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1.0 INTRODUCTION

Welcome! This *Ports Primer for Communities* has been developed by the Environmental Protection Agency’s (EPA’s) Office of Transportation and Air Quality (OTAQ) in cooperation with the Mobile Source Technical Review Subcommittee (MSTRS) Ports Subgroup including community stakeholders for near-port communities interested in becoming more involved in port decisions that may impact local land use, the environment and quality of life. This *Primer* is intended to help community members participate effectively in the decision-making process by increasing local understanding of:

- The role of ports,
- How ports can impact local land use, economic trends and the environment, and
- Tools and resources that have been successful in other communities.

This document provides a general overview that can be used as a springboard for further exploration and learning. Links to additional resources have been provided throughout the document for more information. We also encourage you to reach out to us to explore further opportunities for engagement with OTAQ and EPA Regional Offices.

Contact information is provided at the end of the *Primer*.

Sincerely,
Chris Grundler, Director
Office of Transportation and Air Quality

How to Use this Document

This document is designed to be an interactive experience for the user. The navigation bar along the bottom of each page allows users to:

- jump to the home page.
- jump to the previous page or the next page.
- refresh the current page to minimize its interactive features.
- jump from section to section.
- jump to the Appendix.
- jump to the Glossary, which contains definitions for words that are underlined throughout the document.
- jump to the Endnotes.

Within each section, buttons in the lower left, or in some cases icon buttons, reveal additional information and case studies.

Web links throughout the document allow users to access additional online resources.

Check the Community Action Roadmap

The Community Action Roadmap is a companion document that provides a step-by-step process to apply the information in the Primer for building capacity and empowering communities.

For more information: [http://epa.gov/ports-initiative](http://epa.gov/ports-initiative)
2.0 The Role of Ports
2.1 The Role of Ports

Our nation’s ports are an important part of our national economy and intermodal transportation system. Over 95 percent of the cargo entering the United States arrives by ship,\(^1\) and over 360 commercial ports nationwide help to transfer these goods to their destinations in communities across the nation.\(^2\) Our ports also serve as a significant resource for national defense and emergency preparedness.\(^3\) Understanding the role of ports can help residents more effectively engage with decisions that impact near-port communities.

In addition, to their impact on the national economy, ports also have an impact on local and regional economies. For more on these economic impacts, see Section 6 (Local and Regional Economy).

The focus of the Ports Primer is on marine ports rather than inland water or land ports. However, many considerations related to marine ports may also apply at inland water or land ports.
2.2 Current Port Industry Challenges

The port industry faces many challenges, many of which can also involve and affect near-port communities. These include:

- **Post-Panamax Shipping**
- **Congestion**
- **Workforce Development**
- **Container Management**
- **Environmental Sustainability**
- **Economic Trends**
- **Climate Adaptation/Resilience**

**Post-Panamax Shipping**

The expansion of the Panama Canal to accommodate larger ocean-going vessels, called Post-Panamax ships, was completed. To receive these larger vessels, ports must invest in infrastructure such as removing sediment to deepen ship channels, channel deepening and widening, and shore-side infrastructure to support these larger vessels and shore-side infrastructure (e.g. docks, cranes) to support these larger vessels.¹

Post-Panamax vessels will have the capacity to bring larger quantities of cargo into port, per visit. Increases in shipping of cargo to and from ports are expected as a result.
3.0 How Ports Work
3.1 Port Operations

Ports can serve a range of vessels including recreational watercraft, barges, ferries, and ocean-going cargo and passenger ships.\(^1\) The United States has over 150 deep-draft ports, which serve ocean-going ships.\(^2\)

The way ports operate and how they are governed varies and may include state and local public entities, such as port authorities, port navigation districts and municipal port departments. The structure of a local port has implications for how near-port communities relate to decision makers and participate in decision-making processes.

Port vs. Port Authority\(^3\)

A port is a geo-economic entity. The term refers to the collective port-related activities of a particular place that may be operated by many different entities including public, private or some combination of the two.\(^4\)

A port authority is a government entity. A port authority may own facilities in one or more ports, and a port authority’s domain may include both seaports and airports.

For example, port authorities do not control private terminals, military operations or industrial facilities located in or around port facilities. However, some private tenants in ports may be subject to controls written into lease agreements.\(^5\)

Opportunities are encouraged for port authorities to take a leadership role in ensuring that the entire port complex makes environmental improvements and engages constructively with local communities.
3.2 Port Governance

State and local governments are important players in port governance and in oversight of transportation projects that may affect ports. Private corporations may also play a role if they lease or own a terminal at a port. Roles and potential entities involved in decision-making may include:

- Regional, state or local port authority
- Divisions of state, county or municipal government
- Independent port or navigation district
- Private corporations (terminal lessees or owners)

Treaties between specific nations may stipulate additional regulations for ports and port-going vessels.

Port Agency Types

The agencies that govern ports may vary considerably, so it is important to understand the authority and responsibilities of the port agency near you. Common examples include:

- **Autonomous (independent) port authority**: a self-sustaining, self-governing public body
- **Semi-autonomous (semi-independent) port authority**: a public body subject to certain state controls
- **Bi-state or regional port authorities**: a public body created by agreement between two or more states
- **Port authorities with limited agency or power**: a public body limited to certain actions such as bonding
- **Divisions of state, county or municipal government**: a government department
- **Independent port or navigation districts**: entities that function as “special purpose” political subdivisions of a state with defined geographic boundaries over which they have authority.
3.3 Federal and International Governance

The U.S. Constitution grants the federal government jurisdiction over the navigable waters of the United States.

- Eighteen federal departments and agencies have a role in governance.¹
- The U.S. Coast Guard (USCG) and the Army Corps of Engineers (USACE) have the primary delegated authority.²
- No lead agency exists; instead, agencies manage their responsibilities separately.³
- The Committee on the Marine Transportation System (CMTS) acts as a coordinating body among federal agencies.⁴

The International Maritime Organization (IMO), a special agency of the United Nations, is responsible for additional oversight, including safety, security and pollution concerns. Vessels are regulated by the IMO and international treaties.

Current Federal Roles⁵

According to the U.S. Maritime Administration, the Transportation Research Board identifies the roles relating to ports and governance over navigable waters currently undertaken by the federal government as:

- “Constructing, operating and maintaining the navigable channels
- Managing the traffic on the waterways
- Providing mariners with aids to navigation, charts and information on water and weather conditions
- Regulating the safety and environmental compatibility of vessels
- Responding to marine accidents that threaten public safety and the environment
- Helping to finance the highways that connect marine ports and terminals to the larger transportation system
- Ensuring the security of the Marine Transportation System and its many components.”
4.0 Port-Community Relations
4.1 Port Impacts to Local Communities

Ports support and benefit local, regional and national economies through their role in creating jobs and transporting goods. They can also partner with communities to offer workforce development programs, protect the environment and coordinate on land use planning to incorporate community amenities.

However, ports can also create potential challenges for near-port communities who are disproportionately impacted by port operations and related transportation systems. In addition, while ports are major economic engines for local, regional, and national economies, these economic benefits may not be equitably distributed. The near-port communities may not be receiving a fair share of the economic benefits that are flowing to the region.

Additional detail examining potential impacts to near-port communities related to these topics is provided in the Primer:

- Land Use and Transportation – Section 5.0
- Local and Regional Economy – Section 6.0
- Environmental Impacts – Section 7.0

Note that near-port communities can include Native American tribal groups. Tribes are sovereign nations and may have associated treaty rights that influence port-community relations.

Addressing Environmental Justice

While communities across the country benefit from access to consumer goods, near-port communities bear a disproportionate burden from the environmental impacts of these activities. Ports and related industry operations frequently impact communities of color and low-income communities, resulting in environmental justice concerns.

According to EPA’s Office of Environmental Justice, “environmental justice […] will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.”

Executive Order 12898 requires that federal agencies shall, to the greatest extent practicable, identify and address disproportionately high and adverse human health or environmental impacts from their programs, policies, and activities. This obligation extends beyond NEPA reviews to activities such as permitting and rulemaking.

For more information: Environmental Justice

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4.2 Case Studies: Port-Community Relations

The relationship between ports and near-port communities can be complex, ranging from adversarial to collaborative. The case studies presented here illustrate this range, including:

- Instances where near-port communities fought legal battles to hold ports accountable for community impacts.
- Instances where community-based organizations and local government work to limit the impact of port activity through policies protecting sensitive populations.
- Instances where ports and communities work collaboratively to create positive community change.

Additional case studies are provided in Sections 5, 6 and 7.

CASE STUDY | Los Angeles and Long Beach Ports: Clean Trucks Program

The Trade, Health, Environment (THE) Impact Project is a regional community-based participatory research partnership to address air pollution and health impacts related to activities at the Los Angeles and Long Beach Ports. One of the results of THE Impact Project was the development of the Clean Air Action Plan (CAAP) and an increase in accountability to local communities for health and environmental impacts. One strategy of the CAAP is the Clean Trucks Program (CTP), which phases out older, more polluting diesel trucks and replaces them with 16,000 port-serving cleaner fuel trucks. Two crucial objectives of the CTP include advancing the improvement of air quality at the Port and reducing the negative impacts of goods movement on the local community. During CTP’s first year, there was a 70 percent reduction in the rate of port truck emissions. In 2012, the fully implemented program reduced port truck emissions by more than 80 percent.

For more information:
Progress at the Ports of Los Angeles and Long Beach
The Port of Los Angeles Clean Truck Program

Reminder: Check the Community Action Roadmap for a step-by-step process to apply the information in the Primer for building capacity and empowering communities.
5.0 Land Use and Transportation
5.1 Goods Movement and Transportation Planning

Goods movement is an integral aspect of port operations and planning. The transportation system helps move freight from its source of production to points of consumption.

Communities and businesses around the world gain economic benefits from the ability to buy and sell their goods in distant markets. The movement of goods through ports often directly impacts communities next to these facilities. Near-port communities can be disproportionately impacted by goods movement because of the cumulative impact of the many types of freight facilities that may converge at ports.

Freight facilities may include:¹
- Seaports, airports and border crossings
- Railyards and rail lines
- Marine highways
- Highways and high truck traffic roads
- Warehouse and distribution facilities

Transportation Planning and Coordination

Transportation planning is critical for effective operations at ports. If goods cannot get into or out of a port facility efficiently, this bottleneck can slow port operations. Therefore, agencies involved in planning of different modes of transportation must coordinate to improve the flow of goods to and from ports while also achieving transportation goals of the local community.⁵

Government entities involved in transportation planning can include:
- Local transportation planning departments
- Metropolitan planning organizations
- State and federal departments of transportation
- Port authorities
- State and local environmental agencies
5.2 Land Use

Land use at ports can have a direct impact on neighboring residential communities. Impacts can include:

- Competition between port land uses and community land uses as ports expand.
- Loss of residential and commercial property through the exercise of eminent domain.
- Potential for decreased property values for residents of near-port communities.
- Air and noise pollution from machines, trucks and ships as well as channel maintenance and expansion.
- Light pollution from both constant and flashing lights.

Ports are also often co-located with other heavy industries. The combined effect of port operations along with operations at neighboring facilities may create a disproportionate burden for communities located near ports.

Land Use Regulations

Land use is typically regulated at the local level by city and county governments.

In some instances, the port authority itself may be set up as a political subdivision of the state called an independent port or navigation district. In these instances, the port district may have regulatory control of land use within their jurisdiction.

Federal agencies, including EPA, do not have direct authority over zoning and other land use decisions made at the local level. Land use decisions at the state or local level may be subject to NEPA requirements if federal funding is involved. Also, some states have state requirements that may affect land use decisions.

Reminder: Check the Community Action Roadmap for a step-by-step process to apply the information in the Primer for building capacity and empowering communities.
5.3. Potential Community Interests

Community interests in transportation planning and land use may include:

- **Air quality**: The concentrated use of diesel engines in and around ports, as well as co-located stationary sources such as industrial sites, can contribute to decrease air quality.

- **Public safety**: Intensive goods movement via heavy trucks and rail can create public safety concerns around truck routes and rail crossings.

- **Competing land uses**: Port expansion needs may cause ports to compete with communities for developable land and may limit the available land for community-oriented amenities and services.

- **Impacts from nuisances**: Light and noise pollution from port operations can result in lower quality of life and health impacts for community residents.

- **Environmental justice**: Near-port communities often experience higher concentrations of environmental impacts than other residential communities; these cumulative impacts may result in environmental justice concerns.

- **Resilient adaptation**: Climate change and extreme weather events can impact both ports and near-port communities, who have a shared interest in the protection of critical infrastructure.

### Light and Noise Nuisances

In land use regulation, a “nuisance” is considered an activity that disrupts an individual or community’s “right to quiet enjoyment” of their space or property. Light and noise pollution created by port operations are examples of nuisances that can affect daily quality of life of near-port communities.

Light and noise pollution have also been linked to health impacts such as hearing impairment, high blood pressure and sleep deprivation.¹

In addition, light and noise pollution may impact wildlife. Noise from ship engines can disrupt important habitats, leading to impacts on bird feeding and nesting sites as well as marine mammal hearing and behavior patterns.² Light pollution can also disrupt biological rhythms, leading to high mortality in bird populations.³
5.4. Case Studies: Land Use and Transportation

Strategies to reducing the impact of goods movement and land use on near-port communities are often interrelated. Examples include:

- Delaware Valley Regional Planning Commission – An MPO uses federal transportation funding to conduct diesel retrofit projects.

- Air Pollution and Public Health in Galena Park, Texas – A regional non-profit partners with a near-port community to quantify public health impacts from air pollution and identify strategies for reducing air pollution.

- Advocating for Healthy Land Use Siting Practices in the San Francisco Bay Area – A local collaborative advocates for land siting practices that protect sensitive populations from air pollution impacts.

- Land Use Planning at Helsinki’s Vuosaari Harbor – A port in Finland has a unique opportunity as it relocates to incorporate cutting-edge land use planning strategies to reduce impacts on wildlife and near-port communities.

CASE STUDY | Delaware Valley Regional Planning Commission: Diesel Retrofit Projects

The Delaware Valley Regional Planning Commission (the Commission) serves nine counties in the Greater Philadelphia area and is responsible, among other things, for regional transportation planning and administration of federal transportation funds from the Congestion Mitigation and Air Quality Improvement (CMAQ) program. In 2012, the Commission sponsored a competitive process to award $10.7 million in CMAQ funds to local transportation-related projects. This led to the selection of 18 projects, including three diesel retrofit projects that received a total of $2.9 million. These projects included:

- A diesel locomotive repower initiative by the Southeastern Pennsylvania Transit Authority
- A diesel locomotive retrofit for a CSX switcher locomotive
- Construction equipment retrofits in the south Jersey area

Together, these three projects are estimated to reduce diesel emissions by 258 kilograms/day.
6.0 Local and Regional Economy
6.1. Local Economy and Jobs

The port sector contributes significantly to the local economy in communities where ports are located. Contributions include:

- Employment opportunities at the port
- Employment opportunities in port-related sectors (e.g. the rail and trucking industries)
- Increased tax base for the local and state government

At some ports, workers are members of labor unions that advocate on their behalf and may establish terms related to hiring, wages and advancement.

Cargo Handling Employment Opportunities

Cargo-handling jobs are often the first thing that comes to mind when thinking of employment opportunities at ports. A few of the jobs related to cargo-handling are listed below:

- **Clerks** check the actual count of the goods versus the amount listed on the ship’s manifest when cargo is unloaded from a ship. The clerk will note shortages, overages or damage.

- **Longshoremen** (also called stevedores) load and unload ships or perform administrative tasks associated with the loading or unloading of cargo. Longshore “gangs” are hired by stevedoring firms and may or may not be labor union members.

- **Hostlers (or hustlers)** drive tractors for moving cargo within a container yard.

- **Consolidators** combine cargo from a number of shippers into a container that will deliver the goods to several buyers.
6.2. Port Factors Impacting the Regional Economy

Ports support regional economies as well as local economies. Shifting trends in regional and international trade can have a significant impact on goods distribution patterns and therefore on regional economies. When port activity rises or falls, related business sectors, especially those in the goods movement sector, can experience a ripple effect.

Suez Canal Expansion

In 2015, Egypt completed an expansion of the Suez Canal, which connects the Mediterranean Sea to the Red Sea providing the shortest sea link between Asia and Europe. The expansion will allow for two-way traffic along part of the route and reduces transit time from 18 hours to 11 hours. More ship traffic through the Suez Canal is anticipated and could increase port activities at U.S. ports.¹
6.3. Potential Community Interests

Community interests in the impact of ports on the local and regional economy may include:

- **Post-Panamax Shipping**
- **Jobs and Job Training Programs**
- **Labor and Working Conditions**
- **Impacts on Goods Movement**

**Post-Panamax Shipping**

Many ports are facing pressure to expand their capacity to accommodate post-Panamax ships. This can impact near-port communities in a variety of ways including:

- New jobs created by port expansion and upgrades.
- Competing land use needs as ports seek room to expand.
- Environmental impacts related to construction and dredging.
- Increased shipping activity at the port.
- Loading and unloading larger vessels will require more trucks and rail usage, which could affect air emissions positively or negatively depending the technology used and related factors.
6.4. Case Studies: Job and Benefits

Ports can implement a number of programs and policies that spur investment in local entrepreneurs and the local workforce. These programs can be tailored to emphasize investments in near-port communities and/or communities experiencing high rates of poverty, unemployment and underemployment. Two successful examples of ports with these policies include the Port of Oakland and the Port of Los Angeles.

**CASE STUDY | Port of Oakland: Social Responsibility Division\(^1,2\)**

The Social Responsibility Division (SRD) at the Port of Oakland oversees port efforts to invest in near-port communities. Programs and policies include a commitment to invest in local businesses and the local workforce. Some of these include: a small local business utilization policy, a disadvantaged business enterprise program, a Maritime and Aviation Project Labor Agreement (which includes a commitment to local hiring and local workforce development), and a living wage policy.

For more information: [Port of Oakland](#)

"Today, there are high expectations for business and government to collaborate and invest in society. Looking at one’s business through the community lens and investing time, money and energy in projects that benefit one’s neighbors help build trust and allies. A port’s active investment in the community results in long-term community support and goodwill that makes it possible for the port to succeed in business."

- Port Spokeswoman Marilyn Sandifur

*Port of Oakland: Social Responsibility Division*

*Port of Los Angeles: Project Labor Agreement*
7.0 Environmental Impacts
7.1. Environmental Impacts

Port operations can lead to environmental impacts on air, water and land. Many communities with environmental justice concerns also experience disparities in health outcomes that they attribute to exposure to emissions from port operations. Ports are required to mitigate port projects and operations.

The Environmental Protection Agency has authority to address some but not all causes of these impacts. For example, EPA has regulated manufacturers to build cleaner engines, but EPA can’t mandate use of clean equipment or control hours of operation of port equipment. EPA also has no authority to regulate land use. EPA can assess the environmental impacts of siting a new highway but has limited authority to prevent that highway from being built.

Climate Adaptation

Ports rely on a wide range of vehicles with diesel engines, which are a source of greenhouse gas (GHG) emissions and affect climate change. This is discussed further on the following page.

In addition, due to their coastal locations, seaports are increasingly devoting substantial resources to address risks associated with extreme weather events. Flooding associated with extreme weather events stands out as one of the most significant risks to ports. Flooding has the potential to damage electrical substations, as well as electrical motors on wharf cranes and ground level electric pumps. It can also destroy cargo. Ports are developing plans to mitigate the effects of climate change-related extreme weather events.

For more information, see: Ports Planning for Climate Change Impacts

Reminder: Check the Community Action Roadmap for a step-by-step process to apply the information in the Primer for building capacity and empowering communities.
7.2. Air Emissions

Near-port communities are often disproportionately impacted by air emissions due to port operations, goods movement operations and other industries that may be co-located with ports. Air emissions at ports also impact regional air quality.

EPA sets national air quality standards that are implemented by states and tribal agencies. There is also growing momentum within the port sector to reduce emissions and improve air quality.
7.3. Federal Environmental Regulations, Initiatives and Standards

The mission of EPA is to protect human health and the environment. EPA is responsible for establishing regulations and standards for key environmental statutes affecting ports. While there is a broad range of environmental regulations that applies to ports depending on the circumstance, regulations and initiatives with particular relevance to near-port communities include:

- Clean Air Act (CAA)
- Clean Water Act (CWA) and the proposed Waters of the United States rule
- National Environmental Policy Act (NEPA)
- Ports Initiative

Clean Air Act (CAA) and the Clean Power Plan

The CAA is designed to protect public health from different types of air pollution. It establishes air quality standards and requires states to develop enforceable plans to achieve those standards. For the port industry, significant aspects of the CAA include regulations on diesel engines, marine vessel loading operations, paint coatings, and emissions from vehicles and many types of port equipment.

Many of the vehicles and equipment involved in port activities remain in operation for a long time. Often referred to as the legacy fleet, existing diesel vehicles and equipment are not governed by the CAA. Unlike EPA, states are able to regulate the use of the legacy fleet.

On August 2, 2015 the President unveiled The Clean Power Plan that establishes guidelines for states to follow in developing and implementing plans to reduce Greenhouse Gases that contribute to climate change. Included are requirements that vulnerable communities have a seat at the table with other stakeholders. EPA is proposing a model rule states can adopt, as well as a federal plan that the EPA will put in place if a state fails to submit an adequate plan.

For more information: Clean Air Act, Clean Power Plan, Fact Sheet
7.4. Agency Responsibilities

In addition to EPA, many federal, state and local agencies have responsibilities related to ports and port-related issues. A chart in Section 3 outlines federal regulation of port operations in more detail. This section describes:

- State and local agencies with environmental oversight
- Federal agencies with environmental oversight

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For resources to help locate state level regulators: Port Compliance: State Regulations

State and Local Agencies

Federal Agencies
7.5 Potential Community Interests

Community interests in environmental impacts may include:

- Environmental Justice
- Air Quality
- Nuisance Impacts
- Public Health Outcomes
- Ecological Impacts
- Access to Natural Areas & Open Space
- Climate Adaptation/Resilience

Environmental Justice

Near-port communities often experience higher concentrations of environmental impacts than other residential communities; these cumulative impacts, in addition to direct and indirect impacts, may result in environmental justice concerns.

Some near-port communities include tribal groups and may need to address tribal-specific environmental justice concerns. For example, water quality problems can lead to impacts on aquatic life. In addition, water traffic congestion could be an issue if there is recreational boat use in the area. Although these issues could arise for any near-port community, they may raise specific cultural concerns for near-port communities that include tribal groups.
7.6. Case Studies: Environment

Near-port communities and ports have successfully partnered on projects to reduce environmental impacts. Through the Swan Island Air Quality Project, the Port of Portland, Oregon, partnered with neighborhood association leaders and other port stakeholders to address air quality and health impacts on the local community. The Port of Bellingham and the Washington Department of Ecology engaged community residents, business owners and other port stakeholders to develop a plan for aligning environmental cleanups and waterfront revitalization at Bellingham Bay.

In other instances, legal challenges have resulted in improvements to environmental conditions. At the Port of Los Angeles, a legal settlement between the Port and the City of Los Angeles and the claimants resulted in the introduction of shoreside power technology at the China Shipping terminal.

CASE STUDY | Port of Los Angeles: Shoreside Power¹

The Port of Los Angeles has made a significant investment in extending electric power infrastructure to container ship terminals. This allows ships to plug into external power sources instead of continuously idling while at the terminal. The power facility is a direct outcome of a legal settlement from the Port and the City of Los Angeles who were sued by the Natural Resource Defense Council, Coalition for Clean Air, and two San Pedro Homeowner groups.

The port has the capability to plug in two container ships at a time. The port estimates that this alternate mode of powering docked ships results in the elimination of at least one ton of nitrous oxides and particulate matter each day for every ship that plugs in.

For more information: Port of Los Angeles Alternative Maritime Power

Port of Los Angeles: Shoreside Power
Port of Bellingham: Bellingham Bay Demonstration Project
Port of Portland: Swan Island Air Quality Project
8.1. Using Scientific Data and Research

Communities can demonstrate environmental concerns by providing scientific evidence of environmental impact. In some cases, communities may be able to access existing local data and conduct their own analyses by partnering with a local agency, organization or academic institution that collects raw data. Studies using local data are not common because of the high level of resources typically needed to collect the data. Additionally, technical support may be needed to conduct the data analysis desired by the community. However, when these resources are available, local data can be an extremely powerful tool. One example from the San Francisco Bay Area is provided below.

When local data are not available, communities may turn to existing studies to demonstrate the known and potential impacts of environmental conditions on human health and the environment. This approach can also be an effective tool for communicating the urgency to address the community’s environmental concerns.

Bay Area Air Quality Management District: Local Data Analysis

The Bay Area Air Quality Management District has done air quality analyses for regional land use and transportation planning as well as local air quality analyses for West Oakland, California. These analyses were conducted in the context of development of two Environmental Impact Reviews (EIRs) triggered by California Environmental Quality Act (CEQA) requirements. (CEQA is the state version of the National Environmental Policy Act (NEPA) and triggers development of EIRs, which are similar to the Environmental Impact Statements triggered by NEPA.)

These air quality analyses are available in the form of individual chapters of the respective EIRs. The methodologies might be adapted by other agencies or technical service providers partnering with local communities. To access the analyses, follow the links provided below:

- West Oakland Specific Plan – Draft EIR, Section 4.2
- Plan Bay Area 2040, Public Review Draft Environmental Impact Report, Section 2.2

Reminder: Check the Community Action Roadmap for a step-by-step process to apply the information in the Primer for building capacity and empowering communities.
8.2. Citizen Science Projects

Citizen science is a tool that can empower communities to better understand the environmental conditions impacting them, provide a vehicle for analyzing and sharing that data, and advocate for positive environmental and community change. Citizen science projects recognize the value of engaging the public in scientific investigations. Citizens can participate in or lead research efforts both by analyzing existing data and gathering new data for analysis.

Members of the public have contributed to scientific research for a very long time, but recently new technology has spurred the emerging field of citizen science. Community residents bring valuable local knowledge to scientific research. For example, community residents may be able to identify and prioritize locations of concern for the placement of air quality monitors.

Community-Based Participatory Research

Citizen science is a form of community-based participatory research (CBPR). As defined by the W.K. Kellogg Foundation Community Health Scholars Program, CPBR is a “collaborative approach to research that equitably involves all partners in the research process and recognizes the unique strengths that each brings. CBPR begins with a research topic of importance to the community, has the aim of combining knowledge with action and achieving social change to improve health outcomes and eliminate health disparities.”

- Community-Based Participatory Research
- Citizen Science and Air Quality Monitoring
- EPA's Air Sensor Toolbox for Citizen Scientists
8.3. Citizen Science Case Studies

The following case studies exemplify the use of citizen science tools:

- **Village Green Project** – air monitoring bench provides air quality data to community
- **Ironbound Community-based Environmental Monitoring Study** – Citizens from Newark, NJ collect air quality data while piloting air quality monitor.

**CASE STUDY | Air Monitoring Benches Installed for Public Use**

Through the Village Green Project, EPA has developed an air monitoring bench that operates on solar and wind power and provides minute-to-minute data on two common air pollutants – ozone and particulate pollution -- and weather conditions. The real-time data is publically available and can better help citizens understand air quality.

EPA is collaborating with state and local partners to further test the air monitoring system, and provide educational outreach on air quality.

For more information: [Village Green Project](#)
9.0 Appendix
# APPENDIX TABLE OF CONTENTS

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<td>A5. Acknowledgements and Contacts</td>
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A1. Federal Role in the Marine Transportation System

The Committee on the Marine Transportation System (MTS) has developed a compendium addressing federal programs in the MTS and an accompanying set of online resources. According to the Committee, the compendium represents “the first-ever categorical matrix of programs and functions for the 35 Federal Departments, agencies, and bureaus engaged with the MTS.” The following resources are available online:

- **A Compendium of Federal Programs in the MTS** – A resource guide to the roles, responsibilities and interests of the 11 federal agencies involved in the MTS.

- **Accompanying Matrices** – A set of matrices with varying degrees of detail that outline the interests and responsibilities of the 11 federal agencies involved in the MTS. For an example, click the button below to view the simplest matrix. For more detailed matrices, follow the link and explore online.

- **Federal Funding Handbook for Marine Transportation Infrastructure** - A resource of federal funding sources for marine transportation.

For more information:

[Compendium of Federal Programs in the MTS](Compendium of Federal Programs in the MTS)
[Compendium Website](Compendium Website)
[Federal Funding Handbook for Marine Transportation Infrastructure](Federal Funding Handbook for Marine Transportation Infrastructure)
A2. Citizen Mapping, Data Tools and Resources

The tools listed here are in various stages of development and from various sources. The potential value for using tools will vary on a case-by-case basis depending on the purpose and level of a capacity of users. Although, the information included in this table is intended to make the Ports Primer more useful, the presence of a resource on this list does not constitute EPA endorsement.

The following symbols provide more information about the availability of each data source:

- ✓ = resource available in relevant format
- D = data which are available for download
- O = data which are available online
- MP = accessible via mobile phone
- MP/I = accessible via mobile phone or internet
- C/I = requires users to have a working knowledge of computers and the internet
- GIS = some uses may require users to have access to and working knowledge of Geographic Information Systems (GIS) software

<table>
<thead>
<tr>
<th>Resource</th>
<th>Mobile Apps</th>
<th>Data Collection Tool</th>
<th>Data</th>
<th>Data Analysis</th>
<th>Spatial Data</th>
<th>Mapping Tool</th>
<th>Networking</th>
<th>Description</th>
<th>Cost</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Data (EPA)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>D</td>
<td>Provides reports, data visualization tools, data download and online mapping tools for air quality.</td>
<td>Free</td>
<td>C/I</td>
</tr>
<tr>
<td>AIRNow (EPA)</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Provides real-time, location-specific air quality information and forecasts.</td>
<td>Free</td>
<td>MP</td>
</tr>
<tr>
<td>Air Sensor Toolbox for Citizen Scientists (EPA)</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Provides ”information and guidance on new low-cost compact technologies for measuring air quality.”</td>
<td>Free</td>
<td>C/I</td>
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## A2. Citizen Mapping, Data Tools and Resources

<table>
<thead>
<tr>
<th>Resource</th>
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</thead>
<tbody>
<tr>
<td><strong>Alternative Fueling Station Locator</strong> (U.S. Dept. of Energy)</td>
<td>✓</td>
<td>Provides the locations of alternative fueling stations, including places to buy fuels such as electricity, natural gas, biodiesel, E85, propane or hydrogen.</td>
<td>Free</td>
<td>MP/I</td>
</tr>
<tr>
<td><strong>Area Health Resource Files</strong> (U.S. Dept. of Health and Human Services)</td>
<td>D ✓ D ✓</td>
<td>Provides access to county-level health data, an online mapping tool and health resources comparison tools. Some data may require special software to access.</td>
<td>Free</td>
<td>C/I, GIS</td>
</tr>
<tr>
<td><strong>Census</strong> (U.S. Census Bureau)</td>
<td>✓</td>
<td>Provides access to census and American Community Survey data in a variety of formats, including topical and location-based fact sheets, mobile applications, interactive maps, and geographic data and demographic datasets that can be downloaded for further analysis.</td>
<td>Free</td>
<td>C/I</td>
</tr>
<tr>
<td><strong>Cleanups in My Community</strong> (EPA)</td>
<td>O ✓</td>
<td>A mapping tool that displays locations where pollution is being or has been cleaned up. Clicking on a site reveals additional information about its environmental status.</td>
<td>Free</td>
<td></td>
</tr>
<tr>
<td><strong>Common Sense Community</strong> (Common Sense)</td>
<td>✓</td>
<td>Common Sense develops mobile sensing technologies (hardware and software) that collect environmental data. The project is still in the pilot phase and aims to help communities &quot;gather and analyze environmental data[, …] learn more about their environment, and influence environmental regulations and policy. Ultimately, the project seeks to empower citizens and novice users with opportunities to pursue the kinds of data collection and analysis that were once handled almost exclusively by professional scientists and analysts.&quot;</td>
<td>Tools and software were used in a pilot study and are not yet available for purchase.</td>
<td></td>
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</table>

## A2. Citizen Mapping, Data Tools and Resources

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<th>Description</th>
<th>Cost</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Commons (Community Commons and IP3)</td>
<td></td>
<td>O</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>Community Commons provides educational resources, an interactive mapping tool and networking opportunities for sustainable communities. It includes over 7,000 GIS data layers and an online mapping tool that allows users to create and share maps of their own communities. Sources for data are provided, but data cannot be directly downloaded. It also includes profiles of many place-based community initiatives and peer learning forums.</td>
<td>Free</td>
<td>C/I</td>
</tr>
<tr>
<td>Community Planning and Development Maps (U.S. Dept. of Housing and Urban Development)</td>
<td>✓</td>
<td>O</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>An interactive online mapping service for mapping current U.S. Department of Housing and Urban Development (HUD) grant activities, local housing market and economic data, and census data.</td>
<td>Free</td>
<td>C/I</td>
</tr>
<tr>
<td>Data.gov (U.S. General Services Administration)</td>
<td>✓</td>
<td>D</td>
<td>D</td>
<td>✓</td>
<td></td>
<td></td>
<td>A vast collection of data, tools and resources based on federal datasets and data contributed by non-federal participants. Organized by topic and searchable by location and keyword.</td>
<td>Free</td>
<td>C/I</td>
</tr>
<tr>
<td>Digital Coast Tools (National Oceanic and Atmospheric Administration)</td>
<td>O</td>
<td>✓</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td>Digital Coast Tools provides data sets that range from economic data to satellite imagery. The site contains visualization tools, predictive tools, and tools that make data easier to find and use</td>
<td>Free</td>
<td>C/I</td>
</tr>
<tr>
<td>EJScreen (EPA)</td>
<td>O</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>An online environmental justice (EJ) mapping tool that “provides EPA with a nationally consistent dataset and methodology for calculating “EJ indexes,” which can be used for highlighting places that may be candidates for further review, analysis, or outreach as the agency develops programs, policies and other activities. The tool provides both summary and detailed information at the Census block group level or a user-defined area for both demographic and environmental indicators.”</td>
<td>Free</td>
<td>C/I</td>
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### A2. Citizen Mapping, Data Tools and Resources

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<tr>
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<th>Type</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Enforcement and Compliance History Online (ECHO) (EPA)</td>
<td>O</td>
<td>Allows users to assess facilities’ compliance with environmental regulations. Provides information on permit data, inspection dates and findings, violations, enforcement actions and penalties assessed.</td>
<td>Free</td>
<td>C/I</td>
</tr>
<tr>
<td>EnviroAtlas (EPA)</td>
<td>O</td>
<td>Provides interactive tools and resources on ecosystem services (the many benefits people receive from nature). Key tools include an interactive mapping service and an Eco-Health Relationship browser which explores the relationship between ecosystems and human health.</td>
<td>Free</td>
<td>C/I, GIS</td>
</tr>
<tr>
<td>Envirofacts and Enviromapper (EPA)</td>
<td>D</td>
<td>An online search tool for accessing environmental data from EPA. Includes access to an interactive mapping tool. Provides a broad array of data including information on Superfund sites, drinking water, toxic and air releases, hazardous waste, water discharge permits, and grants.</td>
<td>Free</td>
<td>C/I</td>
</tr>
<tr>
<td>Environmental Public Health Tracking Network (U.S. Centers for Disease Control and Prevention)</td>
<td>D</td>
<td>Provides maps, tables and charts on “health, exposure, and hazard information and data from a variety of national, state, and city sources.” Data can be accessed by topic or location.</td>
<td>Free</td>
<td>C/I</td>
</tr>
<tr>
<td>My Environment (EPA)</td>
<td>D</td>
<td>Provides a cross-section of environmental information based on the user’s location.</td>
<td>Free</td>
<td>C/I</td>
</tr>
<tr>
<td>The National Map (U.S. Geological Survey)</td>
<td>D</td>
<td>Provides access to free spatial data, including orthoimagery (aerial photographs), elevation, geographic names, hydrography, boundaries, transportation, structures and land cover. Also provides online mapping tools for some data types.</td>
<td>Free</td>
<td>C/I, GIS</td>
</tr>
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</table>

## A2. Citizen Mapping, Data Tools and Resources

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<thead>
<tr>
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<th>Description</th>
<th>Cost</th>
<th>Access</th>
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<tbody>
<tr>
<td>National-Scale Air Toxics Assessment (NATA) Data (EPA)</td>
<td></td>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data from EPA's ongoing assessment of air toxics. The website includes a summary report with maps of cancer and non-cancer effects. For the expert user, data is available in MS Excel format from 1996, 1999, 2002 and 2005.</td>
<td>Free</td>
<td></td>
</tr>
<tr>
<td>NEPAssist</td>
<td>✓</td>
<td>O</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NEPAssist is a tool that facilitates the environmental review process and project planning in relations to environmental considerations. The web-based application draws environmental data dynamically from EPA's Geographic Information System databases and web services and provides immediate screening of environmental indicators for a user-defined area of interest.</td>
<td>Free</td>
<td>C/I</td>
</tr>
<tr>
<td>nowCOAST (National Oceanic and Atmospheric Administration (NOAA))</td>
<td></td>
<td>O</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A mapping tool that &quot;provides real time coastal observations and NOAA forecasts.&quot; Tool allows users to visually explore current snapshots of the weather and other environmental conditions in coastal communities.</td>
<td>Free</td>
<td>C/I</td>
</tr>
<tr>
<td>Smart Location Database (EPA)</td>
<td></td>
<td>D</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A &quot;nationwide geographic data resource for measuring location efficiency. It includes more than 90 attributes summarizing characteristics such as housing density, diversity of land use, neighborhood design, destination accessibility, transit service, employment, and demographics. Most attributes are available for every census block group in the United States.&quot; The tool may be useful for mapping equity-related information.</td>
<td>Free</td>
<td>C/I</td>
</tr>
<tr>
<td>Sustainable Communities HOT Report (EPA-HUD-DOT Partnership for Sustainable Communities)</td>
<td></td>
<td>D</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>An online tool that produces community sustainability comparison reports at the county level. Factors analyzed by the tool include transportation, housing, economic development, income and equity.</td>
<td>Free</td>
<td>C/I</td>
</tr>
</tbody>
</table>

## A2. Citizen Mapping, Data Tools and Resources

<table>
<thead>
<tr>
<th>Resource</th>
<th>Type</th>
<th>Description</th>
<th>Cost</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transportation Infrastructure Funding Map</strong> (Committee on the Marine Transportation System)</td>
<td>O</td>
<td>An interactive tool that maps five years of Federal infrastructure investment in the marine transportation system (MTS). The tool allows users to visually explore 15 datasets related to the MTS and is intended to inform future infrastructure investment decisions.</td>
<td>Free</td>
<td>C/I</td>
</tr>
<tr>
<td>Tox Town (National Institute of Health)</td>
<td>D</td>
<td>Provides an introduction to toxic chemicals and environmental health risks that citizens may encounter in everyday life.</td>
<td>Free</td>
<td>C/I</td>
</tr>
<tr>
<td><strong>Web-based Injury Statistics Query and Reporting System</strong> (WISQARS) (U.S. Centers for Disease Control and Prevention)</td>
<td>O</td>
<td>A database that provides data on fatal and nonfatal injury, violent death, and cost of injury. The website includes a mapping tool that allows users to explore injury data at the state and county levels.</td>
<td>Free</td>
<td>C/I</td>
</tr>
</tbody>
</table>

A3. Glossary

Glossary courtesy of the American Association of Port Authorities, National Cooperative Freight Research Program, Starcrest Consulting Group and the U.S. Department of Transportation.

**Ballast water**: Fresh or salt water, sometimes containing sediments, held in tanks and cargo holds of ships to increase stability and maneuverability during transit.

**Breakbulk**: General cargo that is not in containers but rather is stored in boxes, bales, pallets or other units to be loaded onto or discharged from ships or other forms of transportation. Examples include iron, steel, machinery, linerboard and wood pulp.

**Bulk**: Loose cargo (dry or liquid) that is loaded (shoveled, scooped, forked, mechanically conveyed or pumped) in volume directly into a ship’s hold. Examples include grain, coal and oil.

**Capacity**: The available space for, or ability to handle, freight.

**Cargo**: The freight (goods, products) carried by a ship, barge, train, truck or plane.

**Class I freight railroad**: Defined by the American Association of Railroads each year based on annual operating revenue. A railroad is dropped from the Class I list if it fails to meet the annual revenue threshold for three consecutive years.

**Clerks**: When cargo is unloaded from a ship, a clerk checks the actual count of the goods versus the amount listed on the ship’s manifest. The clerk will note shortages, overages or damage. This is used to make claims if needed.

**Consolidator**: The person or firm that consolidates (combines) cargo from a number of shippers into a container that will deliver the goods to several buyers.

**Container**: A box made of aluminum, steel or fiberglass used to transport cargo by ship, rail, truck or barge. Common dimensions are 20’ x 8’ x 8’ (called a TEU or twenty-foot equivalent unit) or 40’ x 8’ x 8’ (called an FEU or forty-foot equivalent unit).

**Convention**: An international agreement.

**Diesel**: A type of fuel typically used in a compression-ignition engine. In common maritime use, diesel can refer to several varieties of fuels including Marine Diesel Oil (MDO) and Marine Gas Oil (MGO). Diesel may also be labeled by its sulfur content, such as the case of LSD (low sulfur diesel with less than 500 parts per million (ppm) sulfur) or ULSD (ultra-low sulfur diesel with less than 15 ppm sulfur).
A3. Glossary

Glossary courtesy of the American Association of Port Authorities, National Cooperative Freight Research Program, Starcrest Consulting Group and the U.S. Department of Transportation.

**Draft**: The depth of a loaded vessel in the water taken from the level of the waterline to the lowest point of the hull of the vessel; depth of water, or distance between the bottom of the ship and waterline.

**Drayage**: The transport of goods over a short distance

**Drayage Terminal**: A terminal with the capacity to handle truck pickup and dropoff.

**Dredge**: The process of removing sediment from harbor or river bottoms for safety purposes and to allow for deeper vessels.

**Eminent Domain** The right of a government or its agent to expropriate private property for public use, with payment of compensation.

**Exports**: Merchandise transported out of the United States to foreign countries.

**Freight**: Merchandise hauled by transportation lines.

**Goods movement**: The distribution of freight (including raw materials, parts and finished consumer products) by all modes of transportation including marine, air, rail and truck.

**Gross domestic product (GDP)**: The total value of goods and services produced by labor and property located in the United States. As long as the labor and property are located in the United States, the supplier (workers, owners) may be either U.S. residents or residents of foreign countries.

**Hostler (or hustler)**: An employee who drives a tractor for the purpose of moving cargo within a container yard.

**Imports**: Commodities of foreign origin entering the United States, as well as goods of domestic origin returned to the United States with no change in condition or after having been processed and/or assembled in other countries.

**Intermodal**: Used to indicate movements of cargo containers interchangeably between transport modes – i.e. motor, water and air carriers – and where the equipment is compatible within multiple systems. For example, boxes of hot sauce from Louisiana are stuffed into metal boxes called containers at the factory. That container is put onto a truck chassis (or a railroad flat car) and moved to a port. There the container is lifted off the vehicle and lifted onto a ship. At the receiving port, the process is reversed. Intermodal transportation uses few laborers and speeds up the delivery time.
A3. Glossary

Glossary courtesy of the American Association of Port Authorities, National Cooperative Freight Research Program, Starcrest Consulting Group and the U.S. Department of Transportation.

**Labor union**: An organization of workers formed to serve members’ collective interests with regard to wages and working conditions.

**Landlord port**: At a landlord port, the port authority owns the wharves, which it then rents or leases to a terminal operator (usually a stevedoring company). The operator invests in cargo-handling equipment (forklifts, cranes, etc.), hires longshore laborers to operate such lift machinery and negotiates contracts with ocean carriers (steamship services) to handle the unloading and loading of ship cargoes.

**Longshoremen**: Dock workers who load and unload ships or perform administrative tasks associated with the loading or unloading of cargo. They may or may not be members of labor unions. Longshore “gangs” are hired by stevedoring firms to work the ships. Longshoremen are also called stevedores.

**Marine Terminal**: Port facilities for docking, cargo-handling and storage.

**Marine Transportation System (MTS)**: Consists of all the intermodal components that are part of the maritime domain, including ships, ports, inland waterways, intermodal rail and trucks, and other users of the maritime system.

**Maritime**: Located on or near the sea. Commerce or navigation by sea. The maritime industry includes people working for transportation (ship, rail, truck and towboat/barge) companies, freight forwarders and customs brokers; stevedoring companies; labor unions; chandlers; warehouses; ship building and repair firms; importers/exporters; pilot associations, etc.

**Neo-bulk**: Uniformly packaged goods, such as wood pulp bales, which stow as solidly as bulk, but are handled as general cargos.

**On-dock Railyard**: A railyard connected directly to a dock.

**Operating port**: A port where the port authority builds the wharves, owns the cranes and cargo-handling equipment, and hires the labor to move cargo in the sheds and yards. A stevedore hires longshore laborers to lift cargo between the ship and the dock, where the port’s laborers pick it up and bring it to the storage site. (See landlord port.)
A3. Glossary

Glossary courtesy of the American Association of Port Authorities, National Cooperative Freight Research Program, Starcrest Consulting Group and the U.S. Department of Transportation.

**Particulate matter (PM):** Refers to small particles in the air that can be measured to determine air quality and potential health impacts. Airborne PM can result from direct emissions of particles (primary PM) or from the condensation of certain gases that have themselves been directly emitted or chemically transformed in the atmosphere (secondary PM). PM is often classified by size:

- $PM_{2.5}$ – Also known as “fine” particulate matter, $PM_{2.5}$ refers to the fraction of PM in a sample that is 2.5 microns in diameter or less. This size of PM is commonly associated with combustion and secondary PM.

- $PM_{10}$ – Also known as “coarse” particulate matter, $PM_{10}$ refers to the fraction of PM in a sample that is 10 microns in diameter or less.

**Port:** The harbor area where ships are docked.

**Port Agency or Port Authority:** A government entity. A port authority may own facilities in one or more ports, and a port authority’s domain may include both seaports and airports. It may be difficult to tell visually where the control of a port authority ends. For example, port authorities do not control private terminals (except in as much as landlord ports can impose lease-based controls on private terminal tenants), military operations and industrial facilities located in or around port facilities.

- **Autonomous (independent) port authority:** a self-sustaining, self-governing public body

- **Semi-autonomous (semi-independent) port authority:** a public body subject to certain state controls

- **Bi-state or regional port authorities:** a public body created by agreement between two or more states

- **Port authorities with limited agency or power:** a public body limited to certain actions such as bonding

- **Divisions of state, county or municipal government:** a government department

- **Independent port or navigation districts:** entities that function as “special purpose” political subdivisions of a state with defined geographic boundaries over which they have authority
A3. Glossary

Glossary courtesy of the American Association of Port Authorities, National Cooperative Freight Research Program, Starcrest Consulting Group and the U.S. Department of Transportation.

**Roll-on/Roll-off (ro/ro):** Cargo that can be driven directly into the belly of the ship via ramps that are lowered to the dock, rather than being lifted aboard. Examples include cars, buses, trucks or other vehicles.

**Stevedores:** Labor management companies that provide equipment and hire workers to transfer cargo between ships and docks. Stevedore companies may also serve as terminal operators. The laborers hired by the stevedoring firms are called stevedores or longshoremen.

**Supply Chain:** A network that supplies goods or services from the source of production through the point of consumption. A supply chain is considered to include people, organizations, transportation infrastructure, information technology and physical locations such as manufacturing plants, distribution centers, and retail outlets.

**Terminal:** A designated area of a port used for the transmission, care and convenience of cargo and/or passengers in the interchange of them between land and water carriers or between two water carriers. It includes wharves, warehouses, covered and/or open storage spaces, cold storage plants, grain elevators and/or bulk cargo loading and/or unloading structures, landings, and receiving stations.

**Trucks:** Heavy automotive vehicles used to transport cargo. In the maritime industry, cargo is often carried by tractor-trailers. The tractor is the front part of the vehicle, also called a cab. The trailer is the detachable wheeled chassis behind the tractor, on which containers or other cargoes are placed.

**Twenty-Foot Equivalent Unit (TEU):** A unit of measurement equal to the space occupied by a standard twenty-foot container. Used in stating the capacity of container vessel or storage area. One 40-foot container is equal to two TEUs.

**Vessel:** A ship or large boat.

**Volatile organic compound (VOC):** A very broad term used to describe the entire set of vapor-phase atmospheric organic chemicals.
A4. Endnotes and Image Sources

2.1 The Role of Ports

Endnotes

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2.2 Current Port Industry Challenges

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3.1 Port Operations

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Image Sources
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3.2 Port Governance

Endnotes
A4. Endnotes and Image Sources

3.3 Federal and International Governance

Endnotes

4.1 Port Impacts to Local Communities

Endnotes

4.2 Case Studies: Port-Community Relations

Endnotes

5.1 Goods Movement and Transportation Planning

Endnotes
A4. Endnotes and Image Sources


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7.6 Case Studies: Environment
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A5. Acknowledgements and Contacts

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TASC is a national EPA program that provides technical assistance services to communities. The program's goal is to help people understand complex environmental issues and ensure meaningful community involvement in environmental decision-making. For more information on TASC, click here.