Scary Maps

Use of Air Quality Modeling, Risk Assessment, and Isopleth Graphics to Encourage Diesel Emission Reductions

1. Train Yard
2. Truck Stop
3. Port

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September 2009 NACAA Membership Meeting

Public Health Concerns Evaluated

- **Fine Particulate (PM-2.5)** National Ambient Air Standards (NAAQS)

  annual NAAQS = 15 ug/m^3

  24-hour NAAQS = 35 ug/m^3

- **Incremental Cancer Risk**

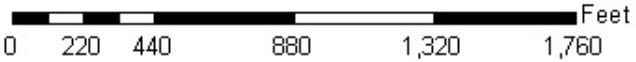
  - assumes 70-year continual exposure
  - only diesel particulate from site included

Risk Management Procedures for Facility-Wide Risk (Existing Sources)

- **Cancer risk greater than 1,000 in a million – Unacceptable risk, requires immediate action to reduce.**
- **Cancer risk from 100 to 1,000 in a million – Significant risk, pursue short-term (less than 1 year) risk minimization strategy.**
- **Cancer risk from 10 to 100 in a million – Significant risk, pursue long-term (more than 1 year) risk minimization strategy.**
- **Cancer risk less than 10 in a million – Negligible Risk.**

RARITAN RAIL YARD

THE NEW JERSEY TRANSIT RAILYARD AT RARITAN



NJ Transit's Idling Reduction Program

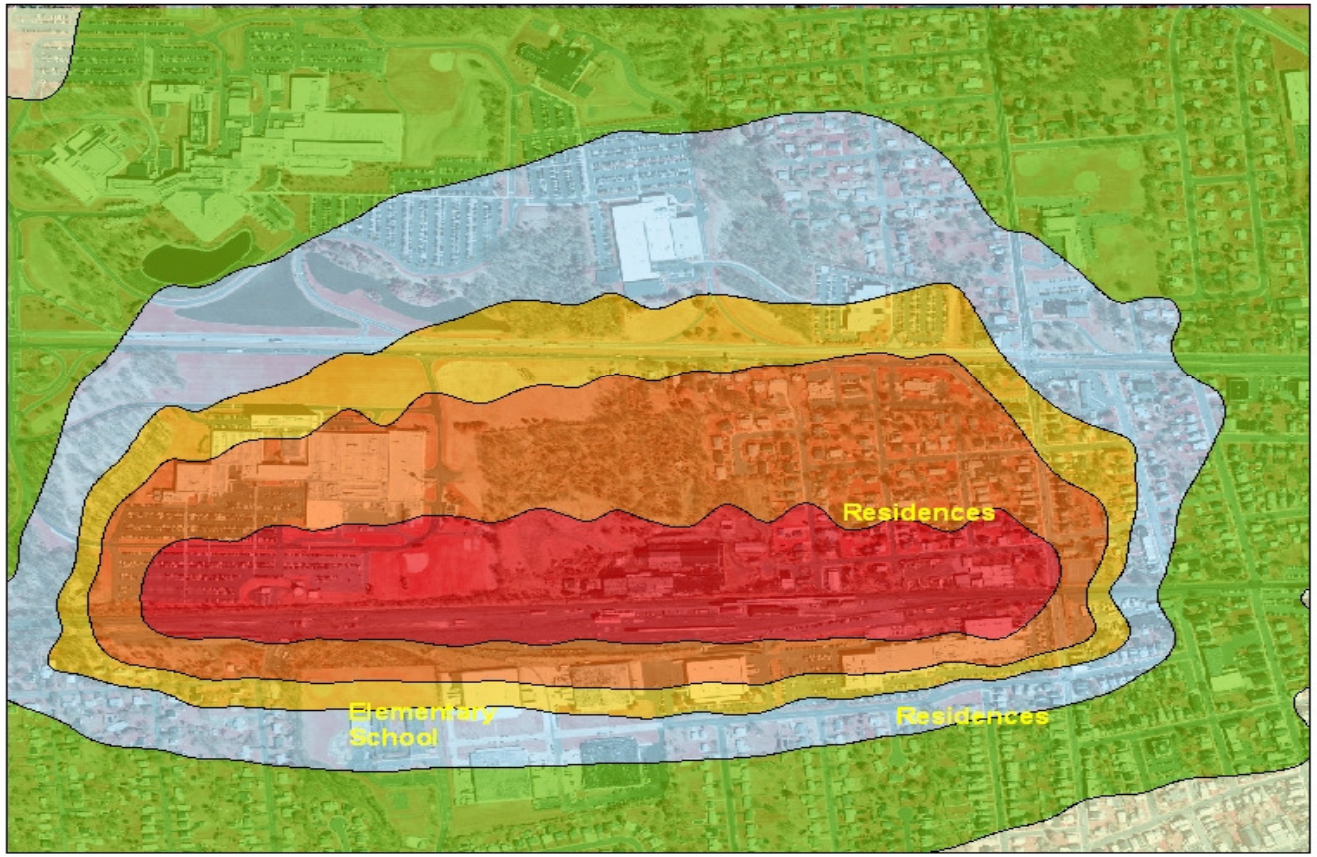
Four Idling Scenarios Evaluated:

1. DEP initial estimate (Scary Map)
2. Revised per NJ Transit Data (reality)
3. Initial Idling Reduction Program (40°F)
4. Revised Idling Reduction Program (0°F)

Revised Idling Reduction Program → **80 percent reduction in total idling hours, except when nighttime temperatures below 0º F.**

INITIAL SCARY MAP (estimated inventory)

Maximum Predicted 24-Hour PM-2.5 Concentrations due to Past Train Idling Practices (NJDEP Initial Estimate)



Legend

- 0 - 5 ug/m**3
- 5 - 10 ug/m**3
- 10 - 15 ug/m**3
- 15 - 20 ug/m**3
- 20 - 40 ug/m**3
- Above 40 ug/m**3

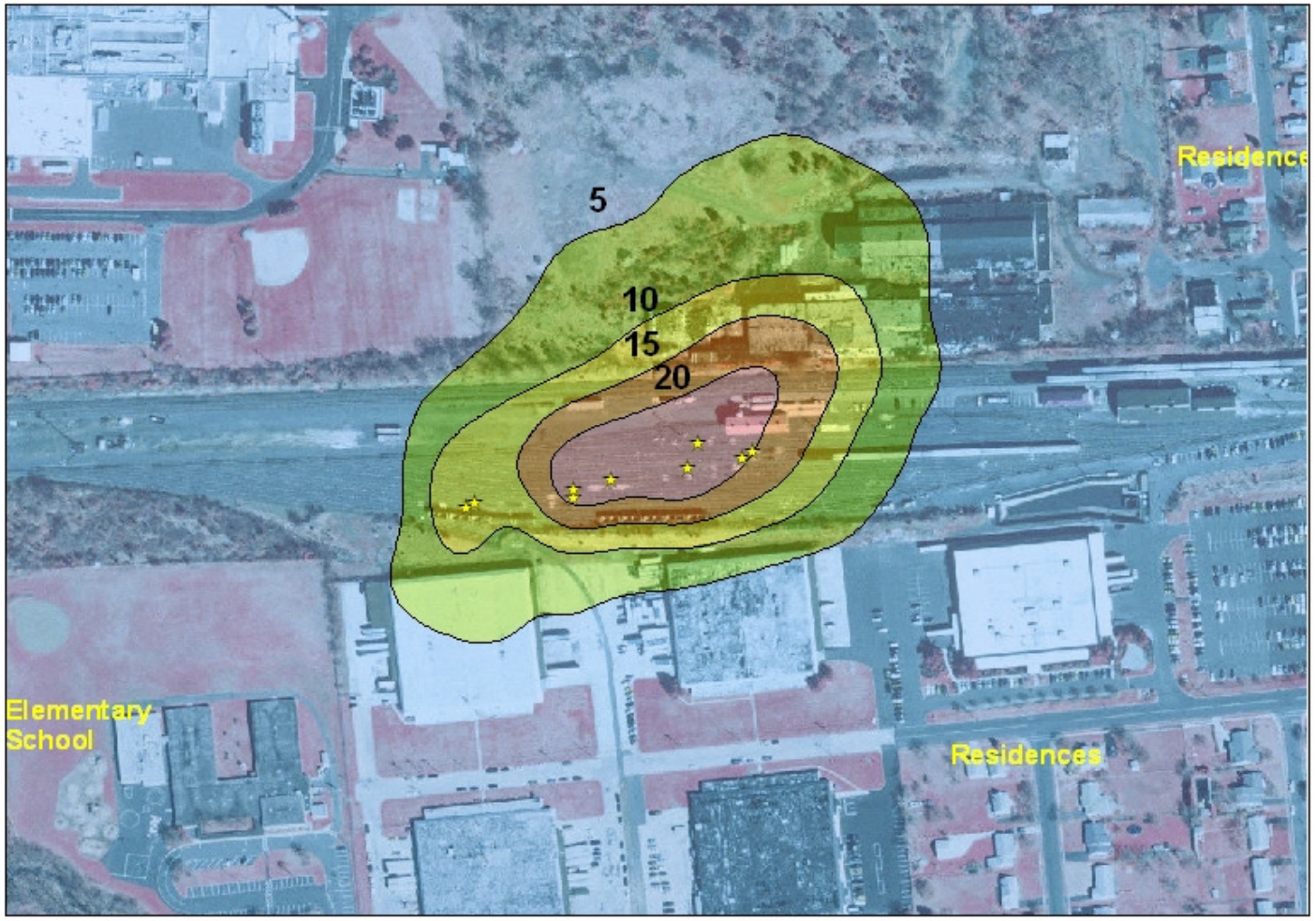
N
W E
S

0 312.5 625 1,250 1,875 2,500 Feet

NAAQS= 35ug/m3; Background levels (not included in figure) = 30.5 ug/m3

REVISED SCARY MAP (refined inventory)

Maximum Predicted 24-Hour PM-2.5 Concentrations due to Past Idling Practices (using NJ Transit data)



Legend

- ☆ Locomotives
- 0 - 5 ug/m**3
- 5 - 10 ug/m**3
- 10 - 15 ug/m**3
- 15 - 20 ug/m**3
- Above 20 ug/m**3

N
W E
S

0 140 280 560 840 1,120 Feet

NAAQS= 35 ug/m**3; Background levels (not included in figure) = 30.3 ug/m**3

AFTER IDLING REDUCTION PROGRAM

Maximum Predicted 24-hour PM-2.5 Concentration with (Temperatures above 0º F)

Legend

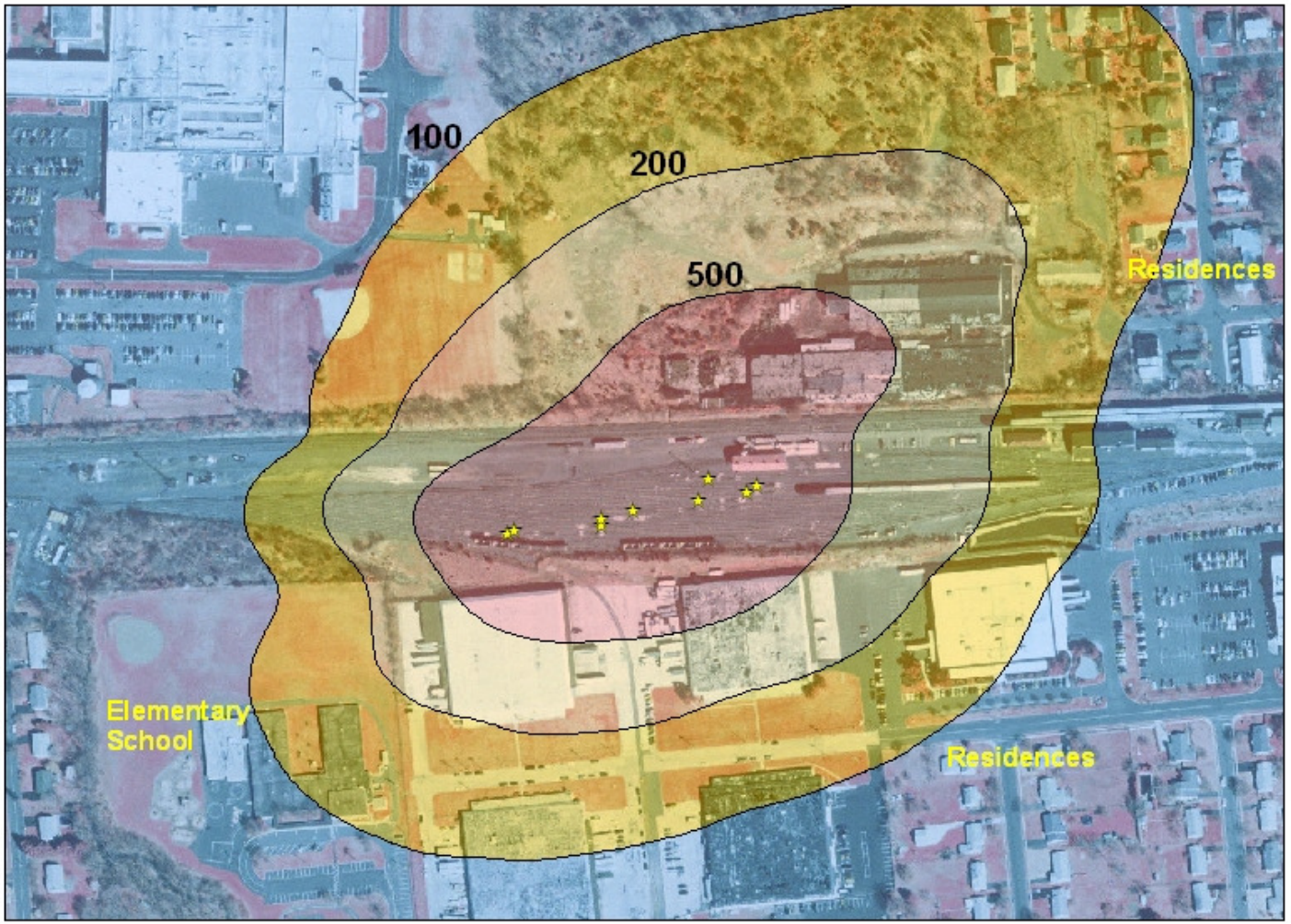
- Locomotives
- 0 - 5 ug/m**3
- 5 - 10 ug/m**3
- 10 - 15 ug/m**3
- 15 - 20 ug/m**3
- Above 20 ug/m**3

N
W E
S

NAAQS= 35 ug/m**3; Background levels (not included in figure) = 30.3 ug/m**3

Feet
0 125 250 500 750 1,000

CANCER RISK MAP **- Incremental Cancer Risk due to Past Train Idling Practices (using NJ Transit data)**



Legend

- ☆ Locomotives
- 10 - 100 in a million risk
- 100 - 200 in a million risk
- 200 - 500 in a million risk
- Over 500 in a million risk

N
W E
S

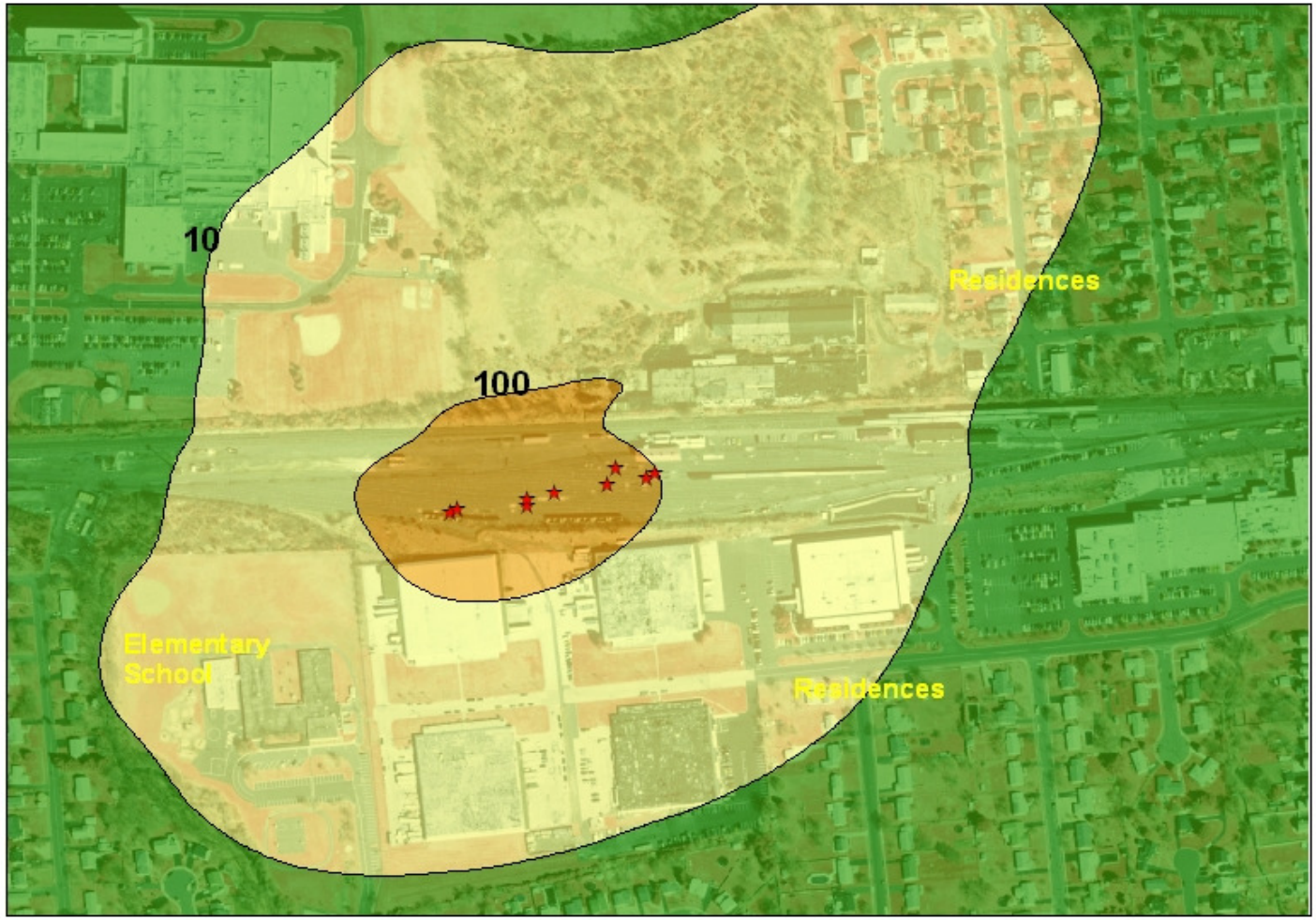
0 155 310 620 930 1,240 Feet

Note: Exposures at the Elementary School are expected to be less than a life time and so the risk will be less (see text for further explanation).

No background values included in this figure

AFTER IDLING REDUCTION PROGRAM

Incremental Cancer Risk due to Train Idling



Legend

- Locomotives
- Below one in a million risk
- 1 - 10 in a million risk
- 10 - 100 in a million risk
- 100 -1000 in a million risk
- Above 1000 in a million risk

N
W E
S

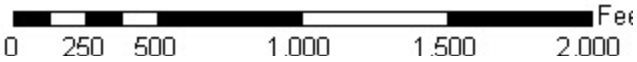
Note: Exposures at the Elementary School are expected to be less than a life time and so the risk will be less (see text for further explanation).

No background values included in estimated cancer risk

Feet
0 130 260 520 780 1,040

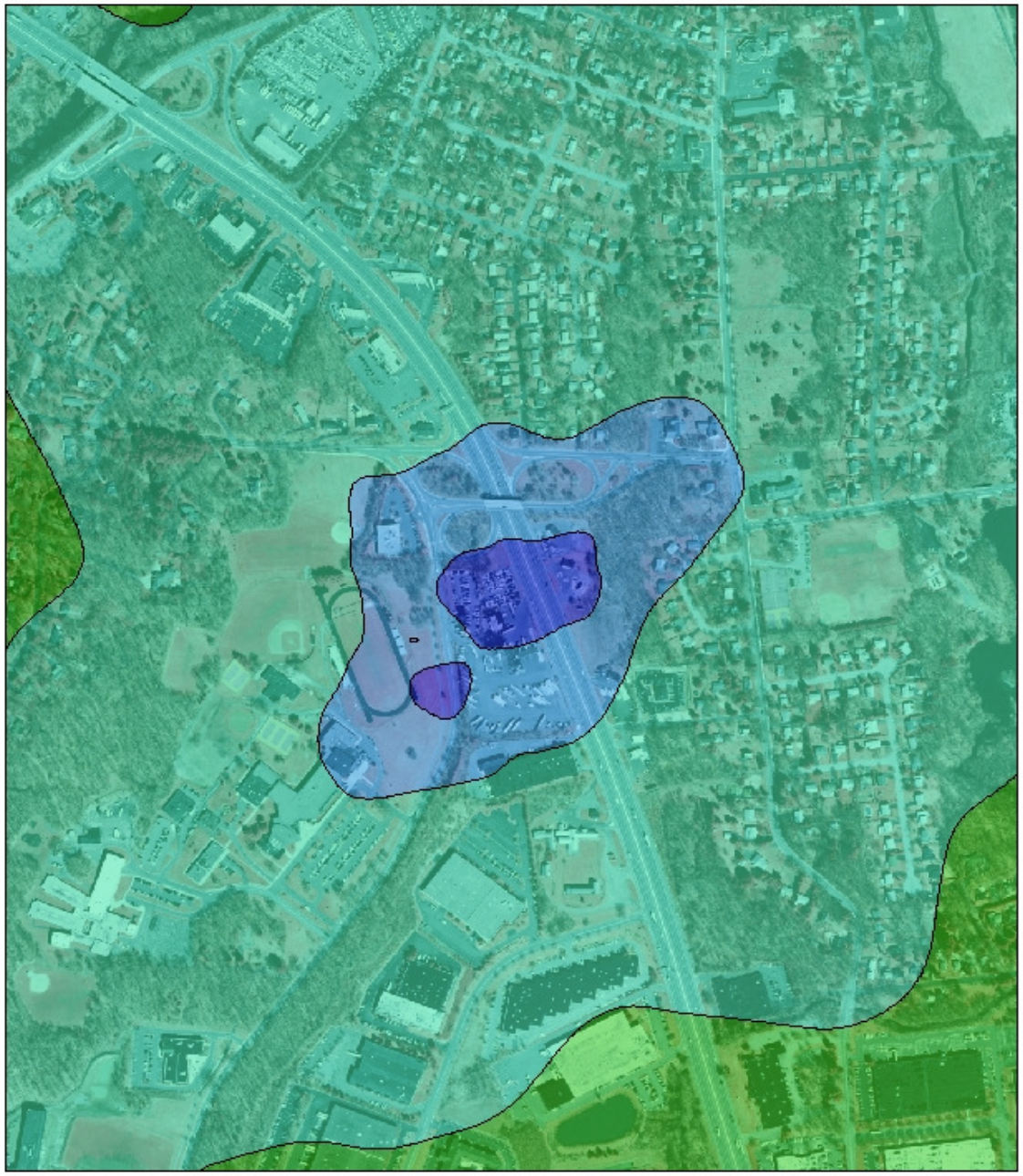
MAHWAH TRUCK STOP

Aerial view of the Pilot Truck Stop in Mahwah, NJ.



Pilot Truck Stop Air Dispersion Modeling

- Standard Air Permit Modeling Methodology and Techniques Used.
- Key Inputs – number of trucks idling, hours of idling, time of idling.
- Four Scenarios Evaluated:
  1. DEP initial estimate of major truck stop expansion
  2. Existing conditions per applicant/citizen input
  3. Proposed truck stop modification - pre May 2010
  4. Proposed truck stop modification – post May 2010 (effective date of more stringent NJ Idling Rule)



Current Conditions

Predicted 98th percentile 24-Hour PM-2.5 Impacts due to Pilot Truck Stop

(Citizen survey observed up to 45 idling trucks

Legend

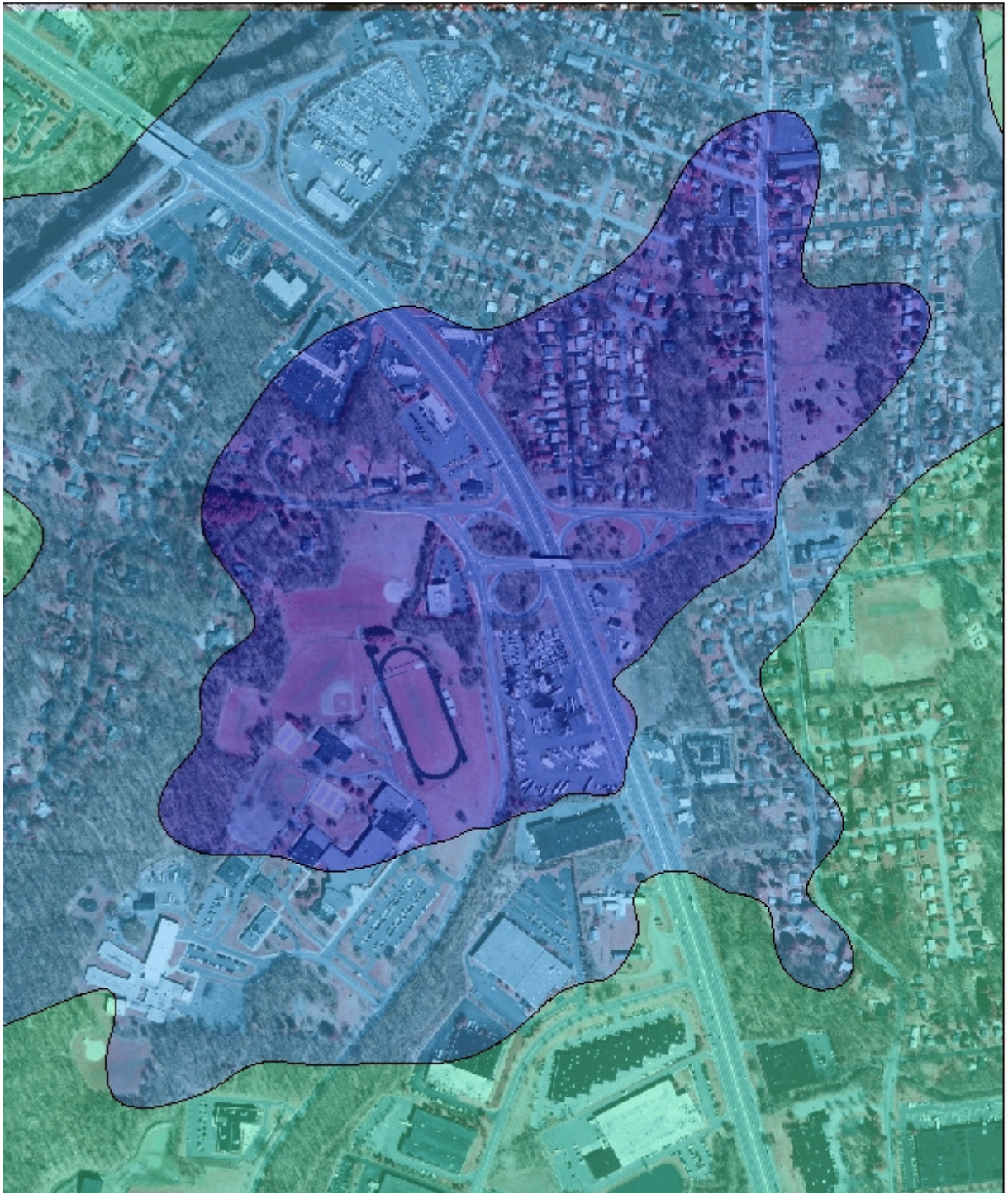
- 0 - 0.1 ug/m**3
- 0.1 - 1 ug/m**3
- 1 - 3 ug/m**3
- 3 - 4 ug/m**3

Maximum of 4.2 ug/m3

N
W E
S

0 250 500 1,000 1,500 2,000 Feet

Note: National Ambient Air Quality Standard is 35 ug/m^3; Background levels are 31.1 ug/m^3



INITIAL SCARY MAP

Predicted 24-Hour PM-2.5 Concentration due to Pilot Truck Stop

(DEP's estimate of major expansion, up to 150 idling trucks)

Legend

- 0 - 0.1 ug/m**3
- 0.1 - 1 ug/m**3
- 1 - 3 ug/m**3
- > 3 ug/m**3

Maximum of 12.2 ug/m3

N
W E
S

Note: National Ambient Air Quality Standard is 35 ug/m^3; Background levels are 31.1 ug/m^3

REVISED NON-SCARY MAP

Predicted 24-Hour PM-2.5 Concentrations due to Pilot Truck Stop

(Proposed Modification –up to 10 idling trucks)

Legend

- 0 - 0.1 ug/m**3
- 0.1 - 1 ug/m**3
- 1 - 3 ug/m**3
- 3 - 4 ug/m**3

Maximum of 0.9 ug/m3

N
W E
S

0 250 500 1,000 1,500 2,000
Feet

Proposed Modification

Incremental Cancer Risk due to Pilot Truck Stop (up to 10 idling trucks)

Legend

- Below one in a million risk
- 1 - 10 in a million risk
- 10 - 100 in a million risk
- 100 - 1000 in a million risk
- Above 1000 in a million risk

N
W E
S

0 250 500 1,000 1,500 2,000
Feet

Note: Less than 10 in a million risk is considered insignificant for an entire facility's risk

PORT
UNIGLORY

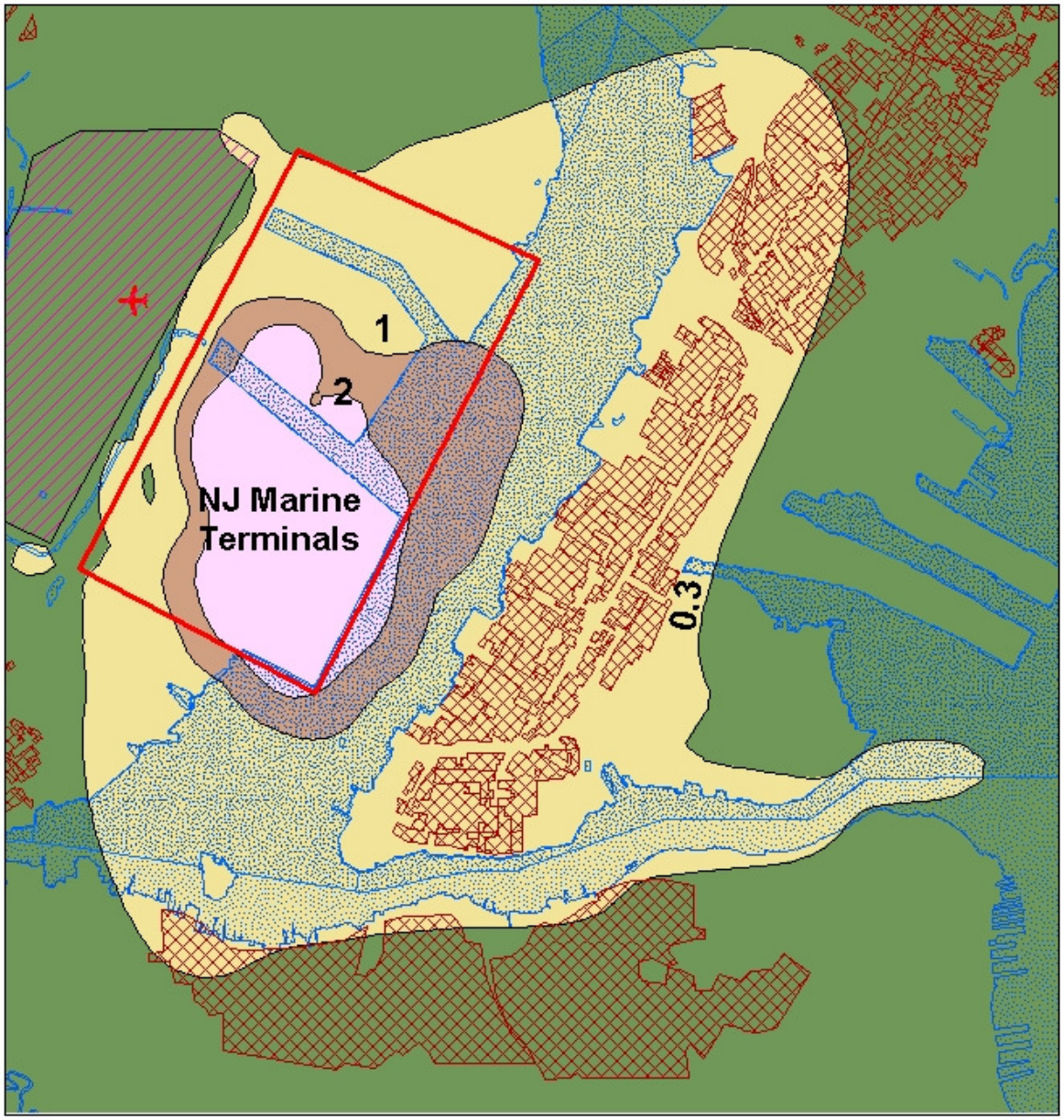
PROXIMITY OF THE NEWARK AIRPORT
ANEMOMETER TO PORT NEWARK/ELIZABETH

Emission sources (tpy)

Dispersion Modeling of Port Emission Sources

- Variety of sources – trucks, ships, locomotives, cargo-handling equipment
- Covering an area of 3 sq. miles with nearest communities over a mile away
- Also includes both transit and “at berth” ship emissions

DRAFT
MAXIMUM PREDICTED ANNUAL PM2.5 CONCENTRATIONS
DUE TO ALL PORT ACTIVITIES (not including background)



Legend

- Property line
- 0 - 0.3 ug/m^3 (below SIL)
- 0.3 - 1 ug/m^3 (above SIL)
- 1 - 2 ug/m^3
- Greater than 2.0 ug/m^3
- Residential
- Newark Airport

N
W E
S

Adjusted background PM2.5 at Elizabeth Lab = 13.4 ug/m^3
(2006-2008 average)

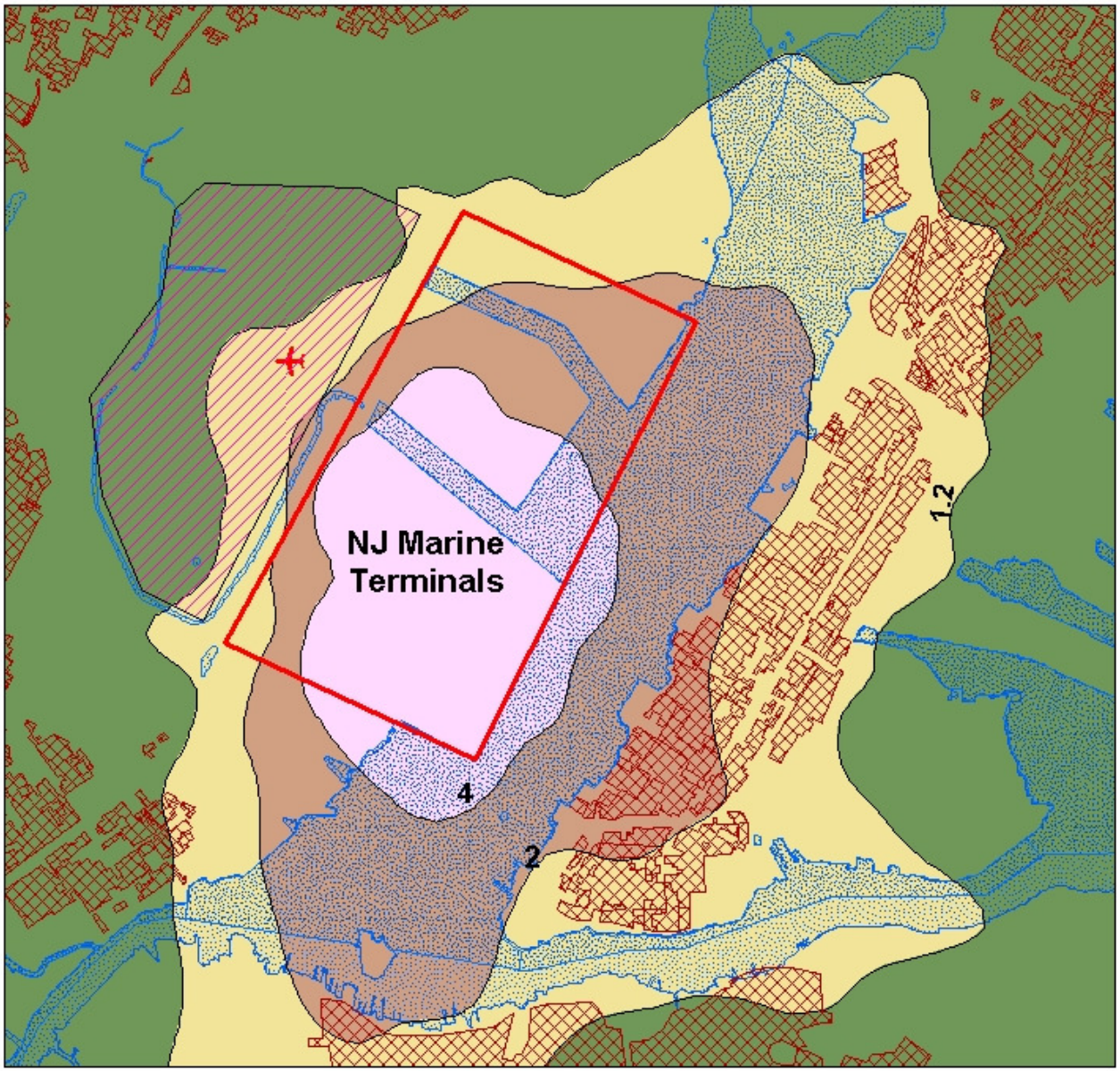
Significant Impact Level = 0.3ug/m^3

NAAQS = 15.0ug/m^3

0 0.25 0.5 1 Miles

DRAFT

MAXIMUM PREDICTED 24-HOUR PM2.5 CONCENTRATIONS
DUE TO ALL PORT ACTIVITIES (not including background)



Legend

- Newark Airport
- Airports
- Property line
- Water
- Residential
- 0 - 1.2 ug/m^3 (below SIL)
- 1.2 - 2 ug/m^3 (above SIL)
- 2 - 4 ug/m^3
- Greater than 4 ug/m^3

N
W E
S

Background PM2.5 at Elizabeth Lab = 35.3 ug/m^3
(2005-2008 average)
Interim Significant Impact Level = 1.2 ug/m^3
NAAQS = 35 ug/m^3

0 0.25 0.5 1 Miles

DRAFT

MAXIMUM PREDICTED 70-YEAR LIFETIME CANCER RISK DUE TO PORT-RELATED DIESEL PARTICULATE EMISSIONS (not including background)

Legend

- Residential
- 0 - 10 in a million risk
- 10 - 100 in a million risk
- 100 - 1000 in a million risk
- Greater than 1000 in a million risk
- Property line
- Newark Airport

N
W E
S

Risk Management Action Levels:

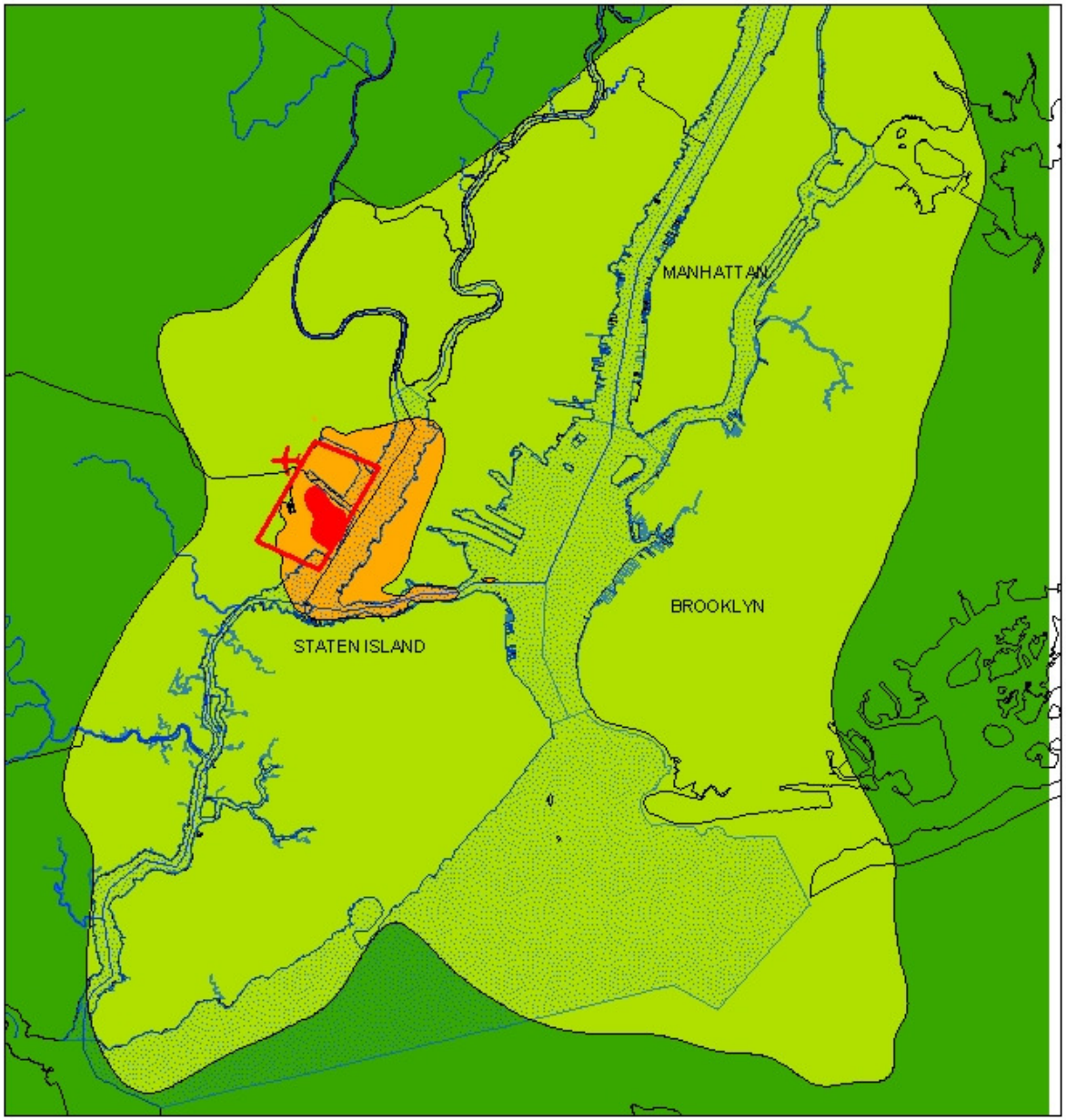
10 -100 Long-term risk reduction

100 -1000 Short-term risk reduction

Maximum offsite risk is 173 in a million
Maximum residential risk is 150 in a million

0 0.25 0.5 1 Miles

DRAFT
MAXIMUM PREDICTED 70-YEAR LIFETIME CANCER RISK DUE TO PORT-RELATED DIESEL PARTICULATE EMISSIONS (not including background)



Legend

- 0 -10 in a million risk
- 10 - 100 in a million risk
- 100 - 1000 in a million risk
- Greater than 1000 in a million risk
- Newark Airport

N
W E
S

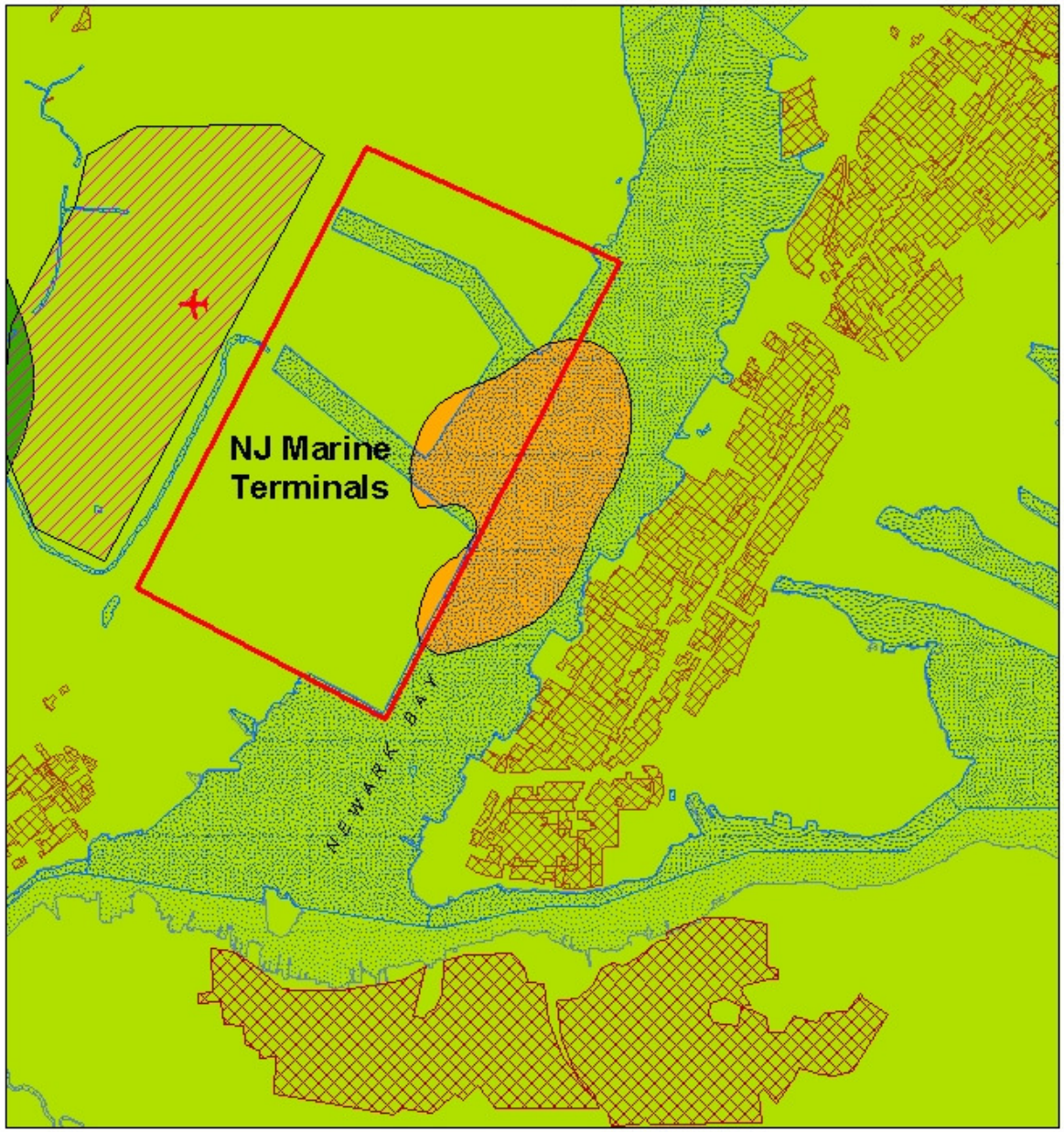
Risk Management Action Levels:

10 -100 Long-term risk reduction

100 -1000 Short-term risk reduction

0 2.5 5 10 Miles

DRAFT
MAXIMUM PREDICTED 70-YEAR LIFETIME CANCER RISK DUE TO DIESEL PARTICULATE EMISSIONS FROM OCEAN-GOING VESSELS (not including background)



Legend

- Residential
- 0 - 10 in a million risk
- 10 - 100 in a million risk
- 100 - 1000 in a million risk
- Greater than 1000 in a million risk
- Property line
- Newark Airport

N
W E
S

Risk Management Action Levels:

10 -100 Long-term risk reduction

100 -1000 Short-term risk reduction

0 0.25 0.5 1 Miles

DRAFT
MAXIMUM PREDICTED 70-YEAR LIFETIME CANCER RISK DUE TO DIESEL PARTICULATE EMISSIONS FROM CARGO HANDLING EQUIPMENT (not including background)

Legend

- Residential
- 0 - 10 in a million risk
- 10 - 100 in a million risk
- 100 - 1000 in a million risk
- Greater than 1000 in a million risk
- Property line
- Newark Airport

N
W E
S

Risk Management Action Levels:

10 -100 Long-term risk reduction

100 -1000 Short-term risk reduction

0 0.25 0.5 1 Miles

DRAFT
MAXIMUM PREDICTED 70-YEAR LIFETIME CANCER RISK DUE TO DIESEL PARTICULATE EMISSIONS FROM TRUCKS (not including background)

Legend

- Property line
- Residential
- 0 - 10 in a million risk
- 10 - 100 in a million risk
- 100 - 1000 in a million risk
- Greater than 1000 in a million risk
- Newark Airport

N
W E
S

Risk Management Action Levels:

10 -100 Long-term risk reduction

100 -1000 Short-term risk reduction

0 0.25 0.5 1 Miles

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