

**Land Use at the Philadelphia Port:  
Environmental Issues and Concerns**

**A report for the Clean Air Council**

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**With comments from the Port Environmental Task Force**

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## Introduction

The port terminals scattered along the Delaware River represent part of a robust global commercial shipping industry that generates roughly 75,000 jobs in the greater Philadelphia region. As a key part of this global transportation network, Philadelphia's port is notable in several ways. By volume, it is the second largest port in the North Atlantic. Philadelphia is also the leading U.S. port for temperature-sensitive cargo, and is the fourth largest U.S. handler of imported products.<sup>1</sup>

Recent debate surrounding Delaware River dredging, prompted by large-scale changes in the nature of container shipping, has brought to the fore some of the environmental concerns posed by marine port activity. The Philadelphia port terminals are also the subject of renewed planning attention as the Philadelphia City Planning Commission has begun the conceptual work for an ambitious riverfront revitalization and redevelopment process. These facilities have already found themselves more frequently on the planning radar due to urban redevelopment projects that bring mixed land uses—light industrial, retail, residential, and recreational—to vacant riverfront space. Ports will increasingly be close neighbors with a mix of functions. This underscores the importance of understanding the environmental risks and concerns posed by land that is currently in port use, or is a disused port-related brownfield.

Philadelphia port operators have already begun taking environmental concerns seriously. For instance, the Philadelphia Regional Port Authority (PRPA) and port operators participate in the Clean Air Council's efforts to retrofit diesel powered port equipment with particulate-trapping technology. The PRPA also supports the Partnership for the Delaware Esutary's "No Dumping!" effort that seeks to make area residents better aware of the dangers to water quality posed by dumping toxic materials into street drains and sewers.<sup>2</sup>

In this paper we consider some of the land-use concerns of marine port operations and how these issues apply to the port of Philadelphia. Because this topic is underrepresented in the literature of ports management and environmental sciences, some extrapolation is required. Reviewing port-related landside activities will give us some idea of potential environmental concerns. Using this framework we will then look specifically at Philadelphia's port terminals and the materials they typically handle. Of special interest are two issues: (1) stormwater runoff from these paved industrial spaces, and (2) toxic spill management. The paper will also highlight some notable design, development, and management efforts aimed at reducing pollution and improving public waterfront access at other ports in the U.S. and around the world.

**Marine Port Land Use and Land Management**

In the environmental engineering and sciences, coastal research, and ports management literature, the vast majority of port- and harbor-related environmental research focuses on the significant and obvious environmental impact of shipping activity on water and marine habitat quality and air pollution due to factors such as diesel emissions, dredging, the release of ballast water, and contamination by chemicals used in ship maintenance. Discussions that connect land use to environmental issues are elusive, and clearly represent an opportunity for new research.

International organizations that direct port investment, design, and environmental regulation pay scant attention to the environmental impact of land use at ports. The International Maritime Organization (IMO), an international body that establishes and maintains regulatory frameworks for the global shipping industry, lists environmental concerns as part of its remit. Although the IMO has developed a wide range of regulations and best-practices documents regarding the mitigation of water and air pollution caused by container ships, it does not address any potential landside environmental hazards.<sup>3</sup> The World Bank, funding port modernization in developing nations, identifies four categories of environmental protection management at ports requiring the development of prevention or remediation measures: impact of marine structures, ship waste management, dredging activities, and accidental pollution.<sup>4</sup> These categories primarily deal with hazards produced by container ships themselves.

In its handbook on environmental management, the American Association of Port Authorities (AAPA), an industry association representing North and Central American port authorities, provides what may be one of the most complete assessments available of land use concerns,<sup>5</sup> which we will use as a framework to guide the rest of this paper. AAPA cross-references comprehensive lists of water- and land-based activities related to both port development (development of new facilities or expansion of existing ones) and operations. The study assesses their short and long term potential impacts on air quality, surface water quality, soils and sediment, ground water quality, fresh water biota, and marine biota.

We re-create these helpful tables here, keeping in mind AAPA's caveat that "the type and magnitude of impact is dependent on the extent to which an activity occurs, its proximity to sensitive receptors, and the controls employed by the port or its tenants."<sup>6</sup>

***Potential Impacts from Development Related Activities<sup>7</sup>***

	Air quality		Surface water quality		Soils & sediment		Ground water quality		Fresh water biota		Marine biota	
	ST	LT	ST	LT	ST	LT	ST	LT	ST	LT	ST	LT
Building demolition	H	L	H	L	L	L	L	L	M	L	M	L
Building renovation	M	L	M	L	L	L	L	L	M	L	M	L
Bulkhead installation	M	L	H	L	L	M	L	L	M	M	M	M
Contamination remediation	M	L	H	L	L	L	L	L	M	L	M	L
Dredge material placement	M	L	H	M	L	M	L	L	H	M	H	M
Dredging	M	L	M	L	L	M	L	L	H	M	H	M
Landfilling	M	L	M	L	L	L	L	L	M	L	M	L

New building construction	M	L	M	L	L	L	L	L	M	L	M	L
Pier construction and rehabilitation	M	L	L	L	L	L	L	L	M	L	M	L
Pavement installation	M	L	M	L	L	L	L	L	M	L	M	L
Pavement removal	M	L	M	L	L	M	L	L	M	L	M	L
Site cleaning	M	L	M	L	L	L	L	L	M	L	M	L
Utility construction	M	L	M	L	L	L	L	L	M	L	M	L
ST – Short Term    LT – Long Term L – Low Impact    M – Moderate Impact    H – High Impact												

### ***Potential Impacts from Operational Activities<sup>8</sup>***

	Air quality		Surface water quality		Soils & sediment		Ground water quality		Fresh water biota		Marine biota	
	ST	LT	ST	LT	ST	LT	ST	LT	ST	LT	ST	LT
<b>Automobile transport</b>												
Off-loading	H	M	M	L	L	L	L	L	M	L	M	L
storage	M	L	M	L	L	L	L	L	M	L	M	L
Building & grounds maintenance	L	L	M	M	M	M	M	M	M	M	M	M
<b>Cargo handling</b>												
Dry bulk	H	M	H	L	M	L	L	L	M	M	M	M
Liquid bulk	M	M	M	L	M	M	M	M	M	M	M	M
General cargo	L	L	M	L	L	L	L	L	L	L	L	L
Containers	L	L	L	L	L	L	L	L	L	L	L	L
Break bulk	M	L	M	L	L	L	L	L	M	M	M	M
Chemical storage & handling	M	M	M	L	M	L	M	L	M	L	M	L
<b>Fueling</b>												
On-loading	H	M	M	L	M	L	M	L	M	M	M	M
Storage	M	M	M	L	M	M	M	M	L	L	L	L
Off-loading	M	M	M	L	M	L	M	L	M	M	M	M
<b>Painting</b>												
Building	H	L	L	L	L	L	L	L	L	L	L	L
Anti-fouling	H	L	M	L	L	L	L	L	M	M	M	M
Service vehicles	H	L	L	L	L	L	L	L	L	L	L	L
Paint stripping	H	L	M	L	L	L	L	L	M	L	M	L
<b>Public access &amp; recreation</b>												

Cruise lines	M	M	L	L	L	L	L	L	M	L	M	L
Fishing piers	L	L	M	L	L	L	L	L	L	L	L	L
Moorings/slips	L	L	M	M	L	L	L	L	M	L	M	L
Public recreation access	M	M	M	M	L	L	L	L	M	L	M	L
Rail maintenance	L	L	M	L	M	L	L	L	M	L	M	L
<b>Ship liquid discharges</b>												
Ballast water	L	L	H	L	L	L	L	L	M	M	M	M
Tank cleaning	M	L	H	L	L	L	L	L	M	L	M	L
Bilge water	L	L	H	L	L	L	L	L	M	L	M	L
Sewage	L	L	M	L	L	L	L	L	M	L	M	L
<b>Solid waste</b>												
Ship-generated	L	L	M	L	L	L	L	L	M	L	M	L
Shore-generated	L	L	M	L	L	L	L	L	M	L	M	L
Vehicle and equipment maintenance	H	L	M	L	M	L	M	L	M	L	M	L
Vessel repair and maintenance	M	M	M	L	M	L	M	L	M	L	M	L
Ship breaking	M	L	M	L	M	L	L	L	M	L	M	L
Ship air emissions	M	M	L	L	L	L	L	L	L	L	L	L
ST – Short Term    LT – Long Term L – Low Impact    M – Moderate Impact    H – High Impact												

From these tables we can extract the high- and moderate-impact port activities which are relevant to land use management and which bear further investigation or policy attention in Philadelphia. Below we identify several of these activities and list connected land-use concerns.

**Port Activity**

dredge material placement and landfilling

pavement installation

**Land Use Issues**

proper management of fill material, particularly when it is used for reclamation and port expansion; impacts on inland hydrology; opportunity for ecological design

design that allows for proper management of storm runoff

automobile off-loading	design efficiency that minimizes distance to automobile washing and storage spaces
cargo handling	transfer and storage equipment and infrastructure that prevents dry materials, particularly hazardous materials, from blowing in the wind or joining stormwater runoff and that prevents chemical and liquid cargo spills or leakage from storage structures
fueling	storage and transfer infrastructure that prevents soil and groundwater contamination; security and public safety concerns
painting	structures, materials, and equipment that prevent or minimize soil and water contamination by paint residue
solid waste generation	improving waste management and recycling practices
vehicle and equipment maintenance	practices that minimize the addition of hazardous materials to stormwater runoff

Of these potential hazards at active port properties, the issue of toxic cargo spills and their management and prevention is of particular importance to the Clean Air Council's Green Ports Task Force. Toxic spills present an immediate threat to both port workers as well as to residents in the vicinity, and spills on these vast paved surfaces become a runoff hazard when they occur near storm drains or water access point, or are not quickly cleaned up. The materials in question include potentially toxic cargo as well as chemicals used in port operations such as produce fumigation. The Philadelphia ports, however, do not have a comprehensive set of policies and practices for emergency

spill response and cleanup as each tenant facility employs their own practices. The Virginia Port Authority's highly successful spill management program, supported by comprehensive employee training, provides a model that can be deployed at the Philadelphia ports.

The spill management, prevention, and reduction plan proposed for PRPA port facilities by the Green Ports Task Force, based on the Virginia Port Authority's program, includes these elements:

- § Quantify the amount of toxic or potentially toxic cargo at PRPA port terminals.
- § Quantify the amount of toxic chemicals routinely used and stored at PRPA port terminals.
- § Educate terminal operators on what other ports have done to decrease the amount of dangerous chemicals used and stored at the ports.
- § Work with port neighborhoods, PRPA and individual terminal operators to supplement the cost of transitioning to less toxic chemicals for fumigation and other potentially toxic on-site cargo cleaning.
- § Work with port neighborhoods, PRPA, and individual terminal operators to implement a series of Best Management Practices (BMPs) for spill minimization and management.
- § Work with PRPA and individual terminal operators to supplement the cost of implementing these BMPs.

Establishing a consistent and effective spill response protocol for the Philadelphia ports will be an important step forward in ensuring that these important industrial facilities are also good neighbors to other riverfront functions.

Related to port design and operation but not sufficiently highlighted in AAPA's impact tables is the effect of the routine operation of port equipment on stormwater runoff. Much like the problem of spill management, this is an issue that gets insufficient attention in the Philadelphia port system. As cargo-handling vehicles and cranes move about next to cargo ships and the water surface, and carry containers across sprawling paved surfaces, they can leak fluids and leave behind debris and other potentially toxic materials.

Although stormwater runoff from industrial sites like marine ports represents a significant risk to water quality and aquatic life, it remains mostly unregulated. While the Philadelphia Water Department has issued specifications for stormwater detention and retention, these regulations only apply to new development of more than 15,000 square feet, leaving most existing facilities unaffected.<sup>9</sup>

The Pennsylvania Department of Environmental Protection (PA DEP) has not applied any sort of leverage in this issue either. PA DEP administers the National Pollutant Discharge Elimination System (NPDES) permitting process, which regulates industrial stormwater discharge. None of the Philadelphia area ports holds a current NPDES permit. The need is clear, then, for a comprehensive approach to stormwater

management at the Philadelphia port facilities which will revitalize state and local oversight as well as engage port operators in adopting best practices towards minimizing hazardous industrial runoff.

Based on these activity lists we can also extrapolate as to possible environmental hazards at inactive former port sites. These problems might include the presence of soil that has been contaminated by the handling or warehousing of hazardous cargo materials such as fuels and chemicals; soil contamination as a result of painting and equipment maintenance as well as paint stripping; improper and unremediated disposal of ship wastes; and the presence of contaminated dredge material that has been used for landfilling and reclamation.

### **Cargo at Philadelphia's Port Terminals**

In view of the risks posed by certain types of cargo, for instance dry bulk that is inclined to become airborne, it is useful to review the kinds of materials that the various Philadelphia port terminals handle and store in on-site warehouses. In this section we will consider the materials coming into Philadelphia terminals and posit a possible level of risk that they pose. In the table below, project cargo refers to types of cargo that are particularly large or heavy, or which require disassembly prior to shipping and re-assembly upon offloading. Break bulk cargo is that which is not shipped in containers, but is instead stowed directly into a ship's hold. Break bulk cargo frequently consists of

units such as cartons. Bulk cargo, on the other hand, is loaded into a ship in unpackaged form. Grain products are one example of bulk cargo.

### ***Cargo Types at Philadelphia Port Terminals***

<b>Terminal</b>	<b>Cargo handled<sup>10</sup></b>	<b>Possible environmental risks</b>
<b><i>Pier 122</i></b> <b><i>*Currently Inactive*</i></b>	<b><i>bulk cargo</i></b> <b><i>iron ore</i></b> <b><i>aggregates</i></b> <b><i>fertilizer</i></b>	<b><i>nitrogen and phosphorus</i></b> <b><i>components of fertilizer as</i></b> <b><i>water contamination hazards</i></b>
<b>Packer Avenue Marine Terminal</b>	container cargo steel products frozen meat fruit heavy lift cargo paper products project cargo	low risk cargo
<b><i>Pier 96 and 98 Annex</i></b> <b><i>*Currently Inactive*</i></b>	<b><i>automobiles &amp; trucks</i></b> <b><i>heavy equipment</i></b> <b><i>project cargo</i></b>	<b><i>water quality risk auto</i></b> <b><i>washing shed</i></b>
<b>Pier 84</b>	cocoa beans cocoa products	low risk cargo
<b>Pier 82</b>	fruits and vegetables break bulk project cargo paper products	chemicals used in fruit fumigation services possible air and water quality risk
<b>Piers 78 and 80</b>	newsprint paper products wood pulp lumber and forest products	low risk cargo
<b>Piers 38 and 40</b>	newsprint paper products wood pulp lumber and forest products	low risk cargo
<b>Tioga Marine Terminal</b>	containers fresh fruit paper products cocoa products automobiles palletized cargo	chemicals used in fruit fumigation services possible air and water quality risk

	project cargo break bulk steel products	
Cruise Terminal		low risk passenger activity

Some of the possible environmental issues posed by the types of cargo and its handling in the Philadelphia port terminals include the handling of fumigatives for fresh fruits.

### Space and Structure at Philadelphia's Port Terminals

The Port of Philadelphia is comprised of several individual piers strung along the Delaware River between the Tioga Marine Terminal at the north, and the Packer Avenue Marine terminal at the south. The individual, stand-alone pier facilities occupy smaller spaces than Tioga and Packer. Piers 38 and 40, for example, are sandwiched between Philadelphia's heliport and the U.S. Coast Guard station and administrative building, with a residential neighborhood directly across Columbus Boulevard. These piers face Columbus Boulevard, with their container and equipment storage, warehousing, and parking taking up just 12 acres.

Piers 78 and 80, totaling 44 acres, are slightly further south on Columbus Boulevard and are located amongst retail and light industrial uses. These piers are neighbors to the big-box strip shopping center that contains Home Depot, Wal-Mart, and Superfresh. Other nearby business include warehouses, a strip club, and other retail

buildings. The empty lot between Pier 78 and the back side of the Superfresh supermarket is currently being developed by PRPA as a wood product warehouse.

Piers 82 (13.3 acres) and 84 (13.9 acres) are neighbors with the relatively new Columbus Commons big-box center, which features a few restaurants, a Lowe's, and an Ikea. There is little in the way of empty space surrounding these piers as well; the same goes for Piers 96 and 98, together comprising 54.9 acres, just a little further south on Columbus Boulevard.

The Packer Avenue Marine Terminal, with a total area of 112 acres, has considerable space devoted to container storage, automobile storage, cargo warehousing, and transfer structures. The location of this terminal relatively close to on-ramps for interstates 76 and 95 minimizes the distance trucks must travel on surface streets. This terminal probably has the greatest potential for acquiring new neighbors. There is a large empty parcel of land directly across Columbus Boulevard from the terminal, which now contains a "gentleman's club" in an odd neo-Georgian building as the first development pioneer in this largely weedy space; the PCPC is not, however, encouraging entertainment and hospitality uses near the Packer property. The Packer Avenue terminal follows the curve of Columbus Boulevard as it turns towards the sports stadiums nearer to Broad Street; there is much potential here for future entertainment and hospitality facilities as well as for new port-related infrastructure such as warehouse buildings.

The Tioga Marine Terminal at the northern end of this row of port facilities is also a large space with a total area of 116 acres, but is more definitively bounded by a residential neighborhood—Port Richmond—than the Packer Avenue terminal. There is a very small park located in the middle of the port area, where Allegheny Avenue ends at the Delaware. The park seems to be used by nearby residents for fishing and generally spending time near the river. The Tioga Terminal has access to interstate 95 that is quite efficient and which mostly prevents the need for large trucks to travel the nearby city arterials Richmond Street and Allegheny Avenue. A considerable amount of space is used for warehousing, parking and equipment storage. At both the Packer and Tioga terminals there is a massive amount of paved space, which raises concerns about storm runoff.

### **Southport Expansion and Produce Terminal**

In 2004, Pennsylvania Governor Ed Rendell signed a bill that turned over ownership of 47 acres of waterfront property at the Philadelphia Naval Business Center, formerly the Philadelphia Naval Yard, to the PRPA. Current plans call for some degree of expansion including the Parcel 9A, and Piers 122 and 124.

A dispute between a coalition of port workers and the PRPA and the state has arisen, however, with a proposal to move the Philadelphia Regional Produce Terminal, currently located on 47 acres between Packer and Pattison Avenues in South

Philadelphia, to the Naval Business Center. The coalition argues that the produce terminal doesn't need waterfront space, and that locating it amidst active port operations will disrupt traffic flow into and out of the Packer and proposed Southport expansion. It also objects to taking up waterfront space that could otherwise be used for port activity, arguing that port expansion is critical to the health of Philadelphia's shipping industry as the size and number of container ships traveling between cities increases steadily. The other proposed location for the produce terminal has been the Pier 98 annex on Delaware avenue, also a waterfront space but not slated for new expansion development.<sup>11</sup>

Key environmental concerns here regarding land use patterns will relate to efficiency of traffic flows. With the addition of a casino at Reed Street and Columbus boulevard as well as other port projects expected to ramp up the traffic load on local streets, how might additional traffic to and from a more developed waterfront add to the problem?

### **The Philadelphia Port and Delaware Riverfront Planning**

PennPraxis, the consulting and outreach arm of University of Pennsylvania's School of Design, was charged by Mayor Street to spearhead a public planning effort around seven miles of riverfront along the Delaware in October 2006. Working with a

46 member Advisory Group, PennPraxis unveiled A Civic Vision for the Central Delaware on November 14, 2007. The goal of this planning process was to address blight and underutilization along a seven-mile stretch of the Delaware in Philadelphia, and to transform the riverfront into a vibrant mixed-used space that honors the industrial nature of that corridor.<sup>12</sup> The Tioga and Packer Avenue terminals sit just outside the study area, but the plan does address the status of the piers along Columbus Boulevard.

The Philadelphia City Planning Commission produced a working paper on the Philadelphia port in conjunction with this effort which contained the following recommendations:

- ***Preserve major areas of the working port***—protecting the major facilities while facilitating a richer mix of land uses than is currently represented
- ***Evaluate the need for small nodes of port activity***—considering a shift of some port activities to other locations
- ***Consider the Conrail Yards at Lehigh Avenue as a future working port facility***—this currently vacant space has potential to become a maritime terminal
- ***Examine the possibility for recreational, scenic and interpretive public experiences at the working port***—honoring the port as an important economic and industrial presence in the region<sup>13</sup>

Some of these recommendations were echoed in the results of the Central Delaware Riverfront Planning Process. Though its final report, *A Civic Vision for the Central Delaware*, does not directly cite the Conrail yards as a future working port facility, PennPraxis does emphasize the need to preserve the integrity of the working port as an important economic driver for the city. At the same time, a consistent theme that emerged from this year-long process was the need to “Reconnect the city to the river’s edge.” This will inevitably mean that the ports will be in closer proximity to other land uses like retail, recreation, and residential areas.

The PennPraxis vision has a few significant implications, then, concerning land use at and around the port terminals. The consolidation of some of the lower-traffic pier activity into other areas would mean that other terminal spaces would have to absorb new activity, and that pier space could be available for other public uses. Creating a more diverse mix of uses will mean that the noise, truck traffic, and dust created by the ports will come under closer scrutiny, but it will also give residents and visitors a chance to learn more about these places.

There are some readily evident places for environmentally-friendly land-use concerns to dovetail with the PennPraxis riverfront planning process. One of the land use issues that arises frequently in the literature of ports management is that of land use efficiency. At port facilities, a certain amount of space must be available to store and stack shipping containers that have been offloaded from ships or which are waiting to

be loaded. Space is required to move these containers onto trucks and trains. Space is also required for warehousing the bulk and break-bulk products that await distribution, to store and care for operations equipment, to house administrative functions, and to give employees a place to park. Making the use of these spaces as efficient as possible has some specific byproducts: it reduces the distance and therefore the amount of noise and diesel emissions caused by transferring cargo. It reduces the amount of the paved space that feeds storm runoff. Making spatial efficiency a goal can also improve the appearance of a port facility when weedy, wasted, and unmaintained space can be minimized.

Equally notable is the opportunity to work with the Philadelphia Regional Port Authority and the terminal operators to create recreational and educational spaces alongside the port terminals. The planning and design process has placed a great deal of emphasis on establishing connected recreation spaces along the riverfront, and has posited the idea of deploying the port scenery as part of an interpretive process. The large and dramatic Tioga and Packer Avenue terminals lend themselves particularly well to scenic duty. The enormous ships, giant cranes, and the global connections that are suggested by fruit arriving from Central America, or ships with the names of foreign cities painted on them can surely be an exciting and interesting waterfront feature for both local residents and tourists. The possibility of a recreational path following the waterfront—but skirting around the port properties themselves—means

that it would be quite easy to hike, jog, or bike the distance between the large terminals, with views of the smaller pier facilities in between.

This represents a ripe opportunity for environmentalists to initiate educational and interpretive projects that illustrate the global impact of the commercial shipping industry and to discuss the massive infrastructure that is required to sustain the western hemisphere's consumer appetite. This kind of effort can be carried out within a cooperative relationship with port stakeholders. It can further go hand in hand with a program to beautify the port. Currently the terminal surroundings are distinctly unkempt looking. Rusty chain-link fences topped with barbed wire, weeds, and litter abound. It is reasonable to expect an active industrial area to have a certain amount of dust and grime, but there are many ways to spruce up the area without disrupting port operations.

Working within the riverfront redevelopment and redesign plan to establish attractive human-powered recreation spaces and trails is a valuable opportunity to insert a dialogue about the environment into the land use patterns of the port. Interpretive displays can teach about the shipping industry, Philadelphia's industrial legacy, green ports modernization initiatives that have taken place at the Philadelphia terminals, and so forth.

## **Models**

### ***Recreation and Tourism***

The port of Zeebrugge on the North Sea coast of Belgium is a sprawling but well maintained site. A coastal recreational trail goes straight through the middle of the port area, following a public road. Visitors moving at walking, cycling, or skating speeds can easily view the movement of ships and transfer equipment through the port. The recreational route lacks decent signage and interpretive information, yet is a well-used thoroughfare that allows people to get quite close to the action.

### ***Land Use Planning***

The port of Melbourne has devised a sophisticated land use plan as part of a 20-year strategic planning framework to guide future development. The plan emphasizes issues like redevelopment of local roads to accommodate port traffic needs, ensuring efficiency in access to road and rail transportation, building landscaped and attractive buffer spaces that help shield local residential areas and light retail from the noise and dust of the port functions, working with local municipal authorities to establish recreational paths and interpretive/heritage sites alongside the working port, and improving public access to the waterfront.<sup>14</sup>

The Melbourne Port Corporation (MPC) identifies eight environmental risks that shape the planning process, several of which have land-use implications: emergency situations such as chemical spills, hazardous goods management, impacts of port-

related activities on residential amenities, soil contamination, ship and land waste management, stormwater management, resource use, and ballast water discharge. As part of the plan implementation, the MPC has established a stakeholder relationship with Australia's Environment Protection Authority and other local and regional environmental organizations to promote best practices. The process also encompasses citizen participation at each stage. The complete planning document can be found at the MPC's website at [www.portofmelbourne.com](http://www.portofmelbourne.com).

The Port of San Francisco is also working with a land use plan that is part of a waterfront revitalization effort in that city. Much like Philadelphia's newly evolving riverfront redevelopment plans, the San Francisco port plan aims to balance the preservation of working port functions with a diversity of land uses surrounding the port terminals, improved public access to the waterfront, and attention to recreational and environmental preservation opportunities. San Francisco's port planning process also includes environmental organizations in its stakeholder group. An overview of the plan can be viewed at [www.sfgov.org](http://www.sfgov.org).

A major waterfront redevelopment effort is currently underway in Adelaide, also in Australia. The changes and goals here are also similar to what Philadelphia has in mind with its own redevelopment plan. Adelaide's development area is vastly smaller than the seven miles of riverfront upon which Philadelphia has focused, but it does represent a large-scale, diversifying approach.

## Conclusion

The land use practices at Philadelphia port terminals represent a set of environmental management challenges. Immediate concerns include the need to better manage and regulate stormwater runoff and the potential for spills. A range of other operations issues call for further attention and investigation. At the same time these facilities offer exciting opportunities to connect newly emerging green spaces like the Frankford Creek Greenway with a redesigned Delaware riverfront, and to reshape this important regional industry as an environmental leader.

## Notes

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- <sup>1</sup> Pennsylvania Department of Community and Economic Development, home page, "Port of Philadelphia," accessed 12 March 2007, <<http://www.newpa.com/>>
  - <sup>2</sup> Philadelphia Regional Port Authority, "Portwatch," Issue 21, Spring 2006, accessed 26 September 2007, <<http://www.philaport.com/newsletters/PWSpring2006.htm>>.
  - <sup>3</sup> International Maritime Organization, home page, "Marine Environment," accessed 12 March 2007, <<http://www.imo.org/>>.
  - <sup>4</sup> World Bank, home page, "Republic of Guatemala Modernization Program of the Port Sector: Baseline Environmental Survey in Santo Tomas de Castilla and Puerto Quetzal," accessed March 12, 2007, <
  - <sup>5</sup> American Association of Port Authorities, *Environmental Management Handbook*, pp. 2.1-2.7.
  - <sup>6</sup> AAPA, p. 2.5.
  - <sup>7</sup> AAPA, p. 2.5.
  - <sup>8</sup> American Association of Port Authorities, *Environmental Management Handbook*, p. 2.6.
  - <sup>9</sup> Philadelphia Water Department, "Philadelphia Water Department Regulations," p. 106-107
  - <sup>10</sup> Cargo information captured from the home pages of the Philadelphia Regional Port Authority at <http://www.philaport.com> and the Pennsylvania Department of Community and Economic Development at <http://www.newpa.com>.
  - <sup>11</sup> Lorraine Gennaro, "Port of Contention," South Philly Review, 8 March 2007, p.1.
  - <sup>12</sup> Philadelphia City Planning Commission, "The Riverfront Redevelopment Process," a Central Delaware Riverfront Plan working paper, February 2007.
  - <sup>13</sup> Philadelphia City Planning Commission, "The Working Port," a Central Delaware Riverfront Plan working paper, February 2007, p. 1.
  - <sup>14</sup> Melbourne Port Corporation, "Port of Melbourne Land Use Plan," 2002, <http://www.portofmelbourne.com/>.