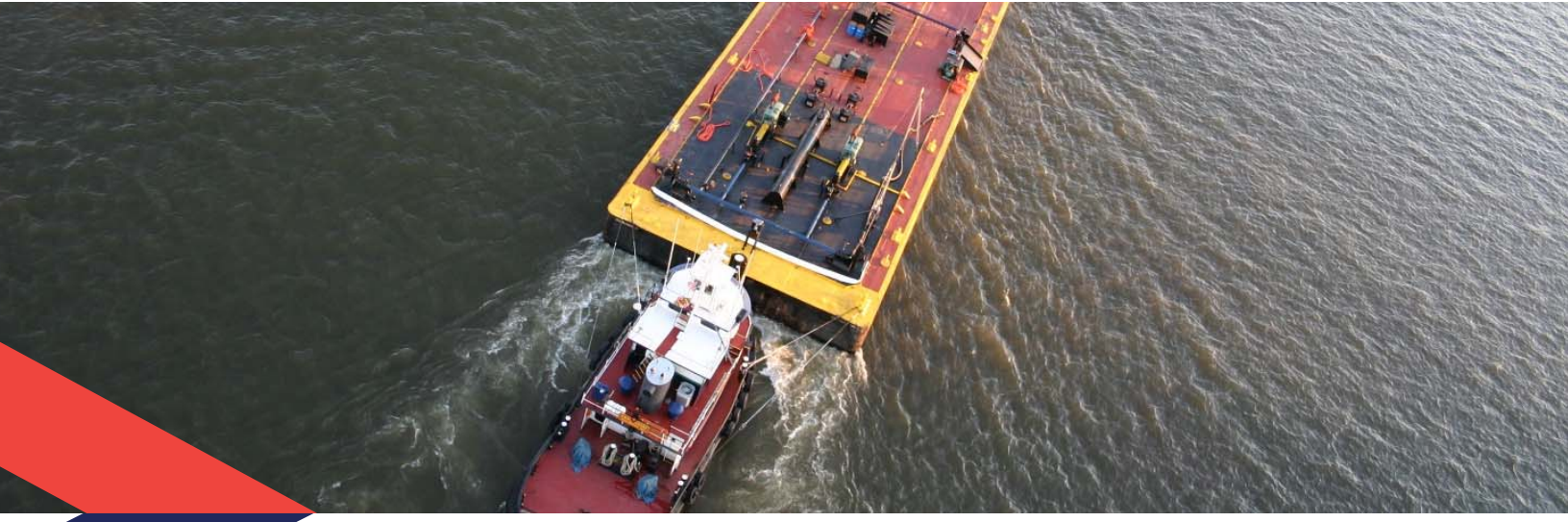

FINAL REPORT

Salisbury Port Feasibility Study

Prepared for:

The City of Salisbury, Maryland

Prepared by:

In association with:

This study was made possible by funding from:

US Economic Development Administration

Salisbury – Wicomico Metropolitan Planning Organization

Vane Brothers

Chesapeake Shipbuilding

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Prepared in cooperation with the United States Department of Transportation, Federal Highway Administration and Federal Transit Administration.

Salisbury Port Feasibility Study

The Salisbury Port Feasibility Study seeks to determine the general economic and physical feasibility of a multi-user port facility in Salisbury, and if feasible, its potential benefits for Salisbury and Delmarva peninsula businesses.

Acknowledgements

The CPCS Team acknowledges and is thankful for the input of those consulted, as well as the guidance and the input of representatives from the City of Salisbury and the Steering Committee.

Opinions and Limitations

Unless otherwise indicated, the opinions herein are those of the authors and do not necessarily reflect the views of the City of Salisbury.

CPCS makes efforts to validate data obtained from third parties, but CPCS cannot warrant the accuracy of these data.

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Cover image: iStock

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Acronyms / Abbreviations

AADT	Annual Average Daily Traffic
BUILD	Better Utilizing Investment to Leverage Development
CBECS	Commercial Buildings Energy Consumption Survey
CCS	Capital Construction Fund
CMAQ	Congestion Mitigation and Air Quality Improvement Program
CRF	Construction Reserve Fund
DNR	Department of Natural Resources
EIA	Energy Information Administration
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GDP	Gross Domestic Product
GHG	Greenhouse Gas
LQ	Location Quotient
MARAD	US Maritime Administration
MPO	Metropolitan Planning Organization
MSA	Metropolitan Statistical Area
NAICS	North American Industrial Classification System
NOAA	National Oceanic and Atmospheric Administration
NOx	Nitrogen Oxides
NS	Norfolk Southern Railroad
NTAD	National Transportation Atlas Database
PM	Particulate Matter
PSGP	Port Security Grant Program
QCEW	Quarterly Census of Employment and Wages
ROM	Rough Order of Magnitude
RTE	Right to Exist
SF	Square Feet
SHA	Maryland State Highway Administration
SMA	Salisbury Metropolitan Area
SOx	Sulfur Dioxides
STIP	State Transportation Improvement Plan
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TBD	To Be Determined
TIP	Transportation Improvement Program
USACE	US Army Corps of Engineers
USDOT	US Department of Transportation

Executive Summary

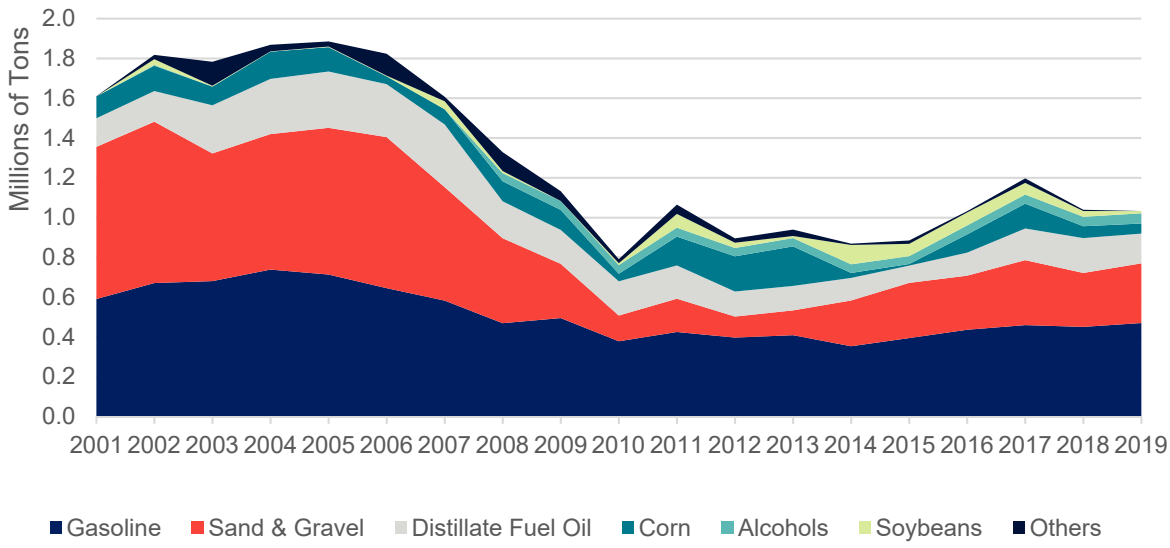
Project Background

The Delmarva Freight Plan identified Salisbury as a freight hub for the southern Delmarva peninsula, and Salisbury's port terminals are key links in supply chains for fuel, aggregate, and agricultural products. However, port traffic has declined since the early 2000s, reaching a recent low point following the 2008 recession. Given the cost benefits of maritime shipping for large or bulk cargo, and potential economic benefits associated with a greater choice of shipping options for businesses, the City of Salisbury and its partners are interested in the development of a multi-user port facility that could serve multiple industries and multiple cargoes. This project sought to determine the market demand and physical feasibility of a potential multi-user or multi-cargo port terminal in the Salisbury area.

Current Port Assets

Salisbury currently has six privately-owned maritime terminals or facilities. In 2019, these facilities handled just over a million tons of cargo. Figure ES-1 illustrates tonnage at the port over the past 20 years.

Figure ES-1: Commercial Tonnage at the Port of Salisbury



Source: CPCS analysis of US Army Corps of Engineers Waterborne Commerce Statistics data. 2021.

A key maritime asset for Salisbury is the navigation channel of the Wicomico River, which is maintained by regular dredging. This dredging work is supported by the US Army Corps of Engineers and is critical for facilitating commercial navigation on the river. The US Army Corps of Engineers designates navigational projects that support more than 1 million tons each year as "economically significant" and provides more consistent dredging support for these projects. Therefore, ensuring that tonnage remains over 1 million tons each year is an important consideration for sustained support of Salisbury's marine transportation system.

What Port Development Can and Can't do for Salisbury

Based on an analysis of commodity trends in the Salisbury area and consultations with water-served industries, there are regional businesses that may be interested in using a new multi-user port terminal in Salisbury. These industries include aggregate and agricultural products. Given the complex dynamics of port development, Salisbury has an important role to play as a coordinator among potential users of a multi-user port facility. If the City chooses to develop a multi-user port terminal, some potential benefits are possible:

- **Support for community redevelopment**. Relocation of some cargo handling facilities on the North Prong helps frees up land for further redevelopment or preservation.
- **Enable growth at existing businesses.** Some maritime users in Salisbury have expressed interest in increasing the volume of commodities they move or expanding their scope of operations if additional space is available.
- **Preserve cost-effective and energy-efficient supply chains**. Continued maritime operations on the Wicomico River depend on adequate dredging, and sustaining dredging through adequate tonnage will ensure that Salisbury's water-served businesses continue to have access to maritime shipping. This maritime shipping option is more cost- and energy-efficient than comparable trucking or rail transportation.
- **Preserve activity and employment in other water-related businesses**. Other local businesses such as Chesapeake Shipbuilding and Murtech also rely on the good maintenance of the Wicomico River's navigational channels to support inbound and outbound vessel movements.

Recommendations

If the City of Salisbury wishes to engage in port development to unlock the opportunities above, it should consider the following approaches:

Policies

Salisbury should adopt **a formal maritime policy** that clearly defines the City's role in supporting the maritime system in Salisbury and the goals that its actions are intended to achieve.

Partnerships

Salisbury should **create a port administration** or authority organization to guide development and **coordinate funding** through the pursuit of state or federal grants.

Programs

A multi-user marine facility accessible to all users requires public ownership, which also then mandates the **development of a port administration** to manage the infrastructure and coordinate between users.

Projects

Secure grant support and private agreements to support **construction of cargo handling, site, and access road improvements** at a proposed site on Marine Road.

Potential Impacts and Benefits of Port Development

Potential benefits can only be realized through investment. Based on preliminary engineering work, a multi-user port terminal on Marine Road that supports the movement of dry bulk cargo would require an upfront capital investment of about $22.8 million. This investment includes improvements to the site, waterfront mooring area construction, and improvements to Marine Road. In addition to this investment, an estimated $271,000 per year would be needed to support the work of a port administration to manage the property and conduct business development.

The creation of the port facility is expected to increase tonnage handled at Salisbury between 50,000 and 125,000 tons per year. In turn, this increase in tonnage would generate between 2,000 and 4,700 additional truck trips each year. Additional truck and barge traffic would impact residents who live near the port and Marine Road, and improvements to Marine Road have been proposed to mitigate some truck traffic impacts.

In exchange for this investment and the impacts of additional truck and barge traffic, the City can expect to unlock a variety of opportunities and benefits. Many of the potential benefits of the multi-user port facility relate to the expected increase in tonnage and its role in sustaining tonnage at a level that ensures regular US Army Corps of Engineers' support for dredging. If river shipping was not an option, cargo currently handled by barge would generate between 38,000 to 40,700 additional longer-distance truck trips on the Delmarva Peninsula each year. Moving cargo by truck and rail is less energy-efficient than barge shipping and would result in more emissions, more spills, damage to road infrastructure, and higher commodity prices for residents. Preserving water transportation and dredging support will also preserve employment for over 100 employees at firms that currently use water transportation.

In addition to these avoided impacts, the City could expect to see opportunities for small near-term employment growth, increased land values and tax receipts from the opportunity to redevelop the North Prong, as well as greater longer-term employment growth at other water-served industries like Chesapeake Shipbuilding.

1 Salisbury's Port Operations

Key Chapter Takeaway

Salisbury's current port serves industries that rely on the affordable movement of dry and liquid bulk materials to support their operations, particularly fuel, aggregate, and agricultural products. Tonnage handled at the port has fallen over the past two decades, and was slightly above 1 million tons in 2019. This 1-million-ton threshold is important because ports with less than 1 million tons of annual cargo may receive less dredging support from the US Army Corps of Engineers, making long-term commercial navigation difficult or eventually impossible.

1.1 Project Background

The Delmarva Freight Plan identified Salisbury as a freight hub for the southern Delmarva peninsula, and its port terminals are key links in supply chains for fuel, aggregate, and agricultural products. However, port traffic has declined since the early 2000s, reaching a recent low point following the 2008 recession. Maritime shipping is useful for moving large or bulk low-value cargo and provides potential economic benefits associated with greater transportation choices for businesses. Therefore, the City of Salisbury and its partners were interested in understanding the value of the development of a multi-user port facility that could serve multiple industries or cargo types.

This project sought to determine the market demand and physical feasibility of a potential multi-user or multi-cargo port terminal in the Salisbury area.

The development of this report was supported by the following groups, whose representatives provided guidance on project development, feedback on intermediate deliverables, and contacts for stakeholder consultations.

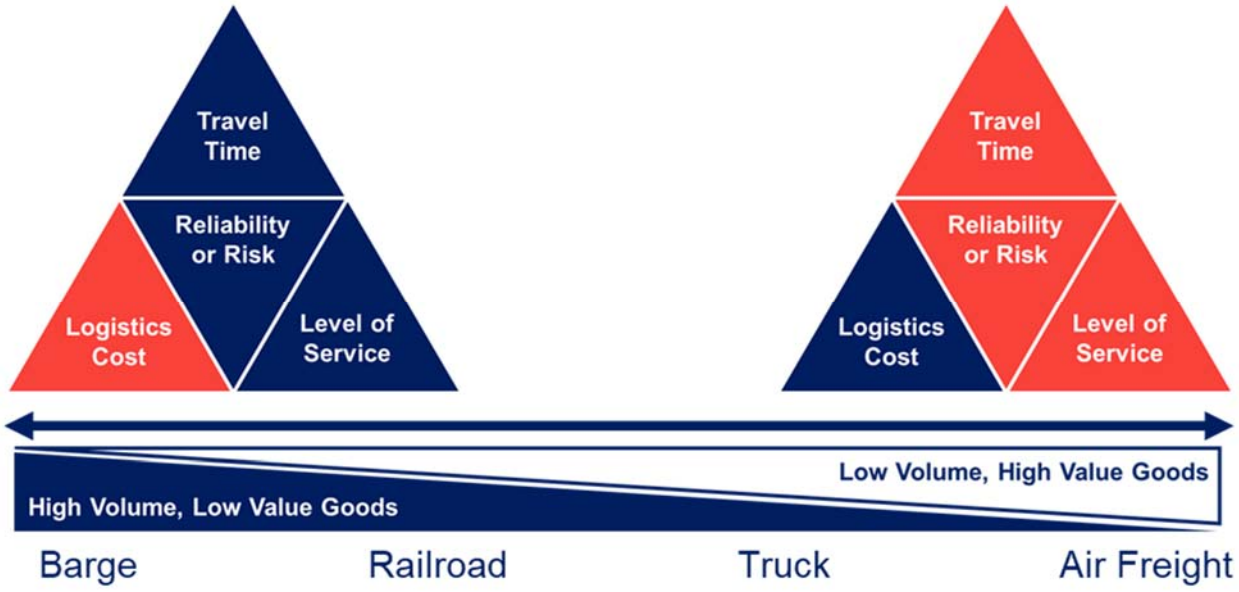
- Delmarva Water Transport Committee
- Greater Salisbury Committee
- Salisbury Area Chamber of Commerce
- Salisbury-Wicomico Economic Development Inc.
- Salisbury/Wicomico Metropolitan Planning Organization
- Tri-County Council for the Lower Eastern Shore of Maryland

1.2 The Role of Maritime Transportation in Freight and Logistics

Understanding maritime shipping's strengths and weaknesses provides context for further discussions about its role in Salisbury and Delmarva's supply chains, and growth opportunities. Generally, since maritime transportation is slower than trucking but has a higher weight capacity, it is most relevant to industries that ship or receive large or bulky goods with a relatively low value per ton.

Figure 1 illustrates maritime transportation's value for shippers and shows how freight transportation options exist on a service "spectrum" based on shippers' needs and the characteristics of their cargo. Shippers must balance logistics costs against other factors such as travel time, reliability of service, and level of service. On the right side of the spectrum, where reliability, travel speed, and level of service are most important, shippers use air cargo and premium trucking services. However, shippers must pay a premium for these services, making them relevant for high-value commodities such as pharmaceuticals and electronics, where high shipping costs will have a relatively smaller impact on the overall cost of the good for the end-user. On the left side of the spectrum, where per-ton logistics cost is very important, shippers favor barges or bulk rail service to move heavy, bulky, and low unit-cost materials such as aggregates, grain, and fuel. In this case, shipments may move more slowly.

Figure 1: The Freight Transportation Service "Spectrum"



Source: CPCS

Maritime transportation is primarily used for the shipment of bulky, low-value goods, or goods too large to easily travel by road or railroad.

The shipping patterns of Salisbury's water-served businesses reflect this freight decision-making process, as current terminal users on the Wicomico River are focused on high-volume dry and liquid bulk materials such as liquid fuels, aggregates such as stone and gravel, and agricultural products. The set of freight trade-offs illustrated above also means that future users of the water transportation system are most likely to be businesses that produce or consume large volumes of lower-value goods, or businesses that ship or receive goods too large or heavy to be easily moved by truck.

1.3 Salisbury's Port Assets and Users

The marine terminals that comprise the Port of Salisbury are in downtown Salisbury, adjacent to the central business district. The port area consists of a total of 2.25 miles of waterfront along the Wicomico River. The port is comprised of two distinct sections: the main branch of the Wicomico

River, which is home to most barge terminals, and the upper section (North Prong) which is home to two marine facilities. Maritime operations in the North Prong are limited by its small turning basin and navigation constriction created by drawbridges on Main Street and Salisbury Parkway. Figure 2 lists the terminal names or operators, and their main activities. Figure 4 on the following page illustrates the extent of the port area, as well as the port's terminals and major local roads. Figure 5 shows the larger market area around Salisbury, which is discussed in Appendix A.

Figure 2: Salisbury Barge Terminals and their Commodities or Activities

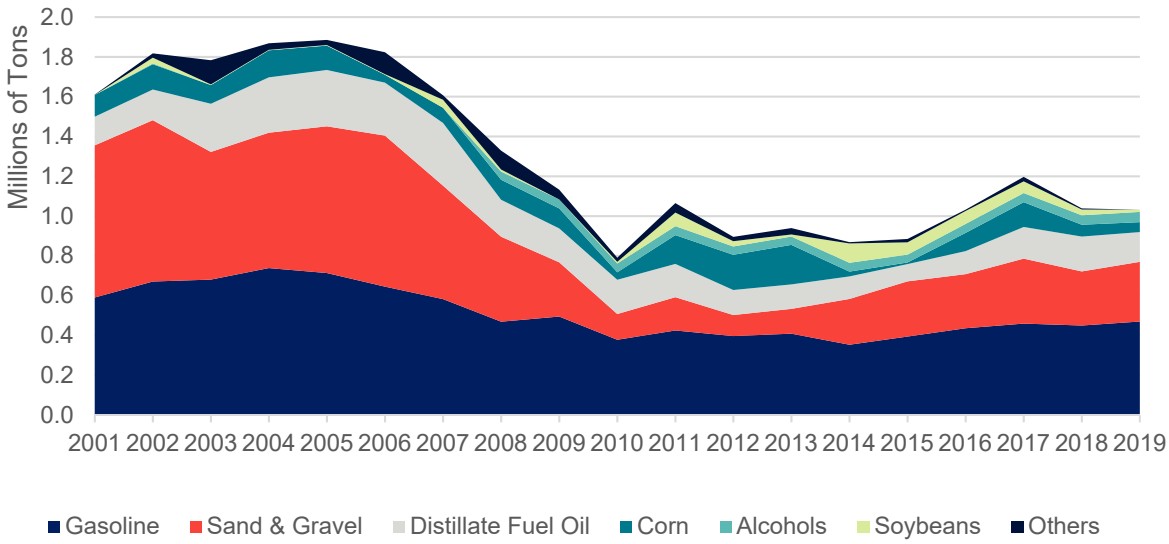
Terminal Name	Key Commodities or Activities
Apex Oil / Centerpoint Terminal	Gasoline, Fuel Heating Oil
Cato Oil	Gasoline, Fuel Heating Oil
Chesapeake Shipbuilding	Ship Construction
Murtech Marine	Marine Construction and Consulting
Perdue Agribusiness	Animal Feed
Vulcan Materials	Stone, Sand, Crushed Rock, Cement

Source: USACE and CPCS Analysis

1.4 Salisbury's Port Traffic and Trends

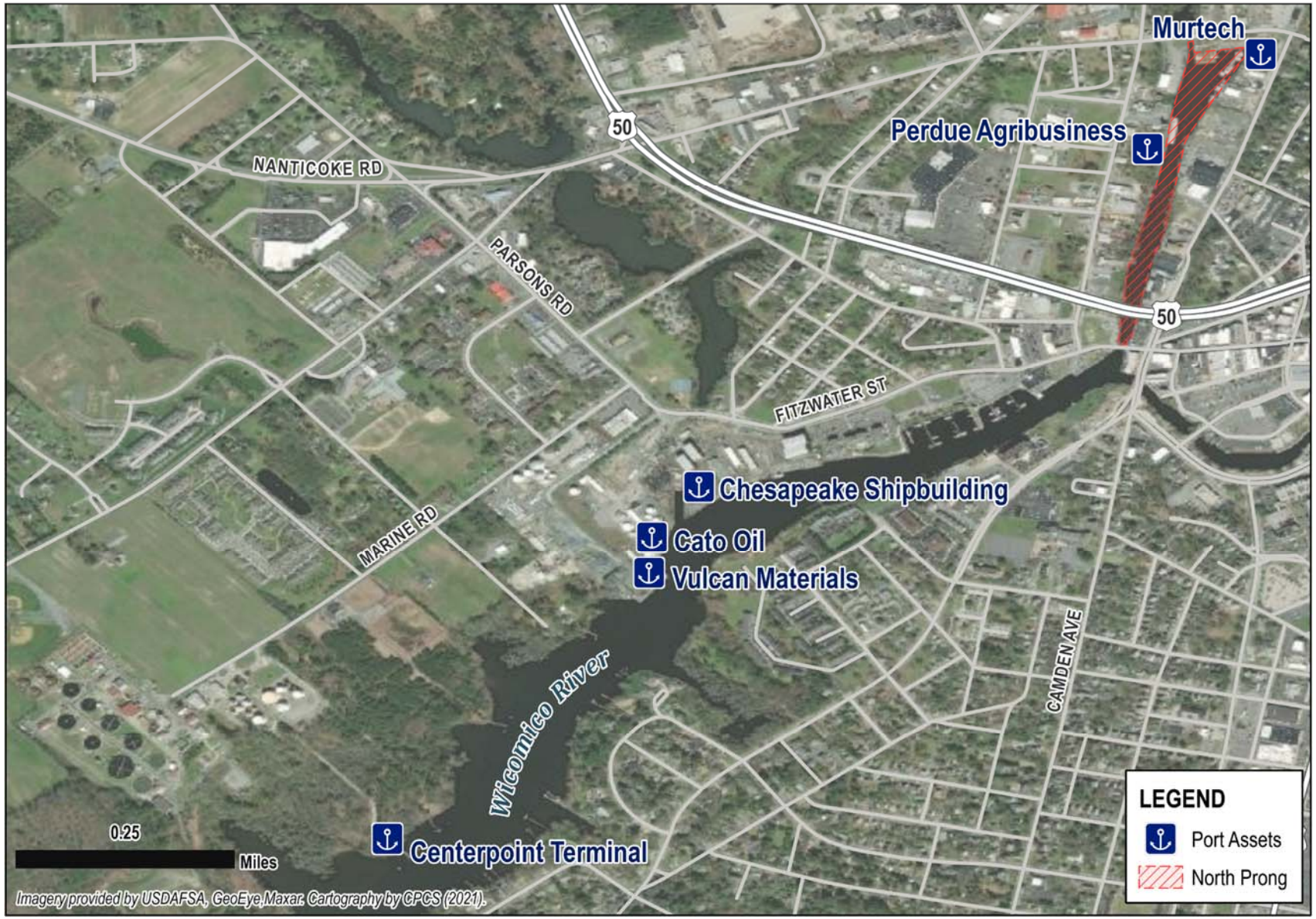
From 2001 to 2019 the Port of Salisbury handled an average of approximately 1.3 million short tons of cargo per year. Salisbury's tonnage exhibited a downward trend during the early 2000s but has remained relatively stable with slow growth since the Great Recession. Notable in Figure 3 is the decline of sand and gravel seen in 2007-2009 as construction slowed nationwide due to the 2008 housing crisis and economic downturn. These conditions caused an overall decline in total tons shipped; however, shipping volumes have stabilized, and tonnage has remained constant since 2010, even showing a slight trend upwards in recent years. It is yet to be seen how the economic disruptions caused by the coronavirus pandemic in 2020 will affect future commodity outlook.

Figure 3: Total Commodities Handled at Port of Salisbury



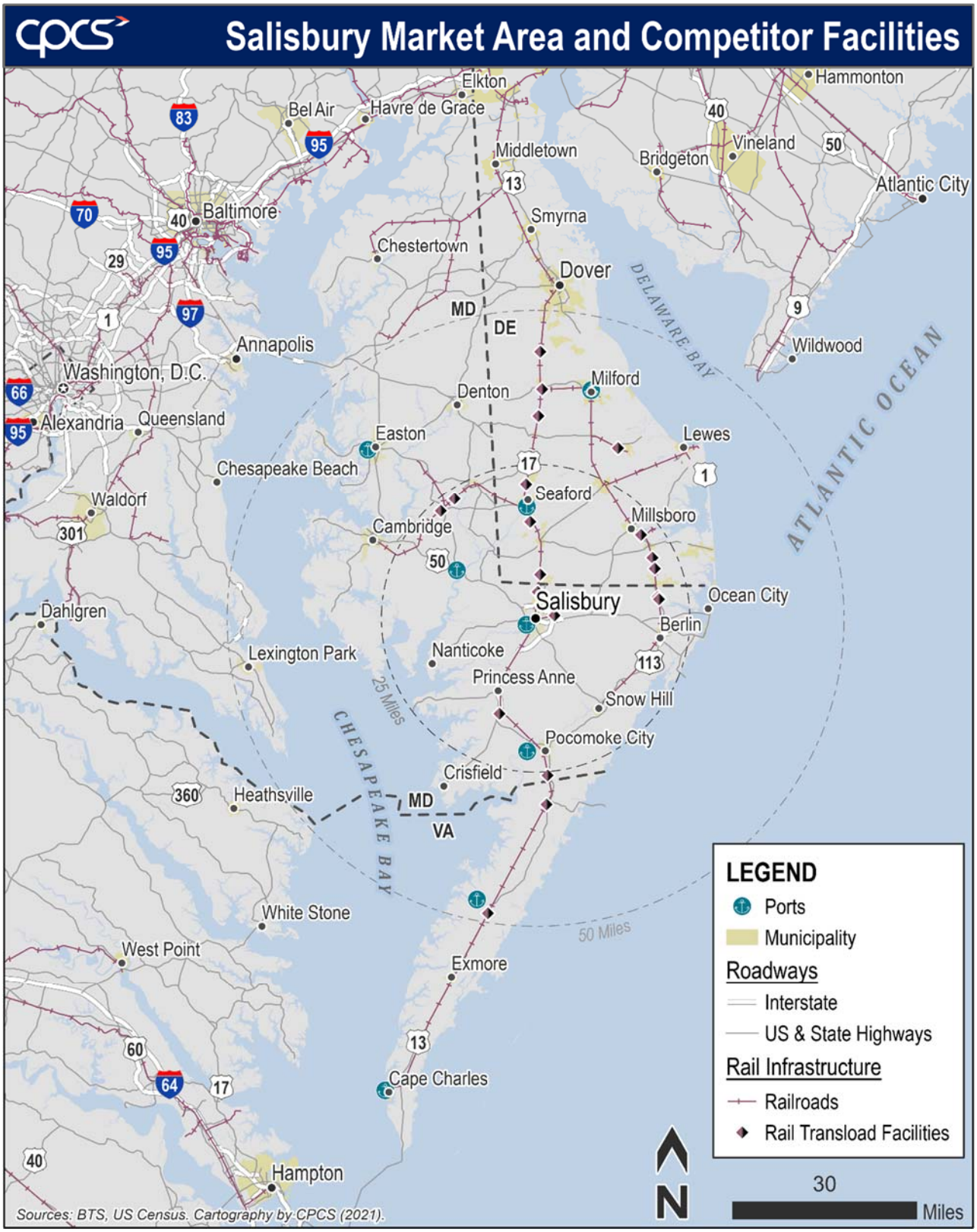
Source: CPCS analysis of US Army Corps of Engineers Waterborne Commerce Statistics data. 2021.

Figure 4: Salisbury's Port Assets



Source: CPCS.

Figure 5: Salibury Market Area and Potential Competitor Facilities



Tonnage Requirements for Dredging Support

In addition to the infrastructure shown in Figure 4, shipping in Salisbury is made possible thanks to dredging work supported by the US Army Corps of Engineers. The Wicomico River is a shallow-draft river, and this dredging makes the river channel deep and wide enough to support commercial navigation for barges. However, the channel to shallow and twisting to support larger, deeper vessels.

The US Army Corps of Engineers makes decisions about dredging projects based on a variety of factors, including the volume of freight movement supported by a dredging project. Ports that handle less than one million tons annually are not considered "economically significant" by the Corps of Engineers, and are at a competitive disadvantage against larger ports when the feasibility and expected benefits of dredge projects are evaluated by the Corps.

This 1 million-ton threshold for "economic significance" is highly relevant to Salisbury, as the port's tonnage dropped below 1 million tons during and after the Great Recession, but has since recovered. If dredging support was not available, ongoing sediment deposition in the river could hinder commercial navigation or ultimately prevent commercial navigation entirely.

Figure 6 presents the tonnage and share of various commodities handled during the 2001-2019 period. The largest share of commodities is gasoline and fuel oils, which highlights Salisbury's importance as a fuel distribution hub for the surrounding region. These fuel products are handled by Cato Oil and Apex Oil at two terminals on the river, and together these commodities account for nearly half of the tonnage handled at the port. The next largest port user is Vulcan materials, which imports aggregate for construction projects.

Fuel and aggregate make up the majority of Salisbury's port tonnage.

Figure 6: Salisbury's Top Waterborne Commodities, 2001-2019

Commodity	Sum of Short Tons 2001-2019	Share
Gasoline	9,757,950	40%
Sand & Gravel	7,868,394	32%
Distillate Fuel Oil	3,423,501	14%
Corn	1,824,563	7%
Soybeans	535,465	2%
Alcohols	528,668	2%
Other	659,762	3%
Total	**24,598,303**	**100%**

Source: CPCS analysis of US Army Corps of Engineers Waterborne Commerce Statistics data. 2021.

2 Port Development Opportunities

Key Chapter Takeaway

Engaging in port development can provide Salisbury with the chance to accomplish a variety of potentially-beneficial goals, including: supporting growth at existing businesses, mitigating the threat of losing Army Corps' dredging support and the negative transportation impacts that loss would create, and freeing up port-related land on the North Prong for redevelopment. However, the City must also consider of the potential impacts of port development on residents, and economic forces that could alter demand for some of the port's major commodities in the future. A particularly important near-term opportunity is the City's potential role to act as a coordinator for shared facility development among existing port users.

2.1 Introduction

Before exploring how and why Salisbury could engage in port development, it is important to understand the area's port-relevant strengths, weaknesses, opportunities, and threats (SWOT). These SWOT elements are a structured approach to exploring the major factors that could impact how Salisbury could engage in port development, and what factors or trends might lie outside of the control of the City or the port's current users.

Figure 7: Strengths, Weaknesses, Opportunities, and Threats Matrix

	Helpful (to achieving goals)	**Harmful** (to achieving goals)
Internal (attributes of City and assets)	**Strengths**	**Weaknesses**
External (attributes of economy, environment, etc)	**Opportunities**	**Threats**

The SWOT elements discussed here were identified based on the varied information collected during the creation of this report, including data analysis, consultations with water transportation stakeholders, and feedback from the City and Steering Committee.

2.2 Strengths

Strengths are internal factors that give Salisbury and its port facilities an advantage over other communities or ports. The major port-related strengths for Salisbury are:

Geographic location: the port is the largest river port on the Chesapeake Bay, and its location provides cost-effective transportation to several Delmarva communities.

Existing "captive" traffic base: there has been long-term demonstrated demand for marine transportation in Salisbury, as evidenced by existing traffic supporting fuel, aggregate, and agricultural product movement. These existing cargoes generally cannot be moved as cost-effectively by truck or rail, which suggests that some demand for shipping through marine facilities in Salisbury will continue to exist into the future.

Borrowing and grant eligibility: the City's ability to borrow money to fund infrastructure improvements may help fund multi-user port investments described below. Individual port users may be unwilling to undertake these investments individually, but the investments could yield a range of public benefits. As a public entity, the city may also be able to access additional public grant programs for infrastructure investments.

2.3 Weaknesses

Weaknesses are internal factors that place Salisbury and its port facilities at a disadvantage relative to other communities or ports. The major port-related weaknesses for Salisbury are:

Ongoing dredging requirements: the Wicomico River must be dredged to maintain adequate depth for commercial navigation, and failure to maintain adequate channel dimensions could create barriers to safe or efficient commercial navigation.

Limited vessel size: the limited depth of the Wicomico River's navigational channel and the river's sharp turns means that Salisbury's port facilities are only accessible for barges and other relatively shallow-draft vessels. This limitation of barges for freight traffic means the City's marine terminals will not be able to accommodate larger oceangoing vessels, and new cargo development opportunities are limited to barge-relevant cargo.

Limited traffic capacity: consultations with port stakeholders indicated that existing closely spaced marine terminals could be a potential limit to vessel throughput, as docking a barge at one terminal may limit operations at a neighboring terminal. Currently, this capacity constraint is not much of a concern but could become a greater problem if the frequency of vessel traffic increased. The development of a new port facility and mooring area is an opportunity to mitigate future maritime congestion concerns.

Lack of port infrastructure and operation knowledge: The City currently lacks experience in operating or managing port facilities and may lack the staff resources to deeply engage in day-to-day port development or administration. These limited resources will constrain the types of actions the City can take to support port development, and thus the types of engagement recommendations that are made in Chapter 3.

Slower public decision-making processes: The public sector's relatively slow decision-making speed (compared to private businesses) may complicate City support for engagement in port development.

Public perception of port development impacts and financing: citizens may have an unfavorable perception of maritime operations because of noise, light, air and water emissions, dust, and truck traffic created by existing terminals. Residents adjacent to the proposed multi-user port and its road corridors may oppose the development of further port facilities.

At the same time, port development is likely to provide services for a select number of local businesses, and the perception that the City is using public funds to support port development for the benefit of a limited number of companies instead of benefit for the broader public may result in opposition to further development.

2.4 Opportunities

Opportunities are external factors that Salisbury or maritime stakeholders could capitalize on to their advantage. Early in the project, a screening was conducted to identify growth opportunities for different types of barge-eligible commodities. This work found opportunities for **growth in existing port cargoes**, but limited opportunities to attract new cargo or new users. Traditionally, cargo handled at Salisbury has been associated with a set of captive cargoes that move in large volumes, are consumed within 20-50 miles of Salisbury, and cannot affordably be moved long distances by truck. To identify potential cargo trends relevant to the port, and potential new cargoes, consultations were conducted with port stakeholders, and "mini" market analyses were performed to assess the viability of select new cargoes. Figure 8 summarizes the main findings of this work, and further detail from this review is available in Appendix A.

Figure 8: Market Summary Studies

Cargo	Likelihood for Growth in Salisbury
Inbound Fuel	**Moderate**: steady demand in the near-term, with potential growth related to increasing population. Changes to Maryland and Virginia gasoline formula requirements could open new markets in Delaware, but long-term headwinds exist from the expected electrification of personal vehicles.
Inbound Aggregates	**Moderate**: Steady demand with expected population growth and corresponding demand from building and road construction. There may be opportunities to increase port tonnage by supporting the export of sand from the Salisbury area.
Inbound Animal Feed	**Low**: Uncertain demand, feed tonnage is highly variable from year to year, as demand is based on local crop growth and agricultural prices. Long-term poultry inventory in Wicomico and surrounding counties have shown small growth over the past 20 years.

Cargo	Likelihood for Growth in Salisbury
Outbound Agricultural Products	**Low**: While agricultural production has increased historically, year-to-year agricultural production in the region and outbound shipments of agricultural products from adjacent ports are highly variable, introducing a high level of uncertainty. Poultry production in the region will also consume some local crop production.

Growth opportunities are focused on existing cargo types, not new cargo or industries.

While tonnage is expected to be stable, growth potential is anticipated to be limited. Our discussions with key stakeholders found:

- **Petroleum products (fuel):** our interviews did not allow us to estimate potential growth in this sector, but substantial growth is unlikely unless Maryland adopts the same gasoline reformulation requirements as in Delaware. It was not possible to determine whether this policy would be implemented in the short- to medium-term. Therefore, it is projected that fuel demand will continue at the same levels.

- **Aggregates:** the construction sector supports the shipment of aggregates. The Delmarva Peninsula has experienced solid growth in population and construction activity, which has driven continued demand for aggregates. Furthermore, the region lacks substantial stone or gravel resources, which will mean that continued construction will require the import of gravel. Additionally, there is medium to long-term potential to export sand to other regions. Based on the consultations, we estimate that the potential growth for the aggregate sector could lie between 50,000 to 100,000 tons per year over each of the next 5 years.

- **Agricultural products:** this sector offers potential growth in the medium term. We understand that this sector's stakeholders consistently have business development projects waiting for the right conditions to be developed. While some of the more detailed information gathered from consultations in this sector are confidential, we estimate sector growth to conservatively be approximately 25,000 tons in the next five years. Stakeholders also reminded us that the local production volume of agricultural products is highly dependent on a given year's weather, and waterborne cargo flows of some agricultural products can be highly volatile from year to year.

- **Other sectors:** there is potential for additional shipbuilding activity in Salisbury if the reorganization of other port users allows shipbuilding companies to acquire additional land to develop new docks. However, this is unlikely to substantially impact port cargo tonnage.

During consultations, many of Salisbury's current port users indicated that they are constrained by the size or capabilities of their existing facilities in Salisbury. They are interested in using a multi-user port facility as either a replacement or supplement to their existing operations and the additional cargo handling and storage capacity provided by a multi-user terminal could be used to support increases in these businesses' activities in Salisbury. Additionally, one landowner expressed interest in making their property available for further port development.

In addition to potential growth in tonnage with the creation of a multi-user port facility, other port-related opportunities include:

Optimizing land use and traffic patterns on the North Prong: relocating some maritime businesses to a new multi-user maritime facility on the main branch of the Wicomico River will free up waterfront property on the North Prong for higher value property and better land uses and support the overall redevelopment of Salisbury's downtown and surrounding neighborhoods. Removing some shipping from the North Prong will also reduce vessel traffic through Salisbury's two drawbridges and improve local traffic flows.

Potential policy changes: fuel imports have historically been an important commodity for the port as the Delmarva peninsula lacks pipelines. Currently, gasoline fuel distributors in Salisbury do not serve customers in Delaware, as Delaware requires that gasoline must be "reformulated" as part of air pollution mitigation measures. Changes to Maryland and Virginia gasoline reformulation requirements could open new markets in Delaware for fuel imports via Salisbury.

Federal plan to update transportation infrastructure across the country: The Biden Administration's recently proposed American Jobs Plan recommends $17 billion for investment in the United States' inland waterways and coastal ports. The Maritime Administration's ongoing Port Infrastructure Development Program was authorized and appropriated $230 million for 2021. Plans and programs like these may be available to support maritime investments to create a multi-user port terminal, although the City and its partners will likely have to compete against many larger or higher-volume ports for funding and find revenue sources for the required matching fund's portion of the overall project cost.

2.5 Threats

Threats are external factors that could create challenges for Salisbury and its port stakeholders. Potential threats for port development include:

Structural decline in fuel cargo at Salisbury: fuel is the biggest commodity handled in Salisbury but is likely to experience long-term structural declines as concerns about climate change and expected adoption of electric vehicles make internal combustion engines unattractive for many personal vehicles. A decline in fuel tonnages at Salisbury is a potential major threat to dredging, described below.

Loss of US Army Corps of Engineers dredging support: Salisbury's annual tonnage has dipped below one million tons multiple times in the past decade, and extended years under this million-ton threshold could jeopardize dredging support.

Inability to recoup costs: if the development of a multi-user terminal moves forward, and depending on the structure of operating agreements, current port users and landowners may attempt to leverage their positions to negotiate extremely low port user costs, which could limit the City's ability to recover capital investment or operating costs.

The inherent uncertainty in development: any reduction in shipping activity from port users would also translate into a revenue reduction for a multi-user port terminal owner and operator and increase financial risk. If shippers do not develop their expansion projects, the City will lose potential cargo at the port as well as employment opportunities.

Future development at competitor ports: development of new cargo handling terminals at other ports, such as Seaford could attract tonnage away from Salisbury. However, consultations with port stakeholders did not identify any new maritime developments elsewhere, and the high cost of developing new marine infrastructure may deter new investment in other areas. On the other hand, development at the port of Salisbury also might not attract cargo from nearby ports.

3 Port Development Approach

Key Chapter Takeaway

While port development has historically been a private-sector activity in Salisbury, the City's engagement is needed in order to create a multi-user terminal and unlock potential benefits such as the opportunity to facilitate community redevelopment, and support the strength of Salisbury's businesses and their supply chains. In particular, the City has an important role to play as a coordinator and facilitator to bring private partners together for port development.

3.1 The Case for Public Engagement in Port Development

Historically Salisbury's marine terminals have been developed and operated in response to private market forces, largely without dedicated port-specific engagement with the City. Based on the analysis and consultations conducted in this project, it appears that potential port tonnage growth would come from current marine terminal users in Salisbury, with limited opportunities for the attraction of new industries or types of cargo. Therefore, there may not be a need for local public sector engagement in marine infrastructure, since the shippers using marine transportation already have their own infrastructure.

However, while some parties have expressed interest in using a multi-user terminal and expanding the volume or scope of their operations, none of these private parties have taken steps to develop this terminal individually or collectively. The lack of private development of expanded maritime facilities is likely due to two factors:

1. **Low return on individual firms' private investments.** Maritime infrastructure is expensive to construct. Based on the feedback from consultations, it appears that the incremental growth in aggregate or agricultural tonnage associated with expanded or additional port facilities would be insufficient to generate enough value for an individual private port user to undertake the investment alone.

2. **Lack of cooperation or communication between stakeholders.** In theory, a group of private stakeholders with a shared interest in expanding their port operations could come together to make a shared investment. However, this type of collaboration has not occurred yet, likely because benefits to each user are still relatively small, because there is uncertainty about the viability of a new facility, and there is relatively little open, joint communication among all stakeholders. Consultee feedback indicated that the private sector's uncertainty regarding the City's intentions for port redevelopment was one potential barrier to cooperation.

Port development needs the City to support stakeholder coordination and information sharing to be successful.

The City and other public agencies can play a role in reducing these obstacles for private port stakeholders, and the recommendations in this chapter are tailored to help define this City role. As a public entity, the City should expect to see public benefits from engagement in port development. There are four types of notable public opportunities or public benefits possible through port development:

- **Support community redevelopment**. Relocation of some cargo handling facilities on the North Prong helps frees up land for further redevelopment or preservation. If the land is redeveloped for higher-value economic activities that are a better use of scarce resources, the City may be able to realize benefits in the form of increased land values and corresponding increases in tax receipts. Relocation and consolidation of freight handling activities may also reduce truck traffic in neighborhoods around the North Prong. This reduces congestion and pollution in the neighborhoods around the North Prong.

- **Enable growth at existing businesses.** Some maritime users in Salisbury have expressed interest in increasing the volume of commodities they move or expanding their scope of operations if additional space is available. Therefore, the creation of a multi-user port terminal has the potential to allow local businesses to grow their operations.

  This potential growth is particularly important because it relates to US Army Corps of Engineers' dredging support. Growing tonnages at the port are needed to ensure that the port's total cargo tonnage does not drop below one million tons. Preserving adequate dredging support through sustained tonnage above one million tons will help the City realize two other benefits:

- **Preserve cost-effective and energy-efficient supply chains**. Continued maritime operations on the Wicomico River depend on adequate dredging, and sustaining dredging through adequate tonnage will ensure that Salisbury's water-served businesses continue to have access to maritime shipping. If maritime access was no longer reliable or available due to decreased dredging efforts, Salisbury's water-served businesses would either have to relocate to areas with reliable navigational capacity or conduct all their shipping by truck and rail. In both cases, disruption of local supply chains would be likely to create additional rail or truck traffic for the region's transportation network. Additional inter-regional truck traffic would contribute to greater wear and tear on the area's transportation network, increased congestion, increased transportation emissions from less-efficient truck transportation, additional vehicle accidents, and increased costs for goods like fuel and aggregate.

- **Preserve activity and employment in other water-related businesses**. Chesapeake Shipbuilding and Murtech also rely on the good maintenance of the Wicomico River's navigational channels to support inbound and outbound vessel movements. Reduction in the depth or dimensions of the navigational channel due to inadequate maintenance may limit the types of vessels Chesapeake and Murtech could serve or operate, and threaten their operations in Salisbury.

It is important to note that there are also some other benefits commonly associated with port development that are unlikely to be realized in Salisbury. In particular, the commodity review summarized in Chapter 2 suggests that port development will not be an appropriate approach for increasing Salisbury's economic diversification or attracting new businesses.

3.2 Tools for Engagement in Port Development

Based on the private sector barriers described above, it is likely that the identified public benefits of port development cannot be realized without some type of engagement or investment of time or

funds by the City and its public partners. Within the context described above, it makes sense for the City of Salisbury to get involved in the development of a new port facility, accessible to all shippers. This engagement has the potential to yield public benefit for the City, while also mitigating some threats to regional supply chains.

It is likely that the public benefits of port development cannot be realized without some type of engagement by the City and its partners.

Therefore, the question becomes **how should Salisbury support port development?** Generally, the City of Salisbury and its public partners have four types of tools to engage in port development. These four categories of tools form the basis of recommendations below:

Policies: Policies support the achievement of other recommendations, as often the full benefits of other recommendations may not be achieved absent the City's guidance to ensure that stakeholders understand its position and role, as well as ensuring that the City's engagement with port development works with other City efforts. For example, the City could adopt a formal maritime policy that states how the City will – and will not – engage in development.

Partnerships: Stakeholders often find infrastructure-related recommendations to be the most tangible, however likely the most important category of recommendations is "partnerships." As most freight transportation decisions are privately made, they are not within the control of public agencies (Salisbury, county, and others) domain. This means that partnerships and collaboration with economic development agencies and private companies will be critical to advancing any efforts to develop the port and attract new tenants or customers.

Programs: Programs represent recommendations where specific infrastructure projects have not been identified, but where a thoughtful, methodical approach should be considered in making investments (e.g., a program to invest incrementally in different elements of port development over time, instead of ad-hoc investments without prior planning).

Projects: Projects represent infrastructure-related recommendations, such as the types of cargo handling equipment or utilities that must be constructed as a part of a multi-user facility development.

3.3 Policies

As noted above, the private sector's uncertainty about the role and goals of the City regarding port development is a potential barrier to future development. As a starting point for further engagement on maritime topics, Salisbury should adopt a formal maritime policy that clearly defines the City's role in supporting the maritime system in Salisbury and the goals that its actions are intended to achieve. This clarity can help "set the stage" for further engagement in specific partnerships or programs listed below. This policy can be as simple as a 1-page bulleted statement or resolution.

Salisbury should adopt a formal maritime policy that defines the City's role in supporting the maritime system, and the goals that it intends to achieve.

Specific elements of the policy could include statements that reflect other recommendations:

- **State the City's mission or goals for engagement in port development.** For example, the City could state that it seeks to realize the public benefits listed in section 3.1.
- **Explain how the City's engagement in port development efforts relates to or supports the City's broader economic and community development goals, and the mission or goals of partner agencies such as the Salisbury/Wicomico Metropolitan Planning Organization.** Connecting work on port topics to broader City goals will help the City further build the case for engagement in port work. If the City adopts a formal port policy, it should also seek to incorporate port-relevant information into relevant plan documents and investments.
- **Recognize the key public and private stakeholders that the City will cooperate with to achieve its maritime goals.** The port policy should acknowledge the private sector stakeholders of the port as partners for development, as well as other partners such as the MPO, Salisbury-Wicomico Economic Development, Greater Salisbury Committee, Chamber of Commerce, and other interested parties. Acknowledgment of partners is a key first step towards implementing the partnership and program recommendations below.
- **Define the City's role in port development.** The City should clearly state what types of actions it will take to support port development, to create more certainty about its actions among other stakeholders. For example, if the City determines that the port administration concept described below is an appropriate approach for future engagement, the port policy should state this fact.

A City port policy should be viewed as a living document and launching point for more substantive work. While the development and adoption of a port policy document will help solve the issue of uncertainty about the city's role in this subject, additional work will be needed to drive development forward.

3.4 Partnerships

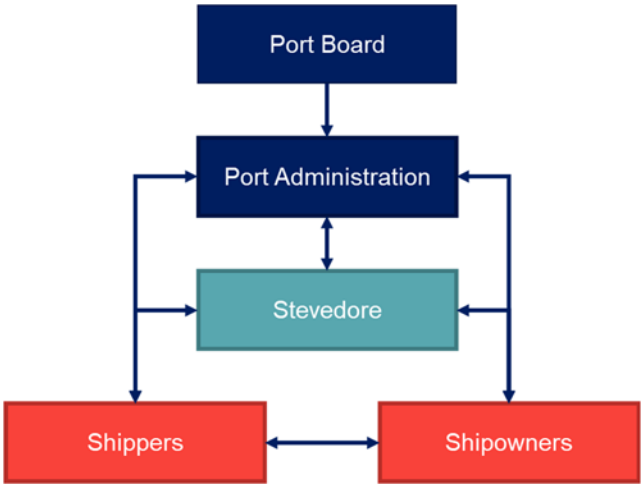
Once the City's position is defined, engaging with partners can take many forms. Some potential areas for partnership include:

- **Staffing the board of a port administration or authority organization.** This recommendation is explored in greater depth in section 3.5 and will require the City to enlist the participation of engineering, marketing, economic development, legal, and environmental stakeholders to aid in governance of a body that could create and manage a multi-user port terminal.
- **Provide access to federal or state funding programs or agencies.** Some port infrastructure-related investment programs require a public agency sponsor, even when funding is awarded to a private company. Salisbury could serve as a local partner on grant applications to improve existing privately-owned port infrastructure that is key to regional freight transportation. A list of potential funding programs is provided in Appendix B.

3.5 Programs

To ensure a multi-user maritime facility remains accessible to all shippers, a public organization usually must own the marine infrastructure. In this project, the City of Salisbury seems to be the public entity best positioned to lead this work. Therefore, a recommendation for a potential port development program is provided here. This recommendation is intended to help address the topic of balancing development risks and benefits between the City and potential users. This recommendation also seeks to considerations include how the City can lead development with its actual expertise and how to limit the financial risk to Salisbury's taxpayers.

Figure 9: Interactions between Port Administration and Partners/Clients



Port Administration Membership

The model used in this case is to create a City-controlled not-for-profit organization – a Port Administration. This organization will have a mandate to develop and manage the multi-user marine facility. The paid or volunteer Port Administration board can be chaired by the City General Manager to make sure the City's interests in the port are adequately represented and protected. The other board members could be other individuals with specific expertise relevant to port operations, civil engineering, business law, business development, marketing, environmental stewardship etc.

Elected persons and port user representatives should not be allowed on the Port Administration board. This exclusion is necessary because individuals with personal or business interests tied directly to operations of the port are not the best individuals to protect the interests of the Port Administration. Prohibiting elected officials and users from serving on the board also defuses many potential concerns about conflicts of interest. Sometimes, port users argue that the board should have a person representing their interests. We see this case in large ports owned and managed by a Federal or State Port Administration, for example. A well-managed Port Administration has the interest of their customers in mind and it is particularly easy to achieve with small infrastructures. Therefore, the need for a shippers' representative on the Port of Salisbury board would not be necessary.

Port Administration Roles and Responsibilities

The role of the Port Administration would be limited to the management of infrastructure and activity coordination. Actual shippers would work with vessel operators to oversee all the vessel and cargo handling operations as they have the equipment, knowledge, and personnel required for such operations. For now, there is no need to have an agreement with a stevedore or third-party company

to offer cargo handling and storage service to shippers. In the event another shipper would like to use the port infrastructure, the Port Administration would simply allow them to organize their own team or directly hire the services of a stevedore.

For an operation as small and simple as Salisbury's, the Port Administration's permanent staff would probably be limited to one or two people including a general manager and an assistant. The general manager would oversee overseeing port infrastructure maintenance, coordinating vessel arrivals and departures, managing land allocation amongst users, and marketing the infrastructure to attract more activity. Ideally, these two staff members would be paid from port revenues described below.

In terms of business development, the Port Administration would have to work with the City and county development authorities. One reason for having diverse expertise on the Port Administration board is to support the general manager. Instead of having a board representing specific interests, it would be a "support council" for the general manager who would have to deal with very diverse issues from marketing to engineering, to environmental regulation compliance. Board guidance and knowledge would be precious for the manager.

One crucial point is to keep the management of the port and its relationship to the City as simple as possible. For example, from previous projects, CPCS encountered small port "horror stories" where a port manager had to fill in a work request form in different copies just to have a City employee replace a light bulb in the port's office. The cost charged for such operations is very expensive and leads to a yearly deficit that is hard to justify during a City Council meeting. Therefore, even though the Port Administration should have material and service procurement procedures similar to the City, it should have the authority to hire its own contractors to perform maintenance work as efficiently as possible. This also means that in some cases, the City could be the most cost-efficient service provider.

Supporting Infrastructure Construction: Use Agreements and Fees

Before beginning the construction of the port, the Port Administration should have agreements with shippers to secure sufficient cargo volume for a defined period, as these agreements will help recoup port construction and management costs. Potential sources of income for the port administration could include:

- **Port Dues and Docking fees**, which are a source of income directly from the vessel. Port dues are charged once per vessel call and depend on vessel size only (gross registered tonnage or overall length). It is similar to a cover charge at a restaurant or club. Docking fees are also paid by the vessel for the use of the berth. This fee is charged according to the vessel size for a period of time (usually 12 or 24 hr period). Special pricing is often put in place for vessels calling at the port several times per month, for winterized vessels or those in need of a wharf for refits or maintenance work.

- **Storage fees** are also a source of income. Shippers pay these charges and they are adjusted according to the time, the type of storage (indoor vs outdoor), and the required area/volume. It must be mentioned that often short-term material storage (less than a week) is free at many small ports. A port administration can also lend areas on long-term lease to shippers who would need to build specialized cargo handling and storage facilities. This provides steady long-term income but the space or equipment can no longer be used by other shippers.

- **Wharfage** is often a port administration's main source of income. This fee is billed to the shipper based on the type of cargo and the volume/tonnage handled at the port. If cargo is transiting through the port, i.e. both unloaded and loaded at the port, wharfage is usually charged once

only. We suggest that the City of Salisbury "secure" cargo volume with the main shippers as well as agree on the wharfage rate. Since it would most likely be the main source of income, the City would be able to estimate if it would be sufficient to cover Port Administration costs as well as debt annual reimbursement. This approach mitigates the risk of deficits and makes sure that the project will not necessitate cash infusions from the City to cover annual loss.

We believe the above model for port administration would enable Salisbury to catalyze the development of a multi-user terminal that would yield private benefits of additional cargo handling capacity while also creating public benefits such as opportunities for redevelopment of the North Prong and ensuring that the Wicomico River's tonnage remains high enough to secure dredging support and avoid a shift of freight from water to other modes of transportation that have greater externalities.

Figure 10 below presents our estimations based on experience with similar projects related to regional port administration. Overall, the operational costs are anticipated to be around $271,000 per year, excluding maintenance work on the port infrastructure.

Figure 10: Port Administration Expected Expenses

Expense	Amount
General Manager Salary	$90,000
Assistant Salary	$40,000
Staff Benefits (20%)	$26,000
Insurance (Terminal Operation Liability)	$12,000
Insurance (D&O)	$2,000
Utilities	$40,000
Cleaning	$10,000
Garbage	$7,500
Office	$8,500
Travel Expense and Representation	$10,000
Security	Covered by users
Board of Directors	Volunteer
Maintenance	TBD, some by users
Consultation fee (Legal, Engineering)	$25,000
Total	**$271,000**

Sources: CPCS, AON Insurance, Others.

Most costs are related to the salaries of the staff running the Port Administration. The General Manager is envisioned to oversee all aspects of the administration of the port, taking on roles ranging from business development to harbormaster to marine port safety officer. An Administrative Assistant will support the General Manager in their tasks. The Administrative Assistant will also oversee the accounting tasks related to the Port Administration. For such a small Port Administration, the Board of Directors could be comprised of volunteers, or depending on the success in attracting talented members, a form of remuneration could be added.

Operational tasks such as cleaning would be performed by specialized external firms. Given that most security costs are required when cargo operation occurs, port administrations often cover this cost with a specific security tariff.

3.6 Project

Early stages of this project screened for potential areas for port development, and in-depth findings from the site screening process are included in Appendix C. Based on this process, a site adjacent to existing barge terminals on Marine Road advanced for further study to determine the types of infrastructure improvements needed, and the cost of these infrastructure improvements.

The proposed Salisbury multi-user port marine access and site layout is based on the projected needs and relevant commodities as identified throughout the study's prior work. Efficiency in internal network circulation, as well as material handling was instrumental in identifying the layout suggestions. In addition, site layout and material sizing were based on known quantities as well as additional room for future growth and expansion. The port's cargo handling expectations include grain receiving, aggregate receiving, bulk materials, and other commodities. The outbound shipment of materials is also possible. Future growth and expansion may include new types of inbound or outbound bulk materials.

The dry bulk and other anticipated commodities can be accommodated through two piers and a series of river cells for barge mooring as opposed to a more expensive wharf wall. The proposed design includes a barge haul cable system integrated into 17 river cells for more efficient unloading and loading of the barges. There is also enough space to allow queuing of additional barges should the pier access be occupied.

The eastern pier is dedicated to agricultural products and would accommodate grain receipt and other commodities as needed. The conveyance system can be through an unloader crane or a vacuum system, depending on the user's needs. The western pier is wider and can accommodate aggregate shipping and receiving as well as other bulk materials as needed.

The site infrastructure is shared between multiple users. The improvements consist of single access from Marine Road. The entrance/exit access point would be wide enough for two trucks to enter and exit simultaneously, providing enough width and curvature to meet large tractor-trailers (WB-67). The site layout also includes outfitting the existing concrete block building with administrative offices, maintenance sheds, and two weigh station scales. This area would also be enhanced with parking for employees and deliveries. An internal access road will circulate through the site providing access to the separate laydown or material handling areas of the port. The access road will provide a one-way direction to accommodate tractor-trailer trucks (WB-67). The individual conveyance systems for each specific commodity should be provided by the specific users of the port.

3.6.1 Site Layout

The site will be served by a single access point to control the traffic moving in and out of the port. The site entrance road will be paved for approximately 400' into the site, where the roadway will transition to a gravel base to allow future modifications as the port develops and evolves. The existing block building can be refitted to support the administrative functions of the port and serve as a scale house. Two scales are proposed to be located along the access road and can be utilized by any user of the port. A small maintenance area could be located near the administrative building to provide roadway grading maintenance and overall site maintenance. An area adjacent to this will also be provided for maintenance equipment, deliveries, repair of equipment, and service equipment/spare parts that are kept on hand.

The site accommodates the two identified commodities as well as space for handling other dry bulk materials.

- The east side of the site is set aside for agricultural products and can accommodate the import of grain and other commodities. The pier can be equipped with either a pneumatic unloader or utilize a crane with a hopper and auger conveyance system, which would feed into the silo gravity discharge.
- The west side of the site can accommodate both the import and export of aggregates and sand as well as other dry bulk materials that can be transported to the material storage area on the site. It is anticipated that a conveyor system will be used with a radial stacker for aggregate imports. A hopper pit combined with the conveyor system can be utilized for sand exports. This system reduces material handling costs and increases overall capacity.

3.6.2 Marine Access

Marine access will be accommodated by two piers and a series of river cells for mooring and cabling the barges. The design accommodates an additional barge storage area between the piers and the ability to fully load/unload barges from both piers. The piers will consist of precast concrete slabs supported by steel pipe piles with a steel sheet pile bulkhead at the shoreline. The pier decks will be designed to support unloading cranes, conveyors, and other equipment as needed by the tenant.

The river cells will be constructed of interlocking steel sheet piles to create a circular shape. The inside of the cells will be filled with stone and capped with a concrete slab. The cells will be fitted with bumpers, mooring rings, and ladders. A barge haul system consisting of winches and a cable system will be used to maneuver the barges back and forth during loading/ unloading operations. This type of system mitigates the need to have a tugboat reposition the barges, thus lowering operational costs.

The western pier is designed to accommodate the aggregate imports and exports as well as other dry bulk materials as needed. The eastern pier will allow for the import of grain and other agricultural commodities. The Wicomico River will need to be dredged along the river cells. However, the piers and placement of the river cells will minimize the dredging efforts while still maintaining the navigable waterway. Figure 12 illustrates the conceptual layout of the piers and river cells.

Figure 11: Proposed Site Layout

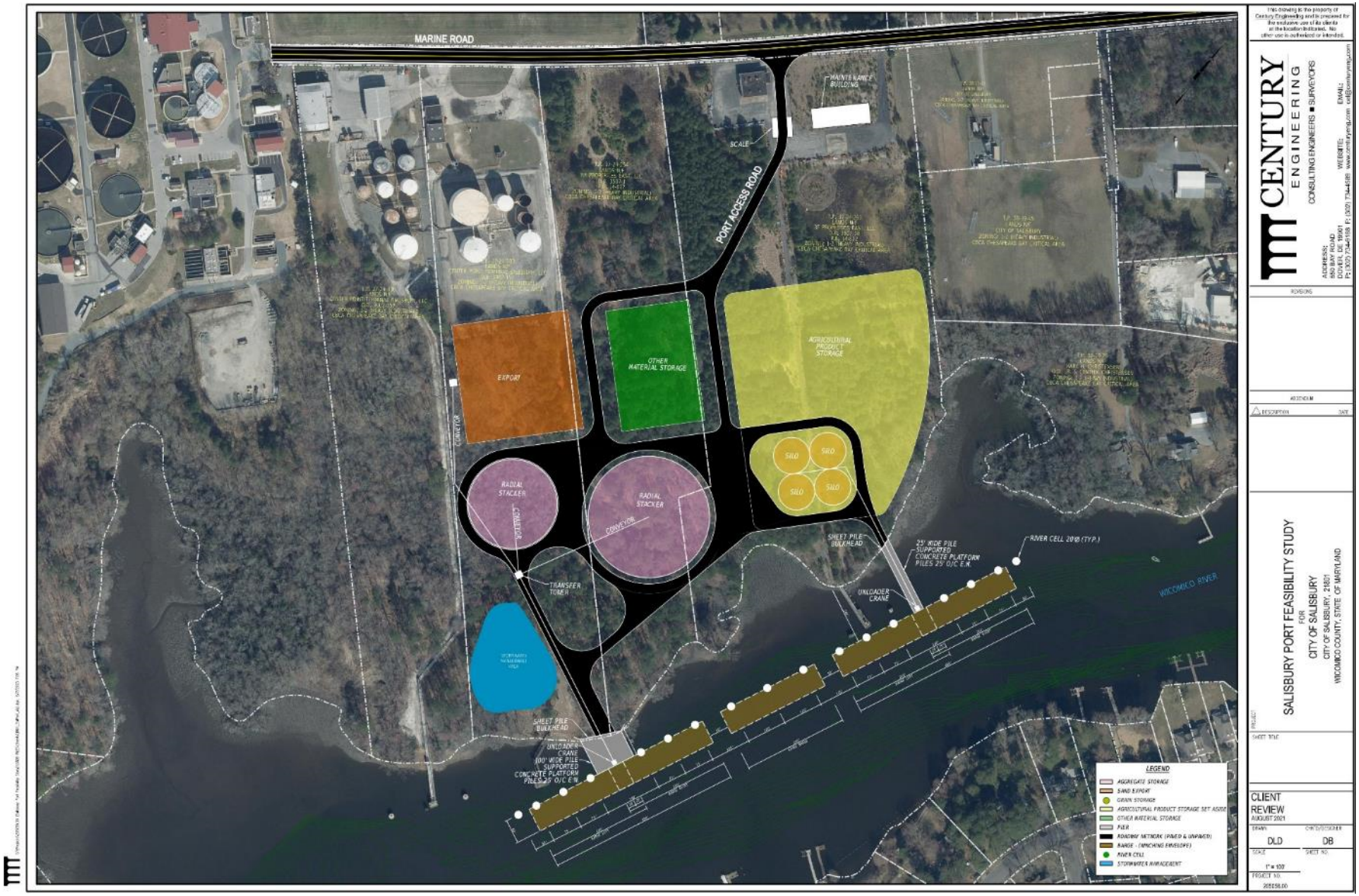
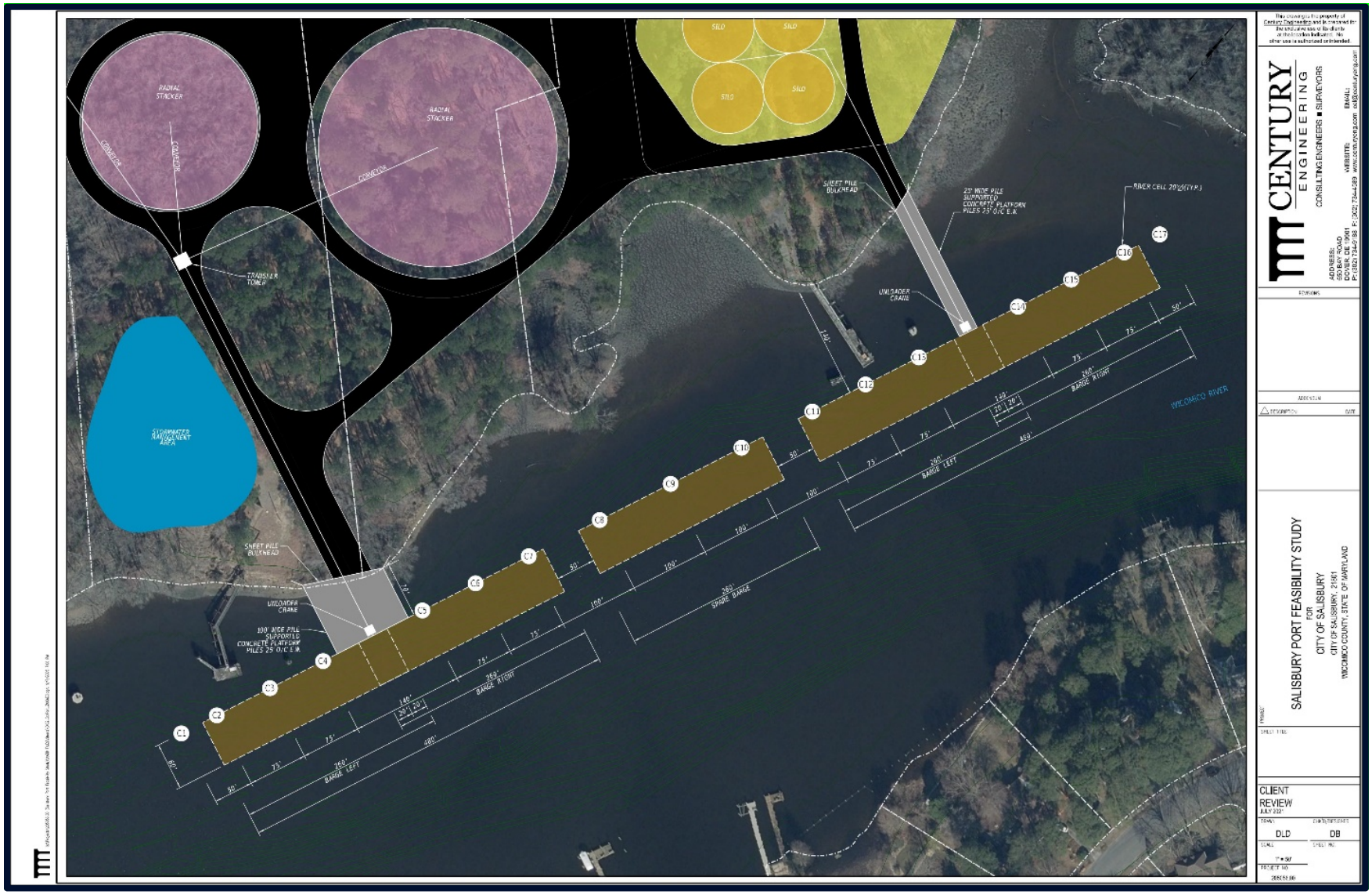


Figure 12: Proposed Water Access Layout



3.6.3 Roadway Access

The access to the new multi-user port will be from Marine Road. It is anticipated that trucks will utilize Marine Road to Parsons Road, Parsons Road to Nanticoke Road, and Nanticoke Road to US-50 and other major roadways. Based on our analysis, we do not anticipate any new traffic controls along Marine Road or Parsons Road. To accommodate the increased truck traffic on Marine Road, we are proposing that the road be widened and repaved. Parking on the north side of the road will be maintained by incorporating a wider, more defined shoulder. The cross-section of the proposed roadway will include 12' travel lanes, 7' parking/shoulder on the north side, and a 5' shoulder on the south side. A curb and gutter with a closed drainage system will be placed on both sides of the roadway. Stormwater management will be managed within the multi-user port site. Utility relocation is not anticipated with the improvements along Marine Road. Figure 14, Figure 15, and Figure 16 illustrate the conceptual roadway layout for Marine Road.

3.6.4 Utilities

Marine road currently has electric, water, sewer, and gas infrastructure within the existing roadway right-of-way. These utilities can be easily accessed by the site and distributed within the proposed site network. It is anticipated that electric, water, and sewer will need to be laid out from Marine Road to a location near each material handling pier.

3.6.5 Opinion of Cost

The Engineer's Opinion of Probable Construction Cost included in this report is only intended to assist the City in developing a general understanding of the potential costs for the development of this facility. These opinions of probable cost are rough order of magnitude (ROM) in nature and are not detailed cost estimates or Contractor bids. They are based on a preliminary concept, schedule assumptions, Mean Cost Data, unit prices obtained from local sources, and other generalized cost information. Actual construction costs will vary from this opinion. A summary of the opinion of cost for the Marine Work, Site Work, and Marine Road Improvements can be found below in Figure 14, and detailed breakdowns of the compositions of these costs can be found in Appendix D.

Figure 13: Rough Order of Magnitude Construction Cost Estimates

Expense	Amount
Site Improvements	$3,062,582.87
Marine Work	$17,402,525.00
Marine Road Improvements	$2,328,661.36
Total ROM Construction Costs	**$22,793,769.23**

Source: Century Engineering.

Figure 14: Marine Road Improvements (1 of 3)

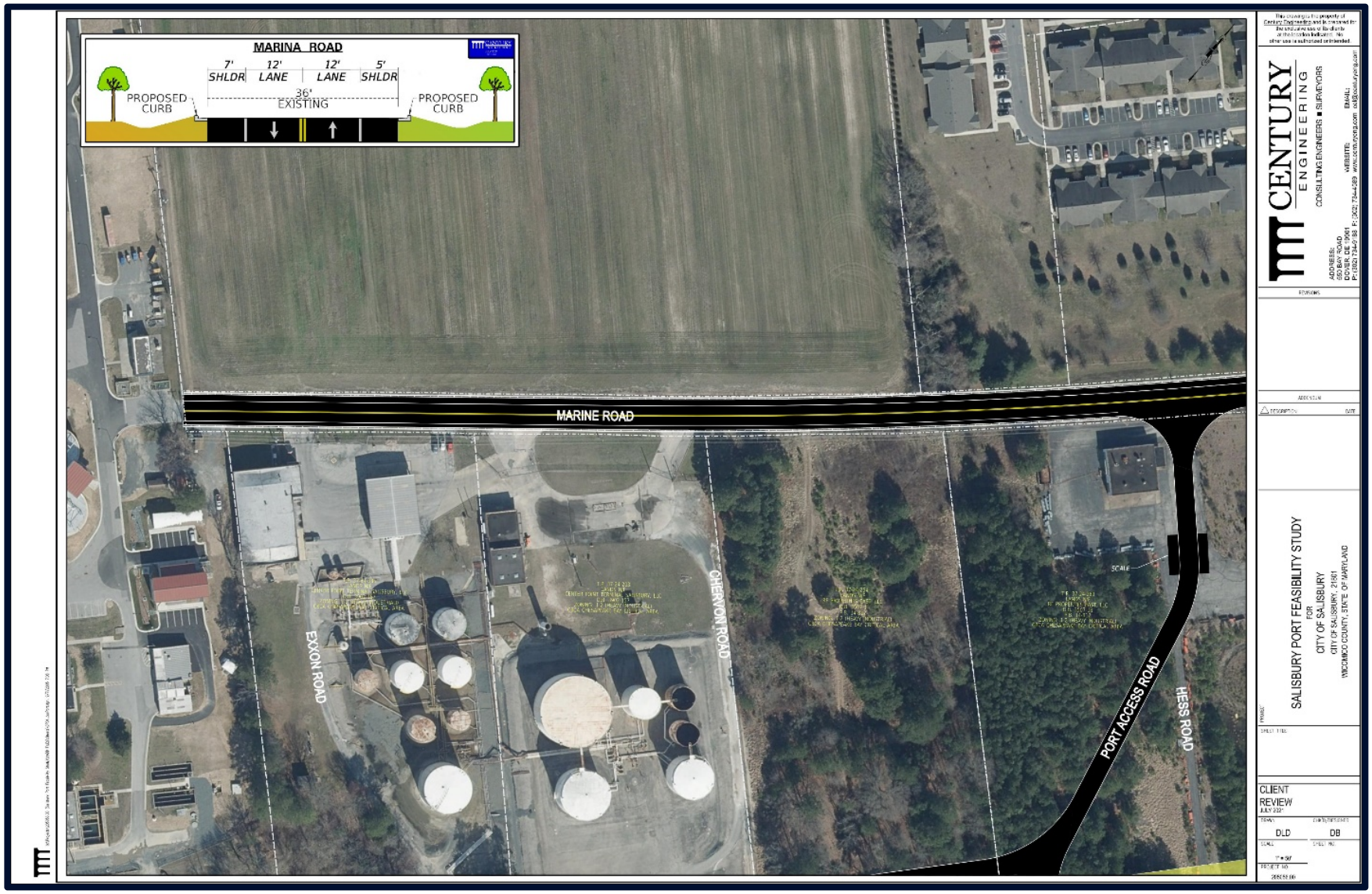


Figure 15: Marine Road Improvements: (2 of 3)

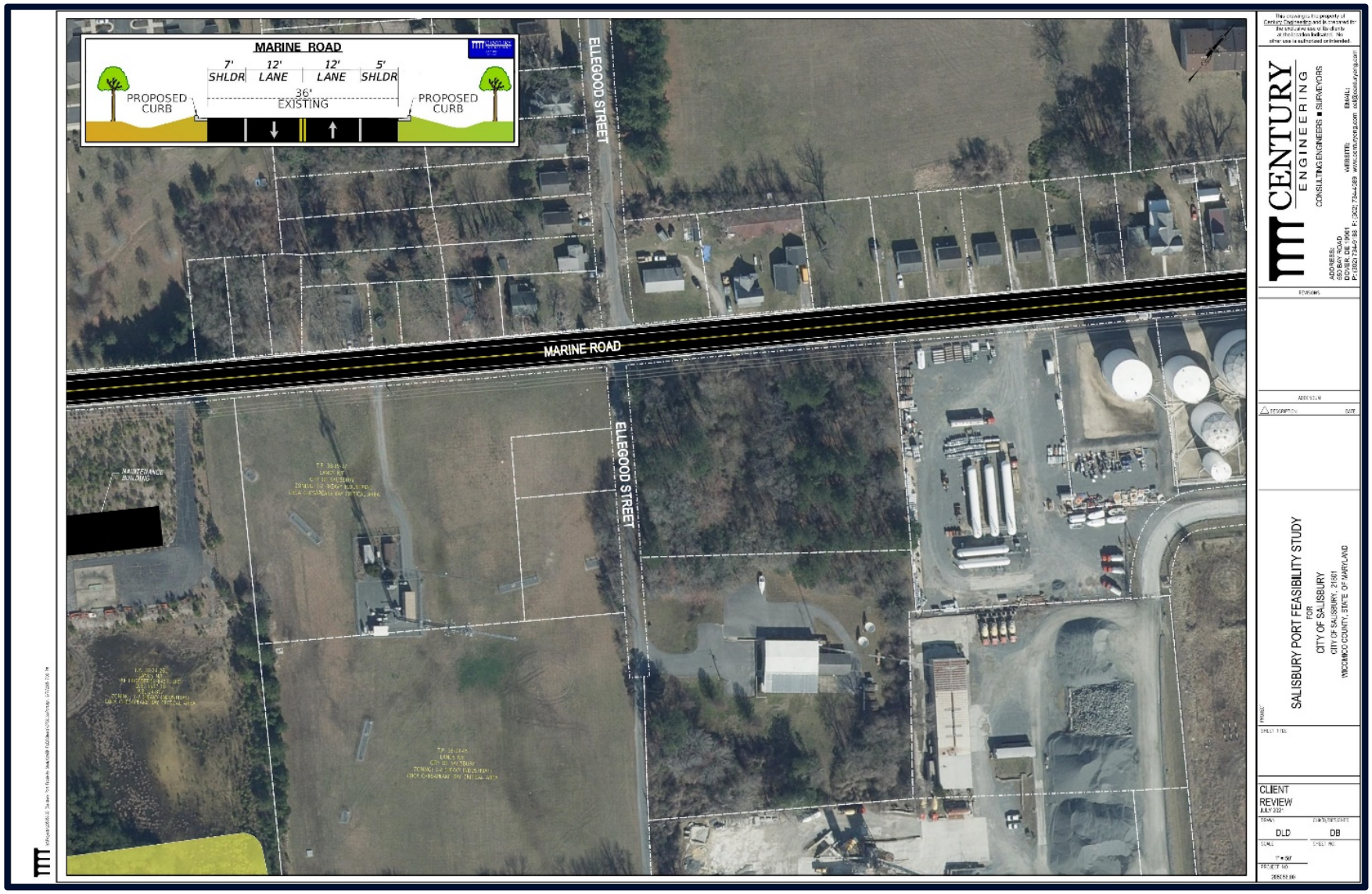


Figure 16: Marine Road Improvements (3 of 3)

4 Benefits and Impacts of Port Development

Key Chapter Takeaway

Many of the potential benefits of port development relate to avoided impacts of a decline in tonnage and potential loss of dredging support. Other potential benefits include preserved employment at water-served industries, and opportunities to increase land value and increase tax receipts from redevelopment of properties around the North Prong. However, increasing tonnage at the port is also likely to generate a relatively smaller amount of additional truck and barge traffic in the region, which will likely impact residents.

4.1 Transportation System Benefits and Impacts

Continued maritime operations on the Wicomico River depend on adequate dredging and sustaining dredging through adequate tonnage will ensure that Salisbury's water-served businesses continue to have access to maritime shipping. If maritime access was no longer reliable or available due to decreased dredging efforts, Salisbury's water-served businesses would either have to relocate to areas with more reliable navigational capacity or conduct all their shipping by truck and rail. In both cases, disruption of local supply chains would be likely to create additional rail or truck traffic for the region's transportation network.

This section provides an analysis of the impacts of the anticipated growth in demand for specific commodities on the region's highway and rail operations.[1] Identification of impacts was drawn from the following steps:

1. Take the general demand forecasts (low and high levels) presented in Figure 17;
2. Synthesize the average cargo volume carried by heavy-duty trucks or railcars based on commodity type, specific weight, and general method of containerization;
3. Calculate low and high truck and railcar equivalents for two scenarios:
    - **No-Port Scenario:** calculating truck and rail equivalents that could be added to the system if the Port of Salisbury ceased operation. In other words, this scenario considers the number of trucks and railcars that are removed from the region's transportation system due to barge services offered by the Port.
    - **Growth Scenario**: calculating truck equivalents that will be handled by the Port; this also provides an estimate of the potential for increased local drayage truck trips as cargo is moved to/from the new terminal to local warehouses, production centers, and farms.

[1] Since the types of cargo carried by barge (heavy, bulky, low volume per ton) are almost always mutually exclusive from cargo carried by air (lightweight, extremely high value), an assessment of impacts on airport assets is not necessary.

Figure 17: Potential Tonnage Growth After Creation of Multi-User Terminal

Product	2014/2018 Average	Potential Growth		Potential Tons	
	Tons	Low	High	Low	High
Petroleum Products	548,523			548,523	548,523
Aggregates	275,523	50,000	100,000	325,523	375,523
Agricultural Products	131,182		25,000	131,182	156,182
Alcohols	44,193			44,193	44,193
Metallic Products	800			800	800
Others	5,028			5,028	5,028
Total	**1,004,243**	**50,000**	**125,000**	**1,054,243**	**1,129,243**

The creation of a multi-user port terminal would unlock opportunities for growth in aggregates and agricultural products.

4.1.1 Truck Impacts

Figure 18 summarizes the cargo weight per truck by type of product carried and shows the average annual truck equivalents that are needed to address the Port's demand in the no-port and growth scenarios. In the no-port scenario, over 37,600 (low) to 40,300 (high) trucks would be added to the regional road network. Meanwhile, the new multi-user terminal will handle the truck equivalent of about 2,000 (low) to 4,698 (high) truck trips (growth scenario). While the port terminal means that this growth can occur without 2,000-4,698 additional medium-long haul truck trips, it also means that this number of local truck trips will be added to the transport network to transport the new port cargo to its destination.

Figure 18: Estimated Truck Traffic Generation

Product	Tons per Truck	Equivalent Trucks (No-Port Scenario)		Equivalent Trucks (Growth Scenario)	
		Low	High	Low	High
Petroleum Products	29	19,153	19,153	0	0
Aggregates	25	13,021	15,021	2,000	4,000
Agricultural Products	36	3,664	4,363	0	698
Alcohols (Ethanol)	29	1,524	1,524	0	0
Metallic Products	23	35	35	0	0
Others	22.5	223	223	0	0
Total	-	37,620	40,319	2,000	4,698

Source: CPCS analysis, 2021.

4.1.2 Railcar Impacts

As Figure 19 shows, the potential future volumes for Port of Salisbury are equivalent to 9,228 (low) to 9,910 (high) railcars in a no-port scenario, meaning that if the Port was not serving the Salisbury area, these railcars would add to the existing demand for rail freight, adding train lengths and the total number of trains operating on the Norfolk Southern (NS) line as well as the short lines active in the region. Shippers with no direct access to rail facilities need to carry their cargo to terminals using trucks, which will add to the first/last mile traffic and burden the local and regional roadway systems.

Figure 19: Potential Railcar Impacts

Product	2014/18 Average Tons	Tons Per Railcar	Equivalent Railcars (No-Port Scenario)	
			Low	High
Petroleum Products	548,523	118	4,649	4,649
Aggregates	275,523	110	2,959	3,414
Agricultural Products	131,182	110	1,193	1,420
Alcohols	44,193	110	375	375
Metallic Products	800	110	7	7
Others	5,028	110	46	46
Total	1,004,243	-	9,228	9,910

Source: CPCS analysis, 2021.

In reality, the most likely outcome of loss of port service would be a combination of transportation changes, with some loads shifted to rail, others shifted to truck, and a rise in local fuel, aggregate, and agricultural product prices to cover the increased cost of these more-expensive transportation modes. The ultimate outcome would be not only higher truck and rail traffic in the region but increased local commodity prices as well.

4.2 Land Use and Economic Impacts

4.2.1 Overview

In this section, we provide a high-level overview of the potential economic benefits of developing a multi-user facility and maintaining the Salisbury port maritime system. As noted in Working Paper 2, many of these benefits relate to the preservation of existing industries, supply chains, and jobs. These impacts are much more difficult to quantitatively measure than the development of new cargo, but they are still very important to the economy. Potential benefits include:

- **Roadway impacts:** Shipping via water reduces truck-related congestion on regional roads.
- **Environmental impacts:** Absent the port, cargo would be transported by road or rail, leading to a higher volume of local and regional air emissions as well as accidents and petroleum spills.
- **Impacts on land use**: Relocation of existing port facilities would free up the North Prong for further redevelopment or preservation, which could lead to increased land values and tax revenues.

- **Other impacts**: maintaining traffic volumes preserves federal funding for dredging, which is a substantial cost saving to the City and port users.
- **Impacts on jobs**: while the facility is unlikely to lead to a substantial number of new direct jobs, it could spur a number of indirect and induced jobs through its impacts on land use and redevelopment.

4.2.2 Roadway Impacts

As shown in Figure 17, the Port of Salisbury is expected to handle between 1.05 and 1.13 million tons of petroleum products, aggregates, agricultural products, and other cargo annually. In the no-port scenario, between 38,000 and 40,700 trucks will be needed to carry these commodities.

Without the port, the additional truck trips would significantly impact the high-volume corridors in the region and may even exacerbate the traffic congestion issues on certain routes beyond the 100-mile boundary of Salisbury. The Maryland State Highway Administration (SHA) conducts biennial assessments of truck mobility and delay issues across the state and provides a list of top truck bottlenecks to the Federal Highway Administration. According to SHA, segments of US-50 before and after the Chesapeake Bay Bridge experience the longest hours of delay and are the top worst road segments for trucks to travel in Maryland.[2] A significant increase in the truck volumes traveling to and from the Salisbury region could impact traffic on the Bay Bridge and contribute to an increase in truck travel time and delay, and as a result, increase shipping costs.

Under the growth scenario, about 2,000 (low) to 4,698 (high) local drayage truck trips will be added to the road system. This may increase local congestion in the networks connecting the new terminal to local industries. To mitigate some of these impacts, Century has presented options for improving the port access road (Marine Road).

4.2.3 Environmental Impacts

The additional number of trucks that would travel on the Salisbury area roads in the no-port or growth scenarios would contribute to an increase in Green House Gas (GHG) and other air emissions. According to the Environmental Protection Agency's (EPA's) medium and heavy-duty emission standards, a medium-sized dry van or refrigerator semi truck emits about 82 grams of Carbon Dioxide (CO_2) per ton of cargo carried and mile traveled, while a heavy-duty dry van or refrigerator trailer releases about 144 grams per ton-mile.[3] As a result, between 152 (low) and 163 (high) million grams of CO_2 would be released into the air for every mile traveled by the additional trucks if the Salisbury area was not served by the Port facility.

Barge shipping is much more energy-efficient than rail or truck transportation and has lower air emissions.

Rail locomotives move loads equivalent to multiple trucks and therefore are far more fuel-efficient and have lower emission rates (22 grams of CO_2 per on-mile on average).[4] If rail freight were to replace the Port to address the future demand, between 23 (low) to 25 (high) million grams of CO^2

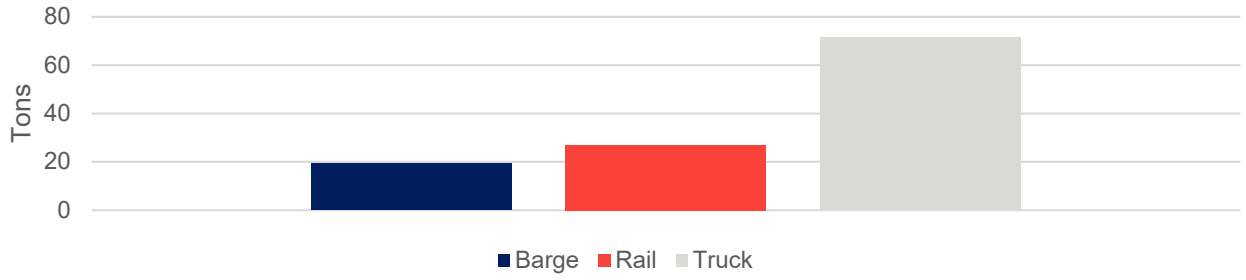
[2] MD SHA, Mobility Report: Top 15 Worst Corridors for Truck Travel, 2019.

[3] EPA, Medium and heavy-duty emission standards, 2014-2027.

[4] EPA, 2020 SmartWay Logistics Company Partner Tool: Technical Documentation, 2019. https://www.epa.gov/sites/production/files/2020-07/documents/420b20042.pdf

would be released into the air for every mile traveled by the trains. Figure 20 provides a visual example of the different levels of emissions between different modes of transportation.

Figure 20: Tons of CO_2 Emissions per Million Ton-Miles



Source: Texas Transportation Institute. "A Modal Comparison of Domestic Freight Transportation Effects on the General Public." 2009.

Truck and locomotive diesel engines also release air pollutants such as Nitrogen Oxides (NOx) and Sulfur Dioxides (SOx). When emitted into the air, NOx, SOx, and a few other types of pollutions undergo some chemical reactions, combine with water droplets in the atmosphere, and form compounds that can travel over long distances and remain in the air for years. These compounds make up some categories of emissions known as Particulate Matter (PM), which can sometimes be seen with the naked eye in the form of fog or a smoke haze commonly known as smog. Considering emissions like this is important because diesel engine pollutants cause cardiovascular diseases, aggravate lung and respiratory illnesses, and increase the rate of hospitalization and premature deaths.[5]

According to EPA's 2020 Emission Standards, semi trucks emit 0.073 grams of NOx and 0.034 grams of PM for every truck-miles traveled.[6] Meanwhile, rail locomotives release 0.42 grams of NOx and 0.012 grams of PM for every ton-mile.[7] By taking between 1.05 and 1.13 million tons of freight off the area's roadways and rail lines in the no-port scenario, Port of Salisbury prevents the release of thousands of grams of NOx and PM into the atmosphere. Figure 21 summarizes the truck and rail equivalent emission impacts in the no-port and growth scenarios.

Figure 21: Truck, Rail, and Barge Emission Impacts (grams per mile)

GHG/ Pollutant	Truck Equivalent Impacts		Rail Equivalent Impacts		Barge Impacts	
	Low	High	Low	High	Low	High
No-Port Scenario						
NOx	76,960	82,435	450,162	482,187	13,705	14,680
PM	35,844	38,394	12,651	13,551	234,042	250,692
CO_2	151,810,992	162,610,992	23,193,346	24,843,346	17,395,010	18,632,510
Growth Scenario						
NOx	3,650	9,125	21,350	53,375	650	1,625
PM	1,700	4,250	600	1,500	11,100	27,750
CO_2	7,200,000	18,000,000	1,100,000	2,750,000	825,000	2,062,500

Source: CPCS analysis, 2021.

[5] US EPA, Particulate Matter (PM) Pollution Basics, accessed June 2021.
[6] FHWA, Freight Movement & Air Quality: Chapter 2: National Freight Transportation Trends and Emissions
[7] EPA, 2020 SmartWay Logistics Company Partner Tool: Technical Documentation, 2019.

Transportation of hazardous material (hazmat) such as fuel oils and petroleum products can also lead to environmental impacts due to spillage. Hazmat spillage can cause long-term problems, serious injuries and fatalities in people and animals, and damage to property and the environment. According to the United States Energy Information Administration (EIA), offshore spills often reach lakes, rivers, wetlands, and protected wildlife habitats where they cause damage.

Truck and rail are the worst modes for hazmat transport (including petroleum shipments) in terms of the amount spilled per year: between 2007 and 2016, the average percentage of hazmat shipped and spilled was higher for rail and truck compared to pipeline and marine transport. Generally, the percent of hazmat shipped and spilled is consistent over time, except for rail, which is driven by high-impact incidents. By taking over 548,000 tons of petroleum products off the road and rails of the region, the Port of Salisbury prevents about three petroleum spill incidents per year.

4.2.4 Land Use Impacts

One of the benefits of developing the multi-use terminal is that it will allow for port redevelopment. Relocation of the remaining cargo handling facilities from the North Prong frees up land for further redevelopment or preservation. If the land is redeveloped for higher-value economic activities that are a better use of scarce resources, the City may be able to realize benefits in the form of increased land values and corresponding increases in tax receipts. Relocation and consolidation of freight handling activities may also reduce truck traffic in neighborhoods around the North Prong. This reduces congestion and pollution in the neighborhoods.

The median property tax in Wicomico County is $1,530 per year for a home worth the median value of $195,100. On average, the County collects 0.78 percent of a property's assessed fair market value as annual property tax.[8] CPCS's analysis of recent property sales and listings along the previously redeveloped east prong of the Wicomico River estimates commercial real estate values of $99/sqft and residential real estate values of $117/sqft. This is a significant increase over current empty lot prices, which are currently estimated to be approximately $30/sqft. [9] If redevelopment occurs in the North Prong following the same pattern of development as the east prong, property values could increase to comparable rates.

There appear to be several parcels totaling 185,000 square feet that could be redeveloped on the North Prong, as shown in Figure 22.

Figure 22: Potential Parcels for Redevelopment

Parcel	Area	Use
106-5-1622	27,105 SF	Commercial
106-5-1623	24,840 SF	Commercial
106-5-1624	30,470 SF	Commercial
106-6-1667	1.3800 AC 60,113 SF	Commercial
106-6-1665	42,947 SF	Commercial
Total	185,475 SF 4.26 AC	

Source: Maryland Department of Assessments and Taxation at https://dat.maryland.gov/Pages/default.aspx

[8] Tax-Rates.org, Wicomico County, MD Tax Rates, 2020. http://www.tax-rates.org/maryland/wicomico_county_property_tax

[9] CPCS estimate with data from Zillow.com and Brevitas.com, 2021

If these parcels are redeveloped as commercial assets at a premium of an additional $69/sqft, this would equate to an additional $12.8 million in property values. Given the tax rate of 0.78 percent, this would amount to approximately $99,822 in additional annual tax revenue to the County.

4.2.5 Other Impacts on the Economy

The Wicomico River requires regular dredging to maintain its navigability, which is currently done by the Army Corps of Engineers using Federal funds. Federal funds allocated to the dredging of the Wicomico River are presented in Figure 23. Should traffic volumes fall below 1 million tons per year and federally funding is lost or less frequent, the City or port stakeholders may have to cover up to $4 million in annual dredging costs to maintain the navigability of the river.

Figure 23: USACE Dreding Support for Wicomico River

Year	Amount (USD)
FY2019	$4,000,000
FY2020	$4,025,000
FY2021	$4,400,000

Source: Army Corps of Engineers Wicomico River Fact Sheet February 1, 2021 at https://usace.contentdm.oclc.org/digital/collection/p16021coll11/id/545

Should dredging be impacted, in addition to the potential movement of tonnage from maritime shipping to truck or rail, other users of the river would also be impacted. Chesapeake Shipbuilding also relies on the good maintenance of the Wicomico River's navigational channels to support inbound and outbound vessel movements. Reduction in the depth or dimensions of the navigational channel due to inadequate maintenance may limit the types of vessels Chesapeake could serve and threaten its operations in Salisbury.

4.2.6 Impacts on Jobs

Given that most of the traffic to be handled at the new multi-use terminal is existing traffic relocating from other parts of the port, the impact on direct job creation is anticipated to be minimal. However, the relocation of existing port users could allow for redevelopment, and this could lead to a number of indirect or induced new jobs.

The development of a Port Administration will create two new full-time jobs, plus will support additional part-time work for services such as cleaning and security. For users that maintain their current volumes, no additional jobs will be created. Interviews with port stakeholders did not glean much information on the potential for job creation, but presumably, several new jobs would be created to handle the additional 50,000-125,000 tons of cargo. In total, we anticipate up to 10 new direct jobs created as a result of the terminal.

In addition, the terminal could also spur indirect job creation. Of note, Chesapeake Shipbuilding's parent company is interested in acquiring additional storage and fabrication space as well as an additional slip for vessel outfitting. Given their space requirements, it is unlikely that Chesapeake could be a tenant at the new multi-user facility. However, the relocation of other port users to the facility could free up space for Chesapeake's expansion. The company estimates that the expansion would lead to the creation of 100 new jobs as well as hiring for up to 100 additional contractors.

Further, if the North Prong is redeveloped, there is potential for indirect job creation in mixed-use development. Figure 24 presents the median space in sqft required per worker.

Figure 24: Space per Worker Ratios

Principal Building Activity	Median Space per Worker (Sq. Ft.)
Administrative or Professional Office	561
Mixed-use	720
Strip shopping center	909
Restaurant or cafeteria	564
Bar, pub, or lounge	1,250
Other food service	475

Source: EIA, Commercial Buildings Energy Consumption Survey (CBECS), 2016.

Finally, the development of the multi-use terminal provides supports the recognition of the port as economically important, maintaining federal support for dredging the river. If this support were lost and it was no longer feasible to use the port, many regional jobs would be threatened. The figure below estimates jobs supported by existing port users from publicly available sources.

Figure 25. Estimated Employment by Port Users

Port user	Estimated number of employees in Salisbury	Estimated number of maritime-related employees
Vulcan Materials	2	2
Perdue Agribusiness Inc.	624	10
Cato Gas & Oil	150	10
C & D Concrete	5-9	5-9
CenterPoint Terminal	1-4	1-4
Chesapeake Shipbuilding	100	100

Source Reference USA, 2021.

5 Conclusion

The City of Salisbury's port is a unique asset: no other communities in the area have such a robust and diverse port complex, and Salisbury is well-situated to serve many other communities in the southern Delmarva peninsula. Given the potential public benefits described in this report, it appears that the City has a potential role to play in facilitating the development and operation of a multi-user port facility.

If the City wishes to undertake port development, a key first step will be the development of a maritime policy and identification of the public and private stakeholders needed to guide future port development. This effort can lay the groundwork for further negotiations needed to secure business for a port facility and begin construction.

Appendix A Economic Context and Commodity Studies

Economic Context Introduction

Demand for freight transportation services is an *induced* demand: the movement of goods is generated in response to activity in other sectors of the economy such as manufacturing or consumer purchases. Therefore, examining economic activity, particularly in industries that are heavily reliant on transportation services, provides valuable context to understand the potential opportunities for the development of new freight transportation infrastructure or services.

This appendix provides a summary of the industries in and around Salisbury that are heavily reliant on freight transportation to support their operations, particularly those industries using materials eligible for marine transportation, an overview of broad trends in those industries, and a synthesis of how these industries and their economic trends are relevant to the potential development of a multi-user port facility.

Salisbury's Freight-Related Industries

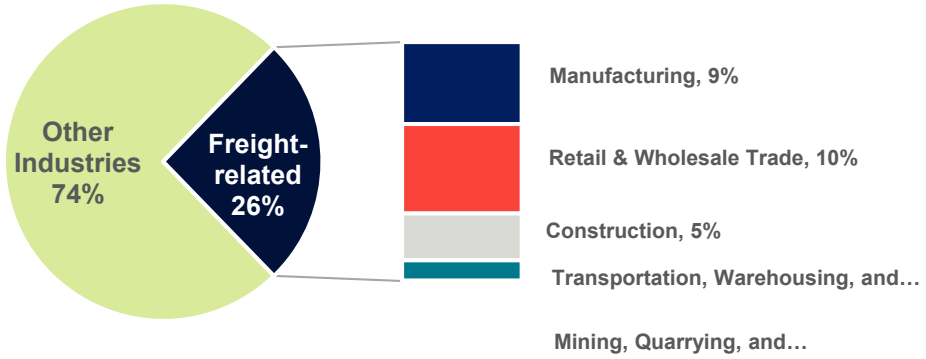
Freight-related industries are industry sectors that rely heavily on the movement of physical goods to support their operations. These industries include natural resource-based businesses such as farming or quarrying, manufacturing, retail, wholesale, warehousing, and transportation services. Many of these industries, particularly natural resource-related businesses like farms and quarries are often location-dependent and are thus dependent on access to affordable freight transportation services to remain competitive.

Freight Related Industry's Share of Salisbury's Economy

Figure 26 provides a breakdown of the Salisbury Metropolitan Statistical Area's (MSA's)[10] Gross Domestic Product by freight-related industry. Economic activity in freight-related industries represent about 26 percent of the Salisbury MSA's estimated GDP. In particular, retail and wholesale trade are the most significant freight-related industries in Salisbury MSA in terms of annual GDP contribution (10%), followed by manufacturing (9%) and construction (5%).

[10] Salisbury MSA is a metropolitan area as defined by the Census Bureau, and is centered on the city of Salisbury, Maryland. Salisbury MSA consists of three Counties of Somerset, Wicomico, and Worcester in Maryland, and Sussex County in Delaware.

Figure 26: Salisbury MSA's GDP Share by Industry



Source: CPCS analysis of GDP by County and MSA in Current Dollars by NAICS Industry, 2019, Bureau of Economic Analysis.

Freight-related industries make up a relatively small share of the Salisbury area's economy.

Figure 27 shows the overall 2019 GDP of the industries located in the MSA's counties. Illustrating the importance of tourism for many Delmarva communities, as accommodation and food services account for the highest share of the 2019 GDP of the four counties, followed by retail trade and private goods-producing industries.

Figure 27: County-Level GDP Share – Select Industries

Row Labels	Somerset	Sussex	Wicomico	Worcester
Agriculture, forestry, fishing and hunting	5.4%	2.5%	1.6%	0.0%
Arts, entertainment, recreation, accommodation, and food services	1.3%	5.0%	3.5%	17.6%
- Accommodation and food services	1.0%	4.5%	3.2%	15.0%
- Art, entertainment, and recreation	0.3%	0.5%	0.3%	2.6%
Construction	2.6%	6.0%	3.8%	3.7%
Manufacturing	6.8%	8.3%	13.1%	3.7%
- Durable goods manufacturing	6.3%	1.8%	2.5%	2.4%
- Nondurable goods manufacturing	0.5%	6.5%	10.5%	1.3%
Trade	13.3%	7.4%	14.4%	8.9%
- Retail trade	3.0%	5.2%	8.2%	7.0%
- Wholesale trade	10.4%	2.3%	6.3%	1.9%
Transportation and warehousing	0.0%	1.3%	2.1%	0.0%
Utilities	2.0%	0.5%	1.6%	0.0%

Source: CPCS analysis of Bureau of Economic Analysis GDP Data, 2019.

As discussed above, maritime transportation, and barge transportation more specifically, is only relevant to industries producing or consuming large volumes of bulk goods or goods too large to easily travel long distances by truck or rail. These qualifiers exclude many types of freight-reliant industries, particularly retail and wholesale trade, which means the share of economic activity associated with firms that use or could use the maritime system will be even lower.

Freight-Related Employment

The *employment by industry* data provided by the Quarterly Census of Employment and Wages (QCEW) program provides a comprehensive view of jobs associated with specific industries at the county and MSA levels. As Figure 28 shows, freight-related industries (shaded) made up about 30% of the Salisbury MSA's employment, but much of that employment is associated with industries relying solely on trucks for freight transportation, particularly retail trade.

Figure 28: Salisbury MSA Employment by Industry

Industry		Employment	% of Total
Private Non-Farm	Forestry, fishing, and related activities	1,637	0.65%
	Mining, quarrying, and oil and gas extraction	169	0.07%
	Utilities	898	0.35%
	Construction	16,025	6.32%
	Manufacturing	15,242	6.01%
	Wholesale trade	4,926	1.94%
	Retail trade	27,516	10.86%
	Transportation and warehousing	5,878	2.32%
	Information	(D)	-
	Finance and insurance	8,058 E	3.18%
	Real estate and rental and leasing	14,562 E	5.75%
	Professional, scientific, and technical services	9,311 E	3.67%
	Management of companies and enterprises	1,518	0.60%
	Administrative & support & waste management & remediation services	14,112	5.57%
	Educational services	1,997 E	0.79%
	Health care and social assistance	26,255 E	10.36%
	Arts, entertainment, and recreation	6,177	2.44%
	Accommodation and food services	27,431	10.83%
	Other services (except government and government enterprises)	(D)	-
Government and government enterprises		25,572	10.09%
Farm Employment		3,487	1.38%
Total Non-Farm Employment		224,344	88.53%

E The estimate shown here constitutes the major portion of the true estimate; (D) Not shown to avoid disclosure of confidential information; estimates are included in higher-level totals.
Source: CPCS analysis of Full-Time and Part-Time Employment by NAICS Industry 2019, Bureau of Economic Analysis.

Freight-reliant industries make up about 30% of the Salisbury MSA's total employment.

Location Quotient and Shift Share Analysis

In addition to examining each industry's relevance to the regional economy, it is important to understand any unique industrial specialties in the region. This section provides an overview of the Salisbury Metropolitan Area's (SMA) specialization in freight-related industries using Location Quotient (L.Q.) analysis. A location quotient of an industry indicates the proportion of the workforce employed in that industry relative to other geographic areas or industries. Therefore, analyzing L.Q.s

is a quick way to understand a local region's economic base specialization relative to the national norm. Industries that have higher L.Q. values are typically more export-oriented and, therefore, greater contributors to the regional economy. Although an L.Q. value of greater than 1.0 shows relatively high regional employment compared to national-level employment in a certain industry, studies show that an L.Q. of 1.3 is a better threshold for analyzing industry competitiveness.[11]

Figure 29 summarizes the SMA's annual country-level analysis of average employment L.Q.s based on the QCEW database. As shown, food processing is one of the most competitive freight-related industries in the SMA, with the highest concentration in Sussex and Wicomico Counties. It is important to note that barge service is an important link to the supply chain of animal feed for the area, which goes on to support food processing, particularly for poultry. However, of the competitive industries listed below, no others are likely to be as closely linked with waterborne transportation.

Food processing is a key competitive industry in the region and is supported by the barge movement of animal feed, particularly for poultry.

Figure 29: Location Quotients for Competitive Industries in Salisbury Metropolitan Area

Industry Group (NAICS Code)	County-Level LQs				SMA LQs
	Somerset	Sussex	Wicomico	Worcester	
Utilities (22-221)	0.00	1.00	3.26	0.00	1.38
Manufacturing (31-33)	0.45	1.46	0.76	0.33	1.08
Food Processing (311)	1.49	7.98	1.72	0.96	5.14
Retail Trade (44-45)	0.37	1.41	1.30	1.40	1.32
Furniture & Home Furnishings (442)	0.00	3.14	1.17	1.53	2.25
Building & Garden Equipment (444)	0.48	1.77	1.11	1.81	1.53
Health and Personal Care Stores (446)	0.82	1.24	1.55	1.31	1.30
Clothing and Clothing Accessories (448)	0.00	2.32	1.42	2.30	1.95
Miscellaneous Store Retailers (453)	0.31	1.44	1.37	1.33	1.34
Transportation & Warehousing (48-49)	0.73	0.87	0.84	0.53	0.81
Transit and Ground Passenger Transportation (485)	0.23	2.27	0.86	0.17	1.53
Arts, Entertainment, and Recreation (71)	0.34	1.24	0.55	5.63	1.56
Amusement, Gambling, & Recreation (713)	0.43	1.62	0.53	4.12	1.59
Accommodation and Food Services (72)	0.46	1.67	1.00	3.36	1.64
Accommodation (721)	0.27	1.54	0.79	7.13	1.98
Food & Drinking Services (722)	0.49	1.69	1.03	2.71	1.58
Public Administration (92)	0.63	0.07	0.39	0.98	0.30
Executive Offices (921110)	0.00	13.17	0.00	0.00	7.42
Regulation of Agricultural Marketing & Commodities (926140)	4.02	4.89	2.32	0.41	3.63

Source: CPCS analysis of Bureau of Labor Statistics data of 2019.

Although Location Quotients at the county and regional levels reflect the competitiveness of different regional industries compared to the national averages, **Shift Share Analysis** is a more dynamic

[11] For more information on LQ method, assumptions refer to Appendix A.

economic indicator used to understand changes in an area's industrial competitiveness over time, compared to the national norm.

Shift share analysis estimates regional job growth based on three factors:

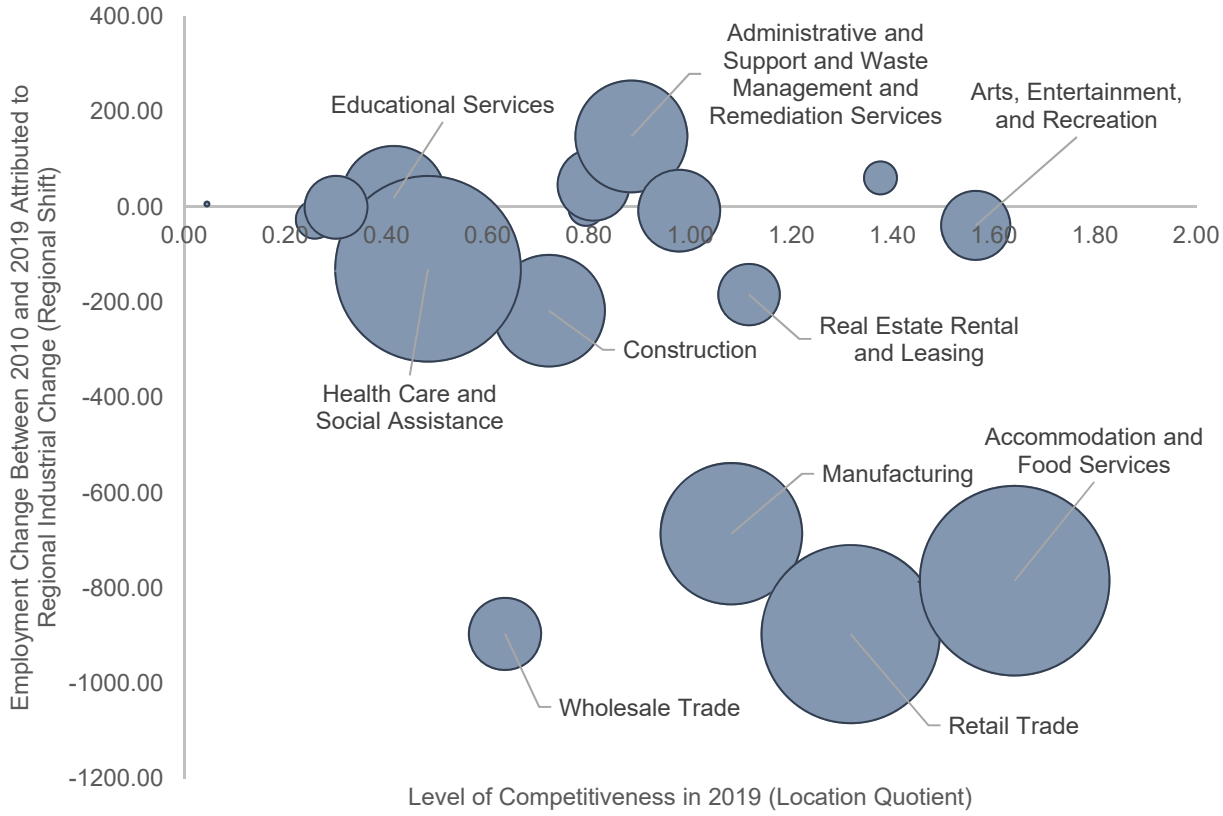
- Industrial mix effect: the growth of a specific industry at the national level. This effect is calculated through the analysis of industry-level employment data for the desired time frame.
- National growth effect: the regional industry growth impacted by the national level growth rates for the desired time frame.
- Regional competitive effect: the growth (or any change) in regional industry employment due to the unique characteristics of that region.

The resulting shift-share analysis is based on the following formula:

Actual Employment Change = National Share + Industrial Mix + Regional Shift

Figure 30 provides a visual comparison of the MSA's freight-related industries by how competitive they were in 2019 (X-axis) and how much employment has increased or declined independently of national trends (Y-axis). Industries with a Location Quotient greater than 1.0 on the X-axis indicate that they were more competitive than the U.S. average in 2010. On the Y-axis, positive values indicate that the industry has improved in competitiveness between 2010 and 2019, while the employment size of each industry in the area is indicated by the size of the circle for each industry.

Figure 30: Regional Competitiveness in Industries



Source: CPCS analysis of Bureau of Labor Statistics data of 2019 and 2010.

While the L.Q. analysis in the previous section proved that manufacturing, retail trade, and accommodation and food services are important to the Area's economy, the shift-share analysis adds another layer to this by highlighting the significant competitive advantages of the Salisbury Metropolitan Area for the construction and healthcare and social assistance industries. Also, the MSA's construction industry is growing at a faster rate compared to the nation, suggesting that construction material (such as bulk aggregate, asphalt, cement, etc.) could be a potential market for the Salisbury port to capture.

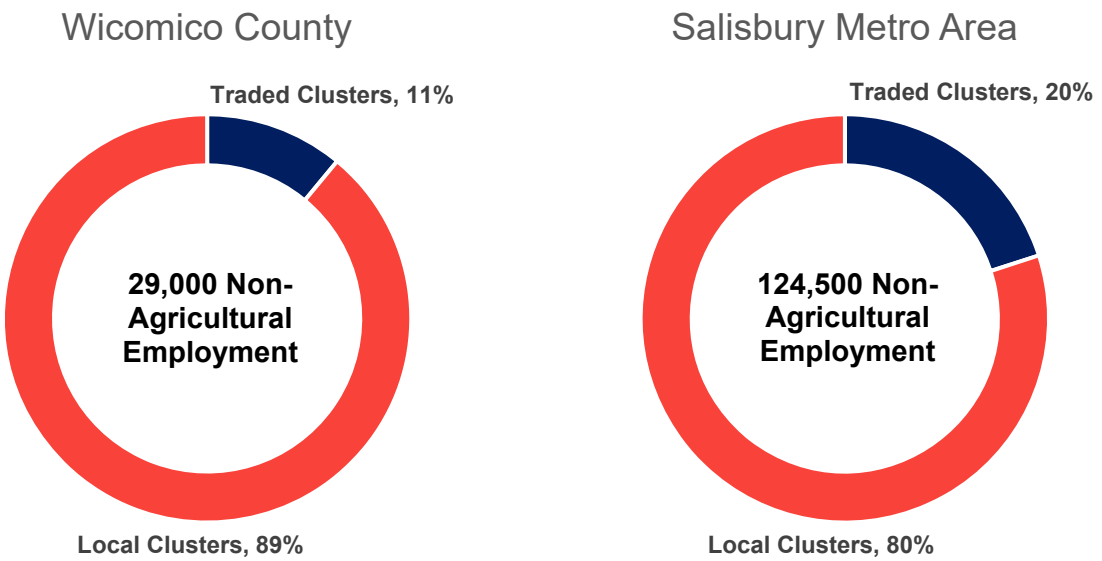
Construction services are increasing in importance for the Salisbury area's economy, a shift that could increase demand for aggregates.

The results of the shift-share analysis also show that there has been a growth in transportation and warehousing as well as utility employment, however, in this case, the regional factors have little influence over this growth as the primary driver is the national growth in these industries.

Cluster Analysis

Finally, Cluster Mapping Analysis also provides insight into employment in *local* and *traded* industry clusters, which are groups of related industries in a common area. Traded industry clusters are engaged with markets outside of the area of study, and can indicate industrial specialization, and industries generating demand for freight transportation. By contrast, local industrial clusters are usually engaged in an activity that is contained within the area of study. Figure 31 illustrates the share of Wicomico County and the Salisbury MSA's economy associated with industries in "traded" clusters. Figure 32 and Figure 33 illustrate which industries make up these traded clusters.

Figure 31: Traded Vs Local Clusters

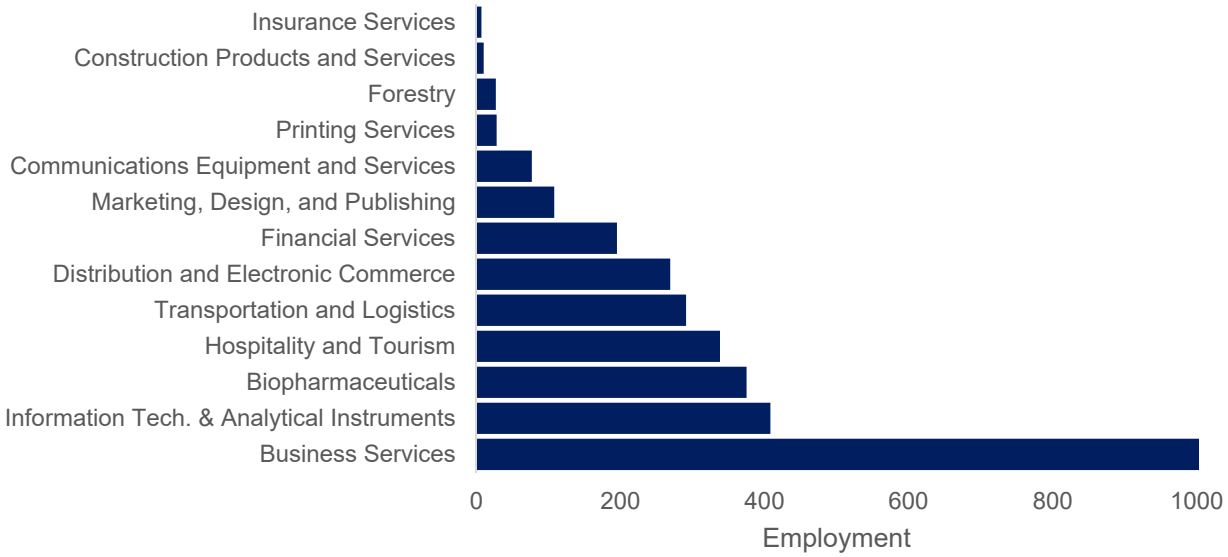


Note: Salisbury, MD-DE Metropolitan Statistical Area, centered on the city of Salisbury, consists of Somerset, Wicomico, and Worcester Counties in MD and Sussex in DE.
Source: U.S. Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School, 2017.

Of note amongst these figures, is the very high importance of livestock processing as a traded cluster when examining the combined economies of the Salisbury MSA. As mentioned earlier, this industry is already highly important to traffic at the port and partially reliant on inbound barge shipments of animal feed. However, there are no other industries that ship or receive bulk goods that rise to the top of these traded cluster rankings.

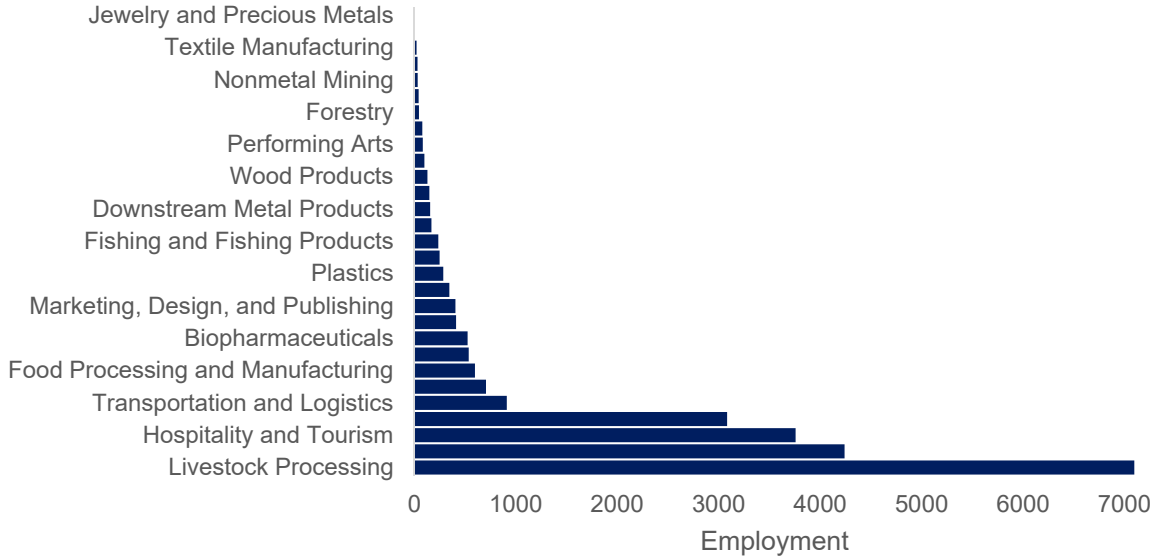
Livestock processing is a key traded industry cluster for the region and a key generator of barge traffic.

Figure 32: Wicomico County, Non-Agricultural Employment by Traded Cluster



Source: U.S. Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School, 2017.

Figure 33: Salisbury Metro Area, Non-Agricultural Employment by Traded Cluster



Source: U.S. Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School, 2017.

Economic Outlook Summary

The economic analysis above suggests that a relatively small part (one quarter to one-third) of Salisbury and the surrounding region's economic activity is reliant on freight transportation. An even smaller share of the region's industries and economic activity is associated with barge traffic or could be supported by port operations in the future.

However, it is important to note that while water transportation may be relevant to only small portions of the overall regional economy, water transportation is a critical link for the region's fuel, construction, and agricultural supply chains, and loss or unavailability of barge service could have significant knock-on effects for the region's economy as a whole.

Salisbury's Potential Competitors

This list provides a summary of the 12 relevant port and railroad facilities that also handle dry bulk, liquid bulk, or project cargo commodities listed above within 100 miles of Salisbury, and which are located on the Delmarva Peninsula. Within the market area, there were additional river docks and intermodal facilities listed in the US Army Corps of Engineers' dock data, National Transportation Atlas Database (NTAD), and Delmarva Freight Plan. However, some of the points in these two data sets were not relevant to this study, and docks or terminals were removed or combined if:

- The dock or terminal did not handle commodities relevant to the study.
- The dock or terminal catered to an international or ocean shipping market. For example, the port of Wilmington, while located on the Delmarva peninsula, does not compete in the same market as Salisbury.
- Intermodal cargo movements were not supported at the site.

Additionally, some entries in both the USACE and NTAD were out-of-date or listed previous owners. Based on a review of Google Maps and Google Streetview, the USACE and NTAD data points were filtered, merged (when necessary), and updated to produce a list of 12 relevant competitor facilities in the market area. While CPCS makes every effort to validate USACE and NTAD data, it cannot guarantee the accuracy or completeness of these third-party data sources.

Figure 34 lists all the identified competitor facilities within 100 miles of Salisbury, and Figure 35 illustrates their locations.

Figure 34: Potential Competitors or Similar for Salisbury's Port Facilities

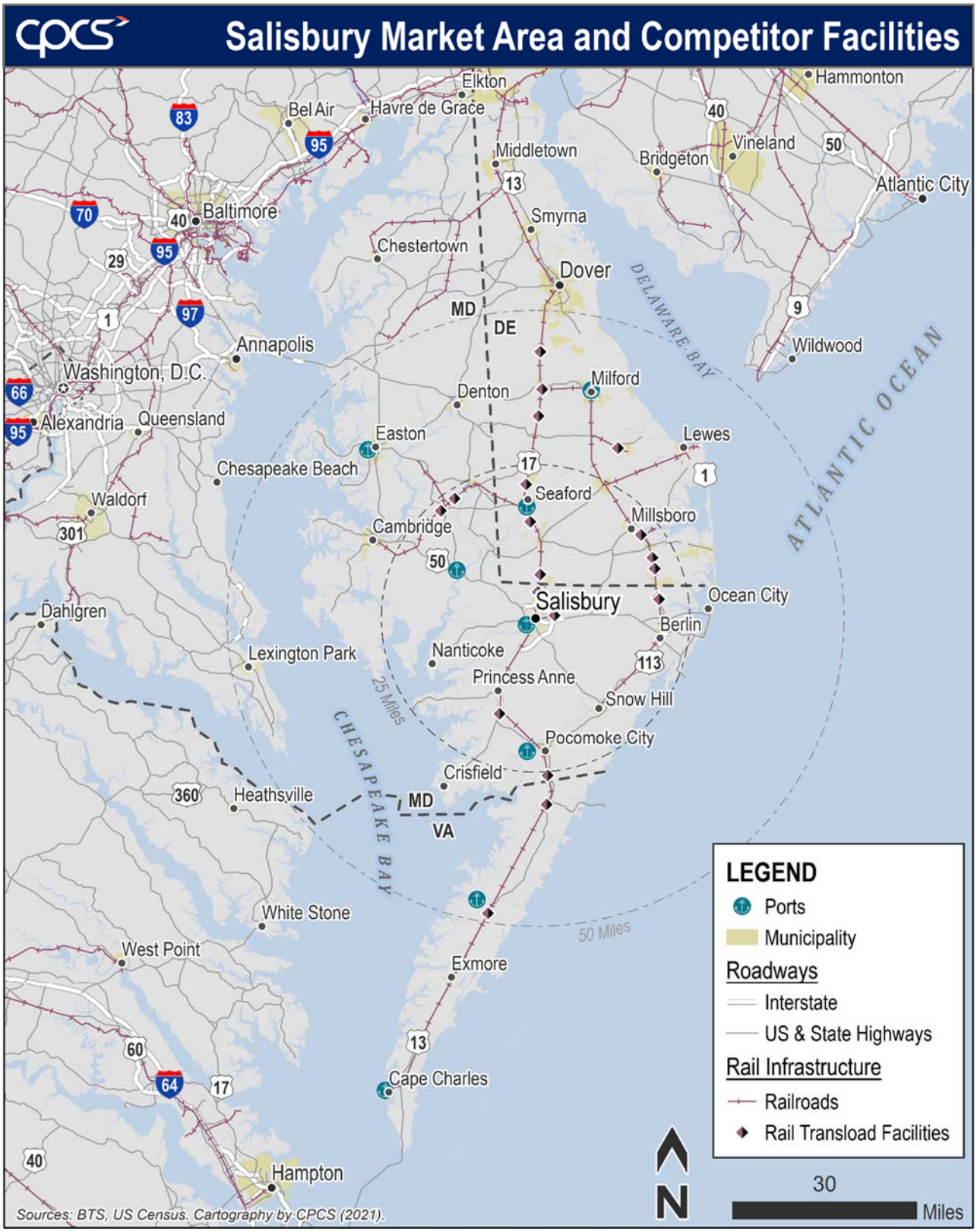
Facility Name	Waterway	Location	Connections	Commodities Handled
Invista	Nanticoke River	Seaford, DE	Rail, Barge	Chemical Products
Vulcan Materials	Nanticoke River	Seaford, DE	Barge	Sand & Gravel
Perdue Agribusiness	Nanticoke River	Seaford, DE	Rail, Barge	Agricultural Products, Fertilizer
Vienna Generating Station	Nanticoke River	Vienna, MD	Barge	Oil & Petroleum Products

Facility Name	Waterway	Location	Connections	Commodities Handled
Vulcan Materials	Pocomoke River	Pocomoke City, MD	Barge	Sand & Gravel
Mears Sand & Gravel	Onancock River	Onancock, VA	Barge	Sand & Gravel
Coastal Precast Systems	Chesapeake Bay	Cape Charles, VA	Rail, Barge	Misc. Mineral Products, Fuel Oil
Vulcan Materials	Tred upon Avon	Easton, MD	Barge	Sand & Gravel
Vinyard Shipyard	Mispillon River	Milford, DE	Barge	Wood Products, Fab. Metal
Central Grain	N/A	Harington, DE	Rail	Agricultural Products
Perdue Agribusiness	N/A	Bishop, MD	Rail	Agricultural Products
Allan Myers	N/A	Bishop, MD	Rail	Sand and Gravel
Suburban Propane	N/A	Bishop, MD	Rail	Oil & Petroleum Products
Suburban Propane	N/A	Onley, VA	Rail	Oil & Petroleum Products
Tri-County Gas Co	N/A	Oak Hall, VA	Rail	Oil & Petroleum Products
Mountaire Farms of Delmarva	N/A	Westover MD,	Rail	Agricultural Products
American Infrastructure	N/A	Delmar, MD	Rail	Sand and Gravel
Amick Farms	N/A	Delmar, MD	Rail	Agricultural Products
River Asphalt	N/A	Dagsboro, DE	Rail	Sand and Gravel
Baker Petroleum	N/A	Milton, DE	Rail	Oil & Petroleum Products
Bioenergy Innovation Center	N/A	Seaford , DE	Rail	Fertilizer
Tri Gas & Oil	N/A	Hurlock, MD	Rail	Oil & Petroleum Products
Perdue Farms	N/A	Hurlock, MD	Rail	Agricultural Products
Willard Agri-Services	N/A	Greenwood, DE	Rail	Fertilizer
Helena Agri-Enterprises	N/A	Bridgeville, DE	Rail	Agricultural Products
Mountaire Farms	N/A	Frankford, DE	Rail	Agricultural Products

Facility Name	Waterway	Location	Connections	Commodities Handled
Pioneer Materials	N/A	Felton, DE	Rail	Sand and Gravel
Allen Harim Foods	N/A	Bridgeville, DE	Rail	Agricultural Products
Perdue Agribusiness	N/A	Salisbury, MD	Rail	Agricultural Products
N/A	N/A	Frankford, DE	Rail	Oil & Petroleum Products
Branscome	N/A	Pocomoke, MD	Rail	Sand and Gravel

Source: CPCS Transcom analysis of National Transportation Atlas Database and US Army Corps of Engineers Master Dock data, and Delmarva Freight Plan.

Figure 35: Salibury Market Area and Potential Competitor Facilities



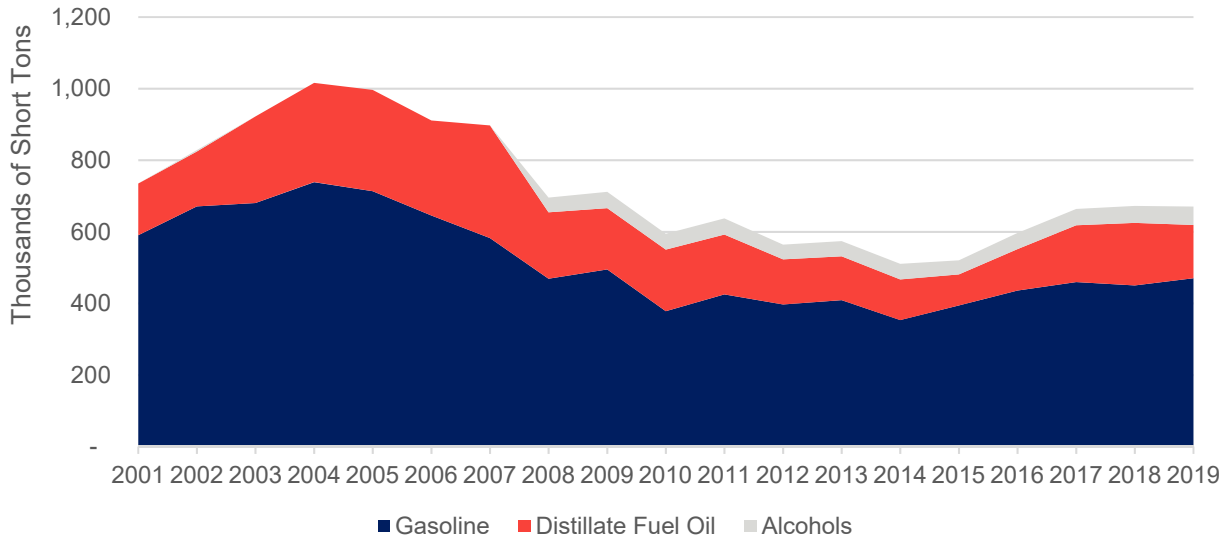
Inbound Fuel

Fuel shipments, primarily gasoline and heating oil, have made up 50 to 70 percent of Salisbury's total port tonnage over the past ten years. This large share of overall port tonnage means that fuel shipments are critical in ensuring that the Wicomico River meets the million-ton mark to qualify for US Army Corps of Engineers maintenance dredging. Therefore, it is important to understand potential changes and trends in this commodity type as it will influence its ability to remain an "anchor" commodity for the port in the near future.

Commodity Trends

Figure 36 illustrates the tonnage trends in Salisbury's inbound fuel shipments over the past 20 years. Overall, shipments have remained relatively steady around 660 to 670 thousand tons over the past three years. However, tonnages are well below historic highs from the early 2000s, and above the recent low point of 510,000 tons in 2014.

Figure 36: Salisbury Inbound Fuel Tonnage



Source: US Army Corps of Engineers Waterborne Commerce Statistics. 2020.

Transportation Profile

Currently, fuel is handled by two companies in Salisbury: Cato Oil, and Apex Oil/Centerpoint Terminal. Fuel terminal operators in Salisbury have a distribution range of roughly 50 miles, that covers much of the Eastern Shore, into Queen Anne's County, and down into Virginia's portion of the Delmarva Peninsula. The northern border for distribution is determined by distribution operations based around refineries in Delaware City, and partly by gasoline formulation requirements that are enforced on a county-by-county basis in Maryland. Currently, gasoline fuel distributors in Salisbury do not serve customers in Delaware, as the entire state of Delaware requires that gasoline must be "reformulated" as part of air pollution mitigation measures. By contrast, counties in Maryland's lower Eastern Shore and Virginia's part of the Delmarva Peninsula are not subject to these reformulation requirements.[12]

[12] United States Energy Information Administration. 2020.

Potential Competitor Facilities

The Delmarva Peninsula is a relatively unique region in the eastern United States because most of the Peninsula lacks the gasoline or diesel distribution pipelines common in many other parts of the region. As a result, all gasoline and other liquid fuels consumed in the region must be brought in by other means of transportation.

In regard to potential competitor ports, no other ports within 50 miles of Salisbury have handled gasoline or distillate fuel oil in the past 5 years. Oil and petroleum rail facilities on the Delmarva peninsula serve mainly heating oil and natural gas storage and distribution sites, with their gasoline and diesel services focused on commercial fleets and agricultural customers, instead of distribution to retail gas stations.

Figure 37: Potential Rail-Served Fuel Distribution Competitors for Salisbury

Facility Name	Location	Connections	Commodities Handled
Baker Petroleum	Milton, DE	Rail	Heating oil, propane, diesel, gasoline
Tri Gas & Oil	Hurlock, MD	Rail	Heating oil, propane, diesel, gasoline
Willard Agri-Services	Greenwood, DE	Rail	Oil & Petroleum Products, Agricultural Products
N/A	Frankford, DE	Rail	Fuel, details uncertain

Related Economic Activity

The medium-term outlook for fuel demand in the Salisbury area is uncertain: increasing population base and continued success as a tourist destination could drive increased demand for fuel in the area, particularly in the summer months. However, if fuel economy standards are tightened or the market share of electric vehicles increases, the demand increases could remain flat, or decrease. Nationally, in the short term, the US Energy Information Administration forecasts that US gasoline consumption through 2022 will remain lower than 2019 consumption.[13]

In the longer term (15+ years), fuel, particularly gasoline, is unlikely to maintain or increase its tonnage in Salisbury as increasing adoption of electric cars for economic and environmental reasons will likely reduce the proportion and number of internal combustion engine vehicles throughout the United States.[14]

Locally, one policy change that could quickly increase the volume of fuel shipments to Salisbury is a change to Maryland and Virginia's gasoline reformulation requirements. If Maryland or Virginia require Eastern Shore counties to sell reformulated gasoline, the fuel handled in Salisbury will be reformulated, and then can also be supplied to communities in Delaware. Given Salisbury's proximity to Delaware, it is possible that Salisbury's fuel distributors could capture elements of the Delaware gasoline and diesel markets.

[13] US Energy Information Administration Short Term Energy Outlooks. 2021.
[14] Gersdorf et al. Electric Mobility After the Crisis: Why and Auto Slowdown Won't Hurt EV Demand. McKinsey & Company. 2020.

Fuel shipments will remain a core element of Salisbury's tonnage in the near- to medium-term but are likely to decline over the longer term.

Inbound Aggregates

Much of the Delmarva Peninsula lacks naturally occurring aggregate resources like stone and gravel, which are necessary ingredients for construction materials like concrete and asphalt. As a result, stone and gravel materials must be brought into the region, and these heavy and low value-per-ton materials are often moved by barge.

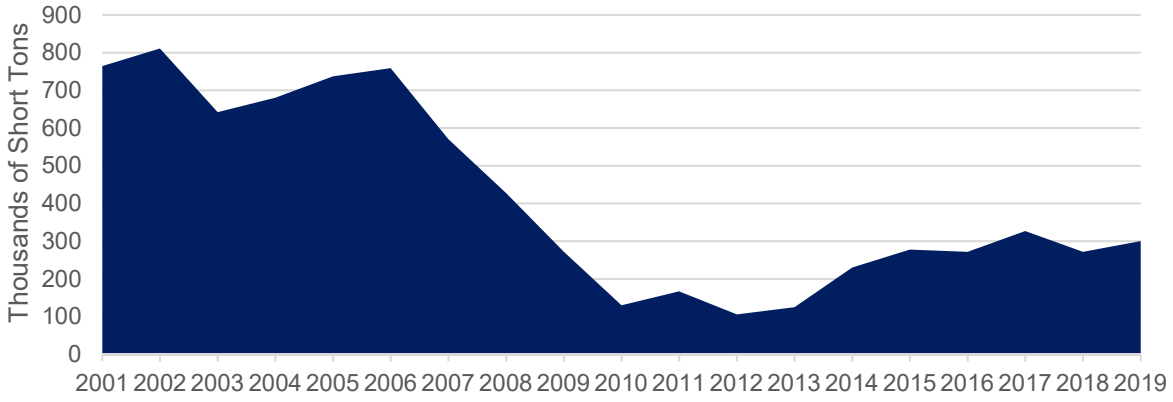
Commodity Trends

Aggregates are the second most important cargo for Salisbury by tonnage, and the tonnage of this commodity has been closely tied to new construction in the immediate area around Salisbury, and thus the health of the overall area economy. Figure 38 provides a visual example of tonnage trends over the past 20 years, with tonnages declining significantly before the Great Recession, and slowly recovering thereafter.

Transportation Profile

Aggregates have a very low value, generally below $50 per ton. Since aggregates are so low in value, transportation costs make up a large portion of aggregates' cost. For example, trucking aggregates for more than 30-50 miles can double the product's cost for end-users.[15] These cost considerations mean that rail and maritime routes are used to move aggregates long distances, and trucking distance is kept as short as possible. Findings like this were confirmed by stakeholder consultations, which identified 20-30 miles as the maximum cost-effective distance for aggregate shipments on the Delmarva Peninsula.

Figure 38: Salisbury Aggregate Tonnages



Source: US Army Corps of Engineers Waterborne Commerce Statistics. 2020.

Potential Competitor Facilities

The Delmarva Peninsula is home to multiple barge terminals handling aggregate materials, most of which are owned by Vulcan Materials. Additionally, there are a handful of rail-served aggregate

[15] Robinson, Gilpin and William Brown. Sociocultural Dimensions of Supply and Demand for Natural Aggregate – Examples from the Mid-Atlantic Region, United States. US Geological Survey. 2002.

yards. Figure 39 lists the locations of these facilities. Consultations with aggregate suppliers and maritime stakeholders indicated that, regarding aggregate shipping, nearby ports are not considered to be competitors or substitutes for Salisbury's port because trucking costs would make the closure of Salisbury or aggregate terminals at adjacent ports economically unattractive.

Figure 39: Other Terminals Handling Aggregate in 30 miles of Salisbury.

Facility Name	Waterway	Location	Connections
Vulcan Materials	Nanticoke River	Seaford, DE	Barge
Vulcan Materials	Pocomoke River	Pocomoke City, MD	Barge
Mears Sand & Gravel	Onancock River	Onancock, VA	Barge
Vulcan Materials	Tred upon Avon	Easton, MD	Barge
American Infrastructure	N/A – Rail Served	Delmar, MD	Rail
Allan Myers	N/A – Rail Served	Bishop, MD	Rail
Branscome	N/A – Rail Served	Pocomoke, MD	Rail

Related Economic Activity

As noted above, the Salisbury area is expected to experience continued population growth, and the population of Salisbury MSA is expected to grow by 91,000 people by 2040. This continued population growth is expected accompanied by the construction of additional housing and roads, as well as retail and other service establishments. In turn, this new construction will help sustain demand for aggregate materials in the future.

Expected population growth is likely to sustain or increase demand for aggregate shipping to Salisbury.

Consultations with aggregate stakeholders indicated that while the Salisbury region lacks aggregate such as stone and gravel, it has substantial reserves of sand which are potentially valuable for construction elsewhere in the Atlantic region. If a new port terminal was constructed, there is potential interest in expanding aggregate handling facilities and they would need new infrastructures.

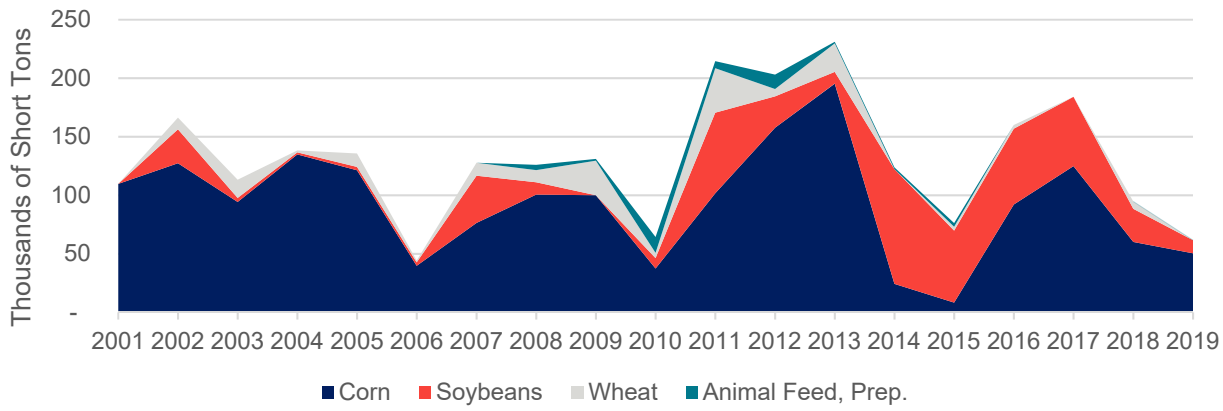
Inbound Animal Feed

As noted above, Salisbury's port facilities play an important role in supporting a regionally unique major industry: livestock and food processing.

Commodity Trends

According to consultations and findings from the prior 2014 port study, demand for inbound shipments of animal feed is variable and based on the local availability of feed. Figure 40 below illustrates this volatility in annual shipment volumes, with inbound tonnages of feed in Salisbury ranging between 50,000 tons to 225,000 tons.

Figure 40: Inbound Animal Feed Shipments, Salisbury



Source: US Army Corps of Engineers Waterborne Commerce Statistics. 2020.

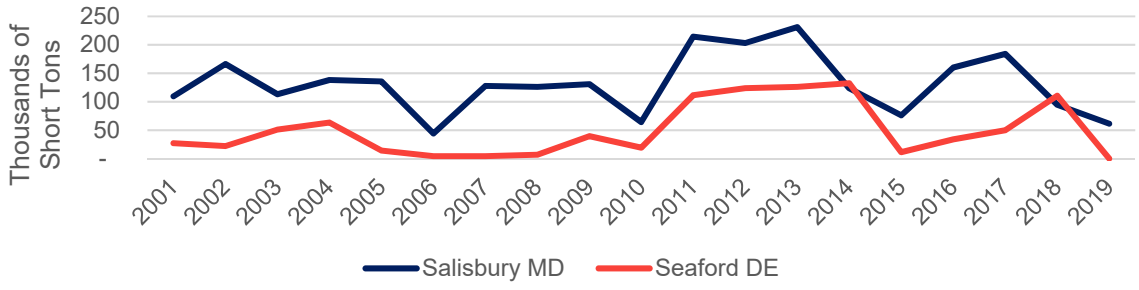
Transportation Profile

Since corn and soybeans have a relatively low value per ton, and since trucking has a moderately high cost per ton-mile, grains can only be moved relatively short distances by truck. For example, previous research in Great Plains states with much larger transport distance than the Delmarva Peninsula indicated that less than 10% of truck trips from farm-to-elevator exceed more than 45 miles.[16] Given the constrained size and shape of the Delmarva Peninsula, and the presence of other cargo handling facilities, it is likely that most grain-as-feed shipments in the region are traveling less than 50 miles.

Potential Competitor Facilities

Based on a review of NTAD, USACE, and Google Earth data, nine potential inbound grain handling facilities were identified within 50 miles of Salisbury. Within 50 miles of Salisbury, Seaford, DE is the only other port that handles inbound animal feed products, albeit at a lower tonnage than Salisbury. However, Seaford also serves an export role, shipping out far more corn and soybean tonnage than it receives most years. Figure 41 illustrates the inbound grain shipments handled at both facilities. Many of the other facilities identified in Figure 42 are also owned by specific poultry producers, and may not be true competitors for Salisbury, as they are "captive" to their respective companies.

Figure 41: Salisbury and Seaford Inbound Grain Shipments



Source: US Army Corps of Engineers Waterborne Commerce Statistics. 2020.

[16]Vachal, Kimberly and Denver Tolliver. *Regional Elevator Survey: Grain Transportation and Industry Trends for Great Plains Elevators*. Upper Great Plains Transportation Research Institute. 2001.

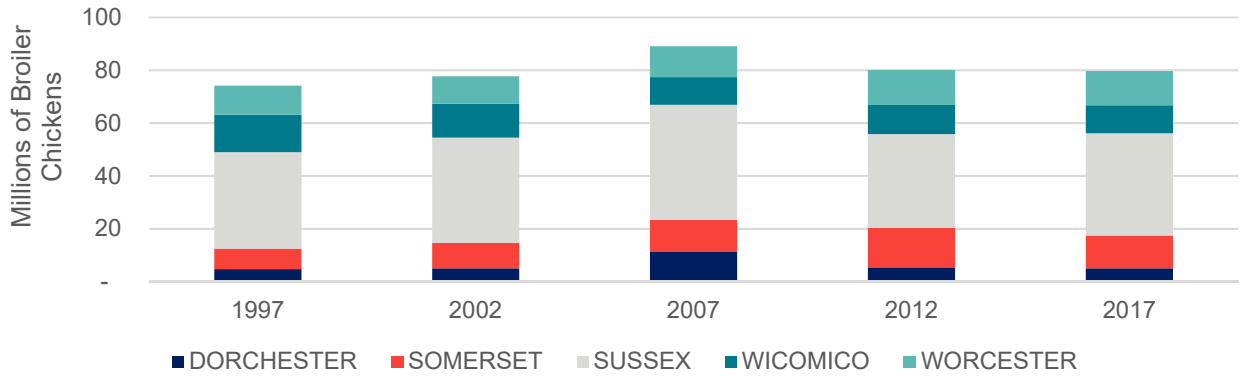
Figure 42: Potential Feed Transload Facilities

Facility Name	Waterway	Location	Connections	Commodities Handled
Perdue Agribusiness	Nanticoke River	Seaford, DE	Rail, Barge	Agricultural Products, Fertilizer
Perdue Agribusiness	N/A	Bishop, MD	Rail	Agricultural Products
Mountaire Farms of Delmarva	N/A	Westover, MD	Rail	Agricultural Products
Amick Farms	N/A	Delmar, MD	Rail	Agricultural Products
Perdue Farms	N/A	Hurlock, MD	Rail	Agricultural Products
Helena Agri-Enterprises	N/A	Bridgeville, DE	Rail	Agricultural Products
Mountaire Farms	N/A	Frankford, DE	Rail	Agricultural Products
Allen Harim Foods	N/A	Bridgeville, DE	Rail	Agricultural Products
Perdue Agribusiness	N/A	Salisbury, MD	Rail	Agricultural Products

Related Economic Activity

According to USDA records, chicken production around the Salisbury area has remained relatively steady over the past 20 years, a trend confirmed through consultations as well as the prior 2014 port study. Figure 43 illustrates this relative consistency in chicken production for Salisbury and the surrounding areas.

Figure 43: End of December Broiler Chicken Inventories, Wicomico and Adjacent Counties



Source: US Department of Agriculture, National Agricultural Statistics Service.

While the future for feed shipments in Salisbury is uncertain, largely as a function of the volatility of shipments of this commodity, there may be additional opportunities related to feed shipments in Salisbury.

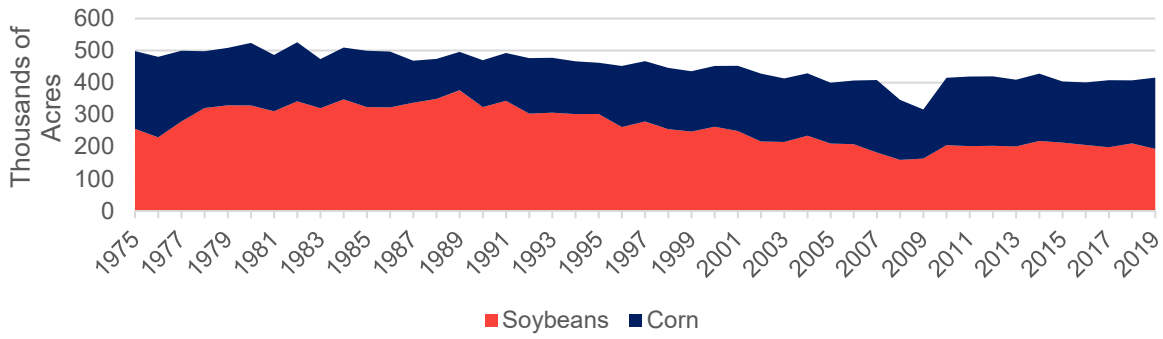
Outbound Crops

In addition to poultry production, Salisbury and much of the Delmarva Peninsula has a strong agricultural base, and large volumes of crops are produced in the region. Figure 45 illustrates this widespread agricultural production across the region. In theory, dry bulk goods like corn, soybeans, and wheat are well-suited to outbound transportation via water.

Commodity Trends

In general, agricultural production in Wicomico County and surrounding areas has shown some growth in the past 40+ years, despite a roughly 20% decline in the amount of land under cultivation. Figure 44 and Figure 46 illustrate the contrasting trends of land under cultivation versus the volume of agricultural products harvested in the area.

Figure 44: Planted Acreage of Corn and Soybeans, Wicomico and Adjacent Counties



Source: US Department of Agriculture, National Agriculture Statistics Service.

Figure 45: Agricultural Land Cover Around Salisbury

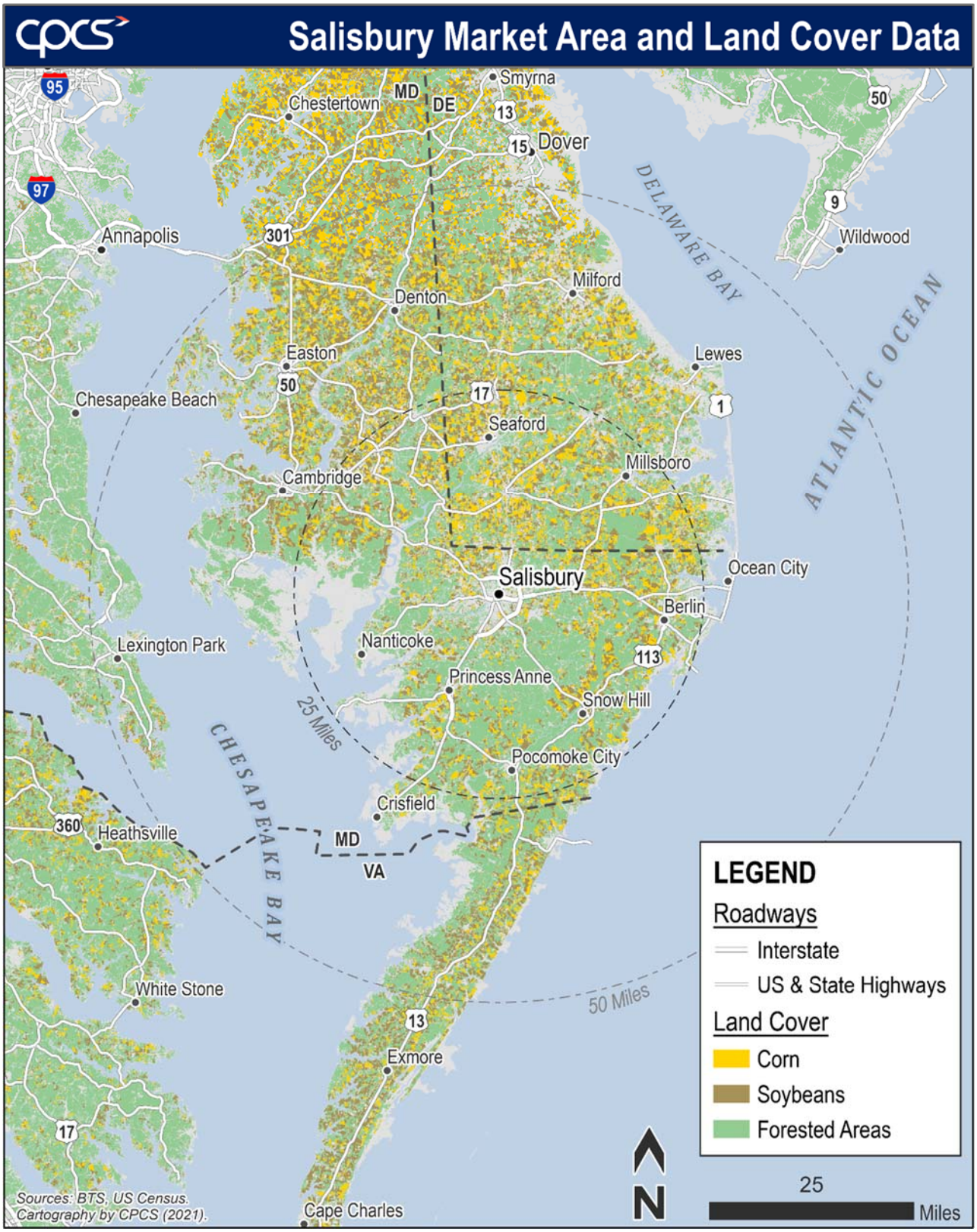
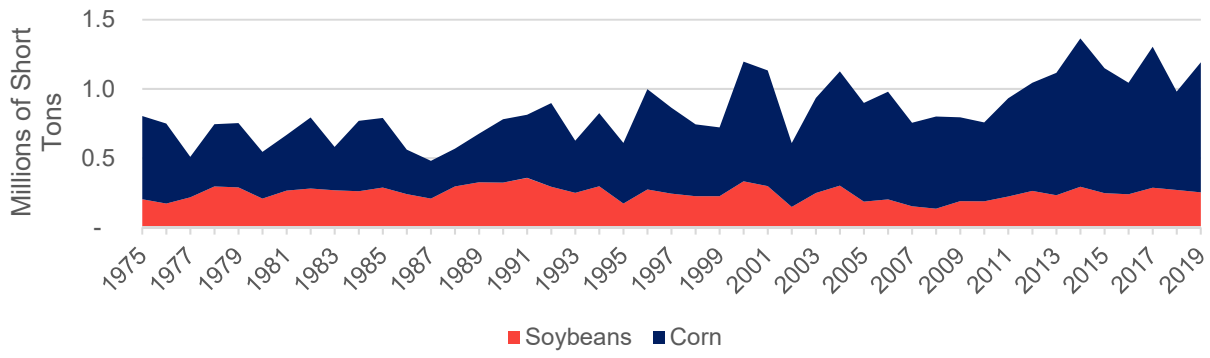


Figure 46: Harvested Volume of Soybeans and Grain Corn, Wicomico and Adjacent Counties



Source: US Department of Agriculture, National Agriculture Statistics Service.

Like the demand for feed, there is significant variation in the volume of crop production in the Salisbury area, but it has generally been increasing since the 1970s.

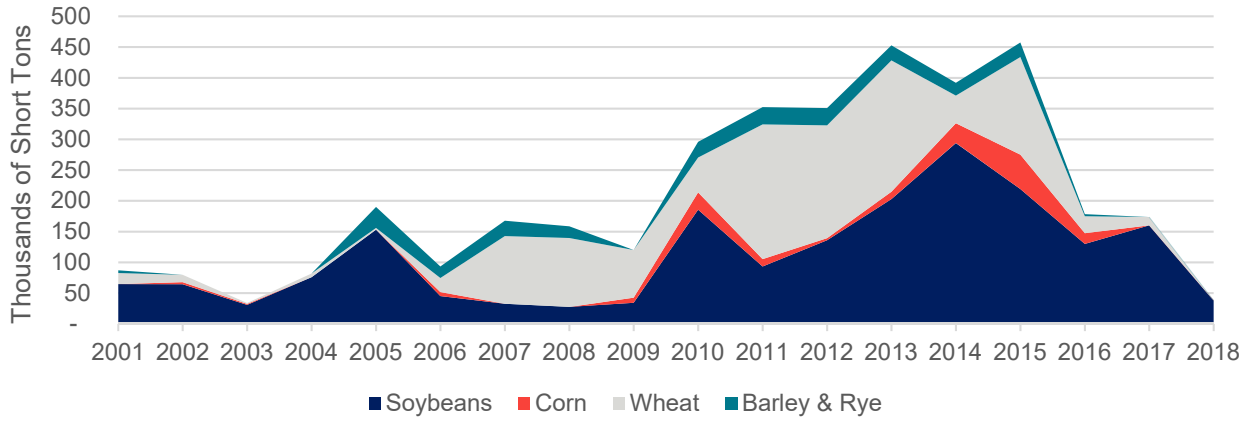
Transportation Profile

As noted in the animal feed market analysis, raw agricultural products have a relatively low value per ton, and since trucking has a moderately high cost per ton-mile, grains can only be moved relatively short distances by truck. Given the constrained size and shape of the Delmarva Peninsula, and the presence of other cargo handling facilities, it is likely that most grain-as-feed shipments in the region are traveling less than 50 miles.

Potential Competitor Facilities

Within the general market area of Salisbury, there is one port already handling agricultural products, Seaford, DE. Outbound agricultural shipments from Seaford are handled through a set of grain elevators owned by Perdue, and, like feed shipments, vary widely from year to year.

Figure 47: Seaford, DE Outbound Agricultural Products



Source: US Army Corps of Engineers Waterborne Commerce Statistics.

In addition to the port facilities in Seaford, there are rail-served grain elevators in Salisbury's market area that may be potential competitors for a port facility. These elevators are listed previously in Figure 42.

Related Economic Activity

Given the importance of poultry farming in the region and livestock's role as a value-added input for food manufacturing, it is likely that much of the agricultural products produced around Salisbury are used as inputs to poultry farming, rather than being exported to other regions.

Other Commodity Considerations

In addition to the high-level market assessments above, CPCS conducted consultations with stakeholders in other industry sectors that use water transportation to determine if they warranted additional study.

Inbound Fertilizers

Given the large portion of the study area covered by agricultural land, there is likely to be a demand for agricultural inputs such as fertilizer. In certain circumstances such as agricultural lands around the Mississippi and Ohio Rivers, fertilizer is cheap enough and moves in quantities large enough to warrant barge transportation. However, no fertilizer moved into ports in the Salisbury area by water transportation since at least 2001. Compared to other dry bulk goods like aggregate and agricultural products, fertilizer has a relatively higher value-per-ton and thus is capable of being moved longer distances by rail and truck. Therefore, it is likely that the Delmarva Peninsula's fertilizer supply chain is oriented around truck and rail distribution, and unlikely to shift to barge unless demand increased significantly, or barge transportation offered cost savings significant enough to warrant re-routing of supply chains. The project team has reached out to a local fertilizer distribution company for further information but has not received a response.

Outbound Forest Products

Wicomico County and its neighboring counties have significant tracts of un-reserved forest land and the Delmarva Peninsula as a whole is home to a wide range number of sawmills and lumbering concerns.[17] This wood product industry has the potential to generate outbound shipments of wood chips, sawdust, or finished wood pellets, which would be relatively low-value and eligible for barge shipments. However, it appears that the volumes of these forest products are relatively low when compared to volumes generated by the established pulp and sawmills in mainland North America, and many products of Delmarva mills are consumed locally for power generation or heating. Consultations with a forest products firm further confirmed that there is little interest in outbound shipping.

Wind Turbine Components

The wind component manufacturing and shipping industry has particularities that do not play in favor of the Port of Salisbury. First, major oversized components (blades, tower sections, alternator, wind nacelle) are mostly purchased from specialized suppliers and often imported from overseas. Therefore, components for offshore wind installations or components imported from other countries require a port with access for larger ocean-going vessels.

There are other steel and concrete components required for windmill construction and those can be built more locally. In theory, a company based in or around Salisbury could bid on these jobs. However, even if a local firm were awarded such work, they might not need water transportation services since these steel and concrete components are not as large and could more easily use land transport to reach ocean ports for deployment.

[17] Greater Delaware Area Forest Biomass Resource Analysis. US Forest Service Wood Education and Resource Center. 2012

General Project Cargo

Designing a port based on a specific project cargo (such as wind turbine components or other industrial machinery) with limited unavailable information regarding tonnage, duration of project and without a definite inception plan is not recommended. A major drawback of basing port investments on project cargo is the fact that such cargoes often move sporadically and cannot make up a steady stream of business each year for a port. On the other hand, positioning the Port of Salisbury to attract project cargo with simple investments in sufficient laydown space, dock walls, or adequate road access could be considered within the extra port capacity needed for future expansion.

Appendix B Economic Context and Commodity Studies

Congestion Mitigation and Air Quality Improvement (CMAQ) Program

In 1991, Congress passed the Intermodal Surface Transportation Efficiency Act-the ISTEA, which built on the Clean Air Act and emphasized a multi-modal transportation focus, paving the way for greater focus on environmental programs.[18] Part of this approach was the newly authorized Congestion Mitigation and Air Quality Improvement (CMAQ) Program, which provides a flexible funding source for State and local governments to fund transportation projects and programs that reduce mobile source emissions to help meet the requirements of the Clean Air Act.[19]

Administered by FHWA, the CMAQ program has been reauthorized under every successive Transportation Bill up to and including the FAST Act in 2015. Projects that receive funding through CMAQ must be included in an MPO's current transportation plan and transportation improvement program (TIP) or the current State transportation improvement program (STIP) in areas without an MPO.[20]

Maritime Administration Funding Programs

The funding opportunities provided by the Maritime Administration (MARAD) can be used to support port or maritime transportation investment. These programs include:

- **Marine Highway Program:** The US Marine Highway Program promotes the use of navigable waters to reduce landside congestion, improve air quality, and mitigate the impacts of freight activities on communities. Calls for eligible projects are published by the Federal Register approximately two years and designated projects receive preferential treatment from the MARAD, possible funding assistance, and other support services. The Maryland Port Administration and Port of Baltimore are listed as current supporters of Marine Highway M-95, and Salisbury may be eligible for funding under this program.

- **Small Shipyard Grants:** This program provides financial support for projects that make capital and related improvements and provide workforce training for marine vessels and associated industries. Small Shipyard Grants are capped at 75% of the project's total cost and are available to facilities with fewer than 1,200 employees.

- **Construction Reserve Fund:** The Construction Reserve Fund (CRF) provides financial assistance through tax deferral benefits to U.S.-flag operators. Eligible parties include entities involved in domestic trade between US ports and with possessions located within the coastwise laws and along the inland waterways, as well as fishing vessel owners and operators. Grant programs like this may be relevant to clients of Chesapeake Shipbuilding.

- **Capital Construction Fund:** American flag vessel operators are eligible to apply for the Capital Construction Fund (CCF) program. CCF aims to provide these entities with a competitive advantage over foreign-flag operators, for the construction and replacement of

[18] FHWA, CMAQ Program Website, accessed February 2021: https://www.fhwa.dot.gov/environment/air_quality/cmaq/

[19] FHWA, National Coalition on Truck Parking: Funding, Finance, and Regulations Working Group - Emissions Reduction Grant Programs Fact Sheet, 2020.

[20] Ibid

their vessels. Grant programs like this may be relevant to clients of Chesapeake Shipbuilding.

- **Port Infrastructure Development Program:** This discretionary grant program provides state and local (port) authorities with an opportunity to fund their port and terminal infrastructure projects. The notice of funding opportunity for the program was announced on April 16, 2021 and the application period will close by July 30, 2021.[21] The program's funds ($230 million) are awarded on a competitive basis to support projects that support the efficient movement of goods and enhance economic vitality through port infrastructure modernization. Impacts on climate change, environmental justice, and racial equity, reducing barriers to opportunity, and meeting the challenges faced by rural areas are other factors considered in awarding projects.[22]

Better Utilizing Investment to Leverage Development (BUILD) Grant Program

USDOT's BUILD discretionary grant program supports the state DOTs in their investments in road, rail, and maritime projects that have national impacts. The program's selection criteria are specifically designed to favor multi-modal and multi-jurisdictional projects that receive limited support through traditional DOT programs. USDOT will publish the final FY 2021 BUILD Notice of Funding Opportunity by April 26, 2021.[23]

Critical freight projects generally qualify for BUILD funds as they play an important role in goods movement efficiency and economic vitality but have limited sources of Federal funds. As an example, in 2020, Port of Baltimore received a $10 million BUILD grant to enhance flood mitigation systems infrastructure at the Dundalk Marine Terminal.[24] Also, Maryland Port Administration has received $3.9 million in BUILD grant through Maryland DOT to modernize Berth 3 at the Seagirt Marine Terminal by 2022, and $466 million to improve rail access to the Port of Baltimore.[25]

Port Security Grant Program (PSGP)

This Federal Emergency Management Agency's (FEMA) grant provides funding to state and local public agencies and the private sector to improve critical port infrastructure protection and security risk management and enable "maritime security mitigation protocols" to improve disaster recovery and resiliency. In FY 2020 Maryland Port Administration received $1.15 million in PSGP funds to improve cybersecurity and closed-circuit television capabilities at the state-owned marine terminals of the Helen Delich Bentley Port of Baltimore.[26] The total funding available in FY year 2021 is $100 million, and the application period will close on May 14, 2021.

21 The Federal Register, Notice of Funding Opportunity for the Maritime Administration's Port Infrastructure Development Program (PIDP) Under the Consolidated Appropriations Act, 2021.

22 USDOT Maritime Administration, U.S. Department of Transportation Announces Funding Availability for Port Infrastructure Development Program, March 29, 2021.

23 USDOT, BUILD Discretionary Grants, accessed April 2021.

24 Senator Ben Cardin Media Recourses, Accessed April 2021. https://www.cardin.senate.gov/media

25 Baltimore Metropolitan Council, Maryland Port Administration Projects, 2021. https://baltometro.org/sites/default/files/bmc_documents/general/transportation/tip/21-24/21-24TIP_Maryland_Port_Administration.pdf

26 Security Magazine, Port of Baltimore receives Federal security funding, August 2020.

Appendix C Site Assessment

Introduction

This chapter provides an overview of the physical attributes of some potential port terminal locations and the needs and issues that may need to be addressed in the development of select sites. The chapter is broken down into:

- Commercial navigation-related considerations that can influence facility siting and design.
- Review of the feasibility of general development at each site.
- Discussion of the types of facilities required for port development.
- Examination of the supporting transportation infrastructure upgrades needed at each site.

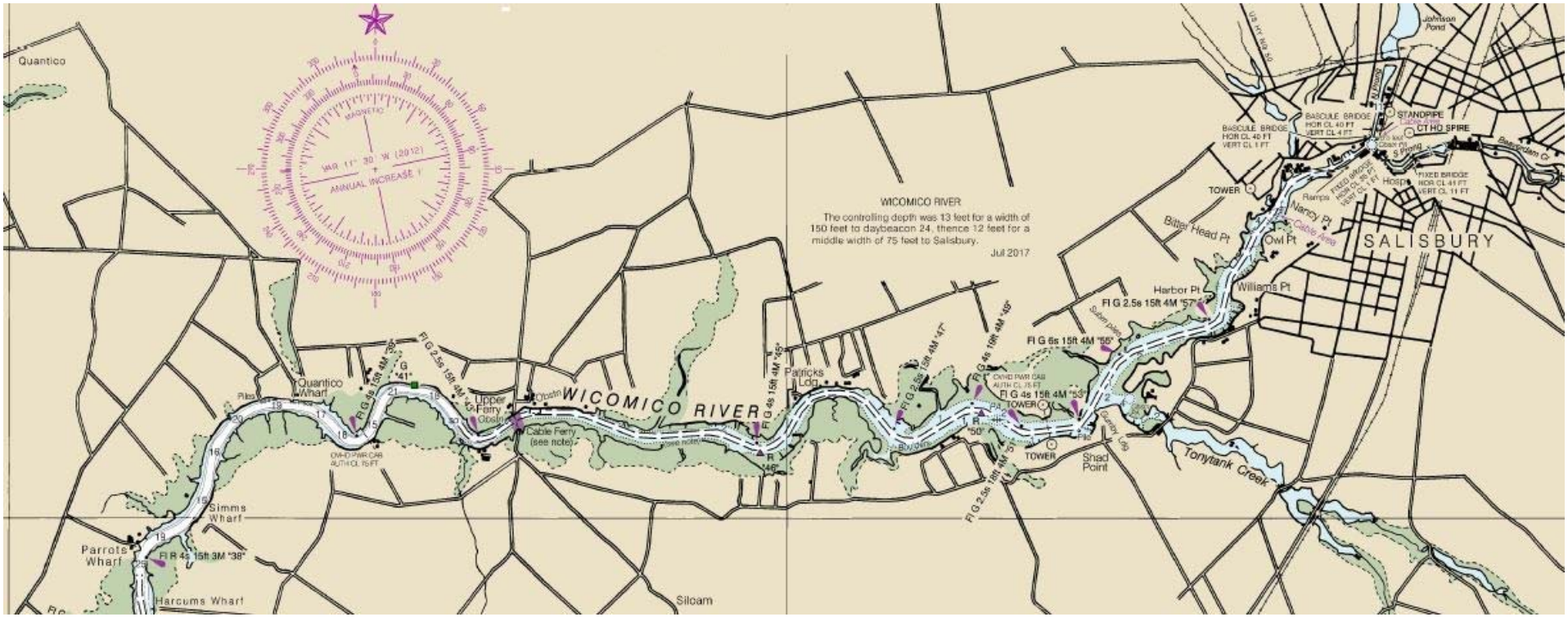
River Considerations

Commercial navigation on the Wicomico River is made possible by dredging work organized by the US Army Corps of Engineers and is subject to constraints created by the river's flow and shape, as well as the needs and operations of varying water users. This section profiles some physical considerations that are relevant to navigation on the Wicomico River and provides context for further discussions in this chapter.

River Capacity

One of the most significant limitations to traffic along the Wicomico is waterbody size. The channel is shared with recreational boaters and fishermen. The extent of commercial fishing is unknown but is likely limited to the lower portion of the Wicomico River or along the entrance bays. Additionally, consultees indicated that tug and barge traffic is reduced to single-direction traffic for much of the river, and barges must communicate and coordinate with each other before traversing the river. Port-related traffic may further be restricted to the time of day. While the Federal Channel (see below) is regulated at 150-feet in width, the available channel meeting 14-feet in depth is often wider from the mouth to Green Hill Creek. Above, Green Hill Creek, the available channel width meeting authorized depths can be 150-feet or less depending on shoaling. Figure 48 illustrates the channel and location of some improvements.

Figure 48: Wicomico River Navigational Channel and Improvements



Source: US Army Corps of Engineers

Geometric Conditions

Federal Channel

The United States Army Corps of Engineers maintains a 37-mile channel, 150-feet wide by 14-feet deep from the Chesapeake Bay to Salisbury, MD authorized by the Rivers and Harbor Act (modified 1954). Based on information from recently available reports, maintenance dredging of the channel is performed on 2-year intervals. The current dredge disposal site is the Sharps Point Site owned by Wicomico County. Federal funding can impact the size and scope of dredging operations.

The most recent operations removed approximately 100,000 cubic yards of material at a cost of $3.4-million. As noted in Chapter 1, maintenance priority is often dependent upon port traffic tonnage.

Flow Conditions

According to NOAA Coast Pilot, periods of extreme cold weather will cause ice as far down as Whitehaven, MD (6.5 miles above mouth). Ice blockage in extreme cold winters may impact operations with a particular impact to traffic operating during colder, non-daylight hours. Tidal velocities at Wicomico River entrance are 0.6 knot and 0.9 knot on flood and ebb respectively. Length of trip and tidal fluctuations may play a role in transportation along the river; operations of deeper drafting traffic may choose to time high tide conditions. NOAA tide predictions indicate an annual tidal range of approximately 4-feet at Whitehaven, MD and 5-feet at Salisbury, MD. Average daily tidal range is approximately 2.36-feet at Whitehaven, MD and 3.05-feet at Salisbury, MD. Local climatic conditions can alter these predictions.

Ferry Operations

Two ferry services cross the Wicomico River and can impact other commercial navigation. The ferry at Whitehaven, MD operates during daylight hours. The cable is dropped to the river bottom when not operating and the crossing is unmarked to vessel traffic. The ferry at Upper Ferry, MD operates during daylight hours. The cable is held taut and is suspended at or near the water surface during daylight hours. The cable is dropped during non-daylight hours and the crossing is marked to vessel traffic. Audible signaling from vessels alerts the ferry operator. Both ferries are operated and maintained by the Wicomico County Department of Public Works. Ferry operations begin at 7 AM and end at seasonal times.

Overhead Structures

There is an overhead power cable 14-miles above the mouth that has a clearance of 75-feet according to NOAA Coast Pilot. Two drawbridges located on the North Prong of the Wicomico River across W Main Street and US 50 have respective clearances of 1-foot and 4-feet. A 4-hour minimum notice to open the draw bridges is required by telephone. Horizontal clearance of both bridges is 40-feet.

River Navigation

United States Coast Guard Regulations

Pertaining to port expansion activities, the United States Coast Guard has authority under Title 33 and Title 46 Regulations. These regulations oversee maritime security, waterfront facilities, pollution, and other relevant sections. These regulations must be followed and implemented into port facilities.

Speed Restrictions

A 6-knot speed limit is in place at both ferry crossings and from Harbor point to the head of navigation.

Channel Obstructions

The existing channels are marked by Aids to Navigation. NOAA charts indicate several obstructions and wrecks along the Wicomico River. Numerous private and public docks flank both sides of the channel, and commercial navigation stakeholders have noted that dock development on the river has reduced the navigational margin for error on some bends in the river. Underwater cable areas are indicated (independent of ferry cables) from Owl Point to Nancy Point and near the confluence of the North and South Prongs with the Wicomico River. None of these identified items are not anticipated to limit the future development of the port. Shoaling may reduce available channel depth and width between dredging operations.

Possible Multi-User Port Site Locations

For this initial feasibility evaluation, two sites along the north side of the Wicomico River were reviewed. This section reviews the general feasibility of port facility development at these two locations.

General Considerations

General considerations are factors that are relevant to all sites regardless of their location or infrastructure.

Zoning

The sites under consideration are in the City of Salisbury and Wicomico County. The Site inside the City would be developed under Riverfront Redevelopment Multiuse District No. 2 zoning. It is unclear if all the properties identified within the City currently have the proper zoning and a possible rezoning may be necessary. The sites located within the County are zoned A-1 – Agricultural – Rural. These sites would need to be developed under the Special Standards within the County Zoning Code. This would require the property to be rezoned to I-2 (Industrial) and a special exception by the Planning Commission for a commercial marina would still be needed. The Marinas section of the code provides enough flexibility for the development of a multi-user port within the County.

Local Code Restrictions

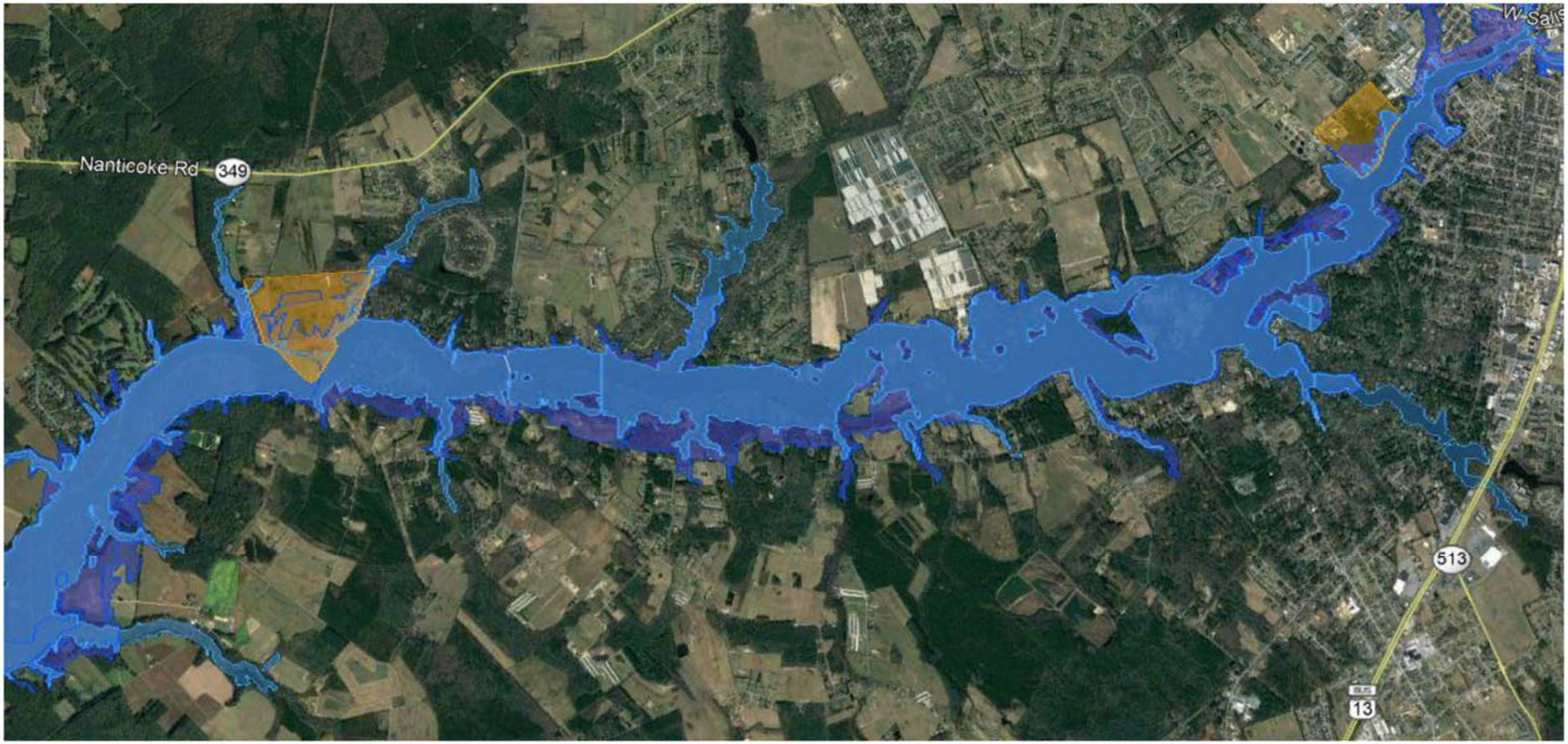
Due to the unique aspects of a multi-user port, there are several local code requirements that will need to be assessed. There is a likelihood that variances will be needed. Examples of variances within the City are the requirement for a multi-use path along the frontage of the property and the need for landscaping in certain aspects of the development. These requirements are incompatible with the proposed use and variances would be needed.

Environmental Considerations

Permitting

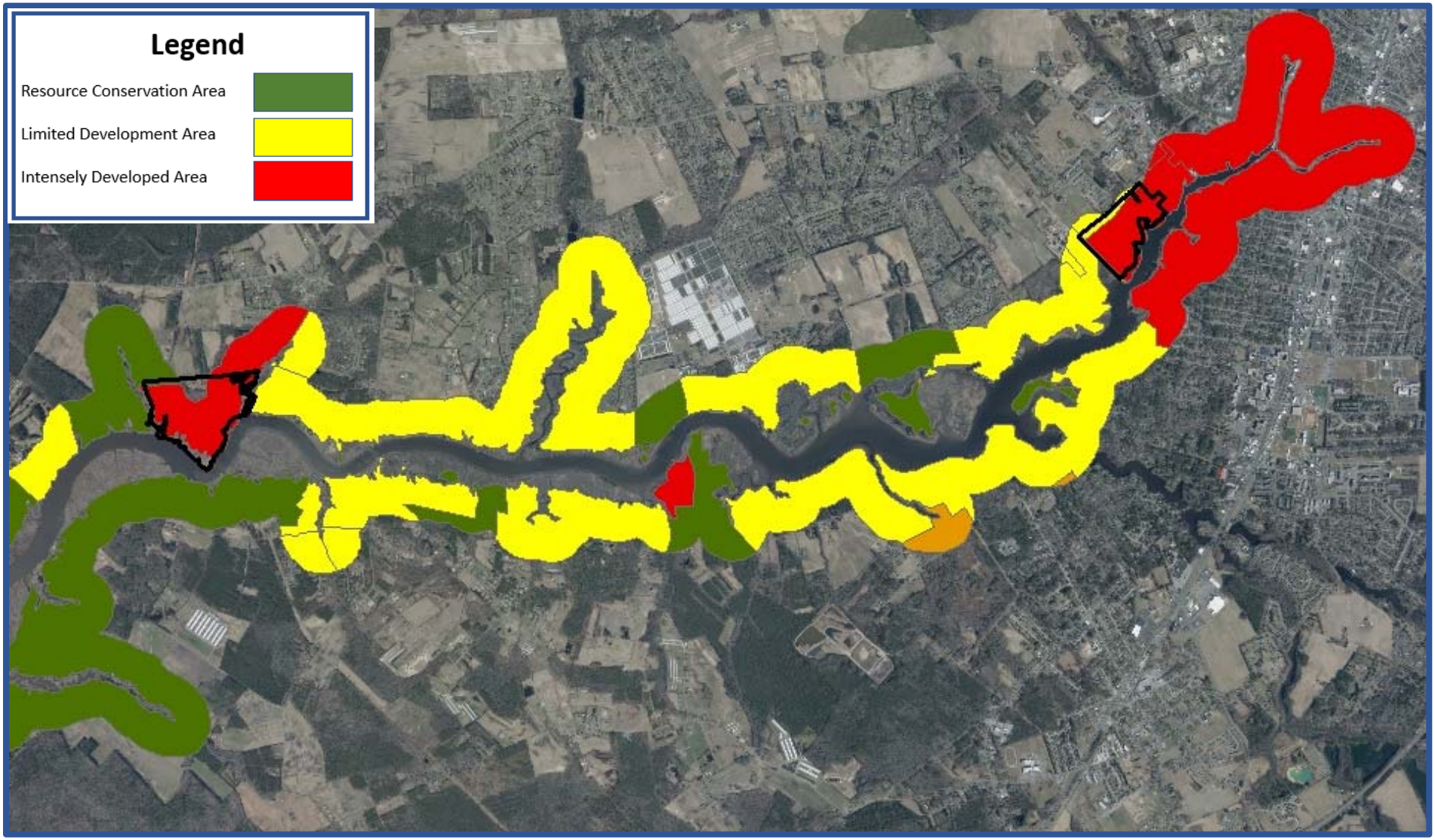
Shoreline development activities would likely cause water and wetlands impacts. Permits for activities would be required from the United States Army Corps of Engineers, Maryland Department of Environment, and other federal/state regulatory agencies. Given the scope of such an activity, a multiple-year process with stakeholder input and review should be anticipated.

Figure 49: Floodplains and Wetlands on the Wicomico River



Source: Century Engineering

Figure 50: Maryland Critical Areas



Source: Century Engineering

Compensatory mitigation to streams and wetlands may be needed based on the impact. It is anticipated that the following permits will be needed; Section 404 & Section 10 Permits from the USACE; Maryland Tidal Wetlands and Waterways Permit, Maryland Nontidal Wetlands and Waterways Permits, Water Quality Certification, Coastal Zone Management (Federal Consistency). Figure 49 illustrates the locations of potential port sites as well as some of the wetland and floodplain coverage in the area.

Historical

Known or unknown historical or archaeological resources could delay or prevent a project if discovered. Development of a site or channel alterations (e.g. a submerged wreck) may invoke preservation efforts. This coordination, as part of the Section 106 permitting process will require consultation with the Maryland Historical Trust.

Section 7 (RTE)

The presence of federal/state rare, threatened, and endangered species along the river corridor may require consultation, avoidance, and mitigation. Resources such as anadromous fish, migratory birds, subaquatic vegetation, and rare plants are examples of these. Coordination with the Maryland Department of Natural Resources (DNR), NOAA, and US Fish and Wildlife Service will be needed to ensure project compliance.

Channel Encroachments

Encroachments into Federally Authorized Projects are disallowed. Examples of encroachments are bulkheads, piles, dolphins, wharves, and other structures. Because of this requirement, port development along narrower portions of the river will have limited opportunities for structure construction. During consultation, some stakeholders also noted that the development of private recreational piers on the Wicomico River, while not extending into the navigational channel, had reduced the margin for navigational error on tight bends in the river.

Critical Area Commission

Port development activities should be limited to existing areas of Intensely Developed Area designation within Critical Areas. Development in peripheral designated areas (Limited Development Areas) is more restrictive and may not be allowed. Impacts to riparian buffers will require compensatory mitigation or fee-in-lieu. Figure 50 illustrates varying levels of designated conservation or development zones within the area.

Forest Conservation Act

Delineated forest stands may require afforestation, and coordination with the Maryland Department of Natural Resources will be needed to ensure project compliance.

Site 1

Site 1 is located within the Corporate limits of the City of Salisbury. This site is adjacent to exiting port and marine activities. The limits of Site 1 are shown in Figure 51.

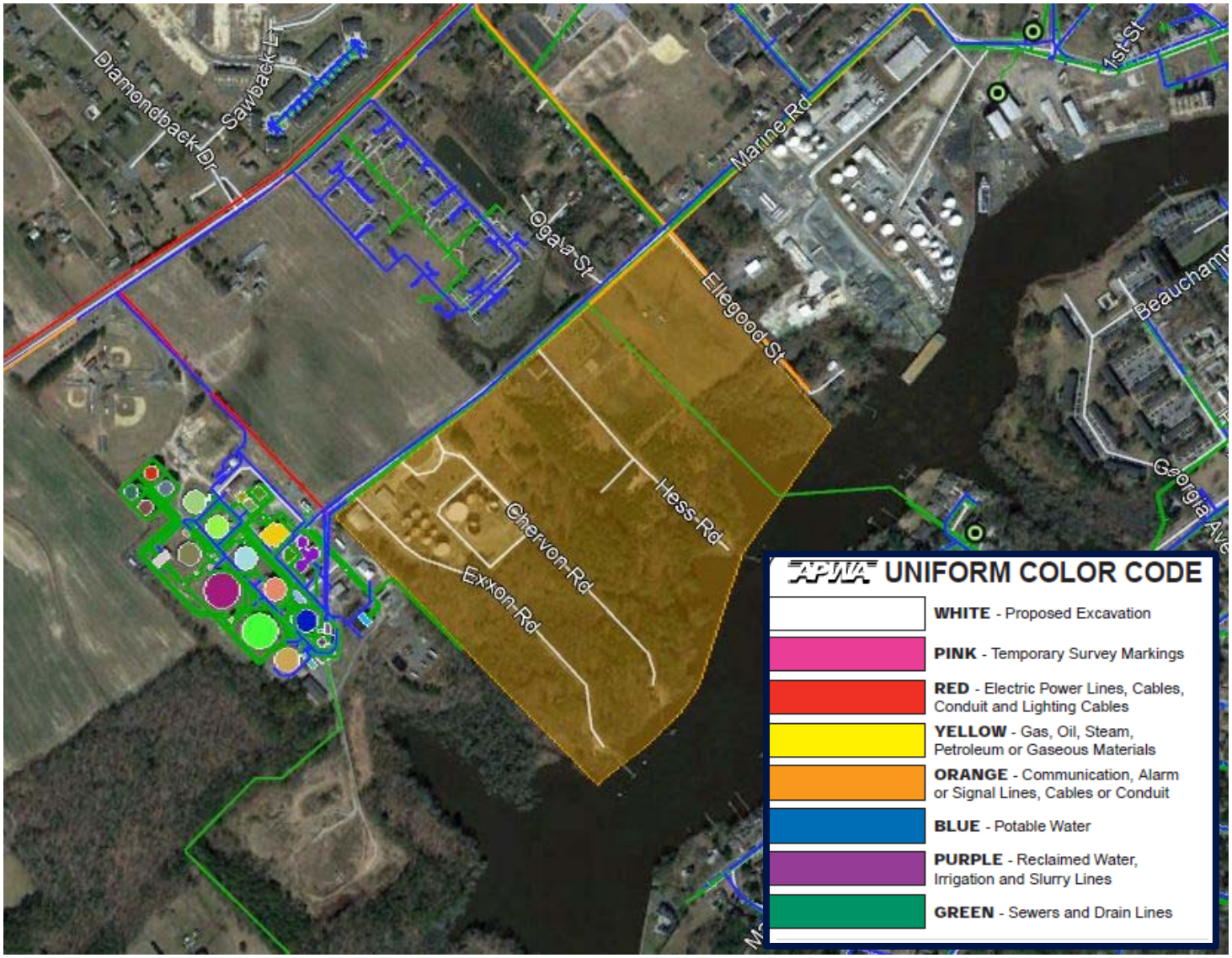
Site 1 Size

The size of this location is approximately 75 acres of additional land directly adjacent to the existing Port of Salisbury. Approximately 20 acres of this location are in the 100-year floodplain and considered wetlands. Wetland areas would require filling the area for stability and resiliency, as well as, providing a mitigation area.

Figure 51: Site 1 Extent

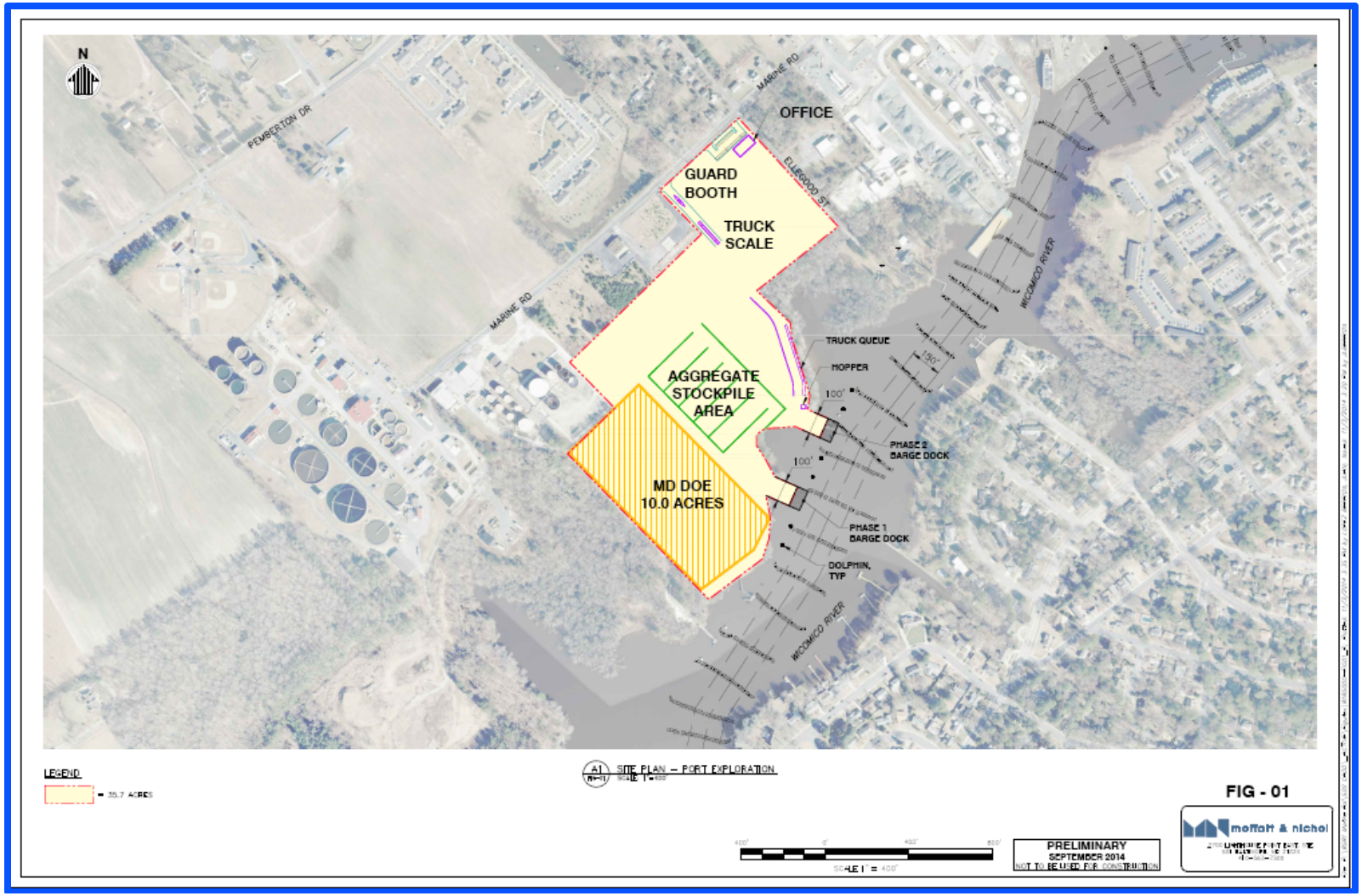
Source: Century Engineering

Figure 52: Site 1 Utility Services



Source: Century Engineering

Figure 53: Concept Site from *Market Feasibility of Wicomico River Port Development* (2014)



Source: Martin and Associates. 2014.

Site 1 Character and Surroundings

Site 1 is located immediately adjacent to the existing Port of Salisbury. The frontage of Port Expansion Site 1 is along Marine Road which is industrial between Exxon Road and Ogala Street. Between Ogala Street and Parsons Road, Marine Road is mixed between industrial use for the Port on the East side of the road and residential on the west side. Parsons Road becomes Fitzwater Street in the marina district. This area, close to the existing port, is slated for the future development of the marina area. This area includes marina parking, residential areas, waterfront condos, and bicycle routes.

Land use across the waterway for Site 1 includes residential homes and condominiums. Landscape screening may need to be incorporated to shield the viewshed from the additional industrial use of Site 1's expansion. This landscape screening could also act as a shield from wave action to armor the shoreline. Existing rail service is located approximately two miles east of this site.

The location of this site is farther from the mouth of the river, but it is closer to the destinations and regional roadways to disperse the materials that ship to this site by barge.

Site 1 Lot Layout

Site 1 has a frontage length of almost three-quarters of a mile along the water, which will allow for the docking and unloading of several barges simultaneously. There is room for the optimum port condition of a parallel berth to the water channel with a relieving platform out over the water.

While approximately one-fourth of the site is in the floodplain and considered a wetland, there is an area that is prime for mitigation the was identified in the draft PowerPoint for the Market Feasibility of Wicomico River Port Development as shown in Figure 53. This mitigation area could also serve as a visual mitigation measure for the residential areas across the water providing a natural scenic vista.

Site 1 Ownership

The City of Salisbury owns a 4-acre parcel within Site 1. Adjacent and to the west of Site 1 is a City of Salisbury-owned 62-acre site that houses a sewer treatment plant, baseball fields, and industrial/open space. The remaining parcels are owned by Center Point Terminal Salisbury LLC and RF Properties East LLC.

Site 1 Utility Infrastructure

Due to the location of this site with Salisbury, the location has water, sewer, electric, and communication service. Service extensions will be required into the site; however, extensions will be relatively short considering facilities are already in the area along the front roads. Roadway widening suggested for transportation improvements will require the relocation of several overhead utilities and utility poles.

Site 2

Potential Port Site Location 2 is located approximately 5 miles due west, from Site Location 1. This location was previously a creosote application facility, and brownfield site development considerations would need to be investigated to not interfere with existing remediation efforts.

Figure 54: Site 2 Extent

Source: Century Engineering

Site 2 Size

The size of this location is approximately 121 acres. Approximately 40 acres of this site is wetland and a 100-year floodplain along the riverfront. Wetland areas would require filling the area for stability and resiliency, as well as provision of a mitigation area. An additional 5-acre wetland is located inland on the site as well.

Site 2 Character and Surroundings

Salisbury Port Location 2 is much more rural than Port Location 1. Residential viewshed issues are less likely to occur in this location. The majority of land use surrounding this location is agricultural in nature. Existing rail service is approximately six miles from this location. Barges would require less travel time from the mouth of the river to this location, but trucking destinations to the east would require longer trucking distances and time.

Site 2 Lot Layout

The overall shape of this parcel is triangular. This shape may aid in preparing two separate berths, approximately one-half mile in length that could accommodate multiple barges unloading at once. The shape may prove challenging to provide enough cargo storage area and circulation behind the berth.

Site 2 Ownership

This entire site would need to be purchased and a site plan developed including mitigation measures. The property is currently owned by Koppers Co., LLC.

Site 2 Utility Infrastructure

This site has fewer existing utilities already on-site, when compared to Site 1. Electric service can be found on Nanticoke Road and can be brought to the site in conjunction with roadway widening along Wells Road. It is not clear how far the transmission lines are from this location. Similarly, communication service can also be found on Nanticoke Road and can be brought to the site in conjunction with roadway widening along Wells Road. Sewer and water service; however, cease service approximately four miles east of this location. In a cost analysis of extending utility service, it may be more prudent to investigate whether the site has well/aquifer availability for clean water and whether septic can be utilized for waste. This would have to be analyzed in conjunction with the site remediation and exiting site restrictions.

Terminal Considerations

General Considerations

This section discusses general design considerations for planning a new port on the Wicomico River. Since each commodity has separate handling requirements, a more detailed discussion will be presented once the desired types of commodities are confirmed.

It is anticipated that a new port will be used primarily for river barges, considering the limitations of the river. The relatively shallow water depth (14-feet, authorized) precludes the use of larger craft. Tugboats (or towboats) are the primary means for transporting barges on the Wicomico River.

Modern river barges are fabricated from steel with flat bottoms and are usually 200’ long and 35’ wide. Based on data supplied by the American Waterway Operators Association, the following are basic types of barges currently in use on United States rivers:

1. The open dry cargo barge is 195' in length and has a capacity of 1,530 tons. These barges typically transport coal, steel, ore, sand, gravel, and lumber.

2. The covered dry cargo barge is of similar size to the open barge (1), but is used for grain, soybeans, coffee, paper products, granular fertilizers, etc. or goods that must be protected from the elements.

3. The inland liquid cargo tank barge is longer, at 297', and has a capacity of one million gallons for such commodities as petroleum and petroleum products, liquid fertilizer, and chemicals.

As noted in Chapter 1, barge shipping rates are significantly lower on a per ton-mile basis than rail and truck rates. This discrepancy in rates leaves barge transport (and maritime shipping more generally) second only to pipelines as the most economical mode of transport today.

Port-Side Requirements

Wharf Space

River barges are usually moored alongside of a wharf for loading and unloading. The wharf is commonly used when sufficient water depth is available to allow barges to moor directly alongside. A wharf is usually constructed from interlocking steel sheet pile driven into the river bottom to create a solid wall. The area behind the sheet pile is filled with earth materials and capped with paving. The river bottom in front of the sheet pile is sometimes dredged to produce the desired water depth. The face of the wharf is fitted with fenders that absorb the energy from the barge pushing against the wharf and turns it into a controlled force that the wharf can safely absorb. The mooring lines are fastened to bollards fixed along the edge of the wharf. The barge is accessed directly from land and is easily reached for loading and unloading.

Staging Area – Mooring Dolphins

Mooring cells are often used to secure barges where water depth is limited near the shore and the use of a wharf is not possible. A mooring cell is a circular steel sheet pile structure, typically about 20 feet in diameter that is filled with crushed stone and capped with a concrete slab. They generally extend about 25 feet below the river bottom depending on bottom conditions and project about 20 feet above the water surface elevation. The mooring cells are located a distance from the water's edge to reach deeper water. One mooring cell is constructed at each end of the barge and sometimes one or two are built in between, depending on specific needs. The barge pushes against the mooring cell and is tied to a large steel ring fastened to the sheet pile. A finger pier with a platform next to the barge is used to gain access from land to the barge for loading and unloading.

Fleeting Space

Fleeting, or barge storage space is another consideration. To allow efficient use of the terminal, empty and full barges waiting to be loaded/unloaded must have a queuing space. This space will need mooring dolphins to securing the barges. Often a turning basin is necessary to allow tugboats and barges to maneuver.

Available water depth, channel width, the need for dredging, environmental impacts and geotechnical considerations must also be considered when planning a port facility.

Regardless of the terminal design, it is important to note that regulations imposed by Federal, State, and Local Authorities having jurisdiction play a substantial part in the planning aspect. Their regulations will significantly define what construction is permissible and will significantly affect the direction of the project.

Figure 55: Port Side Infrastructure Improvements

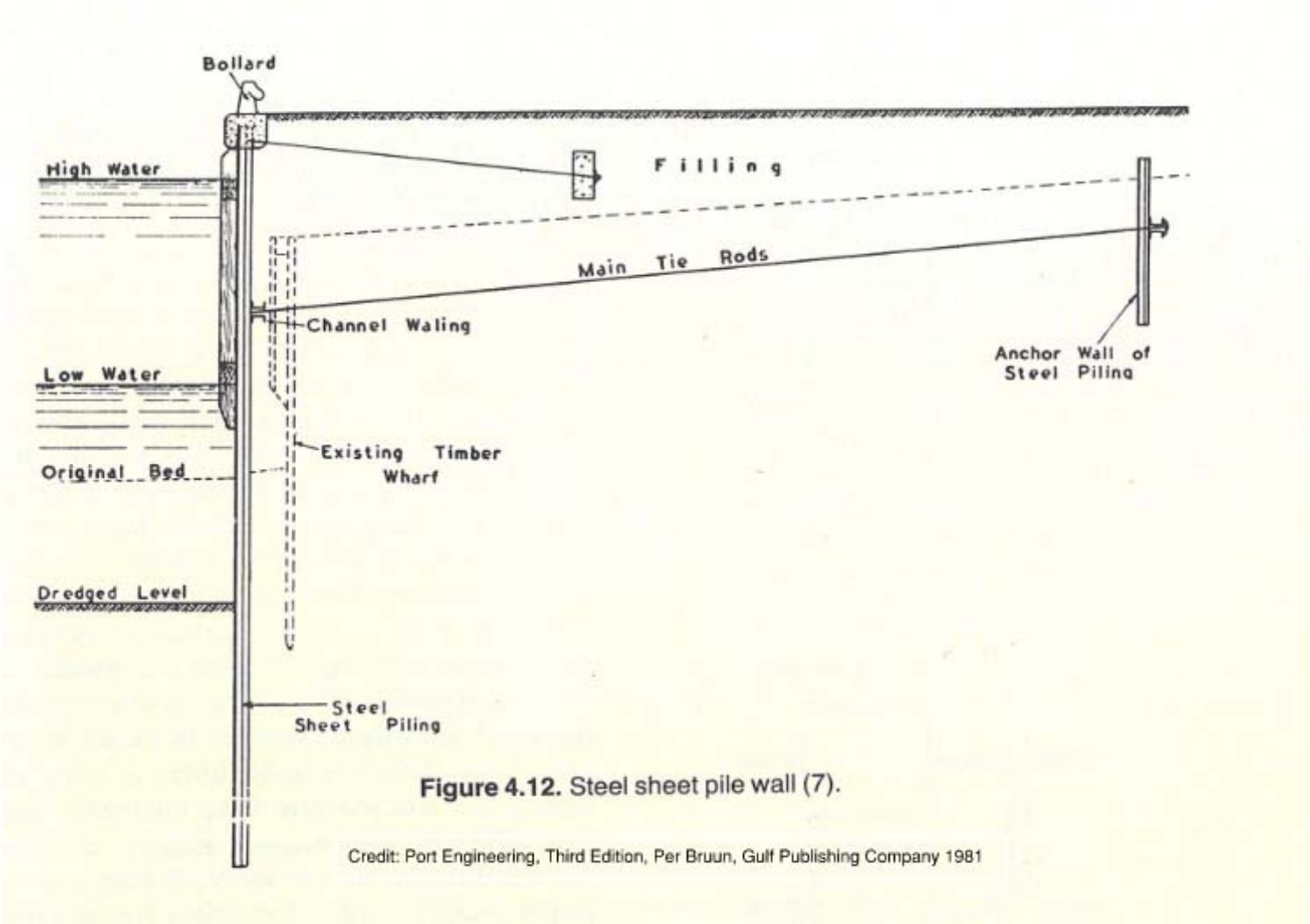


Figure 4.12. Steel sheet pile wall (7).

Credit: Port Engineering, Third Edition, Per Bruun, Gulf Publishing Company 1981

Material Handling

A variety of means are used to load/unload materials from barges. This section discusses typical methods for handling considering the type of facility and different categories of goods.

A conventional, track-mounted crane supported on top of a wharf is used to handle items like coal, steel, ore, sand, gravel, lumber, and finished products. This arrangement is quite flexible and can accommodate very large heavy items. The only limitation is the weight and size of products that can be shipped to the terminal and the barge capacity. Track-mounted cranes can travel and pivot, so goods can be handled directly from the barge onto trucks, trains, or conveyors, and vice versa. The entire length of the barge can be loaded/unloaded without the need to move the barge. This is a simple, cost-effective way to handle goods, and avoids the operational costs to have a tugboat on standby to move the barge. Where immediate transport is not necessary, goods that are not affected by weather are often stored on the wharf in a dedicated outdoor area.

A different approach is used where mooring cells are employed. A stationary crane is usually erected on top of a dedicated river cell to accomplish loading and unloading. The barge is pulled back and forth in front of the crane using a “barge haul” (cable hoist) system. This method also avoids the need to have a tugboat on standby to move the barge. Like a wharf, goods can be handled directly from the barge onto trucks, trains, or conveyors, and vice versa.

Unloading of granular products is typically accomplished by either a grab bucket barge unloader or a continuous barge unloader. The grab bucket system employs a clamshell bucket suspended by a set of hoisting cables from a crane. A separate set of control cables is used to open and close the bucket. The continuous barge unloader is a series of buckets supported between two strands of roller chain, running in a continuous loop along a boom. The boom is maneuverable to allow access to all portions of the barge.

Once taken off the barge, granular products can be placed onto a conveyor for stockpile storage at the terminal or loaded into trucks. Liquid products are usually pumped directly into large tanks for storage and later distribution. Dry products such as grains and fertilizers are usually stored in silos or covered warehouses for protection.

Material handling must be conducted in a manner that minimizes the amount of cargo spilled onto the deck or into the water. The handling process is the responsibility of the operator at the port facility.

The final selection of the type of material handling equipment is a function of the type of commodity to be handled.

Segregation of Material

Planning a new multi-user port facility must consider the segregation of commodities. Bulk items, construction materials, liquids, food products, and finished goods all have specific handling and storage requirements that must be considered in the planning phase.

Ample laydown and unloading space must be provided. In many cases, covered sheds or enclosed warehouse space is required to store and protect goods from the elements. Food products must be stored in an enclosed warehouse environment to mitigate vermin damage and deterioration. In some cases, refrigerated warehousing is needed to prevent spoilage.

Petroleum products and flammable chemicals are stored in large tanks surrounded by clay earth berms to contain spillage. These "tank farms" must be located away from other portions of the terminal to mitigate the potential for fire and explosion.

With a multi-user facility, the goal is to provide enough flexibility to accommodate the various products and tenants in a safe and efficient manner. To the greatest extent possible, having one facility that can handle different commodities produces the best value for the investment, rather than having a separate port facility for each commodity.

Supporting Transportation Infrastructure

Access to and from the port play a critical role in the overall success and viability of a multi-user port. Based on the commodity assessment, most materials will be loaded into trucks for transport to the final destination. Locally, Nanticoke Road will be the primary route of truck traffic from the local road network out to the major freight network.

Figure 56: Average Annual Daily Traffic on Local Roads

Roadway	Functional Classification	AADT
W Salisbury Parkway	Principal Arterial	26,151
Fitzwater Street	Minor Arterial	10,380
Parsons Road	Minor Arterial	10,380
Marine Road	Local	N/A
Pemberton Road	Major Collector	9,395
Nanticoke Road	Minor Arterial	12,362
Wells Road	Local	N/A
Whitehaven Road	Minor Collector	1,230

Source: Maryland State Highway Administration.

Site 1 Roadway Network

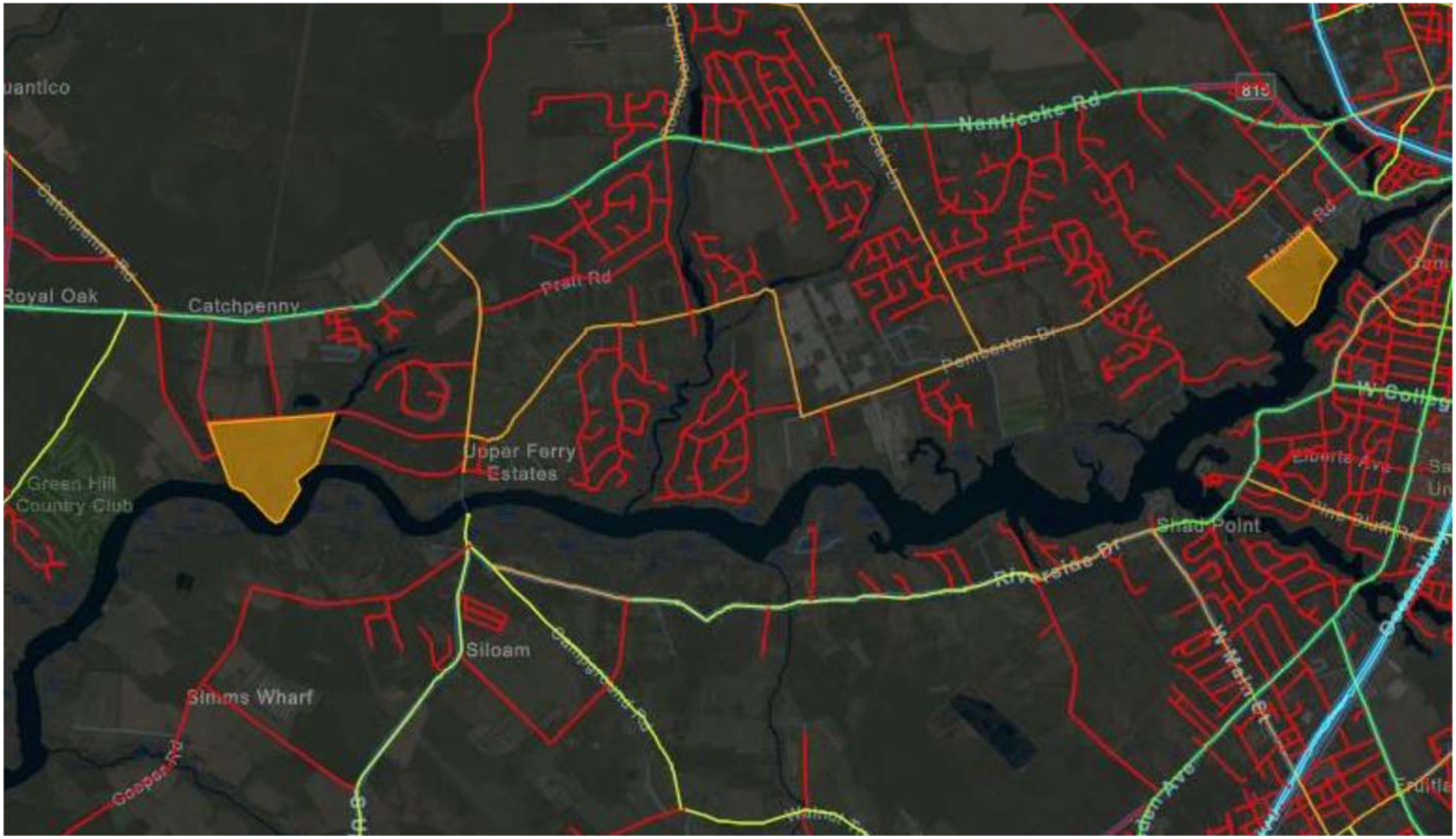
There are two roadways that require improvements for this site location. Marine Road will require widening to accommodate the volume of trucks generated by this site. Widening will include one lane in each direction that is 12 feet wide with an 8-foot wide shoulder and open or closed drainage depending on the right of way widths. Marine Road from Exxon Road to Ellegood Street has fewer constraints for widening than the portion of Marine Road between Ellegood Street and Parsons Road. In addition, turn lanes will need to be developed in the approaches to all intersections servicing the trucks. Corner radii will also need to be widened to accommodate truck turning templates. This location is more urban than the other potential sites. Typical of a rural/urban transition area, there is more evidence of crashes in the vicinity of Site 1.

Site 2 Roadway Network

This site location would require the improvement of Wells Road, County Route 114, between Pemberton Drive and Nanticoke Road. Wells Road is a two-lane local County road with no striping or shoulders. Right of way for this roadway is approximately 50 feet wide. Widening will include one lane in each direction that is 12 feet wide with an 8-foot wide shoulder and open or closed drainage depending on the right of way widths. In addition, turn lanes will need to be developed in the

approaches to all intersections servicing the trucks. Corner radii will also need to be widened to accommodate truck turning templates. While there are a few crashes on Nanticoke Road in the vicinity of Wells Road, there is not a particular pattern of crashes that suggests an issue at this intersection. Sight distance will need to be reviewed since this intersection is on a slight curve. Nanticoke Road already has pavement in place that could be used toward the right and left-turn lanes onto Wells and/or as acceleration/deceleration lanes.

Figure 57: Study Sites and their Highway Infrastructure



Source: Century Engineering.

Figure 58: Site 1 Roadway Improvements and Crash Locations

Source: Century Engineering.

Figure 59: Site 2 Roadway Improvements and Crash Locations

Source: Century Engineering.

Appendix D ROM Cost Estimates

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Appendix E Truck and Rail Assumptions

Truck Assumptions

- **Petroleum Products**: on average, tanker trucks on average can hold about 8,000 gallons of petroleum products, which is the equivalent of about 190 barrels, or approximately 28.6 tons.
- **Aggregates:** dump trucks can normally carry up to 25 tons of gravel and sand, which is equivalent to 16.7 cubic yards of material.
- **Agricultural Products:** various truck types can carry different types of agricultural products in bulk or load units. For this analysis, we assume that trucks can carry up to 36 tons of bulk product.
- **Alcohol:** an average tanker truck capacity of 8,000 gallons is estimated for shipment of alcohol (ethanol, based on USACE data) in tankers.
- **Other Products:** based on the existing state truck size and weight limit laws, single-unit trucks have a weight limit of 20,000 lbs., while tandem trucks' weight must not exceed 34,000 lbs., tridem (three-axle) trucks should weigh less than 42,500 lbs, and maximum vehicle weight is limited to 80,000 lbs. in weight.[27] Special permits are required for loads above these limits. We assume that a tractor-trailer without cargo weighs about 35,000 lbs. and can carry up to 45,000 lbs. of general cargo payload.[28]

Rail Assumptions

- On average, a railcar can carry about 33,000 gallons of fuel oil or other liquid products (including alcohols), which is about 118 tons.
- The Norfolk Southern (NS) tracks serving the Salisbury area can accommodate 286,000 lb. railcars, which is about 140 tons. Since an empty railcar has a gross weight of about 30 tons, we assume that railcars carrying other commodities can have a payload of up to 110 tons.[29]

[27] MDOT, SHA, Motor Carrier Handbook, accessed June 2021. https://www.roads.maryland.gov/OOTS/motorcarrierhandbook.pdf

[28] TCSFuel, A GUIDE TO TRUCK WEIGHT, CLASSIFICATION, AND USES, accessed July 2021. https://www.tcsfuel.com/blog/truck-weight-classification/

[29] Bureau of Transportation Statistics Website, Railcar Weights, accessed June 2021.