Jefferson City Area Heartland Port Authority

Heartland Port Project
Comprehensive market study 2020

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May 2020

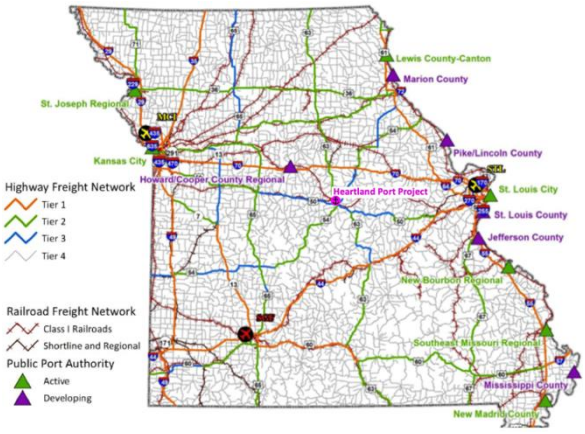
Contents

Figures

Tables

Executive summary

The Heartland Port Authority of Central Missouri was created on 2018 in a proactive effort to promote economic development and marine transportation infrastructure in central Missouri. As part of these efforts, the Heartland Port Project involves the development of a greenfield public port in the Jefferson City area, located at the intersection of Callaway and Cole counties. Greenfield projects involve an inherent level of uncertainty that require the identification and mitigation of potential risks. To assist the Heartland Port Authority better understand the financial viability of this project, this report presents the findings of a comprehensive market study and a preliminary assessment of the financial feasibility of the Project.



The Heartland Port Project is located in Jefferson City and it enjoys fast and efficient access to Missouri's most important freight arteries in all relevant modes (i.e. truck, rail, and waterways). While truck and rail are the predominant modes of freight transportation in Missouri, levels of service on the state freight network are exhibiting signs of congestion and poor freight fluidity. These conditions make the barge alternative, which is more environmentally friendly than both truck and rail, more attractive for the potential markets in our study-area, which is comprised by the 24-counties located within an 80-mile radius from Jefferson City.

As part of the comprehensive market study for the report, a survey was conducted of potential users of a port facility in Jefferson City. There were 73 responses to the survey. Respondents were asked to estimate current annual shipments and annual receipts for the business. The data from these responses was used in conjunction with other industry sources to estimate the potential traffic for the proposed port facility. The estimates on annual shipments or receipts reported in the survey are documented in Table E1.

Table E1. Estimates on annual number of shipments or receipts

Commodity / Product Category	Response Count	Shipments	Unit of Measure	Receipts
Agri-Bulk	9	60,250	Tons	145,700
Fertilizer	11	77,500	Tons	10,030
Aggregates	8	15,320,100	Tons	2,225,200
Harvested Timber	13	15,694,987	Tons	27,605,710
Mineral Bulk	1	500	Tons	500
Liquid Bulk	3	5	Tons	17
Liquid Bulk	2	1,000,000	Gallons	-
Roll On – Roll Off	1	528,000	Tons	250,000
Roll On – Roll Off	4	100	Single Units	1
Roll On – Roll Off	1	500	"What ever customer wants"	
Break Bulk	2	220	Loads	20
Break Bulk	1	10	Single Unit	-
Break Bulk	4	-	No Response	-
Other	11	68,345	Tons	88,663
Others	2	1,000	Trucks/Loads	900
Other	4		No Response	

In response to the question on what level of cost saving would be necessary for a respondent to consider barge transportation, 41% of those answering the question indicated a transportation cost savings of 10% or less. A cost saving of 20% or less would encourage 67% of those responding to consider barge transportation. The reported cost savings threshold necessary for a respondent to consider barge transportation is analyzed in Table 6 of the report.

Our market analysis revealed that there is potential for movement of non-containerized cargo from the 24-counties via the Heartland Port based on the route cost savings offered by the Heartland Port barge route to potential port users. Five categories of non-containerized import commodities (Nonmetallic gravels, stones and minerals; Chemicals and industrial gases; Iron, steel and ferroalloy products; Pesticides, fertilizers and related agrichem; and nonferrous smelted and refined metals) and five categories of non-containerized export commodities (soybeans; grains; DDGs; soybean meal; and ethanol) represent the overall market for which the Heartland Port Project is most likely to attract cargo.

Agribulk cargoes are the most prominent cargo type, primarily driven by soybean, followed by corn, DDGs, and soybean meal. Agribulk cargoes are expected to grow from 170,300 metric tons (MT) in the opening year of the project (Yr 0) to 268,552 MT in the last year of the analysis period (Yr 30), with a compounded annual growth rate (CAGR) of 1.5%. Drybulk cargoes are the next most prominent and are expected to grow from 27,900 MT in Yr 0 to 82,400 MT in Yr 30, a compounded annual growth rate (CAGR) of 3.7%. Breakbulk cargoes are next and they are expected to grow from 6,700 MT to 7,700 MT in Yr 30, a CAGR of 0.5%. Liquid-bulk cargoes, composed primarily of ethanol, are the smallest category and are expected to grow from 5,600 MT to 8,000 MT in Yr 30, a CAGR of 1.2%. Mercator assumed a ramp-up period between the opening of the Heartland Port Project in Yr 0 and Yr 3; subsequently, the model assumes that the project achieves a steady-state volume. The Base Case volume forecast, including the consideration of the ramp-up period, for non-containerized cargo is shown in Figure E1.

Figure E1. Base Case volume forecast and ramp-up period for non-containerized cargo (000, metric tons)

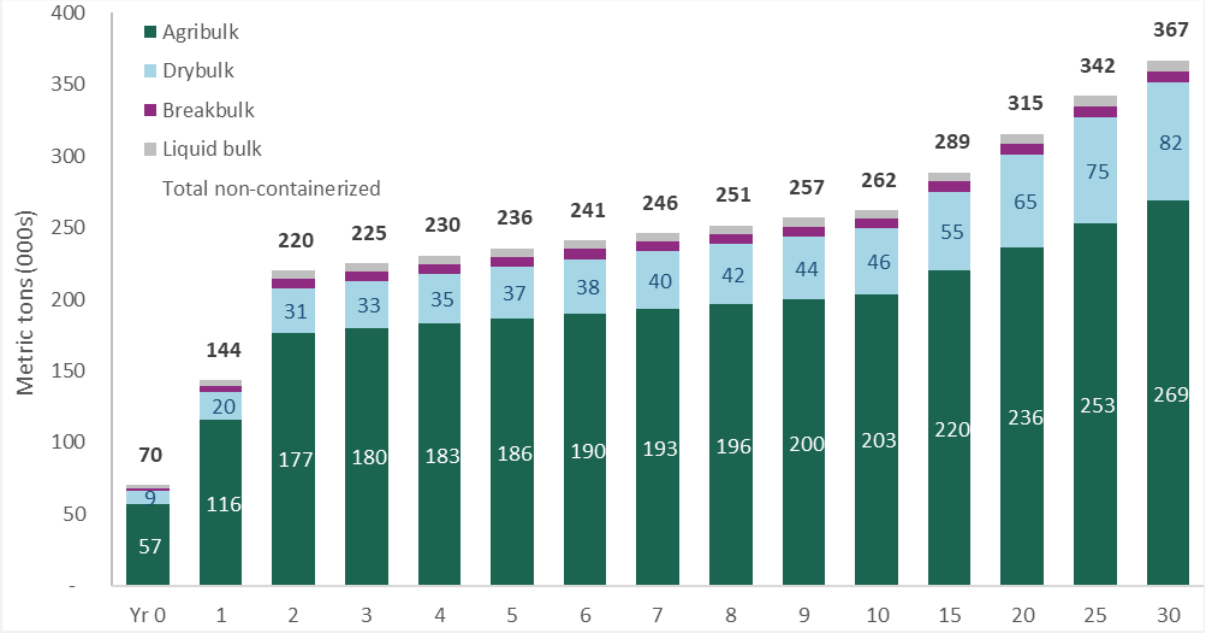
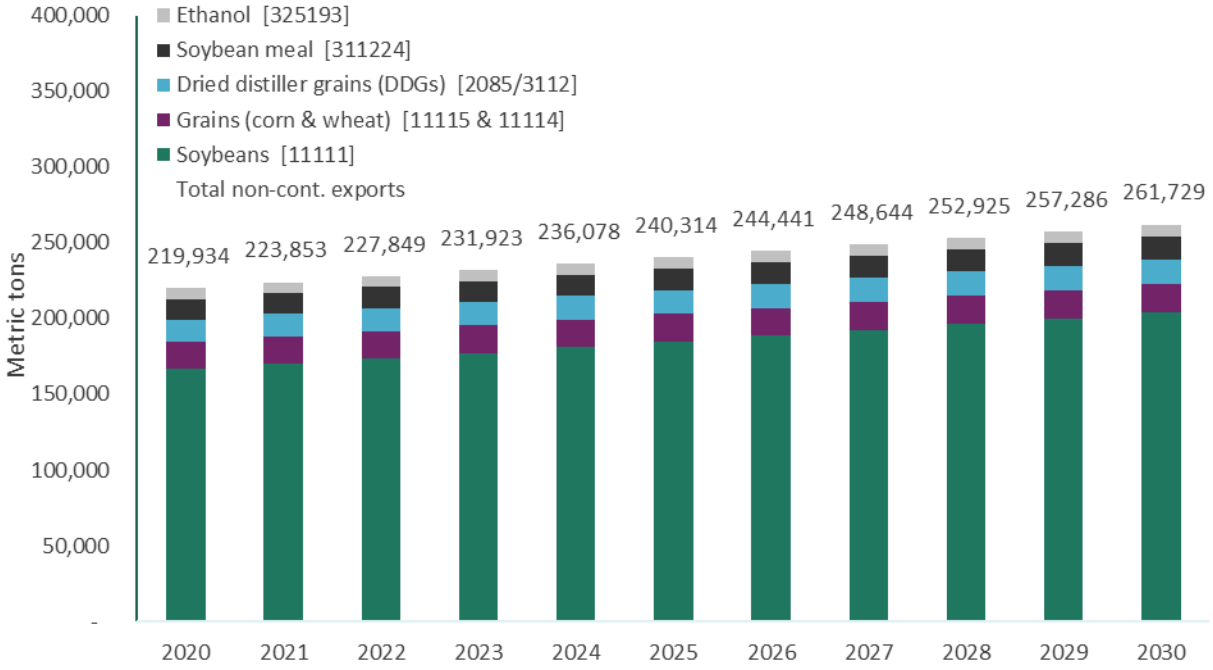
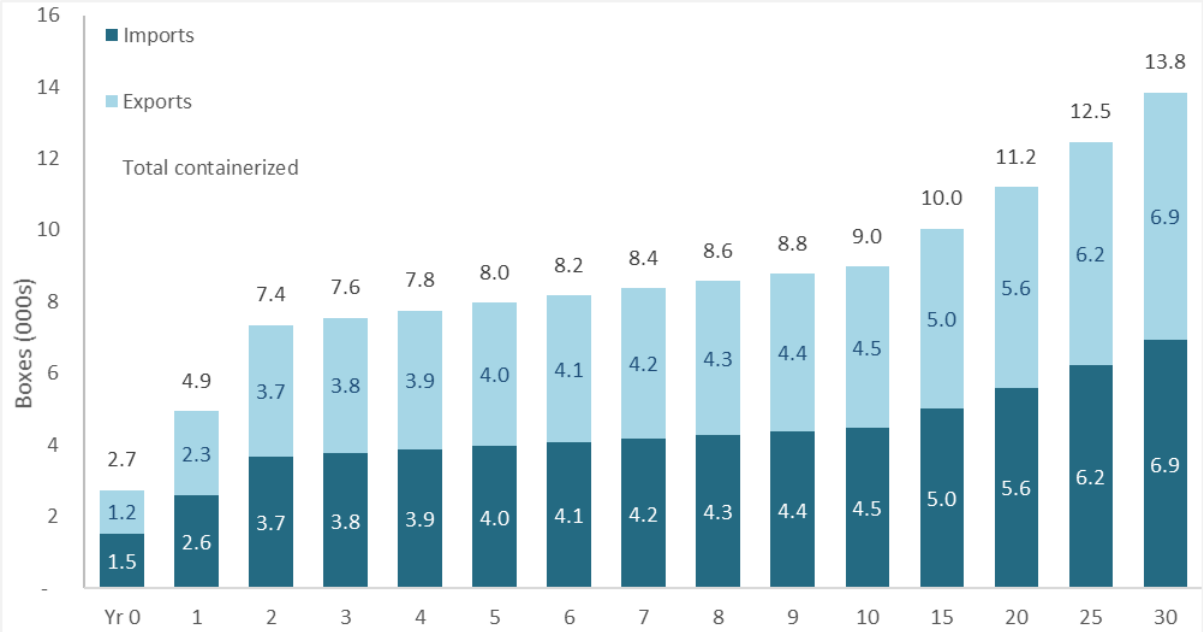


Figure E2 Forecast of non-containerized exports for the 24-county study area by commodity (metric tons)



DIS estimated that in 2018, bulk exports from the Heartland Port Project study area were 219,934 MT of exports of non-containerized cargoes from the 24 counties expected in 2020 will be broken down as follows: 166,723 MT of soybeans, 17,537 MT of corn and wheat, 15,105 DDGs, 13,550 soybean meal, and 7,021 ethanol for agribulk commodities. Agribulk commodities are one of the categories with the highest potential market for the Heartland Port Project. Annual projections for the four categories are shown in Figure E2.

Figure E3. Base Case volume forecast and ramp-up for containerized cargo (Lifts)



Forestry is another category of products that are exported from the 24-county study area. The largest category of exports is "Logs" and logs are very likely to be exported in containers, thus we've assumed that all exports in the APHIS data are exported in containers. Total exports of forestry products from Missouri were reported by USDA-APHIS as 111,001 metric tons in 2019 with 21,312 metric tons being shipped from the 24-county study area. Table 12 of the report has details on forestry products.

Containerized volumes are expected to grow from around 2,750 lifts per year to around 13,850 lifts per year over the 30-year forecast period under the assumptions for the Base Case scenario, at a CAGR of 5.5% per year. Most of this growth is associated with the ramp up in share capture in the initial years. Over the long-term, the growth rate would gradually decline from around 2.8% per year to around 2.1% per year. The Base Case volume forecast, including the consideration of the ramp-up period, for containerized cargo is shown in Figure E2.

Mercator constructed a discounted cash flow model integrating the projected demand to be handled by the Port with the assumptions for capital expenditures (capex) and operating expense (opex) for each business segment. Capital costs from previous studies commissioned by the Heartland Port Authority were used as the starting point of our capex estimates. Opex included two categories of staff—professional staff and laborers. To minimize expenses, the professional staff would include only three positions. Also to minimize expenses, functions related to computer systems/IT, legal, and cargo handling equipment mechanic are assumed to be outsourced.

Based on a landlord port model concept, the Heartland Port Authority/Port Commission would execute a concession agreement with an entity that would operate the Heartland Port and pay a concession fee for this right to the Port Authority. This entity would likely be a marine river terminal operator (MRTO) or possibly a grain trader. Users of the port would pay the MRTO concessionaire a basic throughput or handling rate per unit of cargo handled, and additional fees for ancillary services. The model considers a concession payment from the MRTO concessionaire to the Heartland Port Authority in the form of a payment per unit of throughput volume handled by the port.

Table E1. Financial modeling results: Base Case volumes (million, $)

ID	Business segments operating	Min acres req.	Eq. and storage capex Yr0	Construction Capex Yr0	Tot. startup capex Yr0	Gross revenue Yr3	Operating margin Yr3	EBITDA Yr3	Cash flow NPV	IRR %	Yrs to payback
1	**Container+BB**	**10**	(3.2)	(15.9)	(19.1)	2.9	2.3	1.8	**3.6**	**12%**	11
2	**Agribulk**	**3**	(6.9)	(9.7)	(16.6)	1.3	1.1	0.6	**(7.8)**	**-2%**	N/A
3	**Drybulk**	**3**	(4.6)	(8.4)	(13.0)	0.2	0.2	(0.2)	**(10.1)**	**0%**	N/A
4	**Liquid-bulk**	**3**	(2.7)	(7.3)	(10.0)	0.0	0.0	(0.3)	**(9.7)**	**0%**	N/A
5	**Cont+BB + Agribulk**	**13**	(10.1)	(21.1)	(31.1)	4.2	3.3	2.7	**1.7**	**10%**	13
6	**Cont+BB + Drybulk**	**13**	(7.8)	(19.7)	(27.5)	3.2	2.5	2.0	**(0.6)**	**9%**	15
7	**Cont+BB + Liquid-bulk**	**13**	(5.9)	(18.7)	(24.5)	2.9	2.3	1.8	**(0.2)**	**9%**	14
8	**Cont+BB + Agribulk+ Drybulk**	**20**	(14.6)	(26.6)	(41.3)	4.5	3.5	2.9	**(3.8)**	**8%**	16
9	**Cont+BB + Agribulk+ Drybulk+ LB**	**20**	(17.3)	(28.2)	(45.4)	4.5	3.6	2.9	**(6.7)**	**7%**	17

Based on our financial modelling, we conclude that the container segment would be the most important for project viability, being the only segment with positive earnings and positive NPV. Assuming the Base Case volumes, the outputs of the financial model for the two most attractive scenarios container and breakbulk (Cont+BB) and Cont+BB+Agribulk show an NPV of the project cash flows of $3.6 million and $1.7 million respectively, after considering capex, interest, taxes, depreciation, and amortization.

Although the returns from the project would not be attractive to an institutional investor, this project might be attractive to a strategic player who could capture non-financial benefits.[1]

While agribulk shows a negative cash flow NPV as a stand-alone business, the fact that its operating margin and EBITDA in year 3 are positive and that volumes are significant under the Base Case forecast provide some indication that, at least, merits further research and analysis. Agribulk might turn into positive territory under more refined assumptions. For instance, changes in the capital structure of the project, further capex refinements based on an actual engineering design/analysis, consideration of further value-adding activities on-site might generate additional revenues worthy of consideration for the overall project. The results from the financial model for the Base Case volume forecast are shown in Table E1. A complete set of outputs from the financial model for each business segment modeled and their different combinations is provided in *Section 6. Financial* analysis.

Assuming that the necessary condition for supporting containerized cargo flows to Jefferson City are in place (i.e. local distribution center capacity is established and a low-cost and frequent container ship or barge service is operating), containerized cargo handling could be viable and is responsible for most of the value generated under the scenarios evaluated. As presently conceived, the non-container investments are not individually or collectively viable, and to support them the container business may have to absorb certain capital expenses associated with any bulk operations if those activities are included in the development plan.

The proposed multimodal port would help to enhance the economic environment for businesses in central Missouri by improving the cost of doing business in the region. Because moving freight by water is the least expensive and more environmentally friendly of all transportation modes, there are societal benefits that can stem for a project of this nature that could not be captured by a private investor. As demonstrated by the *2018 Central Missouri Multimodal Port Feasibility Study* 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.[2] In these regards, the Missouri Department of Transportation (MoDOT) has well established mechanisms for successful public-public and public-private-partnerships (P3). 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, rail and road access improvements, and general site development. Programs like this can be a great assistance for successful project development.

In order for the project to move forward, several environmental regulatory requirements would need to be satisfied. This report concludes with a roadmap for the different types of factors that would need to be considered in an Environmental Impact Review process typical for a project of this magnitude.

[1] Based on a weighted average cost of capital (WACC) of 9.5% based on a 50/50 debt/equity ratio. For a description of the entire list of assumptions, please refer to Section 6.

[2] Jefferson City Area Chamber of Commerce, *Central Missouri Multimodal Port Feasibility Study Final Report,* prepared by Cambridge Systematics and Hanson Professional Services, Jun 2018, page 10-106.

Overall, the Heartland Port Authority continued 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 will be crucial for the successful development of this project. Once funding assistance is secured, the attractiveness of this project for a private investor can be expected to increase substantially, and the odds for the structuring and implementation of a successful P3 for this project will consequently increase as well.

1. Introduction

Like many other Midwestern states reliant upon infrastructure to move agricultural commodities, manufactured goods, and raw materials to markets, Missouri's transportation system needs to be expanded and, in some cases, upgraded and modernized. The interstate highway system is more than fifty years old, many of the locks and dams on key river systems date back over seventy years, and the rail network was originally built in the late 1800s. Agricultural commodities are often transported via multiple modes and in many cases over a long distance. The same can be said for raw materials (i.e. agribulk and mineral-bulk commodities) and manufactured goods of many types.

The Mississippi-Missouri River System ranks among the top-5 largest river systems in the world and is the most important inland waterway in North America, historically serving as the backbone of inland commercial navigation in the U.S. The immense volume of commerce that takes place along the Mississippi-Missouri River System has fostered the economic growth of countless cities and communities. Today, a wide range of industrial products and commodities travel up and down the river system. Upstream commodity flows are led by sand and gravel, fertilizers, salts, and cement, among others. Downstream cargo flows are led by grains, which account for most of the volumes for the overall system. The system represents the main artery for agricultural shipments by barge from the Midwest to New Orleans for export to destinations worldwide.

Missouri has 1,050 miles of navigable river, including 500 miles on the Mississippi River and 550 miles on the Missouri River, which are home to 15 public port authorities and more than 200 private river terminals. Because moving freight by water is the least expensive and more environmentally friendly of all transportation modes, businesses and industries in Missouri enjoy an unparalleled logistical advantage over competitors located in areas with no waterways. According to the latest data available from the U.S. Army Corps of Engineers (USACE), more than 4.5 million metric tons (MT) of freight were shipped through Missouri ports in 2017, an increase of 80% since 2011.[3] Nonetheless, the Missouri River remains under-utilized, offering great potential to relieve the strain on highways and a competitive, more environmentally friendly alternative to rail.[4]

In a proactive effort to promote economic development and marine transportation infrastructure in the central Missouri region, the Heartland Port Authority of Central Missouri was created in 2018.[5] As part of its mission, the Heartland Port Authority commissioned a study for the Central Missouri Multimodal Port Project in 2018, which evaluated the market feasibility of logistics-based development opportunities, developed a conceptual site plan, conducted a benefit-cost analysis (BCA), and quantified the economic and fiscal impacts arising from the project.[6] The Heartland Port Project involves the development of a public port in the Jefferson City area, located at the intersection of Callaway and Cole counties. The project considers two sites for the construction of the port facilities: (i) on the north side of the river at the preexisting OCCI Inc. temporary port, and (ii) on the south side of the river located east of the U.S. National Guard Facility.

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[3] US Army Corps of Engineers, *Waterborne Commerce National Totals and Selected Inland Waterways for Multiple Years*, CY 2017 https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll2/id/3002.

[4] MoDOT, *Mo Freight Plan—Missouri Ports and Waterways Network, 2017*.

[5] Jefferson City Area Chamber of Commerce, *MoDOT Port Authority Application—Heartland Port Authority* Aug 2018.

[6] Jefferson City Area Chamber of Commerce, *Central Missouri Multimodal Port Feasibility Study Final Report,* prepared by Cambridge Systematics and Hanson Professional Services, Jun 2018.

Most, if not all, greenfield projects involve an inherent level of uncertainty that require the identification and mitigation of potential risks for the project (e.g. unknown cargo capture prospects or volume commitments for the project, uncertainty in micro- and macro-econometric variables, uncertainty in the development competitive market environment). Hence, to better understand the viability of this project, it is critical for the Heartland Port Authority and other project stakeholders to have an analytical framework that enables them to quantify the potential demand that could realistically be attracted by the Project and their relationship with its potential financial viability, and better assess the risks of the project.

1.1 Objective

To assist the Heartland Port Authority, the scope of work (SoW) involved several tasks broken down in two phases:

- **Phase 1: Comprehensive market study.** The objective of this phase was to identify all companies in a 24-county area that could potentially utilize the Heartland Port for outbound and inbound shipments, and identify commodity markets and understand how commodities, manufactured goods, and raw materials flow from producers to markets.
- **Phase 2: Preliminary assessment of the financial feasibility of the Project.** The objective of this phase was to develop a detailed business model for the port that includes a preliminary analysis of the potential financial viability of the project based on the commodities with higher potential.

1.2 Structure of the report

This report presents the results of phases 1 and 2 and is structured in seven sections in addition to this introduction and a set of appendices. These sections are:

- *Section 1. Proposed Port Development Sites* describes the conceptual site plans for the development opportunities related to this project.
- *Section 2. Freight Transportation System in Central Missouri* provides an overview of the highways, railroads, and waterways utilized for the movement of freight.
- *Section 3. Market Analysis* presents an overview of the main industries contributing to the movement of cargo in Missouri and their locations and analyzes the commodities with greater potential for the port in the short- and long-terms.
- *Section 4. Heartland Port: 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 Heartland Port, which substitutes barge for rail on the inland component.
- *Section 5. Potential Conceptual Structure of the Heartland Port Concession and Operational Model* 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. Potential Levels of Cost Recovery* presents the financial analysis of the preliminary financial viability of the project and a set of potential levels of cost recovery scenarios.
- *Section 7. Environmental Regulatory Requirements* identifies on a preliminary basis the environmental and regulatory requirements for the project to move forward.

1.3 The Heartland Port—project location and study area

Figure 1. Heartland Port Project—project location and study area

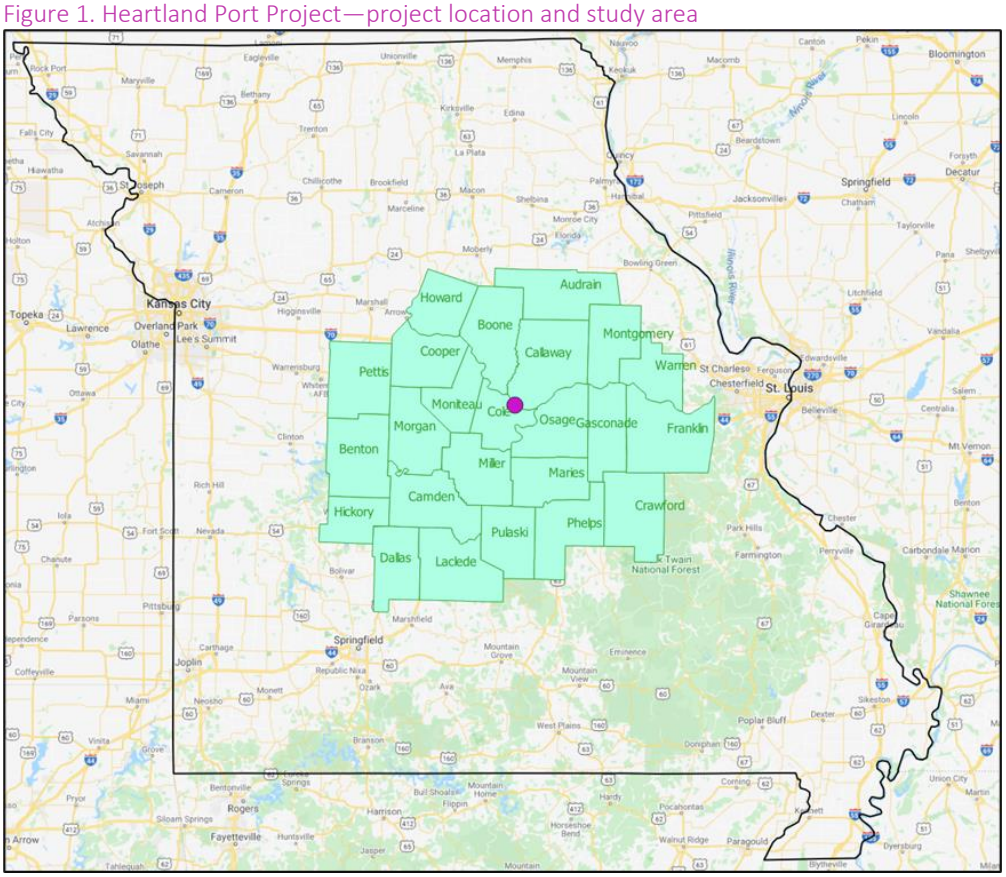


Figure 2. Heartland Port Project and major trade corridors

2. Freight transportation system in Central Missouri

As with most port projects, the commercial success of the Heartland Port Project will intrinsically be linked to its ability to generate value for its customers—shippers and beneficial cargo owners (BCOs) moving target commodities and products—by providing an efficient, reliable, and cost-effective transportation alternative to their incumbent routes. To maximize the extent of its hinterland reach and successfully attract volumes, the Heartland Port must demonstrate to its potential customers that substituting barge transportation on the Missouri-Mississippi River in the their international import and export supply chains will be superior to rail transport in terms of lower inland transport costs, while not dramatically increasing or compromising transit-time and reliability. A new route via the Heartland Port and the gateway Port of New Orleans needs to be a cost-effective to be considered as a potential alternative to incumbent routes.

In order to explore the degree of efficiency of the Heartland Port Project as a transportation alternative, this section provides an overview of the freight network serving the movement of freight in the state and assesses the connectivity and accessibility of the Heartland Port Project to the rest of the state's freight system. Next, it outlines the main highways and the Class I railroads serving the movement of freight in the state. This section then presents a comprehensive analysis of public and private ports, marine terminals, and docks catering to freight along Missouri's waterways. Lastly, it furnishes a more detailed analysis of the freight network in the 24 counties that comprise the study area.

2.1 Missouri's freight network

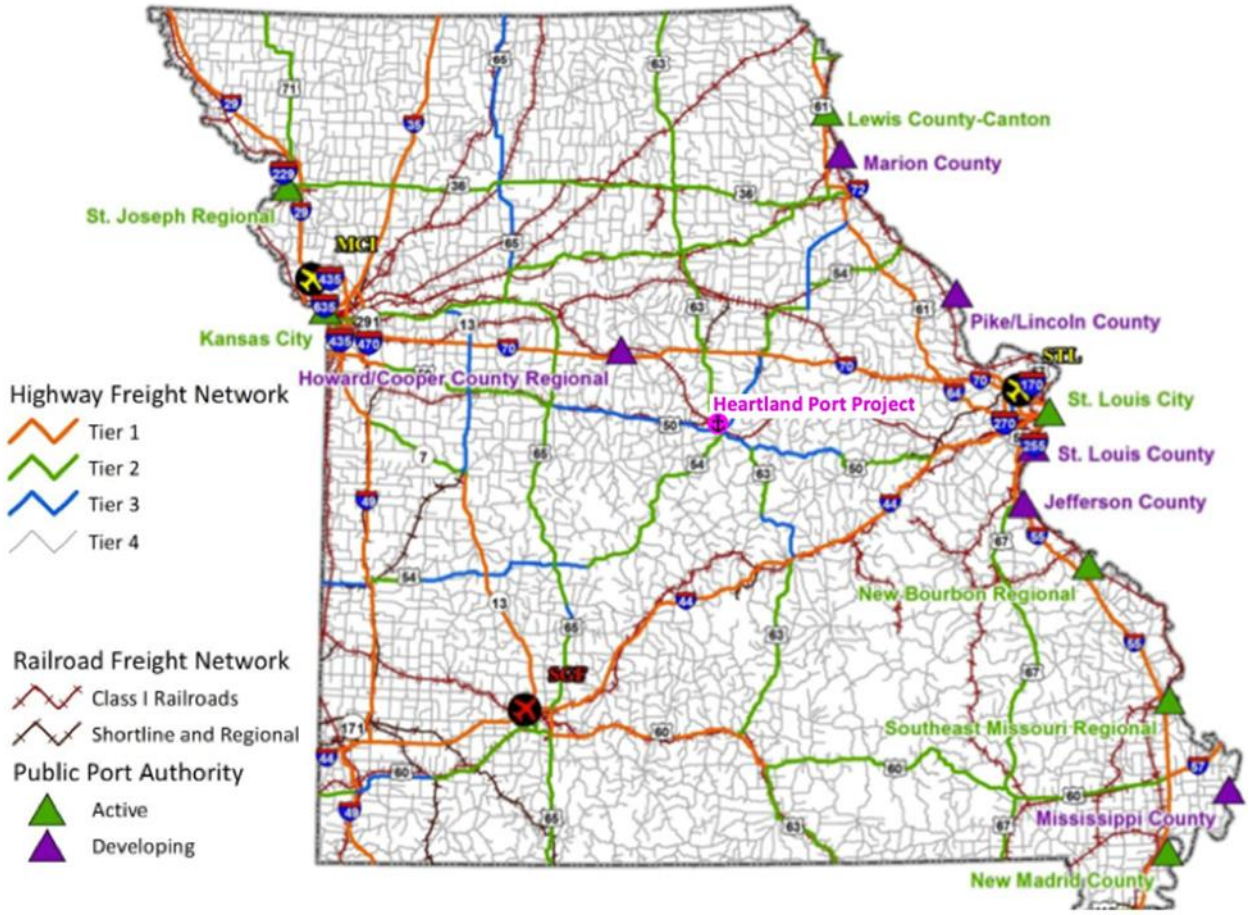
The Missouri Department of Transportation (MoDOT) defined the freight network for the first time in 2017.[7] This network is comprised of highways, rail facilities, ports, airports, pipelines, and intermodal facilities. As a result, a proposed improvement project must be located on or adjacent to the defined freight network to be considered in the freight prioritization process for state funding. The Heartland Port Project is located at the epicenter of the state's freight network, enjoying access to highways, railroads, and ports, as illustrated in Figure 3.

2.2 Highways

Truck is the predominant mode of freight transportation in Missouri, closely followed by rail. Missouri's highway system comprises 33,700 centerline miles of roadway; however, only 20% are classified as heavily traveled "major highways". Major highways include 18 interstate highways, including nine major routes, and nine auxiliary routes, and they carry about 80% of the overall system's traffic and a significant portion of the truck traffic. I-70 and I-44 are the backbone of east-west trade for freight movements destined to or generated in the central part of the state; these two highways carry the highest volume truck traffic in the state. I-70 provides connectivity between Kansas City and St. Louis. I-44 connects St. Louis with Oklahoma. I-49 and I-29 connect the Kansas City metro region and the western part of the state in the north and south directions. US-61 and I-55 connect the St. Louis region and the eastern part of the state also in the north and south directions.

[7] Missouri Department of Transportation (MoDOT), *2017 Freight Plan*.

Figure 3. Missouri's Freight Network System



Source: MoDOT 2017 Freight Plan. Adapted by Mercator.

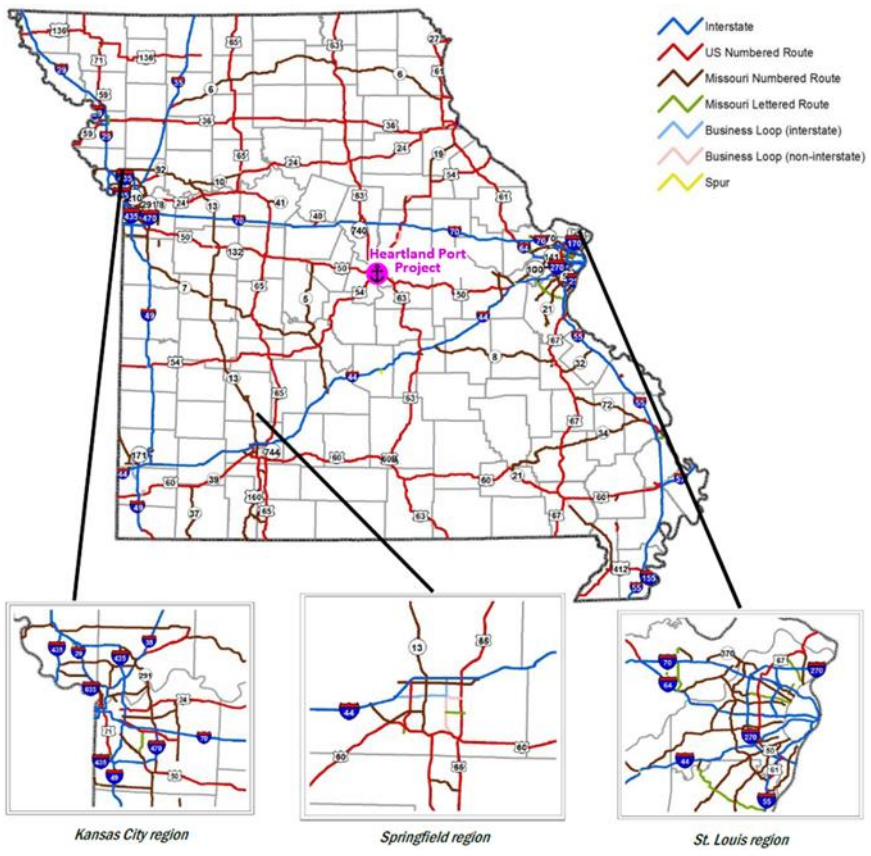
Located 30 miles south from the I-70 corridor in the state's capital, Jefferson City, the Heartland Port Project has excellent connectivity to/from major markets and cargo entry/exit points in all directions: it is about 1,000 miles from the East Coast, 1,900 miles from the West Coast, and 900 miles from the Gulf of Mexico. Inbound and outbound trucks can reach the I-70 corridor in less than one hour when traveling east via the State Highway 54 or 50 towards St. Louis or in a westerly direction towards Kansas via State Highway 63 or 50. State Highway 63 also provides rapid access to I-44 to the south.

MoDOT's *2017 Freight Plan* reports that about 18% of the total truck traffic is inbound (i.e. coming into the state) primarily from Wyoming, Illinois, Kansas, Iowa, Arkansas, and Texas; 15% is outbound (i.e. departing from the state) to Illinois, Texas, Kansas, California, Arkansas, and Iowa; 21% is intrastate (moving between points within Missouri); and about 46% are trucks just passing through the state. A portion of these flows are international imports and exports. Furthermore, the Plan reports that the breakdown of the top five categories of commodities transported by truck are non-metallic materials (21%), secondary traffic (17%), farm products (16%), food or kindred products (12%), and chemicals or allied products (8%).

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. Highway network serving the movement of freight in Missouri

a) Highway system



b) Main freight corridors for trucks in Missouri

Source: MoDOT 2017 Freight Plan. Adapted by Mercator.

2.2 Railroads

Rail is the second predominant mode of freight transportation in Missouri, closely after truck. Missouri has a significant freight rail infrastructure with six Class I freight railroads currently operating on 4,218 miles of main track rail lines and 2,500 miles of yard tracks. Five short-line railroads own and operate a combined 426 miles of track. The UP rail line provides connectivity with two Class I tracks between Kansas City and the Heartland Port Project, which merge into a single line east of the project towards St. Louis. In Kansas City, the UP line interchanges with the BNSF, CP, NS, and KCS. In St. Louis, interchanges are available with the BNSF, NS, and KCS.

Most of the major rail lines in the state are already operating at or near capacity, this includes the UP line that runs through the Heartland Port Project and connects Kansas City with St. Louis. MoDOT's *2017 Freight Plan* reports that about 20% of the total rail traffic is inbound (i.e. coming into Missouri), 5% is outbound (i.e. departing the state), 1% is intrastate, and about 75% is through rail traffic passing through Missouri. The plan reports that the breakdown of the top five commodity categories transported by rail are coal (49%), food or kindred products (9%), chemicals or allied products (8%), miscellaneous mixed shipments (8%), and farm products (8%).

In addition to delays and congestion on the rail lines due to operations being at near capacity, another concern is at-grade rail crossings, which can represent potential roadway safety and delay issues. Ownership of the Class I main rail lines and the major rail corridors serving the movement of freight in Missouri are illustrated in Figure 5.

2.3 Waterways and public and private ports, marine terminals, and docks

Missouri is traversed by 550 miles of the Missouri River and 500 miles of the Mississippi River from north to south. The Missouri converges into the Mississippi at St. Louis and provides uninterrupted flow southbound into New Orleans' ports in the Gulf of Mexico. There are more than 200 public and private river ports and marine terminals in the state. This section presents a comprehensive analysis of Missouri's marine highways, public port authorities, and private ports, river terminals, and docks to better understand the competitive environment in which the Heartland Port can be expected to operate.

2.3.1 Marine Highways

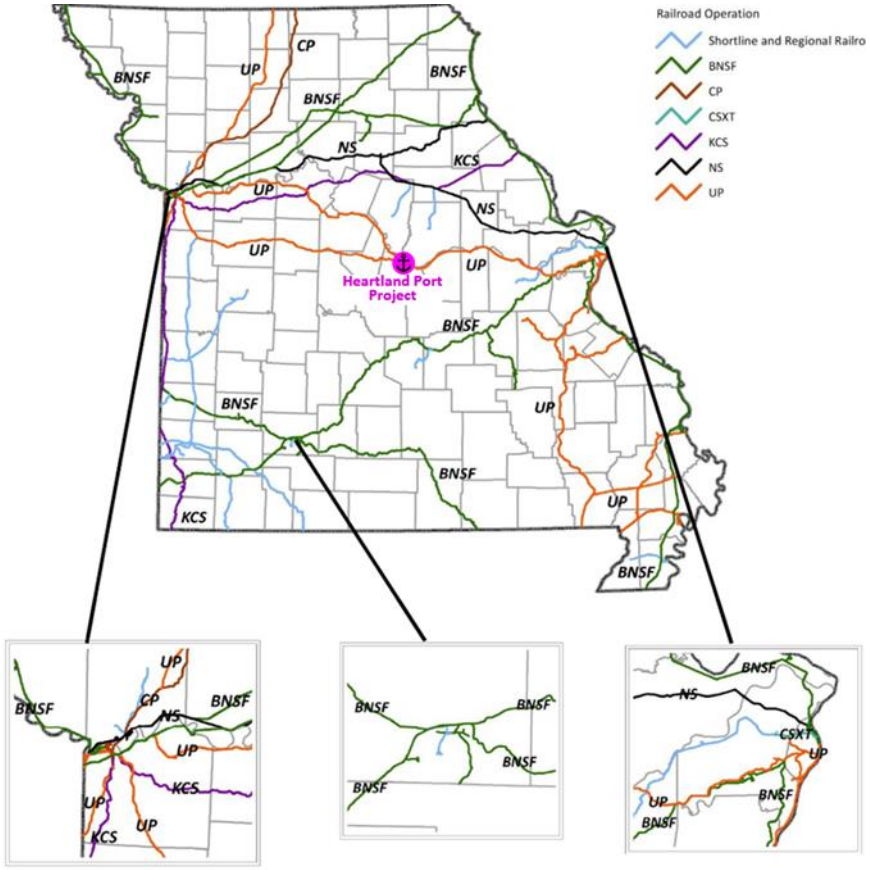
With the intention of shifting cargo from trucks into the more environmentally friendly water mode, the US Department of Transportation (USDOT) designated several marine highways in 2009. Marine highways can receive federal assistance from the Maritime Administration (MARAD). The Heartland Port Project is served by the M-70 along the Missouri River, which runs 160 miles from Kansas City, Missouri to Jefferson City and 140 miles from Jefferson City to St. Louis where it connects with the Mississippi. There are four marine highways designated in Missouri, shown in Table 1.

Table 1. Designated Marine Highways in Missouri

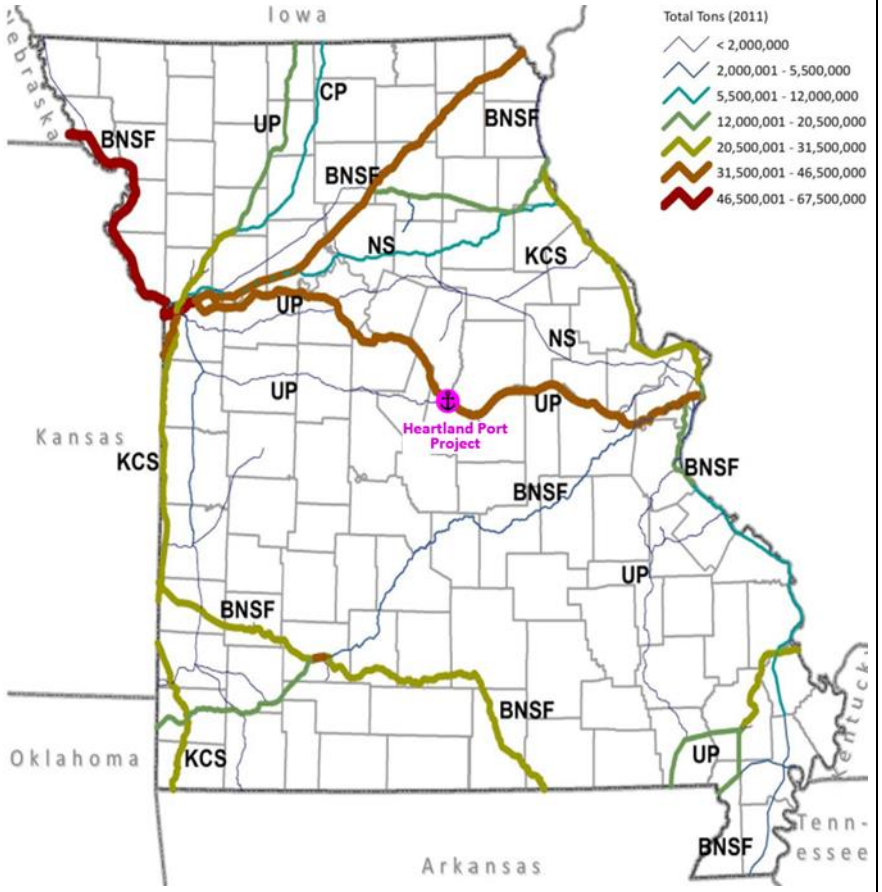
Marine highway	Waterway	From	To
M-29	Upper Missouri River	Kansas City, MO	Sioux City, Iowa
M-70	Missouri River	Kansas City, MO	St. Louis
M-35	Upper Mississippi River	Twin Cities, MO	St. Louis
M-55	Illinois River	Chicago, IL	St. Louis
M-55	Mississippi River	St. Louis	Gulf of Mexico

Figure 5. Class I railroads serving the movement of freight in Missouri and the Heartland Port Project

a) Railroad system



b) Main freight rail corridors in Missouri



Source: MoDOT 2017 Freight Plan. Adapted by Mercator.

2.3.2 Public Port Authorities

As of early 2020, there are 15 public port authorities in the state. The *MoDOT 2017 Freight Plan* classifies the public port authorities as active or developing ports. There are eight 'active' port authorities in Missouri and the remaining seven are 'developing,' that is, they currently do not have a public port facility or are in the process of building one, such as the Heartland Port Authority. In order to analyze the degree of potential competitiveness of the Heartland Port Project, Mercator identified four public port authorities that present the greatest competitive risk to the Heartland Port Project because of their geographic proximity to the Heartland Port, physical infrastructure, cargo handling equipment available, and types of commodities handled. These ports are described below. Two are active (City of St. Louis Port Authority and Port of Kansas City) and two are developing (Howard/Cooper County Regional Port Authority and Pike/Lincoln County).

- City of St. Louis Port Authority—Located about 126 miles downriver from the Heartland Port Project, the Port Authority of the City of St. Louis supports economic development in the City's 6,000-acre Port District, which lies along the City's 19 miles of Mississippi River frontage. This is the stronger competitor for the Heartland Port Project, and has the following characteristics.
  - The *Municipal River Terminal* (also known as St. Louis Municipal Docks) is a 40-acre facility owned by the City of St. Louis Port Authority. These are the only public, general purpose docks in the region on the west side of the Mississippi. In 2015, the Port Authority leased operations of the Municipal River Terminal to SCF Lewis and Clark Terminals LLC, a division of SEACOR Holdings Inc until 2040. On early March 2020, SCF started a weekly container-on-barge service to/from the Port of New Orleans for Hapag-Lloyd. DNJ Intermodal Services also provides near-dock movements of containers by truck.
  - The *Port of Metropolitan St. Louis* is defined by the US Army Corps of Engineers (USACE) as the 70 miles of riverfront on both sides of the Mississippi River. Mercator identified 32 private river terminals and docks located therein (described in the following section).
  - The City of St. Louis is served by six Class I railroads and seven interstates, I-70 being the most relevant for the movement of freight. There are two designated foreign trade zones (FTZs) in the area. Considering all available waterway terminals (public and private), the City of St. Louis Port Authority has capabilities to serve all types of cargo (i.e. agribulk, liquid-bulk, breakbulk, drybulk, and containers).

Facility area	Cargo type	Equipment, capabilities, or capacity
Receiving Infrastructure and inbound conveyance (marine leg)	▪ Agribulk ▪ Breakbulk ▪ Drybulk/Fert ▪ Liquid-bulk	▪ 2,000 ft of general cargo dock ▪ 2 mobile cranes ▪ 60-barge fleeting area
Storage	▪ Agribulk	▪ 1 dry storage warehouse of 90,000 ft^2

	▪ Breakbulk
	▪ Drybulk/Fert
		▪ 40-acre facility:
		  ▪ 10 acres of open storage for breakbulk cargo
		  ▪ 7 acres of open storage for dry bulk (coal), and

	▪ Liquid-bulk	▪ 1.3 million gallons of tank storage
Outbound conveyance or outload capabilities	▪ Agribulk ▪ Breakbulk ▪ Drybulk/Fert ▪ Liquid-bulk	▪ Rail spur into yard for access to Terminal Railroad Association, a regional switching line, and all Class 1s

- **Howard/Cooper County Regional Port Authority**—Located in Boonville County about 50 miles upriver from the Heartland Port Project, and situated on less than 1/3 of an acre, it is the only public facility between Kansas City and St. Louis. The local media reports that the last outbound barge left port in November 2016.[8] MoDOT is providing funding to construct a new dock 100 yards east of the current port on 18 acres that the port secured; some parts of the existing port will continue being used.[9] This port has the following characteristics.

Facility area	Cargo type	Equipment, capabilities, or capacity
Receiving Infrastructure and inbound conveyance (marine leg)	▪ Agribulk ▪ Liquid-bulk ▪ Breakbulk ▪ Drybulk/Fert	▪ General cargo dock with liquid cargo capabilities ▪ A 50-ton crane, and ▪ A 25-ton crane (all located on a floating dock)
Storage	▪ Agribulk ▪ Liquid-bulk ▪ Breakbulk ▪ Drybulk/Fert	▪ 250,000 bushels of grain (about 6,800 MT) ▪ 4 million gallons of liquid chemicals ▪ 2 dry storage buildings and a 15,000-ton outside storage pad available.
Outbound conveyance or outload capabilities	▪ Agribulk ▪ Liquid-bulk ▪ Breakbulk ▪ Drybulk/Fert	▪ Loaders, dump trucks, conveyors and repair equipment available ▪ Within one mile of the Missouri Pacific Railroad, which connects to the main UP branch

- **Port of Kansas City (PortKC)**—Located about 150 miles upriver from the Heartland Port Project, PortKC is located on the confluence of the Missouri and Kansas rivers at the intersection of six Class I railroads and numerous interstates (I-70, I-35, I-29 and Hwy 71). PortKC is a true intermodal connector; however, most of its intermodal yards are near the dense central business district. The facility's transload capabilities include transfer between barge, rail, and truck. The port's top commodities are fertilizer, mill scale, structured steel, shredded scrap, and coal slag. It also handles grain, corn, meal, barley, bark, rock clinker, salt, rolled and coiled steel, H-beams, plate steel, rebar, and petroleum coke. Due to reduced volumes, the port closed its Woodswether Terminal in 2007. At that time, it was handling about 600,000 tons (544,310 MT) per annum. The Kansas City Port Authority took over responsibility for the port and reopened it for commercial use in August 2012. In August 2015, PortKC welcomed its first barge since 2007. Extensive renovation was completed in 2016. Since reopening, annual throughput has been about 110,000 tons (99,790 MT). The port advertises on its website that its potential annual capacity is 800,000 tons (725,747 MT). A rail spur was completed in 2017, connecting the port to the UP rail line. In 2019, the port handled its first rail cars, which transported salt for roads. As part of the effort to reestablish and grow waterborne commerce, PortKC is planning the expansion and redevelopment of a former 415-acre steel mill site into an intermodal port and hub using a public-private partnership (P3).[10] PortKC plans to

[8] *Boonville port has become focal point of talk about proposed Jefferson City port.* News Tribune, Aug. 19 2018: https://www.newstribune.com/news/local/story/2018/aug/19/boonville-port-has-become-focal-point-of-talk-about-proposed-jefferson-city-port/739510/

9 *Port authority to construct whole new port*. Boonville Daily New, Oct 12, 2015: https://www.boonvilledailynews.com/article/20151012/NEWS/151019871

[10] *Port KC advances Missouri River Terminal work with selection of KPMG*. PortKC, July 10, 2019. https://portkc.com/port-kc-advances-missouri-river-terminal-work-with-selection-of-kpmg/

eventually develop the site for intermodal, light manufacturing and freight distribution. Key attributes are listed next.

Facility area	Cargo type	Equipment, capabilities, or capacity
Receiving Infrastructure and inbound conveyance (marine leg)	▪ Agribulk ▪ Breakbulk ▪ Drybulk/Fert	▪ 3 load cells and docking structures for 14 barges (on 900-feet of shoreline) ▪ 3 cranes (25-ton) ▪ 8 front-end loaders ▪ Portable conveyor systems
Storage	▪ Agribulk	▪ 60,000 tons of covered storage ▪ Open storage space
	▪ Breakbulk	▪ Open storage space
	▪ Drybulk/Fert	▪ Open storage space ▪ 145 acres of vacant land available for expansion
Outbound conveyance or outload capabilities	▪ Agribulk ▪ Breakbulk ▪ Drybulk/Fert	▪ Loaders, dump trucks, conveyors ▪ On-site truck scale ▪ Connects to the main UP branch on-dock

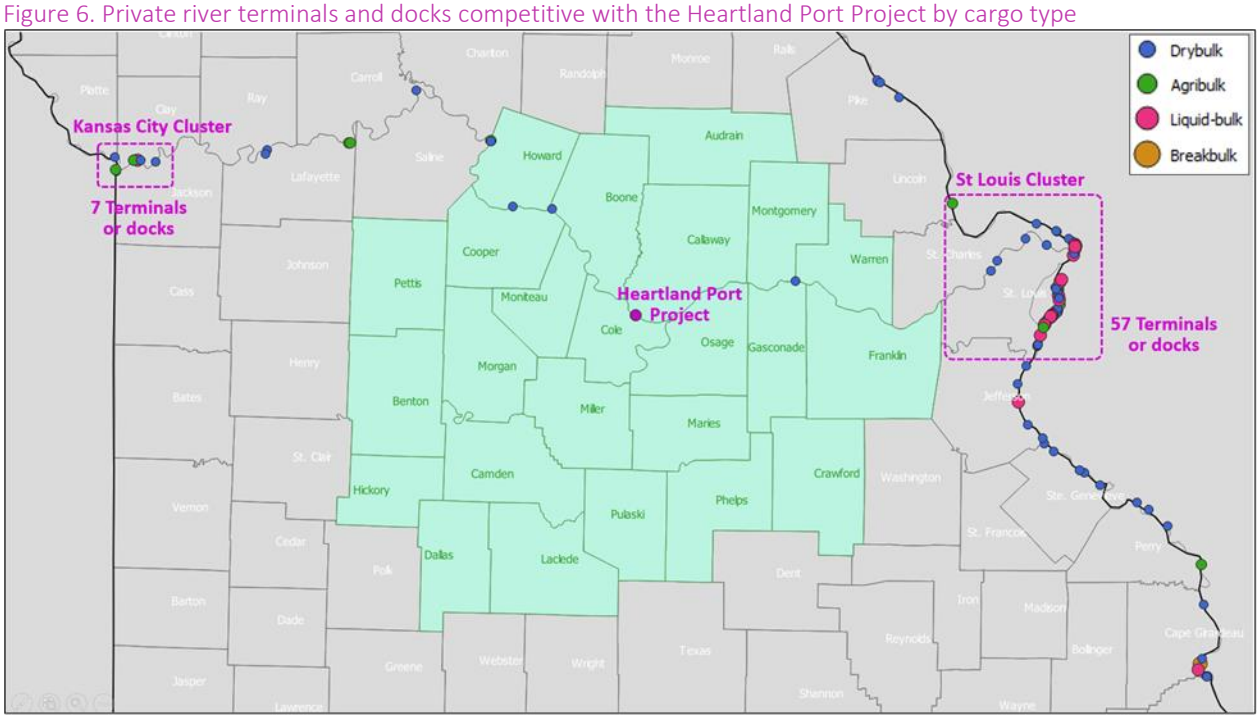
- Pike/Lincoln County—Located on the Mississippi River about 90 miles upriver from St. Louis, Pike and Lincoln counties were awarded Port Authority Designation in February 2011 from the MoDOT Waterways Division. The Pike Lincoln County Port Authority recently purchased 24.5 acres of land outside of Louisiana, Missouri for terminal development. Consequently, this is considered a developing port. Several businesses in the region already utilize barge service via the Mississippi. Both Pike and Lincoln counties have access to several major highways in all directions: US highways 61, 54, and State Highway 79; I-70 is the nearest interstate. For rail, KCS runs through both Kansas City and St. Louis, where there are multiple interchanges. BNSF runs north to south with access in both Pike and Lincoln counties.

2.3.3 Private river terminals and docks

Mercator identified more than 200 waterway facilities (nodes) from the USACE database. This database was processed in multiple iterations to remove non-cargo facilities, such as dredging zones and abandoned or non-functional terminals/docks. A visual inspection was performed utilizing aerial imagery from Google Maps. The resulting database accounts for 84 private ports, river terminals, and docks that Mercator assumed to be operational. Based on their physical characteristics, as observed in the aerial imagery inspections, their company name, and reported commodities handled, Mercator classified these facilities into four major commodity groups: (i) agribulk, (ii) drybulk/fertilizer, (iii) liquid-bulk, and (iv) breakbulk. Only the SCF facility in St. Louis reported movements of containers on barge.

Similar to the public port authorities, Mercator identified 104 facilities that, due to their geographic proximity to the project, facilities and equipment available, and major commodities handled, offer the greatest potential to compete with the Heartland Port Project. These active and developing private facilities are included in Figure 6, followed by comprehensive maps of the public port authorities and the private river terminals and docks in Figure 7.

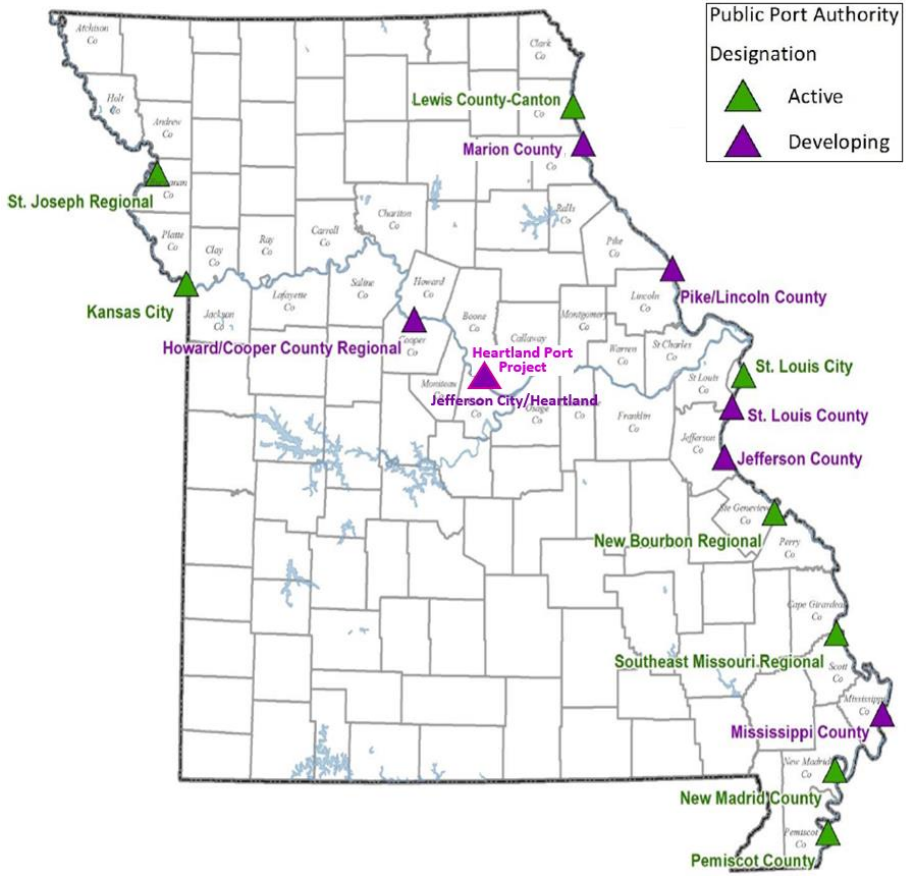
Figure 6. Private river terminals and docks competitive with the Heartland Port Project by cargo type



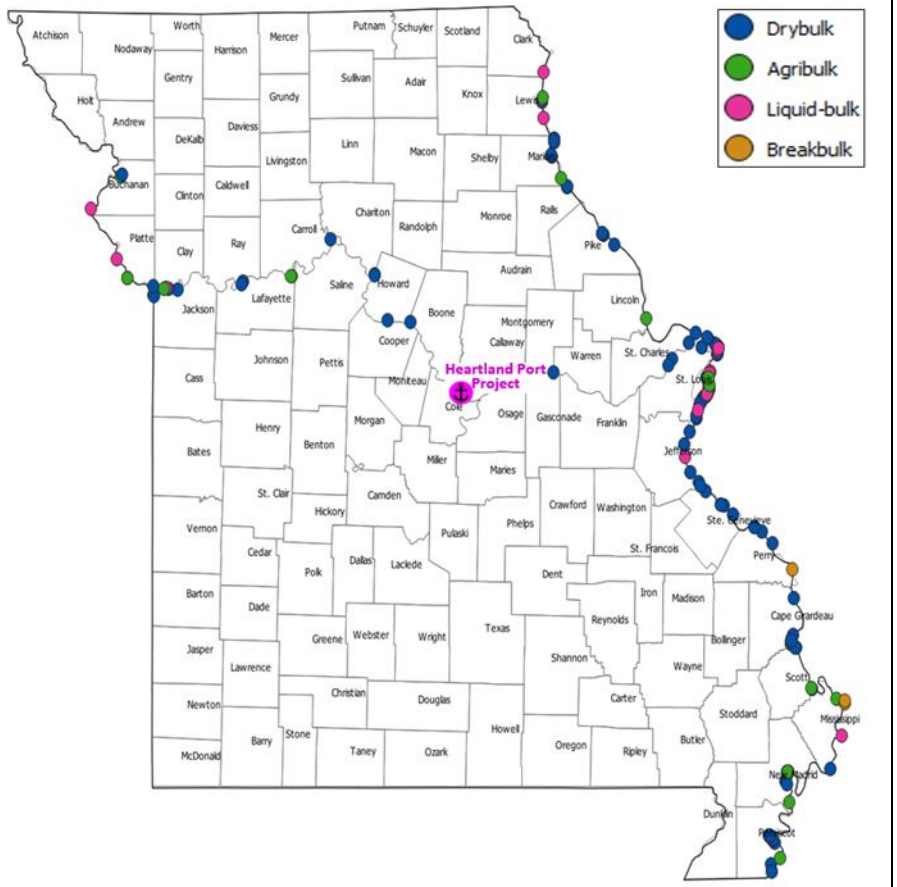
A more comprehensive inventory for the private ports, river terminals, and docks, including some of their physical and operational characteristics, is included in Appendix A: Inventory of private river terminals and docks.

Figure 7. Waterways and public and private ports, terminals, and docks

a) Public Port Authorities in Missouri



b) Private river terminals and docks



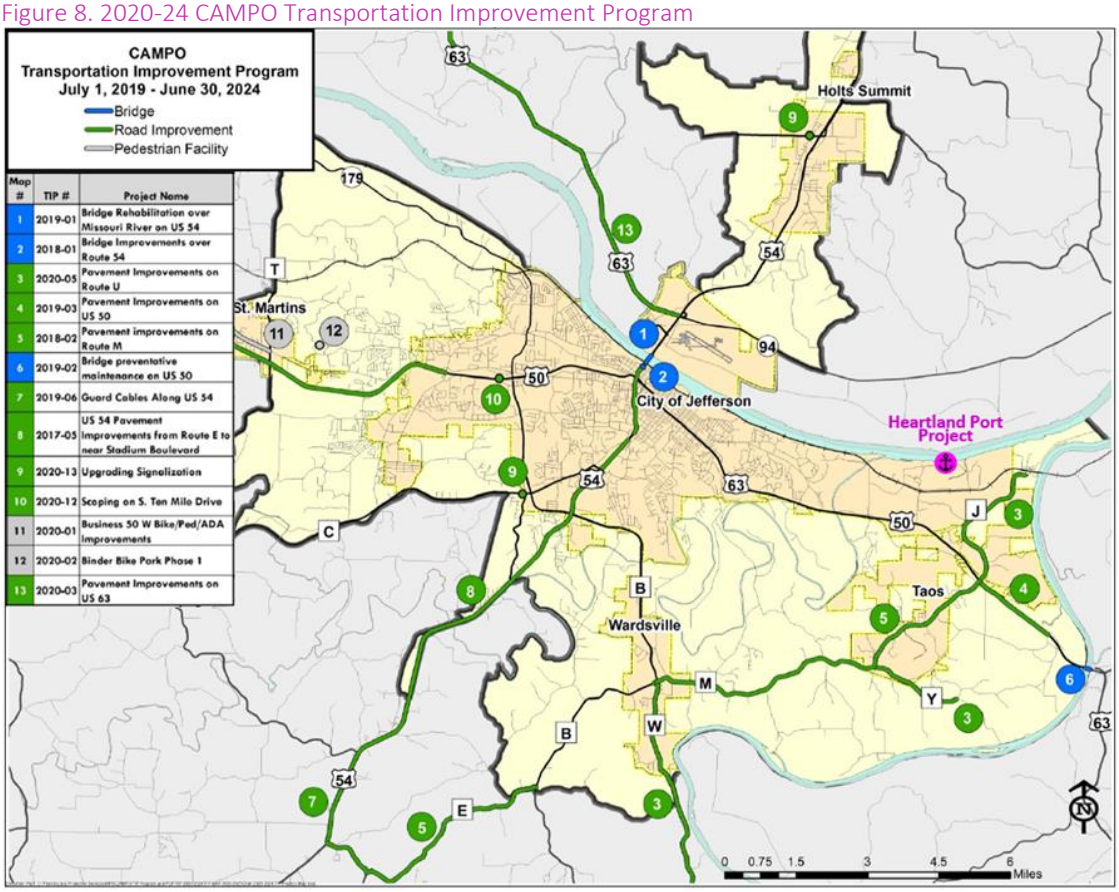
Source: MoDOT 2017 Freight Plan. Adapted by Mercator.

2.3.4 Regional highway connectivity and planned improvements

In terms of connectivity to the immediate hinterland, the Heartland Port Project provides good access for trucks to the state network via US Route 63 and US 50, south of the Missouri River until it reaches the junction with US 54, which, in turn, provides fast access to I-70 over a four-lane divided highway. The Capital Area Metropolitan Planning Organization (CAMPO) is the designated planning organization for Jefferson City. As part of its long-term planning process, CAMPO updates its Transportation Improvement Program (TIP) every five years to prioritize and obtain funding for the most critical projects in the region.

Mercator reviewed the 2020 TIP and identified the highway projects most relevant for the Heartland Port Project long-range transportation planning, as shown in Figure 8. Projects 3, 4, and 5 include pavement improvements on Route U, US50, and Route M near the location of the Port. Projects 1, 2, and 6 from the TIP include improvements and rehabilitation on the bridges crossing the Missouri River near Jefferson City. With the successful execution of these improvements, the Heartland Port Project should enjoy even better connectivity to the overall system and be prepared for the long-term.

Figure 8. 2020-24 CAMPO Transportation Improvement Program



Overall, the Heartland Port Project enjoys fast and efficient access to Missouri's most important freight arteries in all relevant modes (i.e. truck, rail, and waterways) as established throughout this section. However, as demonstrated by the freight flows by truck and rail analyzed, the levels of service on the system is exhibiting signs of congestion and poor freight fluidity. For trucks, the highway network is very close or exceeding capacity, as is the case on the major freight rail corridors. These conditions make the barge alternative, which is more environmentally friendly than both truck and rail, more attractive for its potential markets, which are analyzed in detail in the following section.

3. Market analysis

This section presents the outputs of the comprehensive market study corresponding to Phase 1. The objective of this phase is to identify all companies that could potentially utilize the Heartland Port for outbound and inbound shipments of commodities, final products, and raw materials. Phase 1 aims to identify commodity markets and understand how commodities, manufactured goods, and raw materials flow from producers to markets. With geographic and industrial scope determined, this section summarizes the main findings from a survey circulated among the potential users of the Port, aiming to identify the industries with the higher potential to generate traffic for the Port. This section then presents an analysis of the locations of the main freight generators/attractors in the state, focusing on those commodities with a high potential to be attracted by the Port. Subsequently, a port flow analysis is described that identifies potential volumes in the primary hinterland to be served by the Heartland Port Project. Lastly, we present our 30-year forecast for the overall market (before analyzing any potential capture rates by the port, which are analyzed in Section 6).

3.1 Industry analysis

Movement of processed grain and oilseeds is largely determined by location of ethanol/biodiesel plants, local livestock and poultry production, and size, location and nature of export markets. With geographic and industrial scope determined, a series of questions will be answered through a survey of potential users of the Port. These questions, once answered (or as they're answered in a few instances), will inform Phase 2 of the project. A significant portion of the data for this phase was gathered through direct contacts (primary research) with producers, manufacturers and consumers of incoming commodities. Depending on the number of identified businesses, a sample of the group was contacted for input on these questions.

3.1.1 Market survey—key findings

The primary research component of the market study (i.e. a set of questions) was organized into three logical groups. The first group included any data collected about the content of inbound and outbound shipments in the 24-county study area. The second group included the current status of inbound and outbound shipments to and from businesses in the study area. The third examined the potential changes to the current status resulting from adding a new port to the infrastructure of the study area. A copy of the survey instrument utilized with the questions included within each group are included in Appendix B: Market survey supporting material.

Survey methodology

A list of businesses within the study area that met at least one of the NAICS Code[11] criteria was created from an internal list maintained by DIS, a business information database maintained by Info USA, and a membership list provided by the Missouri Forest Products Association. The Info USA list was filtered by business size to eliminate smaller businesses. The final list contained 2,107 business addresses.

A random selection process was used to identify survey recipients. The selection process included criteria to make sure all relevant NAICS code groups were represented. An online survey was created and invitations to participate were sent to 243 businesses. A second invitation and phone calls were initiated. Survey responses were received from 73 respondents, which represent a 31.7% response rate.

[11] The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.

Distribution of business types responding

The survey included 20 choices for business type along with the option of entering a business type not on the list. Of the 73 responses, 17 respondents chose a business type that was not included in the list of business type selections offered in the survey form. The responses by business type are shown in Table 2.

Table 2. Responses by business type

Business Type	Original Category = No	Original Category = Yes
Agriculture Equipment sales	1	
Agriculture Production, Forestry Production (Including Logging), Fishing and Hunting		15
Asphalt manufacturer	1	
Build boat dock	1	
Chemical Manufacturing (Includes Ethanol and Biodiesel Production)		1
commodity association	1	
Consulting	1	
Consulting Forestry business has been sold	1	
Contract Regulatory Testing	1	
Electric utility, broadband provider and business park owner	1	
Electrical Equipment, Appliance, and Component Manufacturing		2
Electronic repair for generators, inverters, etc		1
Fertilizer, seed, and nutrient business	1	
Food Manufacturing (i.e. Milling and Oilseed Processing, Animal Slaughter and Processing, Dairy Product Mfg)		3
Heavy equipment and crushing and screening equipment		1
Machinery Manufacturing		2
Machinery, manufacturing custom products, shoe companies,		1
Merchant Wholesalers, Durable Goods		3
Merchant Wholesalers, Nondurable Goods		3
Mining, Quarrying, and Oil and Gas Extraction		2
No longer in business-retired	1	
Primary Metal Manufacturing, Fabricated Metal Product Manufacturing		6
Ready mix concrete	1	
Refractory related	1	
Repackage	1	
Retail	1	
retail sporting goods	1	
roofing supplies	1	
Safety and Industrial Supply reseller	1	
Transportation and Warehousing (Truck, Rail, Inland Water)		6
Transportation Equipment Manufacturing		1
Wood Product Manufacturing		9
Totals	**17**	**56**
Grand Total		**73**

Distribution of commodity / product categories

The survey included 8 product/commodity categories. Some respondents provided responses in more than one category which accounts for a total greater than the number of responses. The top 3 categories were (i) agribulk, (ii) fertilizer, and (iii) harvested timber. The distribution of product/commodity categories is presented in Table 3.

Table 3. Distribution of product/commodity categories

Category	Count
Agri-Bulk	9
Fertilizer	11
Aggregates	8
Harvested Timber	13
Mineral Bulk	1
Liquid Bulk	5
Roll On Roll Off	6
Break Bulk	7
Other	17
Total	**77**

Reported volumes by commodity / product group

Survey respondents were asked to estimate current annual shipments and annual receipts for their business. The responses in Agri-Bulk, Fertilizer, Aggregates, Harvested Timber and Mineral Bulk were consistent in units of measure. The nature of the other categories implied a variety of units of measure. These data from these responses was used in conjunction with other industry sources to estimate the potential traffic for the proposed port facility. The estimates on annual shipments or receipts reported in the survey are documented in Table 4.

Table 4. Estimates on annual number of shipments or receipts

Commodity / Product Category	Response Count	Shipments	Unit of Measure	Receipts
Agri-Bulk	9	60,250	Tons	145,700
Fertilizer	11	77,500	Tons	10,030
Aggregates	8	15,320,100	Tons	2,225,200
Harvested Timber	13	15,694,987	Tons	27,605,710
Mineral Bulk	1	500	Tons	500
Liquid Bulk	3	5	Tons	17
Liquid Bulk	2	1,000,000	Gallons	-
Roll On – Roll Off	1	528,000	Tons	250,000
Roll On – Roll Off	4	100	Single Units	1
Roll On – Roll Off	1	500	"What ever customer wants"	
Break Bulk	2	220	Loads	20
Break Bulk	1	10	Single Unit	-
Break Bulk	4	-	No Response	-
Other	11	68,345	Tons	88,663
Others	2	1,000	Trucks/Loads	900
Other	4		No Response	

Would consider barge transportation by business type

Survey respondents were asked if they would consider river transportation for shipping and receiving their products or commodities. Of the 42% responding positively, Agriculture Production, which includes the logging industry, and Wood Product Manufacturing made up 30% of the responses. Over 50% (11) of the business types listed on the survey were represented in the positive responses indicating a broad range of potential users of the proposed port. The number of respondents willing to consider barge transportation is described in Table 5.

Table 5. Respondents willing to consider barge transportation

Business Type	Would Consider Barge
Agriculture Production, Forestry Production (Including Logging), Fishing and Hunting	9
Chemical Manufacturing (Includes Ethanol and Biodiesel Production)	1
Electric utility, broadband provider and business park owner	1
Electrical Equipment, Appliance, and Component Manufacturing	1
Machinery Manufacturing	1
Machinery, manufacturing custom products, shoe companies,	1
Merchant Wholesalers, Durable Goods	1
Merchant Wholesalers, Nondurable Goods	1
Mining, Quarrying, and Oil and Gas Extraction	2
No longer in business-retired	1
Primary Metal Manufacturing, Fabricated Metal Product Manufacturing	2
Ready mix concrete	1
Refractory related	1
retail sporting goods	1
Safety and Industrial Supply reseller	1
Transportation and Warehousing (Truck, Rail, Inland Water)	2
Wood Product Manufacturing	4
Percent of all Respondents Willing to Consider Barge Transportation	**42%**

Responses to cost savings threshold question

In response to the question on what level of cost saving would be necessary for a respondent to consider barge transportation, 41% of those answering the question indicated a transportation cost savings of 10% or less. A cost saving of 20% or less would encourage 67% of those responding to consider barge transportation. The reported cost savings threshold necessary for a respondent to consider barge transportation is analyzed in Table 6.

Table 6. Cost savings threshold by business type

Business Type	10% or Less	Greater than 10%	Greater than 20%	Greater than 30%	Greater than 50%	Grand Total
Agriculture Production, Forestry Production (Including Logging), Fishing and Hunting	4	3		1		**8**
Chemical Manufacturing (Includes Ethanol and Biodiesel Production)	1					**1**
Electric utility, broadband provider and business park owner	1					**1**
Electrical Equipment, Appliance, and Component Manufacturing			1			**1**
Machinery Manufacturing					1	**1**
Machinery, manufacturing custom products, shoe companies,		1				**1**
Merchant Wholesalers, Durable Goods		1				**1**
Merchant Wholesalers, Nondurable Goods			1			**1**
Mining, Quarrying, and Oil and Gas Extraction	1		1			**2**
Primary Metal Manufacturing, Fabricated Metal Product Manufacturing	1		1			**2**
Ready mix concrete				1		**1**
Refractory related			1			**1**
retail sporting goods	1					**1**
Safety and Industrial Supply reseller	1					**1**
Transportation and Warehousing (Truck, Rail, Inland Water)	1					**1**
Wood Product Manufacturing		2	1			**3**
Grand Total	**11**	**7**	**6**	**2**	**1**	**27**

Anticipated increase or decrease in volumes shipped and/or received

To gain a perspective on attitudes in the current environment the respondents were asked their opinion on trends in shipments and/or receipts. Almost 45% indicated volumes would be increasing and 85% expect no change or an increase, as illustrated in Table 7.

Table 7. Expectations on shipping and/or receiving volumes

Selection	Less than 10%	10% to 20%	20% to 30%	30% to 40%	40% to 50%	Greater than 50%	Grand Total
No Change Anticipated							26
Not Sure							9
Volumes will decrease	1						1
Volumes will Increase	8	13	4	1	1	2	29
Grand Total	**9**	**13**	**4**	**1**	**1**	**2**	**65**

3.1.2 Industries with higher potential to generate traffic for the port

While the most responses came from a broad range of manufacturing business types, there were 15 responses from the Agriculture and Logging business type alone. Of the 8 product/commodity categories, the top four represented 53% of all responses. The total responses include 22% who chose "Other". If the Agribulk and Harvested Timber categories are combined, the survey indicates solid support for river transportation from the Agriculture Production and Logging industries, as illustrated in Table 8.

Table 8. Response summary and high potential categories

Business Types	Pct of Total	Product / Commodity Category	Pct of Total
Production	23%	Agri-Bulk	12%
Manufacturing	38%	Fertilizer	14%
Sales & Service	30%	Aggregates	10%
Transportation & Warehousing	8%	Harvested Timber	17%
Total	100%		53%

As observed throughout this section, most of the respondents showing interest corresponded to three industries in general: (i) agribulk, (ii) fertilizer, and (iii) harvested timber. If moving cargo by barge represents transportation cost savings up to 10%, 41% of the survey respondents would be willing to consider it. If the savings are between 10% and 20%, the response is even more optimistic, with 67% of the survey respondents willing to switch to barge. In general, these are encouraging signs for the Heartland Port Project. As will be demonstrated in the route cost analysis in Section 4, the potential efficiencies offered by the Heartland Port Project are in the ballpark of the levels indicated by the survey respondents to use barge as opposed to transport by truck or rail.

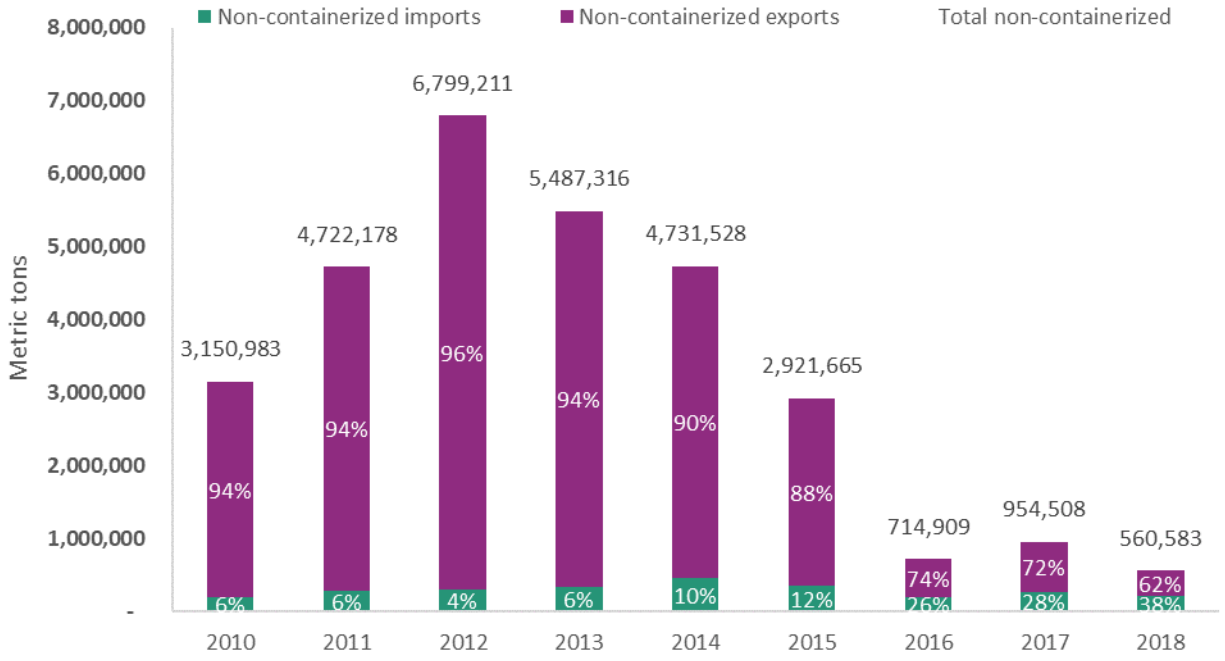
3.2 State level market trends

The next step to generate a picture of the movement of non-containerized cargoes (i.e. breakbulk, agribulk, drybulk, and liquid-bulk) and containerized cargoes in the study area was to analyze the level of imports and exports for Missouri.

3.2.1 Non-containerized cargoes

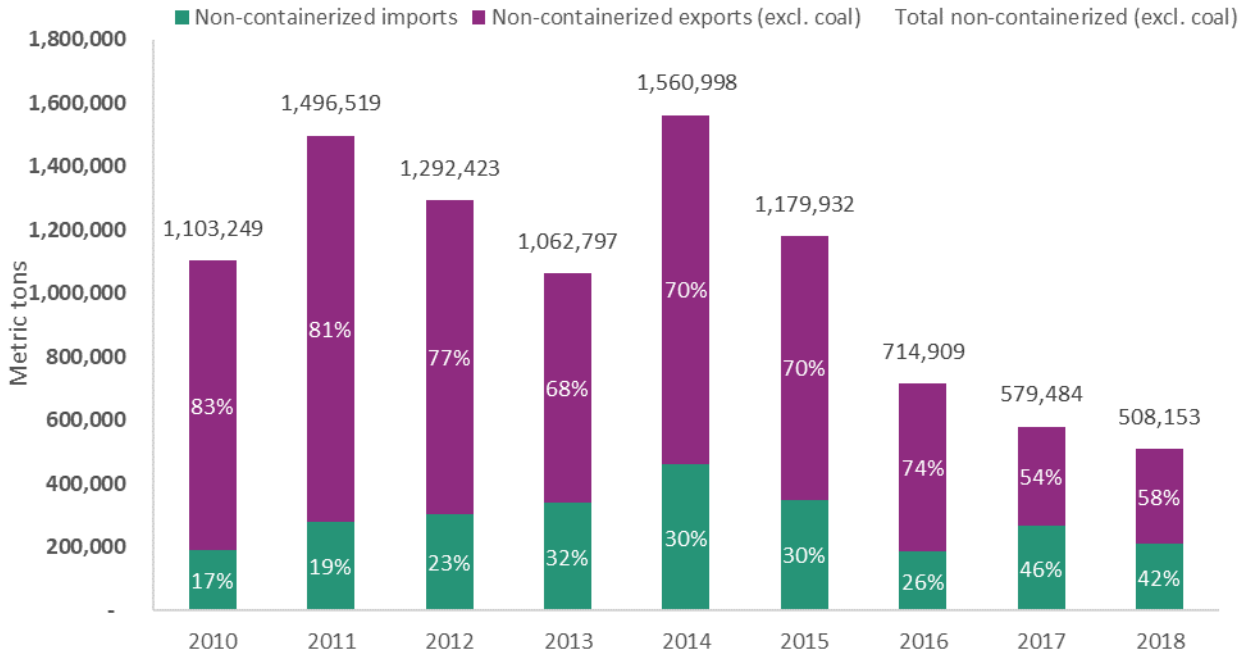
For this analysis, 2010 volumes for non-containerized cargoes are used as the starting point because, in our view, 2010 represents the first "normal" year when containerized volumes recovered from the 2007-2009 Great Recession. Furthermore, this analysis was performed for the state's total volumes, that is, with all commodities considered, and then excluding volumes related to coal exports. The state traded 3.1 million MT of non-containerized cargoes in 2010, of which 94% corresponded to exports when coal is considered. This volume peaked at 6.7 million MT in 2012, and substantially decreased after 2016. The import and export volumes of non-containerized cargoes for the state, with all commodities considered, are illustrated in Figure 9.

Figure 9. Missouri's total non-containerized import and export volumes, including coal (metric tons)



If coal exports are excluded from the analysis, Missouri traded 1.1 million MT of non-containerized cargoes in 2010, of which 83% corresponded to exports when coal was excluded. This volume peaked at 1.6 million MT in 2014 and decreased after 2016. The import and export volumes of non-containerized cargoes for the state excluding coal exports are depicted in Figure 10.

Figure 10. Missouri's total non-containerized import and export volumes, excluding coal (metric tons)



3.2.2 Containerized cargoes

The state of Missouri traded 2.2 million MT of cargo moved in containers in 2010. If a payload factor of 19 MT per 40 ft container is applied, this is equivalent to 115,789 containers. From these, 69% were imports and 31% were exports. This volume grew at an impressive compounded annual growth rate (CAGR) of 6.5% during this period, reaching 3.7 million MT in 2018 (194,736 containers), 67% composed of imports and 33% of exports. On average, Missouri's balance of trade by containers has been 67% imports and 33% exports, with imports growing at a 6.1% CAGR and exports at a faster 7.4% CAGR from 2010 to 2018. The import and export volumes of containerized cargoes for Missouri are illustrated in Figure 11.

Figure 11. State level containerized volumes for Missouri (metric tons)

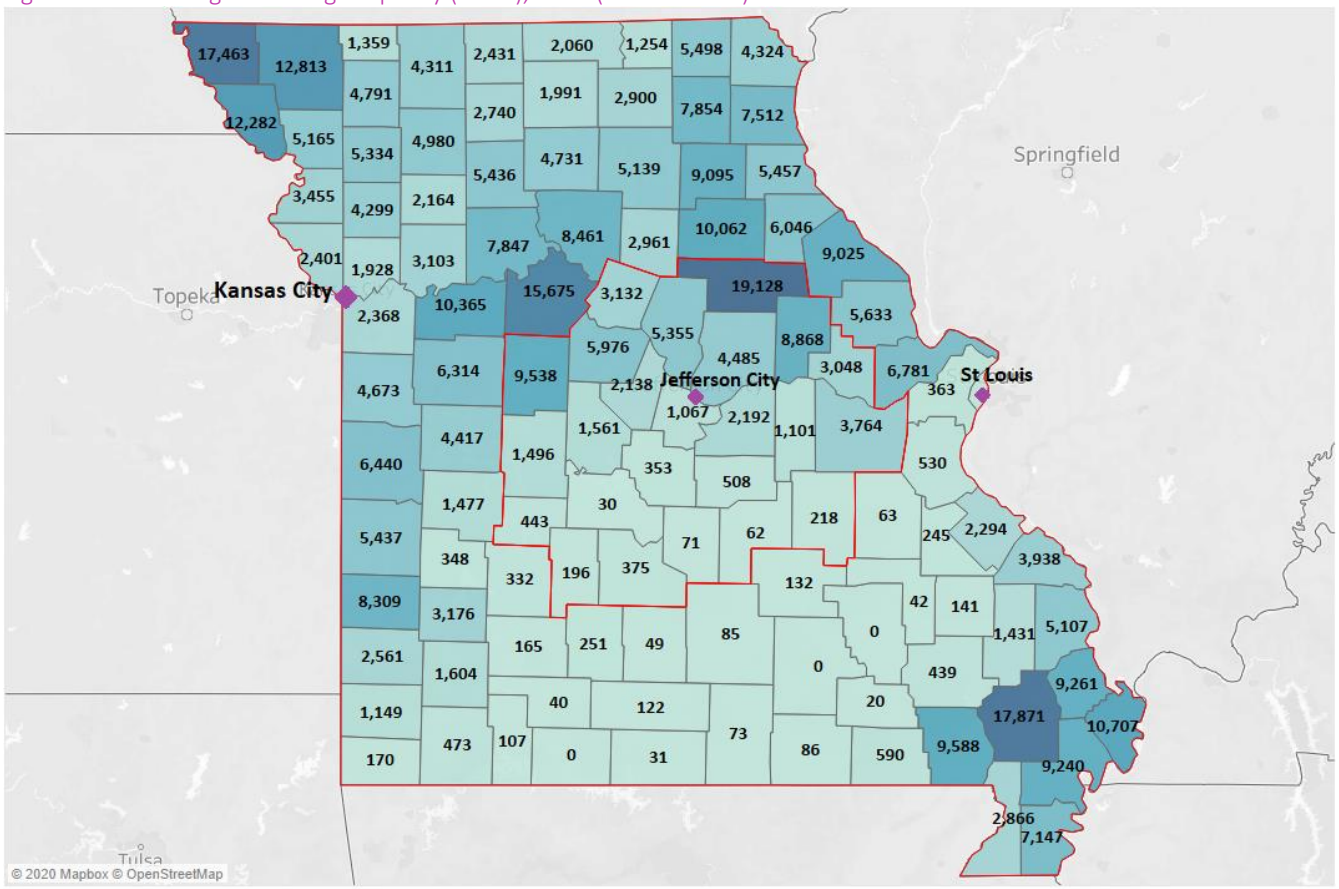
3.3 Location of freight generators/attractors

DIS conducted geospatial analyses to identify the location of key freight generator and attractors for the overall state. These include, among the most relevant, ethanol and biodiesel production plants, local livestock and poultry production sites, on-farm and commercial grain storage sites, grain and soybean processors, mines, among others. As part of this analysis, DIS also sought to identify relevant parameters that could be quantified, such as processing volumes, storage capacity, production levels, etc.

3.3.1 On-farm and commercial grain storage sites

Grain storage in Missouri is estimated by USDA for on-farm and commercial storage sites. The most recent county-level estimate of grain storage capacity by USDA was done through the 2012 Census of Agriculture. According to this report, there were 444 million bushels (11.7 million MT) of on-farm grain and oilseed storage in Missouri. Figure 12 shows the total storage capacity by county, with those having the highest capacities in dark blue; most are in the northern half and southeast corner of the state. Having large amounts of on-farm and commercial grain storage sites inside or near the study area can represent a competitive advantage since it will provide a cheaper mode of transportation by barge to export gateways with trucking costs that are cheaper than the existing alternatives (i.e. Kansas City or St. Louis).

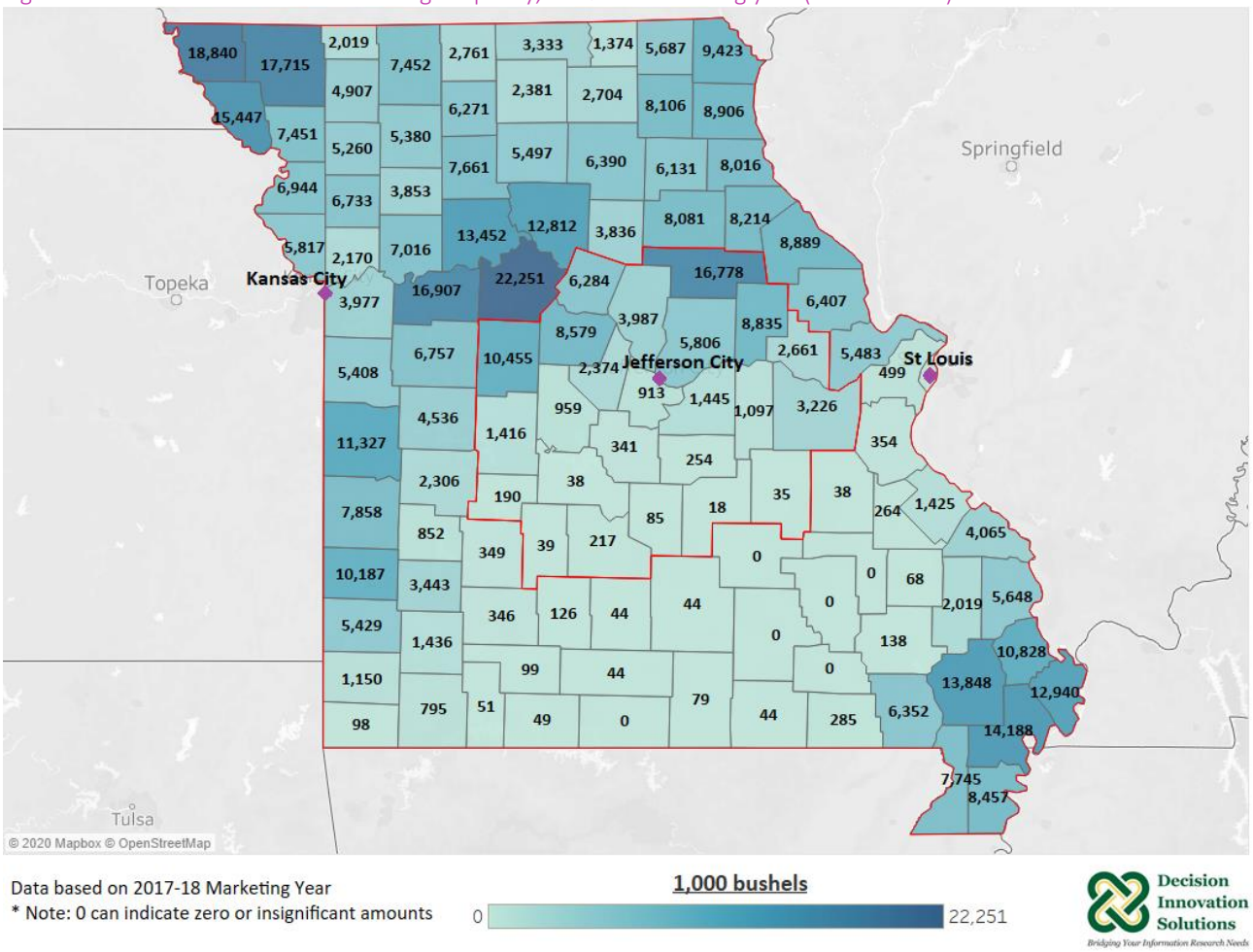
Figure 12. On farm grain storage capacity (static), 2012 (000s bushels)



Source: Decision Innovation Solutions.

Each year, the USDA updates the state-level estimate of on-farm grain storage capacity. In 2018, USDA estimated total on-farm grain storage capacity of 540 million bushels (14.2 million MT). In the absence of updated county-specific data in the 2017 Ag Census, the county-level estimate of on-farm grain storage was calculated as each county's share of total grain production (corn, grain sorghum, soybean and wheat) for Missouri multiplied times the USDA annual estimate of on-farm grain storage for the state of Missouri. The levels of on-farm storage by county are shown in Figure 13.

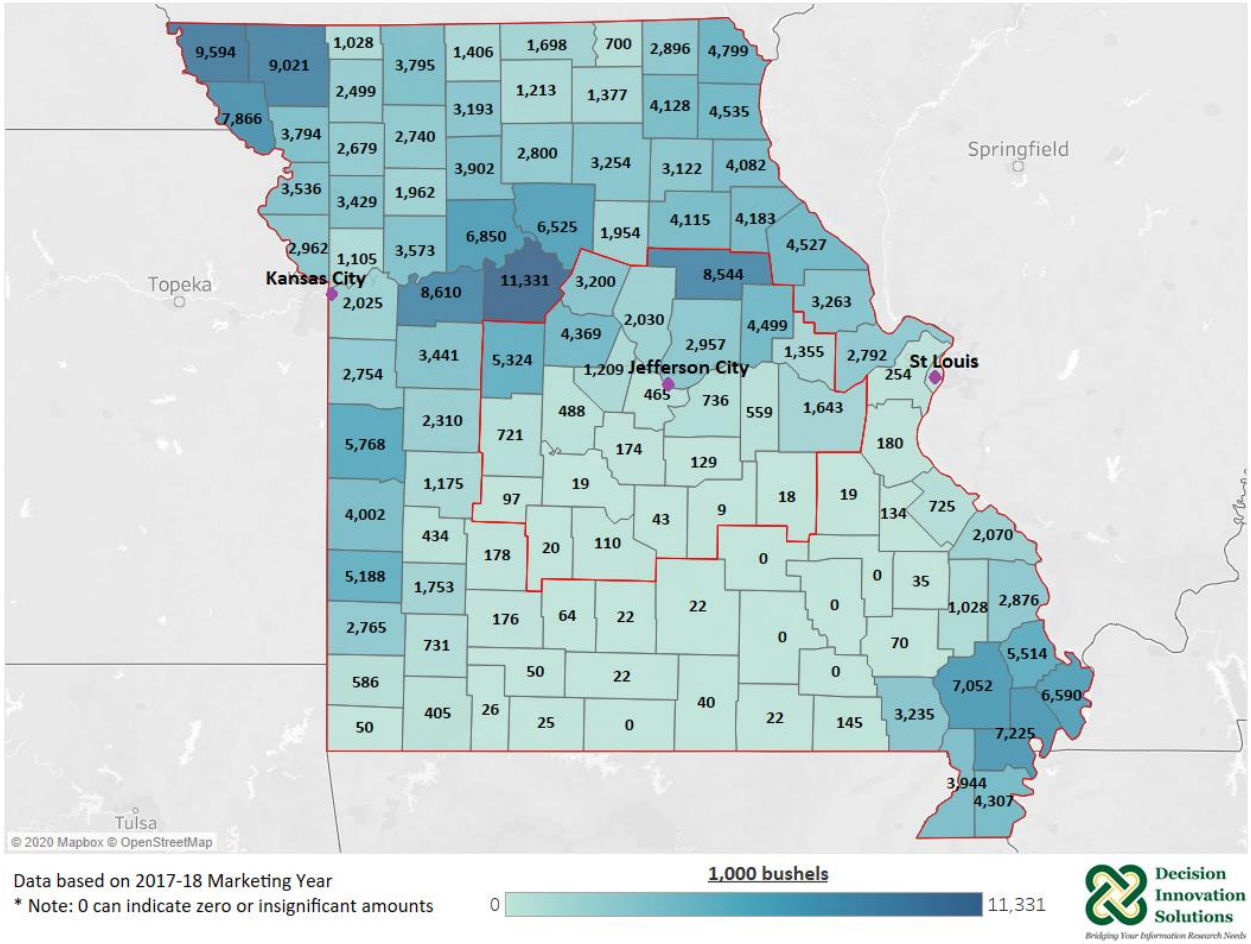
Figure 13. Estimated total on-farm storage capacity, 2017-18 marketing year (000s bushels)



Source: Decision Innovation Solutions.

In 2018, USDA estimated Missouri off-farm storage capacity of 275 million bushels (7.2 million MT). The individual county estimates of off-farm storage capacity were calculated as each county's share of total grain bushels (corn, grain sorghum, soybeans and wheat) of Missouri total grain production, and illustrated in Figure 14.

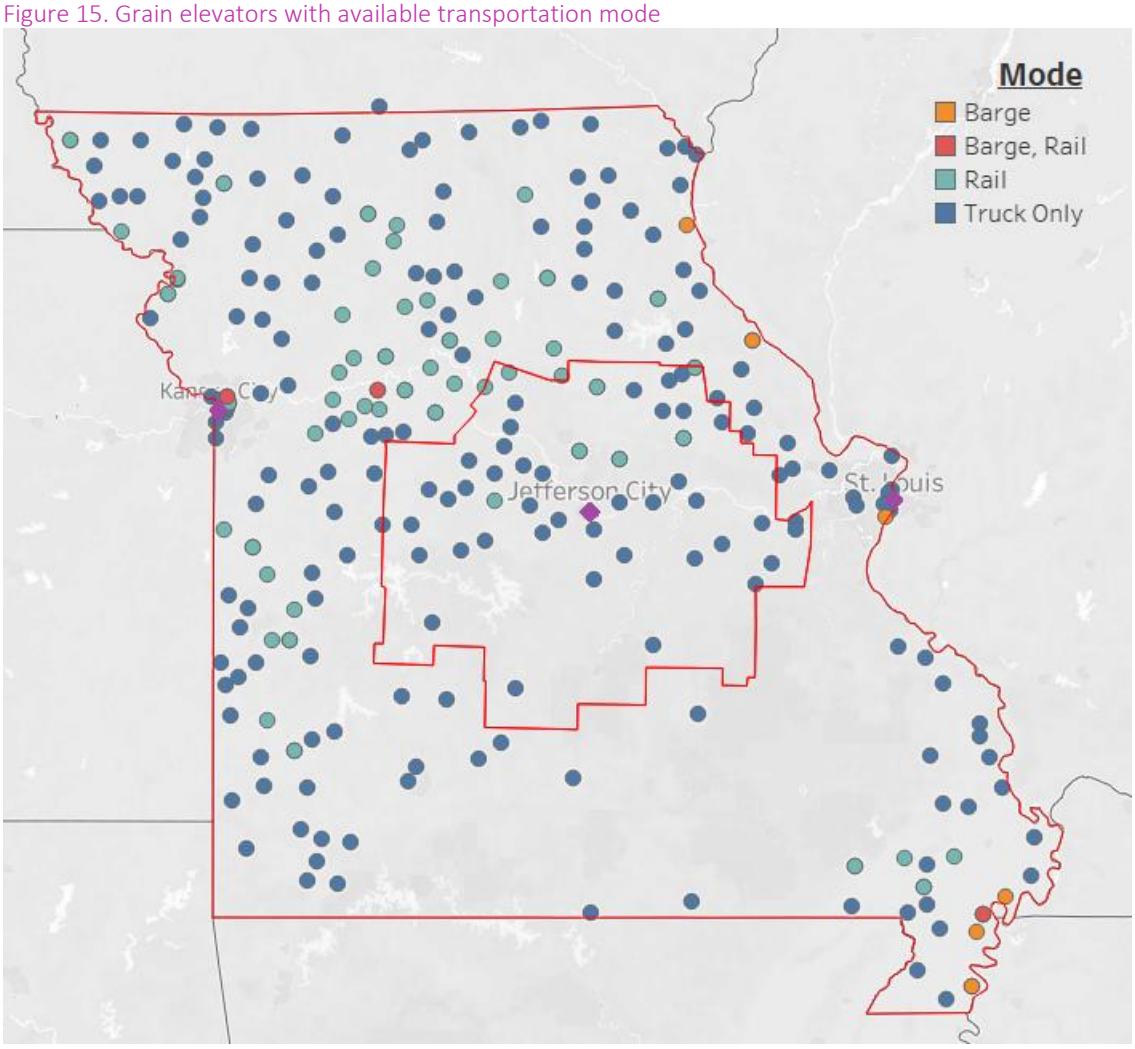
Figure 14. Estimated total off-farm storage capacity, 2017-18 marketing year (000s bushels)



Source: Decision Innovation Solutions.

In combination with the relevant transportation infrastructure and equipment, the location of grain elevators is important for farmers getting the grain to the elevator and unloading it in a timely manner during harvest season. As observed in the following figure, there are very few grain elevators in the central part of the state with access to rail service. Moreover, the availability of barge-rail intermodal connections is extremely limited, not only in the central part but in the entire state, as illustrated by the orange dots in Figure 15.

Figure 15. Grain elevators with available transportation mode

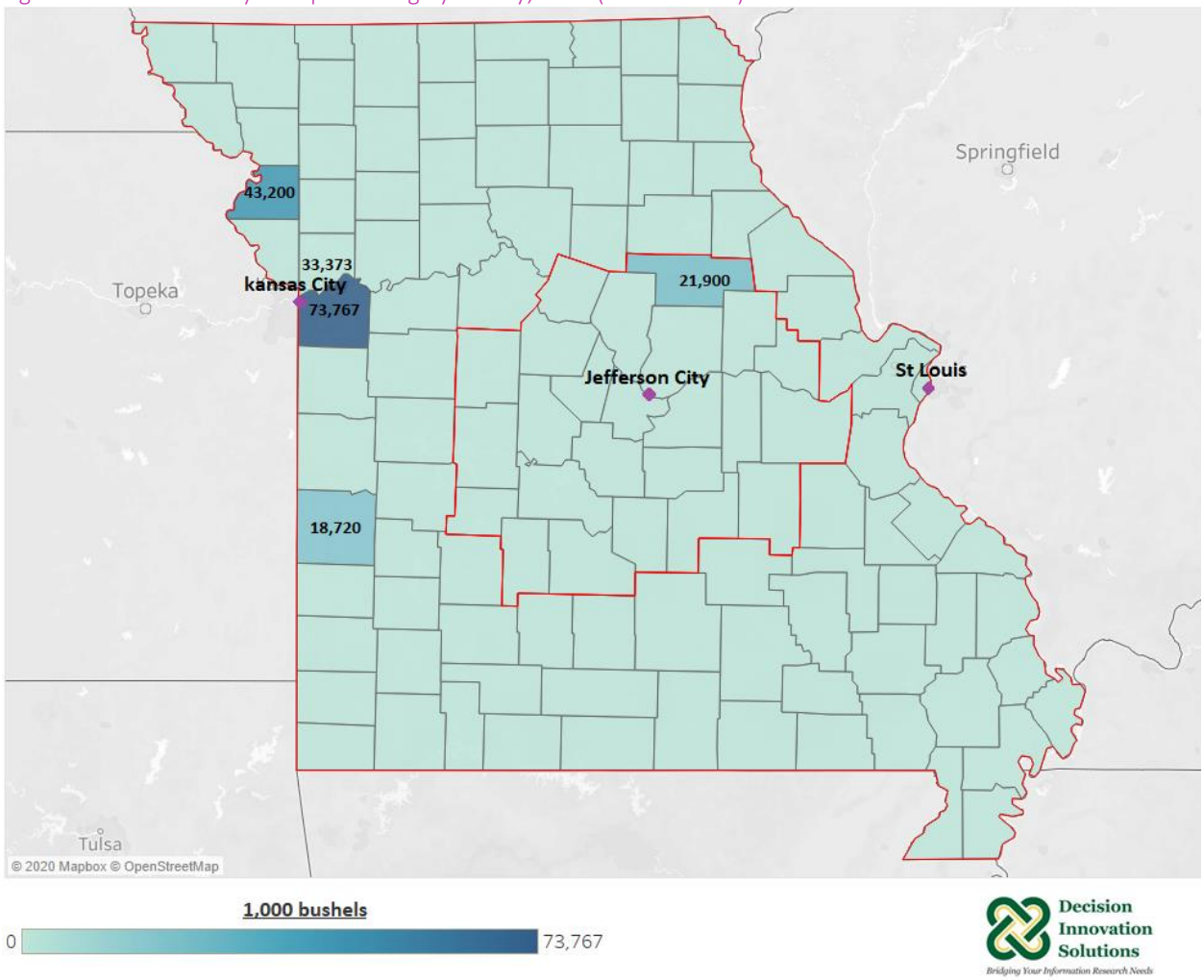


Source: Decision Innovation Solutions.

3.3.2 Grain/soybean processors

Figure 16 shows that there are four active soybean crush facilities in Missouri with a total crush capacity of 157.5 million bushels (4.29 million MT). Jackson County has an estimated crush capacity of 73.8 million bushels (2 million MT); Buchanan County crush capacity is 43.2 million bushels (1.2 million MT), Audrain County has 21.9 million bushels (0.6 million MT) and Vernon County has 18.7 million bushels (0.5 million MT) of crush capacity.

Figure 16. Estimated soybean processing by county, 2018 (000s bushels)

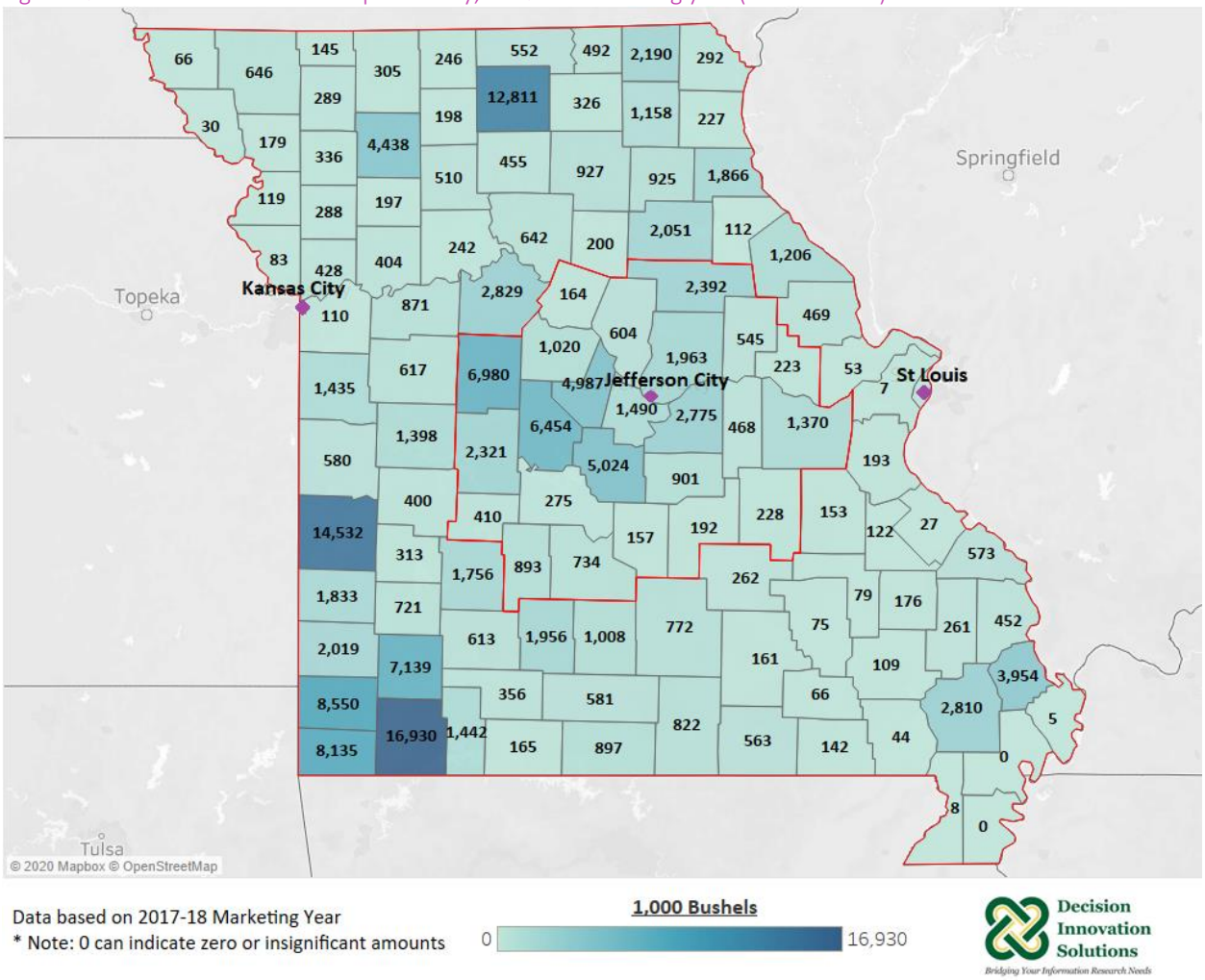


Source: Decision Innovation Solutions.

3.3.3 Local livestock and poultry production sites

Feed demand is spread across every county in Missouri, although there are some high-use areas where there is an increased concentration of livestock and poultry production as noted in dark blue in the following figure. Corn is the primary feed grain and is supplemented by soybean meal as the primary protein feed. Corn is converted to feed in both commercial feed mills and on-farm processing. The total corn feed demand in each county is shown in Figure 17.

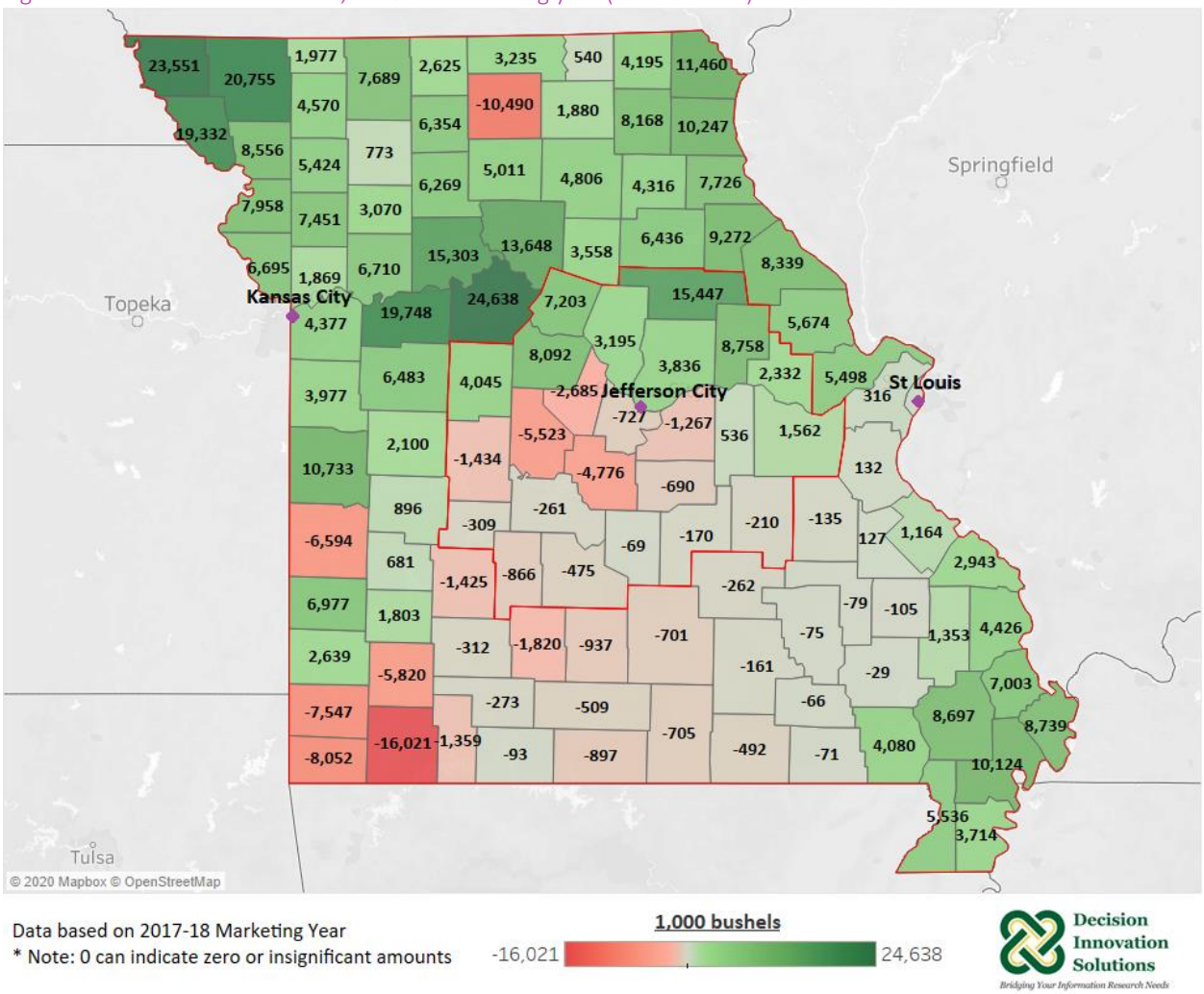
Figure 17. Total corn feed demand per county, 2017-18 marketing year (000s bushels)



Source: Decision Innovation Solutions.

Once in-county corn is used to satisfy demand for feed and ethanol use, surplus corn from counties along the Mississippi River and the next tier of counties westward is shipped to export markets via river barges and by rail. Nearly all that corn is trucked from farms to local grain elevators or directly to barge terminals. The ethanol plants in northern Missouri and the feed demand in this area are satisfied by corn movement from adjacent counties. A visual representation of the amount of corn by county that is available to satisfy feed and ethanol demands by county is illustrated in Figure 18. Counties in pink and beige (have a minus sign) have a deficit in available corn, and so to satisfy demand, bring in corn from neighboring counties with available volume, as shown in green.

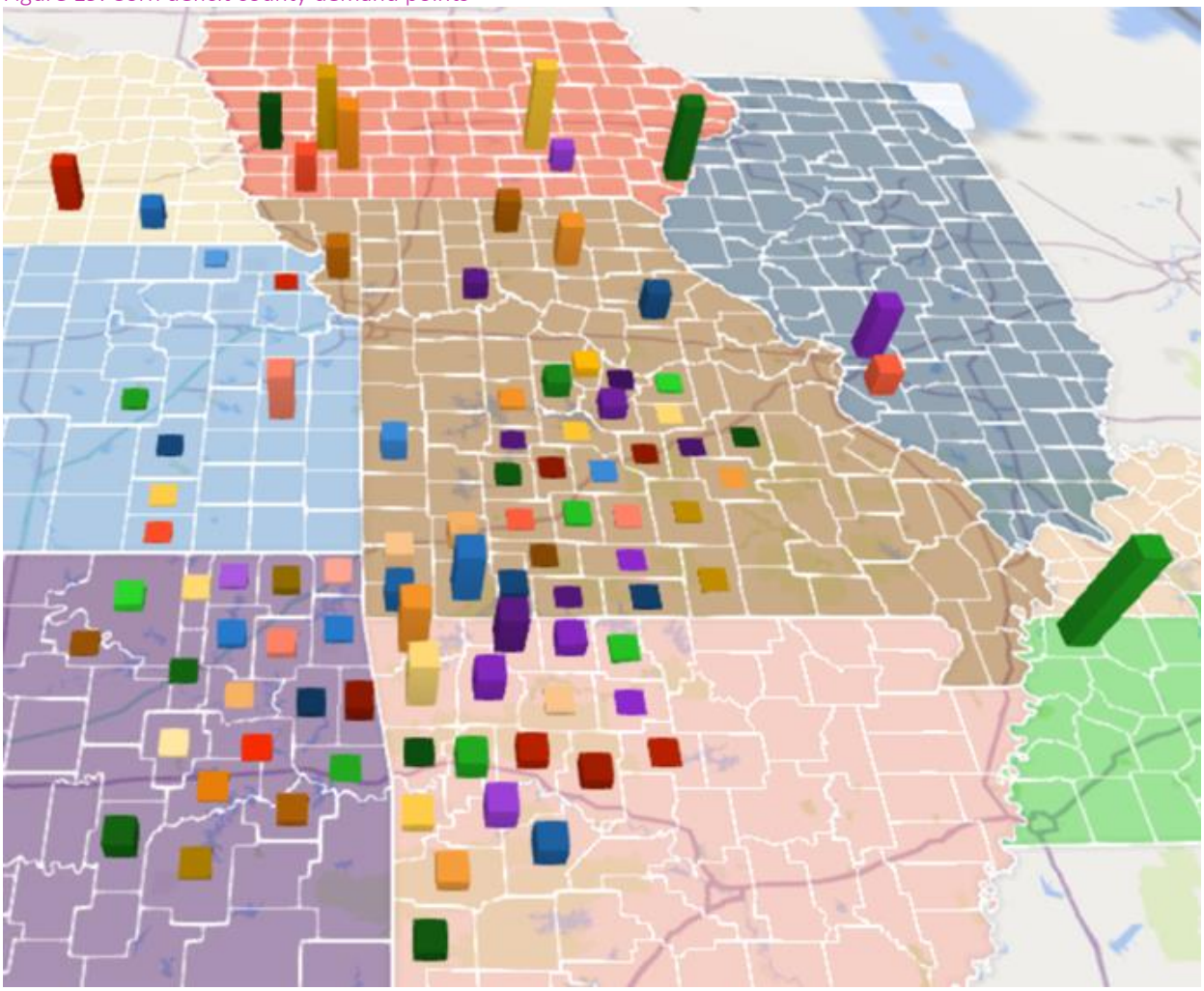
Figure 18. Net farm corn balance, 2017-18 marketing year (000s bushels)



Source: Decision Innovation Solutions.

As Figure 18 demonstrated, many counties in the study area south of the Missouri River are corn-deficit counties. The majority of the corn moving into these counties to satisfy local feed demand is sourced from counties north of the Missouri River and transported by truck. In Figure 19, we expand the study area to include portions of states bordering Missouri. This provides a visual representation of the corn-deficit demand points. The height of the bar indicates the relative quantity of demand (same data source as in prior figure) with a taller bar indicating more inflows needed to satisfy demand points in the county. Most of this corn moves by truck. The colors simply represent individual counties that are corn deficit. In Figure 19 the colors of the columns match the colors of the bars on Figure 19 and provide details on the supply counties and quantities for each demand bar.

Figure 19. Corn deficit county demand points

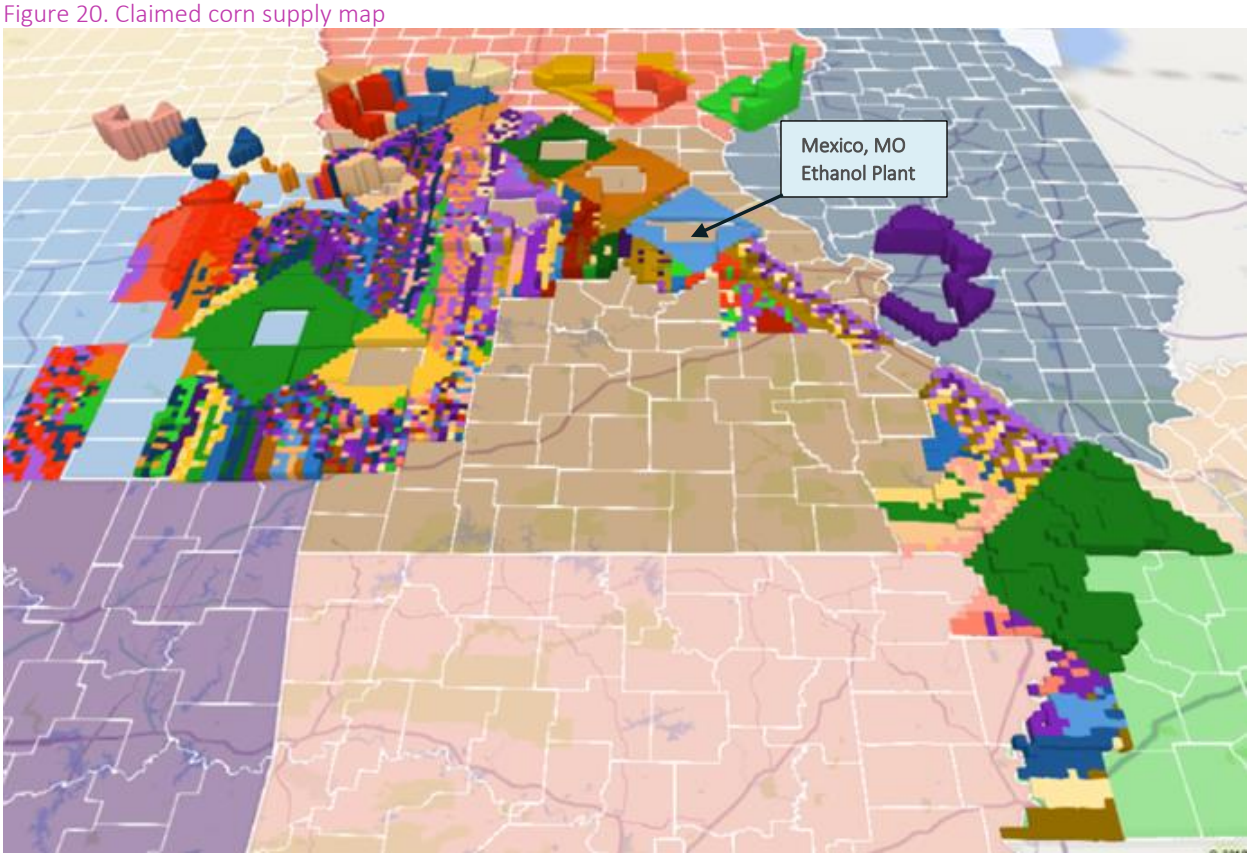


Source: Decision Innovation Solutions.

Figure 20 depicts the "draw areas" for demand points identified previously in Figure 19. "Pixels" of the same color represent the available supply that was claimed for a given demand point. Some like-colored pixels are diamond-shaped. These demand points (corn ethanol plants) were given preferential treatment to acknowledge the fact that corn ethanol plants are traditionally strong buyers of local corn.

A significant portion of the feed mill demand for corn in southwestern Missouri moves by truck with corn from west central Missouri meeting those demands first, but corn from northwestern Missouri also flows to southwestern Missouri, northwest Arkansas, and northeastern Oklahoma feed mills. Corn available for outflows can satisfy domestic corn demand in other areas in Missouri, demand in other states and be available for export. The demand pattern for these corn flows is influenced daily by local and terminal cash grain bids. Local grain flows move in response to both national prices set by the Chicago Mercantile Exchange and by adjustments in local basis (difference between Chicago prices and local prices). Local grain buyers can narrow the basis (raise their cash bids) to attract more local grain movement or widen the basis (reduce their cash bids) to lessen local flows of grain to their particular market.

Figure 20. Claimed corn supply map

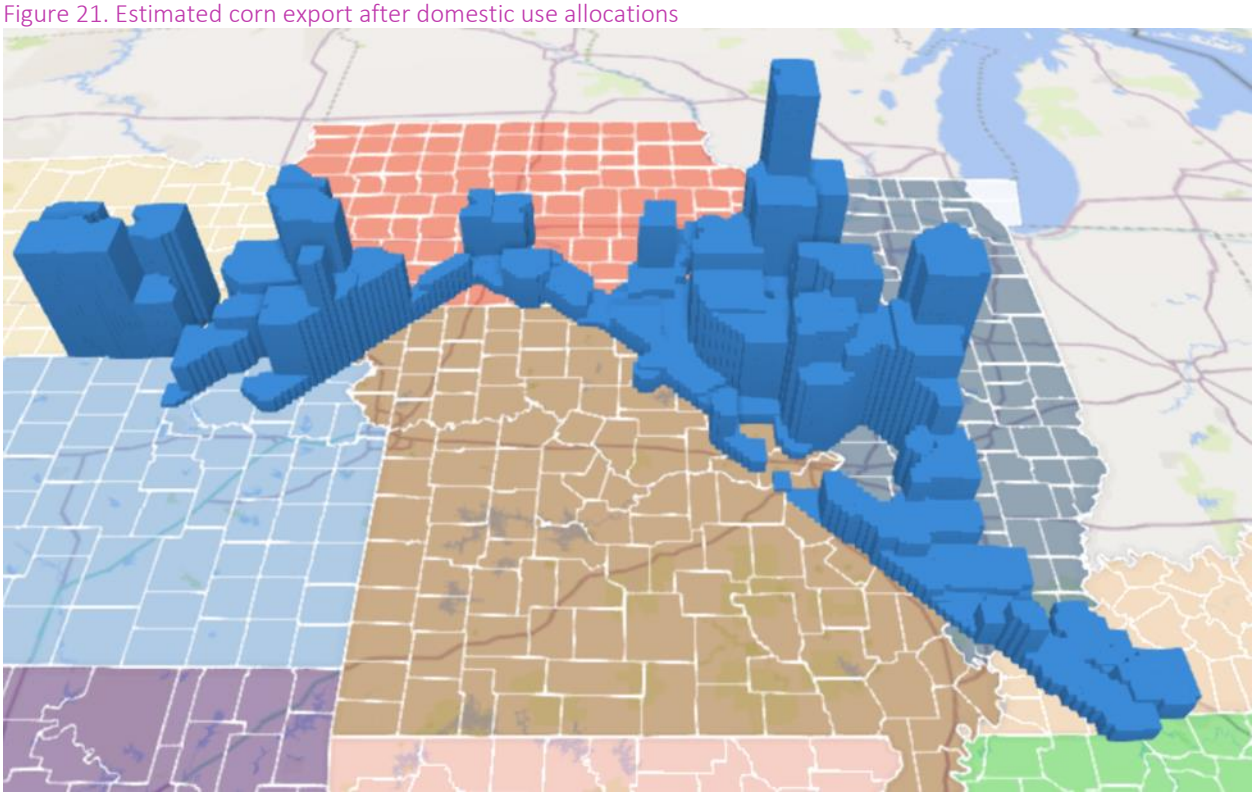


Source: Decision Innovation Solutions.

As shown in Figure 20 the ethanol facility in Mexico, Missouri draws corn from Audrain County and surrounding counties. This pattern is common for essentially all corn ethanol plants shown. Feed mill demand for corn south of the Missouri River is satisfied by corn in counties lying just north of the river and to some degree by counties just east of the study area with corn moving down I-44 into the study area.

Figure 21 shows the areas (blue bars, with the volume denoted by the height of the bar) most likely to supply corn for export markets after allocations to domestic feed use, feed mill demand and ethanol processing. While we know some corn is exported from counties along the Missouri River (especially from Chariton, Carroll, Saline, and Pettis counties), a spatial analysis shows that corn is being drawn to southwestern Missouri and northwestern Arkansas feed markets from well north of the Missouri River. Exports are calculated as a residual calculation after accounting for "local demand".

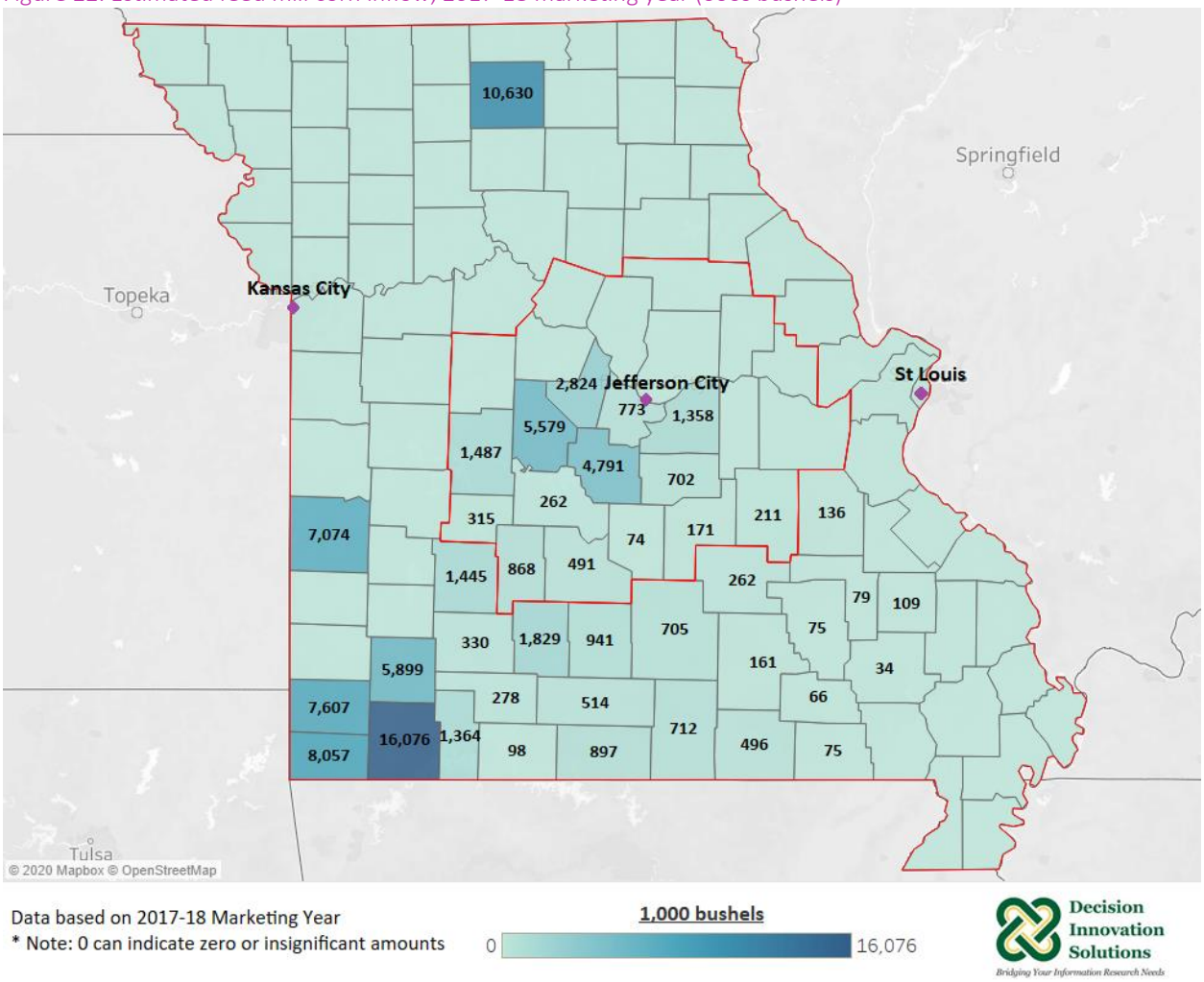
Figure 21. Estimated corn export after domestic use allocations



Source: Decision Innovation Solutions.

Figure 22 below provides a view of the counties (in blue) that bring in corn from elsewhere to satisfy corn demand for feed mills, along with the volumes.

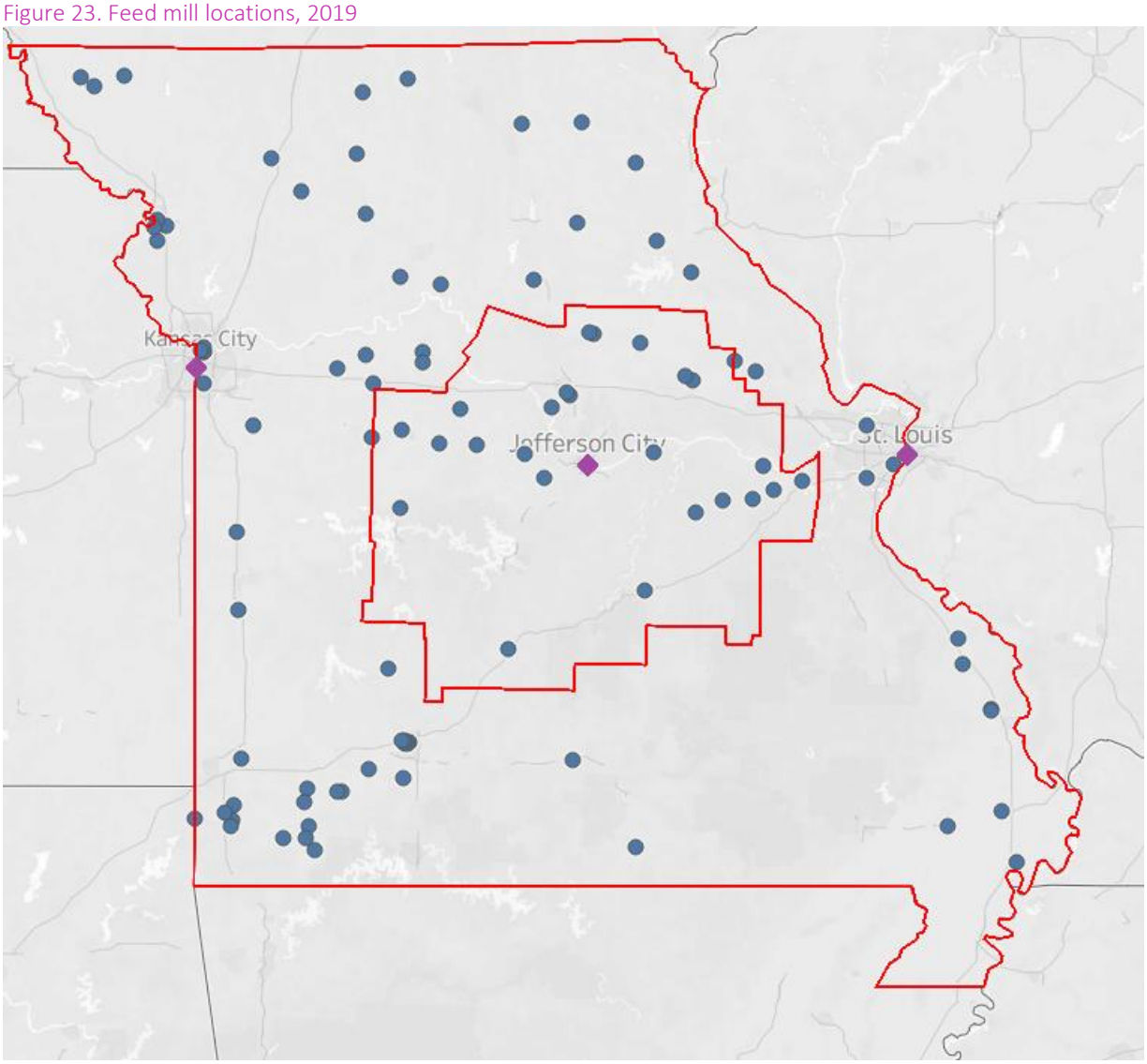
Figure 22. Estimated feed mill corn inflow, 2017-18 marketing year (000s bushels)



Source: Decision Innovation Solutions.

As shown in Figure 22, most of the feed mills that need to secure corn from outside the county to meet feed needs are located in central Missouri and southwestern Missouri (the exception being Sullivan County in northern Missouri). In addition, most counties in the Ozarks need to bring in small to moderate amounts of corn for feed mills. A significant portion of feedmill corn demand is serviced by truck deliveries. These deliveries may originate from on-farm grain storage or from commercial grain storage. Some feedmills have the capability to receive corn and soybean meal via rail. This is especially true for large-volume feed mills that are more apt to be located near concentrations of hog feeding and poultry feeding. As can be seen in Figure 23, the locations of feedmills are dispersed across the state, with some concentration near the Heartland Port.

Figure 23. Feed mill locations, 2019

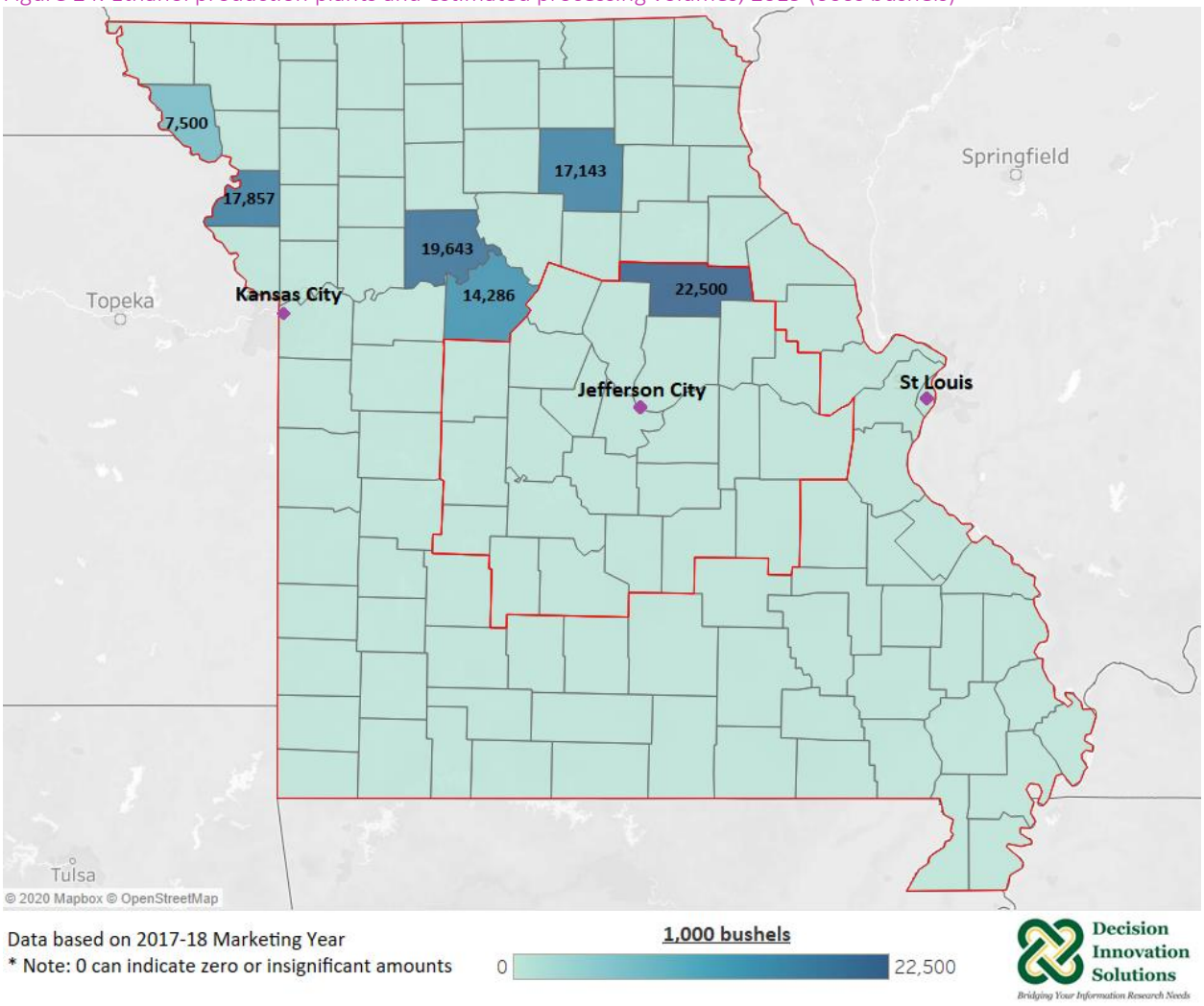


Source: Decision Innovation Solutions.

3.3.4 Ethanol/biodiesel plants

Missouri currently has ethanol production plants in six counties: Audrain, Buchanan, Carroll, Holt, Macon and Saline. Combined, these plants use approximately 100 million bushels (2.54 million MT) of corn annually and produce approximately 300 million gallons (896,100 MT) of ethanol and 825,000 tons (748,638 MT) of dried distillers' grains (DDG). The ethanol plant in Mexico, Missouri produces approximately 185,000 tons (167,876 MT) of DDGs annually. Figure 24 shows the locations of the six counties and their corn requirements (in bushels).

Figure 24. Ethanol production plants and estimated processing volumes, 2019 (000s bushels)

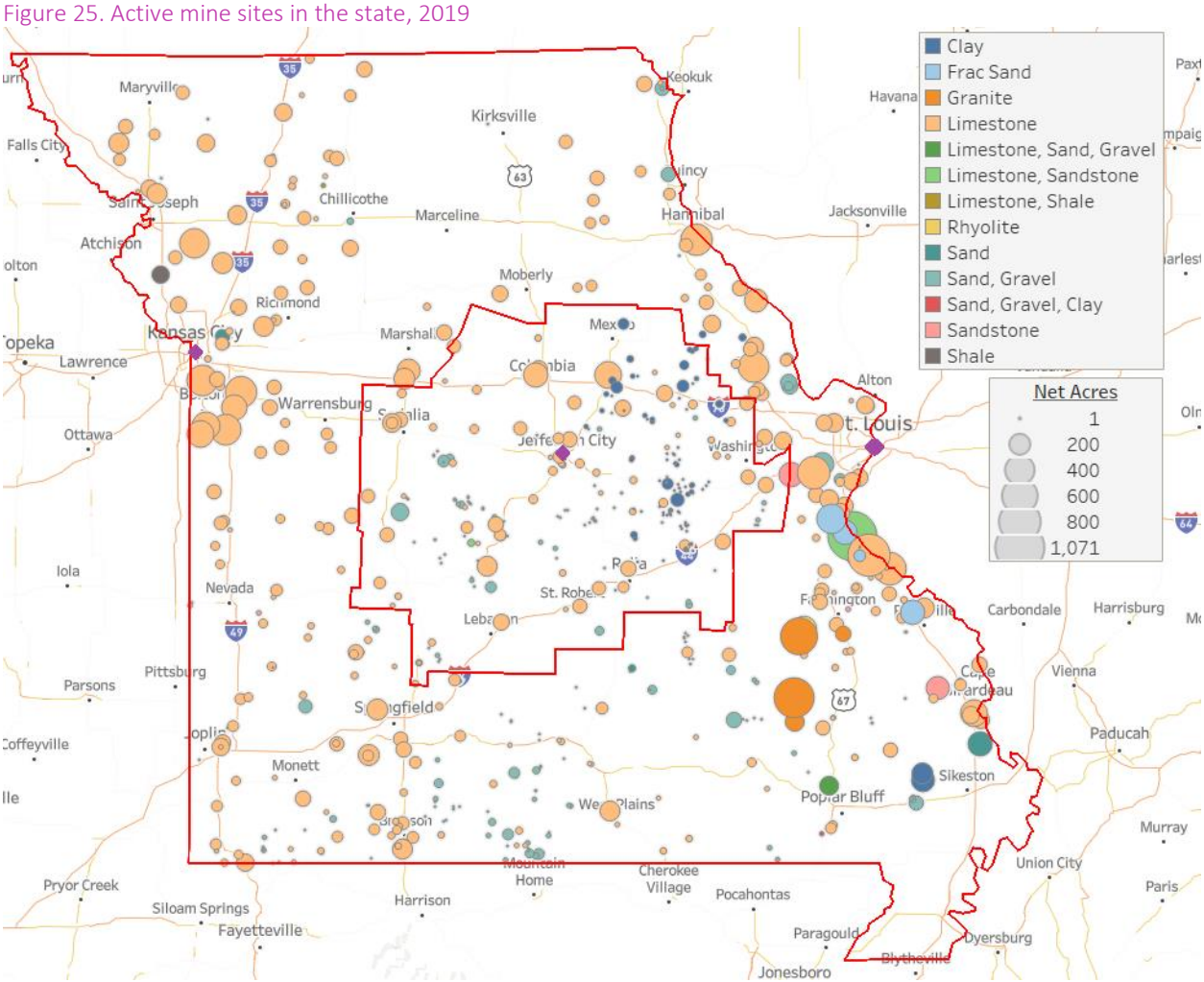


Source: Decision Innovation Solutions.

3.3.5 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 DNR Land Reclamation program provides a map that allows users to filter the map based on commodity and net acres.[12] DIS extracted a map showing the mines in the state producing metals, nonmetals, and sands/gravels, illustrated in Figure 25. The size of dots in the following map 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. Maps broken down for each of the categories can also be found in Appendix C: Freight generators/attractors: mines by type

Figure 25. Active mine sites in the state, 2019



*Note: The size of dots in the following maps are not to scale for area of acres represented.

[12] 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

3.3.6 Forestry and lumber

There are two primary data sources for Missouri forestry and timber exports: (i) United States Department of Agriculture/Animal and Plant Health Inspection Service (USDA/APHIS), and (ii) The IMPLAN Modeling System. Missouri-sourced forest and lumber export data for the time period October 2017 through September 2019 were obtained from USDA/APHIS personnel in November 2019. The format of the data received required significant conversion and summarization to ensure wood species, part names and units of measure were consistently combined. Table 9 shows the list of all names contained in the APHIS database.

Table 9. Part names contained in the APHIS database

▪ Air dried lumber ▪ American oak untoasted chips ▪ Aromatic red cedar cants ▪ Bark ▪ Barrels ▪ Black walnut dimension blanks ▪ Bungs ▪ Cants ▪ Cedar cants ▪ Chip/tank stave sample kit ▪ Chip samples ▪ Chips ▪ Cubes	▪ Cuvee tank stave sample kit ▪ Debarked logs ▪ Dimension blanks ▪ Headings ▪ Heat treated lumber ▪ Kiln dried lumber ▪ Kiln dried staves ▪ Kiln dried wood barrel ▪ Logs ▪ Lumber ▪ Precision tank stave sample kit ▪ Staves ▪ Staves and heading	▪ Staves and heading ▪ Stocks ▪ Tank stave samples ▪ Tank staves ▪ Tank staves and crosscut ▪ Toasted chips ▪ Untoasted tank staves ▪ Walnut saw logs ▪ Wood chips

After the APHIS data were summarized by part name, the unit of measure for each part names was summarized. In some cases, a given part name was summarized by multiple units of measure. Using standard conversions (i.e. pounds to metric ton, kilograms to metric ton, board feet per metric ton, etc), all the part names and associated weights were standardized and expressed in metric tons so as to be consistent with the overall analysis. Units of measure are included in Table 10.

Table 10. Units of measure

▪ Bundles ▪ Board Feet ▪ Individual ▪ Pounds ▪ Cubic Meters ▪ Pallets	▪ Each ▪ Kilograms ▪ MBF ▪ Pieces ▪ Packages ▪ Containers	▪ Square feet ▪ Logs ▪ Barrels ▪ Bags ▪ Boxes

In order to better understand what was exported from the 24-county study area, the use of IMPLAN data was necessary. This was handled using the estimated share of state exports of comparable products as calculated by IMPLAN (IMPLAN Sectors 14 and 15). Applying a factor from IMPLAN of 19.2% (the 24-county estimated share) to the state APHIS data, the estimated exports of forestry and lumber products from the study area in Year 1 is approximately 21,300 metric tons. The totals in Table 11 are in addition to estimates within the IMPLAN modeling system, which total approximately 6,650 MT in Year 1 for both imports and exports, for a total of approximately 27,950 MT of total trade in Year 1. Given that the largest category of exports is "Logs" and logs are very likely to be exported in containers, we've assumed that all exports in the APHIS data are exported in containers.

Table 11. Estimated annual exports of forestry and lumber (Missouri and 24-county study area)

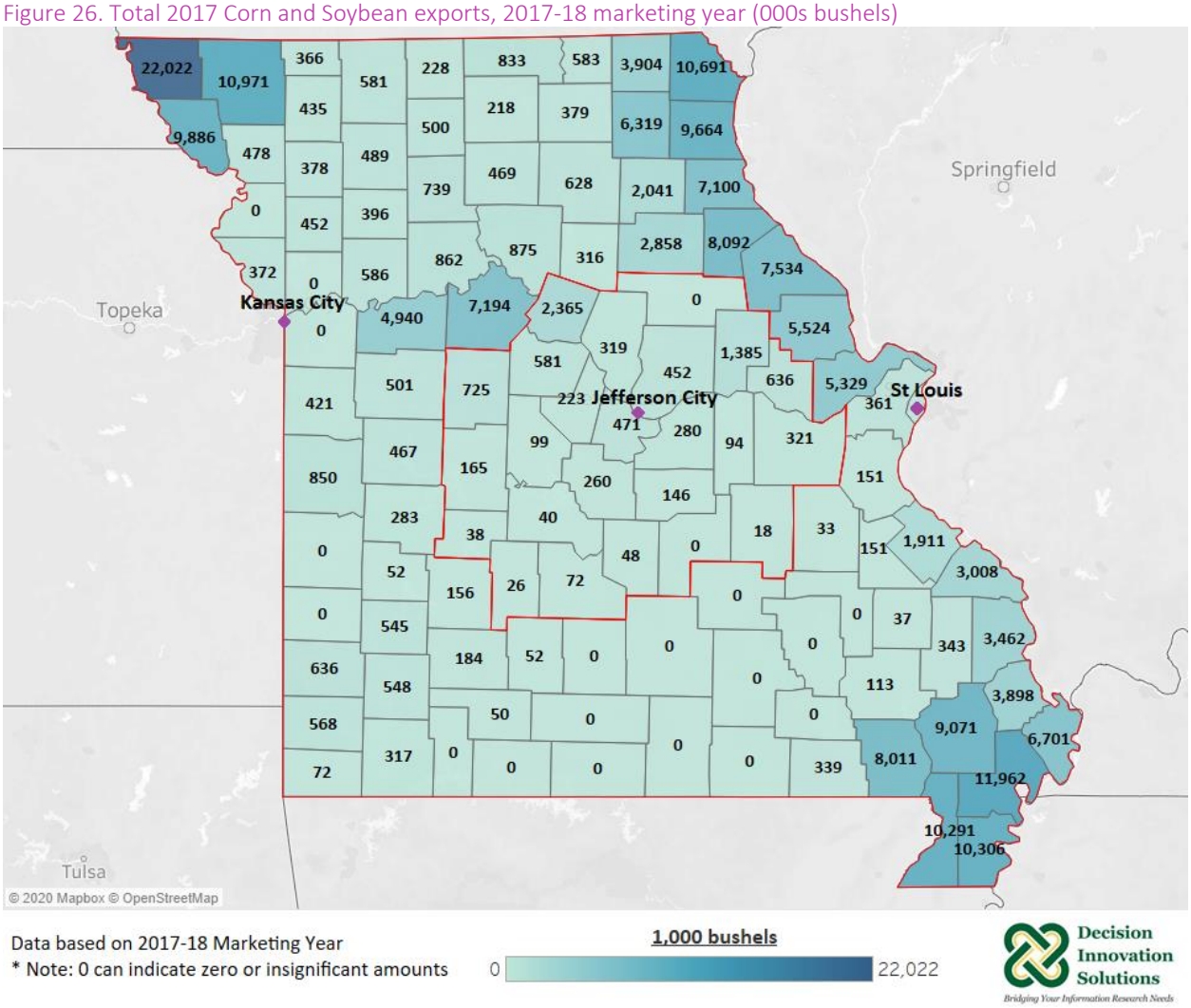
Part Name	Annual MT (Missouri)	Annual MT (24-County Study Area)
Logs	64,886	12,458
Lumber	43,282	8,310
Staves and Heading	1,436	276
Staves	392	75
Cants	237	46
Stocks	210	40
Chips	293	56
Blanks	97	19
Barrels	74	14
Headings	91	17
Cubes	3	0
Total	**111,001**	**21,312**

3.4 Commodity port flow analysis

The three major agribulk commodities available for export from the Heartland Port area are corn, soybeans, and wheat. While some grain sorghum is exported from Missouri, it is primarily moved from growing areas along the Mississippi River. The counties in the HPA study area are net importers of grain sorghum with the bulk of that movement being truck movement from grain sorghum supplies in northeastern Missouri. Most of the grain sorghum exports from Missouri originate in the Bootheel region of the state.

Based on 2017 data, Missouri exported 141 million bushels (3.58 million MT) of corn and 78 million bushels (2.13 million MT) of soybeans. A total of 35 Missouri counties have corn available for export after satisfying domestic needs for in-county feeding, ethanol, and movement for domestic feed needs. Ninety counties have soybeans available for export. Within the HPA study area, Howard and Montgomery Counties had the largest amounts of corn and soybeans shipped for exports in 2017. Corn and soybean exports from Missouri counties for the 2017-18 marketing year in thousand bushels are illustrated in Figure 26.

Figure 26. Total 2017 Corn and Soybean exports, 2017-18 marketing year (000s bushels)



Source: Decision Innovation Solutions.

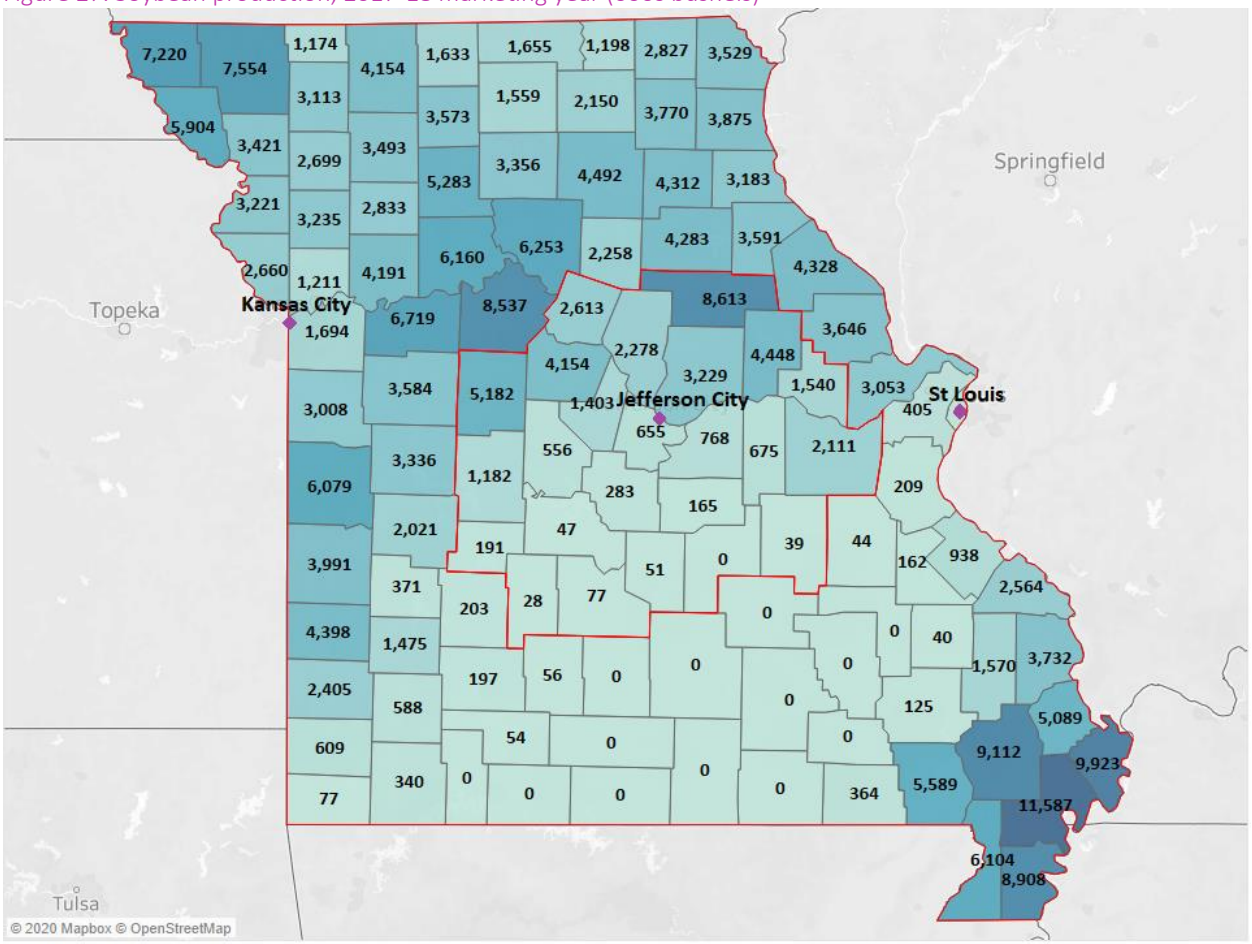
Counties located north of the Missouri River have corn available for outflows to other counties in Missouri, locations in other states and for foreign export. The ethanol plants in Mexico, Missouri, and Macon,

Missouri are demand points that draw corn from neighboring counties. Most of the central Missouri counties located south of the Missouri River are net importers of corn with the bulk of that corn being trucked in from counties north of the Missouri River. There is some lateral (east-west) movement of corn into corn-deficit counties in central Missouri.

3.4.1 Soybeans

Soybean production occurs in 99 of Missouri's counties with 17 counties producing more than 5 million bushels (150,015 MT) in the 2017-18 marketing year, as shown in Figure 27. New Madrid County led the state in production at more than 11 million bushels (330,033 MT). The boot heel ag district produced 20.5% of Missouri's soybeans in 2017; the Northwest ag district produced 19.2%. Northeast Missouri produced 14.5% of the soybeans, Northcentral Missouri 13.5%, Central Missouri 10.8% and East Central Missouri produced 10.5%.

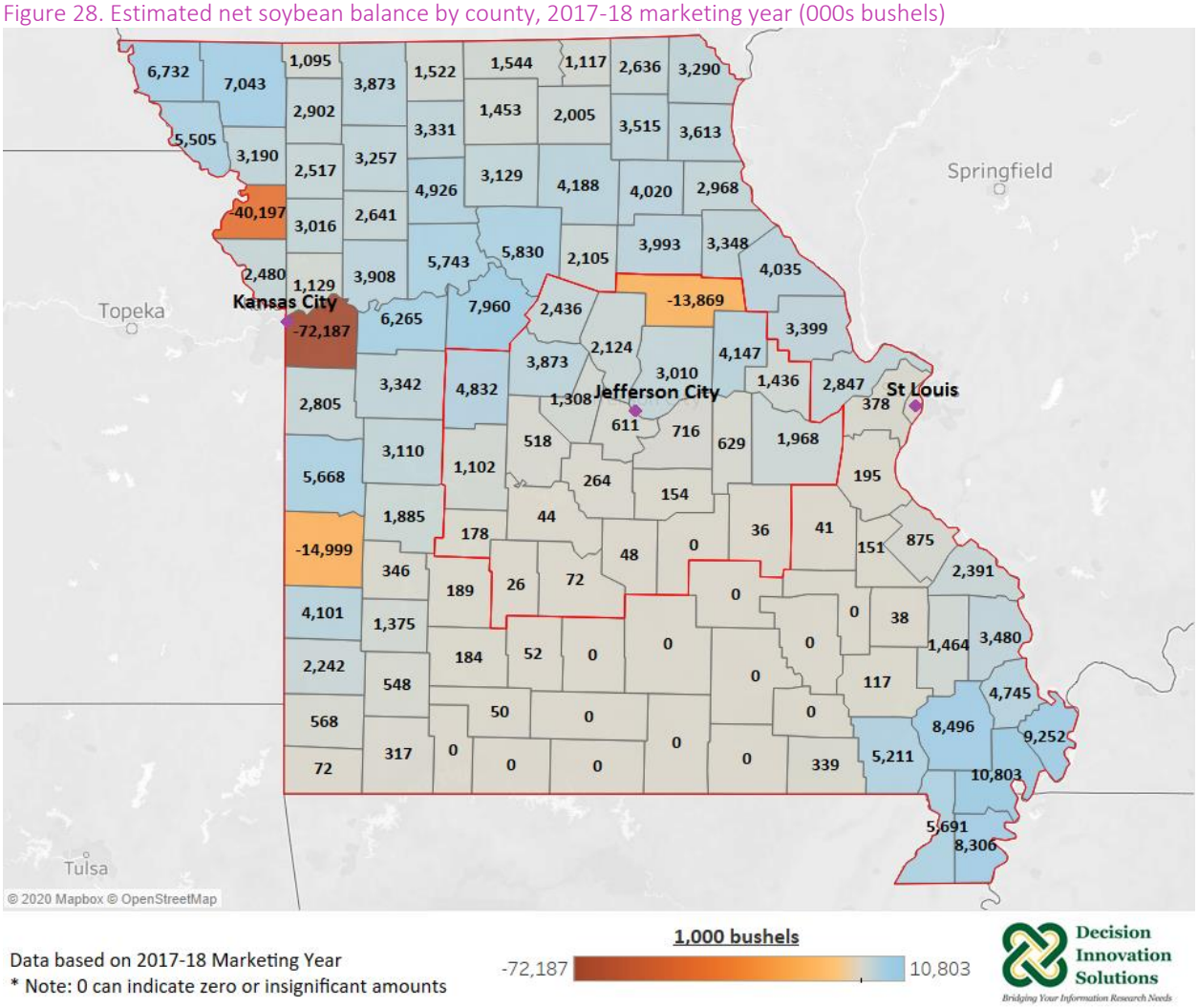
Figure 27. Soybean production, 2017-18 marketing year (000s bushels)



Source: Decision Innovation Solutions.

The net balance for soybeans in a county after accounting for production, ending stocks, and in-county demand for crushing is shown in Figure 28. Counties with negative numbers reflect demand points that require inflows of soybeans to meet that demand. Counties with positive numbers have soybeans that are available for outflows for either domestic crush in other counties or, if not claimed for that, for export.

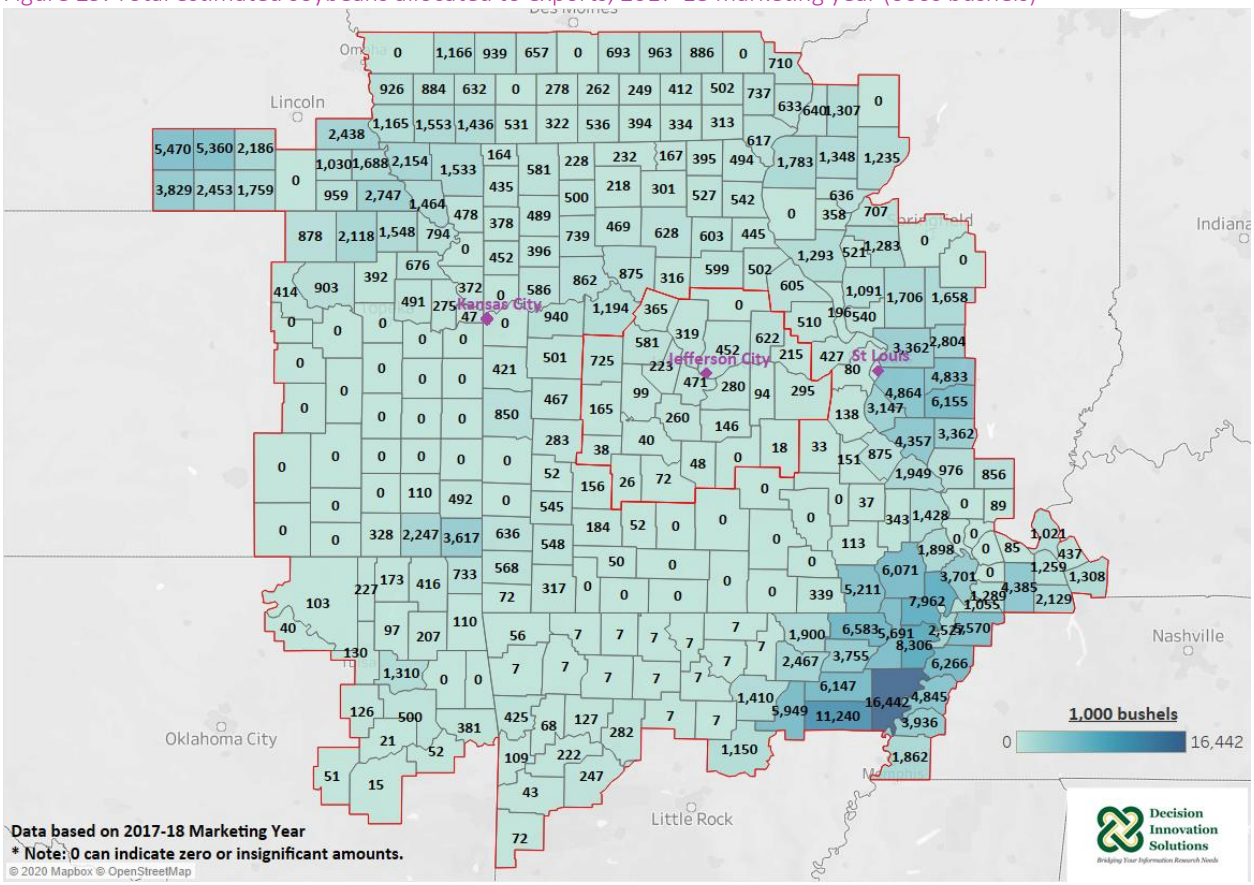
Figure 28. Estimated net soybean balance by county, 2017-18 marketing year (000s bushels)



Source: Decision Innovation Solutions.

Due to some large soybean processing plants just outside of Missouri, a wider view, shown in Figure 29, is provided for available soybean supplies for exports once domestic processing is taken into account.

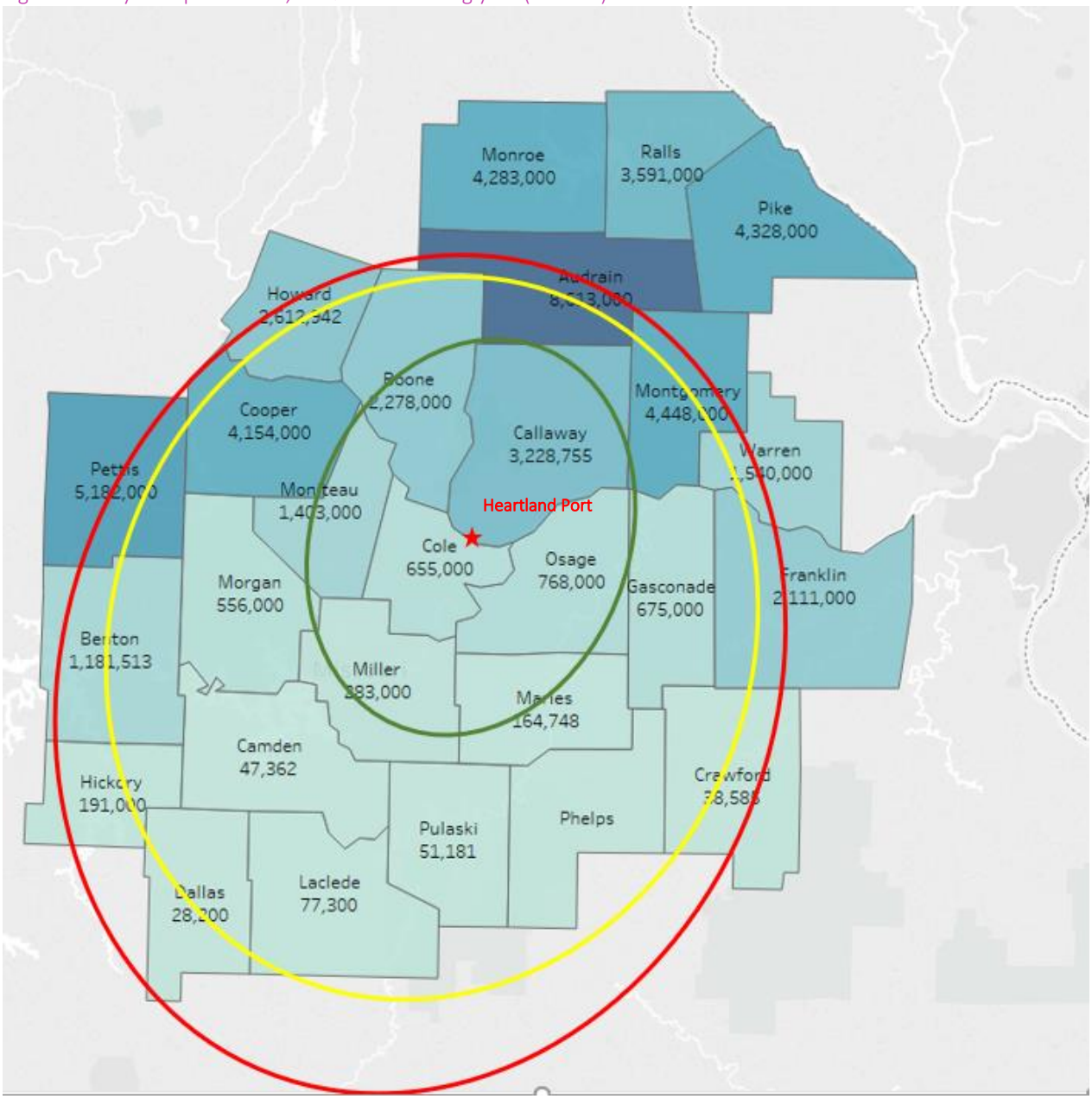
Figure 29. Total estimated soybeans allocated to exports, 2017-18 marketing year (000s bushels)



Source: Decision Innovation Solutions.

Referring to Figure 30, there are approximately 5 million bushels (150,015 MT) of soybean *production* in the primary (green oval) draw area of HPA and approximately 21 million bushels (630,063 MT) of soybean production in the fully extended (red oval) draw area. The soybean processing plant in Mexico, Missouri creates a strong draw on the soybeans in the northern part of the HPA draw area. The soybean processing plants in Kansas City and Vernon County have strong draws on soybeans in the western part of the study area. The HPA barge loading facility has the potential to provide better market access to export markets for soybeans produced within the green and yellow ovals, as shown in Figure 30.

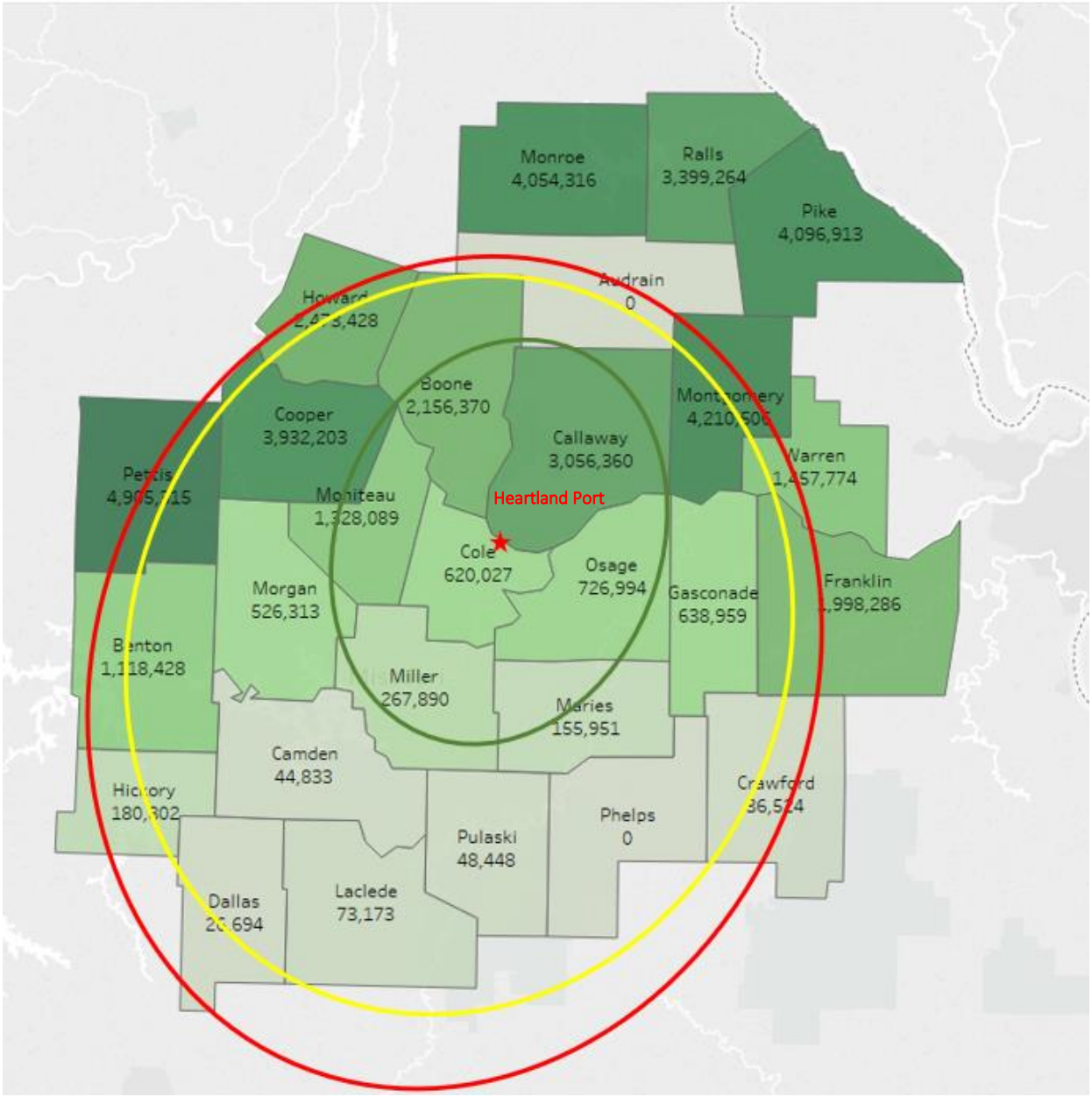
Figure 30. Soybean production, 2017-18 marketing year (bushels)



Source: Decision Innovation Solutions.

Referring to Figure 31, in the primary draw area of HPA, the size of the overall market is about 6.5 million bushels (176,918 MT) of soybean *exports*. From this area, DIS estimates that about 60%, equivalent to 3.9 million bushels, can be served by the Heartland Port. Considering the fully extended draw area of HPA, there are about 17 million bushels (117,011 MT) of soybeans available for exports. From this area, DIS estimates that about equivalent to 2.1 million bushels (63,006 MT) can be served by the Heartland Port. This provides an overall target market of about 6 million bushels (163,309 MT) of soybean exports.

Figure 31. Soybean exports, 2017-18 marketing year (bushels)

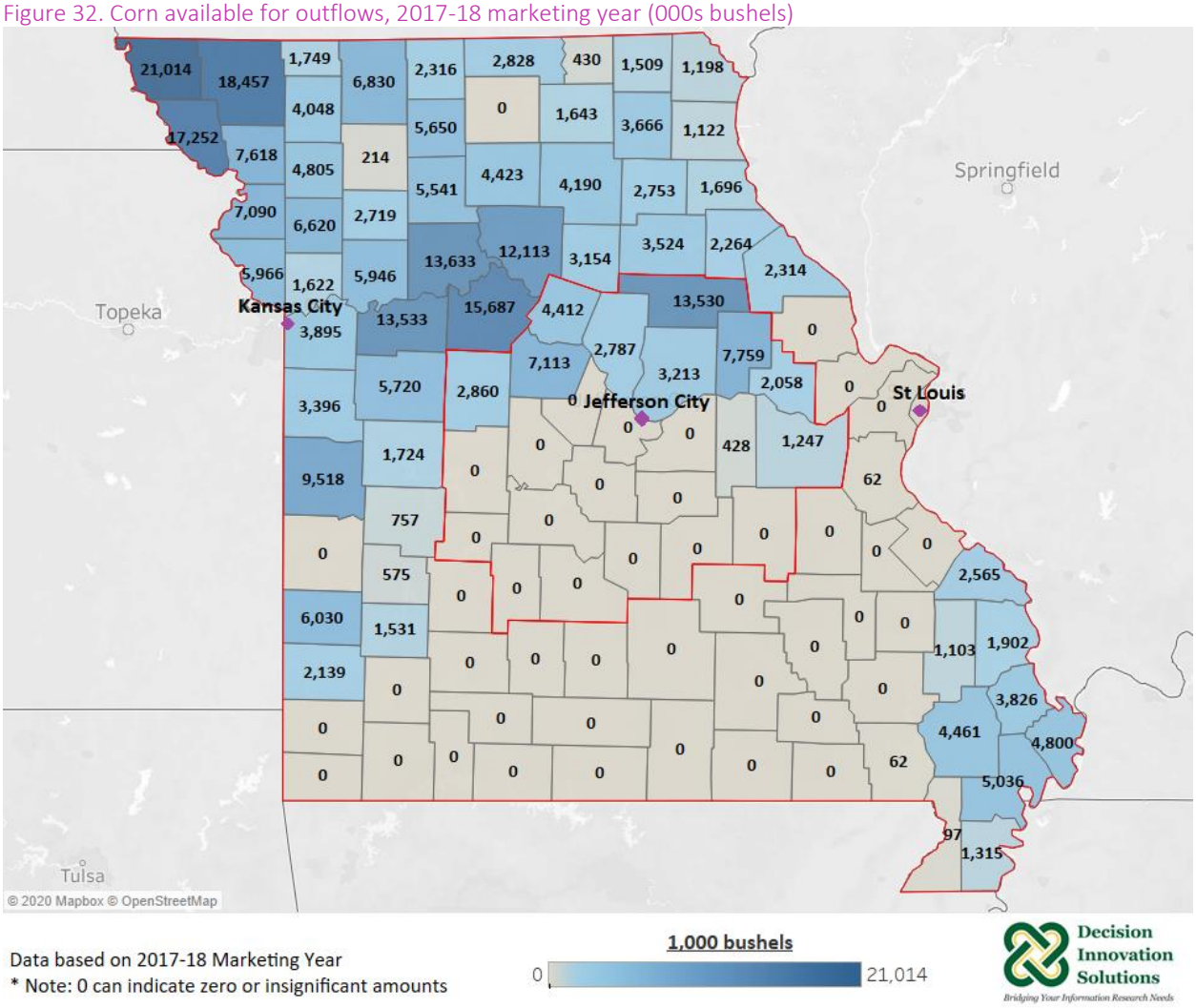


Source: Decision Innovation Solutions.

3.4.2 Corn

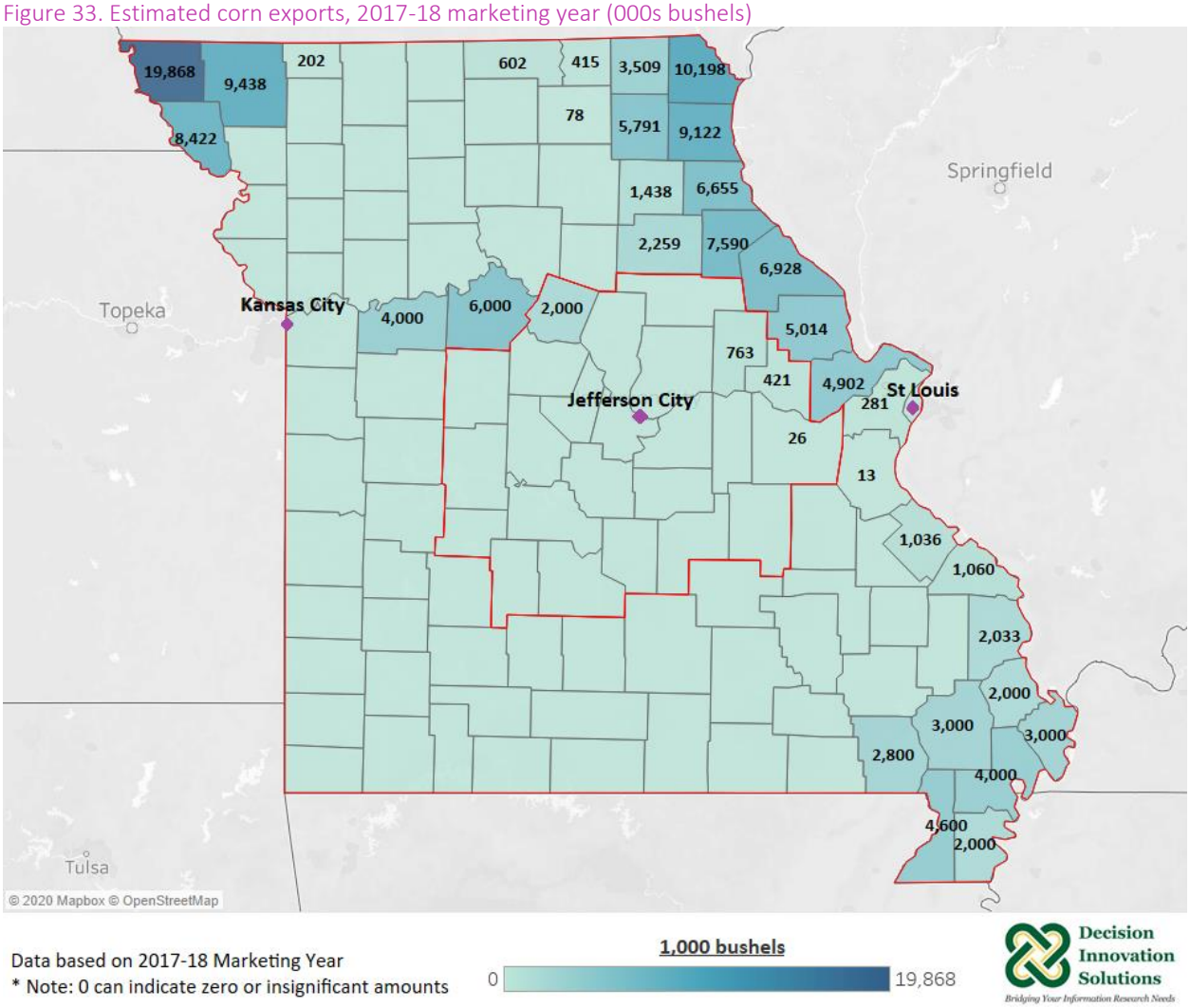
Figure 32 shows the largest quantities of corn available for movement to markets outside the county are in northern and southeastern Missouri. Within the HPA study area, Howard, Boone, Calloway, Montgomery, Warren and Franklin counties have significant amounts of corn available for outflows. Outflows does not necessarily indicate the product is being exported, as much of these outflows flow south to meet feed mill demand in southern Missouri.

Figure 32. Corn available for outflows, 2017-18 marketing year (000s bushels)



Source: Decision Innovation Solutions.

Figure 33. Estimated corn exports, 2017-18 marketing year (000s bushels)



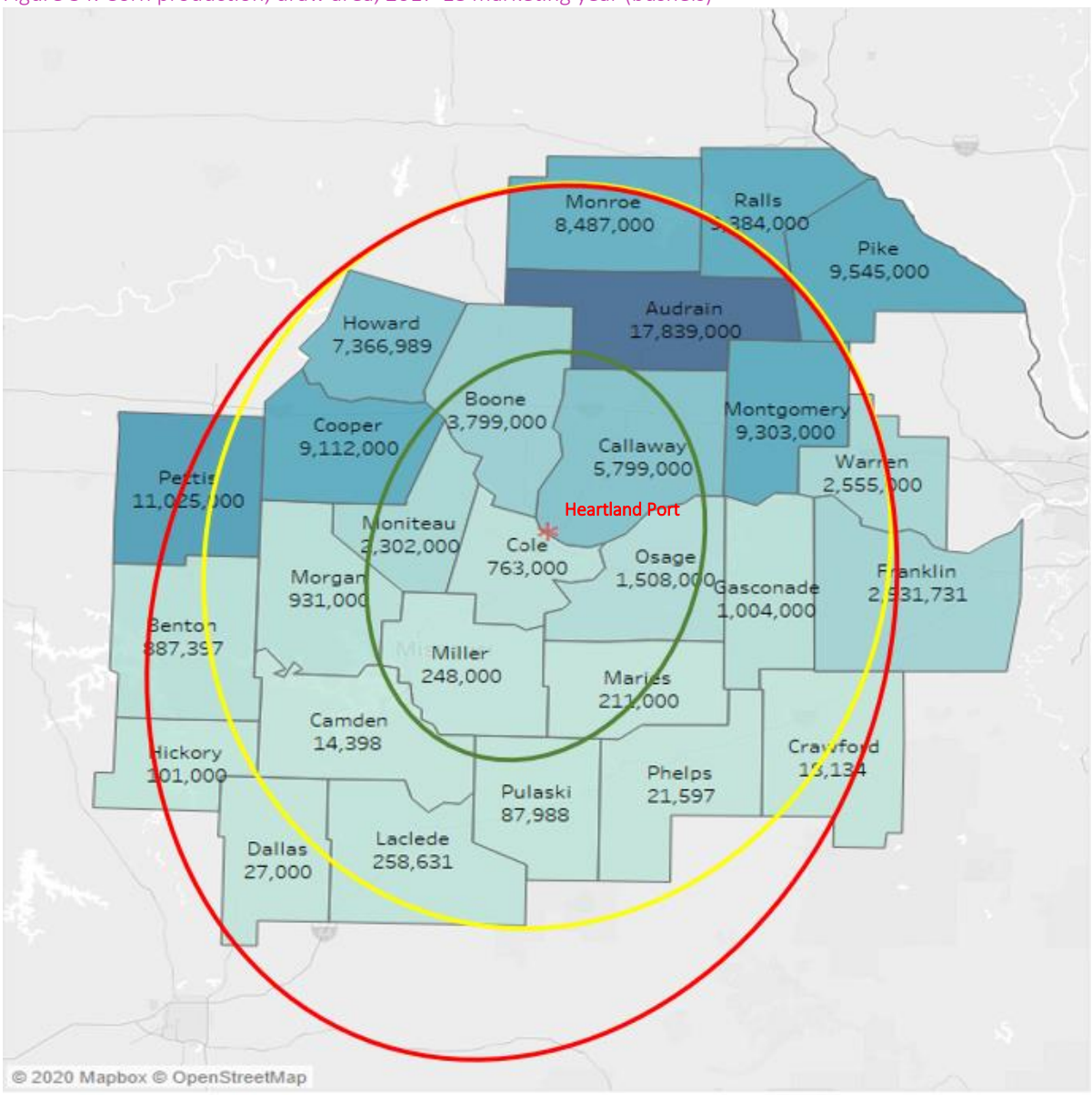
Source: Decision Innovation Solutions.

There is limited corn production, about 10 million bushels (300,030 MT), in the counties of the primary draw area of the HPA. In Figure 34 through Figure 36 , the green oval represents a typical "primary draw area" for grain and oilseed movement. Due to topography, the draw area is slightly longer than it is wide. It extends about 30 miles east and west of the HPA and about 40 miles north and south. Due to highway configuration, particularly US highway 54, it has a slight rotational bias of northeast to southwest.

The yellow oval represents an extended draw area for grains and oilseeds. It tends to be about twice as wide and twice as long as the primary draw area, although the extended draw area is limited on its reach to the northeast due to the existing commodity draws of ethanol and soybean crush facilities in central Audrain County and the presence of barge loading capacity on the Mississippi River in Hannibal and Louisiana, Missouri and to the east because of demand draw in the St. Louis, Missouri metro area.

The red circle is an estimate of the outer limits of the draw area for the HPA. It extends a bit further south due to lack of existing grain draw, roads and infrastructure in the southern counties.

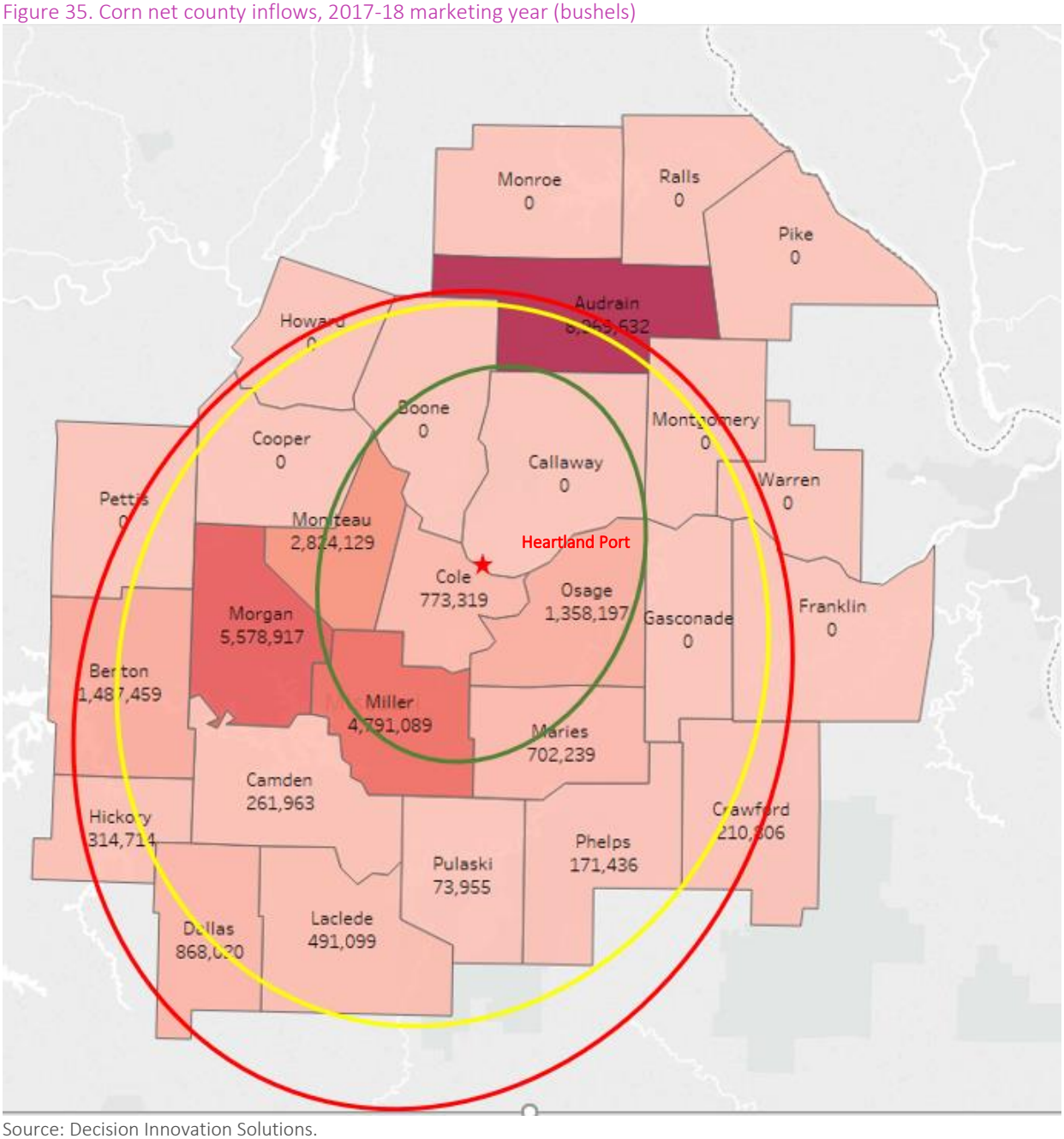
Figure 34. Corn production, draw area, 2017-18 marketing year (bushels)



Source: Decision Innovation Solutions.

Figure 35 shows the counties south of the Missouri River in the study area are net importers of corn for feed milling. They draw about 6 million bushels per year (168,067 MT) for feed. Most of it comes from counties in the study area north of the Missouri River. Additionally, ethanol production in Audrain county draws about 9 million bushels (252,100 MT) of corn from nearby areas.

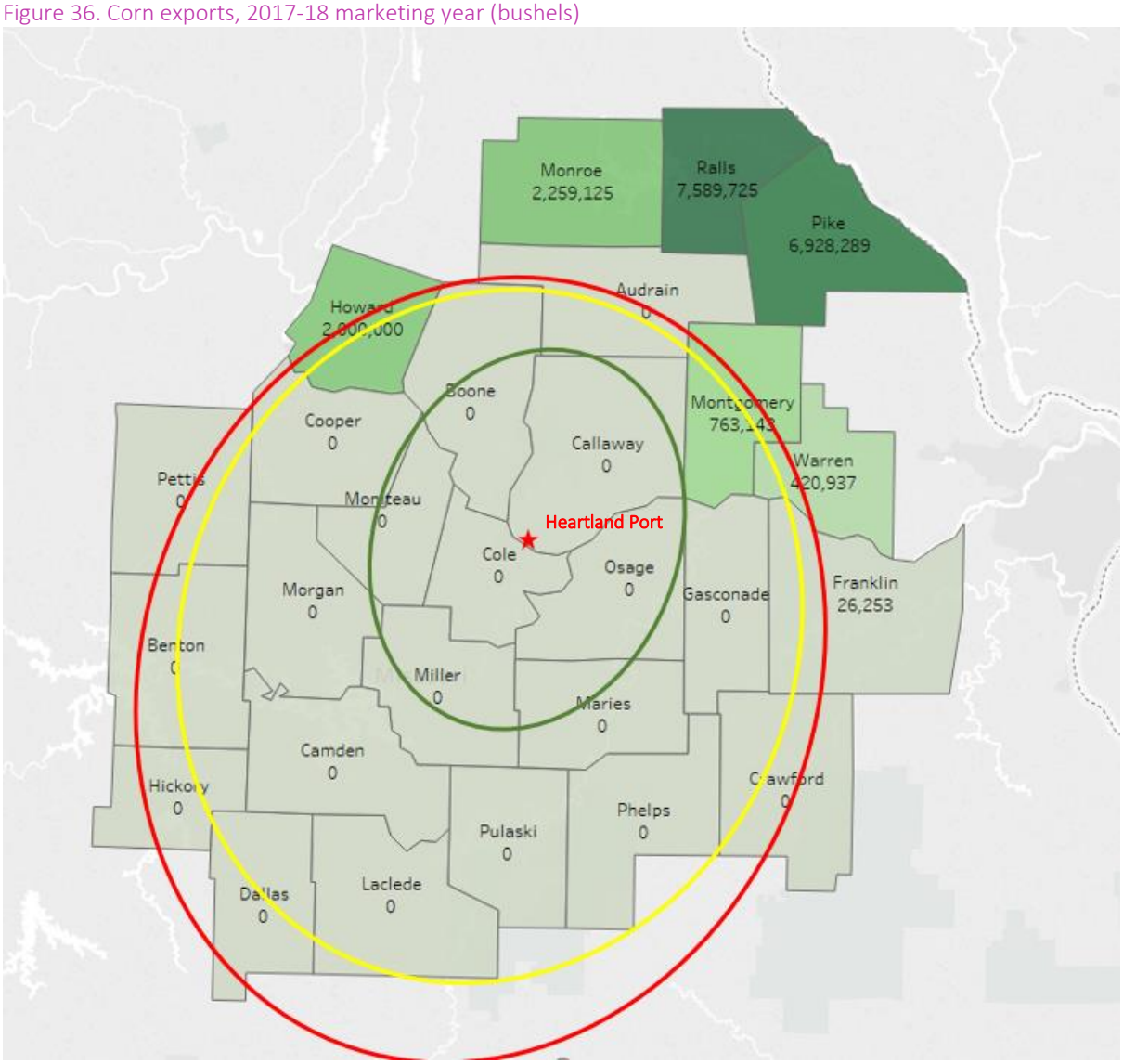
Figure 35. Corn net county inflows, 2017-18 marketing year (bushels)



Source: Decision Innovation Solutions.

In the HPA study area, there is a limited quantity of corn available for export once domestic corn needs are met. Figure 36 shows that there are no corn export bushels in the green primary target draw area of the HPA. There are about 1.5 million bushels (42,016 MT) of corn export potential in the secondary draw area of the HPA. It is unlikely that more than 10% of these bushels could be drawn to the HPA. Thus, total corn export potential through HPA is about 150,000 bushels (4,201 MT). The corn export bushels outside the red drawn area are highly unlikely to be captured by the HPA because of competing export facilities in Missouri at Kansas City, Brunswick, Hannibal, Louisiana and St. Louis.

Figure 36. Corn exports, 2017-18 marketing year (bushels)

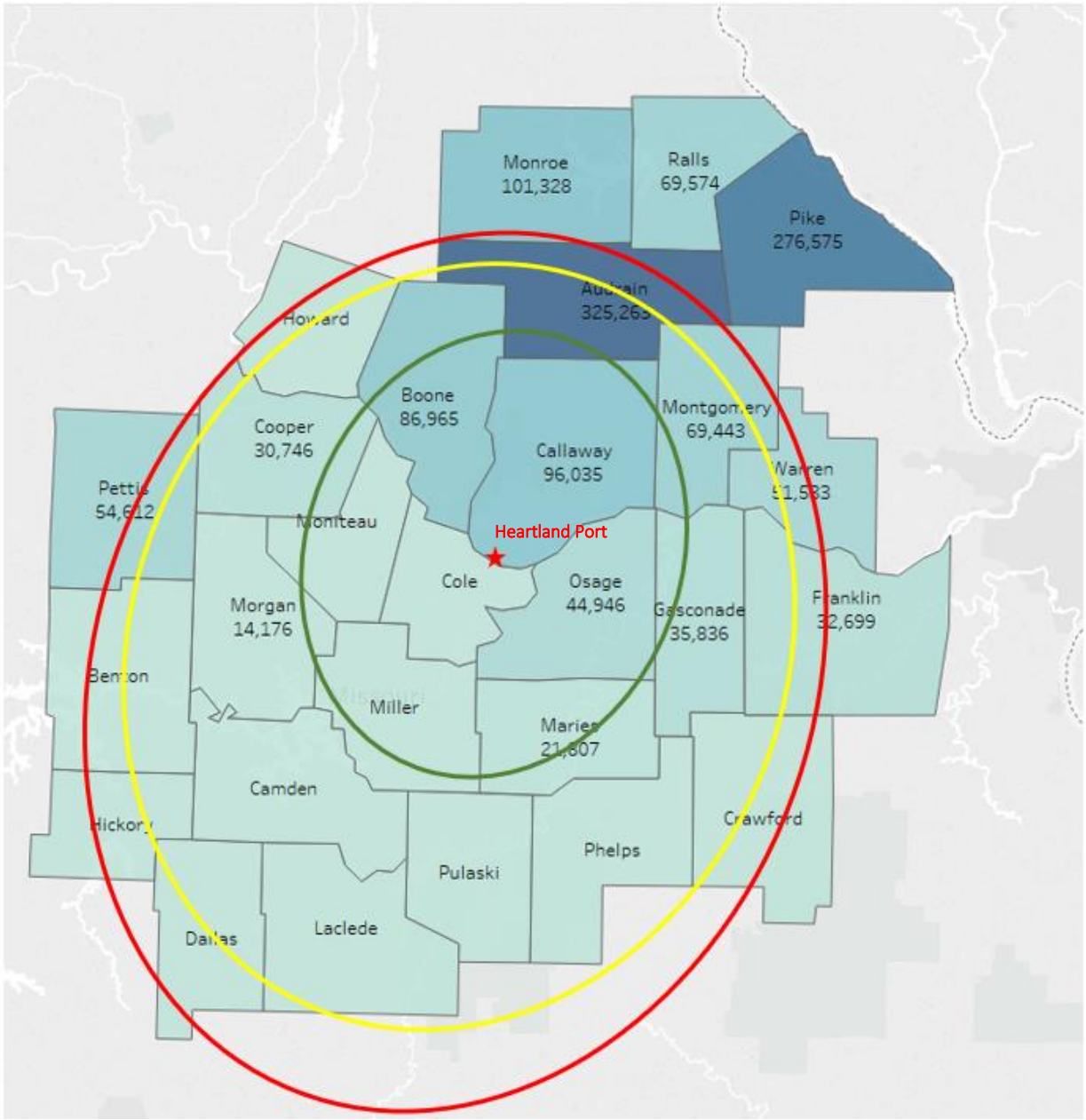


Source: Decision Innovation Solutions.

3.4.3 Grain Sorghum

Figure 37shows that there are about 400,000 bushels (10,160 MT) of grain sorghum produced within the extended draw area of HPA, as illustrated in the following figure. Grain sorghum within the HPA area is primarily used for livestock feed on farms with some shipped to feedmills south of the Missouri River.

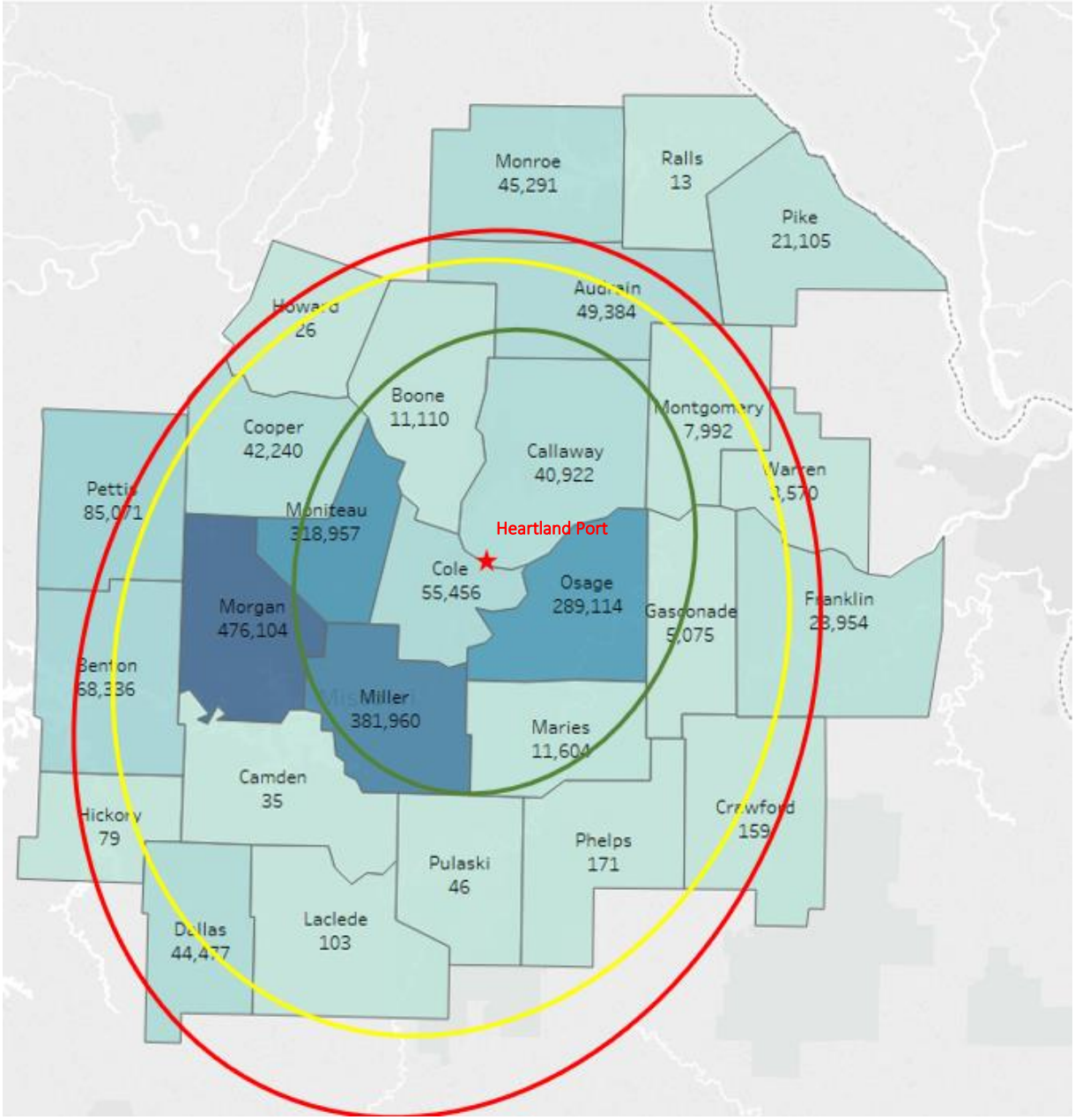
Figure 37. Grain sorghum production, 2017-18 marketing year (bushels)



Source: Decision Innovation Solutions.

Figure 38 demonstrates feed demand for grain sorghum is quite strong in the counties south of the Missouri River in the study area. Within the HPA study area, Morgan, Miller, Moniteau and Osage counties are significant users of grain sorghum for livestock feed.

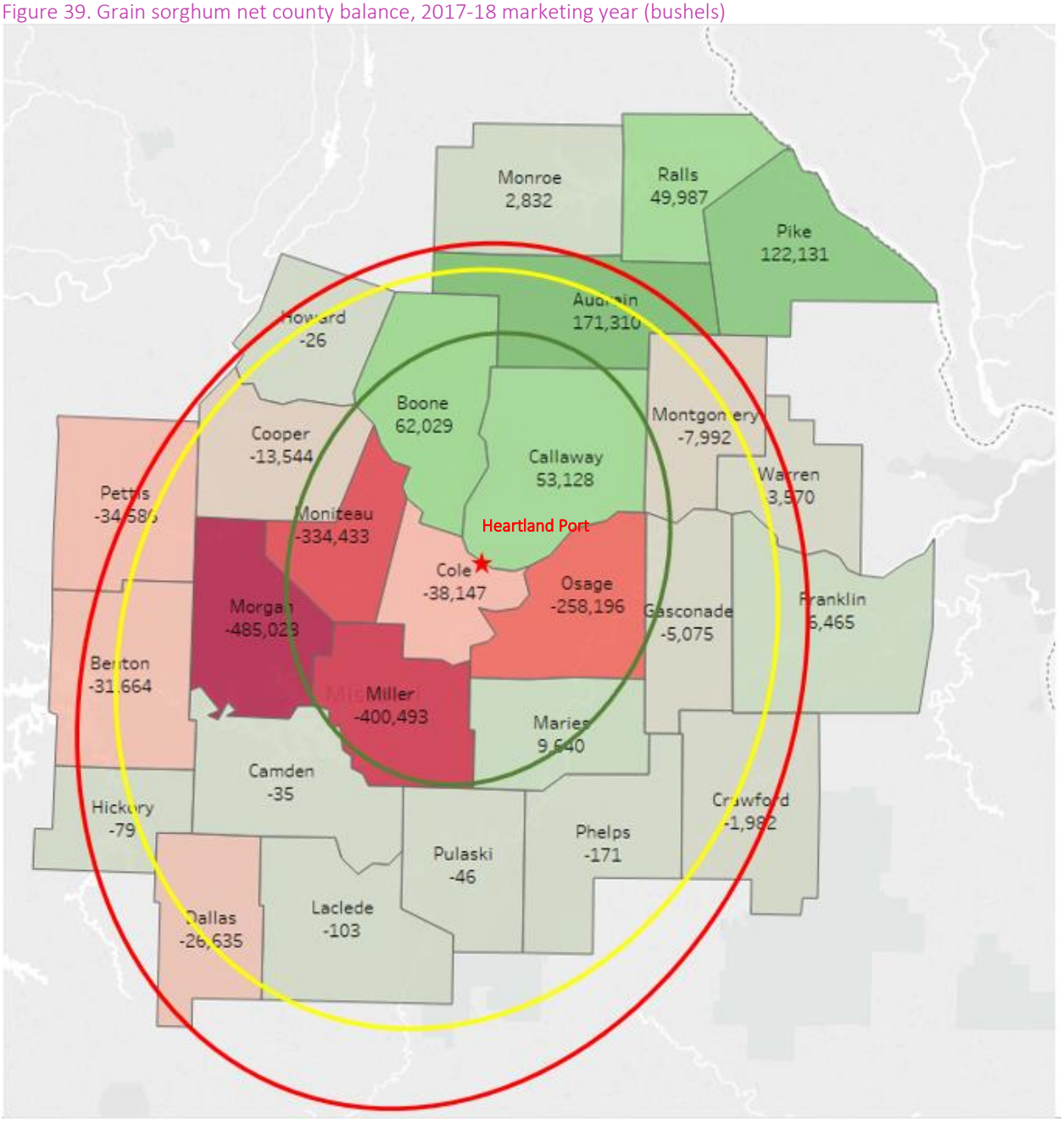
Figure 38. Grain sorghum feed, 2017-18 marketing year (bushels)



Source: Decision Innovation Solutions.

Figure 39 demonstrates that the draw area of HPA is a net importer of grain sorghum for feed milling. There is minimal grain sorghum available for exports from the HPA draw area. Analysis done as part of the Missouri Commodity Flow study indicates that much of the grain sorghum feed demand in Morgan, Moniteau, Miller, Cole, and Osage counties is met by movement of grain sorghum from farms and grain elevators in Boone, Callaway, and Audrain counties. Nearly all of this moves via truck from the supplier counties to the receiving ones.

Figure 39. Grain sorghum net county balance, 2017-18 marketing year (bushels)

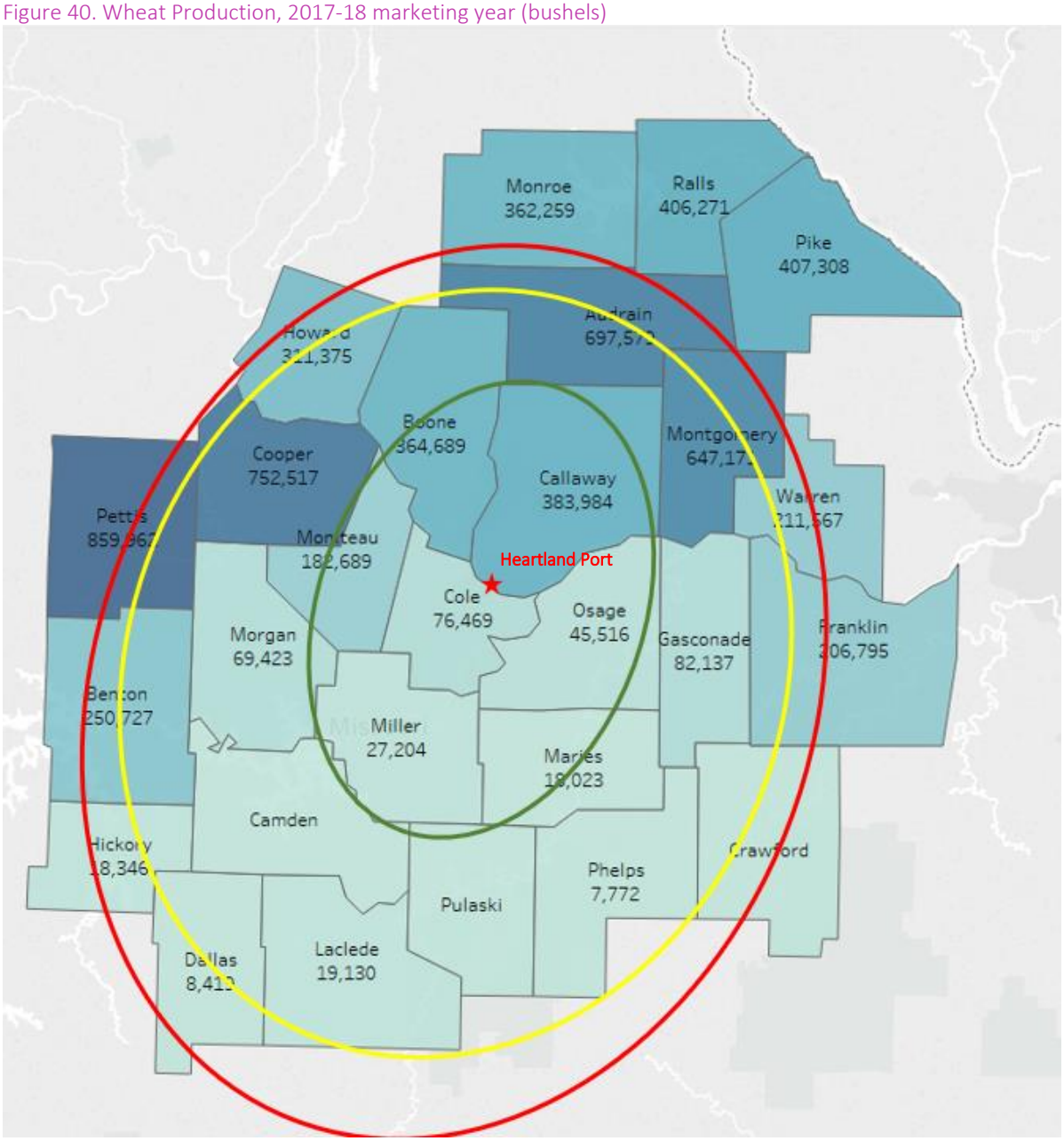


Source: Decision Innovation Solutions.

3.4.4 Wheat

There are approximately 2.8 million bushels (76,203 MT) of wheat produced in the extended draw area of HPA, as shown in Figure 40. A significant portion of this wheat moves to flour mills in the Kansas City and St. Louis metro areas for milling. In the Crop Reporting District (CRD) that includes St. Louis, more than 43 million bushels (1,290,129 MT) of wheat are milled. The CRD that includes Kansas City mills approximately 23 million bushels (626,020 MT) of wheat annually. Currently, wheat from the HPA draw area moves to milling sites via truck and rail. Missouri is an exporter of wheat, especially from counties in the Bootheel region of Missouri. The potential for barge export of wheat from HPA exists, but probably does not exceed 500,000 bushels (13,607 MT).

Figure 40. Wheat Production, 2017-18 marketing year (bushels)



Source: Decision Innovation Solutions.

3.5 Market 30-year forecast of non-containerized cargoes

For the 30-year forecast, the relevant study area was reduced to 24 counties. Monroe, Ralls and Pike counties were dropped from the analysis since it is highly unlikely that any commodities from those counties will ship from the Heartland Port due to existing barge facilities serving those counties on the Mississippi River to their east. These 24 counties comprise the overall market for the Heartland Port Project, since they represent the cargo flows with the highest potential to be attracted by the Port. This section presents the 30-year forecast for the overall market, analyzing the balance of trade (i.e. the import and export flows that represent the headhaul) and then showing the breakdown for the top commodities. This analysis was done first for non-containerized cargoes, since these are the most relevant, and next for containerized cargoes.

3.5.1 Potential non-containerized volumes from the Heartland Port Project study area

Non-containerized cargoes represent the market with the highest potential for the Heartland Port. Export projections through 2028 were obtained from the USDA Long-term Projections data published by USDA in February 2019. The national export trends for these commodities was used to project them forward to 2050. The percentage change from 2020 export levels were calculated for national export projections by commodity. These percentages were applied to the exports by commodity category as reported by IMPLAN for 2018 and to forward years to create agribulk export projections through 2050 for the Heartland Port Project study area. Based on this analysis, DIS expects this market to be around 263,000 MT in 2020, the starting year of the forecast, and grow up to 328,000 MT in 2030, a CAGR of 1.9% for the volumes in the 24-counties total. From this total, the headhaul is expected to be dominated by exports with 84% in 2020. Imports of non-containerized cargoes are expected to remain at 16% (see Figure 41and Table 12). This represents the total available market for non-containerized cargoes.

Figure 41. Non-containerized volumes in the 24-county study area—total (million metric tons)

Source: Decision Innovation Solutions.

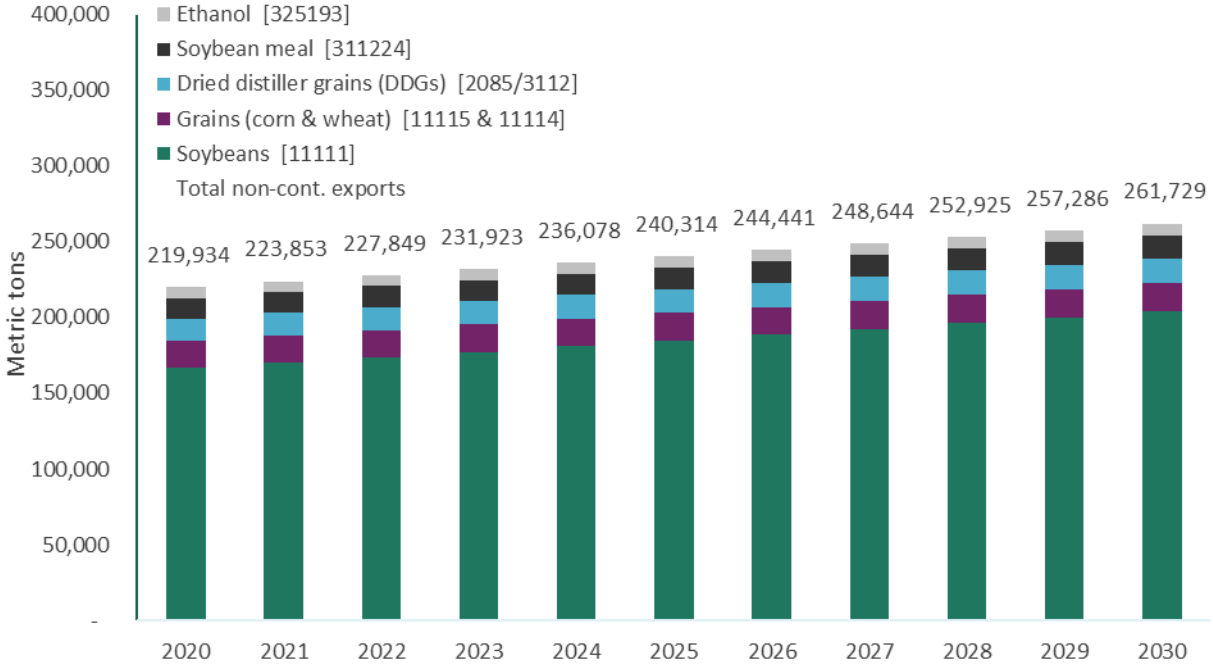
Table 12. Non-containerized volumes for the 24-county study area (000s metric tons)

Non-containerized	Units	2020	2021	2022	2023	2024	2025	2030	2035	2040	2045	2050
Non-cont. imports	000s metric tons	43.3	45.3	47.3	49.5	51.9	54.2	66.0	78.0	90.2	102.6	112.6
Non-cont. exports	000s metric tons	219.9	223.9	227.8	231.9	236.1	240.3	261.7	282.7	303.9	324.9	345.7
Total non-cont.	000s metric tons	**263.3**	**269.1**	**275.2**	**281.5**	**287.9**	**294.5**	**327.7**	**360.6**	**394.1**	**427.4**	**458.3**
Non-cont. imports	%share of Tot	16%	17%	17%	18%	18%	18%	20%	22%	23%	24%	25%
Non-cont. exports	%share of Tot	84%	83%	83%	82%	82%	82%	80%	78%	77%	76%	75%
Total non-cont.	Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Non-cont. imports	YoY%	4.4%	4.5%	4.5%	4.6%	4.7%	4.5%	3.7%	3.2%	2.8%	2.5%	1.1%
Non-cont. exports	YoY%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.7%	1.5%	1.4%	1.2%	1.3%
Total non-cont.	YoY%	**2.2%**	**2.2%**	**2.3%**	**2.3%**	**2.3%**	**2.3%**	**2.1%**	**1.9%**	**1.7%**	**1.5%**	**1.3%**

Source: Decision Innovation Solutions.

DIS estimated that in 2018, bulk exports from the Heartland Port Project study area were $49.3 million of cereal grains, $82.5 million of soybeans, $22.9 million of soybean meal, $1.2 million of soybean oil, $5.5 million of DDGs, and $14.9 million of ethanol. In terms of volumes, DIS estimated that, the 219,934 MT of exports of non-containerized cargoes from the 24 counties expected in 2020 will be broken down as follows: 166,723 MT of soybeans, 17,537 MT of corn and wheat, 15,105 DDGs, 13,550 soybean meal, and 7,021 ethanol for agribulk commodities. Agribulk commodities are one of the categories with the highest potential market for the Heartland Port Project. Annual projections for the four categories are shown in Figure 42.

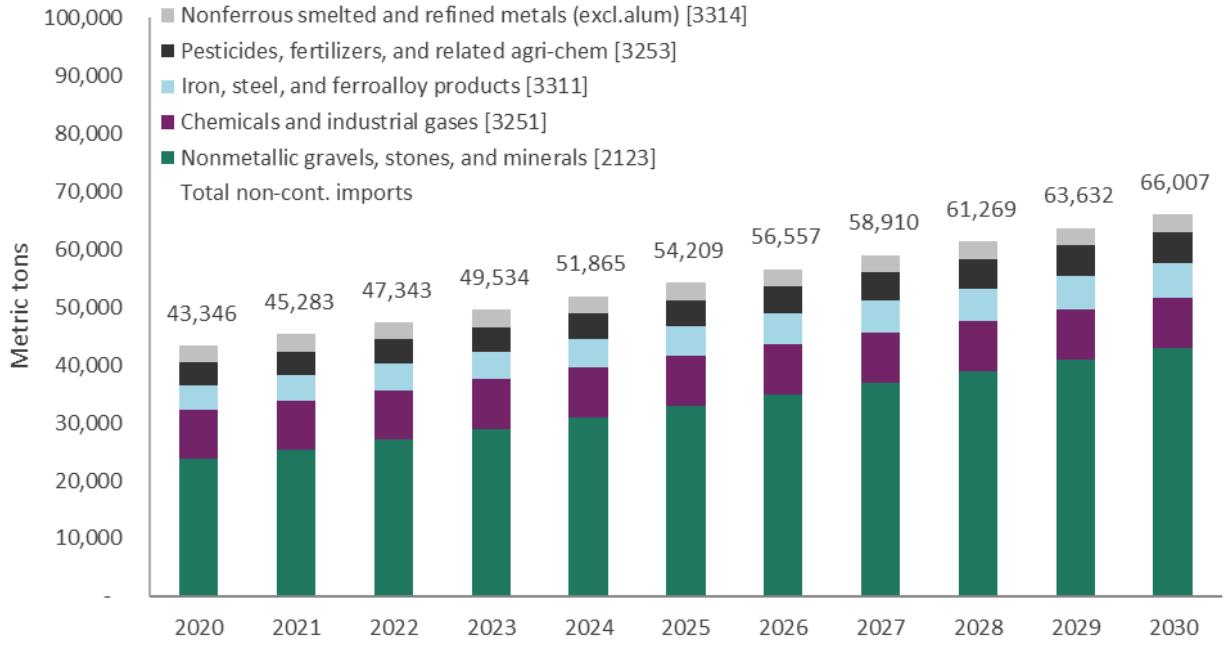
Figure 42. Forecast of non-containerized exports for the 24-county study area by commodity (metric tons)



Source: Decision Innovation Solutions.

DIS estimated that from the 0.48 million MT of non-containerized import cargoes from the 24 counties expected in 2020, 24,309 MT correspond to gravels, stones, and minerals; 8,267 MT to chemicals and industrial gases; and 4,316 to iron, steel, and ferroalloy products for the most relevant categories. Pesticides, fertilizers, and related agri-chem and nonferrous smelted and refined metals show some prospects. Annual projections for the top import categories of non-containerized cargoes are shown in Figure 43.

Figure 43. Forecast of non-containerized imports for the 24-county study area by commodity (metric tons)



Source: Decision Innovation Solutions.

4. Heartland Port: route economics and key target markets

Section 4 presents an analysis of the main target markets for the Heartland Port Project and compares the costs for key incumbent routes against new, alternate routes using the Heartland Port, which substitutes barge for rail on the inland component. These analyses are done for non-containerized cargoes first, followed by containerized ones. To identify potential markets, we enumerate the incumbent routes, analyze their route economics, and identify potential route cost savings that could drive cargo to the Heartland Port Project. We identify the commodities with the highest volumes moving in and out of the 24-county area, and based on the logistical cost advantages of the project quantify the potential cargo capture for the Heartland Port Project for each of the main non-containerized cargo and containerized cargoes.

4.1 General Assumptions

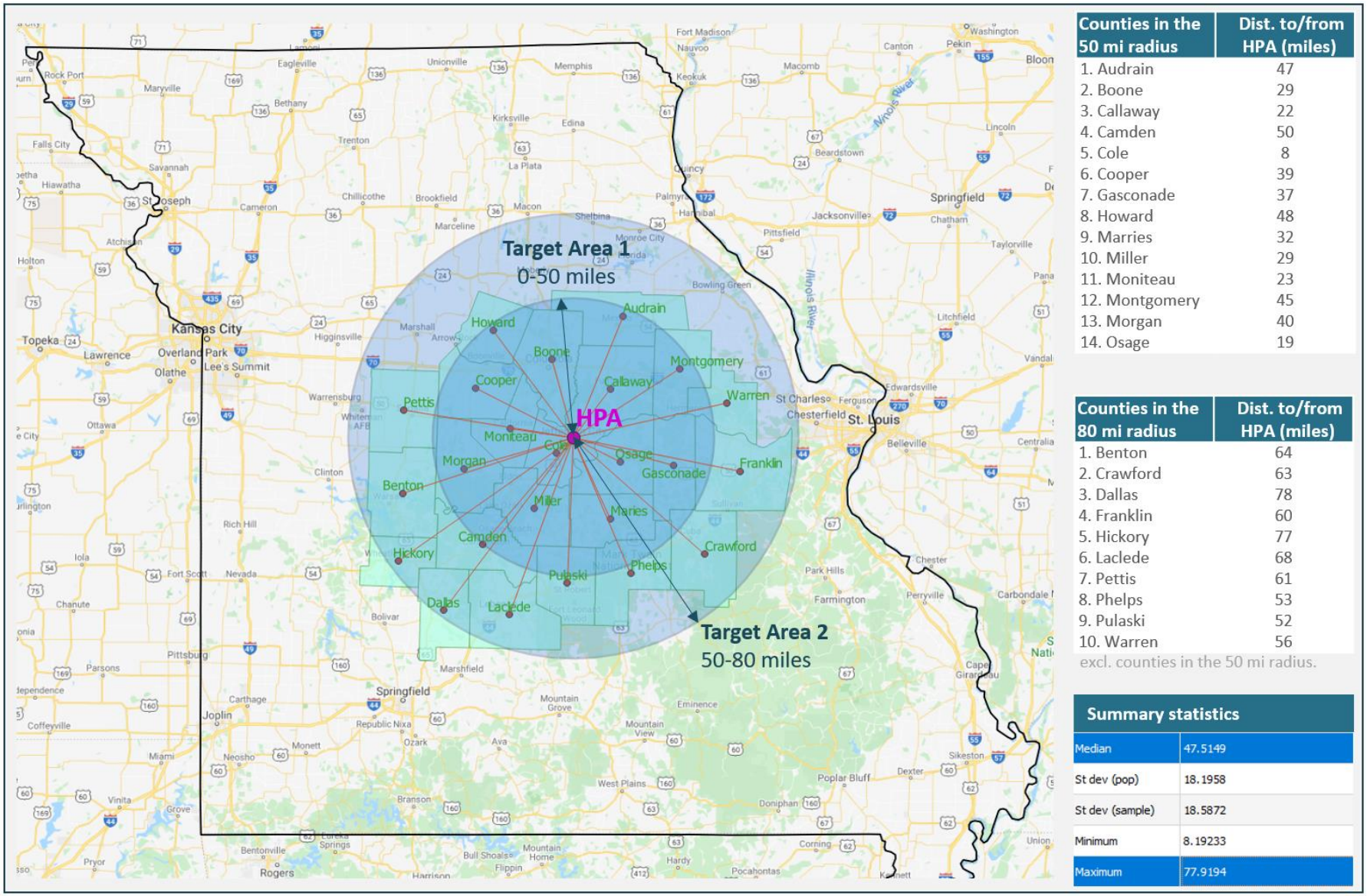
Numerous studies have been performed that compared the fuel efficiencies of barge, railroad, and truck and most conclude that movement of freight by barge is the most fuel-efficient transport mode and the lowest cost option for shipments moving over medium to long distances.[13] Consequently, a fundamental premise underpinning the Heartland Port Project is that the cost savings from transporting goods via barge will be large enough to entice beneficial cargo owners (BCO) to use this mode as opposed to transport by truck or rail, particularly in light of increasing capacity constraints along inland transportation corridors, such as I-70, and concerns regarding rising greenhouse gas emissions related to trucks.

Mercator analyzed route costs for the key non-containerized and containerized cargoes being exported from and imported into the Heartland Port's market region by first segmenting the region into two target trade areas—counties within a 50 mi radius of Heartland Port (Target Area 1), and counties within an 80 mi radius of Heartland Port, but excluding those within the 50 mi radius (Target Area 2), as depicted in Figure 44. The counties included in each of the trade areas are listed in the next bullets:

- Target Area 1—includes 14 counties in the first trade area, represented by the interior circle: Audrain, Boone, Callaway, Camden, Cole, Cooper, Gasconade, Howard, Marries, Miller, Moniteau, Montgomery, Morgan, and Osage.
- Target Area 2—includes 10 in the second, symbolized by the exterior ring: Benton, Crawford, Dallas, Franklin, Hickory, Laclede, Pettis, Phelps, Pulaski, and Warren.

[13] *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

Figure 44. Heartland Port Project target markets—trade areas by distance to/from the Project



Counties in the 50 mi radius	Dist. to/from HPA (miles)
1. Audrain	47
2. Boone	29
3. Callaway	22
4. Camden	50
5. Cole	8
6. Cooper	39
7. Gasconade	37
8. Howard	48
9. Marries	32
10. Miller	29
11. Moniteau	23
12. Montgomery	45
13. Morgan	40
14. Osage	19

Counties in the 80 mi radius	Dist. to/from HPA (miles)
1. Benton	64
2. Crawford	63
3. Dallas	78
4. Franklin	60
5. Hickory	77
6. Laclede	68
7. Pettis	61
8. Phelps	53
9. Pulaski	52
10. Warren	56

excl. counties in the 50 mi radius.

Summary statistics	
Median	47.5149
St dev (pop)	18.1958
St dev (sample)	18.5872
Minimum	8.19233
Maximum	77.9194

4.2 Non-containerized cargoes

4.2.1 Incumbent routes

Based on the organization of trade shares and the mix of commodities and industrial activities with the highest potential to be attracted by the Heartland Port Project, Mercator identified these five main incumbent corridors for the movement of non-containerized exports from Missouri. Each route is listed with the inland point first and then the gateway port or destination (as in the case of Mexico City): (i) St. Louis-Port of New Orleans, (ii) Kansas City-Port of Portland, (iii) Kansas City-San Pedro Bay (SPB) which includes the ports of Los Angeles and Long Beach, (iv) St. Louis-Port of Norfolk, and (v) Kansas City-Mexico City. All five have rail as the inland transport component and two have barge. These incumbent routes are explained in detail in the following bullets and displayed in Figure 46.

- St. Louis-New Orleans. This is the main corridor handling non-containerized exports via the Gulf Coast. Presently, there are two alternatives to move cargo from St. Louis to New Orleans, by rail and barge, each described in detail next.
  - By rail: It is 890 mi long and is served by UP, KCS, and CN in the north-south direction (along with interchange with BNSF and CSXT in the east-west direction). Presently, the nearest loading point for exports moving through the Port of New Orleans gateway is St. Louis (167 mi by truck from the Heartland Port Project study area), although it is also possible to load the cargo in Kansas City.
  - By barge: River transportation is available through the Port of St. Louis[14] along the Mississippi River. This route is composed of a 167 mi trip by truck from Jefferson City to St. Louis and a 1,190 mi movement by barge along marine highway M-55 from St. Louis to New Orleans, the export gateway. The Port of St. Louis presently handles all cargo-types.
- Kansas City-Portland—This is the primary route for non-containerized exports transiting through the Pacific Northwest (PNW), which includes the ports of Portland, Seattle, and Tacoma, and such exports are mainly destined to Asia. It is 1,880 mi long and is served by UP and BNSF. Presently, the nearest loading point to Jefferson City for exports via the PNW is Kansas City (190 mi by truck from the site of the port).
- Kansas City-SPB—This is the corridor for non-containerized exports moving via other ports on the West Coast (primarily Los Angeles or Long Beach), which is logical since the bulk of this cargo is destined to Asia. It is 1,740 mi long and is served by UP and BNSF. Presently, the nearest loading point for exports is Kansas City (190 mi by truck from Jefferson City).
- St. Louis-Norfolk—This corridor handles non-containerized exports via Norfolk, VA in the East Coast. It is 1,510 mi long and is served by the Norfolk Southern (NS) with interchange with CSXT. Presently, the nearest loading point for exports is St. Louis (167 mi by truck from the Heartland Port project).

[14] The Port of Metropolitan St. Louis (PMSL), as defined by the USACE, is 70 miles long and includes both sides of the Mississippi River. It is the third-largest inland water port by tonnage in the U.S. and the northernmost ice- and lock-free port on the Mississippi River. The City of St. Louis Port District, which is within the PMSL, covers 19 miles of riverfront and 6,000 acres of developable land, including the Municipal River Terminal (MRT). The Port is the second-largest inland port by trip-ton miles, and the third-largest by tonnage in the U.S., with more than 100 docks for barges, 16 public terminals on the river inside the port facility, and about 55 docks/terminals considering those outside the port limits in the towns of Madison, St Clair, and St Charles. The Port of St. Louis presently handles all non-containerized cargo-types and container on-barge by SCF. These terminals are identified in Appendix A.

- Kansas City-Mexico City—It is 1,680 mi long and is served primarily by UP on the U.S. side of the border. The Kansas City Southern Mexico (KCSM) corridor that extends from Mexico City (Ciudad de Mexico, or CDMX) connecting with UP in Laredo, Texas was considered the most logical route choice between the study area and Central Mexico. Hence, this corridor was selected from the three main rail corridors connecting with Central Mexico.[15] There is also a water route from Jefferson City to Mexico City, which incorporates truck and barge to New Orleans, a transgulf vessel to Veracruz and truck to Mexico City.

[15] 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 both 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.

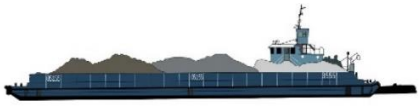
(iii) The KCSM corridor extends from Mexico City to San Luis Potosi, Saltillo, and Nuevo Laredo connecting with UP in Laredo.

4.2.2 Route costs via incumbent routes (non-containerized)

Mercator calculated the route costs paid by shippers or receivers (i.e. Beneficial Cargo Owners, BCOs) for non-containerized cargo by component—truck, rail, and barge—for the primary incumbent routes, and then compared them to the route cargo would follow if routed through the proposed Heartland Port. To estimate costs for each route, inputs were developed by leg or component activity using a combination of desktop research, proprietary models, telephone calls, and quotes obtained from transportation providers.

Once all inputs were obtained or calculated for each cost component per route, all costs were converted to dollars per metric ton ($/MT) to allow consolidation across legs. To do this, payload factors were assumed for each transportation mode. The graphic depicts the maximum carrying capacity assumed for each transportation unit (i.e. river barge, rail hopper car, and truck) with the river barge dwarfing handling about 20 times as much as a railcar, and 100 times as much as a truck, as illustrated Figure 46.

Figure 45. Unit capacity by mode of transport, in metric tons

a) River barge	b) Jumbo Hopper railcar (5,161 ft3)	c) Truck
		
2,000 metric tons (4,409,245 lb)	**100 metric tons** (223,400 lb)	**19 metric tons** (41,888 lb)

Presently, for BCO's looking to export non-containerized cargoes out of the 24-county study area, trucking represents the first mode of transportation to get cargoes to the nearest long-haul intermodal platform (i.e. Kansas City and St. Louis). Once in Kansas or St. Louis, shipments have to be discharged from the trucks into temporary storage areas (e.g. grain silos), and then loaded into railcars at Kansas City or St. Louis, or onto barges at St. Louis. The estimation of our rail costs incorporates discharging of trucks, temporary storage, and loading to railcar, as indicated by the quotes obtained from the industry. Similarly, there is cost at the export gateway related to unloading, temporary storage, and loading of the ocean vessel. Ocean transport costs were estimated by Mercator and validated with third-party sources for each tradelane. The structure of the 2020 route costs assumed for non-containerized cargoes using incumbent routes (i.e. the case where the Heartland Port is not constructed) via Kansas City and St. Louis is illustrated in Figure 46.

Figure 46. Incumbent routes—main rail corridors for non-containerized exports from Missouri

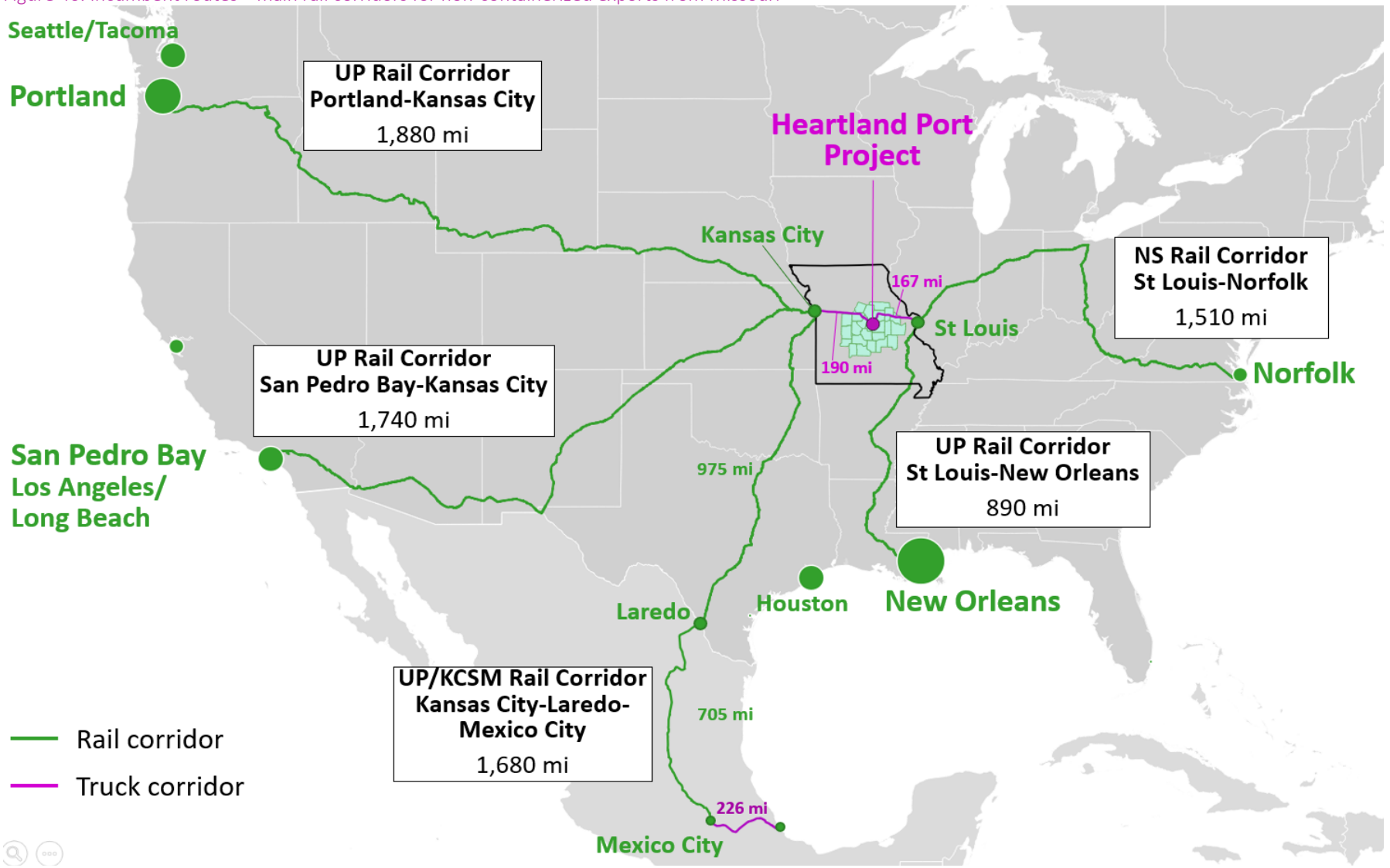
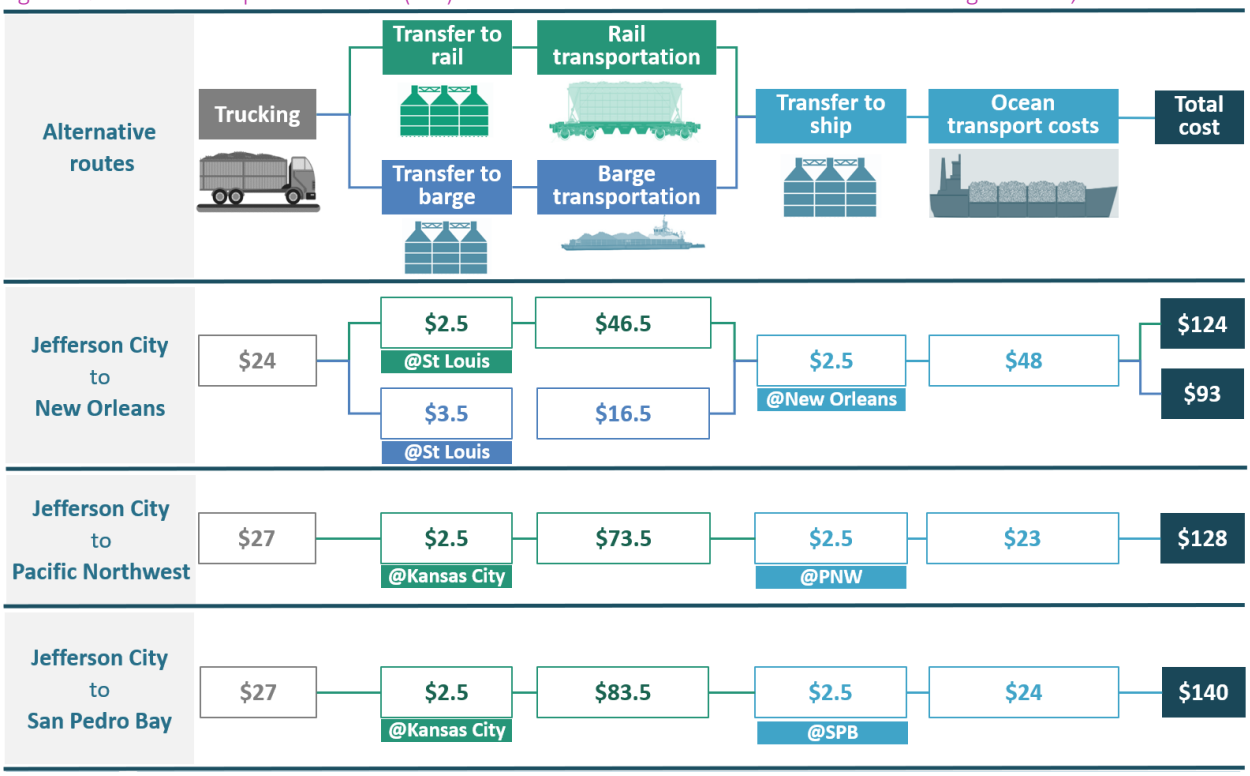


Figure 47. Route costs per metric ton (MT) via incumbent routes for non-containerized cargo to Asia, 2020



Source: Mercator International.

Based on these cost components, we estimate the costs via incumbent rail and barge routes for non-containerized cargo, as illustrated in Table 13. The export gateways analyzed are on the Gulf Coast, Pacific Northwest (PNW), Southern California (SPB), and the East Coast, reflecting the five incumbent corridors for the movement of non-containerized exports from Missouri previously identified in Section 4.2.1. For each of these gateways, the analysis is further broken down into tradelanes to account for differences in transportation costs to the most relevant final destination.

Not surprisingly, the incumbent barge route (i.e. trucking cargo to St. Louis, loading to a barge, and transporting to New Orleans via the Mississippi River route) is the most cost-effective way to export cargo out of the 24-county study area, as demonstrated by our route cost estimates. Hence, the incumbent barge route via St. Louis can be expected to be the strongest competitor to any route that would use the Heartland Port in the future. The objective and the challenge for Heartland will therefore be to capture and load onto barges in Jefferson City cargo now being trucked from the Central MO area to St. Louis. The New Orleans gateway is the most economical gateway either by rail or by barge for shipments going to Asia, Europe, and South/Central America. 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.

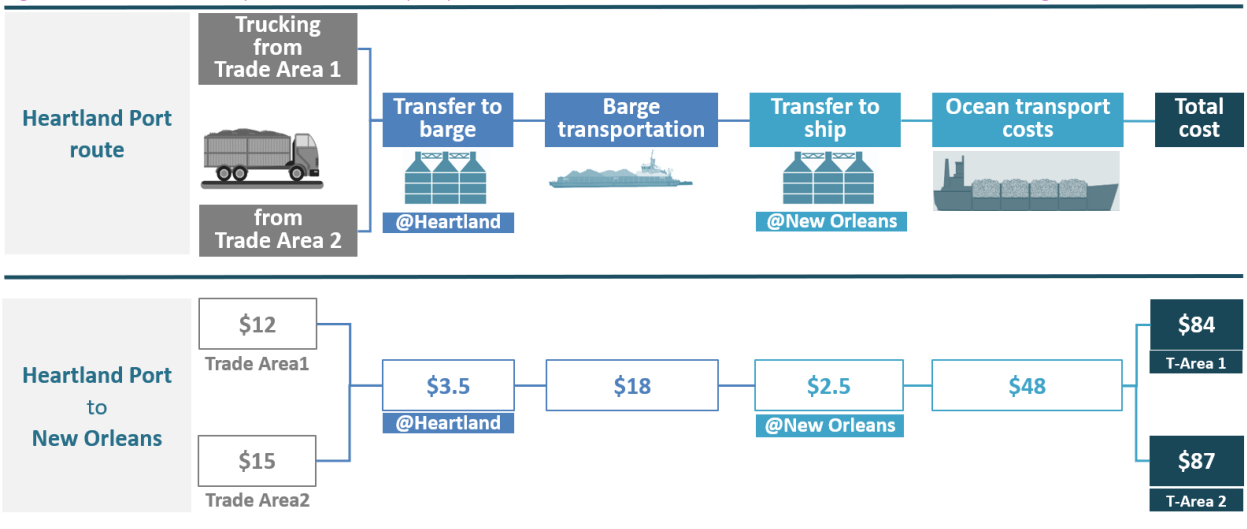
Table 13. Route costs via incumbent routes for non-containerized cargo, 2020 ($/metric ton)

Gateway and tradelane	Incumbent route costs: by rail	by barge
Gulf coast	**$ / MT**	**$ / MT**
Jefferson City - St. Louis - New Orleans - *Asia*	124	$93
Jefferson City - St. Louis - New Orleans - *Europe*	95	64
Jefferson City - St. Louis - New Orleans - *S/C America*	97	66
Jefferson City - St. Louis - New Orleans - *Africa*	96	65
Jefferson City - St. Louis - New Orleans - *CDMX (via transgulf vessel)*	113	82
Jefferson City - Kansas City - Laredo - *CDMX (via Laredo all-rail)*	110	-
Pacific Northwest (PNW)		
Jefferson City - Kansas City - PNW - *Asia*	128	-
West Coast (excl. PNW)		
Jefferson City - Kansas City - POLALB - *Asia*	140	-
East coast		
Jefferson City - St. Louis - Norfolk - *Asia*	195	-
Jefferson City - St. Louis - Norfolk - *Europe*	164	-
Jefferson City - St. Louis - Norfolk - *S/C America*	165	-

4.2.3 Route costs via the Heartland Port Project

Figure 48 provides the cost elements for exporting non-containerized cargo to these same foreign destination regions, but using routes that would rely upon the Heartland Port. Costs are specified for origins/destinations within Target Trade Area 1 (within 50 miles of the port) and Target Trade Area 2 (between 50 and 80 miles from the port). Once the Heartland Port is operational, shippers looking to export non-containerized cargoes out of the 24-county study area would have to truck their cargoes to the Heartland Port. 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 the Heartland Port to New Orleans, and a transfer cost from the barge to the ocean liner vessel.

Figure 48. Route costs per metric ton (MT) via the Heartland Port route for non-containerized cargo to Asia, 2020



*There are 14 counties in Trade Area 1 (the 0-50 mi radius from the Heartland Port Project site) and 10 counties in Trade Area 2 (the 50-80-mile buffer, which exclude the counties in the 50 mi radius).

4.2.4 Route cost savings offered by the heartland port Project for non-containerized cargo

The premise behind the Heartland Port concept is that barge service is more efficient and consequently more cost-effective than land-based modes (i.e. rail and truck), such that the route cost savings when using the Heartland Port will be large enough to ultimately add value in the supply chain and attract users. To estimate the magnitude of such cost savings, Mercator identified the best incumbent routes and then compared each of them to the route cargo would follow by using the Heartland Port. Based on an underlying rate of $3.5/MT to transfer cargo from a truck to a barge at Heartland, the Heartland route would produce an average benefit to port users of about $8.00/MT. These benefits would be about $3.3/MT greater for users in Trade Area 1 ($9.6/MT) compared to users located in Trade Area 2 ($6.3/MT). An estimation of the route cost savings is summarized in Table 14.

Table 14. Route cost savings offered by the Heartland Port Project for non-containerized cargo (US$/metric ton)

		Best incumbent route	Heartland route cost @$3.5/MT		Potential cost savings offered by Heartland		Avg. benefit to port users
Tradelane	Unit	(0-80 miles)	Trade Area 1	Trade Area 2	Trade Area 1	Trade Area 2	(0-80 miles)
Asia	US$ / MT	$93.1	$83.5	$87.0	$9.6	$6.1	$7.9
Europe	US$ / MT	$64.2	$54.6	$58.0	$9.6	$6.2	$7.9
S/C America	US$ / MT	$66.5	$56.9	$60.0	$9.6	$6.5	$8.1
Mexico	US$ / MT	$82.4	$72.9	$76.0	$9.5	$6.4	$8.0
Africa	US$ / MT	$65.3	$55.8	$59.0	$9.5	$6.3	$7.9
Average	**US$ / MT**	**$74.3**	**$64.7**	**$68.0**	**$9.6**	**$6.3**	**$8.0**

Using the financial model, which is described in *Section 6*, Mercator made an initial determination that returns for bulk cargo activity based on a $3.50/MT handling rate were not satisfactory to support the project investment. This led to further analysis to identify a higher rate that would provide adequate incentive to shippers to use the port while delivering sufficient revenue to the Heartland Port operator.

Analysis revealed that if the Heartland handling rate was increased to $6.0/MT to transfer cargo from a truck to a barge at Heartland, the Heartland route would still produce an average benefit to port users of nearly $6.00/MT. This rate of $6.0/MT, which roughly apportions evenly the Heartland vs. St. Louis transportation cost savings between revenue for the port operator and benefit for shippers was thus selected as the base case revenue for Heartland bulk products. Route cost savings offered by the Heartland Port Project at $6.00/MT are shown in Table 15.

Table 15. Route cost savings offered by the Heartland Port Project at $6.00/metric ton

		Best incumbent route	Heartland route cost @$6.0/MT		Potential cost savings offered by Heartland		Avg. benefit to port users
Tradelane	Unit	(0-80 miles)	Trade Area 1	Trade Area 2	Trade Area 1	Trade Area 2	(0-80 miles)
Asia	US$ / MT	$93.1	$85.8	$89.3	$7.3	$3.8	$5.6
Europe	US$ / MT	$64.2	$56.9	$60.3	$7.3	$3.9	$5.6
S/C America	US$ / MT	$66.5	$59.2	$62.3	$7.3	$4.2	$5.8
Mexico	US$ / MT	$82.4	$75.2	$78.3	$7.2	$4.1	$5.7
Africa	US$ / MT	$65.3	$58.1	$61.3	$7.2	$4.0	$5.6
Average	**US$ / MT**	**$74.3**	**$67.0**	**$70.3**	**$7.3**	**$4.0**	**$6.0**

As the route cost analysis demonstrates, the transport efficiencies offered by barge service via the Heartland Port create a lower cost alternative for bulk cargo shippers. It is expected that with a handling

rate of $6.0/MT to transfer cargo from a truck to a barge at Heartland, the route cost savings (which should be between $5/MT and $6/MT) will be sufficient to attract potential users to the port. For some shippers, it may be possible for Heartland Port to eliminate the need for using regional elevators, which would produce additional savings for those shippers. These potential savings may allow Heartland to charge more than the assumed $6/MT for some shippers and still produce attractive savings, but more detailed analysis is needed to verify these possible savings.

Based on these data, the next step was to infer reasonable market shares of non-containerized cargo volumes from the 24-county area, as detailed in the following section.

4.2.5 Available non-container volume from the 24-county area

Use of DIS forecasts

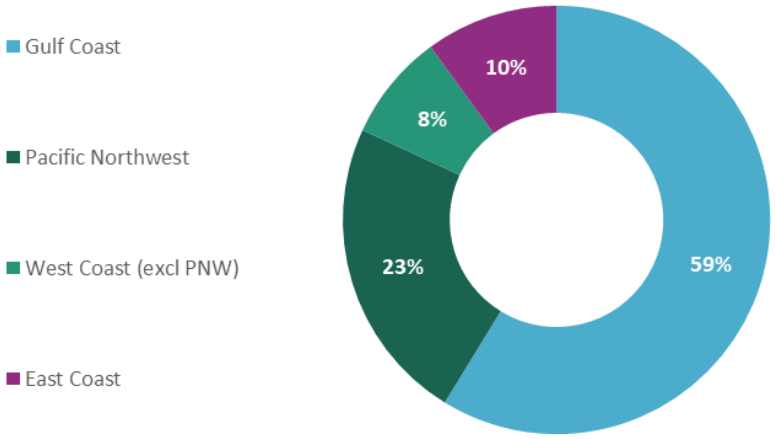
Based on the cargo flows with the highest potential to be attracted by the Port, non-container volumes that could be handled at the Heartland Port were identified and forecasted by DIS for the 24-county study area, as described in *Section 3.4*. Available volumes from the 24-county area represent the overall market for the Heartland Port Project (i.e. 100%). However, it is unrealistic to assume that the port would capture 100% of the overall market. Consequently, Mercator conducted a three-step analysis to identify the potential market share that could be captured by the Heartland Port. First, the top-5 commodities for Missouri's principal non-containerized trade were identified for the headhaul direction (in Section 3.4). Second, the shares by gateway (at the national level) for the top-5 non-containerized commodities were estimated and used as the imputed market shares by gateway for the non-containerized cargo flows to/from the 24-county study area. Third, based on the route cost savings offered by the Heartland Port Project route for each gateway, Mercator determined the potential market that could realistically be captured by the Heartland Port.

Imputed market shares by gateway and tradelane

Missouri's principal non-containerized trade is in the export direction, composed primarily of agribulk commodities. For the five highest volume non-containerized commodities exported from Missouri (i.e. soybeans, grains, Dried Distillers Grains (DDG), soybean meal, and ethanol), we used data from the U.S. Census at the national level to obtain export volumes by U.S. coastal region for such commodities.

This analysis revealed that the Gulf Coast is the most significant for non-containerized exports from the U.S., capturing 59% of the total, followed by ports in the Pacific Northwest (i.e. Portland, Seattle, and Tacoma) with a 23% share, the remaining ports in the West Coast with 8%, and the East Coast having the remaining 10% share, as illustrated in Figure 49. With Missouri located in the center of the country, these coastal shares provided reasonable proxies for estimating the shares by coast for the export volumes of non-containerized cargoes from Missouri. For Missouri exports by export gateway, we assumed the gateway distribution for the state was similar to the country as a whole.

Figure 49. Imputed market shares by gateway (at the national level) for the top-5 non-containerized commodities



Once the shares by U.S. coastal region were estimated, as illustrated in Figure 49, data at the county level was used to identify those industrial cargos deemed to have the highest potential to be attracted by the Heartland Port. For this, we considered only those cargoes with sufficient local area volume to fill one barge per quarter. Based on U.S. Census export volume data for these cargos, Mercator identified the shares captured by each U.S. coast by trade region: Asia, Europe, South/Central America, Africa, and Australia/Oceania. In addition, the share of trade with Mexico was broken out separately to assist in the identification of the potential volume between Missouri and this country, as shown in Table 16.

Table 16. Imputed market shares by tradelane (at the national level) for the top-5 non-containerized commodities

Non-containerized exports	Tradelane %
Asia	**50.1%**
Europe	**17.0%**
S/C America	**18.3%**
Africa	**6.9%**
Mexico	**7.7%**
Total non-containerized imports	**100%**

4.2.6 Potential market share captured by the Heartland Port

The goal for this step is to determine the share of freight that could be captured by the Heartland Port from the overall market available in the 24-county study area. As previously mentioned, we selected the top-5 commodity categories with volumes large enough to generate at least one barge trip per quarter (i.e. one barge carrying 2,000 MT every three months). Based on the analysis of shares by gateway for the top-5 non-containerized commodities and on the route cost savings offered by the Heartland Port Project route, Mercator estimated the potential market that could be captured by the Heartland Port by route. Mercator estimated that at most an 80% market share could be captured by the Heartland Port for the volumes to/from the 24-county study area for each tradelane (i.e. Asia, Europe, S/C America, Africa, and Mexico) once fully developed (i.e. after the ramp-up).[16]

[16] An 80% market share was selected as an optimistic assumption and would need confirmation at a later stage of analysis.

On this basis, five categories of non-containerized import commodities (Nonmetallic gravels, stones and minerals; Chemicals and industrial gases; Iron, steel and ferroalloy products; Pesticides, fertilizers and related agri-chem; and Nonferrous smelted and refined metals) and five categories of non-containerized export commodities (Soybeans; Grains; DDGs; Soybean Meal; and Ethanol) are the cargos within 24-county study area (i.e. Trade Area 1 and Trade Area 2) most likely to be attracted to the proposed port. Imports and exports of non-containerized cargo by commodity from the 24-counties are illustrated in Table 17 followed with Base Case volume forecast for each of the cargo types in Table 18.

Table 17. Imports and exports of non-containerized cargo by commodity for the 24-counties (000s metric tons)

Imports	Type	Yr 0	1	2	3	4	5	6	7	8	9	10	15	20	30
Nonmetallic gravels, minerals [2123]	Drybulk	19.0	20.3	21.7	23.2	24.8	26.4	28.0	29.6	31.2	32.8	34.4	42.4	50.4	64.4
Chemicals and industrial gases [3251]	Breakbulk	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9	7.1	7.3	7.7
Iron, steel, ferroalloy products [3311]	Drybulk	3.4	3.6	3.7	3.8	4.0	4.1	4.2	4.4	4.5	4.7	4.8	5.5	6.2	7.5
Pesticides, fertilizers, agri-chem [3253]	Drybulk	3.1	3.2	3.3	3.4	3.6	3.7	3.8	3.9	4.0	4.2	4.3	5.0	5.9	8.1
Nonferrous metals (excl.alum) [3314]	Drybulk	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Target volume for non-cont. imports		**34.7**	**36.2**	**37.9**	**39.6**	**41.5**	**43.4**	**45.2**	**47.1**	**49.0**	**50.9**	**52.8**	**62.4**	**72.1**	**90.1**
Exports	**Type**	**Yr 0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**15**	**20**	**30**
Soybeans [11111]	Agribulk	133.4	136.2	139.0	142.0	144.9	148.0	150.9	154.0	157.0	160.2	163.4	178.3	193.4	222.0
Grains (corn & wheat) [11115 & 11114]	Agribulk	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	15.0	15.5	16.1	17.2
Dried distiller grains [2085/3112]	Agribulk	12.1	12.2	12.3	12.3	12.4	12.5	12.6	12.7	12.8	12.9	12.9	13.4	13.8	15.3
Soybean meal [311224]	Agribulk	10.8	11.0	11.1	11.2	11.3	11.4	11.5	11.7	11.8	11.9	12.0	12.5	13.1	14.0
Ethanol [325193]	Liq. bulk	5.6	5.7	5.7	5.7	5.8	5.8	5.9	5.9	5.9	6.0	6.0	6.4	6.8	8.0
Target volume for non-cont. exports		**175.9**	**179.1**	**182.3**	**185.5**	**188.9**	**192.3**	**195.6**	**198.9**	**202.3**	**205.8**	**209.4**	**226.1**	**243.2**	**276.6**
TOTAL non-containerized	**Units**	**Yr 0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**15**	**20**	**30**
Imports total	000 MT	34.7	36.2	37.9	39.6	41.5	43.4	45.2	47.1	49.0	50.9	52.8	62.4	72.1	90.1
Exports total	000 MT	175.9	179.1	182.3	185.5	188.9	192.3	195.6	198.9	202.3	205.8	209.4	226.1	243.2	276.6
Target volume for non-cont. cargo	000 MT	**210.6**	**215.3**	**220.2**	**225.2**	**230.4**	**235.6**	**240.8**	**246.0**	**251.4**	**256.7**	**262.2**	**288.5**	**315.3**	**366.7**

Table 18. Base Case volume forecast by cargo type from the 24-counties (000, metric tons)

Non-containerized TOTAL (metric tons)	Yr 0	1	2	3	4	5	6	7	8	9	10	15	20	30
Breakbulk (chem & ind gases)	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9	7.1	7.3	7.7
Agribulk (corn, soybean, DDG, & meal)	170.3	173.4	176.6	179.8	183.1	186.4	189.7	193.0	196.4	199.8	203.4	219.7	236.3	268.6
Drybulk (mineral & fertilizer)	27.9	29.5	31.1	32.9	34.7	36.6	38.4	40.3	42.1	44.0	45.9	55.3	64.9	82.4
Liquid bulk (ethanol, chemic, & ind. gases)	5.6	5.7	5.7	5.7	5.8	5.8	5.9	5.9	5.9	6.0	6.0	6.4	6.8	8.0
Target volume for non-containerized cargoes	**210.6**	**215.3**	**220.2**	**225.2**	**230.4**	**235.6**	**240.8**	**246.0**	**251.4**	**256.7**	**262.2**	**288.5**	**315.3**	**366.7**

To facilitate planning and analysis of port operations and costs, the selected commodities were grouped into four cargo types: agribulk, dry bulk, breakbulk, and liquid bulk.

- For agribulk, composed primarily of soybean exports, DIS estimates an available market of about 170,300 MT for the 24-counties in the study area, which is expected to grow at a CAGR of 1.5% over the 30-year study period.
- For drybulk, composed of non-metallic gravels, minerals, ferroalloy products and fertilizers, the DSI analysis gives an estimated available market of about 27,900 MT for the 24-counties in the study area, expected to grow at a CAGR of 3.7% over the 30-year study period.

- For breakbulk, composed primarily of chemical and industrial gases, DSI indicates an available market of about 6,700 MT for the 24-counties in the study area, which is expected to grow at a CAGR of 1.2% over the 30-year study period.
- For liquid bulk, composed primarily of ethanol, DIS estimates an available market of 5,600 metric tons for the 24-counties in the study area, growing at a CAGR of 1.2% over the 30-year period.

CAGRs are summarized in 5-year intervals in Table 19.

Table 19. CAGR of non-containerized cargoes from the 24-counties by cargo type

Non-containerized TOTAL	Yr 0-5	Yr 5-10	Yr 10-15	Yr 15-20	Yr 20-25	Yr 25-30	Yr 0-30
Break-bulk	0.2%	0.3%	0.4%	0.6%	0.6%	0.6%	**0.5%**
Agri-bulk	1.8%	1.8%	1.6%	1.5%	1.3%	1.2%	**1.5%**
Dry-bulk	5.5%	4.7%	3.8%	3.2%	2.8%	2.0%	**3.7%**
Liquid-bulk	0.7%	0.7%	1.2%	1.3%	1.5%	1.8%	**1.2%**
Target volume for non-cont.	**2.3%**	**2.2%**	**1.9%**	**1.8%**	**1.6%**	**1.4%**	**1.9%**

4.3 Containerized cargoes

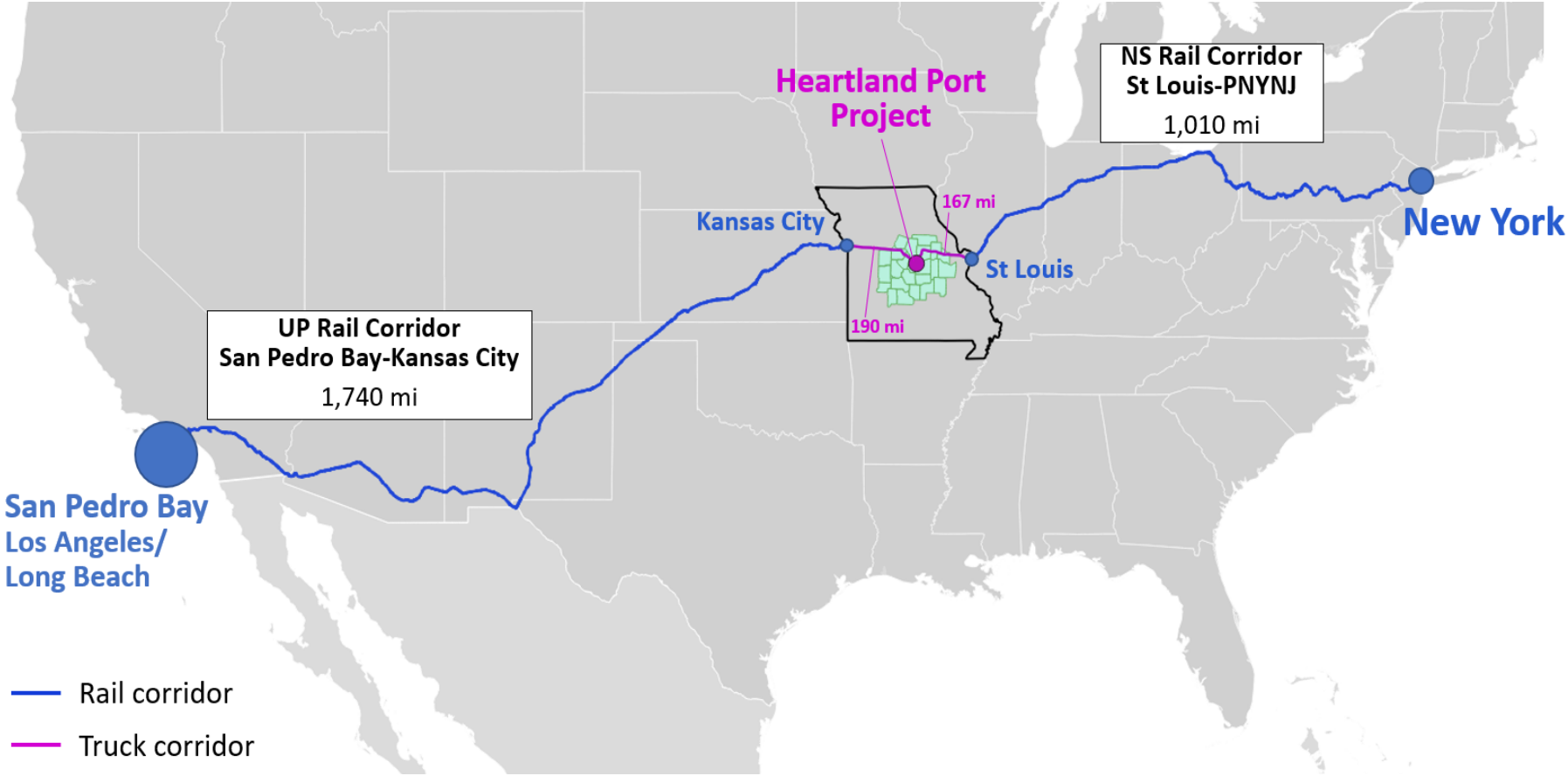
4.3.1 Incumbent routes

Presently, for shippers and BCO's looking to import containerized cargoes into the 24-county study area, there are two primary route alternatives: (i) San Pedro Bay on the West Coast through Kansas City (SPB-Kansas City) and (ii) New York-New Jersey on the East Coast through St. Louis (Port of New York and New Jersey (PANYNJ)-St. Louis). Both use intermodal rail from the gateway port to an inland hub. The incumbent intermodal rail routes for the movement of containers imported into the Heartland study area are described in the following bullets and shown in Figure 50.

- San Pedro Bay-Kansas City. This is the main route for containerized imports from Asia via the Pacific Coast. This rail corridor is 1,740 mi long and is served by the Union Pacific (UP). Marine containers on double-stack trains dominate this route. Although the tracks on this corridor extend beyond Kansas City all the way to St. Louis (passing through the Heartland Port Project), there are no intermodal ramps in the segment between Kansas City and St. Louis. Hence, this indicates that import containers are railed from the Ports of Los Angeles and Long Beach to Kansas City (1,740 mi) and then trucked 190 mi to the destinations in the Heartland Port Project study area.
- New York/New Jersey (PNYNJ) - St. Louis. This is the primary corridor for containerized imports via the Atlantic Coast. This 1,010 mi long corridor is served by NS from St. Louis to Fort Wayne, Cleveland, Pittsburgh, Harrisburg, Allentown, and New York and by the UP line for trains coming from Kansas City. This corridor is suitable for double-stack trains. Similar to the route described above, containers are railed between PNYNJ and St. Louis (1,010 mi) and trucked about 167 mi to/from destinations in the Heartland Port Project area.

Given the possibility that, if a container transport service on the river existed, containers to/from the 24-county Heartland Port hinterland could move by barge over St. Louis rather than over the Heartland Port, this option is analyzed as part of the alternate / incumbent container routes.

Figure 50. Incumbent intermodal rail routes for containers imported into the Heartland study area



4.3.2 Route costs via incumbent routes (containerized)

Mercator calculated the route costs for containerized cargo by component—truck, rail, and barge—for the primary incumbent routes, and then compared them to the routes that cargo would follow if using the proposed Heartland Port. Once cost inputs were obtained or calculated for each cost component per route, all costs were converted to dollars per 40 ft container ($/Box). The capacities assumed by mode are illustrated in Figure 51. For container on barge service, presently, there is one barge operator providing service between New Orleans and St. Louis.[17] This weekly service operates 195-200 ft barges capable to accommodate 36 loaded containers (40 ft) each (3 high) and 48 if empties (4-high). Typically, 1 tugboat can push up to six container barges.

Figure 51. Unit capacity by assumed mode of transport, in metric tons and 40 ft containers

a) 40 ft container by rail	b) 40 ft container by truck	c) River barge
		
15 metric tons (33,069 lb)	**15 metric tons** (33,069 lb)	**36-48 containers** per barge

Ocean transport costs, either from Asia to San Pedro Bay or from Europe to New York-New Jersey, represent the first leg of the import trip. Ocean transport costs were estimated by Mercator and validated with third-party sources for each tradelane. Long-haul rail movements represent the next leg of the trip from either San Pedro Bay to Kansas City or from New York-New Jersey to St. Louis. There is cost at the import gateway port related to ship-to-shore transfer and loading to railcar. The rail rate incorporates loading/discharging, from railcar-to-yard-to-truck, as indicated by the quotes obtained from the industry. Trucking represents the last mode of transportation to get cargoes from the nearest long-haul intermodal platform (i.e. Kansas City and St. Louis) to Jefferson City. The structure of the 2020 route costs assumed for containerized cargoes using incumbent routes (i.e. where the Heartland Port Project is not constructed) via Kansas City and St. Louis is illustrated in Figure 52.

Figure 52. Route costs via incumbent routes for containerized cargo imports, 2020

Alternative routes	Ocean transport costs	Transfer cost ship unloading	Rail loading	Intermodal rail transportation	Rail discharging	Trucking	Total cost
(Asia to) San Pedro Bay to Jefferson City	$1,600	$100 @San Pedro Bay	$150	$1,950 @Kansas City		$670	$4,470
(Europe to) NY-NJ to Jefferson City	$2,500	$100 @NYNJ	$150	$860 @St Louis		$590	$4,200

Source: Mercator International.

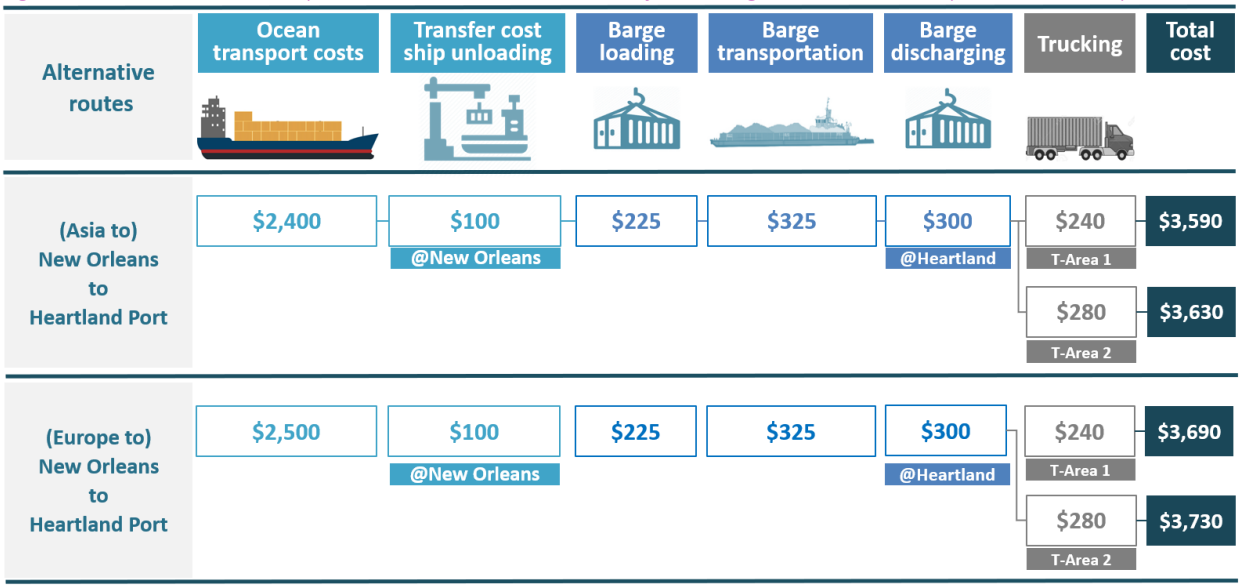
4.3.3 Route costs via the Heartland Port Project

In order to estimate the prospective route economics advantage that could be offered by the Heartland Port, we analyzed the prospective route costs shipping via the Heartland Port and compared these with costs that do not rely upon the proposed new port. The structure of the 2020 route costs assumed for

[17] Interview with SFC.

containerized cargoes using the Heartland Port, which involve river transport via the New Orleans Gateway, is illustrated in Figure 53.

Figure 53. Route costs for imports via the Heartland Port Project—barge and ocean transport cost assumptions



Source: Mercator International.

4.3.4 Route cost savings offered by the Heartland Port Project for containerized cargo

Based on the analyses of route costs for the incumbent vs new Heartland Port routes, Mercator constructed route cost comparison tables for the two tradelanes (US-Asia and US-Europe) that represent the major potential markets to be served by the Heartland Port. These route cost comparisons include a breakdown for each of the cost components and the total route costs for Target Trade Area 1 and Target Trade Area 2.

For imports from Asia, the Heartland Port route offers potential savings when compared to the intermodal rail route via San Pedro Bay – Kansas City. The Heartland Port Project river route can be between $840 and $880 cheaper than the incumbent route for containers being imported into central Missouri from Asia. In other words, by paying a cargo handling rate of $300/Box at Heartland, the cost to shippers using the port would still be approximately $880 less than using the incumbent route by rail via San Pedro Ba (about 20% cost savings) for imports into Trade Area 1, and $840 less (about 19% cost savings) for imports into Trade Area 2. The route cost comparison of incumbent versus the new Heartland Port route for the Asia tradelane is illustrated in Table 20.

Table 20. Asia—route cost comparison: incumbent vs. new Heartland Port route (US$/, Box, 40 ft cont.)

San Pedro Bay - Jefferson City area (incumbent route)		$/Box	**New Orleans - Heartland Port** (new Heartland river route)	$/Box	Route cost difference	% difference
Ocean shipping	Shanghai-San Pedro Bay	$1,600	Shanghai-New Orleans	$2,400		
Linehaul port handling	at San Pedro Bay	$100	at New Orleans	$100		
Load to inland mode	Train at San Pedro Bay	$150	Barge load or discharge at New Orleans	$225		
Inland transportation	Rail San Pedro Bay-Kansas City	$1,950	Barge Transport New Orleans-Heartland Por	$325		
Barge port handling	n.a.	n.a.	Barge load or discharge at Heartland Port	$300		
	Subtotal	**$3,800**	**Subtotal**	**$3,350**		
Dest. trucking (T-Area 1)	Kansas City - Trade Area 1	$670	Heartland Port - Trade Area 1	$240		
Dest. trucking (T-Area 2)	Kansas City - Trade Area 2	$670	Heartland Port - Trade Area 2	$280		
Trade Area 1 (0-50 miles)	**Total cost per 40 ft container**	**$4,470**	**Total cost per 40 ft container**	**$3,590**	**$880**	**20%**
Trade Area 2 (50-80 miles)	**Total cost per 40 ft container**	**$4,470**	**Total cost per 40 ft container**	**$3,630**	**$840**	**19%**

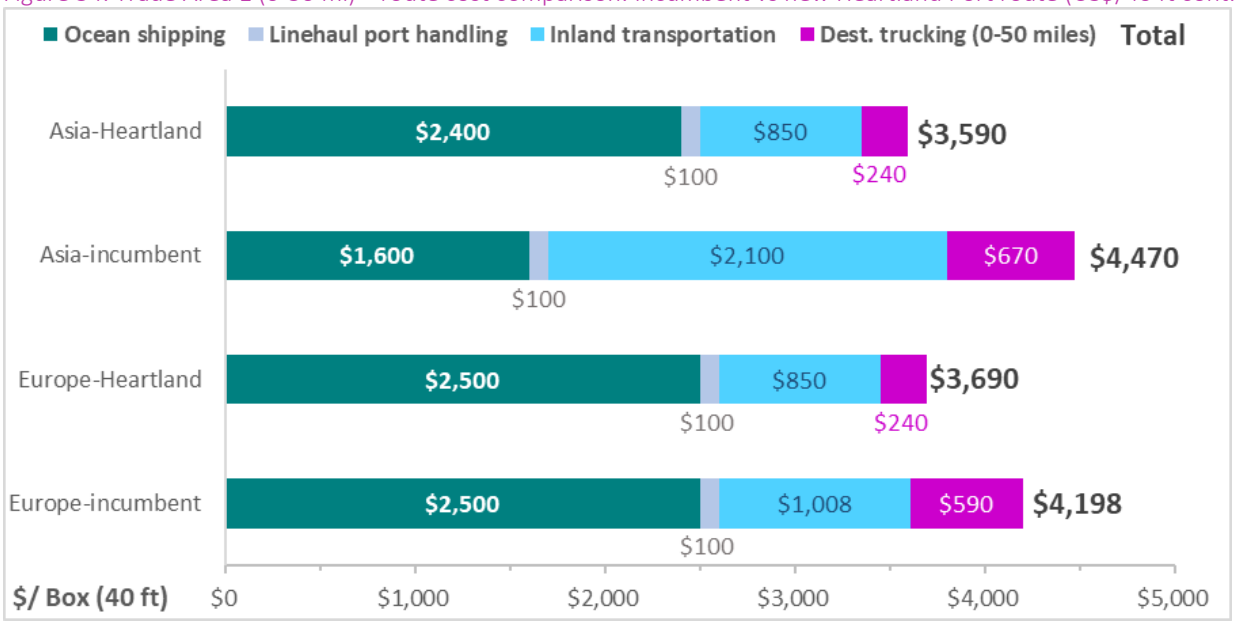
For imports from Europe, the Heartland Port route offers potential savings when compared to the intermodal rail via ports in New York/New Jersey – St Louis. The Heartland Port Project river route can be between $470 and $510 cheaper than the incumbent rail route for containers imported from Europe. Assuming a handling rate of $300/Box at Heartland, the cost for the route using the port would still be approximately $510 less than using the incumbent route by rail via NYNJ (about 12% cost savings) for imports into Trade Area 1, and $470 less (about 11% cost savings) for imports into Trade Area 2. These percentages along with the route cost comparison is shown in Table 21.

Table 21. Europe—route cost comparison: incumbent vs. new Heartland Port route (US$/Box, 40 ft cont.)

New York/New Jersey - Jefferson City area (incumbent route)		$/Box	New Orleans - Heartland Port (new Heartland river route)	$/Box	Route cost difference	% difference
Ocean shipping	Rotterdam - NYNJ	$2,500	Rotterdam-New Orleans	$2,500		
Linehaul port handling	at NYNJ	$100	at New Orleans	$100		
Load to inland mode	Train at NYNJ	$150	Barge load or discharge at New Orleans	$225		
Inland transportation	Rail NYNJ - St Louis	$860	Barge Transportation New Orleans-Heartlan	$325		
Barge port handling	n.a.	n.a.	Barge load or discharge at Heartland Port	$300		
	Subtotal	**$3,610**	**Subtotal**	**$3,450**		
Dest. trucking (T-Area 1)	St Louis - Trade Area 1	$590	Heartland Port - Trade Area 1	$240		
Dest. trucking (T-Area 2)	St Louis - Trade Area 2	$590	Heartland Port - Trade Area 2	$280		
Trade Area 1 (0-50 miles)	**Total cost per 40 ft containe**	**$4,200**	**Total cost per 40 ft container**	**$3,690**	**$510**	**12%**
Trade Area 2 (50-80 miles)	**Total cost per 40 ft containe**	**$4,200**	**Total cost per 40 ft container**	**$3,730**	**$470**	**11%**

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. Figure 54 shows the comparison of the incumbent route costs vs. the new Heartland Port route for a 40 ft container from Asia or from Europe into one of the 14-counties located inside Trade Area 1 (0-50 mi). For containers from Asia, inland cost savings from using a barge or ship from New Orleans into the Heartland Port are significant compared to shipping a box by rail more than 1,740 mi from San Pedro Bay to Kansas City and then trucking it 190 mi to its final destination. The savings from the barge route outweigh the increases in ocean shipping costs. For container imports from Europe, savings are smaller but significant.

Figure 54. Trade Area 1 (0-50 mi)—route cost comparison: incumbent vs new Heartland Port route (US$/40 ft cont.)



Source: Mercator International.

For containers arriving by water into New Orleans, Mercator estimates the rate could be around $300 per box for the barge transportation upriver to St. Louis, (excluding loading/unloading). Additionally, a trucking cost from St. Louis to its final destination would be about $590 must be paid, giving a cost of $890 (plus handling on and off the barge) for shipments from NOL. For the case where the barge operator continues all the way to the Heartland Port, Mercator estimates the barge cost would be about 10% - 20% (assume $50) more than the service to St. Louis due to the extra distance. The extra barge cost, however, is offset by a reduction in trucking (about $280 from Heartland as compared to about $590 from St. Louis. Using the Heartland Port, service from NOL would cost about ($350 + $280=) $630, which is about $260 less than discharging the barge in St. Louis.

Another way to frame the possible savings that could be generated by the Heartland Project is to compare the economics of a barge service operating directly to Jefferson City with a barge service to St. Louis. The trucking leg from St. Louis to points near Jefferson City would be about $590/Box, as compared to a cost from the Heartland Port of between $240/Box for Trade Area 1 and $280/Box for Trade Area 2. Assuming there is adequate traffic volume to support the service, the cost of extending the barge service to the Heartland Port (138 river miles beyond St. Louis) should add about 10% - 20% to the New Orleans' barge cost, or about $50/box. Because the reduction in trucking costs exceeds the incremental barge cost, barging to Jefferson City lowers the transportation cost. Some or all of this could accrue to the port operator in Jefferson City, which could charge a barge discharging rate that is higher than what is charged in St. Louis, supporting the conclusion that a $300 barge rate ought to be possible.

As this route cost analysis demonstrates, the Heartland Port could provide a competitive alternative to St. Louis as a gateway for containers on barge to/from New Orleans, particularly for those destined to or originating within the 24-county study area and in particular to/from Trade Area 1.[18]

4.3.5 Containerized cargo market shares and available volume for the 24-county area

From a container perspective, the majority of volumes that might be attracted to the port would be associated with the 24-county Jefferson City port hinterland, which has a population of under 1 million people (approximately 15% of the state of Missouri's population of over 6 million). This would be a small container terminal when compared to the rail ramps in Kansas City and St. Louis, and the volumes forecasted under the base case scenario reflect three critical assumptions. First, it is assumed that a container line can successfully roll out a weekly service connecting New Orleans to Kansas City via the Mississippi and Missouri rivers and attract sufficient volumes to make the barge option viable. Second, it assumes that this new weekly service would choose to call Jefferson City assuming appropriate facilities are constructed. Third, and related, there is an assumption that a distribution center is constructed with in a short distance of the port.

Market overview

Most non-energy imports to the US are shipped by ocean in standardized 40 ft or 20 ft containers, and the standard unit of measure for unitized cargos (i.e. cargos shipped in ocean containers) is the TEU, which stands for 'twenty-foot equivalent unit'. Most unitized shipments utilize 40-foot containers, but 20-foot containers are required in some circumstances. The most common reason for utilizing a 20-foot container

[18] SCF, the only 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.

instead of a 40-foot container is that the contents are so dense that fully loading a 40-foot container is not possible.

Prior to being cleared at by US Customs at one of 328 US Customs ports of entry, containers are considered to be, and labeled as, 'intact'. Approximately 80% of containers clear customs at the seaport at which they are discharged, and the great majority of the remainder are cleared at customs ports associated with major inland intermodal rail hubs. A majority share of containerized goods imports destined for inland markets are cleared at the major coastal ports of entry, and only a portion is shipped in intact containers via intermodal rail.

There are two major US Customs ports of entry in Missouri that are associated with the major rail hubs in Kansas City and St. Louis with which the proposed Jefferson City port would compete for intact container volumes.[19] The St. Louis facility is located on Missouri's border with Illinois, and the Kansas City facility is located on Missouri's border with Kansas. As such, these two facilities serve a hinterland that extends beyond Missouri's border and into Illinois and Kansas.

There is little competition for intact intermodal moves from the only other US Customs port in Kansas (located in Wichita), and for this reason, all the intact intermodal containers carrying goods destined for Kansas are assumed to clear customs at the Kansas City location. Similarly, the St. Louis customs clearance port handles intact intermodal containers that carry goods destined for both Missouri and a portion of Illinois. The largest inland customs port is associated with the Chicago rail hub, consequently, only a relatively small portion of goods destined for Illinois is handled at the St. Louis facility.

We estimate that total population of the Kansas City and St. Louis (KC/SL) customs ports hinterland is just over 10.5 million people, which is roughly 2.9% of the North American population. Population can be used as a proxy for import[20] demand, and without any adjustments made for relative differences in real GDP per capita, or adjustments for relative differences in the cost of living (two measures which counteract each other in terms of their impact on import demand), we estimate that the total volume of container imports destined for the KC/SL hinterland in 2019 was approximately 775,000 TEUs, which is 2.9% of the 26.9 million TEUs of imports to North America that same year[21].

Approximately 40% of the 775,000 TEUs of container imports carrying goods destined for consumption in the KC/SL hinterland are loaded directly onto railcars and moved intact to inland ports. These shipments are referred to herein as 'intact intermodal' volumes/containers. The remainder (i.e. the group that is not considered to be intact intermodal) clears customs at or near the seaport of entry, and the imports are processed at distribution centers (or cross-dock warehouses, etc.) and loaded into truck trailers, which, in turn are either trucked or loaded onto trains.

[19] We are interested in "intact" international shipping containers arriving in Central Missouri with the cargo as originally loaded at the foreign point of origin, as distinguished from containerized cargo that may arrive after be deconsolidated and re-loaded into domestic trucks.

[20]The number of containers loaded with imports to North America greatly outnumber the number of loaded export containers, thus making imports the headhaul. Because inbound and outbound container flows must balance, empty containers must be repositioned, and they therefore account for a significant portion of the backhaul (outbound containers). Because headhaul and backhaul equipment flows must balance, the headhaul flows will drive total volumes, and headhaul flows drive the market. As such, the analysis and forecast presented herein focus on import volumes. Carriers (rail, ocean, and even truck) offer steep discounts to those that want to ship volumes on a backhaul because supply will always be higher than demand, and for this reason we sometimes see commodities that would otherwise more efficiently be transported in bulk (rather than being 'unitized', which is to say shipped in containers). In Missouri, a large volume of roundwood exports are shipped in containers for this reason.

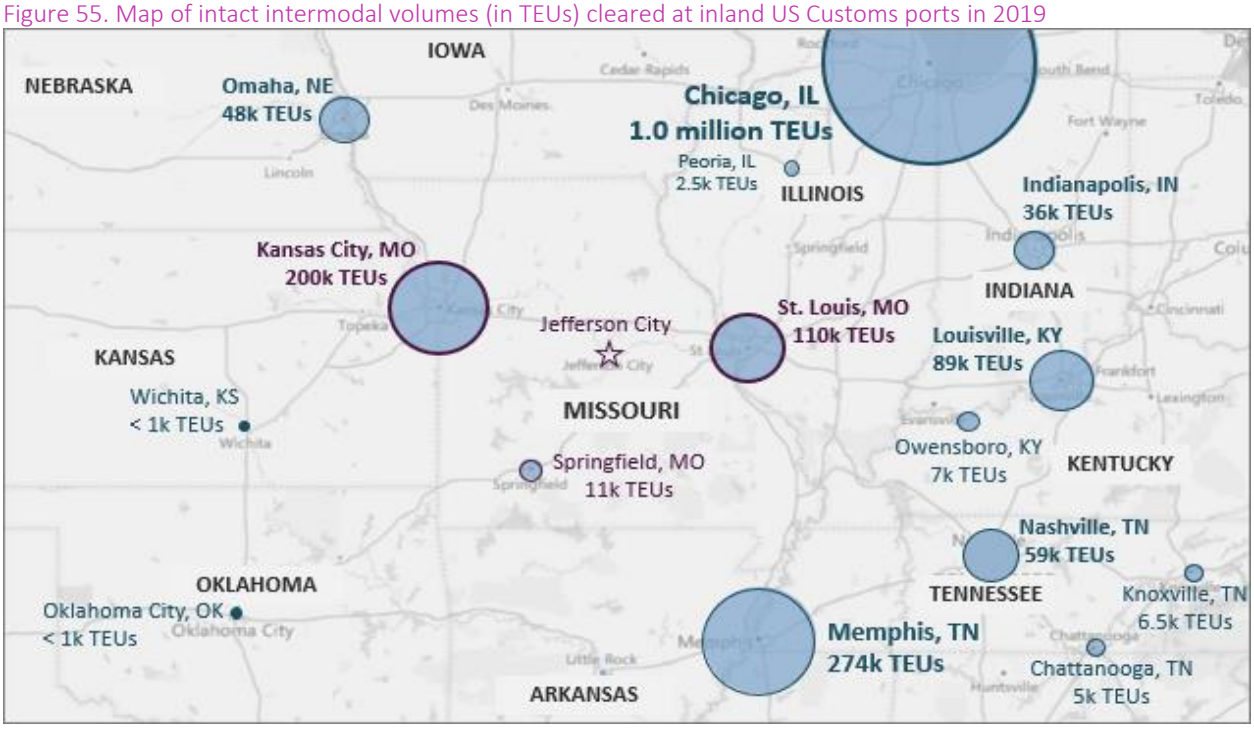
[21] TEU = 20 ft container equivalent units.

Intact intermodal imports to KC/SL, Missouri, and the 24-county Jefferson City hinterland

While there is no data source for points of final consumption, data are generated from bills of lading that can be used to identify pertinent details regarding the volume of intact intermodal rail volumes that are cleared in the KC/SL customs ports. In particular, the bills of lading allow identification of the port of entry, commodity carried, and the carrier (among other data points including shipper).

In total, just under 180,000 intact intermodal containers (mostly 40 ft containers, but some 20 ft containers) or 310,000 TEUs of imports were cleared at KC/SL facilities in 2019. An additional 11,000 TEUs cleared in Springfield, Missouri. The proportional symbol map, shown in Figure 55, gives a sense of the volume of the intact intermodal containers cleared in the KC/SL customs ports relative to the volumes cleared in other inland ports in the Midwest. Chicago clearly dominates the landscape, handling four times the volume of the next closest US Customs port, Memphis, Tennessee. Behind Memphis, Kansas City and St. Louis are the third highest and fourth highest volume inland ports in the Midwest.

Figure 55. Map of intact intermodal volumes (in TEUs) cleared at inland US Customs ports in 2019



Source: Mercator International.

Using population as a proxy, we can estimate the share of the intact intermodal imports that are cleared in the KC/SL facilities that are destined for Missouri and, separately, to the 24-county hinterland that would be efficiently served by a container barge port facility in Jefferson City. In 2019, we estimate that of the approximately 180,000 intact intermodal import containers handled in the KC/SL customs ports, approximately 100,000 containers were driven by demand associated with the citizens of Missouri, and of this slightly less than 10,000 containers are driven by demand generated in the 24-county region that comprises the proposed Jefferson City port hinterland. This is summarized in Table 22.

Table 22. Population and container imports, 2019

Population 2019		
Location	Millions	% of N. Am.
North America	364.26	
KC/SL hinterland	10.51	2.9%
Missouri	6.13	1.7%
24-County Est.	0.94	0.3%

Imports 2019		
Location	TEUs (000s)	Containers
North America	26,870	
KC/SL Total	774.9	
KC/SL Intact Intermodal	311.1	179.1
Missouri Intact Itermodal	181.5	104.5
24-County Est.	16.2	9.3

In total, intact intermodal volumes to the potential container barge corridor (Memphis, St. Louis, and Kansas City) amounted to 584,000 TEUs in 2019. In order to support a weekly river service utilizing container vessels with a capacity of 2,500 TEUs, around 20% of the corridor's intact intermodal volumes would need to be captured (assuming 90% vessel utilization rate). Analysis presented in the next section suggests that this may be reasonable. Thus, the next question asks what portion of the corridor volumes would be associated with the 24-county Jefferson City hinterland, or, put differently, what portion of the intact intermodal volumes identified as carrying goods destined for consumption in the 24-county Jefferson City hinterland is considered to be divertible.

4.3.6 Potentially divertible intact intermodal imports to the 24-county study area

Any route cost savings associated with the barge option must be considered against the transit time penalty of the barge option. The additional transit time ranges from 16 to 20 days, depending on the port and trade lane being considered. By way of example, delivering a container from Asia to St. Louis via the San Pedro gateway may take 21-25 days of ocean transit time, one day at port, and 3 days of rail transit time. If that same container were to be routed to New Orleans via the Panama Canal, the ocean transit will increase to 35 days, and the barge to St. Louis will add another four or five days to the transit time. Adding to that an extra 2 days at the seaport to account not only for offloading the container ship but also loading back to the barge, and we arrive at a 20-day transit time differential.

In order to estimate the divertible share of the volume of intact intermodal container movements that are currently imported to the three major customs ports on the barge corridor (Memphis, St. Louis, and Kansas City) as well as the volume of intact intermodal moves currently associated with demand generated by economic activity in the 24-county Jefferson City hinterland, flows of intact intermodal moves from each of the four port gateways were analyzed by commodity and value of shipment.

A potential capture rate was assigned for each commodity from each of the ports that send intact intermodal volumes to the KC/SL customs ports. These capture rates take account of both the average value per container as well as the transit time sensitivity of each commodity. These capture rates range from 60% for low value shipments of commodities falling into the HS-25 category (a category which is primarily comprised of table salt, fused magnesia, and Portland cement), to 0% to high value, time sensitive goods such as refrigerated cargoes.

Aggregating each commodity capture rate by port, we determine that 15% of Pacific coast volumes could be diverted, but 25% of intact intermodal volumes currently shipped over New York/New Jersey, and 27% of the volumes shipped over Norfolk could be diverted. In total, this works out to a weighted average of between 15% and 20%, which is in line with the estimated corridor level capture rate of 20% that would be required to support a 2500 TEU weekly barge service.

Referring back to Table 22, we estimate that approximately 16,000 TEUs (just over 9,000 containers) of intact intermodal volume demand was generated from within the 24-county Jefferson City hinterland. This equates to a weekly average of around 310 TEUs/180 containers per week. If the river service captures 18% of this volume, the proposed Jefferson City port would handle just over 30 containers (56 TEUs) of imports per week, and the total volume would be double that. Assuming that the 16,000 TEUs of intact containers currently filled with goods destined for the 24-county Jefferson City port hinterland are currently evenly split between St. Louis and Kansas City, we estimate that the 'all other' intact volumes handled in these customs ports to be 102,000 TEUs and 192,000 TEUs, respectively.

If a river vessel discharges containers in Jefferson City, this port could also capture a share of volumes destined for Kansas City, though the share would be rather small, perhaps between 5% and 10%. Initially, experience suggests that the new port might capture only around half of the divertible 24-county hinterland volumes, but it is reasonable to expect this to increase in a few years to a figure as high as 80%.[22]

Under these assumptions, the proposed Jefferson City port would initially offload moderate volumes on the order of 35 containers (60 TEUs) per week, with a total volume (inbound plus outbound) of around 70 moves (120 TEUs) per week.[23] After three years, the port could gain additional share from its hinterland as well as some share of the Kansas City market, such that volumes could increase to around 70 import moves per week (120 TEUs) and total inbound plus outbound volumes would be twice that–140 moves/250 TEUs. Table 23 presents our estimate of initial import volumes and Table 24 presents our estimate of third-year volumes for the proposed Heartland Port.

The tables on the following page present the data used to project the potential volumes that could be competitively moved over the proposed Heartland port as well as the assumptions that support these estimates. Being located between the two major rail hubs, the proposed Heartland port would be expected to capture a share of the volumes moving over both. The top line (Total Intact TEUs) presents the total volume of intact containers (expressed in TEUs) that were imported to, and cleared customs, at both Kansas City (200k TEUs) and St. Louis (110k TEUs). Based on the population analysis presented earlier, these total volumes were apportioned to the 24-county port hinterland (8k TEUs would be expected to be diverted from both Kansas City and St. Louis). The divertible share is expected to be around 18% in year one, rising slightly to 20% by year three as the efficiency of the system increases slightly over time, and as higher volumes are diverted.

Initially it is estimated that around 50% of the divertible volumes destined for consumption in the 24-county area would be captured by the proposed port, but only 5% of the volumes destined for other counties in the Kansas City hinterland would be captured initially. It might be asked why the 5% of volumes that might be expected to be served via the proposed port would not simply be considered to be in this port's hinterland. A container on barge service would likely call both St. Louis and Kansas City, but discharging in Kansas City incurs a transit time penalty, and over-the-road congestion would also render Kansas City as

[22] A factor that will diminish the attractiveness of shipping containers directly to the Heartland Port is that most container cargo moves through a large regional distribution center (DC) such as those found in Kansas City and St. Louis, and is then transported in less than containerload shipments to receivers across the DC's hinterland. The construction of DCs at or near the Heartland Port would thus likely be necessary in order for container cargo to shift from the routes that pass-through Kansas City and St Louis. In addition, a river service will be disadvantaged by the greater uncertainty / reduced reliability created by seasonal variations in water flow / river depth. For the sake of this analysis we assume this impact will be minimal, but in practice, and depending on the nature of cargos and the cargo's own seasonal patterns, it could be a significant negative factor.

[23] A total intact volume of 311k TEUs and 179k containers cleared in the Kansas City in 2019, thus the ratio of TEUs to containers is 1.74.

less attractive for a small share of volumes. It is assumed that no volumes destined for the St. Louis market would not be discharged from the container barge in St. Louis, but would instead continue west to be discharged at the proposed Heartland port to be trucked back East to the St. Louis market.

As the efficiencies of the Heartland port grow over time, the port will become more widely recognized as a viable low-cost alternative for the type of goods that are more sensitive to transit costs than transit times. In turn, the share of divertible volumes from the 24-county area that is attracted to the proposed port might be expected to grow from 50% to 80%, while the share associated with the Kansas City hinterland might grow from 5% to 10%.

Table 23. Estimate of initial import volumes for the proposed Heartland Port*

	Jefferson	Kansas City			St. Louis		
	City Total	24-county	Other	Total	24-county	Other	Total
Total Intact TEUs	↓	8,000	192,000	200,000	8,000	102,000	110,000
Divertible Share	↓	18%	18%	18%	18%	18%	18%
Share of Divertible captured	↓	50%	5%	7%	50%	0	4%
TEUs (000s) p.a.	3,168	720	1,728	2,448	720	0	720
TEUs per week	61	14	33	47	14	0	14
Containers (000s) p.a.	1,821	414	993	1,407	414	0	414
Containers per week	35	8	19	27	8	0	8

*The Jefferson City totals above and below are calculated by adding together the two 24-county volumes.

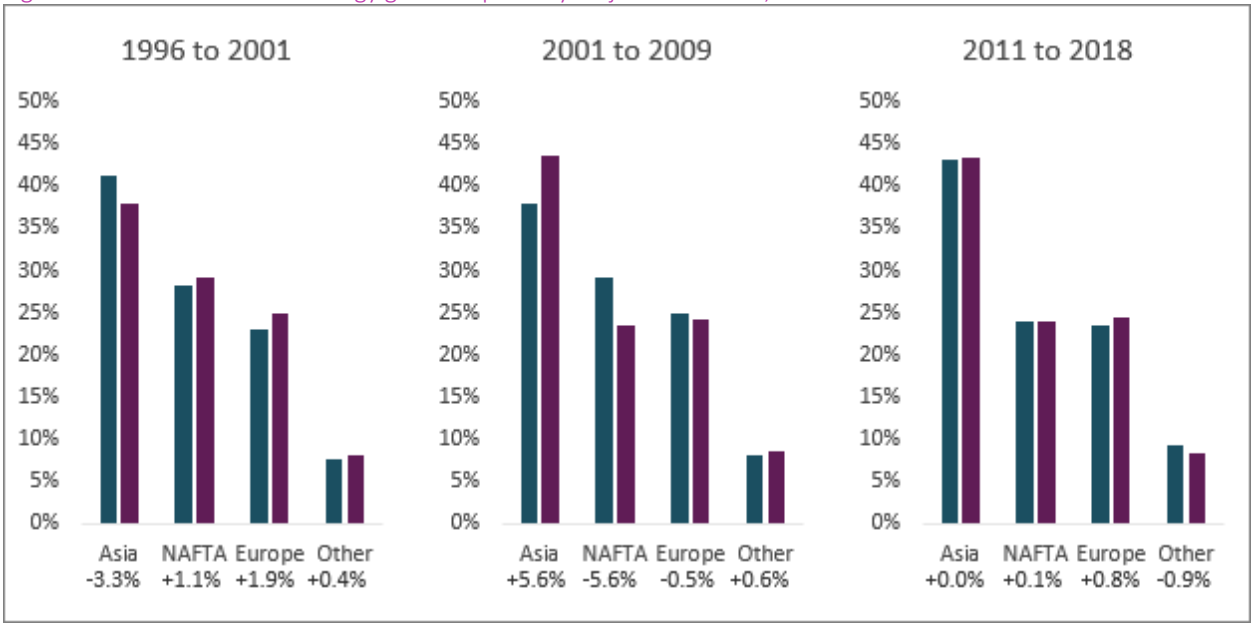
Table 24. Estimate of third-year volumes for the proposed Heartland Port

	Jefferson	Kansas City			St. Louis		
	City Total	24-county	Other	Total	24-county	Other	Total
Total Intact TEUs	↓	8,000	192,000	200,000	8,000	102,000	110,000
Divertible Share	↓	20%	20%	20%	20%	20%	20%
Share of Divertible captured	↓	80%	10%	13%	80%	0	6%
TEUs (000s) p.a.	6,400	1,280	3,840	5,120	1,280	0	1,280
TEUs per week	123	25	74	98	25	0	25
Containers (000s) p.a.	3,678	736	2,207	2,943	736	0	736
Containers per week	71	14	42	57	14	0	14

Forecast growth of intermodal imports to the 24-County Jefferson City hinterland

A top-down approach has been taken to grow the initial volume of traffic that was identified as being potentially divertible. In this approach, an econometric model based on the historical relationship between real GDP and non-energy goods imports is used to forecast total non-energy goods imports on a dollar value basis. Of course, not all non-energy goods imports arrive in containers, nor do they all arrive by sea. For this reason, a trend analysis was used to gain insights to the relative share of non-energy goods imports to the US from its NAFTA neighbors (Mexico and Canada). Three major periods of development in US non-energy goods imports are shown in Figure 56, and described in the bullet points that follow.

Figure 56. Shares of US non-energy goods imports by major trade block, 1996-2018



- **Period 1 (1996-2001):** Formation of the EU and ratification of NAFTA resulted in US imports from Europe and NAFTA countries rising faster than imports from Asia. Consequently, Asia's share of total imports fell while the share from Europe and NAFTA increased. Also, the relationship between TEUs and real GDP was slightly depressed, meaning that each unit of real GDP growth resulted in slightly fewer TEUs of imports.
- **Period 2 (2001-2009):** China completes its accession to the WTO in 2001, and on China's back, Asia's share of total US imports grew rapidly, and primarily at the cost of imports from Mexico, which was another low-labor cost supplier to the US. The relationship between TEUs and real GDP increased slightly over this period as trade over land borders fell relative to trade served by ocean carriers.
- **Period 3 (2011-2018):** A new equilibrium was reached around the time of the Global Financial Crisis, and shares of imports from Asia, Europe, NAFTA, and elsewhere remained flat. The relationship between TEUs and GDP returned to the pre-NAFTA relationship.

The most recent period of stability, stretching from 2011 to 2018, was significantly disrupted by the US-China trade war in 2019, and the Covid-19 outbreak has caused a further dislocation in 2020. Regarding the latter, it is assumed that the virus will wane in the summer months, and that a vaccine will be available by the next flu season. Therefore, we expect a return to normalcy after a period of potentially intense but relatively brief disturbance.

It is also assumed that the trade war will eventually settle, and the stability witnessed over the 2011 to 2018 period will return. That said, understanding the impacts of the trade war are important as in our pessimistic model we assume that the trade war persists indefinitely.

In 2018, the trade war resulted in a minor, 0.5% contraction of US non-energy goods imports and a major redistribution of imports by sending country. Imports from China and Hong Kong contracted 16.2%, a decline of nearly 92 billion USD from 569 billion USD to 477 billion USD. If imports from China and Hong Kong had contracted by 0.5% instead, the decline would have been just 3 billion USD. This decline, of

course, was due to the tariffs imposed on Chinese imports, and the great majority of the decline from China was made up by exceptional growth rates from other countries. This can be seen quite clearly in columns D and G in Table 25. This table is sorted by column G, which shows the value of imports from each country above what imports from each country would have been if they grew at the national rate. Put differently, if there were no shifts in each country's share of non-energy imports, each country's imports would have grown by the amount in column F. Thus, column G presents an unrefined estimate of the value of imports from each country that would otherwise have come from China.

Table 25. US non-energy goods imports (nominal USD-millions), 2018-2019

Country	2018	2019	Observed Y/Y	Obs. Delta	If Country Imports Grew at -0.5%	Observed minus no share gain
A	B	C	D	E	F	G
			(C-B)/B	C-B	B*-0.05	E-F
All Countries	2,359,925	2,347,440	-0.5%	-12,486	-12,486	0
China	**562,449**	**472,160**	**-16.1%**	**-90,289**	**-2,976**	**-87,313**
Hong Kong	**6,415**	**4,807**	**-25.1%**	**-1,608**	**-34**	**-1,574**
China + Hong Kong	**568,864**	**476,967**	**-16.2%**	**-91,897**	**-3,010**	**-88,888**
Vietnam	51,204	69,384	35.5%	18,180	-271	18,451
Mexico	330,157	344,945	4.5%	14,788	-1,747	16,535
Taiwan	46,948	55,728	18.7%	8,780	-248	9,029
France	52,312	57,523	10.0%	5,211	-277	5,488
Ireland	57,548	61,916	7.6%	4,369	-304	4,673
Netherlands	23,107	27,588	19.4%	4,481	-122	4,603
India	53,129	56,174	5.7%	3,045	-281	3,326
United Kingdom	57,315	60,055	4.8%	2,740	-303	3,043
Belgium	15,613	18,512	18.6%	2,899	-83	2,982
Korea, South	72,937	75,529	3.6%	2,592	-386	2,978
Switzerland	41,120	43,859	6.7%	2,739	-218	2,956
Italy	55,046	57,392	4.3%	2,346	-291	2,637
Denmark	8,738	11,022	26.1%	2,284	-46	2,330
Germany	128,072	129,416	1.0%	1,344	-678	2,021
Thailand	32,942	34,759	5.5%	1,817	-174	1,991
Cambodia	3,965	5,578	40.7%	1,613	-21	1,634
Malaysia	39,971	41,382	3.5%	1,411	-211	1,623
Japan	145,038	145,679	0.4%	642	-767	1,409
Slovakia	4,209	5,215	23.9%	1,006	-22	1,028
Australia	10,126	10,914	7.8%	789	-54	842
All Other	561,567	557,903	-0.7%	-3,664	-2,971	-692

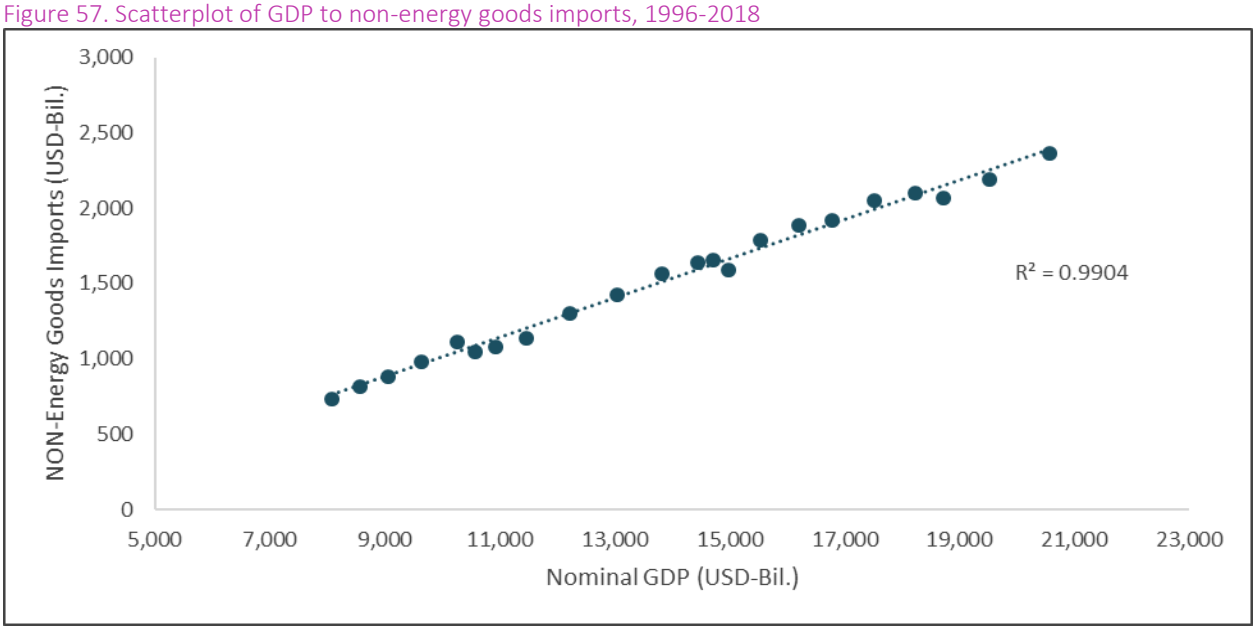
Related to identifying the impact on the share of container volumes versus overland volumes, we see that Mexico could be considered the second greatest beneficiary of the China-US trade war. If the trade war persists, it is reasonable to assume that Mexico will continue to absorb part of China's share loss, but our base case assumes that the trade war is resolved, and shares by geography remain what they are today.

Base Case volume forecast

US non-energy goods imports—the majority of which are containerized—are highly correlated with gross domestic product except during severe recessions, such as that which accompanied the global financial crisis (GFC) of 2009. After removing 2009 from the historical data series, we see that a regression of non-

energy goods imports to real GDP produces a model with a coefficient of determination over 0.99, meaning that more than 99% of the observed variation in non-energy goods imports can be explained/predicted by real GDP, as demonstrated in Figure 57.

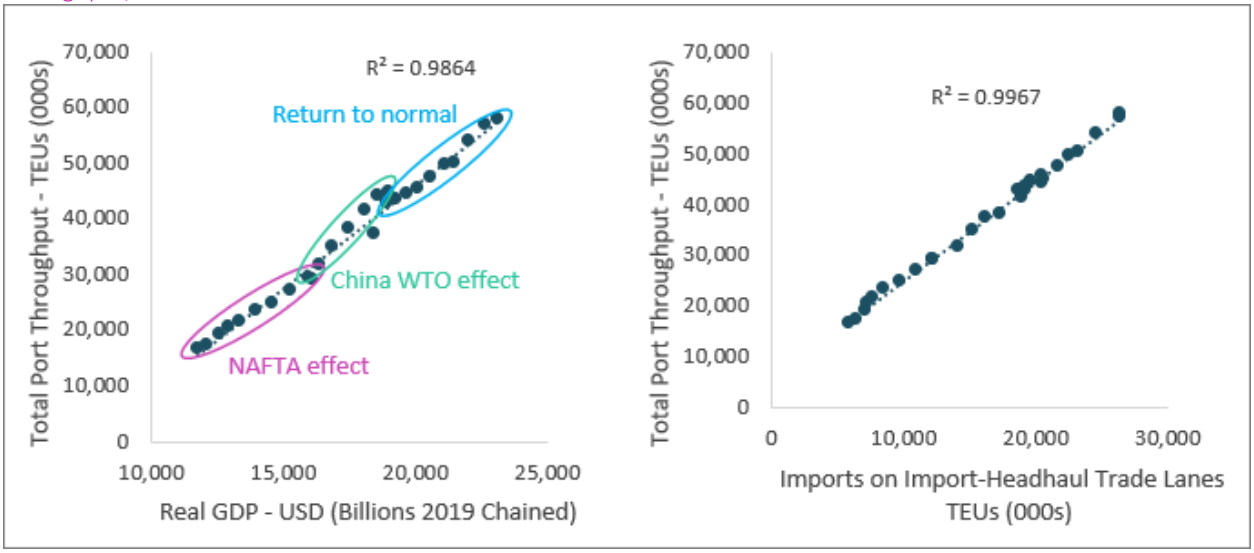
Figure 57. Scatterplot of GDP to non-energy goods imports, 1996-2018



The scatterplot below left shows that a regression of total container volumes to real GDP reveals the impact that trade deals have had on volumes. Knowing that the total non-energy imports did not deviate from the linear trend (see the scatterplot above), but that the container volumes to GDP progressed through three periods aligned with the shifts in trade by regional block lead to the conclusion that the deviations, and return to normal are driven by trade deals. During the NAFTA phase-in period, the number of TEUs generated by each unit growth in real GDP was slightly lower than the long run average. This was due to the fact that the source of imports shifted from places that from which imports arrive in ocean containers (primarily Asia) to Mexico, from whom the great majority of imports arrive primarily by truck and rail. Similarly, China's accession to the WTO resulted in an upswing in the number of TEUs generated per unit of GDP as Mexico's share of imports to the US fell. Since 2011, however, these effects have worn off and the trend has returned to the long-run trend.

Figure 58 (right) demonstrates that the level of import TEUs on eight import-headhaul trade lanes collectively explain/predict nearly 99.7% of the observed variation in total port throughput over the 1992-2018 period. This provides a check against the assumption that loaded imports drive total throughput (left).

Figure 58. Scatterplots of Real GDP to total port throughput and imports on import-headhaul tradelanes to total port throughput, 1996-2018



In short, the top-down approach involves forecasting non-energy imports based on the linear relationship to real GDP. And because the base case assumption is that recent stability in the share of imports by major regional trade block is expected to remain stable, we can use the model shown above right to forecast imports on import headhaul trade lanes, and then use this forecast to project total port throughput inclusive of inbound and outbound loads and empties across all 11 major trade lanes—including the 8 import-headhaul trade lanes and the 3 export headhaul trade lanes.

Under the base case assumptions, volumes would grow from around 2,750 lifts[24] per year to around 13,850 lifts per year over the 30-year forecast period. This equates to a compound growth rate of 5.5% per year, but most of this growth is associated with the ramp up in share capture in the initial years. Over the long-term, the growth rate would gradually decline from around 2.8% per year to around 2.1% per year. The Base Case volume forecast is shown in Table 26.

Table 26. Base Case 30-year Jefferson City volume forecast

	Y0	Y1	Y2	Y3	Y4	Y5	Y10	Y20	Y30
North American Import Growth Rate		2.9%	2.8%	2.8%	2.7%	2.6%	2.3%	2.2%	2.1%
Heartland Port Volumes									
TEUs									
Inbound	2,652	4,524	6,396	6,573	6,749	6,926	7,810	9,749	12,040
Outbound	2,122	4,072	6,396	6,573	6,749	6,926	7,810	9,749	12,040
Total	4,774	8,596	12,792	13,145	13,499	13,852	15,620	19,498	24,079
Lifts (at 1.74 TEUs/container)									
Inbound	1,524	2,600	3,676	3,777	3,879	3,981	4,488	5,603	6,919
Outbound	1,219	2,340	3,676	3,777	3,879	3,981	4,488	5,603	6,919
Total	2,743	4,940	7,352	7,555	7,758	7,961	8,977	11,206	13,839
Total Growth Rate		80.1%	48.8%	2.8%	2.7%	2.6%	2.3%	2.2%	2.1%

[24] A lift refers to a movement of a single container from a vessel to the landside or viceversa. This is typically the main revenue unit in which ports charge for loading and discharging a container to/from a vessel. A lift can be a 20 ft or a 40 ft -long container.

Estimate of Containerized Export Cargo by Selected Categories

While data is not available on what exactly is in the intact containers that are currently handled in Missouri, the U.S. Census Bureau does provide estimates of cargo that does move via containers from Missouri. DIS, using a combination of U.S. Census Bureau data and NAICS codes and allocations according to percentages derived from IMPLAN provides the following estimate of containerized export cargos from the 24-county study area.

Table 27 Exports of containerized cargo by 2-digit NAICS Code and the Top 16 containerized cargos by 2-digit NAICS code and IMPLAN Code (000s metric tons)

Exports	Type	Yr 1	2	3	4	5	6	7	8	9	10	15	20	30
Ag & Forestry 11	**Containerized**	**6.1%**	**6.3%**	**6.4%**	**6.6%**	**6.7%**	**6.8%**	**6.9%**	**7.0%**	**7.1%**	**7.2%**	**7.6%**	**7.9%**	**8.2%**
Mining 21	**Containerized**	**0.2%**	**0.2%**	**0.2%**	**0.2%**	**0.2%**	**0.2%**	**0.2%**	**0.2%**	**0.2%**	**0.2%**	**0.2%**	**0.2%**	**0.2%**
Food & Food Processing 31	**Containerized**	**17.6%**	**17.6%**	**17.6%**	**17.6%**	**17.6%**	**17.6%**	**17.5%**	**17.5%**	**17.5%**	**17.5%**	**17.3%**	**17.2%**	**17.1%**
Chemicals & Mfg 32	**Containerized**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**25.0%**	**24.9%**	**24.9%**	**24.9%**	**24.9%**	**24.9%**	**24.9%**	**24.8%**
Manufactured Goods 33	**Containerized**	**51.1%**	**50.9%**	**50.7%**	**50.6%**	**50.5%**	**50.5%**	**50.4%**	**50.3%**	**50.3%**	**50.2%**	**50.0%**	**49.8%**	**49.7%**
Top 16 Exports by 2 digit NAICS and IMPLAN Code	**Type**	**Yr 1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**15**	**20**	**30**
Motorcycle, bicycle, and parts manufacturing	**Containerized**	10.8%	11.2%	11.7%	12.0%	12.4%	12.7%	13.0%	13.2%	13.5%	13.7%	14.6%	15.3%	16.1%
Leather and hide tanning and finishing	**Containerized**	8.2%	8.4%	8.5%	8.7%	8.8%	8.9%	9.0%	9.1%	9.2%	9.3%	9.6%	9.8%	10.1%
Other engine equipment manufacturing	**Containerized**	12.2%	12.0%	11.7%	11.5%	11.3%	11.0%	10.8%	10.7%	10.5%	10.3%	9.6%	9.1%	8.4%
Small arms ammunition manufacturing	**Containerized**	6.5%	6.8%	7.0%	7.2%	7.4%	7.6%	7.7%	7.9%	8.0%	8.1%	8.6%	9.0%	9.5%
Commercial logging	**Containerized**	4.8%	5.0%	5.1%	5.2%	5.3%	5.4%	5.5%	5.6%	5.7%	5.7%	6.0%	6.2%	6.5%
Other basic organic chemical manufacturing	**Containerized**	5.9%	5.8%	5.7%	5.6%	5.5%	5.4%	5.3%	5.3%	5.2%	5.1%	4.9%	4.7%	4.4%
Plastics packaging materials and unlaminated film and sheet manufacturing	**Containerized**	3.5%	3.6%	3.6%	3.7%	3.8%	3.8%	3.9%	3.9%	4.0%	4.0%	4.2%	4.3%	4.4%
Animal, except poultry, slaughtering	**Containerized**	6.2%	6.0%	5.8%	5.6%	5.4%	5.3%	5.1%	5.0%	4.8%	4.7%	4.2%	3.8%	3.3%
Sawmills	**Containerized**	2.1%	2.2%	2.2%	2.3%	2.3%	2.4%	2.4%	2.5%	2.5%	2.5%	2.7%	2.7%	2.9%
Biological product (except diagnostic) manufacturing	**Containerized**	1.7%	1.8%	1.9%	2.0%	2.0%	2.1%	2.2%	2.2%	2.3%	2.3%	2.5%	2.7%	2.8%
Farm machinery and equipment manufacturing	**Containerized**	2.3%	2.3%	2.3%	2.2%	2.2%	2.2%	2.2%	2.1%	2.1%	2.1%	2.0%	2.0%	1.9%
Miscellaneous nonmetallic mineral products manufacturing	**Containerized**	1.2%	1.3%	1.4%	1.5%	1.6%	1.6%	1.7%	1.7%	1.8%	1.8%	2.0%	2.1%	2.3%
Travel trailer and camper manufacturing	**Containerized**	1.5%	1.5%	1.5%	1.5%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.7%	1.7%	1.8%
Handtool manufacturing	**Containerized**	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.6%	1.6%	1.6%	1.6%	1.6%	1.5%	1.5%
Sawmill, woodworking, and paper machinery	**Containerized**	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%	1.3%	1.4%	1.4%	1.4%	1.5%	1.5%	1.6%
Oilseed farming	**Containerized**	1.0%	1.1%	1.1%	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%	1.3%	1.4%	1.5%	1.6%

Scenario with zero container traffic at Jefferson City

As discussed in the introductory paragraph to the container section, the base case rests on assumptions that a carrier successfully deploys vessels to the river service so that weekly calls can be maintained. This is thought to be a minimum call frequency required to compete with rail volumes that arrive daily. There is some concern regarding whether this is possible given periodic droughts and floods.

The carrier would need to attract significant volumes, and the carrier would need to be able to do so while charging rates that generate at least modest profits. For this to happen, at minimum the carrier will need to have access to New Orleans as well as the three major ports of Memphis, St. Louis, and Kansas City. It is unlikely that calling Jefferson City would add to the carrier's volumes, as it can be assumed that the 24-county region would be served by the carrier regardless of whether the carrier chooses to call Jefferson City. If a port facility in Kansas City is not found, then Jefferson City would handle volumes for all of the Kansas City market as well, but it is unlikely that a carrier would not also call Kansas City unless there is some barrier to doing so. Thus, there is a risk that the carrier may choose to not call Jefferson City as doing so may not add enough volume to justify the extra transit time penalty and expense.

It is further assumed under the base case scenario that a distribution center is built on or very near the proposed container terminal. In order to attract a modest portion of what has been deemed as 'divertible intact container volumes' there would need to be a facility where the containers could be unloaded, and split among truckloads with final destinations inside HPA hinterland (24-county) area, just as they are in St. Louis and Kansas City. This is likely to be especially challenging as the total market for the Jefferson City amounts to only around 8% of the Kansas City volumes and 15% of St. Louis volumes.

The essence of the challenge is that all the dominoes must fall in place for a container terminal at Jefferson City to be viable. Consequently, under the pessimistic scenario, we would envision no container volumes moving over the proposed port.

Scenarios required to reach positive net present value

In addition to the Base Case Scenario, Mercator identified the volume that the Heartland port would need to capture in order for the project to reach a positive net present value (NPV). This Scenario is described in further detail in the financial analysis presented in Section 6.

4.4 Base case volume forecast summary

In summary, there is potential for movement of non-containerized cargo from the 24-counties via the Heartland Port. Five categories of non-containerized import commodities (Nonmetallic gravels, stones and minerals; Chemicals and industrial gases; Iron, steel and ferroalloy products; Pesticides, fertilizers and related agrichem; and Nonferrous smelted and refined metals) and five categories of non-containerized export commodities (Soybeans; Grains; DDGs; Soybean Meal; and Ethanol) represent the overall market for which the Heartland Port Project is most likely to attract cargo.

As this analysis revealed, the three cargo types that could move through the Heartland Port are agribulk, drybulk, and liquid bulk. Agribulk cargoes are the most prominent cargo type, primarily driven by soybean, followed by corn, DDGs, and soybean meal. Agribulk cargoes are expected to grow from 170,300 MT in the opening year of the project (Yr 0) to 268,552 MT in the last year of the analysis period (Yr 30), with a CAGR of 1.5%. Drybulk cargoes are the next most prominent and are expected to grow from 27,900 MT in Yr 0 to 82,400 MT in Yr 30, a CAGR of 3.7%. Breakbulk cargoes are next and they are expected to grow from 6,700 MT in Yr 0 to 7,700 MT in Yr 30, a CAGR of 0.5%. Liquid-bulk cargoes, composed primarily of ethanol, are smallest category and are expected to grow from 5,600 MT in Yr 0 to 8,000 MT in Yr 30, a CAGR of 1.2%. This is summarized in Table 28 and CAGRs in Table 29

Table 28. Base Case volume forecast by cargo type from the 24-counties (000, metric tons)

Non-containerized TOTAL	Yr 0	1	2	3	4	5	6	7	8	9	10	15	20	25	30
Breakbulk	6.7	6.7	6.8	6.8	6.8	6.8	6.8	6.8	6.9	6.9	6.9	7.1	7.3	7.5	7.7
Agribulk	170.3	173.4	176.6	179.8	183.1	186.4	189.7	193.0	196.4	199.8	203.4	219.7	236.3	252.6	268.6
Drybulk	27.9	29.5	31.1	32.9	34.7	36.6	38.4	40.3	42.1	44.0	45.9	55.3	64.9	74.6	82.4
Liquid bulk	5.6	5.7	5.7	5.7	5.8	5.8	5.9	5.9	5.9	6.0	6.0	6.4	6.8	7.3	8.0
Target volume for non-cont.	**210.6**	**215.3**	**220.2**	**225.2**	**230.4**	**235.6**	**240.8**	**246.0**	**251.4**	**256.7**	**262.2**	**288.5**	**315.3**	**342.0**	**366.7**

Table 29. CAGR of non-containerized cargoes from the 24-counties by cargo type

Non-containerized TOTAL	Yr 0-5	Yr 5-10	Yr 10-15	Yr 15-20	Yr 20-25	Yr 25-30	Yr 0-30
Break-bulk	0.2%	0.3%	0.4%	0.6%	0.6%	0.6%	0.5%
Agri-bulk	1.8%	1.8%	1.6%	1.5%	1.3%	1.2%	1.5%
Dry-bulk	5.5%	4.7%	3.8%	3.2%	2.8%	2.0%	3.7%
Liquid-bulk	0.7%	0.7%	1.2%	1.3%	1.5%	1.8%	1.2%
Target volume for non-cont.	2.3%	2.2%	1.9%	1.8%	1.6%	1.4%	1.9%

Containerized volumes are expected to grow from around 2,750 lifts per year to around 13,850 lifts per year over the 30-year forecast period under the assumptions for the Base Case scenario, at a CAGR of 5.5% per year. Most of this growth is associated with the ramp up in share capture in the initial years. Over the long-term, the growth rate would gradually decline from around 2.8% per year to around 2.1% per year. This is illustrated in Table 30.

Table 30. Potential market of containerized cargo from the 24-counties (TEUs and Lifts)

	Y0	Y1	Y2	Y3	Y4	Y5	Y10	Y20	Y30
North American Import Growth Rate		2.9%	2.8%	2.8%	2.7%	2.6%	2.3%	2.2%	2.1%
Heartland Port Volumes									
TEUs									
Inbound	2,652	4,524	6,396	6,573	6,749	6,926	7,810	9,749	12,040
Outbound	2,122	4,072	6,396	6,573	6,749	6,926	7,810	9,749	12,040
Total	4,774	8,596	12,792	13,145	13,499	13,852	15,620	19,498	24,079
Lifts (at 1.74 TEUs/container)									
Inbound	1,524	2,600	3,676	3,777	3,879	3,981	4,488	5,603	6,919
Outbound	1,219	2,340	3,676	3,777	3,879	3,981	4,488	5,603	6,919
Total	2,743	4,940	7,352	7,555	7,758	7,961	8,977	11,206	13,839
Total Growth Rate		80.1%	48.8%	2.8%	2.7%	2.6%	2.3%	2.2%	2.1%

Containerized cargoes represent a complementary market for the Heartland Port Project that, with the right infrastructure and cargo handling equipment, could facilitate water-born container service along the Missouri and Mississippi Marine Highways and ultimately connect with the Port of New Orleans. Nonetheless, a new water-born container service is more speculative in nature since it is now non-existent along these marine highways, and any volume in the study area must materialize from modal changes from truck and rail into barge or river vessels, which will only occur if the river service offers BCOs tangible benefits in terms of a cost/value proposition, without unduly increasing transit time and transit reliability. These and other critical factor as well as the financial viability for each of the cargo types discussed throughout this section will be analyzed in more detail in Section 6.

5. Conceptual structure of the Heartland Port concession and operational model

The objective of this section is to describe the potential structure of the Heartland Port concession and a possible operational model of the company undertaking the project. This section begins with the analysis of the potential structure of the Heartland Port concession, the parties involved, and the flow of funds among stakeholders. Next, this section 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 overall project and all its components regardless of the expected levels of demand, cost, or financial viability, which are analyzed in Section 6.

5.1 Potential structure of the Heartland Port concession

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

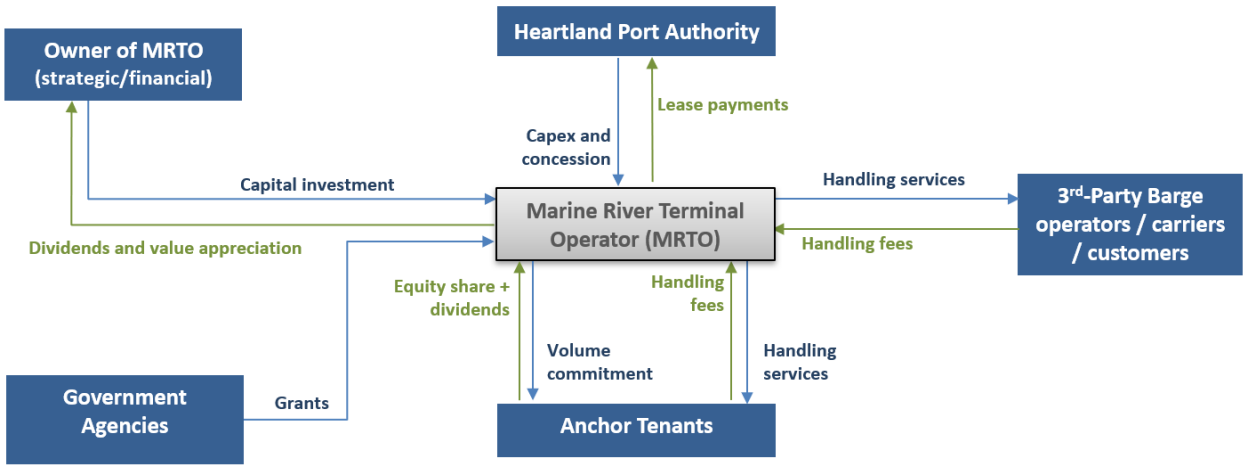
To simplify project feasibility analysis, we will assume that all investments (startup construction and other infrastructure costs, and operating equipment) are made by the operating entity/concessionaire. Most concession agreements for infrastructure having these characteristics exceed ten years. In return for long-term volume commitments, anchor tenants such as barge operators may wish to take a stake in the terminal concession company. Nonetheless, under a shared investment concept, the Heartland Port Authority could install major infrastructure at the site to help the project be more viable and/or attract potential investors. Under the same concept, the concessionaire could be required to invest in specialized infrastructure, equipment, 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 Heartland Port Authority 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 Heartland Port Authority, with the assistance and support of the Cole and Callaway county governments, the MoDOT, etc; however, such subsidies are not assumed in the initial feasibility analysis presented in the next section.

Figure 59 diagrams the major elements of the landlord port concession structure for the Heartland Port Project.

Figure 59. Potential structure of the Heartland Port concession and flow of funds

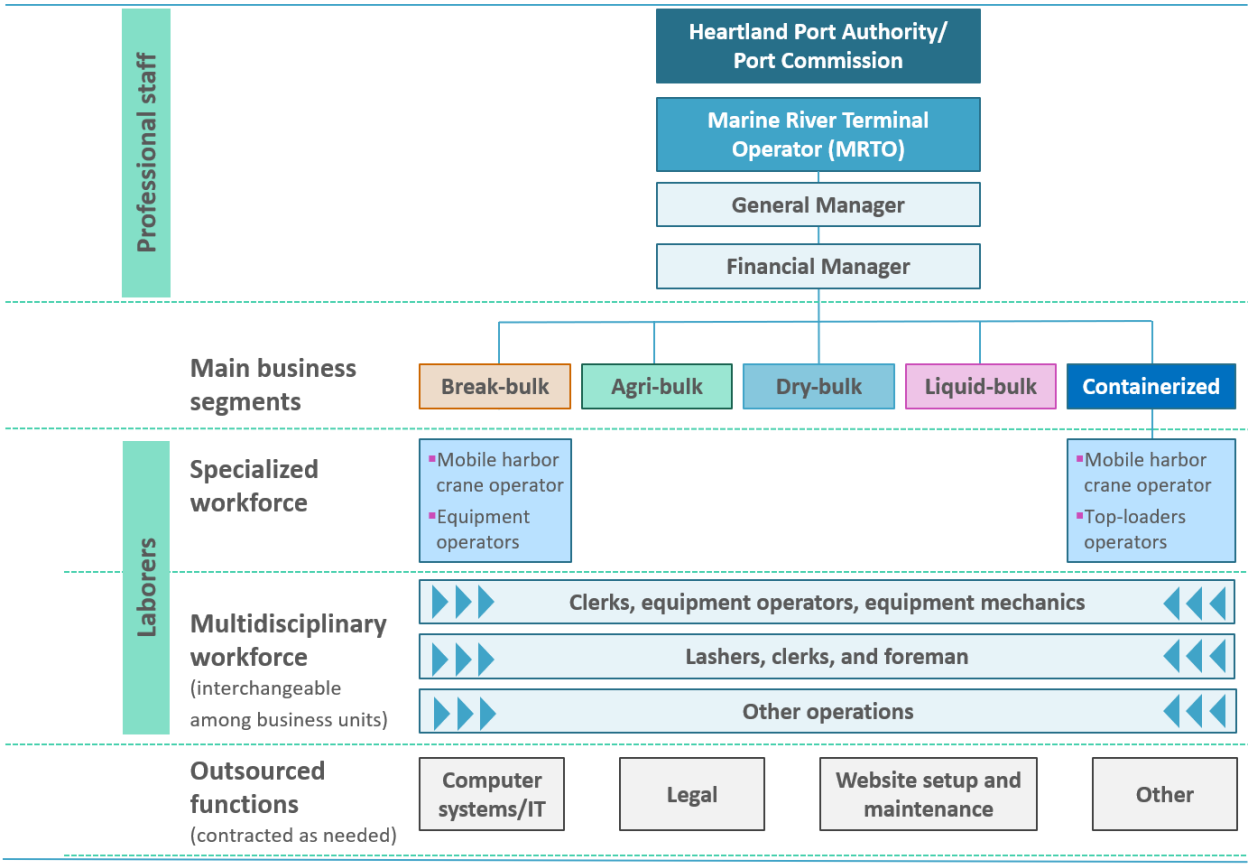


5.2 Conceptual organizational structure

This section provides an overview of a possible institutional framework for governing the Heartland 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 Heartland Port would commence operations handling containerized and breakbulk cargo and grain.

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 Heartland Port is illustrated in Figure 60 and each position described afterwards.

Figure 60. Conceptual organizational structure of the Heartland Port



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. A hypothetical, conceptual organizational structure of a mature MRTO concessionaire operating the port is included in Appendix D: Conceptual organizational structure of a mature concessionaire operating the port for reference.

5.2.2 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.

5.2.3 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 Conceptual operational layout and project site

Cargo operations at multipurpose marine river terminals involve a number of steps that also affect the overall port's ability to attract and efficiently handle cargo. Terminal design and operational performance significantly influence the processes, time, and effort involved at each step of the operation (e.g. barge arrivals/departures, loading/unloading, and landside transportation). This section presents the general elements that comprise a typical multipurpose marine river terminal and a high-level overview of a typical operation such as the one expected in the Heartland Port. The elements considered in this section are not intended to be prescriptive or exhaustive. Rather, they provide an overview of how a multipurpose marine river terminal could operate.

5.3.1 Berth, facility, and equipment

Terminal design has a significant effect on the operational capability and performance. The terminal operator will have to identify the operating layout that makes the most sense for the Heartland Port and analyze the design trade-offs. The key elements of a marine river terminal design that will influence operations include:

- **Waterside access**. This involves the waterway along the Missouri River (M-70) and the barge fleeting and anchorage sties proposed nearby the Heartland Port.[25] The navigation channels in the Mississippi and Missouri Rivers are maintained by the USACE. Water levels in the Missouri are subject to the USACE water release program for the river. During drought periods water for agricultural uses has priority over navigational uses. Subject to availability of water, the USACE is required to allow enough water flow support from the dams and reservoirs in the upper basin to

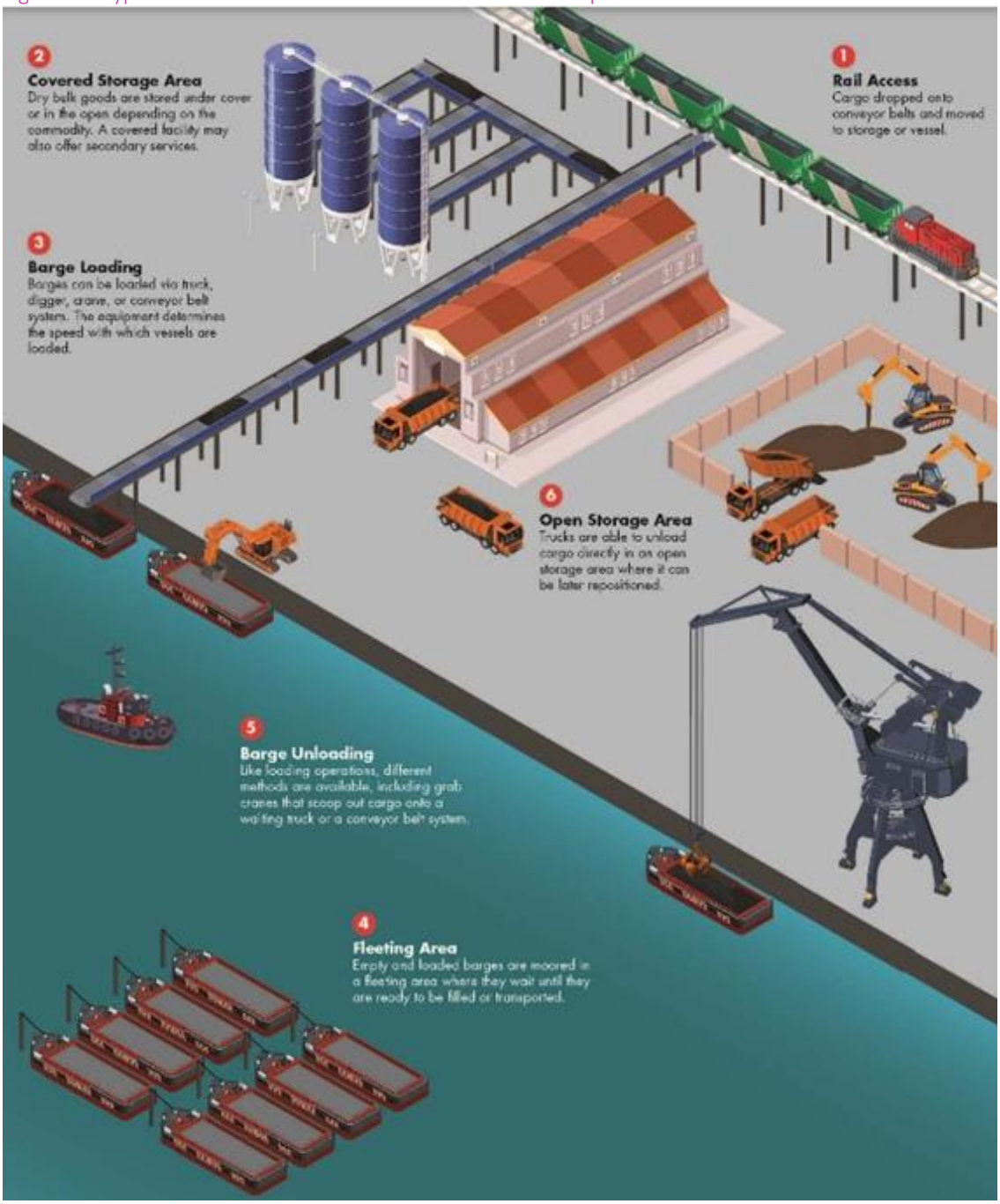
[25] Jefferson City Area Chamber of Commerce, *Central Missouri Multimodal Port Feasibility Study Final Report,* prepared by Cambridge Systematics and Hanson Professional Services, Jun 2018.

support navigation only during the April – November period. Without dredged waterways, shallow points can be a limiting factor on the size of barges and small river ships that can access the port. As identified in Appendix A: Inventory of private river terminals and docks, most terminals reporting data have water depth between 12 ft and 10 ft. The design for HPA should provide water depth that is at least comparable to the other ports along the river and the maintained channel depth. It is reasonable to expect a minimum draft of 10 ft for the Heartland Port to be operational. The heights of bridges (air drafts) and locks can also constrain access to the port.

- Berth length. The berth is the place to stop and secure a barge at a port for loading, unloading, or simply parking. The Heartland Port is expected to have a berth length of 200 ft with enough water depth alongside.
- Cargo laydown area. This is the main yard where inbound or outbound containerized and breakbulk cargoes are handled. For the Heartland Port operation, it is envisioned that the main yard will be designed for containers primarily, and to accommodate breakbulk operations only as a secondary business segment on the areas of the yard not occupied by containers.
- Cargo handling equipment. For containers, the Heartland Port is expected to operate with a mobile harbor crane (MHC) for the movements between the barge and the yard. The same MHC crane is expected to handle occasional movements of breakbulk and project cargoes. Top-loaders, tractors and bombcarts are expected to handle the movement between the MHC and cargo laydown and storage areas. For bulk cargoes, the Port is expected to operate with a combination of fixed equipment, including conveyors, dump-pits, and pipelines in the case of liquid-bulks.
- Bulk storage area. Bulk terminals require space to store, weigh, and mix cargo when it is transferred from trucks to storage and then into barges. Agribulk storage at the Heartland Port is expected to take place in steel grain silos. Drybulk storage can be done in open-pits or steel silos. Liquid-bulk operations require special tank farms equipped with the appropriate pipeline infrastructure.
- Intermodal connections. Since the Port's natural market is considered to be the 24-county area, it is expected that cargo will arrive and depart by truck. As analyzed in section 2.3.4, the Heartland Port enjoys substantial highway connections for trucks moving to and from the main yard. Although no railroads service is deemed necessary to serve the 24-county area, the conceptual plan preserves the possibility for a future connection to the rail network. The liquid-bulk storage is also expected to serve truck-barge movements only; however, the tanks can be connected by pipeline to nearby main pipelines, manufacturing and processing facilities, tank farms, or other storage and distribution facilities.

A conceptual layout showing the typical elements involved in marine river terminal operations is described in Figure 61.

Figure 61. Typical elements involved in marine river terminal operations



Source: U.S. Department of Transportation.

While physical constraints can place limits on terminal capacity and operational performance, the Heartland Port potential site offers enough space to accommodate the envisioned operations. Next, we provide a description of the proposed project site showing a rendering of the allocation of the key operational elements identified to the planned project site.

5.3.2 Development opportunity A: South Site only

The Jefferson City Area Chamber of Commerce, working in close coordination with the project stakeholders, identified two potential sites for port and terminal development: (i) South Site and (ii) North Site. Mercator assumes that the Heartland Port Project begins with the South Site as the only site to accommodate cargo. This section presents the description of the conceptual site from the *Port Feasibility Study* prepared by Cambridge Systematics and Hanson Professional Services in June 2018[26], and is followed by the modifications adopted by Mercator to analyze the financial viability of the project.

Original assumptions in the 2018 Port Feasibility Study—South Site extract

This section describes the conceptual site from the *Port Feasibility Study* prepared by Cambridge Systematics and Hanson Professional Services in June 2018, shown in Figure 62.

The South Site is about 125 acres total and is located south of the Missouri River at about River Mile 137 (RM 137), Right Descending Bank (RDB) in Cole County. Access to the site is via US Highway 63 and Militia Drive. Railroad tracks owned by UP traverse near the south side of the site.

A new access road will connect to No More Victims Road, approximately 3,300 ft east of the existing intersection with Militia Dr. The access road generally parallels the existing creek, crossing it once to minimize potential impacts to wetlands. Wetland impacts associated with the access road and rail spur (discussed below) may be on the order of two acres.

The future rail spur would connect to the UP Jefferson City Subdivision Mainline and it is designed to meet UP Industrial Lead Track standards. The rail spur provides access to a rail yard containing approximately 4,000 linear ft of railcar storage for about 60 railcars. A rail dump pit is proposed on the westernmost track of this rail yard; this dump pit would connect to the dry bulk storage area via a conveyor system.

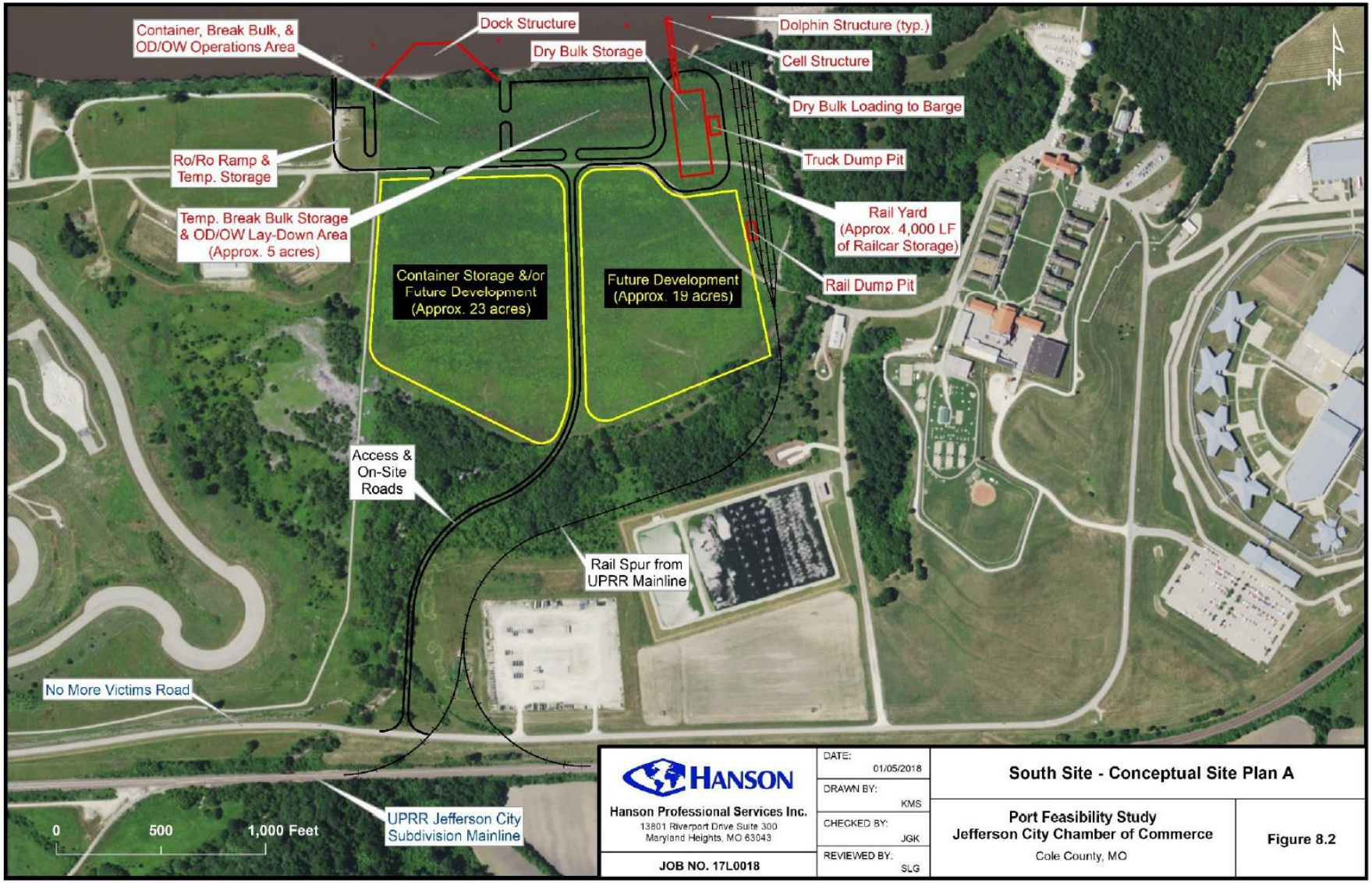
The dry bulk storage area is located immediately west of the rail yard and adjacent to the Missouri River. This area includes a truck dump pit, which connects to the dry bulk storage area. A conveyor system is proposed to connect the dry bulk storage area to the in-water infrastructure, which facilitates barge loading/queuing operations and includes two dolphin structures and a cell structure.

A sheet pile dock structure is proposed west of the dry bulk storage area. The dock structure will allow a crane to load/offload, break bulk, and containerized commodities to/from barges. The primary dock face is about 200 ft long, which will allow a crane to completely load/unload a barge without moving the barge. Dolphin structures are proposed adjacent to the dock to accommodate barge queuing.

Based on a 2012 FEMA Flood Insurance Rate Map (FIRM), the floodway at the South Site encompasses the majority of the river frontage and extends about 400 ft south, away from the river. The construction of buildings within the floodway limits is not likely to be permitted; thus, the dry bulk storage area is located just outside of the floodway limits. Further, based on survey information provided by the Jefferson City Area Chamber of Commerce, the average elevation at the site is about 540 ft (NGVD). Based on a 2012 FEMA FIRM, the 100-year flood elevation at the site is 552 ft (NAVD). Thus, about 1,139,890 cubic yards (i.e. filling 59 acres by 12 ft to a 552 ft elevation) of fill may be required for site construction, depending on the extent of anticipated operating conditions.

[26] Jefferson City Area Chamber of Commerce, *Central Missouri Multimodal Port Feasibility Study Final Report,* prepared by Cambridge Systematics and Hanson Professional Services, Jun 2018.

Figure 62. Development Opportunity A: South Site Only



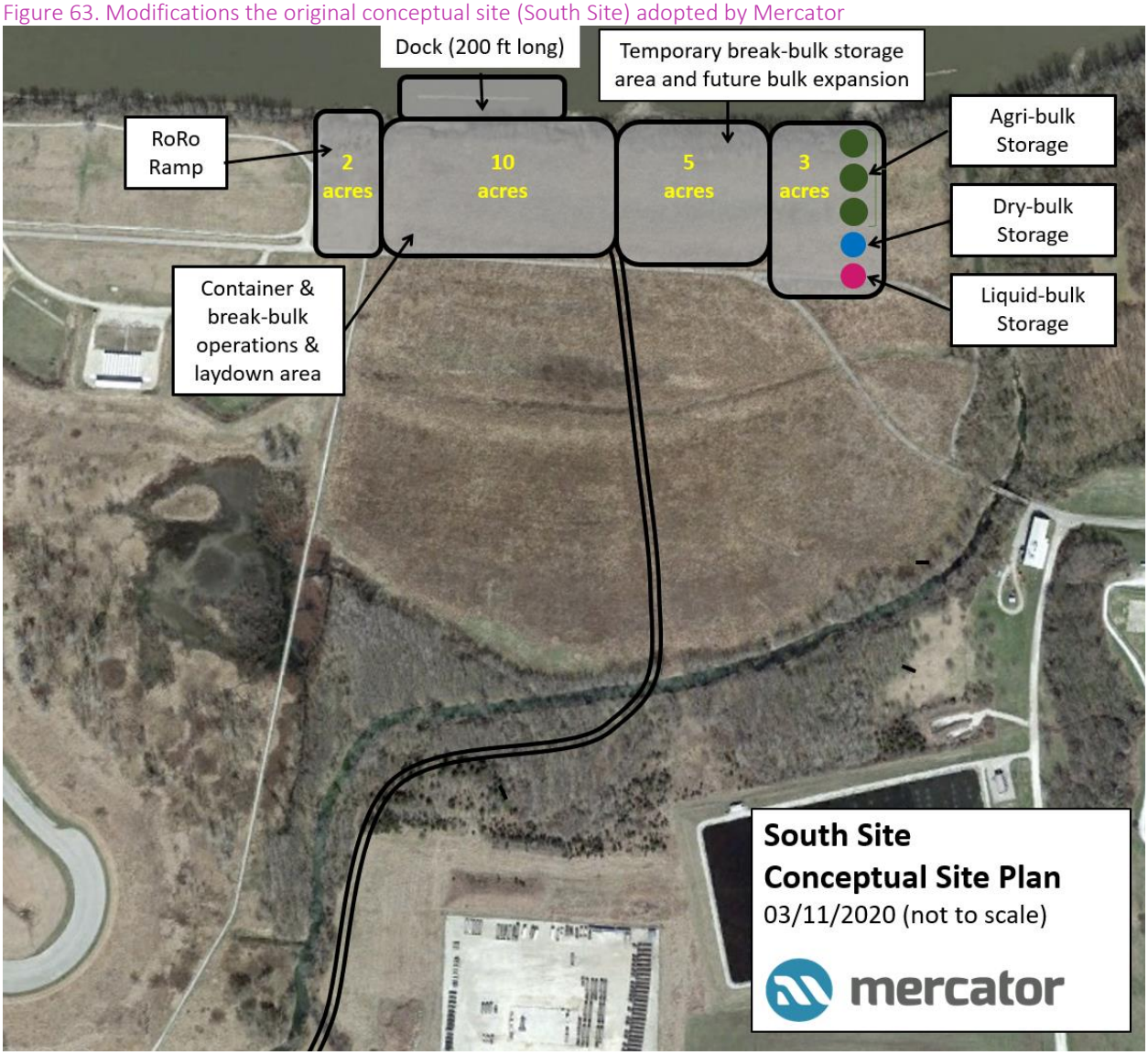
Mercator modifications to the original conceptual site

This section presents the modifications to the original conceptual site adopted by Mercator to analyze the financial viability of the project. The modifications to the original conceptual site (South Site) adopted by Mercator are shown in Figure 63 are detailed in the following bullets:

- Mercator assumes that only about 20 acres of land will be required for container, agribulk, breakbulk, drybulk, and liquid-bulk operations. Mercator assumes that these 20 acres will be sufficient to allocate all growth expected during the forecasting period.
- The new access road connecting to No More Victims Road, approximately 3,300 ft east of the existing intersection with Militia Dr remains unchanged.
- The terminal will not process movements by rail, so no rail investments in rail facilities are included in the CapEx budget, although space will remain available for installation in the future if warranted.
- The agribulk, drybulk, and liquid-bulk storage areas are located on the west side of the (future) rail yard and adjacent to the Missouri River (same as the original location).
- Each area includes a truck dump pit for each of the bulk storage areas and a conveyor system to connect the storage bins and tanks to the in-water infrastructure for barge loading/discharging.
- We include two dolphin structures and a cell structure for barge parking and queuing operations.
- The primary sheet pile dock structure is proposed west of the bulk storage area; the dock structure remains about 200 ft long to enable a MHC to load/discharge containerized and breakbulk cargoes without the need to move the barge.
- Dolphin structures are proposed adjacent to the dock to accommodate barge queuing or to accommodate a larger river vessel.
- The construction of the drybulk storage area is assumed to be outside of the floodway limits.
- Only the 20 acres allocated for all operations are required to be filled to the average 100-year flood elevation at the site is 552 ft (NAVD); that is, filling 20 acres by 12 ft to reach a 552 ft elevation (for a total of 387,200 cubic yards).

All other assumptions not specifically mentioned in this operational plan or in the opex and capex discussed in the next section are expected to remain unchanged from the 2018 study.

Figure 63. Modifications the original conceptual site (South Site) adopted by Mercator



6. Financial analysis

This section presents the results of the financial analysis of the Heartland Port Project. The objective of this analysis is to assess the viability of this project as a commercial enterprise and its degree of attractiveness to private investors. In this section we describe the financial model, the methodology and approach followed, as well as its underlying assumptions. This section presents the Base Case analysis, including the projected demand to be handled by the Port, the necessary capital (capex), fixed and variable operating expenditures (opex), as well as the handling rates and their associated revenues for each business segment. We present the results of the financial analysis for the Base Case volume forecast and handling rates which show that the project as conceived barely meets financial feasibility criteria. The last part presents a summary of the main findings.

6.1 Description of the financial model

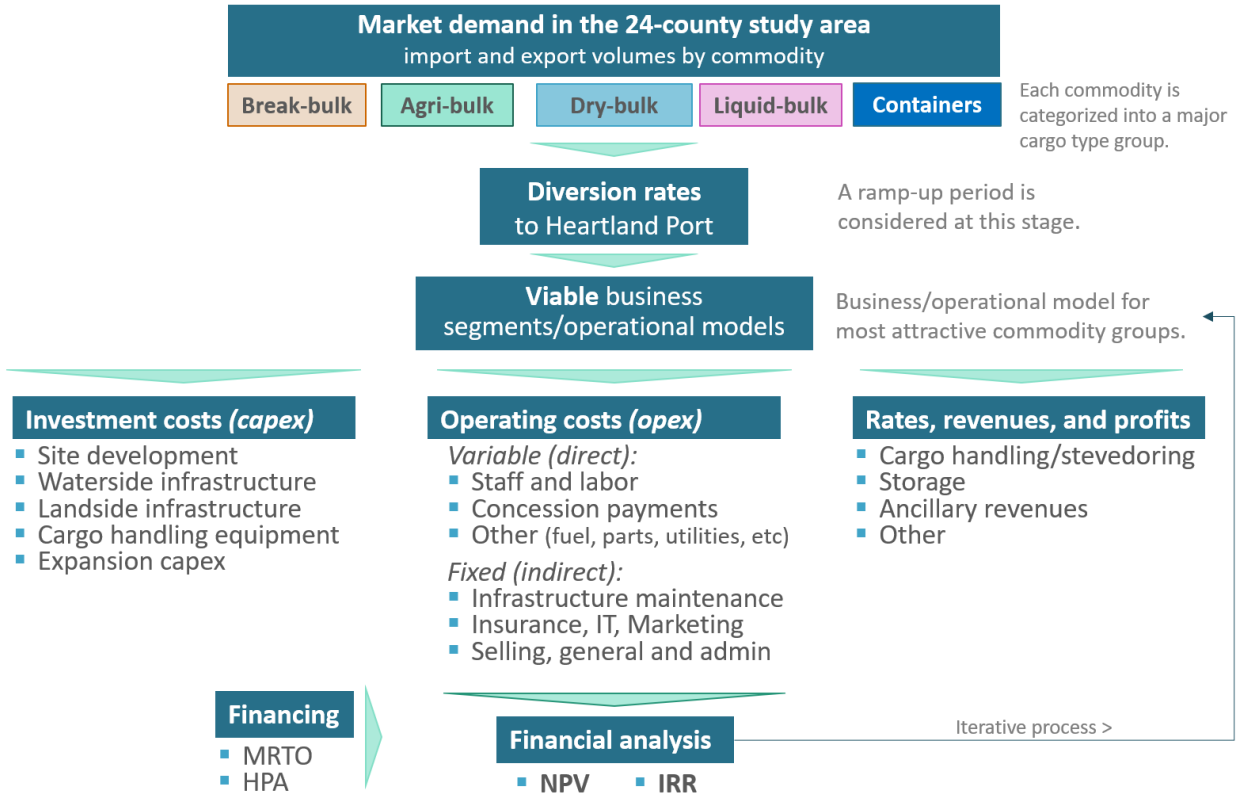
Mercator constructed a discounted cash flow model integrating the projected demand to be handled by the Port with the assumptions for capex and opex for each business segment. In the Heartland Port Project financial model, the value to the MRTO undertaking the project is entirely driven by its future cash flows. Nonetheless, a strategic investor might have different reasons to consider investing in the Heartland Port Project that go beyond generating cash flows. For example, a nearby MRTO might want to invest in the project to expand its business scope or prevent a competitor from entering the same market. Alternatively, a barge operator might find it attractive to invest in Heartland to gain new customers and benefits from having a more complete network.

Throughput volumes are based on the market demand projections and the route cost analyses presented in Section 4. The volume projections assume that only a growing fraction of the overall market will be captured in the early years of the project (i.e. the ramp-up period). The ramp-up refers to the amount of time it takes a new facility to become fully productive from when first opens to the public. This is typical for greenfield projects. Revenues from the main business activities are based on the expected volume demand and handling rates for each of the primary business segments (i.e. breakbulk, agribulk, drybulk, liquid bulk, and containers). Variable capex and opex are also modeled as a function of the volume forecast.

Capital costs from previous studies commissioned by the Heartland Port Authority are used as the starting point of our capex estimates.[27] Where exact figures were unavailable, realistic cost and revenue assumptions were made. Indicative quotes and estimates were based on independent research from online sources and third-party vendors and service providers. Benchmarks from other ports were used to estimate handling revenues. The financial model also considers additional revenue from storage and ancillary services as a percentage from the overall revenue from the main business. Where plans are highly uncertain, such as the development of supplementary businesses (e.g. cargo consolidation, deconsolidation, and cross-docking activities that can be conducted at the port), the item is excluded from the analysis. The model also allows to develop scenarios where the share of capital investments can be split between the Heartland Port Authority and the private company undertaking the project. The overall structure of the Heartland Port Project financial model is illustrated in Figure 64.

[27] Jefferson City Area Chamber of Commerce, *Central Missouri Multimodal Port Feasibility Study Final Report,* prepared by Cambridge Systematics and Hanson Professional Services, Jun 2018.

Figure 64. Structure of the Heartland Port Project financial model



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. Given the uncertainty about the financing method to be used by a private partner and the final capital structure of the proposed MRTO, the financial model assumes that all cash flows accrue to the MRTO and its capital structure is assumed to be 50% equity and 50% debt throughout the 30 years of analysis. The cost of equity is considered at 13%, assuming the project investor is a strategic player, rather than an institutional infrastructure investor, which would require a higher return from such a greenfield project. The cost of debt is assumed at 6% based on recent obligations issued in the state of Missouri. This results in a weighted avg. cost of capital (WACC) of 9.5%, which is used as the discount rate.

The model considers a concession payment from the MRTO concessionaire to the Heartland Port Authority in the form of a payment per unit of throughput volume handled by the port. A uniform concession payment rate is applied to all non-containerized cargoes (i.e. agribulk, breakbulk, drybulk, and liquid-bulk) of $1.0/MT. A concession payment of $10/box is applied to containers.

The MRTO concessionaire is assumed to be subject to a 27.25% corporate tax rate. This is composed of a 21% federal corporate tax rate plus a 6.25% State Corporate Income Tax imposed by Missouri.

6.2 Base Case volumes

Mercator assumes a ramp-up period between the opening of the Heartland Port Project in Yr 0 and Yr 3 when the project achieves a steady-state volume and operations for non-containerized cargoes and for containers as well. Such ramp-up period is applied to the Base Case volume forecast, as illustrated in Figure 65 and Figure 66 respectively.

Figure 65. Base Case volume forecast and ramp-up period for non-containerized cargo

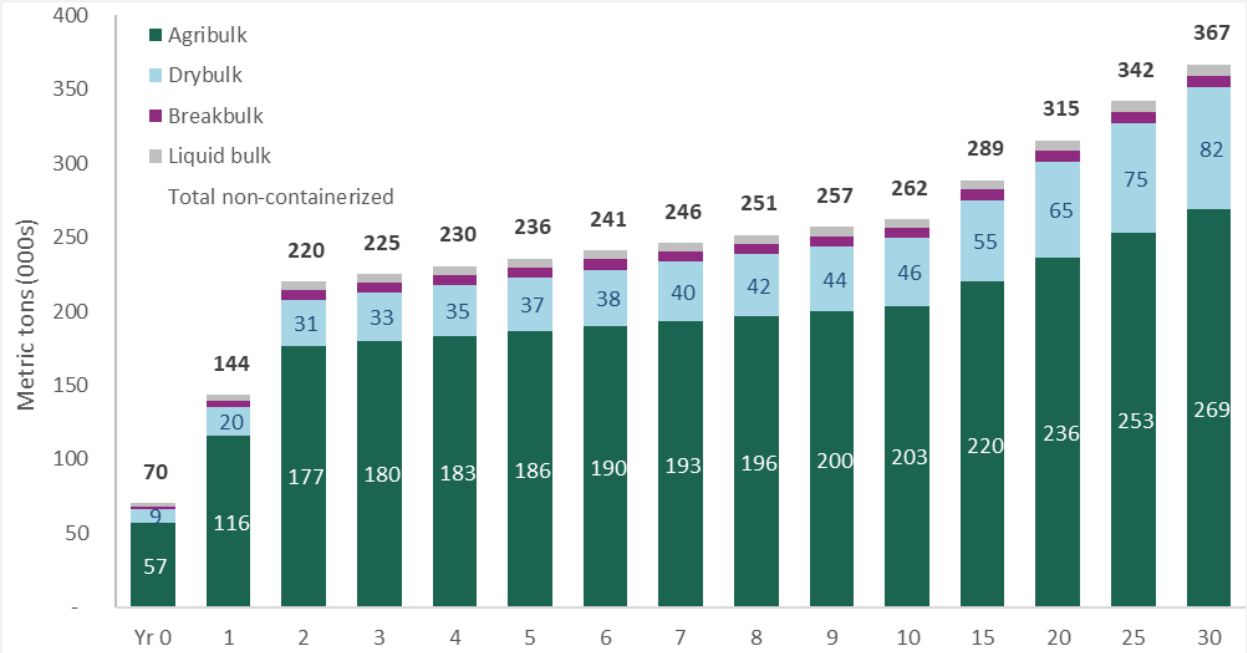
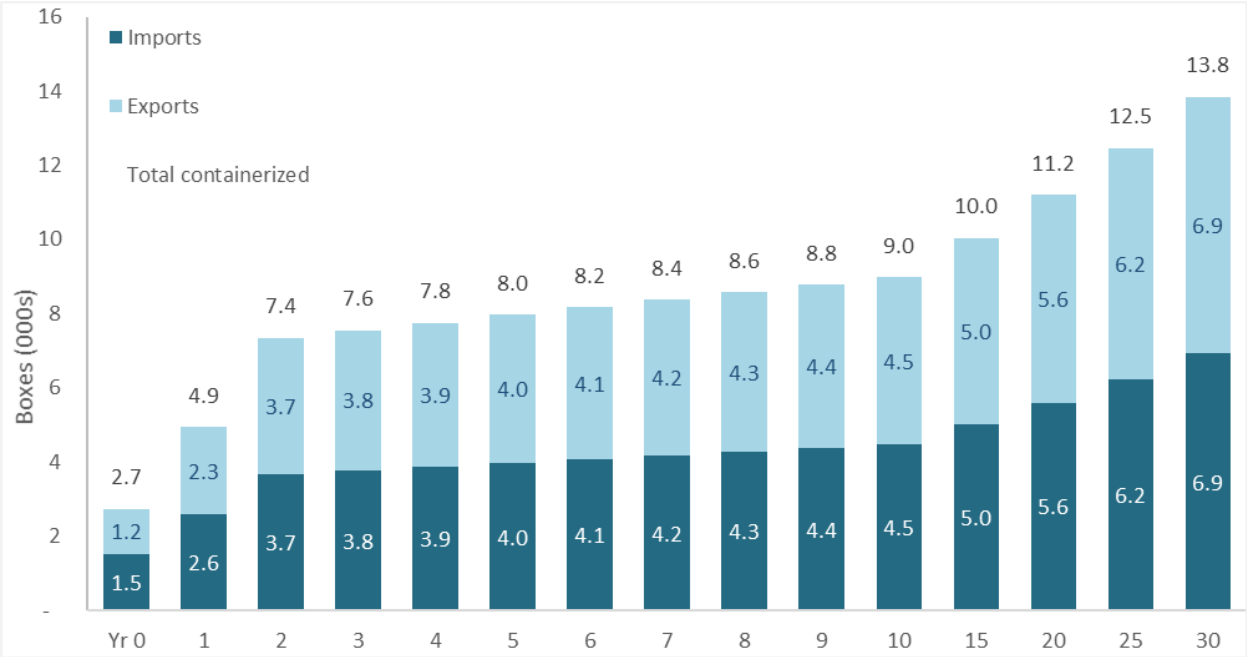


Figure 66. Base Case volume forecast and ramp-up for containerized cargo



6.3 Combination of business segments analyzed

Mercator analyzed the start-up costs, capital investments, and operational expenditures required to operate each business segment individually as well as operating one or more combinations of such segments for a total of nine combinations.

6.3.1 Indicative capex

Mercator developed scenario-based capex calculations utilizing the capital costs from studies previously commissioned by the Heartland Port Authority as the starting point and modified them accordingly to analyze different combination of business segments.[28] Indicative quotes and estimates were obtained from independent research from online sources and third-party vendors and service providers. Capex related to *handling equipment and storage* associated with each business segment account for future expansions needed to accommodate the expected volumes for each business segment or combination of business segments modeled. Capex related to *construction and civil works* consider only the minimum necessary for a particular business segment to operate.

Capex are organized in the following categories, which form the basis of the combination of business segments analyzed.

1. Container and breakbulk (cont+BB)—Total start-up capex are **$19.1 million**:

   Since these two business segments share most of the equipment and some operational area, this combination assumes that no extra capex is required to start the breakbulk operations once the investment for the container yard is made; hence, the container and breakbulk categories are grouped and analyzed as a single business segment.

   - *Handling equipment and storage.* These two business segments include $3.2 million for container handling equipment (CHE), which account for one mobile harbor crane (MHC) with a productivity of 15 moves/hr, and 2 top-loaders and 3 bomb-carts with tractors per crane.
   - *Construction and civil works.* These two business segments include $15.9 million, which consider $3.4 million for waterside works, cells and dolphins, and fill/embankment of 10 acres for the main yard. For these two business segments to operate, a sheet pile dock structure is proposed on the west side of the terminal to allow for the crane operation. The proposed primary dock face is 200 ft long, which will allow a crane to completely load/unload a barge without moving the barge. Dolphin structures are proposed adjacent to the dock to accommodate barge queuing. $4.5 million is considered for the construction of the dock and 200 ft sheet pile. Mobilization, engineering, and contingency for these two business segments only is estimated at $5.7 million.

2. Agribulk—Total start-up capex are **$16.6 million:**
   - *Handling equipment and storage.* This business segments considers $6.9 million for agribulk storage (for 6,000 metric tons), a truck dump pit, scales/testing equipment, and 900 ft of conveyor system & foundations.

[28] Jefferson City Area Chamber of Commerce, *Central Missouri Multimodal Port Feasibility Study Final Report,* prepared by Cambridge Systematics and Hanson Professional Services, Jun 2018.

- *Construction and civil works.* This business segment includes $1.5 million for waterside cells and dolphins and fill/embankment only for the 3 acres required to build the bulk area. The bulk area considers 3 acres for about five silos or tanks. Modeling this business segment alone assumes no dock for the main yard is required and conveyors connect directly to the cells. Mobilization, engineering, and contingency is estimated at $6.0 million.

3. Drybulk—Total start-up capex are **$13.0 million:**
   - *Handling equipment and storage.* This business segment considers $4.6 million for drybulk storage (2,000 metric tons in 1 steel bin), a truck dump pit, scales/related equipment, and 1,000 ft of conveyor system & foundations.[29]
   - *Construction and civil works.* Include $1.5 million for waterside cells and dolphins and fill/embankment only for the 3 acres required to build the bulk area. Modeling this business segment alone assumes no dock. Mobilization, engineering, and contingency is $4.7 million.
4. Liquid bulk—Total start-up capex are **$10.0 million:**
   - *Handling equipment and storage.* This business segments considers $2.7 million for liquid bulk storage (1,000 metric tons in 1 steel tank) and 1,100 ft of pipelines and related systems.
   - *Construction and civil works.* Include $1.5 million for waterside cells and dolphins and fill/embankment only for the 3 acres required to build the bulk area. Modeling this business segment alone assumes no dock. Mobilization, engineering, and contingency is $3.6 million.
5. Roads and utilities—The model assumes that the same roads and utilities are required for the terminal independent of the business segments modeled. The cost assumed is **$2.2 million**. No cargo flow that utilizes rail has been identified, so rail infrastructure is not built in any of the scenarios to save capex.
6. Mobilization, engineering, and contingency—Assumes a project cost for mobilization (6%), engineering/permitting/surveying (14%), and contingency (30%) of the startup capex for the business segments modeled only.

These assumptions are made with a view to develop an operation as envisioned in the conceptual layout. Nevertheless, testing these different combinations of business segments allow us to generate an understanding about the magnitude of the investments required for each business segment, the expected volumes, potential levels of revenue and earnings, and the business value for each segment. This method allows us to forecast the cash flows attributable to the subject asset and associated cargo sector being served. It also helps to determine the optimal levels of investment for each business segment based on their degree of profitability.

A summary for the startup capex per business segment modeled and their different combinations is shown in Table 31.

[29] Since the expected cargo flows for drybulk are imports, a less expensive operation might be conducted utilizing a crane with clam shell unloaders, a hopper, dump trucks, a dumping pit, a conveyor, and a storage silo bin. This configuration would only work with a dock in place.

Table 31. Startup capex (Yr 0) per business segment or combination of segments modeled (million, $)

ID	Business segments operating	Min acres req.	Handling equipment and storage Yr 0	Construction and civil works in Yr 0					TOTAL startup capex Yr 0
				Roads and utilities	Mobilization, engineering, and contingency	Dock and sheet pile (container+BB)	Waterside civil works, cells, dolphins, and fill/embankment	Subtotal	
1	Container+Breakbulk (BB)	10	3.2	2.2	5.7	4.5	3.4	15.9	$ 19.1
2	Agribulk	3	6.9	2.2	6.0	-	1.5	9.7	16.6
3	Drybulk	3	4.6	2.2	4.7	-	1.5	8.4	13.0
4	Liquid-bulk (LB)	3	2.7	2.2	3.6	-	1.5	7.3	10.0
5	Cont+BB + Agribulk	13	3.2	2.2	8.8	4.5	3.5	17.1	20.4
6	Cont+BB + Drybulk	13	7.8	2.2	8.8	4.5	8.7	19.7	27.5
7	Cont+BB + Liquid-bulk	13	5.9	2.2	8.8	4.5	8.7	18.7	24.5
8	Cont+BB + Agribulk + Drybulk	20	14.6	2.2	8.8	4.5	10.6	26.6	41.3
9	Cont+BB + Agribulk + Drybulk+ LB	20	17.3	2.2	8.8	4.5	14.6	28.2	45.4

6.3.2 Indicative opex

Mercator assumed the minimum operating expenses necessary for the operation of each business segment and their related facilities. Opex are grouped in five main categories according to the business segments and their operational characteristics:

(i) Direct costs for breakbulk
(ii) Direct costs for agribulk, drybulk, and liquid-bulk
(iii) Direct costs for containers
(iv) Indirect costs
(v) Selling, General and Administrative (SG&A), and
(vi) Concession payments to the HPA.

Variable expenses, which are calculated as a function of the expected volume for each business segment considered, include direct costs (i), (ii), (iii), and the concession payment (vi). Fixed expenses include indirect/overhead (iv) and SG&A (v) and are only adjusted for inflationary changes.

Direct costs

As described in the organizational structure in *Section 5.2*, variable cost stevedoring gangs are considered for the container and breakbulk operations. Smaller gangs that can perform multiple functions are considered for the bulk cargoes (i.e. agribulk, drybulk, and liquid-bulk). Table 32 shows the composition of the gangs assumed for each operation. Gangs are assumed to work based on the volume of cargo received for each business segment. The minimum hours estimated required to process the expected volume for each business segment are rounded up to a minimum 4-hour shift. This is done for all gangs. Table 33 shows the gang composition of specialized labor assumed for bulk operations, which assumes laborers perform multidisciplinary tasks among agribulk, drybulk, and liquid-bulk segments.

Table 32. Gang composition of specialized labor assumed for containers and breakbulk operations (variable cost)

Business segment ->	Container		Breakbulk	
Gang composition	**person / crane-hr**	**Hourly rates**	**person / crane-hr**	**Hourly rates**
Crane/equipment operator	**2**	55	**2**	55
Checker	**1**	36	**1**	36
Lasher/Barge Men	**2**	36	**2**	36
Dock man	**2**	36	**2**	36
Top-loaders	**1**	55	**1**	55
Drivers	**4**	36	**4**	36
Total stevedoring gang	**12**	**$ 41 (avg)**	**12**	**$ 41 (avg)**

Table 33. Gang composition of specialized labor assumed for bulk operations (variable cost)

Business segment ->	Bulk operations (agribulk, drybulk, and liquid-bulk)	
Gang composition	**person / crane-hr**	**Hourly rates**
Chief	**2**	55
Conveyor operator	**1**	36
Labor mechanics	**2**	36
Total stevedoring gang	**5**	**$ 41 (avg)**

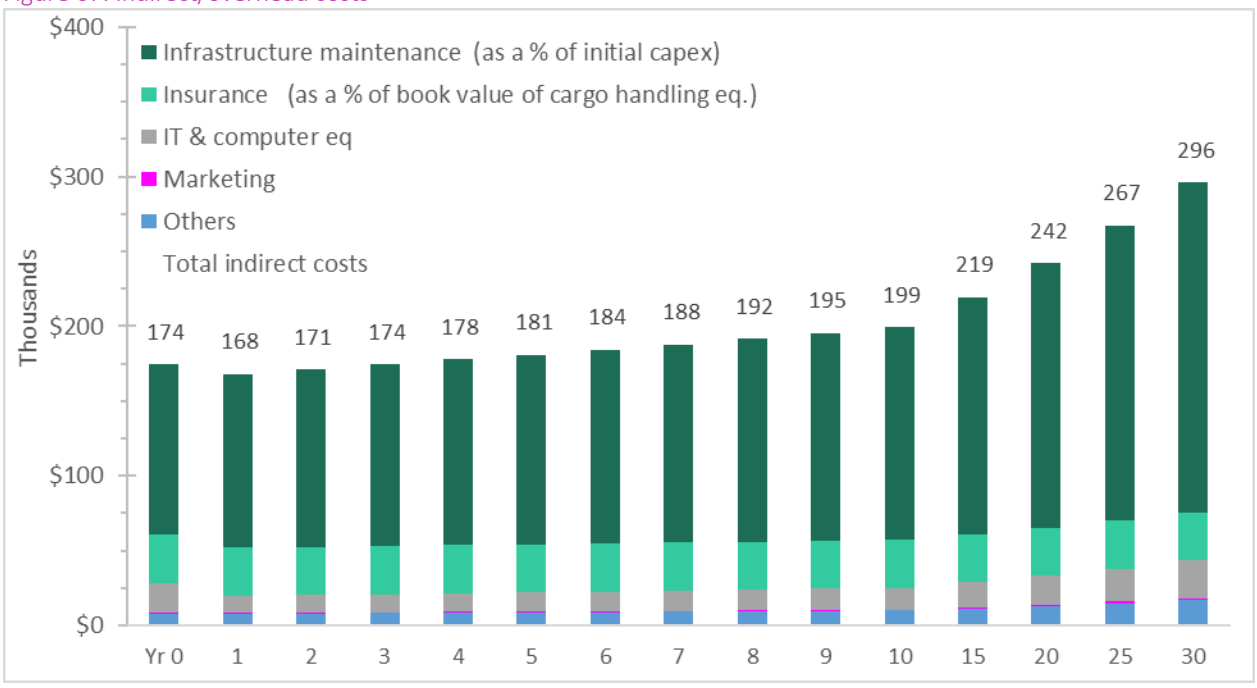
In addition to the variable costs for gang labor, 4 permanent positions are budgeted for receiving and delivering on the landside: two shared for the container and breakbulk operations and two more for the bulk operations shared among agribulk, drybulk, and liquid-bulk segments. These are treated as fixed costs and are activated only when a particular segment is modeled.

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 selected business model, 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 0.5% of the initial capex depending on the business segments modeled.
  - *Insurance*—considered as a 1% of the book value of the cargo handling equipment.
  - *IT & computer equipment*—included minimal fixed costs per employee for hardware, software, network / IT admin (outsourced), website setup and maintenance (outsourced).
  - *Other expenses*—assumed to be driven as a function of the number of professional staff, which remain fixed for the entire period of analysis.
    - *General business expenses*. Includes minimal fixed cost per year for supplies, postage, printing and communications, and marketing and materials, etc.
    - *Legal expenses.* Includes minimal fixed cost per year to outsource any legal functions related to the business.
    - *Personal protective equipment*

A summary of the main indirect/overhead costs is provided in Figure 67.

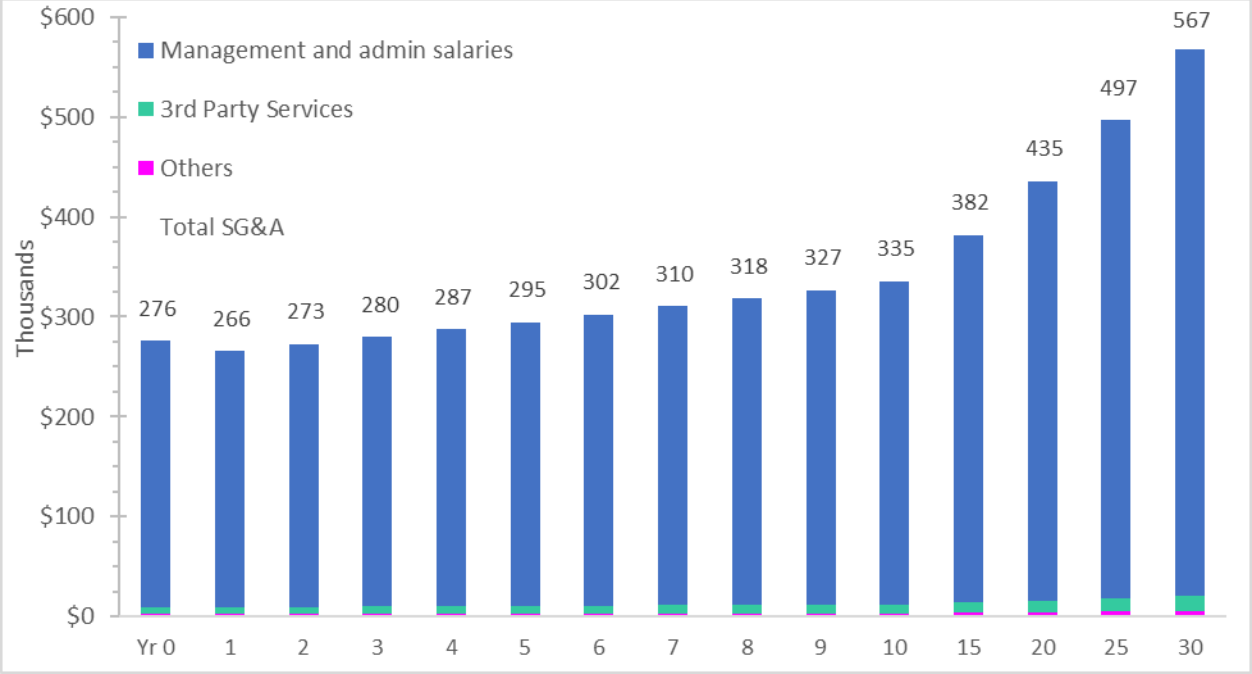
Figure 67. Indirect/overhead costs



- **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 $ 110,000
  - 1 Financial manager with annual loaded salary $ 70,000
  - 2 Non-management staff, with an average annual loaded salary of $ 35,000, consisting of two staff (administrative assistant and maintenance).

  A summary of the main SG&A expenses is provided in Figure 68.

Figure 68. Selling, General Management, and Admin salaries (SG&A)



6.3.3 Handling rates

Regarding the assumptions for cargo handling rates that can be expected for the MRTO undertaking the project, benchmarks from other ports currently under operation were used to estimate handling revenues for breakbulk, agribulk, drybulk, liquid-bulk, and containerized cargoes. However, these rates were adjusted under the premise that the Heartland Port should be able to capture a portion of the benefits offered to shippers and farmers by providing shippers and farmers a closer alternative for storage and shipping. The rates assumed in the financial model are included in Table 34.

Table 34. Handling rates used in the financial model

Cargo handling rates charged by port	Units	Cargo handling rates
Non-containerized		
Breakbulk	US$/MT	**$30.0**
Agribulk	US$/MT	**6.0**
Drybulk	US$/MT	**6.0**
Liquid bulk	US$/MT	**4.0**
Storage + ancilliary revenue	% of Tot Rev	**15%**
Containerized		
Container lift rate	US$/Box	**$300**
Storage + ancilliary revenue	% of Tot Rev	**15%**

6.4 Financial analysis

Based on our financial modelling, we conclude that the container segment would be the most important for project viability, being the only segment with positive earnings and positive NPV.

The scenario in which the Heartland Port handles only containers and breakbulk cargos (the "Containers+BB" scenario) produces yr. 3 EBITDA of $1.8 million and an NPV of $3.6 million over the life of the project. Agribulk, drybulk, and liquid-bulk as stand-alone business segments show negative EBITDA and negative NPV.

While agribulk shows a negative NPV, the fact that its operating margin and EBITDA in year 3 are positive, that its expected volumes are significant, and that when viewed as an incremental addition to the container segment has only a modest negative impact on overall project results suggests that this traffic segment merits further research and analysis.[30]

Achieving success in the container sector will be critical to achieving viability for the Heartland Port. Container sector success, as discussed earlier in this report, will itself likely depend on attracting a container distribution center to Jefferson City, and depend on the launching of a quality liner container service on the river with a reliable and regular schedule and competitive rates.

Next, we provide a summary-level of key outputs from the financial model. Each combination of business segments is analyzed to show the impacts on returns for the MRTO and the HPA. Business segments with IRRs in excess of 10% and in which the MRTO recovers meaningful value relative to current estimated throughput costs, represent project opportunities that could warrant additional exploration, as is the case of 1) Container+BB and 5) Cont+BB+Agribulk. Volumes and rates reflect our base view of what could be achieved under favorable business conditions, so we would not recommend assuming higher volumes or rates.

[30] The drybulk sector may also develop into a viable contributor to the port but this would depend on development of new traffic flows not currently moving, or perhaps on achieving a lower cost infrastructure solution than the fixed conveyor scheme that was contemplated.

6.4.1 Summary outputs from the financial model

Table 35 shows the results from the financial model for the Base Case volume forecast. A visual summary of the outputs from the financial model for each business segment modeled and their different combinations is provided subsequently.

Table 35. Financial modeling results: Base Case volumes (million, $)

ID	Business segments operating	Min acres req.	Eq. and storage capex Yr0	Construction Capex Yr0	Tot. startup capex Yr0	Gross revenue Yr3	Operating margin Yr3	EBITDA Yr3	Cash flow NPV	IRR %	Yrs to payback
1	**Container+BB**	**10**	(3.2)	(15.9)	(19.1)	2.9	2.3	1.8	**3.6**	**12%**	11
2	**Agribulk**	**3**	(6.9)	(9.7)	(16.6)	1.3	1.1	0.6	**(7.8)**	**-2%**	N/A
3	**Drybulk**	**3**	(4.6)	(8.4)	(13.0)	0.2	0.2	(0.2)	**(10.1)**	**0%**	N/A
4	**Liquid-bulk**	**3**	(2.7)	(7.3)	(10.0)	0.0	0.0	(0.3)	**(9.7)**	**0%**	N/A
5	**Cont+BB + Agribulk**	**13**	(10.1)	(21.1)	(31.1)	4.2	3.3	2.7	**1.7**	**10%**	13
6	**Cont+BB + Drybulk**	**13**	(7.8)	(19.7)	(27.5)	3.2	2.5	2.0	**(0.6)**	**9%**	15
7	**Cont+BB + Liquid-bulk**	**13**	(5.9)	(18.7)	(24.5)	2.9	2.3	1.8	**(0.2)**	**9%**	14
8	**Cont+BB + Agribulk+ Drybulk**	**20**	(14.6)	(26.6)	(41.3)	4.5	3.5	2.9	**(3.8)**	**8%**	16
9	**Cont+BB + Agribulk+ Drybulk+ LB**	**20**	(17.3)	(28.2)	(45.4)	4.5	3.6	2.9	**(6.7)**	**7%**	17

Figure 69. Summary outputs from the financial model: 1–Container and breakbulk (cont+BB)

Business segments being modeled	
Breakbulk	Yes
Agribulk	No
Drybulk	No
Liquid bulk	No
Container	Yes
Dock modeled (200 ft):	Yes
Fill/embank. acres modeled	10 acres

Inputs in P&L_CF

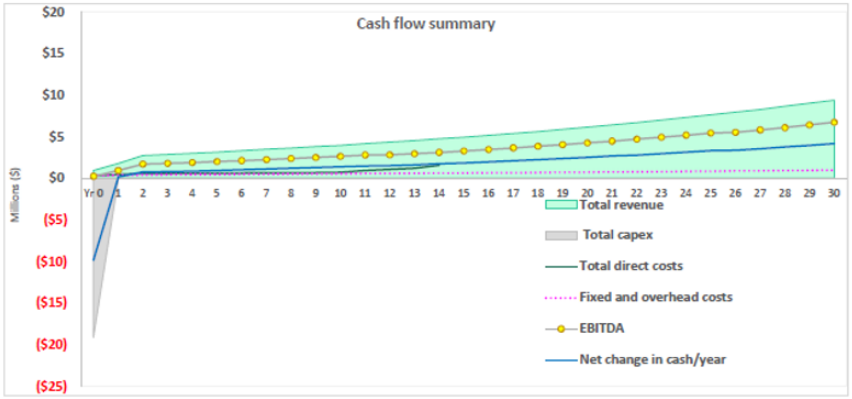
	Discount rate	EBITDA NPV	Cash Flow NPV
Discounted at WACC	9.5%	$24.0	$3.6
		IRR	12.4%

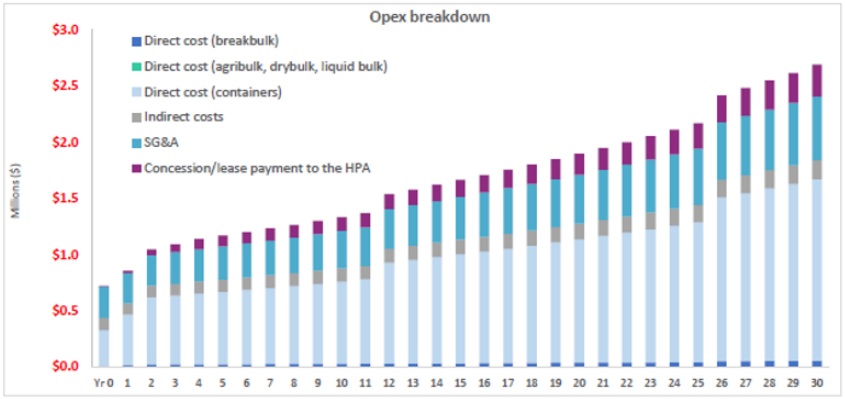
Total startup capex Yr 0	(19.1)
Return on total assets	126%
No of yrs w positive cash flow	30
Years to payback	11

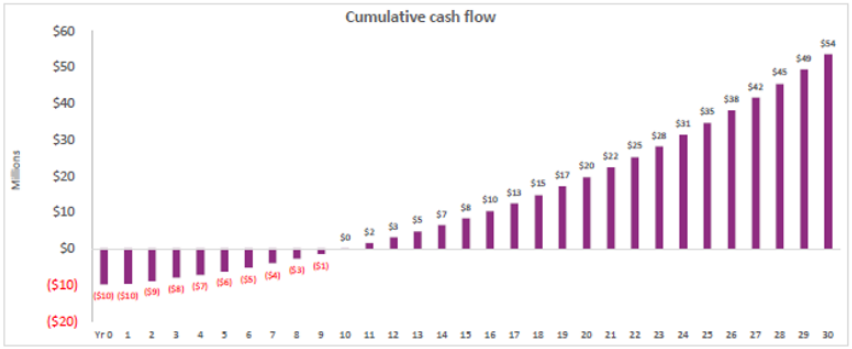
million US$

Outputs of business segments modeled	
Gross revenue Yr 3	$2.91
Total margin Yr 3	2.27
EBITDA Yr 3	1.82
Capex Yr 0	
Related to indiv. busnss segments	(3.2)
Related to overall project	(15.9)
Total startup capex Yr 0	(19.1)
Project subsidy Yr 0	0.0

million US$







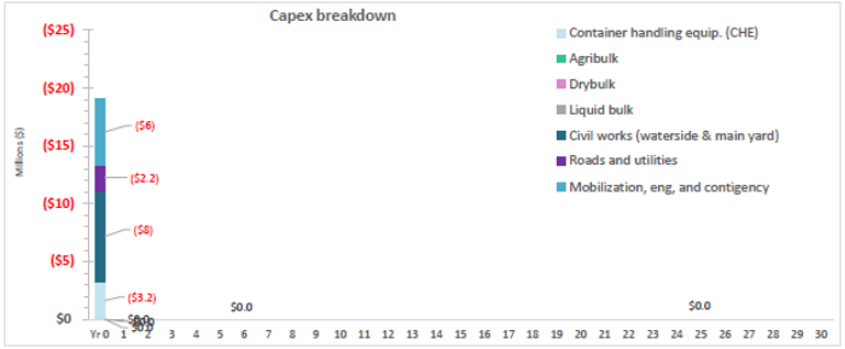


Figure 70. Summary outputs from the financial model: 2–Agribulk

Business segments being modeled	
Breakbulk	No
Agribulk	Yes
Drybulk	No
Liquid bulk	No
Container	No
Dock modeled (200 ft):	No
Fill/embank. acres modeled	3 acres

Inputs in P&L_CF

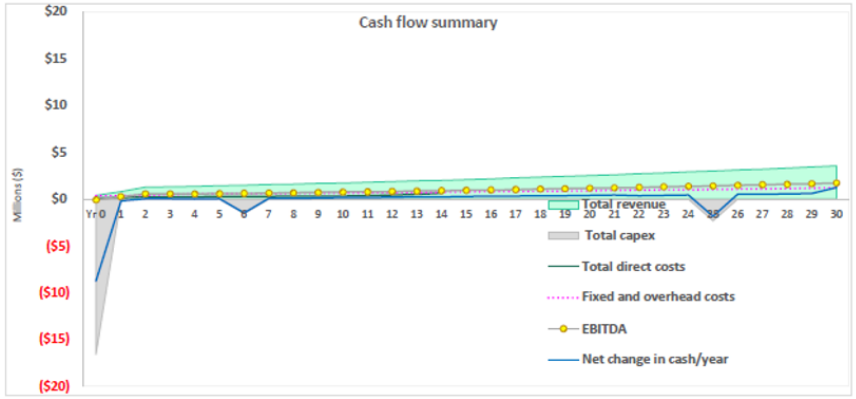
	Discount rate	EBITDA NPV	Cash Flow NPV
Discounted at WACC	9.5%	$6.7	($7.8)
		IRR	-2.1%

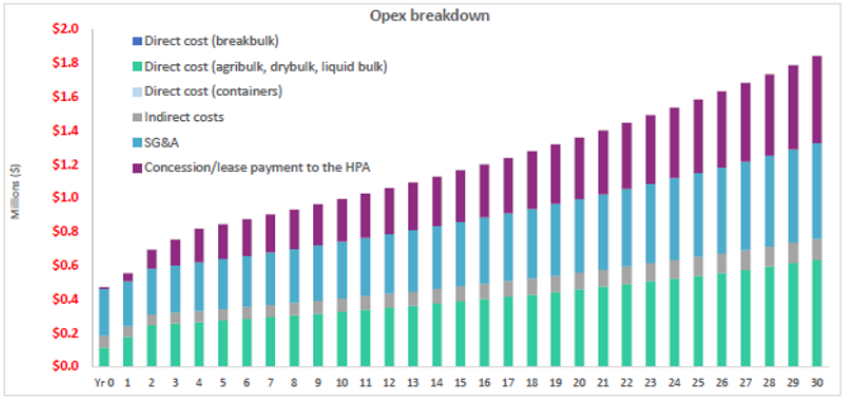
Total startup capex Yr 0	(16.6)
Return on total assets	40%
No of yrs w positive cash flow	27
Years to payback	N/A

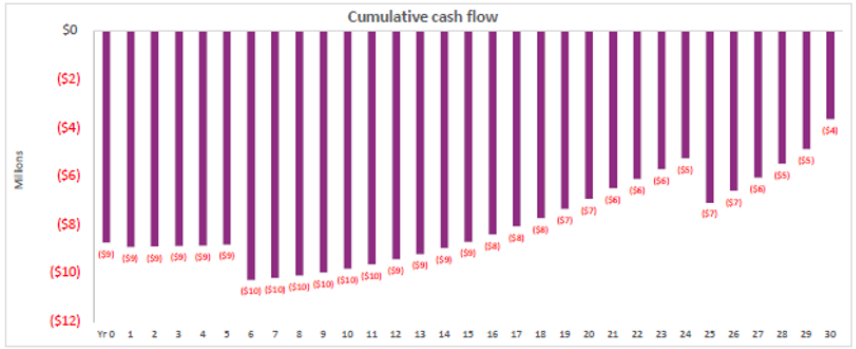
million US$

Outputs of business segments modeled	
Gross revenue Yr 3	$1.32
Total margin Yr 3	1.07
EBITDA Yr 3	0.57
Capex Yr 0	
Related to indiv. busnss segments	(6.9)
Related to overall project	(9.7)
Total startup capex Yr 0	(16.6)
Project subsidy Yr 0	0.0

million US$







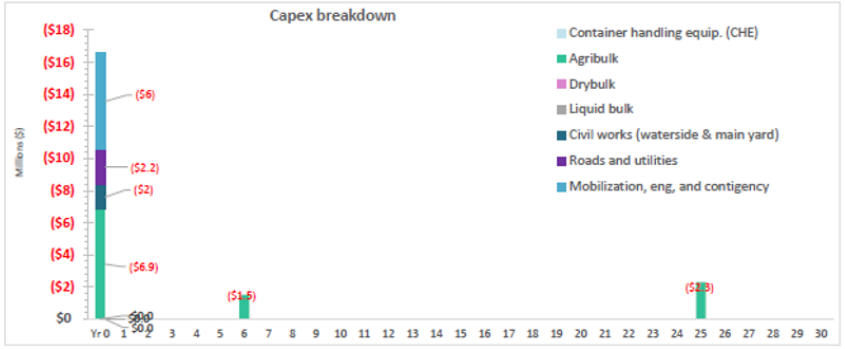


Figure 71. Summary outputs from the financial model: 3–Drybulk

Business segments being modeled	
Breakbulk	No
Agribulk	No
Drybulk	Yes
Liquid bulk	No
Container	No
Dock modeled (200 ft):	No
Fill/embank. acres modeled	3 acres

Inputs in P&L_CF

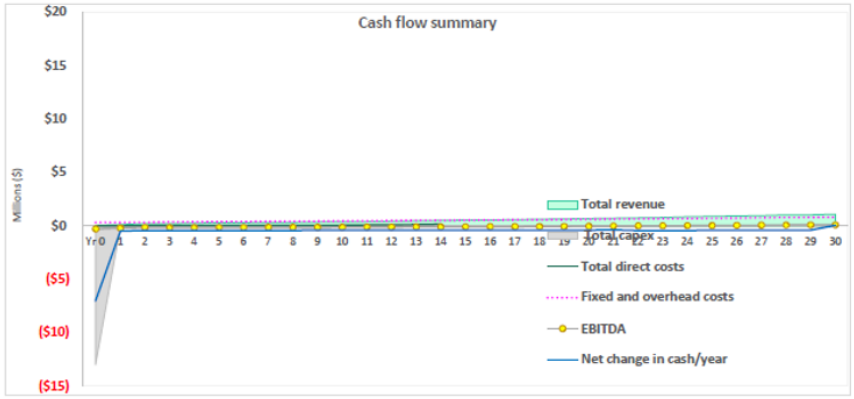
	Discount rate	EBITDA NPV	Cash Flow NPV
Discounted at WACC	9.5%	($1.3)	($10.1)
		IRR	#NUM!

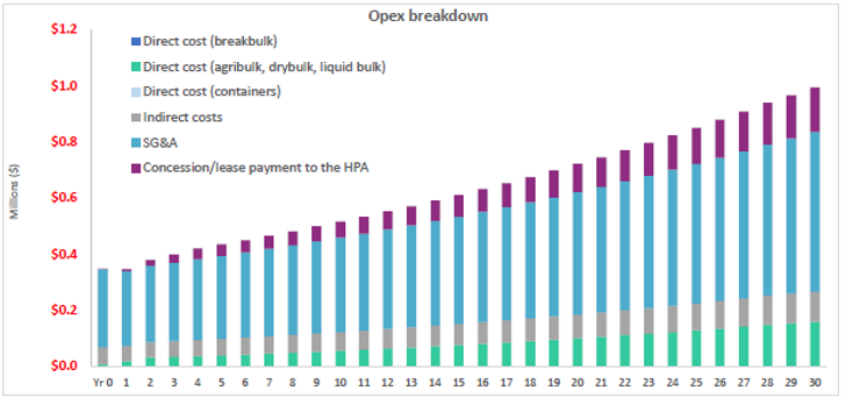
Total startup capex Yr 0	(13.0)
Return on total assets	-10%
No of yrs w positive cash flow	1
Years to payback	N/A

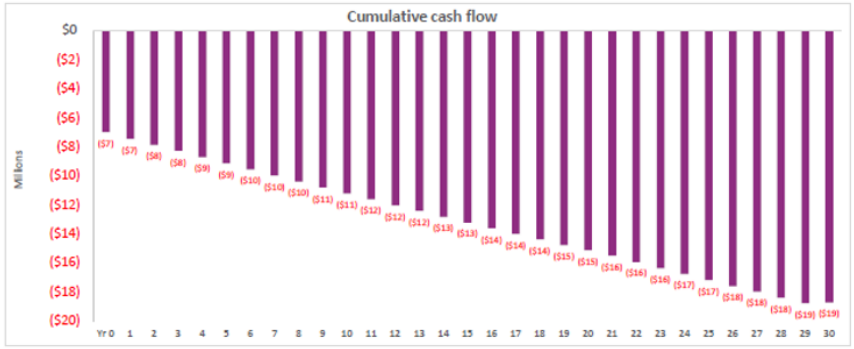
million US$

Outputs of business segments modeled	
Gross revenue Yr 3	$0.24
Total margin Yr 3	0.21
EBITDA Yr 3	(0.16)
Capex Yr 0	
Related to indiv. busnss segments	(4.6)
Related to overall project	(8.4)
Total startup capex Yr 0	(13.0)
Project subsidy Yr 0	0.0

million US$







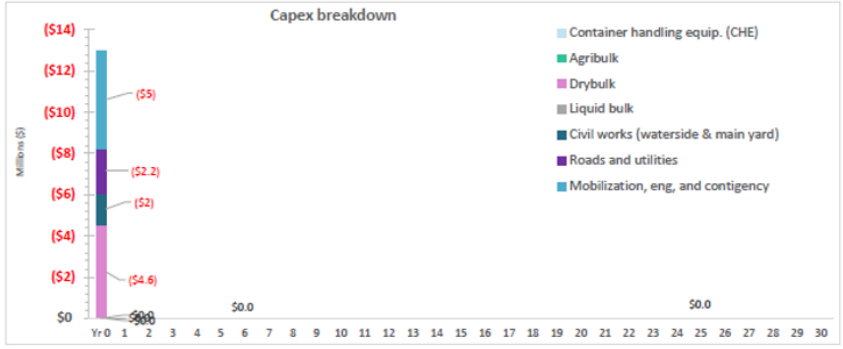


Figure 72. Summary outputs from the financial model: 4–Liquid bulk

Business segments being modeled	
Breakbulk	No
Agribulk	No
Drybulk	No
Liquid bulk	Yes
Container	No
Dock modeled (200 ft):	No
Fill/embank. acres modeled	3 acres

Inputs in P&L_CF

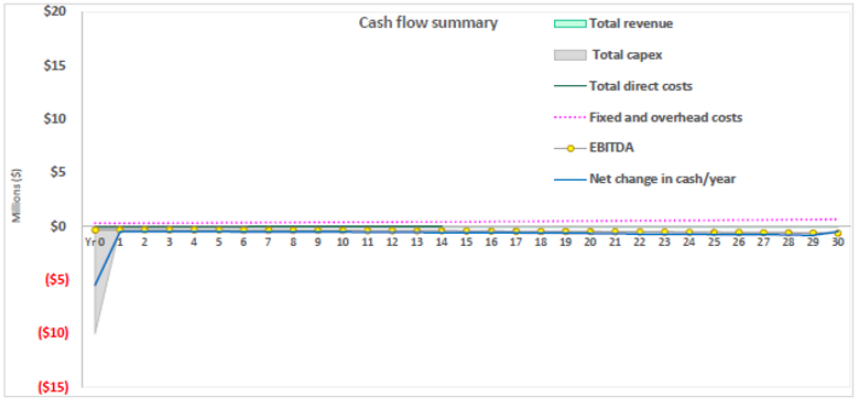
	Discount rate	EBITDA NPV	Cash Flow NPV
Discounted at WACC	9.5%	($3.7)	($9.7)
		IRR	#NUM!

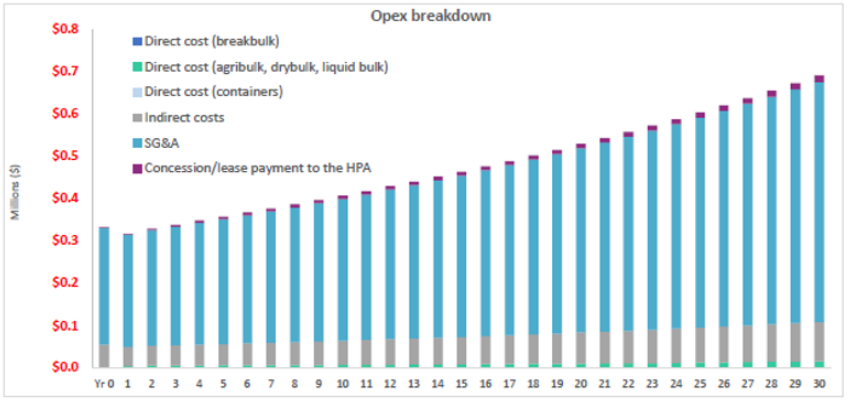
Total startup capex Yr 0	(10.0)
Return on total assets	-37%
No of yrs w positive cash flow	0
Years to payback	N/A

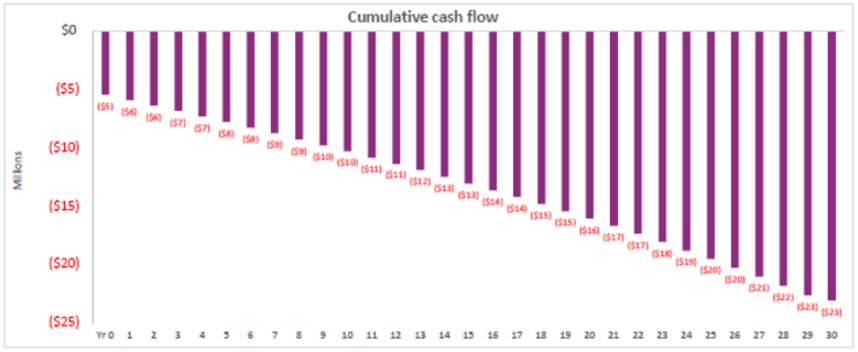
million US$

Outputs of business segments modeled	
Gross revenue Yr 3	$0.03
Total margin Yr 3	0.02
EBITDA Yr 3	(0.31)
Capex Yr 0	
Related to indiv. busnss segments	(2.7)
Related to overall project	(7.3)
Total startup capex Yr 0	(10.0)
Project subsidy Yr 0	0.0

million US$







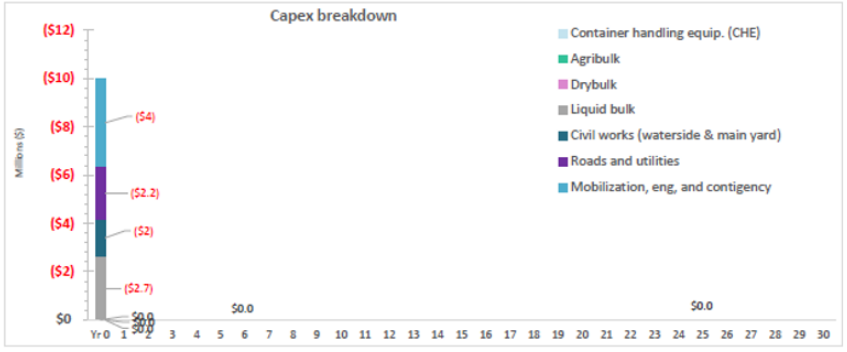


Figure 73. Summary outputs from the financial model: 5–Cont+BB+Agribulk

Business segments being modeled	
Breakbulk	Yes
Agribulk	Yes
Drybulk	No
Liquid bulk	No
Container	Yes
Dock modeled (200 ft):	Yes
Fill/embank. acres modeled	13 acres

Inputs in P&L_CF

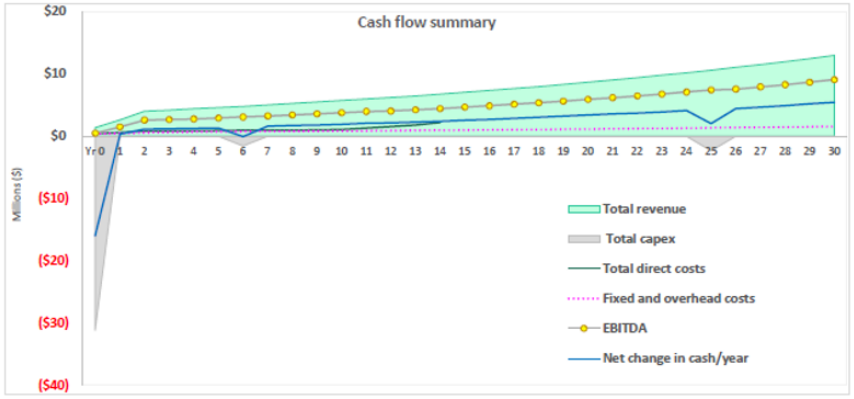
	Discount rate	EBITDA NPV	Cash Flow NPV
Discounted at WACC	9.5%	$34.4	$1.7
		IRR	10.4%

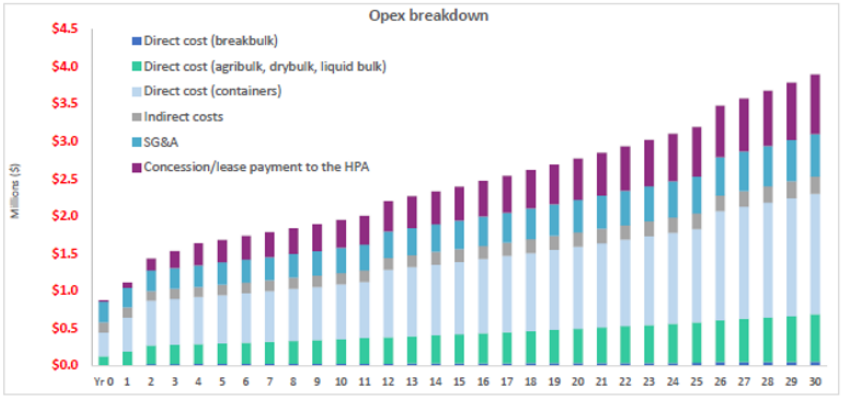
Total startup capex Yr 0	(31.1)
Return on total assets	110%
No of yrs w positive cash flow	29
Years to payback	13

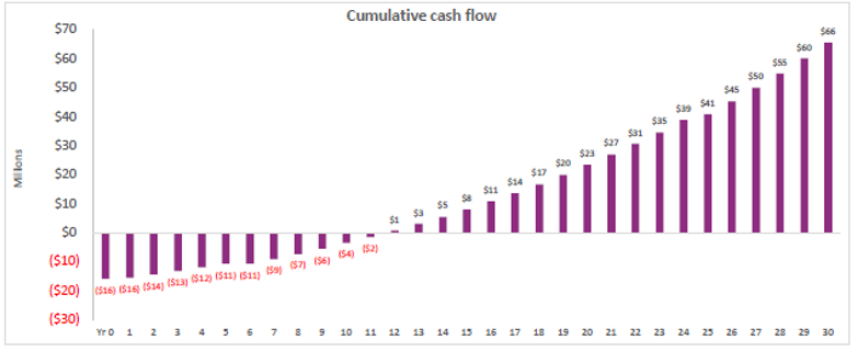
million US$

Outputs of business segments modeled	
Gross revenue Yr 3	$4.23
Total margin Yr 3	3.34
EBITDA Yr 3	2.70
Capex Yr 0	
Related to indiv. busnss segments	(10.1)
Related to overall project	(21.1)
Total startup capex Yr 0	(31.1)
Project subsidy Yr 0	0.0

million US$







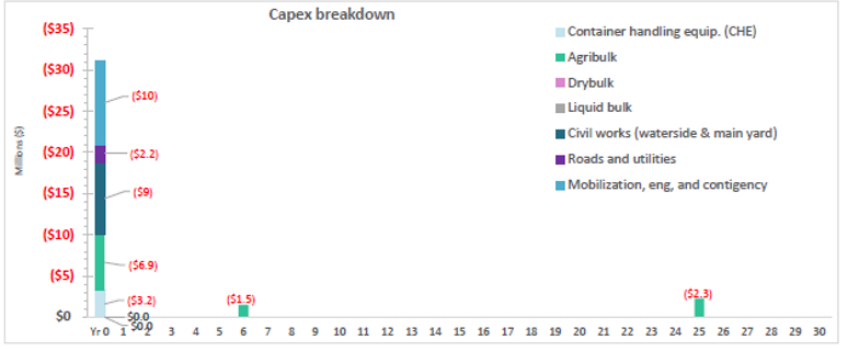


Figure 74. Summary outputs from the financial model: 6–Cont+BB+Drybulk

Business segments being modeled	
Breakbulk	Yes
Agribulk	No
Drybulk	Yes
Liquid bulk	No
Container	Yes
Dock modeled (200 ft):	Yes
Fill/embank. acres modeled	13 acres

Inputs in P&L_CF

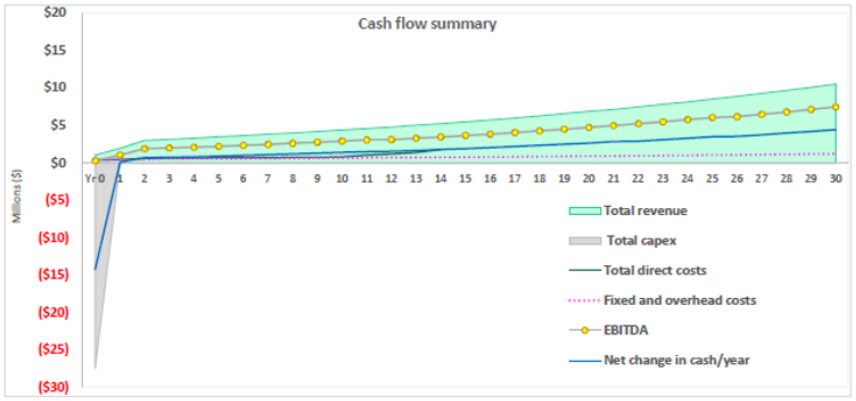
	Discount rate	EBITDA NPV	Cash Flow NPV
Discounted at WACC	9.5%	$26.4	($0.6)
		IRR	9.1%

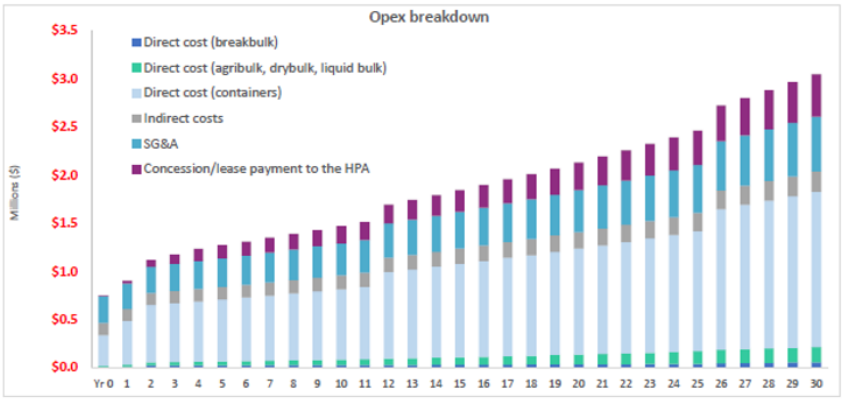
Total startup capex Yr 0	(27.5)
Return on total assets	96%
No of yrs w positive cash flow	30
Years to payback	15

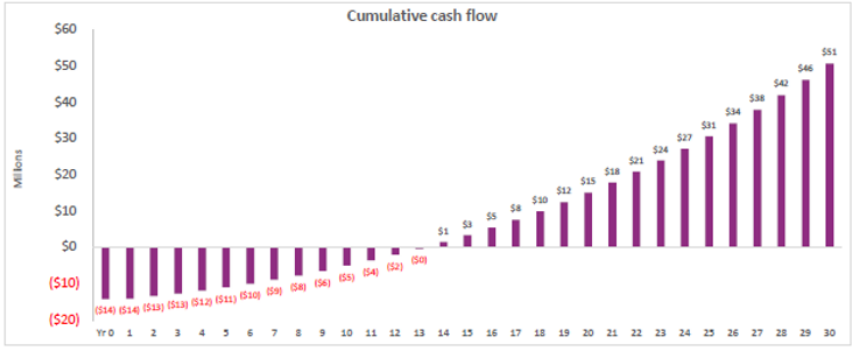
million US$

Outputs of business segments modeled	
Gross revenue Yr 3	$3.15
Total margin Yr 3	2.48
EBITDA Yr 3	1.97
Capex Yr 0	
Related to indiv. busnss segments	(7.8)
Related to overall project	(19.7)
Total startup capex Yr 0	(27.5)
Project subsidy Yr 0	0.0

million US$







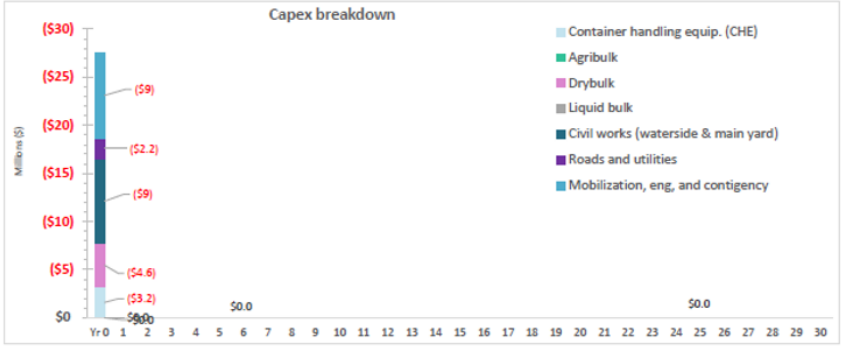


Figure 75. Summary outputs from the financial model: 7–Cont+BB+Liquid bulk

Business segments being modeled	
Breakbulk	Yes
Agribulk	No
Drybulk	No
Liquid bulk	Yes
Container	Yes
Dock modeled (200 ft):	Yes
Fill/embank. acres modeled	13 acres

Inputs in P&L_CF

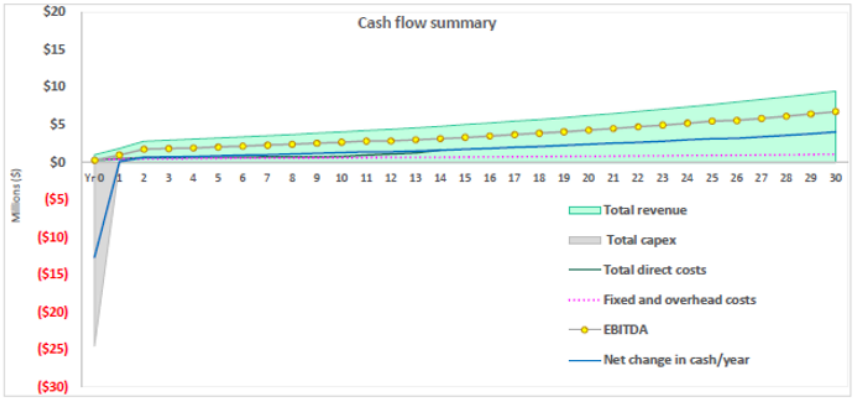
	Discount rate	EBITDA NPV	Cash Flow NPV
Discounted at WACC	9.5%	$24.1	($0.2)
		IRR	9.4%

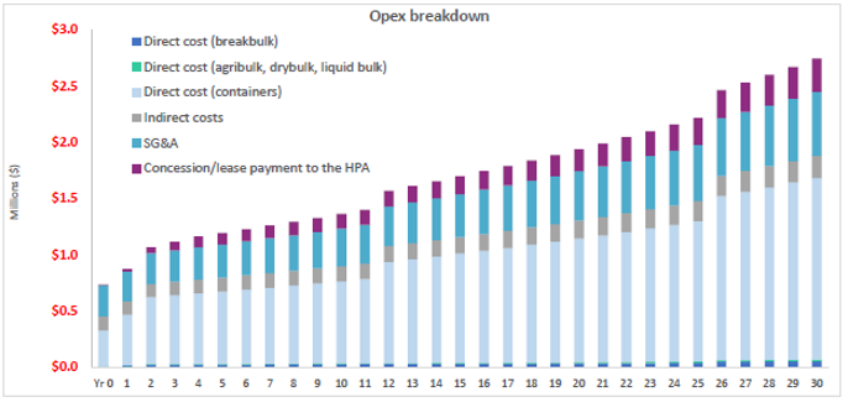
Total startup capex Yr 0	(24.5)
Return on total assets	98%
No of yrs w positive cash flow	30
Years to payback	14

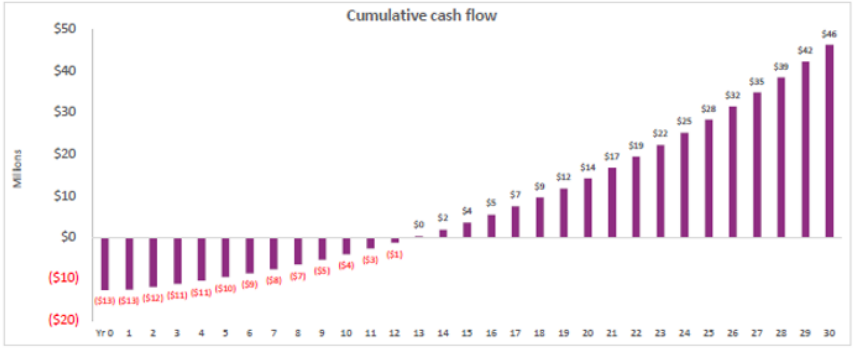
million US$

Outputs of business segments modeled	
Gross revenue Yr 3	$2.94
Total margin Yr 3	2.30
EBITDA Yr 3	1.82
Capex Yr 0	
Related to indiv. busnss segments	(5.9)
Related to overall project	(18.7)
Total startup capex Yr 0	(24.5)
Project subsidy Yr 0	0.0

million US$







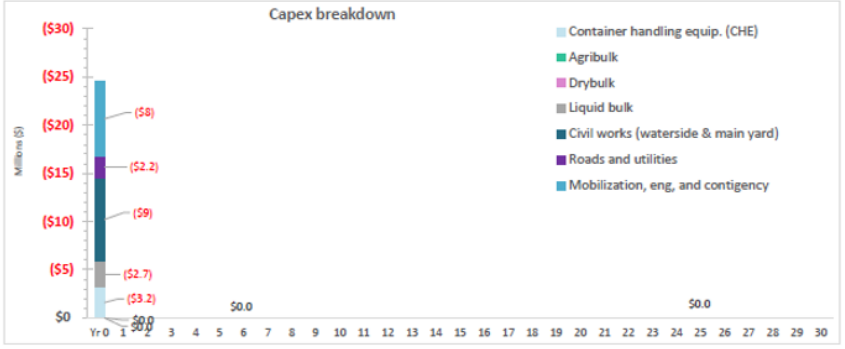


Figure 76. Summary outputs from the financial model: 8–Cont+BB+Agribulk+Drybulk

Business segments being modeled	
Breakbulk	Yes
Agribulk	Yes
Drybulk	Yes
Liquid bulk	No
Container	Yes
Dock modeled (200 ft):	Yes
Fill/embank. acres modeled	20 acres

Inputs in P&L_CF

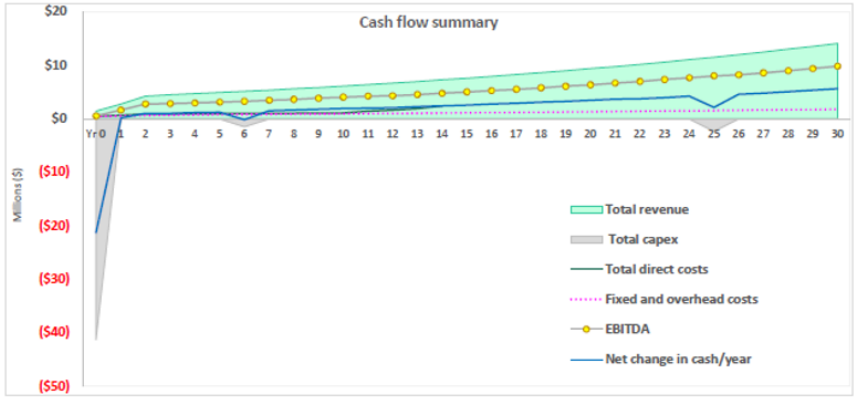
	Discount rate	EBITDA NPV	Cash Flow NPV
Discounted at WACC	9.5%	$36.7	($3.8)
		IRR	7.9%

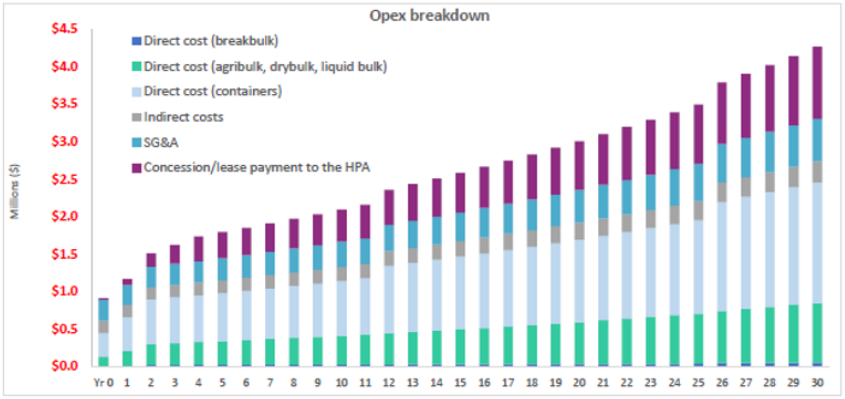
Total startup capex Yr 0	(41.3)
Return on total assets	89%
No of yrs w positive cash flow	29
Years to payback	16

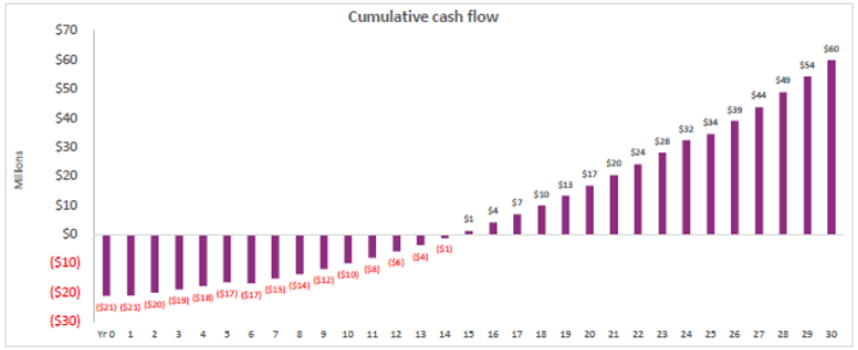
million US$

Outputs of business segments modeled	
Gross revenue Yr 3	$4.48
Total margin Yr 3	3.55
EBITDA Yr 3	2.85
Capex Yr 0	
Related to indiv. busnss segments	(14.6)
Related to overall project	(26.6)
Total startup capex Yr 0	(41.3)
Project subsidy Yr 0	0.0

million US$







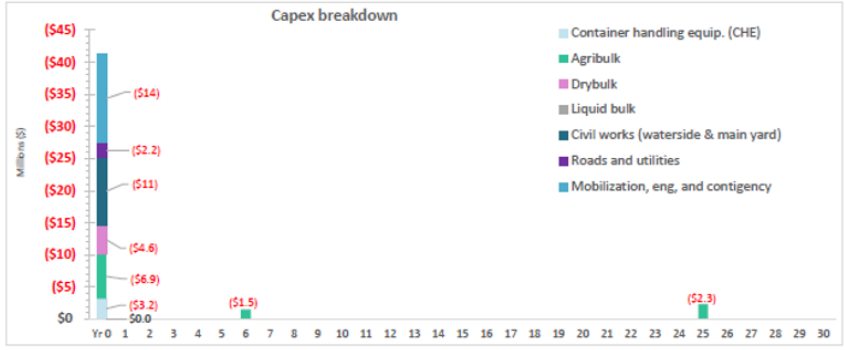


Figure 77. Summary outputs from the financial model: 8–Cont+BB+Agribulk+Drybulk+Liquid bulk (conceptual layout fully constructed)

Business segments being modeled	
Breakbulk	Yes
Agribulk	Yes
Drybulk	Yes
Liquid bulk	Yes
Container	Yes
Dock modeled (200 ft):	Yes
Fill/embank. acres modeled	20 acres

Inputs in P&L_CF

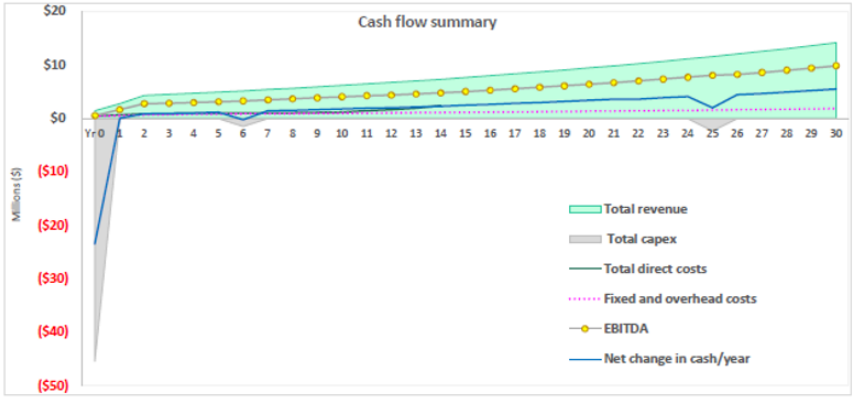
	Discount rate	EBITDA NPV	Cash Flow NPV
Discounted at WACC	9.5%	$36.7	($6.7)
		IRR	6.9%

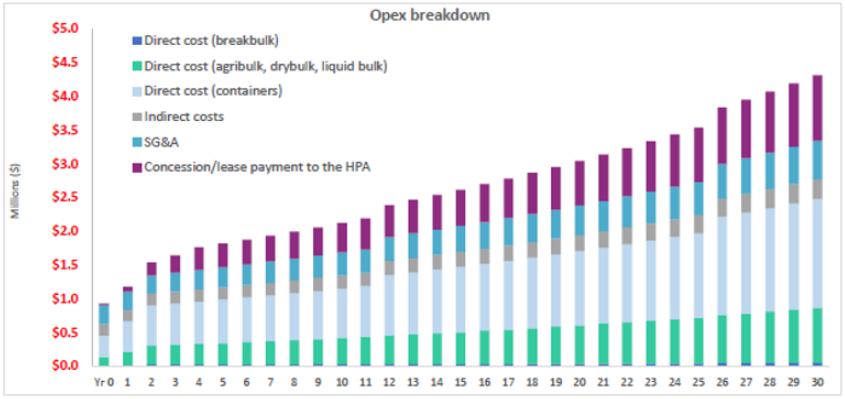
Total startup capex Yr 0	(45.4)
Return on total assets	81%
No of yrs w positive cash flow	29
Years to payback	17

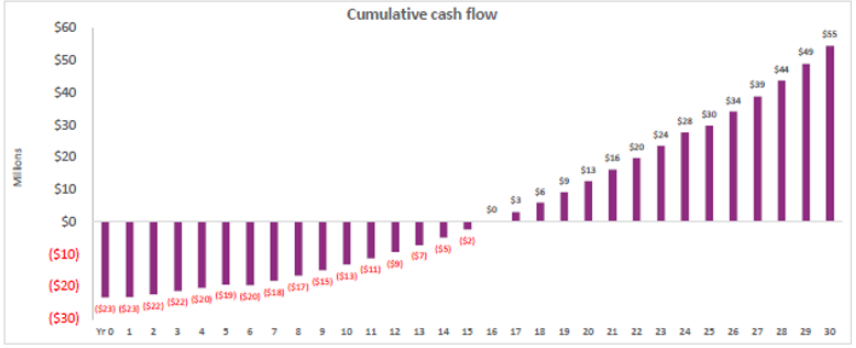
million US$

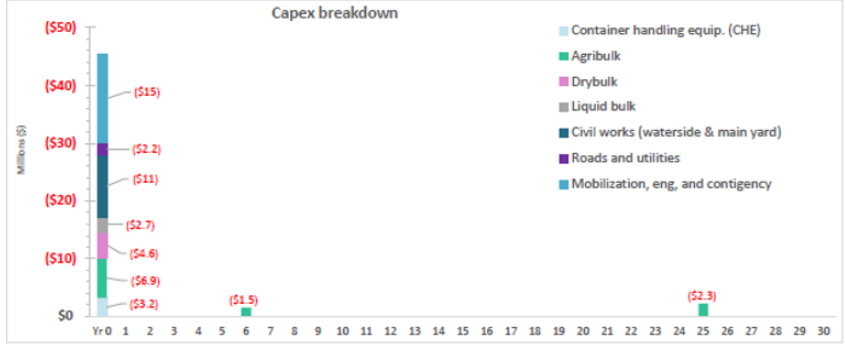
Outputs of business segments modeled	
Gross revenue Yr 3	$4.50
Total margin Yr 3	3.57
EBITDA Yr 3	2.86
Capex Yr 0	
Related to indiv. busnss segments	(17.3)
Related to overall project	(28.2)
Total startup capex Yr 0	(45.4)
Project subsidy Yr 0	0.0

million US$









6.5 Key takeaways

Assuming that the necessary condition for supporting containerized cargo flows to Jefferson City are in place (i.e. local distribution center capacity is established and a low-cost and frequent container ship or barge service is operating), containerized cargo handling could be viable and is responsible for most of the value generated under the scenarios evaluated. As presently conceived, the non-container investments are not individually or collectively viable, and to support them the container business may have to absorb certain capital expenses (and potentially some operational expenses) associated with any bulk operations if those activities are included in the development plan. Liquid bulk operations seem to be detrimental to the overall project under the current volume assumptions.

Assuming the *Base Case volumes*, the outputs of the financial model for the two most attractive scenarios Cont+BB and Cont+BB+Agribulk show an NPV of the project cash flows of $3.6 million and $1.7 million respectively, after considering capex, interest, taxes, depreciation, and amortization for these two business segments. Although the returns from the project would not be attractive to an institutional investor, (IRR of 10% based on a 50/50 debt/equity ratio) this project might be attractive to a strategic player who could capture non-financial benefits

While agribulk shows a negative cash flow NPV as a stand-alone business, the fact that its operating margin and EBITDA in year 3 are positive and that volumes are significant under the Base Case forecast, provide some indication that, at least, merits further research and analysis. Agribulk might turn into positive territory under more refined assumptions. For instance, changes in the capital structure of the project, further capex refinements based on an actual engineering design/analysis, consideration of further value-adding activities on-site might generate additional revenues worthy of consideration for the overall project.

Because moving freight by water is the least expensive and more environmentally friendly of all transportation modes, there are societal benefits that can stem for a project of this nature that could not be captured by a private investor. As demonstrated by the *2018 Central Missouri Multimodal Port Feasibility Study* 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 that exceed $200 million in the Boone, Callaway, Cole, and Osage Counties.[31]

The MoDOT has established various mechanisms for successful public/public and public/private partnerships. 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 general site development. Other resources include federal grants, transportation development districts, cost-sharing programs, among others.[32]

With a rail connection and the ability to load railcar, the port would have the ability to function as a collection point for the region even during periods of low water traffic or when the river levels are too low

[31] Jefferson City Area Chamber of Commerce, *Central Missouri Multimodal Port Feasibility Study Final Report,* prepared by Cambridge Systematics and Hanson Professional Services, Jun 2018, page 10-106.

[32] https://www.modot.org/partnership-development

for barge traffic. This would provide greater versatility to the marketplace. A rail connection would also introduce the option of alternative gateway ports beyond US Gulf ports, such as US West Coast ports, which could be important if severe weather or other conditions constrain the ability to move export freight through US Gulf Ports. If the Heartland Port becomes successful at attracting imports of containerized goods, the development of an intermodal rail yard and related infrastructure would allow the facility to operate as a dry port for exports when the river levels are too low and is not feasible to operate barges.

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. In those regards, the Jefferson City Area Chamber of Commerce and the Heartland Port Authority 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 of this project for a private investor can be expected to increase substantially.

7. Environmental regulatory requirements

The Heartland Port project is expected to help alleviate traffic congestion on the roadway and railways, and the potential to reduce truck and rail related emissions and improve highway and rail safety.[33] This section presents a preliminary identification of the environmental regulatory requirements that would need to be satisfied in order for the project to move forward. The objective of this section is to provide a roadmap for the different types of factors that would need to be considered in an Environmental Impact Review process typical for a project of this magnitude. Such roadmap considers the expected roles of and rules in relationship to the Heartland Port Project of the following environmental agencies and regulations: National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ), U.S. Army Corps of Engineers (USACE), tribal land/consultation, United States Fish and Wildlife Services (USFWS) Endangered Species Act, field office of MO Conservation department in Jefferson City, Missouri, and the Missouri Department of Natural Resources (DNR), each is presented in more detail in the following sections.

7.1 National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) is the nation's basic environmental law that applies to all actions taken or approved by federal agencies. A Declaration of National Environmental Policy requires the federal government to use all practical means to create and maintain conditions under which man and nature can exist in productive harmony. The key goals of NEPA are to assist Federal agency officials with making well-informed decisions and to ensure both public and other agency's involvement in decision-making. NEPA requires that before federal agencies take a major action, they must evaluate environmental impacts prior to decision making on any major Federal action, such as the review of a permit application. These agencies must disclose the environmental impacts of their proposed action and evaluate alternatives that would have fewer environmental costs.

Major Federal actions involved in marine river terminals, such as the Heartland Port Project, typically involve the USACE Section 10/404/408. The NEPA process consists of an evaluation of the environmental effects of a federal undertaking including its alternatives. There are three levels of analysis depending on whether or not an undertaking could significantly affect the environment:

- Categorical exclusion determination
- Preparation of an environmental assessment/finding of no significant impact (EA/FONSI), and
- Preparation of an environmental impact statement (EIS).

Categorical exclusion is used if the proposed action does not "individually or cumulatively have a significant effect on the human environment" (40CRF 1508.4). If an Environmental Assessment is needed, the two outcomes are either a finding of no significant impact, which will allow the project to continue, or an Environmental Impact Statement (EIS) will be required.

An EIS is the mechanism used to comply with the NEPA in the construction of marine river terminals like the Heartland Port Project. An EIS must be prepared pursuant to the NEPA of 1969 (42 U.S.C. 4321 et seq.) and the Council on Environmental Quality (CEQ) NEPA Regulations (40 CFR Parts 1500-1508). The typical requirements of an EIS are described next.

[33] Jefferson City Area Chamber of Commerce, *Central Missouri Multimodal Port Feasibility Study Final Report,* prepared by Cambridge Systematics and Hanson Professional Services, Jun 2018, page 10-106.

7.1.1 EIS overview

An EIS is a detailed study of the potential impacts, both beneficial and adverse, of a proposed project on the environment and local community. It also evaluates reasonable alternatives based off the identified project purpose and need. NEPA requires a federal agency to prepare an EIS for any major Federal action with the potential to significantly affect the quality of the human environment.

For marine river terminals of the scale of the Heartland Port Project, the USACE typically bears the responsibility as the "Lead Federal Agency" responsible for both managing and overseeing the entire EIS process and identifying Cooperating Agencies to ensure compliance with other applicable laws and regulations. The USACE will use the EIS to inform its permit decisions and permissions. The EIS will conclude with a Record of Decision (ROD) for the 10/404 permit decision and the 408-permission decision. The ROD is the document in which USACE will announce and explain our permit and permission decisions regarding CPRA's proposed project.

Following the publication of the Notice of Intent, the NEPA process involves the Heartland Port Authority and the USACE holding scoping meetings, preparing and distributing the draft EISs for public review, holding public hearings to solicit public comment on the draft EISs, and publishing final EISs. Not less than 30 days after the publication of the U.S. Environmental Protection Agency's Notice of Availability of the final EISs, the USAC may issue a ROD documenting its decision concerning the proposed action for the project. The EIS process is illustrated in Figure 78.

Figure 78. EIS process

Source: NSDOT.

7.1.2 Typical requirements for each stage of the EIS process

NEPA recommends that EIS must be analytic rather than encyclopedic. They must contain discussions of impacts in proportion to their significance. Insignificant impacts eliminated during the process under § 775.11(a) to determine the scope of issues must be discussed only to the extent necessary to state why they will not be significant. The focus of the EIS document must be to comply with NEPA and to assess the environmental impact of proposed actions, rather than to justify decisions already made. If a cost-benefit analysis relevant to the choice among environmentally different alternatives was prepared for the proposed action, it must be incorporated by reference or appended to the statement to aid in evaluating the environmental consequences. Table 36 provides information on each stage of the EIS process.

Table 36. EIS Process

Notice	The public is notified that the agency is preparing an EIS. The agency provides the public with information regarding how they can become involved in the process. The agency announces its project proposal with notices in the Federal Register, local media, and letters to citizens and groups that it knows are likely to be interested. Citizens and groups are welcome to send in comments helping the agency identify the issues it must address in the EIS (or EA).
Scoping, purpose, and need	The public scoping process is an early and open phase in the EIS process intended to provide interested or affected parties an opportunity to express concerns, ideas, and comments, which will inform/identify the issues and alternatives analyzed in the EIS document. The first meetings are held to discuss existing laws, the available information, and the research needed. The tasks are divided up and a lead group is selected. Decision makers and all those involved with the project should attend the meetings. At this stage the following questions must be answered: ▪ What is the purpose of this project? ▪ What is the goal trying to be achieved? ▪ Why is this project needed? ▪ What are the critical issues, resources, and impacts to be considered?
Project Alternatives	This stage must be informed by the information collected during the scoping process of the EIS. At this stage the following questions must be answered: ▪ What alternatives will be looked at in the EIS? ▪ No action alternative ▪ Proposed action, and ▪ A reasonable range of alternatives.
Affected Environment	This stage must aim to identify the potential environment to be affected by each of the alternatives. At this stage, the agency must conduct reasonable efforts to define the baseline conditions of the human environment that could potentially be affected and the anticipated environmental consequences. That is, defining how will building, operating, and maintaining this project could potentially affect those baseline conditions of the human environment.
Draft EIS (DEIS)	Based on both agency expertise and issues raised by the public, the agency prepares a Draft EIS with a full description of the affected environment, a reasonable range of alternatives, and an analysis of the impacts of each alternative.
Comment	Affected individuals then have the opportunity to provide feedback through written and public hearing statements. Formal comments for the EIS can be recorded multiple ways: ▪ Submit comment cards and letters during scoping meetings and by mail to the USACE ▪ Direct comments during public hearings (which must be recorded by the lead agency or the project sponsor) ▪ Construct and circulate a project website explaining the project, the EIS process, and soliciting public feedback.
Final EIS (FEIS) and Proposed Action	Based on the comments on the *Draft EIS*, the agency writes a *Final EIS*, and announces its Proposed Action. The public is not invited to comment on this, but if they are still unhappy, or feel that the agency has missed a major issue, they may protest the EIS to the Director of the agency. The Director may either ask the agency to revise the EIS.
Record of Decision (ROD)	Once all the protests are resolved the agency issues a Record of Decision which is its final action prior to implementation. If members of the public are still dissatisfied with the outcome, they may sue the agency in Federal court.
Supplemental EIS (SEIS)	Typically prepared after either a *Final EIS* or *Record of Decision* has been issued and new environmental impacts that were not considered in the original EIS are discovered, requiring the lead agency to re-evaluate its initial decision and consider new alternatives to avoid or mitigate the new impacts. Supplemental EISs are also prepared when the size and scope of a federal action changes, or when all of the proposed alternatives in an EIS are deemed to have unacceptable environmental impacts and new alternatives are proposed.

Items such as permits, licenses and authorizations relating to the proposal must be listed in the draft environmental impact statement. An EIS must also include discussion of any deviation from the proposal actions and any state or local law, or ordinances. Included in this discussion is an explanation on how the actions will be reconciled to the law, or ordinance. An outline for the standard format for an EIS is provided as reference in Appendix E: Standard format for environmental statements.[34]

7.2 The Council on Environmental Quality (CEQ)

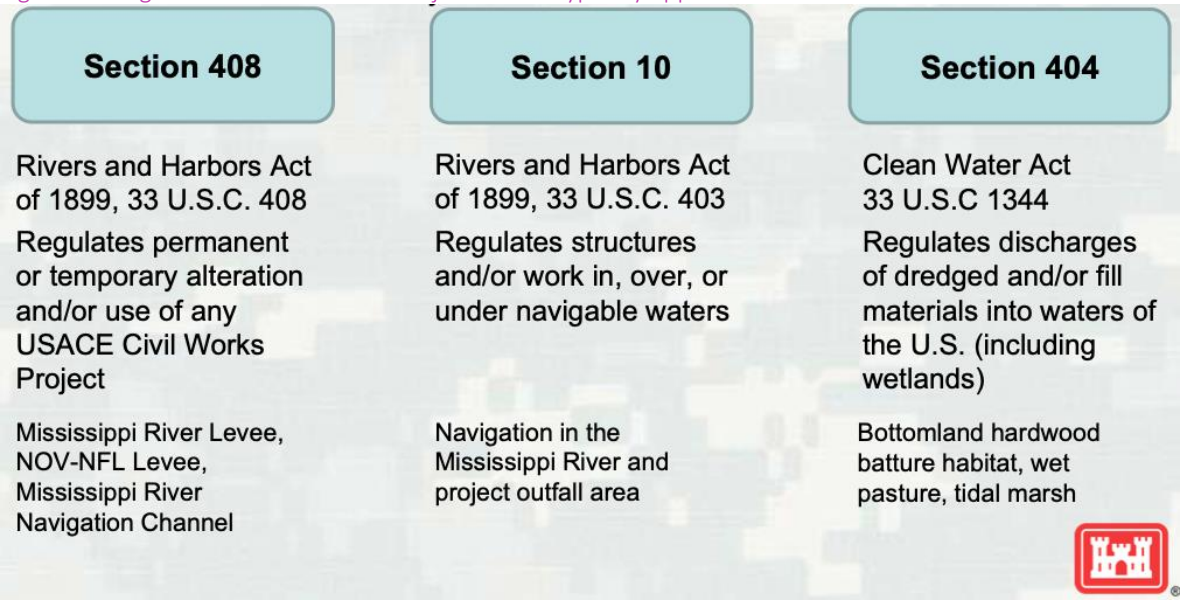
The Council on Environmental Quality (CEQ) oversees Federal agency NEPA implementation and develops and recommends national policies that promote the improvement of environmental quality. The CEQ proposed an update on regulations for implementing the procedural provisions of the NEPA. The proposed update is to reduce unnecessary paperwork and delays, and to promote better decision-making consistent with NEPA's statutory requirement. CEQ announced the proposed update on January 10, 2020, and is currently in the commenting period phase.

7.3 Clean Water Act of 1972 (CWA)

7.3.1 The U.S. Army Corps of Engineers (USACE)

USACE reviews an applicant's request for permits and permissions to make decisions based on the best available science, engineering standards, and professional judgment, that considers impacts to USACE projects, waters of the U.S., and jurisdictional wetlands. For marine river terminal projects, the USACE typically considers regulations contained in the River and Harbors Act (Sections 408 and 403) and in the Clean Water Act (Section 404). These requirements, as applied by the USACE, are illustrated in Figure 79.

Figure 79. Regulations under the USACE jurisdiction typically applied to marine river terminals



Source: USACE.

[34] 39 CFR § 775.11—Environmental impact statements. Legal Information Institute, Cornell University, https://www.law.cornell.edu/cfr/text/39/775.11

- Section 408—A Section 408 permit is required for alterations that builds upon, alters, improves, moves, occupies, or otherwise affects the usefulness, or structural or ecological integrity of USACE projects. A decision on the Section 408 must come before a Section 10/404 is issued. In addition, other environmental compliances must be issued prior to the approval of a Section 408. Documentation that is needed includes: technical analysis, hydrologic system performance, geotechnical, NEPA Compliance, real estate requirements, and the requester's review plan. NEPA compliance, ESA compliance, and the NHPA compliance should all be provided to the USACE.

- Section 10—A Section 10 of the Rivers and Harbors Act of 1899 is required for the construction of any structure in or over any navigable water of the United States. This includes dredging or disposal of dredged materials, excavation, filling, or channelization of the water, and any construction in the water, such as docks, piers, pilings, etc. In addition, compliance with other federal regulations will also need to be completed in order for the issuance of the Section 10 approval.

  Section 10 Navigable Waters of the United States within the Kansas City District, Corps of Engineers Regulatory Boundary. USACE Kansas City District identified the following nine navigable waters:

  - *Blue River* – From river mile 0.0 (mouth at Missouri River) upstream to mile 4.38 (within the city limits of Kansas City, Missouri);
  - *Gasconade River* – From river mile 0.0 to mile 107.0 (confluence with the Missouri River upstream to the vicinity of Arlington, in Phelps County, Missouri);
  - *Grand River* – From river mile 0.0 to mile 3.0 (confluence with the Missouri River upstream to the vicinity of Brunswick, in Chariton County, Missouri);
  - *Kansas River* – From river mile 0.0 to mile 170.4 (confluence with the Missouri River upstream to its confluence with the Republican and Smoky Hill Rivers in the vicinity of Junction City, in Geary County, Kansas);
  - *Lamine River* – From river mile 0.0 to mile 14.0 (confluence with the Missouri River upstream to the vicinity of Roberts Bluff Bridge in Cooper County, Missouri);
  - *Missouri River* – From river mile 49.8 to mile 552.7 (St. Charles County upstream to the Missouri/Iowa state line in Atchison County, Missouri);
  - *Osage River* – From river mile 0.0 to mile 81.7 (confluence with the Missouri River upstream to Bagnell Dam in Miller County, Missouri); and
  - *Lake of the Ozarks* – From lake mile 0.0 to mile 89.3 (Bagnell Dam to the vicinity of Warsaw, in Benton County, Missouri).

- Section 404—A Section 404 permit is from the Clean Water Act to regulate the discharge of dredged or fill materials into any waters of the United States (including wetlands). No discharge of dredged or fill material may be permitted if either a practical alternative exists, or the water would be significantly degraded. For the permit application, it should be shown how impacts are being minimized, and if needed, it is possible to provide compensation if there are unavoidable impacts.

- Section 401—If the project may involve placing materials in a lake, river, stream, dry streambed or wetland, and is within jurisdictional waters, it will be considered a regulated activity and may require a Section 401 Water Quality Permit.

Best Management Practices should be established to reduce stormwater pollution. Prior to construction activities, the contractor would be required to obtain an NDPDES permit and develop a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP would outline phasing for erosion and sediment controls, stabilization measures, pollution-prevention measures, and prohibited discharges. The SWPPP would also include BMPs to minimize erosion, sedimentation, and stormwater runoff (e.g. fiber rolls, straw waddles, erosion mats, silt fencing, turbidity barriers, mulching, filter fabric fencing, sediment traps and ponds, surface water interceptor swales, ditches). In addition, waste material would be disposed of in accordance with state and federal laws. The SWPPP should include dust control measures during construction.

The responsible party or the operator is required to submit a Notice of Intent (NOI) to the Environmental Protection Agency (EPA) before start of construction project and submit the Notice of Termination (NOT) to EPA when construction project is complete.

A jurisdictional determination is a decision by the USACE Kansas City Division as to whether areas on property are regulated under federal statutes. A federally-regulated wetland, lake, pond or stream is called a "waters of the U.S. USACE performs wetland delineations for potential applicants for permits under Section 404 of the CWA; however, this can take months and it is highly recommended that the potential applicant uses qualified consultants to conduct wetland delineations, especially for project of this magnitude.

However, the EPA released a final rule recently to replace the 2015 Waters of the United States (WOTUS) regulation, which provided additional federal pollution protections to large and small bodies of water in accordance with the Clean Water Act (CWA). The rule is the second piece in a two-step process to repeal and replace WOTUS, pursuant to Executive Order 13778 issued in 2017. The revised definition includes four categories: territorial seas and traditional navigable waters (TNWs); tributaries; lakes, ponds, and impoundments of jurisdictional waters; and adjacent wetlands. It also outlines which waters are not subject to federal control, such as bodies that contain water from rainfall, groundwater, many ditches, prior converted cropland, farm and stock watering ponds; and water treatment systems. The rule will take approximately 60 days following publication in the Federal Register.

7.3.2 Federal Safe Drinking Water Act, Missouri Safe Drinking Water Act

A permit is required if the proposed action plans to dispense water to the public, including submission of predesign studies and plans and specifications, system operation and reliability of the system. Missouri's Safe Drinking Water Commission 60 regulates such permit.

7.4 Clean Air Act of 1963

Under the Missouri Air Conservation Law and in accordance with the Clean Air Act (CAA), Missouri establishes the criteria pollutants have human health-based or welfare-based standards that set the maximum concentrations that are allowed in the ambient air (i.e. the air that the general public is exposed to). The federal standards for the criteria pollutants are known as the National Ambient Air Quality Standards (NAAQS). These criteria pollutants include particulate matter less than 10 microns in diameter (PM10), particulate matter less than 2.5 microns in diameter (PM2.5), sulfur dioxide (SO2), carbon monoxide (CO), ozone, nitrogen dioxide (NOx) and lead. Missouri has two additional pollutants which have ambient air quality standards in addition to the NAAQS. These include hydrogen sulfide and sulfuric acid.

- A list of all Ambient Air Quality Standards can be found at 10 CSR 10-6.010. List of regulated air pollutants, please refer to the Code of State Regulations, specifically 10 CSR 10-6.020(3) at the following website:
  - http://www.sos.mo.gov/adrules/csr/current/10csr/10csr.asp.
- EPA approves States Implementation Plan. The link provides the current status of Missouri Designated Areas:
  - https://www3.epa.gov/airquality/urbanair/sipstatus/reports/mo_areabypoll.html
- Air Quality Standards, Definitions, Sampling and Reference Methods and Air Pollution Control Regulations for the Entire State of Missouri can be found here:
  - https://www.sos.mo.gov/cmsimages/adrules/csr/current/10csr/10c10-6a.pdf

Carbon and non-carbon emissions cost savings resulting from the Heartland Port Project

The Heartland Port project is expected to help alleviate traffic congestion on the roadway and railways, and the potential to reduce truck and rail related emissions. This category of project benefits, freight emissions cost savings, captures the net savings in carbon emission damage costs resulting from truck and rail ton-miles saved (or avoided) due to truck/rail to barge freight diversion. Total net savings in carbon emission costs resulting from the port development project over the 2020-2045 timeframe, account for $46 million. Total net savings in non-carbon emission costs resulting from the port development project over the 2020-2045 timeframe account for $14.6 million (in 2016 dollars), as documented by the *2018 Central Missouri Multimodal Port Feasibility Study*.[35]

7.4.1 Air construction permits / new source review permits

Department of Natural Resources Air Pollution Control Program issues air construction permits. Construction permits are required for new air pollution source. Certain activities have been determined by the state to be a source of insignificant emissions and are exempt from permitting requirements per 10 CSR 10-6.061. Construction permits allow an installation to construct and operate an air emission source. There are various types of Air Permits: Air Pollution Control Program issues several types of construction permits: Major, Minor and De Minimis permits, portable relocation permits, temporary permits, and permits-by-rule. The Department of Natural Resources provides guidance on Air Quality:

- https://dnr.mo.gov/env/apcp/permits/constpmtguide.htm

7.5 Section 106 Tribal Land and Consultation

Agencies are required to consult on a "government-to-government" basis with federally-recognized Indian tribes and nations on projects receiving federal funds or requiring federal permits.

The lead agency or the project sponsor must consult with federally-recognized Indian tribes with ancestral, historic, and ceded land connections to Missouri. Consultation with tribes is intended to facilitate avoiding or minimizing project impacts to cultural resources that a tribe considers of historical or religious significance. A tribe must determine if the proposed project is located at or near known culturally significant

[35] Jefferson City Area Chamber of Commerce, *Central Missouri Multimodal Port Feasibility Study Final Report,* prepared by Cambridge Systematics and Hanson Professional Services, Jun 2018, pp. 9-77 - 9-79.

sites or localities. Placing this step early in the planning process allows the greatest opportunity to work to avoid or minimize adverse effects to these culturally sensitive/significant areas.

7.5.1 The Archeological Historic Preservation Act of 1970

The American Indian Religious Freedom Act of 1978 requires consultation with Native American groups concerning proposed actions on sacred sites on federal land or affecting access to sacred sites. It establishes federal policy to protect and preserve for American Indians, Eskimos, Aleuts, and Native Hawaiians the right to free exercise of their religion in the form of site access, use and possession of sacred objects, as well as the freedom to worship through ceremonial and traditional rites.

The Act requires federal agencies to consider the impacts of their actions on religious sites and objects important to American Indians, regardless of eligibility for listing on the NRHP.

The Native American Graves Protection and Repatriation Act of 1990 is triggered by the possession of human remains or cultural items by a federally-funded repository or by the discovery of human remains or cultural items on federal or Tribal lands and provides for the inventory, protection, and return of cultural items to affiliated Native American groups. Permits are required for intentional excavation and removal of Native American cultural items from federal or Tribal lands.

7.5.2 National Historic Preservation Act of 1966

Section 106 of the National Historic Preservation Act (16 U.S.C. § 470), as amended, requires that federally-funded projects be evaluated for the effects on historic and cultural properties included in, or eligible for listing on, the NRHP.

The MoDOT has communicated with a large number of Indian tribes and nations with ties to Missouri to identify areas of tribal interest and concern. To date, 26 federally-recognized Tribes have requested consultation about transportation projects in some portion of Missouri. MoDOT keeps confidential information regarding archaeological sites, traditional cultural properties, and sacred sites. MoDOT's Tribal Consultation Map indicates the following 10 federally-recognized Tribes in Cole County:

- Iowa Tribe of Kansas and Nebraska
- Iowa Tribe of Oklahoma
- Kaw Indian Nation of Oklahoma
- Miami Tribe of Oklahoma
- Osage Nation
- Ponca Tribe of Nebraska
- Ponca Tribe of Oklahoma
- Sac and Fox Tribe of the Missouri in Kansas and Nebraska
- Sac and Fox Tribe of the Mississippi in Iowa
- Sac and Fox Nation of Oklahoma

For the Heartland Port Project, the consultation process must seek, discuss, and consider the views of other participants, and, where feasible, seek agreement with them on matters arising in the Section 106 process. Typical Consulting Parties include:

- Federal Agency (USACE, FHWA, Forest Service, National Park Service, etc.)
- State Historic Preservation Office (SHPO)
- Tribes—see tribal consultation page

- Local governments with jurisdiction over historic properties
- Project applicants (MoDOT and local governments)
- Missouri Department of Natural Resources (MoDNR)
- Those with a demonstrated interest in the undertaking—legal or economic interest in the project or those with an interest in project effects on historic properties.

The Lead Agency and the project sponsor will need to work in close coordination with the MoDOT Historic Preservation Section to get the process started.[36] MoDOT will work with the State Historic Preservation Officer (SHPO) to identify consulting parties and invite them to participate in consultation. Participants must be conferred an official *"consulting party"* status. Consulting parties help the USACE and MoDOT make decisions. Because they often live in the community, consulting parties can help identify properties that are eligible for listing on the National Register of Historic Places. Consulting parties also help identify project effects on historic properties. An adverse effect occurs when a project alters the characteristics of a property that make it eligible for inclusion in the National Register in such a way that it diminishes the integrity of the historic property. If a project will have an adverse effect, consulting parties help to identify ways to minimize or mitigate the effect. A Section 106 Project Form must be completed in order to initiate the process. SHPO Section 106 Survey Memo Form, MO 780-1718 must be completed by a professional archaeologists or architectural historians reporting survey results. According to 36 CFR Part 800, Federal agencies are responsible for initiating Section 106 review. The Missouri State Historic Preservation Officer (SHPO) within the Department of Natural Resources, coordinates the state's historic preservation program and consults with agencies during Section 106 review. The process will include a cultural resource survey/inventory, consultation with SHPO and Tribes.

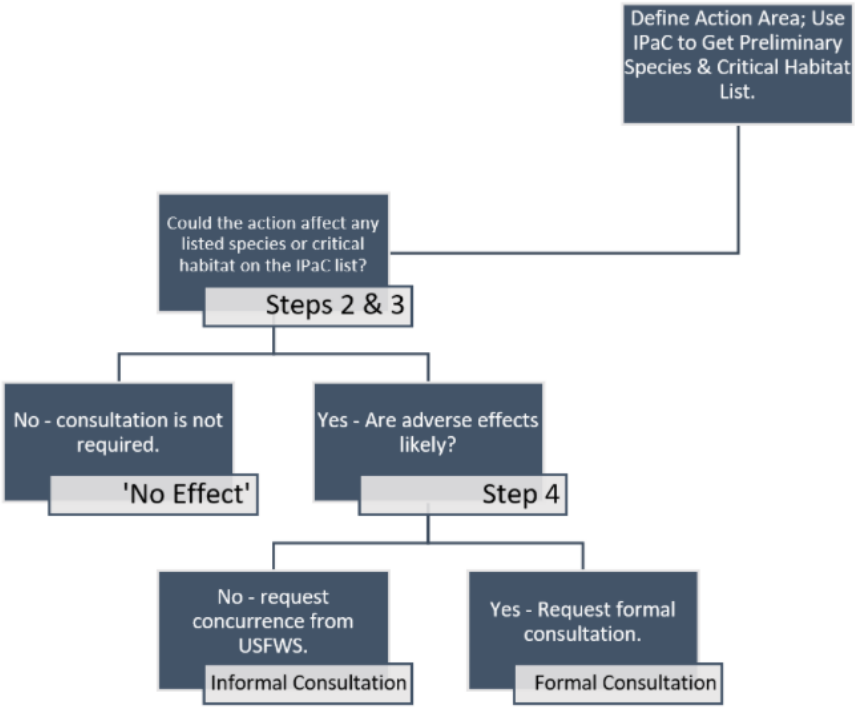
7.6 Section 7 Fish and Wildlife Service Endangered Species Act

Section 7 of the Endangered Species Act of 1973 (ESA) requires all Federal agencies to use their authorities to conserve endangered and threatened species in consultation with U.S. Fish and Wildlife Service (USFWS). This 'proactive conservation mandate' for Federal agencies is articulated in section 7(a)(1) of the law. Section 7(a)(2) contains a complementary consultation mandate for Federal agencies, which we discuss below. Under the Section 7 implementing regulations (50 CFR Part 402), Federal agencies must review their actions to determine whether they may affect endangered or threatened species or critical habitat. To accomplish this, Federal agencies must determine whether any listed species may be present in the action area and whether that area overlaps with critical habitat. If one or more listed species may be present in the action area – or if critical habitat overlaps with the action area – agencies must evaluate the potential effects of their action.

Agencies must confer with the USFWS per Section 7(a)(4) of the ESA if any action is likely to jeopardize a species proposed for listing or to destroy or adversely modify proposed critical habitat. To determine whether either of these are likely, agencies may follow the same approach that we recommend for listed species and designated critical habitat – that is, evaluate the likely effects of their actions on any proposed species that may be present in the action area and on any proposed critical habitat that overlaps with the action area. Step-by-step instructions for Section 7 Consultation technical assistance are provided in Figure 80.

[36] To get the process started the HPA must contact MoDOT Historic Preservation Manager. For contact information and a more comprehensive overview of the entire process please see https://www.modot.org/consultation-under-section-106.

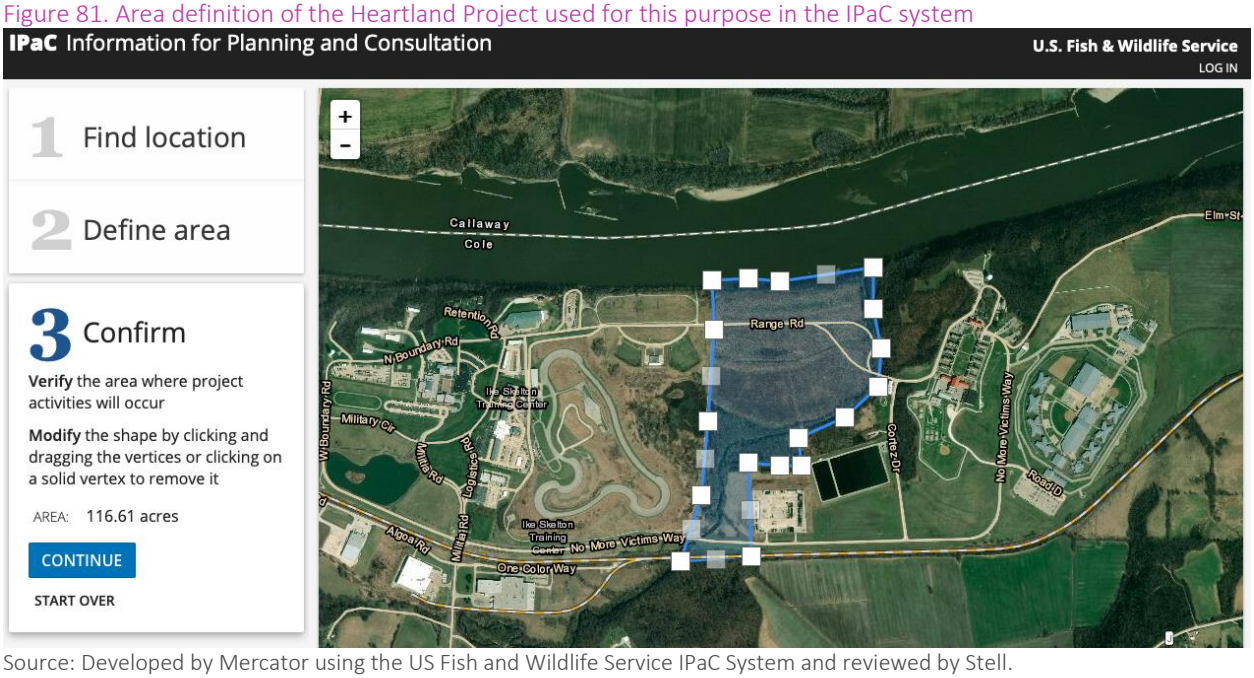
Figure 80. Section 7 Consultation technical assistance process



Source: US Fish and Wildlife Service.

Mercator and its environmental subconsultants utilized the tools provided online by the US Fish and Wildlife Service under the Section 7 Consultation to determine whether a listed or proposed species or designated or proposed critical habitat may be present within the action area.[37] The area definition of the Heartland Project used for this purpose in the IPaC system is illustrated in Figure 81.

Figure 81. Area definition of the Heartland Project used for this purpose in the IPaC system



Source: Developed by Mercator using the US Fish and Wildlife Service IPaC System and reviewed by Stell.

[37] US Fish and Wildlife Service, Information for Planning and Consultation (IPaC), project planning tool, https://ecos.fws.gov/ipac/

7.6.1 Endangered Species Act of 1973

Formal Consultation with the United States Fish and Wildlife Midwest Region is required if an action is likely to "adversely affect" listed species and designated critical habitat. For proposed species, further consultation is required only if the action is likely to "jeopardize the continued existence" of the species or result in "destruction or adverse modification" of critical habitat. Federal agencies are required to determine whether their actions may affect listed or proposed species and designated and proposed critical habitat. In order to successfully execute a proposed Action. Biological Assessments (BA) are only required for "major construction activities," which are Federal actions that may significantly affect the quality of the human environment. The purpose of a biological assessment is to evaluate the potential effects of the action on listed and proposed species and designated and proposed critical habitat and determine whether any such species or habitat are likely to be adversely affected by the action. Section 7 Endangered Species Act Consultation, it is recommended that the proponent conduct a Biological Assessment to support conclusions regarding the effects of their proposed actions on protected resources.

Listed species and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries). Based on the analysis conducted using the IPaC System, Mercator identified the following as listed, proposed, or candidate endangered species in the Heartland Port Project area, shown in Table 37.

Table 37. Presence of listed, proposed, or candidate endangered species in the Heartland Port Project Area

Listed species	Is the species' habitat present in the action area?	Conclusion	Next step	Comments
▪ Pallid Sturgeon (Scaphirhynchus albus)	▪ May be present	▪ Informal consultation required	▪ Informal Consultation with USFWS	
▪ Gray Bat (Myotis grisescens)	▪ May be present	▪ Informal consultation required	▪ Informal Consultation with USFWS	
▪ Indiana Bat (Myotis sodalist)	▪ May be present	▪ Informal consultation required	▪ Informal Consultation with USFWS	
▪ Northern Long-eared Bat (Myotis septentrionalis)	▪ May be present	▪ Informal consultation required	▪ Informal Consultation with USFWS	▪ Species listed as threatened

7.6.2 Migratory Bird Treaty Act (MBTA)

Protection for migratory birds is provided under the Migratory Bird Treaty Act (MBTA) (916 U.S.C. § 703–711). The MBTA regulates impacts on migratory birds, such as taking, direct mortality, habitat degradation, and displacement of individual birds. The MBTA defines 'taking' to include by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof, except when specifically permitted by regulations. The MBTA regulates impacts on migratory birds, such as taking, direct mortality, habitat degradation, and displacement of individual birds. The MBTA defines 'taking' to include by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof, except when specifically permitted by regulations.

Certain birds are protected under the MBTA and the Bald and Golden Eagle Protection Act. The birds listed in Table 38 are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in the area of the Heartland Port Project. Based on the analysis conducted using the IPaC System, Mercator identified the following species as listed, proposed, or candidate migratory birds in the Heartland Port Project area.

Table 38. Presence of listed, proposed, or candidate migratory birds in the Heartland Port Project Area

Listed migratory birds	Is the species' habitat present in the action area?	Conclusion	Next step	Comments
▪ Bald Eagle ▪ (Haliaeetus leucocephalus)	▪ May be present	▪ No consultation needed.	▪ Informal Consultation with USFWS	▪ Most likely to be present year-round
▪ Blue-winged Warbler ▪ (Vermivora pinus)	▪ May be present	▪ No consultation needed.	▪ Informal Consultation with USFWS	▪ Most likely to be present in April
▪ Cerulean Warbler ▪ (Dendroica cerulea)	▪ May be present	▪ No consultation needed.	▪ Informal Consultation with USFWS	▪
▪ Kentucky Warbler ▪ (Oporornis formosus)	▪ May be present	▪ No consultation needed.	▪ Informal Consultation with USFWS	▪ Most likely to be present April-June
▪ Red-headed Woodpecker ▪ (Melanerpes erythrocephalus)	▪ May be present	▪ No consultation needed.	▪ Informal Consultation with USFWS	▪
▪ Wood Thrush ▪ (Hylocichla mustelina)	▪ May be present	▪ No consultation needed.	▪ Informal Consultation with USFWS	▪

The Nationwide Standard Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year-round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure.

General Measures as defined by the Nationwide Standard Conservation Measures include:

- Educate all employees, contractors, and/or site visitors of relevant rules and regulations that protect wildlife. See the Service webpage on Regulations and Policies for more information on regulations that protect migratory birds.
- Prior to removal of an inactive nest, ensure that the nest is not protected under the Endangered Species Act (ESA) or the Bald and Golden Eagle Protection Act (BGEPA). Nests protected under ESA or BGEPA cannot be removed without a valid permit. See the Service Nest Destruction Policy.
- Do not collect birds (live or dead) or their parts (e.g., feathers) or nests without a valid permit. Please visit the Service permits page for more information on permits and permit applications. Provide enclosed solid waste receptacles at all project areas. Non-hazardous solid waste (trash) would be collected and deposited in the on-site receptacles. Solid waste would be collected and disposed of by a local waste disposal contractor. For more information about solid waste and how to properly dispose of it, see the EPA Non-Hazardous Waste website.
- Report any incidental take of a migratory bird, to the local Service Office of Law Enforcement.

- Consult and follow applicable Service industry guidance.
- Habitat Measures as defined by the Nationwide Standard Conservation Measures include:
- Minimize project creep by clearly delineating and maintaining project boundaries (including staging areas).
- Consult all local, State, and Federal regulations for the development of an appropriate buffer distance between development site and any wetland or waterway.
- Maximize use of disturbed land for all project activities (i.e., siting, lay-down areas, and construction).
- Implement standard soil erosion and dust control measures. For example: (i) Establish vegetation cover to stabilize soil, (ii) Use erosion blankets to prevent soil loss, and (iii) Water bare soil to prevent wind erosion and dust issues.

Additional measures and/or permits may be advisable depending on the type of activity and the type of infrastructure or bird species present on the project site. A complete list of the Nationwide Conservation Measures can be found here.[38]

7.6.3 Fish and Wildlife Coordination Act

Fish and Wildlife Coordination Act gives the National Oceanic and Atmospheric Administration (NOAA) an important advisory role to review and comment on proposed federally permitted activities that could affect living marine resources. As amended in 1964, the act requires that all federal agencies consult with NOAA Fisheries, U.S. Fish and Wildlife Service, and state wildlife agencies when proposed actions might result in modification of a natural stream or body of water. Federal agencies must consider how these projects would affect fish and wildlife and provide for improvement of these resources. Essential Fish Habitat mapper can be found here: https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper

The act allows NOAA Fisheries to provide comments to the U.S. Army Corps of Engineers during review of projects under section 404 of the Clean Water Act (concerning the discharge of dredged materials into navigable waters) and section 10 of the Rivers and Harbors Act of 1899 (obstructions in navigable waterways). NOAA Fisheries comments provided under the Fish and Wildlife Coordination Act are intended to reduce environmental impacts to migratory, estuarine, and marine fisheries and their habitats.

7.7 Wetlands

Lastly, in order to meet USACE's Dredge and Fill Wetlands Permit Requirements, a wetland delineation is recommended. USACE Wetlands Delineations Manual contains information to identify wetlands. All delineations must be conducted in accordance with the 1987 Corps of Engineers Wetlands Delineation Manual, or appropriate Regional Supplement, and submitted to the District for review and verification.

Based on the outcomes from the IPaC System, Mercator utilized the U.S. Fish and Wildlife Service's Wetlands Mapper tool to generate current information on the status, extent, characteristics and functions of wetlands, riparian, and deepwater habitats. This information is intended to promote the understanding and conservation of wetland resources and to aid in resource management, research and decision making. The Wetlands Mapper shows wetland type and extent using a biological definition of wetlands. There is no attempt to define the limits of proprietary jurisdiction of any Federal, State, or local government, or to

[38] US Fish and Wildlife Service, Nationwide Standard Conservation Measures, https://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

establish the geographical scope of the regulatory programs of government agencies.39 Based on this analysis, Mercator identified the following wetlands, riparian, and deepwater habitats in or near the Heartland Port Project according to their respective classification codes and definitions, as per the U.S. Fish and Wildlife Service, which are illustrated in Figure 82.

- The Missouri River (R2BUH)—Defined as riverine habitat up-river from freshwater tidal areas are classified as R2UBH (Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded) where gradients are low, water velocity is slow, there is no tidal influence, and water flows throughout the year. Mercator estimates that no more than 2 acres of this area, located on the river adjacent to the northern side of the parcel, will be impacted from the construction of the dock, dolphin, and cell structures.
- Rising Creek (R2UBGx)—The Rising Creek is classified as a Riverine habitat and it divides the Heartland Port Project area diagonally from the northeast side of the area, connecting with the Missouri River, to the southwest area of the parcel. The U.S. Fish and Wildlife Service divides this wetland in two segments: (i) The North Half of the Rising Creek and (ii) The South Half of the Rising Creek. The North Half occupies an area of 1.2 acres and the South Half occupies 1.4 acres.
- Freshwater Emergent Wetland (PEM1/SS1A)—Two areas immediately adjacent to the Rising Creek on the south side. The largest and main wetland is on the right side and it measures 3.4 acres. The smaller of these two wetlands is located to the left, also on the south side of the Rising Creek before the curve, and it measures 0.4 acres.
- Freshwater Ponds (PUBKx)—Two areas on the south side of the Rising Creek. The pond on the right is 1.9 acres and the pond on the left is 1.8 acres.

Figure 82. Inventory of wetlands, riparian, and deepwater habitats in and near the Heartland Port Project

Source: Developed by Mercator using the U.S. Fish and Wildlife Service's Wetlands Mapper tool. Reviewed by Stell.

[39] US Fish and Wildlife Service, Wetlands Mapper tool, https://www.fws.gov/wetlands/data/Mapper.html

7.7.1 Floodplain management

Executive Order 11988 adopts a higher flood standard for future federal investments in and affecting floodplains. This includes projects where federal funds are used to build new structures and facilities or to rebuild those that have been damaged. The guidelines address an eight-step process that agencies should carry out as part of their decision-making on projects that have potential impacts to or within the floodplain. There are eight steps in the decision-making process required in Section 2(a) of the Order.

7.8 Missouri Department of Natural Resources (DNR)

The Missouri Department of Natural Resources helps to develop mineral, oil and gas resources in an environmentally safe manner, while promoting the environmentally sound operations of businesses, communities, agriculture, and industries in the state. The department and its Water Resources Center has statutory authority for water quantity issues such as statewide water use and availability, water resources monitoring and planning, drought assessment, flood and hydrology studies and wetland studies. The Surface Water Section provides technical support by performing water supply analyses, in-stream flow assessments and floodplain studies. The surface water section also administers the collection and analysis of statewide water use data in accordance with the Major Water User Law. Depending on the final configuration of the Heartland Port Project, compliance with additional regulations established by the DNR might be required. A complete list is included here.[40]

The Missouri DNR issues permits for wetland or dredge and fill, and land disturbance activities. These permits are required for any construction, placement, disposal or fill material, or earth movement within a wetland or body of water. Any land disturbance activities of greater than an acre will require a permit. Within the permit it is also required to have a stormwater pollution prevention plan implemented to reduce pollution to the waters. Additionally, the DNR also issues 401 permits. The Clean Water Act section 401 certification can be needed in tandem with a section 404, at the USACE discretion. The Missouri DNR has authority to issue 401 certification, and would evaluate the application, if needed.

7.8.1 Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

Hazardous substance, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. § 9601(14)), is defined as: "(A) any substance designated pursuant to section 1321(b)(2)(A) of Title 33; (B) any element, compound, mixture, solution, or substance designated pursuant to section 9602 of this title; (C) any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Resource Conservation and Recovery Act (RCRA) of 1976, as amended, (42 U.S.C. § 6921); (D) any toxic pollutant listed under section 1317(a) of Title 33; (E) any hazardous air pollutant listed under Section 112 of the CAA (42 U.S.C. § 7412); and (F) any imminently hazardous chemical substance or mixture with respect to which the Administrator of the USEPA has taken action pursuant to section 2606 of Title 15. The term does not include petroleum, including crude oil or any fraction thereof, which is not otherwise specifically listed or designated as a hazardous substance, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas)."

[40] Missouri Department of Natural Resources (DNR), Forms, Applications, Permits, Manuals and Other Documents https://dnr.mo.gov/forms/

7.8.2 Resource Conservation and Recovery Act (RCRA)

Resource Conservation and Recovery Act (RCRA) defines a hazardous waste in 42 U.S.C. § 6903, as "a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may: (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed."

7.8.3 Missouri Hazardous Waste Management Law

Facilities and properties that (1) have documented releases of hazardous substances or wastes to the environment or (2) manage hazardous substances or wastes in substantial quantities and have the potential to release hazardous substances or wastes to the environment are required to report these activities to federal and state regulatory agencies. The Missouri Department of Natural Resources Hazardous Waste and Enforcement Unit and USEPA maintain databases to track and monitor these facilities and properties. The Hazardous Waste and Enforcement Unit handles hazardous waste permits and ensures compliance with hazardous waste laws and regulations: Revised Statutes of Missouri (Chapter 260.350-260.575), Code of Federal Regulations (40 CFR 260 – 279) and Code of State Regulations (10 CSR 25).

7.8.4 Toxic Substance and Control Act (TSCA)

The law requires all commercial Polychlorinated Biphenyl (PCB) facilities in Missouri obtain a hazardous waste permit from the Missouri Department of Natural Resources. The department's Hazardous Waste Program inspects these facilities to make sure they are following TSCA requirements. The department must also keep an updated list of all commercial PCB facilities in the state.

7.8.5 Missouri Soil Conservation Section 278

Refer to Soil and Water Districts Commission - Division 70

7.8.6 Missouri Solid Waste Management Law

Section 260.200 through 260.345 only handled by Missouri Solid Waste Division 80.

7.9 Missouri Conservation Department

The Missouri Department of Conservation can be a resource for new projects. The Missouri Conservation Department works with communities across the state to decrease the negative impacts of urbanization or construction projects on fish, forests, and wildlife or to benefit from the wiser use of natural resources. Communities turn to MDC every year for technical assistance. On their publication *Conservation Planning Tools for Missouri Communities—A Reference Manual*, the department outlines tools and strategies aimed to promote conservation practices that are applicable to the growth and management of all Missouri communities.[41]

This document recommends the development of a natural resource inventory (NRI). The NRI is a report that contains maps and descriptions of existing natural resources within the area of interest such as a the Heartland Port Project area. Most, if not all, of the guidelines recommended by this document will be satisfied by the EIS. Nonetheless, equipped with the results of an NRI and an assessment of the physical

[41] Missouri Conservation Department, *Conservation Planning Tools for Missouri Communities—A Reference Manual, https://mdc.mo.gov/sites/default/files/downloads/Conservation%20Planning.pdf.*

condition of local natural resources, this document recommends that planners and community leaders can work with the public to craft a vision and set goals related to conservation.

Guiding principles that may be discussed during this process include:

- Ecosystem management—An approach to natural resource management that focuses on sustaining ecosystems to meet both ecological and human needs in the future. Ecosystem management is adaptive to changing needs and new information. It promotes a shared vision of a desired future by integrating social, environmental and economic perspectives to manage geographically defined natural ecological systems. An ecosystem is a dynamic complex of plant, animal and microorganism communities and their nonliving environment interacting as a functional unit.
- Ecosystem, capital value—The present value of the stream of ecosystem services that an ecosystem will generate under a particular management or institutional regime.
- Ecosystem, direct use value—The benefits derived from the services provided by an ecosystem that are used directly by an economic agent. These include consumptive uses (e.g. harvesting goods) and non-consumptive uses (e.g. enjoyment of scenic beauty). Agents are often physically present in an ecosystem to receive direct use value.
- Ecosystem, indirect use value—The benefits derived from the goods and services provided by an ecosystem that are used indirectly by an ecosystem.

Lastly, the Missouri Department of Conservation provides grants and funding opportunities related to promotes sustainable development practices and the establishment of natural resource conservation practices in urban and developing areas. For some of these opportunities, eligible property includes lands in public ownership or open to the public. Private property is only eligible when another partner(s) is providing at least a 1:1 cash match or when the private property extends or connects projects on public land by providing stormwater conveyance, habitat connectivity, or other public benefits. This might be a resource for the Heartland Port Project. A list of is provided here.[42]

7.10 Noise impact

Federal Highway Administration (FHWA) has given MoDOT on flexibility of implementing Noise Standard at 23 CFR Part 772. MoDOT program to implement FHWA Noise Standard include traffic noise prediction requirements, noise analyses, noise abatement criteria and requirements for informing local officials. It would be beneficial to determine the need for a noise study early in project scoping.

7.11 Executive Order 12898: Environmental Justice in Minority and Low-Income Populations

In order to meet Executive Order 12898, the EIS must identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law. The order also directs each agency to develop a strategy for implementing environmental justice. The order is also intended to promote nondiscrimination

[42] Missouri Department of Conservation, Funding Opportunities, https://mdc.mo.gov/property/community-conservation/community-conservation-funding-opportunities

in federal programs that affect human health and the environment, as well as provide minority and low-income communities access to public information and public participation.

7.12 Other laws and regulations

The initial boundaries of the Heartland Port Authority include Counties of Callaway and Cole County, including Jefferson City. Further discussion required to ensure that project meets local laws and ordinances.

All project activities must adhere to OSHA Regulations (Standard 1926, 29 CFR).

Appendix A: Inventory of private river terminals and docks

Table A1. Private river terminals and docks—main purpose and commodities handled

ID	Port	Operator	Owner	Main purpose and commodities	Railway
1	**St Louis**	St Louis Municipal River Terminal	St Louis Municipal River Terminal	Receipt and shipment of grain, salt, scrap metal, sand, coal, project cargo	Direct access to Terminal Railroad Association, a local short-line railroad serving the entire PMSL
2		Fort Bellefontaine Quarry Co	Fort Bellefontaine Quarry Co	Receipt of sand; and occasional shipment of stone.	None.
3		Capital Sand Co Inc	Capital Sand Co Inc	Receipt of sand.	None.
4		St. Charles Sand Co Inc	St. Charles Sand Co Inc	Receipt of sand.	None.
5		Central Stone Co	Knox County Stone Inc	Receipt of sand; and occasional shipment of stone.	BNSF (non-operational)
6	**St Louis**	Bulk Service Corp	Bulk Service Corp	Shipment of grain, grain byproducts, soybean meal, soda ash, and miscellaneous dry-bulk commodities including coal.	Four 80-car-capacity surface tracks serve three undertrack pits; connect with
7	**St Louis**	ConocoPhillips	ConocoPhillips	Shipment of crude petroleum, asphalt, and benzene.	Plant trackage at rear; connects with NS
8	**St Louis**	ConocoPhillips	ConocoPhillips	Shipment of lubricating oil, asphalt, and petroleum products.	Plant trackage connects with NS
9	**St Louis**	ConocoPhillips	ConocoPhillips	Receipt and shipment of No. 6 fuel oil; and shipment of petroleum products.	Plant trackage connects with NS
10	**St Louis**	ConocoPhillips	ConocoPhillips	Shipment of petroleum products.	Plant trackage connects with NS
11	**St Louis**	American River Transportation Co	Archer Daniels Midland Co	Receipt and shipment of petroleum and other miscellaneous bulk liquids.	Two 15-car-capacity surface tracks at rear; connect with UP
12	**St Joseph**	Bartlett and Co	Bartlett and Co	Shipment of grain.	Four 75-empty-car surface tracks; and 40-loaded-car surface tracks serve four undertrack pits and three loading spouts; connect with UP
13	**St Joseph**	Holliday Sand and Gravel Co	Holliday Sand and Gravel Co	Receipt of sand and gravel.	None.
14	**Kansas City**	LaFarge Corp Cement Group	LaFarge Corp., Cement Group	Shipment of cement.	Two surface tracks serve cement plant at rear; connect with Burlington Northern Santa Fe Railway.
15	**Kansas City**	Holliday Sand and Gravel Co	Holliday Sand and Gravel Co	Receipt of sand and gravel at lower dock; and mooring barges at upper dock.	None.
16	**Kansas City**	HCI Chemtech Corp	HCI Chemtech Corp	Receipt of coke, asphalt, and caustic soda.	One 6-car-capacity surface track serves terminal at rear; connects with Burlington Northern Santa Fe Railway.
17	**Kansas City**	Cargill Inc	Cargill Inc	Shipment of grain.	Four 45-car-capacity surface tracks serving undertrack pit and loading spouts join trackage of Norfolk Southern Railway; connects with Burlington Northern Santa Fe Railway.
18		AgriServices of Brunswick LLC	Brunswick River Terminal Inc	Receipt of liquid- and dry-bulk fertilizer; occasional shipment of grain	Two 24-car-capacity surface tracks serve two undertrack pits; connect with NS
19	**Kansas City**	Bartlett and Co	The Kansas City-Wyandotte County Joint P Author	Shipment of grain.	Seventy-two car trackage serves undertrack pits and loading spouts at grain elevator in rear; connects with P
20	**Kansas City**	Mid-West Terminal Warehouse Co	Mid-West Terminal Warehouse Co	Receipt and shipment of miscellaneous bulk materials; and receipt of salt and dry-bulk fertilizer.	Forty-nine car trackage serves terminal at rear; connects with UP
21		Bartlett and Co	Bartlett and Co	Receipt of liquid fertilizer; and shipment of grain.	One 5-car-capacity surface track serves undertrack pit and loading spout; connects with UP
22		Mid-Missouri Cooperative	Mid-Missouri Cooperative	Shipment of grain.	One 12-car-capacity surface track serves loading spout; connects with UP
23		Ergon Aaphalt	Ergon Aaphalt Inc	Receipt of calcium chloride and asphalt.	One surface track serves two loading spouts; connects with UP

ID	Port	Operator	Owner	Main purpose and commodities	Railway
24		ADM/Growmark	ADM/Growmark	Shipment of grain.	Three 60-car-capacity surface tracks serve three undertrack pits with loading spout; connect with UP
25		Chemtronics Inc	Chemtronics Inc	Receipt of liquid fertilizer.	One 5-car-capacity surface track serves terminal at rear; connects with UP
26		Maczuk Industries Inc	Maczuk, Industries Inc	Receipt of liquid fertilizer.	None.
27		Jefferson City River Terminal	Jefferson City River Terminal	Receipt of cement; and shipment of grain; mooring barges for fleeting.	None.
28		Hermann Sand & Gravel Inc	Hermann Sand & Gravel Inc	Receipt of sand and gravel. Occasional shipment of Forest Products, Lumber, Logs, Woodchips	None.
29		Leuke Hauling Inc	Leuke Hauling Inc	Receipt of sand.	None.
30		Lexington Sand Co	Capital Sand Co Inc	Receipt of sand.	None.
31		MFA Inc	MFA Inc	Receipt of dry-bulk fertilizer; and shipment of grain.	One 5-car-capacity surface track serves loading spout; connects with UP
32		Glasgow Cooperative Assoc	Glasgow Cooperative Assoc	Shipment of grain.	One 15-car-capacity surface track serves loading spout; connects with Gateway Western Railway.
33		Glasgow Sand Plant	Capital Sand Co Inc	Receipt of sand.	None.
34		Capital Sand Co Inc	William Sapp	Receipt of sand.	None.
35		Interstate Marine Terminals	Howard Cooper Reg. Port Authority	Receipt of liquid fertilizer, miscellaneous dry-bulk materials including fertilizer and salt; shipment of grain.	None.
36	St Louis	Koch Fertilizer Storage and Terminal	Current Owner: Koch Nitrogen	Receipt and shipment of anhydrous ammonia.	Two surface tracks serve ten-jumbo-car-capacity loading rack at terminal in rear; connect with NS
37	St Louis	Dynegy Midwest Generation Inc	Dynegy Midwest Generation Inc	Receipt of coal.	One 150-car-unit surface-loop track serves car pit at power plant in rear; connects with NS
38	St Louis	ConAgra Foods Inc	ConAgra Foods Inc	Receipt of grains wheat and occasionally rye; shipment of pellets (pressed wheat-processing waste).	One surface track serving undertrack pit and car-dumper connects with NS. Four-part platform-level tracks serving adjacent flour mill connect with UP.
39	St Louis	Bluff City Minerals	Fred Weber Inc	Receipt of sand.	None.
40	St Louis	Petroleum Fuel and Terminal Co	Centerpoint Terminal Co	Receipt and shipment of Petroleum and Petroleum Products, asphalt, gasolines.	Two surface tracks serve 8-car-capacity loading rack and 16-car unloading rack at terminal in rear; connect with NS
41	St Louis	ADM/Growmark	City of St Louis	Receipt and shipment of grain and fertilizers	Four 105-car-capacity surface tracks serve two hopper-car pits; connect with BNSF.
42	St Louis	Lange-Stegmann Co	City of St Louis.	Receipt of liquid bulk, drybulk fertilizer; and dry-bulk commodities coal, coke, ores, grain, salt	Fourteen surface tracks serving four railcar pits at rear have capacity for three-hundred cars; joins trackage of Terminal Railroad Association of St Louis connecting with BNSF.
43	St Louis	Bulk Service Corp	Bulk Service Corp	Shipment of dry-bulk commodities including grains and fertilizer	Three surface tracks serving three railcar pits join tracks of Terminal Railroad Association of St Louis; connects with NS
44	St Louis	Continental Cement Co	Continental Cement Co Inc	Receipt of cement.	One unused surface track serves undertrack pit; connects with Terminal Railroad Association of St Louis.
45	St Louis	Center Point Terminal Co	Apex Oil Co	Receipt and shipment of fuel oil and asphalt.	None.
46		Holcim U.S. Inc	Holcim U.S. Inc	Receipt of coal, coke, and tire chips; shipment of cement.	Three surface tracks serve loading spouts at plant in rear; connect with tracks of BNSF.
47		Hercules Inc	U.S. Army Corps of Engineers	Receipt of methanol, coal, coke, fertilizers, Sulphur (Dry), Clay & Salt Occasional Grains	One surface track serves plant at rear; connects with tracks of BNSF.

ID	Port	Operator	Owner	Main purpose and commodities	Railway
48		Wayne B. Smith Inc	Wayne B. Smith Inc	Receipt and shipment of dry-bulk commodities including sand, ores, coal, fertilizer, salt, aggregates, and occasional grain.	One surface track serves yard at rear; connects with tracks of BNSF.
49		Bunge North America Inc	Bunge North America Inc	Shipment of grain.	None.
50		Continental Cement Co LLC	Continental Cement Co LLC	Shipment of cement.	Trackage serving cement plant in rear; connects with Burlington Northern Santa Fe Railway.
51		Continental Cement Co LLC	Continental Cement Co LLC	Receipt of coal for plant consumption; and mooring company- owned barges for maintenance and repair.	Trackage serving cement plant at rear; connects with Burlington Northern Santa Fe Railway.
52		Bunge North America Inc	Bunge North America Inc	Shipment of grain.	None.
53	St Louis	Broadway Petroleum Co	Broadway Petroleum Co LLC	Receipt and occasional shipment of asphalt.	At time of '90 survey, one 7-car-capacity surface track served terminal at rear connecting with UP; however, at time of '03 survey, operation had shut down.
54	St Louis	Italgrani Elevator	Italgrani Elevator Co	Receipt and shipment of grain.	Four surface tracks at rear serve four undertrack pits; connect with UP
55	St Louis	ConocoPhillips	ConocoPhillips	Receipt and shipment of petroleum products.	One surface track serves terminal 1.5 miles in rear; connects with NS
56	St Louis	Phoenix Terminal Co	Mr. William Brown	Receipt and shipment of steel products, lumber, and drybulk commodities including sand, grain, coal, and coke.	None.
57	St Louis	Marathon Ashland Pipe Line LLC	Marathon Ashland Pipe Line LLC	Receipt and shipment of petroleum products.	None.
58		Winfield Grain Co Inc	Winfield Grain Co Inc	Shipment of grain.	None.
59	St Louis	The Premcor Refining Group	The Premcor Refining Group	Receipt and shipment of petroleum products.	None.
60	St Louis	The Valvoline Co	Ashland Inc	Receipt of lubricating oil.	One surface track serves 3-car-capacity unloading rack; connects with UP
61	St Louis	Buzzi Unicem USA	Buzzi Unicem USA Inc	Receipt of bulk cement.	None.
62	St Louis	J. D. Streett & Co	J. D. Streett & Co Inc	Receipt and shipment of petroleum products.	None.
63	St Louis	American River Transportation Co	Archer Daniels Midland Co	Receipt and shipment of petroleum products; and mooring-and-handling supplies for company-owned boats.	Two surface tracks serve four loading positions at terminal in rear; connect with UP
64	St Louis	Kinder Morgan Transmix LLC	Buckeye Pipe Line LLC South St Louis Terminal Dock	Receipt and shipment of asphalt and petroleum products.	One surface track with four loading stations; connects with UP
65	St Louis	Brenntag Mid-South	Brenntag Mid-South Inc	Receipt and shipment of miscellaneous liquid chemicals and petrochemicals.	One surface track at rear serves 9-car-capacity loading rack; connects with UP
66	St Louis	Buzzi Unicem USA	Buzzi Unicem USA Inc	Receipt of bulk cement and fertilizers	At time of '90 survey, two 16-car-capacity surface tracks served undertrack pit and loading spout connect- ing with UP; however, at time of '03 survey, operation had shut down.
67	St Louis	Peavey/Conagra Foods	Eagle Marine Industries Inc	Upper berth: Receipt of coal. Lower berth: Receipt and shipment of dry-bulk materials including grain, grain by-products, fertilizer, and chemicals.	Three 75-car-capacity surface tracks serve undertrack pit; connect with Alton & Southern Railway.
68	St Louis	Cahokia Marine Service Inc	Cahokia Marine Service Inc	Receipt and shipment of general cargo; steel products, grain, liquid- and dry-bulk fertilizer; and dry-bulk coal and sand (see Remarks).	Surface tracks serving terminal at rear join trackage of CSX Transportation, Inc.; connects with UP
69	St Louis	Kiesel Marine Service Inc	Mississippi River Sand and Material Co	Occasional receipt of petroleum products.	None.
70	St Louis	Peavey/Conagra Foods	Canadian National/Illinois Central Railroad	Shipment of dry-bulk commodities including coal; and mooring barges for fleeting.	One surface track serving undertrack pit joins four 112-car-capacity surface storage tracks; connect with Terminal Railroad Association of St Louis.

ID	Port	Operator	Owner	Main purpose and commodities	Railway
71	**St Louis**	Fred Weber Inc	City of St Louis	Occasional receipt of sand.	None.
72	**St Louis**	Cargill AgHorizons	Cargill AgHorizons	Shipment of grain.	One surface track serving undertrack railpit joins three surface storage tracks of Terminal Railroad Association; connect with Kansas City Southern Railroad.
73	**St Louis**	St Louis Auto Shredding Inc	Terminal Railroad Association of St Louis	Shipment of scrap metal.	None.
74	**St Louis**	J. D. Streett & Co Inc	J. D. Streett & Co Inc	Receipt of petroleum products, caustic soda, ethylene glycol, and ethanol.	Two surface tracks serve 4-station loading rack; connect with UP
75	**St Louis**	American Commercial Terminals Inc	City of St Louis	Shipment of coal.	Two parallel surface tracks, capacity one-hundred-and-thirty-five cars (unit train) serve rotary car dumper, rate twenty-five cars per hour; connect with BNSF.
76	**St Louis**	Mid-Coast Terminal Co	Mid-Coast Terminal Co	Receipt and shipment of gral cargo, steel, liquid, drybulk fertilizer, packaged goods, and miscellaneous dry- bulk.	Three surface tracks at rear of transit sheds; connect with NS
77	**St Louis**	The American Milling Co.	Alton & Southern Railway	Receipt and shipment of miscellaneous dry-bulk materials including grain, coal, salt, fertilizer, and livestock feed.	Three 100-car-capacity surface tracks serve terminal at rear; connects with Alton & Southern Railway.
78		Ameren Union Electric Corp	Ameren Union Electric Co	Receipt of coal for plant consumption.	None.
79		Joe Tori Dredging Inc	Lafarge North America	Receipt of sand.	None.
80	**St Louis**	Beelman River Terminals Inc	Beelman River Terminals Inc	Receipt and shipment of general cargo; drybulk commodities grain, coal, coke, sand, scrap metal, ores; liquid-bulk.	None
81	**St Louis**	Slay Bulk Terminals and Kinder Morgan	Slay Bulk Terminals Inc. and City of St Louis	Receipt of liquid chemicals.	Previous to dock's initial '80 survey, it was noted that an unused surface track was located at terminal in rear; trackage connects with Terminal Railroad Association of St Louis.
82	**Kansas City**	Holliday Sand and Gravel Co	Holliday Sand and Gravel Co	Receipt of sand and gravel	None.
83	**St Louis**	Bunge-SCF Grain Terminal	Fairmont City	Receiving grains	yes
84	**St Louis**	Green Plains Madison	Green Plains Madison	Shipment of grain.	yes

Table A2. Private river terminals and docks—main operational characteristics (as reported to the USACE)

ID	Port	Operator	Depth (ft)	Cargo Type 1	Cargo Type 2	Cargo Type 3	Headhaul	Loading / Unloading Rate 1	Rate Units 1	Storage Capacity1	Capacity1 Units	Storage Capacity2	Capacity2 Units
1	St Louis	St Louis Municipal River Terminal		Drybulk	Agribulk		Ib/Ob						
2		Fort Bellefontaine Quarry Co	9.0	Drybulk			Ib/Ob	150	tons/hr	15000	tons		
3		Capital Sand Co Inc	13.0	Drybulk			Inbound	600	tons/hr	80000	tons		
4		St. Charles Sand Co Inc	10.0	Drybulk			Inbound	450	tons/hr	20000	tons		
5		Central Stone Co	8.0	Drybulk			Ib/Ob			200000	tons		
6	St Louis	Bulk Service Corp	15.0	Drybulk	Agribulk		Outbound	350	tons/hr	70000	tons		
7	St Louis	ConocoPhillips	20.0	Liquid-bulk	Drybulk		Outbound			4817000	barrels		
8	St Louis	ConocoPhillips	20.0	Liquid-bulk	Drybulk		Outbound			4700000	barrels		
9	St Louis	ConocoPhillips	20.0	Liquid-bulk			Ib/Ob						
10	St Louis	ConocoPhillips	20.0	Liquid-bulk			Outbound						
11	St Louis	American River Transportation Co	25.0	Agribulk	Liquid-bulk		Ib/Ob			10000	barrels	1890000	gallons
12	St Joseph	Bartlett and Co	9.0	Agribulk			Outbound	20000	bushels/hr	3944000	bushels		
13	St Joseph	Holliday Sand and Gravel Co	10.0	Drybulk			Inbound			75000	tons		
14	Kansas City	LaFarge Corp Cement Group	23.0	Drybulk			Outbound	200	tons/hr	55000	tons		
15	Kansas City	Holliday Sand and Gravel Co	12.0	Drybulk			Inbound	550	tons/hr	100000	tons		
16	Kansas City	HCI Chemtech Corp	9.0	Liquid-bulk			Inbound			170000	barrels	1276000	gallons
17	Kansas City	Cargill Inc	10.0	Agribulk	Breakbulk		Outbound	18000	bushels/hr	900000	bushels		
18		AgriServices of Brunswick LLC	30.0	Drybulk	Agribulk	Liquid-bulk	Ib/Ob	100	tons/hr	60000	tons	900000	bushels
19	Kansas City	Bartlett and Co	10.0	Agribulk			Outbound	30000	bushels/hr	10000000	bushels		
20	Kansas City	Mid-West Terminal Warehouse Co	10.0	Drybulk			Ib/Ob	175	tons/hr	60000	tons		
21		Bartlett and Co	12.0	Agribulk	Liquid-bulk		Ib/Ob	20000	bushels/hr	5500	tons	1380000	bushels
22		Mid-Missouri Cooperative	13.0	Agribulk			Outbound	10000	bushels/hr	1100000	bushels		
23		Ergon Aaphalt	15.0	Liquid-bulk	Drybulk		Inbound			27500	gallons	162820	barrels
24		ADM/Growmark	9.0	Agribulk			Outbound	14000	bushels/hr			2300000	bushels
25		Chemtronics Inc	9.0	Liquid-bulk			Inbound			13286000	gallons		
26		Maczuk Industries Inc	9.0	Liquid-bulk			Inbound			1965000	gallons		
27		Jefferson City River Terminal Inc	10.0	Drybulk	Agribulk		Ib/Ob	50	tons/hr	15000	tons		
28		Hermann Sand & Gravel Inc	7.0	Drybulk			Inbound	150	tons/hr	30000	tons		

ID	Port	Operator	Depth (ft)	Cargo Type 1	Cargo Type 2	Cargo Type 3	Headhaul	Loading / Unloading Rate 1	Rate Units 1	Storage Capacity1	Capacity1 Units	Storage Capacity2	Capacity2 Units
29		Leuke Hauling Inc	10.0	Drybulk			Inbound	400	tons/hr	30000	tons		
30		Lexington Sand Co	10.0	Drybulk			Inbound	200	tons/hr	70000	tons		
31		MFA Inc	15.0	Drybulk	Agribulk		Ib/Ob	4000	bushels/hr	450000	bushels		
32		Glasgow Cooperative Assoc	12.0	Agribulk			Outbound	7000	bushels/hr	1220000	bushels		
33		Glasgow Sand Plant	5.0	Drybulk			Inbound	500	tons/hr	31000	tons		
34		Capital Sand Co Inc	14.0	Drybulk			Inbound	200	tons/hr	65000	tons		
35		Interstate Marine Terminals Inc	18.0	Drybulk	Agribulk	Liquid-bulk	Ib/Ob			3000000	gallons		
36	St Louis	Koch Fertilizer Storage and Terminal	30.0	Drybulk			Ib/Ob			30000	tons		
37	St Louis	Dynegy Midwest Generation Inc	12.0	Drybulk			Inbound	1000	tons/hr	500000	tons		
38	St Louis	ConAgra Foods Inc	18.0	Agribulk	Drybulk		Ib/Ob	18000	bushels/hr	3500000	bushels		
39	St Louis	Bluff City Minerals	7.0	Drybulk			Inbound	300	tons/hr	50000	tons		
40	St Louis	Petroleum Fuel and Terminal Co	15.0	Liquid-bulk	Drybulk	Agribulk	Ib/Ob			17448000	gallons		
41	St Louis	ADM/Growmark	10.0	Drybulk	Agribulk		Ib/Ob	300000	bushels/hr	1735000	bushels		
42	St Louis	Lange-Stegmann Co	12.0	Drybulk	Liquid-bulk		Inbound	600	tons/hr	135000	tons		
43	St Louis	Bulk Service Corp	10.0	Drybulk	Agribulk		Outbound	1000	tons/hr				
44	St Louis	Continental Cement Co	10.0	Drybulk			Inbound	140	tons/hr	10500	tons		
45	St Louis	Center Point Terminal Co	12.0	Liquid-bulk	Agribulk		Ib/Ob			380000	barrels		
46		Holcim U.S. Inc	15.0	Drybulk			Ib/Ob	1500	tons/hr	88000	tons		
47		Hercules Inc	10.0	Drybulk			Inbound			498000	gallons		
48		Wayne B. Smith Inc	12.0	Drybulk	Agribulk		Ib/Ob			47300	tons		
49		Bunge North America Inc	10.0	Drybulk	Agribulk		Outbound	40000	bushels/hr	2600000	bushels		
50		Continental Cement Co LLC	10.0	Drybulk			Outbound	1200	tons/hr	64000	tons		
51		Continental Cement Co LLC	6.0	Drybulk			Inbound			30000	tons		
52		Bunge North America Inc	13.0	Agribulk			Outbound	20000	tons/hr	2768000			
53	St Louis	Broadway Petroleum Co	12.0	Liquid-bulk			Ib/Ob			489000	barrels		
54	St Louis	Italgrani Elevator	9.0	Agribulk			Ib/Ob	25000	bushels/hr	4000000	bushels		
55	St Louis	ConocoPhillips	15.0	Liquid-bulk			Ib/Ob			800000	barrels		
56	St Louis	Phoenix Terminal Co	15.0	Drybulk	Agribulk		Ib/Ob	300	tons/hr				
57	St Louis	Marathon Ashland Pipe Line LLC	30.0	Liquid-bulk			Ib/Ob			627000	barrels		

ID	Port	Operator	Depth (ft)	Cargo Type 1	Cargo Type 2	Cargo Type 3	Headhaul	Loading / Unloading Rate 1	Rate Units 1	Storage Capacity1	Capacity1 Units	Storage Capacity2	Capacity2 Units
58		Winfield Grain Co Inc	15.0	Agribulk			Outbound	15000	bushels/hr	200000	bushels		
59	St Louis	The Premcor Refining Group	18.0	Liquid-bulk			Ib/Ob			480000	barrels		
60	St Louis	The Valvoline Co	10.0	Liquid-bulk	Agribulk		Inbound			100000	barrels		
61	St Louis	Buzzi Unicem USA	4.0	Drybulk			Inbound	250	tons/hr	20000	tons		
62	St Louis	J. D. Streett & Co	10.0	Liquid-bulk			Ib/Ob			485000	barrels		
63	St Louis	American River Transportation Co	13.0	Liquid-bulk	Agribulk		Ib/Ob			214000	barrels		
64	St Louis	Kinder Morgan Transmix LLC	15.0	Liquid-bulk			Ib/Ob			481000	barrels		
65	St Louis	Brenntag Mid-South	18.0	Liquid-bulk			Ib/Ob			7500000	barrels		
66	St Louis	Buzzi Unicem USA	14.0	Drybulk			Inbound	140	tons/hr	29600	tons		
67	St Louis	Peavey/Conagra Foods	9.0	Drybulk	Agribulk		Ib/Ob	25000	bushels/hr	320000	bushels	219000	tons
68	St Louis	Cahokia Marine Service Inc	20.0	Drybulk	Agribulk	Liquid-bulk	Ib/Ob	3000	tons/hr	10220000	gallons		
69	St Louis	Kiesel Marine Service Inc	7.0	Liquid-bulk			Inbound			27800	barrels		
70	St Louis	Peavey/Conagra Foods	10.0	Drybulk			Outbound	1300	tons/hr				
71	St Louis	Fred Weber Inc	9.0	Drybulk			Inbound	260	tons/hr	35000	tons		
72	St Louis	Cargill AgHorizons	15.0	Agribulk	Drybulk		Outbound	30000	bushels/hr	2500000	bushels		
73	St Louis	St Louis Auto Shredding Inc	15.0	Drybulk			Ib/Ob			80000	tons		
74	St Louis	J. D. Streett & Co Inc	12.0	Liquid-bulk			Inbound			8694000	gallons	47000	barrels
75	St Louis	American Commercial Terminals Inc	12.0	Drybulk			Outbound	6000	tons/hr	500000	tons		
76	St Louis	Mid-Coast Terminal Co	15.0	Liquid-bulk	Drybulk	Agribulk	Ib/Ob	350	tons/hr	40000	tons	3000000	gallons
77	St Louis	The American Milling Co.	20.0	Drybulk			Ib/Ob			10000	tons		
78		Ameren Union Electric Corp	10.0	Drybulk			Inbound	3000	tons/hr	430000	tons		
79		Joe Tori Dredging Inc	17.0	Drybulk			Inbound			80000	tons		
80	St Louis	Beelman River Terminals Inc	15.0	Drybulk			Ib/Ob	1000	tons/hr	400000	tons		
81	St Louis	Slay Bulk Terminals and Kinder Morgan	15.0	Liquid-bulk			Inbound			3400000	gallons		
82	Kansas City	Holliday Sand and Gravel Co	10.0	Drybulk			Inbound	450	tons/hr	100000	tons		
83	St Louis	Bunge-SCF Grain Terminal		Agribulk			Inbound			1000000	bushels		
84	St Louis	Green Plains Madison		Agribulk	Drybulk		Outbound						

Appendix B: Market survey supporting material

Section	? #	Company Name-->	1:_____	2:_____	3:_____	4:_____
Introduction	1	Completion Date/Time				
	2	Email				
	3	Name				
	4	How would you best categorize your business using one of the following categories?				
		Agriculture Production, Forestry Production (Including Logging), Fishing and Hunting				
		Mining, quarrying, and oil and gas extraction				
		Food manufacturing (i.e., milling and oilseed processing, animal slaughter and processing, dairy product manufacturing)				
		Textile mills, textile product mills, apparel manufacturing				
		Leather and allied product manufacturing				
		Wood product manufacturing				
		Paper manufacturing, printing and related support activities				
		Petroleum and coal products manufacturing				
		Chemical manufacturing (includes ethanol and biodiesel production)				
		Plastics and rubber products manufacturing, nonmetallic mineral product manufacaturing				
		Primary metal manufacturing, fabricated metal product manufacturing				
		Machinery manufacturing				
		Computer and electronic product manufacturing				
		Electrical equipment, appliance and component manufacturing				
		Transportation equipment manufacturing				
		Furniture and related product manufacturing				
		Merchant wholesalers, nondurable goods				
		Merchant wholesalers, durable goods				
		Transportation and warehousing (truck, rail, inland water)				
		Warehousing and storage				

Section	? #	Company Name-->	1:_____	2:_____	3:_____	4:_____
Agri-Bulk	5	Does your business ship and/or receive Agri-Bulk (i.e. Corn, Soybeans, Small Grains)				
	6	Which Agri-Bulk commodities does your business ship and/or receive?				
		Corn				
		Soybeans				
		Wheat				
		Other Grains				
		Processed grain products (i.e., soybean meal, DDGS, etc.)				
		Other				
	7	What is the annual volume in tons SHIPPED for all Agri-Bulk commodities?				
	8	What is the annual volume in tons RECEIVED for All Agri-Bulk commodities				
	9	Percent handled by Truck				
	10	Percent handled by Rail				
	11	Percent handled by Barge				
	12	Does your business ship and/or receive other commodities, products or raw materials beside Agri-Bulk?				
Fertilizer or Raw Materials	13	Does your business ship and/or receive Fertilizer?				
	14	In what form is the fertilizer shipped and/or received?				
		Bulk ingredients for blending				
		Bulk finished product				
		Bags or totes				
		Other				
	15	What is the annual volume in tons SHIPPED for all Fertilizer products or raw materials?				
	16	What is the annual volume in tons RECEIVED for all Fertilizer products or raw materials?				
	17	Percent handled by Truck				
	18	Percent handled by Rail				
	19	Percent handled by Barge				
	20	Does your business ship and/or receive other commodities, products or raw materials beside Fertilizer?				

Section	? #	Company Name-->	1:_____	2:_____	3:_____	4:_____
Aggregates or Quarried Stone	21	Does your business ship and/or receive Aggregates such as sand, gravel, rock or quarried stone?				
	22	What types of Aggregates or Quarried Stone are shipped and /or received?				
		Sand				
		Gravel				
		Rock				
		Quarried Stone				
		Other				
	23	What is the annual volume in tons SHIPPED for all Aggregates or Quarried Stone?				
	24	What is the annual volume in tons RECEIVED for all Aggregates or Quarried Stone?				
	25	Percent handled by Truck				
	26	Percent handled by Rail				
	27	Percent handled by Barge				
	28	Does your business ship and/or receive other commodities, products or raw materials beside Aggregates or Quarried Stone?				
Mineral Bulk	29	Does your business ship and/or receive Mineral Bulk?				
		What types of mineral bulk are shipped and/or received?				
		Sodium				
		Potassium				
		Chloride				
		Calcium				
		Phoshorus				
		Magnesium				
		Sulfur				
		Other				
	30	What is the annual volume in tons SHIPPED for all Mineral Bulk?				
	31	What is the annual volume in tons RECEIVED for all Mineral Bulk?				
	32	Percent handled by Truck				
	33	Percent handled by Rail				
	34	Percent handled by Barge				
	35	Does your business ship and/or receive other commodities, products or raw materials beside Mineral Bulk?				

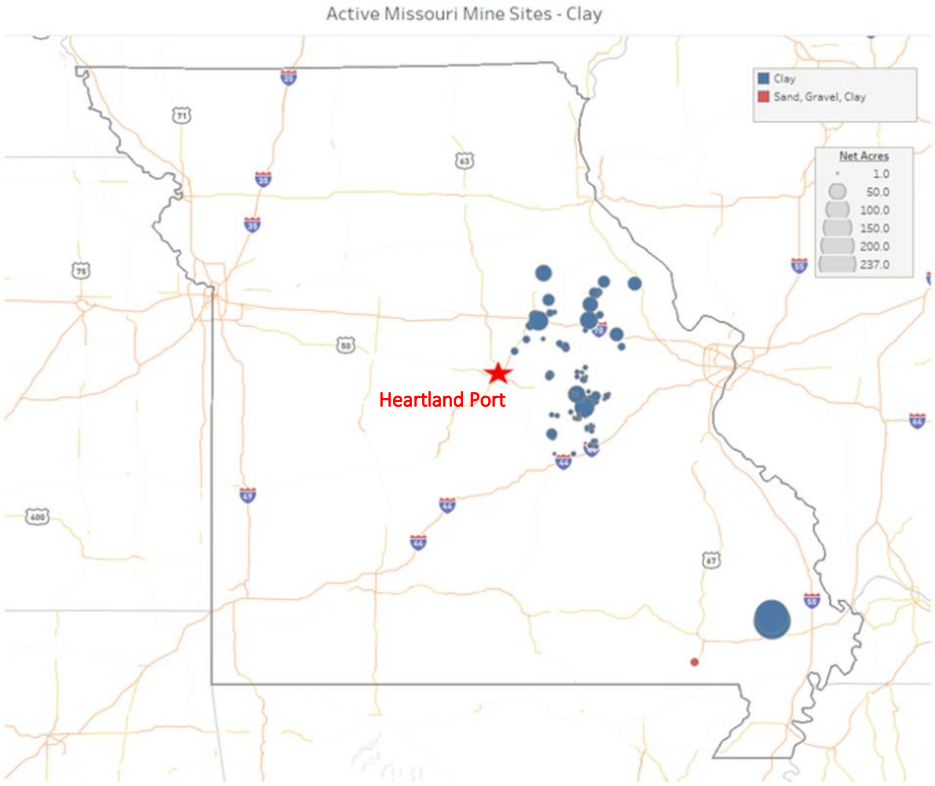
Section	? #	Company Name-->	1:_____	2:_____	3:_____	4:_____
Liquid Bulk	44	Does your business ship and/or receive Liquid Bulk (oil, petrochemical, etc)?				
	45	What types of Liquid Bulk (oil, petrochemicals, etc) does your business ship and/or receive?				
		Crude oil				
		Petrochemicals				
		Other				
	46	What unit of measure do you use to track you inbound and outbound shipments?				
		Gallons				
		Barrels				
		Pounds				
		Tons				
		Other				
	47	What is the annual volume, in units selected above SHIPPED for all Liquid Bulk?				
	48	What is the annual volume, in units selected above, RECEIVED for all Liquid Bulk?				
	49	Percent handled by Truck				
	50	Percent handled by Rail				
	51	Percent handled by Barge				
	52	Does your business ship and/or receive other commodities, products or raw materials beside Liquid Bulk?				

Section	? #	Company Name-->	1:_____	2:_____	3:_____	4:_____
Break-Bulk or Project Cargoes	62	Does your business ship and/or receive Break-Bulk or Project Cargoes (steel products, large pieces of fixed machinery or equipment)?				
	63	What types of Break-Bulk or Project Cargoes (steel products, large pieces of fixed machinery or equipment) are shipped and/or received?				
		Automobiles or light trucks				
		Agricultural or industrial machinery				
		Semi-trucks				
		Other				
	64	What unit of measure do you use to track inbound and outbound shipments of Break-Bulk or Project cargoes?				
		Single Unit (vehicles, machinery, etc.)				
		Tons				
		Other				
	65	What is the annual volume, in units selected above, SHIPPED for all Break Bulk or Project cargoes?				
	66	What is the annual volume, in units selected above, RECEIVED for all Break Bulk and Project Cargoes?				
	67	Percent handled by Truck				
	68	Percent handled by Rail				
	69	Percent handled by Barge				

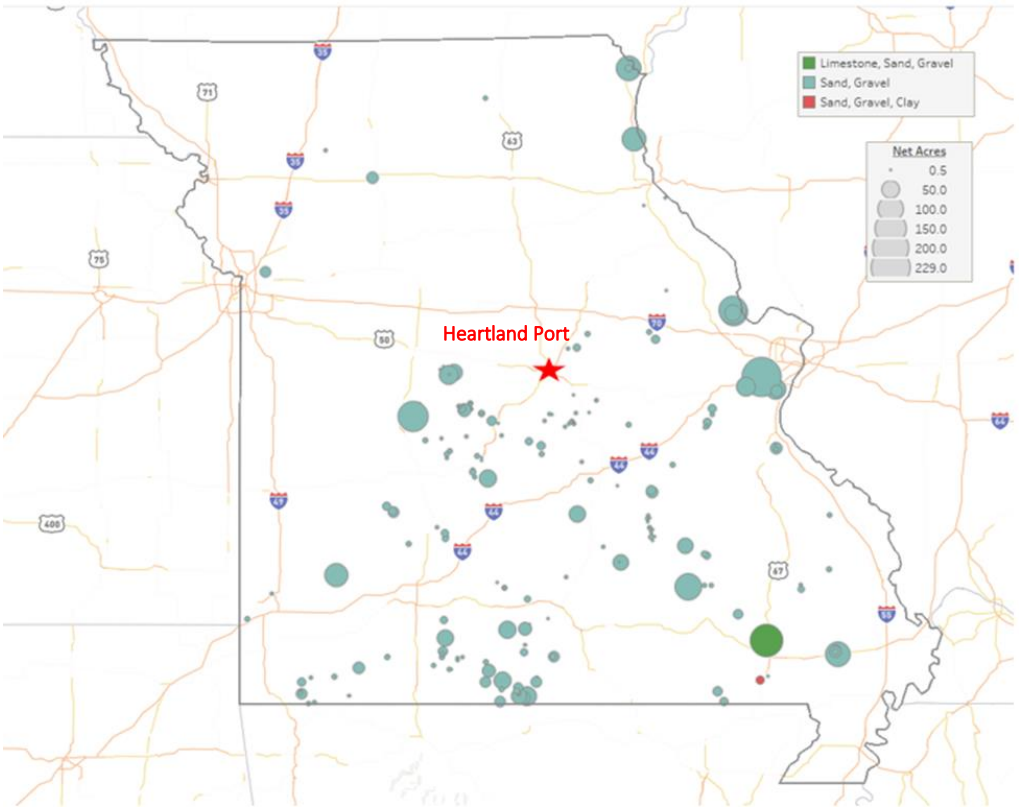
Section	? #	Company Name--> 1:_____	2:_____	3:_____	4:_____
Transportation Provider Information	78	Who are your current transportation providers?				
	79	For Truck - what are your average unit costs of transportation?				
	80	For Rail - What are your average unit costs of transportation?				
	81	For Barge - What are your average unit costs of transportation?				
	82	If there were a significant cost advantage to you, would you consider using river transportation for either shipping or receiving of your materials or products?				
	83	What level of cost savings would be necessary to make you consider river transportation solutions? 10%, 20%, 30%, 40%, more?				
		10% or less				
		Greater than 10%				
		Greater than 20%				
		Greater than 30%				
		Greater than 40%				
		Greater than 50%				
	84	What quantity or volume of commodites, products or raw materials would you consider shipping using river transportation?				
	85	What quantity or volume of commodites, products or raw materials would you consider receiving using river transportation?				
Market Characteristics	86	Which markets are your commodities, products or raw materials shipped to or received from?				
		International				
		Interstate				
		Intrastate				
	87	Are commodity, products, and raw materials shipments time sensitive, seasonal, consistent (i.e. weekly, monthly, etc.) and what is the stability of the markets?				
		Time sensitive				
		Seasonal				
		Consistent				
		Markets are stable				
		Markets are NOT stable				
		Does not apply				

Section	? #	Company Name-->	1:_____	2:_____	3:_____	4:_____
Current and Future Needs in the Transportation of Commodities, Products or Raw Materials	88	Do you anticipate changes in the volume of commodities, products, raw materials shipped and/or received over the next 5 years?				
		Volumes will Increase				
		Volumes will Decrease				
		No Change Anticipated				
		Not Sure				
	89	How much of an increase/decrease in the volume of commodities, products or raw materials shipped and/or received do you anticipate?				
		Less than 10%				
		10% to 20%				
		20% to 30%				
		30% to 40%				
		40% to 50%				
		Greater than 50%				
	90	How much of a decrease in the volume of commodities, products or raw materials shipped and/or received do you anticipate?				
	91	How much of a decrease in volumes of shipments or receipts do you anticipate?				
	92	What transportation obstacles do you currently face getting your products to market?				
	93	Are there developing needs for frozen or refrigerated shipping?				
	94	Comments regarding frozen or refrigerated shipping needs?				
	95	Are there opportunities for partial load shipments inbound or outbound?				
	96	Comments regarding partial load shipment opportunities?				
	97	Are there other entities that might utilize the port facility, i.e. military, federal, state or local governments?				
	98	Please describe the other entities that might utilize the port facility and what services would meet their needs				
	99	Do you have any other thoughts or observations that would benefit this analysis?				
Conclusion	100	We would be glad to discuss the Heartland Port Authority project with you. Optionally, if you are interested in learning more please provide your contact information in the text box below. Your contact information will not be shared with anyone outside the project without your approval.				

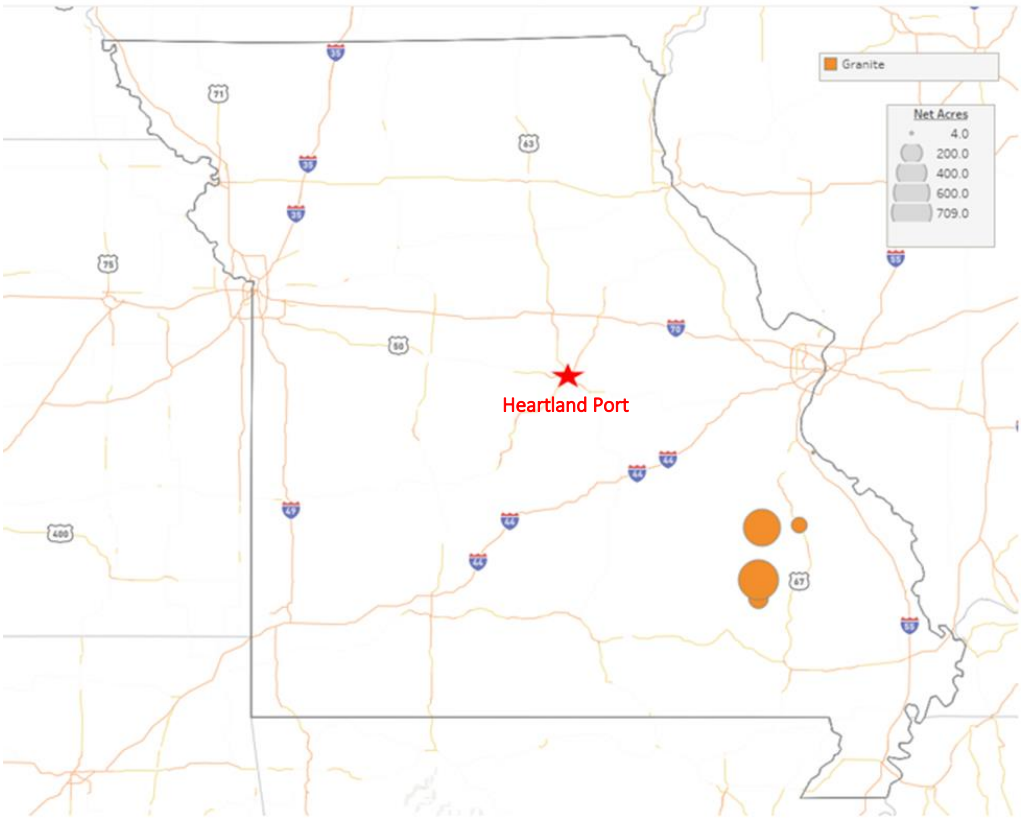
Appendix C: Freight generators/attractors: mines by type



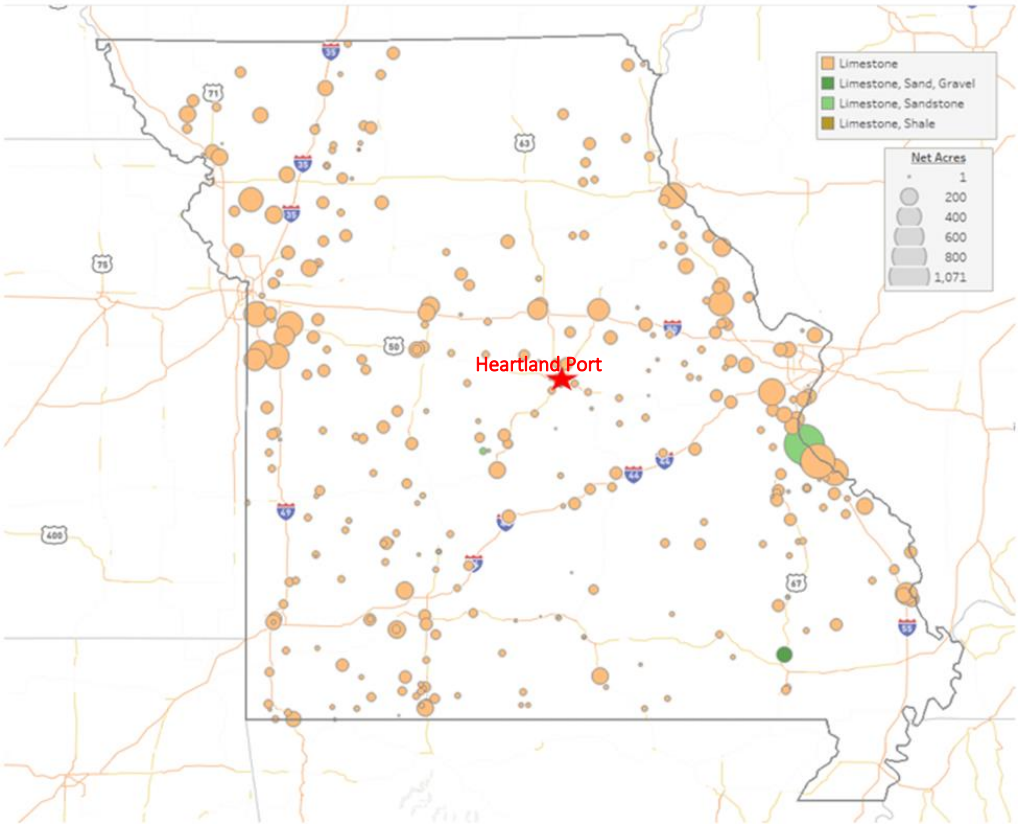
Active Missouri Mine Sites - Gravel



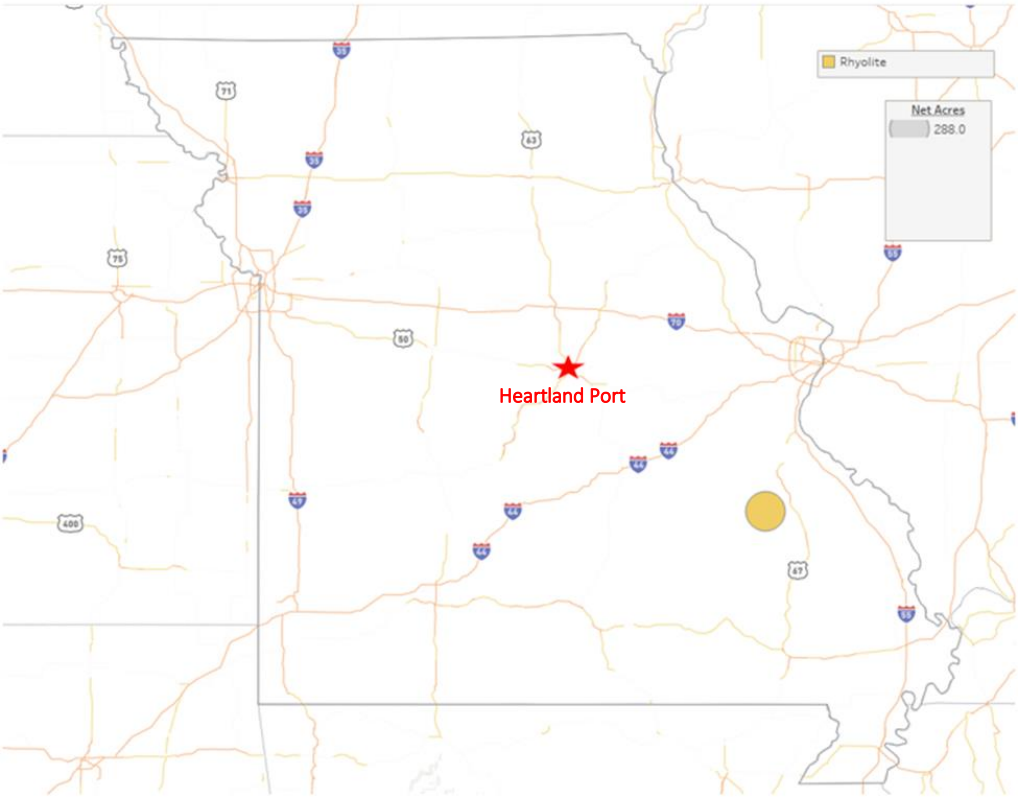
Active Missouri Mine Sites - Granite



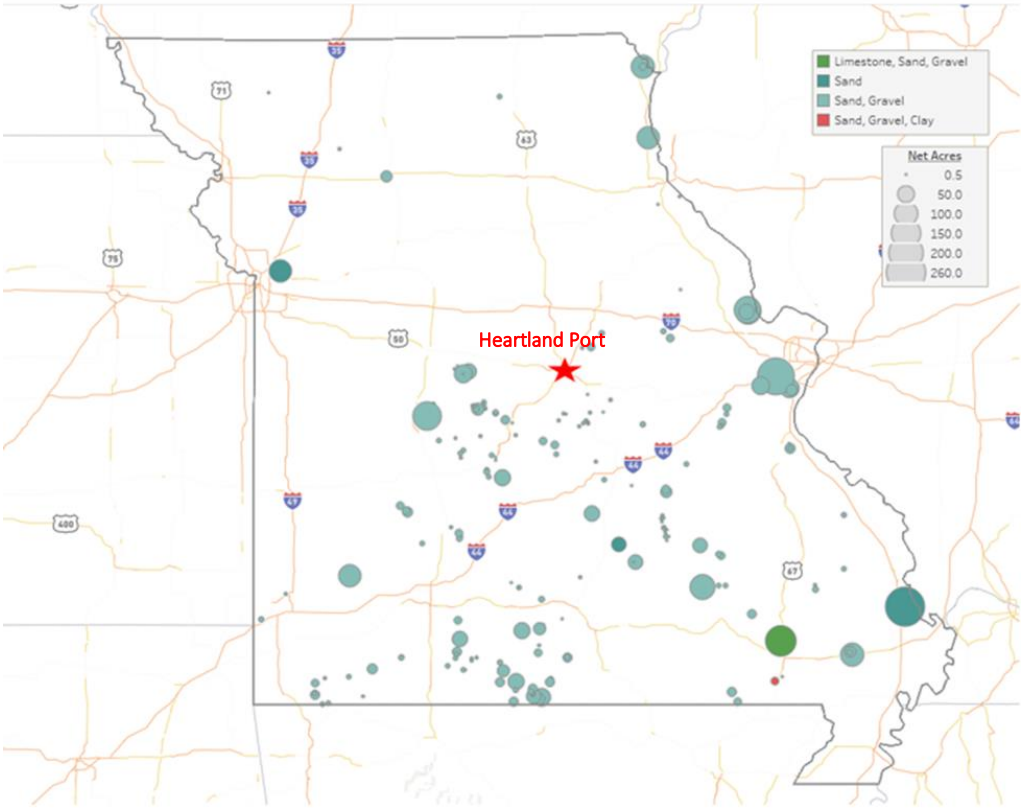
Active Missouri Mine Sites - Limestone



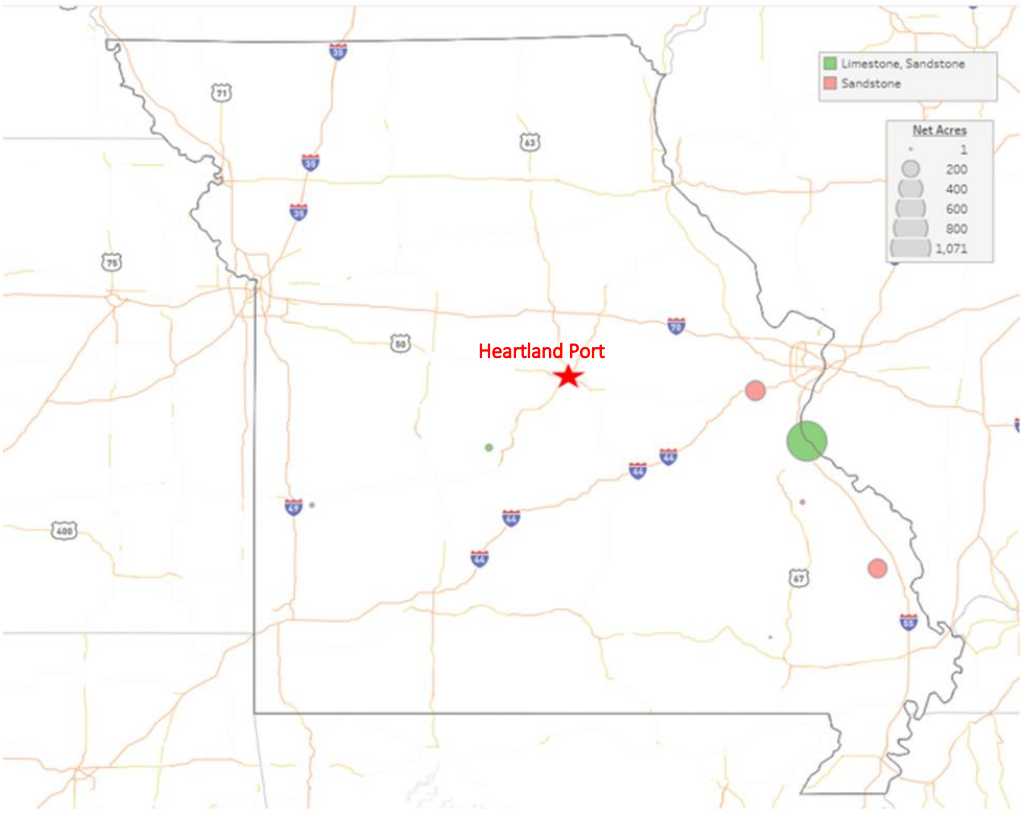
Active Missouri Mine Sites - Rhyolite



Active Missouri Mine Sites - Sand

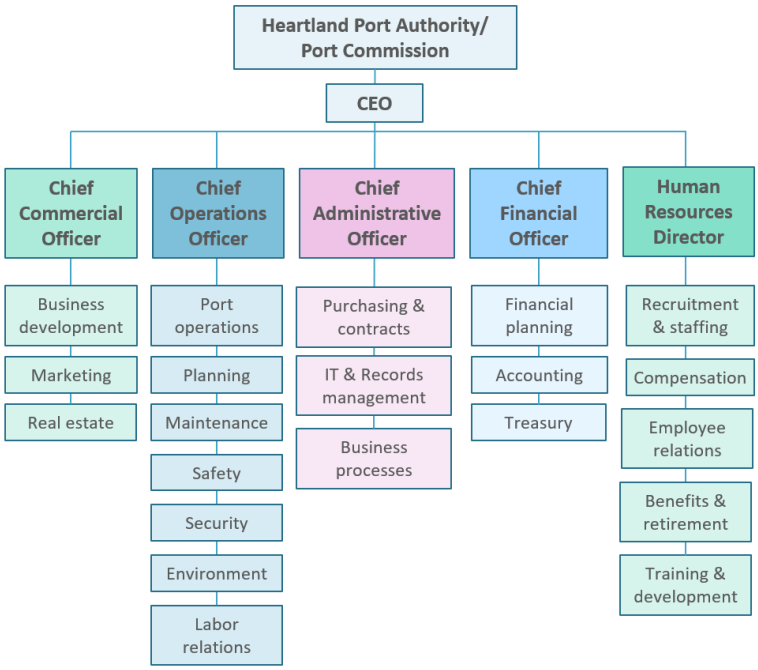


Active Missouri Mine Sites - Sandstone



Appendix D: Conceptual organizational structure of a mature concessionaire operating the port

Design conceptual *organizational structure*



Design conceptual *business/operational model*

- Which commodity groups show enough demand to warrant capital investments?
  - (i) dry-bulk
  - (ii) roll-on roll-off (RoRo)
  - (iii) break-bulk
  - (iv) containers
- What infrastructure, equipment, and similar elements must be considered?
  - yards, wharves, storage areas, conveyors, mixers, dry-bulk elevators, scales, etc.
- What would the day-to-day operations of the facility look like?
  - Business hours (eg. M-F 8am-5pm vs 24/7/365)
  - Barge schedules
  - Number of shifts (labor)
- What are feasible operational layouts and what are their capex/opex implications?
  - (i) dry-bulk
  - (ii) roll-on roll-off (RoRo)
  - (iii) break-bulk
  - (iv) containers

Appendix E: Standard format for environmental statements

(c) ***Format.*** The standard format for environmental statements is:

(1) ***Cover Sheet.*** The cover sheet, not to exceed one page, must include:

(i) A list of the responsible agencies including the lead agency and any cooperating agencies.

(ii) The title of the proposed action that is the subject of the statement (and if appropriate, the titles of related cooperating agency actions), together with any city, state, and county where the action is to take place.

(iii) The name, address, and telephone number of a person at the agency who can supply further information.

(iv) A designation of the document as a draft or final statement or a draft or final supplement.

(v) A one-paragraph abstract of the statement.

(vi) The date by which comments must be received.

(2) Summary. The section should compare and summarize the findings of the analyses of the affected environment, the environmental impacts, the environmental consequences, the alternatives, and the mitigation measures. The summary should sharply define the issues and provide a clear basis for choosing alternatives.

(3) ***Table of Contents.***

(4) Proposed action. This section should clearly outline the need for the EIS and the purpose and description of the proposed action. The entire action should be discussed, including connected and similar actions. A clear discussion of the action will assist in consideration of the alternatives.

(5) ***Alternatives and mitigation.*** This portion of the environmental impact statement is vitally important. Based on the analysis in the Affected Environment and Environmental Consequences section (see § 775.11(c)(6)), the environmental impacts and the alternatives are presented in comparative form, thus sharply defining the issues and providing a clear basis for choosing alternatives. Those preparing the statement must:

(i) Explore and evaluate all reasonable alternatives, including the "no action" alternative, and briefly discuss the reasons for eliminating any alternatives.

(ii) Devote substantial treatment to each alternative considered in detail, including the proposed action, so that reviewers may evaluate their comparative merits.

(iii) Identify the preferred alternative or alternatives in the draft and final statements.

(iv) Describe appropriate mitigation measures not considered to be an integral part of the proposed action or alternatives. See § 775.9(a)(7).

(6) ***Affected Environment and Environmental Consequences.*** For each reasonable alternative, each affected element of the environment must be described, followed immediately by an analysis of the impacts (environmental consequences). The analysis must include, among others, the following:

(i) Any adverse environmental effects which cannot be avoided should the action be implemented.

(ii) The relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity,

(iii) Any irreversible or irretrievable commitments of resources should the action be implemented, and

(iv) Energy requirements and conservation; and natural, or depletable, resource requirements and conservation.

(7) ***List of Mitigation Measures.***

(8) ***List of Preparers.*** List the names, together with the qualifications (expertise, professional disciplines), of persons who were primarily responsible for preparing the environmental impact statement or significant background papers.

(9) ***List of Agencies, Organizations and Persons to Whom Copies of the Statement Are Sent.***

(10) ***Index.***

(11) ***Appendices.*** Include comments on draft statement in final statement.

(d) ***Distribution.***

(1) Any completed draft environmental impact statement which is made the subject of a public hearing, must be made available to the public as provided in § 775.12, of this chapter at least 15 days in advance of the hearing.

(2) Draft and final environmental impact statements must be filed with the Environmental Protection Agency. Five copies are filed with EPA's headquarters addressed to the Office of Federal Activities (A-104), Environmental Protection Agency, 401 M Street SW., Washington, DC 20460; five copies are also filed with the responsible EPA region. Statements may not be filed with the EPA earlier than they are transmitted to commenting agencies and made available to the public.

(3) Copies of draft and final environmental impact statements must be furnished to:

(i) Any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved.

(ii) Any appropriate Federal, state, or local agency authorized to develop and enforce environmental standards.

(iii) The appropriate review officials identified in the Postal Service regulations and procedures governing intergovernmental review of Postal Service facility project actions, the State Historic Preservation Officer, and, when National Register or eligible properties may be affected, the Advisory Council on Historic Preservation.

(iv) Any person, organization or agency requesting them.

(4) Copies of final environmental impact statements must be furnished to any person who, or organization or agency which, submitted substantive comments on the draft.

(e) ***Responses to comments.***

(1) A final statement responds to comments on a draft statement in one or more of the following ways:

(i) Modification of alternatives, including the proposed action.

(ii) Development and evaluation of alternatives not previously given serious consideration.

(iii) Supplementation, improvement, or modification of analyses.

(iv) Correction of facts.

(v) Explanation of why a comment does not warrant a direct response, citing supporting sources, authorities, or reasons. Relevant circumstances which may trigger reappraisal or further response must be indicated.

(2) Substantive comments received on a draft statement must be attached to the final statement.

(3) If all of the changes are minor and are confined to responses described in paragraphs (e)(1) (iv) and (v) of this section, errata sheets may be written, and only the comments and errata sheets need be recirculated. In such a case, the draft statement with the comments, errata sheets, and a new cover, must be filed as the final statement.

(f) ***Supplements.***

(1) A supplement to a draft or final environmental impact statement must be issued if:

(i) Substantial changes are made in the proposed action that are relevant to environmental concerns; or

(ii) Significant new circumstances or information bearing on environmental impacts of the proposed action arise or are discovered.

(2) The decision on a proposed action involving an environmental impact statement, must be delayed until any necessary supplement has been circulated and has gone through the commenting period. A supplement is prepared, circulated, and filed in the same manner (except for determining scope) as draft and final statements, unless alternative procedures are approved by CEQ.

(g) ***Contracting.*** A contractor employed to prepare an environmental impact statement must certify that it has no financial or other interest in the outcome of the project.

(h) ***Proposals for Legislation.*** Legislative environmental impact statements must be prepared and transmitted as follows:

(1) A legislative environmental impact statement is considered part of the formal transmittal of a legislative proposal to the Congress. It may be transmitted to the Congress up to 30 days after the proposal. The statement must be available in time for Congressional hearings and deliberations.

(2) Preparation and processing of a legislative statement must conform to the requirements for impact statements, except as follows:

(i) It is not necessary to determine the scope of issues.

(ii) A draft is considered to be a final statement. Both draft and final statements are needed only when:

(A) A Congressional committee with jurisdiction over the proposal has a rule requiring both.

(B) Both are specifically required by statute for proposals of the type being submitted.

(3) Comments received on a legislative statement, and the Postal Service's responses, must be forwarded to the Congress.

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