High Risk Energy Infrastructure

Resource Valuation and Vulnerability Analysis in Communities Surrounding The Distrigas of Massachusetts LLC Liquefied Natural Gas Everett Marine Terminal

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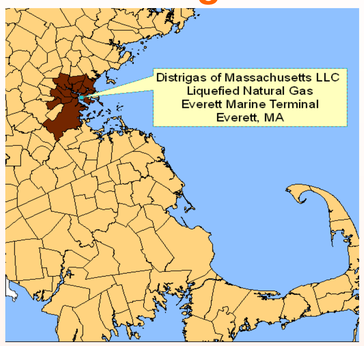
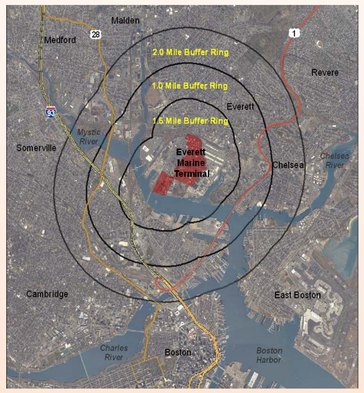
Data Source: MassGIS
Projection: MA State Plane, NAD **1983**

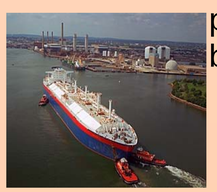


Everett, MA is home to the Everett Marine Terminal, a Distrigas of Massachusetts LLC (DOMAC) liquefied natural gas (LNG) import and regasification facility. From 1971-2003, this expansive facility received half of the nation's imported LNG. Today it serves 20% of New England's NG demand. While the terminal provides an invaluable service, it is precariously positioned in Everett and is less than 2.5 miles from downtown Boston. LNG infrastructure is physically and strategically vulnerable, and a facility disaster would significantly impact neighboring communities. Today, siting of LNG terminals involves extensive analyses of project economics, risk assessment, and environmental impact, and facilities are far less likely to be sited in dense urban areas. Here, with the Everett Marine Terminal as a model, GIS is used to quantify local resources of the natural and built environment and analyze community vulnerability. This information, when inputted into economic models, can be used to valuate potential damage and plan the allocation of resources for vulnerable communities in the event of a disaster.



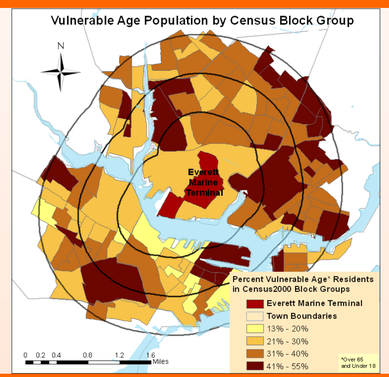
The Study Area

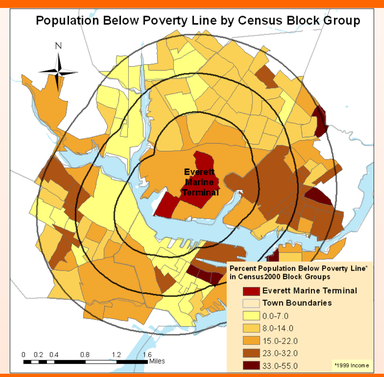
A multi-ring buffer was placed around the industrial land use parcel that houses the Everett Marine Terminal. Hypothetical disaster zone radii were arbitrarily set at 0.5, 1.0, and 1.5 miles in order to separate abutting communities that would be most affected from those that would be moderately affected and to quantify resources and analyze population by zone.



Sample Maps: Demographics

Vulnerability related to income, age and language were identified in Census data with the assumption that population trends persisted. Tabular data was joined to Census Block Group polygons, and factors of vulnerability were quantified using selection, statistics, and field calculator tools for each buffer zone.

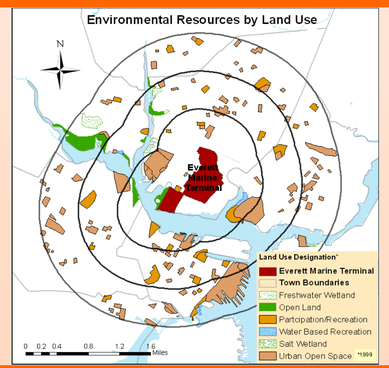


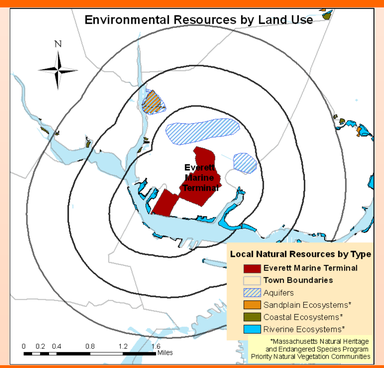


	Within 0.5 Mile Buffer Ring	Within 1.0 Mile Buffer Ring	Within 1.5 Mile Buffer Ring	Within Entire Buffer Ring
Total Population	8543	46448	81252	136243
Mean population density per square mile	11892	25537	24537	61966
Vulnerable age population (over 65 and under 18)	3867	14856	28253	198209
Population with income below poverty line (1999 Dollars)	1312	7248	13406	21966
Households with non-English speaking residents	1280	6762	12541	20583
Population without U.S. citizenship	1697	10227	19296	31220

Sample Maps: Environment

Local natural resources including sensitive habitats and ecosystems, coastline, and aquifers were mapped onto the study area. These resources have both environmental and economic value that can be quantified. Selections, statistics and field calculator tools were used to calculate resource area in each buffer zone.

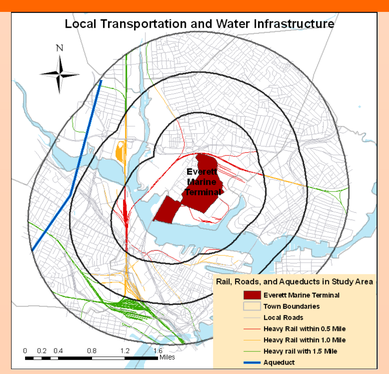




	Within 0.5 Mile Buffer Ring	Within 1.0 Mile Buffer Ring	Within 1.5 Mile Buffer Ring	Within Entire Buffer Ring
Acres of Sandplain Ecosystems	0.0	26.6	6.3	32.9
Acres of Coastal Ecosystems	0.0	2.1	2.5	4.6
Acres of Riverine Ecosystems	58.0	2.8	24.8	85.6
Acres of aquifer	155.0	36.5	0.0	191.5
Acres of salt wetland	0.0	0.0	1.5	1.5
Acres of non-forested freshwater wetland	0.0	13.3	22.4	35.7
Acres of open land	22.0	14.4	61.5	97.9
Acres of urban open space	160.0	117.1	276.4	553.5
Acres of water-based recreation	6.2	2.2	3.5	11.9
Miles of coastline	12.5	11.5	20.0	43.9

Sample Maps: Infrastructure

Nearby infrastructure, including rail lines, roads, and public facilities were mapped onto the study area and their total lengths calculated. In addition, the area of residential, commercial, and industrial land use parcels were tallied for each buffer zone.



	Within 0.5 Mile Buffer Ring	Within 1.0 Mile Buffer Ring	Within 1.5 Mile Buffer Ring	Within Entire Buffer Ring
Miles of aqueduct	0.0	0.0	2.3	2.3
Miles of heavy rail infrastructure	20.4	24.4	39.4	84.2
Miles of roads	37.4	96.5	136.2	270.2
Acres of commercial land use	90.6	247.7	230.9	569.2
Acres of industrial land use	449.9	403.7	278.2	1131.8
Acres of residential land use	49.8	1060.9	1228.3	2339.0
Number of Schools (Pre-K through High School)	2	18	17	37
Number of Libraries	1	8	13	22
Number of Community Health Centers	1	6	4	11