipal Recycling Programs

Recycling in the region consists primarily of curbside recycling and drop-off locations:

- Chesapeake contracts for its curbside recycling services. The service is provided on an every-other week schedule using a 96-gallon container. With the implementation of curbside collection, the City eliminated use of drop-off facilities. Recyclable materials include aluminum cans and foil, #1 and #2 plastic bottles and containers, glass jars and bottles, tin and steel cans, mixed paper (newspaper, office, junk mail, telephone books, catalogs/magazines), cardboard and paper bags, boxboard (e.g., cereal boxes, paper towel rolls).

- Curbside recycling in Franklin is provided through a contract with a private firm (All Virginia Environmental Solutions). The service provider uses an automated, single-stream system using 95-gallon carts. Items that are recyclable are, aluminum cans, cardboard, paper (office, newspaper, junk mail, catalogs, glass (clear, green and brown), metal cans, newspaper, office paper and plastics #1 through #7.

- Isle of Wight operates eight, single-stream drop-off recycling facilities at the County convenience centers (Camptown, Carroll Bridge, Carrsville, Crocker's, Jones Creek, Stave Mill, Walters and Wrenn's Mill). Materials accepted at the centers include paper (newspaper, office, magazines and telephone books, junk mail), cardboard, paperboard (cereal boxes, shoe boxes), milk and juice cartons, plastic bottles and containers (#1 through #7), glass, tin and steel cans, aluminum (cans, foil, pie plates). Additional containers are available for plastic bags, electronics, scrap metal, appliances, cooking oil, motor oil, yard waste. Residents of Smithfield receive monthly curbside collection of recyclable materials through a private contractor.

- Norfolk provides curbside collection of recyclable goods on a bi-weekly basis to 58,200 single-family homes. Each residence is provided a 90-gallon recycling container for participation in the curbside program. Citizens also have two drop-off facilities located in the City for recycling; a third site is scheduled to open soon. Office paper and cardboard are collected from Norfolk schools and other City buildings.

- The City of Portsmouth discontinued its curbside recycling program and provides residents the opportunity to recycle at seven local drop-off sites located throughout the City. The bins accept comingled materials.

- Southampton County offers recycling services through drop-off facilities as well as single-stream curbside collection (in some areas of the County) through a contract with a private firm (All Virginia Environmental Solutions). The County is in the process of providing containers for recycling at 11 convenience centers and transfer stations. Recyclables collected include paper, cans (aluminum, steel, tin), glass, plastic bottles and tubs, cardboard, and paperboard.

- Suffolk currently offers recycling services through 13 drop-off locations. Materials accepted include aluminum cans, plastic bottles (#1 and #2), cardboard, mixed papers, steel/tin cans and glass bottles. Suffolk currently has a franchise agreement for a private hauler for curbside collection, but must have 2,500 homeowners sign up for service for it to become effective. The cost for this service is $12 per month.

- Virginia Beach contracts for its own recycling program through Tidewater Fibre Corporation and provides containers to all residents who receive curbside waste collection from the City. Automated recycling pickup, using large 95-gallon containers, is provided on an every-other-week basis. In addition, four drop-off facilities are also located throughout the City.

Some of the programs offered by SPSA include the following:

- **Ferrous Metal Processing Plant.** Metal collected at the RDF WTE Facility and at the drop-off facilities is brought to this Plant for processing. (Propane tanks are collected as well and handled through a contract with a local distributor.) Ferrous metals, such as steel food and paint cans, scrap metal, and compressed gas tanks are processed into small nuggets at the Bi-Metals Recycling Facility at the Regional Landfill. These nuggets are then sold to steel mills and processed into new steel.

- **White Goods Recycling Facilities.** Refrigerators, washing machines, air conditioning units, and other large household appliances are collected from residents free of charge at the Regional Landfill. Local contractors prepare the appliances for recycling by removing and collecting the freon for proper disposal. The scrap metal from the appliances is then recycled.

- **Tire Shredder** . Tires are shredded at the Tire Processing Facility located at the Regional Landfill. The shredded tires are used for drainage projects, pipe bedding and alternate daily cover ADC). SPSA reports that approximately 400,000 tires are shredded per year.

- **Used Oil Collection Sites.** Most SPSA facilities have containers to collect motor oil from residents free of charge. Used oil is cleaned of particles and processed into new oil and fuels. The oil collected by SPSA is recycled through a contract with a private vendor.

2.1.2 Recycling Quantities

A summary of recyclable materials collected in the region is provided in Table 5. Over the past several years, the region has collected around 400,000 tons of waste to be recycled.

Table 5. Local Recycling Programs

	Curbside Recycling							
	Cardboard & Paper	Plastic Bottles & Jugs	Glass Bottles & Jars	Metal Cans	Cartons	Plastic Tubs (Wide Mouth)	Rigid Plastics (Small)	Rigid Plastics (Large)
Chesapeake	x	x	x	x	x			
Franklin	x	x	x	x				
Isle of Wight	No curbside recycling service							
Norfolk	x	x	x	x	x			
Portsmouth	x	x	x	x	x	x		
Southampton	x	x	x	x		x		
Suffolk	x	x	x	x	x			
Virginia Beach	x	x	x	x	x			

	Drop Off Recycling							
	Cardboard & Paper	Plastic Bottles & Jugs	Glass Bottles & Jars	Metal Cans	Cartons	Plastic Tubs (Wide Mouth)	Rigid Plastics (Small)	Rigid Plastics (Large)
Chesapeake	x	x	x	x	x			
Franklin	No drop-off recycling service							
Isle of Wight	x	x	x	x	x	x		
Norfolk	x	x	x	x	x			
Portsmouth	x	x	x	x	x	x		
Southampton	x	x	x	x		x		
Suffolk	x	x	x	x	x			
Virginia Beach	x	x	x	x	x			

Table 6. Materials Recycled (Tons)

	2010	2011	2012	2013	2014	2015	2016
Metals	97,387	138,430	177,813	126,967	174,668.82	102,885	169,296
Glass	805	1,842	132	4,356	4,107.10	1,797	3,830
Plastic	3,522	4078	2,959	5,368	4,551	2,091	12,223
Paper	90,407	182,834	167,371	201,935	191,891	187,110	216,450
Yard Waste	56,112	78,983	67,660	64,877	56,038	67,807	20,195
Total	**248,233**	**406,167**	**415,935**	**403,503**	**431,256**	**361,690**	**421,994**

Sources: SPSA and HRPDC (Includes primary materials recycled through municipal programs. Does not include special items such as batteries, electronics, used oil, etc.)

2.1.3 Recycling Education

HRPDC and the individual localities continue to bring awareness of its programs to the public that are both local and regional in scope. Educational initiatives to encourage recycling are currently underway both at the local and regional level. These educational initiatives will be continued and expanded, based on need and availability of funding and staff resources, to ensure that the citizens and businesses in the SPSA localities are aware of available recycling programs and the benefits of recycling.

- **HR CLEAN: HR CLEAN** promotes litter prevention, recycling, community beautification and environmental awareness in the cities and counties that make up the Hampton Roads Region. The program is managed by the HRPDC and closely coordinates with other regional environmental education programs. The program's website (www.hrclean.org) contains information on residential recycling, business recycling and buying recycled goods.

- **Chesapeake:** The city has curbside recycling information, including "how to" videos for the new curbside collection program available on its website (http://www.chesapeake.va.us/services/depart/pub-wrks/wastemanagement-recycling.shtml). The City has implemented "Recycling Perks," a program that rewards residents for participation in the recycling program. The City's website states that "Recycling Perks are designed to help residents save money and provide discounts on entertainment or leisure activities. Rewards are offered by local businesses to reward residents for recycling."

- **Franklin:** Recycling information is included in the city's newsletter *City Clips,* which is available online at: http://www.franklinva.com.

- **Isle of Wight:** The county has a webpage devoted to environmental issues, including recycling, that is entitled *Isle be Green* (http://islebegreen.com).

- **Norfolk:** The Norfolk Environmental Commission http://www.norfolkbeautiful.org/). This website contains information for Norfolk residents regarding household hazardous waste, recycling, and adopt a spot. Additional recycling information is available on the city's website (http://www.norfolk.gov/curbside_recycling).

- **Portsmouth:** Information regarding recycling drop off facilities is available on the city's website at http://www.portsmouthva.gov/publicworks/recycle.aspx.

- **Suffolk:** Recycling information is provided on the City's website at http://www.suffolk.va.us/pub_wks/recycling.html.

- **Virginia Beach:** Recycling information is available on the city's public works webpage, which is available through http://www.vbgov.com. The Waste Management division also uses social media to disseminate updated recycling information. Virginia Beach recently acquired an official recycling mascot to attend local events. The mascot represents the city's "Catch the Wave--Recycle" logo.

Both the municipalities and the HRPDC provide information to the public on waste disposal issues, including litter control, recycling, and household hazardous waste. In addition, through the HRPDC, information is provided to the public on a variety of other environmental issues. This information is provided in the form of media coverage, advertising, fact sheets, brochures, educational materials, and "give-aways."

2.1.4 Private Recycling Programs

Private businesses provide additional recycling opportunities in the Region for residents and businesses. Many examples are provided below.[1] Although most recycling businesses accept one or two materials, many accept a range of common recyclable materials. In addition to the opportunities listed here, many large businesses, such as Walmart, have branches in the Region likely have their own recycling programs to back-haul their recyclables to central locations.

The quantities of materials recycled through private recyclers is typically not tracked in a comprehensive fashion by the Region. Quantities of recycling by firms are tracked.

2.1.4.1 Commercial Recycling Collection

Both TFC and Bay Disposal offer fee-based recycling opportunities to commercial businesses located in the Region. Collection programs generally are offered for paper, corrugated cardboard, plastic containers, aluminum cans, steel/tin cans, and glass. Butler Paper Recycling and Atlantic Paper Stock provide office and institutional recycling for paper commodities.

2.1.4.2 Private Material-specific Drop-off Locations

Several businesses in the Region specialize in recycling a few material types as described below.

2.1.4.2.1 Electronics

Collection of computers, monitors, laptops, and televisions, telephones, game consoles, and small appliances is provided by Goodwill, Best Buy, and electronics retailers. Generally, electronics recycling, with the exception of monitors, is free; however, some retailers will provide incentives for users of their electronics recycling programs.

2.1.4.2.2 Household battery, ink cartridge, and cell phone collection

Several locations within the Region collect ink cartridges, cell phones and household batteries. Some retailers, such as Target, collect all three. Only cell phones are collected at most wireless retailers. Retailers that accept NiCad/rechargeable batteries include Home Depot, Best Buy, and Batteries Plus. Ink cartridges are accepted at recycling programs operated by OfficeMax and Best Buy.

---

[1] Discussion of specific recycling programs n this section should not be construed as a recommendation or endorsement by the Hampton Roads Planning District Commission. The recycling programs discussed here may not represent all programs available in the region as some businesses may have reduced or expanded the types of materials they accept.

2.1.4.2.3 Metal Recycling

Several metal recyclers are located in the Region that will accept both ferrous and nonferrous metals, including aluminum, brass, and copper. These recyclers include Sims Metal Management Dubin metals, Guterman Iron and Metal, Surplus Recycling, U-Cycle Recycling, Virginia Beach Salvage Exchange, and Wise Recycling. Some will pay a fee for certain metals.

2.1.4.2.4 Car Batteries and Used Motor Oil

Car batteries and used motor oil are accepted at Jiffy Lube, Advanced Auto Parts, Firestone, Treadquarters, Pep Boys, and Interstate.

2.1.4.2.5 Compact Fluorescent Lights

Used compact fluorescent lights (CFL) are accepted by Home Depot and Lowes stores.

2.1.4.2.6 Plastic Bags

Plastic bags (#2 and #4 plastics) are accepted at a variety of grocery stores and retailers including Farm Fresh, Sam’s Club, Lowe’s, JCPenny, Walmart, and Target.

2.1.4.2.7 Asphalt, Concrete, and Brick

These three materials are accepted by Waterway. Concrete is accepted by Vulcan materials.

2.1.4.2.8 Waste Cooking Oil

Virginia Beach SPCA accepts used vegetable oil to fuel its Neuter Scooter mobile clinic.

2.1.4.2.9 Textiles

Goodwill stores generally recycle textiles that are not of high enough quality to be sold in the stores.

2.1.4.3 Reuse Opportunities

Various organizations offer reuse opportunities for clothing and household items including Goodwill, Salvation Army, and Habitat for Humanity (reusable building materials).

2.1.5 Material Recovery Facilities

Table 7 lists the known active MRFs in the Tidewater area.

Table 7. Material Recovery Facilities in Southeastern Virginia

Facility Name	Location
Active Permitted Facilities	
B&H Sales Corp (PBR567)	Norfolk
Bay Disposal LLC (PBR598)	Norfolk
Bay Disposal LLC (PBR620)	Smithfield
Clearfield MMG Inc - Suffolk (PBR155)	Suffolk
Clearfield MMG Inc - Chesapeake (PBR622)	Chesapeake
Military Highway Recycling Center MRF (PBR596)	Chesapeake
Recycling and Disposal Solutions of Virginia (RDS) (PBR558)	Portsmouth
Select Recycling Waste Services Inc (PBR619)	Chesapeake
SPSA – Tire Processing Facility (PBR072)	Suffolk
TFC Recycling - Chesapeake (PBR568)	Chesapeake
United Disposal Incorporated (PBR522)	Norfolk
US Navy - Norfolk Naval Shipyard (PBR135)	Portsmouth
Waste Industries LLC (PBR077)	Chesapeake
Wheelabrator Portsmouth Inc (PBR 500)	Portsmouth

Source: Virginia DEQ 2019 Annual Solid Waste Report for CY2018

2.1.6 Markets for Recycling and Reuse

Currently, all of the municipalities rely on the private sector for processing and marketing of collected recyclables. Collected materials are sold to a variety of end markets; the municipalities have no control over marketing decisions or prices paid. The municipalities can affect recycling markets, however, by:

- Using economic development mechanisms to attract business that manufacture recycled products or assist current businesses with methods to use recycled materials. By doing this, the region will help close the loop for recycling and can create markets for their collected materials.

- Creating viable, long-term markets for recovered materials. Generally, markets for recyclables are driven by demand for the end-products manufactured from recovered materials. The region can encourage procurement of products made with recycled content.

2.1.7 Summary

Currently there is only one significant facility in the Region that is capable of processing materials collected from various recycling programs. At the time the 2005 SWMP was written, SPSA was the primary provider of recycling collection services in the Region, with the exception of Virginia Beach. As an alternative, SPSA considered the construction and operation of a competing MRF. However, SPSA has discontinued recycling services and the member communities have taken over the responsibility for collection of recyclables. Processing of recyclables is currently a private sector function (see Figure 3).

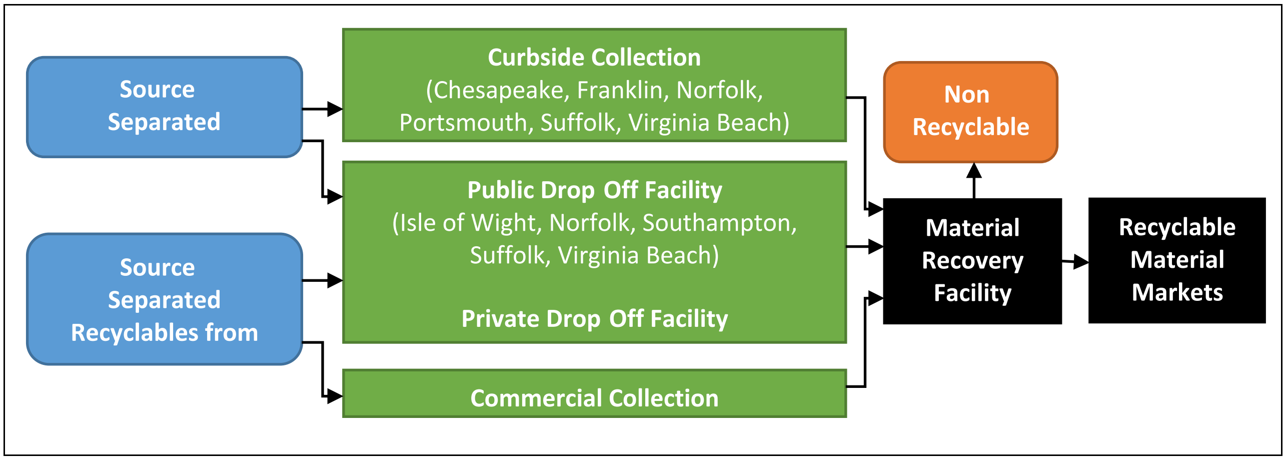


Figure 3. Management of Recyclables

2.2 YARD WASTE MANAGEMENT

Household chores such as raking leaves, mowing grass and trimming trees and shrubs generate the majority of yard waste, which has accounted for approximately 20 percent of solid waste collected in the Region (from SPSA Yard Waste Recycling flyer). The following is a summary of current yard waste collection/handling activities.

2.2.1 Municipal Collection

The majority of yard waste generated in the Region is currently collected by the SPSA member communities:

- **City of Chesapeake.** Leaves, trimmings and grass clippings are picked up with regular collections when placed at curbside. The City requires yard waste, leaves and grass clippings to be placed in clear plastic bags. The material currently is delivered to Waterway Materials or the Holland Landfill.

- **City of Franklin.** Each customer is provided a green 90-gallon cart for yard waste collection. Collected yard waste is delivered to a city-owned farm where it is processed.

- **Isle of Wight County.** Approximately 600 tons of yard waste is delivered to the convenience centers, which is transported to a composting facility in Waverly, Virginia.

- **City of Norfolk.** The City collects yard wastes, in amounts up to 20 clear plastic bags (up to 3 cubic yards if scheduled). The City disposes of some yard waste along with bulk items with a private vendor but the majority of yard waste is transported to a composting facility in Waverly, Virginia.

- **City of Portsmouth.** The City provides yard waste collection services; material is taken to the City of Portsmouth's landfill at Craney Island.

- **Southampton County.** The County does not offer curb side yard waste collection. Yard waste is delivered by citizens to the mini-transfer stations operated by the County. Woody debris is grinded by a private vendor.

- **City of Suffolk.** The City collects yard waste from single-family homes. Collected material is sent directly to the Regional Landfill or the Suffolk Transfer Station.

- **City of Virginia Beach.** The City collects yard waste from residences on a weekly schedule. Most yard waste collected is currently transported to a private composting facility in Waverly for beneficial reuse. Some yard waste is mulched at the City's Landfill No. 2 and used to landscape city properties.

2.2.2 Previous SPSA Yard Waste Management Initiatives

SPSA has operated facilities where yard waste collected by member communities was handled, mulched and composed. The end product of this activity had been a source of revenue for the Authority through the sales of mulch and compost (marketed as Nature's Blend). In 2005, operations conducted at the Regional landfill and Landfill No. 2 were consolidated on a section of Landfill No. 2 known as Phases 2B and 3. However, this facility was closed in 2007 to address Landfill No. 2 neighbor complaints of excess odors from the facility. No new Regional initiatives have been implemented since the Virginia Beach Landfill No. 2 facility was closed.

2.2.3 Private Sector Yard Waste Management

Waterways Recycling, LLC is located in Chesapeake and operates out of Waterway Marine Terminal. Though the facility is capable of processing and recycling the full range of construction, demolition and debris (CDD) materials, the facility is slightly more geared to convert woodbased debris into processed wood. A significant portion of their recycled product customer base pre-orders and utilizes its wood chips.

2.2.4 Yard Waste Management Summary

As stated previously, the Region does not currently have a facility dedicated to the handling and processing of yard waste, although several member communities are in the process of implementing programs to beneficially reuse the yard waste that they collect.

2.3 SOLID WASTE COLLECTION

2.3.1 Municipal Collection

Below is a summary of each member's MSW collection services to its citizens. Table 8 provides the relative contributions of the SPSA member localities to the total collected waste within the region. Municipal quantities have generally decreased over the past several years.

2.3.1.1 City of Chesapeake

Chesapeake's Department of Public Works, Division of Waste Management collects residential solid waste once per week from over 65,000 households using automated vehicles. Collected waste is primarily delivered to either the RDF WTE Facility or the SPSA Chesapeake Transfer Station located just off Greenbrier Parkway. The City supplies the residents with standard 96-gallon solid waste containers. Also available upon request is a smaller, 64-gallon container or 35-gallon container.

Chesapeake residents are able to dispose of waste at the Chesapeake Transfer Station or any other SPSA facility at no charge. Yard waste (clear bags or bundles) and bulk waste are collected weekly from residents as well. No requests are necessary for pick up of yard waste, but the City does require that requests to schedule bulk waste collection be received one week prior to the day of collection. Yard waste is delivered to Waterway Materials or the Holland Landfill, bulk waste is delivered to SPSA or to the Holland Landfill.

Residents are responsible for properly disposing of their own building debris and are directed to SPSA transfer stations and the Regional Landfill in Suffolk.

Chesapeake also collects waste from a limited number of small commercial establishments that are able to deposit all waste into two or three cans. The City does not intend to expand this service to additional establishments.

2.3.1.2 City of Franklin

The City of Franklin's Department of Public Works offers collection for 3,000 residential and small commercial generators, with weekly solid waste and yard waste collection. Special collections of bulk waste are offered upon request once a month. Each of the customers is given a black 90-gallon solid waste receptacle and a green 90-gallon cart for yard waste. Bulk yard waste is also collected upon request. Yard waste collected is delivered to a city-owned farm where it is processed. All other wastes are taken to the SPSA Franklin transfer station.

2.3.1.3 Isle of Wight County

The County operates eight convenience centers to handle solid waste, most of which are open seven days a week. A SPSA transfer station within the County is also available for waste disposal.

If requested, curbside collection is provided to Isle of Wight County residents for a fee by a franchised commercial hauler. The Towns of Smithfield and Windsor also each provide curbside pickup for residents through an agreement with a private hauler. Smithfield provides twice-weekly pickup of both residential refuse and yard debris. The hauler provides containers for a monthly fee. No municipal refuse collection is provided for Town businesses.

2.3.1.4 City of Norfolk

The Waste Management Division of the Department of Public Works collects approximately 95,000 tons of refuse, bulk waste, and yard waste annually from 61,000 households and businesses within the City. The City issues 90-gallon containers to residents of single-family homes, and curbside collection is provided once weekly by automated collection vehicles. Collection of bulk wastes is handled on the same designated day, when requested at least 24 hours in advance. In addition, yard wastes, in amounts up to 20 clear plastic bags (up to 3 cubic yards if scheduled), can also be collected at this time for recycling.

Waste collection in Norfolk's central business district takes place each Monday, Wednesday, and Friday evening. In addition, the City collects recyclables such as paper and cardboard each Tuesday and Thursday evening. Businesses outside the central business district receive waste collection weekly.

2.3.1.5 City of Portsmouth

The City of Portsmouth's Department of Public Works collects MSW from approximately 33,000 households each week using 95-gallon containers. Bulk waste and yard waste collection services also are provided; material is taken to the City of Portsmouth's landfill at Craney Island.

2.3.1.6 Southampton County

In addition to the Franklin Transfer Station, SPSA operates two other stations within Southampton County at Ivor and Boykins. The County offers to the residents of Southampton County fourteen mini-transfer stations. The waste collected from these mini-transfer stations is then delivered to the larger sites, where it is collected by SPSA. Southampton County residents may dispose of waste at any other SPSA facility free of charge.

2.3.1.7 City of Suffolk

The City of Suffolk Department of Public Works provides weekly residential refuse collection for all single-family homes within the City (approximately 32,000) using 90 gallon containers and automated collection vehicles. The City also provides collection services to approximately 200 businesses. Bulk and yard waste are also collected by the City. The City delivers collected waste directly to the Regional Landfill or the Suffolk Transfer Station.

2.3.1.8 City of Virginia Beach

Virginia Beach provides 95-gallon solid waste containers and weekly, automated curbside collection for approximately 150,000 households within the City. Curbside bulk pickup is available to households by special request. Each request must be received 24 hours prior to the regularly scheduled collection day. Yard waste is also collected from residences on the collection day. Bulk waste is delivered to the SPSA transfer stations and the majority of yard waste is transported to a private handling facility near Waverly, Virginia. Some yard waste is transported to the City's Landfill No. 2 where it is mulched for use on city properties.

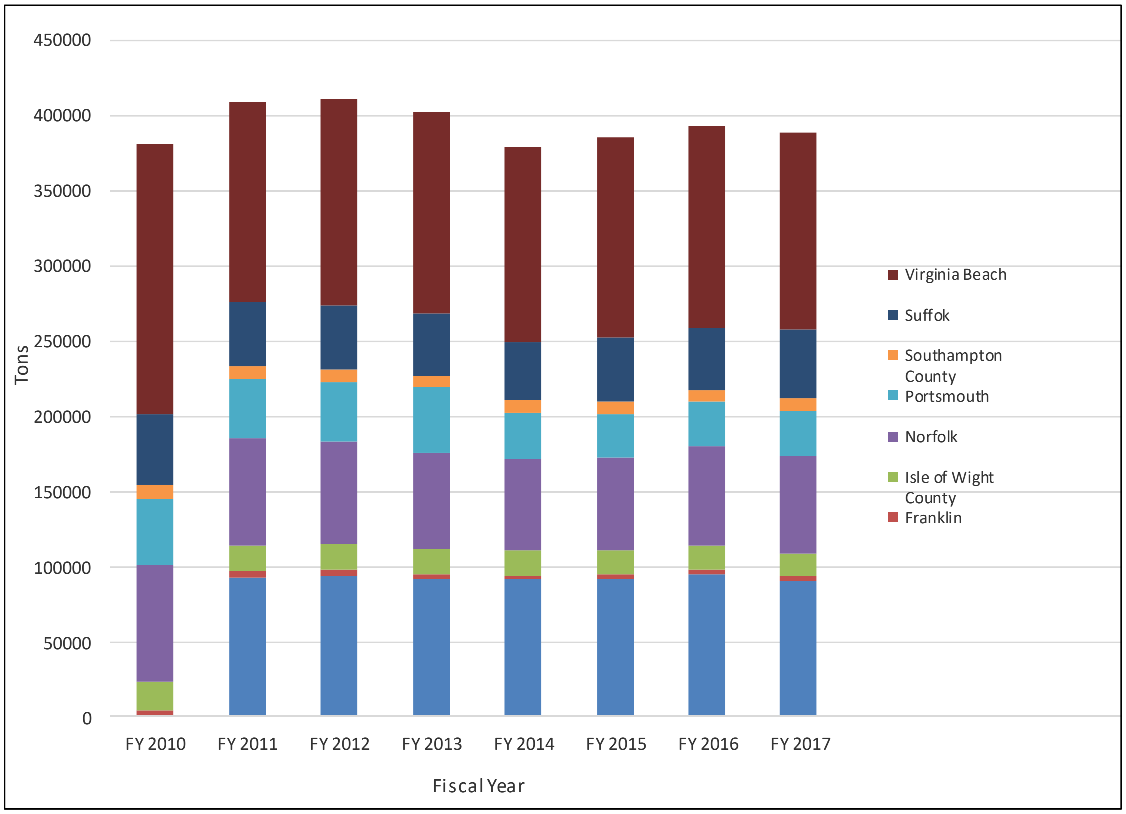
The Virginia Beach Landfill No. 2 is a 300-acre facility located in the Kempsville area of the City. Waste generated within the City by Virginia Beach residents can be delivered in privately owned vehicles to Landfill No. 2 free of charge. However, most the waste received at the Landfill is ash from the Wheelabrator RDF WTE Facility.

The City operates a landfill gas recovery plant at its Landfill No. 2 in cooperation with a private firm, Ingenco. According to Ingenco, Landfill No. 2 annually produces landfill gas equivalent in energy to approximately 1.5 million gallons of fuel oil. The plant harnesses the landfill-produced methane gas for energy production, and provides the City with royalty payments annually.

Table 8. Breakdown of Municipally Collected Waste by Locality

Locality	2010	2011	2012	2013	2014	2015	2016	2017	Tons per Household	Percent of Total
Chesapeake	99,969	92,935	93,963	91,757	91,182	92,072	94,981	90,926	1.05	23.4
Franklin	4,596	3,840	3,795	2,533	2,462	2,524	2,592	2,690	0.72	0.7
Isle of Wight County	18,676	17,395	17,464	17,411	17,254	16,070	16,513	15,180	0.96	3.9
Norfolk	77,874	71,141	67,662	63,953	60,416	62,296	66,240	64,680	0.74	16.7
Portsmouth	44,057	39,729	40,005	43,334	31,572	28,439	29,089	30,023	0.80	7.7
Southampton County	9,263	7,957	8,187	7,791	8,207	8,107	8,385	8,593	1.18	2.2
Suffolk	46,607	42,703	42,571	41,582	37,881	43,339	40,770	45,645	1.22	11.8
Virginia Beach	180,134	133,066	137,624	134,007	130,349	133,304	134,285	130,645	0.77	33.6
Total	481,176	408,766	411,271	402,368	379,143	386,151	392,855	388,382	0.87	100.0

Source: SPSA
Tonnage per Household calculated using data on Table 4



Source: SPSA

Figure 4. MSW Collected by Locality(Tons)

Table 9. Solid Waste Services

Service	Chesapeake	Franklin	Norfolk	Portsmouth
Solid Waste Residential Collection	The city provides weekly, automated collection using 96-gallon containers.	The city provides weekly collection using 90-gallon containers.	The city provides weekly, automated service using 90-gallon containers.	The city provides weekly collection services.
Solid Waste Commercial Collection	Not provided.	The city provides collection services for small commercial generators.	The city provides collection services for businesses located in the Central Business District (CBD) every other day. Businesses located outside the CBD receive one weekly collection.	Not provided.
Yard Waste Collection	City provides separate collection of yard waste using clear plastic bags on a weekly basis.	City provides collection services using a green 90-gallon cart on a weekly basis.	Yard waste is collected weekly by the City. Residents may use either a 30-gallon container or clear plastic bags.	Yard waste is collected by the City in clear plastic bags from the curb (placed next to MSW).
Recyclables Collection	The City provides curbside recycling services for the city every other week using a 96-gallon bin.	Franklin offers automated recycling using a 95-gallon cart.	The city collects recyclables twice a week from businesses located in the CBD. Curbside collection of recyclables is provided by the City every other week using a 95-gallon cart.	The City operates recycling drop off locations for the city.

Table 9 (Continued)

Service	Suffolk	Virginia Beach	Isle of Wight	Southampton
Solid Waste Residential Collection	The city provides weekly automated and manual collection from single-family homes.	The city provides weekly automated collection from single-family homes using 90-gallon containers. Townhouse areas may use 32-gallon containers or plastic bags.	The county provides weekly collection through a franchised hauler (for a fee) for those residents requesting the service. As an alternative, the county operates eight full-service manned convenience centers for self-hauled waste.	The county operates 14 sites for residents to self haul waste.
Solid Waste Commercial Collection	Not provided.	Not provided.	Not provided.	Not provided.
Yard Waste Collection	The City offers curb-side yard waste collection upon request (limited to residential dwellings).	The City provides weekly collection of yard waste either stacked or in clear plastic bags. The City also offers a yard waste container rental program for larger quantities of yard waste.	The County does not provide curb-side collection of yard waste, but does provide containers for residents to dispose of yard waste at each of its eight convenience centers.	The County does not offer curb-side yard waste collection. Yard waste is accepted at the County's 16 refuse collection sites.
Recyclables Collection	The city offers drop-off only recycling for its residents. Drop-off facilities are located throughout the city.	Virginia Beach provides residents with automated curbside collection (non-SPSA) using 95-gallon carts on an every-other-week basis.	Drop-off only recycling sites for the county that are located at the convenience centers and the transfer station. The town of Smithfield offers bi-weekly curbside recycling to all single-family homes, duplexes, and townhouses.	The county provides 18-gallon bin recycling for residents of Courtland, Newsoms, and Boykins. Drop-off facilities are located at six of the county's mini-transfer stations.

2.3.2 Private Collection

Private firms perform a significant function in the Region with regard to waste collection and disposal. While the SPSA member communities are the primary collectors of MSW from single-family residents (with the exception of the more rural areas in Southampton and Isle of Wight Counties), private firms are the primary collectors of MSW from multi-family, commercial, and industrial establishments. Commercially collected MSW is delivered by the private firms to either the Wheelabrator RDF WTE Facility, a SPSA Transfer Station or an out-of Region disposal facility. Of the waste that is delivered to the Transfer Stations, processible waste is delivered to the RDF WTE Facility by SPSA for a fee. Non-processible waste is loaded onto Wheelabrator trailers for eventual disposal at Waste Management's Bethel or Atlantic Waste Landfills (Waste Management is the parent company of Wheelabrator). Wheelabrator maintains contracts with the private haulers. Firms that play a significant role in the collection of MSW in the Region include Waste Management, Waste Industries, Republic Services, and Bay Disposal.

2.3.2.1 Commercial Waste Receipts

During FY 2019, SPSA's commercial customers delivered 183,715 tons of waste into the system. This amount includes 26,265 tons of Navy waste and 86,195 tons of other waste. Historically, quantities of commercial waste have been decreasing due to expiration of contracts, an increase in tipping fees for CDD waste, and a decision to cease accepting out of region waste in late 2008.

Table 10. SPSA Commercial Waste Receipts

	Tons Received							
Category	2010	2011	2012	2013	2014	2015	2016	2017
Commercial	452,652	512,614	505,506	496,781	502,803	578,182	567,416	466,420
CDD	30,951	29,005	14,797	9,770	9,014	10,066	11,486	14,252
Navy	28,780	27,940	27,774	25,179	23,613	25,357	24,725	19,414
Out of Area	2,862	1,723	2,306	1,169	1,280	1,173	1,612	1,650
Proprietary	14,511	11,082	7,335	9,136	13,2221	15,387	13,819	13,256
Total	529,756	582,364	557,718	542,035	549,931	630,165	619,058	514,992

Source: SPSA

2.3.2.2 Flow Control

When SPSA was formed, its organization and facilities were sized and began operations under the assumption that all MSW generated in its service area would be delivered to SPSA facilities. Since SPSA's formation, the Commonwealth of Virginia has allowed several large landfills to be constructed in largely rural areas of eastern Virginia.

With the adoption by the U.S. Supreme Court of the Carbone decision in 1994, neither states nor localities could effectively control the flow of waste across political boundaries. In order to internalize cash flows, the operators of the large private landfills began hauling waste generated from within the SPSA service area to their own landfills, sometimes as much as 100 miles away.

Because the SPSA system was developed and sized to accept all of the region's waste, the loss of a significant portion of the waste stream has had a significant negative financial impact on SPSA and its member communities. The Use and Support Contracts which called for member communities to deliver all or substantially all of their solid waste to SPSA were effectively amended by this decision to include only that waste which is collected by the member communities or controlled by them through contracts. The SPSA system was built under the assumption that SPSA members could control the flow of both residential and commercial solid waste generated within their borders and that adequate waste flows would create sufficient revenues to finance construction and maintenance of the system. In 1994, the U.S. Supreme Court ruled (Carbone case) that flow control was unconstitutional. After this decision, SPSA's commercial waste flows significantly decreased. In an attempt to regain lost waste flows, SPSA negotiated contracts with private haulers, both in and outside of the Region, which included a reduced tipping fee.

In 2007, the Court clarified its decision (United Haulers case) to allow localities to direct waste to a publicly-owned facility. As a result, the cities of Norfolk, Chesapeake, Portsmouth, and Franklin, and Isle of Wight and Southampton counties passed ordinances requiring delivery of waste generated within their jurisdictions to SPSA facilities beginning in January 2009; however, the Cities of Virginia Beach and Suffolk did not. The decline in commercial waste deliveries, and the resulting negative revenue impact to SPSA led to a financial crisis culminating in the sale of the RDF WTE Facility to Wheelabrator in April 2010. This has significantly reduced SPSA's debt service, stabilized its financial condition, and reduced tipping fees.

2.4 SOLID WASTE TRANSFER

2.4.1 SPSA Transfer Stations

SPSA currently operates nine transfer stations that received 685,991 tons of waste in 2017. Figure 5 shows the location of each facility. In 2017, the Norfolk Station accepted the greatest percentage of waste followed by the Landstown Station. A summary of each transfer station throughput is provided in Table 11. The 2017 SPSA Annual Survey Report prepared by CH2M describes the current condition of the SPSA transfer stations as well as recommended maintenance activities.

- *Boykins Transfer Station*: The station opened in 1985 and consists of an elevated area where customers can deposit waste into a stationary compactor or two open-top roll-off containers. The station is permitted to accept 50 tons per day and is manned by Southampton County and serviced by SPSA.

- *Chesapeake Transfer Station*: This transfer station was built in 1984 and utilizes a bi-level, non-compacted, direct-dump design consisting of one refuse hopper, a tipping area on the upper level, and a "load out" area on the lower level. The facility has a maximum capacity of 500 tons per day with a storage capacity of up to 150 tons at any given time. The station utilizes a drop-and-hook system, which allows waste on the floor to be removed and placed in staged trailers for hauling at a later time.

- *Franklin Transfer Station*: This station was opened in 1985 and consists of an open tipping floor area screened with a fabric chain link fence and a prefabricated office building. Waste is dumped into the single hopper directly into open-top transfer trailers and is hauled to the Regional Landfill by SPSA. The facility is permitted for 150 tons per day and capable of storing 50 tons at any one time. The station utilizes a drop-and-hook system, which allows waste on the floor to be removed and placed in staged trailers for hauling at a later time.

- *Isle of Wight Transfer Station*: This station was opened in 1985 and consists of a push-wall transfer station with a three-sided metal building superstructure. Transfer trailers travel on a loading lane situated at a lower grade than the tipping floor so that the side of the trailers are approximately four feet above the tipping floor, and a front-end loader lifts waste into the transfer trailers which are then hauled to the Regional Landfill by SPSA. The station is permitted for 150 tons per day and capable of storing 50 tons at any one time. The station utilizes a drop-and-hook system, which allows waste on the floor to be removed and placed in staged trailers for hauling at a later time.

- *Ivor Transfer Station*: This station was opened in 1985 and consists of an elevated area where customers can deposit waste into a stationary compactor or two open-top roll-off containers. The station is permitted to accept 30 tons per day and is manned by Southampton County and serviced by SPSA.

- *Landstown Transfer Station*: This station opened in 1993 and consists of an enclosed tipping floor with three hoppers for loading. The station is permitted to accept 1,500 tons per day.

- *Norfolk Transfer Station*: This station opened in 1985 and consists of an enclosed tipping floor with three hoppers for loading. The station is permitted to accept 1,300 tons per day.

- *Oceana Transfer Station*: This station was built by the City of Virginia Beach in 1982. In 1987, SPSA bought the facility. The station has a design capacity of 500 tons per day, with the capability of storing 450 at any one time. The station utilizes a drop-and-hook system, which allows waste on the floor to be removed and placed in staged trailers for hauling at a later time.

- *Suffolk Transfer Station*: This station, built in 2005, is located near the entrance to the Regional Landfill and consists of an enclosed tipping floor with two hoppers for loading. The station is permitted to accept 1,300 tons per day. The station utilizes a drop-and-hook system, which allows waste on the floor to be removed and placed in staged trailers for hauling at a later time.

2.4.2 Private Transfer Stations

There are no known proposed or permitted privately owned transfer stations in the Region.

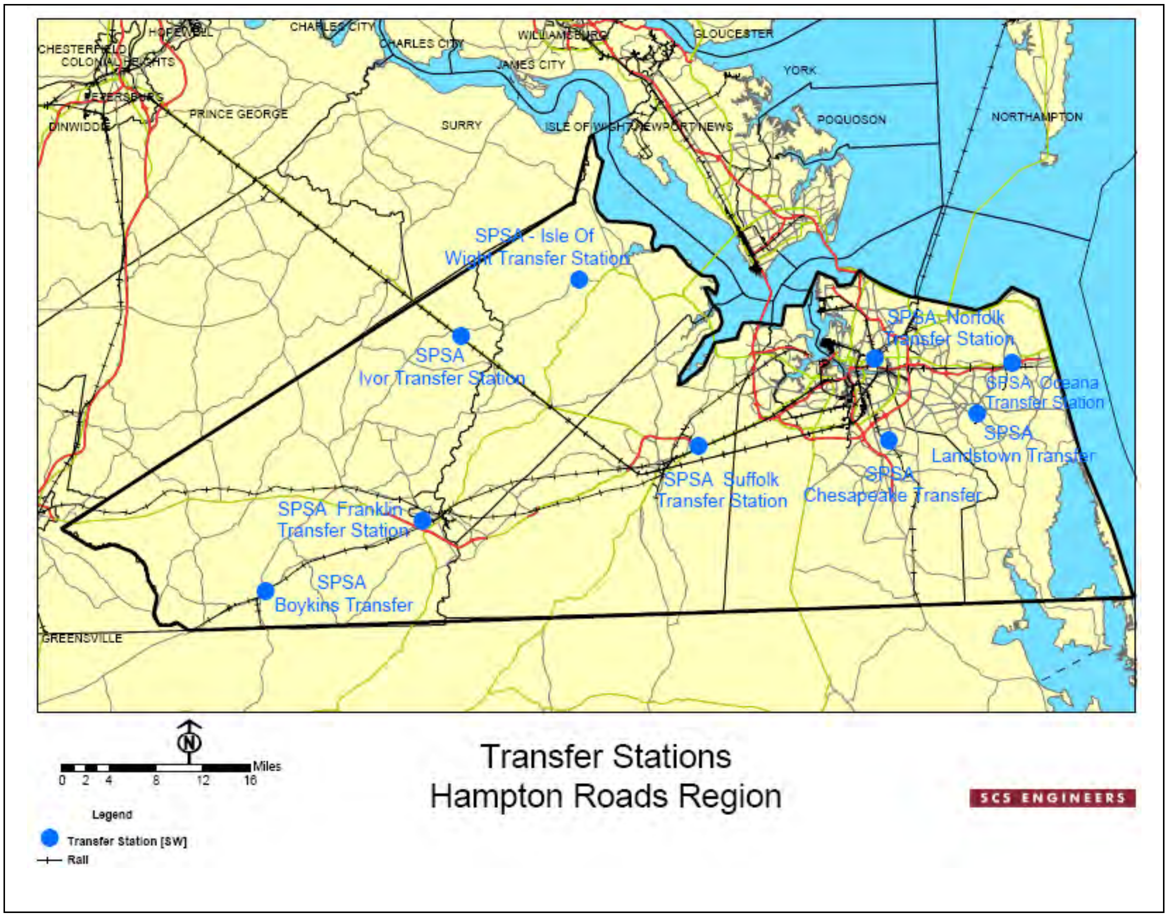
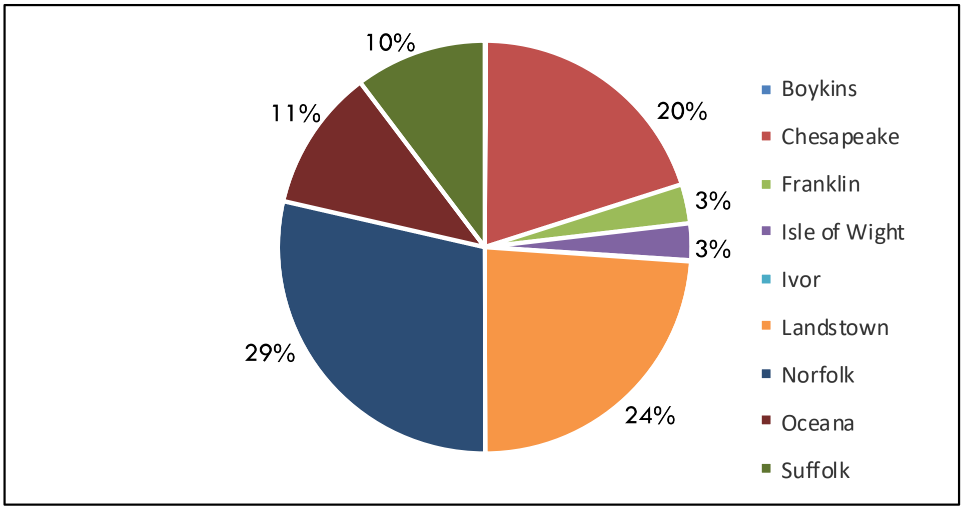


Figure 5. SPSA Transfer Station Location Map



*Ivor and Boykins Stations Transfer < 1% of Waste

Source: SPSA

Figure 6. Relative Proportion of Waste Transferred – Fiscal Year 2017

Table 11. Transfer Station Solid Waste Totals

Transfer Station	Design Capacity (tons per day)	Tons Received							
		2010	2011	2012	2013	2014	2015	2016	2017
Boykins	50	(1)	302	644	652	643	618	664	662
Chesapeake	500	127,883	146,621	145,405	136,885	142,736	141,030	135,637	137,053
Franklin	150	21,393	21,000	21,722	19,290	20,284	21,962	21,016	21,070
Isle of Wight	150	27,161	25,254	23,240	22,028	22,840	21,699	23,368	19,737
Ivor	50	(1)	300	653	652	616	624	642	595
Landstown	1,300	213,976	198,042	186,613	176,565	169,469	176,966	163,026	163,630
Norfolk	1,300	209,769	214,934	223,509	219,281	215,456	214,046	195,975	196,339
Oceana	500	85,954	85,579	101,781	93,829	88,681	83,961	74,736	76,298
Suffolk	500	67,457	69,825	68,848	62,350	61,988	65,074	65,101	70,607
Total	5,500	753,593	761,856	772,415	731,532	722,713	725,980	680,165	685,991

Source: SPSA (1) Boykins and Ivor waste quantities not reported separately in FY 10

2.5 SOLID WASTE DISPOSAL

Described in the following section are the solid waste disposal assets located in the planning area including the SPSA Regional Landfill, the Virginia Beach Landfill No. 2, the Wheelabrator RDF WTE Facility, and other private disposal facilities.

2.5.1 Regional Facilities

2.5.1.1 RDF WTE Facility

2.5.1.1.1 Operations

The RDF WTE Facility, located in Portsmouth, Virginia opened in June 1987. The facility processes municipal and commercial solid waste into fuel, shredding the wastes and removing metals. The fuel is burned in lieu of coal at the adjacent Power Plant to produce steam and electricity.

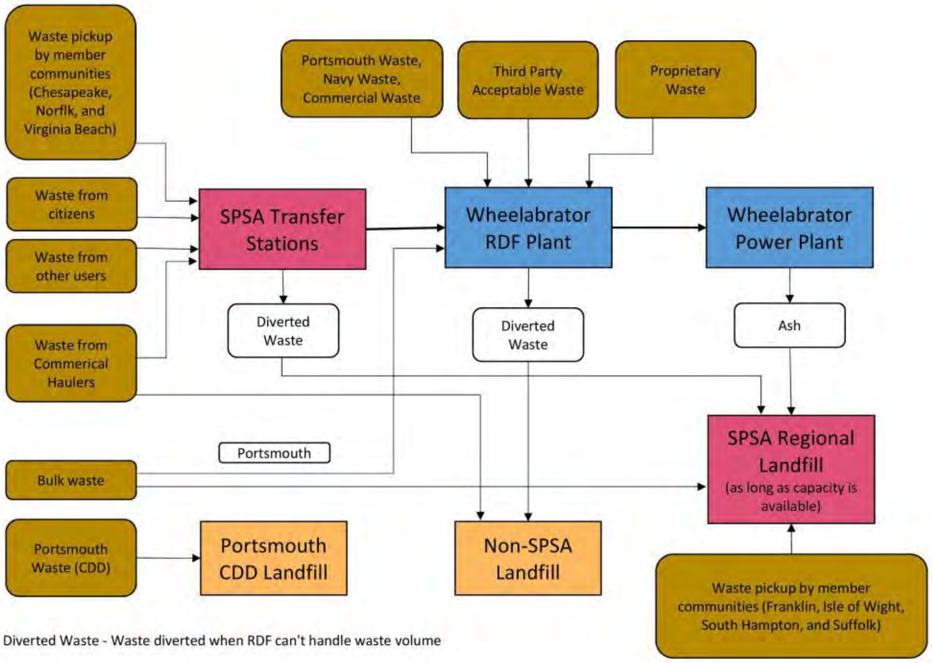
Solid waste is delivered to the RDF WTE Facility and dumped onto the enclosed tipping floor, which is roughly four acres in size. Front-end loaders push the waste toward the initial conveyor belts, while pulling out non-processible materials such as mattresses, lumber, tires and other bulky items. Hazardous wastes are also pulled out of the waste to be processed. Those items that are not processed are sent to a landfill for recycling and/or landfilling.

The waste placed on the conveyors is taken through a series of shredders, trommels, and sorting machines. The waste is broken down into smaller pieces that pass through magnetic separators in order to remove ferrous metals. Stations are positioned along the conveyor for teams of pickers who pull out large sticks or other non-processible objects prior to the waste being transported to the Power Plant. The result is small particles of solid waste that are in a more acceptable fuel form. These are sent by conveyor to the adjacent Power Plant that fuels the Norfolk Naval Shipyard.

The RDF WTE Facility was designed to process 2,000 tons of waste per day, and was projected to divert just over 450,000 tons of material per year from the Regional Landfill. Ferrous metals are removed from the combustor ash produced from the RDF WTE facility.

2.5.1.1.2 Ownership and Contractual Arrangements

In late 2007, SPSA advertised that it would entertain proposals from qualified interested parties for the sale of the RDF WTE Facility. In 2010, SPSA sold the facility to Wheelabrator Technologies. Under the terms of the sale and subsequent agreements, Wheelabrator will accept and processes SPSA member community solid waste at the RDF WTE Facility through June 2027. Under the current agreement with Wheelabrator, all MSW received at the Chesapeake, Landstown, Oceana, and Norfolk transfer stations are delivered to the RDF plant. Wheelabrator then delivers ash to the SPSA Regional Landfill. Waste that can’t be processed at the RDF plant is delivered to private landfills. Waste from the Suffolk, Isle of Wight, Ivor, Franklin, and Boykins transfer stations can be delivered directly to the SPSA Regional Landfill. Waste from these transfer stations is currently being delivered directly to the SPSA Regional Landfill.



Diverted Waste - Waste diverted when RDF can't handle waste volume

Figure 7. Flow of Municipal Solid Waste

2.5.1.2 Regional Landfill (SWP 417)

The SPSA Regional Landfill is located on 833 acres within the City of Suffolk near the intersection of US Route 13/58/460 and the US Route 58/460 Bypass. SPSA began disposing of waste in the Landfill in January 1985. Of the 833 acres, 188 acres are currently permitted and constructed landfill area (Cells I through VI). Cell VII was permitted in 2011. The landfill is currently open to the public six days a week.

Since 2015, the SPSA Regional Landfill has been utilized for disposal of around 300,000 tons per year and 350,000 CY per year of disposal airspace. Solid waste disposed of at the landfill consists of MSW, construction and demolition debris, ash and other wastes as well as clean fill. HRSD handles the treatment of leachate through their network of treatment facilities. Currently, the largest waste streams being received by the landfill is MSW from member communities to the west of the facility and ash from the Waste to Energy facility that processes the remainder of the SPSA member communities MSW.

The Landfill was originally designed to contain four disposal cells (Cells I through IV), which have now undergone the closure process. The permitted capacity of Cells I through IV is 25,800,000 cubic yards. In 1998, Cell V opened and provided the Landfill with additional capacity, extending the life of the Landfill through 2005. With the addition of Cell V, a final height of 205 feet above mean sea level can be achieved. A sixth landfill cell (Cell VI) opened in May 2006 west of Cell V. The permitted capacity of Cells V and VI is 12,200,000 cubic yards. The total permitted capacity of the Regional Landfill is 38,000,000 cubic yards.

On an annual basis SPSA measures the volume of material already placed in the Regional Landfill by a topographic survey. HDR Engineering was hired by SPSA to perform airspace calculations utilizing information from the topographic survey. In the February 2018 Airspace Management Report, HDR Engineers, presented information concerning when the currently constructed landfill cells could possibly reach capacity depending on the quantity of waste disposed annually and the density achieved in waste being placed for disposal. In the 2018 report, assuming current conditions continue, HDR Engineers estimated that in January of 2018 the Regional Landfill had more than four million cubic yards of permitted airspace available for future waste disposal in Cells V and VI. Assuming waste can be placed at a density of 1,400 to 1,600 lbs/CY and all permitted airspace can be captured, Cells V and VI will not reach capacity in their current configuration until 2027 or 2028, respectively. The actual rate of landfill airspace consumption will depend on the rate of waste intake over time and the ability of the landfill operators to maintain the outside side slopes at the design elevations as the landfill settles. The 2018 report has analyzed potential disposal capacity for Cell VII to be reached in 2041 at 1,280 lbs/CY density and 2048 at 1,670 lbs/CY density with incoming waste being 400,000 tons annually. Per the Solid Waste Information and Assessment (SWIA) Report for CY 2019, the SPSA Regional Landfill has 12,008,065 cubic yards of permitted capacity remaining and an expected remaining permitted life of 22 years.

In November 2010, an agreement became effective between SPSA and Suffolk Energy Partners, LLC (SEP), that conveyed exclusive rights for all the landfill gas (LFG) at the Regional Landfill to SEP for capture and beneficial reuse. Since 1994 the Regional Landfill has utilized a gas recovery system. The system includes gas collection wells strategically located throughout Cells I – VI. In addition to the gas collection wells, the system includes gas collection piping, a flare system, condensate drains, a 3.2 MW power plant using four internal combustion engines, and a 2.3 mile pipeline to sell gas to BASF, a company located adjacent to the west side of the landfill. Landfill gas not supplied to BASF is used to generate electricity and some is flared as a last resort.

2.5.1.3 Virginia Beach Landfill (SWP398)

The Virginia Beach Landfill No. 2 is a 300-acre facility in the western portion of the City. The current landfill area footprint is 104 acres. Waste generated within the City by Virginia Beach can be delivered in privately owned vehicles to the landfill free of charge. Ash from the RDF WTE facility is no longer delivered to Virginia Beach Landfill No. 2.

2.5.1.3.1 Capacity

The Virginia Beach Landfill has a permitted capacity of 15,331,000 cubic yards and a remaining capacity of 3,575,000 cubic yards (DEQ CY2019 SWIA Report for Virginia Beach City – Landfill No. 2.)

2.5.1.3.2 Estimated Site Life

The Virginia Beach Landfill has an expected remaining permitted life of 73 years (DEQ CY2019 SWIA Report for Virginia Beach City – Landfill No. 2.)

2.5.1.3.2 Expansion Potential

There are no plans to expand the landfill at this time.

2.5.1.4 Portsmouth CDD Landfill (SWP 041)

Portsmouth owns and operates a permitted construction, demolition, and debris (CDD) landfill located in the northern portion of the City known as the Craney Island Landfill. The facility only accepts CDD generated within the City.

2.5.1.4.1 Capacity

The Portsmouth CDD Landfill has a remaining permitted capacity of 1,926,444 cubic yards (DEQ CY2019 SWIA Report for Portsmouth City – Craney Island Landfill)

2.5.1.4.2 Estimated Site Life

The Portsmouth CDD Landfill has an expected remaining permitted life of 142 years (DEQ CY2019 SWIA Report for Portsmouth City – Craney Island Landfill)

2.5.1.4.2 Expansion Potential

There are no plans to expand the landfill at this time.

2.5.2 Private Landfill Capacity

There are several privately-owned disposal facilities that have the potential for accepting the Region's solid waste. All of these facilities are outside the Region. A large majority of the Region's waste that does not go to the RDF WTE Facility is currently being disposed in Waste Management's Bethel and Atlantic Waste Disposal Landfills.

2.5.2.1 Location and Status

Figure 8 shows the locations of most of the private disposal facilities with the approximate distance from the approximate center of the South Hampton Roads Region (intersection of I-264 and I-64).

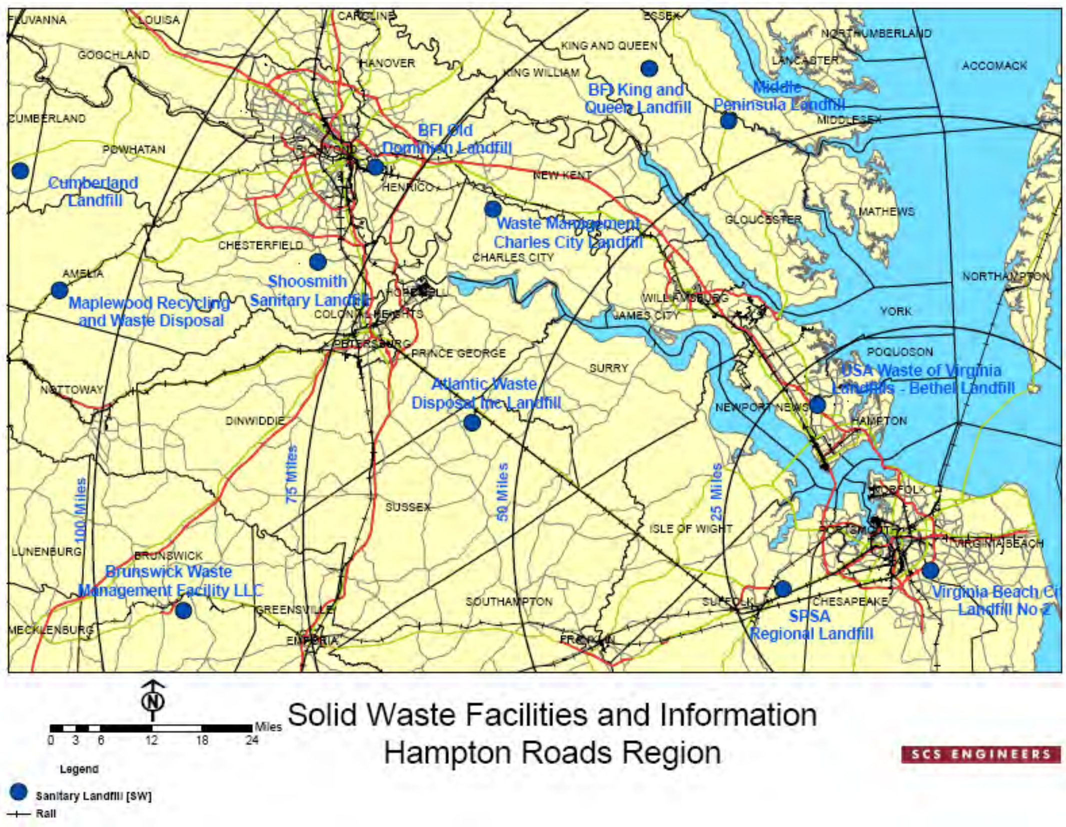


Figure 8. Private Landfill Facilities in Eastern Virginia

2.5.2.2 Capacity

As shown in Table 12, most the private disposal facilities in eastern Virginia have sufficient capacity needed to accommodate the Region's waste flow through the planning period.

The table summarizes the reported estimated total remaining permitted capacity, remaining reported permitted life, total projected remaining capacity and total projected life of each facility. As indicated, the total remaining permitted capacity and life of each facility were obtained from VDEQ's published annual report on solid waste management in Virginia (for calendar year 2018).

2.5.2.3 Haul Distance

Table 13 shows the hauling distance from each transfer station (and the RDF WTE Facility) in the SPSA network to each private waste disposal facility in eastern Virginia.

2.5.2.4 Rail Access

Several of the out-of-region landfills listed in Table 12 and Table 13 have rail access and transfer capabilities for servicing New York, Maryland, and other out-of-state communities (Atlantic Waste, King George, Brunswick).

2.5.3 Survey of Solid Waste Disposal Sites

The Virginia Regulations for Solid Waste Management require that all known solid waste disposal sites (closed, inactive, and active) in the planning region be documented and recorded. Appendix B lists all solid waste management facilities in the Southeastern Virginia Region.

Table 12. Out of Region Landfill Facilities

Landfill	Total Remaining Permitted Capacity (Tons)	2018 Waste Disposed (Tons)	Remaining Reported Permitted Life (Years)
Atlantic Waste Disposal - Sussex Co. (Waste Management)	45,497,743	1,279,485	74
BFI King and Queen Landfill (Republic)	6,957,506	664,583	17
BFI Old Dominion Landfill (Republic)	8,186,234	468,487	24.3
Brunswick Waste Management Facility	9,982,220	211,151	72
King George Sanitary Landfill (Waste Management)	16,795,934	1,699,050	22
Maplewood Recycling and Disposal (Waste Management)	16,397,337	232,232	148
Middle Peninsula (Waste Management)	13,995,988	519,785	52
Bethel Landfill (Waste Management)	22,467,607	645,913	80
Charles City Landfill (Waste Management)	12,805,824	614,549	37
Shoosmith Sanitary Landfill	20,050,000	1,002,544	30

* Source: Virginia DEQ 2019 Annual Solid Waste Report for CY 2018

Table 13. Potential Out-of-Region Long Haul Transportation Distance (From Current SPSA Transfer Stations)

	Distance, Miles (One Way)											
Transfer Station	**SPSA Regional Landfill**	**ATL Waste Disposal, Sussex County**	**WM Charles City County Landfill**	**Cumberland Landfill**	**WM Maplewood Landfill**	**WM Middle Peninsula Landfill**	**WM King George Landfill**	**BFI King & Queen Landfill**	**BFI Old Dominion Landfill**	**Brunswick Waste Management Facility**	**WM Bethel Landfill**	**Shoesmith Sanitary Landfill**
Landstown	27	73	89	155	139	70	144	82	99	107	34	104
Oceanna	29	68	89	143	137	70	144	82	100	109	28	106
Norfolk	17	63	78	145	129	59	133	71	88	98	23	94
Franklin	30	42	72	118	104	96	146	109	77	53	60	67
Isle of Wight	25	34	64	116	101	58	140	71	72	76	23	65
Suffolk	0	46	85	128	117	65	152	78	95	81	29	77
Boykins	44	45	76	120	107	109	153	117	83	52	73	71
Ivor	25	21	52	102	89	72	127	85	60	64	36	53
Chesapeake	20	65	88	148	132	68	142	81	98	100	32	97
RDF Transfer - Portsmouth	13	59	87	141	125	68	142	80	98	94	31	90

3.0 SPECIAL WASTE

This section includes discussions of various waste types generated in the region that are categorized, processed, handled, or otherwise addressed separately or differently than the wastes that are addressed in the other sections of this plan. The following information describes in more detail the most prevalent types of special wastes handled throughout the region.

3.1.1 Household Hazardous Waste

Household cleaners, pesticides and fertilizers, fuels, paints, batteries, and pool chemicals that would otherwise go into the Regional Landfill are diverted from the waste stream through the SPSA Household Hazardous Waste (HHW) collection program. SPSA operates five HHW collection facilities. Virginia Beach has assumed responsibility for the HHW facility operation at the City's Landfill No. 2. The City of Norfolk also operates a household hazardous waste facility. The table below provides a breakdown of the materials collected at the SPSA facilities.

Table 14. Household Hazardous Waste Disposal Quantities

Waste Profile	Units	Quantity							
		2010	2011	2012	2013	2014	2015	2016	2017
Paint Related Materials	Gallons	1,540	4,565	1,650	1,650	1,045	880	660	990
High Btu (Waste fuel/solvents)	Gallons	1,540	3,575	1,595	1,595	1,430	1,650	1,650	1,485
Low Btu (Waste oil/oily water)	Gallons	1,485	990	275	330	385	330	110	220
Detergents/Cleaners	Gallons	1,045	495	330	0	330	1,320	385	440
Pesticide Liquids	Gallons	6,960	4,510	1,245	2,365	1,100	2,420	2,035	1,705
Inorganic Acids	Gallons	990	1,870	344	440	275	385	275	220
Base Liquids	Gallons	1,056	165	110	55	165	385	220	110
Oxidizers	Pounds	NR	NR	NR	NR	NR	NR	NR	4,400
Antifreeze	Gallons	1,433	5,559	1,421	1,624	2,086	2,298	1,460	1,285
Wet Cell Batteries*	Each	950	225	350	243	695	390	307	731
Propane Cylinders*	Each	3,574	1,248	605	1,201	8664	568	576	730
Pesticide Solids	Pounds	4,505	22,200	3,800	12,800	18,400	8,800	6,750	9,900
Base Solids	Pounds	880	800	400	0	0	110	55	0
Dry Cell Batteries**	Pounds	12,600	2,400	800	700	1,225	1,100	700	700
Aerosol Cans	Pounds	855	1,870	1,100	800	705	600	6	2,400
Mercury	Pounds	825	125	180	0	0	456	584	30
Reactive (Calcium Carbide)	Pounds	5	10	50	0	0	0	1	0
Oil	Gallons	26,903	19,449	9,546	8,533	8,941	11,250	6,954	10,161
Solvents	Gallons	NR	1,954	653	200	139	0	0	0
Other Cylinders*	Each	NR	4,884	4,912	2,256	1,236	700	1,125	416
Cooking Oil	Gallons	0	0	0	1,100	860	980	555	600
Total Liquid	Gallons	42,952	43,132	17,169	17,892	16,756	21,898	14,304	17,216
Total Solid	Pounds	24,470	33,705	7,480	16,050	24,530	14,916	11,246	17,430

Source: SPSA | NR = not reported | *Totals do not include waste measured as "each", **dry cell battery weight is based on approximately 700 pounds per 55 gallon drum, ***FY 2017 Data does not include quantities collected independently of SPSA by the cities of Norfolk and Virginia Beach

3.1.2 Medical Waste

Virginia's medical waste management regulations have established standards for the storage, transportation and treatment of medical waste. Regulated medical waste may be stored, steam sterilized, incinerated or treated by an acceptable alternative mechanism in a permitted facility. The private sector is the primary supplier of Regulated Medical Waste (RMW) collection, treatment and disposal in the Region. There are two active RMW stream sterilizers in the Region. There are currently no permitted RMW incinerators or transfer stations in the Region. Table 15 lists the active and proposed RMW facilities in the Tidewater Region.

The purpose of medical waste regulations is to establish standards and procedures in order to protect public health and safety, and to protect the environment and natural resources. Under current permitting requirements, those facilities that handle and process wastes on site, (such as hospitals and college labs) and do not accept wastes from other institutions or businesses, are not required to obtain a permit or report quantities. They are however, required to maintain proper handling procedures and standards for the protection of public safety and health, and the environment.

Table 15. Regulated Medical Waste Facilities in the Tidewater Region

Facility Name	Location	Type	Operator
Old Dominion University	Norfolk	Steam Sterilizer (Unit 1)	ODU
Old Dominion University	Norfolk	Steam Sterilizer (Unit 2)	ODU
Curtis Bay Waste Services	Norfolk	Transfer and Storage Facility	Curtis Bay Waste Services

3.1.3 Construction and Demolition Debris

CDD consists of waste generated during construction, renovation, and demolition projects. The often bulky, heavy materials that make up CDD include wood, concrete, steel, brick, asphalt, gypsum, and plastic. CDD also includes salvaged building components such as doors, windows, and plumbing fixtures. Every time a building, road, or bridge is constructed, remodeled, or demolished, these materials are generated.

In addition, large volumes of CDD waste materials are generated during major storm events such as tropical storms and hurricanes. Historically, the region has experienced such storm events and has been forced to manage the resulting debris. The Region must plan and prepare for the management of large influxes of CDD in addition to the volumes of CDD waste that are generated as a result of normal construction and demolition activities within the area.

The EPA has estimated that the per capita generation of building-related CDD materials is 3.2 pounds per person per day.[2] This estimate was based on a series of calculations to estimate

---

[2] US EPA: Estimating 2003 Building-Related Construction and Demolition Materials Amounts

residential construction debris, nonresidential construction debris, residential demolition debris, nonresidential demolition debris, and renovation/remodeling debris. The EPA in continuing to study methods for estimating CDD generation.

Regional CDD generation may also be estimated using historical data from CDD waste disposed at landfills in the region. From 2015 to 2018, per DEQ Annual Solid Waste Reports, an average of 359,234 tons of CDD waste was disposed at four landfills in the region. These include the three landfills listed in Table 17 and the SPSA Regional Landfill. Using these disposal figures, the Region's residents generate an estimated 1.6 pounds of CDD waste per day. While some CDD waste is recycled, it is likely that the rate of CDD generation in the Region is closer to 1.6 lbs/person/day than 3.2 lbs/person/day.

Table 16. CDD Generation (Tons/Year)

	2020	2030	2040
Regional CDD Generation (Rate of 3.2 lbs/person/day)	718,983	776,764	844,055
Regional CDD Generation (Rate of 1.6 lbs/person/day)	359,234	388,104	421,725

The majority of CDD handled and disposed of in the Region is collected by the private sector. There are three active CDD-only disposal facilities in the Region. However, the City of Portsmouth's landfill is currently intended for disposal of city produced CDD material only. The Centerville Turnpike CDD Landfill has a reported capacity of 3,732,641 tons. The Higgerson-Buchanan Landfill has a permitted capacity of 1,376,917 tons. The Elbow Road CDD landfill on Centerville Turnpike in Chesapeake was closed in 2012.

Table 17. Active CDD and Industrial Landfills

Landfill	Facility Type	Total Remaining Permitted Capacity (Tons)	Waste Disposed (Tons)	Remaining Reported Permitted Life (Years)
City of Portsmouth Craney Island Landfill	CDD	1,997,702	8,435	140
Higgerson Buchanan Landfill	CDD	1,376,917	26,457	10
Centerville Turnpike CDD Landfill	CDD	3,732,641	321,819	13.8
International Paper LF No. 2 – Isle of Wight	Industrial	1,718,840	89,670	67
John C. Holland Enterprises Inc	Industrial	834,411	27,972	42

Source: Virginia DEQ 2019 Annual Solid Waste Report for CY 2018

Landfills that are permitted for other types of waste (either MSW or Industrial) may also accept CDD, although a CDD only disposal facility would most likely have a lower tipping fee, and therefore disposal of CDD in a MSW or Industrial landfill may not be considered cost effective since CDD waste would be replacing MSW or Industrial waste air space. Non-CDD only permitted landfills that may accept CDD waste include the SPSA Regional Landfill (MSW) and the Holland Landfill (Industrial). Additionally, several of the MRFs listed in Table 7 recycle CDD waste.

The region has the total capacity to manage CDD waste over the planning period, however, CDD disposal capacity is limited. The region will need to explore options for managing CDD waste such as increased recycling, accommodating more CDD waste at the SPSA Regional Landfill, expanding the catchment area of the Portsmouth CDD landfill, or adding private CDD landfill capacity at existing or new landfills.

3.1.4 Industrial Sludge

Industrial Sludge is generated by a variety of businesses and industries in south Hampton Roads. The following major producers have, in the past, reported the volumes of sludge produced and the disposal methods.

- Smithfield Foods reported that it produced 62 wet tons of wet solids per day, 4 to 5 days per week. The waste was reportedly sent to the BFI landfill in Lawrenceville.
- City of Norfolk water treatment process generates sludge that is disposed of in the SPSA Regional Landfill.
- City of Norfolk 37th Street Water Treatment Plant sludge was piped directly to the solids handling section at HRSD’s VIP wastewater treatment plant behind ODU.

Based upon SPSA records, it received 5,586 tons of sludge from Norfolk and 131 tons from Suffolk in FY 2017-2018 (from SPSA records). Several private companies in Southeastern Virginia also collect, handle, and dispose of industrial sludge. The region does not have comprehensive information on the generation of industrial sludge.

3.1.5 Agricultural Waste

Agricultural wastes are by-products of farming and ranching that include crop harvesting waste and manure. According to the 2007 Census of Agriculture, the number of farms in the region is decreasing:

- **Chesapeake.** Land in farms is down 16 percent from 2002 (61,087 acres to 51,124 acres). Of the acreage in farms, 85 percent is cropland.
- **Isle of Wight.** Acreage of farms is down 15 percent from 2002 to 2007 (86,521 acres to 73,461 acres). Approximately 70 percent is cropland and 23 percent is woodland.
- **Southampton.** Approximately 168,700 acres of farmland existed in 2002. This decreased to approximately 161,650 acres in 2007 (a 4 percent decrease). Of the remaining farmland, 56 percent is cropland and 36 percent in woodland.

- **Suffolk.** Since 2002, both the number of farms and acreage in farmland increased 26 percent and 1 percent, respectively. The amount of land in farms in 2007 was approximately 71,400 acres. Of this, 75 percent was cropland and 16 percent was woodland.

- **Virginia Beach.** The amount of land in farms has decreased 6 percent (28,380 acres in 2002 to 26,670 acres in 2007). Of this acreage, 81 percent is cropland.

A rural waste characterization study conducted for Washington State Department of Ecology attempted to quantify and characterize the types of waste disposed, recycled, or reused for four agricultural groups (field crops, orchards, vegetables, and livestock). The study found that less than 1% of the waste generated by these agricultural groups was landfilled. The primary means of handling waste generated by agriculture was through beneficial use, such as replenishment of soil nutrients.

4.0 WASTE MANAGEMENT SUMMARY

This section of the plan provides a summary of the waste management system that exists in the region.

4.1 RECYCLABLES

Portsmouth is the only locality in the Region that conducts curbside recycling itself. The other communities in the region have all contracted with private firms or are negotiating private contracts for curbside and/or drop-off facility services.

Other public and private programs exist within the region for the recycling of non-curbside collected materials: used oil, batteries, appliances, electronics, and tires.

4.2 YARD WASTE

Yard waste in the region is managed through a variety of mechanisms:

- Some residents recycle yard debris in their own yards (grasscycling and/or composting)
- Several municipalities collect grass, clippings, and leaves at the curb. Collected material is either sent for composting at a private facility or disposal within the SPSA system.

However, no regionally-owned composting option is available.

4.3 MUNICIPAL SOLID WASTE

Due to the transfer of the RDF WTE Facility to Wheelabrator, the flow of waste in the system has changed since the last solid waste management plan was written. A chart of municipal solid waste flow is provided in Figure 9.

4.4 CONSTRUCTION AND DEMOLITION DEBRIS (CDD)

Currently, most CDD generated in the Region is sent directly to CDD landfills, both in and outside the Region. The private CDD landfills accept material from a wide area, including out-of-state sources. Privately owned collection firms operating in the Region provide CDD collection services. Construction firms are responsible for procuring CDD collection containers (e.g., dumpsters) and services at their building sites. Most companies collect CDD from the construction sites for transport directly to a CDD disposal facility. CDD generated by the City of Portsmouth is sent to the Portsmouth Landfill (Craney Island) for disposal.

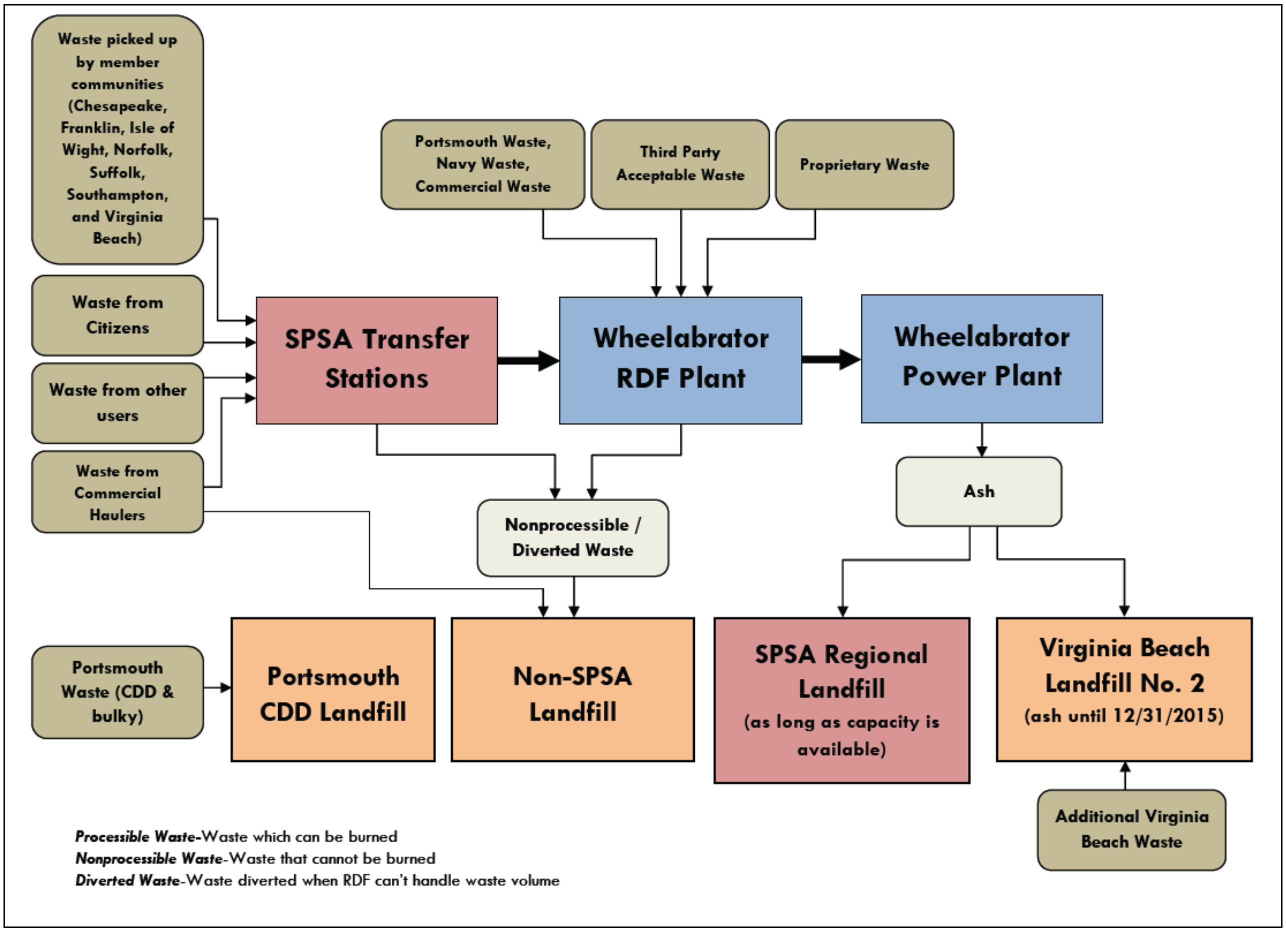


Figure 9. Flow of Municipal Solid Waste Prior to 2016

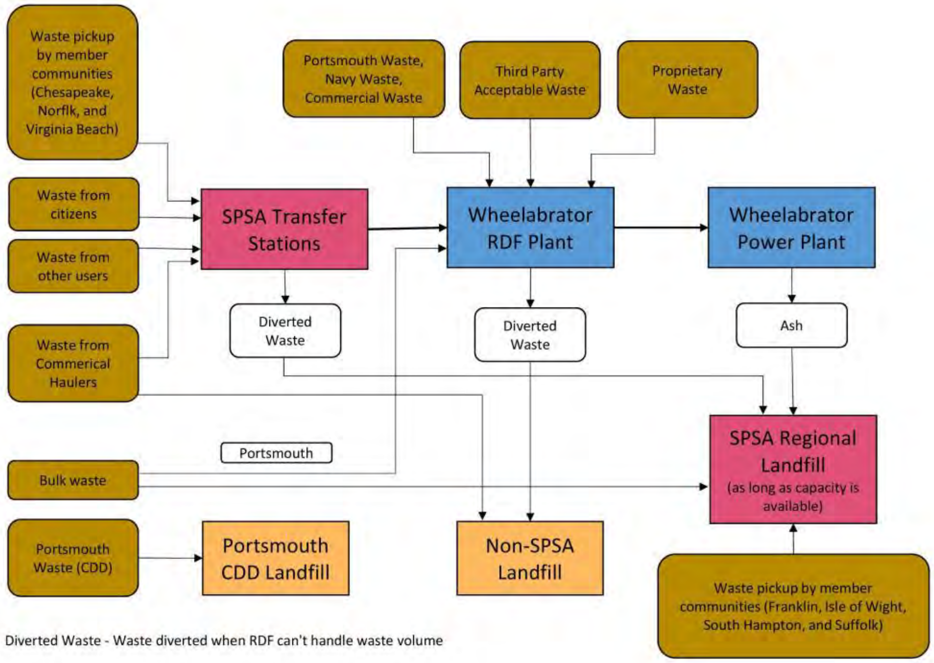


Figure 10. Current Flow of Municipal Solid Waste

5.0 FUTURE MUNICIPAL SOLID WASTE MANAGEMENT NEEDS

5.1 INTRODUCTION

While the Region has programs in place and facilities are available for management of the current waste stream, the quantity of waste generated in the Region will change with time. This means that the Region's programs will be required to change in response. To provide the Region with an understanding of these projected changes, it was necessary to document current waste generation and project future waste generation.

5.2 MUNICIPAL SOLID WASTE

Projections of municipal solid waste generation were calculated by applying an EPA per capita waste generation rate to regional population projections. As part of its Sustainable Materials Management program, the EPA periodically develops per capita MSW generation rates, measured in pounds per person per day. The EPA's *Advancing Sustainable Materials Management: 2015 Factsheet* provides per capita generation rates developed every five years from 1960 to 2015. The rate was as low as 2.68 lbs/person/day in 1960 and peaked at 4.74 lbs/person/day in 2000. The most recent rate from 2015 was 4.48 lbs/person/day. Since 1990, the rate has stayed relatively steady, with an average over that period of 4.575 lbs/person/day. To make projections for regional MSW generation, the per capita generation rate of 4.575 lbs/person/day was applied to regional population projections developed by the HRPDC for the years 2020, 2030, and 2040.

Table 18. MSW Generation Projections for Southeastern Virginia (Tons/Year)

	2020	2030	2040
Chesapeake	208,328	233,927	262,671
Franklin	7,736	8,352	9,017
Isle of Wight County	35,693	43,261	52,434
Norfolk	205,578	208,472	211,406
Portsmouth	80,500	81,243	81,991
Southampton County	17,234	19,155	21,291
Suffolk	91,291	118,008	152,543
Virginia Beach	381,561	398,112	415,381
Total	**1,027,921**	**1,110,529**	**1,206,735**

6.0 RECYCLING RATE

The following provides an overview of the Virginia recycling requirements and the recycling rates achieved by the Region's recycling programs.

6.1 VIRGINIA REQUIREMENTS FOR SOLID WASTE MANAGEMENT PLANNING, RECYCLING, AND ANNUAL REPORTING

In 1989, the Virginia General Assembly adopted legislation that laid the foundation for solid waste management planning, requiring that solid waste management plans be developed at the local or regional level. After July 1, 2007 no permit for a new sanitary landfill, incinerator, or waste-to-energy facility or for an expansion of an existing sanitary landfill, incinerator, or waste-to-energy facility will be issued until the solid waste planning unit within which the facility is located has an approved solid waste management plan. Regulations governing the development and submittal of solid waste management plans are provided in 9VAC20-130-10 et seq.

This legislation also established recycling rates for communities. The established rates were: 10 percent by 1991, 15 percent by 1993, and 25 percent by 1995. Each county, city, town, or regional authority was required by the legislation to establish recycling programs that would meet these goals.

Legislation introduced in 2006 provided for a two-tiered recycling mandate: 15 percent or 25 percent. The recycling rate that must be achieved by a community is dependent upon two factors: population density and unemployment rates. Localities or regions (called Solid Waste Planning Units or SWPUs) with population densities less than 100 persons per square mile or with an unemployment rate 50 percent higher than the statewide average are required to meet the 15 percent mandated recycling level, all others are required to continue to meet the 25 percent recycling mandated level.

The regulations for solid waste management plans require that the plan describe how the mandated recycling rate will be met or exceeded. Additionally, Section 9VAC 20-130-165 D requires that every city, county, town, or SWPU submit the data and calculations to document the recycling rate for the preceding calendar year to the Department of Environmental Quality.

Virginia uses the following formula for calculating the recycling rate:

Recycling Rate = (PRMs + Credits) ÷ (PRMs + Credits + MSW Disposed)

Where:

- **"Principal recyclable materials (PRMs)"** means paper, metal, plastic, glass, commingled yard waste, wood, textiles, tires, used oil, used oil filters, used antifreeze, batteries, electronics, or material as may be approved by the director.

- **"Municipal solid waste (MSW)"** means waste that is normally composed of residential, commercial, and institutional solid waste and residues derived from the combustion of these wastes. MSW generated equals the sum of PRMs recycled and MSW disposed. (MSW disposed equals the amount of MSW delivered to landfills, transfer stations, incineration and waste-to-energy facilities).

    - "Residential waste" means any waste material, including garbage, trash and refuse, derived from households. Households include single and multiple residences, hotels and motels, bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds and day-use recreation areas. Residential wastes do not include sanitary waste in septic tanks (septage) that is regulated by other state agencies.

    - "Commercial waste" means all solid waste generated by establishments engaged in business operations other than manufacturing or construction. This category includes, but is not limited to, solid waste resulting from the operation of stores, markets, office buildings, restaurants and shopping centers.

    - "Institutional waste" means all solid waste emanating from institutions such as hospitals, nursing homes, orphanages, and public or private schools. It can include regulated medical waste from health care facilities and research facilities that must be managed as a regulated medical waste.

- **Credits** may be added to the recycling formula, provided that the aggregate of the credits does not exceed five percentage points of the annual municipal solid waste recycling rate achieved for each solid waste planning unit:

    - A credit of one ton for each ton of any non-municipal solid waste material that is recycled (e.g., industrial waste, construction and demolition debris).

    - A credit of one ton for each ton of any solid waste material that is reused.

    - A credit of one ton for each ton of recycling residue disposed in a landfill. "Recycling residue" means the (i) nonmetallic substances, including but not limited to plastic, rubber, and insulation, which remain after a shredder has separated for purposes of recycling the ferrous and nonferrous metal from a motor vehicle, appliance, or other discarded metallic item, and (ii) organic waste remaining after removal of metals, glass, plastics and paper which are to be recycled as part of a resource recovery process for municipal solid waste resulting in the production of a refuse derived fuel.

    - A credit of two percentage points of the minimum recycling rate mandated for the solid waste planning unit for a source reduction program that is implemented within the solid waste planning unit. "Source reduction" means any action that reduces or eliminates the generation of waste at the source, usually within a process. Source reduction measures include process modifications, feedstock substitutions, improvements in feedstock purity, improvements in housekeeping and management practices, increases in the efficiency of machinery, and recycling within a process. Source reduction minimizes the material that must be managed by waste disposal or nondisposal options by creating less waste. "Source reduction" is also called "waste prevention," "waste minimization," or "waste reduction."

- A credit of one ton for each inoperable vehicle for which a locality receives reimbursement from the Virginia Department of Motor Vehicles under §46.2-1407 of the Code of Virginia.

If the SWPU's annual recycling rate falls below the minimum rate, the SWPU is required to submit a recycling action plan (RAP), or its approved solid waste management plan may be revoked. The RAP must identify specific elements of the recycling program that will be changed or improved in order for the SWPU to reach its recycling rate. The RAP requires both a commitment by the SWPU to provide resources necessary to improve its program, as well as a timeline for achieving the program elements. The RAP must be adopted by the administrative governmental board(s) for all localities covered by the Solid Waste Management Plan, and then approved by DEQ. Regular reporting on the progress made on the RAP elements is required.

6.2 HISTORIC RECYCLING RATES

Beginning with calendar year 2001, Virginia required that all SWPUs submit annual recycling rate reports. The state uses these reports to establish a statewide recycling rate. A comparison of the statewide recycling rate and the recycling rate achieved by the southeastern Virginia region is shown in the table below. The region has consistently exceeded the state's requirement of 25 percent. The region's recycling rate for CY 2018 was 49.9%.

Table 19. Regional Recycling Rates, 2011 -2016

Region	2011	2012	2013	2014	2015	2016
Bristol Area	35.0%	36.3%	36.3%	NA	NA	NA
Fredericksburg Area	56.5%	55.9%	46.3%	43.6%	46.2%	44.5%
Hampton Roads/Tidewater	44.6%	35.7%	33.5%	31.3%	33.7%	34.9%
Lynchburg Area	38.8%	31.3%	38.9%	41.5%	40.1%	35.7%
Northern Shenandoah Valley	39.1%	41.6%	40.4%	41.4%	49.7%	45.9%
Northern Virginia	44.5%	47.3%	46.0%	45.4%	47.4%	45.9%
Richmond Area	57.7%	57.4%	57.4%	57.5%	62.7%	58.9%
Roanoke Area	42.5%	37.6%	35.4%	27.8%	39.0%	39.4%
Statewide	43.5%	41.5%	41.2%	42.5%	44.2%	42.6%

7.0 LITTER CONTROL

The Region's localities all participate in the Clean Community Program of the Commonwealth. They utilize state grants, when available, together with local funding, other grants and private initiatives in operating their local litter control and related educational programs. The Virginia Beach Clean Community Commission is now a City Council appointed commission with administrative support from Public Works, Waste Management Division. Programs and events include; adopt a spot, storm drain marker, Clean the Bay Day and support for Earth Day. The eight cities and counties that are members of SPSA also participate with SPSA, the Virginia Peninsulas Public Service Authority and their local government counterparts on the Peninsula in HR CLEAN, which is the regional litter control and recycling education program. It operates through the HRPDC. Among the initiatives undertaken by HR CLEAN is an effort to develop an educational program for members of the law enforcement community and judicial system about littering, its control, and the need for more stringent enforcement of anti-littering statutes.

The Cities of Chesapeake, Norfolk, Portsmouth, and Suffolk are member affiliates of the Keep America Beautiful (KAB) program. Each affiliate provides opportunities to the public in areas of education, beautification, and litter control programs. To be an affiliate of KAB, minimum standards and reporting are required. One of the programs being offered to volunteers is the Great American Clean-up where citizens participate in litter clean-ups in their neighborhoods and public areas. The Great American Cleanup takes place annually from March through May.

In addition to the KAB programs, the localities in Southeastern Virginia support and participate in clean-up activities supported by private organizations, such as the Chesapeake Bay Foundation, Lynnhaven River Now, Riverkeepers and other private foundations. They also support and participate in the various "Adopt" programs, which operate under the auspices of the Virginia Departments of Conservation and Recreation and Transportation. They also participate in the various Stewardship programs, which are sponsored by the Governor and the Secretary of Natural Resources.

Examples of these cooperative programs include:

- The Chesapeake Bay Foundation (CBF) promotes volunteer opportunities throughout the region. Along with local coordinators, CBF organizes clean up events not only on the Bay, but at nearby rivers, waterways, under bridges, and the oceanfront.

- Each locality has the opportunity to participate in the annual "Clean The Bay Day," which takes place the second Saturday of June in Norfolk, Chesapeake, Gloucester, Newport News, Poquoson, Portsmouth, Suffolk, and Virginia Beach. Most of the waste collected is put into the waste stream while a small percent might be recycled.

- Similar "Adopt" programs operate under a state umbrella, but are administered locally. The Adopt-A-Highway Program, the first of such "adoption" efforts, is an anti-litter and roadside enhancement campaign intended to promote pride and local ownership in our beautiful state. It allows individuals and organized groups of citizens and/or businesses to work in partnership with the Commonwealth by "adopting" a section of state highway and agreeing to help take care of it. This program offers organizations a way to contribute to their community and state, as well as generate publicity for their efforts. A number of localities and private organizations also participate in the Adopt-A-Waterway Program, which is facilitated by the Department of Conservation and Recreation. Due to the overwhelming success of these efforts, HR CLEAN promotes Adopt Hampton Roads as a way to encourage involvement in Adopt-A-Spot and Adopt-A-Waterway programs. These efforts have flourished region wide.

- In several instances, the Sheriffs in Hampton Roads localities utilize inmate labor to clean up areas of highways throughout the region.

Additionally, in an effort to curb litter and non-point source pollution, each locality requires citizens to secure waste set out for collection.

8.0 SOLID WASTE NEEDS ASSESSMENT

8.1 EVALUATION OF SOLID WASTE MANAGEMENT

SPSA periodically employs a consultant to conduct a comprehensive survey and report. The report evaluates SPSA's fiscal and operational health. The report summarizes current and recent solid waste collection data for each of SPSA's facilities, including the Regional Landfill, the RDF WTE Facility, and transfer stations. The report also describes the current and projected future condition and capacities of these facilities.

Regarding solid waste received at each transfer station, the individual local governments decide on solid waste collection routes. In deciding these routes, the local governments will bring solid waste from different areas within their jurisdiction to the most appropriate transfer station. In addition, private solid waste collection companies make similar decisions. These decisions in turn will affect the amount of solid waste any transfer station receives. SPSA itself has no direct control over the decisions of these entities but works with these entities to plan and identify needed new improvements and facilities.

SPSA will continue to rely on conducting this type of evaluation and assessment of its solid waste management system to improve its ability to meet the solid waste management needs of the region.

8.2 NEEDS ASSESSMENT

The existing solid waste management system was reviewed within the context of the solid waste management hierarchy to identify needs to be addressed during the development of this plan and its future implementation. This assessment is presented according to the solid waste management hierarchy. Identified needs that fall outside of the hierarchy, such as solid waste transfer, are presented at the end of the section.

8.2.1 Source Reduction and Reuse

8.2.1.1 Current Conditions

There are four basic methods for waste reduction:

- Reduce consumption by using product alternatives that generate less waste.
- Reuse products for their original or compatible purposes.
- Increase the durability or lifetime of products.
- Decrease the amount of material used to produce each product or reduce product packaging.

Waste reduction is generally not as well documented or understood as recycling and requires extensive education. Additionally, some waste reduction tactics, especially those involving product and packaging waste, are controlled by economic, political, and educational forces beyond city and county control.

Waste reduction is supported in the region through various programs and offerings. Many promotional materials and outreach programs exist to spread awareness of waste reduction and recycling. Material donation and reuse opportunities currently available include:

- Numerous private and non-profit businesses operate secondhand material outlets throughout the county.
- Websites such as www.craigslist.org provide an internet-based forum to buy, sell, and exchange secondhand products locally.
- The cities and counties sponsor public surplus sales of materials and equipment no longer needed by those agencies but still usable.
- Some of the member jurisdictions have developed internal goals for buildings that meet Leadership in Environmental Engineering Design (LEED) standards. Some of the jurisdictions have LEED certified buildings.

8.2.1.2 Needs

Waste reduction could be further encouraged by addressing the following needs:

- Residents and businesses are not exposed to education and promotion programs focusing on alternatives to toxics and proper disposal of household hazardous waste.
- According to the most recent EPA estimates, yard waste accounts for 13 percent of the waste stream; food scraps accounts for an additional 13 percent. The cost of home composting bins or mulching mowers may be a deterrent to residents.
- Businesses do not have access to technical assistance and outreach addressing waste reduction opportunities.
- Agencies could adopt procurement policies that encourage the purchase of products made from recycled-content materials.

8.2.1.2.1 Waste/Material Exchange

Materials or waste exchanges are not new. The concept began in Europe and spread to North America in the late 1970s. A waste exchange acts as a liaison between waste generators and potential users. Some exchanges are operated by states or local governments, others are wholly private, for-profit businesses. The exchanges vary in terms of area of service and the types of commodities exchanged. In general, waste exchanges tend to handle hazardous materials and industrial process waste while materials exchanges handle nonhazardous items. Information on several waste exchanges are provided in Table 20.

Increasingly, waste exchanges are making use of the internet to create online databases and eliminate printed catalogs. Private exchanges frequently share information with one another.

Waste/material exchanges operate much like “classified ads.” Businesses, offices, schools, and individuals "advertise" their surplus/unwanted materials, or materials they want to get, by completing an electronic listing form. Once the form has been completed and submitted, the listing is posted on the website. Users can look for and find materials by browsing or searching the materials categories. Users interested in trading posted materials then contact each other directly.

In many instances, sites offer school donation programs. These programs provide the opportunity for businesses to list materials specifically available to schools. Since schools are working with limited resources.

Web-based materials exchange opportunities are limited in the Region. HRPDC could consider establishing a regionally-based waste or material exchange for businesses or residents.

Table 20. Waste/Material Exchanges

State Waste Exchanges	
Alaska Materials Exchange (AME)	http://www.greenstarinc.org/ame/ameindex.php
The AME was developed in 1994 as a partnership among the Alaska Department of Environmental Conservation, ARCO-Alaska, BP Exploration, Alyeska Pipeline Services, the Anchorage Chamber of Commerce, and the U.S. EPA. From 1994 until 2003, the AME was a quarterly printed catalog mailed to users across the State. In 2003, the AME was transferred to Green Star and updated to an interactive web-based system.	
California Materials Exchange (CalMAX)	http://www.ciwmb.ca.gov/calmax
CalMAX, maintained by the California Integrated Waste Management Board, is a free service designed to help businesses find markets for materials they have traditionally discarded. CalMAX published quarterly catalogs from 1992-2005; however, in an effort to reduce the use of paper and streamline the administrative process, CalMAX made the decision to publish the last catalog in the summer of 2005 and now operates exclusively as an online exchange service. The CalMAX database categorizes materials into 15 separate classifications and is accessible 24 hours a day through the CalMAX Web site.	CalMAX California Materials Exchange
Ohio's Materials Exchange (OMEx)	http://www.myomex.com/
OMEx publishes no-cost materials wanted and available ads for the purpose of facilitating exchanges for users who then work out the details of payment, transportation and storage. Ads are placed, and updated, by the listing entities. OMEx began in 1998. It is administered by the Association of Ohio Recyclers and funded through the Ohio Department of Development's Ohio Energy Office. Waste Alternatives, Inc., of Mount Vernon, OH, services and maintains the listing program while The Internet Professional administers the website.	AOR OMEx
Indiana Waste Exchange (IMX)	http://www.in.gov/idem/imx/index.html
The IMX is maintained by the Indiana Department of Environmental Management, Office of Pollution Prevention and Technical Assistance. The IMX is an electronic bulletin board that aids in the dissemination of information on surplus and waste materials either available from or wanted by industrial and commercial entities. IMX operates through the IMX Listserv. Through this listserv, users receive e-mail information about new listings on a regular basis. Listed materials are organized into 17 individual categories.	
Iowa Waste Exchange (IWE)	http://www.iowadnr.gov/waste/iwe/index.html
The mission of the IWE is to provide Iowa industries with smart waste management. The IWE is a free, confidential program that actively promotes the reuse and recycling of Iowa business and industry by-products and wastes. The program operates out of six regions with a coordinator assigned to each region. The IWE is part of and funded by the Iowa Department of Natural Resources. Since 1990 the IWE has matched over 2.6 million tons of materials.	IOWA WASTE EXCHANGE
Minnesota Materials Exchange	http://www.mnexchange.org/
The Minnesota Materials Exchange program is coordinated by the Minnesota Technical Assistance Program (MnTAP). The program focuses on items that are commonly used in a business or organizational setting, rather than a household. Most things are available free or at a low cost. Users are sent emails (2 per month) identifying the newest available and wanted items. MnTAP, a nonregulatory program that helps businesses reduce waste, is funded primarily by a pass-through grant from the Minnesota Pollution Control Agency's Prevention and Assistance Division to the University of Minnesota, School of Public Health, Division of Environmental Health Sciences.	Minnesota Materials Exchange
Montana Material Exchange	http://www.montana.edu/mme/
The Montana Material Exchange (MME) maintains and distributes listings of materials available and materials wanted from individuals and local and international companies. The site is maintained by the Montana State University Extension Service, Pollution Prevention Program, in partnership with the Montana Chamber of Commerce.	MME
Nebraska Materials Exchange Program	http://www.knb.org/exchange.html
Keep Nebraska Beautiful offers this program. Since its inception in the Fall of 1994, the number of materials listed and exchanged has grown tremendously.	
Ohio's Materials Exchange (OMEx)	http://www.myomex.com/

Table 20. Waste/Material Exchanges

OMEx publishes no-cost materials wanted and available ads for the purpose of facilitating exchanges for users who then work out the details of payment, transportation and storage. Ads are placed, and updated, by the listing entities. Information provided through OMEx is supplied by the listing party. OMEx began in 1998. It is administered by the Association of Ohio Recyclers and funded through the Ohio Department of Development's Ohio Energy Office. Waste Alternatives, Inc., of Mount Vernon, OH, services and maintains the listing program while The Internet Professional administers the website.

Tennessee Materials Exchange (TME) http://www.cis.tennessee.edu/environmental/recycle/TME.shtml

The Tennessee Materials Exchange (TME) is a free service, operated by the University of Tennessee Center for Industrial Services (CIS), that helps Tennessee industries and businesses find markets for industrial by-products, surplus materials and wastes. TME listings are updated monthly.

Vermont Business Materials Exchange (VBMX) http://www.vbmex.org

VBMX is a free service whose goal is to minimize waste by fostering the exchange of reusable resources. VBMX keeps a database of available and wanted materials, and publicizes the listings through this web site, the VBMX Listserve, other specialized listserves, the quarterly catalog, and Vermont Business Magazine.

West Virginia Materials Exchange http://www.state.wv.us/swmb/exchange/Index.htm

Created in 1998 by the West Virginia Solid Waste Management Board, the exchange works with business, industry, government agencies and others to facilitate the exchange, reuse and recycling of surplus materials, overstocks, and manufacturing by-products.

Business Material Exchange of Wisconsin (BMEx) http://www.bmex.org/

The BMEx is regional material exchange that has been operating since 1996. The BMEx is open to any resident, business, organization, institution, agricultural operation or other entity located in Wisconsin.

Regional Exchanges

2Good2Toss http://www.2good2toss.com/

2good2toss is Washington's online exchange for reusable building materials and household items. Washington's Department of Ecology funded the start-up costs to get the site off the ground, and each participating municipality paid the web site developer a one-time set-up fee for their exchange on the site and then pays an annual subscription fee to have the site maintained. While anyone can view posted items, users must reside in participating Washington state counties or cities to be eligible to post items. 2good2toss.com is in keeping with Ecology's mission, as set forth in chapter 70.95 RCW, to reduce the volume of solid waste placed in the state's landfills and waste to energy facilities through waste reduction, source separation, recycling, and diversion.

Resource Exchange Network for Eliminating Waste (RENEW) http://www.zerowastenetwork.org/renewdev/

RENEW is a materials exchange network originally established by the Texas Legislature in 1987 to promote the reuse or recycling of industrial wastes. In 2007, the Zero Waste Network expanded RENEW to encompass the Environmental Protection Agency's Region 6. RENEW is a marketing channel for industries, businesses, and governmental units that want to sell surplus materials, by-products, and wastes to users who will reclaim or reuse them.

Southern Waste Information eXchange http://www.wastexchange.org/

The Southern Waste Information Exchange is a free service designed to help businesses, industries and other organizations. Registered users can post both wanted and available listings, similar to a classified ad section. Businesses, industries and other organizations can list their available materials by type, quantity, frequency of availability, geographic location, and date listed. They may also include photos of the materials. Users can post detailed wanted listings, specifying the type(s) of material they need and the frequency. The WasteXchange is funded by the Florida Department of Environmental Protection.

Table 20. Waste/Material Exchanges

Industrial Materials Exchange http://www.metrokc.gov/hazwaste/imex/

IMEX, the Industrial Materials Exchange, is a free service designed to match businesses that produce wastes, industrial by-products, or surplus materials with businesses that need them. IMEX is a free listing service. Businesses, offices, schools, and individuals "advertise" their surplus/unwanted materials, or materials that they are seeking, by submitting an electronic IMEX listing form. The listings are then posted on the IMEX web site, where they are viewed by interested waste generators and waste recyclers. IMEX will only accept listings from the Pacific Northwest. Specifically, this means that listings will be accepted only from Alaska, Idaho, Oregon, and Washington (EPA Region 10).

National Waste/Material Exhange

Freecycle Network http://faq.freecycle.org/

The Freecycle Network is a private, nonprofit organization incorporated in the State of Arizona. Users join local groups and post items on local Freecycle group sites. Currently, the Freecycle Network is made up of 4,934 groups with 8,338,153 members around the world.

Locally-Sponsored Waste/Material Exchanges

The Los Angeles County Materials Exchange Program (LACoMAX) http://dpw.lacounty.gov/epd/lacomax/

LACoMAX is a free service provided by the County of Los Angeles Department of Public Works, Environmental Programs Division. Users of this on-line materials exchange service can browse or post listings of a wide variety of available and wanted materials. Listings are categorized by 15 material classifications and 6 regions and include common items such as wood pallets, out-of-fashion textiles, and chemicals as well as more uncommon items. All exchanges are coordinated between the two interested parties.

Marin County (Marin Max) http://marinmax.org/

MarinMax is designed for use by businesses, non-profits and individuals within Marin County.

New York City, Department of Sanitation http://www.wastematch.org/

NYC Wastematch is a free service, created and funded by the NYC Department of Sanitation, which facilitates the exchange of used and surplus goods and equipment from organizations that no longer need them to other entities that do.

Twin Cities Free Market http://www.twincitiesfreemarket.org/index.cfm

The Twin Cities Free Market is a reuse program of Eureka Recycling, a nonprofit organization. The Free Market is an interactive, internet-based program that targets residential exchanges. Residents of Carver, Hennepin, Ramsey, and Washington County may use the Free Market. The Free Market is funded in part by the City of Saint Paul, Carver County, Hennepin County, Ramsey County, Washington County, and the State of Minnesota SCORE Fund.

8.2.2 Recycling and Composting

8.2.2.1 Current Recycling Conditions

As discussed earlier, the cities and counties currently provide curbside collection services or drop-off facilities for collection of recyclables.

8.2.2.2 Recycling Needs

8.2.2.2.1 Business Recycling

There is a continued need to provide information to businesses to encourage recycling as their actions contribute to the overall recycling rate in the region.

- Recruit and provide technical assistance to large businesses in the region to increase recycling. The purpose of providing technical assistance is to set up new recycling programs in larger businesses and work with the haulers or recyclers to efficiently implement these new programs. After a business is recruited, it would receive a waste audit and at least one on-site visit. During the on-site visit, the program staff person would develop waste reduction and recycling recommendations.

- Develop a business recognition program for recycling, composting, and waste reduction for exemplary waste reduction, composting, and recycling activities.

8.2.2.2.2 Evaluation and Monitoring

The cities and counties have taken over from SPSA implementation of curbside and drop-off programs. There needs to be a coordinated effort to evaluate the status of individual recycling programs. The evaluation should address the following:

- Evaluation of what is and isn’t marketable and identify opportunities to develop markets for recycled materials.

- Progress toward recycling goals.

- Assessment of public outreach and education programs.

- Assessment of recycling collection and marketing programs.

- Establish an accurate assessment of the region’s recycling rate.

- Identify gaps and needs in recycling programs.

8.2.2.2.3 E-Waste

There has been swift growth in the manufacture and sale of consumer electronic products. Advances in technology have led to better, smaller, cheaper products. Industry analysts give every indication that the trend toward rapid introduction of new electronic products will continue.

As the production and use of electronic products continues to grow, the challenge of recovery and disposal is becoming significant. Computer monitors and older TV picture tubes contain an average of four pounds of lead and require special handling at the end of their lives. In addition to lead, electronics can contain chromium, cadmium, mercury, beryllium, nickel, zinc, and brominated flame retardants (USEPA). Another serious concern associated with end-of-life management is the export of electronic scrap to developing countries that may lack adequate worker safety and environmental standards.

While end-of-life electronics (end-of-life electronic products are either obsolete for their intended purpose or no longer useful by the current user and lacks any significant market value as an operational unit. Definition used by the Institute of Scrap Recycling Industries, Inc.) currently comprise only a small amount of the municipal waste stream, that percentage is expected to grow dramatically in the next few years (estimated to be 1.2% of waste generated in 2006 per USEPA, 2006). The average life span of a personal computer is currently about 2-3 years. Electronics that break often are not repaired due to the relatively low price of replacement equipment. When the equipment breaks or becomes obsolete, it is commonly discarded.

SPSA accepts cell phones for recycling through its Household Hazardous Waste Collection facilities. SPSA does not have an established program for the collection and recycling/disposal of computers and other electronics at this time and relies on other programs and vendors to provide this service. Electronics recycling services should be provided to the Region through its solid waste management system.

8.2.2.2.4 Recycling Data Collection

Accurate recycling rate reporting is dependent on the cooperation of recycling entities in the region. In the past, a letter and survey were mailed to a limited number of commercial establishments. The following represent possible improvements to the data collection effort:

- Virginia DEQ also has developed a template for gathering recycling information that HRPDC may find useful.

- HRPDC should create a system that is easy to use for commercial establishments to report recyclables. Montgomery County, Maryland, for example, has a reporting module on their website. This reporting system self-populates their recycling database and makes compilation of the data easier. Businesses can also report recycling quantities through the mail or fax via a form that can be downloaded from their website.

- HRPDC should target businesses that are likely to generate recycling quantities that are NOT collected through a licensed (reporting) waste collector. For example, Montgomery County develops a list of SIC codes to target each year. Each year, a different business sector is targeted to establish contact: book stores for book/paper recycling, HVAC contractors for scrap metal, grocery stores for baled cardboard, restaurants for composted food waste, etc. Each year there are several businesses identified that generate significant quantities of recyclables that are not captured through facility or waste collector reporting. Businesses that typically produce large quantities of recyclables include:

    - Landscaping and Tree Service Companies

    - Auto dealerships

    - Large grocery chains (Food Lion, Farm Fresh, Harris Teeter)

    - Property management companies (generally, they establish recycling programs at large office buildings/complexes with multiple tenants)

    - Large retail establishments (Kohls, Wal-Mart, Target). Please note that Virginia DEQ placed recycling information for Walmart on its website.

- HRPDC should maintain enough staff to process submitted recycling information. Montgomery County, Maryland has multiple people on staff that process recycling information submitted by the commercial sector. In addition to verifying their understanding of submitted information, they track the generator of recyclable material, the collector of each recyclable material type, and the ultimate disposal location of the recyclable material. This helps to ensure they do not double count materials.

- Lastly, HRPDC should be prepared to contact non-responsive establishments. As a last resort, most of the municipalities have enacted recycling reporting ordinances that have penalties for non-compliance.

8.2.2.3 Current Composting Conditions

Most of the yard waste in the Region currently is being landfilled, although some communities have at least some portion of the yard waste they collect transported to a composting facility near Waverly, Virginia (McGill Environmental Systems Inc.). Collection systems are in place throughout most of the Region to collect yard waste separately. It can be readily processed and recycled for beneficial use either as compost, wood chips, soil amendment, or other beneficial uses.

8.2.2.4 Composting Needs

The Region has had difficulty with its yard waste management program. A comprehensive regional processing facility was constructed by SPSA in 2005 at Virginia Beach's Landfill No. 2, but was closed in 2007 following opposition from surrounding residents and the City of Virginia

Beach after persistent nuisance complaints and public health concerns. A regional facility may be appropriate for the urban areas within the Region (Chesapeake, Norfolk, Suffolk, Portsmouth, and Virginia Beach), but an alternative approach may be appropriate for the more rural areas (City of Franklin and Isle of Wight and Southampton Counties).

8.2.3 Resource Recovery (Waste-to-Energy)

8.2.3.1 Current Conditions

In late 2007, SPSA advertised that it would entertain proposals from qualified interested parties for the sale of the RDF WTE Facility. In 2010, SPSA sold the facility to Wheelabrator Technologies. Under the terms of the sale and subsequent agreements, Wheelabrator will accept and processes SPSA member community solid waste at the RDF WTE Facility through June 2027.

8.2.3.2 Needs

The RDF WTE Facility is a key component of the Region's waste management infrastructure. It is anticipated that Wheelabrator will operate its RDF WTE Facility into the foreseeable future. The facility has the capacity to dispose of a significant portion of the Region's municipal, commercial, and industrial solid waste. It is uncertain at this time what the intentions of the Region's member communities are with respect to utilization of the Wheelabrator RDF WTE Facility beyond the current contract term agreed to by SPSA. If the contract with SPSA is not renewed pursuant to the service agreement SPSA currently has with Wheelabrator, the individual municipalities may negotiate their own contracts with Wheelabrator or seek other disposal methods.

8.2.4 Landfilling

8.2.4.1 Current Conditions

Currently permitted and constructed landfill area are Cells I through VI. Cell VII was permitted in 2011. On an annual basis the Authority measures the volume of material already placed in the Regional Landfill by a topographic survey. HDR Engineering was hired by SPSA to perform the airspace calculations utilizing information from the topographic survey. In the February 2018 Airspace Management Report, HDR Engineers, presented information concerning when the currently constructed landfill cells could possibly reach capacity depending on the quantity of waste disposed annually and the density achieved in waste being placed for disposal. In the 2018 report, assuming current conditions continue, HDR Engineers estimated that in January of 2018 the Regional Landfill had more than four million cubic yards of permitted airspace available for future waste disposal in Cells V and VI. Assuming waste can be placed at a density of 1,400 to 1,600 lbs/CY and all permitted airspace can be captured, Cells V and VI will not reach capacity in its current configuration until 2027 or 2028, respectively. The actual rate of landfill airspace consumption will depend on the rate of waste intake over time and the ability of the landfill operators to maintain the outside side slopes at the design elevations as the landfill settles. The 2018 report has analyzed potential disposal capacity for Cell VII to be reached in 2041 at 1,280 lbs/CY density and 2048 at 1,670 lbs/CY density with incoming waste being 400,000 tons annually.

8.2.4.2 Needs

Landfills will be needed to provide for the disposal of MSW, CDD, industrial waste, sludges, and ash residue generated in the Region. The quantities of these waste streams that will require landfilling will depend on how much waste is recycled, incinerated, or otherwise processed. Given current technology, landfills will remain a necessary and important component of waste management for disposal of non-processible waste and ash. Therefore, the Region may be required to maintain landfill disposal capacity within the Region or secure disposal capacity elsewhere.

8.3 OTHER WASTE MANAGEMENT NEEDS

8.3.1 Transfer of Solid Waste

SPSA indicates that all eight of the transfer stations are in operation and are generally operating within their design capacities.

8.3.1.1 Needs

As the region continues to grow, improvements and upgrades will be required at the transfer stations to continue to meet the needs of the region in the most cost-effective manner.

8.3.1.1.1 Criteria for Transfer Station Improvements

The transfer stations are aging; however, the service levels must be maintained or improved as the population grows and the facilities reach their physical and functional limits. The following can be indicators that a transfer station is in need of upgrading:

- Time spent by customers on site becomes excessive.
- Facility hours are no longer meeting customer needs.
- The transfer station is experiencing difficulty in accommodating all vehicle and tonnage throughput during peak hours.
- The transfer station is experiencing damage due to changes in collection vehicle design.
- Traffic impacts on local streets are increasing.
- Environmental standards are not being met.

As the facilities age and the needs for solid waste services change, the transfer system may require upgrades to maintain operational efficiency. The 2017 SPSA Annual Survey Report prepared by CH2M describes the current condition of the SPSA transfer stations as well as recommended maintenance activities. SPSA indicates that all nine of the transfer stations are generally operating within their design capacities. The design capacity of each station and most recent annual waste quantities reported are provided in the table below.

Table 21. SPSA Transfer Stations Design Capacity and Waste Quantities, FY 2016 - 2017

Transfer Station	Design Capacity (Tons per Day)	FY 2017 Waste Quantities	Daily Average (tons/day)*
Boykins	50	662	5
Chesapeake	500	137,053	479
Franklin	150	21,070	74
Isle of Wight	150	19,737	69
Ivor	30	595	4
Landstown	1,500	163,630	572
Norfolk	1,300	196,339	687
Oceana	500	76,298	267
Suffolk	1,300	70,607	247
Total	5,480	685,991	2,404

8.3.1.1.2 Expanded Transfer Station Capacity

A general rule for evaluating the need for collection vehicle transfer is based on hauling distance. Although cost-effectiveness will vary, transfer stations generally become economically viable when the one-way hauling distance to the disposal facility is greater than 15 to 20 miles. However, it should be noted that transportation conditions (i.e., traffic, road quality, size of vehicles used and collection routing) will impact the benefit of direct-haul versus consolidating refuse at a transfer station.

In rural areas, transfer stations also provide increased convenience for residential and non-residential self haulers, who might otherwise have to travel long distances to reach a disposal site. Increased convenience helps reduce the amount of illegal dumping, illegal burning, and other inappropriate forms of disposal.

SPSA currently operates a transfer station network. Two possible reasons for adding an additional transfer station include:

- Economic growth in outlying areas of the region, particularly western Chesapeake, western Portsmouth and northern Suffolk and the southern sections of Chesapeake and Virginia Beach, may cause the waste stream to grow to a point where another transfer station may become feasible or desirable. Drive times would be significantly reduced and convenience for residents would be greatly improved.

- There also may be a need to build an additional transfer station in urban areas particularly if existing stations are being over utilized and any upgrades are not feasible.

- Relocation of an existing transfer station to better conform to existing or planned land uses within a jurisdiction. For example, the City of Virginia Beach is considering options for replacement of the Landstown Transfer Station because its current location is in an area that has an expanding educational land use, and the City would like the existing Landstown transfer station property to be used for different purposes.

The benefits of building a new transfer station must be weighed against the costs of adding new facilities. SPSA maintains the existing transfer stations which may require periodic upgrades.

SPSA could evaluate the long-term need for additional transfer stations based on the following:

- Projected population growth and growth patterns.
- Availability of suitable sites.
- Remaining capacity of existing transfer stations.
- Customer usage of existing transfer stations.
- Convenience and accessibility for the region’s residents.
- Effect on transfer system costs.
- Land uses.

Sufficient time should be allowed for construction of new transfer stations as warranted.

9.0 IMPLEMENTATION PLAN

Previous versions of the SWMP provided a timeline for the development of several new facilities for the solid waste system. The following provides an overview of the alternatives that were considered and an update on the Region's progress in implementing these alternatives as well as new initiatives being considered. In addition, the HRPDC sponsored a study in 2008 which evaluated institutional, organizational, technology, and disposal options for managing waste in the region after 2018, when the use and support agreements between the SPSA Region members expire.[3]

9.1 WASTE MANAGEMENT HIERARCHY

In accordance with the Virginia Solid Waste Management Regulations, the region's solid waste management plan must consider and address all components of the solid waste hierarchy. The solid waste hierarchy ranks methods of managing solid waste from most preferred to least preferred:

The Virginia Department of Environmental Quality has adopted a hierarchical approach to the management of solid waste. The hierarchy establishes the framework for solid waste management and includes the following components:

- Source Reduction
- Reuse
- Recycling
- Resource Recovery (Waste-to-Energy)
- Incineration
- Landfilling

SPSA and its member localities, as well as the HRPDC, continue to examine various alternatives for the management of solid waste in Southeastern Virginia. Historically SPSA has focused its efforts on disposal of the Region's solid waste and on alternative approaches to increasing participation in the disposal programs offered to the region. The eight member local governments continue to focus on improvements to the local solid waste collection and recycling systems as well. This section of the RSWMP summarizes the hierarchical approach to Integrated Waste Management envisioned by state and federal agencies and outlines the alternatives being considered.

---

[3] SCS Engineers, Final Interim Report, Solid Waste Management for Southside Hampton Roads, Planning Horizon 2018-2047, Prepare for the Hampton Roads Planning District Commission, Revised January 5, 2009.

9.1.1.1 Source Reduction and Reuse

9.1.1.1.1 Source Reduction

The Virginia Solid Waste Planning and Recycling Regulations define source reduction as “any action that reduces or eliminates the generation of waste at the source, usually within a process. Source reduction measures include process modifications, feedstock substitutions, improvements in feedstock purity, improvements in housekeeping and management practices, increases in the efficiency of machinery and recycling within a process.”

Source reduction, as an approach to solid waste management, has been applied primarily to industrial and hazardous wastes. It reduces the amount of waste requiring disposal, thus prolonging the life of existing waste disposal alternatives. However, it does not eliminate the need for other disposal options.

The primary responsibility of local and regional agencies in source reduction must be in the area of public education and creation of a spirit of stewardship on the part of the citizens, both individual and corporate, due to the fact that packaging of items is out of the control of SPSA and local retailers. Each governmental entity in the region can practice source reduction, to some degree, through its buying practices. Source reduction is directly under the control of private individuals and businesses.

9.1.1.1.2 Reuse

Reuse generally assumes the reuse of a material in a manner identical to its original use and is not significantly different from recycling or source reduction. Therefore, it is considered in this Plan as synonymous with source reduction. Refilling of returnable drink containers is an example of reuse. As with source reduction, the primary responsibility of local and regional agencies is in the area of public education.

9.1.1.2 Actions

- **Continue Household Hazardous Waste (HHW) collection program:** SPSA continues to operate a regional HHW collection program through five collection facilities. One facility (at the Regional Landfill) is open on a full-time basis; the remaining four are open based on a monthly recurring schedule. The City of Virginia Beach has recently opened its own HHW drop-off facility at its Landfill No. 2, and the City of Norfolk also plans to begin operation of HHW facilities to serve their residents. These programs support other environmental programs such as the Hampton Roads Regional Stormwater Management Program which is built on a series of cooperative initiatives such as illicit discharge detection and elimination.

- **Consider Implementation of a Regional Waste/Material Exchange:** As discussed earlier, one company's disposal problem may be another's valuable resources. HRPDC can assess options for implementing a regional waste/material exchange for use by businesses and/or residents.

9.1.2 Recycling and Composting

Recycling is the third highest priority in strategies to manage materials in the waste stream. Recycling is defined by the Virginia regulations as "the process of separating a given waste material from the waste stream and processing it so that it may be used again as raw material for a product which may or may not be similar to the original product." Processing old newspapers to produce "new" paper and composting or mulching of yard wastes are examples of recycling.

Recycling reduces the amount of solid waste that requires disposal. It also reduces reliance on the use of virgin materials in manufacturing. Concurrently, recycling can further enhance the increased public awareness of solid waste management issues by involving the public directly in waste management.

9.1.2.1 Actions

- **Evaluate Materials Recovery Facility:** Currently there is only one significant Materials Recovery Facility (MRF) in the Region that is capable of processing materials collected from various recycling programs. At the time the 2005 SWMP was written, SPSA was the primary provider of recycling collection services in the Region, with the exception of Virginia Beach. As an alternative, SPSA considered the construction and operation of a competing MRF. However, SPSA has discontinued recycling services and the member communities have taken over the responsibility for collection of recyclables. A SPSA-operated MRF is no longer a consideration for the Region and processing of recyclables will continue to remain a private sector function.

- **Yard waste facility:** SPSA has operated facilities where yard waste collected by member communities was handled, mulched and composed. Yard waste was transported by SPSA from member collection points to the yard waste management facility at the Virginia Beach Landfill No. 2. However, this facility was closed in 2007 to address neighbor complaints of excess odors from the facility. The Region does not currently have a facility dedicated to the handling and processing yard waste. Although the SPSA's regional yard waste management facility located at Virginia Beach's Landfill No. 2 was abandoned after it encountered operational challenges with odors, the development of a regional facility should be considered in the future if the SPSA member communities decide to cooperate in whole or in part their after use and support agreement with SPSA expire in 2027. However, in the interim, the member jurisdictions continue to evaluate options for utilization of their yard waste for beneficial purposes rather than disposing in a landfill.

- **The HRPDC has implemented a Web-Based Recycling Reporting System:** This system has facilitated easier, more accurate reporting of collected quantities.

9.1.3 Resource Recovery (Waste-to-Energy)

According to Virginia's Solid Waste Planning Regulations, resource recovery entails a comprehensive "solid waste management system which provides for collection, separation, recycling and recovery of energy or solid wastes, including disposal of non-recoverable waste residues." Combustible items are burned as a fuel to produce steam and/or electricity. Noncombustible items, including the ash from the combustibles, must be disposed of in some other fashion, such as landfill or Alternative Daily Cover (ADC). Recyclable materials, typically glass, ferrous metals and aluminum, are recycled following separation. Recycling and source reduction programs may enhance the effectiveness of the combustion alternatives.

9.1.3.1 Actions

- **Operation of RDF WTE Facility:** As mentioned earlier, the sale of the RDF WTE Facility and subsequent transfer of non-processible waste to a private landfill located outside of the SPSA Region has will be the primary disposal method in the Region at least through 2027. Long-term planning for future disposal will still be pursued by the Region members, either cooperatively or independently after 2027. Use of the RDF WTE Facility could still be an available option after 2027.

9.1.4 Landfilling

Landfill disposal of solid waste is the most prevalent option in the United States. The Virginia Regulations define a landfill to include "a sanitary landfill, an industrial waste landfill, or a construction/demolition/debris (CDD) landfill." Landfills for municipal solid waste presently are operated as sanitary landfills, involving daily cover of the waste, required use of liners, and leachate collection systems. Landfilling is required for management of solid wastes that do not lend themselves to any of the other management options. Of the Southeastern Virginia landfills currently permitted and in operation, three are publicly owned while the others are private CDD landfills.

9.1.4.1 Actions

- **New transfer stations**: In addition to the waste transfer facilities in the existing SPSA network, two additional facilities are proposed as a condition of the Special Use Permit (from the city of Suffolk) associated with the permitting of the proposed expansion of the Regional Landfill (Cell VII). It is understood that the status of these facilities is uncertain pending further evaluation by SPSA and discussions with the City.

- **Regional Landfill**: Continue using Cells V and VI. Continue planning for the active use of Cell VII to provide future disposal capacity for the region.

- **Evaluate options for managing CDD waste:** The region has the total capacity to manage CDD waste over the planning period, however, CDD disposal capacity is limited. The region will need to explore options for managing CDD waste such as increased recycling, accommodating more CDD waste at the SPSA Regional Landfill, expanding the catchment area of the Portsmouth CDD landfill, or adding private CDD landfill capacity at existing or new landfills.

- **Continue operation of the Virginia Beach Landfill No. 2:** This landfill is owned by the City of Virginia Beach and continues to remain in operation. The landfill has ceased accepting ash from the RDF WTE Facility. The City is considering long term options for the facility.

9.2 IMPLEMENTATION OF ACTIONS

The timeline for implementation of most actions stated in the previous section is a subject of a strategic planning study authorized by the HRPDC in 2008 and updated in 2010. In addition, based on the study results and other considerations, the SPSA member communities determined that SPSA will continue to be the designated regional solid waste management agency. As long as SPSA is the regional solid waste management agency, it will be involved in the development of the regional solid waste management plan. In March 2010, the communities designated the HRPDC as the regional solid waste planning agency and the agency responsible for tracking and reporting on recycling activates in the Region. Key milestones are summarized below:

- Complete update to the 2018 and Beyond Study: The report finalized in October 2011.

- Make decision regarding the extension of the Wheelabrator service agreement. The current contract between SPSA and Wheelabrator Technologies runs through June 2027. Post 2027, the SPSA member communities will evaluate the method of disposal.

- Fate of the Regional Landfill: The Regional Landfill will continue to be used by SPSA member localities at least through 2027.

- Expiration of the ash disposal agreement with the City of Virginia Beach (December 31, 2015). The City of Virginia Beach is required to pay the same tip fee as the other SPSA members and is no longer obligated to accept ash residue from the RDF WTE Facility.

The implementation of many actions stated in Section 9.1 is ongoing. The HRPDC will continue to evaluate appropriate implementation actions based on assessments of regional needs.

9.3 FUNDING/FINANCING OF PROGRAMS AND FACILITIES

The following section provides an overview of the funding mechanisms established by the local governments of Southeastern Virginia to pay for management of solid waste.

- **SPSA**: Tipping fees are SPSA's primary source of revenue. A tipping fee is generally a fee levied to dispose of waste directly at a landfill or waste to energy facility. SPSA's tipping fee reflects the aggregate cost to maintain and operate nine transfer stations, a transportation network, a landfill, fleet maintenance, administration, and waste disposal at the Wheelabrator WTE facility. Tipping fees are collected for disposal of municipal waste, waste from the Navy, CDD waste, and various other types of waste.

- **City of Chesapeake:** The Waste Management Division of the Public Works Department provides refuse collection services for single family and townhouse residences in the City. It allocates monies from the General Fund to cover the costs of this service.

- **City of Franklin:** The City uses General Fund revenues to pay for the costs of solid waste collection and disposal. Solid waste fees are paid by homeowners and businesses on their monthly utility bill.

- **City of Norfolk:** The City's Department of Public Works Waste Management Division collects approximately 83,000 tons of refuse annually from 64,500 residences and businesses. Since FY 2014-2015, Norfolk has utilized a Special Revenue Fund derived from charges to homeowners and businesses to pay for services.

- **City of Portsmouth:** Portsmouth charges a residential refuse collection fee on its public utilities bill. The City also charges a monthly rate for regularly scheduled service in the downtown commercial district. The City has established a separate Waste Management Fund as a revenue stream to pay for costs of service.

- **City of Suffolk:** The City's collection, disposal, and recycling services are funded through an Enterprise Fund. Residents who receive curbside service are assessed a monthly fee.

- **Virginia Beach:** The City's operations are funded through an Enterprise Fund. Residents are assessed a monthly fee for curbside services.

- **Isle of Wight County:** The County uses its General Fund to pay for refuse collection and disposal services. Within the County, the Towns of Smithfield and Windsor have their own arrangements for residential refuse collection, disposal and recycling services.

- **Southampton County:** The County uses the General Fund to cover costs for refuse collection and disposal services.

9.4 PUBLIC EDUCATION

Educational programs are ongoing throughout the region, and both SPSA and the localities continue to educate the public on the need for proper waste management and disposal practices.

This is done through a variety of means, including a detailed SPSA website, classroom presentations, SPSA facility tours and print pieces such as brochures and informative booklets, and media spots. SPSA and the individual localities provide and participate in a variety of educational programs throughout the member localities and the Hampton Roads region. Programs include the following:

- **SPSA Programs:** SPSA continues to offer limited educational materials on its website.

- **Local Programs:** Most localities in Southeastern Virginia have Clean Community offices that provide educational information to the public about their specific locality, as well as an array of volunteer opportunities. Some of these opportunities include Clean the Bay Day, Adopt-a-Spot, Keep America Beautiful projects, and many more. Most Clean Community offices have program information and contact lists available through the host locality's website.

  Since the municipalities have taken the responsibility for collection of recyclables, information on recycling is available on city/county websites.

- **Regional Programs:** HR CLEAN, the recycling and litter prevention education program of the HRPDC, is a regional coalition of local and regional Clean Community, recycling, and environmental education coordinators who promote litter prevention, recycling, community beautification, and general environmental awareness through educational projects designed to reach all sectors of our communities.

9.5 PUBLIC/PRIVATE PARTNERSHIPS

A broad range of issues will influence the configuration of the regional solid waste system in the future. The economic dynamics of solid waste management are difficult to predict. Public/private partnerships may offer cost effective and efficient solutions to specific solid waste management problems in the future. SPSA continues to develop and explore opportunities and ideas for joint ventures. An examples is the previously discussed Landfill Gas-to-Energy Plant at the SPSA Regional Landfill and the methane recovery plant at Virginia Beach Landfill No. 2. Through its relationship with Suffolk Energy Partners, SPSA is able to process landfill gas for use by either Dominion Virginia Power or BASF. The City of Virginia Beach has partnered with Ingenco in its efforts in this arena.

Contracts between the localities and SPSA, as well as between Wheelabrator and private waste haulers, are and will continue to be important to the waste management programs offered throughout the region. The current agreements between SPSA and its eight member localities will expire in the year 2028. Efforts are already underway to promote continued and strengthened commitment of area local governments to SPSA, and to ensure the future viability of the agency.

9.5.1 Existing Role of the Private Sector

The private sector currently plays a significant role in handling and disposing solid waste generated within the SPSA localities. The existing role of both the public and private sector is explained in Section 2.0. The continued mix of public sector and private sector involvement will be needed to insure that the waste management needs of South Hampton Roads are met in an efficient manner. For the several components of the solid waste stream the division of responsibility between SPSA, the localities, and the private sector is as follows:

- **Municipal Waste**
    - **Recyclable Materials:** Tidewater Fibre collects residential recyclables under contract to most member jurisdictions including Virginia Beach, Chesapeake, Norfolk, and Suffolk. Portsmouth collects the recyclables and delivers the collected materials to RDS.
    - **Municipal Solid Waste:** Municipal solid waste currently is collected by the localities and delivered to SPSA. This waste stream is segregated into processible or non-processible waste. Processible waste is transferred by SPSA to the RDF WTE Facility. Non-Processible waste is transported by Wheelabrator to other disposal facilities. This arrangement is governed by the service agreement between Wheelabrator and SPSA, and is effective through January 2027. In the event the RDF WTE Facility is not operational, waste is either diverted to the Regional Landfill or to other disposal facilities pursuant to the agreement between SPSA and Wheelabrator. Both the operation of the RDF WTE Facility and final disposal of non-processible waste is managed by a private firm. After 2018, new contractual and operational arrangements will be in place governing the management of municipal solid waste, and may include maintaining the existing disposal arrangements, or developing new ones.
    - **Other Recyclable Materials:** Other recyclable materials such as yard waste, white goods, and metals from ash residue generated from the RDF WTE Facility are handled, in part, by private firms.
- **Other Wastes**
    - **Construction and Demolition Debris**: The bulk of CDD handled and disposed of within the SPSA localities is processed by the private sector.
    - **Household Hazardous waste** is collected by SPSA. Disposal is handled by a private contractor.
    - **Special Wastes:** Several types of special wastes, including motor vehicle tires, waste oil and batteries are collected and processed by SPSA. These materials are also collected and processed by the private sector. Other types of special wastes, including stumps and land clearing debris, are for the most part processed as part of the CDD waste stream by the private sector. Septage and sludge are handled by

a combination of SPSA, Hampton Roads Sanitation District, and a wide range of private companies.

  - **Petroleum-Contaminated Materials:** Opened in 1999, Soilex specializes in the treatment and recycling of petroleum-contaminated materials and receives the majority of the region's waste materials that come from oil spills and other emergency response actions. This facility will allow SPSA to receive larger volumes of materials that, once treated, may be used in other beneficial ways at the landfill. What the partnership means to SPSA is additional material to cover landfilled waste that SPSA does not need to pay for and avoided fuel and transportation costs.

- **Methane Gas:** In November 2010, an agreement between SPSA and Suffolk Energy Partners, LLC (SEP) was made that conveyed exclusive rights for all the landfill gas (LFG) at the Regional Landfill to SEP for capture and beneficial reuse. SEP had held the rights to the LFG under a previous agreement and owns and operates the LFG recovery system that consists of recovery wells and flare. In addition, SEP owns and operates an electrical power plant at the Landfill that generates electrical power for sale to Dominion Virginia Power. Gas is also delivered to a BASF Plant on Wilroy Road in Suffolk, approximately 2.3 miles from the Landfill via an existing pipeline constructed in 2001.

9.5.2 Potential Future Role of the Private Sector: Municipal Solid Waste

The nature of the future role of the private sector in handling and processing municipal solid waste generated within the SPSA localities has changed over the past several years and will be determined by a combination of economic factors and political decisions made at the local and regional level. Under the existing contractual structure between the localities and SPSA, the division of responsibility between SPSA and the localities will remain relatively static until 2027. The existing contracts between the localities and SPSA will expire in 2027, as will the contract between SPSA and Wheelabrator. If the contracts are not renegotiated between SPSA and the localities, disposal of solid waste could become a function of the private sector.

9.6 SOLID WASTE MANAGEMENT PLAN IMPLEMENTATION

Various entities, both public and private, are responsible for implementing the SWMP. Public entities include, SPSA, HRPDC, and SPSA member localities. Private entities include waste haulers and processors, landfill operators, and numerous business that participate in the recycling system. Resident also play an important role in the recycling system by separating materials before the enter the commercial processing stream.

10.0 PUBLIC PARTICIPATION

10.1 CURRENT & FUTURE PROGRAMMING

SPSA offers an outlet for the public, both citizens and businesses, to give suggestions, make requests and comments on its website, www.spsa.com. In addition, SPSA offers the public an opportunity to speak to the Board of Directors at the monthly Board meetings held in the Regional Board Room at 723 Woodlake Drive, Chesapeake, VA 23320. These meetings, which are normally held on the fourth Wednesday of every month, are open to the public. The public may also participate in programs such as HRCLEAN which is sponsored by the HRPDC. The HRPDC also offers the public opportunities to speak at their Quarterly Commission meetings.

10.2 SOLID WASTE MANAGEMENT PLAN PUBLIC NOTICE AND HEARING

SPSA provided for public participation during the development of the original RSWMP. Public participation procedures include publication of a public notice announcing the availability of the revised RSWMP and commencement of a 30-day comment period and the person to be contacted with comments.

11.0 REGIONAL SOLID WASTE MANAGEMENT PLAN AMENDMENT PROCEDURES

HRPDC adopted the following procedures for interested parties to request an amendment to the approved RSWMP, and for HRPDC staff to review and process such requests. To initiate an amendment to the RSWMP, a completed application form which can be obtained from the HRPDC) with supporting documentation, must be submitted. The application will be reviewed for completeness and evaluated based on the justification of need for the proposed amendment. The HRPDC must approve all major and most minor amendments to the RSWMP prior to its submittal to the VDEQ. (Minor amendments described in Section 11.1.B.1 and 2 below require such approval.)

11.1 TYPES OF AMENDMENTS TO THE RSWMP

Virginia's Solid Waste Planning Regulations allow for two types of amendments to approved solid waste management plans. They are classified as major or minor amendments.

A. Section 9 VAC 20-130-175.A.1 of defines major amendments as:

1. Any addition, deletion, or cessation of operation of any solid waste disposal facility;

2. Any increase in landfill capacity;

3. Any change that moves toward implementation of a waste management strategy that is lower in the waste management hierarchy;

4. Action plan(s), including an action plan to address a planning unit's recycling rate that has fallen below the statutory minimum;

5. And any change to membership in the approved area.

B. Section 9 VAC 20-130-175.A.2 defines minor amendments as:

1. Any addition, deletion, or cessation or operation of any facility that is not a solid waste disposal facility;

2. Any change that moves toward implementation of a waste management strategy that is higher in the waste management hierarchy or;

3. Any non-substantive administrative change, such as a change in name.

11.2 RSWMP AMENDMENT PROCEDURES

A. To request an amendment to the RSWMP, an applicant shall:

1. Submit a completed application and supporting documentation to the HRPDC for the desired amendment and

2. Pay out of pocket expenses associated with its application such as advertisement of public notice.

3. The application and all supporting documents shall be submitted to the HRPDC.

B. HRPDC response to an application to amend the RSWMP shall include:

1. Within fifteen (15) days of receipt, HRPDC will acknowledge receipt of the application to amend the RSWMP.

2. Within thirty (30) days of receipt, HRPDC will evaluate the application for completeness. A letter acknowledging a complete application will be sent to the applicant.

3. If needed, a request for additional information will be sent to the applicant, who will have thirty (30) days to submit the additional information, or the request to amend the RSWMP will be denied.

4. Within ninety (90) days of receipt of a complete application, HRPDC staff will review and evaluate the justification of need for the proposed facility. This review may include discussions with the applicant, local government officials, members of SPSA staff and permitting staff at VDEQ.

5. The approved RSWMP will be the primary instrument used to evaluate the need for the requested amendment.

6. If the conclusion of the evaluation is that the requested amendment is consistent with the intent of the RSWMP and in the best interest of the planning region, HRPDC staff will amend the text of the approved RSWMP to accommodate the amendment request.

C. Public Participation

1. Public participation is required for all major RSWMP amendments and minor amendments described above.

2. HRPCD Staff will arrange for publication of a required public notice describing the proposed amendment, the commencement of a public comment period (30 days, at minimum), and date, time and location of a required public hearing.

3. Publication of the public notice will occur not less than fifteen (15) days prior to the scheduled hearing.

4. HRPDC staff will arrange for and conduct a public hearing not less than fifteen (15) days prior to the end of the public comment period, nor less that fifteen (15) days following the publication of notice of said hearing. The public hearing will most likely be part of a normally scheduled SPSA Board of Directors meeting.

5. HRPCD staff will ensure the text of the proposed amendment is available for review during the public comment period. The proposed amendment will be placed on HRPDC's website at www.hrpdc.org. Hard copies of the amendment will also be provided upon written request.

D. VDEQ Approval

1. Following the public comment period, HRPDC staff will forward the revised RSWMP to VDEQ. Minor amendments will be submitted to VDEQ for informational purposes. Major amendments will be submitted to VDEQ for its approval.

2. In either case, VDEQ must acknowledge receipt of and/or approve the amendment prior to HRPDC finalizing the amended RSWMP.

3. Amending the RSWMP does not remove the requirement for the applicant to obtain necessary environmental permits to construct and operate the solid waste facility in accordance with local and state regulations.

4. In the event a requested amendment is deemed to not be in keeping with the strategy outlined in the RSWMP or Solid Waste Planning Regulations, HRPDC will so advise the VDEQ, and the applicant.

11.3 GUIDANCE FOR DEMONSTRATING NEED OF A NEW OR EXPANDED SOLID WASTE MANAGEMENT FACILITY

Each application requesting amendment to the RSWMP to include a new facility not detailed in the Plan shall be accompanied by a demonstration of need for the facility in the planning region, which shall be of the form and content as the HRPDC may prescribe. It is the applicant's responsibility to provide reasonable and detailed information sufficient for this determination. Sources of data and information used to demonstrate need shall be cited.

A. The demonstration of need shall be specific as to the types of waste and/or recyclable materials to be managed and shall include, but not be limited to:

1. Documentation of the available capacity at existing facilities in the planning region to be served by the facility;

2. Documentation of the current volume of waste/recyclables generated in the region to be served by the facility and the volume of waste/recyclables reasonably expected to be generated in the area to be served over the next 20 years;

3. A description of additional factors, such as physical limitations on the transportation of materials or the existence of additional capacity outside the region to be served which may satisfied the projected need.

B. The following factors will be considered in evaluating the need for the proposed facility:

1. An approximate service area for the proposed facility which takes into account the economics of collection, processing, transportation, treatment, storage and/or disposal;

2. The quantity of waste/recyclables generated within the planning area suitable for treatment, processing, storage and/or disposal at the proposed facility;

3. The design capacity of existing facilities located within the planning area;

4. The extent to which the proposed facility is needed to replace other facilities, if the need for a proposed facility cannot be established under the above paragraphs.

C. If it is determined that a proposed facility is inconsistent with or contradictory to the above paragraphs or otherwise set forth in the RSWMP, the application to amend the RSWMP will be denied.

Appendix A: PUBLIC HEARING ON REGIONAL SOLID WASTE MANAGEMENT PLAN FOR SOUTHEASTERN VIRGINIA
CHESAPEAKE, VIRGINIA
SEPTEMBER 29, 2004

STATEMENT OF HEARING OFFICER

I am John M. Carlock, Deputy Executive Director, Physical Planning for the Hampton Roads Planning District Commission and will serve as the Hearing Officer for this Public Hearing.

The subject of tonight's Hearing is the Regional Solid Waste Management Plan for Southeastern Virginia, prepared by the Hampton Roads Planning District Commission in cooperation with the Southeastern Public Service Authority of Virginia. This Hearing is being held pursuant to the provisions of Section 10.1-1411 of the Code of Virginia and Title 9, Section 20-130-110, et. seq. of the Virginia Administrative Code. These provisions of statute and regulation require that local or regional solid waste plans be prepared and that a public hearing be held prior to the designated planning agency submitting the plan to the Virginia Department of Environmental Quality for approval.

Pursuant to action by the governing bodies of the sixteen cities, counties and towns in Southeastern Virginia, the Southeastern Public Service Authority of Virginia is the designated regional solid waste planning agency for Southeastern Virginia. SPSA contracted with the Hampton Roads Planning District Commission to prepare the Plan. The two agencies have collaborated for a number of years and, in 1991, prepared the initial regional solid waste management plan.

The Regional Solid Waste Management Plan for Southeastern Virginia was presented to the Board of the Southeastern Public Service Authority of Virginia at its meeting on September 8, 2004. The Board accepted the Plan and authorized this Public Hearing and associated public review period.

Public Notice of the public review and comment period and tonight's Public Hearing was published in the following newspapers:

The Tidewater News - September 12, 2004
The Virginian-Pilot – September 14, 2004
The New Journal and Guide – September 15, 2004.

Since September 9, 2004, the full Plan has been available for review on the websites of the SPSA and the HRPDC. As indicated in the Public Notice, the public comment period will close on October 14, 2004.

Three documents are being entered into the record for this Public Hearing. They are:

Draft Regional Solid Waste Management Plan for Southeastern Virginia, prepared by the Hampton Roads Planning District Commission in cooperation with the Southeastern Public Service Authority of Virginia, August 2004.
Public Notice, as published in the aforementioned newspapers
Power Point Presentation, prepared by the HRPDC staff, which will be presented during the Hearing.

The staff of the Hampton Roads Planning District Commission will present an overview of the Regional Solid Waste Management Plan for Southeastern Virginia, including descriptions of the state planning requirements and the steps to be taken following conclusion of the Hearing.

<< Because there were no members of the public in attendance, the HRPDC staff presentation was not made. >>

Following this presentation, comments will be received from each member of the public desiring to speak. I ask that each speaker state his or her name and affiliation. Any speaker with written comments is requested to provide a copy for the record.

<<There were no speakers wishing to comment on the Plan. >>

As indicated at the beginning of the Hearing, written comments on the Regional Solid Waste Management Plan for Southeastern Virginia may be submitted to either the HRPDC or the SPSA no later than October 14, 2004. Following receipt of all comments, the staffs of the two agencies will compile them for inclusion in the final document. That compilation will include response to all comments received.

It is expected that the final Plan, including any revisions based on in put received during the public comment period, and the Response Summary will be presented to the SPSA Board for action at its next meeting on October 27, 2004. Assuming favorable action by the SPSA Board at that time, the Plan will be submitted to the Virginia Department of Environmental Quality for review and approval immediately thereafter.

Because there were no members of the public in attendance, the Public Hearing, which began at 7:05 PM, was closed at 7:20 PM.

Attendees

Southeastern Public Service Authority of Virginia:
Louis Jordan, Deputy Executive Director
Richard Cheliras, Director of Environmental & Safety Management

Hampton Roads Planning District Commission:
John M. Carlock, Deputy Executive Director, Physical Planning
Eric J. Walberg, Principal Physical Planner
Aimee W. Hadfield, Environmental Educator

Appendix B: Solid Waste Management Facilities in Southeastern Virginia

Source: Virginia DEQ, 2018

Permit ID	Facility Name	Permit Status	Operating Status	Permit Issued Date	Permit Type	FIPS City / County
SWP493	Higgerson Buchanan Incorporated	Permitted	Active	1/2/1986	Solid Waste Full Permit	Chesapeake City
SWP425	SPSA - Chesapeake Transfer	Revoked	Closed	1/27/1984	Solid Waste Full Permit	Chesapeake City
PBR194	SPSA - Chesapeake Transfer	Permitted	Active	1/13/2003	Solid Waste Permit-by-Rule	Chesapeake City
EMG038	Chesapeake City - Dominion Blvd EMG	Revoked		9/15/2003	Solid Waste Emergency Permit	Chesapeake City
EMG040	Chesapeake City - Deep Creek Park EMG	Revoked		10/7/2003	Solid Waste Emergency Permit	Chesapeake City
EMG041	Chesapeake City - Jolliff Road EMG	Revoked		9/15/2003	Solid Waste Emergency Permit	Chesapeake City
EMG042	Chesapeake City - Cornland Road EMG	Revoked		9/15/2003	Solid Waste Emergency Permit	Chesapeake City
EMG176	Chesapeake Deep Water Terminal Incorporated	Revoked		10/2/2003	Solid Waste Emergency Permit	Chesapeake City
PBR510	Clearfield MMG Inc - Chesapeake	Revoked	Closed	7/28/2004	Solid Waste Permit-by-Rule	Chesapeake City
PBR568	TFC Recycling - Chesapeake	Permitted	Active	7/18/2011	Solid Waste Permit-by-Rule	Chesapeake City
SWP176	A and R Logistics Incorporated	Revoked	Not Applicable	11/21/1974	Solid Waste Full Permit	Chesapeake City
PBR615	Waterway Marine Terminal	Pending			Solid Waste Permit-by-Rule	Chesapeake City
PBR506	Waterway Marine Terminal	Revoked	Clean Closed	9/17/2003	Solid Waste Permit-by-Rule	Chesapeake City
SWP305	Elbow Road Farm CDD Landfill	Revoked	Closed	8/21/1980	Solid Waste Full Permit	Chesapeake City
EMG039	Kinder Morgan Operating LP C - ERT	Revoked		9/15/2003	Solid Waste Emergency Permit	Chesapeake City
SWP154	Chesapeake City - Civic Center	Revoked	Closed	3/22/1974	Solid Waste Full Permit	Chesapeake City
PBR230	Chesapeake General Hospital	Revoked	Clean Closed	1/1/1996	Solid Waste Permit-by-Rule	Chesapeake City
EMG008	Chesapeake City - Bainbridge Boulevard	Revoked		9/11/1998	Solid Waste Emergency Permit	Chesapeake City

EMG007	Chesapeake City - Centerville Turnpike EMG	Revoked		9/3/1998	Solid Waste Emergency Permit	Chesapeake City
EMG037	Chesapeake City - Centerville Turnpike EMG	Revoked		9/15/2003	Solid Waste Emergency Permit	Chesapeake City
EMG005	Chesapeake City - Jordan Bridge	Revoked		9/3/1998	Solid Waste Emergency Permit	Chesapeake City
EMG006	Chesapeake City - South Battlefield Boulevard	Revoked		9/3/1998	Solid Waste Emergency Permit	Chesapeake City
EMG009	Chesapeake City - Benefit Road Park Site	Revoked		9/8/1998	Solid Waste Emergency Permit	Chesapeake City
SWP443	Bowler Landfill - Williams Corporation	Revoked	Closed	8/28/1984	Solid Waste Full Permit	Chesapeake City
PBR098	BFI Waste Services LLC - Portable 61270	Revoked	Clean Closed	7/17/1996	Solid Waste Permit-by-Rule	Chesapeake City
PBR078	Safety Kleen Systems Incorporated - Chesapeake	Revoked	Clean Closed	1/4/1996	Solid Waste Permit-by-Rule	Chesapeake City
SWP427	Swinson's Auto Crush	Revoked	Closed	2/2/1984	Solid Waste Full Permit	Chesapeake City
SWP466	Thomas Inert Landfill	Revoked	Closed	3/13/1985	Solid Waste Full Permit	Chesapeake City
PBR227	DOC - Tidewater Correctional Unit 22	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Chesapeake City
SWP422	United Chemical Corporation	Revoked	Closed	1/23/1984	Solid Waste Full Permit	Chesapeake City
PBR228	Southeastern Virginia Training Center	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Chesapeake City
EMG184	Higgerson Buchanon Inc	Revoked		10/27/2003	Solid Waste Emergency Permit	Chesapeake City
SWP440	Dominion - Chesapeake Energy Center	Permitted	Inactive	7/27/1984	Solid Waste Full Permit	Chesapeake City
SWP481	Dominion - Chesapeake Energy Center	Revoked	Not Applicable	9/24/1985	Solid Waste Full Permit	Chesapeake City
PBR229	VDOC - St Brides Correctional Center	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Chesapeake City
PBR077	Waste Industries LLC	Permitted	Active	3/6/1995	Solid Waste Permit-by-Rule	Chesapeake City
SWP474	Atlantic Aggregate Recyclers	Revoked	Closed	5/15/1985	Solid Waste Full Permit	Chesapeake City
IR2002-T-1665	Peace Walker LLC	Unpermitted			Solid Waste Incident Response	Chesapeake City
PBR541	Meeks Disposal Corporation	Revoked	Clean Closed	6/2/2008	Solid Waste Permit-by-Rule	Chesapeake City

PBR554	Tidewater Green Corporation	Revoked	Clean Closed	4/5/2010	Solid Waste Permit-by-Rule	Chesapeake City
PBR596	Military Highway Recycling Center MRF	Permitted	Active	5/7/2014	Solid Waste Permit-by-Rule	Chesapeake City
PBR618	RePower South Chesapeake LLC	Pending			Solid Waste Permit-by-Rule	Chesapeake City
PBR619	Select Recycling Waste Services Inc	Permitted	Active	5/18/2016	Solid Waste Permit-by-Rule	Chesapeake City
PBR622	Clearfield MMG Inc - Chesapeake	Permitted	Active	1/30/2017	Solid Waste Permit-by-Rule	Chesapeake City
SWP438	SPSA - Franklin Transfer Station	Revoked	Closed	6/30/1984	Solid Waste Full Permit	Franklin City
PBR192	SPSA - Franklin Transfer Station	Permitted	Active	1/29/2003	Solid Waste Permit-by-Rule	Franklin City
EMG165	Franklin City - Hunterdale Road EMG	Revoked		9/22/2003	Solid Waste Emergency Permit	Franklin City
EMG166	Franklin City - Pretlow Industrial Park EMG	Revoked		9/22/2003	Solid Waste Emergency Permit	Franklin City
SWP012	Franklin City - Landfill	Revoked	Closed	7/12/1971	Solid Waste Full Permit	Franklin City
SWP238	Smithfield Fresh Meats Corporation-Smithfield	Revoked	Closed	12/16/1977	Solid Waste Full Permit	Isle of Wight County
EMG187	VDOT - Thacker Property - Waterworks Rd EMG	Revoked		10/27/2003	Solid Waste Emergency Permit	Isle of Wight County
SWP366	International Paper - Franklin Mill	Revoked	Closed	8/3/1982	Solid Waste Full Permit	Isle of Wight County
SWP087	Isle Of Wight County - Landfill	Permitted	Post Closure	2/12/1973	Solid Waste Full Permit	Isle of Wight County
SWP478	Edwards Agricultural Landfill	Revoked	Closed	7/17/1985	Solid Waste Full Permit	Isle of Wight County
SWP015	Butler Campground	Revoked	Closed	8/2/1971	Solid Waste Full Permit	Isle of Wight County
SWP047	Smithfield Landfil l-Cofer	Revoked	Closed	1/20/1972	Solid Waste Full Permit	Isle of Wight County
PBR193	SPSA - Isle Of Wight Transfer Station	Permitted	Active	1/29/2003	Solid Waste Permit-by-Rule	Isle of Wight County
SWP494	SPSA - Isle Of Wight Transfer Station	Revoked	Closed	3/17/1985	Solid Waste Full Permit	Isle of Wight County
SWP473	Turner Debris Landfill	Revoked	Closed	5/16/1985	Solid Waste Full Permit	Isle of Wight County
SWP504	International Paper LF No 2 - Isle of Wight	Permitted	Active	7/30/1986	Solid Waste Full Permit	Isle of Wight County
PBR284	VDOJJ - Camp Washington	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Isle of Wight County
EMG198	VDOT - Walters Area Headquarters	Revoked		9/30/2003	Solid Waste Emergency Permit	Isle of Wight County

EMG170	Isle of Wight County - Fairgrounds Site	Revoked		9/30/2003	Solid Waste Emergency Permit	Isle of Wight County
EMG201	VDOT - Bartlett Area Headquarters	Revoked		10/6/2003	Solid Waste Emergency Permit	Isle of Wight County
PBR620	Bay Disposal LLC - Smithfield	Permitted	Active	6/16/2017	Solid Waste Permit-by-Rule	Isle of Wight County
EMG035	Norfok City - Southside EMG	Revoked		9/22/2003	Solid Waste Emergency Permit	Norfolk City
EMG029	Norfolk City - Armistead Avenue EMG	Revoked		11/16/2009	Solid Waste Emergency Permit	Norfolk City
EMG034	Norfolk City - East Beach EMG	Revoked		9/22/2003	Solid Waste Emergency Permit	Norfolk City
PBR511	Virginia Department of Forensic Science - PMS	Revoked	Clean Closed	7/20/2004	Solid Waste Permit-by-Rule	Norfolk City
IR2004-T-1047	HEPACO LLC	Unpermitted			Solid Waste Incident Response	Norfolk City
EMG013	Norfolk City of - Northside Park	Revoked		9/11/1998	Solid Waste Emergency Permit	Norfolk City
IR2002-Y-1032	Virginia Port Authority	Unpermitted			Solid Waste Incident Response	Norfolk City
PBR504	Bay Disposal Incorporated MRF	Revoked	Closed	3/16/2004	Solid Waste Permit-by-Rule	Norfolk City
PBR318	Norfolk City - Public Health Center	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Norfolk City
PBR317	Norfolk City - Public Health Center	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Norfolk City
PBR316	ODU	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Norfolk City
PBR157	ODU	Permitted	Active	7/23/1999	Solid Waste Permit-by-Rule	Norfolk City
PBR322	Bon Secours - DePaul Medical Center	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Norfolk City
PBR114	Luck Stone Berkley Plant	Revoked	Clean Closed	5/15/1997	Solid Waste Permit-by-Rule	Norfolk City
PBR324	Luck Stone Berkley Plant	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Norfolk City
EMG030	Norfolk City - Zoological Park	Revoked		9/22/2003	Solid Waste Emergency Permit	Norfolk City
EMG453	Norfolk City - Zoological Park	Revoked		8/30/2011	Solid Waste Emergency Permit	Norfolk City

PBR321	Childrens Hospital of the Kings Daughter	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Norfolk City
IR2001-T-2068	Childrens Hospital of the Kings Daughter	Unpermitted			Solid Waste Incident Response	Norfolk City
EMG031	Norfolk City - Tarrallton Drive EMG	Revoked		9/30/2003	Solid Waste Emergency Permit	Norfolk City
EMG012	Norfolk City - Tarrallton Drive EMG	Revoked		9/11/1998	Solid Waste Emergency Permit	Norfolk City
EMG454	Norfolk City - Tarrallton Drive EMG	Revoked		8/30/2011	Solid Waste Emergency Permit	Norfolk City
EMG011	Norfolk City of - Ballentine Blvd.	Revoked		9/11/1998	Solid Waste Emergency Permit	Norfolk City
SWP404	Campostella Landfill	Permitted	Post Closure	2/17/1983	Solid Waste Full Permit	Norfolk City
PBR312	Sentara Nursing Center	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Norfolk City
PBR311	Smith and Williams Funeral Home-Norfolk	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Norfolk City
SWP421	SPSA - Norfolk Transfer Station	Revoked	Closed	11/27/1983	Solid Waste Full Permit	Norfolk City
PBR195	SPSA - Norfolk Transfer Station	Permitted	Active	1/29/2003	Solid Waste Permit-by-Rule	Norfolk City
PBR319	American Red Cross - Norfolk	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Norfolk City
PBR522	United Disposal Incorporated	Permitted	Active	9/16/2005	Solid Waste Permit-by-Rule	Norfolk City
SWP437	Titan Virginia Ready Mix LLC - Campostella	Revoked	Closed	7/26/1984	Solid Waste Full Permit	Norfolk City
PBR313	Sentara - Norfolk General Hospital	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Norfolk City
PBR117	Mil-Spec Abrasives LLC	Revoked	Clean Closed	10/28/1997	Solid Waste Permit-by-Rule	Norfolk City
PBR314	Sentara Leigh Hospital	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Norfolk City
EMG175	Norfolk City - 27th Bay St EMG	Revoked		10/7/2003	Solid Waste Emergency Permit	Norfolk City
EMG182	Norfolk City - Gregory Dr EMG	Revoked		10/17/2003	Solid Waste Emergency Permit	Norfolk City
SWP311	US Navy - Naval Station Norfolk	Revoked	Closed	10/24/1980	Solid Waste Full Permit	Norfolk City
PBR323	US Navy - Naval Station Norfolk	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Norfolk City
PBR320	US Navy - Naval Station Norfolk	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Norfolk City

PBR109	US Navy - Naval Station Norfolk	Revoked	Clean Closed	11/19/1996	Solid Waste Permit-by-Rule	Norfolk City
SWP408	US Navy - Naval Station Norfolk	Revoked	Clean Closed	4/19/1983	Solid Waste Full Permit	Norfolk City
PBR315	US Navy - Naval Station Norfolk	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Norfolk City
PBR095	US Navy - Naval Station Norfolk	Revoked	Closed	11/13/1995	Solid Waste Permit-by-Rule	Norfolk City
SWP286	US Navy - Naval Station Norfolk	Revoked	Closed	11/2/1980	Solid Waste Full Permit	Norfolk City
PBR058	Chambers Waste Systems of Virginia	Revoked	Clean Closed	5/16/1994	Solid Waste Permit-by-Rule	Norfolk City
EMG032	Norfolk City - Vocational Technical Center	Revoked		9/22/2003	Solid Waste Emergency Permit	Norfolk City
EMG458	Norfolk City - Vocational Technical Center	Revoked		8/30/2011	Solid Waste Emergency Permit	Norfolk City
EMG033	Church Street Station Studios	Revoked		9/22/2003	Solid Waste Emergency Permit	Norfolk City
PBR567	B&H Sales Corp	Permitted	Active	1/2/2013	Solid Waste Permit-by-Rule	Norfolk City
EMG462	Naval Station Norfolk	Revoked		8/31/2011	Solid Waste Emergency Permit	Norfolk City
EMG463	Naval Station Norfolk	Revoked		8/31/2011	Solid Waste Emergency Permit	Norfolk City
EMG460	Naval Station Norfolk	Revoked		8/31/2011	Solid Waste Emergency Permit	Norfolk City
EMG461	Naval Station Norfolk	Revoked		8/31/2011	Solid Waste Emergency Permit	Norfolk City
EMG455	Norfolk City - Old Ramada Hotel EMG	Revoked		8/30/2011	Solid Waste Emergency Permit	Norfolk City
EMG456	Norfolk City - Hanson Ave EMG	Revoked		8/30/2011	Solid Waste Emergency Permit	Norfolk City
EMG457	Norfolk City - Southside EMG	Revoked		8/30/2011	Solid Waste Emergency Permit	Norfolk City
PBR598	Bay Disposal LLC - Norfolk	Permitted	Active	12/10/2014	Solid Waste Permit-by-Rule	Norfolk City
PBR629	Select Recycling Waste Services Inc - Norfolk	Pending			Solid Waste Permit-by-Rule	Norfolk City
EMG197	Portsmouth City - I C Norcom High School	Revoked		9/28/2003	Solid Waste Emergency Permit	Portsmouth City

SWP482	Wheelabrator Portsmouth Inc - Waste to Energy Fac	Revoked	Closed	6/10/1986	Solid Waste Full Permit	Portsmouth City
PBR500	Wheelabrator Portsmouth Inc - Waste to Energy Fac	Permitted	Active	4/26/2005	Solid Waste Permit-by-Rule	Portsmouth City
PBR347	Bon Secours Maryview Medical Center	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Portsmouth City
PBR172	Bon Secours Maryview Medical Center	Revoked	Clean Closed	6/14/2001	Solid Waste Permit-by-Rule	Portsmouth City
SWP455	SPSA - Former Refuse Derived Fuel Plant	Revoked	Closed	1/4/1985	Solid Waste Full Permit	Portsmouth City
PBR345	Portsmouth General Hospital	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Portsmouth City
SWP391	Portsmouth City of - Incinerator	Revoked	Clean Closed	12/7/1982	Solid Waste Full Permit	Portsmouth City
SWP439	Portsmouth City of - Trans Stn	Revoked	Clean Closed	6/4/1985	Solid Waste Full Permit	Portsmouth City
PBR344	Portsmouth City of - Health Department	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Portsmouth City
PBR342	US Navy - Naval Medical Center Portsmouth	Revoked	Clean Closed	1/1/1996	Solid Waste Permit-by-Rule	Portsmouth City
PBR100	US Navy - Naval Medical Center Portsmouth	Revoked	Clean Closed	12/9/2014	Solid Waste Permit-by-Rule	Portsmouth City
IR2000-T-0995	US Navy - Naval Medical Center Portsmouth	Unpermitted			Solid Waste Incident Response	Portsmouth City
SWP041	Portsmouth City - Craney Island Landfill	Permitted	Active	1/5/1972	Solid Waste Full Permit	Portsmouth City
IR2003-T-2332	Cliff Berry Inc	Unpermitted			Solid Waste Incident Response	Portsmouth City
EMG178	Boxx Systems Inc	Revoked		10/17/2003	Solid Waste Emergency Permit	Portsmouth City
SWP388	US Navy - Norfolk Naval Shipyard	Revoked	Closed	10/26/1982	Solid Waste Full Permit	Portsmouth City
SWP416	US Navy - Norfolk Naval Shipyard	Revoked	Clean Closed	8/10/1983	Solid Waste Full Permit	Portsmouth City
SWP483	US Navy - Norfolk Naval Shipyard	Revoked	Clean Closed	10/1/1985	Solid Waste Full Permit	Portsmouth City
PBR135	US Navy - Norfolk Naval Shipyard	Permitted	Active	8/10/1998	Solid Waste Permit-by-Rule	Portsmouth City
PBR346	US Navy - Norfolk Naval Shipyard	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Portsmouth City
PBR061	US Navy - Craney Island - Fuel Terminal	Revoked	Clean Closed	12/14/1995	Solid Waste Permit-by-Rule	Portsmouth City

PBR343	US Coast Guard Base - Portsmouth	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Portsmouth City
PBR535	City of Portsmouth Tire Processing Facility	Application Withdrawn	Not Applicable		Solid Waste Permit-by-Rule	Portsmouth City
PBR558	Recycling and Disposal Solutions of Virginia (RDS)	Permitted	Active	7/20/2011	Solid Waste Permit-by-Rule	Portsmouth City
SWP063	Solenis LLC	Revoked	Closed	6/12/1972	Solid Waste Full Permit	Southampton County
SWP060	Solenis LLC	Revoked	Clean Closed	5/9/1972	Solid Waste Full Permit	Southampton County
EMG167	Southampton County - Vaughan Property EMG	Revoked		9/22/2003	Solid Waste Emergency Permit	Southampton County
PBR392	DOC - Deerfield Correctional Center	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Southampton County
SWP206	Central Site-Southhampton	Revoked	Closed	7/13/1976	Solid Waste Full Permit	Southampton County
PBR393	DOC - Capron Correctional Unit #20	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Southampton County
PBR390	DOC - Southampton Correctional Center	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Southampton County
PBR394	DOC - Southampton Correctional Center	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Southampton County
SWP011	DOC - Southampton Correctional Center	Revoked	Closed	7/12/1971	Solid Waste Full Permit	Southampton County
SWP291	DOC - Southampton Correctional Center	Revoked	Closed	2/8/1980	Solid Waste Full Permit	Southampton County
SWP338	Southampton County of - Landfill-Boykins	Revoked	Closed	1/1/1982	Solid Waste Full Permit	Southampton County
PBR391	Southside Reception and Classification Center	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Southampton County
SWP484	SPSA - Boykins Transfer	Permitted	Active	10/3/1985	Solid Waste Full Permit	Southampton County
SWP539	SPSA - Ivor Transfer Station	Permitted	Active	5/21/1992	Solid Waste Full Permit	Southampton County
SWP392	Southampton County of - Landfill-Ivor #2	Revoked	Closed	12/7/1982	Solid Waste Full Permit	Southampton County
SWP310	Suffolk City Landfill - Hosier Road	Revoked	Closed	10/16/1980	Solid Waste Full Permit	Suffolk City
PBR402	Louise Obici Memorial Hospital - North Main Street	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Suffolk City
SWP280	John C Holland Enterprises Inc	Permitted	Active	9/7/1979	Solid Waste Full Permit	Suffolk City
EMG196	Suffolk City - Sleepy Hole EMG	Revoked		10/15/2003	Solid Waste Emergency Permit	Suffolk City

PBR076	Good Earth Horticulture Incorporated	Revoked	Clean Closed	2/14/1995	Solid Waste Permit-by-Rule	Suffolk City
SWP460	Art Ray Corporation Debris Landfill	Revoked	Closed	1/25/1985	Solid Waste Full Permit	Suffolk City
PBR155	Clearfield MMG Inc - Suffolk	Permitted	Active	7/22/1999	Solid Waste Permit-by-Rule	Suffolk City
EMG010	Suffolk City - Bennetts Creek Park	Revoked		9/11/1998	Solid Waste Emergency Permit	Suffolk City
PBR057	Virginia Soil Reclamation	Revoked	Closed	3/26/1994	Solid Waste Permit-by-Rule	Suffolk City
PBR133	SPSA - Regional Landfill	Revoked	Clean Closed	2/22/1993	Solid Waste Permit-by-Rule	Suffolk City
SWP417	SPSA - Regional Landfill	Permitted	Active	9/12/1983	Solid Waste Full Permit	Suffolk City
PBR072	SPSA - Regional Landfill	Permitted	Active	11/21/1994	Solid Waste Permit-by-Rule	Suffolk City
PBR518	SPSA - Regional Landfill	Permitted	Active	4/1/2005	Solid Waste Permit-by-Rule	Suffolk City
EMG200	VDOT - SW Suffolk Bypass	Revoked		10/6/2003	Solid Waste Emergency Permit	Suffolk City
EMG173	Whedbe Farm - Holland Debris Burn Site EMG	Revoked		10/2/2003	Solid Waste Emergency Permit	Suffolk City
EMG183	Suffolk City - Manning Rd EMG	Revoked		10/21/2003	Solid Waste Emergency Permit	Suffolk City
IR2000-T-1918	Wright John P	Unpermitted			Solid Waste Incident Response	Suffolk City
SWP451	Indian Trails Debris Landfill	Permitted	Post Closure	11/28/1984	Solid Waste Full Permit	Suffolk City
PBR166	Indian Trails Debris Landfill	Revoked	Clean Closed	5/31/2000	Solid Waste Permit-by-Rule	Suffolk City
EMG174	Indian Trails Debris Landfill	Revoked		10/15/2003	Solid Waste Emergency Permit	Suffolk City
PBR542	American Environmental Group (AEG)	Application Withdrawn	Clean Closed		Solid Waste Permit-by-Rule	Suffolk City
SWP480	American Bio-Gas Recovery	Revoked	Clean Closed	8/26/1985	Solid Waste Full Permit	Virginia Beach City
EMG026	Virginia Beach City - Lake Ridge EMG	Revoked		9/15/2003	Solid Waste Emergency Permit	Virginia Beach City
PBR405	VA Beach General Hospital	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Virginia Beach City
PBR407	VA Beach Health District	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Virginia Beach City

SWP396	SPSA - Oceana Transfer Station	Revoked	Closed	1/27/1983	Solid Waste Full Permit	Virginia Beach City
PBR190	SPSA - Oceana Transfer Station	Permitted	Active	12/20/2002	Solid Waste Permit-by-Rule	Virginia Beach City
PBR410	Prism Diagnostics and Development Corp.	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Virginia Beach City
PBR415	Loftow, Ronald I., D.D.S.	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Virginia Beach City
SWP325	Lakeside Construction Landfill	Revoked	Closed	5/26/1981	Solid Waste Full Permit	Virginia Beach City
PBR409	HCMF Heritage Hall-VA Beach	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Virginia Beach City
SWP384	Gunter Debris Landfill	Revoked	Closed	10/8/1982	Solid Waste Full Permit	Virginia Beach City
SWP330	FEW Incorporated Debris Landfill	Revoked	Closed	6/30/1981	Solid Waste Full Permit	Virginia Beach City
SWP419	APAC-VA Incorporated	Revoked	Closed	5/2/1983	Solid Waste Full Permit	Virginia Beach City
SWP537	SPSA - Landstown Transfer	Revoked	Closed	10/25/1991	Solid Waste Full Permit	Virginia Beach City
PBR191	SPSA - Landstown Transfer	Permitted	Active	1/13/2003	Solid Waste Permit-by-Rule	Virginia Beach City
SWP596	Tidewater Recyclable Products Incorporated	Revoked	Not Applicable	3/31/1999	Solid Waste Full Permit	Virginia Beach City
PBR408	Van Stralen, Kenneth M., Dds	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Virginia Beach City
EMG016	Virginia Beach - Bendix Rd	Revoked		9/8/1998	Solid Waste Emergency Permit	Virginia Beach City
EMG014	Virginia Beach City - Creeds Air Field EMG	Revoked		9/15/2003	Solid Waste Emergency Permit	Virginia Beach City
SWP418	Virginia Beach Debris Landfill-Potters Rd	Revoked	Clean Closed	5/20/1983	Solid Waste Full Permit	Virginia Beach City
EMG015	Virginia Beach City - Potters Pit EMG	Revoked		9/15/2003	Solid Waste Emergency Permit	Virginia Beach City
PBR024	SPSA - Virginia Beach YWCF	Revoked	Clean Closed	6/2/1993	Solid Waste Permit-by-Rule	Virginia Beach City
SWP385	Williams Corporation Debris Landfill - VA Beach	Revoked	Closed	10/14/1982	Solid Waste Full Permit	Virginia Beach City
SWP444	Harold and Williams Development Company	Revoked	Closed	9/28/1984	Solid Waste Full Permit	Virginia Beach City
SWP380	Brooks Pollock Inert Landfill	Revoked	Closed	8/25/1982	Solid Waste Full Permit	Virginia Beach City
SWP368	Braithwaite Debris	Revoked	Closed	8/16/1982	Solid Waste Full Permit	Virginia Beach City
SWP364	Braithwaite Debris	Revoked	Closed	7/27/1982	Solid Waste Full Permit	Virginia Beach City

PBR075	Soilex Corporation - Virginia Beach	Revoked	Clean Closed	1/30/1995	Solid Waste Permit-by-Rule	Virginia Beach City
PBR406	Smith & Williams Funeral Home	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Virginia Beach City
PBR413	Sentara Healthcare	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Virginia Beach City
PBR411	US Navy - NAS Oceana - Dam Neck Annex	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Virginia Beach City
PBR085	US Navy - NAS Oceana - Dam Neck Annex	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Virginia Beach City
PBR414	US Navy - Joint Expeditionary Base - Ft Story	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Virginia Beach City
PBR519	SPSA - Consolidated Yard Waste Facility	Revoked	Clean Closed	5/4/2005	Solid Waste Permit-by-Rule	Virginia Beach City
SWP603	Centerville Turnpike CDD Landfill	Permitted	Active	9/25/2008	Solid Waste Full Permit	Virginia Beach City
SWP367	Virginia Beach City - Landfill No 2	Revoked	Closed	8/5/1982	Solid Waste Full Permit	Virginia Beach City
SWP324	Virginia Beach City - Landfill No 2	Revoked	Closed	5/28/1981	Solid Waste Full Permit	Virginia Beach City
SWP398	Virginia Beach City - Landfill No 2	Permitted	Active	2/15/1983	Solid Waste Full Permit	Virginia Beach City
EMG025	Virginia Beach City - Landfill No 2	Revoked	Clean Closed	9/15/2003	Solid Waste Emergency Permit	Virginia Beach City
IR2000-T-1802	Sentara - Virginia Beach General Hospital	Unpermitted			Solid Waste Incident Response	Virginia Beach City
SWP267	US Navy - Naval Air Station - Oceana	Revoked	Closed	5/25/1979	Solid Waste Full Permit	Virginia Beach City
SWP292	US Navy - Naval Air Station - Oceana	Revoked	Closed	2/11/1980	Solid Waste Full Permit	Virginia Beach City
SWP278	US Navy - Naval Air Station - Oceana	Revoked	Closed	9/6/1979	Solid Waste Full Permit	Virginia Beach City
PBR412	US Navy - Naval Air Station - Oceana	Revoked	Closed	1/1/1996	Solid Waste Permit-by-Rule	Virginia Beach City
SWP276	US Navy - Joint Expeditionary Base - Little Creek	Revoked	Closed	8/28/1979	Solid Waste Full Permit	Virginia Beach City
SWP541	US Navy - Joint Expeditionary Base - Little Creek	Revoked	Clean Closed	6/30/1992	Solid Waste Full Permit	Virginia Beach City
PBR092	US Navy - Joint Expeditionary Base - Little Creek	Revoked	Clean Closed	2/22/1996	Solid Waste Permit-by-Rule	Virginia Beach City
PBR199	US Navy - Joint Expeditionary Base - Little Creek	Revoked	Clean Closed	5/2/2003	Solid Waste Permit-by-Rule	Virginia Beach City

SWP395	US Navy - Joint Expeditionary Base - Little Creek	Revoked	Clean Closed	1/13/1983	Solid Waste Full Permit	Virginia Beach City
PBR094	US Navy - Joint Expeditionary Base - Little Creek	Revoked	Clean Closed	11/13/1995	Solid Waste Permit-by-Rule	Virginia Beach City
IR2008-T-0968	Holliday Inn Executive Center	Unpermitted			Solid Waste Incident Response	Virginia Beach City

Appendix F: SPSA Regional Landfill Traffic Study

This page intentionally left blank.

Traffic Impact Study

Part A Modification Application for Cells VIII and IX Expansion

SPSA Regional Landfill

Suffolk, Virginia
January 2021

CLAUDIA A. WALSH
Lic. No. 033472

Contents

Figures

Tables

Appendices

1. Introduction

The Southeastern Public Service Authority (SPSA) is submitting an application to modify Part A of its Solid Waste Permit (Permit No. 417) for its Regional Landfill, located at #1 Bob Foeller Drive in the City of Suffolk. The modification includes a request to increase the solid waste facility boundary by 129 acres to include expansion for Cells VIII and IX, and development of a soil borrow and stormwater management area on the existing property north of Cell VII. The property is located north of the West Military Highway (US 13/58/460), Bob Foeller Drive, and Welsh Parkway intersection. **Figure 1** displays a study area map.

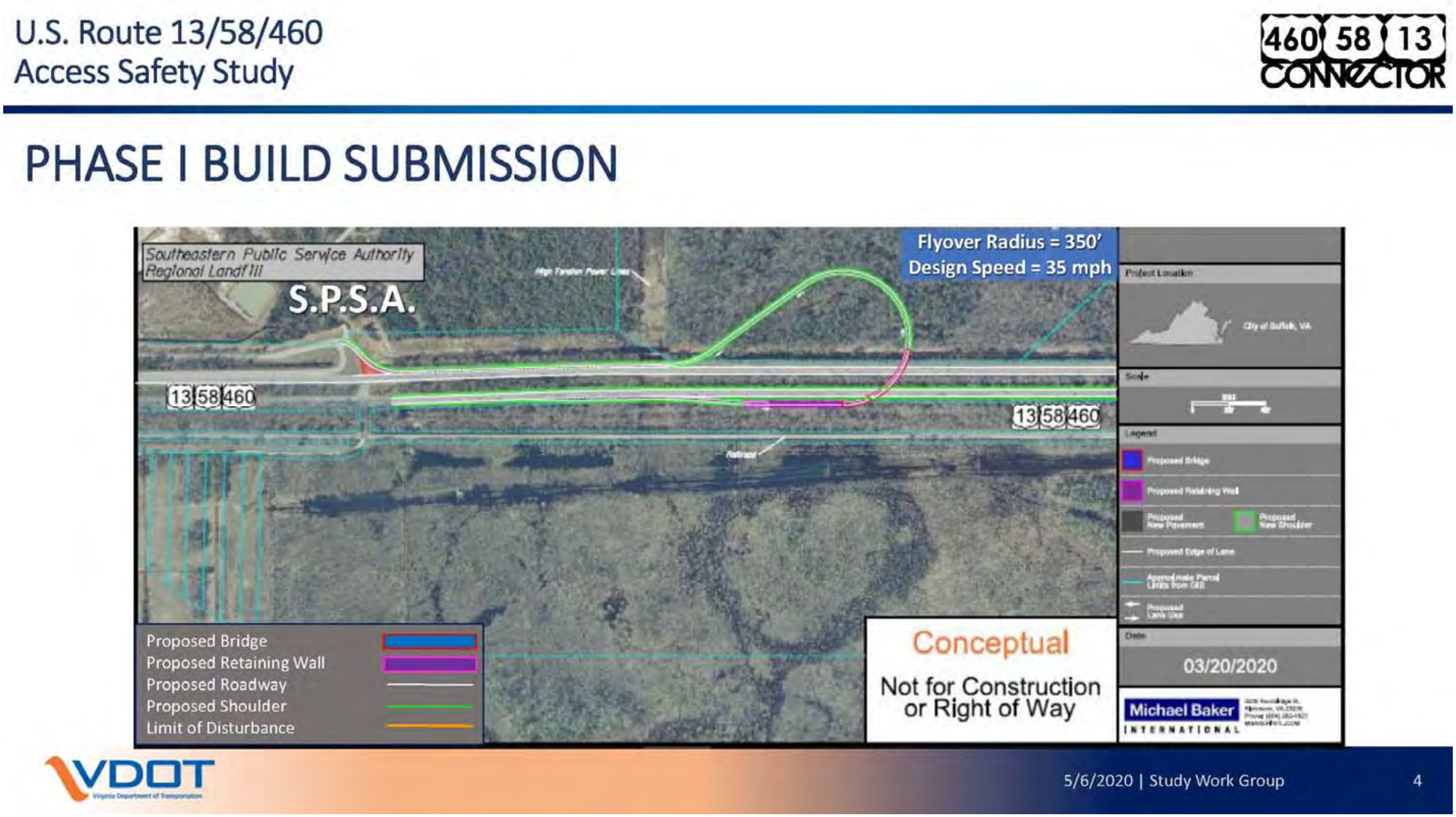
It is anticipated that construction of Cell VIII will take place one to two years prior to the completion of waste filling operations in Cell VII, currently anticipated to be in 2037. Operations in existing Cells V and VI are anticipated to continue through at least 2027, based on current and anticipated disposal rates. Cell VII is anticipated to begin construction in 2025 and be operational prior to cessation of filling in Cells V and VI. In accordance with the Conditional Use Permit Issued by the City of Suffolk (C08-16), SPSA must construct a flyover to accommodate left turning vehicles entering the landfill site prior to receipt of waste in Cell VII. For purposes of this study, HDR has assumed that Cell VII will be constructed and operational and that a flyover would be constructed in the Build of Phase 1.

Cells VII, VIII and IX operations will be accessed using the existing facility entrance roadway, Bob Foeller Drive. HDR is analyzing the existing access onto Bob Foeller Drive (**Figure 1**) and the proposed access on US 13/58/460 of a flyover across the highway for eastbound traffic that connects to Bob Foeller Drive (**Figure 2**). The flyover will be located approximately 3,000’ from the existing intersection at Bob Foeller Drive/Welsh Parkway.

The purpose of this report is to document the operational conditions of the existing entrance and exit and compare to the proposed flyover alternative for years 2040 and 2054. Analysis of 2020 no-build conditions is presented in **Section 2**. Volume growth is presented in **Section 3** of this report. The capacity analysis for the proposed facility with development is documented in **Section 4**. Finally, **Section 5** summarizes the study findings and presents conclusions.

Figure 1: Study Area Map

Figure 2: Proposed Build Configuration



U.S. Route 13/58/460
Access Safety Study

PHASE I BUILD SUBMISSION

Flyover Radius = 350'
Design Speed = 35 mph

Proposed Bridge	🟦
Proposed Retaining Wall	🟪
Proposed Roadway	—
Proposed Shoulder	—
Limit of Disturbance	—

Conceptual

Not for Construction or Right of Way

03/20/2020

5/6/2020 | Study Work Group 4

2. 2020 No-Build Conditions

This section presents the 2020 no-build traffic operational analysis for the peak hour traffic volumes for the analyzed intersections and weaving segment.

As shown in **Figure 1**, the study area includes one intersection plus a weave segment of US 13/58/460 that are being analyzed for this project:

- US 13/58/460 and Bob Foeller Drive/Welsh Parkway
- US 13/58/460 WB from Bob Foeller Drive to US 13/58/460 Business Interchange

The current entrance to the SPSA Regional Landfill can only be accessed via Bob Foeller Drive located at the southern edge of the site. Bob Foeller Drive intersects with US 13/58/460 to the southeast of the SPSA Regional Landfill. Bob Foeller Drive is named as Welsh Parkway on the south side of US 13/58/460. Presently, a locked gate controls access to Welsh Parkway. US 13/58/460 is a divided six-lane highway with a grass median and Bob Foeller Drive and Welsh Parkway are both two-lane local roadways. There are exclusive left turn lanes onto both Bob Foeller Drive and Welsh Parkway along with a yield controlled right turn lane into the SPSA Regional Landfill site on the westbound approach. The storage bays' approximate lengths are 330 feet for the eastbound left turn lane, 240 feet for the westbound left turn lane, and 435 feet for the westbound right turn lane. All the movements to and from Bob Foeller Drive are stop controlled except the yield controlled right turn movement to Bob Foeller Drive from US 13/58/460 and the free-flowing right turn movement from Bob Foeller Drive to onto US 13/58/460.

To determine the 2020 no-build conditions, a 24-hour traffic count was conducted for the following areas:

- The weave section of US 13/58/460
- The free-flow right turn from Bob Foeller Drive onto US 13/58/460
- The Westbound ramp from US 13/58/460 to US 58 Business

In addition to the 24-hour counts conducted, a turning movement count was conducted for the peak hour periods at the following intersections:

- US 13/58/460 and Bob Foeller Drive/Welsh Parkway

The peak hour turning movement counts were collected from 7:00-9:00 AM and 2:00-4:30 PM in 15-minute intervals. All counts were conducted on October 13, 2020 and October 14, 2020. The peak hour periods were determined to be 7:15 – 8:15 in the AM and 3:30 – 4:30 in the PM.

Level of service (LOS) is a qualitative measure used to describe the condition of traffic flow, ranging from excellent free-flow conditions at LOS A to overloaded stop-and-go conditions at LOS F. LOS C is typically considered to be the minimum acceptable level of service in rural areas. LOS at US 13/58/460 and Bob Foeller Drive/Welsh Parkway were analyzed using Synchro 10. LOS for the weaving segment was analyzed using Highway Capacity Software 7.

2.1 No-Build LOS Summaries

2.1.1 Intersection of US 13/58/460, Bob Foeller Drive, and Welsh Parkway

The intersection functions at an unacceptable LOS in the AM and PM peak hour. This is due to the heavy thru volumes along US 13/58/460 creating few gaps available for vehicles making a left turn to access Bob Foeller Drive. **Figure 3** presents the AM and PM peak hour volumes. Analysis results are summarized in **Table 1**. For further detail, please refer to **Appendix A** for the traffic counts and **Appendix B** for the Synchro reports.

2.1.2 Weave Segment from Bob Foeller Drive to US 13/58/460 Business Interchange

The weave segment functions at an acceptable level of service in the AM and PM peak hour. This can be attributed to the low volumes seen at the on ramp. Analysis results are summarized in **Table 2**. For further detail, please refer to **Appendix C**.

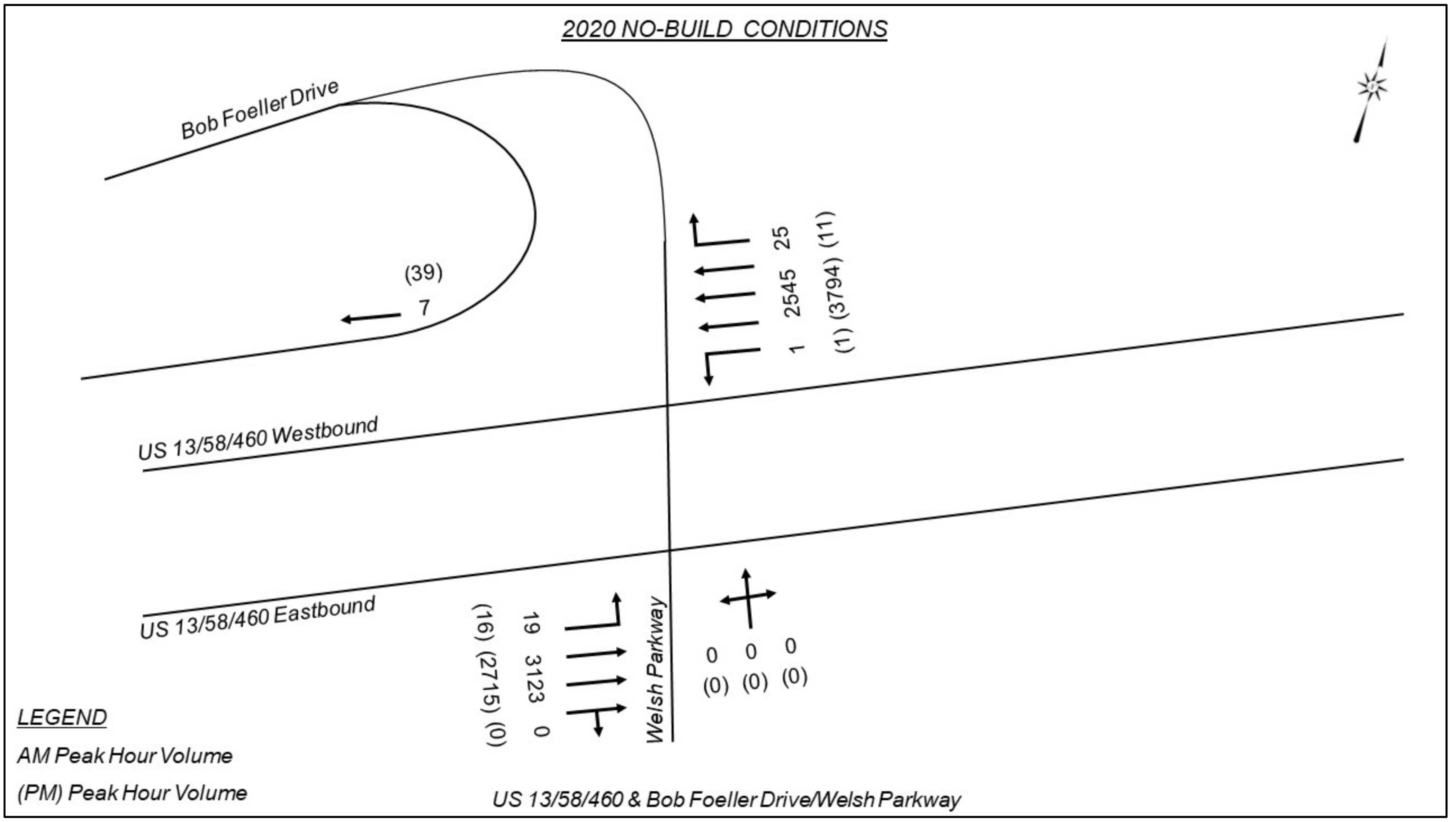
Table 1: 2020 No-Build Intersection Analysis Results

Analysis Year	Primary Street	Secondary Street	Config.	Approach	AM Peak Hour			PM Peak Hour		
					LOS	Delay (s/veh)	Max. v/c	LOS	Delay (s/veh)	Max. v/c
2020 No-Build	US 13 (Portsmouth Boulevard)	Bob Foeller Drive / Welsh Parkway	TWSC	EBL	F	252.8	0.95	F	> 300	3.41
				WBL	F	> 300	0.11	F	105.2	0.03

Table 2: 2020 No-Build HCS Analysis Results

Analysis Year	Primary Street	Freeway Segment	Config.	AM Peak Hour			PM Peak Hour		
				LOS	Density (pc/mi/hr)	Max. v/c	LOS	Density (pc/mi/hr)	Max. v/c
2020 No-Build	US 13 (Portsmouth Boulevard) WB	Bob Foeller Drive to US 13 Business	Weave	B	13.9	0.40	B	19.0	0.54

Figure 3: 2020 No-Build Volumes

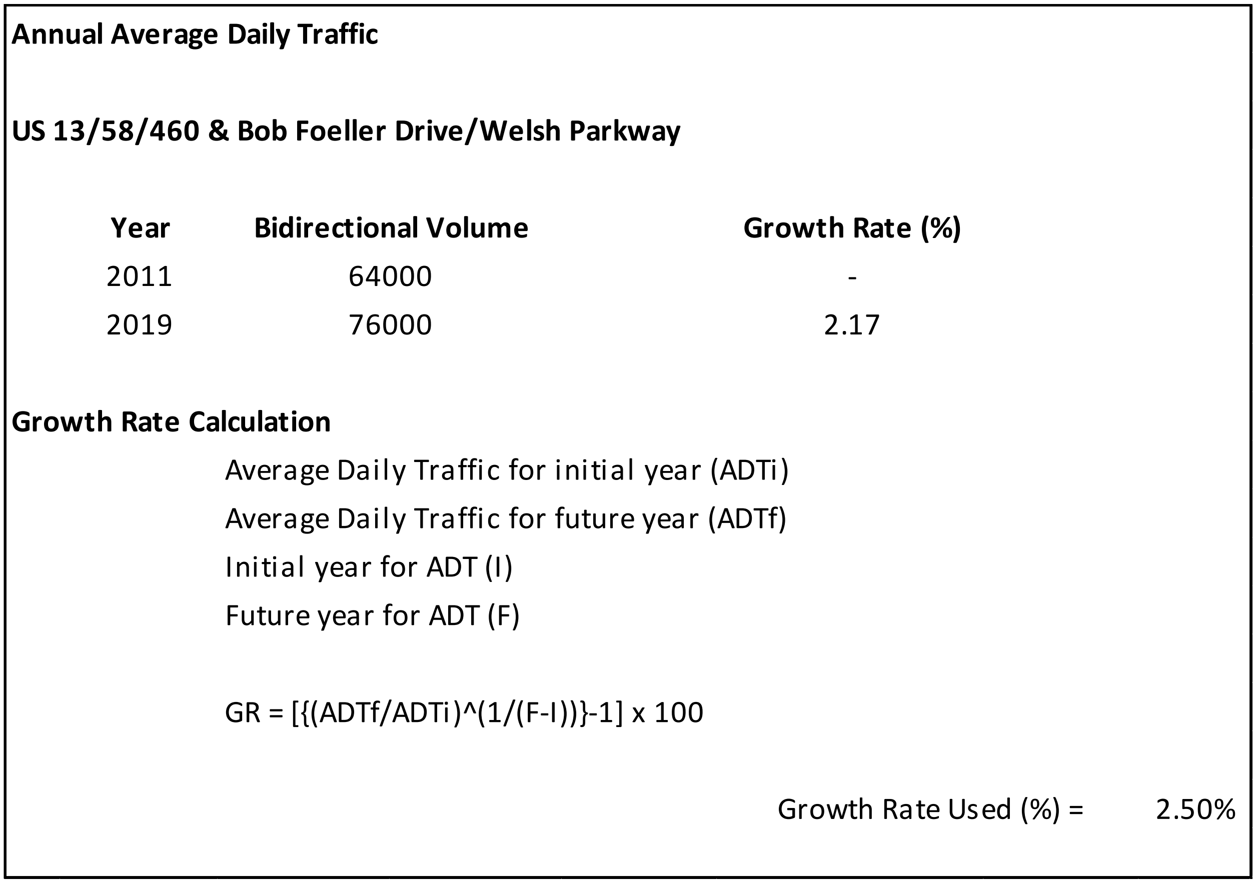


3. Volume Growth

The volumes from the 2020 traffic count were grown to assess conditions in the year 2040 and 2054. A growth rate of 2.5% was determined as an appropriate and conservative rate from the previous study completed in June 2016. This rate was verified by analyzing the most recent 9 years of traffic counts reported by the Virginia Department of Transportation (VDOT) for this segment of US 13/58/460. The 24-hr bidirectional count in the weaving segment was compared to the 2019 count reported by VDOT to confirm the volumes were not impacted by COVID 19. Upon review, the volumes along the corridor were in-line with previous counts and no adjustment was determined to be necessary.

The set of calculations used to determine the growth rate used for the Future Year Build analyses can be seen below, in **Figure 4.**

Figure 4: Compound Growth Rate Development for US 13/58/460



Annual Average Daily Traffic

US 13/58/460 & Bob Foeller Drive/Welsh Parkway

Year	Bidirectional Volume	Growth Rate (%)
2011	64000	-
2019	76000	2.17

Growth Rate Calculation

Average Daily Traffic for initial year (ADTi)
Average Daily Traffic for future year (ADTf)
Initial year for ADT (I)
Future year for ADT (F)

GR = [{(ADTf/ADTi)^(1/(F-I))}-1] x 100

Growth Rate Used (%) = 2.50%

For the traffic to and from the SPSA Regional Landfill, a conservative growth rate of 0.8% was used for all deliveries with the exception of ash from the Portsmouth Waste to Energy Facility. This rate was determined using the facility's anticipated growth over the next 20 years. In June 2027 SPSA's agreement with the Portsmouth Waste to Energy Facility expires. Upon expiration of the agreement, waste from the eastern communities of SPSA's service areas may be delivered to the Regional Landfill for disposal, and receipt of ash residue would cease. The 2040 projections assume that MSW from the eastern community transfer stations would be hauled to the site via 100 CY trailers with an average capacity of 20 tons each. Details on how the growth rate and future projections was determined can be found in **Appendix D**.

4. Analysis of Future Build Configuration

4.1 Future Year Build Analysis

The analyzed Build configuration consists of a proposed VDOT funded flyover for the eastbound traffic that would cross over US 13/58/460 to the east of the Bob Foeller Drive/Welsh Parkway intersection. The configuration would provide a route that allows traffic onto Bob Foeller Drive without the conflict points that were previously present for eastbound left and U-turn users. Users of the flyover will exit from EB US 13/58/460 and merge with WB US 13/58/460 east of the Bob Foeller Drive intersection where it will create an auxiliary lane that ends in the existing right turn lane into the site which creates a weaving scenario for motorists on this segment of highway.

This Build configuration would be used by the City of Suffolk refuse and yard waste trucks and residential traffic to enter the facility and by general traffic to reverse direction as the proposed configuration would eliminate the median crossing. Motorists would still use the existing route to exit the SPSA facility to get on US 13/58/460 WB. To analyze the Build conditions, the background traffic was projected using the growth rates found in the prior section and volumes can be seen in **Figures 5 and 6**. The AM and PM peak hour levels of service for weave segments were computed by utilizing HCS 7.

4.1.1 Weave Segment from US 13/58/460 Flyover to Bob Foeller Drive

Due to the proposed flyover, a new weaving segment along US 13/58/460 WB from US 13/58/460 Flyover to Bob Foeller Drive was analyzed to determine how the proposed configuration would operate. This weave segment functions acceptably at LOS C in the AM peak hour for 2040 and an unacceptable LOS D in the PM peak hour for 2040. In both the AM and PM peak hours for the 2054, the results of the weave analysis showed that the weave segment would operate at LOS E and F respectively. The roadway is operating below the acceptable level due to background traffic along US 13/58/460 as a minimal number of vehicles (under 150 vehicles in each time period) are anticipated to perform a weaving move in this segment.

While the analysis produces results that are less then acceptable, the flyover will improve safety by preventing trucks from having to turn left into the facility and instead allowing trucks to safely crossover the WB traffic to enter the site without changing lanes. Safety is also greatly increased for the traffic wanting to U-turn onto US 13/58/460 WB as motorists are able to utilize the flyover as well. A summary of the results from the analysis are provided in **Tables 3 and 4** and with full reports from HCS analyses provided in **Appendix C**.

4.1.2 Weave Segment from Bob Foeller Drive to US 13/58/460 Business Interchange

The weave segment from Bob Foeller Drive onto US 13/58/460 functions at an acceptable LOS C in the AM peak hour for 2040 and an unacceptable LOS in the PM peak hour for 2040. In 2054, both the AM and PM peak hours operated at an unacceptable LOS. The roadway is operating below the acceptable level due to background traffic along US 13/58/460 as minimal volume are anticipated to enter the highway from the SPSA Driveway (under 100 vehicles in each time period). For analysis results summary, see **Tables 3 and 4** and full reports from the HCS analyses in **Appendix C**.

Table 3: 2040 Build Analysis Results

Analysis Year	Primary Street	Freeway Segment	Config.	AM Peak Hour			PM Peak Hour		
				LOS	Density (pc/mi/hr)	Max. v/c	LOS	Density (pc/mi/hr)	Max. v/c
2040 Build	US 13 (Portsmouth Boulevard) WB	Bob Foeller Drive to US 13 Business	Weave	C	23.8	0.60	D	32.4	0.81
	US 13 (Portsmouth Boulevard) WB	US 13 EB Flyover to Bob Foeller Drive	Weave	C	25.9	0.66	D	33.1	0.81

Table 4: 2054 Build Analysis Results

Analysis Year	Primary Street	Freeway Segment	Config.	AM Peak Hour			PM Peak Hour		
				LOS	Density (pc/mi/hr)	Max. v/c	LOS	Density (pc/mi/hr)	Max. v/c
2054 Build	US 13 (Portsmouth Boulevard) WB	Bob Foeller Drive to US 13 Business	Weave	D	34.9	0.85	F	-	1.14*
	US 13 (Portsmouth Boulevard) WB	US 13 EB Flyover to Bob Foeller Drive	Weave	E	38.5	0.92	F	-	1.14*

**v/c ratio over 1.00 is considered to be overcapacity which results in the segment having a LOS of F and no density determined.*

Figure 5: Future 2040 Build Volumes

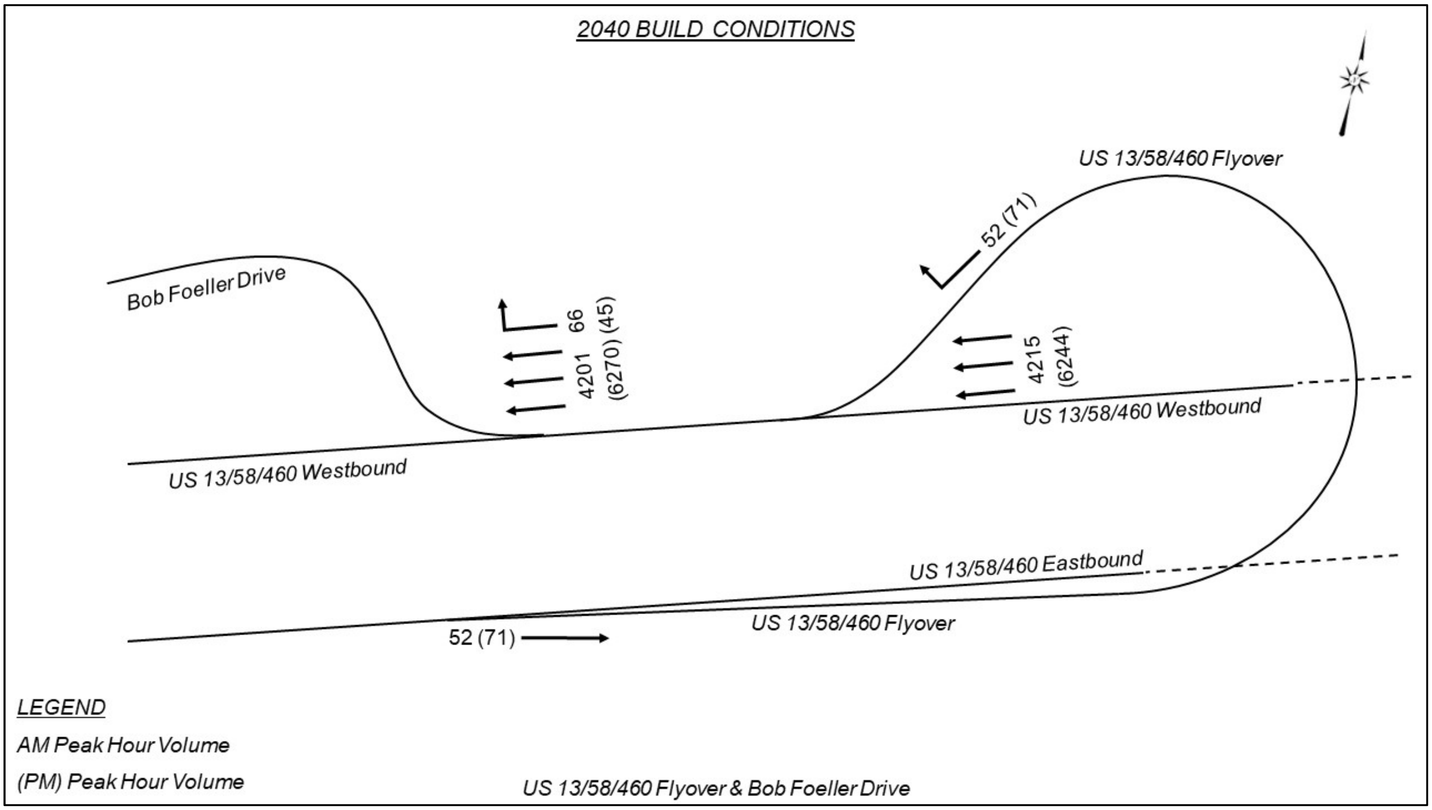
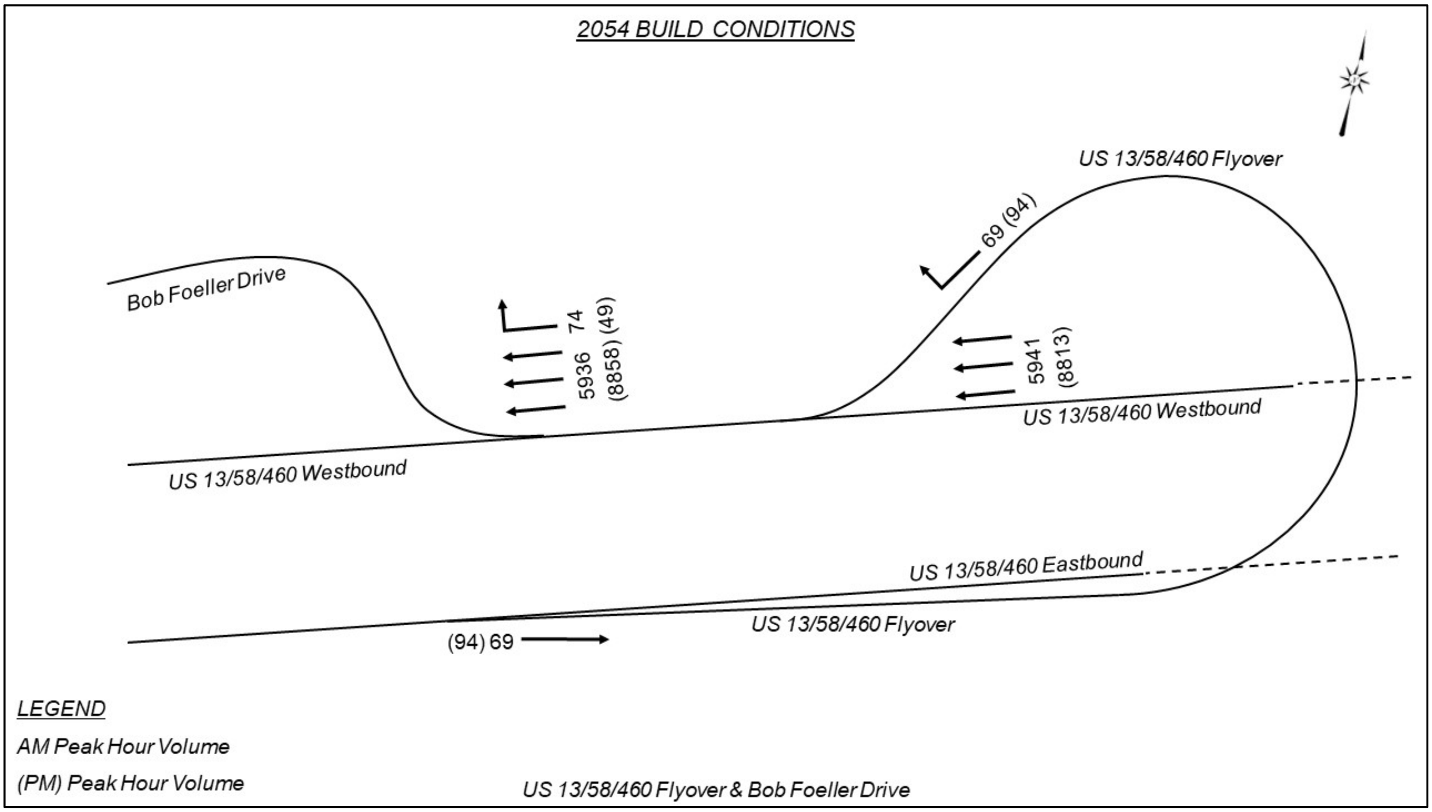


Figure 6: Future 2054 Build Volumes



5. Conclusion

The Southeastern Public Service Authority (SPSA) is submitting an application to modify Part A of its Solid Waste Permit (Permit No. 417) for its Regional Landfill, located at #1 Bob Foeller Drive in the City of Suffolk. The modification includes a request to increase the solid waste facility boundary by 129 acres to include expansion for Cells VIII and IX, and development of a soil borrow and stormwater management area on the existing property north of Cell VII. This Traffic Impact Study analyzed the traffic conditions of the 2020 No-Build and future year 2040 and 2054 Build scenarios at the intersection and weave segments:

- US 13/58/460 and Bob Foeller Drive/Welsh Parkway – *Intersection (No-Build Only)*
- Bob Foeller Drive to US 13 Business – *Weave Segment (Build and No Build)*
- US 13/58/460 Flyover to Bob Foeller Drive – *Weave Segment (Build Only)*

In the 2020 No-Build scenario, the intersection of US 13/58/460 and Bob Foeller Drive/Welsh Parkway operates at LOS F in both peak hour periods and the weave segment operates with LOS B.

For the 2040 Build conditions, both weave segments were found to operate acceptably at LOS C in the AM peak hour and operated at LOS D in the PM peak hour. For 2054 Build Conditions, both weave segments were found to operate below the acceptable LOS C threshold in each time period. The high densities along US 13/58/460 were due to growth to the background traffic along US 13/58/460. While the analysis produces results that may not show significant improvements with respect to the weave operations, the elimination of the left turn crossover at the existing intersection and replacing this with a flyover will provide a major improvement to safety of users trying to access the site.

A

Appendix A – Traffic Count Data

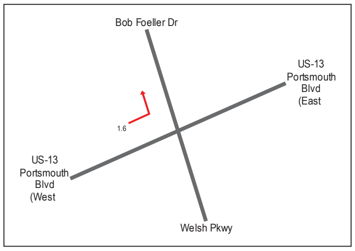
Suffolk, VA
Classified Traffic Count

Site 1
US-13 Portsmouth Blvd
Bob Foeller Dr

Lat/Long
36,756276°, -76,509065°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F



0000 - 2400 (Weekday 24h Session)

🟧 undertaken on Tuesday, October 13th, 2020

	Movement 1.5													
TIME	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13	TOTAL
0000 - 0015	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0015 - 0030	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0030 - 0045	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0045 - 0100	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0100 - 0115	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0115 - 0130	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0130 - 0145	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0145 - 0200	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0200 - 0215	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0215 - 0230	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0230 - 0245	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0245 - 0300	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0300 - 0315	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0315 - 0330	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0330 - 0345	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0345 - 0400	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0400 - 0415	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0415 - 0430	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0430 - 0445	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0445 - 0500	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0500 - 0515	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0515 - 0530	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0530 - 0545	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0545 - 0600	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0600 - 0615	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0615 - 0630	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0630 - 0645	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0645 - 0700	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0700 - 0715	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0715 - 0730	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0730 - 0745	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0745 - 0800	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0800 - 0815	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0815 - 0830	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
0830 - 0845	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0845 - 0900	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
0900 - 0915	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
0915 - 0930	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0930 - 0945	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
0945 - 1000	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1000 - 1015	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
1015 - 1030	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
1030 - 1045	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
1045 - 1100	0	0	0	0	0	2	0	1	0	0	0	0	0	**3**
1100 - 1115	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
1115 - 1130	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1130 - 1145	0	0	0	0	0	1	0	1	0	0	0	0	0	**2**
1145 - 1200	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1200 - 1215	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
1215 - 1230	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**
1230 - 1245	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**
1245 - 1300	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1300 - 1315	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
1315 - 1330	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1330 - 1345	0	0	0	0	0	0	0	2	0	0	0	0	0	**2**
1345 - 1400	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
1400 - 1415	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1415 - 1430	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1430 - 1445	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1445 - 1500	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1500 - 1515	0	0	0	0	0	3	0	0	0	0	0	0	0	**3**
1515 - 1530	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1530 - 1545	0	0	0	0	0	2	0	1	0	0	0	0	0	**3**
1545 - 1600	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1600 - 1615	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1615 - 1630	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1630 - 1645	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**
1645 - 1700	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1700 - 1715	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1715 - 1730	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1730 - 1745	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1745 - 1800	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1800 - 1815	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**
1815 - 1830	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**
1830 - 1845	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1845 - 1900	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1900 - 1915	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1915 - 1930	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1930 - 1945	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1945 - 2000	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2000 - 2015	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2015 - 2030	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2030 - 2045	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2045 - 2100	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2100 - 2115	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2115 - 2130	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2130 - 2145	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2145 - 2200	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2200 - 2215	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2215 - 2230	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2230 - 2245	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2245 - 2300	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2300 - 2315	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2315 - 2330	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2330 - 2345	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2345 - 0000	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Session Total	0	0	0	0	0	35	0	10	0	0	0	0	0	**45**
Sess on Average	0,00	0,00	0,00	0,00	0,00	0,36	0,00	0,10	0,00	0,00	0,00	0,00	0,00	**0,47**
Session Percentage	0,00	0,00	0,00	0,00	0,00	77,78	0,00	22,22	0,00	0,00	0,00	0,00	0,00	

AM Peak Hour	-	-	-	-	-	0930 - 1030	-	-	-	-	-	-	-	**0930 - 1030**
AM Peak Hour Volume	0	0	0	0	0	5	0	0	0	0	0	0	0	**5**

Noon Peak Hour	-	-	-	-	-	1430 - 1530	-	1045 - 1145	-	-	-	-	-	**1445 - 1545**
Noon Peak Hour Volume	0	0	0	0	0	9	0	2	0	0	0	0	0	**10**

PM Peak Hour	-	-	-	-	-	1500 - 1600	-	1730 - 1830	-	-	-	-	-	**1500 - 1600**
PM Peak Hour Volume	0	0	0	0	0	7	0	2	0	0	0	0	0	**8**

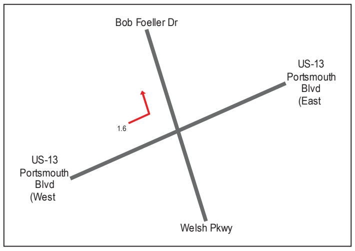
Suffolk, VA
Classified Traffic Count

Site 1
US-13 Portsmouth Blvd
Bob Foeller Dr

Lat/Long
36,756276°, -76,509065°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F



0000 - 2400 (Weekday 24h Session)

🟨 undertaken on Tuesday, October 13th, 2020

	Bi-Directional 15min													
TIME	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13	**TOTAL**
0000 - 0015	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0015 - 0030	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0030 - 0045	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0045 - 0100	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0100 - 0115	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0115 - 0130	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0130 - 0145	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0145 - 0200	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0200 - 0215	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0215 - 0230	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0230 - 0245	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0245 - 0300	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0300 - 0315	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0315 - 0330	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0330 - 0345	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0345 - 0400	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0400 - 0415	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0415 - 0430	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0430 - 0445	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0445 - 0500	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0500 - 0515	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0515 - 0530	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0530 - 0545	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0545 - 0600	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0600 - 0615	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0615 - 0630	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0630 - 0645	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0645 - 0700	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0700 - 0715	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0715 - 0730	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0730 - 0745	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0745 - 0800	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0800 - 0815	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0815 - 0830	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
0830 - 0845	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0845 - 0900	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
0900 - 0915	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
0915 - 0930	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
0930 - 0945	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
0945 - 1000	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1000 - 1015	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
1015 - 1030	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
1030 - 1045	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
1045 - 1100	0	0	0	0	0	2	0	1	0	0	0	0	0	**3**
1100 - 1115	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
1115 - 1130	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1130 - 1145	0	0	0	0	0	1	0	1	0	0	0	0	0	**2**
1145 - 1200	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1200 - 1215	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
1215 - 1230	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**
1230 - 1245	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**
1245 - 1300	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1300 - 1315	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
1315 - 1330	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1330 - 1345	0	0	0	0	0	0	0	2	0	0	0	0	0	**2**
1345 - 1400	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
1400 - 1415	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1415 - 1430	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1430 - 1445	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1445 - 1500	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1500 - 1515	0	0	0	0	0	3	0	0	0	0	0	0	0	**3**
1515 - 1530	0	0	0	0	0	2	0	0	0	0	0	0	0	**2**
1530 - 1545	0	0	0	0	0	2	0	1	0	0	0	0	0	**3**
1545 - 1600	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1600 - 1615	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1615 - 1630	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1630 - 1645	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**
1645 - 1700	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1700 - 1715	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1715 - 1730	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1730 - 1745	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1745 - 1800	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1800 - 1815	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**
1815 - 1830	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**
1830 - 1845	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1845 - 1900	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1900 - 1915	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1915 - 1930	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1930 - 1945	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
1945 - 2000	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2000 - 2015	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2015 - 2030	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2030 - 2045	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2045 - 2100	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2100 - 2115	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2115 - 2130	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2130 - 2145	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2145 - 2200	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2200 - 2215	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2215 - 2230	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2230 - 2245	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2245 - 2300	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2300 - 2315	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2315 - 2330	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2330 - 2345	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2345 - 0000	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Session Total	0	0	0	0	0	35	0	10	0	0	0	0	0	**45**
Session Average	0,00	0,00	0,00	0,00	0,00	0,36	0,00	0,10	0,00	0,00	0,00	0,00	0,00	**0,47**
Session Percentage	0,00	0,00	0,00	0,00	0,00	77,78	0,00	22,22	0,00	0,00	0,00	0,00	0,00	

AM Peak Hour	-	-	-	-	-	0930 - 1030	-	-	-	-	-	-	-	**0930 - 1030**
AM Peak Hour Volume	0	0	0	0	0	5	0	0	0	0	0	0	0	**5**

Noon Peak Hour	-	-	-	-	-	1430 - 1530	-	1045 - 1145	-	-	-	-	-	**1445 - 1545**
Noon Peak Hour Volume	0	0	0	0	0	9	0	2	0	0	0	0	0	**10**

PM Peak Hour	-	-	-	-	-	1500 - 1600	-	1730 - 1830	-	-	-	-	-	**1500 - 1600**
PM Peak Hour Volume	0	0	0	0	0	7	0	2	0	0	0	0	0	**8**

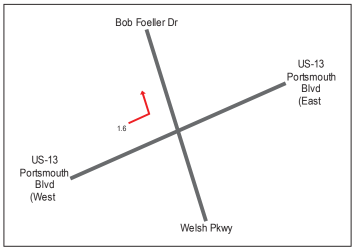
Suffolk, VA
Classified Traffic Count

Site 1
US-13 Portsmouth Blvd
Bob Foeller Dr

Lat/Long
36,756276°, -76,509065°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F

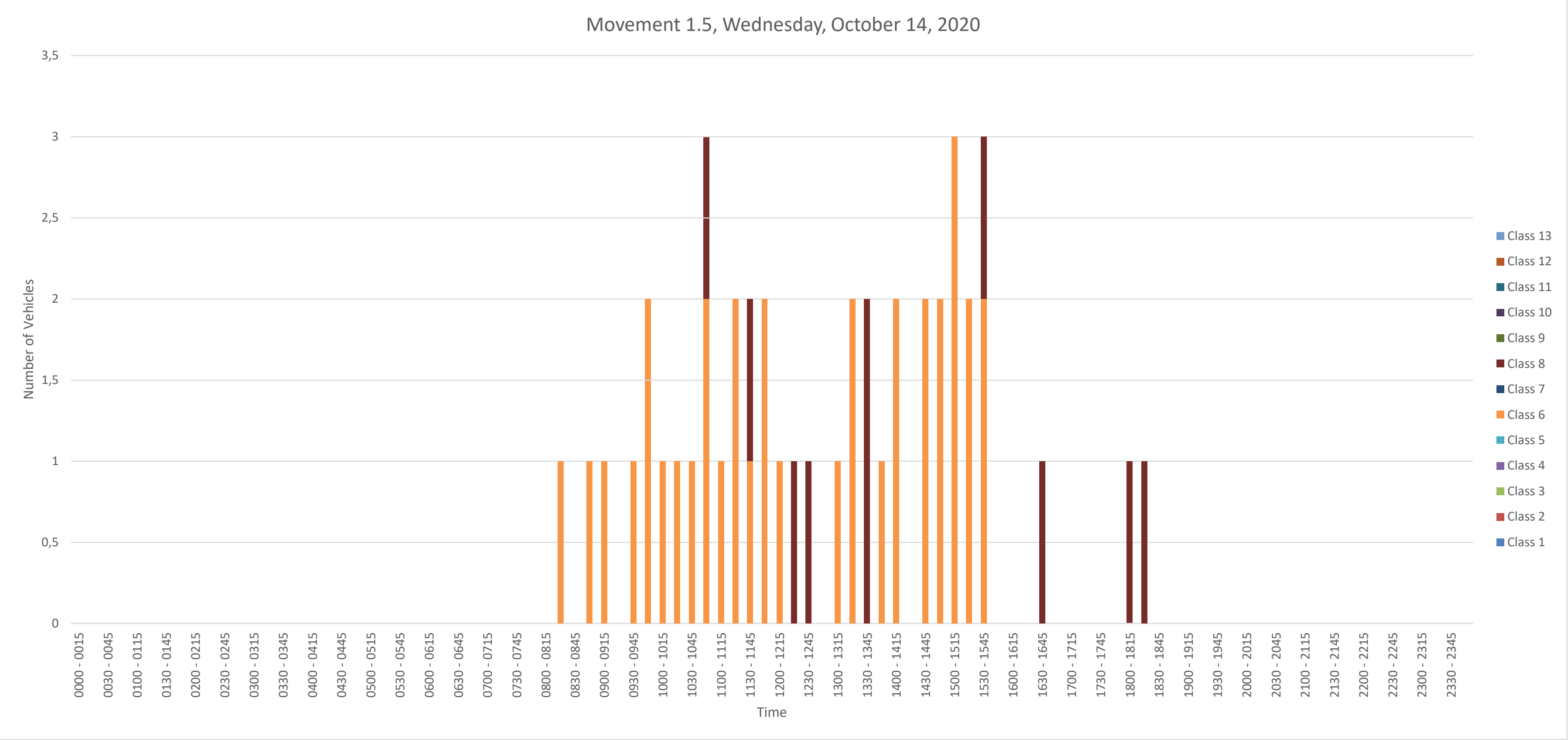


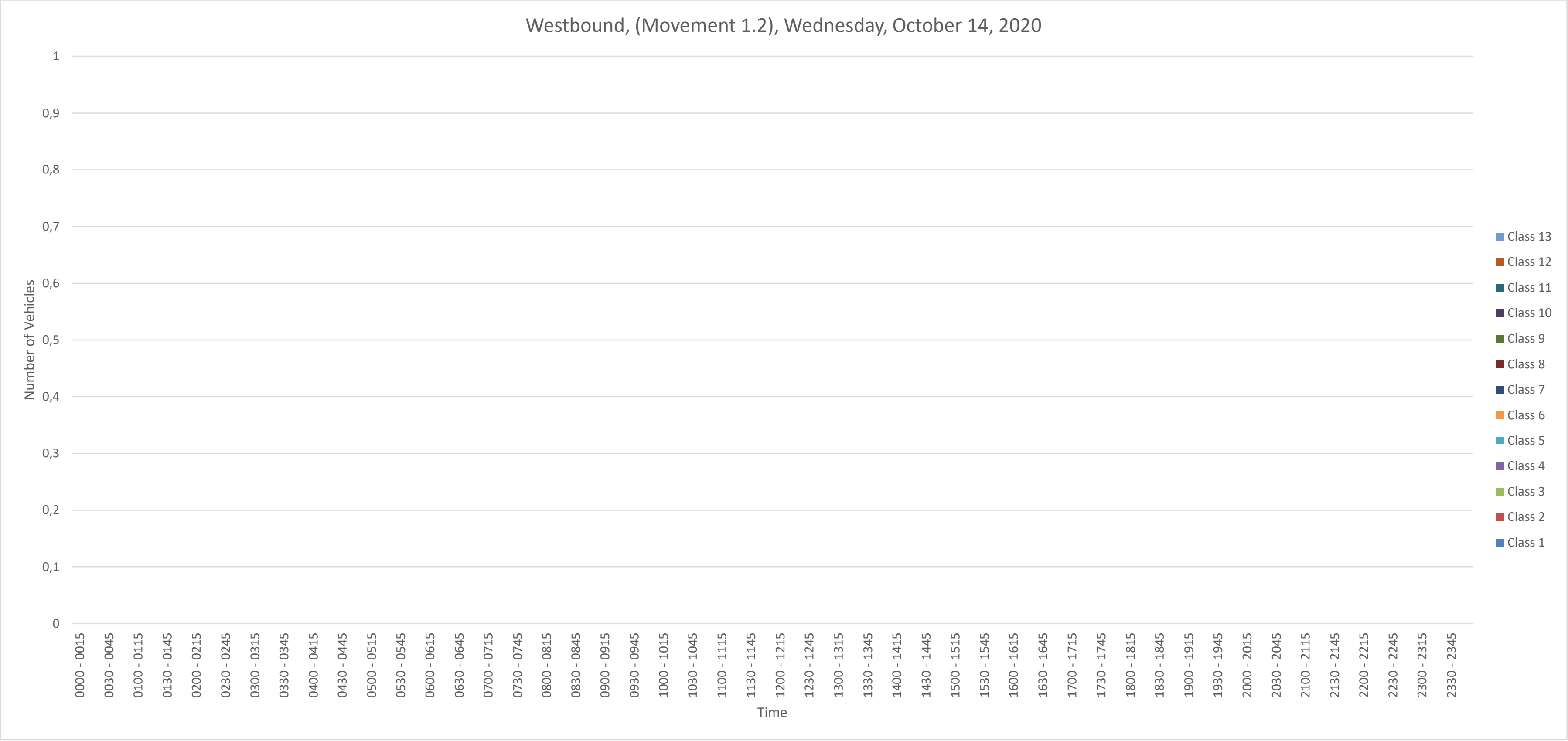
0000 - 2400 (Weekday 24h Session)

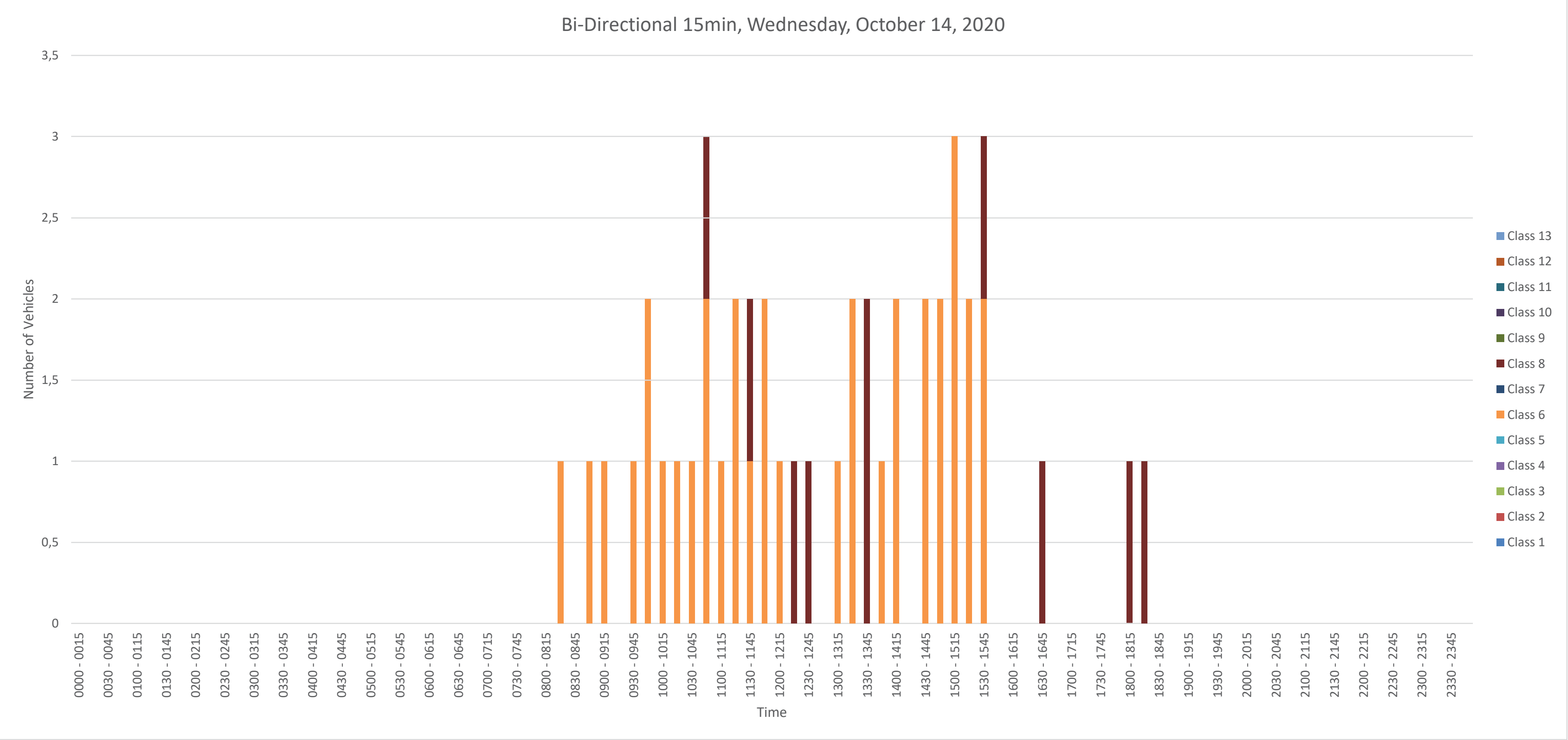
🟨 undertaken on Tuesday, October 13th, 2020

	Site 1		
TIME	EB	WB	**TOTAL**
0000 - 0015	0	0	**0**
0015 - 0030	0	0	**0**
0030 - 0045	0	0	**0**
0045 - 0100	0	0	**0**
0100 - 0115	0	0	**0**
0115 - 0130	0	0	**0**
0130 - 0145	0	0	**0**
0145 - 0200	0	0	**0**
0200 - 0215	0	0	**0**
0215 - 0230	0	0	**0**
0230 - 0245	0	0	**0**
0245 - 0300	0	0	**0**
0300 - 0315	0	0	**0**
0315 - 0330	0	0	**0**
0330 - 0345	0	0	**0**
0345 - 0400	0	0	**0**
0400 - 0415	0	0	**0**
0415 - 0430	0	0	**0**
0430 - 0445	0	0	**0**
0445 - 0500	0	0	**0**
0500 - 0515	0	0	**0**
0515 - 0530	0	0	**0**
0530 - 0545	0	0	**0**
0545 - 0600	0	0	**0**
0600 - 0615	0	0	**0**
0615 - 0630	0	0	**0**
0630 - 0645	0	0	**0**
0645 - 0700	0	0	**0**
0700 - 0715	0	0	**0**
0715 - 0730	0	0	**0**
0730 - 0745	0	0	**0**
0745 - 0800	0	0	**0**
0800 - 0815	0	0	**0**
0815 - 0830	1	0	**1**
0830 - 0845	0	0	**0**
0845 - 0900	1	0	**1**
0900 - 0915	1	0	**1**
0915 - 0930	0	0	**0**
0930 - 0945	1	0	**1**
0945 - 1000	2	0	**2**
1000 - 1015	1	0	**1**
1015 - 1030	1	0	**1**
1030 - 1045	1	0	**1**
1045 - 1100	3	0	**3**
1100 - 1115	1	0	**1**
1115 - 1130	2	0	**2**
1130 - 1145	2	0	**2**
1145 - 1200	2	0	**2**
1200 - 1215	1	0	**1**
1215 - 1230	1	0	**1**
1230 - 1245	1	0	**1**
1245 - 1300	0	0	**0**
1300 - 1315	1	0	**1**
1315 - 1330	2	0	**2**
1330 - 1345	2	0	**2**
1345 - 1400	1	0	**1**
1400 - 1415	2	0	**2**
1415 - 1430	0	0	**0**
1430 - 1445	2	0	**2**
1445 - 1500	2	0	**2**
1500 - 1515	3	0	**3**
1515 - 1530	2	0	**2**
1530 - 1545	3	0	**3**
1545 - 1600	0	0	**0**
1600 - 1615	0	0	**0**
1615 - 1630	0	0	**0**
1630 - 1645	1	0	**1**
1645 - 1700	0	0	**0**
1700 - 1715	0	0	**0**
1715 - 1730	0	0	**0**
1730 - 1745	0	0	**0**
1745 - 1800	0	0	**0**
1800 - 1815	1	0	**1**
1815 - 1830	1	0	**1**
1830 - 1845	0	0	**0**
1845 - 1900	0	0	**0**
1900 - 1915	0	0	**0**
1915 - 1930	0	0	**0**
1930 - 1945	0	0	**0**
1945 - 2000	0	0	**0**
2000 - 2015	0	0	**0**
2015 - 2030	0	0	**0**
2030 - 2045	0	0	**0**
2045 - 2100	0	0	**0**
2100 - 2115	0	0	**0**
2115 - 2130	0	0	**0**
2130 - 2145	0	0	**0**
2145 - 2200	0	0	**0**
2200 - 2215	0	0	**0**
2215 - 2230	0	0	**0**
2230 - 2245	0	0	**0**
2245 - 2300	0	0	**0**
2300 - 2315	0	0	**0**
2315 - 2330	0	0	**0**
2330 - 2345	0	0	**0**
2345 - 0000	0	0	**0**

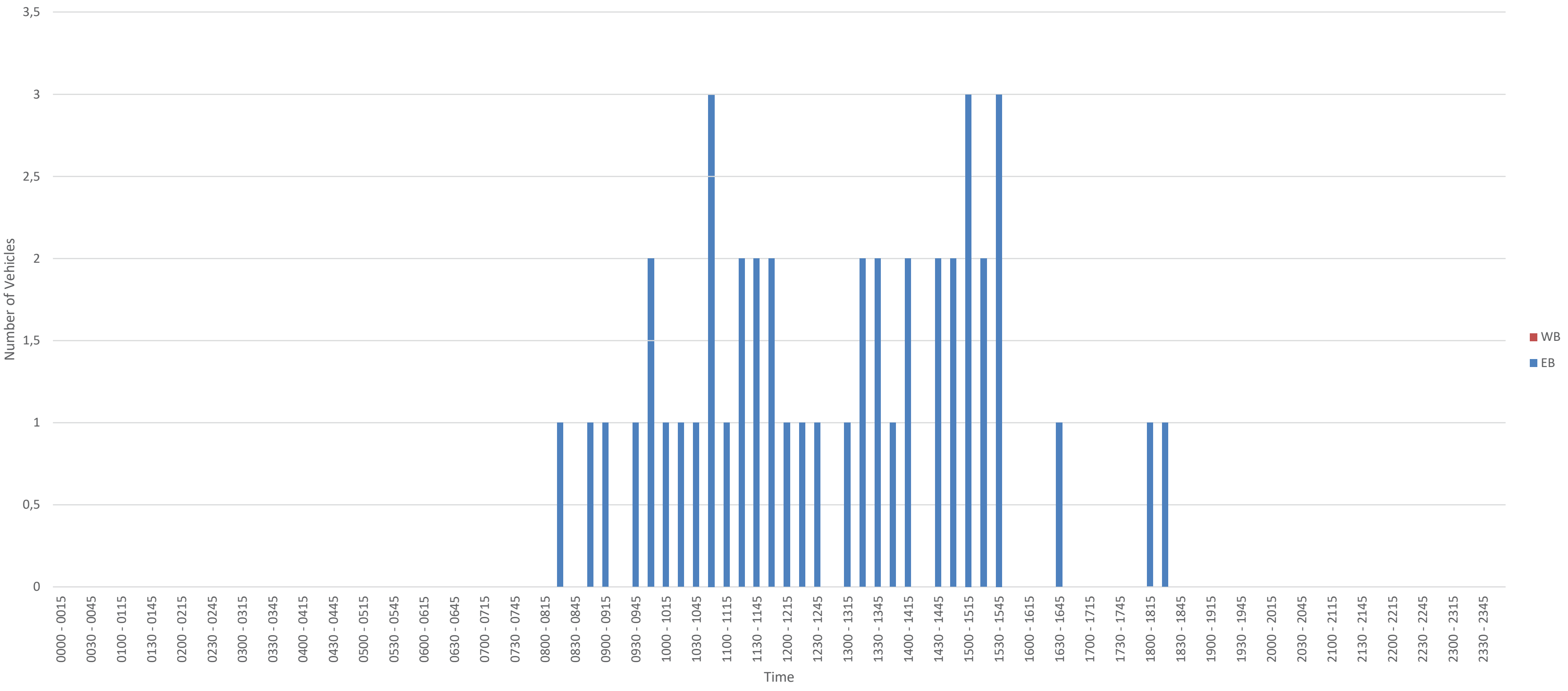
Session Total	45	0	**45**
Sess on Average	0,47	0,00	**0,47**


Movement 1.5, Wednesday, October 14, 2020
Number of Vehicles
3,5
3
2,5
2
1,5
1
0,5
0
Time
0000 - 0015
0030 - 0045
0100 - 0115
0130 - 0145
0200 - 0215
0230 - 0245
0300 - 0315
0330 - 0345
0400 - 0415
0430 - 0445
0500 - 0515
0530 - 0545
0600 - 0615
0630 - 0645
0700 - 0715
0730 - 0745
0800 - 0815
0830 - 0845
0900 - 0915
0930 - 0945
1000 - 1015
1030 - 1045
1100 - 1115
1130 - 1145
1200 - 1215
1230 - 1245
1300 - 1315
1330 - 1345
1400 - 1415
1430 - 1445
1500 - 1515
1530 - 1545
1600 - 1615
1630 - 1645
1700 - 1715
1730 - 1745
1800 - 1815
1830 - 1845
1900 - 1915
1930 - 1945
2000 - 2015
2030 - 2045
2100 - 2115
2130 - 2145
2200 - 2215
2230 - 2245
2300 - 2315
2330 - 2345
Class 13
Class 12
Class 11
Class 10
Class 9
Class 8
Class 7
Class 6
Class 5
Class 4
Class 3
Class 2
Class 1


Westbound, (Movement 1.2), Wednesday, October 14, 2020
Number of Vehicles
1
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
Time
0000 - 0015
0030 - 0045
0100 - 0115
0130 - 0145
0200 - 0215
0230 - 0245
0300 - 0315
0330 - 0345
0400 - 0415
0430 - 0445
0500 - 0515
0530 - 0545
0600 - 0615
0630 - 0645
0700 - 0715
0730 - 0745
0800 - 0815
0830 - 0845
0900 - 0915
0930 - 0945
1000 - 1015
1030 - 1045
1100 - 1115
1130 - 1145
1200 - 1215
1230 - 1245
1300 - 1315
1330 - 1345
1400 - 1415
1430 - 1445
1500 - 1515
1530 - 1545
1600 - 1615
1630 - 1645
1700 - 1715
1730 - 1745
1800 - 1815
1830 - 1845
1900 - 1915
1930 - 1945
2000 - 2015
2030 - 2045
2100 - 2115
2130 - 2145
2200 - 2215
2230 - 2245
2300 - 2315
2330 - 2345
Class 13
Class 12
Class 11
Class 10
Class 9
Class 8
Class 7
Class 6
Class 5
Class 4
Class 3
Class 2
Class 1


Bi-Directional 15min, Wednesday, October 14, 2020
Number of Vehicles
3,5
3
2,5
2
1,5
1
0,5
0
Time
0000 - 0015
0030 - 0045
0100 - 0115
0130 - 0145
0200 - 0215
0230 - 0245
0300 - 0315
0330 - 0345
0400 - 0415
0430 - 0445
0500 - 0515
0530 - 0545
0600 - 0615
0630 - 0645
0700 - 0715
0730 - 0745
0800 - 0815
0830 - 0845
0900 - 0915
0930 - 0945
1000 - 1015
1030 - 1045
1100 - 1115
1130 - 1145
1200 - 1215
1230 - 1245
1300 - 1315
1330 - 1345
1400 - 1415
1430 - 1445
1500 - 1515
1530 - 1545
1600 - 1615
1630 - 1645
1700 - 1715
1730 - 1745
1800 - 1815
1830 - 1845
1900 - 1915
1930 - 1945
2000 - 2015
2030 - 2045
2100 - 2115
2130 - 2145
2200 - 2215
2230 - 2245
2300 - 2315
2330 - 2345
Class 13
Class 12
Class 11
Class 10
Class 9
Class 8
Class 7
Class 6
Class 5
Class 4
Class 3
Class 2
Class 1

Site 1, Wednesday, October 14, 2020



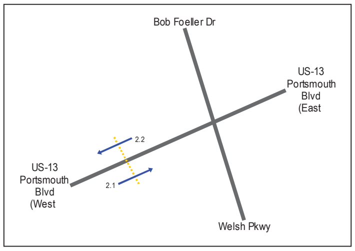
Suffolk, VA
Classified Traffic Count

Site 2
US-13 Portsmouth Blvd,
west of Bob Foeller Dr

Lat/Long
36,754463°, -76,514703°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F



0000 - 2400 (Weekday 24h Session)
Eastbound / Westbound

🟧 undertaken on Tuesday, October 13th, 2020

	Eastbound, (Movement 2.1)													
TIME	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13	**TOTAL**
0000 - 0015	0	40	1	0	2	0	0	0	6	0	0	4	0	**53**
0015 - 0030	0	59	0	0	1	1	0	0	6	0	0	0	0	**67**
0030 - 0045	0	43	0	0	0	0	0	0	11	0	0	3	0	**57**
0045 - 0100	0	36	0	0	0	0	0	0	7	0	0	2	0	**45**
0100 - 0115	0	36	1	0	0	0	0	1	9	0	0	0	0	**47**
0115 - 0130	0	23	2	0	0	1	0	0	6	0	0	3	0	**35**
0130 - 0145	0	32	0	0	1	0	0	0	3	0	0	0	0	**36**
0145 - 0200	0	24	0	0	1	0	0	0	7	0	0	2	0	**34**
0200 - 0215	0	20	0	0	3	1	0	0	7	0	0	2	0	**33**
0215 - 0230	0	39	1	0	0	2	0	1	4	0	0	1	0	**48**
0230 - 0245	0	49	1	0	4	0	0	0	7	0	0	1	0	**62**
0245 - 0300	0	34	2	0	0	0	0	0	14	0	0	1	0	**51**
0300 - 0315	0	54	1	0	2	1	0	0	9	0	0	1	0	**68**
0315 - 0330	0	54	4	0	3	0	0	2	11	0	0	1	0	**75**
0330 - 0345	0	65	2	0	3	1	0	1	20	0	0	2	0	**94**
0345 - 0400	0	108	2	0	1	1	0	0	15	0	0	3	0	**130**
0400 - 0415	0	126	5	0	1	1	0	0	16	0	0	0	0	**149**
0415 - 0430	0	164	8	0	4	0	0	0	13	0	0	3	0	**192**
0430 - 0445	0	252	8	0	3	0	0	0	18	0	0	1	0	**282**
0445 - 0500	2	389	24	0	5	6	0	0	18	0	0	4	0	**448**
0500 - 0515	2	412	41	0	14	4	0	0	19	0	0	1	0	**493**
0515 - 0530	0	461	56	0	6	2	0	0	30	0	2	3	0	**560**
0530 - 0545	5	514	77	0	4	4	0	5	43	1	3	2	0	**658**
0545 - 0600	0	482	68	0	7	4	0	5	43	0	1	1	0	**611**
0600 - 0615	1	580	54	0	8	1	0	0	49	0	1	4	0	**698**
0615 - 0630	6	699	54	0	4	3	0	1	38	0	0	1	0	**806**
0630 - 0645	2	698	95	2	11	3	0	1	38	0	0	2	0	**852**
0645 - 0700	4	563	141	2	5	10	0	0	49	0	0	3	0	**777**
0700 - 0715	4	549	148	0	14	6	0	2	52	3	0	4	0	**782**
0715 - 0730	6	705	154	0	13	8	0	2	60	0	3	2	0	**953**
0730 - 0745	0	576	162	0	13	8	0	1	50	0	0	0	0	**810**
0745 - 0800	2	539	131	0	10	3	0	3	38	1	1	0	0	**728**
0800 - 0815	0	463	113	0	19	11	0	3	60	0	0	0	0	**669**
0815 - 0830	0	400	146	1	17	11	0	2	60	0	0	3	0	**640**
0830 - 0845	0	392	111	0	19	13	0	2	58	2	2	0	0	**599**
0845 - 0900	1	333	101	0	10	12	0	3	55	2	1	0	0	**518**
0900 - 0915	1	275	97	0	12	8	0	1	47	1	1	1	0	**444**
0915 - 0930	1	329	88	1	7	4	0	1	58	1	0	0	0	**490**
0930 - 0945	0	335	75	0	20	10	0	2	66	0	0	0	0	**508**
0945 - 1000	3	299	78	0	14	5	0	4	62	0	1	0	0	**466**
1000 - 1015	2	297	91	0	16	7	0	0	62	0	0	0	0	**475**
1015 - 1030	1	312	87	0	15	12	0	0	69	0	0	0	0	**496**
1030 - 1045	0	303	90	1	15	15	0	0	65	0	0	0	0	**489**
1045 - 1100	1	331	105	0	13	8	0	1	94	1	0	0	0	**554**
1100 - 1115	1	313	88	0	10	5	0	0	86	0	0	0	0	**503**
1115 - 1130	2	325	101	1	6	10	3	0	64	0	0	0	0	**512**
1130 - 1145	0	320	93	1	10	11	3	2	79	1	0	0	0	**520**
1145 - 1200	3	335	85	0	17	19	0	2	62	0	0	0	0	**523**
1200 - 1215	0	313	90	1	20	8	5	2	65	0	0	0	0	**504**
1215 - 1230	0	343	79	0	17	4	2	1	65	2	0	0	0	**513**
1230 - 1245	1	319	75	0	12	12	3	2	73	4	0	0	0	**501**
1245 - 1300	0	338	102	1	18	9	1	1	56	0	0	0	0	**526**
1300 - 1315	2	298	96	0	16	7	2	3	62	2	0	0	0	**488**
1315 - 1330	2	342	105	1	18	6	2	3	62	1	0	0	0	**542**
1330 - 1345	0	343	98	0	19	14	1	4	50	3	0	0	0	**532**
1345 - 1400	0	337	97	1	22	8	1	0	45	1	0	0	0	**512**
1400 - 1415	2	348	130	0	18	12	0	0	53	0	0	0	0	**563**
1415 - 1430	1	386	127	0	18	8	0	1	49	0	0	0	0	**590**
1430 - 1445	1	373	111	0	17	12	1	1	57	2	0	0	0	**575**
1445 - 1500	2	390	111	0	13	7	0	3	50	2	0	0	0	**578**
1500 - 1515	0	421	123	0	25	8	2	2	44	0	0	0	0	**625**
1515 - 1530	0	476	125	5	16	13	2	0	36	0	0	0	0	**673**
1530 - 1545	1	532	154	1	13	13	1	3	33	2	0	0	0	**753**
1545 - 1600	1	464	120	0	16	6	0	0	33	1	0	0	0	**641**
1600 - 1615	1	510	116	0	15	10	0	0	47	0	0	0	0	**699**
1615 - 1630	4	504	105	1	15	6	0	3	31	0	0	0	0	**669**
1630 - 1645	1	488	99	0	7	3	1	8	33	1	1	0	0	**642**
1645 - 1700	2	480	96	0	14	1	0	2	34	1	1	0	0	**631**
1700 - 1715	1	537	102	0	11	7	0	3	25	0	0	0	0	**686**
1715 - 1730	1	556	72	0	20	3	0	3	34	2	0	0	0	**691**
1730 - 1745	1	476	105	0	9	3	0	2	27	0	0	0	0	**623**
1745 - 1800	0	428	78	0	11	6	0	0	27	0	0	0	0	**550**
1800 - 1815	1	398	87	0	9	3	0	3	22	0	0	0	0	**523**
1815 - 1830	0	401	74	0	8	2	0	5	16	0	0	1	0	**507**
1830 - 1845	3	274	60	0	10	4	0	2	22	0	0	0	0	**375**
1845 - 1900	0	267	58	0	4	2	0	2	20	0	0	0	0	**353**
1900 - 1915	0	311	14	0	7	0	0	1	16	0	0	0	0	**349**
1915 - 1930	3	295	17	0	6	0	0	2	17	0	0	0	0	**340**
1930 - 1945	1	274	14	0	4	1	0	0	15	0	0	0	0	**309**
1945 - 2000	0	222	6	0	2	0	0	0	18	0	0	0	0	**248**
2000 - 2015	0	206	10	0	2	0	0	1	22	0	0	0	0	**241**
2015 - 2030	1	210	6	0	3	0	0	0	14	0	0	0	0	**234**
2030 - 2045	0	208	3	0	4	0	0	0	16	0	0	0	0	**231**
2045 - 2100	0	192	5	0	1	1	0	0	10	0	0	0	0	**209**
2100 - 2115	0	171	4	0	4	0	0	1	11	0	0	0	0	**191**
2115 - 2130	0	149	1	0	3	0	0	0	6	0	0	0	0	**159**
2130 - 2145	0	127	2	0	6	0	0	0	8	0	0	0	0	**143**
2145 - 2200	0	124	2	0	3	0	0	2	10	0	0	2	0	**143**
2200 - 2215	1	102	1	0	2	0	0	0	9	0	0	0	0	**115**
2215 - 2230	0	112	1	0	2	0	0	0	17	0	0	0	0	**132**
2230 - 2245	0	90	2	0	2	0	0	2	8	0	0	2	0	**106**
2245 - 2300	0	93	1	0	2	0	0	0	12	0	0	0	0	**108**
2300 - 2315	0	91	1	0	3	1	0	0	6	0	0	0	0	**102**
2315 - 2330	0	81	0	0	2	0	0	0	10	0	0	0	0	**93**
2330 - 2345	0	79	0	0	2	0	0	0	8	0	0	0	0	**89**
2345 - 0000	0	57	1	0	0	0	0	0	6	0	0	0	0	**64**

Session Total	84	28323	5678	20	834	432	30	116	3173	37	18	66	0	**38811**
Session Average	0,88	295,03	59,15	0,21	8,69	4,50	0,31	1,21	33,05	0,39	0,19	0,69	0,00	**404,28**
Session Percentage	0,22	72,98	14,63	0,05	2,15	1,11	0,08	0,30	8,18	0,10	0,05	0,17	0,00	

AM Peak Hour	0615 - 0715	0600 - 0700	0645 - 0745	0600 - 0700	0745 - 0845	0800 - 0900	-	0530 - 0630	0930 - 1030	0830 - 0930	0515 - 0615	0630 - 0730	-	**0630 - 0730**
AM Peak Hour Volume	16	2540	605	4	65	47	0	11	259	6	7	11	0	**3364**

Noon Peak Hour	1100 - 1200	1445 - 1545	1445 - 1545	1445 - 1545	1315 - 1415	1115 - 1215	1115 - 1215	1245 - 1345	1045 - 1145	1215 - 1315	-	-	-	**1445 - 1545**
Noon Peak Hour Volume	6	1819	513	6	77	48	11	11	323	8	0	0	0	**2629**

PM Peak Hour	1600 - 1700	1630 - 1730	1500 - 1600	1500 - 1600	1500 - 1600	1515 - 1615	1500 - 1600	1615 - 1715	1515 - 1615	1630 - 1730	1600 - 1700	1730 - 1830	-	**1515 - 1615**
PM Peak Hour Volume	8	2061	522	6	70	42	5	16	149	4	2	1	0	**2766**

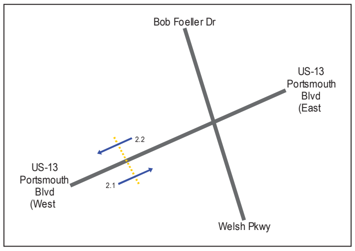
Suffolk, VA
Classified Traffic Count

Site 2
US-13 Portsmouth Blvd,
west of Bob Foeller Dr

Lat/Long
36,754463°, -76,514703°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F



0000 - 2400 (Weekday 24h Session)

🟨 undertaken on Tuesday, October 13th, 2020

	Westbound, (Movement 2.2)													
TIME	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13	**TOTAL**
0000 - 0015	0	43	18	0	0	1	0	1	7	0	1	0	0	**71**
0015 - 0030	0	55	30	0	0	0	0	0	10	0	0	0	0	**95**
0030 - 0045	1	22	24	0	1	0	0	0	10	0	0	0	0	**58**
0045 - 0100	0	25	17	0	2	0	0	0	12	0	1	0	0	**57**
0100 - 0115	0	19	22	0	0	0	0	0	11	0	0	0	0	**52**
0115 - 0130	0	55	40	0	0	0	0	0	5	0	1	1	0	**102**
0130 - 0145	0	44	14	0	1	2	0	0	10	0	0	0	0	**71**
0145 - 0200	0	29	15	0	2	1	0	0	10	0	0	0	0	**57**
0200 - 0215	0	10	9	0	0	0	0	0	14	0	0	0	0	**33**
0215 - 0230	0	25	19	0	0	0	0	0	7	0	0	0	0	**51**
0230 - 0245	0	15	9	0	1	0	0	0	12	0	0	0	0	**37**
0245 - 0300	0	18	10	0	0	1	0	0	11	0	1	1	0	**42**
0300 - 0315	0	11	16	0	1	2	0	1	25	0	1	0	0	**57**
0315 - 0330	0	12	13	0	1	1	0	0	17	0	0	0	0	**44**
0330 - 0345	0	22	12	0	2	0	0	0	19	0	0	0	0	**55**
0345 - 0400	0	24	13	0	0	1	0	0	18	0	0	0	0	**56**
0400 - 0415	0	31	14	0	0	0	0	0	21	0	1	0	0	**67**
0415 - 0430	0	59	18	0	0	1	0	1	28	0	1	1	0	**109**
0430 - 0445	0	81	23	0	1	0	0	1	36	0	0	0	0	**142**
0445 - 0500	0	83	27	0	2	2	0	1	19	0	0	0	0	**134**
0500 - 0515	0	118	21	0	3	2	0	0	35	0	1	0	0	**180**
0515 - 0530	0	179	49	0	3	0	0	2	31	0	0	0	0	**264**
0530 - 0545	0	217	69	0	3	4	0	0	37	0	1	1	0	**332**
0545 - 0600	0	170	64	0	4	3	0	1	36	0	0	0	0	**278**
0600 - 0615	0	163	62	0	4	2	0	1	34	0	0	0	0	**266**
0615 - 0630	0	234	76	0	8	1	0	1	31	0	2	0	0	**353**
0630 - 0645	0	277	105	0	7	2	0	2	46	0	1	0	0	**440**
0645 - 0700	3	280	109	0	12	4	0	2	69	0	0	2	0	**481**
0700 - 0715	1	264	96	1	16	5	0	2	57	1	0	0	0	**443**
0715 - 0730	1	347	99	0	13	11	0	9	50	2	0	0	0	**532**
0730 - 0745	2	424	116	4	16	8	0	7	67	1	0	0	0	**645**
0745 - 0800	3	501	134	1	26	7	1	6	66	2	1	0	0	**748**
0800 - 0815	2	419	116	1	12	6	0	3	85	1	0	0	0	**645**
0815 - 0830	0	358	134	1	16	11	0	6	67	3	0	0	0	**596**
0830 - 0845	2	295	106	1	25	10	1	5	64	1	0	0	0	**510**
0845 - 0900	7	328	113	0	13	9	2	3	71	2	0	0	0	**548**
0900 - 0915	0	282	122	1	16	9	0	1	72	1	0	0	0	**504**
0915 - 0930	1	258	95	0	23	9	0	0	86	0	0	0	0	**472**
0930 - 0945	2	266	119	0	35	9	0	2	67	0	0	0	0	**500**
0945 - 1000	1	301	113	0	11	5	0	2	76	0	0	0	0	**509**
1000 - 1015	1	263	106	0	10	10	0	0	59	0	2	0	0	**451**
1015 - 1030	0	257	123	1	19	11	0	2	62	0	0	0	0	**475**
1030 - 1045	0	256	122	1	16	12	0	3	76	1	0	0	0	**487**
1045 - 1100	3	319	97	1	8	8	0	0	69	0	0	0	0	**505**
1100 - 1115	1	275	112	1	17	9	0	2	57	0	0	0	0	**474**
1115 - 1130	2	297	110	0	16	12	0	1	53	0	0	0	0	**491**
1130 - 1145	14	324	120	0	12	14	0	2	56	0	0	0	0	**542**
1145 - 1200	2	296	127	0	16	13	0	1	67	0	0	0	0	**522**
1200 - 1215	3	274	92	0	16	7	2	4	68	0	0	0	0	**466**
1215 - 1230	0	346	120	2	18	6	2	5	65	0	0	0	0	**564**
1230 - 1245	1	286	119	2	14	4	2	3	62	2	0	0	0	**495**
1245 - 1300	2	317	118	0	20	11	1	4	58	1	0	0	0	**532**
1300 - 1315	0	300	124	1	21	10	1	3	53	1	1	0	0	**515**
1315 - 1330	0	292	127	2	13	8	2	2	53	0	0	0	0	**499**
1330 - 1345	2	314	127	0	10	4	2	4	69	0	1	0	0	**533**
1345 - 1400	0	318	147	4	21	8	2	2	61	0	0	0	0	**563**
1400 - 1415	3	438	130	0	17	3	0	7	51	0	0	0	0	**649**
1415 - 1430	1	405	130	0	10	5	0	10	72	1	0	0	0	**634**
1430 - 1445	1	440	144	1	17	3	1	8	57	2	0	0	0	**674**
1445 - 1500	2	481	166	0	13	5	1	8	53	0	0	0	0	**729**
1500 - 1515	8	577	197	0	15	8	2	12	65	2	0	0	0	**886**
1515 - 1530	4	579	194	0	9	5	1	4	58	1	0	0	0	**855**
1530 - 1545	1	613	184	1	12	8	1	5	52	1	0	0	0	**878**
1545 - 1600	5	675	186	0	10	2	0	3	38	0	0	0	0	**919**
1600 - 1615	3	726	226	3	10	5	0	3	56	1	0	0	0	**1033**
1615 - 1630	3	728	237	2	18	7	1	5	31	2	0	0	0	**1034**
1630 - 1645	5	657	187	0	14	6	0	2	55	0	0	0	0	**926**
1645 - 1700	1	717	188	0	15	4	1	0	21	0	0	0	0	**947**
1700 - 1715	3	720	173	0	10	2	0	1	27	0	0	0	0	**936**
1715 - 1730	2	756	154	0	15	4	0	0	25	0	0	0	0	**956**
1730 - 1745	3	651	155	0	8	1	1	1	20	1	0	0	0	**841**
1745 - 1800	2	588	119	0	13	0	0	0	16	0	0	1	0	**739**
1800 - 1815	0	523	115	0	8	2	2	2	15	0	1	0	0	**668**
1815 - 1830	2	474	96	0	8	0	0	0	18	0	0	2	0	**600**
1830 - 1845	1	419	82	0	4	1	0	2	14	0	0	1	0	**524**
1845 - 1900	0	375	67	0	9	0	0	0	13	0	0	0	0	**464**
1900 - 1915	0	343	22	1	10	1	0	1	14	0	0	2	0	**394**
1915 - 1930	0	285	17	0	4	2	0	0	11	0	0	0	0	**319**
1930 - 1945	0	296	25	0	5	1	0	0	13	0	0	1	0	**341**
1945 - 2000	0	283	18	0	4	0	0	0	17	0	0	0	0	**322**
2000 - 2015	0	282	16	0	5	2	0	1	11	0	1	8	0	**326**
2015 - 2030	0	238	14	0	5	0	0	1	15	0	0	6	0	**279**
2030 - 2045	0	254	10	0	2	1	0	0	10	0	0	5	0	**282**
2045 - 2100	0	213	10	0	1	1	0	1	8	0	0	4	0	**238**
2100 - 2115	0	185	3	0	1	0	0	0	18	0	8	0	0	**215**
2115 - 2130	0	169	4	0	2	0	0	0	9	0	0	0	0	**184**
2130 - 2145	0	168	1	0	4	0	0	0	13	0	4	0	0	**190**
2145 - 2200	0	158	2	0	3	0	0	0	10	0	2	0	0	**175**
2200 - 2215	0	195	5	0	3	0	0	0	17	0	3	1	0	**224**
2215 - 2230	0	154	4	0	2	0	0	0	5	0	4	0	0	**169**
2230 - 2245	0	148	2	0	5	0	0	0	7	0	1	0	0	**163**
2245 - 2300	0	114	0	0	2	0	0	0	4	0	2	0	0	**122**
2300 - 2315	0	110	2	0	3	0	0	0	6	0	3	0	0	**124**
2315 - 2330	0	131	0	0	1	1	0	0	11	0	1	0	0	**145**
2330 - 2345	0	90	1	0	0	0	0	0	8	0	0	0	0	**99**
2345 - 0000	0	98	1	0	1	0	0	0	9	0	1	0	0	**110**

Session Total	107	26554	7459	33	825	356	29	175	3410	30	48	37	0	**39063**
Session Average	1,11	276,60	77,70	0,34	8,59	3,71	0,30	1,82	35,52	0,31	0,50	0,39	0,00	**406,91**
Session Percentage	0,27	67,98	19,09	0,08	2,11	0,91	0,07	0,45	8,73	0,08	0,12	0,09	0,00	

AM Peak Hour	0800 - 0900	0730 - 0830	0730 - 0830	0730 - 0830	0845 - 0945	0815 - 0915	0800 - 0900	0715 - 0815	0900 - 1000	0730 - 0830	0530 - 0630	0600 - 0700	-	**0730 - 0830**
AM Peak Hour Volume	11	1702	500	7	87	39	3	25	301	7	3	2	0	**2634**

Noon Peak Hour	1115 - 1215	1445 - 1545	1445 - 1545	1300 - 1400	1215 - 1315	1100 - 1200	1200 - 1300	1415 - 1515	1000 - 1100	1415 - 1515	1000 - 1100	-	-	**1445 - 1545**
Noon Peak Hour Volume	21	2250	741	7	73	48	7	38	266	5	2	0	0	**3348**

PM Peak Hour	1500 - 1600	1630 - 1730	1600 - 1700	1530 - 1630	1600 - 1700	1500 - 1600	1500 - 1600	1500 - 1600	1500 - 1600	1500 - 1600	1715 - 1815	0,00	-	**1600 - 1700**
PM Peak Hour Volume	18	2850	838	6	57	23	4	24	213	4	1	19	0	**3940**

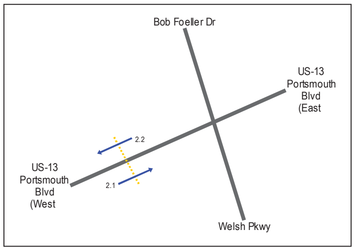
Suffolk, VA
Classified Traffic Count

Site 2
US-13 Portsmouth Blvd,
west of Bob Foeller Dr

Lat/Long
36,754463°, -76,514703°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F



0000 - 2400 (Weekday 24h Session)

🟧 undertaken on Tuesday, October 13th, 2020

	Bi-Directional 15min													
TIME	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13	**TOTAL**
0000 - 0015	0	83	19	0	2	1	0	1	13	0	1	4	0	**124**
0015 - 0030	0	114	30	0	1	1	0	0	16	0	0	0	0	**162**
0030 - 0045	1	65	24	0	1	0	0	0	21	0	0	3	0	**115**
0045 - 0100	0	61	17	0	2	0	0	0	19	0	1	2	0	**102**
0100 - 0115	0	55	23	0	0	0	0	1	20	0	0	0	0	**99**
0115 - 0130	0	78	42	0	0	1	0	0	11	0	1	4	0	**137**
0130 - 0145	0	76	14	0	2	2	0	0	13	0	0	0	0	**107**
0145 - 0200	0	53	15	0	3	1	0	0	17	0	0	2	0	**91**
0200 - 0215	0	30	9	0	3	1	0	0	21	0	0	2	0	**66**
0215 - 0230	0	64	20	0	0	2	0	1	11	0	0	1	0	**99**
0230 - 0245	0	64	10	0	5	0	0	0	19	0	0	1	0	**99**
0245 - 0300	0	52	12	0	0	1	0	0	25	0	1	2	0	**93**
0300 - 0315	0	65	17	0	3	3	0	1	34	0	1	1	0	**125**
0315 - 0330	0	66	17	0	4	1	0	2	28	0	0	1	0	**119**
0330 - 0345	0	87	14	0	5	1	0	1	39	0	0	2	0	**149**
0345 - 0400	0	132	15	0	1	2	0	0	33	0	0	3	0	**186**
0400 - 0415	0	157	19	0	1	1	0	0	37	0	1	0	0	**216**
0415 - 0430	0	223	26	0	4	1	0	1	41	0	1	4	0	**301**
0430 - 0445	0	333	31	0	4	0	0	1	54	0	0	1	0	**424**
0445 - 0500	2	472	51	0	7	8	0	1	37	0	0	4	0	**582**
0500 - 0515	2	530	62	0	17	6	0	0	54	0	1	1	0	**673**
0515 - 0530	0	640	105	0	9	2	0	2	61	0	2	3	0	**824**
0530 - 0545	5	731	146	0	7	8	0	5	80	1	4	3	0	**990**
0545 - 0600	0	652	132	0	11	7	0	6	79	0	1	1	0	**889**
0600 - 0615	1	743	116	0	12	3	0	1	83	0	1	4	0	**964**
0615 - 0630	6	933	130	0	12	4	0	2	69	0	2	1	0	**1159**
0630 - 0645	2	975	200	2	18	5	0	3	84	0	1	2	0	**1292**
0645 - 0700	7	843	250	2	17	14	0	2	118	0	0	5	0	**1258**
0700 - 0715	5	813	244	1	30	11	0	4	109	4	0	4	0	**1225**
0715 - 0730	7	1052	253	0	26	19	0	11	110	2	3	2	0	**1485**
0730 - 0745	2	1000	278	4	29	16	0	8	117	1	0	0	0	**1455**
0745 - 0800	5	1040	265	1	36	10	1	9	104	3	2	0	0	**1476**
0800 - 0815	2	882	229	1	31	17	0	6	145	1	0	0	0	**1314**
0815 - 0830	0	758	280	2	33	22	0	8	127	3	0	3	0	**1236**
0830 - 0845	2	687	217	1	44	23	1	7	122	3	2	0	0	**1109**
0845 - 0900	8	661	214	0	23	21	2	6	126	4	1	0	0	**1066**
0900 - 0915	1	557	219	1	28	17	0	2	119	2	1	1	0	**948**
0915 - 0930	2	587	183	1	30	13	0	1	144	1	0	0	0	**962**
0930 - 0945	2	601	194	0	55	19	0	4	133	0	0	0	0	**1008**
0945 - 1000	4	600	191	0	25	10	0	6	138	0	1	0	0	**975**
1000 - 1015	3	560	197	0	26	17	0	0	121	0	2	0	0	**926**
1015 - 1030	1	569	210	1	34	23	0	2	131	0	0	0	0	**971**
1030 - 1045	0	559	212	2	31	27	0	3	141	1	0	0	0	**976**
1045 - 1100	4	650	202	1	21	16	0	1	163	1	0	0	0	**1059**
1100 - 1115	2	588	200	1	27	14	0	2	143	0	0	0	0	**977**
1115 - 1130	4	622	211	1	22	22	3	1	117	0	0	0	0	**1003**
1130 - 1145	14	644	213	1	22	25	3	4	135	1	0	0	0	**1062**
1145 - 1200	5	631	212	0	33	32	0	3	129	0	0	0	0	**1045**
1200 - 1215	3	587	182	1	36	15	7	6	133	0	0	0	0	**970**
1215 - 1230	0	689	199	2	35	10	4	6	130	2	0	0	0	**1077**
1230 - 1245	2	605	194	2	26	16	5	5	135	6	0	0	0	**996**
1245 - 1300	2	655	220	1	38	20	2	5	114	1	0	0	0	**1058**
1300 - 1315	2	598	220	1	37	17	3	6	115	3	1	0	0	**1003**
1315 - 1330	2	634	232	3	31	14	4	5	115	1	0	0	0	**1041**
1330 - 1345	2	657	225	0	29	18	3	8	119	3	1	0	0	**1065**
1345 - 1400	0	655	244	5	43	16	3	2	106	1	0	0	0	**1075**
1400 - 1415	5	786	260	0	35	15	0	7	104	0	0	0	0	**1212**
1415 - 1430	2	791	257	0	28	13	0	11	121	1	0	0	0	**1224**
1430 - 1445	2	813	255	1	34	15	2	9	114	4	0	0	0	**1249**
1445 - 1500	4	871	277	0	26	12	1	11	103	2	0	0	0	**1307**
1500 - 1515	8	998	320	0	40	16	4	14	109	2	0	0	0	**1511**
1515 - 1530	4	1055	319	5	25	18	3	4	94	1	0	0	0	**1528**
1530 - 1545	2	1145	338	2	25	21	2	8	85	3	0	0	0	**1631**
1545 - 1600	6	1139	306	0	26	8	0	3	71	1	0	0	0	**1560**
1600 - 1615	4	1236	342	3	25	15	0	3	103	1	0	0	0	**1732**
1615 - 1630	7	1232	342	3	33	13	1	8	62	2	0	0	0	**1703**
1630 - 1645	6	1145	286	0	21	9	1	10	88	1	1	0	0	**1568**
1645 - 1700	3	1197	284	0	29	5	1	2	55	1	1	0	0	**1578**
1700 - 1715	4	1257	275	0	21	9	0	4	52	0	0	0	0	**1622**
1715 - 1730	3	1312	226	0	35	7	0	3	59	2	0	0	0	**1647**
1730 - 1745	4	1127	260	0	17	4	1	3	47	1	0	0	0	**1464**
1745 - 1800	2	1016	197	0	24	6	0	0	43	0	0	1	0	**1289**
1800 - 1815	1	921	202	0	17	5	2	5	37	0	1	0	0	**1191**
1815 - 1830	2	875	170	0	16	2	0	5	34	0	0	3	0	**1107**
1830 - 1845	4	693	142	0	14	5	0	4	36	0	0	1	0	**899**
1845 - 1900	0	642	125	0	13	2	0	2	33	0	0	0	0	**817**
1900 - 1915	0	654	36	1	17	1	0	2	30	0	0	2	0	**743**
1915 - 1930	3	580	34	0	10	2	0	2	28	0	0	0	0	**659**
1930 - 1945	1	570	39	0	9	2	0	0	28	0	0	1	0	**650**
1945 - 2000	0	505	24	0	6	0	0	0	35	0	0	0	0	**570**
2000 - 2015	0	488	26	0	7	2	0	2	33	0	1	8	0	**567**
2015 - 2030	1	448	20	0	8	0	0	1	29	0	0	6	0	**513**
2030 - 2045	0	462	13	0	6	1	0	0	26	0	0	5	0	**513**
2045 - 2100	0	405	15	0	2	2	0	1	18	0	0	4	0	**447**
2100 - 2115	0	356	7	0	5	0	0	1	29	0	8	0	0	**406**
2115 - 2130	0	318	5	0	5	0	0	0	15	0	0	0	0	**343**
2130 - 2145	0	295	3	0	10	0	0	0	21	0	4	0	0	**333**
2145 - 2200	0	282	4	0	6	0	0	2	20	0	2	2	0	**318**
2200 - 2215	1	297	6	0	5	0	0	0	26	0	3	1	0	**339**
2215 - 2230	0	266	5	0	4	0	0	0	22	0	4	0	0	**301**
2230 - 2245	0	238	4	0	7	0	0	2	15	0	1	2	0	**269**
2245 - 2300	0	207	1	0	4	0	0	0	16	0	2	0	0	**230**
2300 - 2315	0	201	3	0	6	1	0	0	12	0	3	0	0	**226**
2315 - 2330	0	212	0	0	3	1	0	0	21	0	1	0	0	**238**
2330 - 2345	0	169	1	0	2	0	0	0	16	0	0	0	0	**188**
2345 - 0000	0	155	2	0	1	0	0	0	15	0	1	0	0	**174**

Session Total	191	54877	13137	53	1659	788	59	291	6583	67	66	103	0	**77874**
Session Average	1,99	571,64	136,84	0,55	17,28	8,21	0,61	3,03	68,57	0,70	0,69	1,07	0,00	**811,19**
Session Percentage	0,25	70,47	16,87	0,07	2,13	1,01	0,08	0,37	8,45	0,09	0,08	0,13	0,00	

AM Peak Hour	0630 - 0730	0715 - 0815	0730 - 0830	0730 - 0830	0745 - 0845	0800 - 0900	0800 - 0900	0715 - 0815	0915 - 1015	0815 - 0915	0500 - 0600	0630 - 0730	-	**0715 - 0815**
AM Peak Hour Volume	21	3974	1052	8	144	83	3	34	536	12	8	13	0	**5730**

Noon Peak Hour	1115 - 1215	1445 - 1545	1445 - 1545	1300 - 1400	1300 - 1400	1115 - 1215	1200 - 1300	1415 - 1515	1015 - 1115	1215 - 1315	1000 - 1100	-	-	**1445 - 1545**
Noon Peak Hour Volume	26	4069	1254	9	140	94	18	45	578	12	2	0	0	**5977**

PM Peak Hour	1545 - 1645	1630 - 1730	1530 - 1630	1515 - 1615	1500 - 1600	1500 - 1600	1500 - 1600	1500 - 1600	1500 - 1600	1500 - 1600	1600 - 1700	0,00	-	**1530 - 1630**
PM Peak Hour Volume	23	4911	1328	10	116	63	9	29	359	7	2	19	0	**6626**

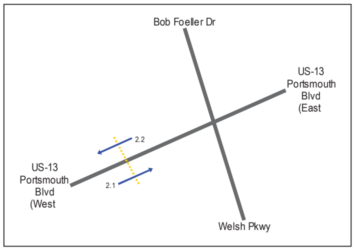
Suffolk, VA
Classified Traffic Count

Site 2
US-13 Portsmouth Blvd,
west of Bob Foeller Dr

Lat/Long
36,754463°, -76,514703°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F



0000 - 2400 (Weekday 24h Session)

🟧 undertaken on Tuesday, October 13th, 2020

	Site 2		
TIME	EB	WB	**TOTAL**
0000 - 0015	53	71	**124**
0015 - 0030	67	95	**162**
0030 - 0045	57	58	**115**
0045 - 0100	45	57	**102**
0100 - 0115	47	52	**99**
0115 - 0130	35	102	**137**
0130 - 0145	36	71	**107**
0145 - 0200	34	57	**91**
0200 - 0215	33	33	**66**
0215 - 0230	48	51	**99**
0230 - 0245	62	37	**99**
0245 - 0300	51	42	**93**
0300 - 0315	68	57	**125**
0315 - 0330	75	44	**119**
0330 - 0345	94	55	**149**
0345 - 0400	130	56	**186**
0400 - 0415	149	67	**216**
0415 - 0430	192	109	**301**
0430 - 0445	282	142	**424**
0445 - 0500	448	134	**582**
0500 - 0515	493	180	**673**
0515 - 0530	560	264	**824**
0530 - 0545	658	332	**990**
0545 - 0600	611	278	**889**
0600 - 0615	698	266	**964**
0615 - 0630	806	353	**1159**
0630 - 0645	852	440	**1292**
0645 - 0700	777	481	**1258**
0700 - 0715	782	443	**1225**
0715 - 0730	953	532	**1485**
0730 - 0745	810	645	**1455**
0745 - 0800	728	748	**1476**
0800 - 0815	669	645	**1314**
0815 - 0830	640	596	**1236**
0830 - 0845	599	510	**1109**
0845 - 0900	518	548	**1066**
0900 - 0915	444	504	**948**
0915 - 0930	490	472	**962**
0930 - 0945	508	500	**1008**
0945 - 1000	466	509	**975**
1000 - 1015	475	451	**926**
1015 - 1030	496	475	**971**
1030 - 1045	489	487	**976**
1045 - 1100	554	505	**1059**
1100 - 1115	503	474	**977**
1115 - 1130	512	491	**1003**
1130 - 1145	520	542	**1062**
1145 - 1200	523	522	**1045**
1200 - 1215	504	466	**970**
1215 - 1230	513	564	**1077**
1230 - 1245	501	495	**996**
1245 - 1300	526	532	**1058**
1300 - 1315	488	515	**1003**
1315 - 1330	542	499	**1041**
1330 - 1345	532	533	**1065**
1345 - 1400	512	563	**1075**
1400 - 1415	563	649	**1212**
1415 - 1430	590	634	**1224**
1430 - 1445	575	674	**1249**
1445 - 1500	578	729	**1307**
1500 - 1515	625	886	**1511**
1515 - 1530	673	855	**1528**
1530 - 1545	753	878	**1631**
1545 - 1600	641	919	**1560**
1600 - 1615	699	1033	**1732**
1615 - 1630	669	1034	**1703**
1630 - 1645	642	926	**1568**
1645 - 1700	631	947	**1578**
1700 - 1715	686	936	**1622**
1715 - 1730	691	956	**1647**
1730 - 1745	623	841	**1464**
1745 - 1800	550	739	**1289**
1800 - 1815	523	668	**1191**
1815 - 1830	507	600	**1107**
1830 - 1845	375	524	**899**
1845 - 1900	353	464	**817**
1900 - 1915	349	394	**743**
1915 - 1930	340	319	**659**
1930 - 1945	309	341	**650**
1945 - 2000	248	322	**570**
2000 - 2015	241	326	**567**
2015 - 2030	234	279	**513**
2030 - 2045	231	282	**513**
2045 - 2100	209	238	**447**
2100 - 2115	191	215	**406**
2115 - 2130	159	184	**343**
2130 - 2145	143	190	**333**
2145 - 2200	143	175	**318**
2200 - 2215	115	224	**339**
2215 - 2230	132	169	**301**
2230 - 2245	106	163	**269**
2245 - 2300	108	122	**230**
2300 - 2315	102	124	**226**
2315 - 2330	93	145	**238**
2330 - 2345	89	99	**188**
2345 - 0000	64	110	**174**

Session Total	38811	39063	**77874**
Session Average	404,28	406,91	**811,19**

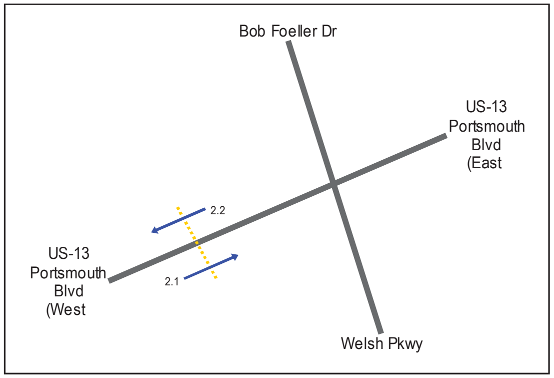
Suffolk, VA
Classified Traffic Count

Site 2
US-13 Portsmouth Blvd,
west of Bob Foeller Dr

Lat/Long
36,754463°, -76,514703°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F



0000 - 2400 (Weekday 24h Session)

🟧 undertaken on Tuesday, October 13th, 2020

	Eastbound, (Movement 2.1)													
TIME	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13	**TOTAL**
0000 - 0100	0	178	1	0	3	1	0	0	30	0	0	9	0	**222**
0100 - 0200	0	115	3	0	2	1	0	1	25	0	0	5	0	**152**
0200 - 0300	0	142	4	0	7	3	0	1	32	0	0	5	0	**194**
0300 - 0400	0	281	9	0	9	3	0	3	55	0	0	7	0	**367**
0400 - 0500	2	931	45	0	13	7	0	0	65	0	0	8	0	**1071**
0500 - 0600	7	1869	242	0	31	14	0	10	135	1	6	7	0	**2322**
0600 - 0700	13	2540	344	4	28	17	0	2	174	0	1	10	0	**3133**
0700 - 0800	12	2369	595	0	50	25	0	8	200	4	4	6	0	**3273**
0800 - 0900	1	1588	471	1	65	47	0	10	233	4	3	3	0	**2426**
0900 - 1000	5	1238	338	1	53	27	0	8	233	2	2	1	0	**1908**
1000 - 1100	4	1243	373	1	59	42	0	1	290	1	0	0	0	**2014**
1100 - 1200	6	1293	367	2	43	45	6	4	291	1	0	0	0	**2058**
1200 - 1300	1	1313	346	2	67	33	11	6	259	6	0	0	0	**2044**
1300 - 1400	4	1320	396	2	75	35	6	10	219	7	0	0	0	**2074**
1400 - 1500	6	1497	479	0	66	39	1	5	209	4	0	0	0	**2306**
1500 - 1600	2	1893	522	6	70	40	5	5	146	3	0	0	0	**2692**
1600 - 1700	8	1982	416	1	51	20	1	13	145	2	2	0	0	**2641**
1700 - 1800	3	1997	357	0	51	19	0	8	113	2	0	0	0	**2550**
1800 - 1900	4	1340	279	0	31	11	0	12	80	0	0	1	0	**1758**
1900 - 2000	4	1102	51	0	19	1	0	3	66	0	0	0	0	**1246**
2000 - 2100	1	816	24	0	10	1	0	1	62	0	0	0	0	**915**
2100 - 2200	0	571	9	0	16	0	0	3	35	0	0	2	0	**636**
2200 - 2300	1	397	5	0	8	0	0	2	46	0	0	2	0	**461**
2300 - 2400	0	308	2	0	7	1	0	0	30	0	0	0	0	**348**

Session Total	84	28323	5678	20	834	432	30	116	3173	37	18	66	0	**38811**
Session Average	3,50	1180,13	236,58	0,83	34,75	18,00	1,25	4,83	132,21	1,54	0,75	2,75	0,00	**1617,13**
Session Percentage	0,22	72,98	14,63	0,05	2,15	1,11	0,08	0,30	8,18	0,10	0,05	0,17	0,00	

AM Peak Hour	0700 - 0800	0700 - 0800	0800 - 0900	0700 - 0800	0900 - 1000	0900 - 1000	-	0600 - 0700	0900 - 1000	0800 - 0900	0600 - 0700	0700 - 0800	-	**0800 - 0900**
AM Peak Hour Volume	13	2540	595	4	65	47	0	10	233	4	6	10	0	**3273**

Noon Peak Hour	1200 - 1300	1500 - 1600	1500 - 1600	1200 - 1300	1400 - 1500	1200 - 1300	1300 - 1400	1400 - 1500	1200 - 1300	1400 - 1500	-	-	-	**1500 - 1600**
Noon Peak Hour Volume	6	1497	479	2	75	45	11	10	291	7	0	0	0	**2306**

PM Peak Hour	1700 - 1800	1800 - 1900	1600 - 1700	1600 - 1700	1600 - 1700	1600 - 1700	1600 - 1700	1700 - 1800	1600 - 1700	1600 - 1700	1700 - 1800	1900 - 2000	-	**1600 - 1700**
PM Peak Hour Volume	8	1997	522	6	70	40	5	13	146	3	2	1	0	**2692**

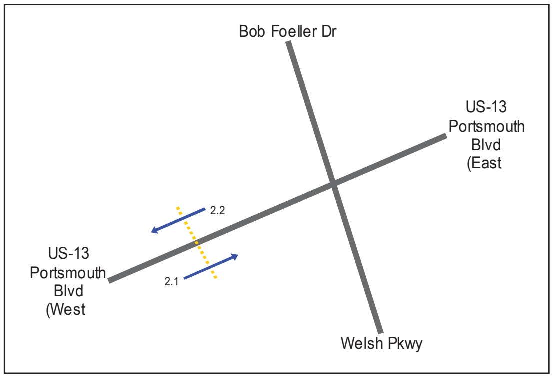
Suffolk, VA
Classified Traffic Count

Site 2
US-13 Portsmouth Blvd,
west of Bob Foeller Dr

Lat/Long
36,754463°, -76,514703°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F



0000 - 2400 (Weekday 24h Session)

🟧 undertaken on Tuesday, October 13th, 2020

	Westbound, (Movement 2.2)													
TIME	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13	**TOTAL**
0000 - 0100	1	145	89	0	3	1	0	1	39	0	2	0	0	**281**
0100 - 0200	0	147	91	0	3	3	0	0	36	0	1	1	0	**282**
0200 - 0300	0	68	47	0	1	1	0	0	44	0	1	1	0	**163**
0300 - 0400	0	69	54	0	4	4	0	1	79	0	1	0	0	**212**
0400 - 0500	0	254	82	0	3	3	0	3	104	0	2	1	0	**452**
0500 - 0600	0	684	203	0	13	9	0	3	139	0	2	1	0	**1054**
0600 - 0700	3	954	352	0	31	9	0	6	180	0	3	2	0	**1540**
0700 - 0800	7	1536	445	6	71	31	1	24	240	6	1	0	0	**2368**
0800 - 0900	11	1400	469	3	66	36	3	17	287	7	0	0	0	**2299**
0900 - 1000	4	1107	449	1	85	32	0	5	301	1	0	0	0	**1985**
1000 - 1100	4	1095	448	3	53	41	0	5	266	1	2	0	0	**1918**
1100 - 1200	19	1192	469	1	61	48	0	6	233	0	0	0	0	**2029**
1200 - 1300	6	1223	449	4	68	28	7	16	253	3	0	0	0	**2057**
1300 - 1400	2	1224	525	7	65	30	7	11	236	1	2	0	0	**2110**
1400 - 1500	7	1764	570	1	57	16	2	33	233	3	0	0	0	**2686**
1500 - 1600	18	2444	761	1	46	23	4	24	213	4	0	0	0	**3538**
1600 - 1700	12	2828	838	5	57	22	2	10	163	3	0	0	0	**3940**
1700 - 1800	10	2715	601	0	46	7	1	2	88	1	0	1	0	**3472**
1800 - 1900	3	1791	360	0	29	3	2	4	60	0	1	3	0	**2256**
1900 - 2000	0	1207	82	1	23	4	0	1	55	0	0	3	0	**1376**
2000 - 2100	0	987	50	0	13	4	0	3	44	0	1	23	0	**1125**
2100 - 2200	0	680	10	0	10	0	0	0	50	0	14	0	0	**764**
2200 - 2300	0	611	11	0	12	0	0	0	33	0	10	1	0	**678**
2300 - 2400	0	429	4	0	5	1	0	0	34	0	5	0	0	**478**

Session Total	107	26554	7459	33	825	356	29	175	3410	30	48	37	0	**39063**
Session Average	4,46	1106,42	310,79	1,38	34,38	14,83	1,21	7,29	142,08	1,25	2,00	1,54	0,00	**1627,63**
Session Percentage	0,27	67,98	19,09	0,08	2,11	0,91	0,07	0,45	8,73	0,08	0,12	0,09	0,00	

AM Peak Hour	0900 - 1000	0800 - 0900	0900 - 1000	0800 - 0900	1000 - 1100	0900 - 1000	0900 - 1000	0800 - 0900	1000 - 1100	0900 - 1000	0700 - 0800	0700 - 0800	-	**0800 - 0900**
AM Peak Hour Volume	11	1536	469	6	85	36	3	24	301	7	3	2	0	**2368**

Noon Peak Hour	1200 - 1300	1500 - 1600	1500 - 1600	1400 - 1500	1300 - 1400	1200 - 1300	1300 - 1400	1500 - 1600	1100 - 1200	1300 - 1400	1100 - 1200	-	-	**1500 - 1600**
Noon Peak Hour Volume	19	1764	570	7	68	48	7	33	266	3	2	0	0	**2686**

PM Peak Hour	1600 - 1700	1700 - 1800	1700 - 1800	1700 - 1800	1700 - 1800	1600 - 1700	1600 - 1700	1600 - 1700	1600 - 1700	1600 - 1700	1900 - 2000	1900 - 2000	-	**1700 - 1800**
PM Peak Hour Volume	18	2828	838	5	57	23	4	24	213	4	1	3	0	**3940**

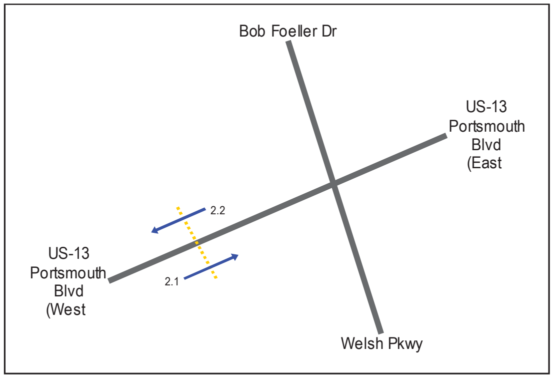
Suffolk, VA
Classified Traffic Count

Site 2
US-13 Portsmouth Blvd,
west of Bob Foeller Dr

Lat/Long
36,754463°, -76,514703°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F



0000 - 2400 (Weekday 24h Session)

🟨 undertaken on Tuesday, October 13th, 2020

	Bi-Directional 60min													
TIME	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13	**TOTAL**
0000 - 0100	1	323	90	0	6	2	0	1	69	0	2	9	0	**503**
0100 - 0200	0	262	94	0	5	4	0	1	61	0	1	6	0	**434**
0200 - 0300	0	210	51	0	8	4	0	1	76	0	1	6	0	**357**
0300 - 0400	0	350	63	0	13	7	0	4	134	0	1	7	0	**579**
0400 - 0500	2	1185	127	0	16	10	0	3	169	0	2	9	0	**1523**
0500 - 0600	7	2553	445	0	44	23	0	13	274	1	8	8	0	**3376**
0600 - 0700	16	3494	696	4	59	26	0	8	354	0	4	12	0	**4673**
0700 - 0800	19	3905	1040	6	121	56	1	32	440	10	5	6	0	**5641**
0800 - 0900	12	2988	940	4	131	83	3	27	520	11	3	3	0	**4725**
0900 - 1000	9	2345	787	2	138	59	0	13	534	3	2	1	0	**3893**
1000 - 1100	8	2338	821	4	112	83	0	6	556	2	2	0	0	**3932**
1100 - 1200	25	2485	836	3	104	93	6	10	524	1	0	0	0	**4087**
1200 - 1300	7	2536	795	6	135	61	18	22	512	9	0	0	0	**4101**
1300 - 1400	6	2544	921	9	140	65	13	21	455	8	2	0	0	**4184**
1400 - 1500	13	3261	1049	1	123	55	3	38	442	7	0	0	0	**4992**
1500 - 1600	20	4337	1283	7	116	63	9	29	359	7	0	0	0	**6230**
1600 - 1700	20	4810	1254	6	108	42	3	23	308	5	2	0	0	**6581**
1700 - 1800	13	4712	958	0	97	26	1	10	201	3	0	1	0	**6022**
1800 - 1900	7	3131	639	0	60	14	2	16	140	0	1	4	0	**4014**
1900 - 2000	4	2309	133	1	42	5	0	4	121	0	0	3	0	**2622**
2000 - 2100	1	1803	74	0	23	5	0	4	106	0	1	23	0	**2040**
2100 - 2200	0	1251	19	0	26	0	0	3	85	0	14	2	0	**1400**
2200 - 2300	1	1008	16	0	20	0	0	2	79	0	10	3	0	**1139**
2300 - 2400	0	737	6	0	12	2	0	0	64	0	5	0	0	**826**

Session Total	191	54877	13137	53	1659	788	59	291	6583	67	66	103	0	**77874**
Session Average	7,96	2286,54	547,38	2,21	69,13	32,83	2,46	12,13	274,29	2,79	2,75	4,29	0,00	**3244,75**
Session Percentage	0,25	70,47	16,87	0,07	2,13	1,01	0,08	0,37	8,45	0,09	0,08	0,13	0,00	

AM Peak Hour	0800 - 0900	0800 - 0900	0800 - 0900	0800 - 0900	1000 - 1100	0900 - 1000	0900 - 1000	0800 - 0900	1000 - 1100	0900 - 1000	0600 - 0700	0700 - 0800	-	**0800 - 0900**
AM Peak Hour Volume	19	3905	1040	6	138	83	3	32	534	11	8	12	0	**5641**

Noon Peak Hour	1200 - 1300	1500 - 1600	1500 - 1600	1400 - 1500	1400 - 1500	1200 - 1300	1300 - 1400	1500 - 1600	1100 - 1200	1300 - 1400	1100 - 1200	-	-	**1500 - 1600**
Noon Peak Hour Volume	25	3261	1049	9	140	93	18	38	556	9	2	0	0	**4992**

PM Peak Hour	1600 - 1700	1700 - 1800	1600 - 1700	1600 - 1700	1600 - 1700	1600 - 1700	1600 - 1700	1600 - 1700	1600 - 1700	1600 - 1700	1700 - 1800	1900 - 2000	-	**1700 - 1800**
PM Peak Hour Volume	20	4810	1283	7	116	63	9	29	359	7	2	4	0	**6581**

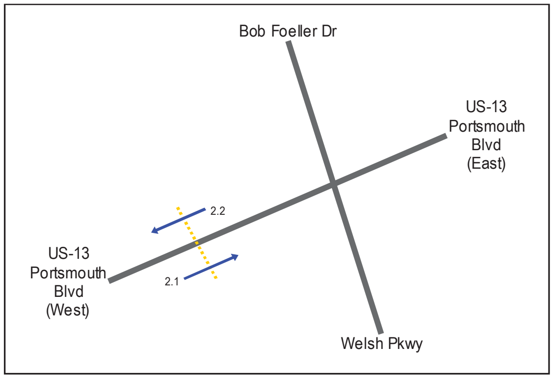
Suffolk, VA
Classified Traffic Count

Site 2
US-13 Portsmouth Blvd,
west of Bob Foeller Dr

Lat/Long
36,754463°, -76,514703°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F

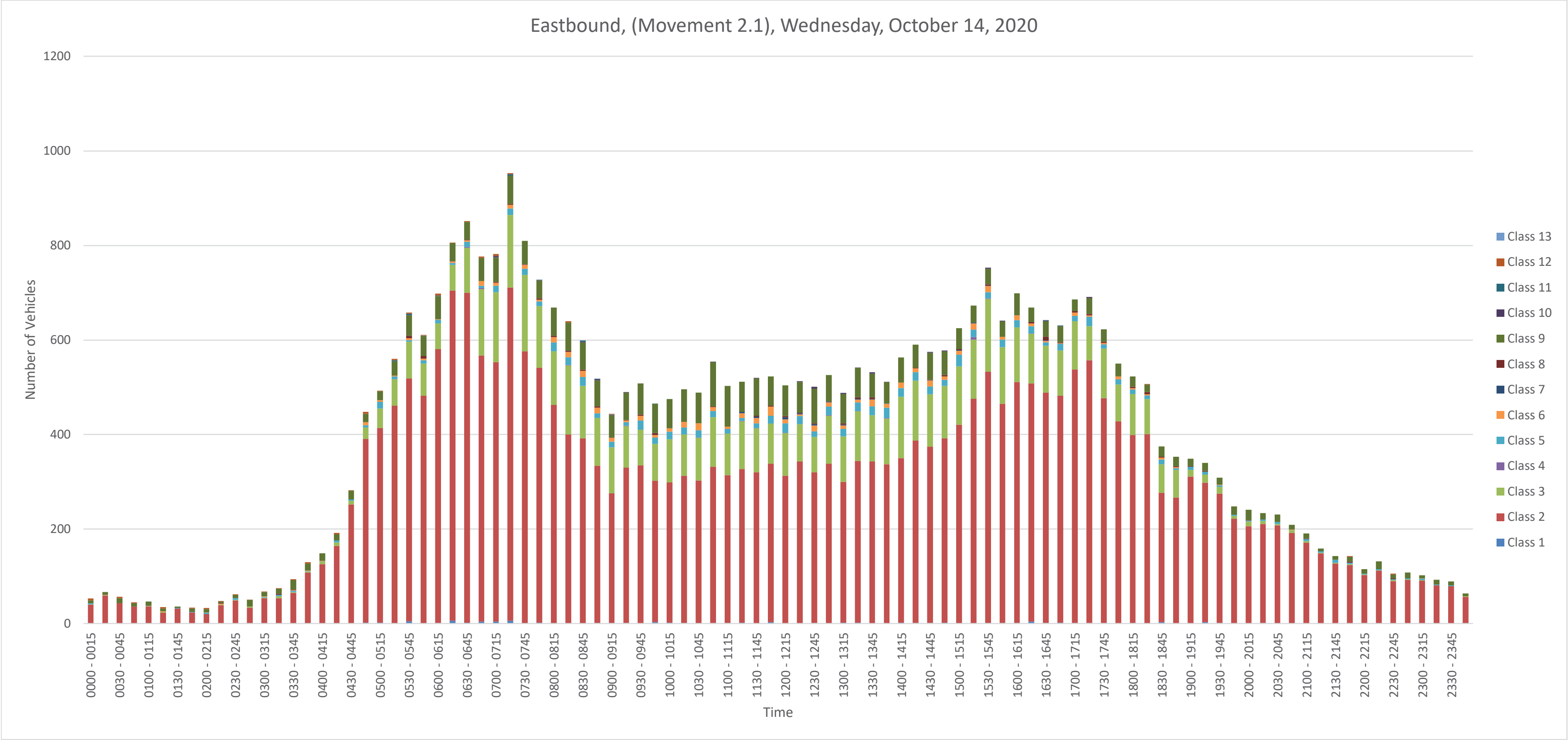


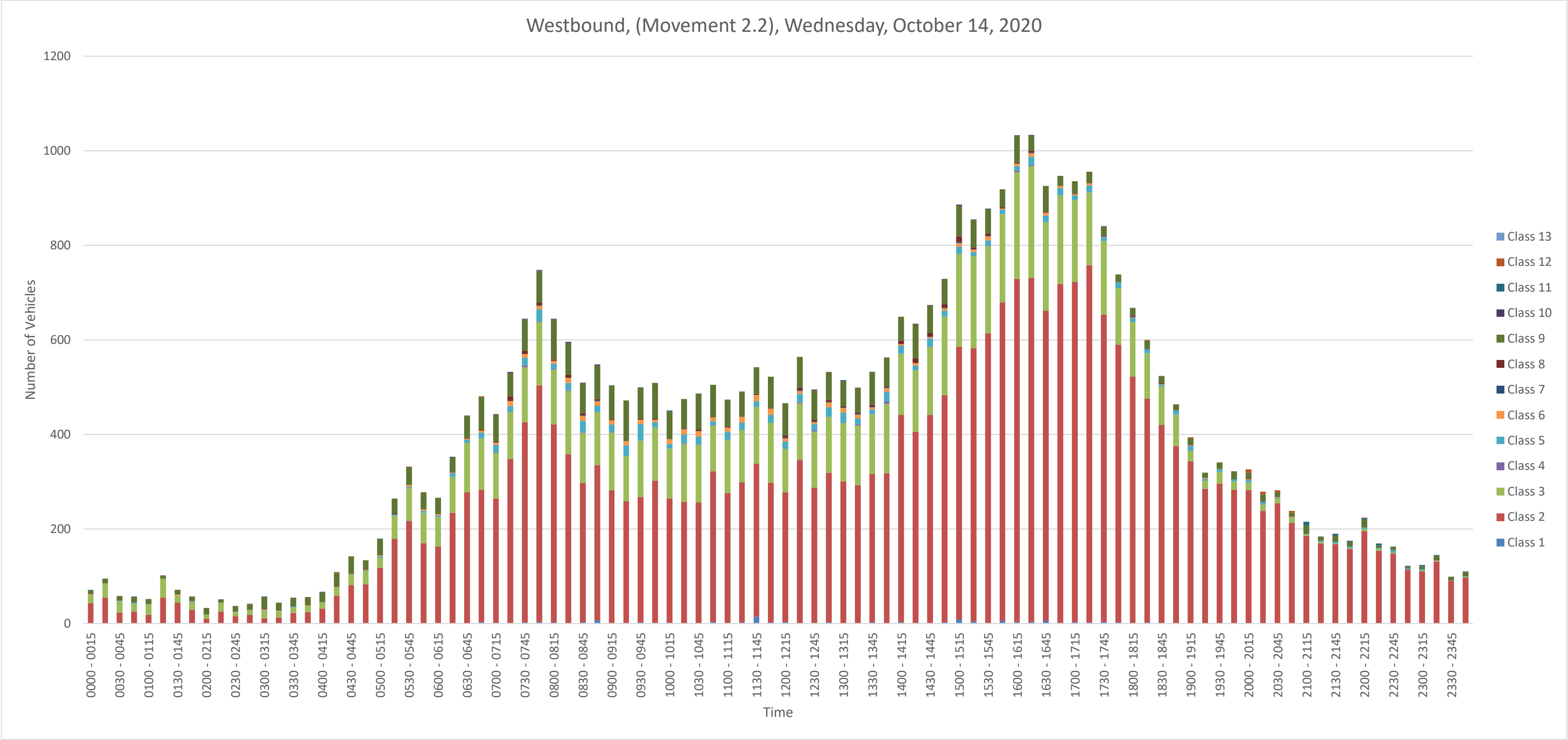
0000 - 2400 (Weekday 24h Session)

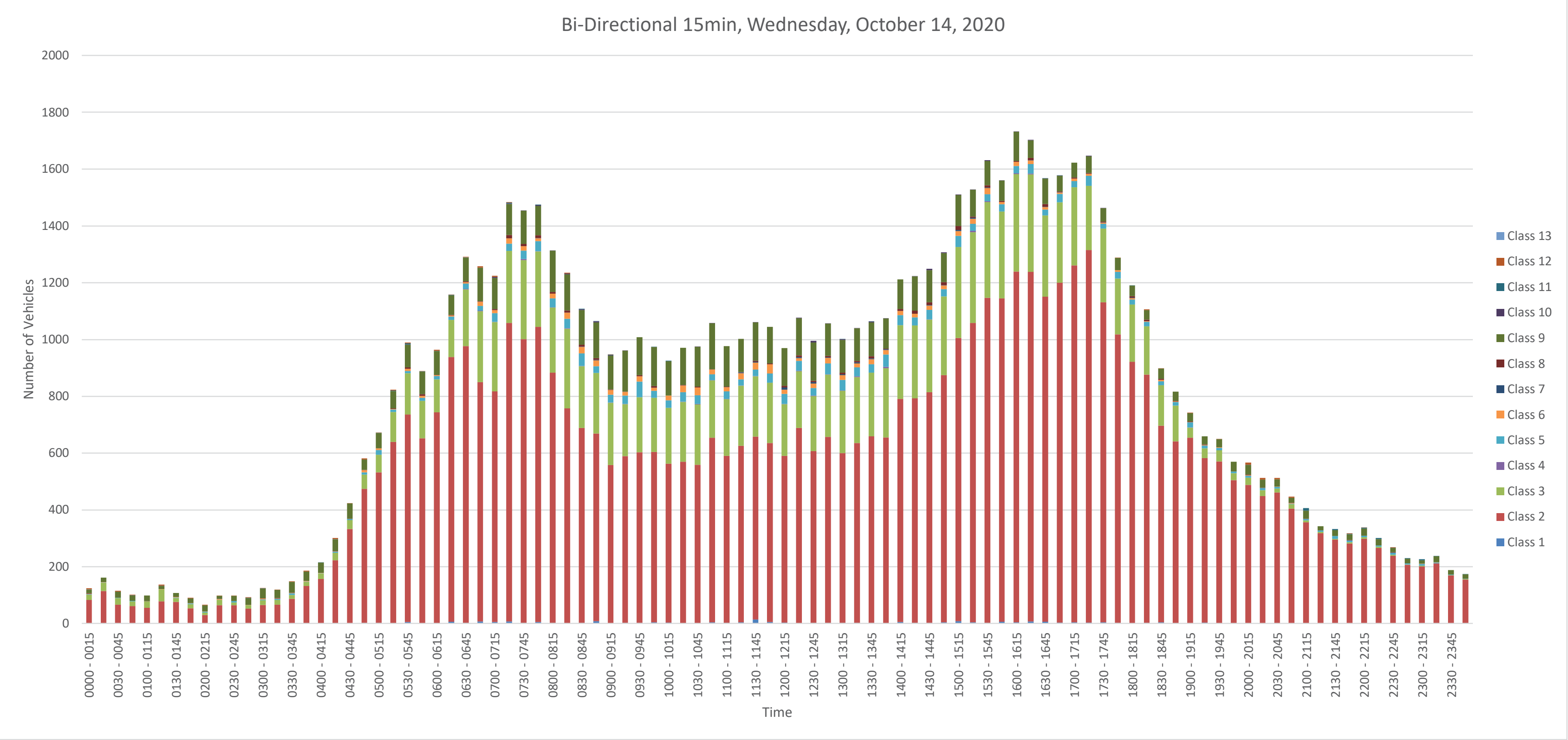
🟧 undertaken on Tuesday, October 13th, 2020

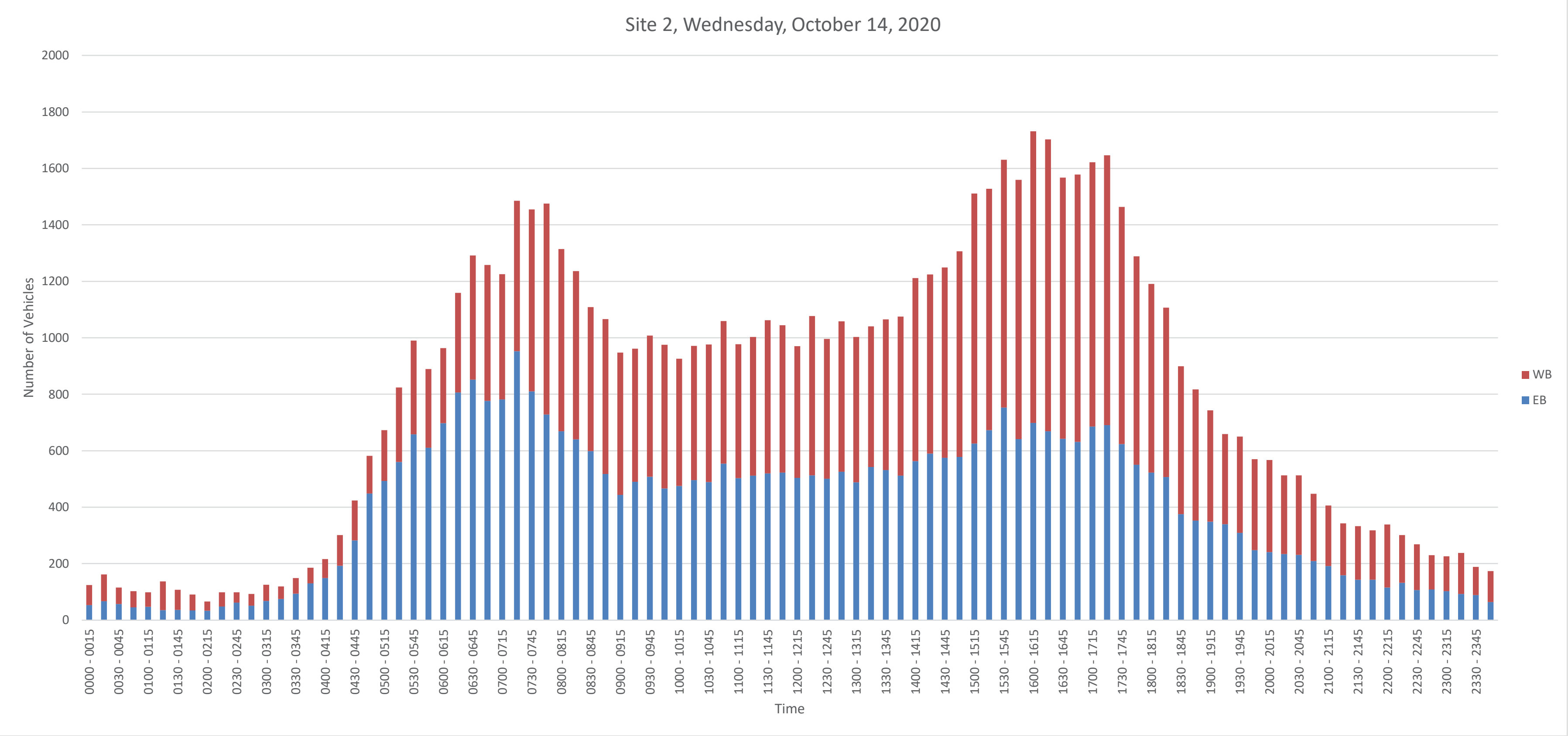
	Volume Summary 60min		
TIME	EB	WB	**TOTAL**
0000 - 0100	222	281	**503**
0100 - 0200	152	282	**434**
0200 - 0300	194	163	**357**
0300 - 0400	367	212	**579**
0400 - 0500	1071	452	**1523**
0500 - 0600	2322	1054	**3376**
0600 - 0700	3133	1540	**4673**
0700 - 0800	3273	2368	**5641**
0800 - 0900	2426	2299	**4725**
0900 - 1000	1908	1985	**3893**
1000 - 1100	2014	1918	**3932**
1100 - 1200	2058	2029	**4087**
1200 - 1300	2044	2057	**4101**
1300 - 1400	2074	2110	**4184**
1400 - 1500	2306	2686	**4992**
1500 - 1600	2692	3538	**6230**
1600 - 1700	2641	3940	**6581**
1700 - 1800	2550	3472	**6022**
1800 - 1900	1758	2256	**4014**
1900 - 2000	1246	1376	**2622**
2000 - 2100	915	1125	**2040**
2100 - 2200	636	764	**1400**
2200 - 2300	461	678	**1139**
2300 - 2400	348	478	**826**

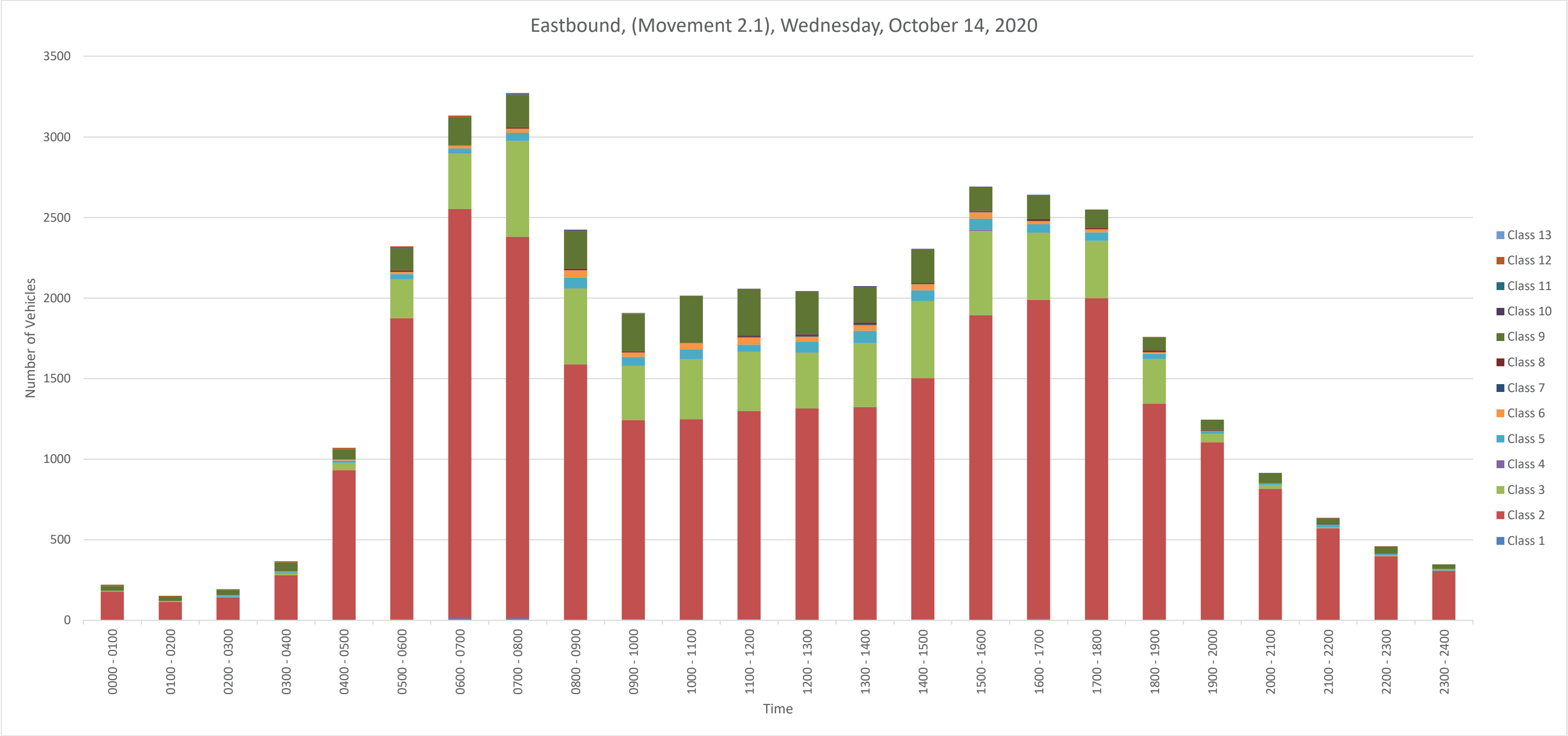
Session Total	38811	39063	**77874**
Session Average	1617,13	1627,63	**3244,75**
Session Percentage	49,84	50,16	


Eastbound, (Movement 2.1), Wednesday, October 14, 2020
1200
1000
800
600
400
200
0
Number of Vehicles
0000 - 0015
0030 - 0045
0100 - 0115
0130 - 0145
0200 - 0215
0230 - 0245
0300 - 0315
0330 - 0345
0400 - 0415
0430 - 0445
0500 - 0515
0530 - 0545
0600 - 0615
0630 - 0645
0700 - 0715
0730 - 0745
0800 - 0815
0830 - 0845
0900 - 0915
0930 - 0945
1000 - 1015
1030 - 1045
1100 - 1115
1130 - 1145
1200 - 1215
1230 - 1245
1300 - 1315
1330 - 1345
1400 - 1415
1430 - 1445
1500 - 1515
1530 - 1545
1600 - 1615
1630 - 1645
1700 - 1715
1730 - 1745
1800 - 1815
1830 - 1845
1900 - 1915
1930 - 1945
2000 - 2015
2030 - 2045
2100 - 2115
2130 - 2145
2200 - 2215
2230 - 2245
2300 - 2315
2330 - 2345
Time
Class 13
Class 12
Class 11
Class 10
Class 9
Class 8
Class 7
Class 6
Class 5
Class 4
Class 3
Class 2
Class 1

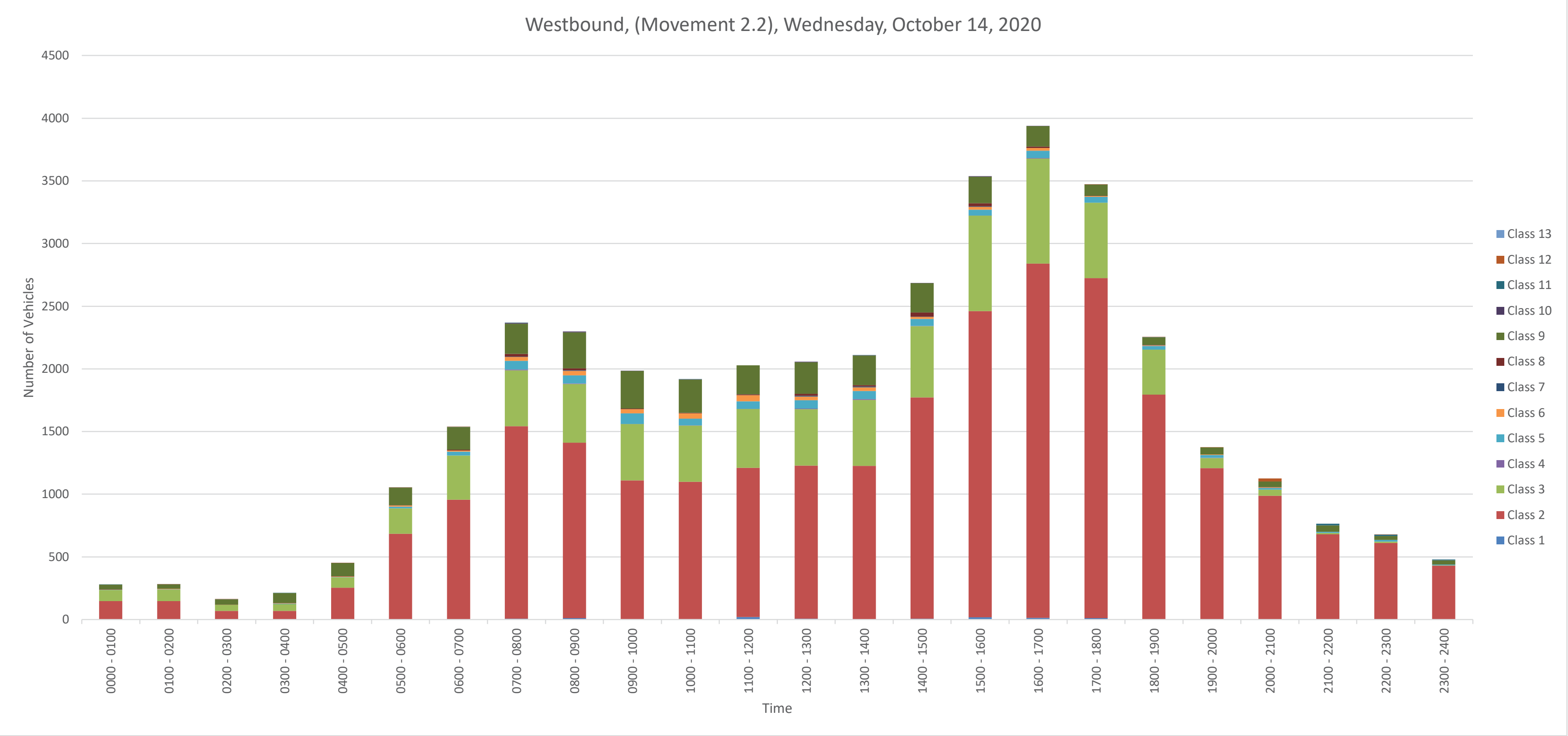

Westbound, (Movement 2.2), Wednesday, October 14, 2020
Number of Vehicles
1200
1000
800
600
400
200
0
0000 - 0015
0030 - 0045
0100 - 0115
0130 - 0145
0200 - 0215
0230 - 0245
0300 - 0315
0330 - 0345
0400 - 0415
0430 - 0445
0500 - 0515
0530 - 0545
0600 - 0615
0630 - 0645
0700 - 0715
0730 - 0745
0800 - 0815
0830 - 0845
0900 - 0915
0930 - 0945
1000 - 1015
1030 - 1045
1100 - 1115
1130 - 1145
1200 - 1215
1230 - 1245
1300 - 1315
1330 - 1345
1400 - 1415
1430 - 1445
1500 - 1515
1530 - 1545
1600 - 1615
1630 - 1645
1700 - 1715
1730 - 1745
1800 - 1815
1830 - 1845
1900 - 1915
1930 - 1945
2000 - 2015
2030 - 2045
2100 - 2115
2130 - 2145
2200 - 2215
2230 - 2245
2300 - 2315
2330 - 2345
Time
Class 13
Class 12
Class 11
Class 10
Class 9
Class 8
Class 7
Class 6
Class 5
Class 4
Class 3
Class 2
Class 1

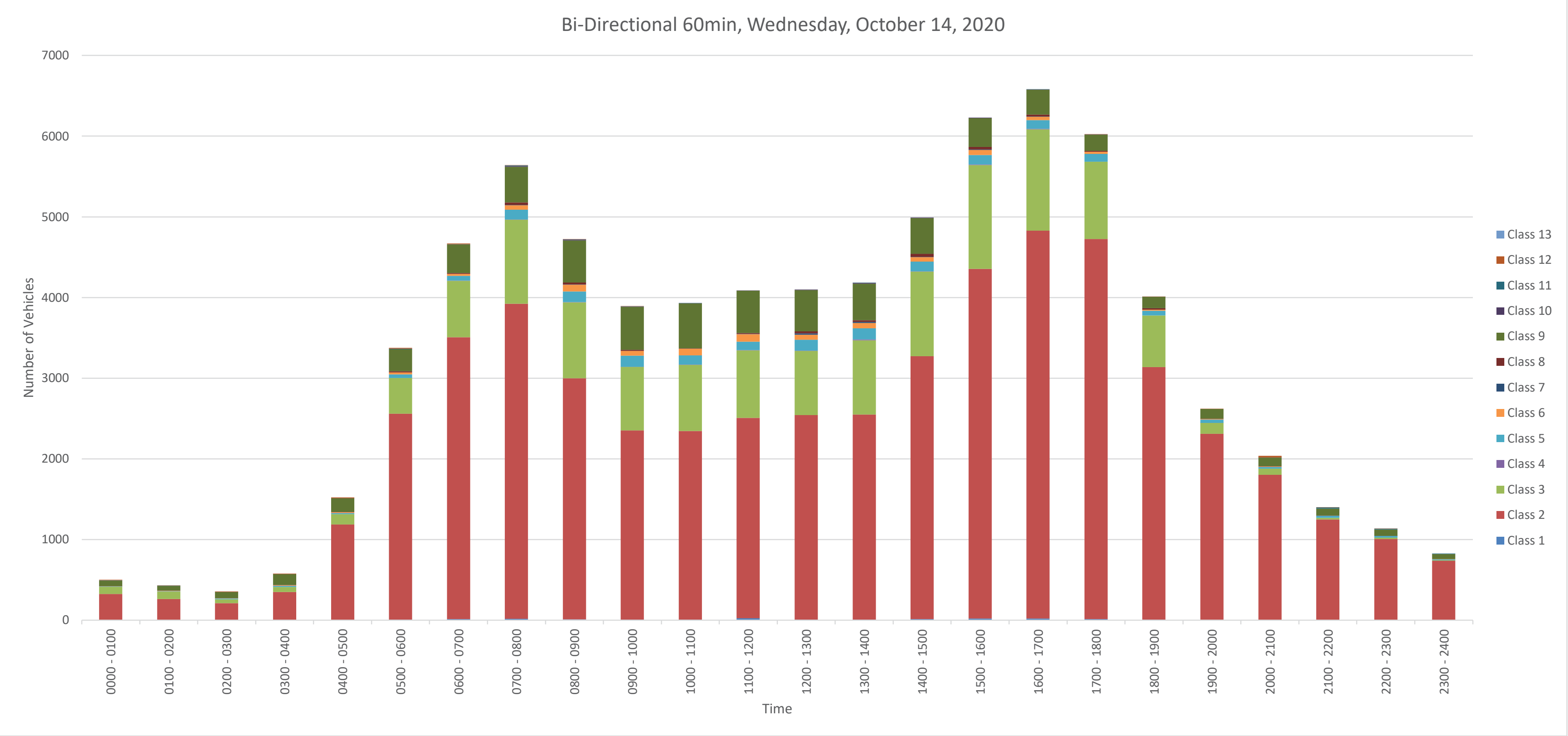
Bi-Directional 15min, Wednesday, October 14, 2020
Number of Vehicles
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Time
0000 - 0015
0030 - 0045
0100 - 0115
0130 - 0145
0200 - 0215
0230 - 0245
0300 - 0315
0330 - 0345
0400 - 0415
0430 - 0445
0500 - 0515
0530 - 0545
0600 - 0615
0630 - 0645
0700 - 0715
0730 - 0745
0800 - 0815
0830 - 0845
0900 - 0915
0930 - 0945
1000 - 1015
1030 - 1045
1100 - 1115
1130 - 1145
1200 - 1215
1230 - 1245
1300 - 1315
1330 - 1345
1400 - 1415
1430 - 1445
1500 - 1515
1530 - 1545
1600 - 1615
1630 - 1645
1700 - 1715
1730 - 1745
1800 - 1815
1830 - 1845
1900 - 1915
1930 - 1945
2000 - 2015
2030 - 2045
2100 - 2115
2130 - 2145
2200 - 2215
2230 - 2245
2300 - 2315
2330 - 2345
Class 13
Class 12
Class 11
Class 10
Class 9
Class 8
Class 7
Class 6
Class 5
Class 4
Class 3
Class 2
Class 1


Site 2, Wednesday, October 14, 2020
Number of Vehicles
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Time
0000 - 0015
0030 - 0045
0100 - 0115
0130 - 0145
0200 - 0215
0230 - 0245
0300 - 0315
0330 - 0345
0400 - 0415
0430 - 0445
0500 - 0515
0530 - 0545
0600 - 0615
0630 - 0645
0700 - 0715
0730 - 0745
0800 - 0815
0830 - 0845
0900 - 0915
0930 - 0945
1000 - 1015
1030 - 1045
1100 - 1115
1130 - 1145
1200 - 1215
1230 - 1245
1300 - 1315
1330 - 1345
1400 - 1415
1430 - 1445
1500 - 1515
1530 - 1545
1600 - 1615
1630 - 1645
1700 - 1715
1730 - 1745
1800 - 1815
1830 - 1845
1900 - 1915
1930 - 1945
2000 - 2015
2030 - 2045
2100 - 2115
2130 - 2145
2200 - 2215
2230 - 2245
2300 - 2315
2330 - 2345
WB
EB

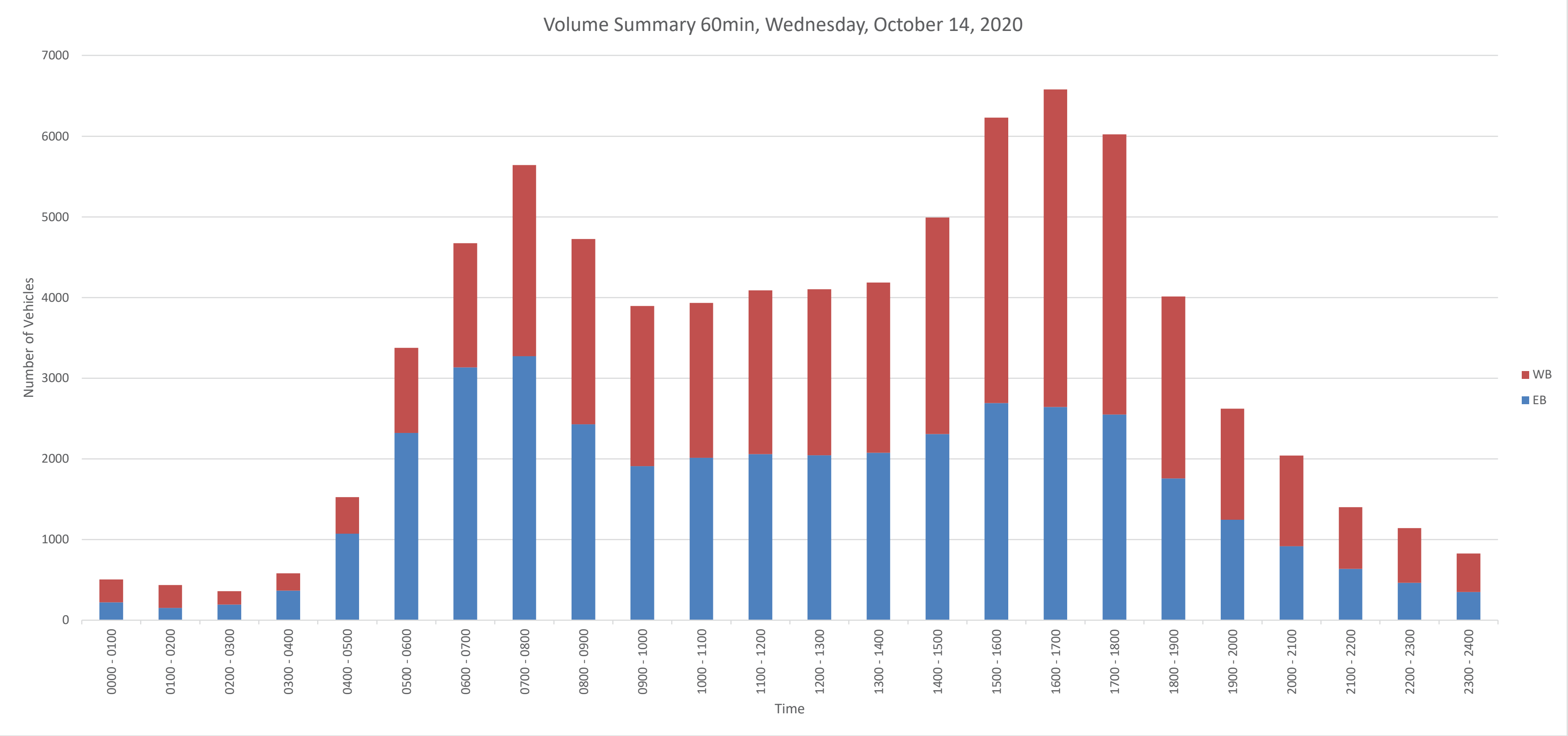


Eastbound, (Movement 2.1), Wednesday, October 14, 2020


Westbound, (Movement 2.2), Wednesday, October 14, 2020
Number of Vehicles
4500
4000
3500
3000
2500
2000
1500
1000
500
0
0000 - 0100
0100 - 0200
0200 - 0300
0300 - 0400
0400 - 0500
0500 - 0600
0600 - 0700
0700 - 0800
0800 - 0900
0900 - 1000
1000 - 1100
1100 - 1200
1200 - 1300
1300 - 1400
1400 - 1500
1500 - 1600
1600 - 1700
1700 - 1800
1800 - 1900
1900 - 2000
2000 - 2100
2100 - 2200
2200 - 2300
2300 - 2400
Time
Class 13
Class 12
Class 11
Class 10
Class 9
Class 8
Class 7
Class 6
Class 5
Class 4
Class 3
Class 2
Class 1



Bi-Directional 60min, Wednesday, October 14, 2020
Number of Vehicles
7000
6000
5000
4000
3000
2000
1000
0
0000 - 0100
0100 - 0200
0200 - 0300
0300 - 0400
0400 - 0500
0500 - 0600
0600 - 0700
0700 - 0800
0800 - 0900
0900 - 1000
1000 - 1100
1100 - 1200
1200 - 1300
1300 - 1400
1400 - 1500
1500 - 1600
1600 - 1700
1700 - 1800
1800 - 1900
1900 - 2000
2000 - 2100
2100 - 2200
2200 - 2300
2300 - 2400
Time
Class 13
Class 12
Class 11
Class 10
Class 9
Class 8
Class 7
Class 6
Class 5
Class 4
Class 3
Class 2
Class 1


Volume Summary 60min, Wednesday, October 14, 2020
7000
6000
5000
4000
3000
2000
1000
0
Number of Vehicles
0000 - 0100
0100 - 0200
0200 - 0300
0300 - 0400
0400 - 0500
0500 - 0600
0600 - 0700
0700 - 0800
0800 - 0900
0900 - 1000
1000 - 1100
1100 - 1200
1200 - 1300
1300 - 1400
1400 - 1500
1500 - 1600
1600 - 1700
1700 - 1800
1800 - 1900
1900 - 2000
2000 - 2100
2100 - 2200
2200 - 2300
2300 - 2400
Time
WB
EB

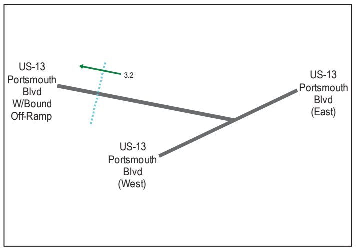
Suffolk, VA
Classified Traffic Count

Site 3
US-13 Portsbouth Blvd W/Bound Off-Ramp,
west of US-13 Portsmouth Blvd

Lat/Long
36,753956°, -76,518575°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F



0000 - 2400 (Weekday 24h Session)

🟧 undertaken on Tuesday, October 13th, 2020

	Westbound, (Movement 3.2)													
TIME	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13	**TOTAL**
0000 - 0015	0	28	1	0	1	0	0	0	0	0	0	0	0	**30**
0015 - 0030	0	37	0	0	0	0	0	0	0	0	0	0	0	**37**
0030 - 0045	0	20	0	0	1	0	0	0	1	0	0	0	0	**22**
0045 - 0100	0	25	0	0	1	0	0	0	2	0	0	0	0	**28**
0100 - 0115	0	22	0	0	1	0	0	0	1	0	0	0	0	**24**
0115 - 0130	0	32	0	0	0	0	0	0	0	0	0	0	0	**32**
0130 - 0145	0	17	2	0	0	0	0	0	1	0	0	0	0	**20**
0145 - 0200	0	18	0	0	0	0	0	0	0	0	0	0	0	**18**
0200 - 0215	0	10	0	0	0	0	0	0	0	0	0	0	0	**10**
0215 - 0230	0	18	2	0	0	0	0	0	0	0	0	0	0	**20**
0230 - 0245	0	10	0	0	0	0	0	0	0	0	0	0	0	**10**
0245 - 0300	0	10	0	0	0	0	0	0	2	0	0	0	0	**12**
0300 - 0315	0	18	0	0	1	0	0	0	3	0	0	0	0	**22**
0315 - 0330	0	7	1	0	0	0	0	0	1	0	0	0	0	**9**
0330 - 0345	0	15	0	0	0	0	0	0	0	0	0	0	0	**15**
0345 - 0400	0	14	1	0	0	0	0	0	0	0	0	0	0	**15**
0400 - 0415	0	14	0	0	0	0	0	0	0	0	0	0	0	**14**
0415 - 0430	0	25	0	0	0	0	0	0	0	0	0	0	0	**25**
0430 - 0445	0	34	1	0	0	0	0	0	0	0	0	0	0	**35**
0445 - 0500	0	33	3	0	2	0	0	0	0	0	0	0	0	**38**
0500 - 0515	0	42	0	0	1	1	0	0	0	0	0	0	0	**44**
0515 - 0530	0	49	0	0	0	0	0	0	1	0	0	0	0	**50**
0530 - 0545	0	51	0	0	3	1	0	0	0	0	0	0	0	**55**
0545 - 0600	0	71	4	0	3	0	0	0	1	0	0	0	0	**79**
0600 - 0615	0	57	3	0	0	2	0	0	1	0	0	0	0	**63**
0615 - 0630	0	94	9	0	2	0	0	0	1	0	0	0	0	**106**
0630 - 0645	0	117	12	0	1	0	0	0	0	0	0	0	0	**130**
0645 - 0700	0	122	19	0	4	2	0	2	2	0	0	0	0	**151**
0700 - 0715	0	81	26	1	3	1	0	0	0	0	0	0	0	**112**
0715 - 0730	1	117	25	0	3	2	0	0	3	0	0	0	0	**151**
0730 - 0745	0	147	28	0	4	3	0	0	9	0	0	0	0	**191**
0745 - 0800	0	188	18	1	6	1	0	0	3	0	0	0	0	**217**
0800 - 0815	0	171	24	0	5	0	0	0	3	0	0	0	0	**203**
0815 - 0830	0	146	39	0	8	2	0	2	7	0	0	0	0	**204**
0830 - 0845	1	113	33	0	6	1	0	1	5	0	0	0	0	**160**
0845 - 0900	0	118	26	0	6	2	0	1	2	0	0	0	0	**155**
0900 - 0915	0	102	35	1	4	1	0	1	4	0	0	0	0	**148**
0915 - 0930	1	104	28	0	11	2	0	1	6	0	0	0	0	**153**
0930 - 0945	0	108	35	0	12	7	0	0	11	0	0	0	0	**173**
0945 - 1000	0	113	31	0	6	2	0	0	8	0	0	0	0	**160**
1000 - 1015	0	76	37	0	5	4	0	1	4	0	0	0	0	**127**
1015 - 1030	1	87	36	0	9	5	1	1	5	0	0	0	0	**145**
1030 - 1045	0	83	32	0	5	5	0	0	11	0	0	0	0	**136**
1045 - 1100	0	125	34	0	8	6	0	1	6	0	0	0	0	**180**
1100 - 1115	0	109	36	0	6	5	0	1	4	0	0	0	0	**161**
1115 - 1130	0	125	45	0	8	6	2	0	5	0	0	0	0	**191**
1130 - 1145	0	123	40	0	5	3	0	1	6	0	0	0	0	**178**
1145 - 1200	1	104	37	0	6	5	0	1	7	0	0	0	0	**161**
1200 - 1215	0	118	28	0	8	1	2	2	9	0	0	0	0	**168**
1215 - 1230	0	123	38	0	9	2	1	1	4	0	0	0	0	**178**
1230 - 1245	1	118	38	0	3	2	0	0	6	0	0	0	0	**168**
1245 - 1300	1	147	36	0	3	2	0	0	5	0	0	0	0	**194**
1300 - 1315	0	133	34	0	10	2	0	0	8	0	0	0	0	**187**
1315 - 1330	0	128	43	0	4	6	0	1	5	0	0	0	0	**187**
1330 - 1345	0	139	37	0	9	1	0	1	12	0	0	0	0	**199**
1345 - 1400	0	135	39	0	11	1	0	0	6	0	0	0	0	**192**
1400 - 1415	2	158	49	0	5	5	0	0	2	0	0	0	0	**221**
1415 - 1430	1	144	40	0	2	2	0	1	3	1	0	0	0	**194**
1430 - 1445	1	151	45	0	6	2	2	1	3	0	0	0	0	**211**
1445 - 1500	1	167	44	0	10	5	1	0	6	0	0	0	0	**234**
1500 - 1515	0	194	61	0	1	7	0	0	6	0	0	0	0	**269**
1515 - 1530	1	224	62	0	2	2	0	1	5	0	0	0	0	**297**
1530 - 1545	0	216	58	0	7	4	0	1	5	0	0	0	0	**291**
1545 - 1600	0	219	74	0	8	2	1	0	5	1	0	0	0	**310**
1600 - 1615	2	263	76	1	4	1	0	2	6	0	0	0	0	**355**
1615 - 1630	2	271	52	0	9	4	0	0	1	0	0	0	0	**339**
1630 - 1645	2	240	27	0	2	3	0	0	4	0	0	0	0	**278**
1645 - 1700	1	238	63	0	4	2	0	0	0	0	0	0	0	**308**
1700 - 1715	1	282	51	0	4	1	0	0	0	0	0	0	0	**339**
1715 - 1730	0	245	48	0	2	1	0	0	3	0	0	0	0	**299**
1730 - 1745	2	240	39	0	3	1	0	0	1	0	0	0	0	**286**
1745 - 1800	1	212	25	0	5	0	0	0	1	0	0	0	0	**244**
1800 - 1815	0	207	29	0	3	1	0	0	0	0	0	0	0	**240**
1815 - 1830	1	187	18	0	2	0	0	0	0	0	0	0	0	**208**
1830 - 1845	0	174	23	0	0	1	0	0	2	0	0	0	0	**200**
1845 - 1900	1	156	27	0	3	0	0	0	1	0	0	0	0	**188**
1900 - 1915	0	146	9	0	4	0	0	0	1	0	0	0	0	**160**
1915 - 1930	1	124	3	0	0	0	0	0	1	0	0	0	0	**129**
1930 - 1945	1	142	4	0	1	1	0	0	0	0	0	0	0	**149**
1945 - 2000	0	132	6	0	1	0	0	0	0	0	0	0	0	**139**
2000 - 2015	0	123	1	0	0	0	0	0	1	1	0	0	0	**126**
2015 - 2030	0	104	4	0	4	0	0	0	0	1	0	0	0	**113**
2030 - 2045	0	112	3	0	1	0	0	0	0	0	0	0	0	**116**
2045 - 2100	0	95	1	0	0	0	0	0	0	1	0	0	0	**97**
2100 - 2115	0	87	0	0	0	0	0	0	0	1	0	0	0	**88**
2115 - 2130	0	78	0	0	1	0	0	0	0	0	0	0	0	**79**
2130 - 2145	0	83	1	0	0	0	0	0	0	0	0	0	0	**84**
2145 - 2200	0	69	1	0	1	0	0	0	0	0	0	0	0	**71**
2200 - 2215	0	84	2	0	0	0	0	0	0	1	0	0	0	**87**
2215 - 2230	1	79	1	0	1	0	0	0	0	1	0	0	0	**83**
2230 - 2245	0	74	0	0	3	0	0	0	0	0	0	0	0	**77**
2245 - 2300	1	57	0	0	0	0	0	0	0	0	0	0	0	**58**
2300 - 2315	0	53	1	0	0	0	0	0	0	0	0	0	0	**54**
2315 - 2330	0	50	0	0	1	0	0	0	0	1	0	0	0	**52**
2330 - 2345	0	44	0	0	0	0	0	0	0	0	0	0	0	**44**
2345 - 0000	0	53	1	0	1	0	0	0	0	0	0	0	0	**55**

Session Total	30	10368	1945	4	305	131	10	25	238	9	0	0	0	**13065**
Session Average	0,31	108,00	20,26	0,04	3,18	1,36	0,10	0,26	2,48	0,09	0,00	0,00	0,00	**136,09**
Session Percentage	0,23	79,36	14,89	0,03	2,33	1,00	0,08	0,19	1,82	0,07	0,00	0,00	0,00	

AM Peak Hour	0830 - 0930	0730 - 0830	0930 - 1030	0700 - 0800	0915 - 1015	0930 - 1030	0930 - 1030	0815 - 0915	0900 - 1000	-	-	-	-	**0730 - 0830**
AM Peak Hour Volume	2	652	139	2	34	18	1	5	29	0	0	0	0	**815**

Noon Peak Hour	1400 - 1500	1445 - 1545	1445 - 1545	-	1300 - 1400	1030 - 1130	1115 - 1215	1130 - 1230	1300 - 1400	1330 - 1430	-	-	-	**1445 - 1545**
Noon Peak Hour Volume	5	801	225	0	34	22	4	5	31	1	0	0	0	**1091**

PM Peak Hour	1600 - 1700	1615 - 1715	1515 - 1615	1515 - 1615	1530 - 1630	1500 - 1600	1500 - 1600	1515 - 1615	1500 - 1600	0,00	-	-	-	**1530 - 1630**
PM Peak Hour Volume	7	1031	270	1	28	15	1	4	21	2	0	0	0	**1295**

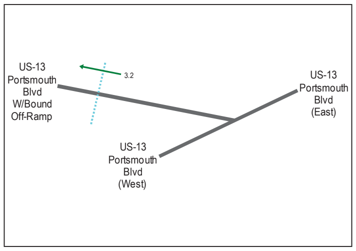
Suffolk, VA
Classified Traffic Count

Site 3
US-13 Portsbouth Blvd W/Bound Off-Ramp,
west of US-13 Portsmouth Blvd

Lat/Long
36,753956°, -76,518575°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F



0000 - 2400 (Weekday 24h Session)

🟧 undertaken on Tuesday, October 13th, 2020

	Bi-Directional 15min													
TIME	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13	**TOTAL**
0000 - 0015	0	28	1	0	1	0	0	0	0	0	0	0	0	**30**
0015 - 0030	0	37	0	0	0	0	0	0	0	0	0	0	0	**37**
0030 - 0045	0	20	0	0	1	0	0	0	1	0	0	0	0	**22**
0045 - 0100	0	25	0	0	1	0	0	0	2	0	0	0	0	**28**
0100 - 0115	0	22	0	0	1	0	0	0	1	0	0	0	0	**24**
0115 - 0130	0	32	0	0	0	0	0	0	0	0	0	0	0	**32**
0130 - 0145	0	17	2	0	0	0	0	0	1	0	0	0	0	**20**
0145 - 0200	0	18	0	0	0	0	0	0	0	0	0	0	0	**18**
0200 - 0215	0	10	0	0	0	0	0	0	0	0	0	0	0	**10**
0215 - 0230	0	18	2	0	0	0	0	0	0	0	0	0	0	**20**
0230 - 0245	0	10	0	0	0	0	0	0	0	0	0	0	0	**10**
0245 - 0300	0	10	0	0	0	0	0	0	2	0	0	0	0	**12**
0300 - 0315	0	18	0	0	1	0	0	0	3	0	0	0	0	**22**
0315 - 0330	0	7	1	0	0	0	0	0	1	0	0	0	0	**9**
0330 - 0345	0	15	0	0	0	0	0	0	0	0	0	0	0	**15**
0345 - 0400	0	14	1	0	0	0	0	0	0	0	0	0	0	**15**
0400 - 0415	0	14	0	0	0	0	0	0	0	0	0	0	0	**14**
0415 - 0430	0	25	0	0	0	0	0	0	0	0	0	0	0	**25**
0430 - 0445	0	34	1	0	0	0	0	0	0	0	0	0	0	**35**
0445 - 0500	0	33	3	0	2	0	0	0	0	0	0	0	0	**38**
0500 - 0515	0	42	0	0	1	1	0	0	0	0	0	0	0	**44**
0515 - 0530	0	49	0	0	0	0	0	0	1	0	0	0	0	**50**
0530 - 0545	0	51	0	0	3	1	0	0	0	0	0	0	0	**55**
0545 - 0600	0	71	4	0	3	0	0	0	1	0	0	0	0	**79**
0600 - 0615	0	57	3	0	0	2	0	0	1	0	0	0	0	**63**
0615 - 0630	0	94	9	0	2	0	0	0	1	0	0	0	0	**106**
0630 - 0645	0	117	12	0	1	0	0	0	0	0	0	0	0	**130**
0645 - 0700	0	122	19	0	4	2	0	2	2	0	0	0	0	**151**
0700 - 0715	0	81	26	1	3	1	0	0	0	0	0	0	0	**112**
0715 - 0730	1	117	25	0	3	2	0	0	3	0	0	0	0	**151**
0730 - 0745	0	147	28	0	4	3	0	0	9	0	0	0	0	**191**
0745 - 0800	0	188	18	1	6	1	0	0	3	0	0	0	0	**217**
0800 - 0815	0	171	24	0	5	0	0	0	3	0	0	0	0	**203**
0815 - 0830	0	146	39	0	8	2	0	2	7	0	0	0	0	**204**
0830 - 0845	1	113	33	0	6	1	0	1	5	0	0	0	0	**160**
0845 - 0900	0	118	26	0	6	2	0	1	2	0	0	0	0	**155**
0900 - 0915	0	102	35	1	4	1	0	1	4	0	0	0	0	**148**
0915 - 0930	1	104	28	0	11	2	0	1	6	0	0	0	0	**153**
0930 - 0945	0	108	35	0	12	7	0	0	11	0	0	0	0	**173**
0945 - 1000	0	113	31	0	6	2	0	0	8	0	0	0	0	**160**
1000 - 1015	0	76	37	0	5	4	0	1	4	0	0	0	0	**127**
1015 - 1030	1	87	36	0	9	5	1	1	5	0	0	0	0	**145**
1030 - 1045	0	83	32	0	5	5	0	0	11	0	0	0	0	**136**
1045 - 1100	0	125	34	0	8	6	0	1	6	0	0	0	0	**180**
1100 - 1115	0	109	36	0	6	5	0	1	4	0	0	0	0	**161**
1115 - 1130	0	125	45	0	8	6	2	0	5	0	0	0	0	**191**
1130 - 1145	0	123	40	0	5	3	0	1	6	0	0	0	0	**178**
1145 - 1200	1	104	37	0	6	5	0	1	7	0	0	0	0	**161**
1200 - 1215	0	118	28	0	8	1	2	2	9	0	0	0	0	**168**
1215 - 1230	0	123	38	0	9	2	1	1	4	0	0	0	0	**178**
1230 - 1245	1	118	38	0	3	2	0	0	6	0	0	0	0	**168**
1245 - 1300	1	147	36	0	3	2	0	0	5	0	0	0	0	**194**
1300 - 1315	0	133	34	0	10	2	0	0	8	0	0	0	0	**187**
1315 - 1330	0	128	43	0	4	6	0	1	5	0	0	0	0	**187**
1330 - 1345	0	139	37	0	9	1	0	1	12	0	0	0	0	**199**
1345 - 1400	0	135	39	0	11	1	0	0	6	0	0	0	0	**192**
1400 - 1415	2	158	49	0	5	5	0	0	2	0	0	0	0	**221**
1415 - 1430	1	144	40	0	2	2	0	1	3	1	0	0	0	**194**
1430 - 1445	1	151	45	0	6	2	2	1	3	0	0	0	0	**211**
1445 - 1500	1	167	44	0	10	5	1	0	6	0	0	0	0	**234**
1500 - 1515	0	194	61	0	1	7	0	0	6	0	0	0	0	**269**
1515 - 1530	1	224	62	0	2	2	0	1	5	0	0	0	0	**297**
1530 - 1545	0	216	58	0	7	4	0	1	5	0	0	0	0	**291**
1545 - 1600	0	219	74	0	8	2	1	0	5	1	0	0	0	**310**
1600 - 1615	2	263	76	1	4	1	0	2	6	0	0	0	0	**355**
1615 - 1630	2	271	52	0	9	4	0	0	1	0	0	0	0	**339**
1630 - 1645	2	240	27	0	2	3	0	0	4	0	0	0	0	**278**
1645 - 1700	1	238	63	0	4	2	0	0	0	0	0	0	0	**308**
1700 - 1715	1	282	51	0	4	1	0	0	0	0	0	0	0	**339**
1715 - 1730	0	245	48	0	2	1	0	0	3	0	0	0	0	**299**
1730 - 1745	2	240	39	0	3	1	0	0	1	0	0	0	0	**286**
1745 - 1800	1	212	25	0	5	0	0	0	1	0	0	0	0	**244**
1800 - 1815	0	207	29	0	3	1	0	0	0	0	0	0	0	**240**
1815 - 1830	1	187	18	0	2	0	0	0	0	0	0	0	0	**208**
1830 - 1845	0	174	23	0	0	1	0	0	2	0	0	0	0	**200**
1845 - 1900	1	156	27	0	3	0	0	0	1	0	0	0	0	**188**
1900 - 1915	0	146	9	0	4	0	0	0	1	0	0	0	0	**160**
1915 - 1930	1	124	3	0	0	0	0	0	1	0	0	0	0	**129**
1930 - 1945	1	142	4	0	1	1	0	0	0	0	0	0	0	**149**
1945 - 2000	0	132	6	0	1	0	0	0	0	0	0	0	0	**139**
2000 - 2015	0	123	1	0	0	0	0	0	1	1	0	0	0	**126**
2015 - 2030	0	104	4	0	4	0	0	0	0	1	0	0	0	**113**
2030 - 2045	0	112	3	0	1	0	0	0	0	0	0	0	0	**116**
2045 - 2100	0	95	1	0	0	0	0	0	0	1	0	0	0	**97**
2100 - 2115	0	87	0	0	0	0	0	0	0	1	0	0	0	**88**
2115 - 2130	0	78	0	0	1	0	0	0	0	0	0	0	0	**79**
2130 - 2145	0	83	1	0	0	0	0	0	0	0	0	0	0	**84**
2145 - 2200	0	69	1	0	1	0	0	0	0	0	0	0	0	**71**
2200 - 2215	0	84	2	0	0	0	0	0	0	1	0	0	0	**87**
2215 - 2230	1	79	1	0	1	0	0	0	0	1	0	0	0	**83**
2230 - 2245	0	74	0	0	3	0	0	0	0	0	0	0	0	**77**
2245 - 2300	1	57	0	0	0	0	0	0	0	0	0	0	0	**58**
2300 - 2315	0	53	1	0	0	0	0	0	0	0	0	0	0	**54**
2315 - 2330	0	50	0	0	1	0	0	0	0	1	0	0	0	**52**
2330 - 2345	0	44	0	0	0	0	0	0	0	0	0	0	0	**44**
2345 - 0000	0	53	1	0	1	0	0	0	0	0	0	0	0	**55**

Session Total	30	10368	1945	4	305	131	10	25	238	9	0	0	0	**13065**
Session Average	0,31	108,00	20,26	0,04	3,18	1,36	0,10	0,26	2,48	0,09	0,00	0,00	0,00	**136,09**
Session Percentage	0,23	79,36	14,89	0,03	2,33	1,00	0,08	0,19	1,82	0,07	0,00	0,00	0,00	

AM Peak Hour	0830 - 0930	0730 - 0830	0930 - 1030	0700 - 0800	0915 - 1015	0930 - 1030	0930 - 1030	0815 - 0915	0900 - 1000	-	-	-	-	**0730 - 0830**
AM Peak Hour Volume	2	652	139	2	34	18	1	5	29	0	0	0	0	**815**

Noon Peak Hour	1400 - 1500	1445 - 1545	1445 - 1545	-	1300 - 1400	1030 - 1130	1115 - 1215	1130 - 1230	1300 - 1400	1330 - 1430	-	-	-	**1445 - 1545**
Noon Peak Hour Volume	5	801	225	0	34	22	4	5	31	1	0	0	0	**1091**

PM Peak Hour	1600 - 1700	1615 - 1715	1515 - 1615	1515 - 1615	1530 - 1630	1500 - 1600	1500 - 1600	1515 - 1615	1500 - 1600	0,00	-	-	-	**1530 - 1630**
PM Peak Hour Volume	7	1031	270	1	28	15	1	4	21	2	0	0	0	**1295**

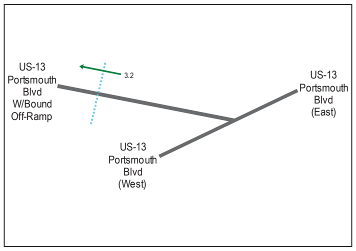
Suffolk, VA
Classified Traffic Count

Site 3
US-13 Portsbouth Blvd W/Bound Off-Ramp,
west of US-13 Portsmouth Blvd

Lat/Long
36,753956°, -76,518575°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F



0000 - 2400 (Weekday 24h Session)

🟨 undertaken on Tuesday, October 13th, 2020

	Site 3		
TIME	EB	WB	**TOTAL**
0000 - 0015	0	30	**30**
0015 - 0030	0	37	**37**
0030 - 0045	0	22	**22**
0045 - 0100	0	28	**28**
0100 - 0115	0	24	**24**
0115 - 0130	0	32	**32**
0130 - 0145	0	20	**20**
0145 - 0200	0	18	**18**
0200 - 0215	0	10	**10**
0215 - 0230	0	20	**20**
0230 - 0245	0	10	**10**
0245 - 0300	0	12	**12**
0300 - 0315	0	22	**22**
0315 - 0330	0	9	**9**
0330 - 0345	0	15	**15**
0345 - 0400	0	15	**15**
0400 - 0415	0	14	**14**
0415 - 0430	0	25	**25**
0430 - 0445	0	35	**35**
0445 - 0500	0	38	**38**
0500 - 0515	0	44	**44**
0515 - 0530	0	50	**50**
0530 - 0545	0	55	**55**
0545 - 0600	0	79	**79**
0600 - 0615	0	63	**63**
0615 - 0630	0	106	**106**
0630 - 0645	0	130	**130**
0645 - 0700	0	151	**151**
0700 - 0715	0	112	**112**
0715 - 0730	0	151	**151**
0730 - 0745	0	191	**191**
0745 - 0800	0	217	**217**
0800 - 0815	0	203	**203**
0815 - 0830	0	204	**204**
0830 - 0845	0	160	**160**
0845 - 0900	0	155	**155**
0900 - 0915	0	148	**148**
0915 - 0930	0	153	**153**
0930 - 0945	0	173	**173**
0945 - 1000	0	160	**160**
1000 - 1015	0	127	**127**
1015 - 1030	0	145	**145**
1030 - 1045	0	136	**136**
1045 - 1100	0	180	**180**
1100 - 1115	0	161	**161**
1115 - 1130	0	191	**191**
1130 - 1145	0	178	**178**
1145 - 1200	0	161	**161**
1200 - 1215	0	168	**168**
1215 - 1230	0	178	**178**
1230 - 1245	0	168	**168**
1245 - 1300	0	194	**194**
1300 - 1315	0	187	**187**
1315 - 1330	0	187	**187**
1330 - 1345	0	199	**199**
1345 - 1400	0	192	**192**
1400 - 1415	0	221	**221**
1415 - 1430	0	194	**194**
1430 - 1445	0	211	**211**
1445 - 1500	0	234	**234**
1500 - 1515	0	269	**269**
1515 - 1530	0	297	**297**
1530 - 1545	0	291	**291**
1545 - 1600	0	310	**310**
1600 - 1615	0	355	**355**
1615 - 1630	0	339	**339**
1630 - 1645	0	278	**278**
1645 - 1700	0	308	**308**
1700 - 1715	0	339	**339**
1715 - 1730	0	299	**299**
1730 - 1745	0	286	**286**
1745 - 1800	0	244	**244**
1800 - 1815	0	240	**240**
1815 - 1830	0	208	**208**
1830 - 1845	0	200	**200**
1845 - 1900	0	188	**188**
1900 - 1915	0	160	**160**
1915 - 1930	0	129	**129**
1930 - 1945	0	149	**149**
1945 - 2000	0	139	**139**
2000 - 2015	0	126	**126**
2015 - 2030	0	113	**113**
2030 - 2045	0	116	**116**
2045 - 2100	0	97	**97**
2100 - 2115	0	88	**88**
2115 - 2130	0	79	**79**
2130 - 2145	0	84	**84**
2145 - 2200	0	71	**71**
2200 - 2215	0	87	**87**
2215 - 2230	0	83	**83**
2230 - 2245	0	77	**77**
2245 - 2300	0	58	**58**
2300 - 2315	0	54	**54**
2315 - 2330	0	52	**52**
2330 - 2345	0	44	**44**
2345 - 0000	0	55	**55**

Session Total	0	13065	**13065**
Session Average	0,00	136,09	**136,09**

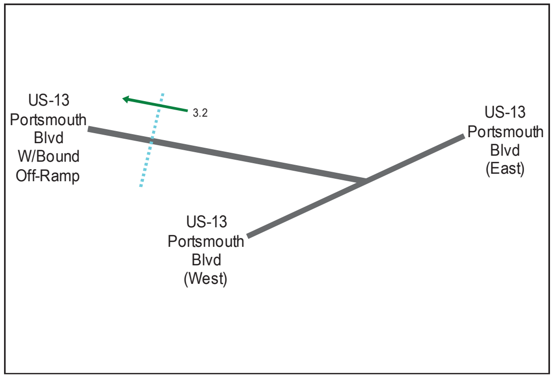
Suffolk, VA
Classified Traffic Count

Site 3
US-13 Portsbouth Blvd W/Bound Off-Ramp,
west of US-13 Portsmouth Blvd

Lat/Long
36,753956°, -76,518575°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F



0000 - 2400 (Weekday 24h Session)

🟧 undertaken on Tuesday, October 13th, 2020

	Westbound, (Movement 3.2)													
TIME	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13	**TOTAL**
0000 - 0100	0	110	1	0	3	0	0	0	3	0	0	0	0	**117**
0100 - 0200	0	89	2	0	1	0	0	0	2	0	0	0	0	**94**
0200 - 0300	0	48	2	0	0	0	0	0	2	0	0	0	0	**52**
0300 - 0400	0	54	2	0	1	0	0	0	4	0	0	0	0	**61**
0400 - 0500	0	106	4	0	2	0	0	0	0	0	0	0	0	**112**
0500 - 0600	0	213	4	0	7	2	0	0	2	0	0	0	0	**228**
0600 - 0700	0	390	43	0	7	4	0	2	4	0	0	0	0	**450**
0700 - 0800	1	533	97	2	16	7	0	0	15	0	0	0	0	**671**
0800 - 0900	1	548	122	0	25	5	0	4	17	0	0	0	0	**722**
0900 - 1000	1	427	129	1	33	12	0	2	29	0	0	0	0	**634**
1000 - 1100	1	371	139	0	27	20	1	3	26	0	0	0	0	**588**
1100 - 1200	1	461	158	0	25	19	2	3	22	0	0	0	0	**691**
1200 - 1300	2	506	140	0	23	7	3	3	24	0	0	0	0	**708**
1300 - 1400	0	535	153	0	34	10	0	2	31	0	0	0	0	**765**
1400 - 1500	5	620	178	0	23	14	3	2	14	1	0	0	0	**860**
1500 - 1600	1	853	255	0	18	15	1	2	21	1	0	0	0	**1167**
1600 - 1700	7	1012	218	1	19	10	0	2	11	0	0	0	0	**1280**
1700 - 1800	4	979	163	0	14	3	0	0	5	0	0	0	0	**1168**
1800 - 1900	2	724	97	0	8	2	0	0	3	0	0	0	0	**836**
1900 - 2000	2	544	22	0	6	1	0	0	2	0	0	0	0	**577**
2000 - 2100	0	434	9	0	5	0	0	0	1	3	0	0	0	**452**
2100 - 2200	0	317	2	0	2	0	0	0	0	1	0	0	0	**322**
2200 - 2300	2	294	3	0	4	0	0	0	0	2	0	0	0	**305**
2300 - 2400	0	200	2	0	2	0	0	0	0	1	0	0	0	**205**
Session Total	30	10368	1945	4	305	131	10	25	238	9	0	0	0	**13065**
Session Average	1,25	432,00	81,04	0,17	12,71	5,46	0,42	1,04	9,92	0,38	0,00	0,00	0,00	**544,38**
Session Percentage	0,23	79,36	14,89	0,03	2,33	1,00	0,08	0,19	1,82	0,07	0,00	0,00	0,00	
AM Peak Hour	0800 - 0900	0900 - 1000	1000 - 1100	0800 - 0900	1000 - 1100	1000 - 1100	-	0900 - 1000	1000 - 1100	-	-	-	-	**0900 - 1000**
AM Peak Hour Volume	1	548	129	2	33	12	0	4	29	0	0	0	0	**722**
Noon Peak Hour	1500 - 1600	1500 - 1600	1500 - 1600	-	1400 - 1500	1100 - 1200	1300 - 1400	1100 - 1200	1400 - 1500	1500 - 1600	-	-	-	**1500 - 1600**
Noon Peak Hour Volume	5	620	178	0	34	20	3	3	31	1	0	0	0	**860**
PM Peak Hour	1700 - 1800	1700 - 1800	1600 - 1700	1700 - 1800	1700 - 1800	1600 - 1700	1600 - 1700	1600 - 1700	1600 - 1700	1600 - 1700	-	-	-	**1700 - 1800**
PM Peak Hour Volume	7	1012	255	1	19	15	1	2	21	1	0	0	0	**1280**

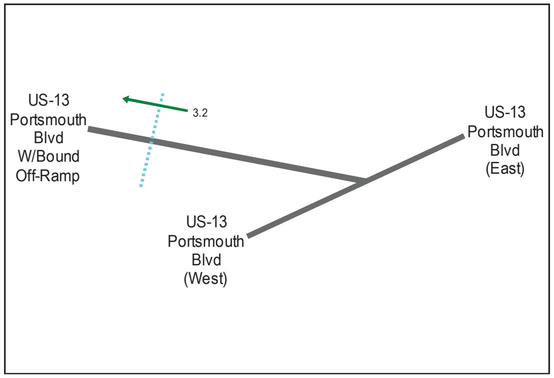
Suffolk, VA
Classified Traffic Count

Site 3
US-13 Portsbouth Blvd W/Bound Off-Ramp,
west of US-13 Portsmouth Blvd

Lat/Long
36,753956°, -76,518575°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F



0000 - 2400 (Weekday 24h Session)

🟧 undertaken on Tuesday, October 13th, 2020

	Bi-Directional 60min													
TIME	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13	**TOTAL**
0000 - 0100	0	110	1	0	3	0	0	0	3	0	0	0	0	**117**
0100 - 0200	0	89	2	0	1	0	0	0	2	0	0	0	0	**94**
0200 - 0300	0	48	2	0	0	0	0	0	2	0	0	0	0	**52**
0300 - 0400	0	54	2	0	1	0	0	0	4	0	0	0	0	**61**
0400 - 0500	0	106	4	0	2	0	0	0	0	0	0	0	0	**112**
0500 - 0600	0	213	4	0	7	2	0	0	2	0	0	0	0	**228**
0600 - 0700	0	390	43	0	7	4	0	2	4	0	0	0	0	**450**
0700 - 0800	1	533	97	2	16	7	0	0	15	0	0	0	0	**671**
0800 - 0900	1	548	122	0	25	5	0	4	17	0	0	0	0	**722**
0900 - 1000	1	427	129	1	33	12	0	2	29	0	0	0	0	**634**
1000 - 1100	1	371	139	0	27	20	1	3	26	0	0	0	0	**588**
1100 - 1200	1	461	158	0	25	19	2	3	22	0	0	0	0	**691**
1200 - 1300	2	506	140	0	23	7	3	3	24	0	0	0	0	**708**
1300 - 1400	0	535	153	0	34	10	0	2	31	0	0	0	0	**765**
1400 - 1500	5	620	178	0	23	14	3	2	14	1	0	0	0	**860**
1500 - 1600	1	853	255	0	18	15	1	2	21	1	0	0	0	**1167**
1600 - 1700	7	1012	218	1	19	10	0	2	11	0	0	0	0	**1280**
1700 - 1800	4	979	163	0	14	3	0	0	5	0	0	0	0	**1168**
1800 - 1900	2	724	97	0	8	2	0	0	3	0	0	0	0	**836**
1900 - 2000	2	544	22	0	6	1	0	0	2	0	0	0	0	**577**
2000 - 2100	0	434	9	0	5	0	0	0	1	3	0	0	0	**452**
2100 - 2200	0	317	2	0	2	0	0	0	0	1	0	0	0	**322**
2200 - 2300	2	294	3	0	4	0	0	0	0	2	0	0	0	**305**
2300 - 2400	0	200	2	0	2	0	0	0	0	1	0	0	0	**205**

Session Total	30	10368	1945	4	305	131	10	25	238	9	0	0	0	**13065**
Session Average	1,25	432,00	81,04	0,17	12,71	5,46	0,42	1,04	9,92	0,38	0,00	0,00	0,00	**544,38**
Session Percentage	0,23	79,36	14,89	0,03	2,33	1,00	0,08	0,19	1,82	0,07	0,00	0,00	0,00	

AM Peak Hour	0800 - 0900	0900 - 1000	1000 - 1100	0800 - 0900	1000 - 1100	1000 - 1100	-	0900 - 1000	1000 - 1100	-	-	-	-	**0900 - 1000**
AM Peak Hour Volume	1	548	129	2	33	12	0	4	29	0	0	0	0	**722**

Noon Peak Hour	1500 - 1600	1500 - 1600	1500 - 1600	-	1400 - 1500	1100 - 1200	1300 - 1400	1100 - 1200	1400 - 1500	1500 - 1600	-	-	-	**1500 - 1600**
Noon Peak Hour Volume	5	620	178	0	34	20	3	3	31	1	0	0	0	**860**

PM Peak Hour	1700 - 1800	1700 - 1800	1600 - 1700	1700 - 1800	1700 - 1800	1600 - 1700	1600 - 1700	1600 - 1700	1600 - 1700	1600 - 1700	-	-	-	**1700 - 1800**
PM Peak Hour Volume	7	1012	255	1	19	15	1	2	21	1	0	0	0	**1280**

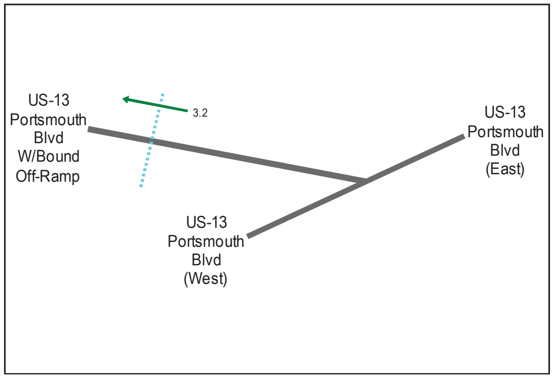
Suffolk, VA
Classified Traffic Count

Site 3
US-13 Portsbouth Blvd W/Bound Off-Ramp,
west of US-13 Portsmouth Blvd

Lat/Long
36,753956°, -76,518575°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F

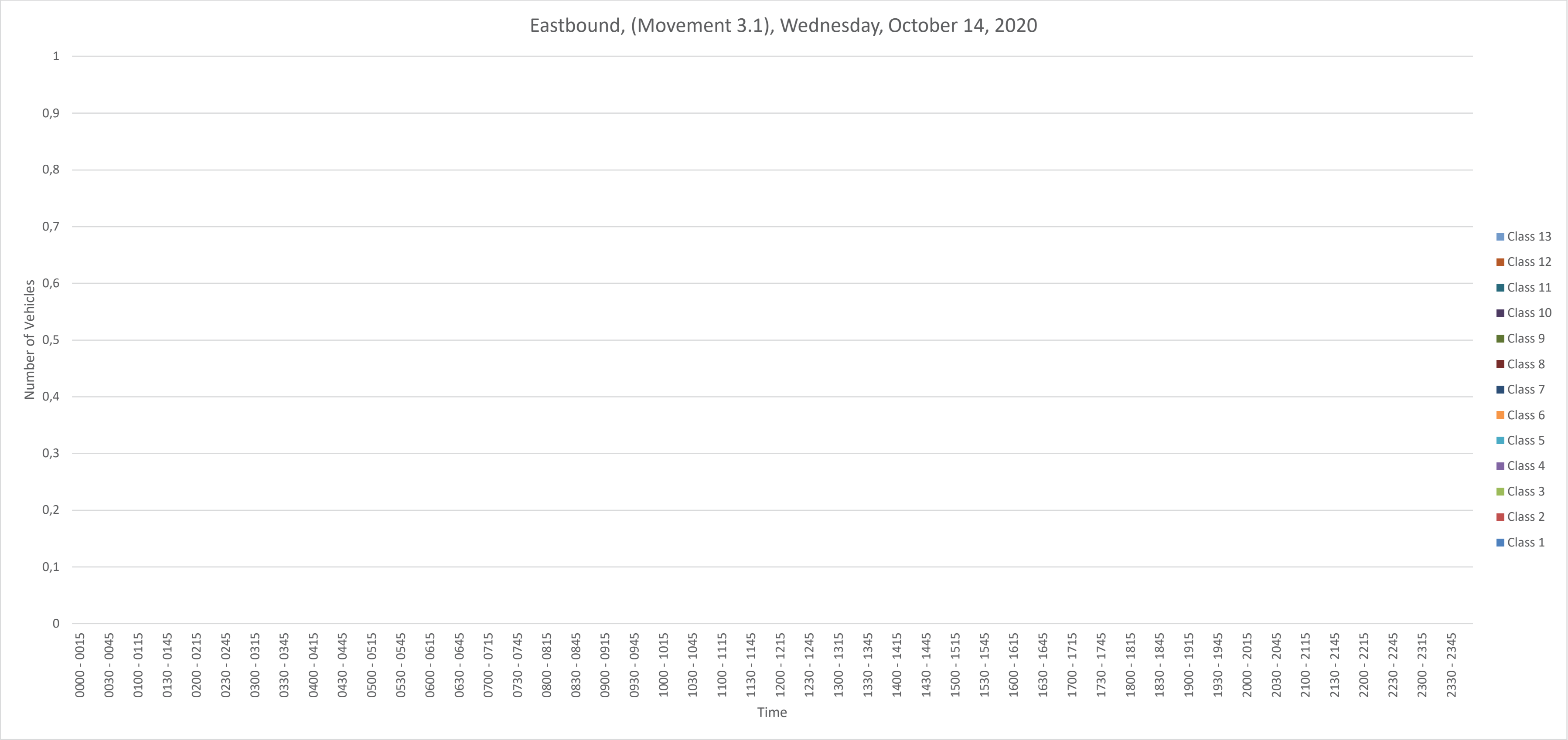


0000 - 2400 (Weekday 24h Session)

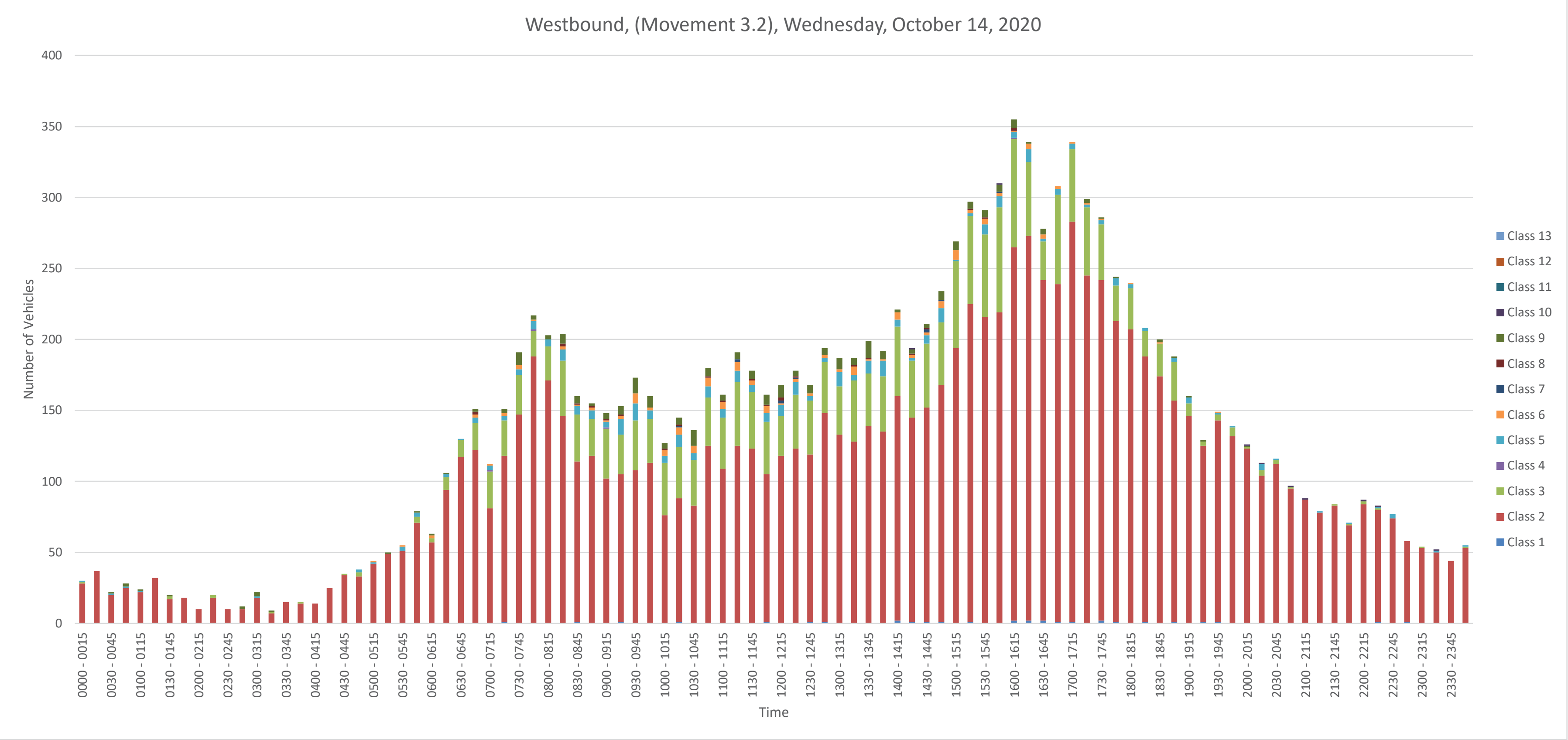
🟧 undertaken on Tuesday, October 13th, 2020

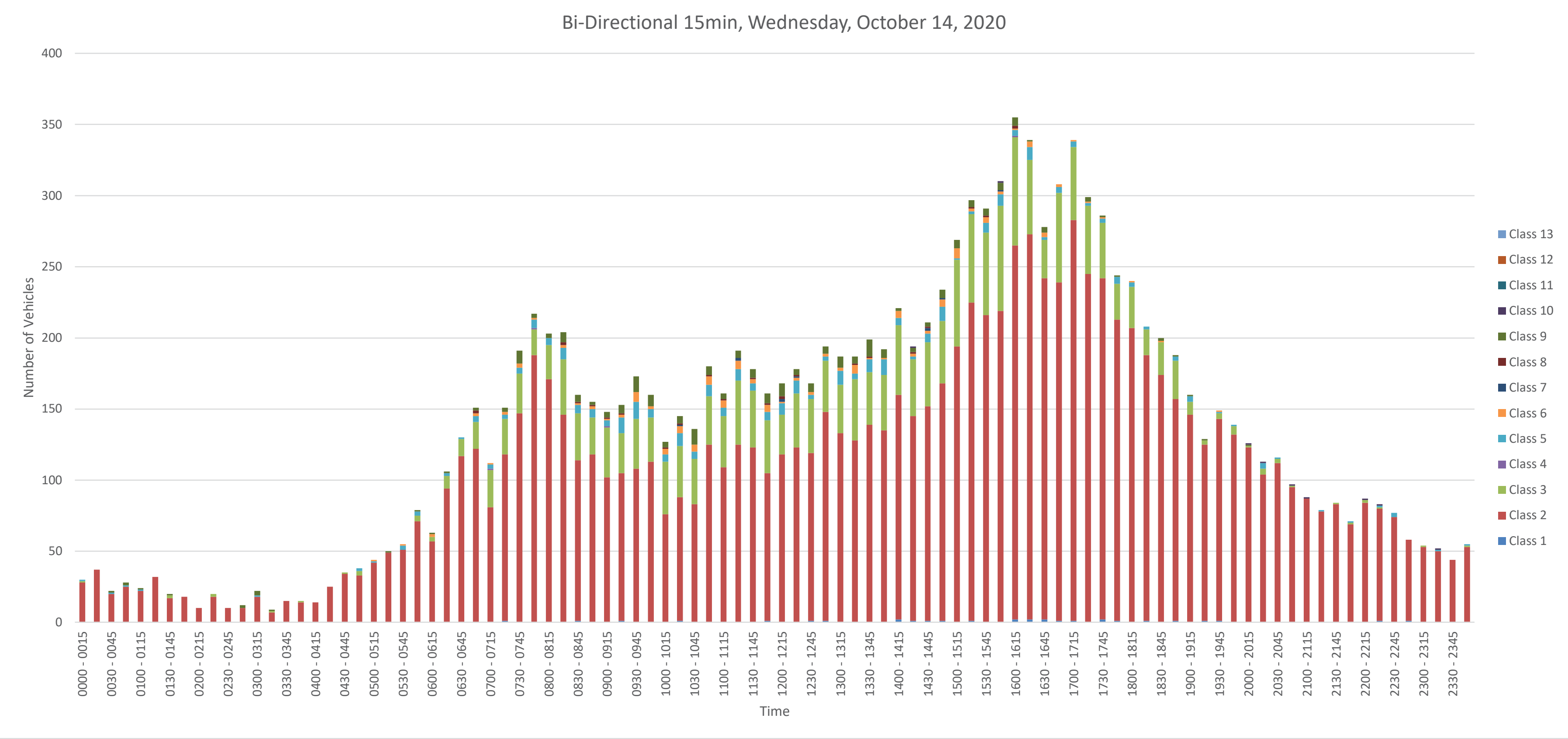
	Volume Summary 60min		
TIME	EB	WB	**TOTAL**
0000 - 0100	0	117	**117**
0100 - 0200	0	94	**94**
0200 - 0300	0	52	**52**
0300 - 0400	0	61	**61**
0400 - 0500	0	112	**112**
0500 - 0600	0	228	**228**
0600 - 0700	0	450	**450**
0700 - 0800	0	671	**671**
0800 - 0900	0	722	**722**
0900 - 1000	0	634	**634**
1000 - 1100	0	588	**588**
1100 - 1200	0	691	**691**
1200 - 1300	0	708	**708**
1300 - 1400	0	765	**765**
1400 - 1500	0	860	**860**
1500 - 1600	0	1167	**1167**
1600 - 1700	0	1280	**1280**
1700 - 1800	0	1168	**1168**
1800 - 1900	0	836	**836**
1900 - 2000	0	577	**577**
2000 - 2100	0	452	**452**
2100 - 2200	0	322	**322**
2200 - 2300	0	305	**305**
2300 - 2400	0	205	**205**

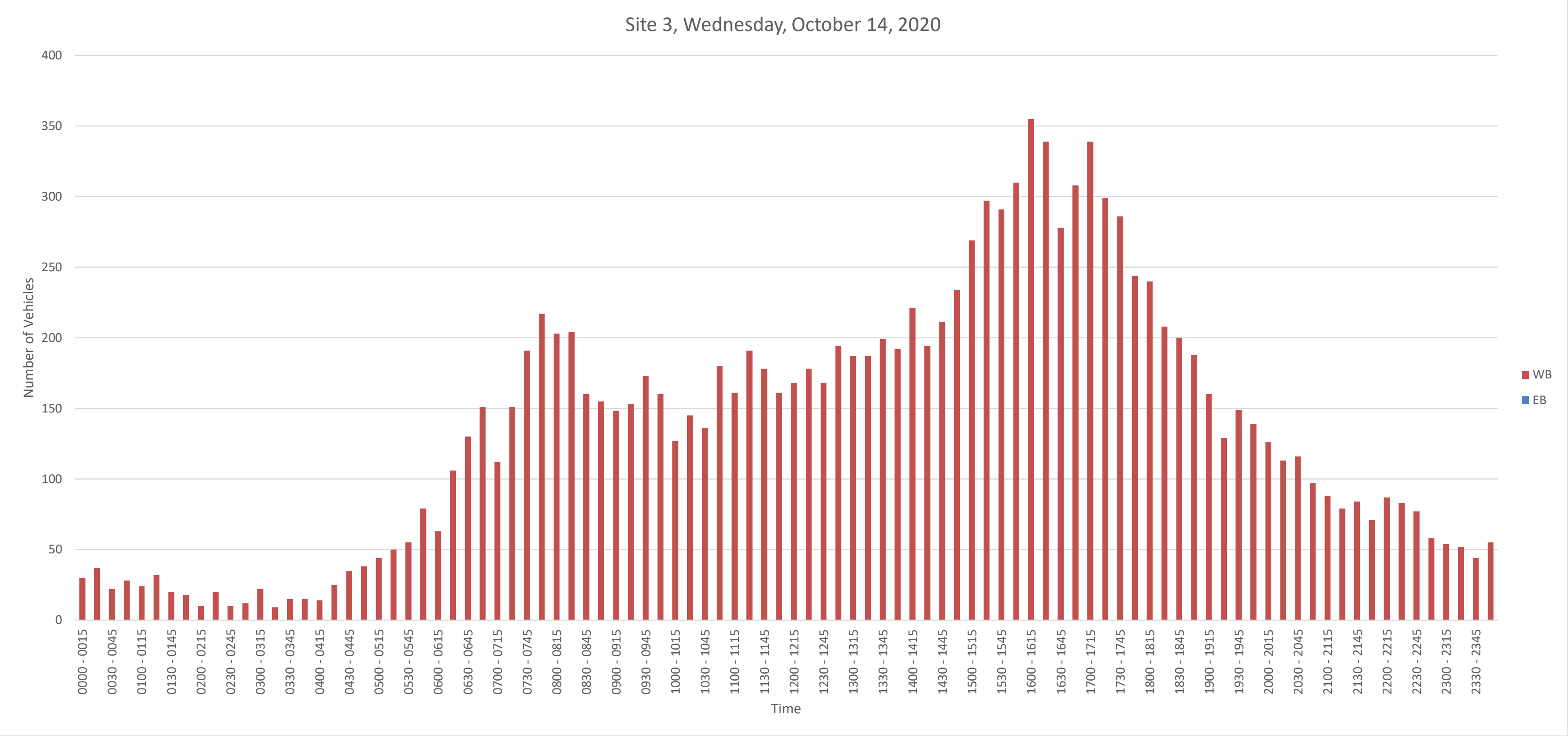
Session Total	0	13065	**13065**
Session Average	0,00	544,38	**544,38**
Session Percentage	0,00	100,00	

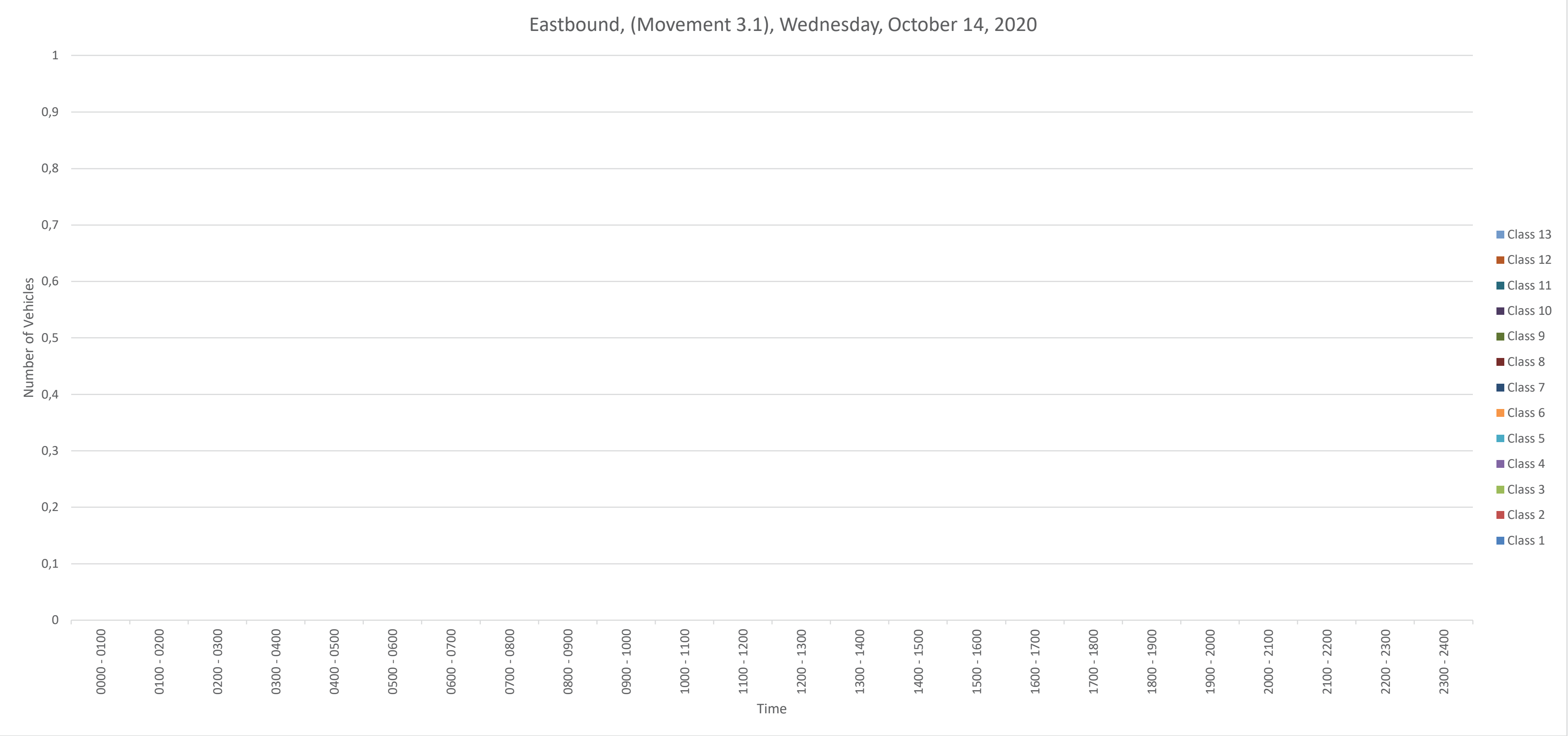


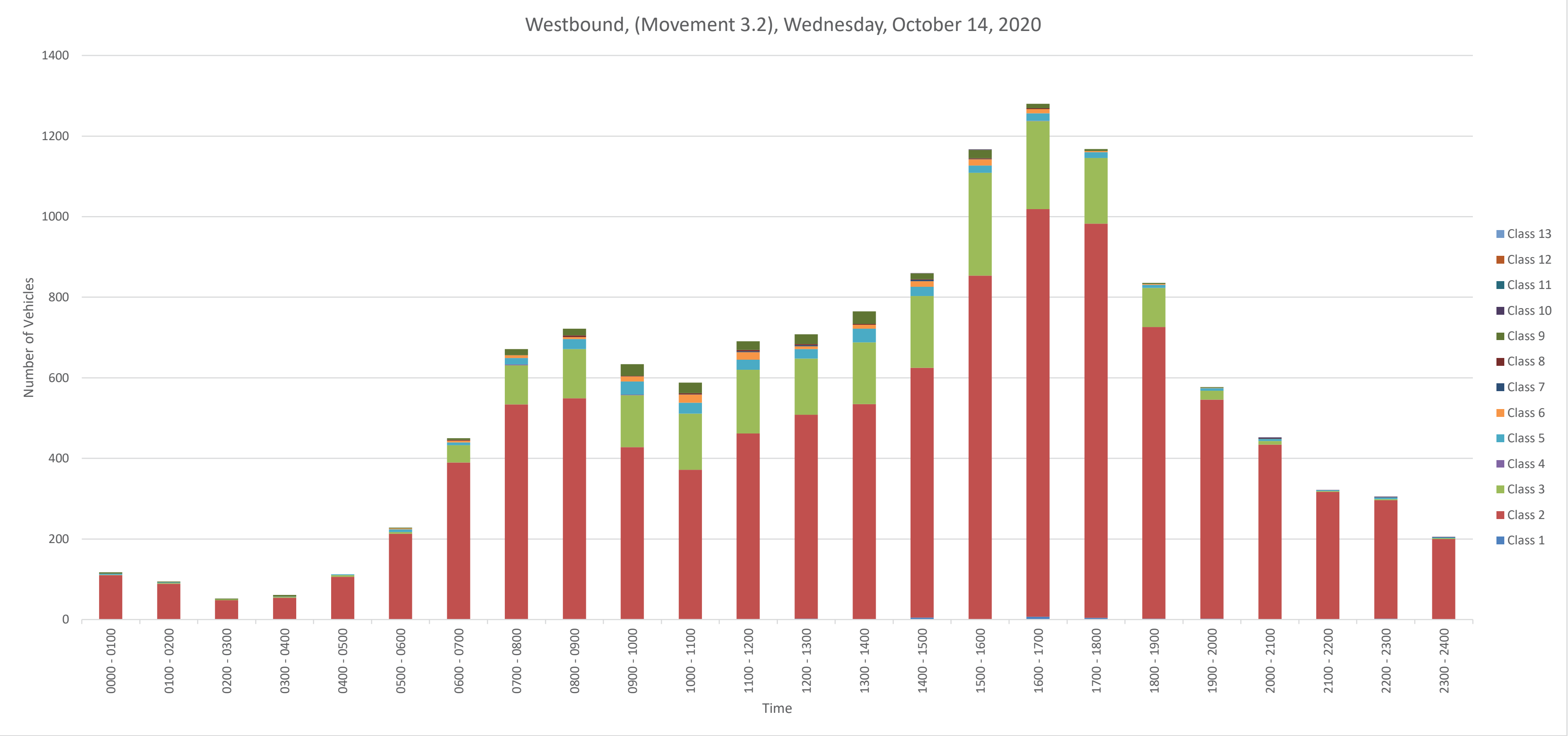
Eastbound, (Movement 3.1), Wednesday, October 14, 2020

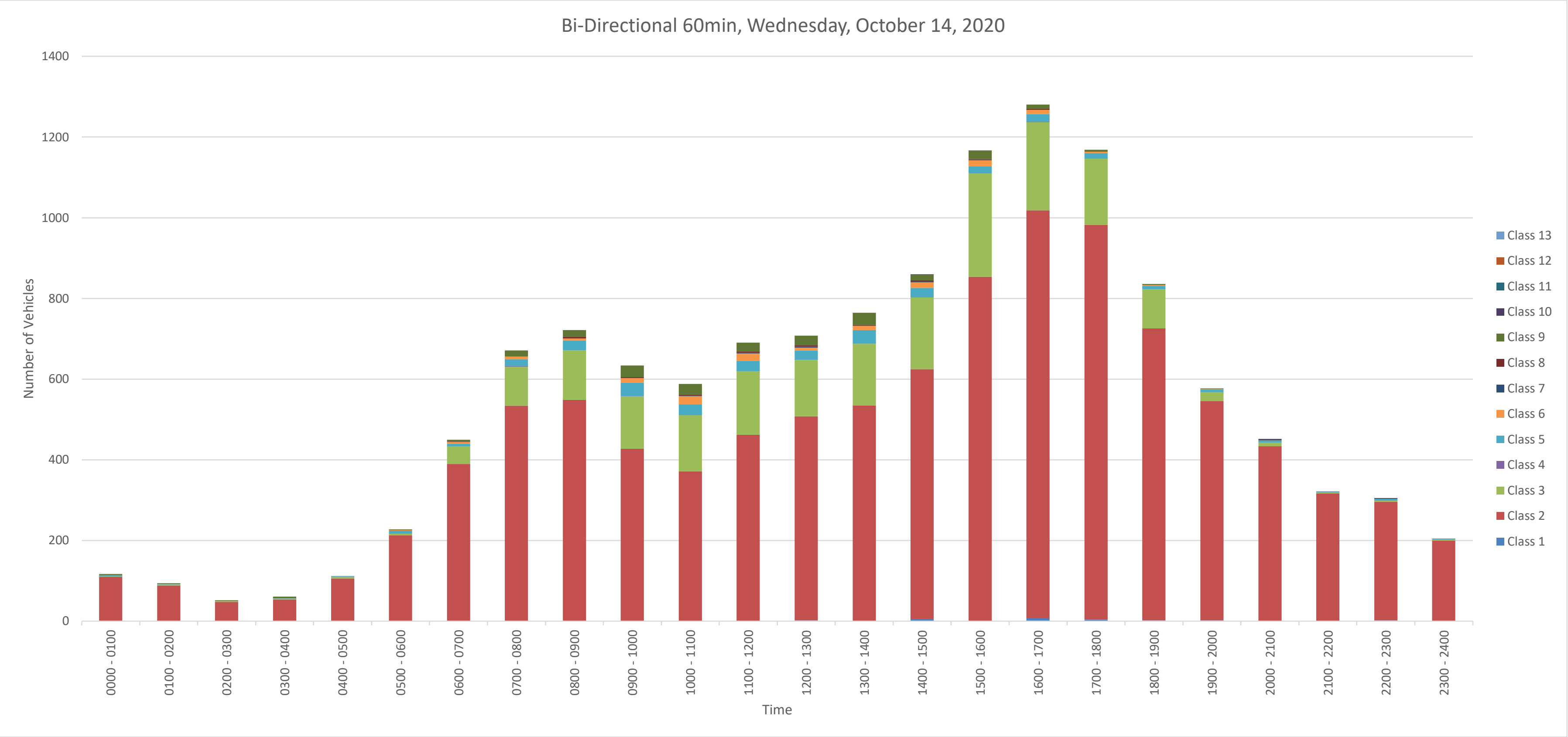

Westbound, (Movement 3.2), Wednesday, October 14, 2020
Number of Vehicles
400
350
300
250
200
150
100
50
0
Time
0000 - 0015
0030 - 0045
0100 - 0115
0130 - 0145
0200 - 0215
0230 - 0245
0300 - 0315
0330 - 0345
0400 - 0415
0430 - 0445
0500 - 0515
0530 - 0545
0600 - 0615
0630 - 0645
0700 - 0715
0730 - 0745
0800 - 0815
0830 - 0845
0900 - 0915
0930 - 0945
1000 - 1015
1030 - 1045
1100 - 1115
1130 - 1145
1200 - 1215
1230 - 1245
1300 - 1315
1330 - 1345
1400 - 1415
1430 - 1445
1500 - 1515
1530 - 1545
1600 - 1615
1630 - 1645
1700 - 1715
1730 - 1745
1800 - 1815
1830 - 1845
1900 - 1915
1930 - 1945
2000 - 2015
2030 - 2045
2100 - 2115
2130 - 2145
2200 - 2215
2230 - 2245
2300 - 2315
2330 - 2345
Class 13
Class 12
Class 11
Class 10
Class 9
Class 8
Class 7
Class 6
Class 5
Class 4
Class 3
Class 2
Class 1

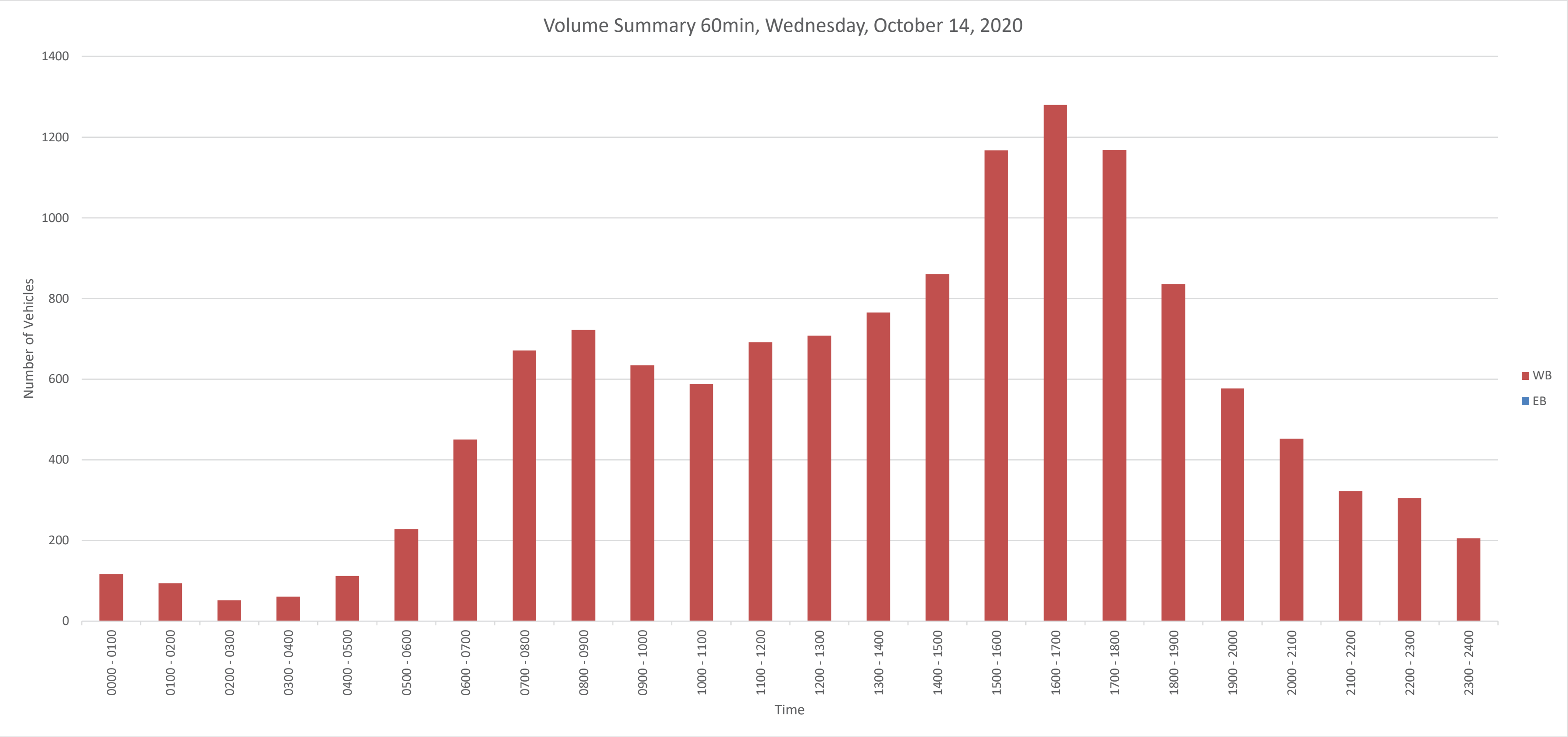

Bi-Directional 15min, Wednesday, October 14, 2020
Number of Vehicles
400
350
300
250
200
150
100
50
0
0000 - 0015
0030 - 0045
0100 - 0115
0130 - 0145
0200 - 0215
0230 - 0245
0300 - 0315
0330 - 0345
0400 - 0415
0430 - 0445
0500 - 0515
0530 - 0545
0600 - 0615
0630 - 0645
0700 - 0715
0730 - 0745
0800 - 0815
0830 - 0845
0900 - 0915
0930 - 0945
1000 - 1015
1030 - 1045
1100 - 1115
1130 - 1145
1200 - 1215
1230 - 1245
1300 - 1315
1330 - 1345
1400 - 1415
1430 - 1445
1500 - 1515
1530 - 1545
1600 - 1615
1630 - 1645
1700 - 1715
1730 - 1745
1800 - 1815
1830 - 1845
1900 - 1915
1930 - 1945
2000 - 2015
2030 - 2045
2100 - 2115
2130 - 2145
2200 - 2215
2230 - 2245
2300 - 2315
2330 - 2345
Time
Class 13
Class 12
Class 11
Class 10
Class 9
Class 8
Class 7
Class 6
Class 5
Class 4
Class 3
Class 2
Class 1


Site 3, Wednesday, October 14, 2020
Number of Vehicles
Time
0
50
100
150
200
250
300
350
400
0000 - 0015
0030 - 0045
0100 - 0115
0130 - 0145
0200 - 0215
0230 - 0245
0300 - 0315
0330 - 0345
0400 - 0415
0430 - 0445
0500 - 0515
0530 - 0545
0600 - 0615
0630 - 0645
0700 - 0715
0730 - 0745
0800 - 0815
0830 - 0845
0900 - 0915
0930 - 0945
1000 - 1015
1030 - 1045
1100 - 1115
1130 - 1145
1200 - 1215
1230 - 1245
1300 - 1315
1330 - 1345
1400 - 1415
1430 - 1445
1500 - 1515
1530 - 1545
1600 - 1615
1630 - 1645
1700 - 1715
1730 - 1745
1800 - 1815
1830 - 1845
1900 - 1915
1930 - 1945
2000 - 2015
2030 - 2045
2100 - 2115
2130 - 2145
2200 - 2215
2230 - 2245
2300 - 2315
2330 - 2345
WB
EB


Eastbound, (Movement 3.1), Wednesday, October 14, 2020
Number of Vehicles
1
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
0000 - 0100
0100 - 0200
0200 - 0300
0300 - 0400
0400 - 0500
0500 - 0600
0600 - 0700
0700 - 0800
0800 - 0900
0900 - 1000
1000 - 1100
1100 - 1200
1200 - 1300
1300 - 1400
1400 - 1500
1500 - 1600
1600 - 1700
1700 - 1800
1800 - 1900
1900 - 2000
2000 - 2100
2100 - 2200
2200 - 2300
2300 - 2400
Time
Class 13
Class 12
Class 11
Class 10
Class 9
Class 8
Class 7
Class 6
Class 5
Class 4
Class 3
Class 2
Class 1


Westbound, (Movement 3.2), Wednesday, October 14, 2020
Number of Vehicles
1400
1200
1000
800
600
400
200
0
0000 - 0100
0100 - 0200
0200 - 0300
0300 - 0400
0400 - 0500
0500 - 0600
0600 - 0700
0700 - 0800
0800 - 0900
0900 - 1000
1000 - 1100
1100 - 1200
1200 - 1300
1300 - 1400
1400 - 1500
1500 - 1600
1600 - 1700
1700 - 1800
1800 - 1900
1900 - 2000
2000 - 2100
2100 - 2200
2200 - 2300
2300 - 2400
Time
Class 13
Class 12
Class 11
Class 10
Class 9
Class 8
Class 7
Class 6
Class 5
Class 4
Class 3
Class 2
Class 1


Bi-Directional 60min, Wednesday, October 14, 2020
Number of Vehicles
1400
1200
1000
800
600
400
200
0
0000 - 0100
0100 - 0200
0200 - 0300
0300 - 0400
0400 - 0500
0500 - 0600
0600 - 0700
0700 - 0800
0800 - 0900
0900 - 1000
1000 - 1100
1100 - 1200
1200 - 1300
1300 - 1400
1400 - 1500
1500 - 1600
1600 - 1700
1700 - 1800
1800 - 1900
1900 - 2000
2000 - 2100
2100 - 2200
2200 - 2300
2300 - 2400
Time
Class 13
Class 12
Class 11
Class 10
Class 9
Class 8
Class 7
Class 6
Class 5
Class 4
Class 3
Class 2
Class 1


Volume Summary 60min, Wednesday, October 14, 2020
Number of Vehicles
1400
1200
1000
800
600
400
200
0
0000 - 0100
0100 - 0200
0200 - 0300
0300 - 0400
0400 - 0500
0500 - 0600
0600 - 0700
0700 - 0800
0800 - 0900
0900 - 1000
1000 - 1100
1100 - 1200
1200 - 1300
1300 - 1400
1400 - 1500
1500 - 1600
1600 - 1700
1700 - 1800
1800 - 1900
1900 - 2000
2000 - 2100
2100 - 2200
2200 - 2300
2300 - 2400
Time
WB
EB

Suffolk, VA
Classified Turn Movement Count

Site 1 of 3
Welsh Pkwy
Bob Foeller Dr
US-13 Portsmouth Blvd (West)
US-13 Portsmouth Blvd (East)

Lat/Long
36,756276°, -76,509065°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F

Marr Traffic Inc
www.marrtraffic.com

0700 - 0900 (Weekday 2h Session) (14-10-2020)
All vehicles

	Northbound					Southbound		Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr		US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
TIME	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Right 1.5	App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
0700 - 0715	0	0	0	0	0	0	0	3	776	0	3	782	0	440	2	0	442	1224
0715 - 0730	0	0	0	0	0	0	0	4	945	0	4	953	0	528	4	0	532	1485
0730 - 0745	0	0	0	0	0	2	2	3	800	0	7	810	0	636	9	0	645	1457
0745 - 0800	0	0	0	0	0	2	2	8	719	0	1	728	1	745	8	0	754	1484
Hourly Total	0	0	0	0	**0**	4	**4**	18	3240	0	15	**3273**	1	2349	23	0	**2373**	**5650**
0800 - 0815	0	0	0	0	0	3	3	4	659	0	6	669	0	636	4	0	640	1312
0815 - 0830	0	0	0	0	0	13	13	4	627	0	9	640	1	574	7	0	582	1235
0830 - 0845	0	0	0	0	0	8	8	4	589	0	6	599	0	496	5	0	501	1108
0845 - 0900	0	0	0	0	0	3	3	1	507	0	10	518	0	535	7	0	542	1063
Hourly Total	0	0	0	0	**0**	27	**27**	13	2382	0	31	**2426**	1	2241	23	0	**2265**	**4718**
Grand Total	0	0	0	0	**0**	31	**31**	31	5622	0	46	**5699**	2	4590	46	0	**4638**	**10368**
Approach %	0,00	0,00	0,00	0,00	-	100,00	-	0,54	98,65	0,00	0,81	-	0,04	98,97	0,99	0,00	-	
Intersection %	0,00	0,00	0,00	0,00	0,00	0,30	0,30	0,30	54,22	0,00	0,44	54,97	0,02	44,27	0,44	0,00	44,73	
PHF	0,00	0,00	0,00	0,00	**0,00**	0,58	**0,58**	0,59	0,83	0,00	0,64	**0,83**	0,25	0,85	0,69	0,00	**0,85**	**0,97**

1400 - 1630 (Weekday 2.5h Session) (13-10-2020)
All vehicles

	Northbound					Southbound		Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr		US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
TIME	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Right 1.5	App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
1400 - 1415	0	0	0	0	0	7	7	10	546	0	7	563	0	635	8	0	643	1213
1415 - 1430	0	0	0	0	0	14	14	0	586	0	4	590	1	616	10	0	627	1231
1430 - 1445	0	0	0	0	0	13	13	6	563	0	6	575	1	655	4	0	660	1248
1445 - 1500	0	0	0	0	0	10	10	5	570	0	3	578	1	716	7	0	724	1312
Hourly Total	0	0	0	0	**0**	44	**44**	21	2265	0	20	**2306**	3	2622	29	0	**2654**	**5004**
1500 - 1515	0	0	0	0	0	20	20	7	614	0	4	625	1	862	5	0	868	1513
1515 - 1530	0	0	0	0	0	10	10	5	663	0	5	673	0	840	0	0	840	1523
1530 - 1545	0	0	0	0	0	10	10	6	740	0	7	753	0	861	4	0	865	1628
1545 - 1600	0	0	0	0	0	7	7	6	630	0	5	641	0	907	4	0	911	1559
Hourly Total	0	0	0	0	**0**	47	**47**	24	2647	0	21	**2692**	1	3470	13	0	**3484**	**6223**
1600 - 1615	0	0	0	0	0	18	18	3	686	0	10	699	0	1005	2	0	1007	1724
1615 - 1630	0	0	0	0	0	4	4	1	659	0	9	669	1	1021	1	0	1023	1696
1/2 Hourly Total	0	0	0	0	**0**	22	**22**	4	1345	0	19	**1368**	1	2026	3	0	**2030**	**3420**
Grand Total	0	0	0	0	**0**	113	**113**	49	6257	0	60	**6366**	5	8118	45	0	**8168**	**14647**
Approach %	0,00	0,00	0,00	0,00	-	100,00	-	0,77	98,29	0,00	0,94	-	0,06	99,39	0,55	0,00	-	
Intersection %	0,00	0,00	0,00	0,00	0,00	0,77	0,77	0,33	42,72	0,00	0,41	43,46	0,03	55,42	0,31	0,00	55,77	
PHF	0,00	0,00	0,00	0,00	**0,00**	0,54	**0,54**	0,67	0,92	0,00	0,78	**0,92**	0,25	0,93	0,69	0,00	**0,93**	**0,96**

Suffolk, VA
Classified Turn Movement Count

Site 1 of 3
Welsh Pkwy
Bob Foeller Dr
US-13 Portsmouth Blvd (West)
US-13 Portsmouth Blvd (East)

Lat/Long
36,756276°, -76,509065°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F

Marr Traffic Inc
www.marrtraffic.com

0700 - 0900 (Weekday 2h Session) (14-10-2020)
Bikes

	Northbound					Southbound		Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr		US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
TIME	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Right 1.5	App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
0700 - 0715	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0715 - 0730	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0730 - 0745	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0745 - 0800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	**0**	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	**0**
0800 - 0815	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0815 - 0830	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0830 - 0845	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0845 - 0900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	**0**	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	**0**
Grand Total	0	0	0	0	**0**	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	**0**
Approach %	0,00	0,00	0,00	0,00	-	0,00	-	0,00	0,00	0,00	0,00	-	0,00	0,00	0,00	0,00	-	
Intersection %	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	

1400 - 1630 (Weekday 2.5h Session) (13-10-2020)
Bikes

	Northbound					Southbound		Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr		US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
TIME	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Right 1.5	App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
1400 - 1415	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1415 - 1430	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1430 - 1445	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1445 - 1500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	**0**	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	**0**
1500 - 1515	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1515 - 1530	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1530 - 1545	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1545 - 1600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	**0**	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	**0**
1600 - 1615	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1615 - 1630	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1/2 Hourly Total	0	0	0	0	**0**	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	**0**
Grand Total	0	0	0	0	**0**	0	**0**	0	0	0	0	**0**	0	0	0	0	**0**	**0**
Approach %	0,00	0,00	0,00	0,00	-	0,00	-	0,00	0,00	0,00	0,00	-	0,00	0,00	0,00	0,00	-	
Intersection %	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	

Suffolk, VA
Classified Turn Movement Count

Site 1 of 3
Welsh Pkwy
Bob Foeller Dr
US-13 Portsmouth Blvd (West)
US-13 Portsmouth Blvd (East)

Lat/Long
36,756276°, -76,509065°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F

Marr Traffic Inc
www.marrtraffic.com

0700 - 0900 (Weekday 2h Session) (14-10-2020)
Passenger Vehicles (1-3)

	Northbound					Southbound		Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr		US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
TIME	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Right 1.5	App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
0700 - 0715	0	0	0	0	0	0	0	3	695	0	3	701	0	358	1	0	359	1060
0715 - 0730	0	0	0	0	0	0	0	4	858	0	3	865	0	444	4	0	448	1313
0730 - 0745	0	0	0	0	0	1	1	3	728	0	7	738	0	534	6	0	540	1279
0745 - 0800	0	0	0	0	0	1	1	6	665	0	1	672	0	636	5	0	641	1314
Hourly Total	0	0	0	0	**0**	2	**2**	16	2946	0	14	**2976**	0	1972	16	0	**1988**	**4966**
0800 - 0815	0	0	0	0	0	2	2	4	569	0	3	576	0	532	3	0	535	1113
0815 - 0830	0	0	0	0	0	5	5	3	536	0	7	546	1	480	4	0	485	1036
0830 - 0845	0	0	0	0	0	3	3	3	499	0	1	503	0	399	5	0	404	910
0845 - 0900	0	0	0	0	0	3	3	0	429	0	6	435	0	439	5	0	444	882
Hourly Total	0	0	0	0	**0**	13	**13**	10	2033	0	17	**2060**	1	1850	17	0	**1868**	**3941**
Grand Total	0	0	0	0	**0**	15	**15**	26	4979	0	31	**5036**	1	3822	33	0	**3856**	**8907**
Approach %	0,00	0,00	0,00	0,00	-	100,00	-	0,52	98,87	0,00	0,62	-	0,03	99,12	0,86	0,00	-	
Intersection %	0,00	0,00	0,00	0,00	0,00	0,17	0,17	0,29	55,90	0,00	0,35	56,54	0,01	42,91	0,37	0,00	43,29	

1400 - 1630 (Weekday 2.5h Session) (13-10-2020)
Passenger Vehicles (1-3)

	Northbound					Southbound		Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr		US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
TIME	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Right 1.5	App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
1400 - 1415	0	0	0	0	0	5	5	5	469	0	6	480	0	560	7	0	567	1052
1415 - 1430	0	0	0	0	0	9	9	0	512	0	2	514	1	525	9	0	535	1058
1430 - 1445	0	0	0	0	0	11	11	4	477	0	4	485	1	570	4	0	575	1071
1445 - 1500	0	0	0	0	0	6	6	3	498	0	2	503	1	641	2	0	644	1153
Hourly Total	0	0	0	0	**0**	31	**31**	12	1956	0	14	**1982**	3	2296	22	0	**2321**	**4334**
1500 - 1515	0	0	0	0	0	12	12	4	538	0	2	544	1	768	5	0	774	1330
1515 - 1530	0	0	0	0	0	8	8	1	597	0	3	601	0	766	0	0	766	1375
1530 - 1545	0	0	0	0	0	6	6	3	680	0	4	687	0	788	3	0	791	1484
1545 - 1600	0	0	0	0	0	5	5	6	575	0	4	585	0	857	4	0	861	1451
Hourly Total	0	0	0	0	**0**	31	**31**	14	2390	0	13	**2417**	1	3179	12	0	**3192**	**5640**
1600 - 1615	0	0	0	0	0	12	12	3	615	0	9	627	0	934	2	0	936	1575
1615 - 1630	0	0	0	0	0	3	3	1	604	0	8	613	1	957	1	0	959	1575
1/2 Hourly Total	0	0	0	0	**0**	15	**15**	4	1219	0	17	**1240**	1	1891	3	0	**1895**	**3150**
Grand Total	0	0	0	0	**0**	77	**77**	30	5565	0	44	**5639**	5	7366	37	0	**7408**	**13124**
Approach %	0,00	0,00	0,00	0,00	-	100,00	-	0,53	98,69	0,00	0,78	-	0,07	99,43	0,50	0,00	-	
Intersection %	0,00	0,00	0,00	0,00	0,00	0,59	0,59	0,23	42,40	0,00	0,34	42,97	0,04	56,13	0,28	0,00	56,45	

Suffolk, VA
Classified Turn Movement Count

Site 1 of 3
Welsh Pkwy
Bob Foeller Dr
US-13 Portsmouth Blvd (West)
US-13 Portsmouth Blvd (East)

Lat/Long
36,756276°, -76,509065°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F

Marr Traffic Inc
www.marrtraffic.com

0700 - 0900 (Weekday 2h Session) (14-10-2020)
Single Unit Trucks (4-7)

	Northbound					Southbound		Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr		US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
TIME	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Right 1.5	App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
0700 - 0715	0	0	0	0	0	0	0	0	20	0	0	20	0	22	0	0	22	42
0715 - 0730	0	0	0	0	0	0	0	0	20	0	1	21	0	23	0	0	23	44
0730 - 0745	0	0	0	0	0	0	0	0	21	0	0	21	0	28	2	0	30	51
0745 - 0800	0	0	0	0	0	0	0	1	12	0	0	13	1	35	1	0	37	50
Hourly Total	0	0	0	0	**0**	0	**0**	1	73	0	1	**75**	1	108	3	0	**112**	**187**
0800 - 0815	0	0	0	0	0	0	0	0	27	0	3	30	0	16	0	0	16	46
0815 - 0830	0	0	0	0	0	5	5	1	26	0	2	29	0	21	3	0	24	58
0830 - 0845	0	0	0	0	0	5	5	0	28	0	4	32	0	28	0	0	28	65
0845 - 0900	0	0	0	0	0	0	0	1	17	0	4	22	0	20	2	0	22	44
Hourly Total	0	0	0	0	**0**	10	**10**	2	98	0	13	**113**	0	85	5	0	**90**	**213**
Grand Total	0	0	0	0	**0**	10	**10**	3	171	0	14	**188**	1	193	8	0	**202**	**400**
Approach %	0,00	0,00	0,00	0,00	-	100,00	-	1,60	90,96	0,00	7,45	-	0,50	95,54	3,96	0,00	-	
Intersection %	0,00	0,00	0,00	0,00	0,00	2,50	2,50	0,75	42,75	0,00	3,50	47,00	0,25	48,25	2,00	0,00	50,50	

1400 - 1630 (Weekday 2.5h Session) (13-10-2020)
Single Unit Trucks (4-7)

	Northbound					Southbound		Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr		US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
TIME	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Right 1.5	App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
1400 - 1415	0	0	0	0	0	1	1	3	26	0	1	30	0	18	0	0	18	49
1415 - 1430	0	0	0	0	0	3	3	0	24	0	2	26	0	10	0	0	10	39
1430 - 1445	0	0	0	0	0	2	2	2	26	0	2	30	0	18	0	0	18	50
1445 - 1500	0	0	0	0	0	2	2	2	17	0	1	20	0	16	1	0	17	39
Hourly Total	0	0	0	0	**0**	8	**8**	7	93	0	6	**106**	0	62	1	0	**63**	**177**
1500 - 1515	0	0	0	0	0	5	5	3	30	0	2	35	0	18	0	0	18	58
1515 - 1530	0	0	0	0	0	2	2	4	30	0	2	36	0	11	0	0	11	49
1530 - 1545	0	0	0	0	0	4	4	2	23	0	3	28	0	15	1	0	16	48
1545 - 1600	0	0	0	0	0	2	2	0	22	0	0	22	0	10	0	0	10	34
Hourly Total	0	0	0	0	**0**	13	**13**	9	105	0	7	**121**	0	54	1	0	**55**	**189**
1600 - 1615	0	0	0	0	0	5	5	0	24	0	1	25	0	12	0	0	12	42
1615 - 1630	0	0	0	0	0	1	1	0	22	0	0	22	0	27	0	0	27	50
1/2 Hourly Total	0	0	0	0	**0**	6	**6**	0	46	0	1	**47**	0	39	0	0	**39**	**92**
Grand Total	0	0	0	0	**0**	27	**27**	16	244	0	14	**274**	0	155	2	0	**157**	**458**
Approach %	0,00	0,00	0,00	0,00	-	100,00	-	5,84	89,05	0,00	5,11	-	0,00	98,73	1,27	0,00	-	
Intersection %	0,00	0,00	0,00	0,00	0,00	5,90	5,90	3,49	53,28	0,00	3,06	59,83	0,00	33,84	0,44	0,00	34,28	

Suffolk, VA
Classified Turn Movement Count

Site 1 of 3
Welsh Pkwy
Bob Foeller Dr
US-13 Portsmouth Blvd (West)
US-13 Portsmouth Blvd (East)

Lat/Long
36,756276°, -76,509065°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F

Marr Traffic Inc
www.marrtraffic.com

0700 - 0900 (Weekday 2h Session) (14-10-2020)
Combination Trucks (8-13)

	Northbound					Southbound		Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr		US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
TIME	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Right 1.5	App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
0700 - 0715	0	0	0	0	0	0	0	0	61	0	0	61	0	60	1	0	61	122
0715 - 0730	0	0	0	0	0	0	0	0	67	0	0	67	0	61	0	0	61	128
0730 - 0745	0	0	0	0	0	1	1	0	51	0	0	51	0	74	1	0	75	127
0745 - 0800	0	0	0	0	0	1	1	1	42	0	0	43	0	74	2	0	76	120
Hourly Total	0	0	0	0	**0**	2	**2**	1	221	0	0	**222**	0	269	4	0	**273**	**497**
0800 - 0815	0	0	0	0	0	1	1	0	63	0	0	63	0	88	1	0	89	153
0815 - 0830	0	0	0	0	0	3	3	0	65	0	0	65	0	73	0	0	73	141
0830 - 0845	0	0	0	0	0	0	0	1	62	0	1	64	0	69	0	0	69	133
0845 - 0900	0	0	0	0	0	0	0	0	61	0	0	61	0	76	0	0	76	137
Hourly Total	0	0	0	0	**0**	4	**4**	1	251	0	1	**253**	0	306	1	0	**307**	**564**
Grand Total	0	0	0	0	**0**	6	**6**	2	472	0	1	**475**	0	575	5	0	**580**	**1061**
Approach %	0,00	0,00	0,00	0,00	-	100,00	-	0,42	99,37	0,00	0,21	-	0,00	99,14	0,86	0,00	-	
Intersection %	0,00	0,00	0,00	0,00	0,00	0,57	0,57	0,19	44,49	0,00	0,09	44,77	0,00	54,19	0,47	0,00	54,67	

1400 - 1630 (Weekday 2.5h Session) (13-10-2020)
Combination Trucks (8-13)

	Northbound					Southbound		Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr		US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
TIME	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total	Right 1.5	App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
1400 - 1415	0	0	0	0	0	1	1	2	51	0	0	53	0	57	1	0	58	112
1415 - 1430	0	0	0	0	0	2	2	0	50	0	0	50	0	81	1	0	82	134
1430 - 1445	0	0	0	0	0	0	0	0	60	0	0	60	0	67	0	0	67	127
1445 - 1500	0	0	0	0	0	2	2	0	55	0	0	55	0	59	4	0	63	120
Hourly Total	0	0	0	0	**0**	5	**5**	2	216	0	0	**218**	0	264	6	0	**270**	**493**
1500 - 1515	0	0	0	0	0	3	3	0	46	0	0	46	0	76	0	0	76	125
1515 - 1530	0	0	0	0	0	0	0	0	36	0	0	36	0	63	0	0	63	99
1530 - 1545	0	0	0	0	0	0	0	1	37	0	0	38	0	58	0	0	58	96
1545 - 1600	0	0	0	0	0	0	0	0	33	0	1	34	0	40	0	0	40	74
Hourly Total	0	0	0	0	**0**	3	**3**	1	152	0	1	**154**	0	237	0	0	**237**	**394**
1600 - 1615	0	0	0	0	0	1	1	0	47	0	0	47	0	59	0	0	59	107
1615 - 1630	0	0	0	0	0	0	0	0	33	0	1	34	0	37	0	0	37	71
1/2 Hourly Total	0	0	0	0	**0**	1	**1**	0	80	0	1	**81**	0	96	0	0	**96**	**178**
Grand Total	0	0	0	0	**0**	9	**9**	3	448	0	2	**453**	0	597	6	0	**603**	**1065**
Approach %	0,00	0,00	0,00	0,00	-	100,00	-	0,66	98,90	0,00	0,44	-	0,00	99,00	1,00	0,00	-	
Intersection %	0,00	0,00	0,00	0,00	0,00	0,85	0,85	0,28	42,07	0,00	0,19	42,54	0,00	56,06	0,56	0,00	56,62	

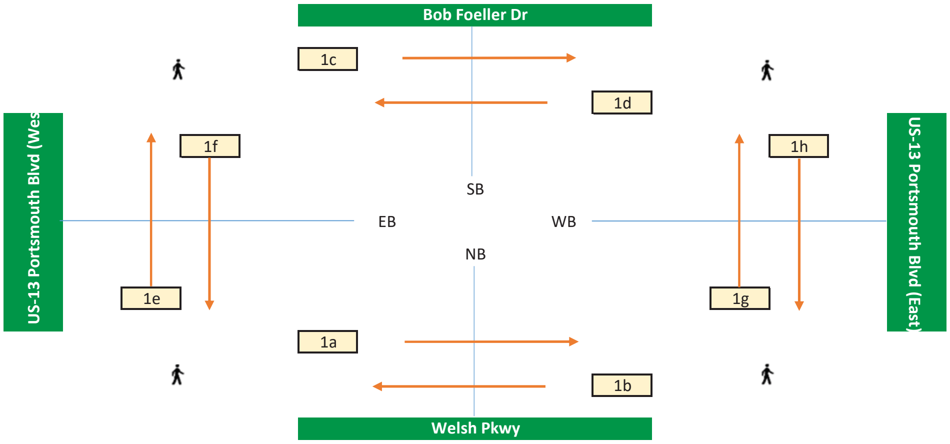
Suffolk, VA
Pedestrian Count

Site 1 of 3
Welsh Pkwy
Bob Foeller Dr
US-13 Portsmouth Blvd (West)
US-13 Portsmouth Blvd (East)

Lat/Long
36,756276°, -76,509065°

Date
Wednesday, October 14, 2020

Weather
Fair
66°F



Marr Traffic Inc
www.marrtraffic.com

0700 - 0900 (Weekday 2h Session) (14-10-2020)
Pedestrians

	Northbound			Southbound			Eastbound			Westbound			
	Welsh Pkwy			Bob Foeller Dr			US-13 Portsmouth Blvd (West)			US-13 Portsmouth Blvd (East)			
TIME	EB 1a	WB 1b	App Total	EB 1c	WB 1d	App Total	NB 1e	SB 1f	App Total	NB 1g	SB 1h	App Total	Int Total
0700 - 0715	0	0	0	0	0	0	0	0	0	0	0	0	0
0715 - 0730	0	0	0	0	0	0	0	0	0	0	0	0	0
0730 - 0745	0	0	0	0	0	0	0	0	0	0	0	0	0
0745 - 0800	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	**0**
0800 - 0815	0	0	0	0	0	0	0	0	0	0	0	0	0
0815 - 0830	0	0	0	0	0	0	0	0	0	0	0	0	0
0830 - 0845	0	0	0	0	0	0	0	0	0	0	0	0	0
0845 - 0900	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	**0**
Grand Total	0	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	**0**
Approach %	0,00	0,00	-	0,00	0,00	-	0,00	0,00	-	0,00	0,00	-	
Intersection %	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	

1400 - 1630 (Weekday 2.5h Session) (13-10-2020)
Pedestrians

	Northbound			Southbound			Eastbound			Westbound			
	Welsh Pkwy			Bob Foeller Dr			US-13 Portsmouth Blvd (West)			US-13 Portsmouth Blvd (East)			
TIME	EB 1a	WB 1b	App Total	EB 1c	WB 1d	App Total	NB 1e	SB 1f	App Total	NB 1g	SB 1h	App Total	Int Total
1400 - 1415	0	0	0	0	0	0	0	0	0	0	0	0	0
1415 - 1430	0	0	0	0	0	0	0	0	0	0	0	0	0
1430 - 1445	0	0	0	0	0	0	0	0	0	0	0	0	0
1445 - 1500	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	**0**
1500 - 1515	0	0	0	0	0	0	0	0	0	0	0	0	0
1515 - 1530	0	0	0	0	0	0	0	0	0	0	0	0	0
1530 - 1545	0	0	0	0	0	0	0	0	0	0	0	0	0
1545 - 1600	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	**0**
1600 - 1615	0	0	0	0	0	0	0	0	0	0	0	0	0
1615 - 1630	0	0	0	0	0	0	0	0	0	0	0	0	0
1/2 Hourly Total	0	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	**0**
Grand Total	0	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	**0**
Approach %	0,00	0,00	-	0,00	0,00	-	0,00	0,00	-	0,00	0,00	-	
Intersection %	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	

Suffolk, VA

Peak Hour Turning Movement Count

Marr Traffic Inc

www.marrtraffic.com

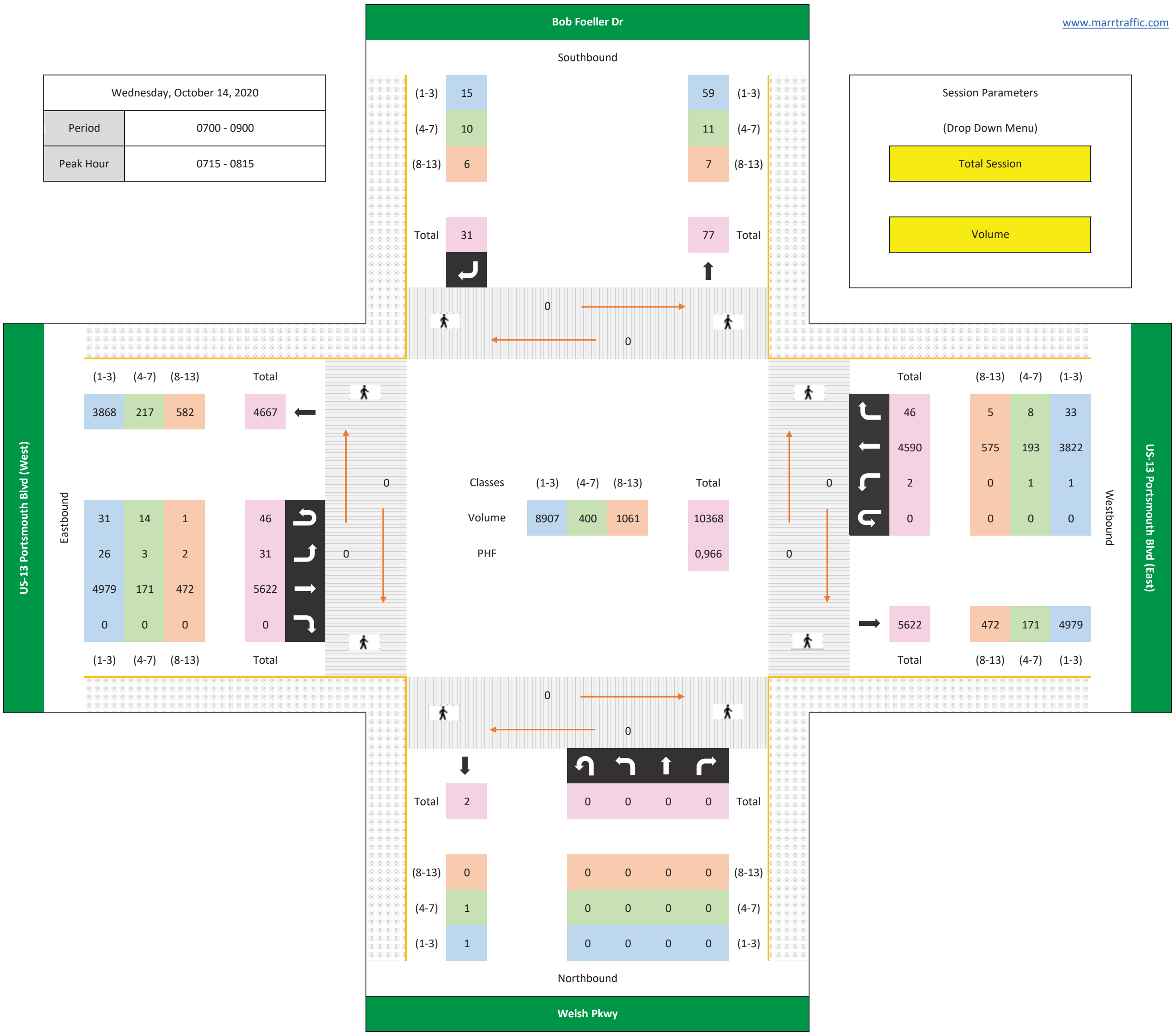
Wednesday, October 14, 2020	
Period	0700 - 0900
Peak Hour	0715 - 0815

Session Parameters

(Drop Down Menu)

Total Session

Volume



Bob Foeller Dr

Southbound

(1-3)	15	59	(1-3)
(4-7)	10	11	(4-7)
(8-13)	6	7	(8-13)
Total	31	77	Total

Pedestrians: 0, 0

US-13 Portsmouth Blvd (West)

Eastbound

(1-3)	(4-7)	(8-13)	Total	
3868	217	582	4667	⬅

31	14	1	46	⮌
26	3	2	31	⮥
4979	171	472	5622	➡
0	0	0	0	⮧
(1-3)	(4-7)	(8-13)	Total	

Pedestrians: 0, 0

Classes	(1-3)	(4-7)	(8-13)	Total
Volume	8907	400	1061	10368
PHF				0,966

US-13 Portsmouth Blvd (East)

Westbound

	Total	(8-13)	(4-7)	(1-3)
⮤	46	5	8	33
⬅	4590	575	193	3822
⮢	2	0	1	1
⮎	0	0	0	0

➡	5622	472	171	4979
	Total	(8-13)	(4-7)	(1-3)

Pedestrians: 0, 0

Welsh Pkwy

Northbound

Pedestrians: 0, 0

		⮍	⮢	⬆	⮣	
Total	2	0	0	0	0	Total
(8-13)	0	0	0	0	0	(8-13)
(4-7)	1	0	0	0	0	(4-7)
(1-3)	1	0	0	0	0	(1-3)

All vehicles

	Northbound					Southbound					Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr					US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
Time	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total			Right 1.5		App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
0715 - 0730	0	0	0	0	0	-	-	0	-	0	4	945	0	4	953	0	528	4	0	532	1485
0730 - 0745	0	0	0	0	0	-	-	2	-	2	3	800	0	7	810	0	636	9	0	645	1457
0745 - 0800	0	0	0	0	0	-	-	2	-	2	8	719	0	1	728	1	745	8	0	754	1484
0800 - 0815	0	0	0	0	0	-	-	3	-	3	4	659	0	6	669	0	636	4	0	640	1312
Total	0	0	0	0	0	0	0	7	0	7	19	3123	0	18	3160	1	2545	25	0	2571	5738
Approach %	0,00	0,00	0,00	0,00	-	0,00	0,00	100,00	0,00	-	0,60	98,83	0,00	0,57	-	0,04	98,99	0,97	0,00	-	
PHF	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,58	0,00	**0,58**	0,59	0,83	0,00	0,64	**0,83**	0,25	0,85	0,69	0,00	**0,85**	**0,97**

Bikes

	Northbound					Southbound					Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr					US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
Time	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total			Right 1.5		App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
0715 - 0730	0	0	0	0	0	-	-	0	-	0	0	0	0	0	0	0	0	0	0	0	0
0730 - 0745	0	0	0	0	0	-	-	0	-	0	0	0	0	0	0	0	0	0	0	0	0
0745 - 0800	0	0	0	0	0	-	-	0	-	0	0	0	0	0	0	0	0	0	0	0	0
0800 - 0815	0	0	0	0	0	-	-	0	-	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach %	0,00	0,00	0,00	0,00	-	0,00	0,00	0,00	0,00	-	0,00	0,00	0,00	0,00	-	0,00	0,00	0,00	0,00	-	
PHF	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	**0,00**	**0,00**

Passenger Vehicles (1-3)

	Northbound					Southbound					Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr					US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
Time	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total			Right 1.5		App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
0715 - 0730	0	0	0	0	0	-	-	0	-	0	4	858	0	3	865	0	444	4	0	448	1313
0730 - 0745	0	0	0	0	0	-	-	1	-	1	3	728	0	7	738	0	534	6	0	540	1279
0745 - 0800	0	0	0	0	0	-	-	1	-	1	6	665	0	1	672	0	636	5	0	641	1314
0800 - 0815	0	0	0	0	0	-	-	2	-	2	4	569	0	3	576	0	532	3	0	535	1113
Total	0	0	0	0	0	0	0	4	0	4	17	2820	0	14	2851	0	2146	18	0	2164	5019
Approach %	0,00	0,00	0,00	0,00	-	0,00	0,00	100,00	0,00	-	0,60	98,91	0,00	0,49	-	0,00	99,17	0,83	0,00	-	
PHF	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,50	0,00	**0,50**	0,71	0,82	0,00	0,50	**0,82**	0,00	0,84	0,75	0,00	**0,84**	**0,95**

Single Unit Trucks (4-7)

	Northbound					Southbound					Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr					US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
Time	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total			Right 1.5		App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
0715 - 0730	0	0	0	0	0	-	-	0	-	0	0	20	0	1	21	0	23	0	0	23	44
0730 - 0745	0	0	0	0	0	-	-	0	-	0	0	21	0	0	21	0	28	2	0	30	51
0745 - 0800	0	0	0	0	0	-	-	0	-	0	1	12	0	0	13	1	35	1	0	37	50
0800 - 0815	0	0	0	0	0	-	-	0	-	0	0	27	0	3	30	0	16	0	0	16	46
Total	0	0	0	0	0	0	0	0	0	0	1	80	0	4	85	1	102	3	0	106	191
Approach %	0,00	0,00	0,00	0,00	-	0,00	0,00	0,00	0,00	-	1,18	94,12	0,00	4,71	-	0,94	96,23	2,83	0,00	-	
PHF	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	**0,00**	0,25	0,74	0,00	0,33	**0,71**	0,25	0,73	0,38	0,00	**0,72**	**0,94**

Combination Trucks (8-13)

	Northbound					Southbound					Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr					US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
Time	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total			Right 1.5		App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
0715 - 0730	0	0	0	0	0	-	-	0	-	0	0	67	0	0	67	0	61	0	0	61	128
0730 - 0745	0	0	0	0	0	-	-	1	-	1	0	51	0	0	51	0	74	1	0	75	127
0745 - 0800	0	0	0	0	0	-	-	1	-	1	1	42	0	0	43	0	74	2	0	76	120
0800 - 0815	0	0	0	0	0	-	-	1	-	1	0	63	0	0	63	0	88	1	0	89	153
Total	0	0	0	0	0	0	0	3	0	3	1	223	0	0	224	0	297	4	0	301	528
Approach %	0,00	0,00	0,00	0,00	-	0,00	0,00	100,00	0,00	-	0,45	99,55	0,00	0,00	-	0,00	98,67	1,33	0,00	-	
PHF	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,75	0,00	**0,75**	0,25	0,83	0,00	0,00	**0,84**	0,00	0,84	0,50	0,00	**0,85**	**0,86**

Pedestrians

	Northbound					Southbound					Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr					US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
Time	EB 1a	WB 1b			App Total	EB 1c	WB 1d			App Total	NB 1e	SB 1f			App Total	NB 1g	SB 1h			App Total	Int Total
0715 - 0730	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0
0730 - 0745	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0
0745 - 0800	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0
0800 - 0815	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach %	0,00	0,00	0,00	0,00	-	0,00	0,00	0,00	0,00	-	0,00	0,00	0,00	0,00	-	0,00	0,00	0,00	0,00	-	
PHF	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	**0,00**	**0,00**

Suffolk, VA

Peak Hour Turning Movement Count

Marr Traffic Inc

www.marrtraffic.com

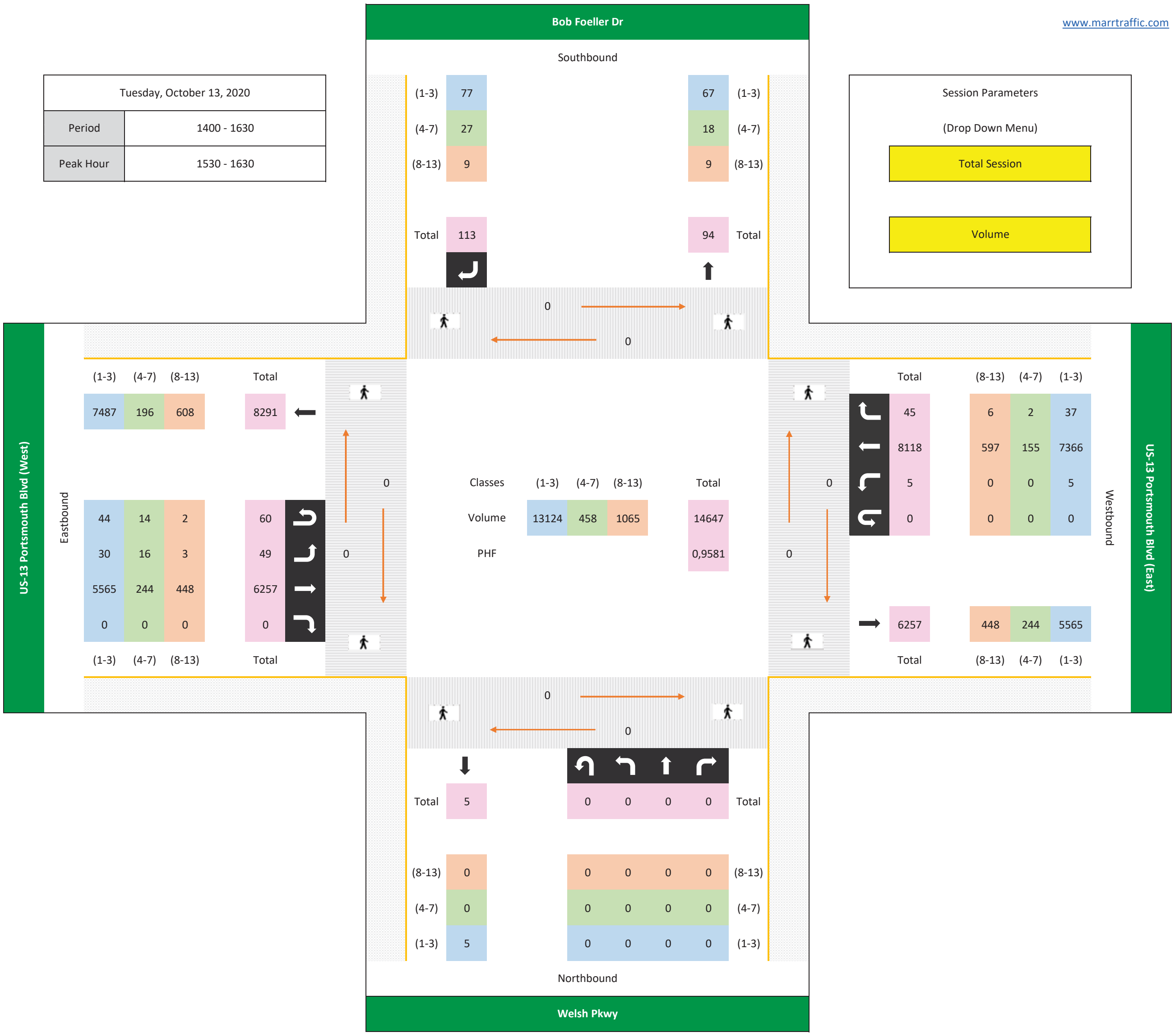
Tuesday, October 13, 2020	
Period	1400 - 1630
Peak Hour	1530 - 1630

Session Parameters

(Drop Down Menu)

Total Session

Volume



Bob Foeller Dr

Southbound

	(1-3)	(4-7)	(8-13)	Total
↲	77	27	9	113
↑	67	18	9	94

US-13 Portsmouth Blvd (West)

Eastbound

	(1-3)	(4-7)	(8-13)	Total
←	7487	196	608	8291
↶	44	14	2	60
↰	30	16	3	49
→	5565	244	448	6257
↱	0	0	0	0

US-13 Portsmouth Blvd (East)

Westbound

	Total	(8-13)	(4-7)	(1-3)
↰	45	6	2	37
←	8118	597	155	7366
↲	5	0	0	5
↶	0	0	0	0
→	6257	448	244	5565

Welsh Pkwy

Northbound

	↓	↶	↰	↑	↱
Total	5	0	0	0	0
(8-13)	0	0	0	0	0
(4-7)	0	0	0	0	0
(1-3)	5	0	0	0	0

Classes	(1-3)	(4-7)	(8-13)	Total
Volume	13124	458	1065	14647
PHF				0,9581

All vehicles

	Northbound					Southbound					Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr					US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
Time	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total			Right 1.5		App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
1530 - 1545	0	0	0	0	0	-	-	10	-	10	6	740	0	7	753	0	861	4	0	865	1628
1545 - 1600	0	0	0	0	0	-	-	7	-	7	6	630	0	5	641	0	907	4	0	911	1559
1600 - 1615	0	0	0	0	0	-	-	18	-	18	3	686	0	10	699	0	1005	2	0	1007	1724
1615 - 1630	0	0	0	0	0	-	-	4	-	4	1	659	0	9	669	1	1021	1	0	1023	1696
Total	0	0	0	0	0	0	0	39	0	39	16	2715	0	31	2762	1	3794	11	0	3806	6607
Approach %	0,00	0,00	0,00	0,00	-	0,00	0,00	100,00	0,00	-	0,58	98,30	0,00	1,12	-	0,03	99,68	0,29	0,00	-	
PHF	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,54	0,00	**0,54**	0,67	0,92	0,00	0,78	**0,92**	0,25	0,93	0,69	0,00	**0,93**	**0,96**

Bikes

	Northbound					Southbound					Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr					US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
Time	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total			Right 1.5		App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
1530 - 1545	0	0	0	0	0	-	-	0	-	0	0	0	0	0	0	0	0	0	0	0	0
1545 - 1600	0	0	0	0	0	-	-	0	-	0	0	0	0	0	0	0	0	0	0	0	0
1600 - 1615	0	0	0	0	0	-	-	0	-	0	0	0	0	0	0	0	0	0	0	0	0
1615 - 1630	0	0	0	0	0	-	-	0	-	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach %	0,00	0,00	0,00	0,00	-	0,00	0,00	0,00	0,00	-	0,00	0,00	0,00	0,00	-	0,00	0,00	0,00	0,00	-	
PHF	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	**0,00**	**0,00**

Passenger Vehicles (1-3)

	Northbound					Southbound					Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr					US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
Time	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total			Right 1.5		App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
1530 - 1545	0	0	0	0	0	-	-	6	-	6	3	680	0	4	687	0	788	3	0	791	1484
1545 - 1600	0	0	0	0	0	-	-	5	-	5	6	575	0	4	585	0	857	4	0	861	1451
1600 - 1615	0	0	0	0	0	-	-	12	-	12	3	615	0	9	627	0	934	2	0	936	1575
1615 - 1630	0	0	0	0	0	-	-	3	-	3	1	604	0	8	613	1	957	1	0	959	1575
Total	0	0	0	0	0	0	0	26	0	26	13	2474	0	25	2512	1	3536	10	0	3547	6085
Approach %	0,00	0,00	0,00	0,00	-	0,00	0,00	100,00	0,00	-	0,52	98,49	0,00	1,00	-	0,03	99,69	0,28	0,00	-	
PHF	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,54	0,00	**0,54**	0,54	0,91	0,00	0,69	**0,91**	0,25	0,92	0,63	0,00	**0,92**	**0,97**

Single Unit Trucks (4-7)

	Northbound					Southbound					Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr					US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
Time	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total			Right 1.5		App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
1530 - 1545	0	0	0	0	0	-	-	4	-	4	2	23	0	3	28	0	15	1	0	16	48
1545 - 1600	0	0	0	0	0	-	-	2	-	2	0	22	0	0	22	0	10	0	0	10	34
1600 - 1615	0	0	0	0	0	-	-	5	-	5	0	24	0	1	25	0	12	0	0	12	42
1615 - 1630	0	0	0	0	0	-	-	1	-	1	0	22	0	0	22	0	27	0	0	27	50
Total	0	0	0	0	0	0	0	12	0	12	2	91	0	4	97	0	64	1	0	65	174
Approach %	0,00	0,00	0,00	0,00	-	0,00	0,00	100,00	0,00	-	2,06	93,81	0,00	4,12	-	0,00	98,46	1,54	0,00	-	
PHF	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,60	0,00	**0,60**	0,25	0,95	0,00	0,33	**0,87**	0,00	0,59	0,25	0,00	**0,60**	**0,87**

Combination Trucks (8-13)

	Northbound					Southbound					Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr					US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
Time	Left 1.1	Thru 1.2	Right 1.3	U-Turn 1.4	App Total			Right 1.5		App Total	Left 1.6	Thru 1.7	Right 1.8	U-Turn 1.9	App Total	Left 1.10	Thru 1.11	Right 1.12	U-Turn 1.13	App Total	Int Total
1530 - 1545	0	0	0	0	0	-	-	0	-	0	1	37	0	0	38	0	58	0	0	58	96
1545 - 1600	0	0	0	0	0	-	-	0	-	0	0	33	0	1	34	0	40	0	0	40	74
1600 - 1615	0	0	0	0	0	-	-	1	-	1	0	47	0	0	47	0	59	0	0	59	107
1615 - 1630	0	0	0	0	0	-	-	0	-	0	0	33	0	1	34	0	37	0	0	37	71
Total	0	0	0	0	0	0	0	1	0	1	1	150	0	2	153	0	194	0	0	194	348
Approach %	0,00	0,00	0,00	0,00	-	0,00	0,00	100,00	0,00	-	0,65	98,04	0,00	1,31	-	0,00	100,00	0,00	0,00	-	
PHF	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,25	0,00	**0,25**	0,25	0,80	0,00	0,50	**0,81**	0,00	0,82	0,00	0,00	**0,82**	**0,81**

Pedestrians

	Northbound					Southbound					Eastbound					Westbound					
	Welsh Pkwy					Bob Foeller Dr					US-13 Portsmouth Blvd (West)					US-13 Portsmouth Blvd (East)					
Time	EB 1a	WB 1b			App Total	EB 1c	WB 1d			App Total	NB 1e	SB 1f			App Total	NB 1g	SB 1h			App Total	Int Total
1530 - 1545	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0
1545 - 1600	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0
1600 - 1615	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0
1615 - 1630	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0	0	-	-	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach %	0,00	0,00	0,00	0,00	-	0,00	0,00	0,00	0,00	-	0,00	0,00	0,00	0,00	-	0,00	0,00	0,00	0,00	-	
PHF	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	**0,00**	0,00	0,00	0,00	0,00	**0,00**	**0,00**

B

Appendix B – Synchro Reports

2020 No-Build Conditions

2020 No-Build Conditions

HCM 6th TWSC
1: Welsh Parkway/Bob Foeller Drive & US 13 (Portsmouth Boulevard)

Intersection	
Int Delay, s/veh	1.7

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↶	↑↑↱		↰	↑↑↑	↱		✥				
Traffic Vol, veh/h	18	19	3123	0	1	2545	25	0	0	0	0	0	0
Future Vol, veh/h	18	19	3123	0	1	2545	25	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	Yield	-	-	None	-	-	None
Storage Length	-	330	-	-	240	-	435	-	-	-	-	-	-
Veh in Median Storage, #	-	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	85	85	85	90	90	90	58	58	58
Heavy Vehicles, %	10	10	10	10	16	16	16	2	2	2	43	43	43
Mvmt Flow	22	23	3763	0	1	2994	29	0	0	0	0	0	0

Major/Minor	Major1				Major2			Minor1		
Conflicting Flow All	2186	2994	0	0	3763	0	0	5053	6849	1882
Stage 1	-	-	-	-	-	-	-	3853	3853	-
Stage 2	-	-	-	-	-	-	-	1200	2996	-
Critical Hdwy	5.8	5.5	-	-	5.62	-	-	5.74	6.54	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	6.64	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.04	5.54	-
Follow-up Hdwy	2.4	3.2	-	-	3.26	-	-	3.82	4.02	3.92
Pot Cap-1 Maneuver	84	33	-	-	11	-	-	2	0	52
Stage 1	-	-	-	-	-	-	-	3	10	-
Stage 2	-	-	-	-	-	-	-	223	31	-
Platoon blocked, %			-	-		-	-			
Mov Cap-1 Maneuver	47	47	-	-	11	-	-	0	0	52
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	0	0	-
Stage 1	-	-	-	-	-	-	-	0	0	-
Stage 2	-	-	-	-	-	-	-	203	0	-

Approach	EB	WB	NB
HCM Control Delay, s	3	0.1	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR
Capacity (veh/h)	-	47	-	-	11	-	-
HCM Lane V/C Ratio	-	0.948	-	-	0.107	-	-
HCM Control Delay (s)	0	252.8	-	-	$ 368.2	-	-
HCM Lane LOS	A	F	-	-	F	-	-
HCM 95th %tile Q(veh)	-	3.9	-	-	0.3	-	-

HCM 6th TWSC
1: Welsh Parkway/Bob Foeller Drive & US 13 (Portsmouth Boulevard)

Intersection	
Int Delay, s/veh	11.2

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↶	↑↑↱		↰	↑↑↑	↱		✥				
Traffic Vol, veh/h	31	16	2715	0	1	3794	11	0	0	0	0	0	0
Future Vol, veh/h	31	16	2715	0	1	3794	11	0	0	0	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	Yield	-	-	None	-	-	None
Storage Length	-	330	-	-	240	-	435	-	-	-	-	-	-
Veh in Median Storage, #	-	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	93	93	93	90	90	90	54	54	54
Heavy Vehicles, %	9	9	9	9	7	7	7	2	2	2	33	33	33
Mvmt Flow	34	17	2951	0	1	4080	12	0	0	0	0	0	0

Major/Minor	Major1				Major2			Minor1		
Conflicting Flow All	2978	4080	0	0	2951	0	0	4687	7135	1476
Stage 1	-	-	-	-	-	-	-	3053	3053	-
Stage 2	-	-	-	-	-	-	-	1634	4082	-
Critical Hdwy	5.78	5.48	-	-	5.44	-	-	5.74	6.54	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	6.64	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.04	5.54	-
Follow-up Hdwy	2.39	3.19	-	-	3.17	-	-	3.82	4.02	3.92
Pot Cap-1 Maneuver	~ 29	~ 8	-	-	37	-	-	3	0	99
Stage 1	-	-	-	-	-	-	-	11	29	-
Stage 2	-	-	-	-	-	-	-	128	8	-
Platoon blocked, %			-	-		-	-			
Mov Cap-1 Maneuver	~ 15	~ 15	-	-	37	-	-	0	0	99
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	0	0	-
Stage 1	-	-	-	-	-	-	-	0	0	-
Stage 2	-	-	-	-	-	-	-	125	0	-

Approach	EB	WB	NB
HCM Control Delay, s	26.5	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR
Capacity (veh/h)	-	~ 15	-	-	37	-	-
HCM Lane V/C Ratio	-	3.406	-	-	0.029	-	-
HCM Control Delay (s)	0	$ 1558.8	-	-	105.2	-	-
HCM Lane LOS	A	F	-	-	F	-	-
HCM 95th %tile Q(veh)	-	7.2	-	-	0.1	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

C

Appendix C – HCS Reports

2020 No-Build Conditions

2040 Build Conditions

2054 Build Conditions

2020 No-Build Conditions

HCS7 Freeway Weaving Report

Project Information

Analyst	HDR	Date	10/30/2020
Agency		Analysis Year	2020
Jurisdiction		Time Period Analyzed	AM Peak Hour
Project Description	SPSA Landfill Weave onto US 13/58/460		

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_s), ft	625	Number of Maneuver Lanes (N_{WL}), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	2
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	1816	5	2	765
Peak Hour Factor (PHF)	0.86	0.86	0.88	0.88
Total Trucks, %	16.00	16.00	6.00	6.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.862	0.862	0.943	0.943
Flow Rate (v_i), pc/h	2450	7	2	922

Weaving Flow Rate (v_w), pc/h	929	Freeway Max Capacity (c_{IFL}), pc/h/ln	2350
Non-Weaving Flow Rate (v_{NW}), pc/h	2452	Density-Based Capacity (c_{IWL}), pc/h/ln	2111
Total Flow Rate (v), pc/h	3381	Demand Flow-Based Capacity (c_{IW}), pc/h	12727
Volume Ratio (VR)	0.275	Weaving Segment Capacity (c_W), veh/h	7469
Minimum Lane Change Rate (LC_{MIN}), lc/h	14	Adjusted Weaving Area Capacity, pc/h	8444
Maximum Weaving Length (L_{MAX}), ft	3751	Volume-to-Capacity Ratio (v/c)	0.40

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	26	Average Weaving Speed (S_W),mi/h	60.6
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	73	Average Non-Weaving Speed (S_{NW}), mi/h	60.8
Weaving Lane Change Rate (LC_W), lc/h	141	Average Speed (S), mi/h	60.7
Weaving Lane Change Rate (LC_{All}), lc/h	214	Density (D), pc/mi/ln	13.9
Weaving Intensity Factor (W)	0.097	Level of Service (LOS)	B

HCS7 Freeway Weaving Report

Project Information

Analyst	HDR	Date	10/30/2020
Agency		Analysis Year	2020
Jurisdiction		Time Period Analyzed	PM Peak Hour
Project Description	SPSA Landfill Weave onto US 13/58/460		

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	625	Number of Maneuver Lanes (N_{WL}), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	2
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	2564	26	13	1292
Peak Hour Factor (PHF)	0.93	0.93	0.91	0.91
Total Trucks, %	7.00	7.00	5.00	5.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.935	0.935	0.952	0.952
Flow Rate (v_i), pc/h	2949	30	15	1491

Weaving Flow Rate (v_W), pc/h	1521	Freeway Max Capacity (c_{IFL}), pc/h/ln	2350
Non-Weaving Flow Rate (v_{NW}), pc/h	2964	Density-Based Capacity (c_{IWL}), pc/h/ln	2058
Total Flow Rate (v), pc/h	4485	Demand Flow-Based Capacity (c_{IW}), pc/h	10324
Volume Ratio (VR)	0.339	Weaving Segment Capacity (c_W), veh/h	7743
Minimum Lane Change Rate (LC_{MIN}), lc/h	60	Adjusted Weaving Area Capacity, pc/h	8232
Maximum Weaving Length (L_{MAX}), ft	4440	Volume-to-Capacity Ratio (v/c)	0.54

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	31	Average Weaving Speed (S_W),mi/h	58.6
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	179	Average Non-Weaving Speed (S_{NW}), mi/h	59.2
Weaving Lane Change Rate (LC_W), lc/h	187	Average Speed (S), mi/h	59.0
Weaving Lane Change Rate (LC_{All}), lc/h	366	Density (D), pc/mi/ln	19.0
Weaving Intensity Factor (W)	0.148	Level of Service (LOS)	B

2040 Build Conditions

HCS7 Freeway Weaving Report

Project Information

Analyst	HDR	Date	10/30/2020
Agency		Analysis Year	2040
Jurisdiction		Time Period Analyzed	AM Peak Hour
Project Description	US 13/58/460 from SPSA Driveway to US 13 Business	Unit	United States Customary

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (Ls), ft	3125	Number of Maneuver Lanes (NWL), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	2
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	0.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	2956	15	6	1243
Peak Hour Factor (PHF)	0.86	0.86	0.88	0.88
Total Trucks, %	16.00	16.00	6.00	6.00
Heavy Vehicle Adjustment Factor (fHV)	0.862	0.862	0.943	0.943
Flow Rate (vi), pc/h	3987	20	7	1498

Weaving Flow Rate (vW), pc/h	1518	Freeway Max Capacity (cIFL), pc/h/ln	2350
Non-Weaving Flow Rate (vNW), pc/h	3994	Density-Based Capacity (cIWL), pc/h/ln	2302
Total Flow Rate (v), pc/h	5512	Demand Flow-Based Capacity (cIW), pc/h	12727
Volume Ratio (VR)	0.275	Weaving Segment Capacity (cW), veh/h	8144
Minimum Lane Change Rate (LCMIN), lc/h	40	Adjusted Weaving Area Capacity, pc/h	9208
Maximum Weaving Length (LMAX), ft	3751	Volume-to-Capacity Ratio (v/c)	0.60

Speed and Density

Non-Weaving Vehicle Index (INW)	208	Average Weaving Speed (SW), mi/h	57.8
Non-Weaving Lane Change Rate (LCNW), lc/h	1746	Average Non-Weaving Speed (SNW), mi/h	58.1
Weaving Lane Change Rate (LCW), lc/h	415	Average Speed (S), mi/h	58.0
Weaving Lane Change Rate (LCAll), lc/h	2161	Density (D), pc/mi/ln	23.8
Weaving Intensity Factor (W)	0.169	Level of Service (LOS)	C

HCS7 Freeway Weaving Report

Project Information

Analyst	HDR	Date	10/30/2020
Agency		Analysis Year	2040
Jurisdiction		Time Period Analyzed	AM Peak Hour
Project Description	US 13/58/460 from US 13/58/460 EB Flyover to SPSA Landfill Entrance	Unit	United States Customary

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	1500	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4172	29	23	43
Peak Hour Factor (PHF)	0.85	0.85	0.58	0.58
Total Trucks, %	16.00	16.00	43.00	43.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.862	0.862	0.699	0.699
Flow Rate (v_i), pc/h	5694	40	57	106
Weaving Flow Rate (v_W), pc/h	146	Freeway Max Capacity (c_{IFL}), pc/h/ln		2350
Non-Weaving Flow Rate (v_{NW}), pc/h	5751	Density-Based Capacity (c_{IWL}), pc/h/ln		2248
Total Flow Rate (v), pc/h	5897	Demand Flow-Based Capacity (c_{IW}), pc/h		96000
Volume Ratio (VR)	0.025	Weaving Segment Capacity (c_W), veh/h		7723
Minimum Lane Change Rate (LC_{MIN}), lc/h	146	Adjusted Weaving Area Capacity, pc/h		8992
Maximum Weaving Length (L_{MAX}), ft	2827	Volume-to-Capacity Ratio (v/c)		0.66

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	144	Average Weaving Speed (S_W), mi/h	55.3
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1227	Average Non-Weaving Speed (S_{NW}), mi/h	56.9
Weaving Lane Change Rate (LC_W), lc/h	391	Average Speed (S), mi/h	56.9
Weaving Lane Change Rate (LC_{All}), lc/h	1618	Density (D), pc/mi/ln	25.9
Weaving Intensity Factor (W)	0.240	Level of Service (LOS)	C

HCS7 Freeway Weaving Report

Project Information

Analyst	HDR	Date	10/30/2020
Agency		Analysis Year	2040
Jurisdiction		Time Period Analyzed	PM Peak Hour
Project Description	US 13/58/460 from SPSA Driveway to US 13 Business	Unit	United States Customary

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	3125	Number of Maneuver Lanes (N_{WL}), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	2
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	4166	40	20	2102
Peak Hour Factor (PHF)	0.93	0.93	0.91	0.91
Total Trucks, %	7.00	7.00	5.00	5.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.935	0.935	0.952	0.952
Flow Rate (v_i), pc/h	4791	46	23	2426

Weaving Flow Rate (v_W), pc/h	2472	Freeway Max Capacity (c_{IFL}), pc/h/ln	2350
Non-Weaving Flow Rate (v_{NW}), pc/h	4814	Density-Based Capacity (c_{IWL}), pc/h/ln	2249
Total Flow Rate (v), pc/h	7286	Demand Flow-Based Capacity (c_{IW}), pc/h	10324
Volume Ratio (VR)	0.339	Weaving Segment Capacity (c_W), veh/h	8462
Minimum Lane Change Rate (LC_{MIN}), lc/h	92	Adjusted Weaving Area Capacity, pc/h	8996
Maximum Weaving Length (L_{MAX}), ft	4440	Volume-to-Capacity Ratio (v/c)	0.81

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	251	Average Weaving Speed (S_W), mi/h	57.3
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1915	Average Non-Weaving Speed (S_{NW}), mi/h	55.6
Weaving Lane Change Rate (LC_W), lc/h	467	Average Speed (S), mi/h	56.2
Weaving Lane Change Rate (LC_{All}), lc/h	2382	Density (D), pc/mi/ln	32.4
Weaving Intensity Factor (W)	0.182	Level of Service (LOS)	D

HCS7 Freeway Weaving Report

Project Information

Analyst	HDR	Date	10/30/2020
Agency		Analysis Year	2040
Jurisdiction		Time Period Analyzed	PM Peak Hour
Project Description	US 13/58/460 from US 13/58/460 EB Flyover to SPSA Landfill Entrance	Unit	United States Customary

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	1500	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	6219	51	20	25
Peak Hour Factor (PHF)	0.93	0.93	0.54	0.54
Total Trucks, %	7.00	7.00	33.00	33.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.935	0.935	0.752	0.752
Flow Rate (v_i), pc/h	7152	59	49	62

Weaving Flow Rate (v_W), pc/h	121	Freeway Max Capacity (c_{IFL}), pc/h/ln	2350
Non-Weaving Flow Rate (v_{NW}), pc/h	7201	Density-Based Capacity (c_{IWL}), pc/h/ln	2254
Total Flow Rate (v), pc/h	7322	Demand Flow-Based Capacity (c_{IW}), pc/h	141176
Volume Ratio (VR)	0.017	Weaving Segment Capacity (c_W), veh/h	8415
Minimum Lane Change Rate (LC_{MIN}), lc/h	121	Adjusted Weaving Area Capacity, pc/h	9016
Maximum Weaving Length (L_{MAX}), ft	2753	Volume-to-Capacity Ratio (v/c)	0.81

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	180	Average Weaving Speed (S_W), mi/h	54.3
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1526	Average Non-Weaving Speed (S_{NW}), mi/h	55.3
Weaving Lane Change Rate (LC_W), lc/h	366	Average Speed (S), mi/h	55.3
Weaving Lane Change Rate (LC_{All}), lc/h	1892	Density (D), pc/mi/ln	33.1
Weaving Intensity Factor (W)	0.271	Level of Service (LOS)	D

2054 Build Conditions

HCS7 Freeway Weaving Report

Project Information

Analyst	HDR	Date	10/30/2020
Agency		Analysis Year	2054
Jurisdiction		Time Period Analyzed	AM Peak Hour
Project Description	US 13/58/460 from SPSA Driveway to US 13 Business	Unit	United States Customary

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (Ls), ft	3125	Number of Maneuver Lanes (NWL), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	2
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	0.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	4177	15	7	1757
Peak Hour Factor (PHF)	0.86	0.86	0.88	0.88
Total Trucks, %	16.00	16.00	6.00	6.00
Heavy Vehicle Adjustment Factor (fHV)	0.862	0.862	0.943	0.943
Flow Rate (vi), pc/h	5635	20	8	2117

Weaving Flow Rate (vw), pc/h	2137	Freeway Max Capacity (cIFL), pc/h/ln	2350
Non-Weaving Flow Rate (vNW), pc/h	5643	Density-Based Capacity (cIWL), pc/h/ln	2302
Total Flow Rate (v), pc/h	7780	Demand Flow-Based Capacity (cIW), pc/h	12727
Volume Ratio (VR)	0.275	Weaving Segment Capacity (cW), veh/h	8144
Minimum Lane Change Rate (LCMIN), lc/h	40	Adjusted Weaving Area Capacity, pc/h	9207
Maximum Weaving Length (LMAX), ft	3751	Volume-to-Capacity Ratio (v/c)	0.85

Speed and Density

Non-Weaving Vehicle Index (INW)	294	Average Weaving Speed (SW), mi/h	57.0
Non-Weaving Lane Change Rate (LCNW), lc/h	2086	Average Non-Weaving Speed (SNW), mi/h	55.4
Weaving Lane Change Rate (LCW), lc/h	415	Average Speed (S), mi/h	55.8
Weaving Lane Change Rate (LCAll), lc/h	2501	Density (D), pc/mi/ln	34.9
Weaving Intensity Factor (W)	0.190	Level of Service (LOS)	D

HCS7 Freeway Weaving Report

Project Information

Analyst	HDR	Date	10/30/2020
Agency		Analysis Year	2054
Jurisdiction		Time Period Analyzed	AM Peak Hour
Project Description	US 13/58/460 from US 13/58/460 EB Flyover to SPSA Landfill Entrance	Unit	United States Customary

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	1500	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	5894	42	27	47
Peak Hour Factor (PHF)	0.85	0.85	0.58	0.58
Total Trucks, %	16.00	16.00	43.00	43.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.862	0.862	0.699	0.699
Flow Rate (v_i), pc/h	8044	57	67	116

Weaving Flow Rate (v_W), pc/h	173	Freeway Max Capacity (c_{IFL}), pc/h/ln	2350
Non-Weaving Flow Rate (v_{NW}), pc/h	8111	Density-Based Capacity (c_{IWL}), pc/h/ln	2251
Total Flow Rate (v), pc/h	8284	Demand Flow-Based Capacity (c_{IW}), pc/h	114286
Volume Ratio (VR)	0.021	Weaving Segment Capacity (c_W), veh/h	7739
Minimum Lane Change Rate (LC_{MIN}), lc/h	173	Adjusted Weaving Area Capacity, pc/h	9004
Maximum Weaving Length (L_{MAX}), ft	2790	Volume-to-Capacity Ratio (v/c)	0.92

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	203	Average Weaving Speed (S_W), mi/h	53.5
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	1713	Average Non-Weaving Speed (S_{NW}), mi/h	53.8
Weaving Lane Change Rate (LC_W), lc/h	418	Average Speed (S), mi/h	53.8
Weaving Lane Change Rate (LC_{All}), lc/h	2131	Density (D), pc/mi/ln	38.5
Weaving Intensity Factor (W)	0.298	Level of Service (LOS)	E

HCS7 Freeway Weaving Report

Project Information

Analyst	HDR	Date	10/30/2020
Agency		Analysis Year	2054
Jurisdiction		Time Period Analyzed	PM Peak Hour
Project Description	US 13/58/460 from SPSA Driveway to US 13 Business	Unit	United States Customary

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (Ls), ft	3125	Number of Maneuver Lanes (NWL), ln	3
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	2
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	0
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	0.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	5881	44	23	2975
Peak Hour Factor (PHF)	0.93	0.93	0.91	0.91
Total Trucks, %	7.00	7.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.935	0.935	0.952	0.952
Flow Rate (vi), pc/h	6763	51	27	3434

Weaving Flow Rate (vw), pc/h	3485	Freeway Max Capacity (cIFL), pc/h/ln	2350
Non-Weaving Flow Rate (vNW), pc/h	6790	Density-Based Capacity (cIWL), pc/h/ln	2249
Total Flow Rate (v), pc/h	10275	Demand Flow-Based Capacity (cIW), pc/h	10324
Volume Ratio (VR)	0.339	Weaving Segment Capacity (cW), veh/h	8462
Minimum Lane Change Rate (LCMIN), lc/h	0	Adjusted Weaving Area Capacity, pc/h	8996
Maximum Weaving Length (LMAX), ft	4440	Volume-to-Capacity Ratio (v/c)	1.14

Speed and Density

Non-Weaving Vehicle Index (INW)	-	Average Weaving Speed (SW), mi/h	-
Non-Weaving Lane Change Rate (LCNW), lc/h	-	Average Non-Weaving Speed (SNW), mi/h	-
Weaving Lane Change Rate (LCW), lc/h	-	Average Speed (S), mi/h	-
Weaving Lane Change Rate (LCAll), lc/h	-	Density (D), pc/mi/ln	-
Weaving Intensity Factor (W)	-	Level of Service (LOS)	F

HCS7 Freeway Weaving Report

Project Information

Analyst	HDR	Date	10/30/2020
Agency		Analysis Year	2054
Jurisdiction		Time Period Analyzed	PM Peak Hour
Project Description	US 13/58/460 from US 13/58/460 EB Flyover to SPSA Landfill Entrance	Unit	United States Customary

Geometric Data

Number of Lanes (N), ln	4	Segment Type	Freeway
Segment Length (L_S), ft	1500	Number of Maneuver Lanes (N_{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC_{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC_{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC_{RR}), lc	0
Interchange Density (ID), int/mi	0.17	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V_i), veh/h	8786	72	22	27
Peak Hour Factor (PHF)	0.93	0.93	0.54	0.54
Total Trucks, %	7.00	7.00	33.00	33.00
Heavy Vehicle Adjustment Factor (f_{HV})	0.935	0.935	0.752	0.752
Flow Rate (v_i), pc/h	10104	83	54	66

Weaving Flow Rate (v_W), pc/h	149	Freeway Max Capacity (c_{IFL}), pc/h/ln	2350
Non-Weaving Flow Rate (v_{NW}), pc/h	10158	Density-Based Capacity (c_{IWL}), pc/h/ln	2256
Total Flow Rate (v), pc/h	10307	Demand Flow-Based Capacity (c_{IW}), pc/h	171429
Volume Ratio (VR)	0.014	Weaving Segment Capacity (c_W), veh/h	8426
Minimum Lane Change Rate (LC_{MIN}), lc/h	0	Adjusted Weaving Area Capacity, pc/h	9024
Maximum Weaving Length (L_{MAX}), ft	2725	Volume-to-Capacity Ratio (v/c)	1.14

Speed and Density

Non-Weaving Vehicle Index (I_{NW})	-	Average Weaving Speed (S_W), mi/h	-
Non-Weaving Lane Change Rate (LC_{NW}), lc/h	-	Average Non-Weaving Speed (S_{NW}), mi/h	-
Weaving Lane Change Rate (LC_W), lc/h	-	Average Speed (S), mi/h	-
Weaving Lane Change Rate (LC_{All}), lc/h	-	Density (D), pc/mi/ln	-
Weaving Intensity Factor (W)	-	Level of Service (LOS)	F

D

Appendix D – SPSA Growth Projections

Southeastern Public Service Authority
Regional Landfill
Material and Traffic Summary

Annual Waste Growth	**0.8%**	Latest Demonstration of Need Assumption
Projected 2040 Total MSW Tonnage[8]	**527,744**	
Total 2040 Estimated Tonnage[11]	**573,591**	
Projected 2040 MSW Tonnage Through Transfer Stations[9]	**477,527**	
Total 2020 Estimated Trip Count (excluding employees/visitors)	**76,567**	
Total 2020 Estimated Tonnage[11]	**308,772**	

	2020 Conditions			2040		
	Estimated Total Yearly Count	Estimated Total Tons to LF	Estimated Trips/Day[6]	Estimated Total Yearly Count	Estimated Total Tons to LF	Estimated Trips/Day[6]
SPSA Employees/Visitors[3]	6,240	0	20	9,360	0	30
Transfer Station						
Residential Vehicles[5]	36,326	3,633	127.0	42,602	4,260	149.0
Suffolk Curbside Packers[5]	7,221	42,820	34.7	8,468	50,217	40.7
Landfill and Processing Facilities						
Ash Roll Offs[5][7]	7,093	152,486	24.8	0	0	0
100 CY MSW Trailers[1]	1,794	35,873	6.3	23,876	477,527	83.5
Small Trucks/Trailers - Tires, White Goods, HHW[10]	8,929	N/A	31.2	10,471	N/A	36.6
Clearfield MMG[4]	5,040	N/A	17.6	5,911	N/A	20.7
Clean Fill Dump Trucks/Trailers[2,5]	233	2,848	0.8	273	3,340	1.0
Other Roll-off/Dump Truck Waste[12][13]	9,933	73,960	34.7	5,136	38,247	18.0
TOTAL	**82,807**	**311,620**	**297**	**106,097**	**573,591**	**379**

1. Assumes 20 ton/100 CY trailer on average
2. Most soil required for landfill construction/operations assumed to be obtained from on-site borrow areas. Quantity assumed to be constant and not dependent on population increase.
3. Assumes that with larger MSW LF operation, additional operators are required in 2040.
4. Clearfield MMG traffic includes soil delivered to facility and not landfilled as waste.
5. Based on historical data for average tons per load.
6. Assumes 6 days per week LF operation. Suffolk collection is 4 days/week. Suffolk TS is operated 5.5 days/week.
7. All WTE ash assumed to be converted to 100 CY MSW trailers in June 2027. Ash residue from Wheelabrator disposed at alternate location.
8. Assumes WTE stops operation in June 2027 and 0.8% annual growth rate for MSW generation (from Demonstration of Need).
9. Projected 2040 tonnage through transfer stations assumed to be total projected 2040 MSW tonnage - tonnage from Suffolk via direct haul using packer trucks.
10. Household hazardous waste tonnage information not available.
11. From Demonstration of Need
12. For 2020, assumed to be the remainder between Total 2020 estimated Tonnage of Ash and MSW and sum of Total Tons listed above.
13. For 2040, number of trips projected based on 0.8% annual growth rate from 2020.