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Port strategic plan and market study

Prepared for:

Northeast Missouri Regional Planning Commission and Rural Development Corporation (NEMO RPC)

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Bridging Your Information Research Needs

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1. Introduction

The Northeast Missouri Regional Planning Commission and Rural Development Corporation (NEMO RPC) works to sustain and grow the regional economies in the counties of Adair, Clark, Knox, Lewis, Schuyler, and Scotland. NEMO RPC provides leadership and resources for business creation, recruitment, expansion, and community development. Simultaneously, the organization helps its city and county members to identify infrastructure issues and improvements, including securing funding sources, individually and as a region.

As part of this mission, the group identified the potential to assist with the creation of a port facility in the region. For several years, private commercial entities have approached the Clark County Commission regarding the potential development of a site to offload dry-bulk products, such as gravel and fertilizers, in the Alexandria, Missouri area. While results from previous efforts have taken time to materialize, they have ultimately resulted in the process to determine the feasibility of such a facility and potential site locations.

In support of these efforts, NEMO RPC and the Clark County Commission need to determine the degree of feasibility of a potential port facility on the Mississippi River. Moreover, it is critical to understand and document aspects such as potential sites, master planning, intermodal-connectivity, potential users, and expected levels of demand. NEMO RPC and project stakeholders would benefit tremendously from evaluating and documenting the degree of financial feasibility through the analysis of the project's relevant factors—predominantly the viability of port sites combined with the measurable demand for services such a facility would offer.

Most greenfield projects involve an intrinsic level of uncertainty that require the identification and mitigation of potential project risks (e.g. site risks, unknown project cargo prospects, uncertainty in micro- and macro-economic variables, etc). To better understand the viability of this project, it is critical for NEMO RPC and project stakeholders to have an analytical framework that allows them to quantify potential levels of demand and their relationship with the degree of financial viability that could realistically be attracted by a port project.

1.1 Objectives

To assist NEMO RPC, the objectives of this project involve several tasks that can be grouped in three phases:

- **Phase 1. Planning.** The objective of this phase is to identify and evaluate viable locations for a port facility in Clark County, MO. In addition to the Mississippi River access, the potential site requires access to rail and highway transportation to make the project fully multimodal.
- **Phase 2. Market Study.** The objective of this phase is to identify all companies or other business entities in a defined study area (*Section 1.2*) that could potentially utilize the port for outbound and inbound shipments of commodities, products, and raw materials.
- **Phase 3. Financial Plan.** The objective of this phase is to develop a detailed business model for the port that includes a preliminary, but comprehensive analysis of the potential financial viability of the project.

1.2 Study area

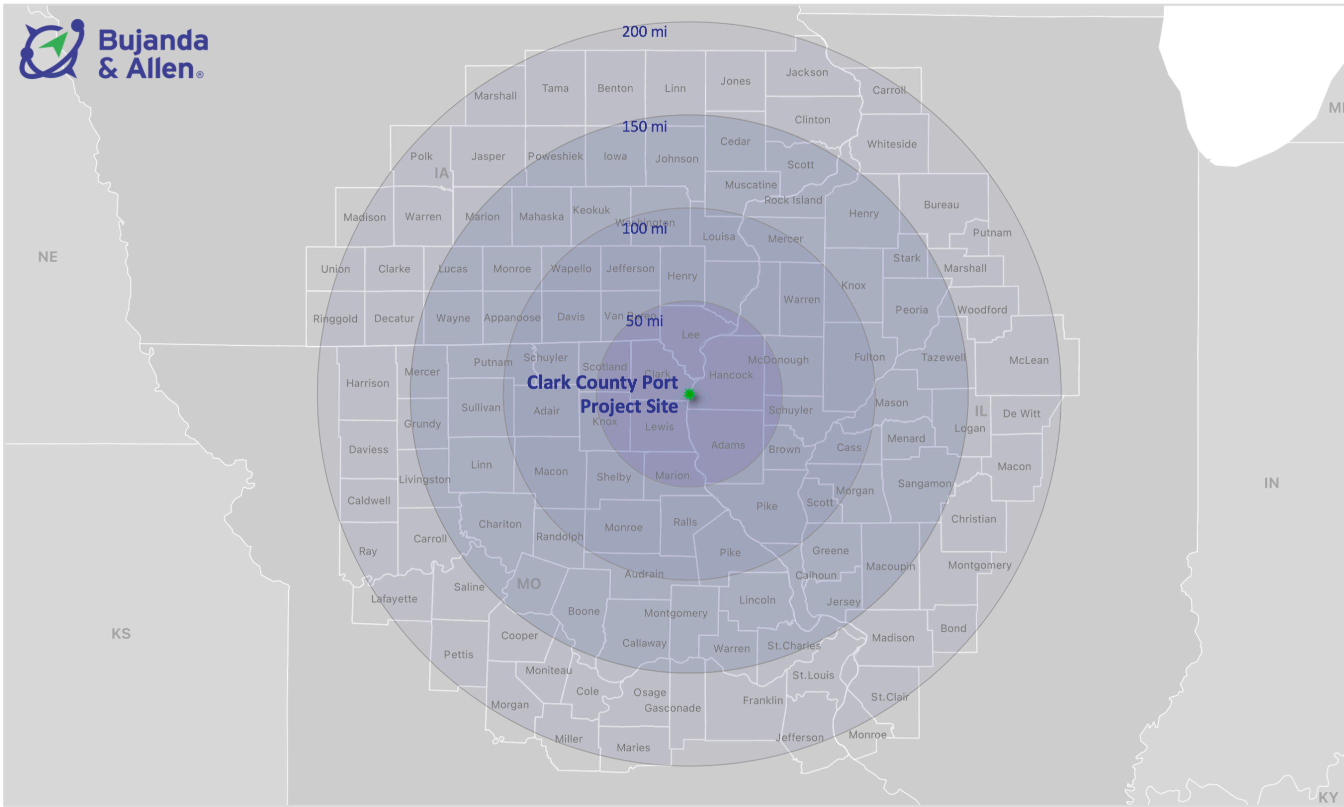
The primary study area for this project, comprises a 50-mile buffer that sits at the intersection of three states and comprises the following counties:

- **Missouri:** Clark, Scotland, Knox, Lewis, and Marion.
- **Iowa:** Lee and Van Buren.
- **Illinois:** Adams and Hancock.

Based on prior conversations with stakeholders, a 100-mile radius from Alexandria, MO is considered the starting point to evaluate the draw area for potential port utilization. Nonetheless, we extend such buffer up to

200 miles to allow for more in-depth analysis and segmentation of potential markets. We also consider a high-level view of logistic issues (i.e. river crossings, highways, elevators, etc). Our study area is shown in Figure 1.

Figure 1. Clark County Port Project site



Source: Bujanda & Allen, 2022.

1.3 Report structure

This report is structured in ten sections including this one and three appendices, two of which are separate documents:

- **Section 1. Introduction** presents the project background, objectives, study area, and report structure**.**
- **Section 2. Freight transportation near Northeast Missouri** provides an overview of the highways, railroads, and waterways utilized for the movement of freight near the project site.
- **Section 3. Market analysis** presents an overview of the industries contributing to freight movement in Missouri and their locations and analyzes the commodities with greater potential for the Clark County Port in the short- and long-terms.
- **Section 4. Route economics and key target** markets presents an analysis of the main target markets for the project and compares key incumbent routes against new, alternates using the Clark County Port, which substitutes barge for rail on the inland component.
- **Section 5. Port concession and operational model structure** describes the structure of the concession, a proposed organizational structure for the marine river terminal concessionaire based on the most promising business segments and describes the overall project.
- **Section 6. Financial analysis** presents the potential levels of cost recovery and the preliminary financial viability of the project and a set of potential levels of cost recovery scenarios.
- **Section 7. Benefit-cost analysis quantifies** the societal public costs and benefits that could stem from the project and that, typically, cannot be recouped by the private sector.

- **Section 8. Economic impact analysis** quantifies the direct and indirect multiplier effects that could stem from the potential investments in the Clark County Port Project.
- **Section 9. Environmental regulatory requirements** identifies on a preliminary basis the environmental and regulatory requirements for the project to move forward.
- **Section 10. Conclusions** extracts and document the key takeaways from the overall study.
- **Appendix A. Site Selection** this separate report, prepared by MECO Engineering, documents the initial investigation for site selection.
- **Appendix B. Letters of support** provides letters provided by stakeholders supporting the project.
- **Appendix C. Checklist cross referenced by section** provides the key considerations in the preparation of an American Marine Highway (AMH) Project Designation application.

1.4 Timing of project designation submission

MoDOT intends to apply for Project Designation on the date specified in Appendix C.

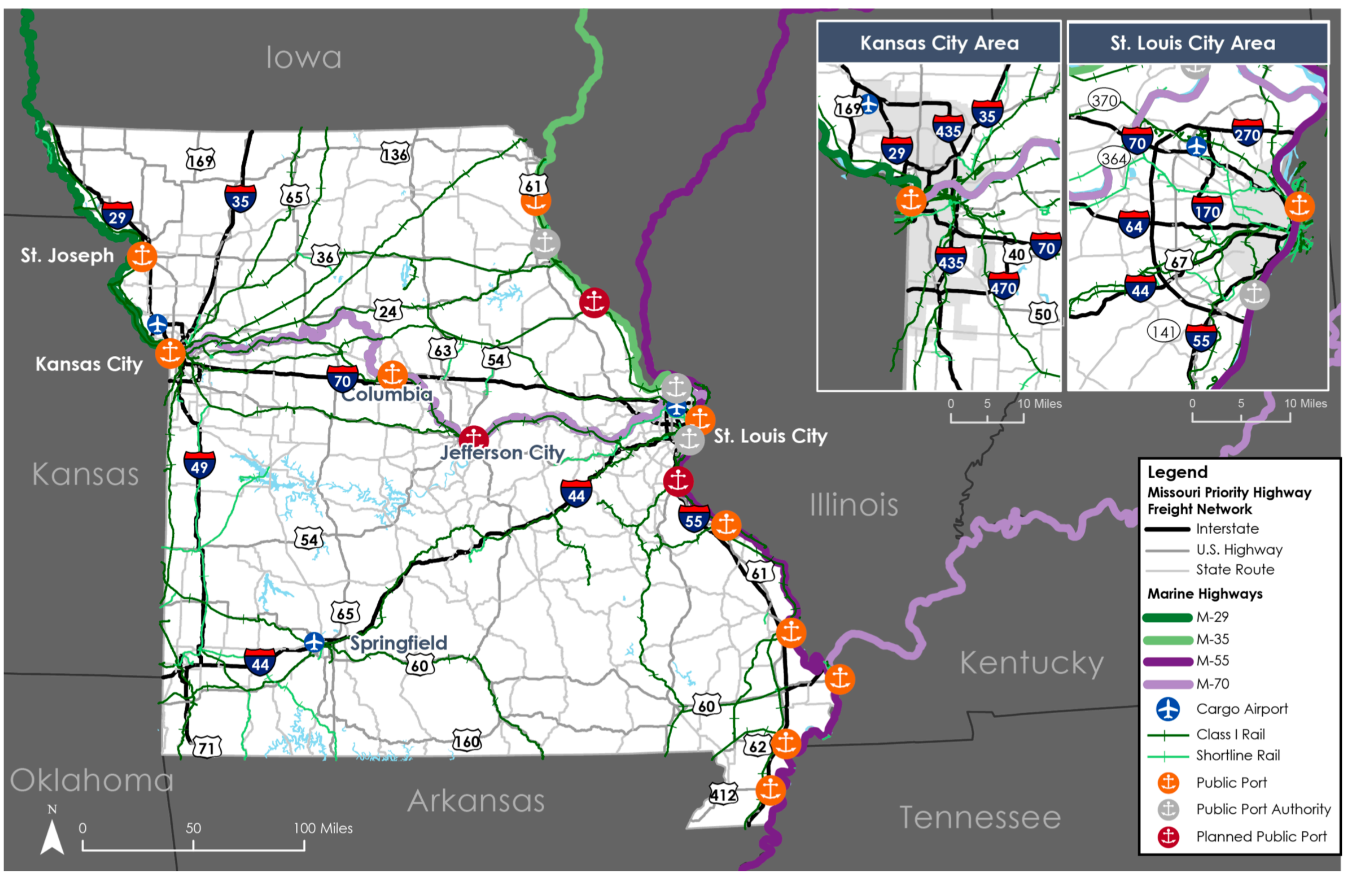
2. Freight transportation near Northeast Missouri

Any port facility in Clark County would have to follow the route via the Mississippi River (marine highways M-35 and M-55) to gateway ports in New Orleans. Such route needs to be cost-effective to be considered as a potential alternative to incumbent routes. This section provides an overview of the freight network serving the movement of freight in the study area and assesses the connectivity and accessibility of northeast Missouri to the freight system in the study area. This section outlines the main highways and the Class I railroads serving the movement of freight. This section concludes with a comprehensive analysis of public and private ports, marine terminals, and docks serving the movement of freight along waterways.

2.1 Freight networks

The Missouri Department of Transportation (MoDOT) defined the freight network for the first time in 2017. This network is comprised of highways, rail facilities, ports, airports, pipelines, and intermodal facilities. As a result, a proposed improvement project must be located on or adjacent to the defined freight network to be considered in the freight prioritization process for state funding. The project and its study area are part of the state's freight network, enjoying access to highways, railroads, and ports at the intersection of three states via one of the most important marine highways in the nation, M-35 and M-55, as illustrated in Figure 2.

Figure 2. Missouri's Freight Network System



Source: MoDOT 2022 Freight Plan.

In 2018, Missouri's Freight Network System carried more than 985 million tons. Of this cargo, rail carried 45% of the total weight of goods moving on the state's transportation system. Trucking ranks next, accounting for 41% of goods moved by weight; pipelines for 9%; waterways for 4%; and air for less than 1%. By 2045, Missouri's Freight Network System is projected to carry more than 1.1 billion tons of freight—an increase of nearly 20%.

2.2 Railroads

Rail is the predominant freight transportation mode in Missouri, closely followed by trucking. Missouri's rail system comprises nearly 5,300 miles, playing a key role for important industries due to its cost-effectiveness to and from import and export gateways. Kansas City and St. Louis are the nation's 2nd and 3rd largest rail hubs in the U.S. after Chicago. Rail hubs in Missouri serve as interchange for traffic between eastern and western U.S.

Six Class I railroads operate on 4,218 miles of main track rail lines and 2,500 miles of yard tracks in the state: (i) BNSF, (ii) Canadian Pacific (CP), (iii) Kansas City Southern (KCS), (iv) Norfolk Southern, (v) Union Pacific (UP), and (vi) CSX.[1] Six local railroads that provide line-haul services, along with 10 switching railroads, operate a combined 426 miles of track. There are 141 intermodal facilities integrating rail primarily with truck and barge modes, providing more alternatives for different segments of supply chains near St. Louis and Kansas City.

Clark County has excellent rail connectivity to/from major freight markets and entry/exit gateways: about 300 miles from Chicago, the largest rail hub in the U.S., 1,900 miles from the West Coast, the largest intermodal port gateway, and 900 miles from the Gulf of Mexico, the largest agricultural gateway in the U.S. The main rail corridors serving the movement of freight in Northeast Missouri include:

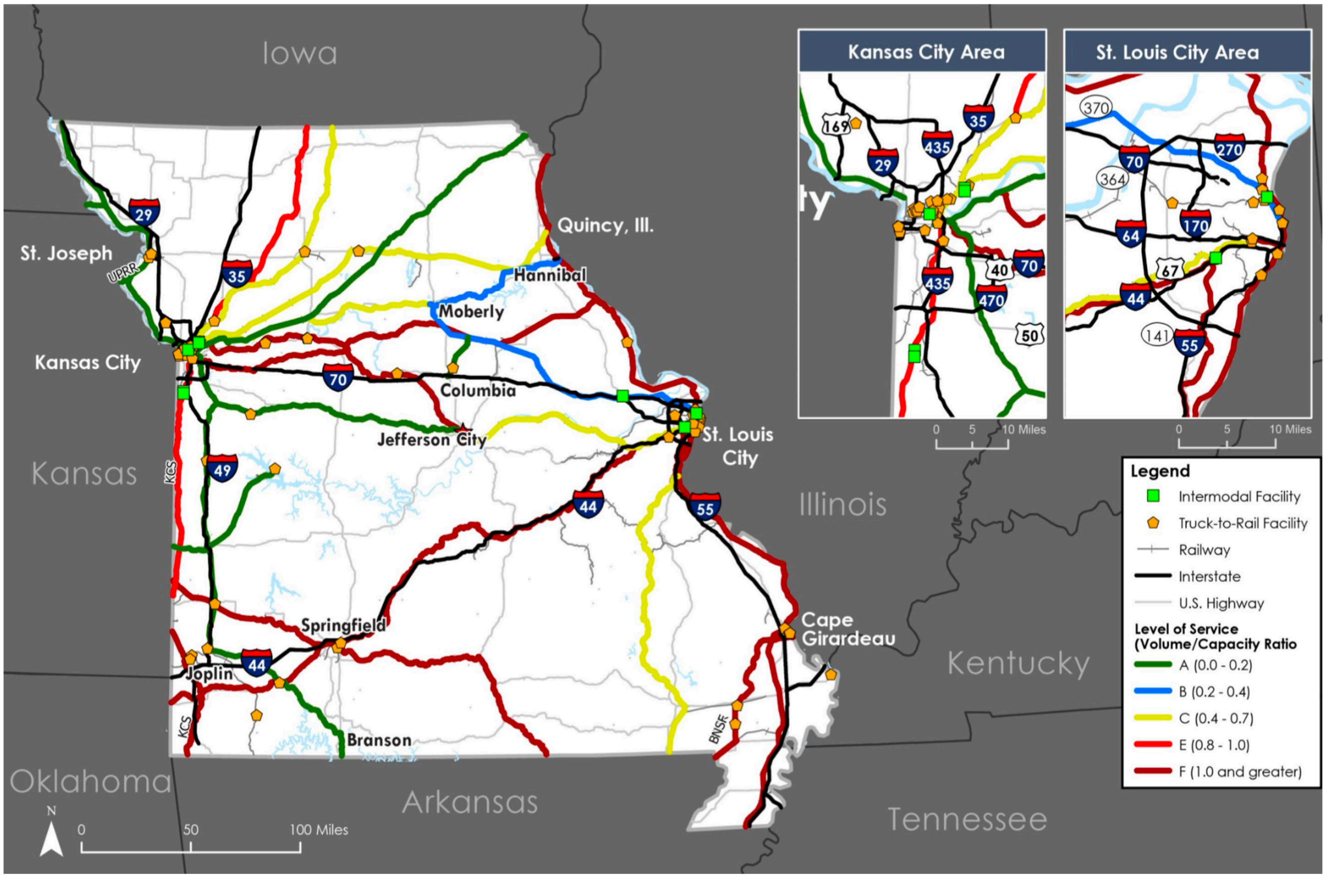
- **North-South:** A BNSF corridor connects Alexandria, MO and Quincy, IL with Galesburg and Chicago to the north and to St. Louis to the south, parallel to the Mississippi River.
- **East-West**: A BNSF corridor connects Alexandria, MO with Kansas City, MO and the western U.S; additionally, NS and CSTX corridors connect the BNSF Mississippi River corridor with the eastern and southern U.S. regions.

Several of Missouri's railroad corridors are close to or exceeding capacity. These corridors represent segments exceeding levels of service (LOS) F or that may exceed capacity in the near future (LOS E). All other corridors are operating at an LOS C or better. Missouri's rail corridors by LOS are illustrated in Figure 3.

Bulk commodities represent a significant portion of the rail tonnage traversing the state rail network. MoDOT's 2022 Freight Plan reports the top five commodity categories by rail are: coal (47%), food or kindred products (11%), farm products (9%), chemicals or allied products (7%), transportation equipment (6%), and other products (19%). Wyoming, the nation's leading coal producer, is Missouri's major trading partner, with nearly 69% of the state's rail imports in 2018. As energy plants move away from coal, Wyoming's share is expected to decline. Top trading partners receiving freight rail shipments are Texas and Illinois, with California rapidly catching up. The automobile industry also plays a central role in the state's economy. Hence, trade of auto-parts and finished vehicles with primarily Mexico and Canada is expected to gain more prominence.

[1] In December 2021, CP completed its acquisition of KCS, forming Canadian Pacific Kansas City. CPKC would provide the first single-line connection between the U.S., Canada, and Mexico. If approved, the railroads expect to integrate over 3 years.

Figure 3. Missouri's rail level of service



Source: MoDOT 2022 Freight Plan.

2.3 Highways

Trucking is the next predominant mode of transportation in the state. Missouri's highway system comprises 33,832 centerline miles of roadway; however, only 20% are classified as "major highways" heavily traveled. Major highways include 18 interstate highways, including nine major routes, and nine auxiliary routes, which carry about 80% of the overall system's traffic including a significant portion of the truck traffic. I-70 and I-44 are the backbone of east-west trade and freight movements generated and terminated in the state by truck, carrying the highest truck volumes in the state.

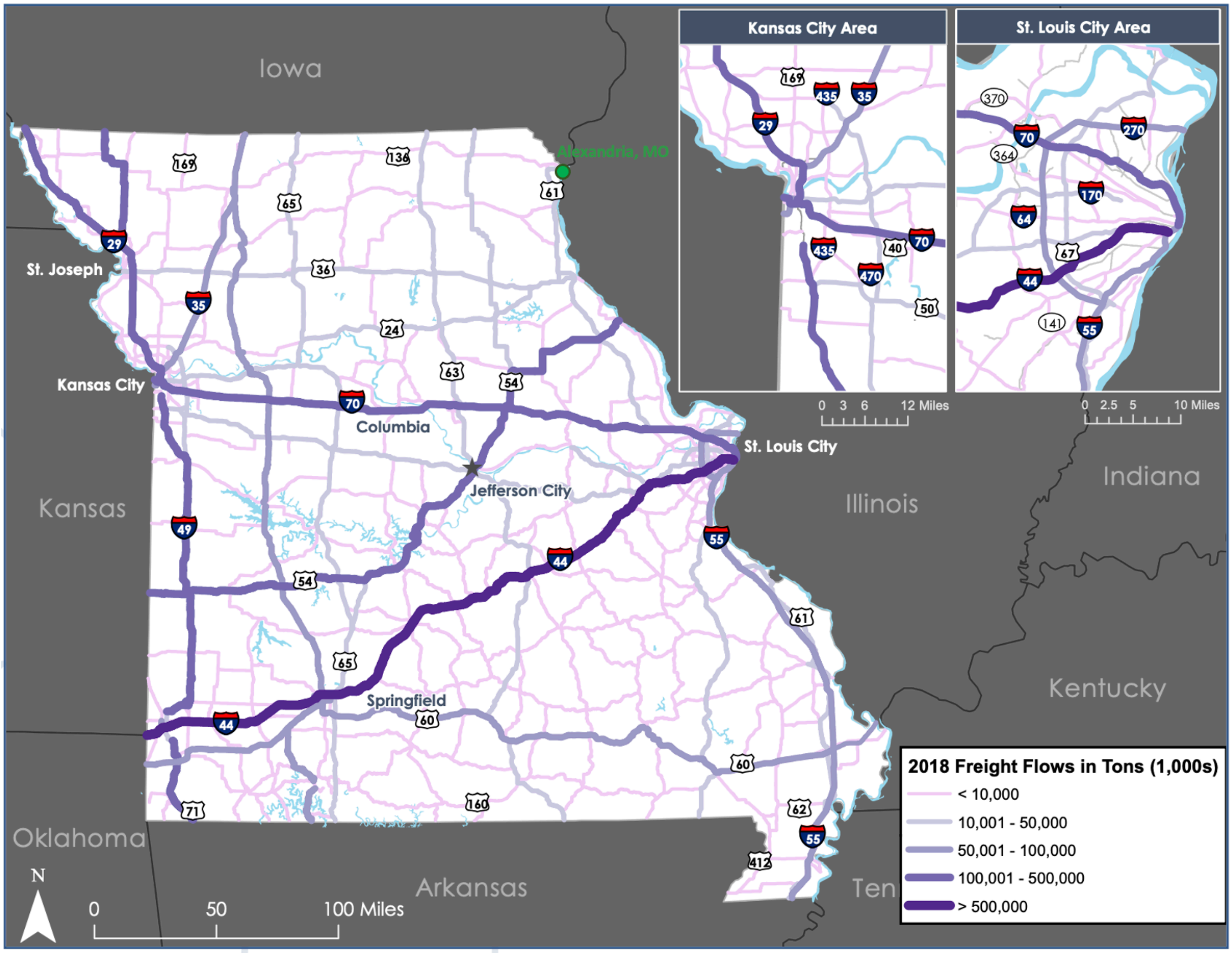
Clark County has excellent connectivity to/from major markets and cargo entry/exit points in all directions: it is about 300 miles from Chicago, 800 miles from the Canadian border, 1,000 miles from the East Coast, 1,900 miles from the West Coast, and 900 miles from the Gulf of Mexico.

The main roads serving the movement of freight in Northeast Missouri include:

- **North-South:** U.S. Route 61 (US 61), Route 15, and US 63 (connecting the northern Stateline with I-70 and US 54 in the central part of the state).
- **East-West**: US 136, Route 6, US 36, and US 24 (connecting the eastern Stateline adjacent to the Mississippi River with US 65, I-35, and the western Stateline in north and central Missouri).

From Alexandria, MO, US 61 and US 136 provide rapid access to any of the routes mentioned above in less than 15 minutes, allowing travel in both the north-south and east-west directions. Missouri's highway system, which includes the state's freight network, and the main freight corridors for truck traffic are illustrated in Figure 4.

Figure 4. Missouri's highway freight demand



Source: MoDOT 2022 Freight Plan.

Non-interstates are crucial particularly for the movement of dry-bulk and agricultural freight. First and last-mile connections for these industries are spread throughout the rural parts of the state, often away from interstates. US 61 and US 136 are the nearest non-interstates connecting our study area with the rest of the State Freight Network. US 61 generally follows the Mississippi River and is designated the Great River Road, extending from its northern terminus in Minnesota to its southern terminus in New Orleans. US 136 is an east-west highway that connects Indiana with Nebraska crossing through the north part of the state and through the study area. Routes such as MO-364, MO-370, and MO-249 provide connectivity with the interstates.

Illinois is Missouri's top trading partner by truck, with more than 20% of the goods moved by truck in and out of the state. Kansas ranks next with 15%, followed by Arkansas with 8%, Texas with 7%, Oklahoma with 5%, and Iowa with 5% of truck trade with Missouri. Texas has the largest share of any non-neighboring state. From these trading partners, Texas is expected to have the most aggressive trade growth with Missouri.

2.4 Waterways, public ports, private river terminals and docks

Bujanda & Allen identified almost 250 public and private river ports in the study area. The Clark County Port would have to be competitive in terms of transportation infrastructure available for all modes, marine highways, and terminal infrastructure vis-à-vis competing alternatives in the study area. This section presents a comprehensive analysis of the marine highways, port authorities, river terminals, and docks to better understand the competitive environment in which the Clark County Port can be expected to operate.

2.4.1 Marine highways

With the intention of shifting cargo from trucks into the more environmentally friendly water mode, the U.S. Department of Transportation (USDOT) designated several marine highways in 2009. Marine highways can receive federal assistance from the Maritime Administration (MARAD). The potential sites for the Clark County Port Project would have to follow the route via the Mississippi River (M-35 and M-55), which runs 180 miles from Alexandria to St. Louis, MO and 1,134 miles from St. Louis to the Port of New Orleans for a total of 1,314 miles from the project site to the Gulf. There are four designated marine highways in our study area, shown in Table 1.

Table 1. Designated Marine Highways near the Clark County Port Project.

Waterway	Marine highway	From	To	River miles
Upper Mississippi River	**M-35**	**Alexandria, MO**	**St. Louis, MO**	**180**
Mississippi River	**M-55**	**St. Louis, MO**	**New Orleans, LA**	**1,134**
Illinois River	M-55	Chicago, IL	St. Louis, MO	273
Missouri River	M-29	Kansas City, MO	St. Louis, MO	2,341

Source: Bujanda & Allen with information from MARAD and the USACE, 2022.

2.4.2 Public port authorities

Missouri has 15 public port authorities, as of early 2021, classified as active or developing by the MoDOT 2022 Freight Plan. Six of them fall within the extensive study area (four along the Mississippi and two on the Missouri River). Iowa currently has only one port authority, the Southeast Iowa Regional Economic & Port Authority (SIREPA) made up of Lee County and the cities of Fort Madison and Keokuk, very near to Clark County, MO.[2] Illinois has seven port districts along the Mississippi and seven along the Illinois River (from a total of 19 districts). The public port authorities and districts within the study area are shown in Table 2.

Table 2. Public port authorities and districts along the Mississippi, Illinois, and Missouri rivers.

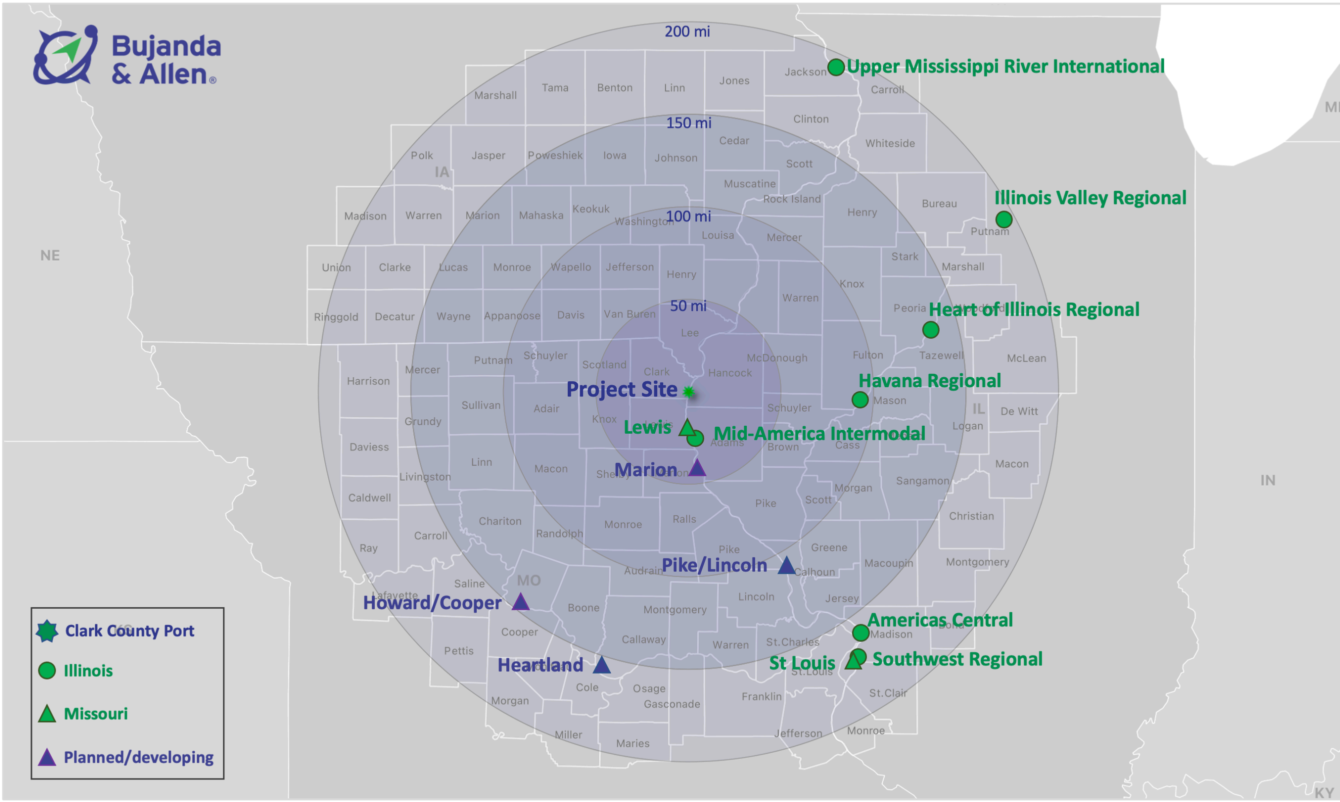
RM*	ST	Bank	Name	Main cargo	Rail
Mississippi River					
585	IL	East	Upper Mississippi River International	Agribulk	BNSF and CN
420	IL	East	Mid-America Intermodal	Agribulk	BNSF, KCS, NS. KJRY, BJRY.
350	MO	West	Lewis County Port Authority	Agribulk	BNSF
326	MO	West	Marion County Port Authority	n.a.	BNSF, NS
294	MO	West	Pike/Lincoln Port Authority	n.a.	BNSF
190	IL	East	Americas Central	Agribulk	UP, NS, KCS, BNSF, CN, CSXT. TRRA, PHRR.
185	IL	East	Southwest Regional	Agribulk	KCS, NS, UP, CSXT. TRRA.
182	MO	West	St. Louis Port Authority	Liquid-bulk	UP, NS, KCS, BNSF, CN, CSXT. TRRA, PHRR.
Illinois River					
225	IL	Both	Illinois Valley Regional Port District	Liquid-bulk	BNSF and NS
160	IL	Both	Heart of Illinois Regional Port District	Agribulk	UP, CN, BNSF, NS. TPW, TZPR, KJRY, IMRR, and IAIS.
116	IL	East	Havana Regional Port District	Drybulk	IMRR
0-85	IL	East	Mid-America Intermodal Port District	Agribulk	BNSF, KCS, NS,. KJRY, BJRY.
Missouri River (planned)					
190	MO	South	Howard Cooper County Port Authority	Agribulk	UP
135	MO	South	Heartland Port Authority	Agribulk	UP

Source: Bujanda & Allen, 2022. *River miles (RM) are for each river, as defined by the USACE.

[2] River Barge Directory, Iowa DOT, 2011, https://iowadot.gov/pdf_files/river_barge_directory.pdf

There are four 'planned or developing,' that is, they currently do not have a public port facility or are in the process of building one. The public port authorities and districts within the study area are shown in Figure 5.

Figure 5. Port authorities and districts along the Mississippi, Illinois, and Missouri rivers in the Study Area



Source: Bujanda & Allen, 2022.

2.4.3 Private river terminals and docks

Bujanda & Allen identified 249 private river terminals and docks within a 200 miles buffer of the Clark County Port Project: 153 in the Mississippi River near (46 near St. Louis), 80 in the Illinois River, and 16 in the Missouri River. We also identified that 52.5% of the 249 private river terminals and docks handle drybulk as their primary cargo, 24.2% agribulk, 16.7% liquid-bulk, 3.8% breakbulk, and 2.8% RoRo. The private river terminals and docks along the Mississippi, Illinois, and Missouri rivers within the study area are illustrated in Figure 6.

Within a 50 miles buffer from the project, Bujanda & Allen identified 29 private river terminals and docks between river mile (RM) 320 and 400. Ten have on-dock or near-dock rail access. From these terminals, 58.6% handle drybulk as their primary cargo, 34.5% agribulk, and 6.9% liquid-bulk. Inbound movements are composed primarily of fertilizers (primarily in dry-bulk form, but some in liquid-bulk), while outbound shipments are primarily grain. The characteristics of these docks are provided in Table 3.

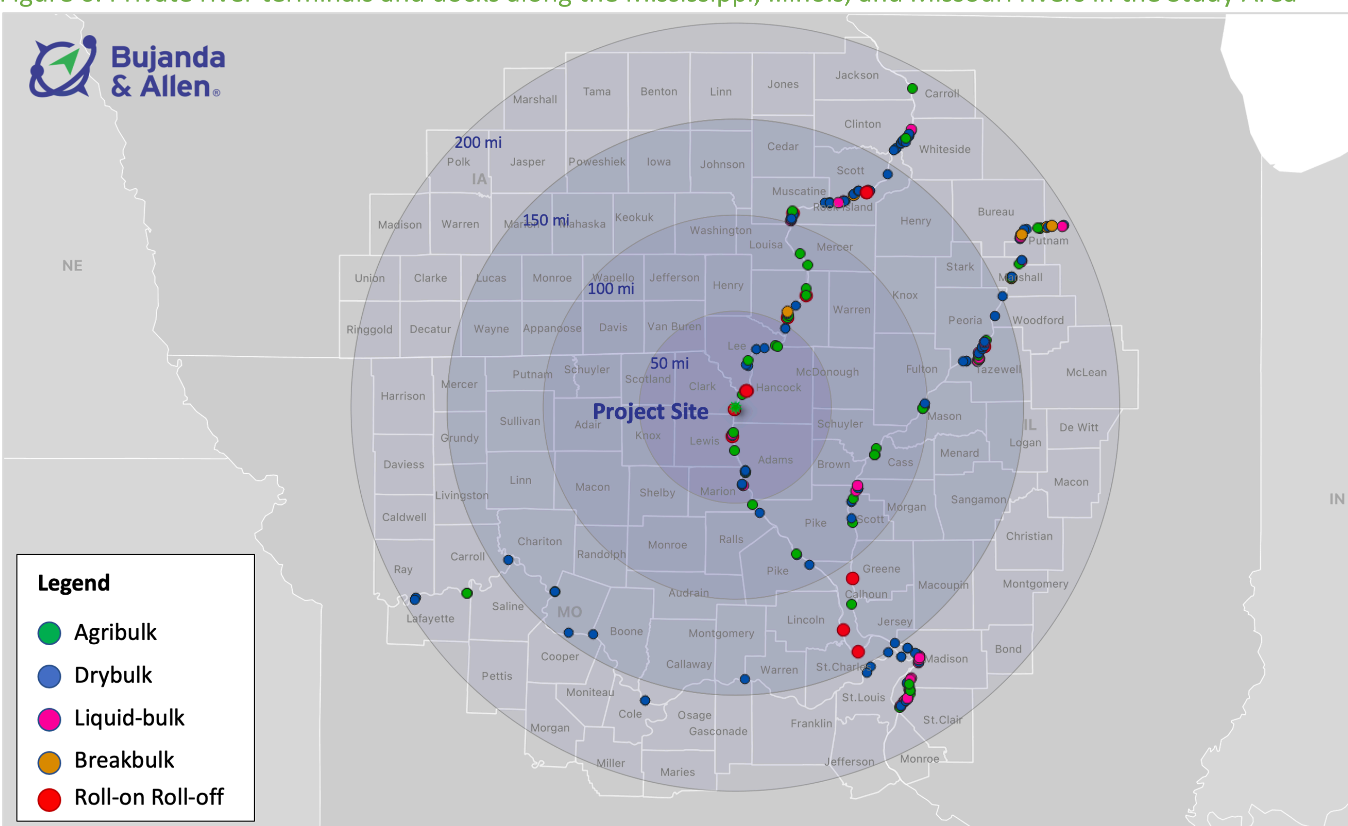
Table 3. Private river terminals and docks along within a 50-mile buffer from the Clark County Port Project.

RM	ST	Bank	County	Operator	Main cargo	Rail	Depth (ft) Min	Max
Mississippi River								
400	IA	West	Des Moines	Koch Fertilizer Storage	Drybulk	BNSF	14	14
399	IA	West	Des Moines	Alliant Energy	Drybulk	BNSF	14	14
390	IL	East	Hancock	AGRI Grain Marketing	Agribulk	-	10	10
390	IA	West	Lee	Colusa Elevator	Agribulk	-	12	12
385	IL	East	Hancock	Royster-Clark Nitrogen	Drybulk	-	15	16
382	IA	West	Lee	Hall Towing	Drybulk	BNSF	11	11
382	IA	West	Lee	Hall Towing	Drybulk	BNSF	11	11
376	IL	East	Hancock	Colusa Elevator	Agribulk	-	12	14

RM	ST	Bank	County	Operator	Main cargo	Rail	Depth (ft) Min	Max
375	IA	West	Lee	Hydro Merschman	Drybulk	-	8	9
371	IA	West	Lee	ORBA Johnson Transshipment	Drybulk	BNSF	10	16
362	IA	West	Lee	Roquette America	Drybulk	KJRY	10	12
362	IA	West	Lee	Iowa Gateway Terminal	Drybulk	BNSF, KJRY	10	10
362	IA	West	Lee	Glencore	Drybulk	BNSF	12	15
360	IL	East	Hancock	URSA Farmers Coop	Agribulk	-	12	12
353	MO	West	Clark	Gabe Logsdon & Sons	Agribulk	-	10	10
343	IL	East	Adams	URSA Farmers Coop	Agribulk	-	12	12
343	MO	West	Lewis	Ayers Oil Co	Liquid-bulk	-	10	10
342	MO	West	Lewis	URSA Farmers Coop	Agribulk	-	12	12
342	MO	West	Lewis	Tri-State Fertilizer	Drybulk	-	9	9
336	MO	West	Lewis	Bunge	Agribulk	-	12	14
327	IL	East	Adams	ADM	Drybulk	-	12	12
327	IL	East	Adams	ADM	Drybulk	-	11	11
326	IL	East	Adams	Canton Marine Towing	Drybulk	-	11	11
326	IL	East	Adams	Blick Construction	Drybulk	-	13	13
326	IL	East	Adams	ADM	Agribulk	-	10	10
326	IL	East	Adams	ADM	Agribulk	-	14	25
320	MO	West	Marion	CF Industries	Drybulk	-	8	8
320	MO	West	Marion	NE Missouri Electric Power	Drybulk	BNSF	9	9
320	MO	West	Marion	BASF	Liquid-bulk	BNSF	8	9

Source: Bujanda & Allen, 2022.

Figure 6. Private river terminals and docks along the Mississippi, Illinois, and Missouri rivers in the Study Area



Source: Bujanda & Allen, 2022.

2.5 Minimum requirements met for a MARAD project designation

2.5.1 Documented vessels

As planned, the Clark County Port Project is expected to increase efficiencies by increasing the use of barges in supply chains serving the study area. These are generally standard barges used on the Mississippi River (35 ft wide by 200 ft long) and built in the U.S. Bujanda & Allen researched and identified 116 fleets of towing vessels operating in the Mississippi River and Gulf Intracoastal Waterway, most of which use U.S. Documented Vessels. Additionally, American Patriot Holdings LLC (APH), a relatively new company, is in the process of finalizing plans to construct self-propelled container vessels which will be operated along M-35, M-55, and M-70. Given the profile of the current and prospective key barge operators along the Mississippi River, it is expected that once implemented, the operation will also be served by U.S. Documented Vessels.

2.5.2 Carries short sea shipping cargo

The Clark County Port Project will enable the movement of commodities between the study area and the U.S. Gulf Coast (USGC).

- **Outbound**—barge services could provide a viable transportation option for agricultural commodities moving to the Port of New Orleans (NOLA) for onward shipment by scheduled international liner services with cargo loaded in "backhaul" containers that otherwise would be repositioned empty.
- **Inbound**—barge services could provide a viable alternative for containers delivered to USGC terminals by international ocean-going vessels, and subsequently loaded by cranes onto barges or river vessels, primarily at New Orleans, and then moved via the M-35 and M-55 waterways primarily, but also via M-55, M-29, and M-70.

The Project will also provide access to the Gulf Intracoastal Waterway (M-10). M-10 stretches from Brownsville, TX to Jacksonville, FL, including other ports in Texas, Louisiana, Mississippi, Alabama, and Florida. This marine highway also connects to M-49 in Morgan City, LA, M-65 in Mobile, AL, and M-55 in New Orleans, LA.

2.5.3 Mitigates landside congestion

Numerous studies conclude that, when compared to other modes, movement of freight by barge is the most fuel-efficient transport mode and the lowest cost option for shipments moving over medium to long distances.[3] A fundamental premise behind the project is that the cost savings from transporting goods by barge will be large enough to attract cargo owners to use this mode as opposed to truck or rail. This would be relevant and beneficial considering increasing capacity constraints and rising greenhouse gas emissions (GHGE) associated with inland corridors in the state, as reported in the *2017 Freight Plan*.[4, 5]

2.5.4 New and expanded services

The Project Designation, and any associated funding or financing in the future, will provide the foundation for the project sponsors to develop and market new barge services that would provide service to beneficial cargo owners (BCO)'s and shippers in the study area. *Section 3* has identified potential market opportunities to expand short-sea shipping service for a variety of cargoes.

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[3] *Environmental Advantages of Inland Barge Transportation*, U.S. Department of Transportation, Maritime Administration. Final Report, August 1994 http://www.uppermon.org/visions/DOT_environ_barge.htm

[4] Missouri Department of Transportation (MoDOT), *2017 Freight Plan*. Rail Condition and Performance, pp 4-9 (60). https://www.modot.org/sites/default/files/documents/Chapters1-10nov2017%5B1%5D.pdf

[5] *AMH offsets carbon emissions from container on barge service*. SCF Seacor Holdings, press release, Jun 24, 2020. https://seacorholdings.com/news/amh-offsets-carbon-emissions-from-container-on-barge-service

3. Market analysis

3.1 Industry analysis

3.1.1 Market survey—key findings

A survey was conducted to better understand the local market from businesses most likely to look at a new port in Clark County as a competitive option for shipping and/or receiving cargo. The following steps were undertaken to accomplish this survey:

- A list of potential respondents was generated through a search and download of relevant NAICS (North American Industry Classification System) codes using a subscription to the Data Axle Genie service.
- The records were then refined by:
  - Distance from Clark County
  - Relevance upon inspection of the downloads
  - Whether suitable contact information was available
- An email was sent requesting a response to a 10-minute survey, which was located here.
- After waiting for about two weeks with little responses, a reminder was sent to potential respondents.
- After waiting again for two weeks with little response, we obtained phone numbers and made calls to complete the surveys on behalf of willing respondents.

3.1.2 Industries with higher potential to generate traffic for the port

A total of 13 respondents provided what we considered to be good information. Table 4 shows a summary of the numbers and types of businesses who responded, what their principal products are, whether they ship or receive internationally and volumes of both international and domestic shipments. As shown in Table 4 and Figure 7[6]:

- Farming/Ranching is the largest category of business and could account for approximately 86,000 metric tons (MT) of shipments per year.
- The two country grain elevators who responded could account for up to about 400,000 MT of corn and soybean shipments per year.
- The single grain origination for export could account for between 400,000 and 650,000 MT of corn and soybeans per year.
- The single river transportation company who responded imports about 45,000 MT of fertilizer and 9,000 MT of animal feed additives of international origin per year. These fertilizer and animal feed additives are then trucked to domestic locations in general area.
- More than half of respondents rated the attractiveness of a container-on-barge service at 4 or 5.

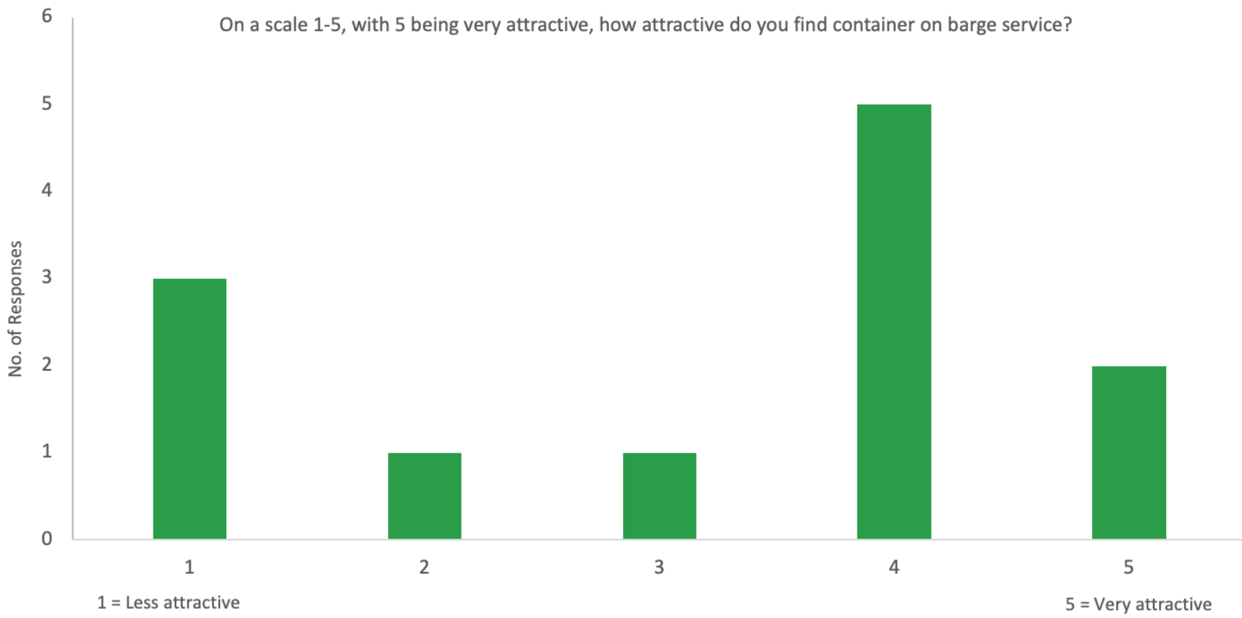
[6] The volume numbers contained in Table 4 are assumed to be included as part of estimates in *Sections 3.3* and *3.4*.

Table 4. Survey response summary

Type of Business	Number of Respondents	Principal Products	Send or Receive International?	International Volume	Domestic Volume
Farming/Ranching	8	Corn, soybeans, dry fertilizer, NH3, UAN	No	N/A	**6 of 8 provided volume:** Corn = 50,294 MT total Soybeans = 35,625 MT total
Country Grain Elevator	2	Corn, soybeans, wheat, milo	No	N/A	Estimated corn/soybeans: approximately 400,000 MT total
Grain Origination for Export	1	Corn, soybeans	Yes	400,000-650,000 MT	Minimal
Manufacturing/Processing	1	Bearing hubs, steel weld elbows, bushings, blades	No	N/A	No answer
River Transportation	1	Fertilizer and animal feed	Yes	45,000 MT fertilizer; 9,000 MT animal feed additives	45,000 MT fertilizer; 9,000 MT animal feed additives

Source: Decision Innovation Solutions, 2022.

Figure 7. Attractiveness of container on barge (COB) service



Source: Decision Innovation Solutions, 2022.

3.1.2 Market survey—conclusions

In addition to the key findings listed in *Section 3.1.1*, respondents were asked what would make a new port location on the Mississippi River in Clark County attractive to them. Respondents universally concluded that it comes down to economics. In other words, for farm commodities, potential users of the port are most concerned with how the basis differential would look compared to other suitable locations for delivery of their commodities. A secondary, but also important, reason for using a port in Clark County include expected shorter wait times (quicker unloads).

3.2 Location of freight generators/attractors

3.2.1 On-farm and commercial grain storage sites

The USDA produces grain storage capacity estimates each year for *on-farm* and *commercial (off-farm)* storage sites at the state-level, which comprises primarily corn, soybean, and wheat. Based on these data, the average volume of *on-farm* grain storage from 2019 to 2021 for Iowa, Missouri, and Illinois was summed up into a total volume of 76.7 million MT of grain.[7]

At the county-level, estimates of grain storage capacity by USDA was done through the 2012 Census of Agriculture. In the absence of updated county-specific data in the 2017 Ag Census, the county-level estimate of *on-farm* grain storage for each of the three commodities was calculated as each county's share of total state grain production (i.e. corn, soybean, and wheat) for the selected 73 counties in Missouri, Iowa, and Illinois multiplied times the 3-year average of each crop estimate of *on-farm* grain storage. The three different tier levels of *on-farm* grain storage by county, Tiers 1 to 3, which provide a total capacity for the study area of 16,422,000 MT, as described next and shown in Figure 8:

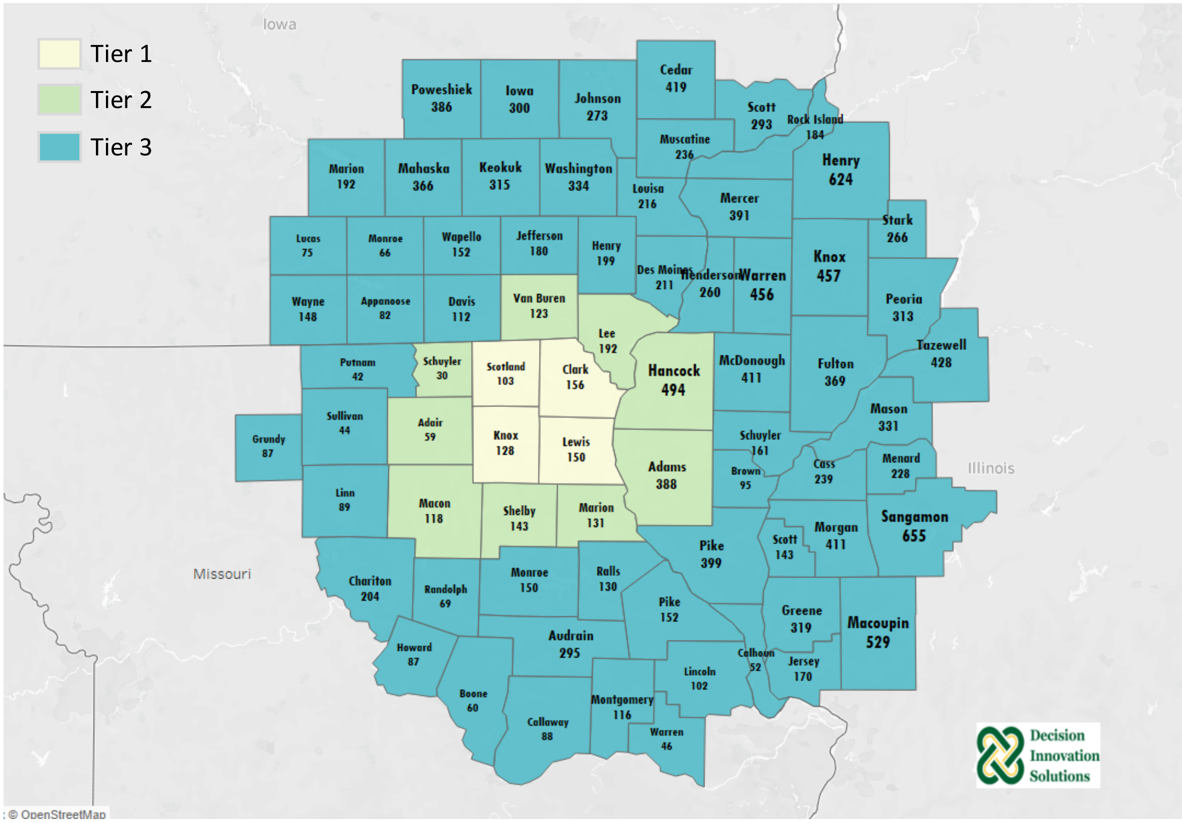
- **Tier 1**—Comprises four counties: Clark, Lewis, Knox, and Scotland, with a total *on-farm* storage capacity of 537,000 MT (3.3% of the total capacity in the study area). Clark, and Lewis in Missouri had the largest 156,000 and 150,000 MT equivalent to 29% and 28%, respectively, of the capacity in Tier 1.
- **Tier 2**—Comprises nine counties: Hancock, Adams, Lee, Shelby, Marion, Van Buren, Macon, Adair, and Schuyler, with a total of 1.678 million MT (10.2% of the capacity in the study area). Hancock and Adams in Illinois had the largest capacity volume of *on-farm* grain storage at 494,000 MT and 388,000 MT equivalent to 29% and 23%, respectively.
- **Tier 3**—Comprises sixty counties with a total of 14.207 million MT (85.6% of the capacity in the study area). The top-ten counties in this tier are: Sangamon, Henry, IL, Macoupin, Knox, Warren, IL, Tazewell, Cedar, Morgan, McDonough, and Pike, IL which account for 34% of the capacity in this tier. Sangamon and Henry ad the largest capacity at 655,000 MT and 624,000 MT equal to 4.6% and 4.4%, respectively.

For *on-farm* storage, between Tier 1 and Tier 2 there were 2.215 million MT of *on-farm* grain storage, equivalent to 13.5% of the total capacity in the study area. This represents our primary target market. Regarding *off-farm* storage, Tier 1 and 2 had a combined 1.58 million MT, whereas the capacity for Tier 3 was approximately 11.65 million MT. The levels of *off-farm* grain storage by county and by study area are shown in Figure 9.

Overall, having large amounts of *on-farm* and *commercial* grain storage sites near the project site can represent a competitive advantage, since the project is expected to provide a cheaper transportation mode, by barge, to export gateways with trucking costs that could be cheaper than the existing alternatives.

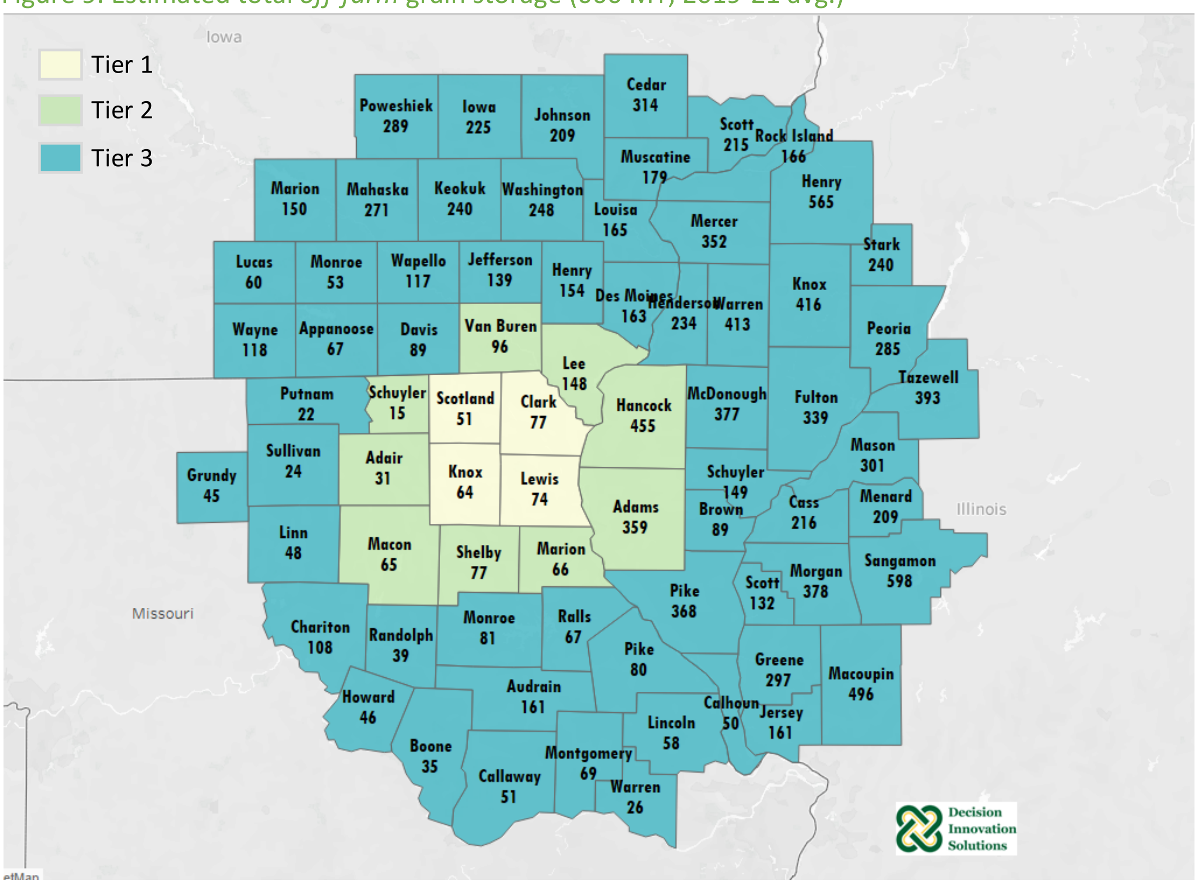
[7] 1 metric ton (unit) is abbreviated as (MT).

Figure 8. Estimated total *on-farm* grain storage (000 MT, 2019-21 avg).



Source: Decision Innovation Solutions, 2022.

Figure 9. Estimated total *off-farm* grain storage (000 MT, 2019-21 avg.)

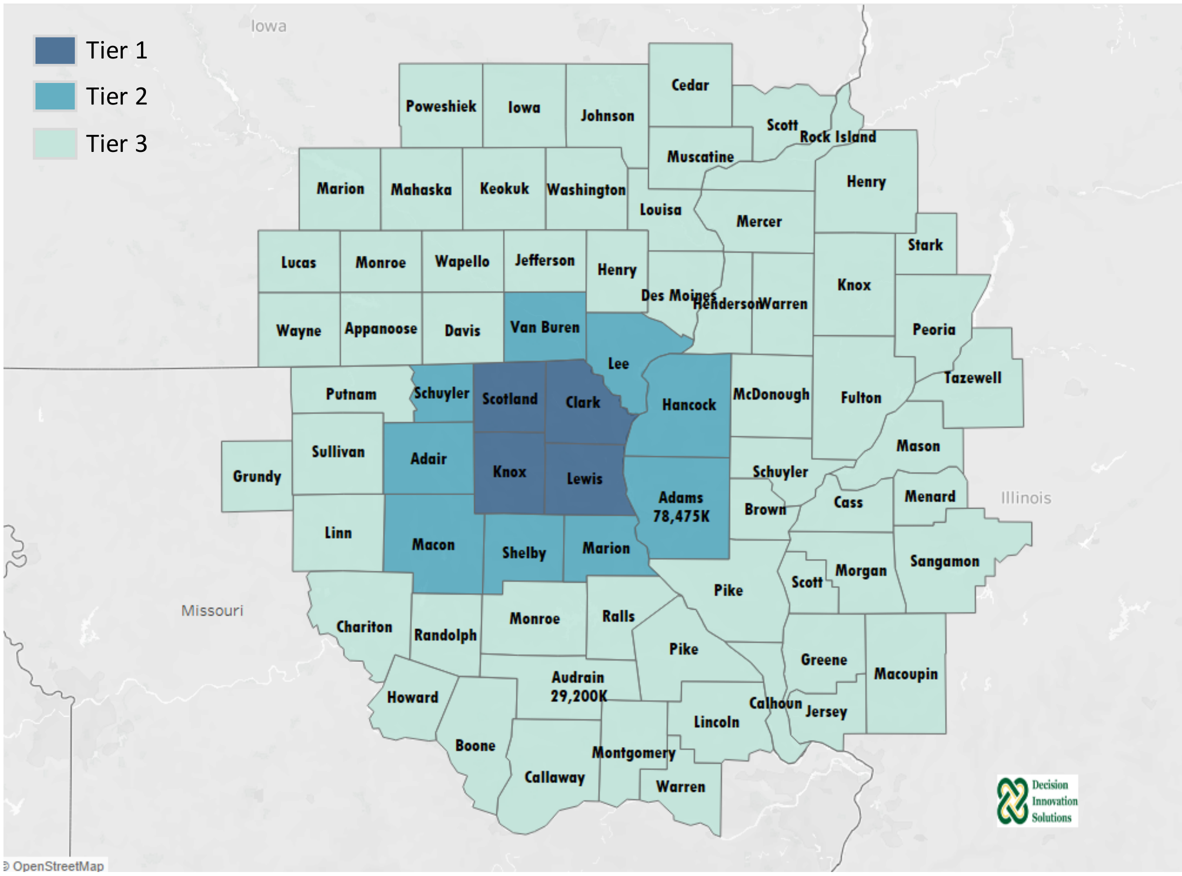


Source: Decision Innovation Solutions, 2022.

3.2.2 Grain/soybean processors

There are two active soybean crush facilities within the study area, with a total capacity of 107.68 million bushels (2.93 million MT). One of those facilities is in Tier 2 in Adams County, Illinois, with a total crush capacity of 78.48 million bushels (2.14 million MT). The second facility is in Tier 3 in Audrain County, Missouri with an estimated crush capacity of 29.2 million bushels (0.79 million MT), as illustrated in Figure 10.

Figure 10. Estimated soybean processing by county (000 bushels, 2020).



Source: Decision Innovation Solutions, 2022.

3.2.3 Local livestock and poultry production sites

Livestock and poultry production is spread across the selected counties for this study, which results in feed demand of corn as primary feed grain and supplemented by soybean meal as the primary protein feed. Corn is converted to feed in both commercial feed mills and on-farm processing, as shown in Table 5. Poultry operations and inventory/production are show in Table 6.

Table 5. Beef and hog 2017 operations and 2020 inventory.

Tier	State	County	2017 Beef Cows Operations	2020 Beef Cows Inventory (head)	2017 COF Inventory Operations	2020 COF Inventory (head)	2017 Dairy Operations	2020 Milk Cows Inventory (head)	2017 Hog Operations	2020 Hog Inventory (head)
1	MO	Clark	187	7,600	7	1,693	11	31	10	33,252
1	MO	Knox	225	14,000	19	5,530	31	1,200	25	291,828
1	MO	Lewis	188	5,887	3	104	24	1,218	16	14,648
1	MO	Scotland	230	9,000	6	656	47	3,400	42	145,373
2	IA	Lee	179	8,200	41	3,455	6	600	45	106,272
2	IA	Van Buren	218	11,300	13	1,320	28	700	32	125,807
2	IL	Adams	419	16,800	49	4,595	15	1,300	44	209,002
2	IL	Hancock	313	14,633	29	4,998	2	134	42	212,025
2	MO	Adair	412	22,000	6	654	24	49	17	1,827
2	MO	Macon	466	24,500	3	1,264	41	77	33	40,204
2	MO	Marion	196	7,600	9	1,076	3	4	19	48,387
2	MO	Schuyler	275	17,067	4	301	17	162	20	12,226
2	MO	Shelby	197	8,200	6	654	3	7	13	90,767
3	IA	Appanoose	273	15,000	5	1,069	12	200	15	93
3	IA	Cedar	216	8,100	51	6,478	3	200	77	390,510
3	IA	Davis	331	14,500	5	276	65	2,000	42	136,389
3	IA	Des Moines	102	3,181	20	832	4	41	22	37,868
3	IA	Henry	201	7,677	28	2,148	4	115	49	161,776
3	IA	Iowa	279	13,300	72	10,822	5	200	55	136,102
3	IA	Jefferson	150	4,800	19	3,483	8	100	47	89,374
3	IA	Johnson	255	10,900	65	5,875	59	1,800	74	97,834
3	IA	Keokuk	263	12,700	54	8,257	6	78	65	250,637
3	IA	Louisa	91	2,871	19	914	2	10	57	293,597
3	IA	Lucas	212	17,300	14	480	5	16	23	48,247
3	IA	Mahaska	203	8,900	56	12,411	4	200	69	352,172
3	IA	Marion	296	11,000	13	1,508	10	400	17	31,630
3	IA	Monroe	237	14,786	16	1,388	8	2,387	13	31,573
3	IA	Muscatine	173	5,500	32	4,294	4	100	32	92,096
3	IA	Poweshiek	243	12,512	59	4,682	2	4,753	33	98,436
3	IA	Scott	116	4,200	46	9,245	12	500	42	276,134
3	IA	Wapello	234	7,026	12	2,382	3	153	25	38,782
3	IA	Washington	225	9,500	47	1,984	25	900	167	1,442,717
3	IA	Wayne	255	14,100	7	455	26	300	24	34,967
3	IL	Brown	90	3,100	4	134	3	100	11	30,407
3	IL	Calhoun	113	2,183	-	-	1	302	11	76,350
3	IL	Cass	63	2,000	6	1,143	4	11	22	96,237
3	IL	Fulton	255	13,888	29	4,948	4	304	24	44,420
3	IL	Greene	218	7,887	19	653	2	9	9	25,478
3	IL	Henderson	148	7,300	16	2,050	6	200	8	18,294
3	IL	Henry	223	6,527	38	8,409	2	9	64	126,096
3	IL	Jersey	135	3,607	14	607	1	65	21	261
3	IL	Knox	224	10,462	27	3,540	1	4	42	196,689
3	IL	Macoupin	267	8,200	29	3,840	13	1,400	17	41,143
3	IL	Mason	74	1,900	3	73	-	-	12	17,073
3	IL	McDonough	232	8,700	25	2,210	3	6	35	96,934
3	IL	Menard	81	3,464	17	1,211	2	9	5	8,530
3	IL	Mercer	160	5,400	14	480	7	23	40	203,401
3	IL	Morgan	148	4,900	21	1,693	5	100	19	28,394
3	IL	Peoria	154	3,689	14	459	4	773	20	17,374
3	IL	Pike	261	8,400	10	383	6	55	62	306,077
3	IL	Rock Island	122	4,300	16	821	6	700	27	30,217
3	IL	Sangamon	192	7,454	31	2,682	6	172	33	46,271
3	IL	Schuyler	116	4,800	6	351	-	-	11	67,941
3	IL	Scott	92	3,600	6	460	6	200	20	13,577
3	IL	Stark	59	1,500	6	439	5	200	9	8,567
3	IL	Tazewell	117	3,400	17	1,244	7	700	34	99,660
3	IL	Warren	198	7,000	25	6,689	10	500	40	117,255
3	MO	Audrain	297	11,400	17	5,589	73	500	50	150,633
3	MO	Boone	377	12,070	7	726	3	145	53	106,991
3	MO	Callaway	625	18,500	4	702	14	71	41	99,483
3	MO	Chariton	355	20,137	10	5,436	2	81	10	57,157
3	MO	Grundy	247	11,700	12	1,010	52	400	46	77,634
3	MO	Howard	265	13,500	5	1,342	4	11	15	992
3	MO	Lincoln	365	9,700	17	1,121	5	100	46	25,147
3	MO	Linn	424	25,500	7	361	23	1,000	18	551
3	MO	Monroe	350	14,000	7	2,483	26	200	49	88,962
3	MO	Montgomery	246	11,500	16	1,997	5	100	29	36,025
3	MO	Pike	342	16,700	16	3,166	39	200	31	40,878
3	MO	Putnam	298	22,000	7	275	-	-	17	131,943
3	MO	Ralls	196	8,905	3	59	2	18	9	14,677
3	MO	Randolph	288	11,900	7	2,585	12	100	19	58,741
3	MO	Sullivan	338	27,397	8	726	4	321	21	389,201
3	MO	Warren	217	6,726	21	1,470	8	1,238	11	22,812

Sources: USDA's 2017 Census of Agriculture (number of operations), Inventory/ production based on DIS estimates based on USDA Census of Agriculture and Survey data. Note: County names in red= Tier 1. County names in blue= Tier 2. County names in black= Tier 3 (which is the rest of study area and located in Missouri, Iowa, Illinois.)

Table 6. Poultry 2017 operations and 2020 inventory/production

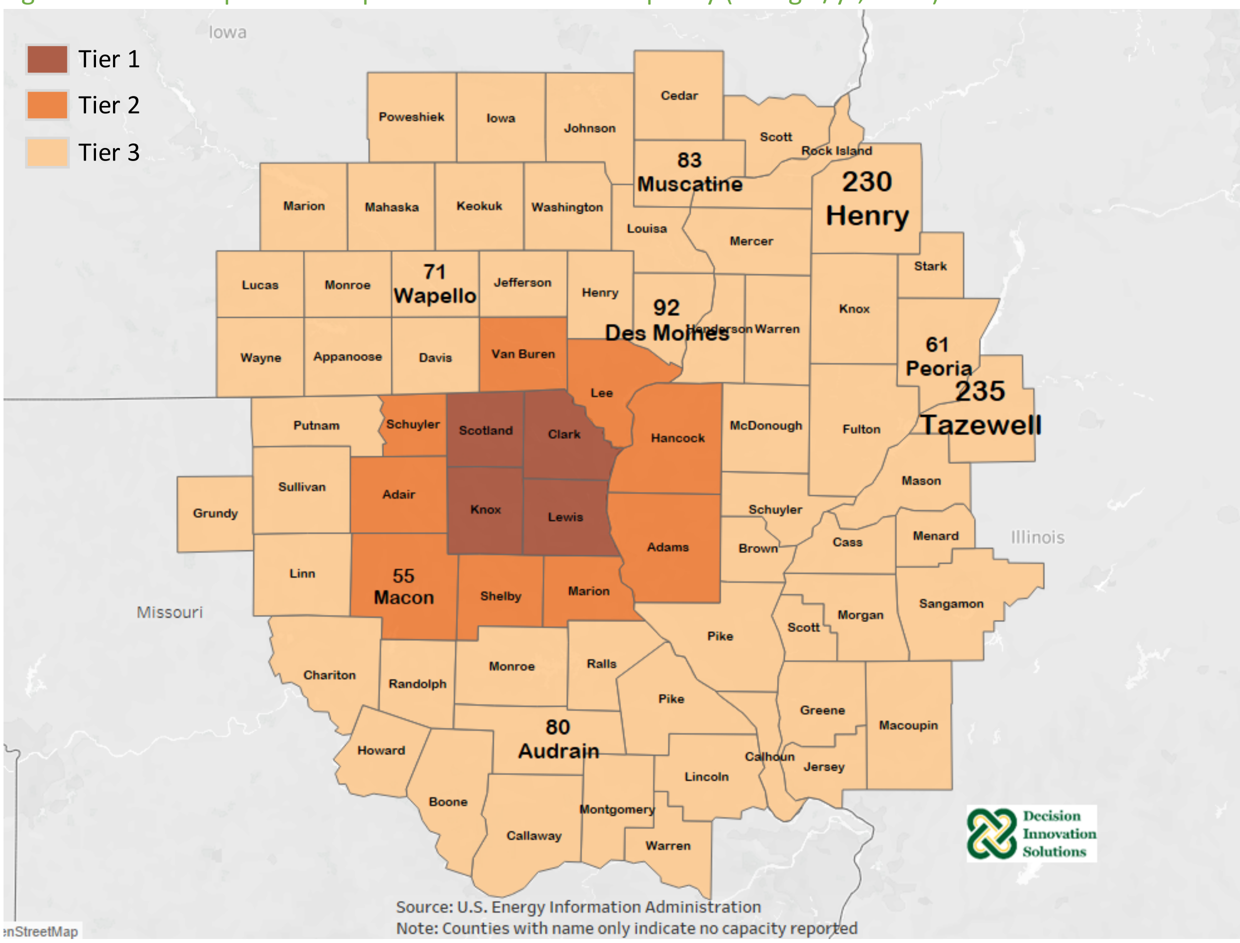
Tier	State	County	2017 Broiler Operations	2020 Broiler Production (head)	2017 Layer Operations	2020 Layer Inventory (head)	Turkey Operations	2020 Turkey Production (head)
1	MO	Clark	1	63,316	60	567	-	-
1	MO	Knox	5	366	84	117,582	2	10,302
1	MO	Lewis	7	1,533	84	956	12	161
1	MO	Scotland	9	569,841	90	141,070	3	18
2	IA	Lee	15	5,342	84	1,150	5	100
2	IA	Van Buren	17	3,028	104	902	5	107
2	IL	Adams	9	3,842	70	1,408	2	3,538
2	IL	Hancock	1	17,455	54	708	3	10
2	MO	Adair	10	1,615	138	61,286	6	243
2	MO	Macon	10	884	232	3,002	5	38
2	MO	Marion	8	1,285	62	748	3	33
2	MO	Schuyler	3	301	70	1,579	5	62
2	MO	Shelby	4	507	54	56,072	2	10,302
3	IA	Appanoose	8	90,100	98	821	3	49
3	IA	Cedar	22	10,630	156	2,137	14	339
3	IA	Davis	16	3,108	216	131,454	1	17,224
3	IA	Des Moines	-	-	20	144	-	-
3	IA	Henry	-	-	62	1,440	17	1,062,935
3	IA	Iowa	19	2,153	122	1,290	8	347
3	IA	Jefferson	3	61	90	17,170	2	34,448
3	IA	Johnson	30	280,257	214	199,781	11	142,141
3	IA	Keokuk	6	484	44	5,504	-	-
3	IA	Louisa	1	45,938	28	450	3	51,672
3	IA	Lucas	4	10,260	92	1,676	1	17,224
3	IA	Mahaska	8	2,382	104	1,591,612	8	46
3	IA	Marion	11	1,312	156	2,347	4	44
3	IA	Monroe	7	2,355	60	509	9	120
3	IA	Muscatine	5	10,448	106	81,646	9	155,017
3	IA	Poweshiek	6	760	134	1,590,768	10	200
3	IA	Scott	22	3,969	106	1,251	4	68,896
3	IA	Wapello	13	881	98	821	2	34,448
3	IA	Washington	10	98,886	118	104,008	23	874,538
3	IA	Wayne	5	532	82	591	2	34,448
3	IL	Brown	4	242	14	153	-	-
3	IL	Calhoun	-	-	42	771	2	3,538
3	IL	Cass	3	52,366	22	358	-	-
3	IL	Fulton	-	-	98	4,726	5	21
3	IL	Greene	-	-	34	841	-	-
3	IL	Henderson	2	34,911	42	889	-	-
3	IL	Henry	11	1,877	156	2,371	3	11
3	IL	Jersey	1	17,455	74	2,369	5	40
3	IL	Knox	3	713	70	1,195	-	-
3	IL	Macoupin	8	680	148	3,235	8	14,150
3	IL	Mason	4	1,177	22	688	2	3,538
3	IL	McDonough	16	3,781	94	1,615	6	44
3	IL	Menard	-	-	36	706	2	3,538
3	IL	Mercer	2	34,911	84	1,503	1	1,769
3	IL	Morgan	3	1,130	38	981	1	1,769
3	IL	Peoria	4	1,278	140	3,382	2	3,538
3	IL	Pike	6	754	50	2,916	2	3,538
3	IL	Rock Island	14	7,744	78	1,243	6	36
3	IL	Sangamon	6	1,514	118	8,456	11	209
3	IL	Schuyler	-	-	44	481	-	-
3	IL	Scott	2	34,911	8	282	-	-
3	IL	Stark	1	17,455	20	219	-	-
3	IL	Tazewell	11	6,681	126	4,859	5	8,844
3	IL	Warren	4	538	140	2,156	6	8
3	MO	Audrain	8	1,486	172	233,173	4	27
3	MO	Boone	8	613	296	22,255	7	36,057
3	MO	Callaway	21	16,690	214	2,456	6	195
3	MO	Chariton	4	295	64	605	4	82
3	MO	Grundy	10	3,337	110	21,051	2	10,302
3	MO	Howard	1	63,316	68	32,366	2	10,302
3	MO	Lincoln	10	601	302	1,449,096	15	126
3	MO	Linn	10	884	132	1,626	14	226
3	MO	Monroe	6	3,243	180	3,607	6	62
3	MO	Montgomery	8	1,085	116	1,994	7	46
3	MO	Pike	7	1,232	130	2,882	1	5,151
3	MO	Putnam	4	631	64	984	3	33
3	MO	Ralls	6	35	104	1,416	4	62
3	MO	Randolph	11	2,712	194	1,996	2	10,302
3	MO	Sullivan	2	126,631	54	510	2	10,302
3	MO	Warren	15	20,941	156	2,050	7	27

Sources: USDA's 2017 Census of Agriculture (number of operations), Inventory/ production based on DIS estimates based on USDA Census of Agriculture and Survey data. Note: County names in red= Tier 1. County names in blue= Tier 2. County names in black= Tier 3 (which is the rest of study area and located in Missouri, Iowa, Illinois).

3.2.4 Ethanol/biodiesel plants

Currently there are eight ethanol production plants in the counties selected for this study, which on January 2022 had a total production capacity of 907 million gallons per year equivalent to 324 million bushels of corn (8.23 million MT), which can result in up to 5,507 million pounds (2.498 million MT) of distillers dried grains with solubles (DDGS). Among these plants Tazewell County, IL has the largest ethanol capacity at 235 million gallons per year, followed by Henry County, Illinois, with an estimated annual ethanol production capacity of 230 million gallons. The plants in Wapello and particularly in Des Moines, IA represent target markets with greater potential to become users given their proximity to the project site, as shown in Figure 11.

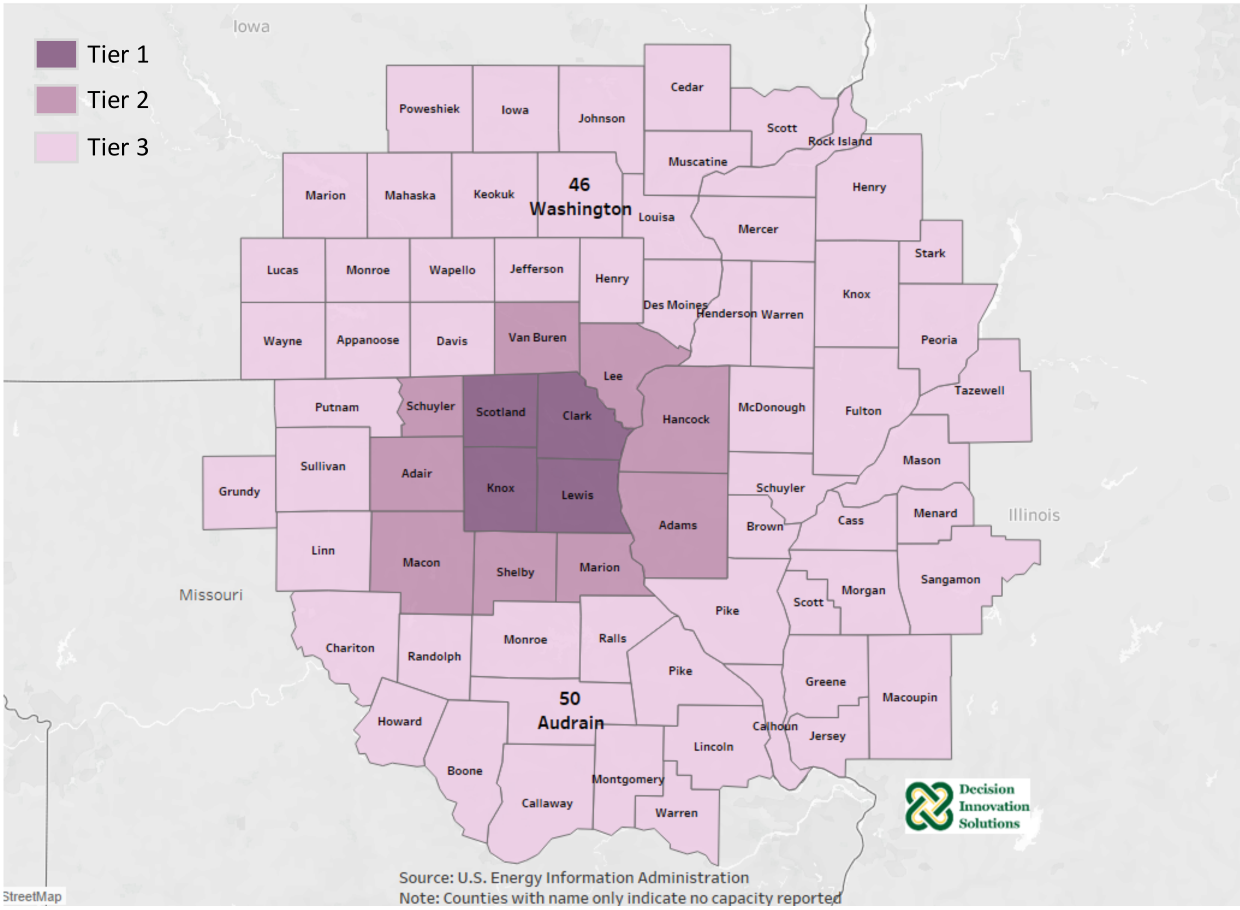
Figure 11. Ethanol production plants and estimated capacity (Mm gal/yr, 2022).



Source: Decision Innovation Solutions, 2022.

There are two biodiesel plants among the counties included in this study with a total annual capacity of 96 million gallons. Both plants are located in Tier 3. One of these plants is in Audrain County, Missouri, with an estimated capacity of 50 million gallons per year, whereas the other plant, which, is in Washington County, Iowa, has an annual capacity of 45 million gallons, as show in Figure 12. The feedstock used by these plants includes soybean oil, other vegetable oils, and animal fats.

Figure 12. Biodiesel production plants and estimated capacity (Mm gal/ yr, 2022).



Source: Decision Innovation Solutions, 2022.

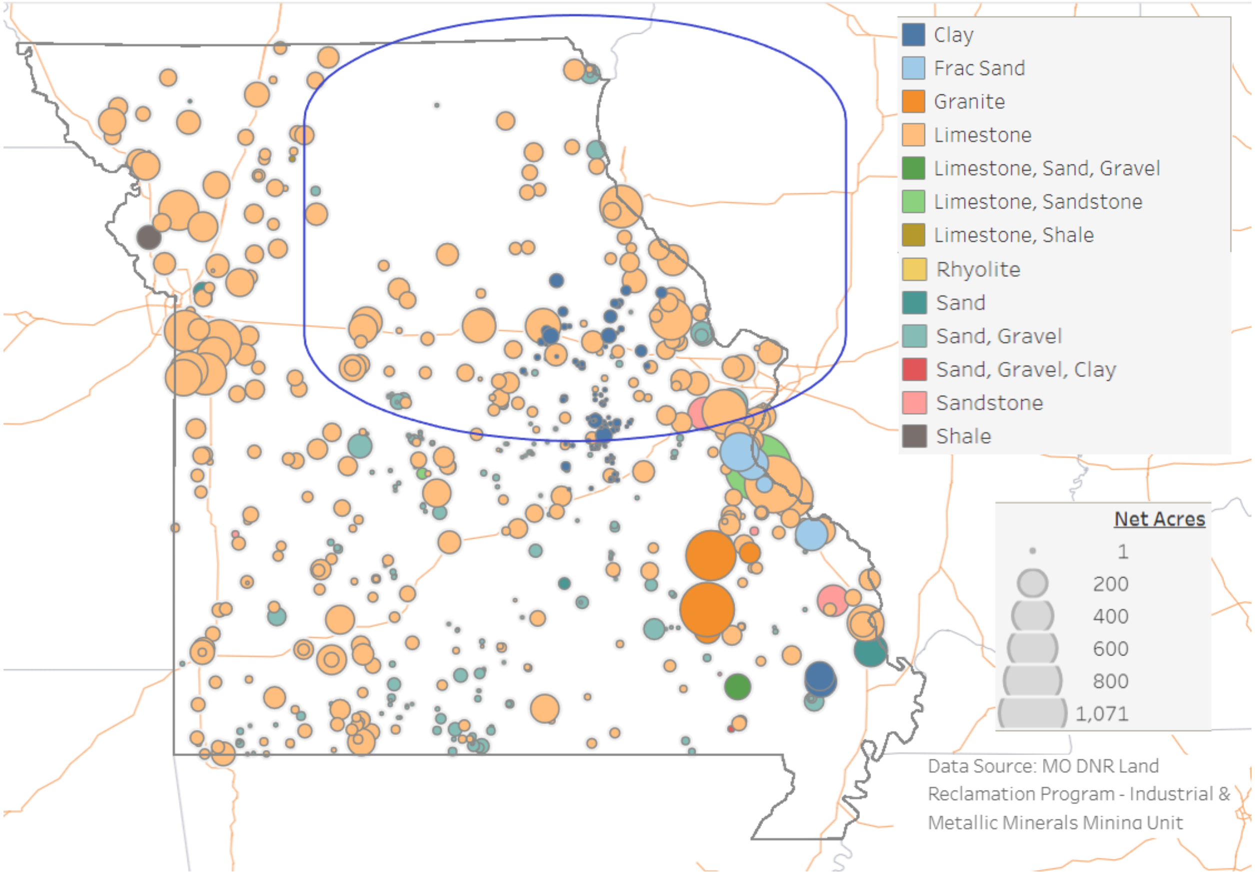
3.2.5 Mining sites: metals/nonmetals

Based on the commodities with higher potential for international trade, mining sites for metals and nonmetals are the last category identified. Missouri's Department of Natural Resources (DNR) Land Reclamation Program provides a map that allows users to filter the map based on commodity and net acres.[8]

DIS extracted a map showing the mines in the state producing metals, nonmetals, and sands/gravels, illustrated in Figure 13. The counties of interest are highlighted in blue circles on the map. The size of dots are intended to differentiate the magnitude of large versus small operations by size of the mining site, measured in acres; however, the size of the dots is not to scale for area of acres represented.

[8] Missouri's DNR Land Reclamation Program, *Industrial and Metallic Minerals Mining Unit*, https://public.tableau.com/views/HPAmaps/MineDashboard?:display_count=y&publish=yes:showVizHome=no#3

Figure 13. Active mine sites in Missouri



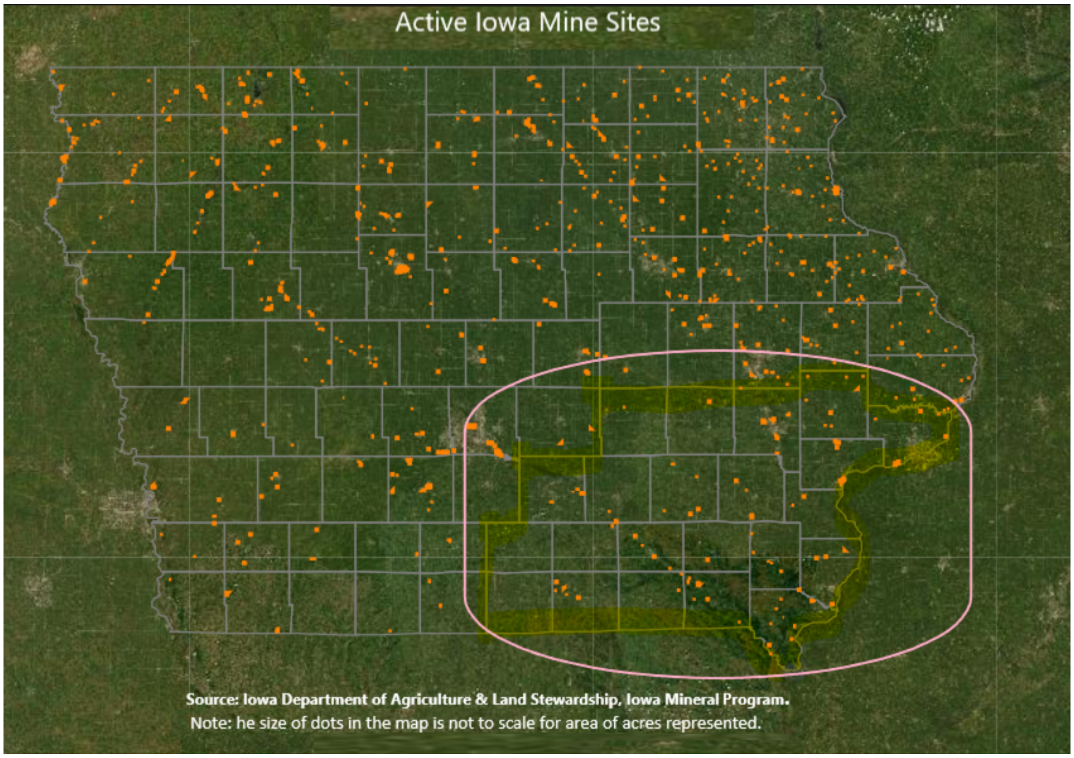
Source: Adopted by Decision Innovation Solutions from Missouri DNR Land Reclamation Program, 2022.

According to Iowa Department of Agriculture & Land Stewardship, Iowa Mineral Program, Iowa has more than 1,019 registered mineral sites in Iowa, which are used by some 201 operators in 94 counties, with counties of interest highlighted (see pink circle on the map). Minerals extracted at these sites include limestone, sand, gravel, gypsum, and clay. The limestone industry alone produces over 33-35 million tons of stone each year for use in the construction industry[9]. Note that the size of dots in the map below is not to scale for area of acres represented. Active Iowa mine sites are shown in Figure 14.

Mining is an important contributor to the state economy also in Illinois. Based on information from the Illinois Department of Natural Resources[10], there are multiple mine sites across the states, which extract minerals such as sand & gravel, limestone, clay, coal, peat, and silica. The mine site locations by type of mineral are shown in Figure 15.

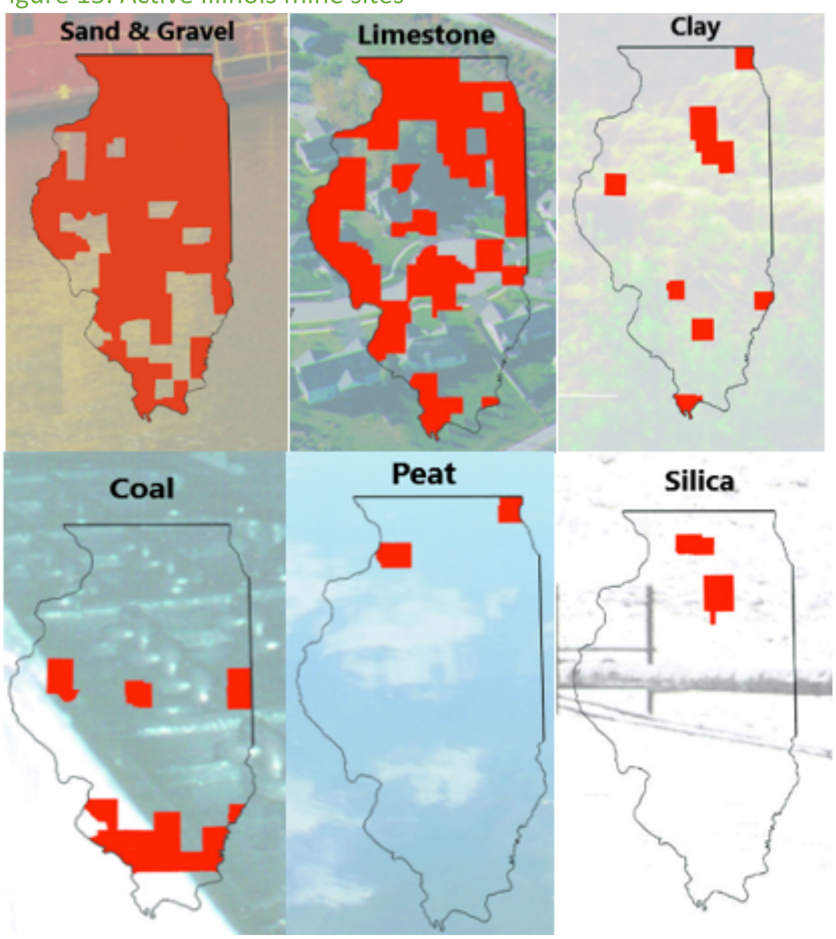
[9] Iowa Mineral Program | Iowa Department of Agriculture and Land Stewardship (iowaagriculture.gov).
[10] Illinois Department of Natural Resources, Education Outreach Mines and Minerals (illinois.gov).

Figure 14. Active Iowa mine sites.



Source: Adopted by Decision Innovation Solutions from the Iowa Department of Agriculture & Land Stewardship, 2022.

Figure 15. Active Illinois mine sites



Source: Illinois Department of Natural Resources, Mining, and Minerals.

3.2.6 Forestry and lumber

To estimate the lumber and forest products potentially available for export through the Clark County port, Missouri-sourced forest and lumber export data was obtained from the USDA Animal and Plant Health Inspection Service (APHIS). This data was obtained for the two-year timeframe from December 2020 to November 2022. The format of the data received required significant conversion and summarization to ensure wood species, part names and units of measure were consistently combined. A total of ten different part names and six different units of measure were present in the APHIS database, shown in Table 7. Additionally, 36 types of wood were present in the APHIS database.

Table 7. Part names and unit types contained in the APHIS Database

Part Names and Unit Types Contained in the APHIS Database	
Part Names	**Unit Types**
Air dried lumber	Bags
Bark	Bundles
Barrels	Cubic Meters
Heat treated lumber	Each
Kiln dried lumber	Kilograms
Logs	Pallets
Lumber	
Pallets	
Wood	
Wood chips	

To better understand what was exported from the study area surrounding Clark County, the use of IMPLAN data was necessary. This was handled using the estimated Missouri portion of the study area's share of state exports of comparable products as calculated by IMPLAN (sectors 15 and 16). This factor of 2.44% was applied to the state APHIS data to estimate the portion of APHIS exports originating from the study area. To expand the results to the non-Missouri portion of the study area, these values were multiplied by the ratio of forestry acres in the overall study area to acres in the Missouri portion of the study area according to the USDA Cropland Data Layer (CDL). As shown in Table 8, this portion is estimated to be approximately 4,801 MT.

Table 8. Estimated annual exports of lumber and forestry products (MO and NEMO Study Area)

Product Type	Annual MT (Missouri)	Annual MT (NEMO Study Area)
Logs	76,499	2,934
Kiln dried lumber	37,319	1,431
Wood	5,599	215
Barrels	2,850	109
Lumber	1,040	40
Wood chips	898	34
Heat treated lumber	772	30
Air dried lumber	177	7
Pallets	23	1
Bark	10	0
Total	**125,187**	**4,801**

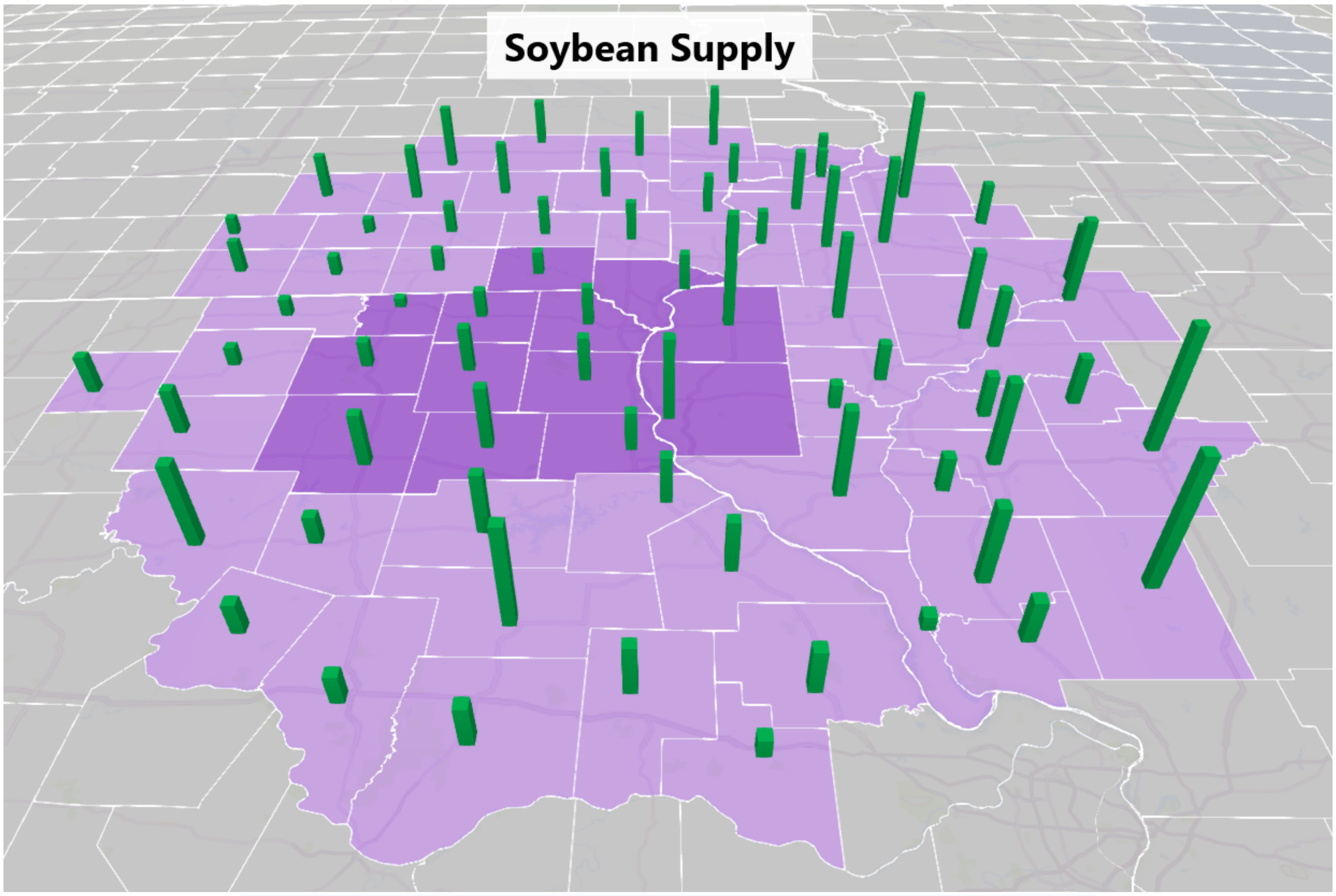
Source: DIS, USDA APHIS, USDA CDL, IMPLAN

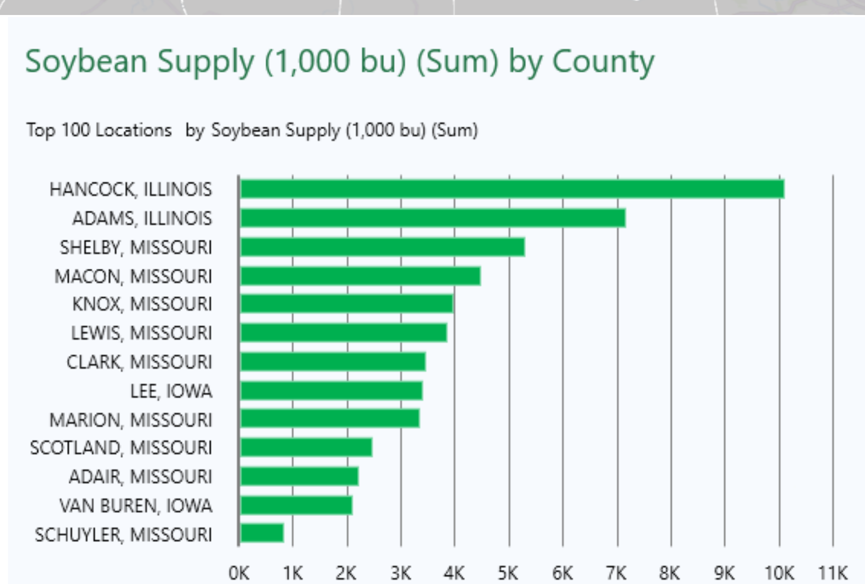
3.3 Commodity port flow analysis

3.3.1 Soybeans

Figure 16 shows that 2020 soybean production is relatively evenly distributed throughout the study area, with all counties producing at least some soybeans. In the primary study area (Tier 1 and Tier 2 counties), Hancock County, IL produced the most soybeans with just over 10 million bushels (272,200 MT). Most counties in the primary study area produced at least 3 million bushels (81,670 MT) of soybeans.

Figure 16. Study area soybean supply

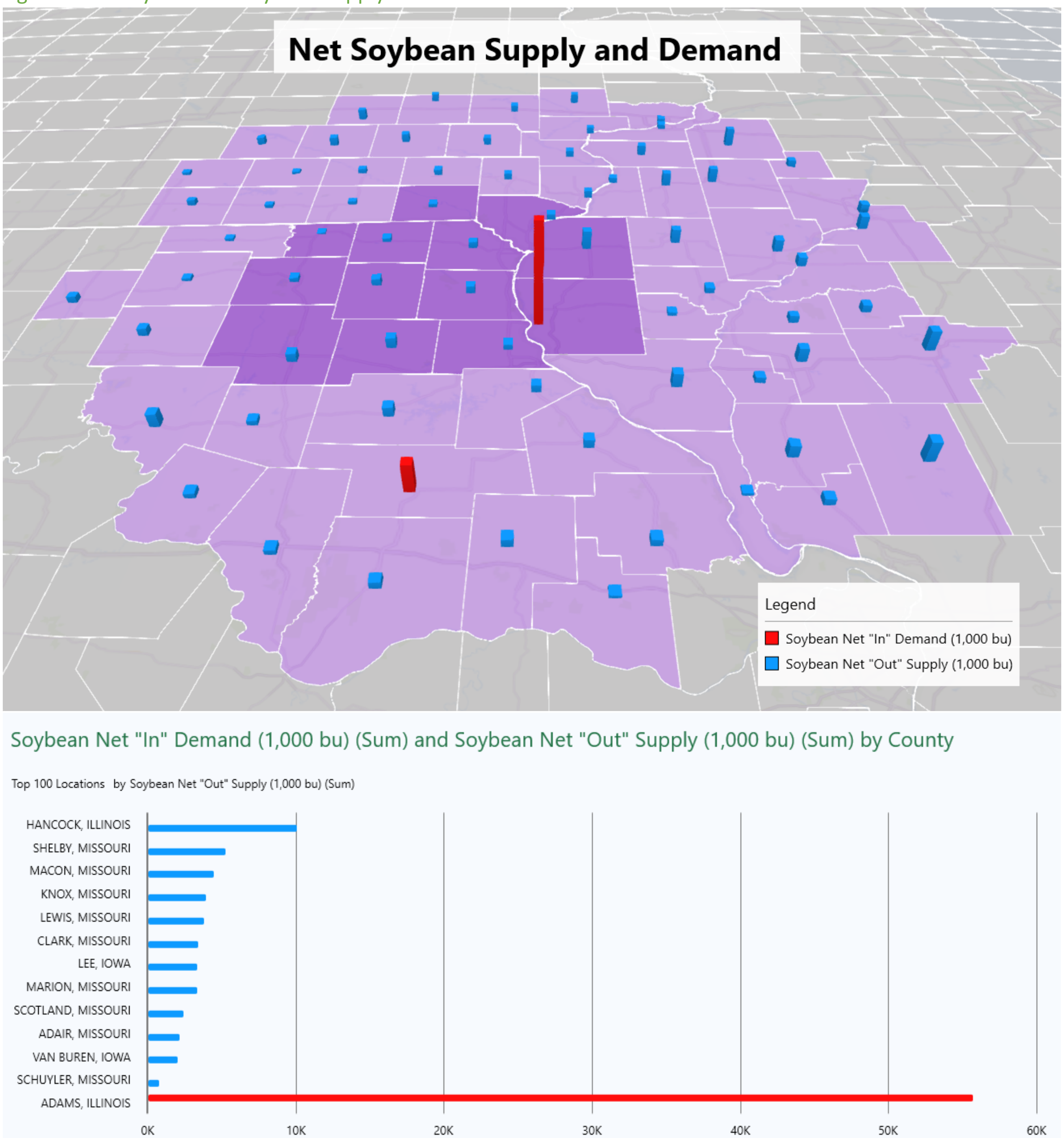




Source: USDA NASS, Decision Innovation Solutions, 2022.

Figure 17 shows the availability of soybeans in the study area by county after subtracting demand for soybeans by crush plants. Around 46 million bushels (1.25 million MT) of soybeans are available in the study area counties with positive net supply. Within the primary study area, the four Tier 1 counties (Scotland, Clark, Knox, and Lewis) have around 14 million bushels (380,000 MT) in net supply. These soybeans are potentially available for export. However, a port in Clark County would have to compete with the crush plant in Adams County, IL which has an estimated net demand of 56 million bushels (1.52 million MT).

Figure 17. Study area net soybean supply and demand

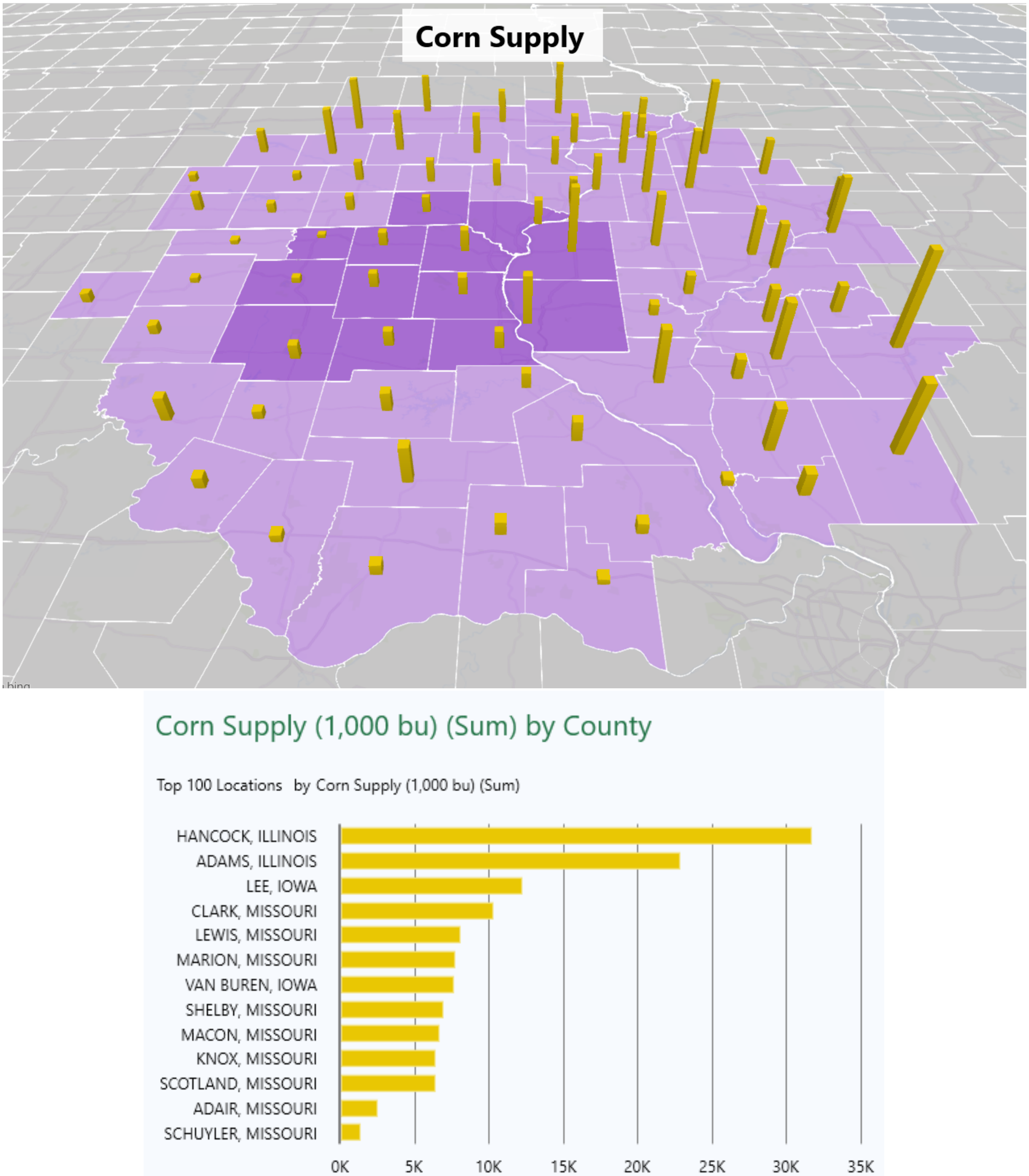


Source: USDA NASS, Decision Innovation Solutions, 2022.

3.3.2 Corn

Figure 18 shows the 2020 production of corn in the study area. Corn production is relatively higher in the Iowa and Illinois portions of the study area. In the primary study area, the two Illinois counties produced the most corn with both counties producing more than 20 million bushels (508,000 MT). Nine counties in the primary study area produced more than 5 million bushels of corn (127,000 MT) each.

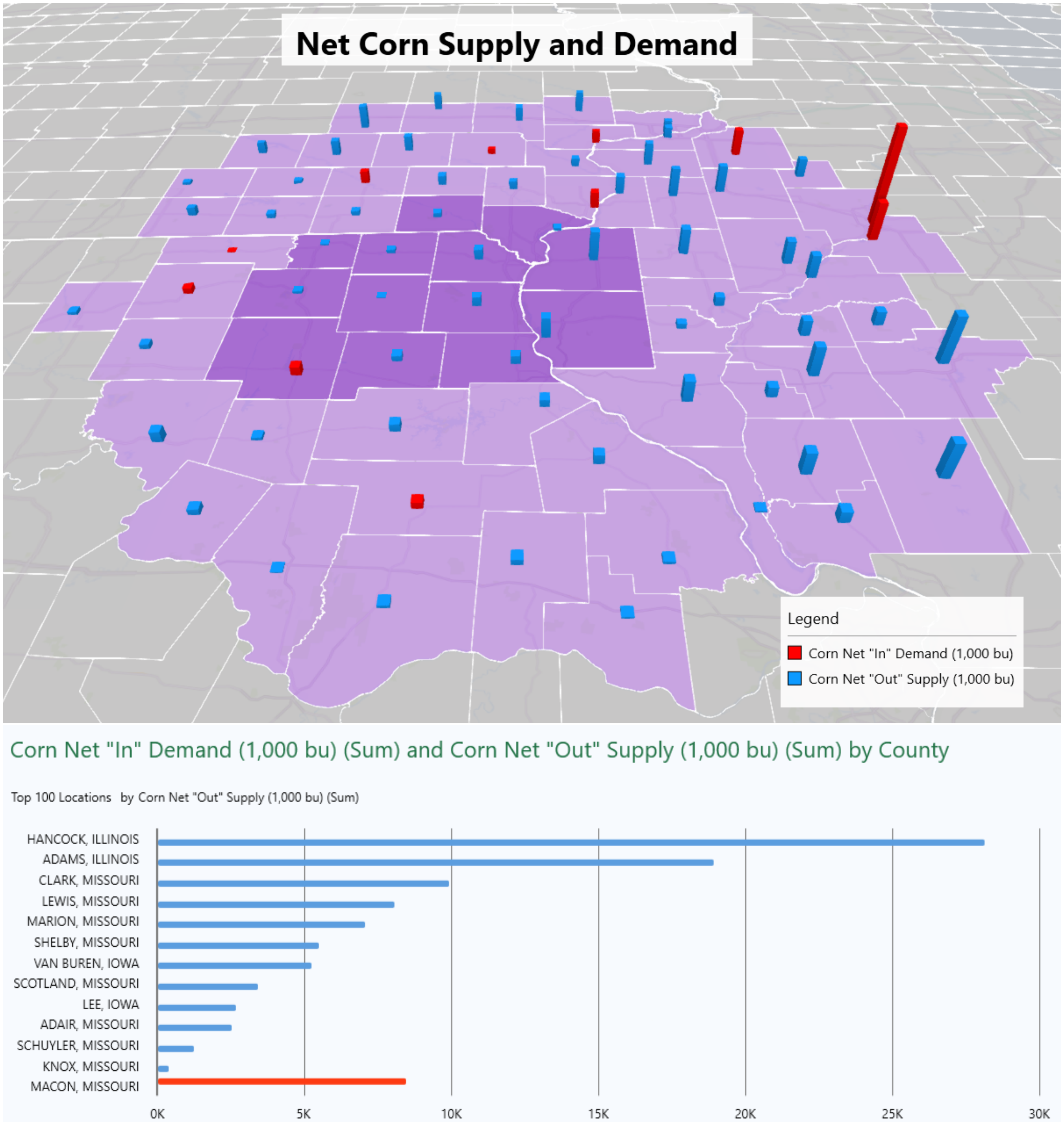
Figure 18. Study area corn supply



Source: USDA NASS, Decision Innovation Solutions, 2022.

Figure 19 shows the net availability of corn in the study area after subtracting feed and processing demand at the county level. Around 93 million bushels (2.5 million MT) of corn are available in counties with net positive supply in the primary study area. Of this amount, around 22 million bushels (600,000 MT) are in the Tier 1 counties. This value represents the maximum possible amount of corn available for export, as some corn from these counties will likely be transported via truck to nearby counties with a net demand for corn.

Figure 19. Study area net corn supply and demand

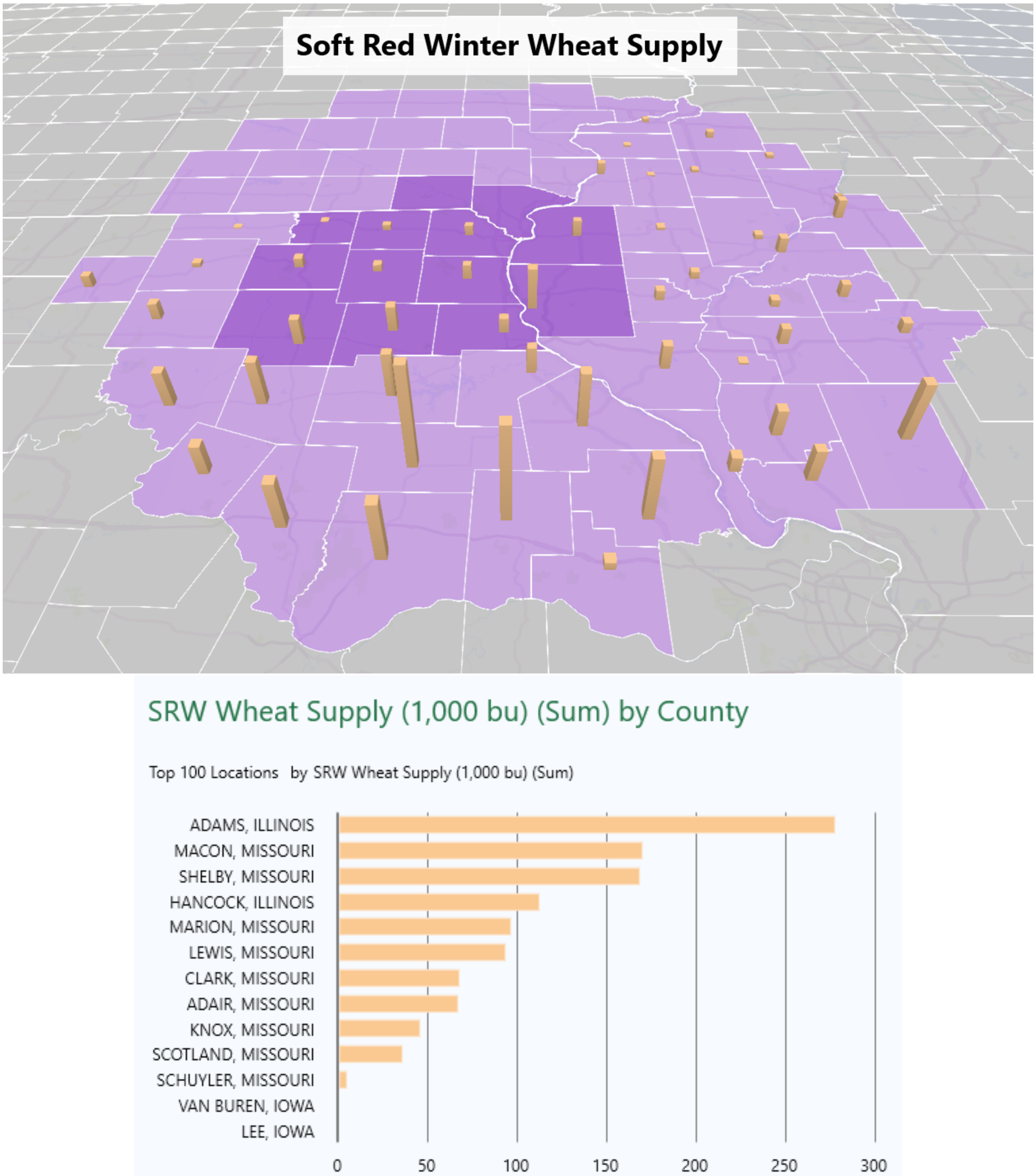


Source: USDA NASS, Decision Innovation Solutions, 2022.

3.3.3 Wheat

The variety of wheat predominantly grown throughout the study area is soft red winter (SRW) wheat. Figure 20 shows the 2020 production of SRW wheat in the study area. Wheat production is concentrated in the southern part of the study area, and virtually no wheat is grown in the Iowa portion of the study area. In the primary study area, Adams County, Illinois is the highest-producing county with around 279,000 bushels (7,594 MT).

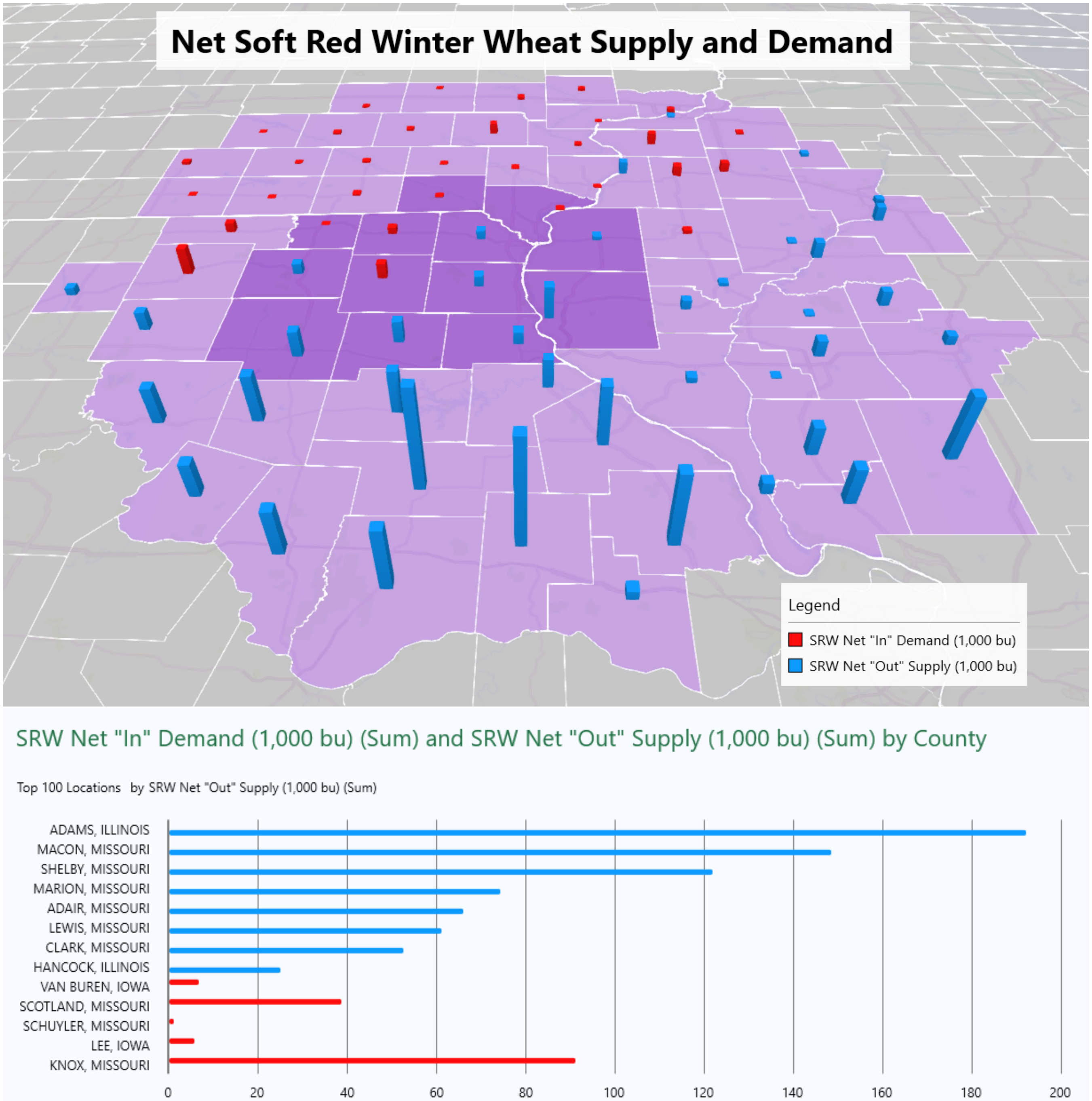
Figure 20. Study area soft red winter wheat supply



Source: USDA NASS, Decision Innovation Solutions, 2022.

Figure 21 shows the estimated net availability of SRW wheat in the study area after subtracting feed and milling demand. In general, there is a net surplus of SRW wheat in the southern half of the study area and a net deficit in the northern half. In the primary study area, 8 counties have a net surplus totaling 744,000 bushels (20,251 MT), and 5 counties have a net deficit totaling 145,000 bushels (3,947 MT). The Tier 1 counties combined have a net demand of 16,000 bushels (435 MT).

Figure 21. Study area net soft red winter wheat supply and demand

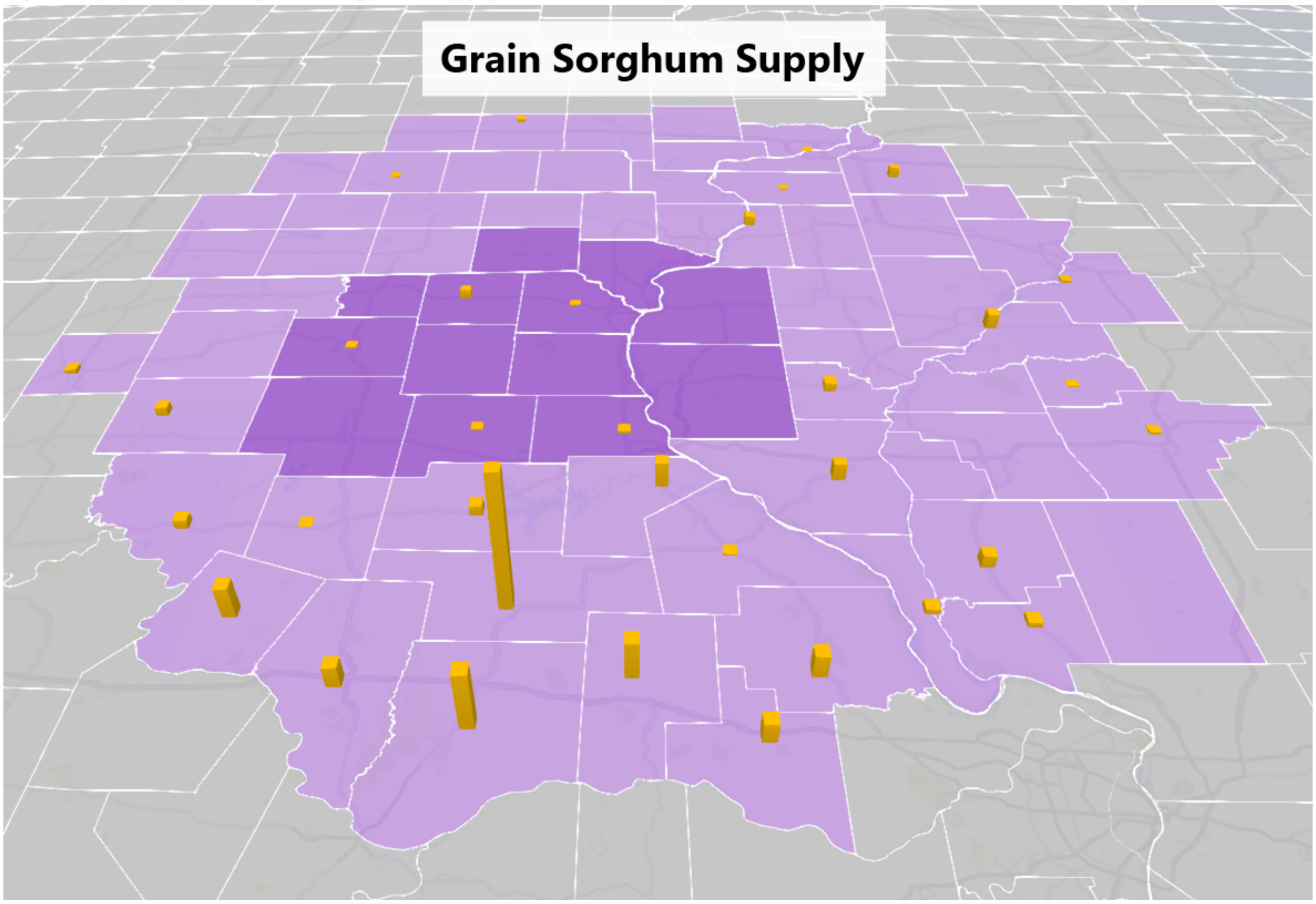


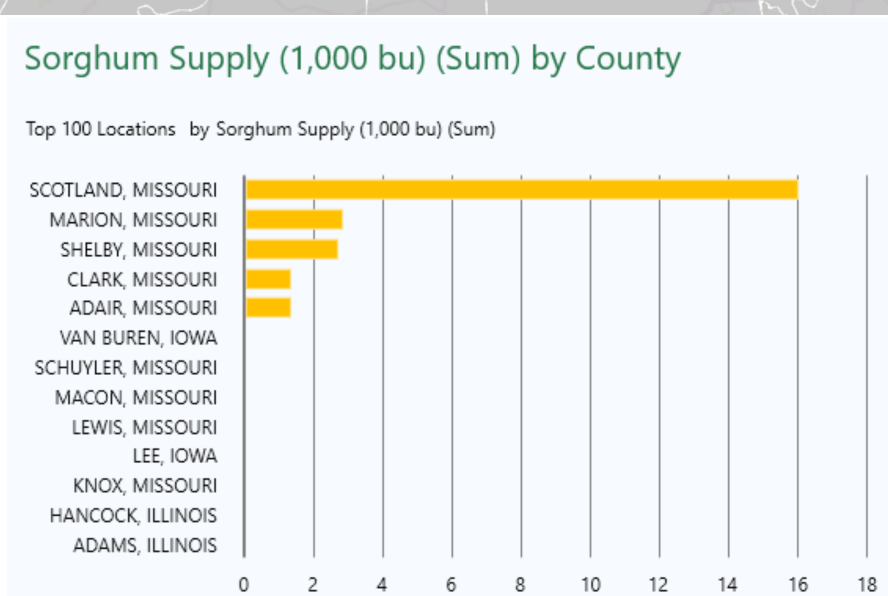
Source: USDA NASS, Decision Innovation Solutions, 2022.

3.3.4 Grain Sorghum

Figure 22 shows the 2020 production of grain sorghum within the study area. Production of grain sorghum is minor outside the far southern counties in the study area. In the primary study area (Tier 1 and Tier 2 counties), only 5 counties produced grain sorghum in 2020. The highest-producing county was Scotland County, MO with a production of around 16,000 bushels (406 MT). The overall lack of supply in the study area suggests that the potential for barge export of grain sorghum out of a port in Clark County is minimal.

Figure 22. Study area grain sorghum supply





Source: USDA NASS, Decision Innovation Solutions, 2022.

3.4 Historical imports and exports of study area

3.4.1 Historical containerized imports

Annual containerized imports to the study area since 2008 have mostly ranged from 80,000 to 115,000 MT, with an average value of 97,000 MT, as shown in Figure 23. By region, Asia is the most common origin of containerized imports, making up half or more of all containerized imports in a typical year.

Figure 23. Historical containerized imports by region

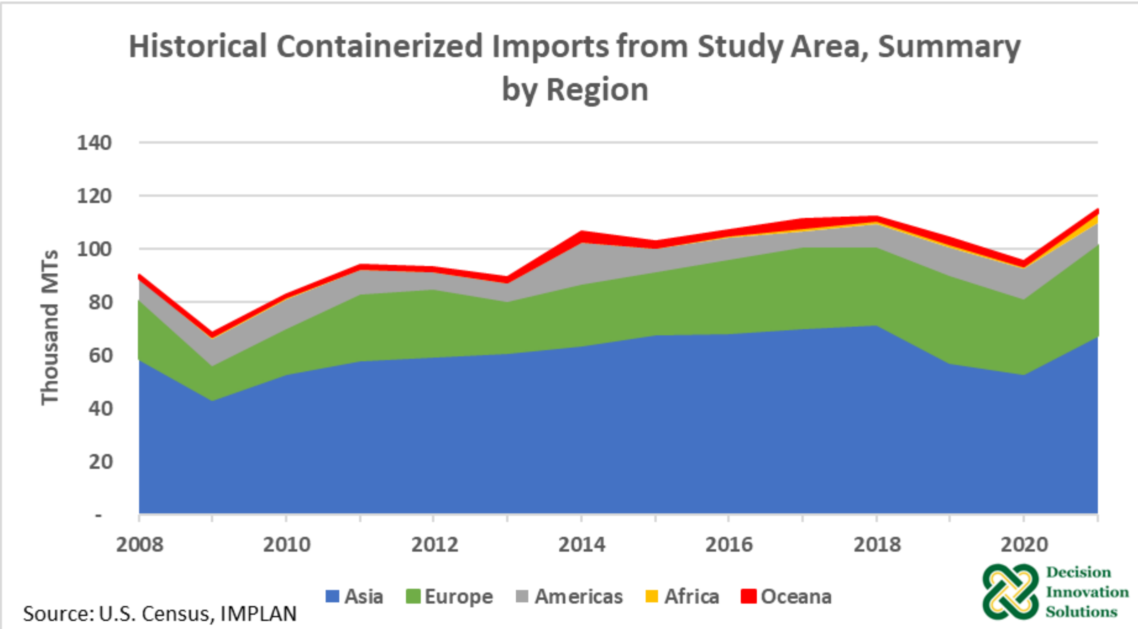


Figure 24 shows all containerized imports to the study area by commodity type. Nearly all containerized imports belong to the Manufacturing or manufactured goods category.

Figure 24. Historical containerized imports from the world

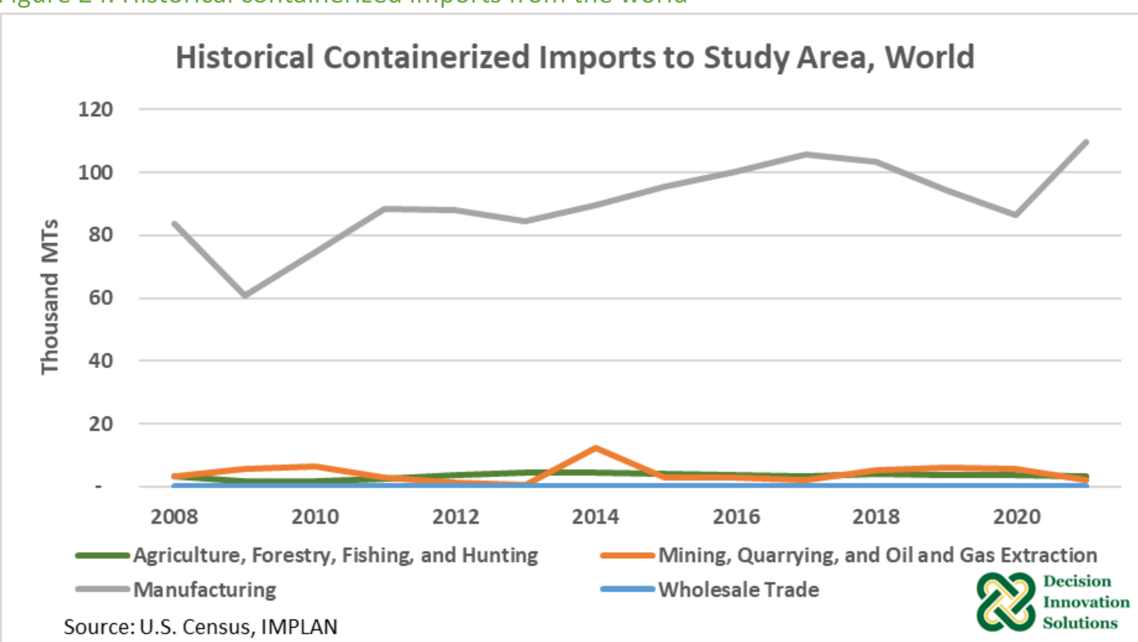


Figure 25 shows containerized imports originating in Asia, nearly all of which are manufactured goods. Containerized imports of manufactured goods from Asia peaked in 2018 with a total of 69,000 MT and fell to 51,000 MT in 2020.

Figure 25. Historical containerized imports from Asia

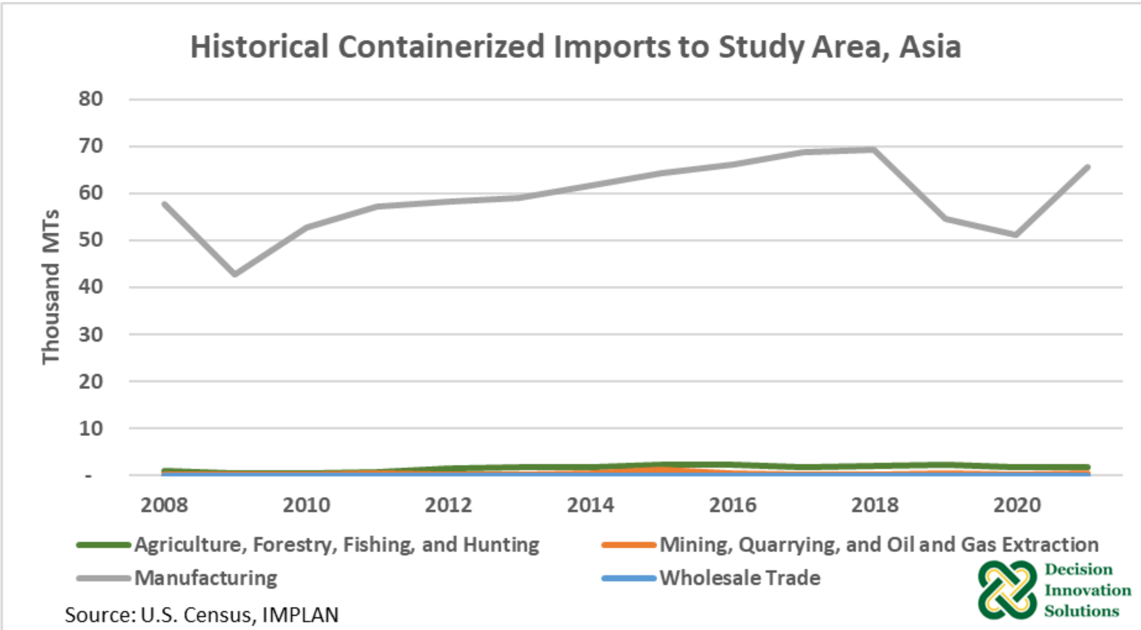


Figure 26 shows containerized imports originating in Europe. Containerized manufactured imports from Europe have been increasing, going from a low of 12,000 MT in 2009 to a peak of 32,000 MT in 2021.

Figure 26. Historical containerized imports from Europe

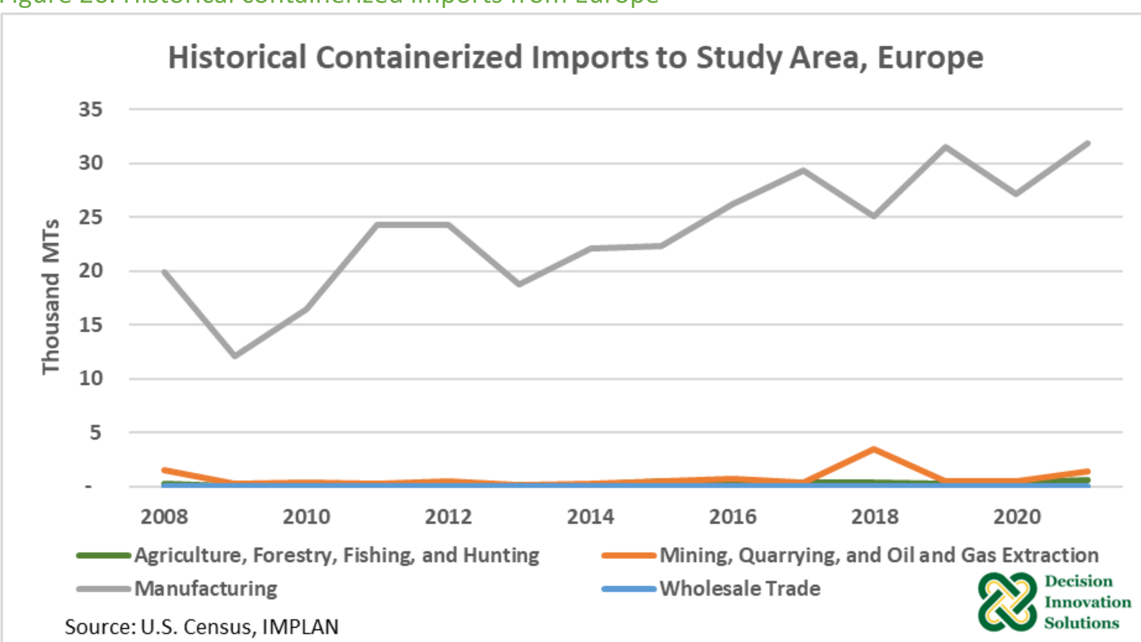
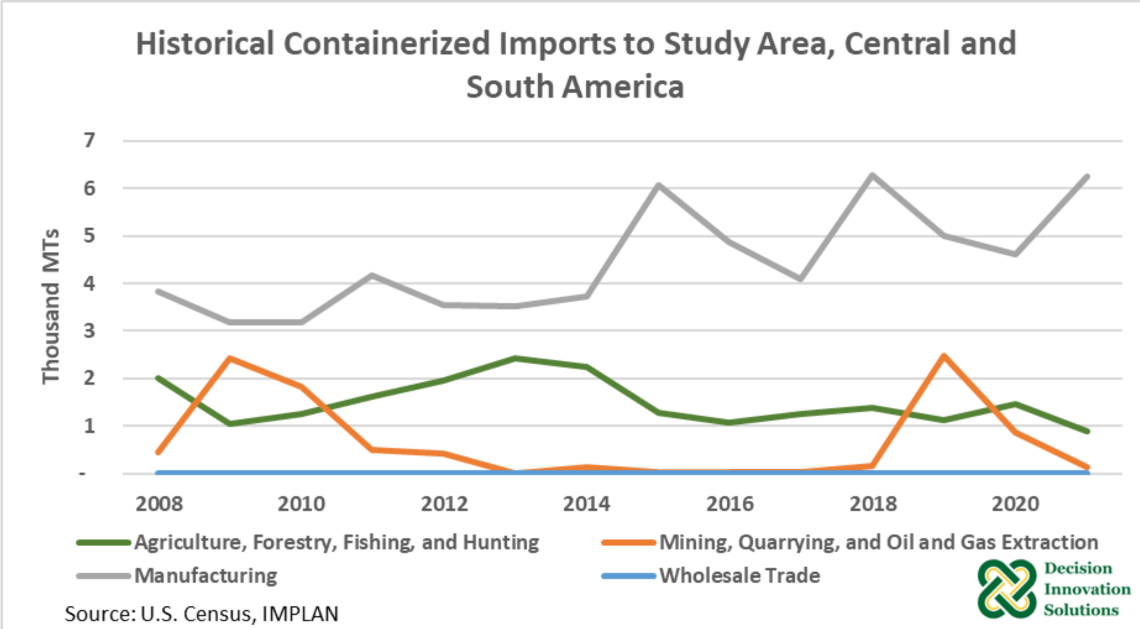


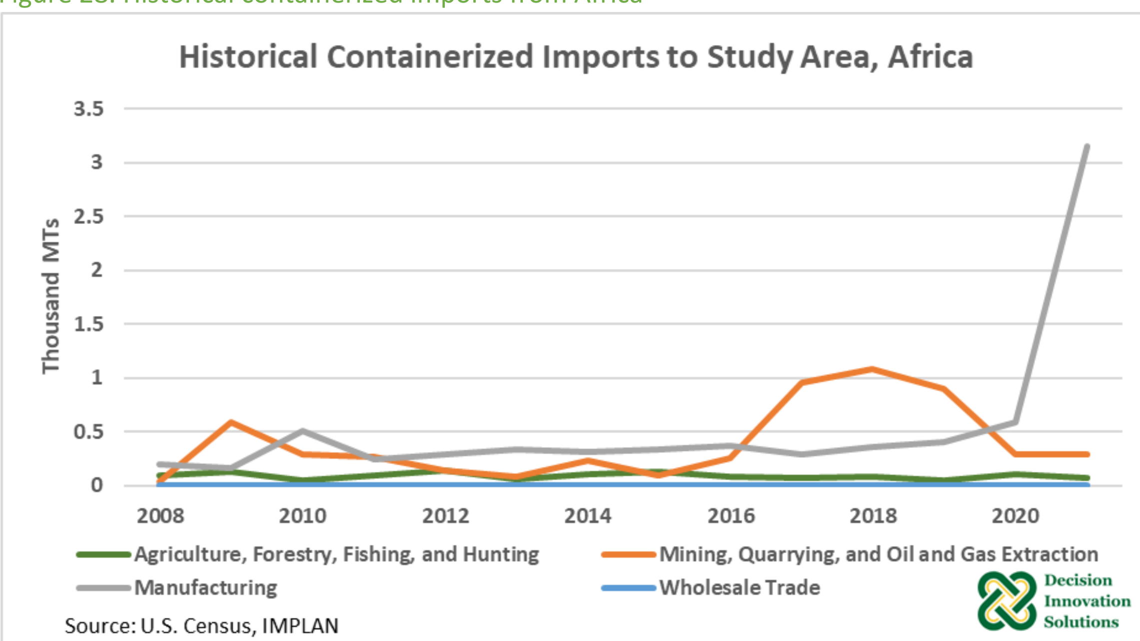
Figure 27 shows containerized imports originating in South and Central America. Containerized imports from this region are relatively small, with totals less than 10,000 MT annually. In addition to manufactured goods, some goods produced by the "Agriculture, Forestry, Fishing, and Hunting" (agricultural goods) and "Mining, Quarrying, and Oil and Gas Extraction" (raw materials) sectors are imported from South and Central America.

Figure 27. Historical containerized imports from South and Central America



Containerized imports originating from Africa are relatively minor, with annual containerized typically not exceeding 1,500 MT. The most recent year of 2021 is an exception, with a notable increase in imports of manufactured goods, as shown in Figure 28.

Figure 28. Historical containerized imports from Africa



3.4.2 Historical non-containerized imports

Non-containerized imports have fluctuated considerably since 2008, though there has been an overall downward trend, as illustrated in Figure 29. Non-containerized imports averaged 288,000 MT from 2008 to 2010 and 132,000 MT from 2019 to 2021. By region, the largest supplier of non-containerized imports to the study area is the Americas.

Figure 29. Historical non-containerized imports by region

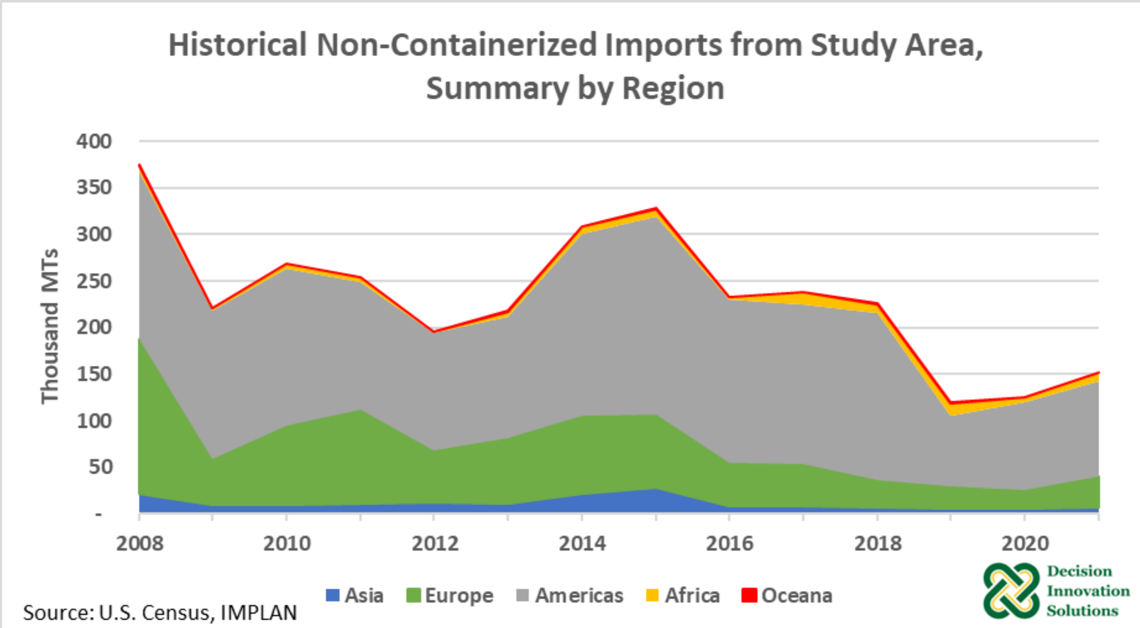
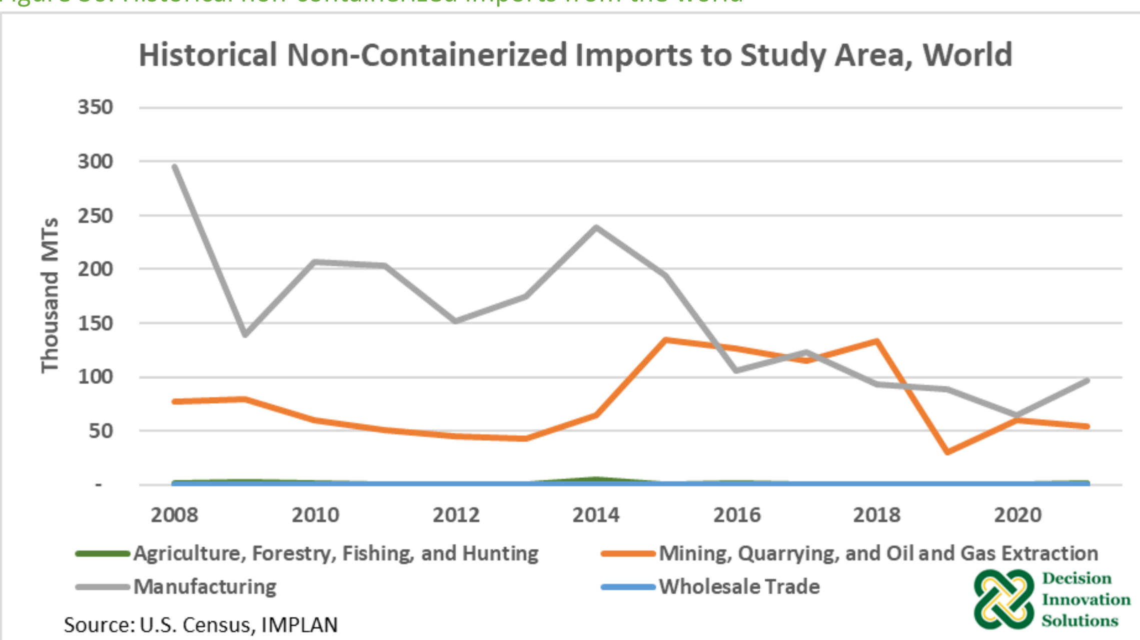


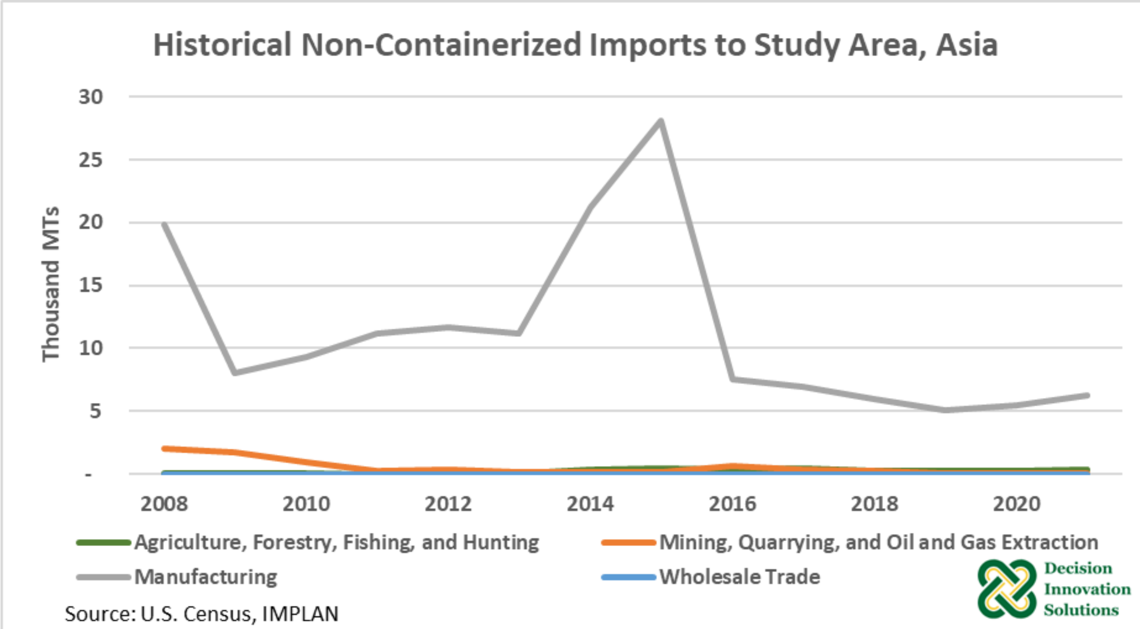
Figure 30 shows all non-containerized imports by commodity type. Nearly all non-containerized imports are manufactured goods or raw materials from the "Mining, Quarrying, and Oil and Gas Extraction" sector. The overall decline in non-containerized imports can largely be attributed to a drop in imported manufactured goods.

Figure 30. Historical non-containerized imports from the world



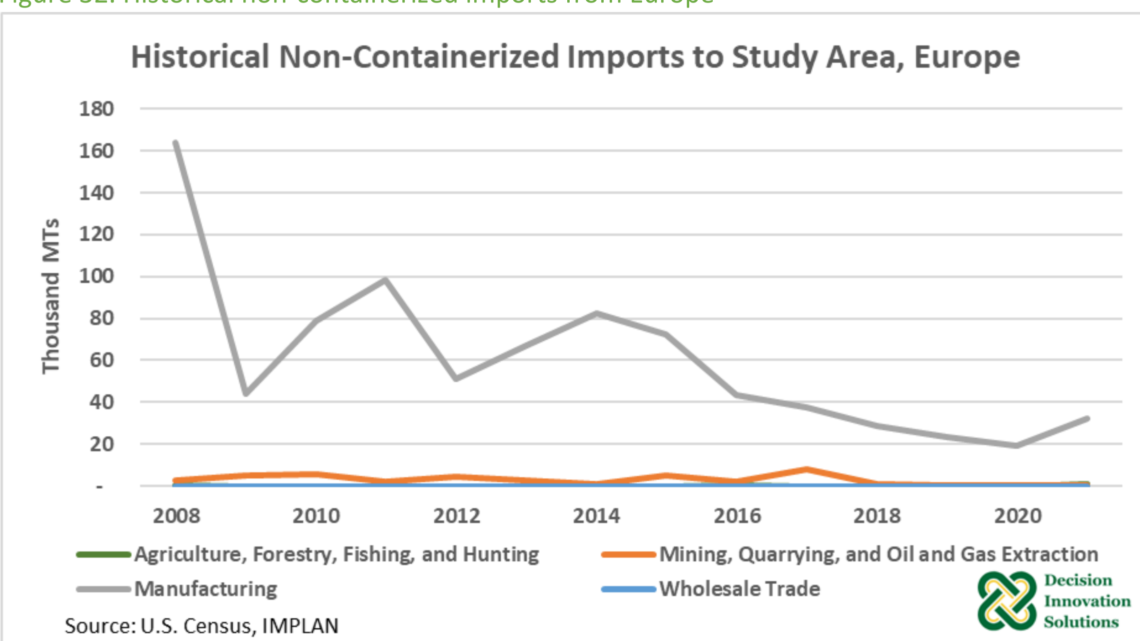
Most non-containerized imports from Asia are manufactured goods. Imports from this category have dropped significantly from the 2015 peak of 28,000 MT to 6,000 MT in 2021, as shown in Figure 31.

Figure 31. Historical non-containerized imports from Asia



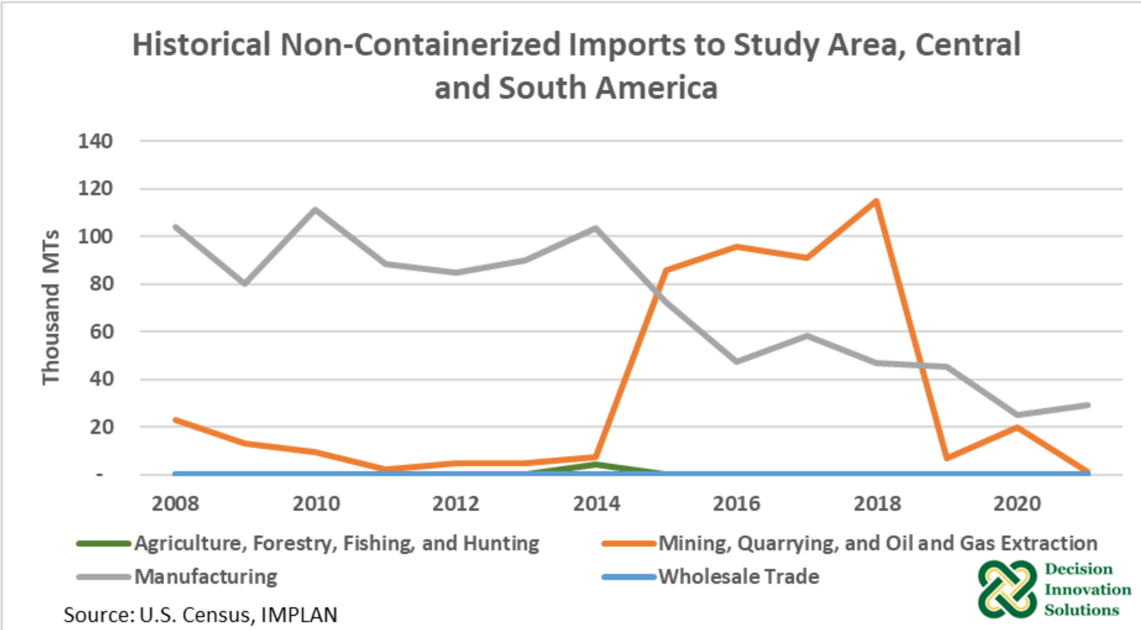
Non-containerized imports from Europe are like those from Asia. Most non-containerized imports from Europe are manufactured goods, and imports from this category have been steadily decreasing, especially after 2014, as shown in Figure 32.

Figure 32. Historical non-containerized imports from Europe



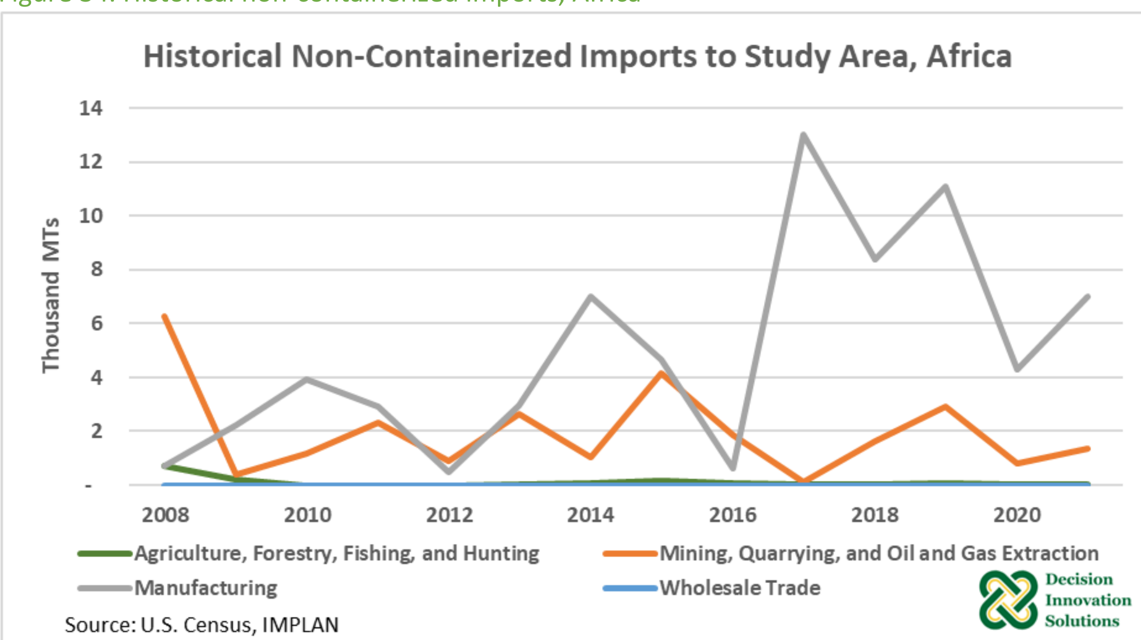
Central and South America are a significant source of non-containerized imports to the study area. Imports of manufactured goods have been decreasing since 2014. Imports of raw materials peaked between 2015 and 2018, averaging around 97,000 MT, as shown in Figure 33.

Figure 33. Historical non-containerized imports from Central and South America



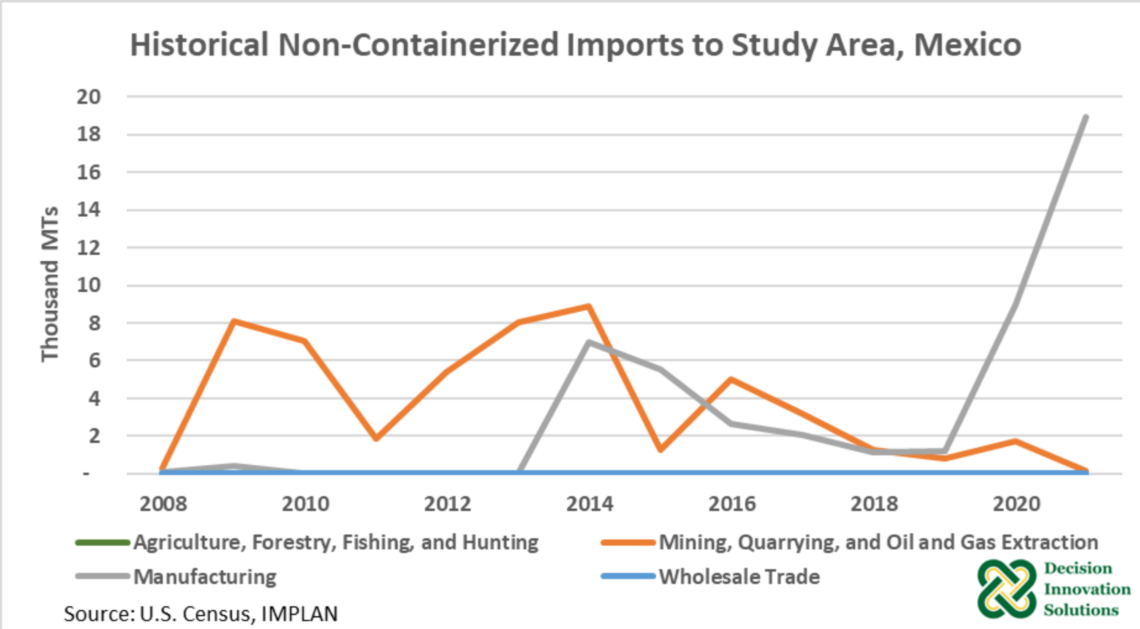
Non-containerized imports from Africa have fluctuated but have generally increased from 2008 to 2020. This increase is primarily due to growth in imports of manufactured goods, as illustrated in Figure 34.

Figure 34. Historical non-containerized imports, Africa



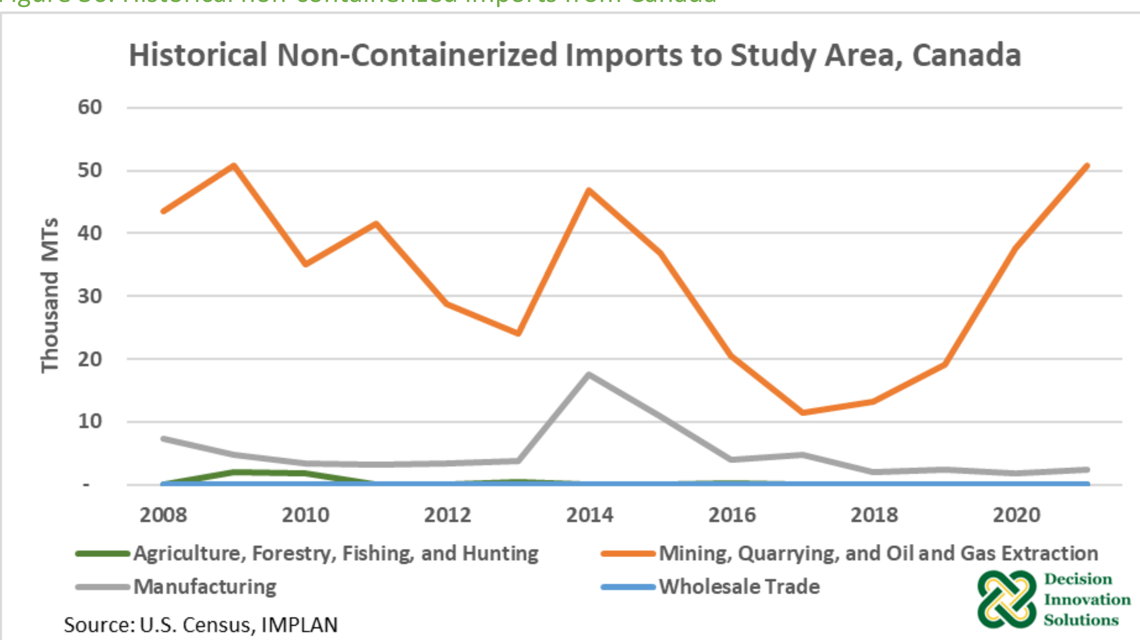
Non-containerized imports originating from Mexico have historically been volatile. Recently, imports of raw materials have decreased while imports of manufactured goods have increased, as shown in Figure 35.

Figure 35. Historical non-containerized imports from Mexico



Most non-containerized imports originating from Canada are raw materials. Imports of this category fell from 47,000 MT to a low of 11,000 MT in 2017 but recovered to 51,000 MT in 2021, as illustrated in Figure 36.

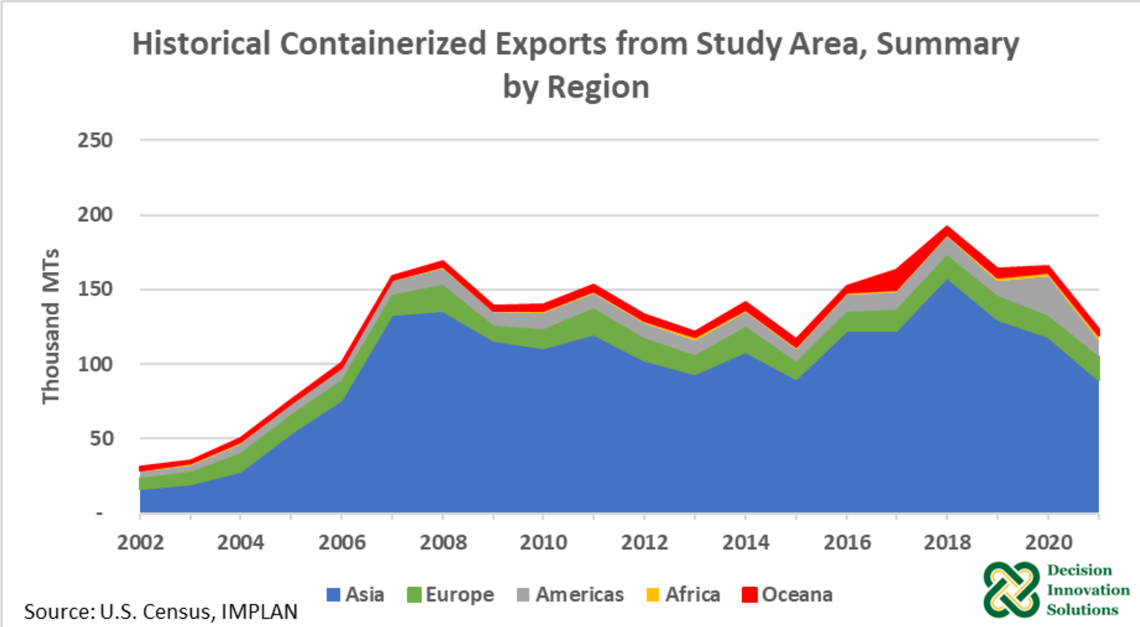
Figure 36. Historical non-containerized imports from Canada



3.4.3 Historical containerized exports

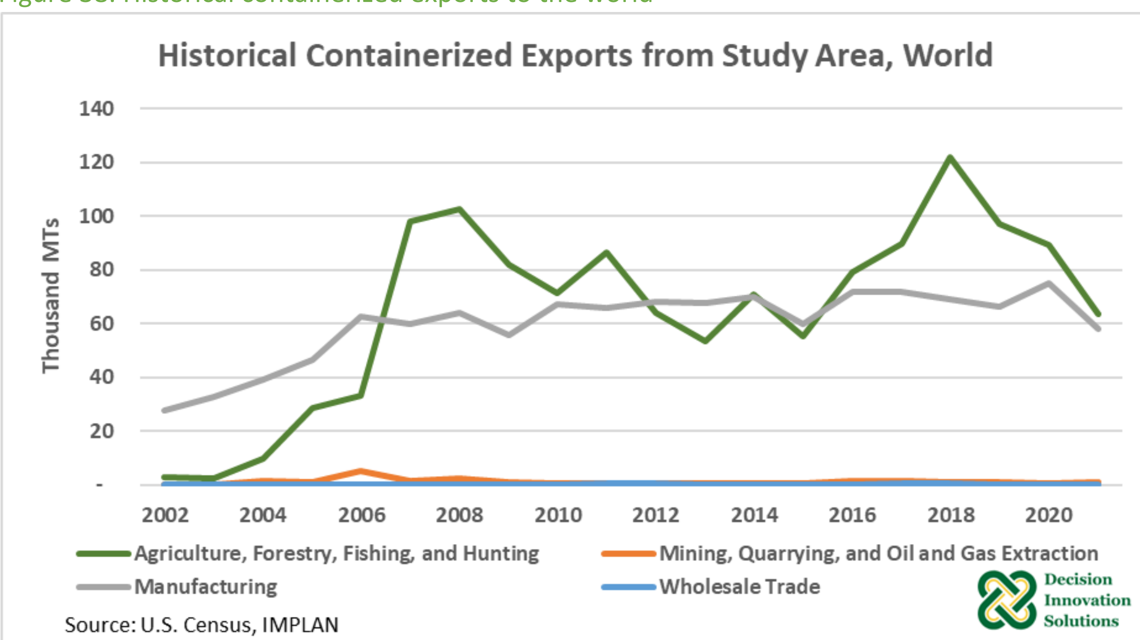
Annual containerized exports from the study area have held mostly constant since 2007 with an average of 151,000 MT, as seen in Figure 37. Asia is by far the largest recipient of containerized exports from the study area with an average of 119,000 MT since 2007. Europe and the Americas receive smaller but still significant amounts of containerized exports from the area, with an average of 13,000 and 10,000 annual MT respectively.

Figure 37. Historical containerized exports by region



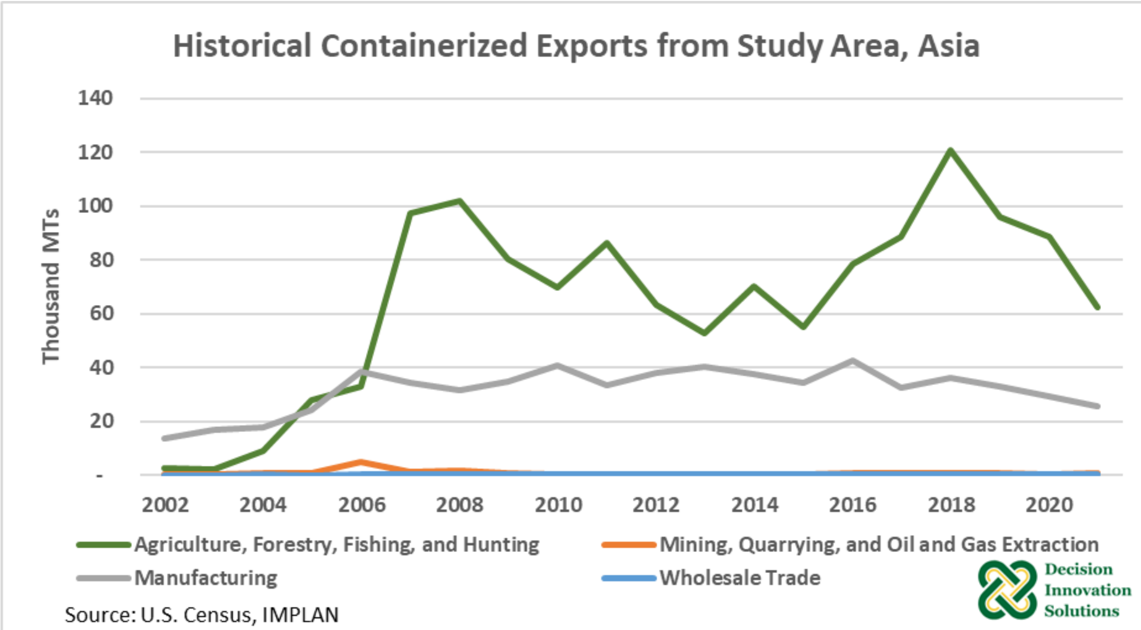
By commodity type, nearly all exports from the study area are agricultural or manufactured goods. Exports of containerized manufactured goods have largely held constant since 2006. Exports of containerized agricultural goods have fluctuated, reaching a peak of 122,000 MT in 2018 but decreasing to 63,000 MT in 2021, as shown in Figure 38.

Figure 38. Historical containerized exports to the world



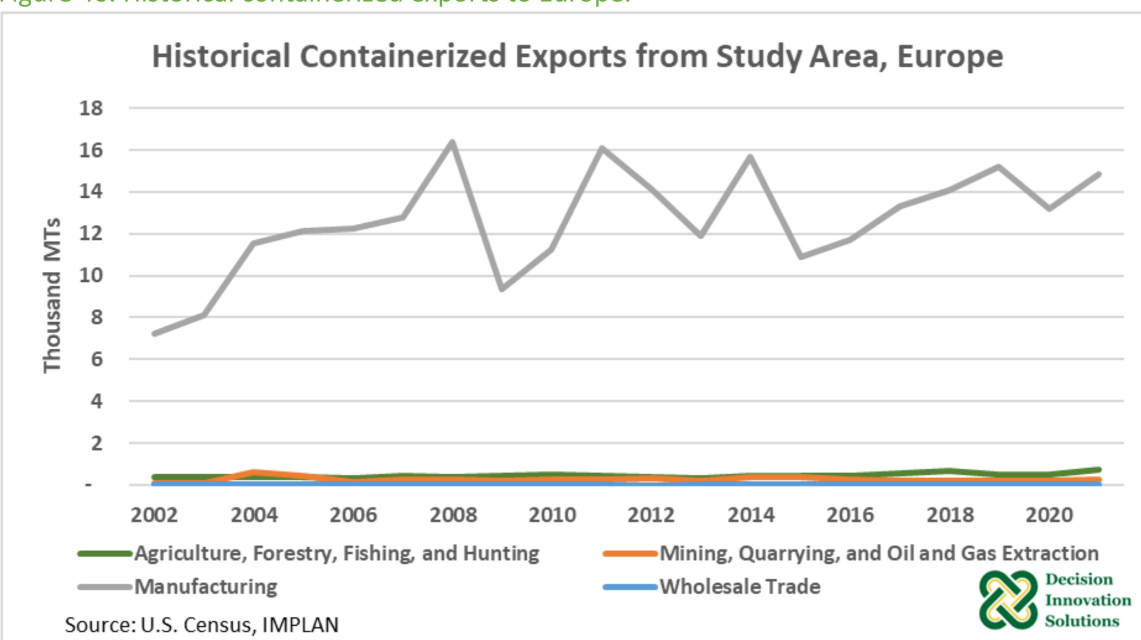
Containerized exports to Asia closely match worldwide exports due to Asia being the destination of most containerized exports. More than 99% of all containerized agricultural exports have gone to Asia since 2010. Exports of this category reached a peak of 121,000 MT in 2018, as shown in Figure 39.

Figure 39. Historical containerized exports to Asia.



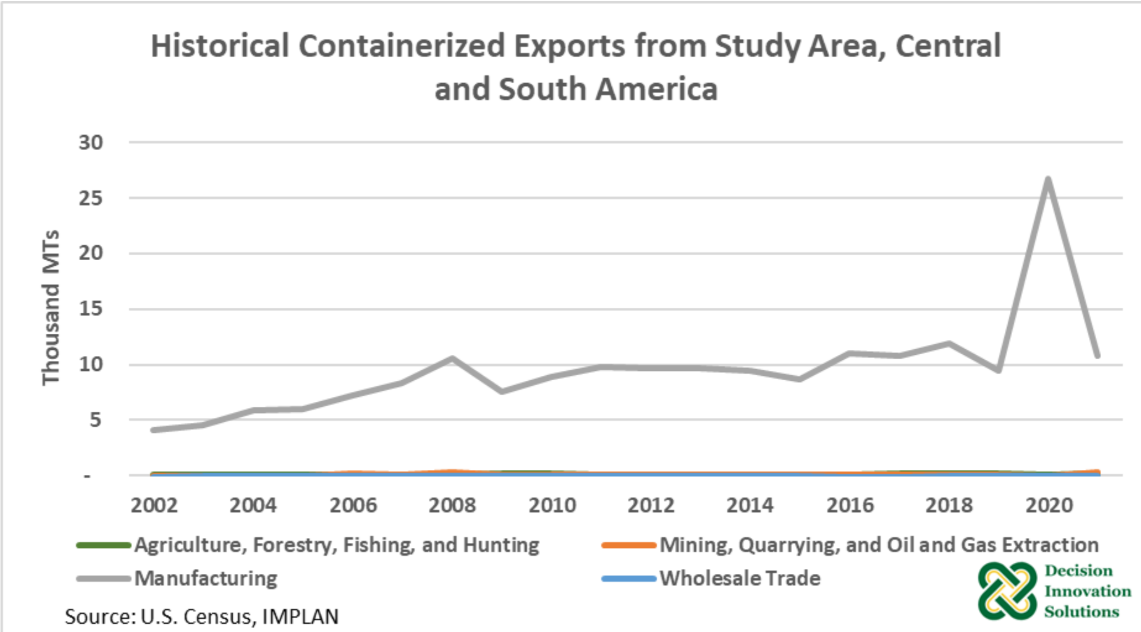
Containerized exports to Europe are nearly all manufactured goods, and they have largely remained around 14,000 MT, as seen in Figure 40.

Figure 40. Historical containerized exports to Europe.



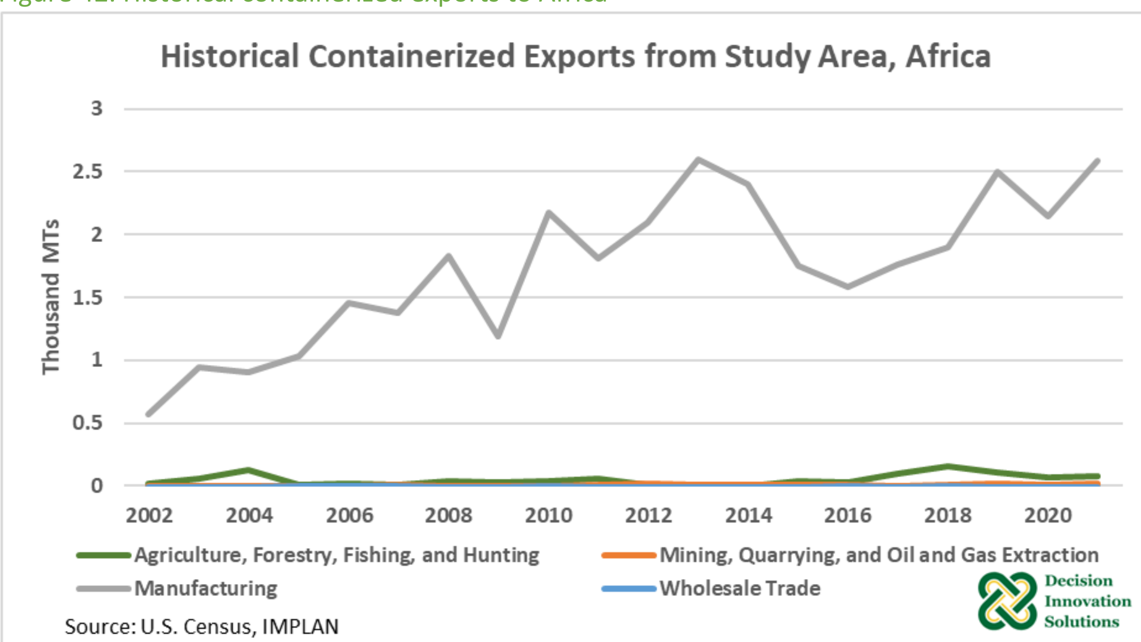
Containerized exports to Central and South America are also nearly all manufactured goods. Exports of this category have remained at around 10,000 MT since 2008 but jumped up to 26,000 MT in 2020 before returning to normal levels in 2021, as shown in Figure 41.

Figure 41. Historical containerized exports to Central and South America



Containerized exports to Africa consist of primarily manufactured goods and have been relatively minor since 2002, as illustrated in Figure 42.

Figure 42. Historical containerized exports to Africa



3.4.4 Historical non-containerized exports

Annual non-containerized exports reached a peak of 665,000 MT in 2011 (largely due to increased exports to Asia) but have since decreased significantly with a total of 139,000 MT in 2020. Non-containerized exports to Asia rebounded slightly in 2020 compared to 2019 with an increase of 15,000 MT, as illustrated in Figure 43.

Figure 43. Historical non-containerized exports by region.

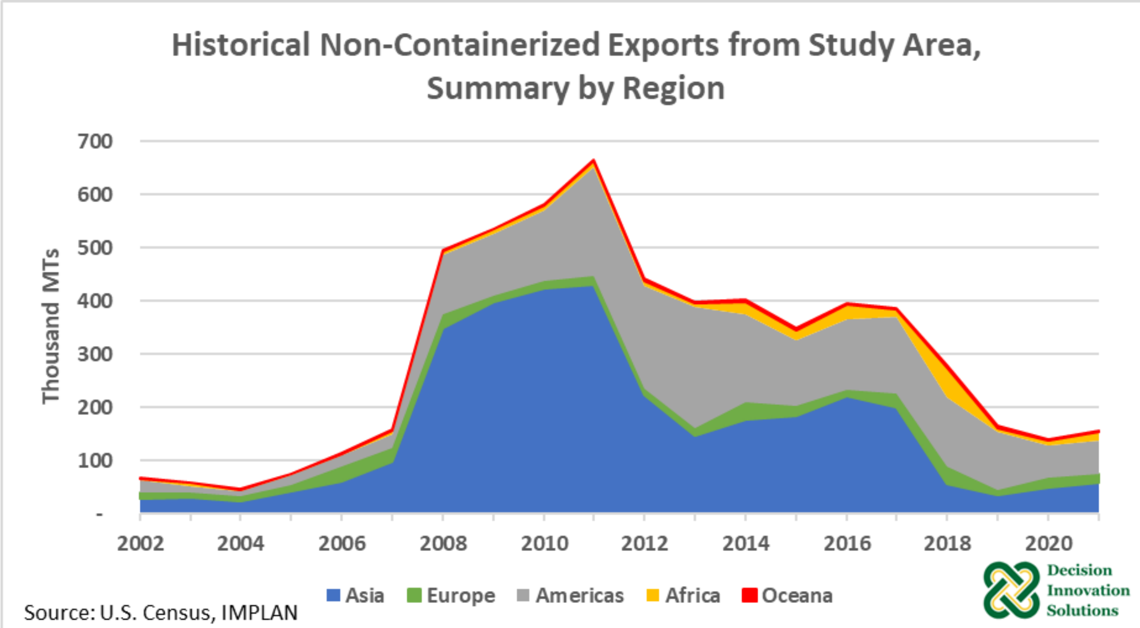
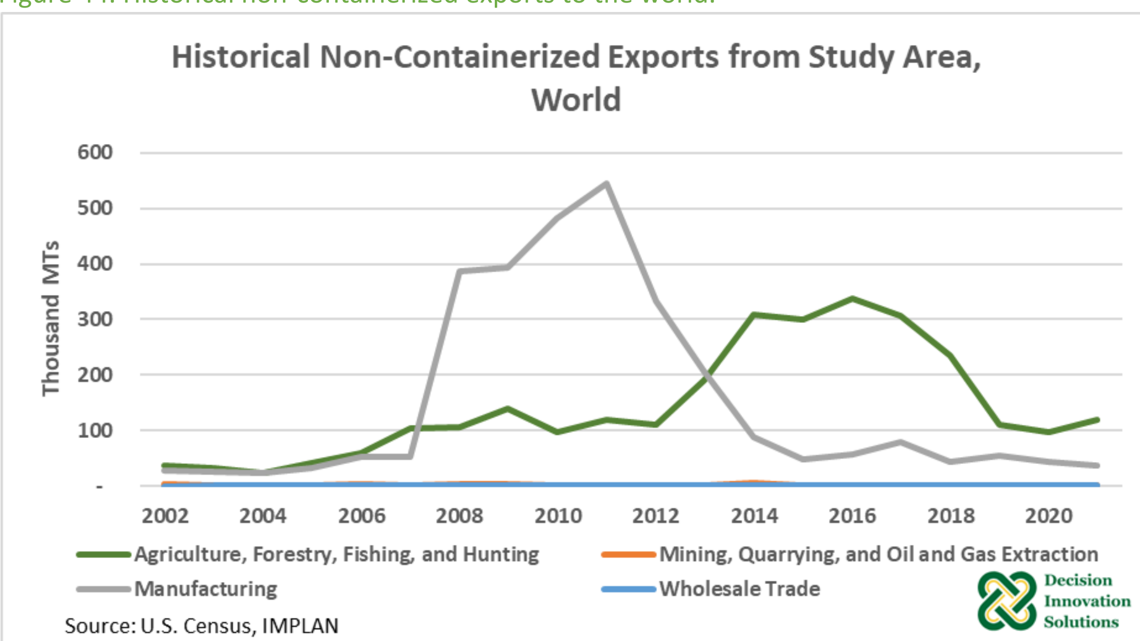


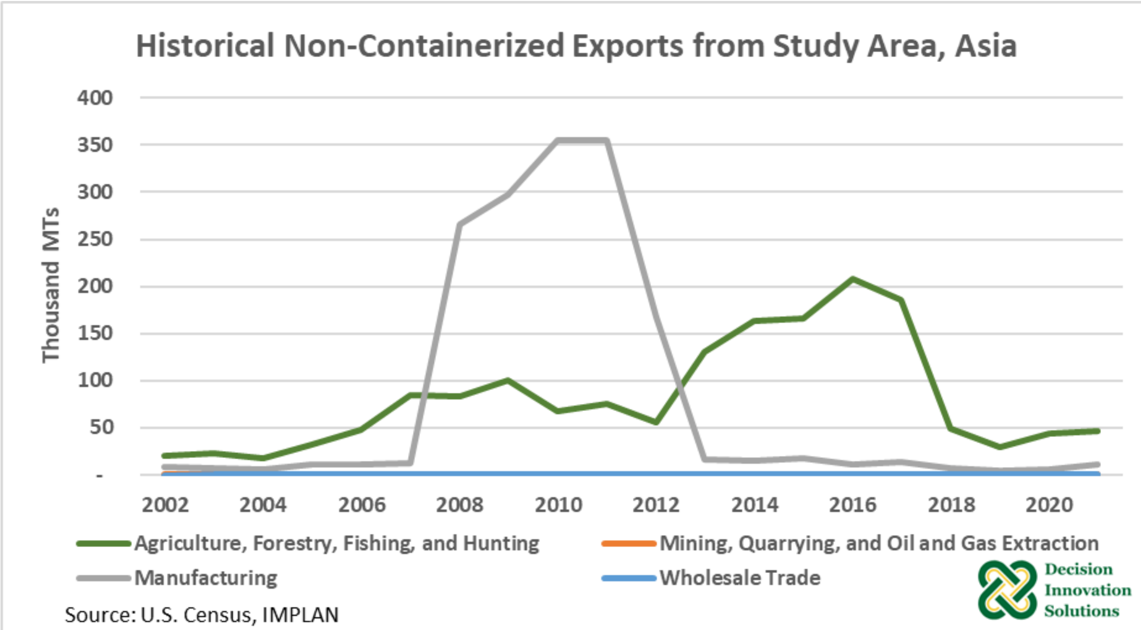
Figure 44 shows all non-containerized exports by commodity type. The 2011 peak is primarily due to large amounts of manufacturing exports that have since decreased. Non-containerized agricultural exports from the study area rose significantly from 110,000 MT in 2012 to 309,000 MT in 2014 but have since decreased.

Figure 44. Historical non-containerized exports to the world.



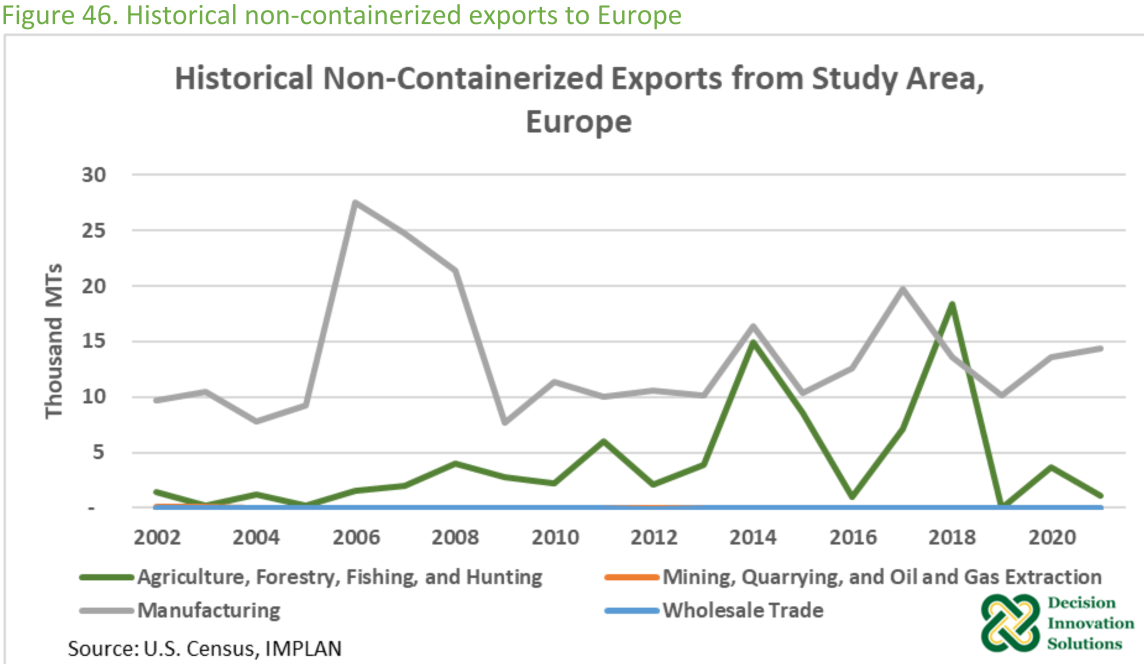
Non-containerized exports of manufactured goods to Asia reached a peak of 355,000 MT in 2011 before decreasing substantially in 2012 and 2013. Non-containerized agricultural exports to Asia rose from 20,000 MT in 2002 to a peak of 209,000 MT in 2016 before falling to 49,000 MT in 2018, as shown in Figure 45.

Figure 45. Historical non-containerized exports to Asia.



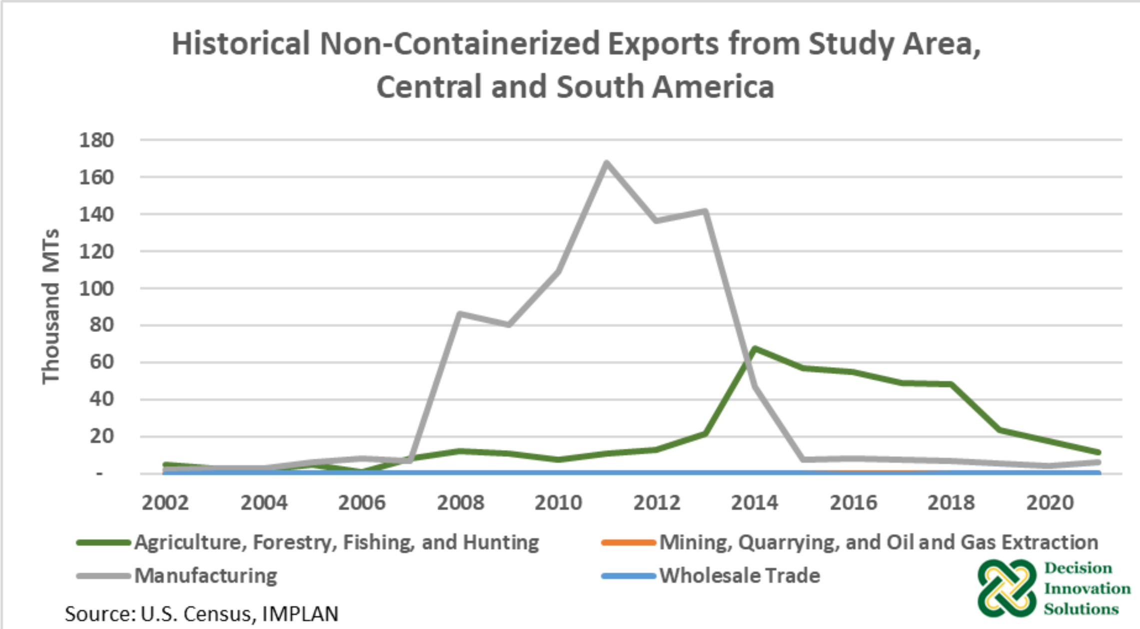
Non-containerized exports of manufactured goods to Europe peaked in 2006 at 28,000 MT and have since generally fluctuated between 10,000 and 20,000 MT. Agricultural exports have experienced high annual volatility since 2012, as shown in Figure 46.

Figure 46. Historical non-containerized exports to Europe



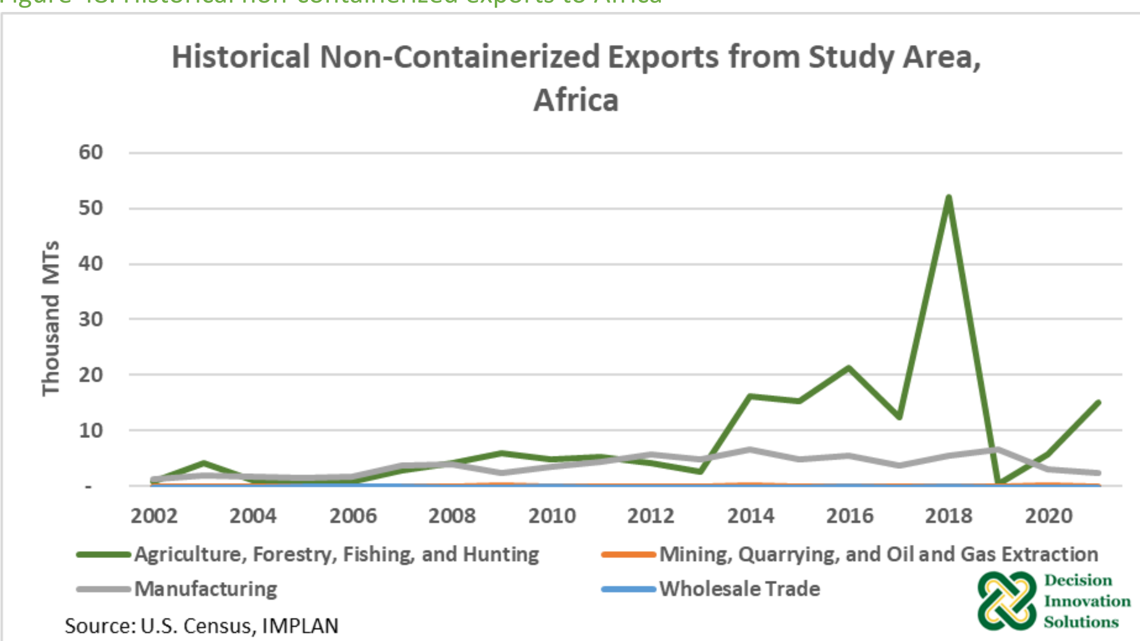
Non-containerized exports of manufactured goods to Central and South America peaked in 2011 at 168,000 MT but have since decreased to 17,000 MT in 2020. Agricultural exports have averaged 39,000 MT since 2016 but are on a downward trend, as shown in Figure 47.

Figure 47. Historical non-containerized exports to Central and South America



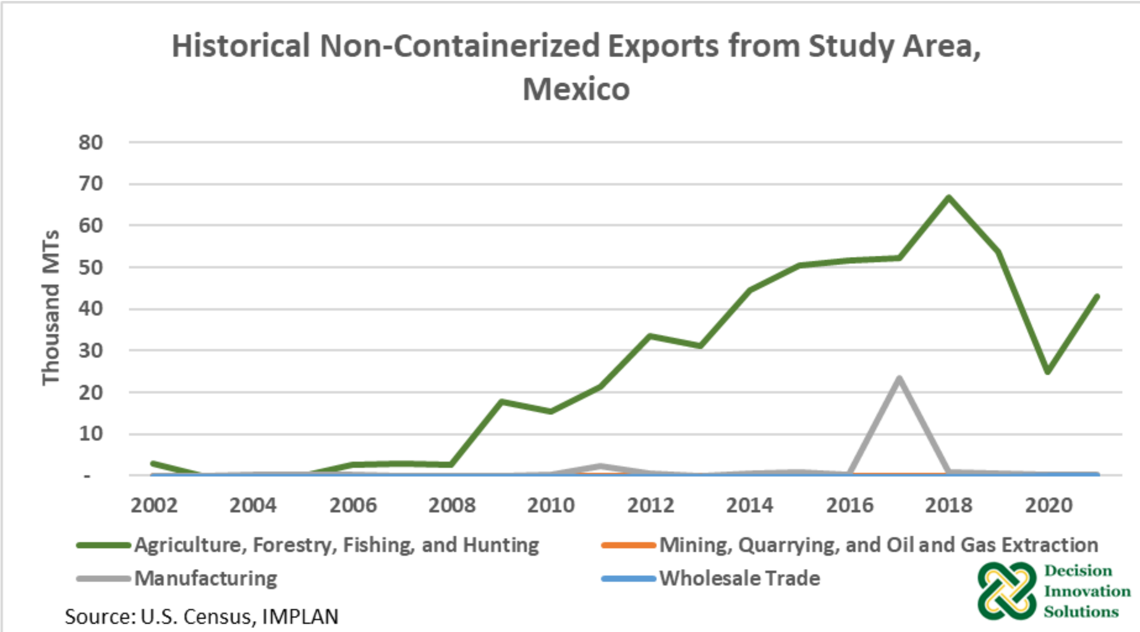
Non-containerized agricultural exports to Africa increased in 2014 to 16,000 MT and peaked in 2018 at 52,000 MT. Manufacturing exports have been relatively small, typically totaling less than 5,000 MT annually, as illustrated in Figure 48.

Figure 48. Historical non-containerized exports to Africa



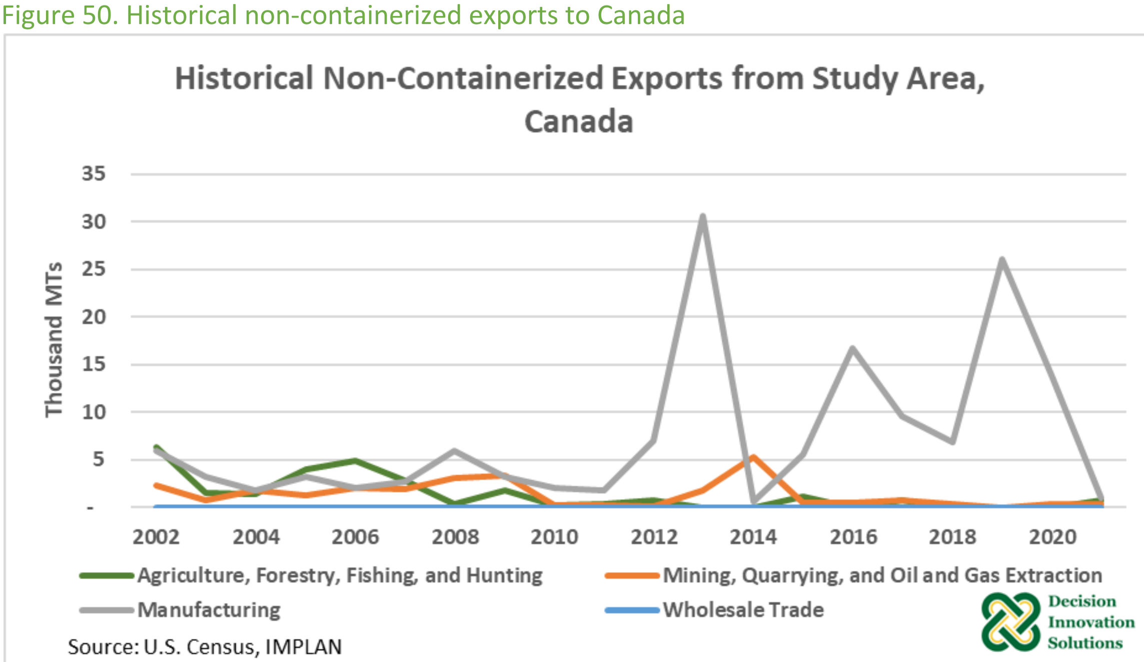
Non-containerized agricultural exports to Mexico increased steadily from 3,000 MT in 2008 to 67,000 MT in 2018, as seen in Figure 49.

Figure 49. Historical non-containerized exports to Mexico



Non-containerized exports to Canada have primarily been manufactured goods. Exports of this category have experienced high volatility, but an average of 12,000 MT of non-containerized manufactured goods has been exported to Canada annually since 2011, as shown in Figure 50.

Figure 50. Historical non-containerized exports to Canada



3.5 Trade volume forecast for the study area

Building off of the work done in the previous section, imports and exports were linearly forecasted at the IMPLAN commodity level[11] and then aggregated to the following major categories: Agriculture and Forestry, Manufacturing, and Resource Extraction (referred to as "Mining, Quarrying, and Oil and Gas Extraction" in the previous section).

3.5.1 Imports

Total imports are estimated to grow at an average compound annual growth rate (CAGR) of 2.2% over the next 30 years. Non-containerized imports (2.4% CAGR) are projected to grow at a faster rate than containerized imports (1.9% CAGR). Overall imports are estimated to be 569,500 MT in 2051, with 200,800 MT being containerized and 368,700 being non-containerized, as shown in Table 9.

Table 9. Projected study area import volume and growth percent.

Total Study Area Volume	Units	2022	2023	2024	2025	2026	2031	2036	2041	2046	2051
Imports	**1,000 MT**	**303.2**	**311.7**	**320.5**	**329.4**	**338.3**	**383.6**	**429.5**	**476.0**	**522.6**	**569.5**
Containerized	1,000 MT	116.5	119.2	122.0	124.7	127.5	141.7	156.2	171.0	185.8	200.8
Non-Containerized	1,000 MT	186.7	192.5	198.5	204.7	210.8	241.9	273.3	305.0	336.8	368.7
Volume Growth Rates											
Imports	**YoY%**	**-**	**2.8%**	**2.8%**	**2.8%**	**2.7%**	**2.4%**	**2.2%**	**2.0%**	**1.8%**	**1.7%**
Containerized	YoY%	-	2.4%	2.3%	2.3%	2.2%	2.1%	1.9%	1.8%	1.6%	1.5%
Non-Containerized	YoY%	-	3.1%	3.2%	3.1%	3.0%	2.6%	2.4%	2.1%	1.9%	1.8%

Source: DIS, IMPLAN, U.S. Census

Growth in containerized imports is projected to be predominantly in the import of manufactured goods. Growth in non-containerized imports is projected to be due to increases in both manufactured goods and raw materials, as seen in Table 10.

Table 10. Projected study area import volume by category.

Total Study Area Volume (1,000 MT)	2022	2023	2024	2025	2026	2031	2036	2041	2046	2051
Containerized Imports	**116.5**	**119.2**	**122.0**	**124.7**	**127.5**	**141.7**	**156.2**	**171.0**	**185.8**	**200.8**
Agriculture and Forestry	4.2	4.3	4.4	4.6	4.7	5.4	6.2	7.1	8.0	8.9
Manufacturing	107.8	110.5	113.1	115.7	118.4	131.8	145.3	159.2	173.0	186.9
Resource Extraction	4.4	4.4	4.4	4.4	4.5	4.5	4.6	4.7	4.8	5.0
Non-Containerized Imports	**186.7**	**192.5**	**198.5**	**204.7**	**210.8**	**241.9**	**273.3**	**305.0**	**336.8**	**368.7**
Agriculture and Forestry	0.7	0.8	0.8	0.8	0.9	1.0	1.2	1.3	1.5	1.6
Manufacturing	100.0	103.9	107.8	111.7	115.7	135.6	155.6	175.8	196.1	216.4
Resource Extraction	86.0	87.8	89.9	92.1	94.3	105.3	116.5	127.9	139.3	150.7

Source: DIS, IMPLAN, U.S. Census

[11] The most recent period of stability, stretching from 2011 to 2018, was significantly disrupted by the US-China trade war in 2019 and further exacerbated by the COVID-19 pandemic beginning in 2020. Trade flows have since been further disrupted in the wake of the Russia-Ukraine conflict beginning in 2022. However, given recent developments (widespread vaccine adoption, China's movement away from its "zero covid" policy, reduction of Europe's reliance on Russian fuels), we expect a gradual return to relative normalcy. Therefore, it is assumed that the stability witnessed over the 2011 to 2018 period will return.

3.5.2 Exports

Total exports are estimated to grow at an average compound annual growth rate (CAGR) of 1.9% over the next 30 years. Containerized exports (2.2% CAGR) are projected to grow at a faster rate than non-containerized exports (1.7% CAGR), though non-containerized goods are projected to still make up a strong majority (64%) of all exports in 2051. Overall exports are estimated to be 967,800 MT in 2051, with 347,400 MT being containerized and 620,400 being non-containerized, as shown in Table 11.

Table 11. Projected study area export volume and growth percent.

Total Study Area Volume	Units	2022	2023	2024	2025	2026	2031	2036	2041	2046	2051
Exports	**1,000 MT**	**561.5**	**575.4**	**589.3**	**603.3**	**617.2**	**687.0**	**757.0**	**827.2**	**897.4**	**967.8**
Containerized	1,000 MT	184.6	190.2	195.8	201.3	206.9	234.9	262.9	291.0	319.2	347.4
Non-Containerized	1,000 MT	376.9	385.2	393.6	401.9	410.3	452.1	494.1	536.2	578.3	620.4

Volume Growth Rates											
Exports	**YoY%**	**-**	**2.5%**	**2.4%**	**2.4%**	**2.3%**	**2.1%**	**1.9%**	**1.7%**	**1.6%**	**1.5%**
Containerized	YoY%	-	3.0%	2.9%	2.8%	2.8%	2.4%	2.2%	2.0%	1.8%	1.7%
Non-Containerized	YoY%	-	2.2%	2.2%	2.1%	2.1%	1.9%	1.7%	1.6%	1.5%	1.4%

Source: DIS, IMPLAN, U.S. Census

Growth in containerized exports is projected to be due to increased exports of agricultural products and manufactured goods. While non-containerized exports of manufactured goods are projected to decrease over the next 30 years, exports of non-containerized agricultural products are expected to increase substantially, as observed in Table 12.

Table 12. Projected study area export volume by category.

Total Study Area Volume (1,000 MT)	2022	2023	2024	2025	2026	2031	2036	2041	2046	2051
Containerized Exports	**184.6**	**190.2**	**195.8**	**201.3**	**206.9**	**234.9**	**262.9**	**291.0**	**319.2**	**347.4**
Agriculture and Forestry	105.7	109.5	113.4	117.3	121.1	140.5	159.9	179.2	198.6	218.0
Manufacturing	77.7	79.5	81.2	82.9	84.6	93.3	102.1	110.9	119.7	128.5
Resource Extraction	0.8	0.8	0.8	0.7	0.7	0.6	0.5	0.3	0.2	0.2
Wholesale Trade	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.6	0.7	0.7
Non-Containerized Exports	**376.9**	**385.2**	**393.6**	**401.9**	**410.3**	**452.1**	**494.1**	**536.2**	**578.3**	**620.4**
Agriculture and Forestry	253.0	263.4	273.9	284.3	294.7	346.8	398.9	450.9	503.0	555.1
Manufacturing	123.1	121.0	118.9	116.8	114.7	104.3	94.0	83.9	73.8	63.7
Resource Extraction	0.8	0.8	0.8	0.9	0.9	1.0	1.2	1.3	1.5	1.6

Source: DIS, IMPLAN, U.S. Census

4. Freight rate analysis

This section evaluates route costs and competitiveness of freight movement via the proposed Clark County Port Project and its 1,314-mile river route to and from the Port of New Orleans. First, this section evaluates route costs for agribulk commodities originating in the study area to final customers in Asia, Europe, South/Central America, Africa, and Mexico using the proposed Mississippi River route versus incumbent routes. Next, this section evaluates the route cost economics of containerized imports from Asia, Europe, South/Central America, Africa, and Mexico to final customers in the study area using the Clark County Port Project versus incumbent routes. This section concludes with a summary of logistical advantages of each route and key takeaways.

4.1 Non-containerized cargo routes

4.1.1 General assumptions

Bujanda & Allen calculated the route costs for agribulk cargo by modal component (i.e. truck, rail, and barge). Route costs were calculated first for the primary incumbent routes and then compared to the routes that the cargo would follow via the proposed Clark County Port barge route. Cost, distance, and similar inputs were obtained for each modal segment of the trip for each route analyzed. Subsequently, all costs were converted to dollars per metric-ton ($/MT) to allow consistency across modes based on payload factors and the carrying capacity for each mode and their respective units, as shown in Figure 51.

Figure 51. Unit capacity by mode of transport in metric tons.

a) Truck	b) Jumbo Hopper railcar (5,161 ft^3)	c) River barge
19 metric tons (41,888 lb)	**100 metric tons** (223,400 lb)	**2,000 metric tons** (4,409,245 lb)

Source: Bujanda & Allen LLC, 2022.

As observed, the river barge overshadows the other two transportation modes, handling roughly 20 times as much as a railcar and 100 times as much as a truck.

4.1.2 Agribulk routes by rail

Bujanda & Allen identified the main incumbent routes for agribulk exports from the project site and the draw regions within the study area to each of the following export gateways: New Orleans, Houston, Portland, Norfolk, Mexico City via Laredo, and Oakland. All routes have rail as the inland transport component and two have barge. An additional route analyzed is via Oakland, as the port recently announced efforts to revamp agribulk exports.[12]

These incumbent routes to each export gateway are detailed next and displayed in Figure 52.

- **Seattle, Tacoma, and Portland.** This 2,235 mi long route is the primary route for agribulk exports destined to Asia via the Pacific Northwest (PNW), which includes the ports of Portland, Vancouver, WA, Kalama, Longview, Seattle, and Tacoma. This route is served by BNSF and UP; however, UP does not connect directly to the project site. Hence, we assume most cargo will follow BNSF corridors to minimize interchange or trackage-rights usage fees, consistent with industry practices. The loading point nearest to the project is near Galesburg, IL, about 100 mi to the north, and Quincy, IL, about 45 mi to the south.

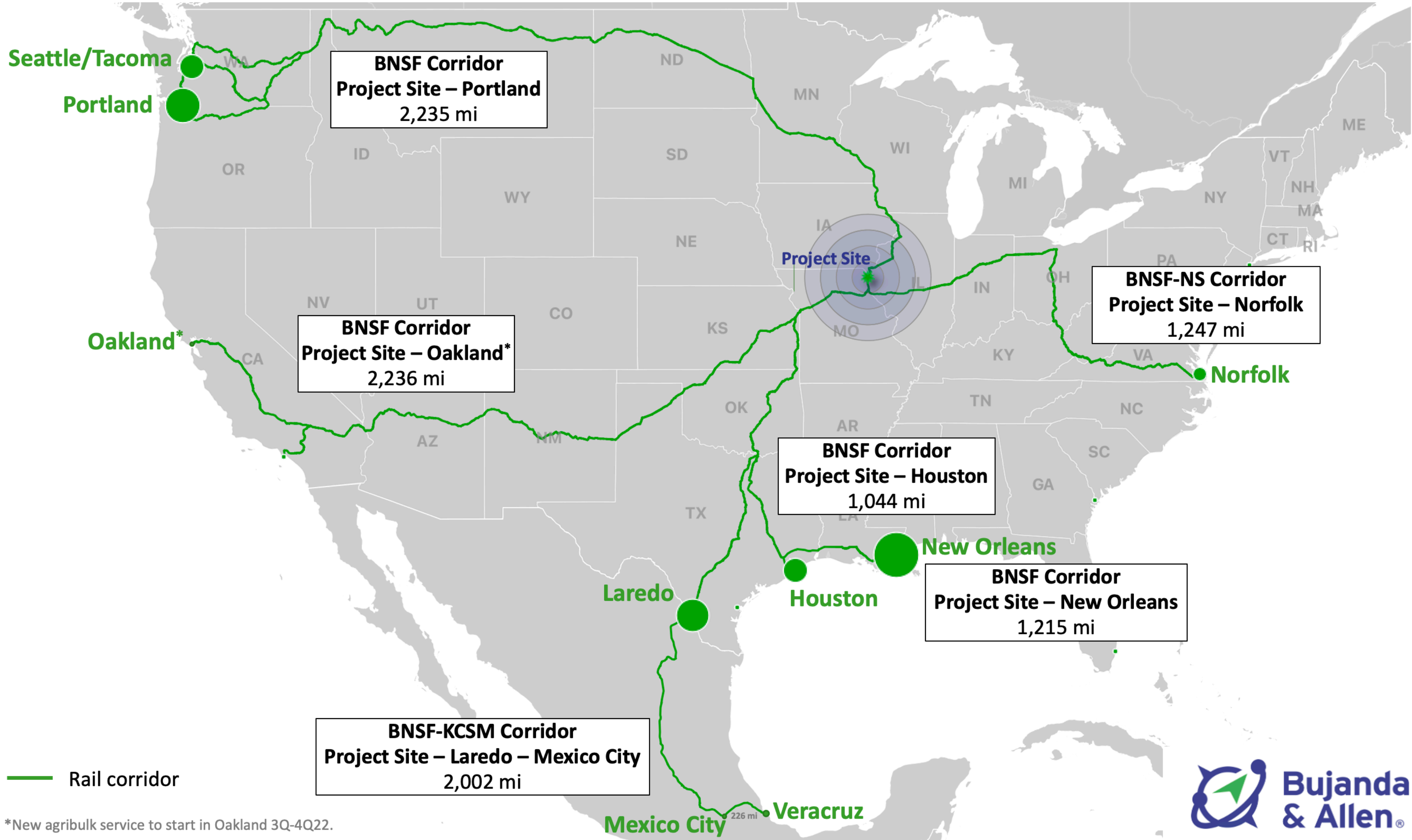
[12] Port of Oakland Launches Program to Expedite Ag Exports. Port of Oakland, Press Release, Jan 3, 2022: https://www.portofoakland.com/press-releases/port-of-oakland-launches-program-to-expedite-ag-exports

- **New Orleans.** This is the main corridor for the Gulf Coast gateway for agribulk and non-containerized exports. There are two alternatives to move cargo to New Orleans, by rail and barge, each detailed next:
    - **By rail:** BNSF provides direct service to gateway ports in New Orleans, via its Houston corridor, for a total route length of 1,125 mi. Galesburg and Quincy, IL are the nearest loading points, with St. Louis and Brunswick, MO also relatively nearby. This corridor connects with CSXT interchange in the east-west direction and with UP, KCS, and CN in the north-south direction.
    - **By barge:** The Mid-America Intermodal Port Commission in Quincy, IL and the Lewis County Port Authority provide access to barge service along the Mississippi River. This route is composed of a 1,314 mi along marine highways M-35 and M-55 from Alexandria, MO to New Orleans, LA.
- **Houston.** This 1,044 mi rail corridor for the Gulf Coast follows the same route than BNSF uses for grain exports via New Orleans but stopping at Houston-Galveston. An alternative route (not shown) is operated by Kansas City Southern (KCS) serving both ports, Houston, and New Orleans, very competitive to the BNSF one. These gateways serve an important amount of traffic of agribulk exports destined to the Port of Veracruz in the Gulf of Mexico.
- **Norfolk.** This 1,247 mi route is the primary corridor for agribulk exports via Norfolk, VA in the East Coast. This route is served by the Norfolk Southern (NS) with interchange with CSXT. The nearest loading points for exports are Fairfield, IA, Quincy and Galesburg, IL, all within a 150-mile buffer from the project site.
- **Mexico City via Laredo.** This 2,002 mi corridor is served by BNSF and UP on the U.S. side of the border. UP connects with Kansas City Southern Mexico (KCSM) in Laredo, Texas and this corridor extends all the way to Mexico City (CDMX). This corridor was considered the most representative route choice between the study area and Central Mexico.[13] There is also a water route from the current draw area to Mexico City, which incorporates barge to Galveston and New Orleans, a transgulf vessel to Veracruz, and truck to Mexico City.
- **Oakland.** This 2,236 mi corridor is served by BNSF (with a competing alternative by UP) and can become a viable alternative as the Port of Oakland increases its efforts to revamp agribulk exports through this gateway. The nearest loading point for exports is Quincy, IL, with ports in Kansas City and St. Louis being suitable alternatives for most farmers.

[13] There are three main rail corridors connecting Central Mexico with the Texas border:

i. The Ferromex corridor that extends from Queretaro, Aguascalientes, Torreon, Chihuahua, and Cd. Juarez connecting with UP and BNSF in El Paso.
ii. The KCSM corridor that extends from Mexico City, San Luis Potosi, Saltillo, and Piedras Negras (interchanging with Ferromex) connecting with UP in Eagle Pass.
iii. The KCSM corridor extends from Mexico City to San Luis Potosi, Saltillo, and Nuevo Laredo connecting in Laredo.

Figure 52. Incumbent routes—main rail corridors for agribulk exports from Clark County, Missouri.



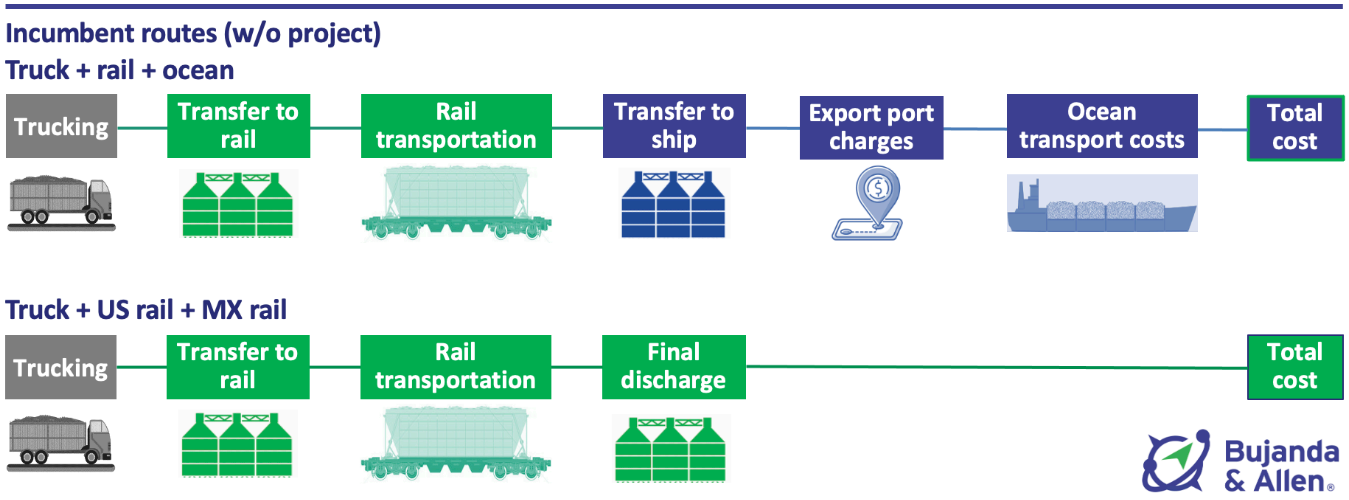
*New agribulk service to start in Oakland 3Q-4Q22.

Source: Bujanda & Allen LLC, 2022.

4.1.3 Route costs for agribulk cargo via incumbent routes (rail)

Bujanda & Allen estimated route costs via incumbent routes by considering each handling movement and modal segment of the supply chain. Segments analyzed include the trucking trip from the farm, discharging of trucks, temporary storage, loading to railcar, transfer to ocean vessels, port charges, and ocean transportation via each of the export gateway ports in the U.S. Additionally, an inland rail route was analyzed via Laredo into Mexico City. The handling movements and modal segments for each route analyzed are illustrated in Figure 53.

Figure 53. Rail, transloading, and ocean transportation costs for agribulk cargo by rail ($/MT).



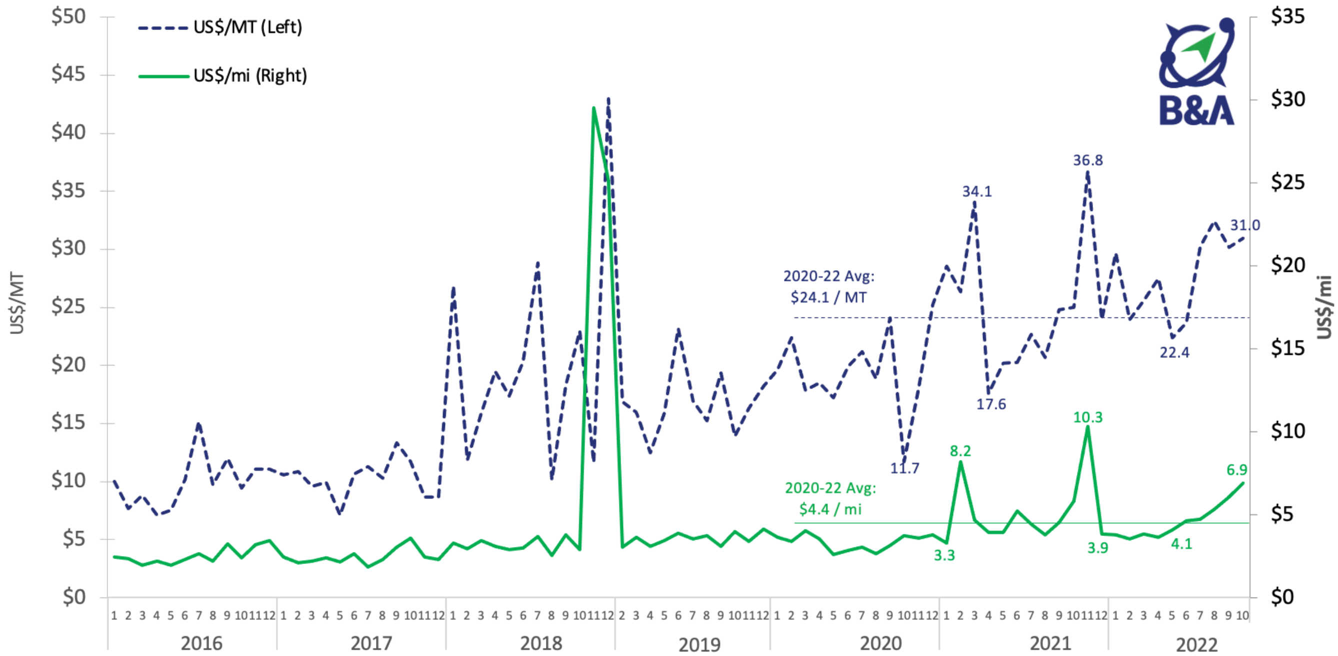
Source: Bujanda & Allen LLC, 2022.

Bujanda & Allen first analyzed the historical trends of freight rates by truck, rail, and ocean vessel, primarily due to recent increased volatility. For rail and vessel rates, the spread between the two major incumbent agribulk gateways, the U.S. Gulf and the PNW was analyzed.

Since the aggravation of the coronavirus pandemic in early 2020, supply chains severely slowed down due to numerous reasons: port shutdowns (primarily in China), disrupted shipping and railroad lanes, labor and material shortages, unpredictable changes in demand, etc. These shocks had a material impact on the historical freight rate trends, which were further exacerbated by the most recent inflationary trends.

The volatility of truck rates for agribulk shipments originating in the U.S. Midwest increased from $11.7/MT in 4Q20 to $36.8 /MT in 4Q21, then decreased to $31/MT in the early part of 4Q22, as shown in Figure 54.

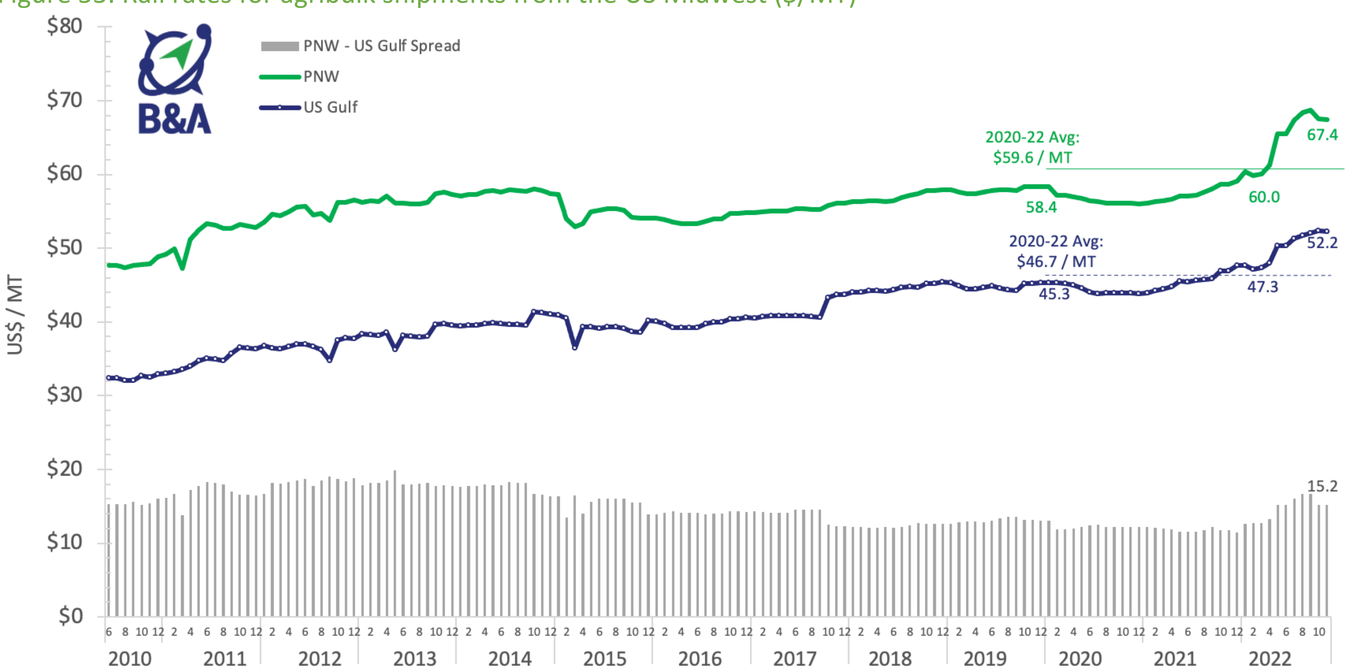
Figure 54. Truck rates for agribulk shipments from the US Midwest



Source: Bujanda & Allen, 2022.

The rail rates for agribulk shipments from the U.S. to Asia via ports in the two major incumbent gateways, the U.S. Gulf and the PNW, reflected less pronounced volatility in the early stage of the pandemic. However, during the late part of 2022 rail rates for agribulk shipments from the US Midwest to the U.S. Gulf and the PNW were more pronounced, as it was the spread between the two, as shown in Figure 55.

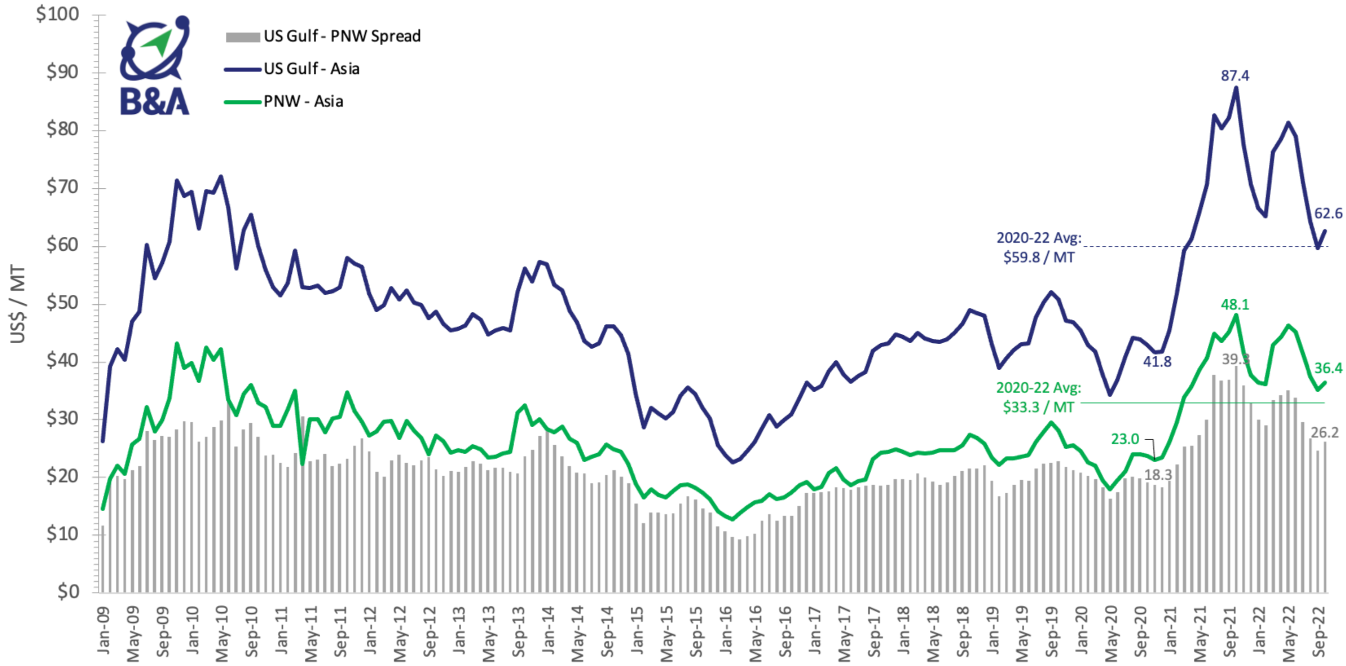
Figure 55. Rail rates for agribulk shipments from the US Midwest ($/MT)



Source: Bujanda & Allen, 2022.

The vessel rates for agribulk shipments from the U.S. to Asia via ports in the two major incumbent gateways, the U.S. Gulf and the PNW, reflected higher volatility during the pandemic, particularly after 1Q21. Via the U.S. Gulf, rates increased from $41.8/MT to a peak of $87.4/MT (double) in 4Q21, which translated into a spread of $39.3/MT over PNW ports during the same quarter. On the late 3Q22, rates dropped to $62.6/MT creating a spread of $26.2/MT over the PNW, as shown in Figure 56.

Figure 56. Vessel rates for agribulk shipments to Asia ($/MT)



Source: Bujanda & Allen, 2022.

In terms of the competitiveness analysis, the differential of a cross-sectional period between export gateway routes is most critical than the historical volatility in freight rates. Bujanda & Allen used the most recent available rates sampled on 3Q22 to conduct the cross-sectional analysis or incumbent versus alternative route cost differentials considering each segment by mode. The export gateways analyzed are the U.S. Gulf Coast, PNW, USWC, and the US East Coast, reflecting the five incumbent corridors for the movement of agribulk exports from the project site and its draw areas. The analysis is further broken down into tradelanes to account for differences in transportation costs to the most relevant destination. The structure of the route costs assumed for agribulk cargoes using rail routes is illustrated in Table 13.

Table 13. Route costs via incumbent routes for agribulk cargo, 2022 ($/MT).

Rail (agribulk)	Rail station $/MT	Total $/MT	Distance mi	Total mi	Transit time days (approx.)	Total days (approx.)
Rail & inland transportation						
Truck to rail station	$22		115		1.0	
Transfer to rail	$6.1		-		2.5	
Rail transportation to						
U.S. Gulf	$47		1,215		6.8	
U.S. PNW	$60		2,235		12.4	
U.S. East Coast	$64		1,247		6.9	
U.S. West Coast (Oakland)	$61		2,236		12.4	
Transfer to ship	$6.1		-		3.0	
Export port handling charges	$13		-		1.0	
Subtotal inland via						
U.S. Gulf	$94		1,330		14.3	
U.S. PNW	$107		2,350		19.9	
U.S. East Coast	$111		1,362		14.4	
U.S. West Coast (Oakland)	$109		2,351		19.9	
Ocean vessel transportarion						
U.S. Gulf to:		**Total**				
Asia	$60	**$154**	9,127	**10,457**	30.5	**45**
Europe	$28	**$122**	4,786	**6,116**	15.5	**30**
Mexico	$27	**$121**	775	**2,105**	2.5	**17**
U.S. PNW to:						
Asia	$33	**$140**	9,127	**11,477**	16.5	**36**
U.S. East Coast to:						
Europe	$22	**$133**	4,786	**6,148**	11.5	**26**
U.S. West Coast (Oakland) to:						
Asia	$43	**$152**	9,127	**11,478**	18.5	**38**

Source: Bujanda & Allen, 2022.

When overall route costs are considered, the PNW is one of the most economical for shipments going to Asia, offering a total route cost of $140/MT, which translates into potential savings of $14/MT over the U.S. Gulf Coast and $12/MT over the U.S. West Coast. For the PNW route, the benefits of being closer to the Great Circle Route and not having to transit through the Panama or Suez canals, outweigh the longer inland transit times of the longer rail segment. This result into transit times that are shorter by about 9 days, when compared to the Gulf (45-36 days), depending on factors such as port congestion and navigational speed.

Regarding agribulk shipments destined to Europe, the U.S. Gulf route offers a total cost of $122/MT, which translates into potential savings of almost $30/MT over the U.S. East Coast gateway. For shipments to Mexico, the all-rail route crossing the border at Laredo is competitive to all the other gateways, including barge.

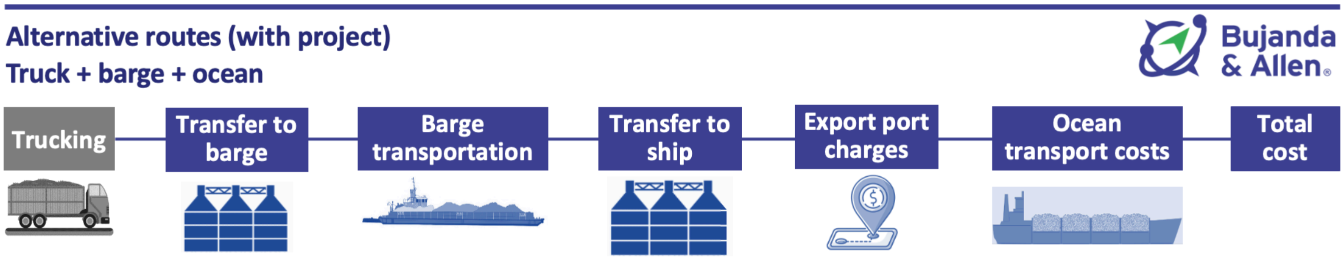
With each transport mode having its own advantages and disadvantages in addition to cost (e.g. reliability, travel time, frequency, parcel size, safety, etc), many of these factors have a strong influence on logistic choices made by BCOs and play an increasingly important role on transportation mode and route selection.

4.1.4 Agribulk route costs via the Clark County Port Project (barge)

By using the marine waterway alternative, shippers looking to export agribulk cargoes out of the study area would have to truck their cargoes to either the Clark County Port Project near Alexandria, MO or the nearest grain elevator near Quincy, IL. Once in the port, shipments will have to be discharged from the trucks into temporary storage and then loaded into barges for transportation to the gateway port in the Gulf.

The construction of the barge rate includes truck discharge, storage, barge loading, barge transportation from either ports to New Orleans, and a transfer cost from the barge to the ocean liner vessel. The cost elements for exporting agribulk cargo to these same foreign destination regions but using routes that would rely on the barge route either via the Clark County Port Project or the grain elevator near Quincy, IL, are shown in Figure 57.

Figure 57. Route costs via the barge route for agribulk cargo to Asia ($/MT)

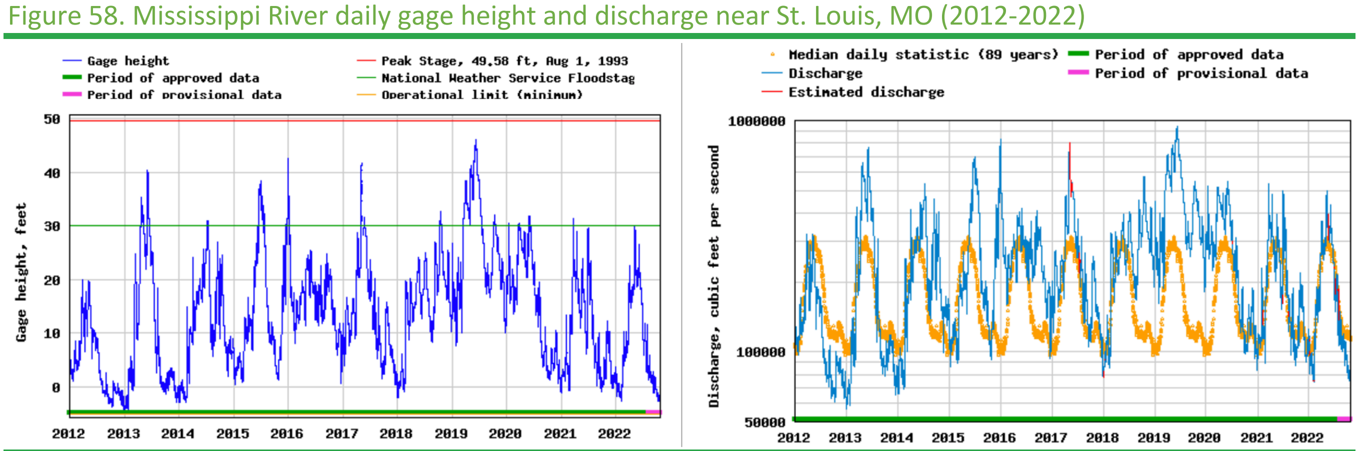


Source: Bujanda & Allen LLC, 2022.

Bujanda & Allen analyzed the historical trends of freight rates by barge for different marine highway segments. The same historical trends of the freight rates for truck, rail, and ocean vessel analyzed in the previous section are applicable to the barge routes. Periods of abnormal low water levels disrupt marine barge traffic, as low water levels force barge and towboat operators to limit the payloads they can take to prevent barges from running aground. Because a portion of the operating expenditures are fixed, lower barge payloads result in higher unitary costs. Higher barge rates are very apparent in the late part of 2013 and 2014, which precisely coincide with the last time the Mississippi River was below its 89-year median daily gage readings.

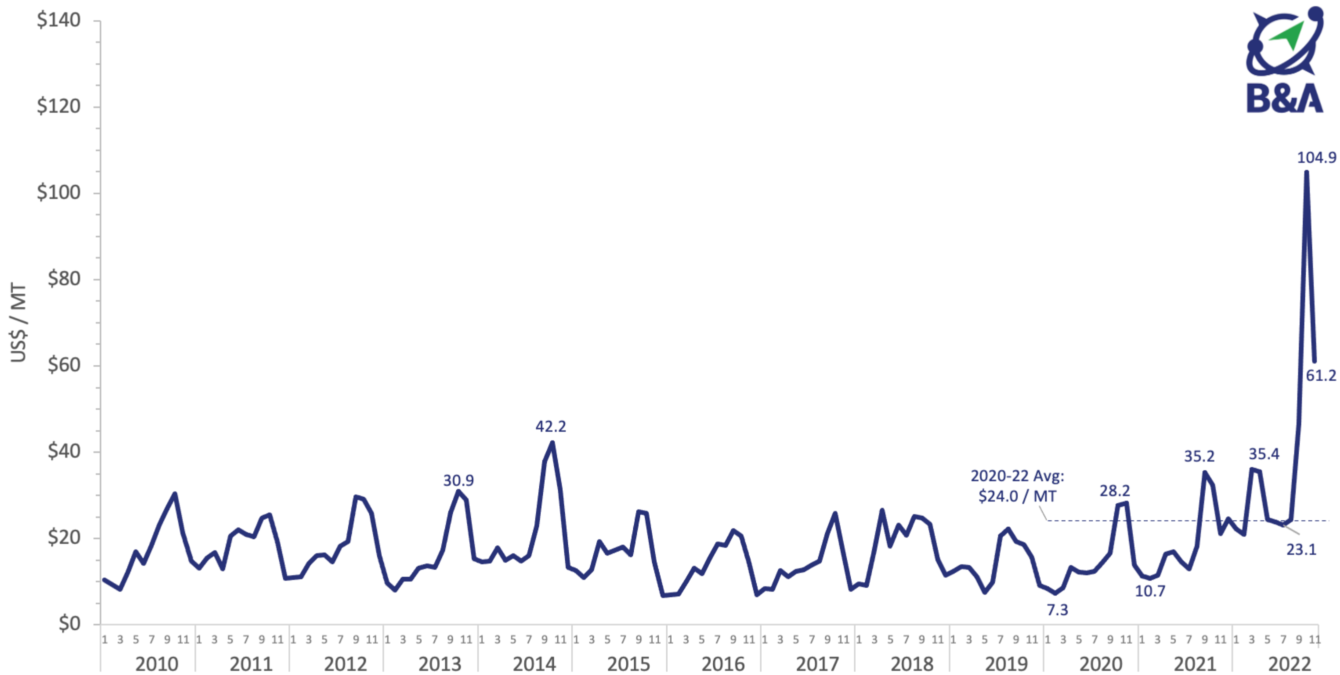
As we enter the winter of 2022, the Mississippi River is reporting abnormally low water levels, which is bringing rates to historically high levels combined with other macroeconomic events such as high inflation and the war in Ukraine. Water levels for the river are illustrated in Figure 58. Average barge rates for downbound agribulk shipments from the U.S. Midwest are shown in Figure 59. Detailed time-series for rates from major loading points indicate that barges loading in the Lower Illinois river are about 11% higher than the Mid-Mississippi, where the project site is located, as shown in Figure 60.

Figure 58. Mississippi River daily gage height and discharge near St. Louis, MO (2012-2022)



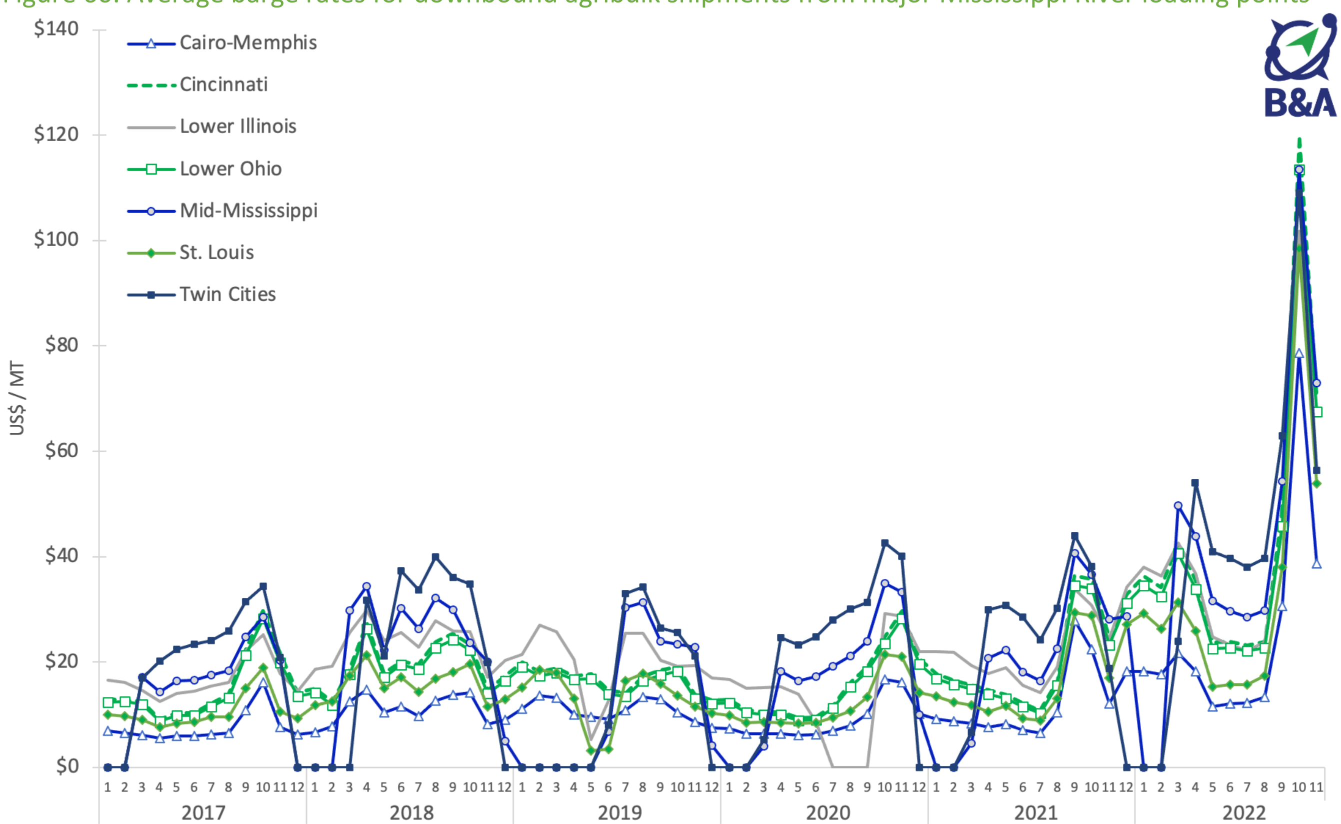
Source: Bujanda & Allen LLC, 2022 with data from NOAA.

Figure 59. Average barge rates for downbound agribulk shipments from the U.S. Midwest (2010-2022)



Source: Bujanda & Allen LLC, 2022.

Figure 60. Average barge rates for downbound agribulk shipments from major Mississippi River loading points



Source: Bujanda & Allen LLC, 2022.

The cost chains for agribulk exports were divided into the following categories:

- **Trucking (drayage)**. The first leg of an export trip begins with the movement of freight from its origination site (e.g. a farm) to the loading terminal.
- **Barge transport costs**. Long-haul barge movements represent the next leg of the trip to New Orleans. These costs include loading and discharging costs incurred by the barge operator.
  - *Barge loading.* These costs are incurred at the port and paid by the barge operator.
  - *Barge discharging.* These costs are for discharging freight from the barge into storage bins at the export gateway (e.g. New Orleans), and as with the loading operation, paid by barge operators.
- **Transfer costs (ship loading) at the gateway**. These are costs that are incurred at the gateway port for loading grain onto the ocean vessel for transportation to destination ports in Asia and Europe.
- **Ocean transport costs**. The representative destination ports in Asia and Europe (e.g. Shanghai and Rotterdam) for exports and its associated ocean transportation costs remained unchanged.

The route costs developed for agribulk exports via the inland waterway transportation (i.e. the Clark County Port Project near Alexandria, MO and the Mid-America Intermodal Port at Quincy, IL) as well as the New Orleans gateway are detailed in Table 14 and Table 15.

Table 14. Clark County Port Project: route costs for agribulk shipments via barge, 2022 ($/MT)

Barge (bulk)	Alexandria, MO $/MT	Total $/MT	Distance mi	Total mi	Transit time days (approx.)	Total days (app)
Waterway & inland transportation						
Truck to loading terminal	$20.0		70		1.0	
Transfer to barge	$6.1	-			5.0	
Barge transportation	$24.0		1,314		8.5	
Transfer to ship	$6.1	-			5.0	
Export port handling charges	$13.0	-			1.0	
Subtotal inland	$69.2		1,384		20.5	
Ocean vessel transportation						
U.S. Gulf to:		**Total**				
Asia	$59.8	**$129.0**	9,127	**10,511**	30.5	**51.0**
Europe	$28.0	**$97.2**	4,786	**6,170**	15.5	**36.0**
Mexico	$27.4	**$96.6**	775	**2,159**	2.5	**23.0**

Source: Bujanda & Allen LLC, 2022.

Table 15. Mid-America Intermodal at Quincy IL: route costs for agribulk shipments via barge, 2022 ($/MT)

Barge (bulk)	Quincy, IL $/MT	Total $/MT	Distance mi	Total mi	Transit time days (approx.)	Total days (app)
Waterway & inland transportation						
Truck to loading terminal	$22.0		120		1.0	
Transfer to barge	$6.1	-			5.0	
Barge transportation	$26.6		1,214		8.5	
Transfer to ship	$6.1	-			5.0	
Export port handling charges	$13.0	-			1.0	
Subtotal inland	$73.8		1,334		20.5	
Ocean vessel transportation						
U.S. Gulf to:						
Asia	$60	**$134**	9,127	**10,461**	30.5	**51.0**
Europe	$28	**$102**	4,786	**6,120**	15.5	**36.0**
Mexico	$27	**$101**	775	**2,109**	2.5	**23.0**

Source: Bujanda & Allen LLC, 2022.

4.1.5 Potential route cost savings for agribulk cargo

As the route cost analysis demonstrates, the transport efficiencies offered by barge service via the barge route create a lower cost alternative for agribulk cargo shippers. However, these efficiencies can be offset by an increase on total transit times up to six days and a half. Nonetheless, for some routes the increase in transit times might not be large enough to still consider the potential transportation cost savings attractive. An estimation of the route cost savings and transit time differentials is summarized in Table 16.

Table 16. Potential route cost benefits for agribulk shipments via the Clark County Port Project ($/MT)

	By rail	By barge		Benefits	
Total transportation	**Incumbent**	**via Alexandria**	**via Quincy**	**via Alexandria**	**via Quincy**
U.S. Gulf to:					
Asia	$154	**$129**	$134	**$24.7**	**$4.6**
Europe	$122	**$97**	$102	**$24.7**	**$4.6**
Mexico	$121	**$97**	$101	**$24.7**	**$4.6**
U.S. PNW to:					
Asia	$140	**$129**	$134	**$11.1**	**$4.6**
U.S. East Coast to:					
Europe	$153	**$97**	$102	**$56.1**	**$4.6**
U.S. West Coast (Oakland) to:					
Asia	$152	**$129**	$134	**$22.9**	**$4.6**
Transit time days (approx.)					
U.S. Gulf to:					
Asia	44.8	**51.0**	51.0	**(6.2)**	-
Europe	29.8	**36.0**	36.0	**(6.2)**	-
Mexico	16.8	**23.0**	23.0	**(6.2)**	-
U.S. PNW to:					
Asia	36.4	**37.0**	37.0	**(0.6)**	-
U.S. East Coast to:					
Europe	25.9	**32.0**	32.0	**(6.1)**	-
U.S. West Coast (Oakland) to:					
Asia	38.4	**39.0**	39.0	**(0.6)**	-

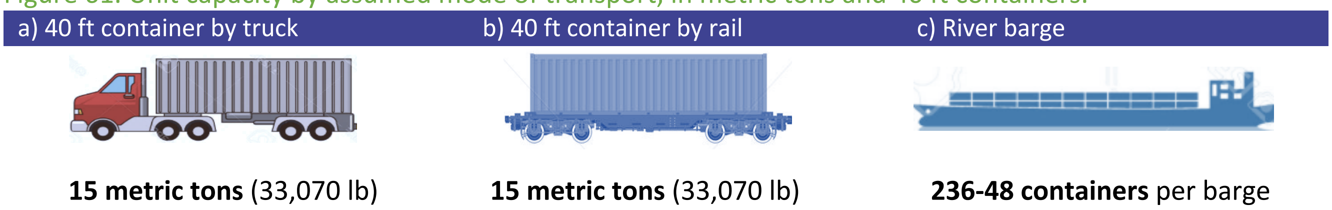
Source: Bujanda & Allen LLC, 2022.

4.2 Containerized cargo routes

4.2.1 General assumptions

Bujanda & Allen calculated the route costs for containerized cargo by component—truck, rail, and barge—for the primary incumbent routes, and then compared them to the route costs offered by the proposed barge route via the Clark County Port Project. Once cost inputs were obtained and calculated for each cost component per route, all costs were converted to dollars per 40 ft container ($/FEU). The capacities assumed by mode are illustrated in Figure 61.

Figure 61. Unit capacity by assumed mode of transport, in metric tons and 40 ft containers.



Source: Bujanda & Allen, 2022.

For container on barge (COB) service, presently, there are barge operators providing service to/from New Orleans. This weekly service operates 195-200 ft barges capable to accommodate 36 loaded 40 ft-containers (3 high) and 48 if empties (4 high). Typically, 1 tugboat can push up to six container barges.

4.2.2 Containerized route costs via incumbent routes (rail)

Shippers and receivers looking to move freight have two primary gateway alternatives through which containers can be routed: (i) San Pedro Bay on the West Coast (SPB) and (ii) New York-New Jersey (NYNJ) on the East Coast. These two incumbent routes are the primary corridors for containerized imports, with Savannah quickly gaining more prominence. Secondary corridors go through the Northwest Seaport Alliance (NWSA), ports in Seattle and Tacoma, for the Asia tradelane and through Norfolk and Baltimore for the Europe tradelane. Laredo serves as a gateway for land traffic with Mexico. New Orleans serves as a gateway for some traffic to and from Asia, Europe, and South America, and is the only alternative providing connection to M-55. Containerized route costs via incumbent routes involve ocean, rail, transloading, and drayage cost components, as illustrated in Figure 62.

Figure 62. Ocean, rail, transloading, and drayage transportation costs for containerized cargo by rail ($/FEU).

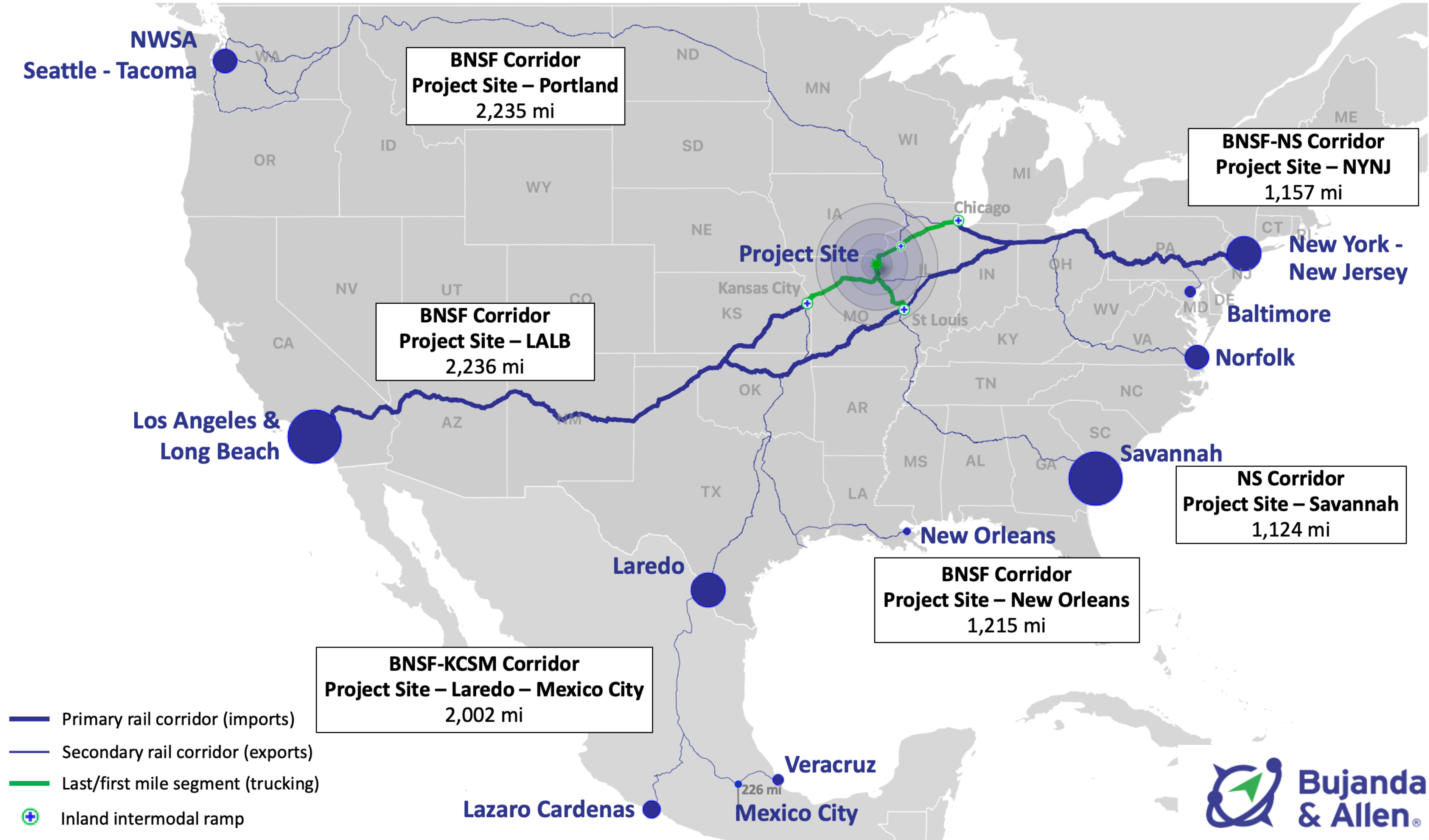
Source: Bujanda & Allen, 2022.

The incumbent routes for containers are detailed next and displayed in Figure 63.

- **San Pedro Bay (SPB)**—This is the main route for containerized imports from Asia via the Pacific Coast. This rail corridor is 2,236 mi and is served by BNSF with a competitive alternative offered by UP via the I-10 corridor. Marine containers on double-stack trains dominate this route. This corridor extends all the way to St. Louis traversing the southwestern part of Missouri via the junction in Avard, OK. Most import containers are railed from the ports of Los Angeles and Long Beach to Kansas City and St. Louis, where we assume the majority are emptied before being trucked (an average of 255 miles) to the project site and destinations in the study area.

- **NYNJ**—This is the primary corridor for containerized imports and exports via the Atlantic Coast. This 1,157 mi long corridor is served from the project site to St. Louis by BNSF, where it connects to the NS corridor to New York (1,157 mi). The estimated average trucking distance between loading/discharging regions within the study area and the project site is 70 mi. Additionally, this corridor has the alternative of unloading containers at Chicago (862 mi); however, a longer trucking distance to/from the project site (295 mi) makes Chicago a less attractive proposition. This corridor is suitable for double-stack trains.
- **Savannah**—This gateway, located 1,215 mi from the project site, has recently gained prominence as a viable alternative for Asian imports and exports, particularly after ports in the West Coast faced congestion issues related to the disruptions caused by the COVID-19 pandemic. Given its similarities in terms of route length and cost with NYNJ, only NYNJ is analyzed in the body of the report.
- **Baltimore**—This gateway port is an alternative to NYNJ. The route is 1,140 mi and is also served by NS from Clark County through Fort Wayne, Cleveland, Pittsburgh, and Harrisburg where it diverts southbound towards Baltimore. Although this corridor offers a slightly shorter distance to Alexandria, MO, it is dwarfed by the shipping services and traffic generated by the container terminals in NYNJ and more recently Savannah. This corridor is not presently suitable for double-stack trains due to tunnel restrictions.
- **Norfolk—**This is a third alternative gateway for containerized imports via the Atlantic Coast. The route is 1,247 mi, served by NS via Fort Wayne to Bellevue, where it diverts southbound towards Columbus, Roanoke, and onwards to the Norfolk port. This corridor is also suitable for double-stack trains and offers numerous interchanges with CSXT.
- **NWSA—**This is a second alternative for containerized imports via the Pacific Coast. It is 2,235 mi to the project site, and it is served by BNSF from container terminals in the NWSA. This corridor is also suitable for double-stack trains. This corridor extends to St. Louis, MO mostly parallel to the Mississippi River; however, no intermediate intermodal ramps are reported. Hence, this indicates that import containers must be railed from the NWSA to St. Louis (2,310 mi) before being trucked (an average of 175 miles) to the project site. Alternatively, import containers can be discharged at Chicago (2,160 mi) and trucked an average of 285 mi or at Galesburg, IL and trucked an average of 100 mi to the project site.
- **Laredo-Mexico-City—**This 2,002 mi corridor is served primarily by BNSF, but between Temple, TX and Laredo, TX, it must use UP tracks to access the port of entry at Laredo. UP connects with Kansas City Southern Mexico (KCSM) in Laredo, Texas and this corridor extends all the way to Mexico City (Cd. de Mexico or CDMX). This corridor was considered the most representative route choice between the study area and Central Mexico. There is also a water route from the current draw area to Mexico City, which incorporates truck and barge to New Orleans, a transgulf vessel to the Port of Veracruz, and truck 226 mi to Mexico City. The nearest intermodal loading and discharging points for this corridor are Kansas City, St Louis, and Chicago as described in previous routes.
- **New Orleans—**This is an alternative for containerized cargo handled via the U.S. Gulf Coast potentially competing with a COB service via the Mississippi River (M-55 and M-35). It is 1,215 mi and it is served by KCS from Kansas City to Shreveport southbound to the Port of New Orleans. This corridor is also suitable for double-stack trains.

Figure 63. Intermodal rail routes for container movements to and from Northeastern Missouri.

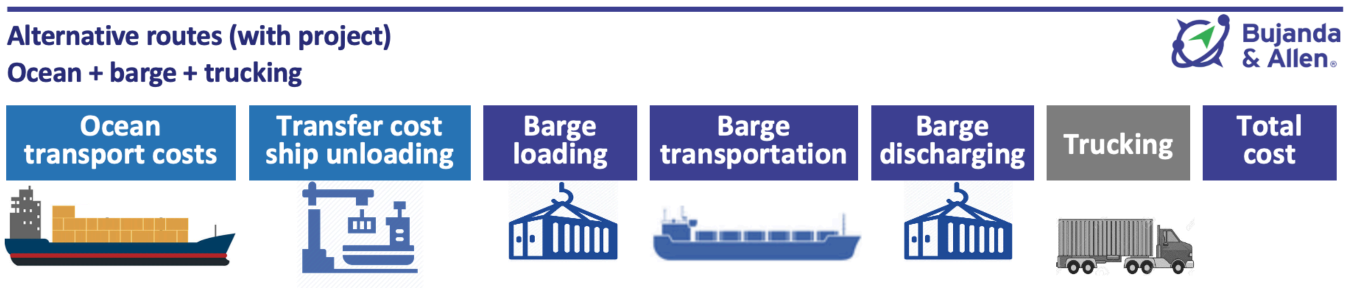


Source: Bujanda & Allen, 2022.

4.2.3 Containerized route costs via the Clark County Port Project (barge)

Ocean transport costs, either from Asia to San Pedro Bay or from Europe to NYNJ, represent the first leg of an import trip. Ocean transport rates for each tradelane were obtained by Bujanda & Allen and validated with third-party data. Long-haul rail movements represent the next leg of the trip from San Pedro Bay to Kansas City or from NYNJ to St. Louis. There are costs at the import gateway port related to ship-to-shore transfer (ship unloading) and loading into a railcar. The rail rate includes loading and discharging between railcar and yard and between yard and truck, as typically quoted by the industry. Trucking represents the last mode of transportation to get cargoes from the nearest long-haul intermodal platform (i.e. Kansas City, St. Louis, or Chicago) to destinations in the study area. The structure of the 2022 route costs assumed for containerized cargo imports using incumbent routes is illustrated in Figure 64.

Figure 64. Route costs via alternative routes by barge for containerized cargo imports ($/FEU)



Source: Bujanda & Allen, 2022.

After the second half of 2020, the COVID-19 pandemic disrupted global supply chains, leading to shipment delays and soaring shipping costs. Prior to the pandemic, ocean freight rates from Shanghai to New York faced maximum resistance levels around $4,890 per FEU in 1Q15 and remained significantly below those levels until the second half of 2020. Rates from Shanghai to Los Angeles had a very similar behavior finding resistance around $2720 per FEU in 4Q18. By October 2021, shipping costs soared, increasing over 500 percent from pre-pandemic levels to more than $16,100 per FEU Shanghai - New York and $12,400 per FEU for the Shanghai – Los Angeles tradelane.

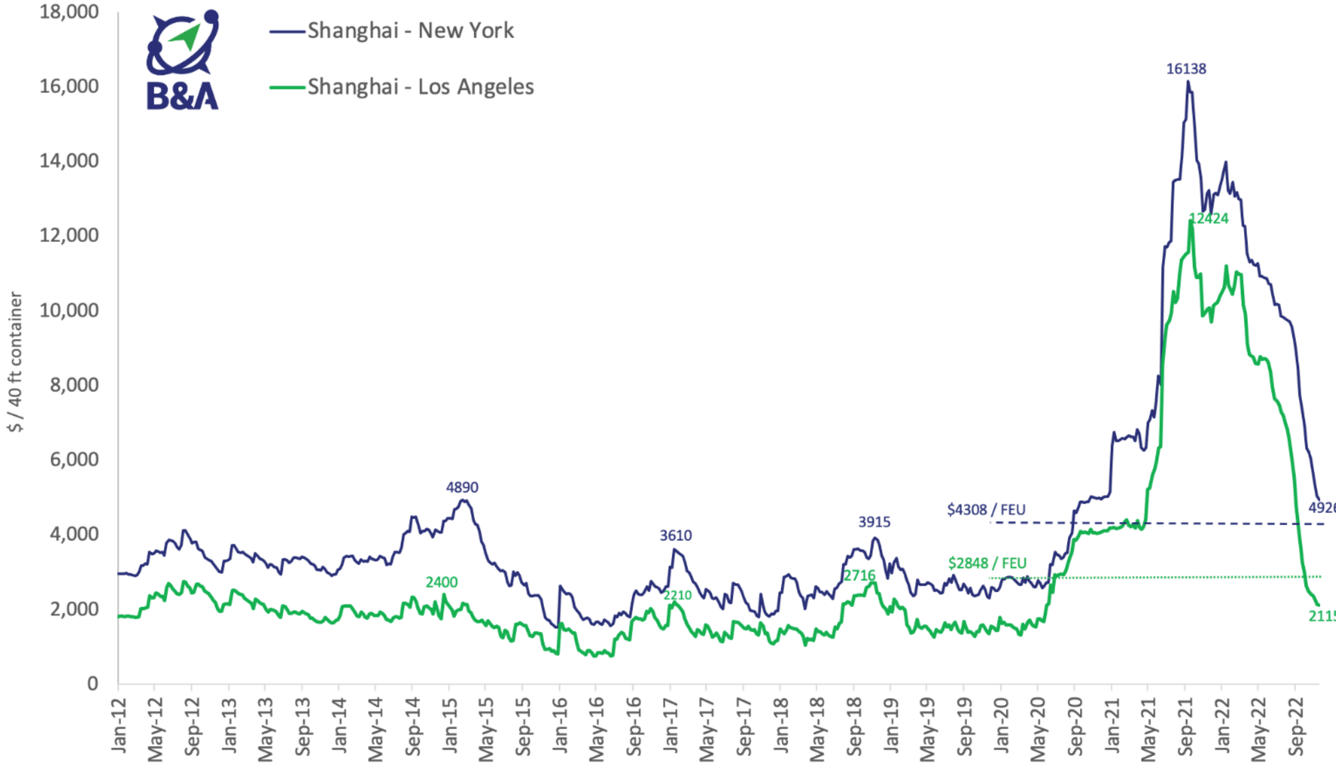
Bujanda & Allen attributes these increases to two main factors:

i) A rapid increase in the money supply triggered by the U.S. covid-19 stimulus and relief, which was followed by strong consumer demand and a strong rise in demand for intermediate inputs and manufacturing activities, all of which have direct implications for cargo markets.

ii) Strong constraints on shipping capacity driven by logistical hurdles and bottlenecks primarily driven by pandemic disruptions and shortages in containers (e.g. mandated lockdowns in Chinese ports).

Unreliable schedules and port congestion led to a surge in surcharges and fees, including demurrage and detention fees. Spot ocean freight rates per FEU from Shanghai to Los Angeles and to New York are shown in Figure 65.

Figure 65. Spot ocean freight rate per 40 ft container from Shanghai to Los Angeles and New York ($/FEU).



Source: Bujanda & Allen, 2022.

The gateways analyzed are on the U.S. West Coast and East Coast, reflecting the two primary incumbent corridors, for the movement of containerized intermodal imports. Secondary corridors include ports in the PNW, Savannah, Laredo, and the U.S. Gulf, for the movement of containerized exports from the study area. For each of these gateways, the analysis is further broken down into tradelanes to account for differences in transportation costs to the most relevant destination. The structure of the route costs assumed for containerized cargoes using intermodal rail routes is illustrated in Table 17.

Table 17. Route costs via intermodal rail routes: containerized cargo, 2022 ($/FEU)

Rail (intermodal container)	Port / IM ramp $/FEU	Total $/FEU	Distance mi	Total mi	Transit time days (approx.)	Total days (app)
Ocean vessel transportarion to						
U.S. West Coast *from:*						
Asia	$2,848	**$6,279**	6,631	**8,867**	12.0	**26**
U.S. East Coast *from:*						
Asia	$4,308	**$6,827**	12,291	**13,538**	21.5	**29**
Europe	$2,227	**$4,746**	3,866	**5,113**	7.0	**15**
U.S. PNW *from:*						
Asia	$3,020	**$6,544**	5,917	**8,152**	11.0	**25**
U.S. Gulf *from:*						
Mexico	$2,875	**$4,974**	899	**2,114**	2.0	**10**
South/Central America	$6,597	**$8,696**	6,248	**7,463**	11.0	**19**
Railroad & inland transportation						
Port handling charges:						
Transfer from ship to rail	$105				1.0	
Export port handling charges	$312					
Rail transport to study area from ports in:						
U.S. West Coast (to St Louis)	$2,017		1,981		11.0	
U.S. East Coast (to St Louis)	$1,105		992		5.2	
U.S. PNW (to Chicago)	$2,110		1,980		11.0	
U.S. Gulf (to St Louis)	$685		960		5.3	
Drayage transportation (truck)						
Transfer from rail to truck	$105				0.5	
Drayage from intermodal yard to final dest.	$893		255		1.0	
Subtotal inland via						
U.S. West Coast	$3,431		2,236		13.5	
U.S. East Coast	$2,519		1,247		7.7	
U.S. PNW	$3,524		2,235		13.5	
U.S. Gulf	$2,099		1,215		7.8	

Source: Bujanda & Allen, 2022.

To estimate the prospective route economics advantage that could be offered via the barge routes, we analyzed route costs shipping via the M-55 and M-35 barge route and compared these with costs that do not rely on the Clark County Port Project. The structure of the 2022 route costs assumed that containerized cargoes use the barge routes, which involve river transport via the New Orleans Gateway. The cost chains for intermodal containers were divided into the following categories:

- **Ocean transport costs.** The representative ports in Asia and Europe (e.g. Shanghai and Rotterdam) and its associated ocean transportation costs remained unchanged.
- **Transfer costs (ship unloading) at the gateway.** These are costs that are incurred at the gateway port for unloading the container from the ocean vessel to the gateway port's container yard.
- **Barge transport costs.** Long-haul barge movements represent the next leg of the trip from New Orleans. These costs include loading costs incurred by the barge operator.
    - *Barge loading*. These costs are incurred at the port and paid by the barge operator.
    - *Barge discharging*. These costs are for discharging the box from the barge into the yard at the Clark County Port Project yard, and as with the loading operation, are paid by the barge operator.
- **Trucking (drayage).** The last leg of a container import trip to the BCO site where the cargo has its final destination in the study area.

The route costs developed for containerized imports via the Clark County Port Project, inland waterway transportation, and the New Orleans gateway are detailed in Table 18.

Table 18. Route costs containerized imports via **the barge route**—barge and ocean transport costs

Barge (container on barge)	Alexandria, MO $/FEU	Total $/FEU	Distance mi	Total mi	Transit time days (approx.)	Total days (app)
Ocean vessel transportation to						
U.S. Gulf *from:*						
Asia	$3,193	**$5,550**	11,616	**13,000**	20.0	**34.5**
Europe	$1,975	**$4,332**	5,585	**6,969**	10.0	**24.5**
Mexico	$2,875	**$5,232**	899	**2,283**	2.0	**16.5**
South/Central America	$6,597	**$8,954**	6,248	**7,632**	11.0	**25.5**
Waterway & inland transportation						
Port handling charges:						
Transfer from ship to barge	$250				5.0	
Export port handling charges	$312					
Barge transport to study area from ports in:						
Barge transportation	$1,300		1,314		8.0	
Drayage transportation (truck)						
Transfer from barge to truck	$250				1.0	
Drayage from Project Site to final dest.	$245		70		0.5	
Subtotal inland	$2,357		1,384		14.5	

Source: Bujanda & Allen, 2022.

4.2.4 Containerized route cost savings

Based on the analyses of route costs for rail versus barge routes, Bujanda & Allen constructed route cost comparison tables for the tradelanes analyzed. These route cost comparisons include a breakdown for each of the cost components and the total route costs. As the route cost analysis demonstrates, the transport efficiencies offered by the COB service via the barge route can create a lower cost alternative for agribulk cargo shippers. However, these efficiencies can be offset by an increase on total transit times up to thirteen days. An estimation of the route cost savings and transit time differentials is summarized in Table 19.

Table 19. Route cost savings for containerized cargo via the Clark County Port Project ($/FEU)

Total transportation	By rail via incumbent routes	By barge (container on barge) via Project Site	Benefits (without - with project, $/FEU)
U.S. West Coast *from:*			
Asia	**$6,279**	**$5,550**	**$729**
U.S. East Coast *from:*			
Asia	**$6,827**	**$5,550**	**$1,277**
Europe	**$4,746**	**$4,332**	**$414**
U.S. PNW *from:*			
Asia	**$6,544**	**$5,550**	**$994**
U.S. Gulf *from:*			
Mexico	**$4,974**	**$5,232**	**($258)**
South/Central America	**$8,696**	**$8,954**	**($258)**
Transit time days (approx.)			
U.S. West Coast *from:*			
Asia	**25.5**	**34.5**	(9.0)
U.S. East Coast *from:*			
Asia	**29.2**	**34.5**	(5.3)
Europe	**14.7**	**24.5**	(9.8)
U.S. PNW *from:*			
Asia	**24.5**	**34.5**	(10.0)
U.S. Gulf *from:*			
Mexico	**9.8**	**16.5**	(6.7)
South/Central America	**18.8**	**25.5**	(6.7)

Source: Bujanda & Allen, 2022.

4.3 Key takeaways

The analysis above shows the potential savings that can be generated by replacing the inland rail transportation with transportation via the rivers, and how such savings vary for each of the target markets. For containers from Asia, inland cost savings from using a barge or ship from New Orleans are significant compared to shipping a box by rail more than 1,740 mi from San Pedro Bay to the study area and then trucking it about 255 mi, on average, to its final destination. The savings from the barge route outweigh the increases in ocean shipping costs.

As this route cost analysis demonstrates, Marine Highways could provide a competitive alternative in terms of cost for containers on barge to/from New Orleans, particularly for those destined to or originating closer to the river ports.[14] However, not all BCOs will be incentivized by cost alone. For some, transit times might be more critical, in which case, rail will remain the mode of choice.

[14] SCF, a container on barge operator in St. Louis, is currently operating a service on a weekly basis between St. Louis and New Orleans for Hapag-Lloyd. SCF estimated it would require at least about 210 boxes/week (11,200 boxes/year) to establish a dedicated service between the Heartland Port and New Orleans.

5. Port concession and operational model structure

This section describes the potential structure of the Clark County Port concession and a possible operational model for the company undertaking the project. This section begins with the analysis of the potential structure of the port concession, the parties involved, and the flow of funds among potential stakeholders. This section then describes a conceptual organizational structure of the entity that would undertake the project. Lastly, this section presents an overview of the project site and a conceptual operational layout of the project and its components independent from the expected demand or financial viability levels, analyzed in *Section 6*.

5.1 Potential port concession structure

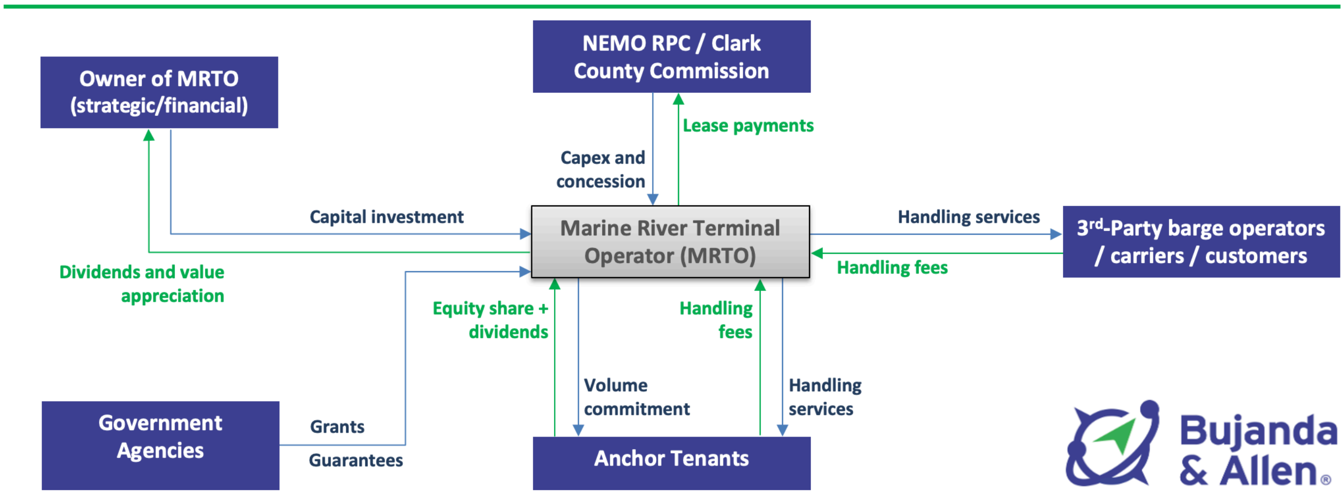
Based on a landlord port model concept, the proposed Port Authority or Commission would execute a concession agreement with an entity that would operate the port and pay a concession fee to the Port Authority. This entity would likely be a marine river terminal operator (MRTO), or possibly a grain trader (e.g. Archer Daniels Midland, Bunge, Cargill, Louis Dreyfus, etc).

To simplify our project feasibility analysis, we assume that all investments (startup construction and other infrastructure costs, and operating equipment) are made by the operating entity or concessionaire. Concession agreements for infrastructure having these characteristics are long-term in nature (exceed ten years). In return for volume commitments, anchor tenants such as barge operators may wish to take a stake in the concession. Nonetheless, under a public-private partnership (P3) concept, the Clark County Port could install major infrastructure to help the project be more viable and attractive to potential investors. Under the same concept, the concessionaire could be required to invest in specialized infrastructure and the operational expenditures.

Users of the port would pay the MRTO concessionaire a basic throughput or handling rate per unit of cargo handled, and additional fees for other services as may be required. The Clark County Port would receive an annual lease or concession payment from the concessionaire (i.e. from the MRTO). The amount of the annual payment is typically linked to cargo volumes subject to a minimum annual guarantee, increased on an annual basis by some agreed-upon inflationary index, and would in practice be determined only after considering how much capital investment was being made by each entity (port authority or operator).

A combination of TIGER, TIFIA, Fastlane, and Missouri State Mobility grants could possibly be secured by the Clark County Port, with the assistance and support of county governments, MoDOT, etc. Nonetheless, our analysis presented in the next sections assumes no subsidies. Diagrams of the major elements of the landlord port concession structure for the Clark County Port Project are shown in Figure 66.

Figure 66. Potential concession structure for the Clark County Port Project



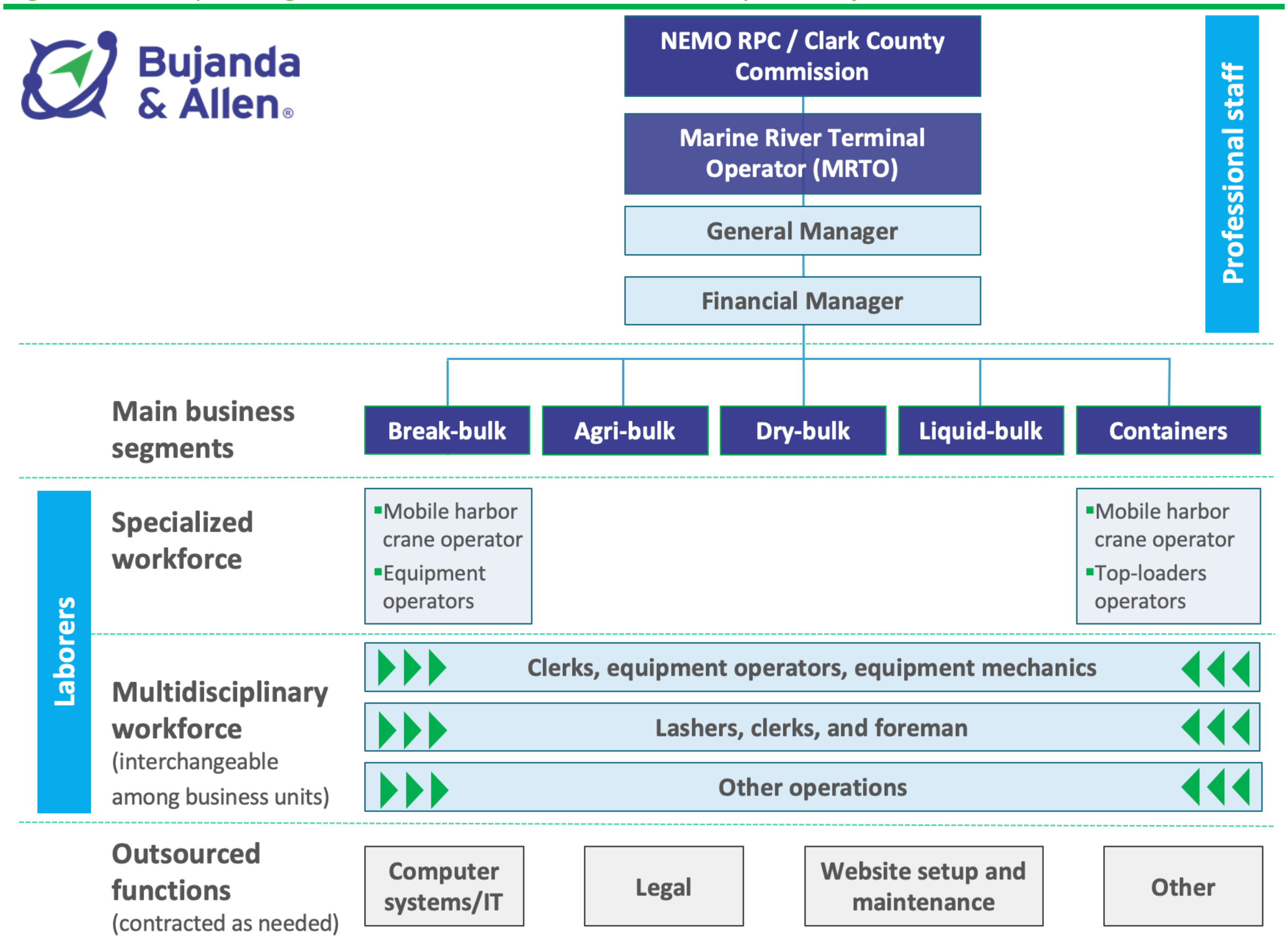
Source: Bujanda & Allen LLC, 2022.

5.2 Conceptual organizational structure

This section provides an overview of a possible institutional framework for governing the Clark County Port Project and presents a potential MRTO management model for implementation and ongoing operations. The structure defines the roles and chief responsibilities for the MRTO concessionaire undertaking the project. The staffing structure developed here assumes the Clark County Port would commence operations handling containerized and breakbulk cargo as well as agribulk drybulk freight.

In our proposed structure, the MRTO would have two categories of staff—professional staff and laborers. Certain specialized functions would be outsourced to limit overhead. To minimize expenses, the professional staff would include only three positions, and as such, personnel filling these positions would have to be experienced in multiple disciplines. The conceptual organizational structure of the Clark County Port is illustrated in Figure 67 and each position described afterwards.

Figure 67. Conceptual organizational structure of the Clark County Port Project



Source: Bujanda & Allen LLC, 2022.

5.2.1 Professional staff

The following are high-level descriptions of the functions of these staff.

- **General Manager—**The general manager would oversee implementation of the capital investments in infrastructure and equipment required to commence operations; create policies and procedures for the operation of the Port; develop job descriptions for key staff; and recruit, hire, train and manage the professional staff and the labor force. Once the Port begins operating, the general manager would be responsible for the overall management of the Port from operational and commercial perspectives.

- *Operational management:* These duties are related to the operational aspects of the MRTO barge unloading/loading, truck loading and loading, cargo storage, infrastructure and equipment maintenance and repair, and terminal safety and security, among other similar functions.
- *Commercial management:* These duties would include strategic planning, financial oversight, and sales and marketing. In the early stage of the project, this position is envisioned to also assume tasks related to the administration of Human Resources, including recruiting, hiring, firing, employee relations, and labor contract management. However, the commercial aspect of this project is inherently related to acquiring and retaining customers.

- **Financial Manager—**In the initial stage, the financial manager's primary responsibilities would include the management of accounts payables and accounts receivables, banking and bank reconciliation, financial reporting, creation of the annual budget, volume and revenue forecasting, capital expense (capex) and operating expense (opex) planning, oversight of the financial data entry done by the office manager, and management of insurance policies, among others.
- **Office Manager—**The most important responsibilities would include providing administrative support to management. Tasks related to this position typically include data entry, bookkeeping support, and office management.

As the Port's volume and revenue increases in the future, more staff may be hired, as needed. Both operational and commercial management functions that are secondary in nature and that were originally performed by the general manager because the operation was a greenfield in the early stage, would naturally evolve to be delegated and become independent positions according to the responsibilities required.

5.2.3 Laborers

The financial model assumes there will be two categories of laborers – those that are specialized, and those who perform multiple functions. The labor force could be unionized or non-union. The two labor categories are explained below.

Specialized

- **Mobile harbor crane (MHC) operator** would operate the mobile harbor crane that lifts cargo on and off vessels. It is expected that the MHC operator would be focused primarily on the container business segment and occasionally assist with movements of breakbulk cargo.
- **Top-loader operator** would operate the top-loaders that lift containers from the ground, once they are unloaded from the MHC, and stack them in piles inside the yard (for inbound movements), or from the pile in the yard and bring them near the dock to be loaded into the barge by the MHC.

Multidisciplinary

- **Foreman/clerk:** This role is responsible for overseeing the activities of the other laborers and for performing cargo tallies against import/export documentation to ensure the cargo received/shipped is accurately reflected on the documentation.
- **Dock / yard / barge labor:** Assist with all aspects of cargo handling and securing, line handling, etc.
- **Grain system operator:** The position would be responsible for manning the grain conveyor scale, mixing station and storage silo area.

- **General equipment operator:** The position should be proficient at operating other cargo handling equipment such as forklifts.
- **Cargo handling equipment mechanic:** This person would repair and perform regular maintenance on the various cargo handling equipment and systems at the terminal. Note that equipment maintenance and repair could be outsourced to contractors if the equipment operators are not skilled in such tasks.

The direct labor workforce would be comprised of flexible staff that work only when cargo vessels or barges are actively being loaded or unloaded, and regularly scheduled staff who handle the receiving and delivery of cargo and containers on all days that the terminal is open for business.

5.2.4 Outsourced functions

Based on the scale of the operation, especially in the early stage of the project, it is expected that the following and similar functions be outsourced or contracted as needed: computer systems/IT, legal, and cargo handling equipment mechanic, among others. Each is described in the following bullets.

- **Computer systems / IT:** This person will initially install computer hardware and software at the Port. The person will develop and manage the computer network; develop and manage network access security programs to ensure vulnerability is minimized including administering emergency response plans; put web threat protection, anti-virus, firewall controls, and content filtering in place; and other duties to make sure the computer hardware and network operates effectively.
- **Legal:** The legal firm would provide legal advice and service on an as needed basis on issues related to the terminal property and operations. The firm will develop a boilerplate services contract between the MRTO and its customers and vendors. The firm would represent the MRTO in dispute arbitration between the MRTO and its customers or vendors.
- **Facility and equipment maintenance:** Repair and maintenance of facilities and equipment as required.

5.3 Project site

5.3.1 Planning and investigation for site selection

Under the direction of NEMO RPC, investigation into a port selection site process and recommendation was provided. The research concluded that the limitation of accessible site locations along the approximate 10.2 river miles of the Mississippi River, resulted in two identified site possibilities. Due to substantial improvements in floodplain and floodway conditions, governing rules take precedence for protection measures and what components would have to be either elevated or protected.

The final determination resulted in the following options:

- Option 1A North (North of Alexandria Area) – Elevated Site
- Option 2A (Gregory Landing Area) – Elevate Site
- Option 2A (Gregory Landing Area) – Improved Levee Protection

An overview of this investigation and documentation is a supplemental component to this report located under ***Appendix A*** for reference. We present a summary of the positive and negative aspects of each site option analyzed in Table 20.

Table 20. Positive and negative aspects of each site option analyzed

Positives	Negatives
Option 1A North (North of Alexandria Area) – Elevated Site	
▪ River, rail, and road access. ▪ Closer proximity to Highway 61. ▪ Utilities can be extended. ▪ Adjustment to layout configuration can be made with less restrictions, as no existing demolition required.	▪ Portion of property will need to be elevated out of Floodway/Floodplain. ▪ Additional time needed for CLOMR approval through FEMA. ▪ Conceptual Plan does not have container loading to barge for future.
Option 2A (Gregory Landing Area) – Elevate Site	
▪ River, rail, and road access. ▪ Existing utilities. ▪ Has capability of container loading to river in future.	▪ The site is in the Floodplain (will need elevated per Ordinance). ▪ Extensive improvements to Route F to access Highway 61. Additional time and cost to project to acquire additional ROW along Route F. ▪ Major demolition of existing terminal and modification. ▪ Extra coordination will be required with Drainage and Levee District for use of port area and easement. ▪ Potential Concern – URSA Farmers Cooperative Company's may not sell parcel needed to align with dock area.
Option 2A (Gregory Landing Area) – Improved Levee Protection	
▪ River, rail, and road access ▪ Existing Utilities ▪ Has capability of container loading to river in future	▪ The cost to improve and modify the existing levee system for accreditation is not cost prohibited. ▪ Incorporating the demolition, site development, the potential that URSA Farmers Cooperative Company may not sell and all the off-site improvements with the improvement to the levee system results in this option being too expensive with the added levee improvement.

Source: MECO Engineering, 2022.

Based on the outcomes of our investigation for site selection, presented in **Appendix A** and summarized in Table 20, the recommended site from this feasibility study is **Option 1A North**. The recommended site will require time to accomplish the necessary requirements. This site clearly has immediate access to a US Highway 61, utilities within the area to be extended, the land available for a rail spur, a deep enough area for a barge to connect to an overhead conveyor, no major existing demolition needed, no levee systems for approval measures/modifications, and an open area for any modifications necessary.

5.3.2 Recommended site

A conceptual plan has been provided and a total project cost estimate determined for the development of Option 1A North, the recommended site, as detailed next.

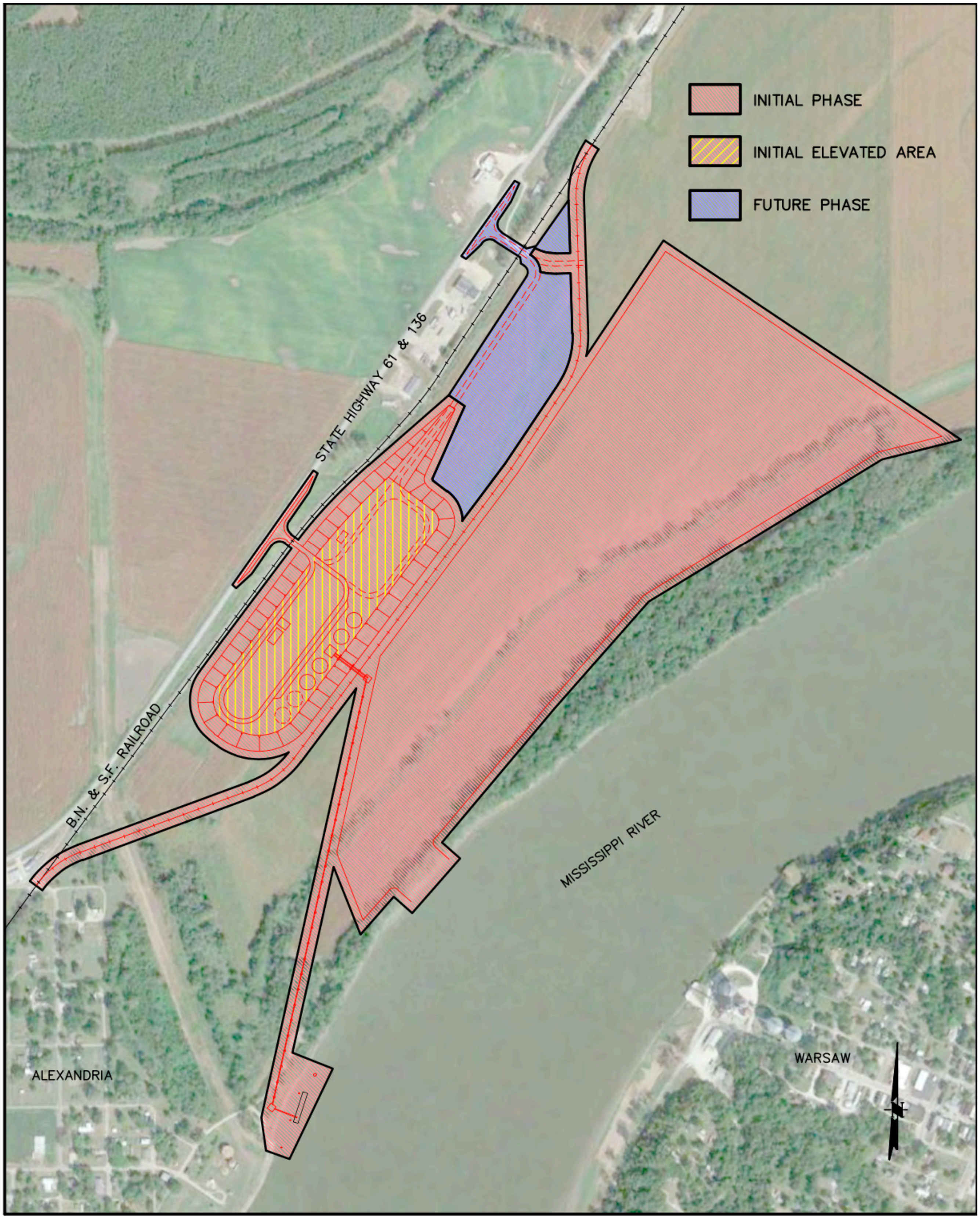
- **Initial Phase—**There are approximately *298 acres* targeted for the overall footprint of this project, which depicts an elevated terminal with a lower area already graded for future containment loading via rail. This initial phase has incorporated a basin area for borrow material for the elevated site. The estimated volume in the basin area is expected to meet the compensatory storage that will be required for the hydraulic modeling to obtain a zero increase to the Base Flood Elevation (BFE). The elevated area depicts an elevation of 499 (1 in above 498). The underlying existing ground elevations were obtained from USGS Lidar Data and used to assemble the conceptual plan provided.
- **Initial Phase—**Targeted transportation via roadway, rail and barge for bulk-based products associated with grain transport or possible other bulk products.
- **Future Phase—**This phase incorporates the surface area incorporated for storage/loading area for containers to rail and the additional site entrance.

Box 1. Permits required for Option 1A North

1. **Construction Permit – Missouri Department of Natural Resources.** Any port project will require a Construction Permit for site development from the Missouri Department of Natural Resources. A 404 permit will be required from USACE and a 401 permit from the Missouri Department of Natural Resources.
2. **Floodplain permit –** A Floodplain permit will be required, along with a No Rise Certification.
3. **Railroad construction permit –** A railroad permit will be required for construction of rail spur and waterline crossing with associated fees.
4. **Department of Natural Resources (DNR) construction permit –** A construction permit will be required for the waterline extension to the site.
5. **Missouri Department of Transportation (MoDOT) permit –** MoDOT will require entrance plans approved and possibly a new permit for entrance, widening of entrance and approach. There is a potential that a traffic study would have to be performed.
6. **Gas connection permit –** There will be a permit required for the proposed gas extension crossing the levee north of Alexandria to reach the site.
7. **Septic system permit –** A septic system will have to be approved by the County Health Department.
8. **Utilities, easements, and right of way permits –** Any existing utility in a public right-of-way, such as electric may need an easement to access the site depending on the routing preferred.
9. **Rezoning –** As there are no building and zoning requirements in Clark County, this parcel would not have to go through the rezoning procedures.
10. **Environmental clearances –** Although not actual permits, environmental clearances will have to be obtained for the selected option and further discussed in *Section 9* of this Report.

Source: MECO Engineering, 2022.

5.4 Conceptual operational layout



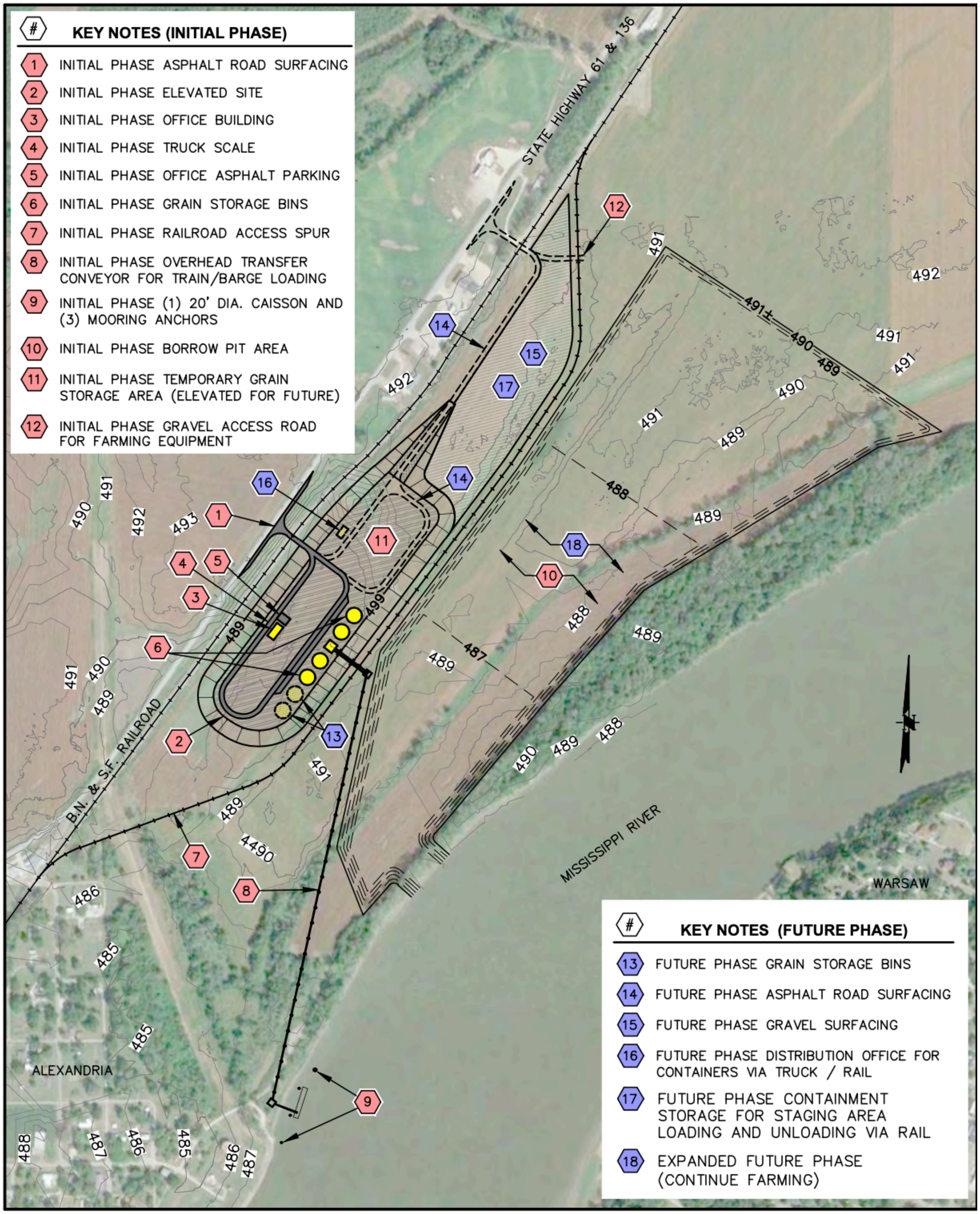
MECO ENGINEERING CO., INC.
mecoengineering.com
MO Engineering Lic. #000898 - IL Design Firm #184-001749

OFFICE LOCATIONS
HANNIBAL, MO
JEFFERSON CITY, MO
BRANSON, MO
PITTSFIELD, IL

CLARK COUNTY PORT AUTHORITY

OPTION 1A NORTH (NORTH OF ALEXANDRIA) OVERALL CONCEPTUAL PLAN

DESIGNED	DRAWN	CHECKED	APPROVED	RELEASED	SCALE	FILE NO.	PROJECT NO.	SHEET NO.
	R. HAYES				1"=800'	102868 OPT-1AN-1	102-868	



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CLARK COUNTY PORT AUTHORITY

OPTION 1A NORTH (NORTH OF ALEXANDRIA) CONCEPTUAL SITE PLAN

DESIGNED	DRAWN	CHECKED	APPROVED	RELEASED	SCALE	FILE NO.	PROJECT NO.	SHEET NO.
	R. HAYES				1"=800'	102868 OPT-1AN	102-868	

5.5 Indicative startup capital costs

The engineering cost estimate for **Option 1A North** reflects an indicative startup capex of **$66.9 million** for the base year (year 0). The $13.0 million capex for the agribulk business segment represents about 19.5% of the total project capex, the largest investment; followed by the $9.5 million for drybulk equivalent to 14.3% of the total project capex, making them the largest business investments. The $12.8 million for earthwork and site preparation, which include budget for to elevate the site 1 ft above the BFE and cut to address compensatory floodway storage, is also a large investment representing 19.1% of the total project capex

Container handling equipment includes budget for a crane (refurbished), forklifts, bombcarts, a container tilter machine, and a barge handling tug. While not strictly required, the local tug would provide operational flexibility and could also support the existing barge business. The cost estimate for land value is based on projections and not actual appraisals. The indicative startup capex paid by the terminal operator for the base year are detailed in *Section 6.3* and summarized in Table 21.

Table 21. Indicative startup capex paid by the terminal operator (base year)

Capex summary	Yr 0
Construction capex by business segment	
Container	1,550,000
Agribulk	13,065,625
Drybulk	9,550,000
Liquid bulk	6,250,000
Container handling equip. capex by business segment	
Container	3,350,000
Agribulk	-
Drybulk	-
Liquid bulk	-
Total capex by business segments	
Container	4,900,000
Agribulk	13,065,625
Drybulk	9,550,000
Liquid bulk	6,250,000
Common capex for all segments	
Earthwork & site preparation	12,807,848
Roads and parking	1,059,800
Utilities	255,000
Rail	3,505,000
Subtotal capex	**51,393,273**
Engineering, surveying, land acq. & permitting	9,773,900
Contingency	5,781,717
Total project capex	**$66,948,890**

Source: MECO Engineering and Bujanda & Allen, 2022.

These capex are *indicative* and we recommended that the proposed conceptual plan be reviewed, and modifications deemed necessary by the entities forming the Port Authority. It is recommended that a hydraulic model be assembled with pre and post development to ensure there is a net zero increase in water surface elevation within the Floodway or adjust the amount of fill and compensatory storage needed to meet the requirements of FEMA as a Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR) will be required. It is also recommended that environmental concerns be addressed for any clearances or additional surveys that will be requested with this proposed development. This study has identified the parcels to be acquired, the proposed improvements and the permits that will be required. It is recommended that coordination of all the components addressed above be pursued as funding is made available.

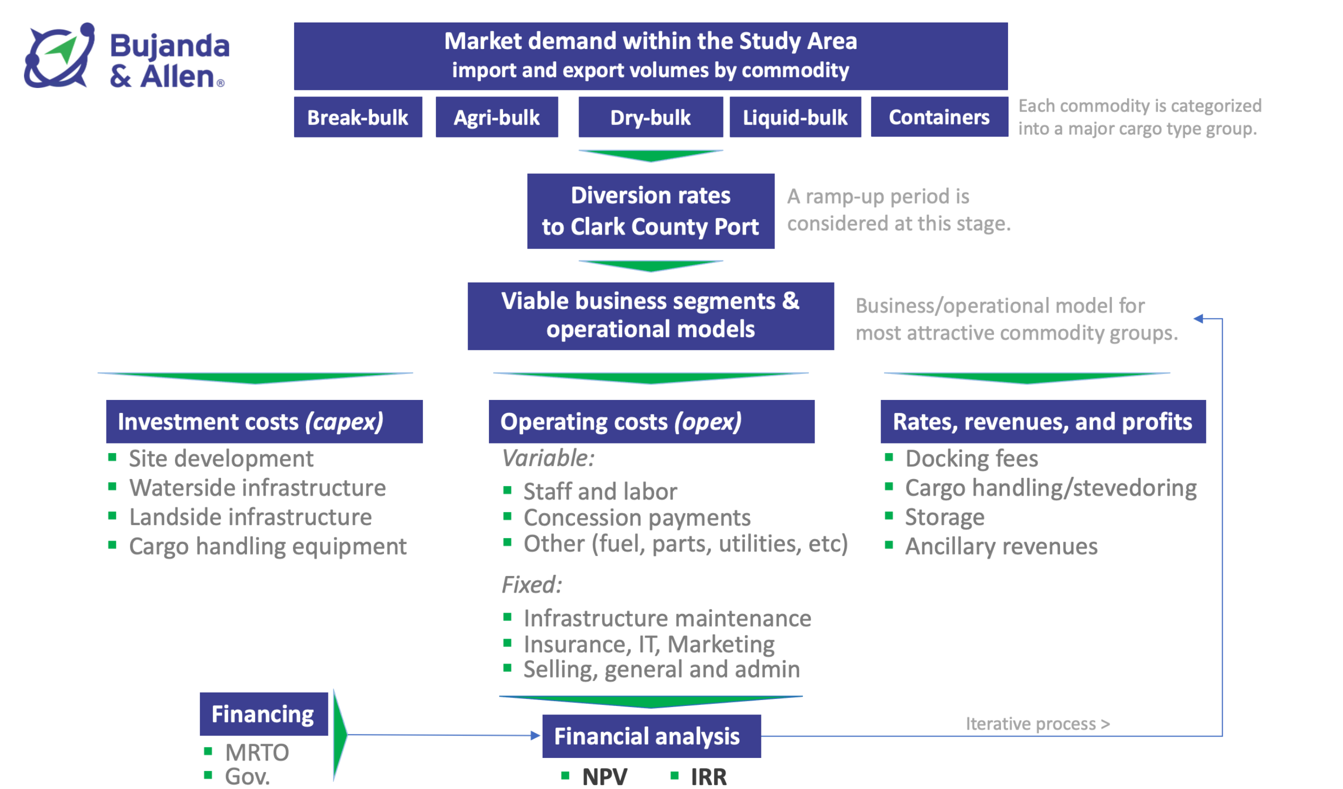
6. Financial analysis

This section presents the results of the financial analysis for the Clark County Port Project. This analysis assesses the viability of the project as a commercial enterprise. We describe the methodology applied, our financial model, and its underlying assumptions. Then, we present the Base Case scenario, including the projected demand for the Clark County Port Project, the necessary capital investments (capex), fixed and variable operating expenditures (opex), as well as the handling rates and associated revenues. Results indicate that the project, as conceived, barely meets financial feasibility criteria from a private investor perspective. Nonetheless, the project is expected to generate societal benefits that cannot be recouped by a private investor, as demonstrated by our BCA in *Section 7*.

6.1 Financial model description

Bujanda &Allen created a discounted cash flow model assuming the value for a private entity investing in the project development is entirely driven by its future cash flows. Throughput volumes are based on the market demand projections presented in *Section 3*. Such projections assume that only a growing fraction of the market will be captured in the early years of the project (i.e. the ramp-up period).[15] Revenues are based on the expected volumes and handling rates for each of the cargo flows (imports and exports) by cargo type moving thru the project. Variable capex and opex are also modeled as a function of the volume forecast. The model allows the development of scenarios where the share of capital investments can be split between private investment and government funding. The structure of the financial model is illustrated in Figure 68.

Figure 68. Structure of the financial model for the Clark County Port Project.



Source: Bujanda & Allen LLC, 2022.

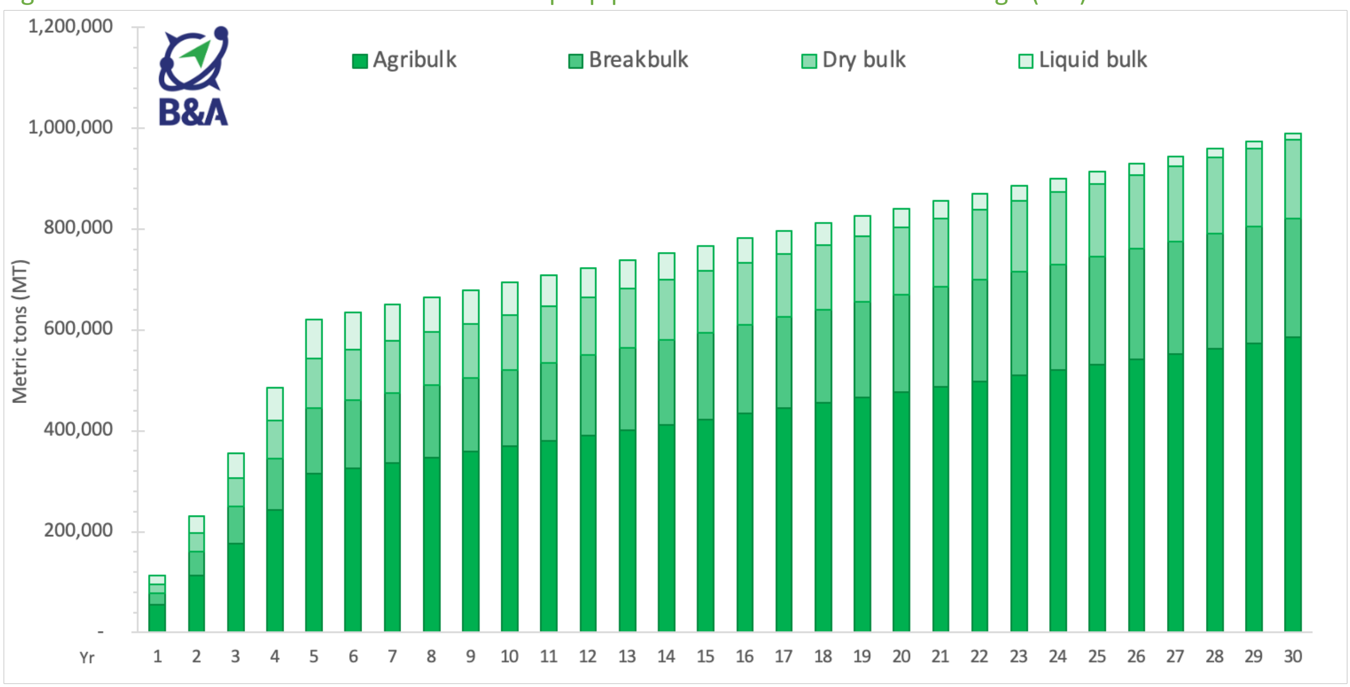
[15] The ramp-up refers to the amount of time it takes a new facility to become fully productive from when first opens operations. For this case, the Base Year (Yr 0), Construction Period is 1 year (between Yr 0 and Yr 1), Opening to the public in Yr 1 with a ramp-up of only 20% of the target volume, Yr 2 with 40%, Yr 3 with 60%, Yr 4 with 80%, and Years 5-30 with 100%.

The indicators used in the model to analyze the degree of financial feasibility are the Net Present Value (NPV) and the Internal Rate of Return (IRR). The financial model considers all cash flows at the end of each year over a 30-year analysis period. The capital structure is assumed to be 50% equity and 50% debt. The cost of equity is considered at 15%, based on rates a private investor would achieve as a strategic player. The cost of debt is assumed at 9% based on recent trends for comparable industry loans.[16] This results in a weighted average cost of capital (WACC) of 12.0%, which is used as the hurdle rate. Bujanda & Allen expects the WACC hurdle rate to be conservative over the 30-year analysis period.[17]

6.2 Base case volumes

Bujanda & Allen assumes a ramp-up period between the project opening in Yr 1 and Yr 5 when the project achieves a steady-state volume and operations for non-containerized and for containerized freight movements. Such ramp-up period is applied to the Base Case volume forecast, as illustrated in Figure 69 and Figure 70 respectively.

Figure 69. Base Case volume forecast and ramp-up period for *non-containerized* cargo (MT)



Source: Bujanda & Allen LLC, 2022.

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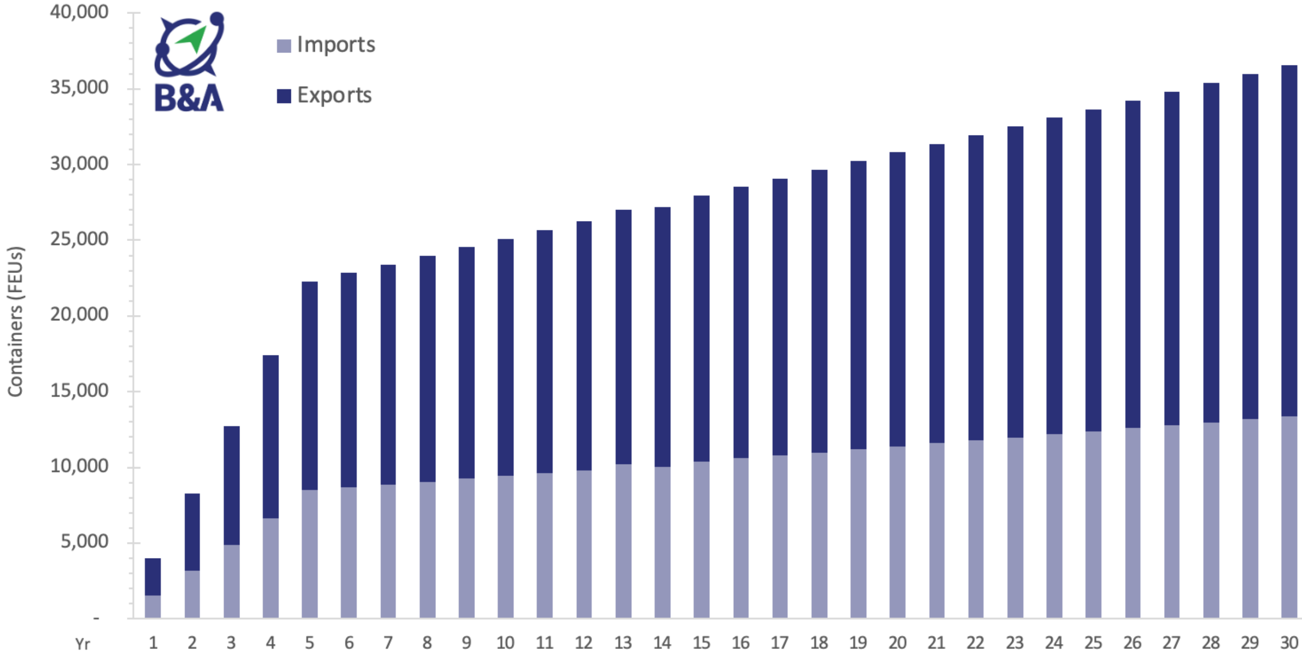
[16] Commercial Loan Direct, industrial property loan programs, December 2022: https://www.commercialloandirect.com/warehouse-mortgage-industrial-loans-warehouse-lending.html

[17] As of December 2022, borrowing costs are at the highest level since 2007 due to the 2022 hikes in the federal funds rates. COVID-19 sent the U.S. economy into a recession in February 2020 (before it was declared a pandemic in March 2020). Unemployment rose as high as 14.7% in April 2020—the highest since the Great Depression. Consequently, the U.S. government and the Federal Reserve took steps to mitigate the effects by providing fiscal stimulus and relief by increasing the money supply (M2) by 25% from December 2019 (prior to the pandemic) to December 2020, and an additional 14% from December 2020 to April 2022 (when M2 peaked)—a 39% increase in M2 from trough to peak. The unemployment rate was 3.7% as of August 2022. On May 2022, the Federal Reserve started raising rates to combat the high inflation after the 2020 and 2021 fiscal and monetary responses to the COVID-19 pandemic. Once inflation returns to pre-pandemic levels, Bujanda & Allen expects unemployment, the federal funds rates, and consequently borrowing costs will revert to the pre-pandemic, long-run trends (pending that the spread of COVID or new variants remains under control).

Figure 70. Base Case volume forecast and ramp-up for *containerized* cargo (FEUs)



Source: Bujanda & Allen LLC, 2022.

6.3 Business segments analyzed

6.3.1 Indicative capex

Bujanda & Allen developed scenario-based capex calculations utilizing the expected capital costs for the project. Given the size of the project, we assume that initial capex investment will take place in the base year (year 0) and that the project will be constructed in less than one year, opening to the public on year 1. Capex related to *handling equipment* consider only the minimum necessary to handle expected volumes.

Capex are organized by construction and equipment capex for each of the following business segments:

- **Container**—Budgets a total of $4.90 million related to the infrastructure needed to construct a dock barge where a crane to move containers between the landside and the waterside will operate. This assumes a 55 x 300 x 12 ft retired tank with reinforcement along with mooring piles, including crane reinforcement, spuds and wells, a barge breasting system with a slide line, and a 500 ft gangway. Regarding equipment, this budgets for a refurbished crane including a container spreader bar and installation and delivery, 2 forklifts, 3 bombcarts, a used barge-handling tug, and a container tilter machine to stuff containers on-site. A basic laydown area of 10 acres is considered tow work containers and breakbulk cargo and is expected to grow to 15 acres at the end of 30-year period based on the expected demand. (The model assumes investments for container handling equipment and laydown area take place based on the expected demand for future years).
- **Agribulk**—Budgets a total of $13.06 million for agribulk storage (silos) as well as inbound and outbound conveyance. This assumes 3 silos of 2,000 metric tons each are required to start operations (the model assumes new silos are built based on the expected demand). Additional items considered include a facility with scales and testing equipment, dryers, overhead conveyors at bins, piers and overhead conveyor to port, Caisson structure protections, mooring anchors, seed and mulch, electrical works for operation, site and lighting, and a truck dumping pit.
- **Drybulk**—Budgets a total of $9.55 million for drybulk storage bins as well as inbound and outbound conveyance of non-grains (minerals and fertilizers). This assumes one bin with a capacity of 2,000

metric tons is required to start operations and throughout the 30-year analysis period based on the expected demand. The budget also considers a truck dump pit, scales, and a conveyor system.

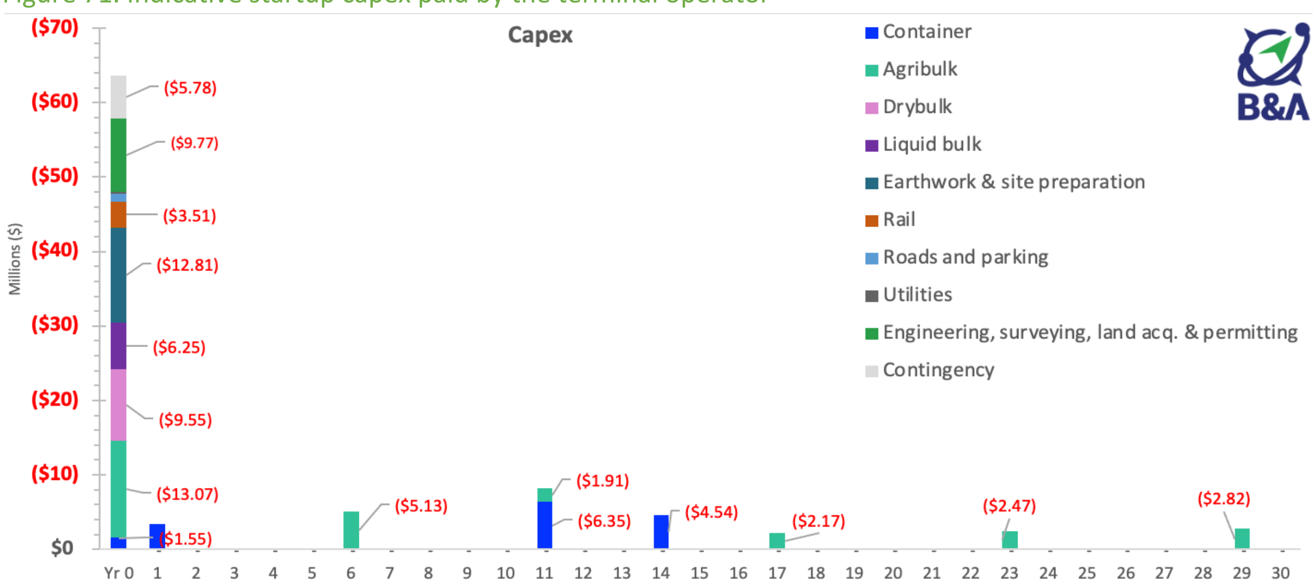
- **Liquid bulk**—Budgets a total of $6.25 million for liquid bulk storage as well as inbound and outbound conveyance. This assumes one tank with a capacity of 1,000 metric tons is required to start operations and throughout the 30-year analysis period based on the expected demand. The budget also considers a pipeline system and its related foundations with a length of 3,500 ft.

Common capex for all business segments include:

- **Earthwork & site preparation**—Budgets $12.80 million primarily for a cut to address compensatory floodway storage, and compacted fill to elevate site 1 ft above the BFE (including a 25% factor). Other elements include grading and finish of the elevated area, mobilization, and erosion control.
- **Rail**—Budgets $3.50 million for the construction of the 6,000 ft on-site rail spur, necessary to connect to the BNSF main line currently located near the project site. About 60% of this budget is for the rail track, 19% to a rail dump pit, 12% to five rail switches required for efficient railcar management, and 9% to a rail switch connecting the project site with the mainline. Other elements in this budget item include waterline extension site, railroad permits, electrical extension to the site.
- **Roads and parking**—Budgets $1.05 million primarily for road improvements to connect the entrance to U.S. Route 61, a 6 in aggregate base, a 3 in asphalt base course, and 2 in asphalt surface course. Other elements in this budget item include mobilization, erosion control, culverts, storm pipe for water collection, compaction, geotextile fabric, tack coat, and main parking.
- **Utilities**—Budgets $255 thousand primarily related to the waterline extension on-site and also considering a septic tank and underground electrical works. The provision of natural gas to the site is assumed to be at no-charge to the operator (with margin contract).
- **Engineering, surveying, land acquisition, and permitting**—Budgets $9.77 million primarily for basic engineering and surveying, and land acquisition of 298 acres. Other elements including river modeling and coordination with FEMA for floodway removal, environmental approval, coordination with railroads and permitting, waterline crossing fees, legal, and grant administration.
- **Contingency**—assumes 10% of the budget.

A summary for the startup capex modeled is shown in Figure 71. The net present value (NPV) of the capex over the 30-year analysis period, used as inputs in the benefit-cost analysis (BCA), are shown in Table 22.

Figure 71. Indicative startup capex paid by the terminal operator



Source: Bujanda & Allen LLC with data from MECO Engineers, 2022.

Table 22. Net present value of capex investment over 30 years

Inputs for BCA Model	Disc. Rate	NPV ($)
NPV of capex (Yr0 $)	0%	92,342,962
Discounted at:	3%	81,530,536
Discounted at:	7%	72,576,239

Source: Bujanda & Allen LLC, 2022.

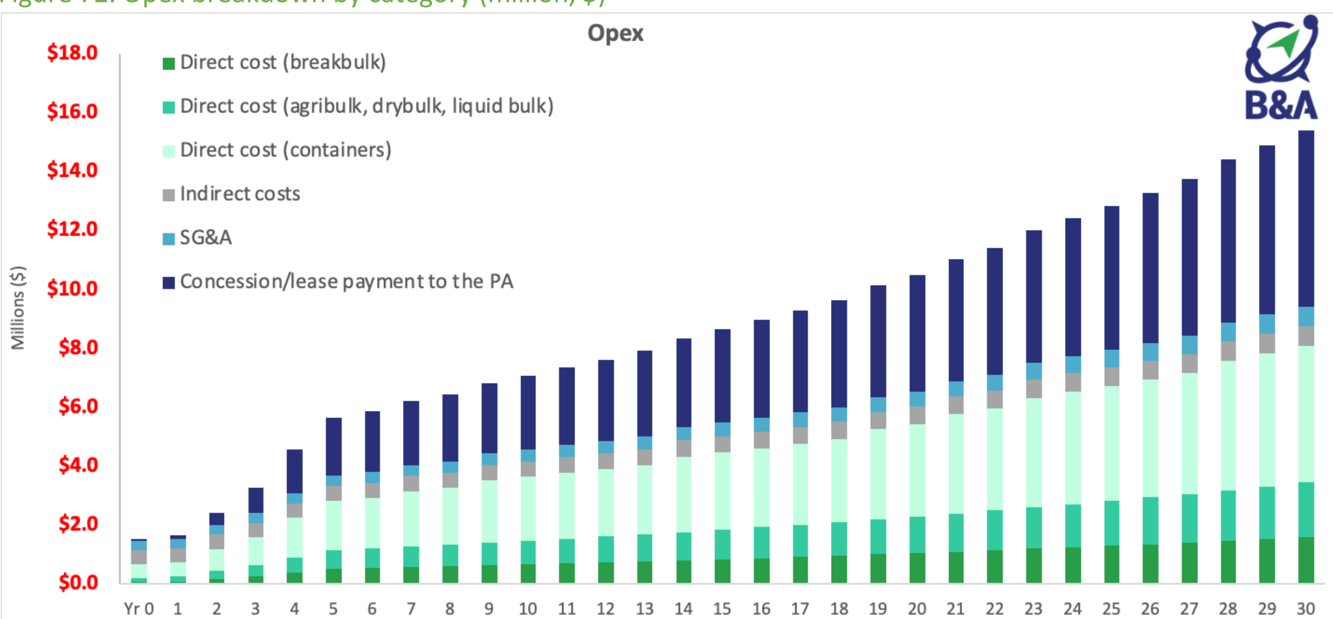
6.3.2 Indicative opex

Bujanda & Allen assumed the minimal operating expenses essential for the operation. Opex costs are modelled to start in Year 1, after construction has been finished, the facility opens to the public, and traffic volumes have started to flow thru the facility. Opex are grouped in three main categories based on their operational characteristics:

(i) Direct costs
(ii) Indirect costs, and
(iii) Selling, General, and Administrative (SG&A).

Variable expenses are calculated as a function of the expected volume for each of the cargo types and business segments analyzed (i.e. breakbulk, agribulk, drybulk, liquid bulk, and containers). Fixed expenses include indirect/overhead and SG&A and are only adjusted for inflationary changes. A summary of the opex breakdown by category is provided in Figure 72, and each category detailed in the following sections.

Figure 72. Opex breakdown by category (million, $)



Source: Bujanda & Allen LLC, 2022.

Direct costs

Bujanda & Allen considered variable labor costs based on operational (activities) similarities: (i) related to the conveyance of bulk cargoes (agribulk, drybulk, and liquid bulk), including mechanics, and (ii) stevedoring gangs, related to the movement of containers and breakbulk cargoes. Gangs are assumed to work based on the volume of cargo received for each type of cargo flow. Additionally, two permanent positions are budgeted for receiving and delivering on the landside: one is a driver for a toploader or forklift and the other as a clerk. The model utilizes a cost per unit (MT or container) calculation as it is assumed that the labor for container receiving and delivering can also be utilized for transloading services as the volumes for the barge operation would not necessitate a full-time employee for either operation. The composition of the gangs for bulk and container receiving and transloading along with the associated cost is shown in Table 23.

Table 23. Composition of specialized labor assumed for container and transload operations (variable cost)

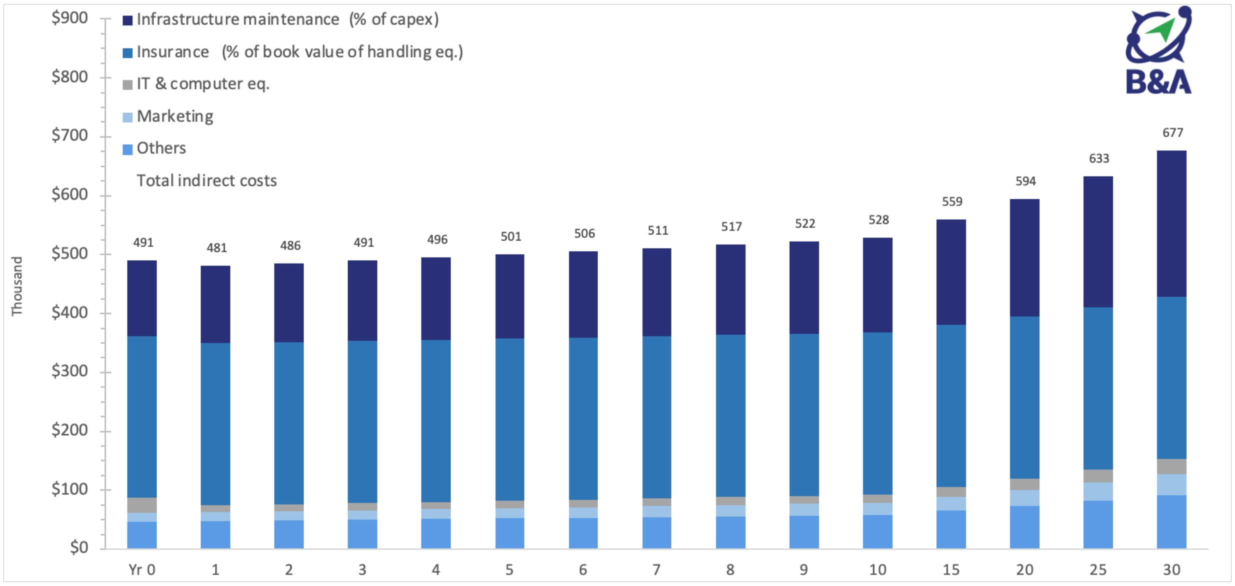
Activity table:	Volume driver	Productivity	Person Req.	Lab-hr/unit	$/Lab-hr	Cost$/Unit
Agribulk, drybulk, and liquid bulk (bulk cargoes)						
Chief	bulk cargoes	380	1	0.003	$58	**$0.17**
Conveyor operator	bulk cargoes	380	1	0.003	$58	**$0.17**
Labor/mechanics	bulk cargoes	380	3	0.008	$39	**$0.31**
Total non-container gang	bulk cargoes	380	5		**$47**	**$0.66**
Container & breakbulk						
Crane operator	container & breakbulk	13	**2**	0.16	$58	**$9.3**
Checker	container & breakbulk	13	**1**	0.08	$39	**$3.1**
Lasher/Barge Men	container & breakbulk	13	**2**	0.16	$39	**$6.3**
Dock man	container & breakbulk	13	**2**	0.16	$39	**$6.3**
Top-loaders	container & breakbulk	13	**1**	0.08	$58	**$4.6**
Drivers	container & breakbulk	13	**4**	0.31	$39	**$12.2**
Total stevedoring gang (container & breakbulk)	container & breakbulk	13	**12**		**$44**	**$41.8**
Container stuffing						
Toploader/forklift driver	container & breakbulk	13	**1**	0.08	$58	**$4.5**
Utility	container & breakbulk	13	**1**	0.08	$39	**$3.0**
Total transloading			**2**		**$49**	**$7.5**
Barge receive/dispatch						
Toploader/forklift driver	container & breakbulk	13	**1**	0.08	$58	**$4.5**
Clerk	container & breakbulk	13	**1**	0.08	$39	**$3.0**
Total receive/deliver			**2**		**$49**	**$7.5**

Source: Bujanda & Allen LLC, 2022.

Indirect/overhead and SG&A costs

- **Indirect/overhead**. Indirect and overhead expenses are assumed to be driven by staffing levels and costs. Once estimated for the operation, these costs are only expected to grow at the rate of inflation. Further explanation of the main indirect and overhead cost components is provided in the following bullets:
  - *Infrastructure maintenance*—considered as a 1% of the initial capex beginning in year 1.
  - *Insurance*—considered as a 10% of the book value of the cargo handling equipment.
  - *IT & computer equipment*—included minimal costs per employee for hardware and software.
  - *Marketing* – There is a small budget for additional marketing for this new COB operation.
  - *Other expenses*—assumed to be driven as a function of the number of professional staff, which remain fixed, and are composed of *General Business Expenses* (supplies, postage, communications, etc) and *Miscellaneous Overhead (*safety equip., tools, etc).

Figure 73. Indirect/overhead costs



Source: Bujanda & Allen LLC, 2022.

- **Selling, General Management, and Admin salaries (SG&A).** Salaries and overhead expenses are assumed to be driven by staffing levels and costs. In the early stage of the project, management and administrative staff is assumed to consist of:
  - 1 General manager with an annual loaded salary of $120,000
  - 1 Financial manager with an annual loaded salary of $85,000
  - 1 Office Admin with an annual loaded salary of $50,000
  - 1 Maintenance staff member with annual loaded salary $47,000

Figure 74. Selling, general management, and admin salaries (SG&A)

Source: Bujanda & Allen LLC, 2022.

Table 24. NPV of opex: inputs for the benefit-cost analysis

Inputs for BCA Model	Disc. Rate	NPV ($)
NPV of opex (in Yr0 $)	0%	271,633,218
Discounted at:	3%	155,473,958
Discounted at:	7%	82,742,081

Source: Bujanda & Allen LLC, 2022.

6.3.3 Handling rates

The assumptions for cargo handling rates that can be expected for the Clark County Port Project for import and export movement of freight are used to calculate the gross revenues for each business segment analyzed. Revenues begin in year 1 as the project opens to the public and volumes begin according to the ramp up period. The model assumes cargo handling rates grow every year according to the expected U.S. inflation rate plus a revenue escalator of 20 basis points on top of inflation. There is a revenue stream for storage and ancillary services (e.g. container stuffing, transloading, etc.) which is assumed as a percentage of total revenue. The cargo handling rates assumed in the financial model are included in Table 25.

Table 25. Handling rates used in the financial model

Handling rates charged by port	Input	Units
Non-containerized		
Breakbulk	$8.5	$/metric-ton
Agribulk	$7.0	$/metric-ton
Drybulk	$6.5	$/metric-ton
Liquid bulk	$4.5	$/metric-ton
Storage + ancilliary revenue	15%	% of Tot Rev
Containerized		
Container lift rate	$350	$/Box
Storage + ancilliary revenue	15%	% of Tot Rev

Source: Bujanda & Allen LLC, 2022.

6.4 Financial analysis

Based on the five cargo types and their associated business segments, we modeled agribulk, drybulk, and liquid bulk as stand-alone business segments; furthermore, we evaluated different combinations of cargo types for a total of nine business models. Our financial modeling leads us to conclude that the container business segment is the most important for project feasibility. The higher margins involved per movement and lower associated capex are higher contributors to positive earnings and NPV.

Results from the financial model show poor feasibility indicators for agribulk, drybulk, and liquid-bulk as stand-alone business segments. Nonetheless, agribulk merits further analysis because its expected volumes are the most significant and associated gross revenues are considerable, its operating margin in year 5 is positive, and its associated capex have only a small impact on overall project cost and feasibility results. A summary-level of key outputs from the financial model for each of the nine business models analyzed are illustrated in Table 26.

Table 26. Financial modeling results (million, $)

Scen. ID	Business segments operating	Equip. & storage capex Yr 0	Construction Capex Yr 0	Tot. startup capex Yr0	Gross rev. Yr 5	Total margin Yr5	EBITDA Yr5	EBITDA NPV	Cash flow NPV	IRR %	Yrs to payback
1	Container & breakbulk	(1.6)	(30.3)	(31.8)	11.5	9.1	6.6	49.3	8.6	15.6%	9
2	Agribulk	(13.1)	(31.4)	(44.5)	2.9	0.4	(2.2)	(16.0)	(45.9)	0.0%	> 30
3	Drybulk	(9.6)	(31.1)	(40.6)	0.8	(1.6)	(4.2)	(31.7)	(51.6)	0.0%	> 30
4	Liquid-bulk	(6.3)	(30.8)	(37.0)	0.1	(2.3)	(4.7)	(35.9)	(52.1)	0.0%	> 30
5	Container, breakbulk, & agribulk	(14.6)	(31.6)	(46.2)	14.4	12.0	9.3	70.2	10.8	15.2%	10
6	Container, breakbulk, & drybulk	(11.1)	(31.3)	(42.4)	12.3	9.9	7.3	54.4	5.1	13.7%	10
7	Container, breakbulk, & liquid bulk	(7.8)	(30.9)	(38.7)	11.7	9.3	6.8	50.3	4.6	13.7%	10
8	Container, breakbulk, agribulk, & drybulk	(24.2)	(32.6)	(56.7)	15.2	12.8	10.0	75.3	7.3	13.8%	11
9	Container, breakbulk, agribulk, drybulk, liquid bull	(30.4)	(33.2)	(63.6)	15.3	12.9	10.2	76.2	3.3	12.8%	11

Source: Bujanda & Allen LLC, 2022.

Overall, business models that show an IRR above 12% characterize business opportunities that deserve further analysis; particularly, business models 8, 5, and 1, ranked by cashflow NPV. As of December 2022, a hurdle rate of 12% can be viewed as conservative given that borrowing costs are at the highest level since 2007 due to the 2022 hikes in the federal funds rates to fight inflation. Once inflation returns to pre-pandemic levels, Bujanda & Allen expects interest rates and consequently the cost of capital will revert to the pre-pandemic, long-run trends, which would increase the valuation and attractiveness of all business segments.

The results for the business models with the highest NPVs (scenarios 5, 1, and 8, ranked by EBITDA) are summarized next:

- **Container, breakbulk, agribulk, & drybulk [8]—**Generates an EBITDA of $75.3 million and net income of $7.3 million. The IRR is 13.8% only 1.8 percentage points over the 12% WACC. The model estimates it would take 11 years for the project investment to break even.
- **Container, breakbulk, & agribulk [5]—**Produces an EBITDA of $70.2 million and net income, after considering interest, taxes, depreciation, and amortization over the life of the project, of $10.8 million. The IRR is 15.2% only 3.2 percentage points over the 12% WACC. The model estimates it would take 10 years for the project investment to break even.
- **Container & breakbulk [1]—**Produces an EBITDA of $49.3 million and net income of $8.6 million. The IRR is 15.6% only 3.6 percentage points over the 12% WACC. The model estimates it would take 9 years for the project investment to break even.

A visual summary of the key outputs from the financial model is shown in the following figures.

Figure 75. Financial modelling summary of outputs for **container, breakbulk, agribulk, and drybulk** (million, $)

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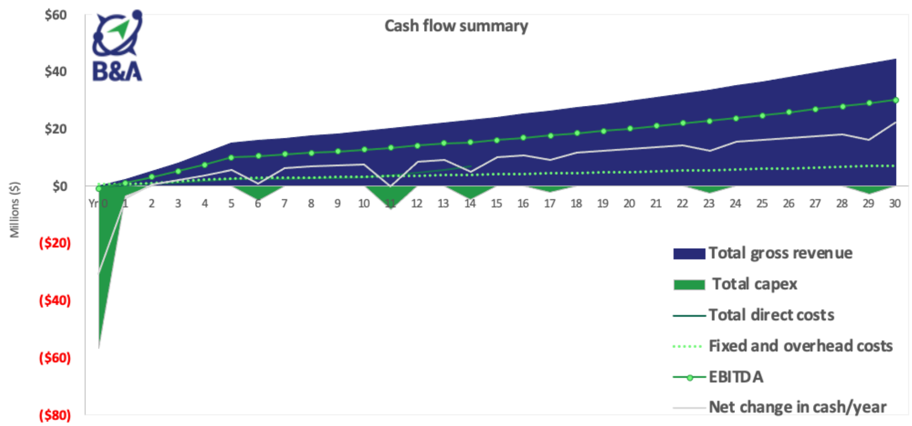
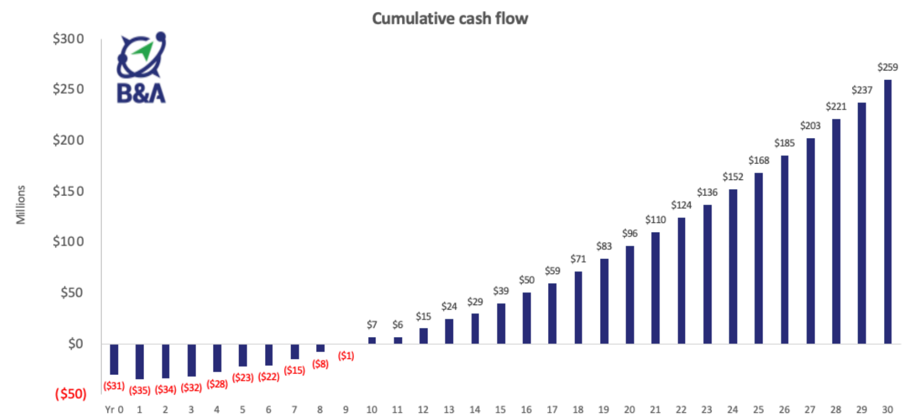
Model outputs

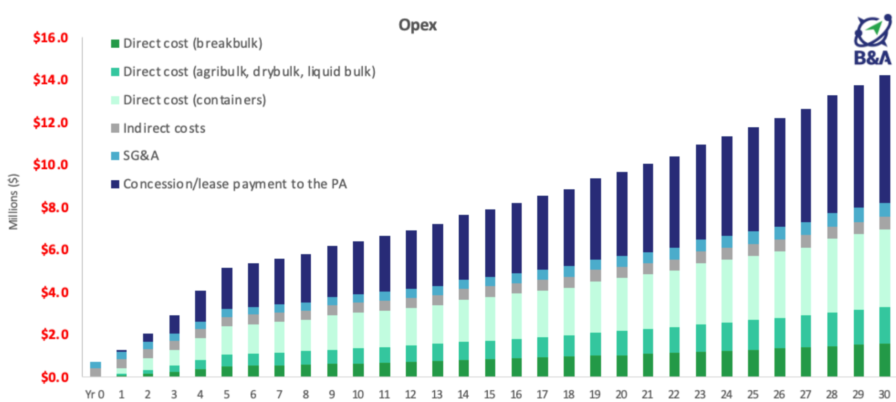
	Discount rate	EBITDA NPV	Cash Flow NPV
Discotuned at WACC	12.0%	$75.3	$7.3
		IRR	13.8%

Total startup capex Yr 0 (million, $)	(56.7)
Return on total assets	133%
No of yrs w positive cash flow	28
Years to payback	11

Summary of outputs (million, $)	Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 10	Yr 15	Yr 20	Yr 30
Gross revenue	0.0	2.5	5.2	8.3	11.6	15.2	19.3	24.1	29.9	44.5
Total costs	(0.7)	(1.3)	(2.1)	(2.9)	(4.1)	(5.2)	(6.4)	(7.9)	(9.7)	(14.2)
Total margin	0.0	2.0	4.3	7.0	9.7	12.8	16.2	20.3	25.2	37.5
EBITDA	(0.7)	1.2	3.2	5.3	7.5	10.0	12.9	16.2	20.2	30.3
Net income	(3.4)	(2.0)	(0.6)	1.0	2.5	4.4	6.5	8.8	11.9	20.3
Capex (up to yr):										
Related to indiv. busnss segments	(24.2)	(3.4)	0.0	0.0	0.0	0.0	(5.1)	(12.8)	(2.2)	(5.3)
Related to overall project	(32.6)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total capex (up to yr)	(56.7)	(3.4)	0.0	0.0	0.0	0.0	(5.1)	(12.8)	(2.2)	(5.3)







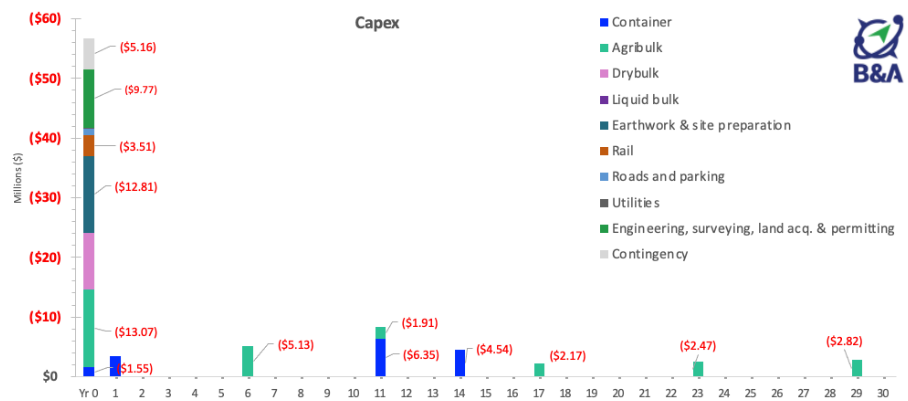


Figure 76. Financial modelling summary of outputs for ***container***, ***breakbulk***, and ***agribulk*** (million, $)

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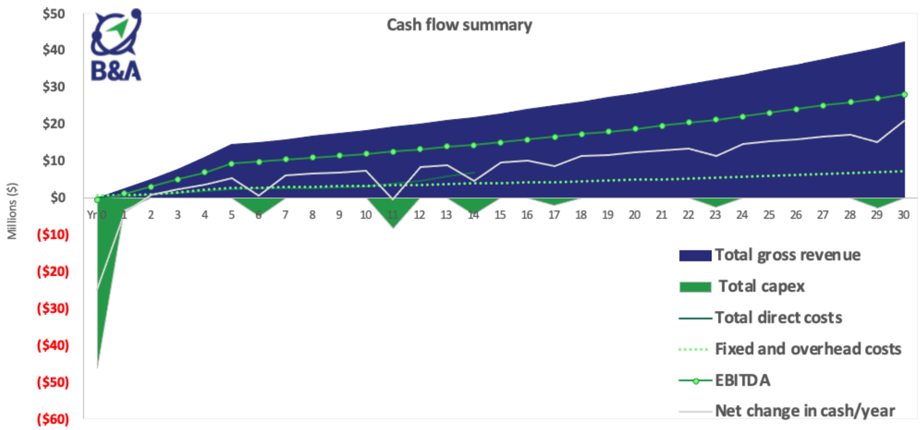
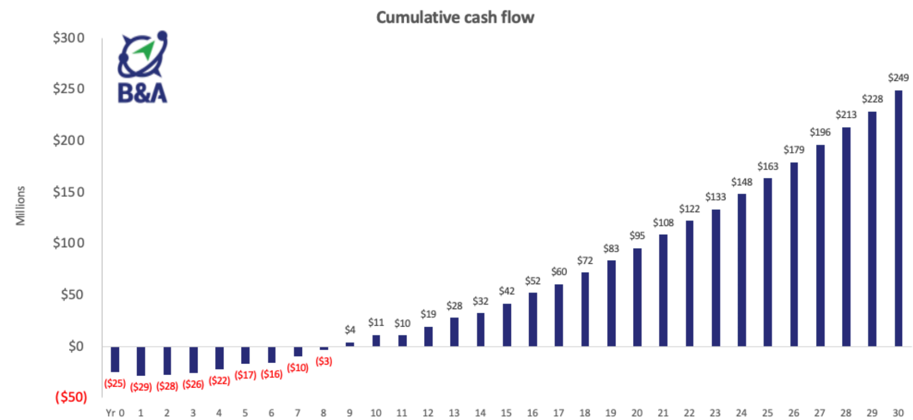
Model outputs

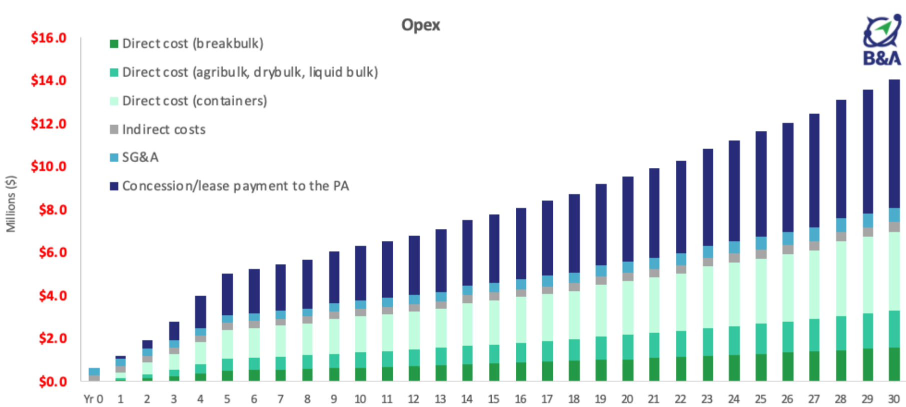
	Discount rate	EBITDA NPV	Cash Flow NPV
Discotuned at WACC	12.0%	$70.2	$10.8
		IRR	15.2%

Total startup capex Yr 0 (million, $)	(46.2)
Return on total assets	152%
No of yrs w positive cash flow	28
Years to payback	10

Summary of outputs (million, $)	Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 10	Yr 15	Yr 20	Yr 30
Gross revenue	0.0	2.3	4.9	7.8	10.9	14.4	18.3	22.9	28.3	42.2
Total costs	(0.6)	(1.2)	(1.9)	(2.8)	(4.0)	(5.0)	(6.3)	(7.8)	(9.6)	(14.1)
Total margin	0.0	1.9	4.0	6.5	9.1	12.0	15.2	19.1	23.6	35.2
EBITDA	(0.6)	1.2	3.0	5.0	7.0	9.3	12.0	15.1	18.7	28.1
Net income	(2.8)	(1.4)	(0.2)	1.3	2.7	4.5	6.4	8.5	11.3	19.0
Capex (up to yr):										
Related to indiv. busnss segments	(14.6)	(3.4)	0.0	0.0	0.0	0.0	(5.1)	(12.8)	(2.2)	(5.3)
Related to overall project	(31.6)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total capex (up to yr)	(46.2)	(3.4)	0.0	0.0	0.0	0.0	(5.1)	(12.8)	(2.2)	(5.3)







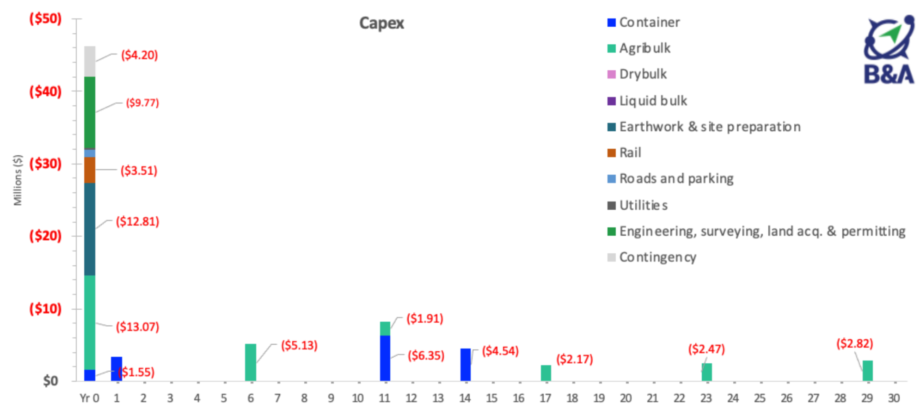


Figure 77. Financial modelling summary of outputs for ***container*** and ***breakbulk*** (million, $)

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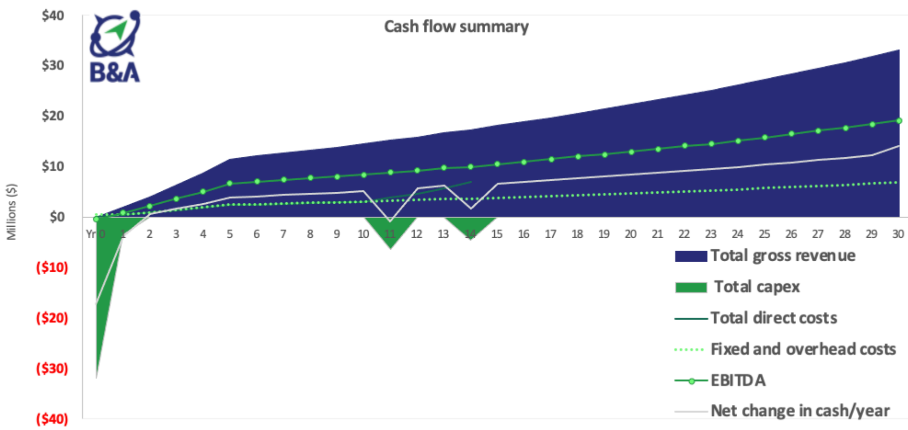
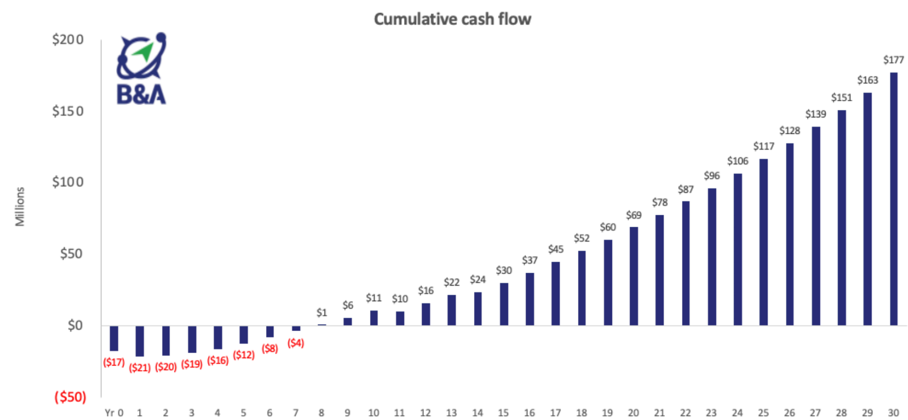
Model outputs

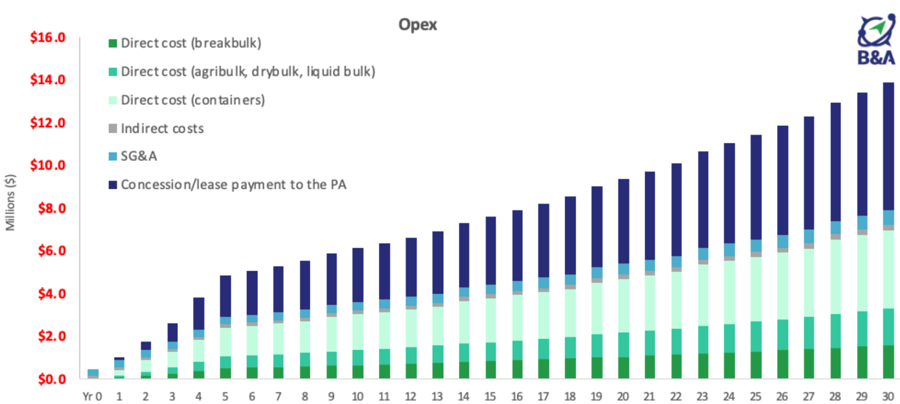
	Discount rate	EBITDA NPV	Cash Flow NPV
Discotuned at WACC	12.0%	$49.3	$8.6
		IRR	15.6%

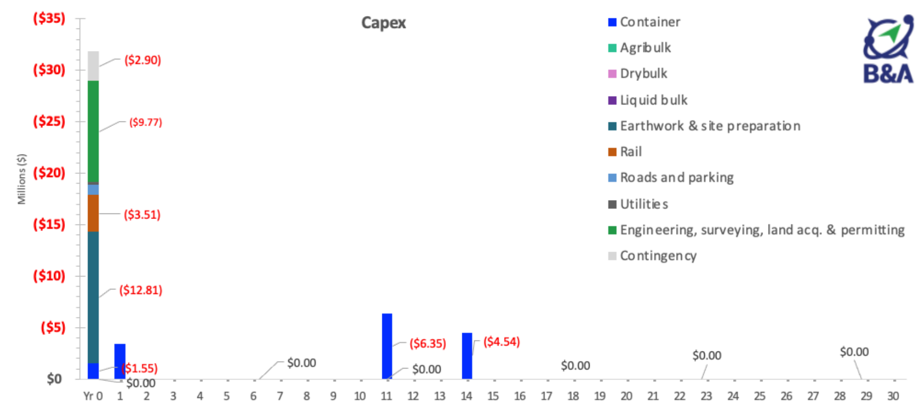
Total startup capex Yr 0 (million, $)	(31.8)
Return on total assets	155%
No of yrs w positive cash flow	28
Years to payback	9

Summary of outputs (million, $)	Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 10	Yr 15	Yr 20	Yr 30
Gross revenue	0.0	1.9	4.0	6.3	8.8	11.5	14.5	18.1	22.3	33.1
Total costs	(0.5)	(1.0)	(1.8)	(2.6)	(3.8)	(4.9)	(6.1)	(7.6)	(9.4)	(13.9)
Total margin	0.0	1.5	3.1	5.0	7.0	9.1	11.5	14.3	17.6	26.1
EBITDA	(0.5)	0.9	2.2	3.7	5.0	6.6	8.4	10.5	12.9	19.2
Net income	(1.8)	(0.9)	0.0	1.1	2.1	3.3	4.6	6.0	7.9	13.1
Capex (up to yr):										
Related to indiv. busnss segments	(1.6)	(3.4)	0.0	0.0	0.0	0.0	0.0	(10.9)	0.0	0.0
Related to overall project	(30.3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total capex (up to yr)	(31.8)	(3.4)	0.0	0.0	0.0	0.0	0.0	(10.9)	0.0	0.0









6.5 Key takeaways

The container business segment is the most important for project feasibility, given the higher margins involved per movement, lower associated capex, and expected levels of traffic for this cargo type. Commingling breakbulk with container operations by sharing cargo handling and storage infrastructure helps to generate greater port efficiencies. As stand-alone business segments, agribulk, drybulk, and liquid-bulk show poor feasibility indicators. Liquid bulk shows poor feasibility indicators given the lower volumes.

Agribulk is the cargo type with the highest expected volumes over the entire analysis period. With more refined assumptions, agribulk might increase its financial viability. For example, changes in the capital structure and further capex refinements based on actual engineering designs, might improve the total margins and overall profitability of this business segment.

The business model where the project operates as a multipurpose port (i.e. container, breakbulk, agribulk, and drybulk) generates the largest EBITDA, of $75.3 million and a net income of $7.3 million. Although institutional investors might not find the expected project's returns (IRR of 15% over a 12% WACC based on a 50/50 debt/equity ratio) to be attractive, a strategic player who could profit non-financially (e.g. gain market share, integrate vertically or across different modes, control market access, etc), might find the project more attractive. With a rail connection and the ability to load railcars, the port would have the ability to operate as a dry port when the river levels are too low and is not feasible to operate barges.

Since moving freight by water is the more green and least expensive transportation mode, marine highway projects, such as the Clark County Port Project, generate societal benefits that cannot be recoup by private investors. Aggregate economic benefits and direct impacts include freight transportation costs savings, freight emission cost savings, safety cost savings, state of good repair cost savings, and job creation, which are analyzed in detail in *Section 7*.

The proposed multimodal port would help to enhance the economic environment for traded and non-traded sector businesses in central Missouri by improving the cost of doing business in the region. With these goals in mind, NEMO RPC could work with state and regional economic development agencies to develop a targeted plan to attract businesses to the port, while at the same time funding assistance is procured. Once funding assistance is secured, the attractiveness to a private investor can be expected to increase substantially.

Box 2. MoDOT Partnership financing options

The MoDOT has established various mechanisms for successful public-public and public-private partnerships (P3s). These expand financing options for transportation projects that serve a public purpose, including: highway and rail projects and water transportation facilities. The benefits to a project assisted by these partnerships may include: inflation cost savings, early economic and public benefits, financing tailored to the project's needs, and a reduced cost of project financing. One example is the Port Capital Improvement Program, which provides capital grants to public port authorities to assist with capital expenditures, such as dock construction, mooring dolphins, access improvements (e.g. rail connectors, road access improvements), utility extensions, and site development. Other resources include federal grants, transportation development districts, cost-sharing programs, among others.

Source: MoDOT, https://www.modot.org/partnership-development, 2022.

7. Benefit-cost analysis

This section describes the Benefit-Cost Analysis (BCA) for the Clark County Port Project. Our BCA methodology systematically identifies, measures, and analyzes the monetized dollar value of the benefits and costs anticipated to result from the project in accordance with the standards and principles set forth by the USDOT and MARAD. Benefits elements include operating public advantages, such as lower freight transportation costs (route efficiency), lower emissions, safety and accident reduction, and good condition. Cost elements include operational costs, maintenance costs for the facility, and capital costs for construction and equipment. The next sections explore each of these benefits and costs, as well as the underlying assumptions and modeling results, such as B/C ratios.

7.1 BCA framework and project financial plan

7.1.1 BCA framework

Bujanda & Allen developed a BCA Model and its assumptions based on guidelines and general principles provided by two main documents:

- *Port Planning and Investment Toolkit: Marine Highway Projects Module (PP&IT)*. U.S. Department of Transportation, MARAD, and AAPA, August 2020.[18]
- *Benefit Cost Analysis (BCA) Guidance for Discretionary Grant Programs*. Office of the Secretary U.S. Department of Transportation, March 2022.[19]

Based on these guidelines, the first step of our BCA was to verify that the goals of the project were aligned with the strategic goals of MARAD's Marine Highway Program (*Sections 1-6)*. The second step analyzed the financial feasibility of the Clark County Port Project to implement barge service in a realistic, profit-oriented manner (*Section 7.1.2 Project Financial Plan*). The third step involved gathering the data inputs for each of the variables required to quantify the project benefits from the sources recommended by the USDOT and MARAD application guidelines. These variables in combination with the costs savings derived from the traffic volumes diverted from rail to barge comprise the benefits module of our model, which is the fourth step of our approach.

These benefits are broken down into the following: freight transportation, freight emissions, safety, and state of good repair, each explained next.

- **Freight transportation cost savings (route cost savings)**—This benefit captures the cost savings from transporting goods over the proposed barge route via the Clark County Port Project as opposed to the incumbent routes via railroad to/from the major gateway ports. The inputs used in the estimation of these benefits were described in *Section 4*. Benefits are calculated by multiplying freight volumes over each route by their corresponding unit operating costs for each mode involved on each route (i.e. FEU x $/FEU for containers and MT x $/MT for non-containerized for ocean, rail, truck, and barge). The transportation costs for the incumbent routes (without project) minus the costs via the Clark County Port route (with project) capture the net reduction in freight transportation costs (i.e. the net benefits from the project for freight transportation).

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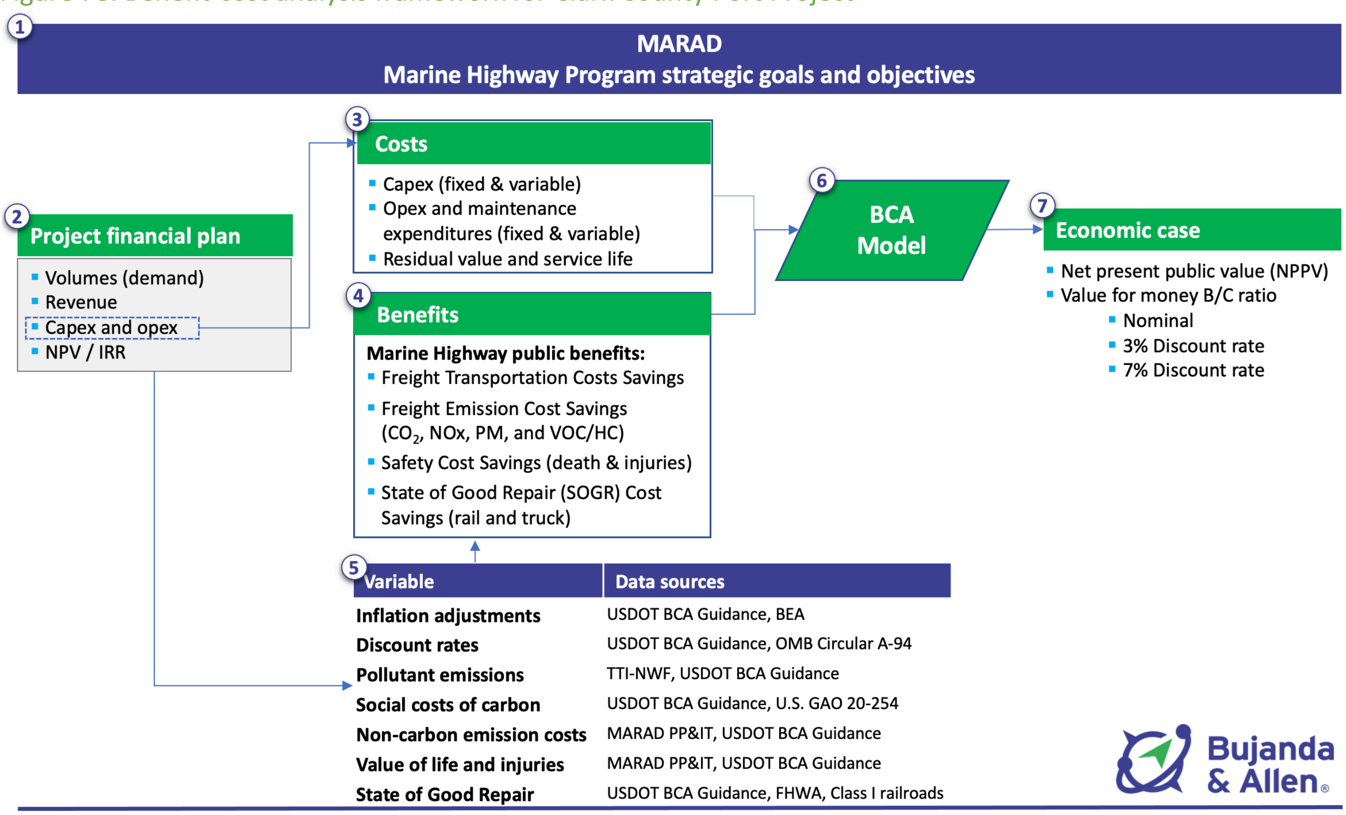
[18] *Port Planning and Investment Toolkit: Marine Highway Projects Module (PP&IT)*. U.S. Department of Transportation, MARAD, and AAPA, August 2020 (updated October 7, 2020), available online at: https://www.maritime.dot.gov/grants-finances/marine-highways/port-planning-and-investment-toolkit-marine-highway-projects-module.

[19] *Benefit Cost Analysis (BCA) Guidance for Discretionary Grant Programs*. Office of the Secretary U.S. Department of Transportation, March 2020 (updated November 30, 2022), available online at: https://www.transportation.gov/office-policy/transportation-policy/benefit-cost-analysis-guidance-discretionary-grant-programs-0.

- **Carbon emissions**—This category of project benefits captures the net savings in carbon (CO2) emissions resulting from ton-miles saved due to freight diversion from the incumbent routes (truck + rail) to the marine highway service (truck + barge) alternative.
- **Non-carbon emissions**—This category include damage costs associated with hydrocarbons and volatile organic compounds (VOC), nitrogen oxides (NOx), and particulate matter (PM) emissions resulting from ton-miles saved due to freight diversion from the incumbent routes (truck + rail) to the barge service (truck + barge) alternative.
- **Safety**—This category of project benefits captures the net savings in traffic crash costs resulting from ton-miles saved due to freight diversion from the incumbent routes (truck + rail) to the marine highway service (truck + barge) alternative.
- **State of good repair**—This benefit category captures the net savings in pavement and rail track maintenance costs resulting from ton-miles saved due to freight diversion from the incumbent routes (truck + rail) to the marine highway service (truck + barge) alternative.

Capex and opex from the project financial model are incorporated into the BCA Model. For the last step of our framework, the BCA Model estimates the net present public value (NPPV) and benefit/cost ratios (B/C). When the B/C ratio is greater than one, viability for the economic case of the project is confirmed (i.e. public benefits/societal value from the project are greater than its costs). The model calculates costs based on the incumbent routes (without project) and cost savings derived from the volume of freight diverted from rail to barge (with project) and the mileage associated with each route and mode. The BCA framework applied to the Clark County Port Project is shown in Figure 78.

Figure 78. Benefit-cost analysis framework for Clark County Port Project



Source: Bujanda & Allen LLC, 2022.

7.1.2 Project financial plan

Bujanda & Allen constructed a financial model incorporating the outputs of the market demand projections for the Clark County Port Project, capex, opex, and potential rates to analyze the financial viability of the project from a private investor perspective. Indicative quotes and estimates were obtained from independent research, online sources, and third parties. A detailed description of the project financial plan is included in *Section 6*. The capex and opex components that cover our BCA Model are explained next.

Capex

Bujanda & Allen developed scenario-based capex calculations utilizing the initial capital costs estimated by MECO Engineers (*Section 6.3.1*). Given the size of the investment, it is reasonable to assume that the project will be constructed in less than one year; hence, initial capex costs are modeled to occur all in Year 1. Capex related to *handling equipment* consider only the minimum necessary to handle the expected volumes for each business segment. Capex related to *construction and civil works* consider only the minimum necessary for the business to operate. Based on the Base Case volumes, our model indicated no need for further expansion capex related to *construction and civil works.* Based on *Scenario 8*, in which container, breakbulk, agribulk, and drybulk facilities are developed, the indicative total capex for the 30-year period is at $85.5 million. These are also discounted at the 3% and 7% for the BCA per USDOT guidelines, as shown in Table 27.

Opex

Bujanda & Allen assumed the minimum operating expenses necessary for the operation. Opex costs are modelled to begin in Year 2 which is when construction has completed, the facility opens to the public, and traffic volumes begin. Opex are grouped in three main categories according to their operational characteristics:

(i) Direct costs for containers
(ii) Indirect costs
(iii) Selling, General and Administrative (SG&A)

Variable expenses are calculated as a function of the expected volume for the container flows and transloading—labeled as direct costs for containers. Fixed expenses include indirect/overhead and SG&A and are only adjusted for inflationary changes. Based on the Base Case volumes, our model indicated $247.3 million in total opex for the 30-year period, which are discounted at the 3% and 7%, as illustrated in Table 27.

Table 27. Clark County Port Project capex and opex net present value at different discount rates.

Inputs for the BCA Model	Discount rate	Capex ($)	Opex ($)
Net present value (in Yr 0 $)	0%	85,541,662	247,390,332
Discounted at:	3%	74,830,517	141,037,616
Discounted at:	7%	66,010,557	74,538,285

Source: Bujanda & Allen LLC, 2022.

Project financial plan summary

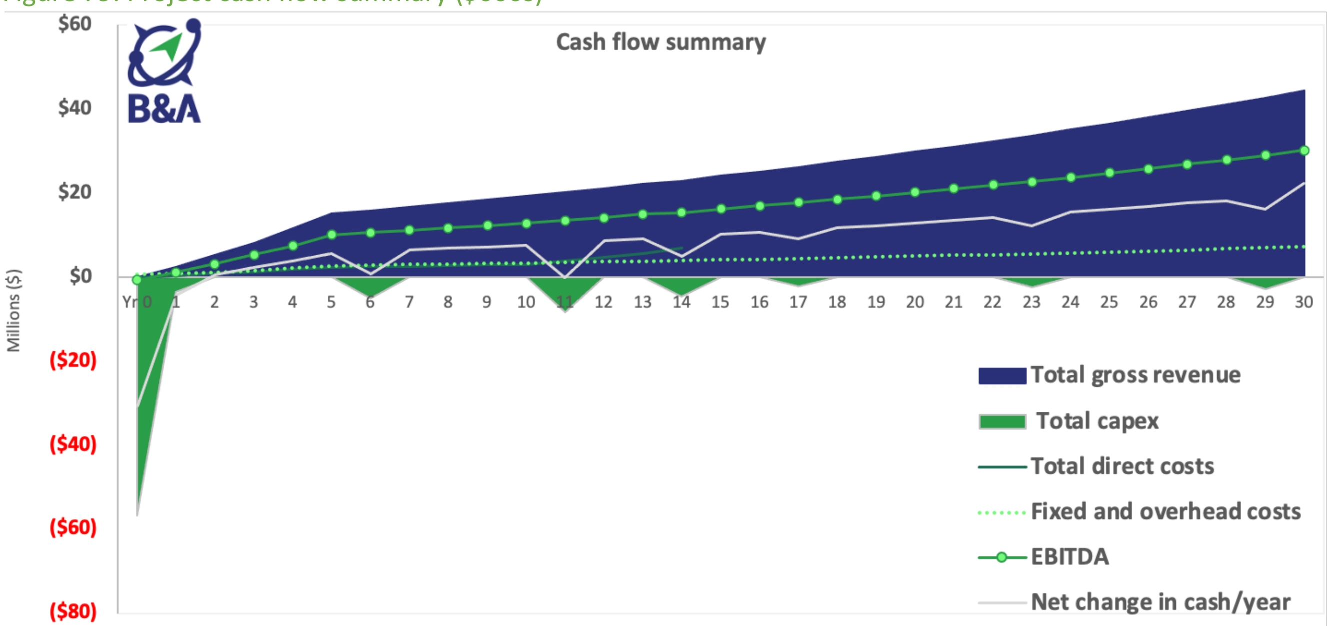
The business model where the project operates as a multipurpose port (i.e. Scenario 8—container, breakbulk, agribulk, and drybulk) generates the largest EBITDA, of $75.3 million and a net income of $7.3 million. The IRR is 13.8% only 1.8 percentage points over the 12% WACC. The model estimates it would take 11 years for the investment to break even. A summary of the key outputs from the financial model is shown in Table 28. The cash flow statement indicates that the project will reach a positive cash flow by year 3, as shown in Figure 79 along with other financial indicators.

Table 28. Project financial plan summary ($000s).

Summary of outputs (million, $)	Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 10	Yr 15	Yr 20	Yr 30
Gross revenue	**0.0**	**2.5**	**5.2**	**8.3**	**11.6**	**15.2**	**19.3**	**24.1**	**29.9**	**44.5**
Total costs	(0.7)	(1.3)	(2.1)	(2.9)	(4.1)	(5.2)	(6.4)	(7.9)	(9.7)	(14.2)
Total margin	**0.0**	**2.0**	**4.3**	**7.0**	**9.7**	**12.8**	**16.2**	**20.3**	**25.2**	**37.5**
EBITDA	**(0.7)**	**1.2**	**3.2**	**5.3**	**7.5**	**10.0**	**12.9**	**16.2**	**20.2**	**30.3**
Net income	**(3.4)**	**(2.0)**	**(0.6)**	**1.0**	**2.5**	**4.4**	**6.5**	**8.8**	**11.9**	**20.3**
Capex (up to yr):										
Related to indiv. busnss segments	(24.2)	(3.4)	0.0	0.0	0.0	0.0	(5.1)	(12.8)	(2.2)	(5.3)
Related to overall project	(32.6)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total capex (up to yr)	**(56.7)**	**(3.4)**	**0.0**	**0.0**	**0.0**	**0.0**	**(5.1)**	**(12.8)**	**(2.2)**	**(5.3)**

Source: Bujanda & Allen LLC, 2022.

Figure 79. Project cash flow summary ($000s)



Source: Bujanda & Allen LLC, 2022.

7.2 BCA model assumptions and outputs

7.2.1 Freight transportation costs (routes utilized)

Bujanda & Allen computed the route costs for containerized and non-containerized goods by mode—ocean, truck, rail, and barge—and then compared them to the routes that freight would take via the Clark County Port Project. Once cost inputs were calculated for every cost component of each route, all costs were converted to dollars per FEUs ($/FEU) for containers and ($/MT) non-containerized cargo, and multiplied times the estimated divertible volume (in FEUs and MTs respectively) for each tradelane and gateway combination (*Section 4*). The net reduction in freight transportation costs due to the displacement of railcars vs the marine highway alternative is captured by subtracting the total route costs for the existing routes (without project) from the total route costs via the Clark County Port Project routes (with project).

The values and key inputs and sources used in estimation of this benefit category include:

- Freight transportation costs ($/FEU and $/MT) per mode involved (truck, rail, barge) for each route.
- Freight volume ($/FEU and $/MT) diverted to the marine highway via the Clark County Port.
- Truck, rail, and barge payload factors to convert MT to FEUs (as described in *Section 5.3*).

Total net savings in freight transportation costs resulting from the Clark County Port Project over the 30-year analysis period, account for $654 million (in Yr 0 $), equivalent to $382 million in benefits at a 3% discount rate, and to $207 million at a 7% discount rate, as illustrated in Table 29.

Table 29. Freight transportation cost benefits from the Clark County Port Project.

		Total freight transportation cost savings (in Yr0 $, thousands)			NPV of TOTAL freight transportation cost savings ($000)*	
Year	Calendar year	Imports	Exports	TOTAL	3.0%	7.0%
0	2023	$ -	$ -	$ -	$ -	$ -
1	2024	1,725	493	2,218	2,154	2,073
2	2025	3,623	1,044	4,667	4,399	4,076
3	2026	5,702	1,653	7,354	6,730	6,003
4	2027	7,968	2,323	10,291	9,143	7,851
5	2028	10,435	3,057	13,492	11,638	9,620
6	2029	10,926	3,217	14,143	11,845	9,424
7	2030	11,436	3,383	14,819	12,049	9,229
8	2031	11,965	3,554	15,519	12,251	9,032
9	2032	12,510	3,730	16,241	12,447	8,834
10	2033	13,071	3,912	16,983	12,637	8,633
11	2034	13,649	4,100	17,749	12,822	8,432
12	2035	14,246	4,295	18,541	13,004	8,232
13	2036	14,974	4,495	19,470	13,258	8,079
14	2037	15,392	4,703	20,095	13,285	7,793
15	2038	16,163	4,917	21,080	13,530	7,640
16	2039	16,843	5,138	21,981	13,698	7,446
17	2040	17,544	5,366	22,910	13,861	7,253
18	2041	18,266	5,602	23,868	14,020	7,062
19	2042	19,011	5,845	24,856	14,175	6,873
20	2043	19,779	6,096	25,875	14,326	6,687
21	2044	20,570	6,354	26,925	14,473	6,503
22	2045	21,386	6,621	28,008	14,617	6,322
23	2046	22,227	6,897	29,124	14,757	6,144
24	2047	23,093	7,181	30,274	14,893	5,968
25	2048	23,985	7,475	31,460	15,025	5,796
26	2049	24,905	7,777	32,683	15,155	5,628
27	2050	25,852	8,090	33,942	15,280	5,462
28	2051	26,828	8,411	35,239	15,402	5,300
29	2052	27,832	8,744	36,576	15,521	5,141
30	2053	28,866	9,086	37,952	15,636	4,986
Totals cumm.		**$ 500,774**	**$ 153,558**	**$ 654,332**	**$ 382,032**	**$ 207,522**

*NPV= TOTAL / (1+Disc. Rate)^Yr

Source: Bujanda & Allen LLC, 2022.

7.2.2 Freight emissions cost savings

This category of project benefits captures the net savings in carbon (CO_2) and non-carbon emission damage costs resulting from ton-miles saved due to freight diversion from the incumbent routes (truck + rail) to the COB service (truck + barge) alternative. Non-carbon emissions include hydrocarbons and volatile organic compounds (VOC), nitrogen oxides (NOx), and particulate matter (PM).

To estimate this benefit, the first step involved multiplying ton-miles for each component of the incumbent routes (truck + rail) times the freight emission rates for each mode (see Table 30). Next, the freight emissions were multiplied by the damage costs per unit for each non-carbon air pollutants (see Table 31). The same process was repeated for the COB service (truck + barge) alternative, but accounting instead for the barge emission rates and corresponding ton-miles. The total route costs for the key incumbent routes minus the total route costs via the Clark County Port Project routes capture the net reduction in non-carbon emission costs from displacing railcars versus the marine highway alternative. This estimation involved converting grams to MT for the non-carbon emissions (i.e. HC, NOx, and PM) and updating the non-carbon emission damage costs from 2018$ to 2020$ using the GDP deflator, as recommended by the guidelines.[20]

Table 30. Freight emission rates by mode (grams / ton-mi).

Emission rates by mode	Units	Non-carbon HC	NOx	PM	Carbon CO2
Inland tow (Barge)	gr / ton-mi	0.0094	0.2087	0.0056	15.62
Railroad	gr / ton-mi	0.0128	0.2830	0.0108	21.19
Truck	gr / ton-mi	0.0800	0.9400	0.0500	154.08

Source: Modal Comparison of Domestic Freight Transportation. Prepared for MARAD and NWF by TTI, Jan 2017, Table 8, pg.40.

Table 31. Non-carbon emission damage costs (converted to 2020 $ / MT).

Non-carbon emission costs	$ / ton 2018	$ / ton 2020	$ / MT 2020
HC	$2,100	$2,200	$2,400
NOx	$8,600	$8,900	$9,800
PM	$387,300	$397,800	$438,100

Source: USDOT Benefit-Cost Analysis (BCA) Guidance for Discretionary Grants, Jan 2020, Table A6, pg.33.

Regarding the social cost of carbon (SCC) dioxide (CO_2) emissions, a similar process was followed but utilizing instead the SCC emission costs per unit. Once the ton-miles for each component of the incumbent routes (truck + rail) times the freight emission rates for each mode (Table 30) were calculated, the freight emissions were multiplied by the unit emission damage costs for the SCC (Table 32). The total route costs for the key incumbent routes minus the total route costs via the Clark County Port Project routes capture the net reduction in CO_2 emission costs from displacing railcars versus the marine highway alternative. This estimation involved converting grams to short-tons for the CO_2 emissions.

Table 32. Social cost of carbon (SCC) emissions (in 2020 $ / MT).

Social Cost of Carbon Emissions (SCC CO2)		2020	2025	2030	2035	2040	2045	2050
Current Approach: 2018 ACE Rule (in 2018 dollars)								
3.0% Discount Rate	$/MT	$ 7.00	$ 7.00	$ 8.00	$ 9.00	$ 9.00	$ 10.00	$ 10.00
7.0% Discount Rate	$/MT	$ 1.00	$ 1.00	$ 1.00	$ 2.00	$ 2.00	$ 2.00	$ 2.00
Current Approach: 2018 ACE Rule (in 2020 dollars)								
3.0% Discount Rate	$/MT	$ 7.19	$ 7.19	$ 8.22	$ 9.24	$ 9.24	$ 10.27	$ 10.27
7.0% Discount Rate	$/MT	$ 1.03	$ 1.03	$ 1.03	$ 2.05	$ 2.05	$ 2.05	$ 2.05

Sources: U.S. GAO - Social Cost of Carbon, Jun 2020, Fig. 1, pg.16 https://www.gao.gov/assets/710/707871.pdf.
USDOT Benefit-Cost Analysis (BCA) Guidance for Discretionary Grants, Jan 2020, Table A7, pg.34.

[20] BEA, December 2020. Table 1.1.9. Implicit Price Deflators for Gross Domestic Product.

Non-carbon emissions

Total net savings due to the SCC resulting from the port development project over the 30-year timeframe, account for nearly $353 million (in 2020 dollars), equivalent to $206 million in benefits at a 3% discount rate, and $127 million in benefits at a 7% discount rate, as illustrated in Table 33.

Table 33. Non-carbon emissions (HC, NOx, PM) cost benefits from the Clark County Port Project.

		Non-carbon emissions (HC, NOx, PM) cost savings (in Yr0 $, thousands)			NPV of TOTAL non-carbon cost savings ($000)*	
Year	**Calendar year**	**Imports**	**Exports**	**TOTAL**	**3.0%**	**7.0%**
0	**2023**	$ -	$ -	$ -	$ -	$ -
1	**2024**	903	302	1,206	1,171	1,137
2	**2025**	1,898	637	2,536	2,390	2,253
3	**2026**	2,989	1,005	3,994	3,655	3,345
4	**2027**	4,180	1,407	5,587	4,964	4,411
5	**2028**	5,477	1,846	7,323	6,317	5,449
6	**2029**	5,738	1,936	7,673	6,426	5,382
7	**2030**	6,009	2,029	8,037	6,535	5,314
8	**2031**	6,289	2,125	8,414	6,642	5,243
9	**2032**	6,579	2,224	8,802	6,746	5,170
10	**2033**	6,876	2,326	9,202	6,847	5,095
11	**2034**	7,183	2,431	9,613	6,945	5,017
12	**2035**	7,500	2,539	10,039	7,041	4,939
13	**2036**	7,875	2,651	10,526	7,168	4,881
14	**2037**	8,120	2,766	10,886	7,197	4,758
15	**2038**	8,517	2,885	11,403	7,319	4,698
16	**2039**	8,878	3,008	11,886	7,407	4,616
17	**2040**	9,251	3,135	12,385	7,493	4,534
18	**2041**	9,634	3,265	12,899	7,577	4,451
19	**2042**	10,030	3,399	13,429	7,659	4,368
20	**2043**	10,437	3,538	13,976	7,738	4,284
21	**2044**	10,858	3,681	14,539	7,815	4,201
22	**2045**	11,291	3,828	15,119	7,891	4,118
23	**2046**	11,737	3,980	15,717	7,964	4,035
24	**2047**	12,197	4,136	16,333	8,035	3,953
25	**2048**	12,671	4,297	16,968	8,104	3,871
26	**2049**	13,160	4,463	17,623	8,172	3,789
27	**2050**	13,663	4,635	18,297	8,237	3,708
28	**2051**	14,180	4,811	18,991	8,301	3,628
29	**2052**	14,714	4,992	19,706	8,362	3,548
30	**2053**	15,263	5,179	20,442	8,422	3,470
Totals cumm.		**$ 264,098**	**$ 89,456**	**$ 353,554**	**$ 206,540**	**$ 127,664**

*NPV= TOTAL / (1+Disc. Rate)^Yr

Source: Bujanda & Allen LLC, 2022.

Social cost of carbon (SCC) emissions

Total net savings due to the SCC resulting from the port development project over the 30-year timeframe, account for nearly $7.2 million (in 2020 dollars), equivalent to $4.2 million in benefits at a 3% discount rate, and $2.3million in benefits at a 7% discount rate, as illustrated in Table 34.

Table 34. Social cost of carbon (SCC) emissions cost benefits from the Clark County Port Project.

		Social Cost of Carbon Emissions (SCC) CO2 cost savings (in Yr0 $, thousands, using 3% SCC)			NPV of TOTAL SCC cost savings ($000)*	
Year	**Calendar year**	**Imports**	**Exports**	**TOTAL**	**3.0%**	**7.0%**
0	**2023**	$ -	$ -	$ -	$ -	$ -
1	**2024**	22	6	28	27	26
2	**2025**	45	13	58	55	51
3	**2026**	69	20	89	82	73
4	**2027**	95	28	123	109	93
5	**2028**	121	36	157	136	112
6	**2029**	125	37	162	135	108
7	**2030**	128	38	166	135	103
8	**2031**	131	39	170	135	99
9	**2032**	135	40	175	134	95
10	**2033**	158	47	205	152	104
11	**2034**	162	48	210	151	100
12	**2035**	165	49	215	151	95
13	**2036**	170	50	221	150	92
14	**2037**	172	52	224	148	87
15	**2038**	199	59	258	166	94
16	**2039**	203	61	264	165	89
17	**2040**	208	62	270	163	85
18	**2041**	212	63	275	162	81
19	**2042**	217	64	281	160	78
20	**2043**	221	66	287	159	74
21	**2044**	225	67	292	157	71
22	**2045**	230	68	298	156	67
23	**2046**	234	70	304	154	64
24	**2047**	238	71	310	152	61
25	**2048**	270	80	350	167	65
26	**2049**	275	82	357	165	61
27	**2050**	280	83	363	163	58
28	**2051**	285	85	369	161	56
29	**2052**	289	86	376	159	53
30	**2053**	294	88	382	157	50
Totals cumm.		**$ 5,578**	**$ 1,660**	**$ 7,238**	**$ 4,267**	**$ 2,346**

*NPV= TOTAL / (1+Disc. Rate)^Yr

Source: Bujanda & Allen LLC, 2022.

7.2.3 Safety cost savings

This category of project benefits captures the net savings in traffic crash costs resulting in fatalities or injuries that could potentially result from ton-miles saved due to freight diversion from the incumbent routes (truck + rail) to the proposed COB (truck + barge) alternative via Clark County Port. The fatality and injury rates assumed for each freight mode and their data sources are shown in Table 35. Rail and truck statistics include incidents involving only vehicular crashes or derailments. Waterborne incidents involve collisions, vessels striking a fixed object, groundings, or capsizings/sinkings. These values account for the average number of fatalities and injuries per fatal crash, as well as the average number of injuries per injury crash.

Table 35. Fatality and injury rates by mode (persons / Million ton-mi).

		Annual Ton-mi	Total fatalities		Total injuries	
Freight mode	Units*	(millions)	Avg annual	Rate*	Avg annual	Rate*
Barge	pers / M ton-mi	272,600	6	0.000022	16	0.000059
Railroad	pers / M ton-mi	1,677,800	807	0.000481	7,962	0.004746
Truck	pers / M ton-mi	2,552,197	4,452	0.001744	104,286	0.040861

Source: Modal Comparison of Domestic Freight Transportation. Prepared for MARAD and NWF by TTI Jan 2017, Tables 13-14, pp. 50-51.
*Rates are per Million ton-miles.

USDOT-recommended values for monetizing fatalities and injuries were used in this analysis. The analysis was conservative and only looked at fatalities (K) and injuries (U). The inclusion of injuries at a more disaggregated level will only show the project as being even more beneficial. The average costs for fatalities and injuries are shown in Table 36. This estimation involved updating the monetized values from 2018$ to 2020$ using the GDP deflator, as recommended by the USDOT guidelines.[21]

Table 36. Average cost of fatalities and injuries ($ / person).

Accident severity	Units	Monetized Value (in 2018$)	Monetized Value (in 2020$)
Fatal accident (K-killed)	$ / person	9,600,000	10,290,000
Severity unknown (U-injured)	$ / person	174,000	187,000

Source: USDOT Benefit-Cost Analysis (BCA) Guidance for Discretionary Grants, Jan 2020, Table A1, pg.30.

Total net savings due to the resulting from the port development project over the 2020-2050 timeframe, account for about $392 million (in Yr 0, dollars), equivalent to $229 million in benefits at a 3% discount rate, and $141 million at a 7% discount rate, as illustrated in Table 37.

[21] BEA, December 2022. Table 1.1.9. Implicit Price Deflators for Gross Domestic Product.

Table 37. Safety cost benefits (fatalities and injuries) from the Clark County Port Project.

		Total safety (K-killed + U-injured) cost savings (in Yr0 $, thousands)			NPV of TOTAL safety cost savings ($000)*	
Year	Calendar year	Imports	Exports	TOTAL	3.0%	7.0%
0	2023	$ -	$ -	$ -	$ -	$ -
1	2024	983	357	1,340	1,301	1,263
2	2025	2,065	752	2,817	2,656	2,503
3	2026	3,251	1,187	4,438	4,062	3,717
4	2027	4,546	1,662	6,208	5,516	4,901
5	2028	5,955	2,181	8,136	7,018	6,054
6	2029	6,238	2,287	8,526	7,140	5,980
7	2030	6,532	2,398	8,930	7,261	5,904
8	2031	6,837	2,512	9,348	7,380	5,826
9	2032	7,150	2,629	9,780	7,495	5,744
10	2033	7,473	2,750	10,223	7,607	5,660
11	2034	7,806	2,875	10,681	7,716	5,574
12	2035	8,150	3,004	11,154	7,823	5,487
13	2036	8,560	3,137	11,697	7,965	5,424
14	2037	8,819	3,274	12,093	7,995	5,286
15	2038	9,253	3,415	12,669	8,131	5,219
16	2039	9,645	3,561	13,206	8,230	5,128
17	2040	10,048	3,712	13,760	8,325	5,037
18	2041	10,464	3,867	14,331	8,418	4,945
19	2042	10,894	4,027	14,920	8,509	4,852
20	2043	11,336	4,191	15,527	8,597	4,760
21	2044	11,791	4,361	16,153	8,683	4,667
22	2045	12,261	4,536	16,797	8,766	4,575
23	2046	12,745	4,717	17,462	8,848	4,483
24	2047	13,244	4,902	18,146	8,927	4,391
25	2048	13,758	5,094	18,852	9,004	4,300
26	2049	14,288	5,292	19,580	9,079	4,210
27	2050	14,833	5,495	20,329	9,152	4,120
28	2051	15,395	5,705	21,100	9,222	4,031
29	2052	15,973	5,921	21,895	9,291	3,943
30	2053	16,569	6,144	22,713	9,357	3,855
Totals cumm.		**$ 286,863**	**$ 105,946**	**$ 392,809**	**$ 229,472**	**$ 141,839**

*NPV= TOTAL / (1+Disc. Rate)^Yr

Source: Bujanda & Allen LLC, 2022.

7.2.4 State of good repair cost savings

This benefit category captures the net savings in landside freight infrastructure maintenance that could potentially result from ton-miles saved due to freight diversion from the incumbent routes (truck + rail) to the proposed alternative via Clark County Port (truck + barge). Over the course of the 30-year forecast period, over 600,000 FEUs and 10 million MT will be removed from the highways and railways into barge. This reduction will directly reduce the impact that trucks have on the condition of the roadway pavement, and railroads will also enjoy a lower generalized maintenance cost.

The cost of pavement maintenance was estimated per truck-mile and is estimated by multiplying the total number of reduced truck miles traveled by the annual cost savings in pavement maintenance due to diversion. We assumed diverted truck loads are split 10%/90% for 60 kip and 80 kip loads respectively, and diverted miles are 35% urban / 65% rural, as recommended by the guidelines. Estimates used to monetize benefits are based on FHWA's Federal Cost Allocation Study from 1997.[22] This estimation involved updating the monetized values from 2001$ to 2020$ using the GDP deflator, as recommended by the USDOT guidelines.[23] This resulted on $0.20/truck-mi, which when converted to ton-miles resulted in $0.012/ton-mi for import trucks and $0.008/ton-mi for export trucks (using the corresponding payload factors of 15 MT/FEU for imports and 24 MT/FEU for exports assumed in *Section 4*).

Regarding railroads, M&R Way & Structures expenditures and their corresponding ton-miles of operation were obtained from the Class I financials submitted to the Surface Transportation Board (STB). Based on these data, an average expenditure of $0.0025/ton-mile for maintenance and repair of way and structures was estimated. A conservative generalized cost savings of $0.0008/ton-mile was used for the analysis. Any additional savings will only add to the overall benefit of the project.

Regarding railroads, M&R Way & Structures expenditures and their corresponding ton-miles of operation were obtained from the Class I financials submitted to the STB. Based on these data, an average expenditure of $0.0025/ton-mile for maintenance and repair of way and structures was estimated. A conservative generalized cost savings of $0.0008/ton-mile was used for the analysis, which is about half of the lowest value reported by a Class I railroad. Any additional savings will only add to the overall benefit of the project. Lastly, the state of good repair costs were estimated for the incumbent routes (truck + rail) and for the proposed alternative via Clark County Port (truck + barge) and the difference estimated to compute the net benefits, as shown in Table 38.

[22] 1997 Federal Highway Cost Allocation Study, Final Report. FHWA, May 2000, Table 13.
[23] BEA, December 2022. Table 1.1.9. Implicit Price Deflators for Gross Domestic Product.

Table 38. State of good repair cost benefits from the Clark County Port Project.

		Surface maint. (state of good repair) cost savings (in Yr0 $, thousands)			NPV of Surface maint. (SOGR) cost savings ($000)*	
Year	**Calendar year**	**Imports**	**Exports**	**TOTAL**	**3.0%**	**7.0%**
0	**2023**	$ -	$ -	$ -	$ -	$ -
1	**2024**	310	68	378	367	353
2	**2025**	637	141	778	733	679
3	**2026**	983	217	1,200	1,098	980
4	**2027**	1,347	299	1,646	1,462	1,256
5	**2028**	1,731	384	2,115	1,824	1,508
6	**2029**	1,777	395	2,172	1,819	1,447
7	**2030**	1,824	406	2,230	1,813	1,389
8	**2031**	1,871	417	2,288	1,806	1,332
9	**2032**	1,918	428	2,346	1,798	1,276
10	**2033**	1,965	439	2,404	1,789	1,222
11	**2034**	2,012	450	2,462	1,779	1,170
12	**2035**	2,060	460	2,520	1,768	1,119
13	**2036**	2,121	471	2,592	1,765	1,076
14	**2037**	2,142	482	2,625	1,735	1,018
15	**2038**	2,203	493	2,697	1,731	977
16	**2039**	2,251	504	2,756	1,717	933
17	**2040**	2,300	515	2,815	1,703	891
18	**2041**	2,348	526	2,874	1,688	850
19	**2042**	2,396	537	2,933	1,673	811
20	**2043**	2,444	548	2,992	1,657	773
21	**2044**	2,492	559	3,052	1,640	737
22	**2045**	2,541	570	3,111	1,624	702
23	**2046**	2,589	581	3,170	1,606	669
24	**2047**	2,637	593	3,230	1,589	637
25	**2048**	2,686	604	3,289	1,571	606
26	**2049**	2,734	615	3,349	1,553	577
27	**2050**	2,783	626	3,409	1,535	549
28	**2051**	2,831	637	3,468	1,516	522
29	**2052**	2,880	648	3,528	1,497	496
30	**2053**	2,928	659	3,588	1,478	471
Totals cumm.		**$ 63,741**	**$ 14,274**	**$ 78,016**	**$ 47,334**	**$ 27,025**

*NPV= TOTAL / (1+Disc. Rate)^Yr

Source: Bujanda & Allen LLC, 2022.

7.2.5 Safety resiliency and redundancy

Given the lack of available data, it was not possible to quantify the resiliency and redundancy benefits. However, a proposed Marine Highway Project offers a resilient route or service that can benefit the public by providing an additional alternative transportation mode and route. This will offer the region potential benefits when other incumbent routes are interrupted as a result of natural or man-made incidents.

7.3 Total monetized benefits (overall net public benefits)

The analysis quantifies the expected economic benefits generated by the potential rail-to-barge freight diversion in terms of reduced pavement maintenance cost and net reductions in freight operating costs, emissions and accidents arising from transporting goods via barge as opposed to truck or railroad carrier. Table 39 summarizes the benefit-cost analysis findings for the Clark County Port Project. Annual costs and benefits are computed over the lifecycle of the project (30 years).

The project has a B/C ratio of **4.5** using 2020$ (Yr 0$). At a real discount rate of 7%, the B/C ratio of the project is **3.6** and at a rate of 3% further to **4.0**. In any case, findings from the BCA demonstrate that there are significant long-term economic benefits associated with the project, primarily associated with potential savings in the number of fatalities and injuries, non-carbon emissions, and freight transportation cost savings. These savings would be generated by transporting goods over the proposed barge route via Clark County Port (with project) as opposed to the incumbent routes via railroad (without project) to/from the major import/export gateway ports, as has been demonstrated throughout this report.

Table 39. Summary of Benefit-Cost Analysis

Project benefits description	USDOT categories	2023 $ (Yr0 $)	Discount rate	Discount rate
Non-containerized		**0%**	**3%**	**7%**
Freight transportation cost savings	1.EconComp.	$434,560	$253,012	$136,906
Social cost of carbon (SCC) savings	2.Emissions benefits	$4,254	$2,502	$1,371
Non-carbon emission cost savings	2.Emissions benefits	$199,086	$116,003	$71,504
Safety cost savings	3.Safety improvements	$217,886	$126,944	$78,240
State of good repair	4.Maint. savings	$47,147	$28,528	$16,229
Subtotal Benefits (B)		**$902,933**	**$526,989**	**$304,251**
Containerized				
Freight transportation cost savings	1.EconComp.	$219,772	$129,020	$70,615
Social cost of carbon (SCC) savings	2.Emissions benefits	$2,984	$1,765	$975
Non-carbon emission cost savings	2.Emissions benefits	$154,468	$90,537	$56,160
Safety cost savings	3.Safety improvements	$174,923	$102,528	$63,599
State of good repair	4.Maint. savings	$30,868	$18,806	$10,795
Subtotal Benefits (B)		**$583,016**	**$342,657**	**$202,145**
Total (non-containerized + containerized)				
Freight transportation cost savings	1.EconComp.	$654,332	$382,032	$207,522
Social cost of carbon (SCC) savings	2.Emissions benefits	$7,238	$4,267	$2,346
Non-carbon emission cost savings	2.Emissions benefits	$353,554	$206,540	$127,664
Safety cost savings	3.Safety improvements	$392,809	$229,472	$141,839
State of good repair	4.Maint. savings	$78,016	$47,334	$27,025
Total Benefits (B)		**$1,485,949**	**$869,646**	**$506,396**
Project costs				
Capital costs	5.Capital costs	$85,542	$74,831	$66,011
O&M costs	6.O&M costs	$247,390	$141,038	$74,538
Total Costs (C)		**$332,932**	**$215,868**	**$140,549**
Benefit-Cost ratio = (B) / (C)		**4.5**	**4.0**	**3.6**

Source: Bujanda & Allen LLC, 2022.

8. Economic impact analysis

8.1 Methodology

The term "economic impact study" implies a change has taken place within a defined local economy. The change in an economy typically comes from one of the following sources:

- Entrance and departure of a business or industry
- Expansion and contraction of an existing business or industry

In this case, we are dealing with an increase in economic activity in the form of a new port business in Clark County. This increase can be broken down into two categories: 1) economic activity generated from capital expenditures for the construction of a new port facility, and 2) the operation of the new facility once constructed.

8.1.1 Methodology Overview

The IMPLAN modeling system was used as the primary tool for conducting this analysis. IMPLAN is a sophisticated and highly customizable input-output modeling system that uses data from a wide variety of sources and receives annual updates to ensure economic relationships are captured as accurately as possible. The 2019 IMPLAN data year was used for this impact analysis, and results are shown in 2022 dollars. The results of this analysis are presented using the following common economic terms:

- **Output:** The broadest measure of economic activity – often referred to as "sales"
- **Value Added:** Sales (output) minus the cost of inputs
- **Labor Income:** Sum of employee compensation and proprietor income; a sub-component of value added
- **Employment (Jobs):** A measure of job positions without regard to whether they are full-time equivalents

The effects of an economic impact event in IMPLAN are expressed in terms of direct, indirect, and induced effects. For example, in the construction of a new port facility, the direct purchases of supplies and equipment are known as *direct effects*. The suppliers and services used by the construction contractors then purchase inputs to supply the contractors; these are known as *indirect effects*. Those who work for the construction contractors, and those who work for the contractor's suppliers then use their additional income to make household purchases; these are known as household, or *induced effects*. Taken together, the sum of direct, indirect, and induced effects is known as the *total effect* and accounts for the total multiplier effect present from the new economic activity.

8.1.2 Model inputs

The geographic scope for this impact analysis is the state of Missouri. The overall economic impact is split into two scenarios: 1) construction and 2) average annual operations.

Construction

Construction impacts were considered for Option 1A North as detailed in *Section 5.*3. A construction budget from MECO was used to estimate the economic activity associated with the construction of a new port facility. Entries from the construction budgets were assigned to IMPLAN industries, as shown below in Table 40.

Table 40. Option 1A construction inputs.

Construction Inputs - Option #1A North			
IMPLAN Code	IMPLAN Description		Input Value
29	Sand and gravel mining	$	9,053,550
52	Construction of new power and communication structures	$	11,000
54	Construction of new highways and streets	$	1,143,780
55	Construction of new commercial structures, including farm structures	$	825,000
56	Construction of other new nonresidential structures	$	14,892,583
235	Prefabricated metal buildings and components manufacturing	$	4,400,000
242	Metal tank (heavy gauge) manufacturing	$	49,500
253	Plumbing fixture fitting and trim manufacturing	$	220,000
269	All other industrial machinery manufacturing	$	1,100,000
288	Conveyor and conveying equipment manufacturing	$	2,151,188
323	Lighting fixture manufacturing	$	192,500
455	Legal services	$	75,500
457	Architectural, engineering, and related services	$	3,364,400
470	Office administrative services	$	150,000
477	Landscape and horticultural services	$	165,000
	Grand Total	**$**	**37,794,000**

Operations

Operations impacts were considered for the three recommended business models as shown in *Section 6.* Financial estimates from Bujanda & Allen were used to estimate the economic activity associated with the operation of a new port facility. All three scenarios use the fifth year of operations, which is the first year of operations after the initial volume ramp-up, as the year of analysis. Values are then discounted back to 2022 dollars using IMPLAN's industry-specific deflators.

8.2 Economic impact results

8.2.1 Construction impact results

The following section details the estimated economic impact of the construction of a new port facility in Clark County. Construction of the facility is assumed to take place over the course of 1 year. Construction impacts, while typically large, are one-time impacts.

Table 41 shows the estimated economic impact of constructing a port in Clark County as outlined in Option 1A North. The initial direct investment of $37.8 million results in an estimated total impact of $67.9 million in output, $32.7 million in value added, and $22.1 million in labor income. An estimated total of 366 jobs would be supported.

Table 41. Construction impact summary

Impact Summary - Construction							
Impact	Employment	Labor Income		Value Added		Output	
Direct	198	$	12.5	$	16.5	$	37.8
Indirect	76	$	5.0	$	8.0	$	15.7
Induced	93	$	4.6	$	8.1	$	14.4
Total	**366**	**$**	**22.1**	**$**	**32.7**	**$**	**67.9**

Source: DIS, 2022.

Table 42 shows the tax impact from the construction of the Option 1A facility. An estimated total tax revenue of $6.8 million is expected to be generated from this project. Of this amount, $2.5 million is estimated to be generated at the state and local level, and $4.3 million is estimated to be generated at the federal level.

Table 42. Construction taxes paid

Taxes Paid - Construction			
Impact	State and Local	Federal	Total
Direct	$ 1.0	$ 2.3	$ 3.3
Indirect	$ 0.8	$ 1.0	$ 1.8
Induced	$ 0.8	$ 1.0	$ 1.7
Total	**$ 2.5**	**$ 4.3**	**$ 6.8**

Source: DIS, 2022.

Table 43 shows the industries most impacted by the construction in terms of value added. The top industry impacted is construction of other new nonresidential structures with a total value-added impact of $6.4 million. The increase in value added demonstrates that the project can put real dollars (not just being spent on supplies) in the pockets of those who would take part in constructing the port and those who live in the surrounding area.

Table 43. Construction top ten industries impacted

Top Ten Industries Impacted - Construction	
Industry	Total Value Added ($M)
Construction of other new nonresidential structures	$ 6.4
Sand and gravel mining	$ 4.4
Architectural, engineering, and related services	$ 2.3
Owner-occupied dwellings	$ 1.2
Prefabricated metal buildings and components manufacturing	$ 1.2
Conveyor and conveying equipment manufacturing	$ 0.8
Management of companies and enterprises	$ 0.7
Construction of new highways and streets	$ 0.6
Monetary authorities and depository credit intermediation	$ 0.6
Wholesale - Other durable goods merchant wholesalers	$ 0.5

Source: DIS, 2022.

8.2.2 Operations impact results

The following section details the estimated economic impact of the operations of a port facility under each of the recommended scenarios given in *Section 6*. Unlike construction impacts, operations impacts are annual impacts that reoccur each year that the business is active.

Scenario 8: Container, breakbulk, agribulk, and drybulk

Table 44 shows the estimated annual economic impact of the operations of a port facility according to scenario 8, which includes container, breakbulk, agribulk, and drybulk services. The direct impact of $13.2 million in output (sales), $3.7 million in value added, and 25 jobs results in an estimated total economic impact of $27.0 million in output, $11.3 million in value added, and 113 jobs.

Table 44. Operations Scenario 8 Impact Summary

Impact Summary - Operations Scenario 8				
Impact	**Employment**	**Labor Income**	**Value Added**	**Output**
Direct	25	$ 2.0	$ 3.7	$ 13.2
Indirect	57	$ 3.7	$ 4.9	$ 9.0
Induced	31	$ 1.5	$ 2.7	$ 4.9
Total	**113**	**$ 7.2**	**$ 11.3**	**$ 27.0**

Source: DIS, 2022.

Table 45 shows the estimated taxes paid under scenario 8. A total of $2.7 million in taxes is paid annually, of which $1.3 million are state and local taxes and $1.4 million are federal taxes.

Table 45. Operations Scenario 8 Taxes Paid

Taxes Paid - Operations Scenario 8			
Impact	**State and Local**	**Federal**	**Total**
Direct	$ 0.6	$ 0.4	$ 1.0
Indirect	$ 0.5	$ 0.7	$ 1.2
Induced	$ 0.3	$ 0.3	$ 0.6
Total	**$ 1.3**	**$ 1.4**	**$ 2.7**

Source: DIS, 2022.

Table 46 shows the top ten industries impacted under scenario 8 in terms of value added.

Table 46. Operations Scenario 8 Top Industries Impacted

Top Ten Industries Impacted - Operations Scenario 8	
Industry	**Total Value Added ($M)**
Water transportation	$ 3.7
Securities and commodity contracts intermediation and brokerage	$ 0.9
Support activities for transportation	$ 0.5
Postal service	$ 0.5
Owner-occupied dwellings	$ 0.4
Monetary authorities and depository credit intermediation	$ 0.4
Couriers and messengers	$ 0.4
Wholesale - Petroleum and petroleum products	$ 0.2
Management of companies and enterprises	$ 0.2
Hospitals	$ 0.2

Source: DIS, 2022.

Scenario 1: Container and breakbulk

Table 47 shows the estimated annual economic impact of the operations of a port facility according to Scenario 1, which includes container and breakbulk services. The direct impact of $10.0 million in output (sales), $2.9 million in value added, and 20 jobs results in an estimated total economic impact of $20.5 million in output, $8.6 million in value added, and 86 jobs.

Table 47. Operations Scenario 1 Impact Summary

Impact Summary - Operations Scenario 1				
Impact	**Employment**	**Labor Income**	**Value Added**	**Output**
Direct	20	$ 1.6	$ 2.9	$ 10.0
Indirect	43	$ 2.8	$ 3.7	$ 6.8
Induced	24	$ 1.2	$ 2.1	$ 3.7
Total	**86**	**$ 5.5**	**$ 8.6**	**$ 20.5**

Source: DIS, 2022.

Table 48 shows the estimated taxes paid under scenario 1. A total of $2.0 million in taxes is paid annually, of which $1.0 million are state and local taxes and $1.1 million are federal taxes.

Table 48. Operations Scenario 1 Taxes Paid

Taxes Paid - Operations Scenario 1			
Impact	**State and Local**	**Federal**	**Total**
Direct	$ 0.4	$ 0.3	$ 0.7
Indirect	$ 0.3	$ 0.5	$ 0.9
Induced	$ 0.2	$ 0.2	$ 0.4
Total	**$ 1.0**	**$ 1.1**	**$ 2.0**

Source: DIS, 2022.

Table 49 shows the top ten industries impacted under scenario 1 in terms of value added.

Table 49. Operations Scenario 1 Top Industries Impacted

Top Ten Industries Impacted - Operations Scenario 1	
Industry	**Total Value Added ($M)**
Water transportation	$ 2.9
Securities and commodity contracts intermediation and brokerage	$ 0.7
Support activities for transportation	$ 0.4
Postal service	$ 0.4
Owner-occupied dwellings	$ 0.3
Monetary authorities and depository credit intermediation	$ 0.3
Couriers and messengers	$ 0.3
Wholesale - Petroleum and petroleum products	$ 0.2
Management of companies and enterprises	$ 0.2
Hospitals	$ 0.1

Source: DIS, 2022.

Scenario 5: Container, breakbulk, and agribulk

Table 50 shows the estimated annual economic impact of the operations of a port facility according to scenario 5, which includes container, breakbulk, and agribulk (but not other drybulk) services. The direct impact of $12.4 million in output (sales), $3.5 million in value added, and 25 jobs results in an estimated total economic impact of $25.6 million in output, $10.7 million in value added, and 108 jobs.

Table 50. Operations Scenario 5 Impact Summary

Impact Summary - Operations Scenario 5				
Impact	**Employment**	**Labor Income**	**Value Added**	**Output**
Direct	25	$ 1.9	$ 3.5	$ 12.4
Indirect	53	$ 3.5	$ 4.6	$ 8.5
Induced	30	$ 1.5	$ 2.6	$ 4.6
Total	**108**	**$ 6.8**	**$ 10.7**	**$ 25.6**

Source: DIS, 2022.

Table 51 shows the estimated taxes paid under scenario 5. A total of $2.5 million in taxes is paid annually, of which $1.2 million are state and local taxes and $1.4 million are federal taxes.

Table 51. Operations Scenario 5 Taxes Paid

Taxes Paid - Operations Scenario 5			
Impact	**State and Local**	**Federal**	**Total**
Direct	$ 0.5	$ 0.4	$ 0.9
Indirect	$ 0.4	$ 0.7	$ 1.1
Induced	$ 0.2	$ 0.3	$ 0.5
Total	**$ 1.2**	**$ 1.4**	**$ 2.5**

Source: DIS, 2022.

The top ten industries impacted under scenario 5 in terms of value added are shown in Table 52.

Table 52. Operations Scenario 5 Top Industries Impacted

Top Ten Industries Impacted - Operations Scenario 5	
Industry	**Total Value Added ($M)**
Water transportation	$ 3.5
Securities and commodity contracts intermediation and brokerage	$ 0.8
Support activities for transportation	$ 0.5
Postal service	$ 0.4
Owner-occupied dwellings	$ 0.4
Monetary authorities and depository credit intermediation	$ 0.4
Couriers and messengers	$ 0.3
Wholesale - Petroleum and petroleum products	$ 0.2
Management of companies and enterprises	$ 0.2
Hospitals	$ 0.2

Source: DIS, 2022.

9. Environmental regulatory requirements

Any project obtaining State or Federal funds will be required to submit an Environmental Report for clearance and acceptance. Below are the targeted environmental components that will need to be addressed for the recommended Option 1A North.

A Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map was generated for this site. This identifies the location of the site in an existing floodway with an established BFE of 498.0 to 498.1. The levees, not part of the selected site, noted on this panel have not been accredited; therefore, they are not shown as providing protection from the 1% annual chance flood. The objective is to raise an elevated platform 1 ft above the BFE and proceed with the hydraulic modeling to submit a Conditional Letter of Map Revision to FEMA, then to follow with a Letter of Map Revision to remove the elevated section out of the Floodplain with documentation of no increase to the BFE with Project.

The Natural Resources Conservation Service website was used to generate a document that summarizes the existing soils in the targeted areas. Investigation of soils type mapping and coverage is a guide for development. The soil type classifications provide vital information with regards to soil type, slopes, drainage, flooding frequency, and other pertinent subsoil conditions with regards to construction.

USACE is also the governing agency with regards to wetland impacts and navigable waters of the U.S. For the recommended site, documentation was taken for U.S. Fish and Wildlife Service for a National Wetland Inventory. This is a collective data base system for identification and likelihood of any site along river terrain with possible wetland areas identified. A wetland delineation or plan will most likely be required for clearance.

The Missouri Department of Conservation protects and manages endangered species under the Federal Endangered Species Act. This site was identified, and a report requested to provide a listing of the specific species identified within the surrounding area. This produces a Missouri Natural Heritage Review that queries for records of Species and Natural Communities of Conservation Concern, public conservation lands, and other sensitive forest, fish and wildlife resources that could be affected by construction. Under Missouri Department of Natural Resources, Section 106 Application Review, a review and SHPO clearance will need to be obtained.

The U.S. Fish and Wildlife is the governing agency that addresses the Endangered Species Act (ESA). An initial review was submitted listing the endangered species and a General Project Design Guideline obtained. This information is provided relative to clearances needed and future design.

Land conversion will have to be cleared through the Natural Resources Conservation Service (NRCS) with regards to the proposed plans, along with the submittal of a Farmland Conversion Impact Form for evaluation.

Specified Tribal letters as identified in Clark County will also be required for clearance of this site and if any additional surveys are requested at this location.

Documentation has been provided in ***Appendix A***, consisting of site outlined on an Aerial Exhibit, Photographs, FIRM Panel, NRCS Soils Exhibit and documentation, Natural Heritage Review and documentation, Wetland Mapper, Fish & Wildlife Consultation, and the Endangered Species Guidelines.

10. Conclusion

This study created an analytical framework to support port planning, market analysis, and financial plan to assist NEMO RPC to evaluate the degree of feasibility of a multimodal port facility in Clark County, Missouri. Such framework evaluated potential viable locations, identified business entities that could potentially utilize the port, proposed several business models, and constructed a preliminary, but comprehensive analysis of the potential financial and economic viability of the project.

As demonstrated throughout this report, there are potential benefits that can be generated by replacing the inland rail transportation with barge service. Our route economics analysis concludes that potential cost savings can be generated by the barge service via the Mississippi River, and that such benefits vary by tradelane and priority area. The research component of the market study specified the existence of several businesses (freight generators and attractors) in the project study area. The companies that responded to the survey indicated interest to use containerized shipping through a port facility if it would reduce their shipping costs.

The container business segment is the most important for project feasibility, given the higher margins involved per movement, lower associated capex, and expected levels of traffic for this cargo type. Commingling breakbulk with container operations by sharing cargo handling and storage infrastructure helps to generate greater economies of scale. As stand-alone business segments, agribulk, drybulk, and liquid-bulk show poor feasibility indicators. Liquid bulk shows poor feasibility indicators given the lower volumes. Agribulk is the cargo type with the highest expected volumes over the entire analysis period. With more refined assumptions, agribulk might increase its financial viability.

The business model where the project operates as a multipurpose port (i.e. container, breakbulk, agribulk, and drybulk) generates the largest EBITDA, of $75.3 million and a net income of $7.3 million. Although institutional investors might not find the expected project's returns (IRR of 15% over a 12% WACC based on a 50/50 debt/equity ratio) to be attractive, a strategic player who could profit non-financially (e.g. gain market share, integrate vertically or across different modes, control market access, etc), might find the project more attractive. With a rail connection and the ability to load railcars, the port would have the ability to operate as a dry port when the river levels are too low and is not feasible to operate barges.

In addition to the freight transportation cost savings, this study evaluated and quantified the benefits stemming from the project, identifying among the main ones: safety improvements, emissions savings, and strong economic impacts that can be capitalized by the region. Overall, this project meets the requirements for a MARAD project designation. Furthermore, it enjoys access to an extensive market catchment area of potential users, generating favorable public benefits and economic impacts to the region. With strong support from private and public stakeholders, NEMO RPC can follow the necessary steps to secure a MARAD Project Designation and attract further investment.

Appendices: for program background only

Appendix A: Site selection assessment from MECO Engineering

See separate file for report,

- MECO Engineering, *Planning – Initial Investigation for Site Selection*, October 2022 (available upon request).

Appendix B: Letters of support

- Separate attachments.

Appendix C: Checklist – cross reference of topics by section

The following table lists the key considerations in the preparation of an AMH Project Designation application.

Item	Criteria	Description	Check	Section
(A)	**Minimum Eligibility requirements**			
1.1	**Documented Vessels**	Uses U.S. Documented Vessels - and mitigates landside congestion or promote short sea transportation See (2).	Yes	2.5.1
1.2	**Carries Cargo in Short Sea Shipping**	Self-explanatory	Yes	2.5.2
1.3	**Mitigates Landside Congestion**	Self-explanatory	Yes	7
2.1	**Short Sea Transportation**	Meets the definition of Short sea shipping. *Short sea transportation* means the carriage by a U.S. documented vessel of cargo (1) That is— (i) Contained in intermodal cargo containers and loaded by crane on the vessel; (ii) Loaded on the vessel by means of wheeled technology; (iii) Shipped in discrete units or packages that are handled individually, palletized, or unitized for purposes of transportation; or (iv) Freight vehicles carried aboard commuter ferry boats; and (2) That is— (i) Loaded at a port in the United States and unloaded either at another port in the United States or at a port in Canada located in the Great Lakes-Saint Lawrence Seaway System; or, (ii) Loaded at a port in Canada located in the Great Lakes-Saint Lawrence Seaway System and unloaded at a port in the United States [refer to 46 CFR sections 393.1(k)]	Yes	2.5.2
2.2	**New or expanded services**	Involves new or expand existing services for the carriage of cargo	Yes	2.5.4
2.3	**Designated Route**	Are on a designated Marine Highway Route	Yes	2.4.1
3.0	**Route Designation submission**	Project Designation applications can be submitted with Route Designations [refer to 46 CFR section 393.3(a)(3)]	Yes	2.5.1
4.0	**Direct Connection**	Successful Project Applicants must demonstrate a direct connection between a proposed Marine Highway Project and the carriage of cargo through ports on Designated Marine Highway Routes.	Yes	2.5.1
(B)	**The timing of Project Designation submissions**	Announcement of a Marine Highway Project Designation Open Season to allow Project Applicants opportunities to submit Marine Highway Project Designation applications will be made by notice in the **Federal Register** and on MARAD's AMHP Web site	Yes	1.4
(C)	**Project Application Contents**	What should Project Applicants include when preparing a Marine Highway Project designation application	Yes	A6
1.0	**Market and Customers**	The market or customer base to be served by the service and the service's value proposition to customers. This includes:	Yes	3
		(i) A description of how the market is currently served by transportation options;	Yes	3.1
		(ii) Identities of shippers that have indicated an interest in, and level of commitment to, the proposed service;	Yes	3.1
		(iii) Specific commodities, markets, and shippers the project is expected to attract;	Yes	3.1
		(iv) The extent to which interested entities have been educated about the project and expressed support, and	Yes	
		(v) A marketing strategy for the project if one exists.	Yes	
2.0	**Operational framework**	A description of the proposed operational framework of the project including:	Yes	3 & 6
		Origin & Destination Pairs	Yes	3.1, 3.3
		Transit times	Yes	4.3
		Vessel types	Yes	4.1, 4.2
		Service Frequency	Yes	6.3
3.0	**Cost Model**	The cost model for the proposed service. The cost model should be broken down by container, trailer, or another freight unit, including loading and discharge costs, vessel operating costs, drayage costs, and other ancillary costs.	Yes	6.3
3.1		Provide a comparison cost model outlining the current costs for transportation using landside mode (truck and rail) alternatives for the identified market that the proposed project will serve.	Yes	4
3.2		Provide the project's financial plan and provide projected revenues and expenses. Include labor and operating costs, drayage, fixed and recurring infrastructure and maintenance costs, vessel or equipment acquisition or construction costs, etc.	Yes	6
3.3		Include any anticipated changes in local or regional short sea transportation, policy or regulations, ports, industry, or other developments affecting the project.	Yes	4

3.4		In the event that public sector financial support is being sought, describe the amount, form and duration of public investment required. Applicants may email *mh@dot.gov* to request a sample cost model.	X	X
4.0	**Overall Net Public Benefits**	An overall quantification of the net public benefits estimated to be gained through the successful initiation of the Marine Highway Project, including highway miles saved, road maintenance savings, air emissions savings, and safety and resiliency impacts. In other words, the collective savings from section 8.	**Yes**	**7**
5.0	**Marine Highway Route utilized**	Identify the designated Marine Highway Routes the project will utilize.	**Yes**	**2.4.1**
6.0	**Organizational Structure**	Provide the organizational structure of the proposed project, including an outline of the business affiliations, environmental, non-profit organizations and governmental or private sector stakeholders.	**Yes**	**1**
7.0	**Partnerships**			
7.1	**Private sector partners**	(i) Identify private sector partners and describe their levels of commitment to the proposed service. Private sector partners can include terminals, vessel operators, shipyards, shippers, trucking companies, railroads, third-party logistics providers, shipping lines, labor, workforce, and other entities deemed appropriate by the Secretary.	**Yes**	**2, 4**
7.2	**Public sector partners**	(ii) Identify State Departments of Transportation, metropolitan planning organizations, municipalities and other governmental entities, including tribal entities, that Project Applicants have engaged and the extent to which they support the service. Include any affiliations with environmental groups or civic associations.	**Yes**	**1**
7.3	**Documentation**	(iii) Provide documents affirming commitment or support from entities involved in the project.	**Yes**	
8.0	**Public benefits**	These measures reflect current law and are consistent with USDOT's Strategic Goals. Project Applicants should organize external net cost savings and public benefits of the project based on the following six categories:	**Yes**	**7**
8.1	**Emissions benefits**	(i). Address any net savings, in quantifiable terms, now and in the future, over current emissions practices, including greenhouse gas emissions, criteria air pollutants or other environmental benefits the project offers.	**Yes**	**7.2.2**
8.2	**Energy Savings**	(ii) Provide an analysis of potential net reductions in energy consumption, in quantifiable terms, now and in the future, over the current practice.	**Yes**	
8.3	**Landside transportation infrastructure maintenance savings**	(iii) To the extent, the data is available to indicate, in dollars per year, the projected net savings of public funds that would result in the road or railroad maintenance or repair, including pavement, bridges, tunnels or related transportation infrastructure from a proposed project.	**Yes**	**7.2.4**
8.3.1	**Landside transportation infrastructure maintenance savings**	Include the impacts of accelerated infrastructure deterioration caused by vehicles currently using the route, especially in cases of oversize or overweight vehicles. This information applies only to projects for a marine highway service where a landside alternative exists.	**Yes**	**7.2.4**
8.4	**Economic Competitiveness**	(iv) To the extent, the data is available, describe how the project will measurably result in transportation efficiency gains for the U.S. public. For purposes of aligning a project with this outcome, applicants should provide evidence of how improvements in transportation outcomes (such as time savings, operating cost savings, and increased utilization of assets) translate into long-term economic productivity benefits.	**Yes**	**7.2.1**
8.5	**Safety Improvements**	(v) Describe, in measurable terms, the projected safety improvements that would result from the proposed operation.	**Yes**	**7.2.3**
8.6	**System Resiliency and Redundancy**	(vi) To the extent data is available, describe, if applicable, how a proposed Marine Highway Project offers a resilient route or service that can benefit the public. Where land transportation routes serving a locale or region are limited, describe how a proposed project offers an alternative and the benefit this could offer when other routes are interrupted as a result of natural or man-made incidents.	**Yes**	**7.2.5**
9.0	**Proposed project timeline**	Include a proposed project timeline with estimated start dates and key milestones. If applicable, include the point in the timeline at which the enterprise is anticipated to attain self-sufficiency.	**Yes**	**7.1.2**
10.0	**Support and investment required**	Describe any known or anticipated obstacles to either implementation or long-term success of the project. Include any strategies, either in place or proposed, to mitigate impediments. Identify specific infrastructure gaps such as docks, cranes, ramps, etc. that will need to be addressed for the project to become economically viable. Include estimates for the required investments needed to address the infrastructure gaps.	**Yes**	**7.1.2**
11.0	**Environmental considerations**	Project Applicants must provide all information necessary to assist MARAD's environmental analysis of the proposed project, pursuant to the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 et seq.) and other environmental requirements.	**Yes**	**7.1.2**
12.0	**Other considerations**		**Yes**	**7.1.2**
12.1	**Confidentiality**	If your application, including attachments, includes information that you consider to be a trade secret or confidential commercial or financial information, or otherwise	**Yes**	

		exempt from disclosure under the Freedom of Information Act (5 U.S.C. 552), as implemented by the Department at 49 CFR part 7, you may assert a claim of confidentiality.		
12.2	**Application length**	The narrative portion of an application should not exceed 20 pages in length. Documentation supporting the assertions made in the narrative portion may also be provided in the form of appendices, but limited to relevant information. Applications may be submitted electronically via*regulations.gov* (*http://www.regulations.gov*). Applications submitted in writing must include the original and three copies and must be on 8.5″ x 11″ single-spaced paper, excluding maps, Geographic Information Systems (GIS) representations, *etc.*	**Yes**	
(D)		**Conclusion**	**Yes**	**7.1.2**
(E)		**For Program Background, only**	**Yes**	**7.1.2**
1.1		Freight Plans, Port Plans, State STIP/TIP or other approved planning documents	**Yes**	**2.2**
1.2		Identifying future planning studies that will be required before or part of any future Marine Highway Grant funding	**Yes**	
1.3		Whether the project will proceed without Project Designation	**Yes**	**7.3**
1.4		Whether the Applicant only intends to seek Project Designation only (no intention to apply for future Marine Highway Grant funding opportunities)	**Yes**	

Timing of project designation submission

MoDOT intends to apply for Project Designation on __________________.

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