Appendix B3

Health Risk Assessment

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1.0 Introduction

This appendix describes the methods and results of a health risk assessment (HRA) that evaluates potential public health effects from toxic air contaminant (TAC) emissions that would be generated during the construction and operation of the proposed Project and alternatives for the Berths 212-214 (YTI) Container Terminal. The HRA evaluated health risks associated with the following scenarios:

- Notice of Preparation (NOP) CEQA Baseline (January1, 2012 through December 31, 2012) – baseline at the time of the NOP;
- Future CEQA Baseline – used only in the evaluation of cancer risk and cancer burden, as described in Section 2.3.2;
- NEPA Baseline – equivalent to Alternative 2 without mitigation;
- Proposed Project without and with mitigation;
- Alternative 1, No Project without mitigation;
- Alternative 2, No Federal Action, without and with mitigation; and
- Alternative 3, Reduced Project, without and with mitigation.

The HRA was conducted in accordance with a Protocol prepared previously by the Port and reviewed and approved by both CARB and SCAQMD (LAHD 2005). The Port protocol is based on the methodology in OEHHA's Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA 2003), Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act (AB2588) (SCAQMD 2011a), and Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Emissions (SCAQMD 2003). The Hotspots Analysis and Reporting Program (HARP) model Version 1.4f (CARB 2012) used in the HRA incorporates the methods in these guidance documents.

The HRA analyzed proposed Project and alternative TAC emissions and human exposure to the TAC emissions during the 70-year period from 2015 to 2084. TACs are compounds that are known or suspected to cause adverse health effects after short-term (acute) or long-term (chronic) exposure. The HRA includes an evaluation of four different types of health effects: individual lifetime cancer risk, cancer burden, chronic noncancer hazard index, and acute noncancer hazard index.

The HRA was developed using a five-step process to estimate incremental health impact results: (1) quantify proposed Project, alternative, and baseline emissions; (2) identify ground-level receptor locations that may be affected by emissions, including a regular receptor grid as well as specific sensitive receptor locations nearby such as schools, hospitals, convalescent homes, or daycare centers; (3) perform dispersion modeling analyses to estimate ambient TAC concentrations at each receptor location; (4) characterize the potential health risk at each receptor location; and (5) evaluate incremental health risk values by comparing potential health risk posed by the proposed Projects relative to CEQA and NEPA baselines. The following sections provide additional details on the methods used to complete each step of the HRA.

2.0 Emissions Development

2.1 Construction Emission Sources

The following emission sources associated with onsite construction activities were included in the HRA:

- Off-road construction equipment: land-based equipment and marine-based equipment (dredging and pile driving equipment);
- On-road construction vehicles (haul trucks, delivery trucks);
- Crane delivery ship used to deliver shore-side gantry cranes;
- Harbor craft: tugboats (used to position dredging barges and scows) and dive boats; and
- Asphalt paving: fugitive VOC emissions.

In accordance with SCAQMD guidance (SCAQMD 2005), only onsite construction emissions were included in the HRA. Construction emissions were not modeled for the CEQA baseline and Alternative 1 because those scenarios would have no construction activities.

2.2 Operational Emission Sources

Both on-site and off-site emission sources were included in the modeling of operational emissions. The following emission sources associated with operational activities were included in the HRA:

- Container ships transiting to and from berth. Ship transit emission sources are comprised of propulsion and auxiliary engines and boiler exhaust. Ship transit in SCAQMD waters consists of transit in the fairway, precautionary zone, and the harbor. Ships transiting were modeled as far as the SCAB overwater boundary, approximately 40 nautical miles.

- Container ships hoteling while at berth and at anchorage in the harbor. Ship hoteling emission sources are comprised of ship auxiliary engines (except when using AMP) and boiler exhaust; propulsion engines would be turned off.

- Tugboats used to assist container ships between the Port breakwater and the berth. Two tugboats were assumed to assist each ship. Tugboat emission sources are comprised of propulsion and auxiliary engines.

- On-road trucks driving on near-Port roads, at the YTI terminal, and idling on-terminal and at the YTI terminal gate. Truck transit emission sources are comprised of exhaust, brake wear, and tire wear. Trucks were modeled as far as approximately 3 miles north of the terminal, a distance established in prior LAHD NEPA/CEQA documents as sufficient to capture maximum concentrations for container terminal projects (LAHD 2011a).

- Locomotives switching and idling at the TICTF on-dock rail yard, and line haul locomotives pulling trains between the TICTF on-dock rail yard and the Alameda

Corridor. Locomotives traveling were modeled as far as approximately 3 miles north of the terminal.

- Cargo handling equipment (CHE) operating at the YTI terminal and TICTF, including forklifts, rubber-tired gantry cranes, top handlers, and yard tractors.

- Transport refrigeration units (TRUs) operating at the TICTF.

- Worker vehicles driving to and from the YTI terminal. Worker vehicle emission sources are comprised of exhaust, brake wear, and tire wear. Worker vehicles were modeled as far as approximately 3 miles north of the terminal.

2.3 Emission Calculation Approach

2.3.1 Averaging Periods for TAC Emissions

The following averaging periods were used to determine toxic air contaminant emission rates for the NEPA baseline, proposed Project, and alternatives:

- Annual emission rates averaged over a 70-year exposure period (2015-2084) were used to determine cancer risk for residential, recreational, and sensitive receptors. To estimate annual average TAC emissions over the 70-year exposure period, equipment activity levels were interpolated between analysis years (2015, 2016, 2017, 2020, and 2026) and held constant at 2026 levels for all years beyond 2026. Similarly, emission factors were interpolated between evaluation years and held constant after the last available emission factor evaluation year.

- Annual emission rates averaged over a 40-year exposure period (2015-2054) were used to determine cancer risk for occupational receptors. The approach for calculating a 40-year average is similar to that described above for the 70-year average.

- Maximum annual emission rates were used to determine chronic hazard indices for all receptor types. The maximum emissions were selected from the project analysis years 2015, 2016, 2017, 2020, and 2026. To ensure the capture of maximum TAC concentrations in the HRA, maximum annual emissions were modeled for each emission source category, even if the maximum emissions would not occur in the same analysis year. For example, maximum construction emissions were determined separately for diesel exhaust and all other sources. These maximum emissions were conservatively modeled together in the HRA even if they would occur during different construction analysis years. Similarly, maximum operational emissions were determined separately for automobile diesel exhaust, all other automobile emissions, cargo handling equipment, harborcraft, line haul locomotives, OGV boilers during anchorage, OGV diesel exhaust during anchorage, OGV boilers during hoteling, OGV diesel exhaust during hoteling, OGV boilers during transit, OGV diesel exhaust during transit, truck diesel exhaust, all other truck emissions, transport refrigeration units, and yard locomotives. These maximum emissions were conservatively modeled together in the HRA even if they would occur during different analysis years.

- Peak 1-hour emission rates were used to determine acute hazard indices for all receptor types. The peak emissions were selected from the project analysis years 2015, 2016, 2017, 2020, and 2026. To ensure the capture of maximum TAC concentrations in the HRA, peak 1-hour emissions were modeled for each emission source category, even if the maximum emissions would not occur simultaneously. The approach for selecting peak 1-hour emission rates by source category is similar to that described above for maximum annual emission rates.

2.3.2 CEQA Baseline

A primary and a secondary methodology were used to develop the CEQA baseline TAC emissions. The primary approach is referred to as the NOP CEQA baseline, and the secondary approach is referred to as the Future CEQA baseline. The NOP CEQA baseline was used in the evaluation of all health effects in this HRA (cancer risk, cancer burden, chronic and acute noncancer effects). The Future CEQA baseline was used only in the evaluation of cancer risk and cancer burden.

To better apprise the public and decision makers of the Project's environmental impacts under CEQA, the predicted cancer risk and cancer burden for the proposed Project and alternatives are compared to both the NOP CEQA baseline and the Future CEQA baseline. The NOP CEQA baseline uses 2012 YTI terminal activity levels and 2012 emission factors; in other words, it represents actual 2012 operational emissions. The Future CEQA baseline also uses 2012 YTI terminal activity levels, but uses emission factors averaged over a 70-year exposure period (2012-2081) for residential cancer risk, or a 40 year exposure period (2012-2051) for occupational cancer risk. These long-term average emission factors incorporate the effects of existing air quality regulations on future equipment emissions.

The NOP CEQA baseline cancer risk is typically higher than the Future CEQA baseline cancer risk, because emission factors for port-related equipment generally decline over time in response to existing air quality regulations and assumptions regarding equipment fleet turnover. This declining trend in emissions is accounted for in the Future CEQA baseline but not the NOP CEQA baseline.

The Future CEQA baseline is not used in the evaluation of chronic and acute noncancer effects. Chronic and acute noncancer effects are based on annual and hourly emissions, respectively. These emission periods occur entirely within the 2012 baseline year, and therefore are represented by the NOP CEQA baseline.

2.4 Project Emission Trends

The extended period of analysis (up to 70 years for cancer risk) required predictions of the future operational characteristics of the proposed emission sources. Two of the more important factors that would affect future emissions from Project sources and that were integrated into the analysis are:

- Reductions in emission factors due to (a) the incidental phase-in of cleaner vehicles or equipment due to normal fleet turnover; (b) the future phase-in of cleaner fuels as required by existing regulations or agreements; and (c) the future phase-in of cleaner engines as required by existing regulations or agreements.

- Increased vehicle and equipment activity levels due to anticipated increases in container throughput.

These two opposing trends that influence future year emission calculations are discussed in the following sections.

2.4.1 Emission Factor Trends

The methodology for determining emission factors for each emission source category is described in Section 3.2.4.1 of the EIS/EIR and in Appendix B1, and therefore is not reproduced in this appendix. The following summarizes long-term emission factor trends pertinent to the HRA:

- **Off-road Construction Equipment.** Emission factors were derived from the CARB Off-road 2011 Emissions Inventory Database for equipment representative of the SCAB (CARB 2011a). The CARB database output shows that, on a per-horsepower-hour basis, emission factors will steadily decline in future years as older equipment is replaced with newer, cleaner equipment that meets the already-adopted future state and federal off-road engine emission standards.
- **On-Road Construction Vehicles.** Emission factors were generated by the EMFAC2011 on-road mobile source emission factor model for a truck fleet representative of the SCAB (CARB 2011a). The EMFAC2011 model output shows that, on a per-mile basis, emission factors will steadily decline in future years as older trucks are replaced with newer, cleaner trucks that meet the required state and federal on-road engine emission standards.
- **Crane Delivery Ships.** Emission factors were obtained from the 2012 Port Emissions Inventory (Port EI) (LAHD 2012a). The emission factors were assumed to remain constant during both construction years.
- **Harbor Craft.** Emission factors were derived based on the USEPA standards for marine compression-ignition engines. Emission factors were assumed to remain constant during the construction period, but would steadily decline in future operational years as older tugboats are replaced with newer, cleaner tugboats per required state regulations.

- **Container Ships.** Emission factors were obtained from the 2012 Port EI (LAHD 2012a). Emission factors for propulsion and auxiliary engines are dependent on engine tier, which in turn is dependent upon engine age. Starcrest provided the average age of vessels that called at the YTI terminal in 2012. Since most of the vessels were on average 10 years old, emission factors corresponding to IMO Tier 1 for slow speed diesel propulsion engines (model years 2000 to 2010) and IMO Tier 1 for medium speed diesel auxiliary engines were used in the analysis. Since there is no confirmation that newer ships would visit the terminal in future years, engine emission factors were assumed to remain constant in future years. Per CARB regulatory requirements, the sulfur content of fuel was assumed to decrease from 0.5% in the baseline year to 0.1% in future years, thereby resulting in diesel particulate matter (DPM) reduction (CARB 2011b). In addition, container ships were assumed to comply with increasing requirements per CARB's shore power regulation, thereby reducing DPM emissions while hoteling at berth (CARB 2007).

- **On-Road Container Trucks.** Emission factors were generated by the EMFAC2011 on-road mobile source emission factor model (CARB 2011a). EMFAC2011 was run by Starcrest using the Port fleet mix for the baseline and future proposed Project and alternative years. Emission factors of PM10 exhaust are predicted to rise slightly above 2012 levels in future years as the fleet – which contained a large percentage of new trucks in 2012 because of the Port's Clean Truck Program – ages and reaches equilibrium with regard to fleet turnover. The percentage of container trucks using alternative fuels was conservatively assumed to remain at 10 percent for all future years even though it is likely that percentage will rise, resulting in a lower cancer risk.
- **Locomotives.** Line haul locomotive emission factors were obtained from the USEPA (USEPA 2009) and assume a gradual replacement of older locomotives with cleaner, newer locomotives in the future. The emission factors for PHL switch locomotives at the on-dock rail yard were based on PHL's 2012 switch engine fleet and fleet turnover assumptions for future project analysis years. As a result, the emission factors for PHL and line haul locomotives are predicted to decline in future years.
- **CHE.** Emission factors were derived from CARB's CHE inventory model (CARB 2011a). Emission factors will steadily decline in future years as older equipment are replaced with newer, cleaner equipment that meet the required state and federal off-road engine emission standards.
- **TRUs.** DPM emission factors were obtained from CARB's TRU inventory (CARB 2011a); VOC emission factors were obtained from CalEEMod (CAPCOA 2013). Emission factors will steadily decline in future years as older equipment are replaced with newer, cleaner equipment that meet the required state and federal off-road engine emission standards.
- **Worker Vehicles.** Emission factors were derived from EMFAC2011 (CARB 2011a). EMFAC2011 shows that emission factors will steadily decline in future years as older vehicles are replaced with newer, cleaner vehicles that meet the required state and federal vehicle engine emission standards.
- **Asphalt Paving.** The VOC off-gas emission factor for asphalt paving was obtained from CalEEMod (CAPCOA 2013). The emission factor per acre paved was assumed to remain constant during the construction period.

2.4.2 Activity Level Trends

Examples of activity levels include the container throughput at the terminal, the number of train and truck trips needed to move the containers, on-site equipment usage, truck/vehicle miles traveled (VMT), and truck travel speeds. For the NOP CEQA baseline and Future CEQA baseline scenarios, 2012 throughput levels were used and held constant over the entire 70-year analysis period. Activity levels for each emission source category are presented in Section 3.2.4.1 in the EIS/EIR and in Appendix B1.

YTI provided the facility throughput and container ship activity used in the HRA. The transportation study (Appendix D) provided the train, truck, and worker trip data used in the HRA. Tugboat activity would increase with the increase in container ships. CHE and TRU activity would increase with projected container throughput increase. The following summarizes the trends in future activity levels for the proposed Project and alternatives:

- Proposed Project: Terminal throughput would increase from 996,109 twenty-foot equivalent units (TEU) in the 2012 baseline year to 1,913,000 TEU in the final analysis year, 2026. Overall ship calls would increase from 162 ship calls in 2012 to 206 ship calls in 2026, and larger ships would be accommodated at the terminal in the future. Annual train trips to and from the on-dock rail yard would increase from 725 trains per year in 2012 to 1,269 trains per year in 2026. The average train length was assumed to increase from 8,000 feet per train in 2012 to 8,660 feet per train in 2026, requiring proportionally more locomotives per train. Annual truck trips would increase from 907,176 trips per year in 2012 to 1,347,939 trips per year in 2026.

- Alternative 1, Alternative 2, and NEPA Baseline: Terminal throughput would increase from 996,109 twenty-foot equivalent units (TEU) in the 2012 baseline year to 1,692,000 TEU in the final analysis year, 2026. Overall ship calls would not increase and larger ships would be accommodated at the terminal in the future. Annual train trips to and from the on-dock rail yard would increase from 725 trains per year in 2012 to 1,075 trains per year in 2026. The average train length was assumed to increase from 8,000 feet per train in 2012 to 8,660 feet per train in 2026, requiring proportionally more locomotives per train. Annual truck trips would increase from 907,176 trips per year in 2012 to 1,222,690 trips per year in 2026.

- Alternative 3: Terminal throughput would increase from 996,109 twenty-foot equivalent units (TEU) in the 2012 baseline year to 1,913,000 TEU in the final analysis year, 2026. Overall ship calls would increase from 162 ship calls in 2012 to 232 ship calls in 2026, and larger ships would not be accommodated at the terminal in the future. Annual train trips to and from the on-dock rail yard would increase from 725 trains per year in 2012 to 1,269 trains per year in 2026. The average train length was assumed to increase from 8,000 feet per train in 2012 to 8,660 feet per train in 2026, requiring proportionally more locomotives per train. Annual truck trips would increase from 907,176 trips per year in 2012 to 1,347,939 trips per year in 2026.

2.4.3 TAC Emission Rates

Diesel internal combustion engines (ICEs) represent the biggest source of TAC emissions associated with the proposed Project and alternatives. Diesel ICEs include construction equipment, ship propulsion and auxiliary engines, harborcraft, diesel container trucks, locomotives, CHE, and TRUs. For the determination of cancer risk and chronic hazard indices, OEHHA and CARB use DPM from ICEs as a surrogate for total diesel exhaust. The inhalation cancer potency factor and chronic non-cancer reference exposure level (REL) for DPM, established by OEHHA and CARB, account for the individual toxic species contained in total diesel ICE exhaust. Therefore, it was not necessary to further speciate diesel ICE exhaust into its chemical components for the determination of cancer risk and chronic noncancer hazard indices.

Sources other than diesel ICEs include ship boilers, tire and brake wear, alternative-fueled trucks, gasoline worker vehicles, and asphalt paving off-gas. For these sources, total organic gas (TOG) and PM10 emissions were speciated into their individual TAC components for the determination of cancer risk and chronic hazard indices. Speciation profiles were based on those developed by CARB (CARB 2014). Table 2-1 presents the speciation profiles that were used to convert PM10 emissions into individual TACs. Table 2-2 presents the speciation profiles that were used to convert TOG emissions into individual TACs.

OEHHA and CARB have not established an acute REL for DPM. Therefore, peak 1-hour TOG and PM10 emissions from all sources, including diesel ICEs, were speciated into their individual TAC components for the determination of acute hazard indices.

Table 2-1. Speciation Profiles for PM10

		Weight Percent							
Toxic Air Contaminant	**HARP TAC ID**	**Profile 112 Ship Boilers**	**Profile 114 Ship Aux. Engines [a]**	**Profile 119 Harbor-craft [a]**	**Profile 123 Alt. Fuel Engines**	**Profile 425 Diesel IC Engines [a]**	**Profile 472 Tire Wear**	**Profile 473 Brake Wear**	**Profile 400 Gasoline Autos**
Ammonia	7664417	--	--	--	--	0.34	0.019	0.003	--
Arsenic	7440382	0.54	0.54	--	--	0.0005	--	0.001	--
Cadmium	7440439	0.05	0.05	--	--	0.004	--	--	--
Chlorine	7782505	--	--	--	--	--	0.78	0.15	7
Copper	7440508	--	--	--	0.05	0.0025	0.049	1.15	0.05
Hexavalent Chromium [b]	18540299	0.027	0.027	--	0.0025	0.00006	0.00015	0.006	0.0025
Lead	7439921	0.55	0.55	--	--	0.0042	0.016	0.005	--
Manganese	7439965	--	--	--	0.05	0.004	0.01	0.17	0.05
Mercury	7439976	--	--	--	--	0.003	--	--	--
Nickel	7440020	0.05	0.05	--	0.05	0.0019	0.005	0.066	0.05
Selenium	7782492	0.05	0.05	--	--	0.001	0.002	0.002	--
Sulfates	9960	25	25	15	45	1.74	0.25	--	45
Vanadium	7440622	--	--	0.55	--	0.0029	--	0.066	--
Applicable sources:		Ship boilers	Ship aux. engines	Tugboats, construction harborcraft	LNG trucks	Ship main engines, locomotives, CHE, trucks, TRU, construction equipment	Tire Wear	Brake Wear	Worker vehicles

Toxic Air Contaminant	HARP TAC ID	Weight Percent							
		Profile 112 Ship Boilers	Profile 114 Ship Aux. Engines [a]	Profile 119 Harbor-craft [a]	Profile 123 Alt. Fuel Engines	Profile 425 Diesel IC Engines [a]	Profile 472 Tire Wear	Profile 473 Brake Wear	Profile 400 Gasoline Autos

Notes:

a. Profiles No. 114, 119, and 425 were only used for the determination of the acute hazard index. For the determination of cancer risk and chronic hazard index, DPM emissions were used without speciation because CARB provides toxicity factors for DPM as a whole (CARB 2013).

b. Hexavalent chromium is assumed to be 5 percent of total chromium, according to CARB's AB2588 Technical Support Document (CARB 1989), page 57.

c. TACs contributing a negligible amount to the total health risk results were screened out of the HRA and are not shown in this table.

d. Source for speciation profiles: CARB 2014.

Table 2-2. Speciation Profiles for TOG

Toxic Air Contaminant	HARP TAC ID	Weight Percent				
		Profile 504 Ship Boilers	Profile 719 Alt. Fuel Engines	Profile 760 Oil Vapors	Profile 818 Diesel IC Engines [a]	Profile 2105 Gasoline Autos
Acetaldehyde	75070	--	0.029	--	7.35	0.28
Acrolein	107028	--	--	--	--	0.13
Benzene	71432	1.91	0.11	--	2.00	2.47
1,3-Butadiene	106990	--	--	--	0.19	0.55
Chlorobenzene	108907	0.044	--	--	--	--
Ethylbenzene	100414	0.062	0.0098	--	0.31	1.05
Formaldehyde	50000	0.088	0.80	--	14.71	0.016
n-Hexane	110543	1.40	0.020	9	0.16	1.60
Methyl Alcohol	67561	--	--	--	0.03	0.12
Methyl Ethyl Ketone	78933	--	--	--	1.48	0.018
Naphthalene	91203	0.062	--	--	0.085	0.047
Propylene	115071	4.02	1.66	--	2.60	3.06
Styrene	100425	--	--	--	0.058	0.12
Toluene	108883	1.90	0.039	--	1.47	5.76
Xylenes	1330207	0.97	0.039	--	1.04	4.80
Applicable sources:		Ship boilers	LNG trucks	Asphalt off-gas	Ship main & aux engines, tugboats, locomotives, CHE, trucks, TRU, construction equipment	Worker vehicles

Toxic Air Contaminant	HARP TAC ID	Weight Percent				
		Profile 504 Ship Boilers	Profile 719 Alt. Fuel Engines	Profile 760 Oil Vapors	Profile 818 Diesel IC Engines [a]	Profile 2105 Gasoline Autos
Notes: a. Profile No. 818 was only used for the determination of the acute hazard index. For the determination of cancer risk and chronic hazard index, DPM emissions were used without speciation because the ARB provides toxicity factors for DPM as a whole (ARB 2013). b. TOG - total organic gas, of which VOC is a subset. c. For Profile No. 504, TOG is 83.47 percent VOC. d. For Profile No. 719, TOG is 9.14 percent VOC. e. For Profile No. 760, TOG is 94.8 percent VOC. f. For Profile No. 818, TOG is 87.85 percent VOC. g. For Profile No. 2105, TOG is 80.12 percent VOC. h. TACs contributing a negligible amount to the total health risk results were screened out of the HRA and are not shown in this table. i. Source for speciation profiles: ARB 2014.						

Table 2-3 through Table 2-11 present the 70-year annual average, 40-year annual average, maximum annual, and maximum 1-hour TAC emission rates used in the HRA for the baseline scenarios and project alternatives. Each emission rate represents the summed emissions from all construction and operational sources within the dispersion modeling domain for the indicated averaging period.

Table 2-3. Toxic Air Contaminant Emissions by Source – NOP CEQA Baseline

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates	
		2012 Annual (lb/yr)	2012 Maximum 1-Hour (lb/hr)
Acetaldehyde	75070	4.00E+00	2.84E+01
Acrolein	107028	7.48E-01	2.19E-04
Ammonia	7664417	1.37E-01	4.28E-01
Arsenic	7440382	1.45E+01	1.16E-01
Benzene	71432	5.51E+01	7.78E+00
1,3-Butadiene	106990	3.08E+00	7.36E-01
Cadmium	7440439	1.34E+00	1.57E-02
Chlorine	7782505	7.05E+00	1.58E-03
Chlorobenzene	108907	7.47E-01	7.93E-04
Copper	7440508	1.25E+01	5.87E-03
Diesel PM (DPM) [a]	9901	2.95E+04	0.00E+00
Ethylbenzene	100414	7.78E+00	1.18E+00
Formaldehyde	50000	6.69E+01	5.69E+01
n-Hexane	110543	3.44E+01	6.36E-01
Hexavalent Chromium	18540299	7.92E-01	5.85E-03
Lead	7439921	1.49E+01	1.23E-01
Manganese	7439965	1.91E+00	5.49E-03
Mercury	7439976	0.00E+00	3.81E-03

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates	
		2012 Annual (lb/yr)	2012 Maximum 1-Hour (lb/hr)
Methyl Alcohol	67561	6.91E-01	1.16E-01
Methyl Ethyl Ketone	78933	1.03E-01	5.71E+00
Naphthalene	91203	1.31E+00	3.30E-01
Nickel	7440020	2.13E+00	1.33E-02
Propylene	115071	2.22E+02	1.02E+01
Selenium	7782492	1.37E+00	1.19E-02
Styrene	100425	6.94E-01	2.25E-01
Sulfates	9960	7.25E+02	7.63E+00
Toluene	108883	6.79E+01	5.74E+00
Vanadium	7440622	6.98E-01	6.45E-03
Xylenes	1330207	4.68E+01	4.05E+00

Notes:
a. Maximum 1-hour DPM emissions are reported as zero because 1-hour DPM emissions from all sources are speciated into their individual TAC components.
b. This table includes emissions within the dispersion modeling domain.

Table 2-4. Toxic Air Contaminant Emissions by Source – Future CEQA Baseline

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates	
		70-Year Average (lb/yr)	40-Year Average (lb/yr)
Acetaldehyde	75070	2.77E+00	2.96E+00
Acrolein	107028	2.39E-01	2.72E-01
Ammonia	7664417	1.37E-01	1.37E-01
Arsenic	7440382	1.00E+01	1.01E+01
Benzene	71432	4.50E+01	4.61E+01
1,3-Butadiene	106990	9.84E-01	1.12E+00
Cadmium	7440439	9.25E-01	9.34E-01
Chlorine	7782505	6.75E+00	6.75E+00
Chlorobenzene	108907	7.47E-01	7.47E-01
Copper	7440508	1.25E+01	1.25E+01
Diesel PM (DPM)	9901	1.52E+04	1.58E+04
Ethylbenzene	100414	3.69E+00	3.99E+00
Formaldehyde	50000	6.28E+01	6.59E+01
n-Hexane	110543	2.81E+01	2.86E+01
Hexavalent Chromium	18540299	5.67E-01	5.72E-01
Lead	7439921	1.03E+01	1.04E+01
Manganese	7439965	1.92E+00	1.92E+00
Mercury	7439976	0.00E+00	0.00E+00
Methyl Alcohol	67561	2.21E-01	2.51E-01
Methyl Ethyl Ketone	78933	3.29E-02	3.74E-02
Naphthalene	91203	1.13E+00	1.14E+00
Nickel	7440020	1.72E+00	1.73E+00
Propylene	115071	2.01E+02	2.09E+02

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates	
		70-Year Average (lb/yr)	40-Year Average (lb/yr)
Selenium	7782492	9.57E-01	9.66E-01
Styrene	100425	2.22E-01	2.52E-01
Sulfates	9960	5.25E+02	5.31E+02
Toluene	108883	4.55E+01	4.71E+01
Vanadium	7440622	6.98E-01	6.98E-01
Xylenes	1330207	2.81E+01	2.95E+01
Notes: a. This table includes emissions within the dispersion modeling domain.			

Table 2-5. Toxic Air Contaminant Emissions by Source – NEPA Baseline and Unmitigated Alternative 2

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates			
		70-Year Average (lb/yr)	40-Year Average (lb/yr)	Maximum Annual (lb/yr)	Maximum 1-Hour (lb/hr)
Acetaldehyde	75070	3.82E+00	3.92E+00	5.12E+00	3.57E+01
Acrolein	107028	3.53E-01	3.75E-01	6.56E-01	2.02E-04
Ammonia	7664417	1.89E-01	1.86E-01	1.94E-01	3.83E-01
Arsenic	7440382	9.61E+00	9.62E+00	9.99E+00	1.01E-01
Benzene	71432	4.93E+01	4.99E+01	5.86E+01	9.76E+00
1,3-Butadiene	106990	1.46E+00	1.54E+00	2.70E+00	9.22E-01
Cadmium	7440439	8.89E-01	8.90E-01	9.24E-01	1.39E-02
Chlorine	7782505	9.54E+00	9.39E+00	9.77E+00	2.17E-03
Chlorobenzene	108907	7.27E-01	7.28E-01	7.56E-01	1.11E-03
Copper	7440508	1.75E+01	1.72E+01	1.80E+01	6.70E-03
Diesel PM (DPM) [a]	9901	1.80E+04	1.83E+04	2.25E+04	0.00E+00
Ethylbenzene	100414	4.84E+00	5.03E+00	7.50E+00	1.48E+00
Formaldehyde	50000	8.44E+01	8.61E+01	1.02E+02	7.14E+01
n-Hexane	110543	3.00E+01	3.08E+01	5.71E+01	1.55E+00
Hexavalent Chromium	18540299	5.75E-01	5.74E-01	5.96E-01	5.11E-03
Lead	7439921	9.97E+00	9.98E+00	1.04E+01	1.07E-01
Manganese	7439965	2.69E+00	2.65E+00	2.77E+00	5.14E-03
Mercury	7439976	0.00E+00	0.00E+00	0.00E+00	3.41E-03
Methyl Alcohol	67561	3.26E-01	3.46E-01	6.05E-01	1.46E-01
Methyl Ethyl Ketone	78933	4.87E-02	5.17E-02	9.04E-02	7.16E+00
Naphthalene	91203	1.14E+00	1.15E+00	1.29E+00	4.14E-01
Nickel	7440020	2.00E+00	1.98E+00	2.07E+00	1.17E-02
Propylene	115071	2.48E+02	2.52E+02	2.95E+02	1.27E+01
Selenium	7782492	9.34E-01	9.34E-01	9.70E-01	1.05E-02
Styrene	100425	3.28E-01	3.48E-01	6.08E-01	2.81E-01
Sulfates	9960	5.32E+02	5.32E+02	5.55E+02	6.75E+00
Toluene	108883	5.07E+01	5.18E+01	6.60E+01	7.20E+00

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates			
		70-Year Average (lb/yr)	40-Year Average (lb/yr)	Maximum Annual (lb/yr)	Maximum 1-Hour (lb/hr)
Vanadium	7440622	9.77E-01	9.62E-01	1.00E+00	7.00E-03
Xylenes	1330207	3.29E+01	3.38E+01	4.54E+01	5.08E+00

Notes:
a. Maximum 1-hour DPM emissions are reported as zero because 1-hour DPM emissions from all sources are speciated into their individual TAC components.
b. This table includes emissions within the dispersion modeling domain.

Table 2-6. Toxic Air Contaminant Emissions by Source – Proposed Project, Unmitigated

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates			
		70-Year Average (lb/yr)	40-Year Average (lb/yr)	Maximum Annual (lb/yr)	Maximum 1-Hour (lb/hr)
Acetaldehyde	75070	4.20E+00	4.30E+00	5.55E+00	3.69E+01
Acrolein	107028	3.90E-01	4.10E-01	6.55E-01	2.01E-04
Ammonia	7664417	2.09E-01	2.05E-01	2.15E-01	3.96E-01
Arsenic	7440382	1.02E+01	1.02E+01	1.02E+01	1.21E-01
Benzene	71432	5.30E+01	5.35E+01	6.09E+01	1.01E+01
1,3-Butadiene	106990	1.61E+00	1.69E+00	2.70E+00	9.55E-01
Cadmium	7440439	9.43E-01	9.41E-01	9.46E-01	1.58E-02
Chlorine	7782505	1.06E+01	1.03E+01	1.08E+01	2.41E-03
Chlorobenzene	108907	7.72E-01	7.70E-01	7.74E-01	1.15E-03
Copper	7440508	1.93E+01	1.90E+01	1.99E+01	7.23E-03
Diesel PM (DPM) [a]	9901	1.94E+04	1.97E+04	2.58E+04	0.00E+00
Ethylbenzene	100414	5.30E+00	5.47E+00	7.66E+00	1.53E+00
Formaldehyde	50000	9.28E+01	9.44E+01	1.14E+02	7.39E+01
n-Hexane	110543	3.21E+01	3.28E+01	5.98E+01	8.43E-01
Hexavalent Chromium	18540299	6.14E-01	6.11E-01	6.19E-01	6.10E-03
Lead	7439921	1.06E+01	1.06E+01	1.06E+01	1.27E-01
Manganese	7439965	2.97E+00	2.92E+00	3.07E+00	5.37E-03
Mercury	7439976	0.00E+00	0.00E+00	0.00E+00	3.53E-03
Methyl Alcohol	67561	3.60E-01	3.78E-01	6.05E-01	1.51E-01
Methyl Ethyl Ketone	78933	5.38E-02	5.65E-02	9.04E-02	7.42E+00
Naphthalene	91203	1.22E+00	1.22E+00	1.32E+00	4.28E-01
Nickel	7440020	2.17E+00	2.15E+00	2.22E+00	1.36E-02
Propylene	115071	2.70E+02	2.73E+02	3.21E+02	1.32E+01
Selenium	7782492	9.93E-01	9.90E-01	9.97E-01	1.23E-02
Styrene	100425	3.62E-01	3.80E-01	6.08E-01	2.91E-01
Sulfates	9960	5.68E+02	5.67E+02	5.76E+02	7.73E+00
Toluene	108883	5.46E+01	5.55E+01	6.73E+01	7.45E+00
Vanadium	7440622	1.08E+00	1.06E+00	1.11E+00	7.14E-03

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates			
		70-Year Average (lb/yr)	40-Year Average (lb/yr)	Maximum Annual (lb/yr)	Maximum 1-Hour (lb/hr)
Xylenes	1330207	3.56E+01	3.64E+01	4.63E+01	5.26E+00

Notes:
a. Maximum 1-hour DPM emissions are reported as zero because 1-hour DPM emissions from all sources are speciated into their individual TAC components.
b. This table includes emissions within the dispersion modeling domain.

Table 2-7. Toxic Air Contaminant Emissions by Source – Proposed Project, Mitigated

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates			
		70-Year Average (lb/yr)	40-Year Average (lb/yr)	Maximum Annual (lb/yr)	Maximum 1-Hour (lb/hr)
Acetaldehyde	75070	4.20E+00	4.30E+00	5.55E+00	3.62E+01
Acrolein	107028	3.90E-01	4.10E-01	6.55E-01	2.01E-04
Ammonia	7664417	2.09E-01	2.05E-01	2.15E-01	3.67E-01
Arsenic	7440382	1.02E+01	1.02E+01	1.02E+01	1.21E-01
Benzene	71432	5.30E+01	5.35E+01	6.09E+01	9.90E+00
1,3-Butadiene	106990	1.61E+00	1.69E+00	2.70E+00	9.35E-01
Cadmium	7440439	9.43E-01	9.41E-01	9.46E-01	1.55E-02
Chlorine	7782505	1.06E+01	1.03E+01	1.08E+01	2.41E-03
Chlorobenzene	108907	7.72E-01	7.70E-01	7.74E-01	1.15E-03
Copper	7440508	1.93E+01	1.90E+01	1.99E+01	7.01E-03
Diesel PM (DPM) [a]	9901	1.82E+04	1.86E+04	2.34E+04	0.00E+00
Ethylbenzene	100414	5.30E+00	5.47E+00	7.66E+00	1.50E+00
Formaldehyde	50000	9.28E+01	9.44E+01	1.14E+02	7.24E+01
n-Hexane	110543	3.21E+01	3.28E+01	5.98E+01	1.74E+00
Hexavalent Chromium	18540299	6.14E-01	6.11E-01	6.19E-01	6.10E-03
Lead	7439921	1.06E+01	1.06E+01	1.06E+01	1.27E-01
Manganese	7439965	2.97E+00	2.92E+00	3.07E+00	5.01E-03
Mercury	7439976	0.00E+00	0.00E+00	0.00E+00	3.26E-03
Methyl Alcohol	67561	3.60E-01	3.78E-01	6.05E-01	1.48E-01
Methyl Ethyl Ketone	78933	5.38E-02	5.65E-02	9.04E-02	7.26E+00
Naphthalene	91203	1.22E+00	1.22E+00	1.32E+00	4.20E-01
Nickel	7440020	2.17E+00	2.15E+00	2.22E+00	1.35E-02
Propylene	115071	2.70E+02	2.73E+02	3.21E+02	1.29E+01
Selenium	7782492	9.93E-01	9.90E-01	9.97E-01	1.22E-02
Styrene	100425	3.62E-01	3.80E-01	6.08E-01	2.85E-01
Sulfates	9960	5.68E+02	5.67E+02	5.76E+02	7.58E+00
Toluene	108883	5.46E+01	5.55E+01	6.73E+01	7.30E+00
Vanadium	7440622	1.08E+00	1.06E+00	1.11E+00	6.88E-03
Xylenes	1330207	3.56E+01	3.64E+01	4.63E+01	5.15E+00

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates			
		70-Year Average (lb/yr)	40-Year Average (lb/yr)	Maximum Annual (lb/yr)	Maximum 1-Hour (lb/hr)

Notes:
a. Maximum 1-hour DPM emissions are reported as zero because 1-hour DPM emissions from all sources are speciated into their individual TAC components.
b. This table includes emissions within the dispersion modeling domain.

Table 2-8. Toxic Air Contaminant Emissions by Source – Alternative 1, Unmitigated

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates			
		70-Year Average (lb/yr)	40-Year Average (lb/yr)	Maximum Annual (lb/yr)	Maximum 1-Hour (lb/hr)
Acetaldehyde	75070	3.82E+00	3.92E+00	5.12E+00	3.55E+01
Acrolein	107028	3.53E-01	3.75E-01	6.56E-01	2.02E-04
Ammonia	7664417	1.89E-01	1.86E-01	1.94E-01	3.81E-01
Arsenic	7440382	9.61E+00	9.62E+00	9.99E+00	1.01E-01
Benzene	71432	4.93E+01	4.99E+01	5.86E+01	9.72E+00
1,3-Butadiene	106990	1.46E+00	1.54E+00	2.70E+00	9.18E-01
Cadmium	7440439	8.89E-01	8.90E-01	9.24E-01	1.38E-02
Chlorine	7782505	9.54E+00	9.39E+00	9.77E+00	2.17E-03
Chlorobenzene	108907	7.27E-01	7.28E-01	7.56E-01	1.11E-03
Copper	7440508	1.75E+01	1.72E+01	1.80E+01	6.68E-03
Diesel PM (DPM) [a]	9901	1.80E+04	1.83E+04	2.24E+04	0.00E+00
Ethylbenzene	100414	4.84E+00	5.03E+00	7.50E+00	1.48E+00
Formaldehyde	50000	8.44E+01	8.61E+01	1.02E+02	7.11E+01
n-Hexane	110543	2.94E+01	2.98E+01	3.44E+01	7.96E-01
Hexavalent Chromium	18540299	5.75E-01	5.74E-01	5.96E-01	5.11E-03
Lead	7439921	9.97E+00	9.98E+00	1.04E+01	1.07E-01
Manganese	7439965	2.69E+00	2.65E+00	2.77E+00	5.12E-03
Mercury	7439976	0.00E+00	0.00E+00	0.00E+00	3.39E-03
Methyl Alcohol	67561	3.26E-01	3.46E-01	6.05E-01	1.45E-01
Methyl Ethyl Ketone	78933	4.87E-02	5.17E-02	9.04E-02	7.13E+00
Naphthalene	91203	1.14E+00	1.15E+00	1.29E+00	4.12E-01
Nickel	7440020	2.00E+00	1.98E+00	2.07E+00	1.17E-02
Propylene	115071	2.48E+02	2.52E+02	2.95E+02	1.27E+01
Selenium	7782492	9.34E-01	9.34E-01	9.70E-01	1.04E-02
Styrene	100425	3.28E-01	3.48E-01	6.08E-01	2.80E-01
Sulfates	9960	5.32E+02	5.32E+02	5.55E+02	6.74E+00
Toluene	108883	5.07E+01	5.18E+01	6.60E+01	7.17E+00
Vanadium	7440622	9.77E-01	9.62E-01	1.00E+00	6.98E-03
Xylenes	1330207	3.29E+01	3.38E+01	4.54E+01	5.06E+00

Notes:
a. Maximum 1-hour DPM emissions are reported as zero because 1-hour DPM emissions from all sources are

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates			
		70-Year Average (lb/yr)	40-Year Average (lb/yr)	Maximum Annual (lb/yr)	Maximum 1-Hour (lb/hr)
speciated into their individual TAC components. b. This table includes emissions within the dispersion modeling domain.					

Table 2-9. Toxic Air Contaminant Emissions by Source – Alternative 2, Mitigated

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates			
		70-Year Average (lb/yr)	40-Year Average (lb/yr)	Maximum Annual (lb/yr)	Maximum 1-Hour (lb/hr)
Acetaldehyde	75070	3.82E+00	3.92E+00	5.12E+00	3.52E+01
Acrolein	107028	3.53E-01	3.75E-01	6.56E-01	2.02E-04
Ammonia	7664417	1.89E-01	1.86E-01	1.94E-01	3.62E-01
Arsenic	7440382	9.61E+00	9.62E+00	9.99E+00	1.01E-01
Benzene	71432	4.93E+01	4.99E+01	5.86E+01	9.62E+00
1,3-Butadiene	106990	1.46E+00	1.54E+00	2.70E+00	9.09E-01
Cadmium	7440439	8.89E-01	8.90E-01	9.24E-01	1.36E-02
Chlorine	7782505	9.54E+00	9.39E+00	9.77E+00	2.17E-03
Chlorobenzene	108907	7.27E-01	7.28E-01	7.56E-01	1.11E-03
Copper	7440508	1.75E+01	1.72E+01	1.80E+01	6.54E-03
Diesel PM (DPM) [a]	9901	1.70E+04	1.74E+04	2.19E+04	0.00E+00
Ethylbenzene	100414	4.84E+00	5.03E+00	7.50E+00	1.46E+00
Formaldehyde	50000	8.44E+01	8.61E+01	1.02E+02	7.04E+01
n-Hexane	110543	3.00E+01	3.08E+01	5.71E+01	1.54E+00
Hexavalent Chromium	18540299	5.75E-01	5.74E-01	5.96E-01	5.11E-03
Lead	7439921	9.97E+00	9.98E+00	1.04E+01	1.07E-01
Manganese	7439965	2.69E+00	2.65E+00	2.77E+00	4.89E-03
Mercury	7439976	0.00E+00	0.00E+00	0.00E+00	3.22E-03
Methyl Alcohol	67561	3.26E-01	3.46E-01	6.05E-01	1.44E-01
Methyl Ethyl Ketone	78933	4.87E-02	5.17E-02	9.04E-02	7.06E+00
Naphthalene	91203	1.14E+00	1.15E+00	1.29E+00	4.08E-01
Nickel	7440020	2.00E+00	1.98E+00	2.07E+00	1.16E-02
Propylene	115071	2.48E+02	2.52E+02	2.95E+02	1.26E+01
Selenium	7782492	9.34E-01	9.34E-01	9.70E-01	1.04E-02
Styrene	100425	3.28E-01	3.48E-01	6.08E-01	2.78E-01
Sulfates	9960	5.32E+02	5.32E+02	5.55E+02	6.64E+00
Toluene	108883	5.07E+01	5.18E+01	6.60E+01	7.10E+00
Vanadium	7440622	9.77E-01	9.62E-01	1.00E+00	6.82E-03
Xylenes	1330207	3.29E+01	3.38E+01	4.54E+01	5.01E+00
Notes: a. Maximum 1-hour DPM emissions are reported as zero because 1-hour DPM emissions from all sources are speciated into their individual TAC components.					

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates			
		70-Year Average (lb/yr)	40-Year Average (lb/yr)	Maximum Annual (lb/yr)	Maximum 1-Hour (lb/hr)
b. This table includes emissions within the dispersion modeling domain.					

Table 2-10. Toxic Air Contaminant Emissions by Source – Alternative 3, Unmitigated

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates			
		70-Year Average (lb/yr)	40-Year Average (lb/yr)	Maximum Annual (lb/yr)	Maximum 1-Hour (lb/hr)
Acetaldehyde	75070	4.20E+00	4.30E+00	5.55E+00	4.78E+01
Acrolein	107028	3.90E-01	4.10E-01	6.55E-01	2.01E-04
Ammonia	7664417	2.09E-01	2.05E-01	2.15E-01	5.10E-01
Arsenic	7440382	1.15E+01	1.14E+01	1.16E+01	1.36E-01
Benzene	71432	5.71E+01	5.74E+01	6.53E+01	1.31E+01
1,3-Butadiene	106990	1.61E+00	1.69E+00	2.70E+00	1.24E+00
Cadmium	7440439	1.06E+00	1.05E+00	1.07E+00	1.86E-02
Chlorine	7782505	1.06E+01	1.03E+01	1.08E+01	2.41E-03
Chlorobenzene	108907	8.67E-01	8.61E-01	8.75E-01	1.46E-03
Copper	7440508	1.93E+01	1.90E+01	1.99E+01	8.07E-03
Diesel PM (DPM) [a]	9901	2.11E+04	2.13E+04	2.70E+04	0.00E+00
Ethylbenzene	100414	5.43E+00	5.59E+00	7.80E+00	1.99E+00
Formaldehyde	50000	9.30E+01	9.46E+01	1.14E+02	9.57E+01
n-Hexane	110543	3.51E+01	3.57E+01	6.31E+01	1.20E+00
Hexavalent Chromium	18540299	6.77E-01	6.71E-01	6.86E-01	6.86E-03
Lead	7439921	1.19E+01	1.18E+01	1.20E+01	1.44E-01
Manganese	7439965	2.97E+00	2.92E+00	3.07E+00	6.71E-03
Mercury	7439976	0.00E+00	0.00E+00	0.00E+00	4.54E-03
Methyl Alcohol	67561	3.60E-01	3.78E-01	6.05E-01	1.95E-01
Methyl Ethyl Ketone	78933	5.38E-02	5.65E-02	9.04E-02	9.61E+00
Naphthalene	91203	1.35E+00	1.35E+00	1.46E+00	5.55E-01
Nickel	7440020	2.29E+00	2.26E+00	2.34E+00	1.56E-02
Propylene	115071	2.78E+02	2.82E+02	3.30E+02	1.71E+01
Selenium	7782492	1.11E+00	1.10E+00	1.12E+00	1.40E-02
Styrene	100425	3.62E-01	3.80E-01	6.08E-01	3.77E-01
Sulfates	9960	6.26E+02	6.22E+02	6.38E+02	9.00E+00
Toluene	108883	5.87E+01	5.94E+01	7.17E+01	9.66E+00
Vanadium	7440622	1.08E+00	1.06E+00	1.11E+00	8.12E-03
Xylenes	1330207	3.77E+01	3.84E+01	4.86E+01	6.81E+00
Notes: a. Maximum 1-hour DPM emissions are reported as zero because 1-hour DPM emissions from all sources are speciated into their individual TAC components. b. This table includes emissions within the dispersion modeling domain.					

Table 2-11. Toxic Air Contaminant Emissions by Source – Alternative 3, Mitigated

Toxic Air Contaminant	HARP TAC ID	TAC Emission Rates			
		70-Year Average (lb/yr)	40-Year Average (lb/yr)	Maximum Annual (lb/yr)	Maximum 1-Hour (lb/hr)
Acetaldehyde	75070	4.20E+00	4.30E+00	5.55E+00	4.67E+01
Acrolein	107028	3.90E-01	4.10E-01	6.55E-01	2.01E-04
Ammonia	7664417	2.09E-01	2.05E-01	2.15E-01	4.63E-01
Arsenic	7440382	1.15E+01	1.14E+01	1.16E+01	1.36E-01
Benzene	71432	5.71E+01	5.74E+01	6.53E+01	1.28E+01
1,3-Butadiene	106990	1.61E+00	1.69E+00	2.70E+00	1.21E+00
Cadmium	7440439	1.06E+00	1.05E+00	1.07E+00	1.80E-02
Chlorine	7782505	1.06E+01	1.03E+01	1.08E+01	2.41E-03
Chlorobenzene	108907	8.67E-01	8.61E-01	8.75E-01	1.46E-03
Copper	7440508	1.93E+01	1.90E+01	1.99E+01	7.72E-03
Diesel PM (DPM) [a]	9901	1.99E+04	2.02E+04	2.50E+04	0.00E+00
Ethylbenzene	100414	5.43E+00	5.59E+00	7.80E+00	1.94E+00
Formaldehyde	50000	9.30E+01	9.46E+01	1.14E+02	9.35E+01
n-Hexane	110543	3.51E+01	3.57E+01	6.31E+01	1.98E+00
Hexavalent Chromium	18540299	6.77E-01	6.71E-01	6.86E-01	6.85E-03
Lead	7439921	1.19E+01	1.18E+01	1.20E+01	1.43E-01
Manganese	7439965	2.97E+00	2.92E+00	3.07E+00	6.16E-03
Mercury	7439976	0.00E+00	0.00E+00	0.00E+00	4.12E-03
Methyl Alcohol	67561	3.60E-01	3.78E-01	6.05E-01	1.91E-01
Methyl Ethyl Ketone	78933	5.38E-02	5.65E-02	9.04E-02	9.38E+00
Naphthalene	91203	1.35E+00	1.35E+00	1.46E+00	5.42E-01
Nickel	7440020	2.29E+00	2.26E+00	2.34E+00	1.54E-02
Propylene	115071	2.78E+02	2.82E+02	3.30E+02	1.67E+01
Selenium	7782492	1.11E+00	1.10E+00	1.12E+00	1.39E-02
Styrene	100425	3.62E-01	3.80E-01	6.08E-01	3.69E-01
Sulfates	9960	6.26E+02	6.22E+02	6.38E+02	8.76E+00
Toluene	108883	5.87E+01	5.94E+01	7.17E+01	9.43E+00
Vanadium	7440622	1.08E+00	1.06E+00	1.11E+00	7.71E-03
Xylenes	1330207	3.77E+01	3.84E+01	4.86E+01	6.66E+00

Notes:
a. Maximum 1-hour DPM emissions are reported as zero because 1-hour DPM emissions from all sources are speciated into their individual TAC components.
b. This table includes emissions within the dispersion modeling domain.

3.0 Receptor Locations

This HRA analyzes the health effects associated with TAC emissions from project and alternative-related sources at a variety of locations (receptors) throughout the project area, including at the locations of potential exposure of residents, offsite workers, recreational users, students, and sensitive member of the public. The analysis utilized a coarse grid of 1,412 receptor points. The coarse grid consisted of an inner grid, with receptors positioned every 250 meters and covering an area of 5 km x 6.5 km, surrounded by an outer grid, with receptors positioned every 500 meters and covering an area of 11 km x 11.5 km. Multiple fine grids, with receptors positioned every 50 meters, were placed over the maximum coarse grid receptors to obtain HRA results to the nearest 50 meters. Figure 3-1 presents the coarse and fine receptor grids used in the HRA.

In addition, TAC concentrations were modeled at 212 discrete sensitive receptor locations of special concern, such as schools, child care centers, convalescent homes, and hospitals in the vicinity of the terminal site. Figure 3-2 shows the locations of the sensitive receptors included in the analysis, and Table 3-1 presents a list of all sensitive receptors cross-referenced by the number used to identify their location in Figure 3-2.

Table 3-1. Sensitive Receptors

Receptor No.	UTM X (m)	UTM Y (m)	Receptor Description	Street Address	City, State, Zip	Category
1	380863	3732991	15th Street Elementary School	1527 Mesa St	San Pedro, CA 90731	School
2	378541	3733938	7th Street Elementary School	1570 W. 7th St	San Pedro, CA 90731	School
3	390978	3738503	Abraham Lincoln Elementary School	1175 E 11th St	Long Beach, CA 90813	School
4	379271	3732975	Academy of the Two Hearts School	1540 S. Walker Ave	San Pedro, CA 90731	School
5	380162	3730867	Angel's Gate Hight School	3607 S. Gaffey St	San Pedro, CA 90731	School
6	389448	3738624	Artesia Well Preparatory Academy	1235 Pacific Ave	Long Beach, CA 90813	School
7	383095	3739869	Avalon High School	1425 N Avalon Blvd	Wilmington, CA 90744	School
8	379660	3734797	Bandini Street Elementary School	425 N. Bandini St	San Pedro, CA 90731	School
9	382813	3738058	Banning New Elementary School #1	500 North Island Ave.	Wilmington, CA 90744	School
10	380681	3734795	Barton Hill Elementary School	423 N. Pacific Ave	San Pedro, CA 90731	School
11	388765	3741760	Birney Elementary School	710 W. Spring St	Long Beach, CA 90806	School
12	385308	3746652	Broadacres Elementary School	19424 South Broadacres Ave	Carson, CA 90746	School
13	392109	3737595	Burbank Elementary	501 Junipero Ave	Long Beach, CA 90814	School

Receptor No.	UTM X (m)	UTM Y (m)	Receptor Description	Street Address	City, State, Zip	Category
14	390224	3740330	Burnett Elementary	565 East Hill St.	Long Beach, CA 90806	School
15	380154	3733793	Cabrillo Avenue Elementary School	732 S. Cabrillo Ave	San Pedro, CA 90731	School
16	389538	3740963	Cambodian Christian	2474 Pacific Ave	Long Beach, CA 90806	School
17	388742	3737045	Cesar Chavez Elementary	730 West Third St.	Long Beach, CA 90802	School
18	378649	3736024	Christ Lutheran Elementary School	28850 S. Western Ave	Rancho Palos Verdes, CA 90275	School
19	392096	3737727	City Christian School	2209 E 6th St	Long Beach, CA 90814	School
20	388630	3747767	Colin L Powell Academy for Success	150 Victoria St	Long Beach, CA 90805	School
21	391439	3738927	Creative Arts Daycare and Elementary School	1423 Walnut Ave	Long Beach, CA 90813	School
22	378441	3735152	Crestwood Street Elementary School	1946 W. Crestwood St	Rancho Palos Verdes, CA 90275	School
23	387444	3742469	Daniel Webster Elementary School	1755 W 32nd Way	Long Beach, CA 90810	School
24	385244	3744652	Del Amo Elementary School	21228 Water St	Carson, CA 90745	School
25	387564	3744579	Dominguez Elementary School	21250 Santa Fe Ave	Carson, CA 90810	School
26	388749	3737794	Edison Elementary	625 Maine Ave.	Long Beach, CA 90802	School
27	386969	3740593	Elizabeth Hudson Elementary School	2335 Webster Ave	Long Beach, CA 90810	School
28	378377	3739433	Eshelman Avenue School	25902 Eshelman Ave	Lomita, CA 90717	School
29	383262	3739680	First Baptist Christian School	1360 Broad Ave	Wilmington, CA 90744	School
30	389624	3738317	First Baptist Church School	1000 Pine Ave	Long Beach, CA 90813	School
31	390180	3738228	First Lutheran Day Care, Preschool and Elementary School	946 Linden Ave	Long Beach, CA 90813	School
32	378510	3739856	Fleming Middle School	242 Walnut St	Lomita, CA 90717	School
33	390951	3737680	Franklin Classical Middle	540 Cerritos Ave.	Long Beach, CA 90802	School
34	382778	3739398	Fries Ave. Elementary School	1301 N Fries Ave	Wilmington, CA 90744	School
35	389389	3738887	George Washington Middle School	1450 Cedar Ave	Long Beach, CA 90813	School
36	382180	3739100	Gulf Avenue Elementary School	828 W. L St	Wilmington, CA 90744	School
37	379361	3740015	Harbor City Elementary	1508 254th St	Harbor City, CA	School

Receptor No.	UTM X (m)	UTM Y (m)	Receptor Description	Street Address	City, State, Zip	Category
			School		90710	
38	380678	3735343	Harbor Occupational Center	740 N. Pacific Ave.	San Pedro, CA 90731	School
39	381835	3737984	Hawaiian Avenue Elementary School	540 Hawaiian Ave	Wilmington, CA 90744	School
40	384377	3739369	Holy Family Preschool and Elementary School	1122 E Robidoux St	Wilmington, CA 90744	School
41	389535	3741054	Holy Innocents Elementary School	2500 Pacific Ave	Long Beach, CA 90806	School
42	379332	3734589	Holy Trinity Elementary School	1226 W. Santa Cruz St	San Pedro, CA 90732	School
43	379760	3736916	J F Cooper High School	2210 N. Taper Ave	San Pedro, CA 90731	School
44	389686	3741436	Jackie Robinson Academy	2750 Pine Ave	Long Beach, CA 90806	School
45	387724	3740376	James Garfield Elementary School	2240 Baltic Ave	Long Beach, CA 90810	School
46	391464	3739299	John G Whittier Elementary School	1761 Walnut Ave	Long Beach, CA 90813	School
47	387943	3742041	John Muir Elementary School	3038 Delta Ave	Long Beach, CA 90810	School
48	387255	3739936	Juan Rodriguez Cabrillo High School	2001 Santa Fe Ave	Long Beach, CA 90810	School
49	389235	3740749	Lafayette Elementary School	2445 Chestnut Ave	Long Beach, CA 90806	School
50	379517	3732375	Leland Street Elementary School	2120 S. Leland St	San Pedro, CA 90731	School
51	390207	3737910	Long Beach Montessori School	525 E. 7th St	Long Beach, CA 90813	School
52	379407	3739022	Lorenz Hillside School	1516 Anaheim St	Harbor City, CA 90710	School
53	386753	3739676	Mary Bethune School	2101 San Gabriel Ave	Long Beach, CA 90810	School
54	391293	3739859	Mary Butler Elementary	1400 E 20th St	Long Beach, CA 90806	School
55	380014	3733758	Mary Star of the Sea Elementary School	717 S. Cabrillo Ave	San Pedro, CA 90731	School
56	379954	3733809	Mary Star of the Sea High School	810 W. 8th St	San Pedro, CA 90731	School
57	376898	3735657	Miraleste Intermediate School	29323 Palos Verdes Dr. E	Rancho Palos Verdes, CA 90275	School
58	377333	3735407	Miraleste Satellite Elementary School	6245 Via Canada	Rancho Palos Verdes, CA 90275	School
59	380299	3740161	Normont Elementary School	1001 253rd St	Harbor City, CA 90710	School
60	389875	3741853	Oakwood Academy	2951 Long Beach Blvd	Long Beach, CA 90806	School
61	381988	3739995	Pacific Harbor Christian	1530 N.	Wilmington, CA	School

Receptor No.	UTM X (m)	UTM Y (m)	Receptor Description	Street Address	City, State, Zip	Category
			School	Wilmington Blvd	90744	
62	379279	3735517	Park Western Place Elementary School	1214 Park Western Place	San Pedro, CA 90732	School
63	383012	3739783	Phineas Banning Senior High School	1527 Lakme Ave	Wilmington, CA 90744	School
64	390353	3739073	Polytechnic High School	1600Atlantic Ave.	Long Beach, CA 90813	School
65	380461	3731193	Pt. Fermin Elementary School	3333 Kerckhoff Ave	San Pedro, CA 90731	School
66	380049	3733031	R H Dana Middle School	1501 S. Cabrillo	San Pedro, CA 90731	School
67	378187	3736987	R S Dodson Middle School	28014 Montereine Dr	San Pedro, CA 90731	School
68	389106	3738800	Regency High School	490 W. 14th Street	Long Beach, CA 90813	School
69	389796	3738044	Renaissance High School for the Arts	235 East Eighth St.	Long Beach, CA 90813	School
70	379594	3738367	Rolling Hills Preparatory School	1 Rolling Hills Prep Way	San Pedro, CA 90732	School
71	390160	3739058	Roosevelt Elementary	1574 Linden Ave.	Long Beach, CA 90813	School
72	390631	3737633	Saint Anthony Preschool / Elementary	855 East Fifth St.	Long Beach, CA 90802	School
73	382425	3738317	Saints Peter & Paul School	706 Bay View Ave	Wilmington, CA 90744	School
74	379699	3732970	San Pedro High School	1001 W. 15th St	San Pedro, CA 90731	School
75	387156	3740295	Savannah Academy	2152 W Hill St	Long Beach, CA 90810	School
76	390368	3747404	Select Community Day (Secondary)	5869 Atlantic Ave.	Long Beach, CA 90802	School
77	391437	3740427	Signal Hill Elementary School	2285 Walnut Ave	Long Beach, CA 90806	School
78	390538	3737763	St. Anthony High School/Constellation Community Charter Middle	620 Olive Ave.	Long Beach, CA 90802	School
79	387420	3740551	St. Lucy School	2320 Cota Ave	Long Beach, CA 90810	School
80	390299	3737645	Stevenson Elementary	515 Lime Ave.	Long Beach, CA 90802	School
81	388905	3745866	Sutter Elementary School	5075 Daisy Ave	Long Beach, CA 90805	School
82	379821	3736524	Taper Avenue Elementary School	1824 N. Taper Ave	San Pedro, CA 90731	School
83	389624	3738615	The New City School	1230 Pine Ave	Long Beach, CA 90813	School
84	378750	3733896	Trinity Luthern School	1450 W. 7th St	San Pedro, CA 90731	School
85	381627	3738566	Vermont Christian School	931 Frigate Ave	Wilmington, CA 90744	School

Receptor No.	UTM X (m)	UTM Y (m)	Receptor Description	Street Address	City, State, Zip	Category
86	378837	3731468	White Point Elementary School	1410 Silvius Ave	San Pedro, CA 90731	School
87	378709	3734317	Willenberg Special Education	308 S. Weymouth Ave.	San Pedro, CA 90731	School
88	387129	3741587	William Logan Stephens Middle School	1830 W Columbia St	Long Beach, CA 90810	School
89	382074	3740337	Wilmington Middle School	1700 Gulf Ave	Wilmington, CA 90744	School
90	384631	3739119	Wilmington Park Elementary School	1140 Mahar Ave	Wilmington, CA 90744	School
91	389921	3738609	12TH STREET HEAD START	1212 LONG BEACH BLVD	Long Beach, CA 90806	Child Care
92	390052	3737368	A LOVE 4 LEARNING ACADEMY	306 ELM AVENUE	Long Beach, CA 90802	Child Care
93	378996	3739241	Armstrong Academy	1682 Anaheim St	Harbor City, CA 90710	Child Care
94	390315	3739619	Atlantic Headstart	1862 Atlantic Ave	Long Beach, CA 90806	Child Care
95	392120	3737740	BETHANY PRESCHOOL	2217 EAST 6TH ST.	Long Beach, CA 90814	Child Care
96	384531	3743755	Blessing's Child Care	1422 E Bach St	Carson, CA 90745	Child Care
97	378469	3734936	Brighter Days Montessori	1903 W. Summerland St	San Pedro, CA 90732	Child Care
98	391267	3739145	Bundle of Joy Daycare 2	1330 E 16th St	Long Beach, CA 90813	Child Care
99	386795	3740292	CABRILLO CHILD DEVELOPMENT CENTER	2205 SAN GABRIEL AVE.	Long Beach, CA 90810	Child Care
100	380186	3733726	Cabrillo Early Education Center	741 W. 8th St	San Pedro, CA 90731	Child Care
101	381264	3732980	Carmen's Cry Baby Care	1509 S. Palos Verdes St	San Pedro, CA 90731	Child Care
102	391870	3737404	Carousel Preschool	366 Cherry Ave	Long Beach, CA 90802	Child Care
103	390062	3738250	Child Care Center At St Mary Medical Center	930 Elm Ave	Long Beach, CA 90813	Child Care
104	389026	3737038	Childtime Learning Center	1 World Trade Ctr # 199	Long Beach, CA 90813	Child Care
105	389481	3741039	Comprehensive Child Development	2565 Pacific Ave.	Long Beach, CA 90806	Child Care
106	380158	3734275	Compreshensive Child Development	769 W. 3rd St	San Pedro, CA 90731	Child Care
107	379694	3736911	Cooper Community Day School	2210 Taper Ave	San Pedro, CA 90731	Child Care
108	393175	3738811	CORONADO HEAD START CHILD CARE CENTER	1395 CORONADO STREET	Long Beach, CA 90804	Child Care
109	378816	3733895	Dahlquist Preschool	1420 W. 7th St	San Pedro, CA 90731	Child Care
110	380440	3733911	Day Star Early Learning	631 W. 6th St	San Pedro, CA	Child Care

Receptor No.	UTM X (m)	UTM Y (m)	Receptor Description	Street Address	City, State, Zip	Category
			Center		90731	
111	389981	3738882	ELM STREET HEAD START	1425 & 1429 ELM AVENUE	Long Beach, CA 90806	Child Care
112	387241	3744204	First Baptist Preschool and Daycare	2679 E Carson St	Long Beach, CA 90810	Child Care
113	392325	3738423	First Foursquare Church Preschool	2416 E 11th St	Long Beach, CA 90804	Child Care
114	388635	3741379	Fords Family Day Care	2726 San Francisco Ave	Long Beach, CA 90806	Child Care
115	387670	3740411	GARFIELD HEAD START	2240 BALTIC AVENUE	Long Beach, CA 90810	Child Care
116	391565	3738529	GAVIOTA HEAD START	1131 GAVIOTA STREET	Long Beach, CA 90813	Child Care
117	378851	3732160	Good Shepherd Preschool	1350 W. 25th St	San Pedro, CA 90732	Child Care
118	392941	3737474	Great Beginnings	3027 E. 4th St.	Long Beach, CA 90814	Child Care
119	381827	3738004	Hawaiian Avenue Children's Center	909 W. D St	Wilmington, CA 90744	Child Care
120	392873	3738988	Huntington Academy - Preschool	2935 E. Spaulding St.	Long Beach, CA 90804	Child Care
121	391036	3739334	Jenkins Day Care	1720 Cerritos Ave	Long Beach, CA 90813	Child Care
122	387506	3739696	JOB CORP HEAD START	1903 SANTA FE AVE.	Long Beach, CA 90810	Child Care
123	390594	3738247	Kelly's Care	943 N Washington Pl	Long Beach, CA 90813	Child Care
124	388725	3741155	Kelly's Kids Daycare Center	855 W Willow St	Long Beach, CA 90806	Child Care
125	379320	3739551	Learning Garden Preschool	1518 Pacific Coast Hwy	Harbor City, CA 90710	Child Care
126	387305	3743542	Little Greenwood Daycare	22114 S Carlerik Ave	Long Beach, CA 90810	Child Care
127	389578	3738196	LITTLE LIGHTHOUSE EDUCATIONAL CHILDCARE CENTER	911 PINE AVENUE	Long Beach, CA 90813	Child Care
128	389940	3740373	LONG BEACH BLVD HEAD START	2236 LONG BEACH BLVD.	Long Beach, CA 90806	Child Care
129	390373	3740260	LONG BEACH CENTER FOR CHILD DEVELOPMENT	622 E. HILL STREET	Long Beach, CA 90806	Child Care
130	390533	3740347	LONG BEACH CHILD DEVELOPMENT CENTER	2222 OLIVE AVE	Long Beach, CA 90806	Child Care
131	391238	3739449	LONG BEACH CITY COLLEGE CHILD DEVELOPMENT-PCC	1305 E. PACIFIC COAST HWY.	Long Beach, CA 90806	Child Care
132	390344	3741430	Long Beach Day Nursery	2801 Atlantic Ave	Long Beach, CA 90806	Child Care
133	388856	3738266	Lucy's Baby Care	940 Maine Ave	Long Beach, CA	Child Care

Receptor No.	UTM X (m)	UTM Y (m)	Receptor Description	Street Address	City, State, Zip	Category
					90813	
134	382973	3739597	Munchkin Center	1348 N Marine Ave	Wilmington, CA 90744	Child Care
135	391193	3739243	My Three Kids Tons of Fun Day Care	1240 E 17th St	Long Beach, CA 90813	Child Care
136	389258	3739250	N 2 Lil Folkz	1624 Chestnut Ave	Long Beach, CA 90813	Child Care
137	382152	3737824	New Harbor Vista Child Development Center	909 W D St	Wilmington, CA 90744	Child Care
138	378944	3734805	Nursery Rhymes Day Care	1410 W. Ofarrell St	San Pedro, CA 90732	Child Care
139	389533	3741212	Oakwood Children's Center	2650 Pacific Ave	Long Beach, CA 90806	Child Care
140	378566	3732624	Ocean View Preschool	1900 S. Western Ave	San Pedro, CA 90732	Child Care
141	388859	3742514	Old King Cole Day Care	3300 Oregon Ave	Long Beach, CA 90806	Child Care
142	391720	3737833	Ole King Cole Dev Center	1814 E 7th St	Long Beach, CA 90813	Child Care
143	392206	3737391	Our Saviour's Lutheran Preschool	370 Junipero Ave	Long Beach, CA 90814	Child Care
144	389020	3739872	P.A.L. Family Day Care	1980 Daisy Ave	Long Beach, CA 90806	Child Care
145	389472	3740264	PACIFIC HEAD START	2179 PACIFIC AVE	Long Beach, CA 90806	Child Care
146	379181	3735610	Park Western Place Children's Center	1220 Park Western Pl	San Pedro, CA 90732	Child Care
147	393415	3737474	Phases - An Early Learning Comp.	404 Newport Ave	Long Beach, CA 90814	Child Care
148	389579	3738221	PINE HEAD START	927 PINE AVE.	Long Beach, CA 90813	Child Care
149	388059	3738658	PLAY HOUSE, THE	1301 W. 12TH STREET	Long Beach, CA 90813	Child Care
150	380385	3733112	Robin's Nest Day Care	645 W. 14th St	San Pedro, CA 90731	Child Care
151	389036	3741241	Ruiz Family Daycare	2670 Daisy Ave	Long Beach, CA 90806	Child Care
152	379775	3731051	San Pedro - Wilmington Early Education Center	920 W. 36th St	San Pedro, CA 90731	Child Care
153	383537	3739930	Sanchez Family Child Care	1443 Deepwater Ave	Wilmington, CA 90744	Child Care
154	387465	3742345	Sanders Teeny Tiny Preschool	3211 Santa Fe Ave	Long Beach, CA 90810	Child Care
155	391533	3740443	SIGNAL HILL HEAD START	2285 WALNUT AVENUE	Long Beach, CA 90806	Child Care
156	393117	3738872	SIMPLY KARE CHILD DEVELOPMENT CENTER	1406 OBISPO AVENUE	Long Beach, CA 90804	Child Care
157	390623	3740004	Smart & Manageable	2054 Myrtle Ave	Long Beach, CA 90806	Child Care
158	378296	3733672	St. Peter's Episcopal Day	1648 W. 9th St	San Pedro, CA	Child Care

Receptor No.	UTM X (m)	UTM Y (m)	Receptor Description	Street Address	City, State, Zip	Category
			School		90731	
159	389847	3741751	Tender Child Care	211 E 29th St	Long Beach, CA 90806	Child Care
160	380473	3734491	Toberman Child Care Center	131 N. Grand Ave	San Pedro, CA 90731	Child Care
161	391450	3738224	Vincent Family Child Care	925 Walnut Ave	Long Beach, CA 90813	Child Care
162	383041	3739433	VOA/CESAR CHAVEZ HEAD START	1269 N. AVALON STREET	Wilmington, CA 90744	Child Care
163	379899	3739740	Volunteers of America-Parent Child Center	1135 257th St	Harbor City, CA 90710	Child Care
164	389193	3738664	WEST ANAHEIM CHILD CARE CENTER	440 W. ANAHEIM STREET	Long Beach, CA 90813	Child Care
165	387452	3740167	West Child Development Center	2125 Santa Fe Ave.	Long Beach, CA 90810	Child Care
166	384704	3739154	Wilmington Park Children's Center	1419 E Young St	Wilmington, CA 90744	Child Care
167	381437	3734112	World Tots LA Day Care Center	100 W. 5th St	San Pedro, CA 90731	Child Care
168	390296	3737362	YMCA GLB FAIRFIELD 3RD STREET PRESCHOOL	607 E. 3RD STREET	Long Beach, CA 90802	Child Care
169	389517	3739600	YOUNG HORIZONS CHILD DEVELOPMENT CENTERS	1840 Pacific Ave	Long Beach, CA 90806	Child Care
170	389536	3740757	YOUNG HORIZONS CHILD DEVELOPMENT CENTERS	1840 Pacific Ave	Long Beach, CA 90806	Child Care
171	390248	3737686	YOUNG HORIZONS CHILD DEVELOPMENT CENTERS	1840 Pacific Ave	Long Beach, CA 90806	Child Care
172	389459	3737689	YOUNG HORIZONS/EL JARDIN DE LA FELICIDAD	507 PACIFIC AVE.	Long Beach, CA 90813	Child Care
173	382217	3738795	Yvette's Daycare	815 W. Opp St	Wilmington, CA 90744	Child Care
174	380194	3736308	YWCA Venture Park Pre-School	1921 N. Gaffey St	San Pedro, CA 90731	Child Care
175	389978	3741459	Earl & Lorraine Miller Children's Hospital; Long Beach Memorial Medical Center and Hospital	2801 Atlantic Ave	Long Beach, CA 90806	Hospital
176	381348	3733563	Harbor View House	921 S. Beacon St	San Pedro, CA 90731	Hospital
177	380022	3739531	Kaiser Permanente Foundation Hospital	25825 S. Vermont Ave	Harbor City, CA 90710	Hospital
178	379142	3733893	Little Company of Mary San Pedro Hospital	1300 W. 7th St	San Pedro, CA 90732	Hospital
179	389449	3739338	Long Beach Doctors Hospital	1725 Pacific Ave	Long Beach, CA	Hospital

Receptor No.	UTM X (m)	UTM Y (m)	Receptor Description	Street Address	City, State, Zip	Category
					90813	
180	389539	3741329	Pacific Hospital of Long Beach (Hospital and Convalescent/Nursing Home)	2776 Pacific Ave	Long Beach, CA 90806	Hospital
181	378675	3738902	Palos Verdes Health Care Center	26303 Western Ave	Lomita, CA 90717	Hospital
182	379012	3733899	San Pedro Peninsula Hospital	1300 W. 7th St	San Pedro, CA 90732	Hospital
183	390167	3738394	St Mary Medical Center (Hospital and Convalescent/Nursing Home)	1050 Linden Ave	Long Beach, CA 90813	Hospital
184	389215	3739462	Tom Redgate Memorial Hospital	1775 Chestnut Ave	Long Beach, CA 90813	Hospital
185	390353	3741373	Akin's Post Acute Rehab Hospital; Atlantic Memorial Healthcare Center	2750 Atlantic Ave	Long Beach, CA 90806	Convalescent
186	390863	3737410	BELLAGIO MANOR	1046 EAST 4TH ST.	Long Beach, CA 90802	Convalescent
187	389789	3736894	BREAKERS OF LONG BEACH, THE	210 E OCEAN BLVD	Long Beach, CA 90802	Convalescent
188	392607	3736849	BROADWAY BY THE SEA	2725 EAST BROADWAY	Long Beach, CA 90803	Convalescent
189	387455	3740696	BURNETT HOME CARE	1740 WEST BURNETT ST.	Long Beach, CA 90810	Convalescent
190	390450	3740328	CARUTHERS ROYALE CARE	2204 LIME AVE.	Long Beach, CA 90806	Convalescent
191	391831	3737625	Colonial Care Center	1913 E. 5th St.	Long Beach, CA 90802	Convalescent
192	392139	3739609	Courtyard Care Center	1880 Dawson Avenue	Long Beach, CA 90806	Convalescent
193	391831	3737516	CROFTON MANOR INN	1950 E. 5TH ST.	Long Beach, CA 90802	Convalescent
194	380445	3733657	Crow Flora Boarding & Care Homes	624 W. 9th St	San Pedro, CA 90731	Convalescent
195	389709	3742434	DELUXE GUEST HOME	3260 PINE AVE.	Long Beach, CA 90806	Convalescent
196	389709	3742485	DELUXE GUEST HOME II	3266 PINE AVENUE	Long Beach, CA 90806	Convalescent
197	392556	3737484	EDGEWATER CONVALESCENT HOSPITAL	2625 EAST FOURTH STREET	Long Beach, CA 90814	Convalescent
198	389119	3738782	Harbor View Rehabilitation Center	490 W. 14TH Street	Long Beach, CA 90813	Convalescent
199	389648	3738051	HEALTHVIEW - PINE VILLA ASSISTED LIVING	117 EAST 8TH STREET	Long Beach, CA 90813	Convalescent
200	378561	3732407	LITTLE SISTERS OF THE POOR	2100 S. Western Ave.	San Pedro, CA 90732	Convalescent
201	387231	3740475	LORAM MANOR	1925 GEMINI STREET	Long Beach, CA 90810	Convalescent
202	378821	3734136	Los Palos Convalescent	1430 W 6th St	San Pedro, CA	Convalescent

Receptor No.	UTM X (m)	UTM Y (m)	Receptor Description	Street Address	City, State, Zip	Category
			Hospital		90731	
203	390456	3738401	OLIVE TREE HOME	1035 OLIVE STREET	Long Beach, CA 90813	Convalescent
204	388555	3741719	RMR RESIDENTIAL CARE FACILITY, LLC	2900 DE FOREST AVENUE	Long Beach, CA 90806	Convalescent
205	389478	3741347	Royal Care Skilled Nursing Center	2725 Pacific Avenue	Long Beach, CA 90806	Convalescent
206	392046	3737494	RUBY'S GUEST HOME	2125 E. 4TH STREET	Long Beach, CA 90814	Convalescent
207	387541	3742481	Santa Fe Convalescent	3294 Santa Fe Ave	Long Beach, CA 90810	Convalescent
208	378848	3734004	Seacrest Convalescent Hospital	1416 W 6th St	San Pedro, CA 90731	Convalescent
209	391434	3738574	Skylight Convalescent Hospital	1201 Walnut Avenue	Long Beach, CA 90813	Convalescent
210	390475	3738176	Villa Maria Care Center	723 E 9th St	Long Beach, CA 90813	Convalescent
211	393252	3736734	VILLA REDONDO CARE HOME	237 REDONDO AVENUE	Long Beach, CA 90803	Convalescent
212	391819	3737006	Wells House	245 CHERRY AVENUE	Long Beach, CA 90802	Convalescent

Figure 3-1. Coarse and Fine Receptor Grids

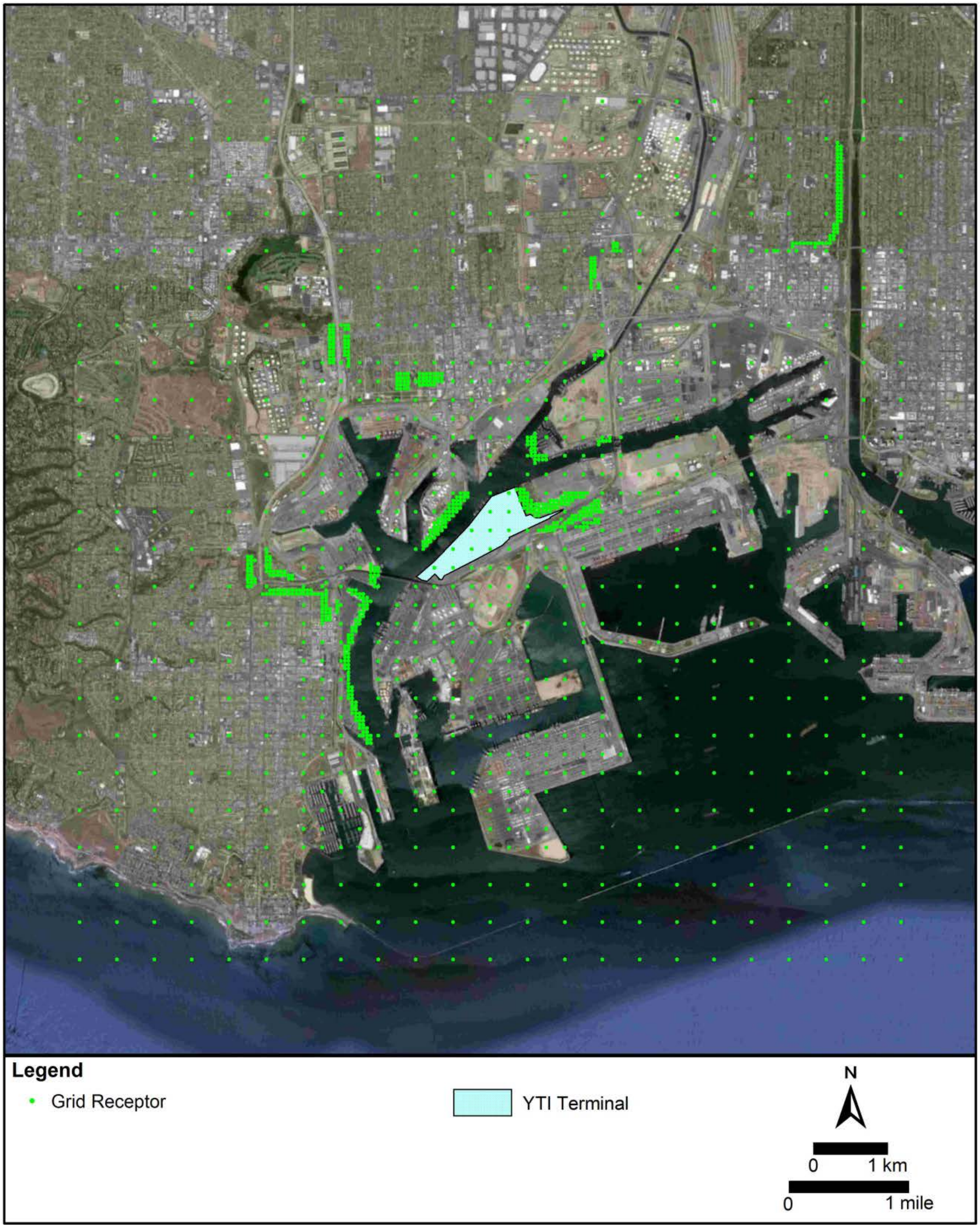
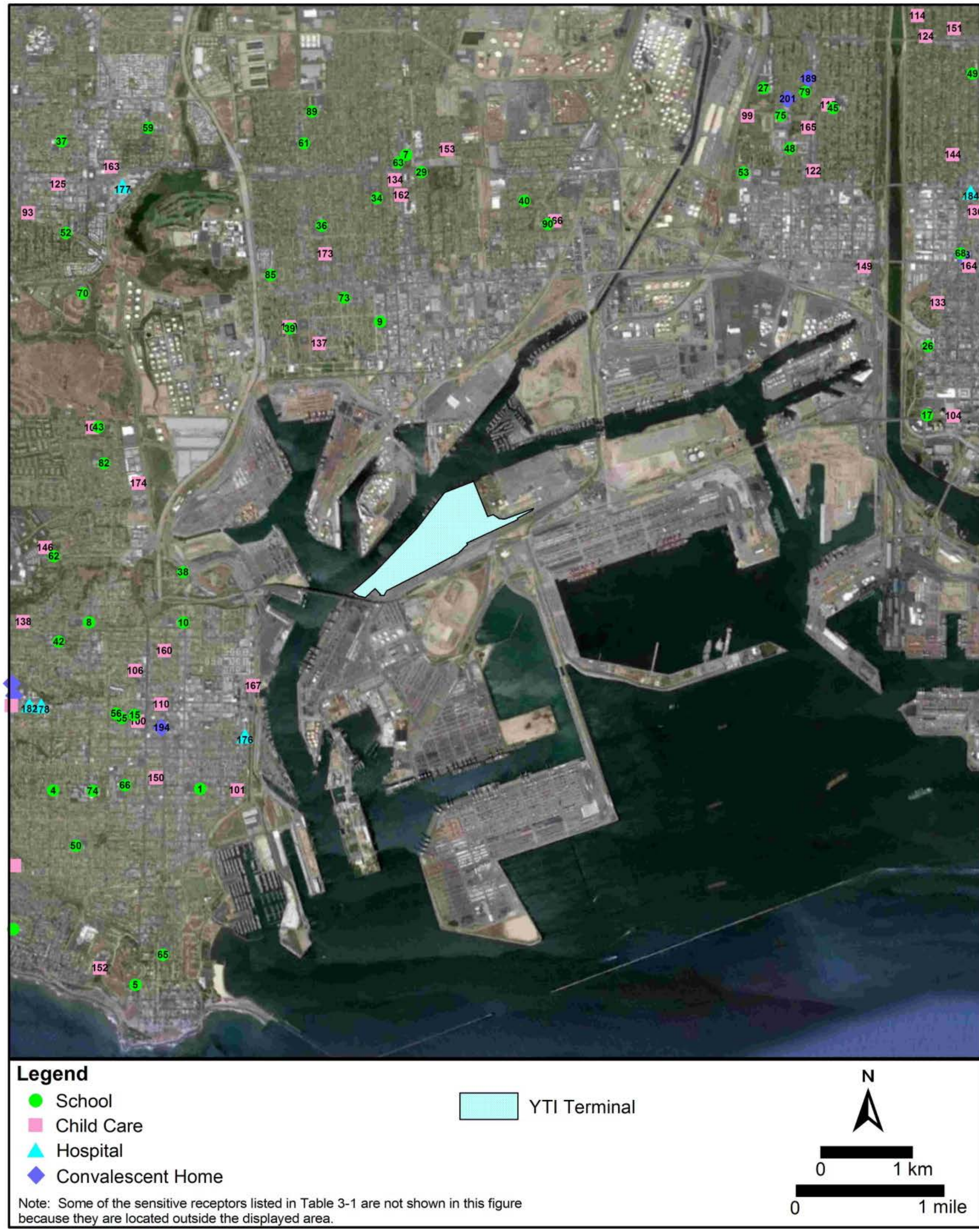


Figure 3-2. Sensitive Receptor Locations



Maximally exposed individual (MEI) locations were selected from the modeled receptor grids for five different receptor types: residential, occupational, sensitive, student, and recreational. The selection methodology for the MEI locations was:

- The residential MEI was selected from all receptors in residential or residentially-zoned areas that did not fall on roads.
- The occupational MEI was selected from all receptors outside the proposed Project boundary that did not fall on roads.
- The sensitive MEI was selected from all identified schools, day care centers, convalescent homes, hospitals, and other identified sensitive receptors in the surrounding area.
- The student MEI was selected from all identified elementary, middle, and high schools in the surrounding area.
- The recreational MEI was selected from all receptors not over water and outside Port of Los Angeles property that did not fall on roads, but including receptors located within the Wilmington and San Pedro Waterfront recreational areas.

4.0 Dispersion Model Selection and Inputs

The air dispersion modeling was performed using the USEPA AERMOD dispersion model, version 12345, based on the Guideline on Air Quality Models (USEPA, 2005). The AERMOD model is a steady-state, multiple-source, Gaussian dispersion model designed for use with emission sources situated in terrain where ground elevations can exceed the stack heights of the emission sources. The AERMOD model requires hourly meteorological data consisting of wind vector, wind speed, temperature, stability class, and mixing height. The selection of the AERMOD model is well suited based on (1) the general acceptance by the modeling community and regulatory agencies of its ability to provide reasonable results for large industrial complexes with multiple emission sources, (2) a consideration of the availability of annual sets of hourly meteorological data for use by AERMOD, and (3) the ability of the model to handle the various physical characteristics of project emission sources, including, point, area, line, and volume source types. AERMOD is approved by the USEPA and SCAQMD for analysis of mobile sources.

4.1 Emission Source Representation

The AERMOD modeling analysis for the HRA evaluated the proposed Project- and alternative-related construction and operational emission sources identified in Sections 2.1 and 2.2. Table 4-1 presents the AERMOD source release parameters for each source type. Appendix B2 presents a more detailed discussion of the development of the source release parameters. For compatibility with the HARP model, the emission sources were grouped in AERMOD and modeled with “unit” emission rates of 1 gram per second. The actual TAC emission rates for each source group were modeled in HARP.

Table 4-1. AERMOD Source Release Parameters

Source Description	AERMOD Source Type	Release Height (m)	Source Spacing (m)	Initial Vertical Dimension (m) [a]	Initial Horizontal Dimension (m) [b]	Exit Velocity (m/s)	Exit Temperature (K)	Stack Diameter (m)
Construction Sources								
Crane delivery ship hoteling – auxiliary engines	point	37.19	--	--	--	9.14	572	0.39
Harbor craft [d]	poly-area	15.24	--	3.54	--	--	--	--
Off-road construction equipment [d]	poly-area	4.57	--	1.06	--	--	--	--
Haul/delivery trucks idling and transiting onsite [d]	poly-area	4.57	--	1.06	--	--	--	--
Asphalt Paving	poly-area	1.0	--	0.23	--	--	--	--
Operational Sources								
Ship transit: propulsion engines, auxiliary engines, auxiliary boilers [e]	volume	59.13	100 in harbor	13.75	46.5			
		49.07	300 in precautionary zone	11.41	139.5	--	--	--
		49.07	1,000 in fairway	11.41	465.1	--	--	--
Ship hoteling: auxiliary engines [e]	point	44.01	--	--	--	7.7	578	0.47
Ship hoteling: boilers [e]	point	44.01	--	--	--	18.2	559	0.49
Ship hoteling at anchorage: auxiliary engines and boilers [e]	poly-area	44.01	--	10.23	--	--	--	--
Tugboats: propulsion and auxiliary engines [f]	volume	15.24	100	3.54	46.5	--	--	--
Locomotives transit: day (6am-6pm)	volume	5.6 [g]	50	2.60 [h]	23.3	--	--	--
Locomotives transit: night (6pm-6am)	volume	14.6 [g]	50	6.79 [h]	23.3	--	--	--
Container trucks: idling at in/out gate, driving on terminal [i]	poly-area	4.57	--	1.06	--	--	--	--
Container trucks transit offsite	line	4.57	--	1.06	--	--	--	--
Cargo handling equipment, TRUs [i]	poly-area	4.57	--	1.06	--	--	--	--
Worker vehicles onsite [g]	poly-area	0.61	--	1.06	--	--	--	--
Worker vehicles off-sit[e]	line	0.61	--	1.06	--	--	--	--

Notes:

a. The initial vertical dimension of the plume (σ_z) was estimated by dividing the initial vertical thickness by 4.3 for elevated releases and by 2.15 for ground-based releases.

b. The initial horizontal dimension (σ_y) is the source spacing divided by a standard deviation of 2.15.

c. Crane delivery ship hoteling was modeled using the point source parameters for a <3,000 TEU hoteling container ship, as compiled by LAHD (LAHD 2008).

d. Release height and initial vertical dimension are consistent with prior LAHD documents (LAHD 2008; LAHD 2011a).

e. Source of ship parameters: LAHD APL EIR/EIS for release height and China Shipping EIR/EIS for other parameters.

f. Source of tugboat parameters: LAHD APL EIR/EIS for release height.

g. Source of locomotive release height: Roseville Railyard Study, page G-3.

h. Source: Roseville Railyard Study divided source height by 2.15 (page 40).

Source Description	AERMOD Source Type	Release Height (m)	Source Spacing (m)	Initial Vertical Dimension (m) [a]	Initial Horizontal Dimension (m) [b]	Exit Velocity (m/s)	Exit Temperature (K)	Stack Diameter (m)
i. Consistent with prior LAHD documents.								
j. Source of worker vehicle parameters: Consistent with LAHD recommendations (LAHD 2012b).								

Appendix B2 Figures 3-1A and 3-1B show the sizes and locations of the modeled emission sources over a base map of the project vicinity.

4.2 Meteorological Data

The dominant terrain features and water bodies that may influence wind patterns in this part of the Los Angeles Basin include the Pacific Ocean to the west, the hills of the Palos Verdes Peninsula to the west/southwest, and the San Pedro Bay and shipping channels to the south of the study area. Although the area in the immediate vicinity of the Ports of Los Angeles (POLA or the Port) and Long Beach (POLB) is generally flat, these terrain features water bodies may result in significant variations in wind patterns over relatively short distances (LAHD 2010).

POLA and POLB currently operate monitoring stations that collect meteorological data from several locations within port boundaries. The data sets contain hourly observations of wind speed, wind direction, temperature, atmospheric stability, and mixing height recorded at each of the monitoring stations in the network. The meteorological data stations to the west of the Palos Verdes Hills and within approximately 5 kilometers of the San Pedro Bay generally exhibit predominant winds from the northwest and from the south or southeast. The consistency of the predominant winds among these stations indicates that the Palo Verdes Hills are channeling the winds from the northwest and that the San Pedro Bay and shipping channels influence the winds from the south and southeast (LAHD 2010).

For this dispersion analysis, the meteorological data collected at the Terminal Island Treatment Plant (TITP) was used for dispersion modeling. TITP is located just south of the YTI terminal on Pier 300, less than 0.5 miles from the center of the YTI terminal. The data used was collected between September 2006 and August 2007, and was processed and provided by Environ (Environ 2013).

The meteorological data were processed using the USEPA's approved AERMET (version 12345) meteorological data preprocessor for the AERMOD dispersion model. AERMET uses three steps to preprocess and combine the surface and upper-air soundings to output the data in a format which is compatible with the AERMOD model. The first step extracts the data and performs a brief quality assurance check of the data. The second step merges the meteorological data sets. The third step outputs the data in AERMOD-compatible format while also incorporating surface characteristics surrounding the collection or application site.

The output from the AERMET model consists of two separate files: the surface conditions file and a vertical profile dataset. AERMOD utilizes these two files in the dispersion modeling algorithm to predict pollutant concentrations resulting from a source's emissions.

As part of the effort to process the 2006-2007 meteorological data for the latest version of AERMOD (version 12345), the data were compared to the more recent meteorological data collected during years 2009 to 2012. It was determined that the 2006-2007 data period is representative in comparison to the 2009 to 2012 data period. To reach this conclusion, Environ evaluated the completeness of the data by quarter, the average wind speed, and visually examined the wind pattern based on wind roses. The evaluation showed that the average wind speed and wind pattern of the original data period is very similar to that of the 2009 to 2012 data period across the stations at both POLA and POLB. Therefore it was concluded that the original data period is representative (Environ 2013).

4.3 Model Options

Regulatory default technical options were selected for the AERMOD model. Use of these options follows the USEPA modeling guidance (USEPA, 2009; and 40 CFR, Appendix W; November 2005). Receptor and source base elevations were determined from USGS National Elevation Dataset (NED) files using AERMAP, version 11103 (USEPA 2011). All coordinates were referenced to UTM NAD83, Zone 11.

Table 4-2 presents the temporal distribution of emissions used in AERMOD for estimating peak 1-hour and annual average concentrations for the HRA. Emissions were assumed to be uniformly distributed during the specific time periods described in the table. The temporal distribution assumptions are identical for the CEQA baseline, NEPA baseline, proposed Project, and project alternatives.

Table 4-2. Temporal Distribution of Emissions for CEQA Baseline, NEPA Baseline, Proposed Project, and Alternatives.

Source Description	Temporal Distribution
Construction-related sources on land [a]	7:00 am – 6:00 pm
Construction-related sources over water [a]	24 hours per day
Ships Hoteling	24 hours per day
Ships Transiting	24 hours per day
Tugboats assisting ships	24 hours per day
Container Trucks [b]	10 percent 6:00 am – 9:00 am 42 percent 9:00 am – 3:00 pm 18 percent 3:00 pm – 7:00 pm 30 percent 7:00 pm – 6:00 am
Locomotives	24 hours per day
Cargo Handling Equipment	7:00 am – 3:00 am
Transport Refrigeration Units	24 hours per day
Worker Trips [b]	23 percent 6:00 am – 9:00 am 29 percent 9:00 am – 3:00 pm 34 percent 3:00 pm – 7:00 pm 14 percent 7:00 pm – 6:00 am

Notes:
a. There is no construction for the CEQA baseline and Alternative 1.
b. The temporal distributions for container trucks and worker trips were derived from the traffic study (Appendix D).

5.0 Calculation of Health Risks

This HRA used HARP Version 1.4f to perform all health risk calculations based on the concentrations per unit emission rate predicted by AERMOD. HARP calculated values for individual lifetime cancer risk, chronic hazard index, and acute hazard index at each modeled receptor for the CEQA baseline, NEPA baseline, and proposed Project alternatives. Because HARP is not directly compatible with AERMOD output file format, it was necessary to reformat the AERMOD output using the ARB's HARP On-Ramp software (CARB 2009) prior to running HARP.

5.1 Toxicity Factors

An inhalation cancer potency factor represents the probability that a person will contract cancer from the continuous inhalation of one milligram (mg) of a chemical per kilogram (kg) of body weight per day over a period of 70 years. Inhalation potency factors were used by HARP to calculate individual lifetime cancer risk using the risk assessment algorithms defined in OEHHA (OEHHA 2003).

To assess the potential for non-cancer health effects resulting from chronic and acute inhalation exposure, OEHHA has established RELs (CARB 2013). An REL is an estimate of the continuous inhalation exposure concentration to which the human population (including sensitive subgroups) may be exposed without appreciable risk of experiencing adverse non-cancer effects. The chronic hazard index is the sum of the chemical-specific chronic hazard quotients affecting a particular target organ. The acute hazard index is the sum of the chemical-specific acute hazard quotients affecting a particular target organ. A hazard quotient is a chemical's predicted concentration divided by its REL. A separate hazard index is calculated for each target organ affected by the TACs because not all TACs affect the same target organ. A hazard index below 1.0 for all affected target organs indicates that adverse non-cancer health effects are not expected.

In addition to the inhalation exposure pathway, several noninhalation exposure pathways were also incorporated in the HRA, including dermal adsorption, soil ingestion, home-grown produce ingestion (residential and sensitive receptors only), and mother's milk ingestion (residential and sensitive receptors only). The TACs evaluated for noninhalation pathways include arsenic, cadmium, hexavalent chromium, lead, mercury, and nickel from all sources except diesel IC engines. For diesel IC engines, the inhalation toxicity factors for DPM already include the effects from exposure to whole diesel exhaust, so a separate evaluation of noninhalation pathways is unnecessary. The various exposure parameters and settings used in HARP for the noninhalation exposure pathways are consistent with SCAQMD guidelines (SCAQMD 2005). The results of this analysis show that the contributions of the noninhalation exposure pathways to the HRA results are negligible compared to the inhalation pathway. Table 5-1 presents the toxicity factors used in this HRA.

Table 5-1. Toxicity Factors Used in the HRA

Toxic Air Contaminant	HARP TAC ID	Inhalation Cancer Potency Factor (mg/kg-d)$^{-1}$	Chronic Inhalation REL (µg/m^3)	Target Organ for Chronic Exposure	Acute Inhalation REL (µg/m^3)	Target Organ for Acute Exposure
Acetaldehyde	75070	0.01	140	I	470	D,I
Acrolein	107028	—	0.35	I	2.5	D,I
Ammonia	7664417	—	200	I	3,200	D,I
Arsenic [b]	7440382	12	0.015	B,C,G,I,J	0.2	B,C,G
Benzene	71432	0.1	60	C,E,G	1,300	E,F,C
1,3-Butadiene	106990	0.6	2	C	660	C
Cadmium [b]	7440439	15	0.02	I,M	—	—
Chlorine	7782505	—	0.2	I	210	D,I
Chlorobenzene	108907	—	1,000	A,C,M	—	—
Copper	7440508	—	—	—	100	I
Diesel PM (DPM) [a]	9901	1.1	5	I	—	—
Ethylbenzene	100414	0.0087	2,000	A,C,L,M	—	—
Formaldehyde	50000	0.021	9	I	55	D
n-Hexane	110543	—	7,000	G	—	—
Hexavalent Chromium [b]	18540299	510	0.2	E,I	—	—
Lead [b]	7439921	0.042	—	—	—	—
Manganese	7439965	—	0.09	G	—	—
Mercury [b]	7439976	—	0.03	C,G,M	0.6	C,G
Methyl Alcohol	67561	—	4,000	C	28,000	G
Methyl Ethyl Ketone	78933	—	—	—	13,000	D,I
Naphthalene	91203	0.12	9	I	—	—
Nickel [b]	7440020	0.91	0.014	C,E,I	0.2	F
Propylene	115071	—	3,000	I	—	—
Selenium	7782492	—	20	A,B,G	—	—
Styrene	100425	—	900	G	21,000	C,D,I
Sulfates	9960	—	—	—	120	I
Toluene	108883	—	300	C,G,I	37,000	C,D,G,I
Vanadium	7440622	—	—	—	30	D,I
Xylenes	1330207	—	700	D,G,I	22,000	D,G,I

Notes:

[a] For diesel internal combustion engines, only DPM emissions were evaluated for cancer risk and chronic hazard indices, because DPM is a surrogate for the combined health effects associated with exposure to diesel exhaust emissions. For all other emission sources, emissions of the 28 other toxic air contaminants were evaluated for cancer risk and chronic hazard indices. For the acute hazard indices, DPM was not evaluated; rather, emissions of the 28 other toxic air contaminants were evaluated for all emission sources (including diesel internal combustion engines).

[b] Arsenic, cadmium, hexavalent chromium, lead, mercury, and nickel were also evaluated for noninhalation exposure pathways. For arsenic, the cancer risk oral slope factor is 1.5 (mg/kg/day)$^{-1}$, and the noncancer chronic oral REL is 0.0000035 mg/kg/day. For cadmium, the noncancer chronic oral REL is 0.0005 mg/kg/day. For hexavalent chromium, the cancer risk oral slope factor is 0.5 (mg/kg/day)$^{-1}$, and the noncancer chronic oral REL is 0.02 mg/kg/day. For lead, the cancer risk oral slope factor is 0.0085 (mg/kg/day)$^{-1}$. For mercury, the noncancer chronic oral REL is 0.00016 mg/kg/day. For nickel, the noncancer chronic oral REL is 0.011 mg/kg/day. The deposition rate was assumed to be the HARP default of 0.02 meters per second (controlled sources).

[c] Key to non-cancer acute and chronic exposure target organs:

A. Alimentary Tract
B. Cardiovascular System
C. Reproductive/Developmental System
D. Eye
E. Hematologic System
F. Immune System
G. Nervous System
I. Respiratory System
J. Skin
K. Bone
L. Endocrine System
M. Kidney

5.2 Mortality and Morbidity

The LAHD has previously included analyses of PM-related mortality in the TraPac, China Shipping, and San Pedro Waterfront EIRs. The latter two documents utilized a methodology published by CARB (2006b), which was primarily developed for large geographic areas such as air basins or the entire state. In 2008, CARB noted that the methods for applying calculations of mortality to a project-level scale were not fully developed, and that such applications should include explicit statements regarding the uncertainties and limitations. Notwithstanding these uncertainties, the LAHD has received requests from individuals, environmental groups, the SCAQMD, OEHHA, and the CARB to include separate quantitative assessments of project-related PM-attributable mortality as well as morbidity in their CEQA analyses.

In response to these requests LAHD developed a methodology to calculate mortality and morbidity from project emissions (LAHD 2011b), which generally follows the approach used by CARB to estimate state-wide health impacts from ports and goods movement in California (CARB 2006a and CARB 2006b), incorporating CARB's methodology for mortality (CARB 2010). In the 2006 analysis, CARB focused on PM and ozone because these are the criteria pollutants for which sufficient evidence of mortality and morbidity effects exists. Modeling changes in ozone concentrations usually requires information on emissions from all sources within a region (for example, the SCAB), and is therefore not considered appropriate for project-level analyses. Therefore, the methodology for project-level studies conducted for LAHD CEQA documents focuses on the health effects associated with changes in PM concentrations. Focusing on PM is also consistent with CARB studies of mortality and morbidity impacts from California ports (CARB 2006a, CARB 2006b, and CARB 2010).

The SCAQMD's localized significance threshold for a 24-hour $PM_{2.5}$ concentration is 2.5 µg/m^3 for operational impacts (SCAQMD 2011b). This value is only 7 percent of the 24-hour NAAQS and 21 percent of the annual CAAQS (there is no 24-hour CAAQS for $PM_{2.5}$). This value is based on CARB guidance and epidemiological studies showing significant toxicity (resulting in mortality and morbidity) related to exposure to fine particles. Because mortality and morbidity studies represent major inputs used by CARB and USEPA to set CAAQS and NAAQS, project-level mortality and morbidity is presented in LAHD CEQA documents as a further elaboration of local PM impacts which are already addressed. Therefore, mortality and morbidity is quantified only if a $PM_{2.5}$ concentration significance finding is identified as part of the air quality impact analysis of project operation.

If dispersion modeling of ambient air quality concentrations during proposed Project or alternatives operation (Impact AQ-4) identifies a significant impact for 24-hour $PM_{2.5}$ mortality and morbidity would be quantified per the following methodology:

- Mortality is calculated using the relative risk factor of a 10% increase in premature deaths per year (mortality rate) per 10 µg/m^3 increase in $PM_{2.5}$ concentration (CARB 2008). Morbidity calculations will follow the general methodology and available concentration-response data described by CARB (CARB 2006b).

- Morbidity endpoints that are calculated on an annual basis will be based on project-specific incremental annual $PM_{2.5}$ concentrations (e.g., project minus Baseline). Morbidity endpoints that require estimates of daily impacts will be based on daily average $PM_{2.5}$ concentrations. The specific health effects endpoints evaluated include:
  - Hospital admissions for chronic obstructive pulmonary disease;
  - Hospital admissions for pneumonia;
  - Hospital admissions for cardiovascular disease;
  - Acute bronchitis;
  - Hospital admissions for asthma;
  - Emergency Room visits for asthma;
  - Asthma attacks;
  - Lower respiratory symptoms;
  - Work loss days; and
  - Minor restricted activity days.

To address mortality and morbidity over the multiple years of a project's lease, the annual incidence for each endpoint will be summed to provide an estimate of the aggregate effects attributable to a project's incremental PM emissions.

Since the adoption of the LAHD methodology for evaluating morbidity and mortality, CARB has updated its approach to estimating premature death associated with exposure to fine particulate matter (CARB 2010). In the updated methodology, CARB relies on the current methods outlined by USEPA (USEPA 2010) in Quantitative Health Risk Assessment for Particulate Matter, from which CARB integrated several key factors. Three key elements of this updated approach include: a) limiting the evaluation to cardiovascular disease-related mortality, b) adoption of an annual average $PM_{2.5}$ threshold concentration of 5.8 $\mu g/m^3$ ("CARB $PM_{2.5}$ threshold") for quantifying mortality, and c) revision of the coefficient used to relate mortality to changes in $PM_{2.5}$ concentrations.

5.3 Cancer Burden

Cancer burden is an estimate of the expected number of additional cancer cases in a population exposed to project- or alternative-generated TAC emissions. Whereas cancer risk represents the probability of an individual developing cancer, cancer burden estimates the number of individuals that could be expected to contract cancer. The cancer burden is calculated by multiplying the individual lifetime cancer risk increment by the population exposed to that level of incremental risk, calculated at the census tract or block level. The exposed population is defined as the number of persons within a facility's zone of impact, which is defined by the LAHD as the area within the facility's one in a million cancer risk isopleth. Consistent with this definition, cancer burden is calculated only if the proposed Project or alternative is associated with cancer risk increments of one in a million or above.

5.4 Exposure Scenarios for Individual Lifetime Cancer Risk

For the cancer risk evaluation, the frequency and duration of exposure to TACs are assumed to be directly proportional to the risk. Therefore, this HRA used specific exposure assumptions for each receptor type, as described below.

Residential and Sensitive Receptors. Cancer risks for residential and sensitive receptors were estimated using the breathing rates described in the CARB Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk (CARB 2004). The HRA determined residential and sensitive receptor cancer risks by using a breathing rate of 302 liters per kilogram day (corresponding to an 80^{th} percentile value) and an exposure duration of 24 hours per day, 350 days per year over 70 years.

Occupational Impacts. Workers generally do not spend as much time within the region of a project as do residents. The SCAQMD, therefore, allows an exposure adjustment for workers (SCAQMD 2005). Lifetime occupational exposure is based on a worker presence of 8 hours per day, 245 days per year for 40 years (OEHHA 2003). The breathing rate for workers is equal to 447 L/kg-day, which equates to 149 L/kg-day over an 8-hour workday (OEHHA 2003).

Student Impacts. SCAQMD's policy is to evaluate student cancer risk based upon a full 70 years of exposure. However, students actually spend a far more limited portion of their lives at a given school than 70 years. Accordingly, student exposures were calculated based on a student presence of 6 hours per day, 180 days per year for 6 years. The breathing rate of children is equal to 581 L/kg-day (OEHHA 2003).

Recreational User Impacts. Exposures for recreational users were estimated based on an exposure frequency of 2 hours per day, 350 days per year, and an exposure duration of 70 years. The breathing rate of a person engaged in recreational activities is assumed to be a "heavy activity" rate equal to 1,097 L/kg-day, which was obtained from the USEPA Exposure Factors Handbook (USEPA 1997).

Table 5-2 summarizes the primary exposure assumptions used to calculate individual lifetime cancer risk by receptor type.

Table 5-2. Exposure Assumptions for Individual Lifetime Cancer Risk

Receptor Type	Exposure Frequency		Exposure Duration	Breathing Rate
	(Hours/Day)	(Days/Year)	(Years)	(L/kg-day)
Residential	24	350	70	302
Occupational	8	245	40	447
Sensitive	24	350	70	302
Student	6	180	6	581
Recreational	2	350	70	1,097

Notes:
a) The residential breathing rate of 302 L/kg BW-day represents the 80th percentile breathing rate. For informational purposes, residential cancer risks were also calculated for a 95th percentile ("high end") breathing rate of 393 L/kg BW-day (OEHHA 2003).
b) The occupational exposure frequency of 245 days/year represents 5 days/week, 49 weeks/year. The occupational breathing rate of 447 L/kg BW-day equates to 149 L/kg BW-day over an 8-hour work day (OEHHA 2003).
c) The student breathing rate of 581 L/kg BW-day represents the high end child breathing rate (OEHHA 2003).

Receptor Type	Exposure Frequency (Hours/Day)	Exposure Frequency (Days/Year)	Exposure Duration (Years)	Breathing Rate (L/kg-day)
d) The recreational breathing rate of 1,097 L/kg BW-day represents a "heavy activity" breathing rate, which is derived from a breathing rate of 3.2 m^3/hr (and assuming a 70-kg adult) as reported in the USEPA Exposure Factors Handbook (USEPA 1997). This recreational breathing rate is conservative because it assumes that an individual could sustain the maximum hourly breathing rate for 2 consecutive hours.				

6.0 Significance Criteria for Project Health Risks

The LAHD has adopted the significance threshold of 10 in a million as being an acceptable level of cancer risk increment for receptors. Based on this threshold, a project would produce less than significant cancer risk impacts if the maximum incremental cancer risk due to the project is less than 10 in 1 million (10×10^{-6}). The LAHD has also adopted the air quality significance threshold for cancer burden of 0.5 excess cancer cases in areas with project-attributable cancer risk above one in a million (1×10^{-6}) (SCAQMD 2011b). In addition, the LAHD has adopted the significance threshold of 1.0 for chronic and acute non-cancer hazard indices; a project would produce less than significant non-cancer impacts if the chronic and/or acute hazard index is less than 1.0 (SCAQMD 2011b).

For the determination of significance from a CEQA standpoint, this HRA determined the incremental change in health effects due to the proposed Project and alternatives by estimating the net change in impacts between each project/alternative scenario and NOP CEQA baseline and Future CEQA baseline conditions. These incremental health effects values were compared to the significance thresholds described above. If either increment (project minus NOP CEQA baseline, or project minus Future CEQA baseline) would exceed a significance threshold, the impact would be considered significant.

For the determination of significance from a NEPA standpoint, this HRA determined the incremental change in health effects due to the proposed Project and alternatives by estimating the net change in impacts between each project/alternative scenario and NEPA baseline condition. These incremental health effects values were compared to the significance thresholds described above.

7.0 Predicted Incremental Health Impacts

7.1 Proposed Project Incremental Impacts

The proposed Project, NOP CEQA Baseline, Future CEQA Baseline, and NEPA Baseline maximum estimated health risks are provided below, as well as the CEQA incremental impact and NEPA incremental impact. Incremental impacts are the proposed Project minus the appropriate baseline.

7.1.1 Unmitigated Impacts

7.1.1.1 CEQA Incremental Impacts

Table 7-1 presents the maximum CEQA health impacts associated with the proposed Project without mitigation. The results for cancer risk include the maximum risk from the proposed Project alone (prior to subtracting baseline), the maximum risk from the NOP CEQA baseline, the maximum NOP CEQA cancer risk increment (Project minus NOP CEQA baseline), the maximum risk from the Future CEQA baseline, and the maximum Future CEQA cancer risk increment (Project minus Future CEQA baseline). The results for chronic and acute noncancer effects include the maximum hazard index from the proposed Project alone (prior to subtracting baseline), the maximum hazard index from the NOP CEQA baseline, and the maximum NOP CEQA hazard index increment (Project minus NOP CEQA baseline). The results for cancer burden include the estimated number of additional cancer cases associated with the proposed Project relative to the NOP CEQA baseline (NOP CEQA increment) and the estimated number of additional cancer cases associated with the proposed Project relative to the Future CEQA baseline (Future CEQA increment). The table shows the following:

- Cancer Risk
  - In relation to the NOP CEQA baseline, the maximum incremental cancer risk is predicted to be less than the significance threshold at all receptor types except the occupational receptor. Cancer risk at the occupational receptor would exceed the significance threshold.

    The maximum impacted occupational receptor would be located about 1,000 feet northeast of the YTI terminal truck out-gate, on industrial Port property, just north of the entry/exit road and TICTF storage tracks. Sources driving impacts at this receptor would be container trucks travelling in and out of the terminal.

  - In relation to the Future CEQA baseline, the maximum incremental cancer risk is predicted to be less than the significance threshold at all receptor types except the marina-based residential and occupational receptors. Cancer risk at the marina-based residential and occupational receptors would exceed the significance threshold.

    The maximum impacted residential receptor would be at the marina live-aboards (locations where people live on boats) in the Cerritos Channel, near Anchorage Street, just west of the Henry Ford and Schuyler Heim bridges. Cancer risk at this receptor would be driven by locomotives traveling across and beyond the Henry Ford Bridge and drayage trucks driving across and beyond the Schuyler Heim Bridge.

    The maximum impacted occupational receptor would be located about 1,000 feet northeast of the YTI terminal truck out-gate, on industrial Port property, just north of the entry/exit road and TICTF storage tracks.

Sources driving impacts at this receptor would be container trucks travelling in and out of the terminal.

Although live-aboard residents would be maximally impacted by the proposed Project, in general, these residents are not expected to stay in their locations for 70 years like traditional land-based residential populations considered under an HRA. Therefore, although residential cancer risk impact determinations were based on the maximum impacted receptors – in this case live-aboard residents – this analysis also identifies, for informational purposes, the impact at the maximum impacted land-side residential receptor.

- Cancer Burden
  - In relation to the NOP CEQA baseline, the cancer burden increment is predicted to be less than the significance threshold.
  - In relation to the Future CEQA baseline, the cancer burden increment is predicted to be less than the significance threshold.
- Chronic and Acute Impacts
  - Because chronic and acute hazard indices are based on annual and peak hour exposures instead of lifetime exposures like cancer risk, they are determined by comparing project-related impacts only to the NOP CEQA baseline, which is the baseline at the time of the NOP in 2012.
  - The maximum chronic hazard index is predicted to be less than significant for all receptor types.
  - The maximum acute hazard index is predicted to be less than significant for all receptor types.
- Particulates: Morbidity and Mortality
  - Operation of the proposed Project would result in a maximum off-site 24-hour $PM_{2.5}$ concentration increment that would not exceed the SCAQMD significance threshold of 2.5 µg/m^3 (see EIR/EIS Section 3.2.4). Because the operational $PM_{2.5}$ concentrations would be less than significant and would not exceed the Port's criterion for calculating morbidity and mortality attributable to PM, potential mortality and morbidity effects were not quantified for the proposed Project.

Table 7-2 shows the percent contribution to cancer risk for the NOP and Future CEQA increments for each modeled source group associated with residential and offsite occupational exposure. The NOP and Future CEQA increments would be less than 1 for non-cancer chronic and acute impacts and are therefore not presented in the table.

Figure 7-1 shows the locations of the maximally exposed individuals (MEIs) for cancer, chronic non-cancer, and acute non-cancer incremental impacts.

Figure 7-2 through Figure 7-5 show the cancer risk isopleths for the NOP CEQA baseline for residential and occupational receptors, and the Future CEQA baseline for residential and occupational receptors, respectively.

Figure 7-6 through Figure 7-11 show the unmitigated absolute proposed Project cancer risk for residential and occupational receptors, the unmitigated NOP CEQA cancer risk increment for residential and occupational receptors, and the unmitigated Future CEQA cancer risk increment for residential and occupational receptors.

Table 7-1. Maximum Incremental CEQA Health Impacts Associated with the Proposed Project without Mitigation

Health Impact	Receptor Type	Maximum Predicted Impact					Significance Threshold
		Proposed Project	**NOP CEQA Baseline**	**NOP CEQA Increment**	**Future CEQA Baseline**	**Future CEQA Increment**	
Cancer Risk	Residential - on Land	23 × 10-6 23 in a million	26 × 10-6 26 in a million	5 × 10-6 5 in a million	19 × 10-6 19 in a million	6 × 10-6 6 in a million	10 × 10-6 10 in a million
	Residential - in Marina	37 × 10-6 37 in a million	85 × 10-6 85 in a million	<0	25 × 10-6 25 in a million	**11 × 10-6** **11 in a million**	
	Occupational	94 × 10-6 94 in a million	75 × 10-6 75 in a million	**19 × 10-6** **19 in a million**	63 × 10-6 63 in a million	**31 × 10-6** **31 in a million**	
	Sensitive	10 × 10-6 10 in a million	23 × 10-6 23 in a million	<0	8 × 10-6 8 in a million	3 × 10-6 3 in a million	
	Student	0.7 × 10-6 0.7 in a million	0.7 × 10-6 0.7 in a million	0.07 × 10-6 0.07 in a million	0.7 × 10-6 0.7 in a million	0.07 × 10-6 0.07 in a million	
	Recreational	17 × 10-6 17 in a million	39 × 10-6 39 in a million	2 × 10-6 2 in a million	12 × 10-6 12 in a million	5 × 10-6 5 in a million	
Chronic Hazard Index		**Proposed Project**	**NOP CEQA Baseline** [3]	**NOP CEQA Increment** [3]			1
	Residential - on Land	0.09	0.1	<0			
	Residential - in Marina	0.1	0.2	<0			
	Occupational	0.6	0.4	0.2			
	Sensitive	0.08	0.1	<0			
	Student	0.08	0.1	<0			
	Recreational	0.1	0.2	0.004			
Acute Hazard Index	Residential - on Land	0.5	0.4	0.1			1
	Residential - in Marina	0.7	0.6	0.3			
	Occupational	1.1	0.9	0.6			
	Sensitive	0.5	0.3	0.1			
	Student	0.4	0.3	0.1			
	Recreational	0.7	0.6	0.3			

Health Impact	Receptor Type	Maximum Predicted Impact					Significance Threshold
		Proposed Project	NOP CEQA Baseline	NOP CEQA Increment	Future CEQA Baseline	Future CEQA Increment	
Cancer Burden				**NOP CEQA Increment**		**Future CEQA Increment**	0.5
				0.002		0.20	

Notes:

1. Exceedances of the significance thresholds are in bold. The significance thresholds apply only to the increments.
2. The NOP CEQA increment represents the Project minus NOP CEQA baseline. The Future CEQA increment represents the Project minus Future CEQA baseline. The Future CEQA baseline and Future CEQA increments are only applicable to cancer risk because cancer risk is based on long-term (multiple-year) exposure periods.
3. Chronic and acute impacts are considered short-term impacts and are determined by comparing project-related impacts to the NOP CEQA baseline, the baseline at the time of the NOP in 2012.
4. Each result shown in the table represents the modeled receptor location with the maximum impact or increment. The impacts or increments at all other receptors would be less than the values in the table.
5. The displayed values for the Project and baseline impacts do not necessarily subtract to equal the displayed CEQA increments because they may occur at different receptor locations.
6. Construction emissions were modeled with the operational emissions for the determination of health impacts.
7. An increment less than zero means the Project impact would be less than the baseline impact at all modeled receptors.

Table 7-2. Source Contributions to Cancer Risk at the CEQA Increment MEIs – Proposed Project without Mitigation

Source Category	Cancer Risk MEI Receptor			
	Residential NOP CEQA Increment	Residential Future CEQA Increment	Occupational NOP CEQA Increment	Occupational Future CEQA Increment
Container Ships - Anchorage	0.2%	0.2%	0.0%	0.0%
Container Ships - Hoteling	1.8%	3.9%	0.7%	0.7%
Container Ships - Transit	3.2%	4.0%	0.6%	0.6%
Container Ships - Total	**5.1%**	**8.2%**	**1.4%**	**1.4%**
Assist Tugboats	**0.2%**	**0.4%**	**0.1%**	**0.1%**
Locomotives	**2.0%**	**64.8%**	**13.3%**	**13.3%**
Container Trucks - Off Site	91.5%	21.7%	80.1%	80.1%
Container Trucks - On Site	0.3%	1.6%	2.8%	2.8%
Container Trucks - Total	**91.8%**	**23.3%**	**82.9%**	**82.9%**
Cargo Handling Equipment	**0.8%**	**2.7%**	**1.2%**	**1.2%**
Construction Activity	**0.1%**	**0.2%**	**0.1%**	**0.1%**
Transport Refrigeration Units	**0.0%**	**0.1%**	**0.1%**	**0.1%**
Worker Trips	**0.1%**	**0.2%**	**0.9%**	**0.9%**

Note: Contributions are from proposed Project sources prior to subtracting baseline.

Figure 7-1. MEI Locations for CEQA Health Increments – Proposed Project without Mitigation

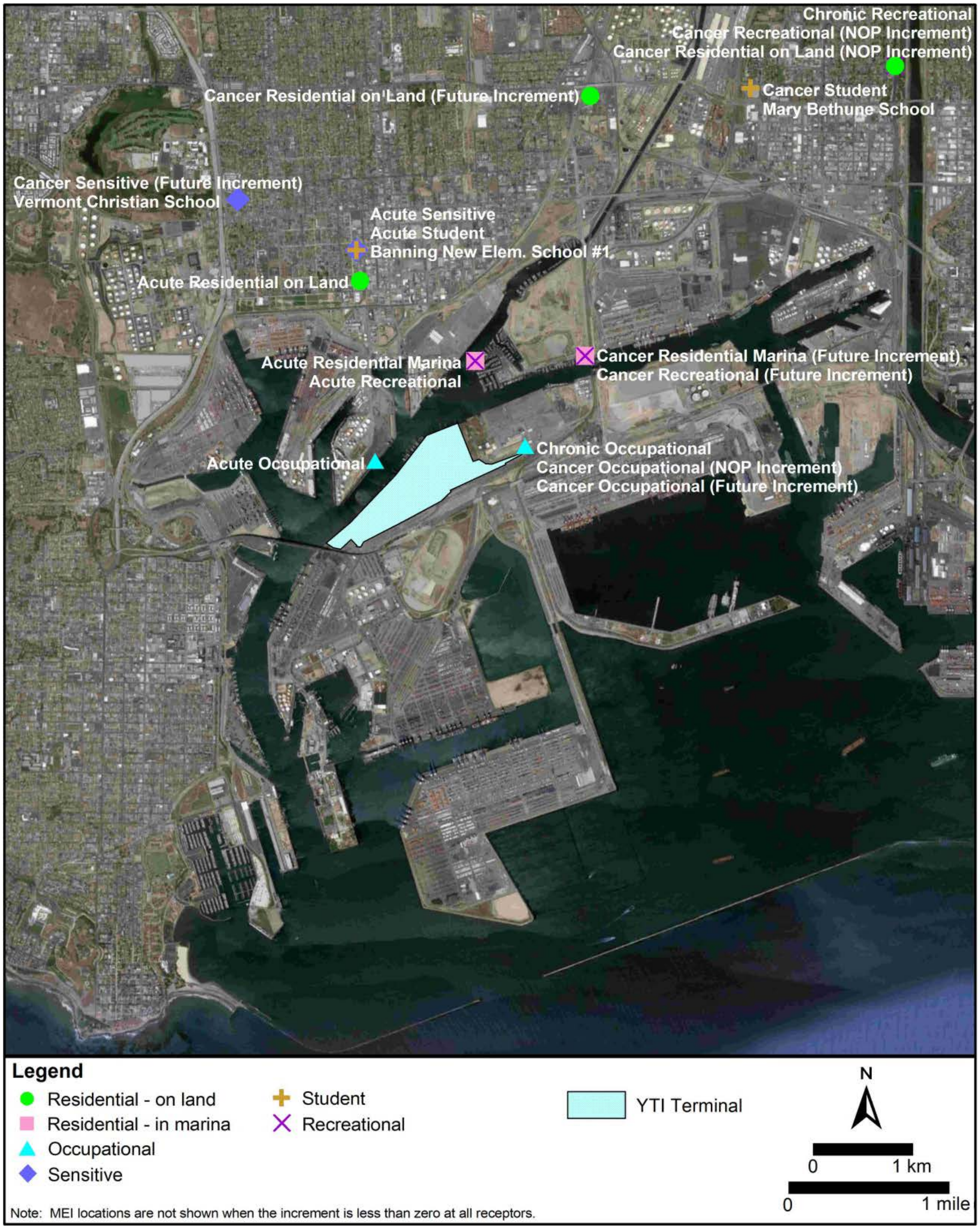


Figure 7-2. Isopleths of Residential Lifetime Cancer Risk: NOP CEQA Baseline

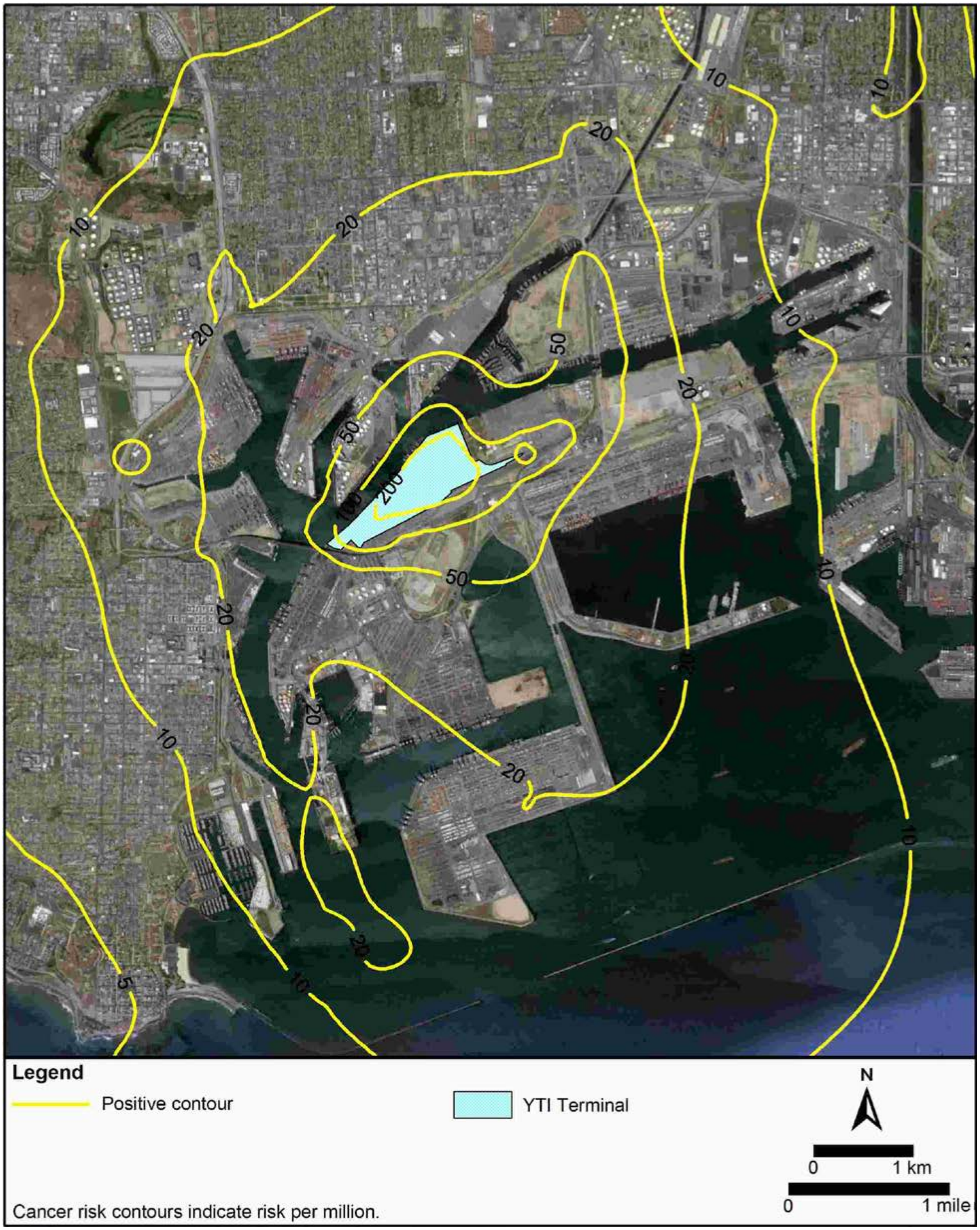


Figure 7-3. Isopleths of Occupational Lifetime Cancer Risk: NOP CEQA Baseline

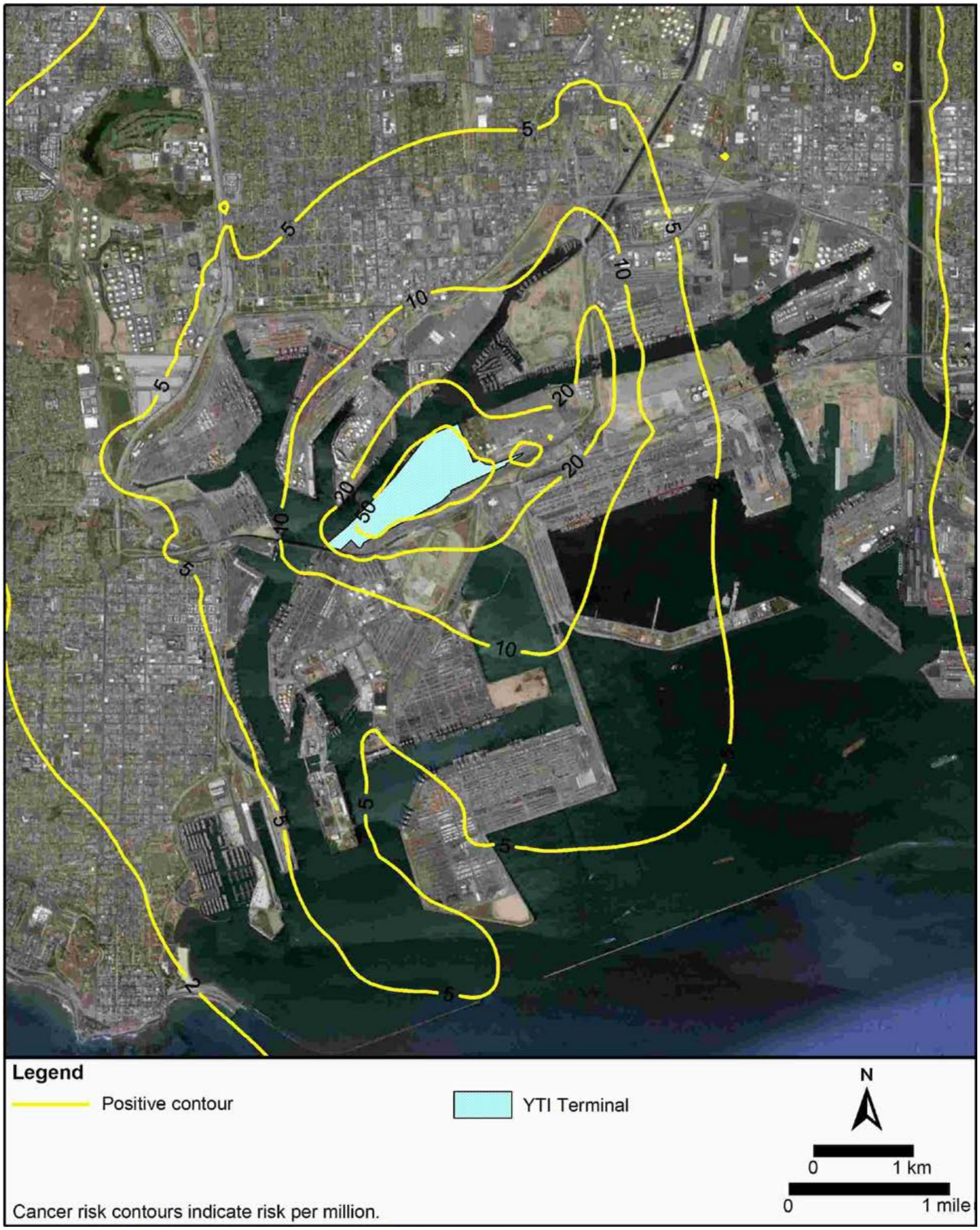


Figure 7-4. Isopleths of Residential Lifetime Cancer Risk: Future CEQA Baseline

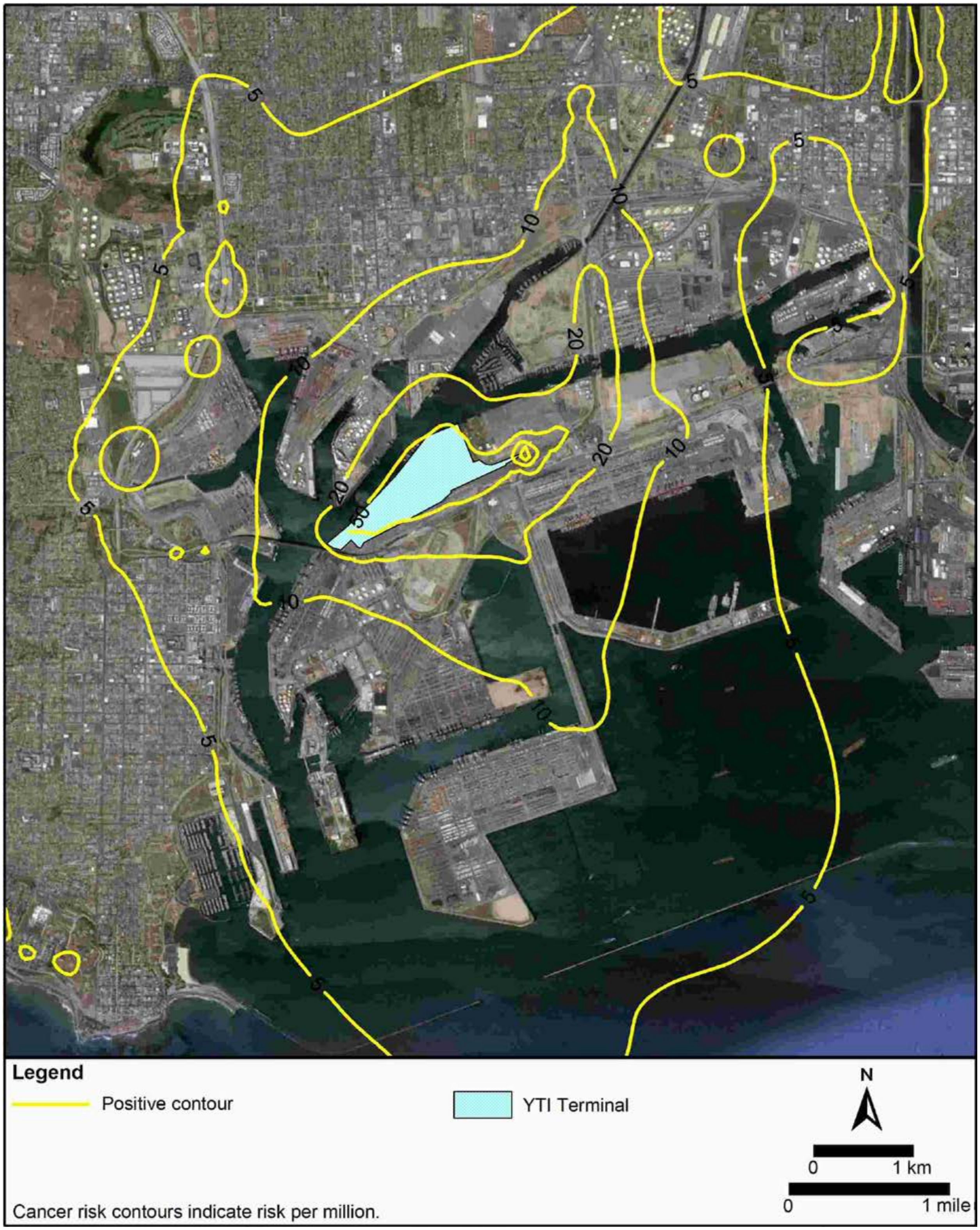


Figure 7-5. Isopleths of Occupational Lifetime Cancer Risk: Future CEQA Baseline

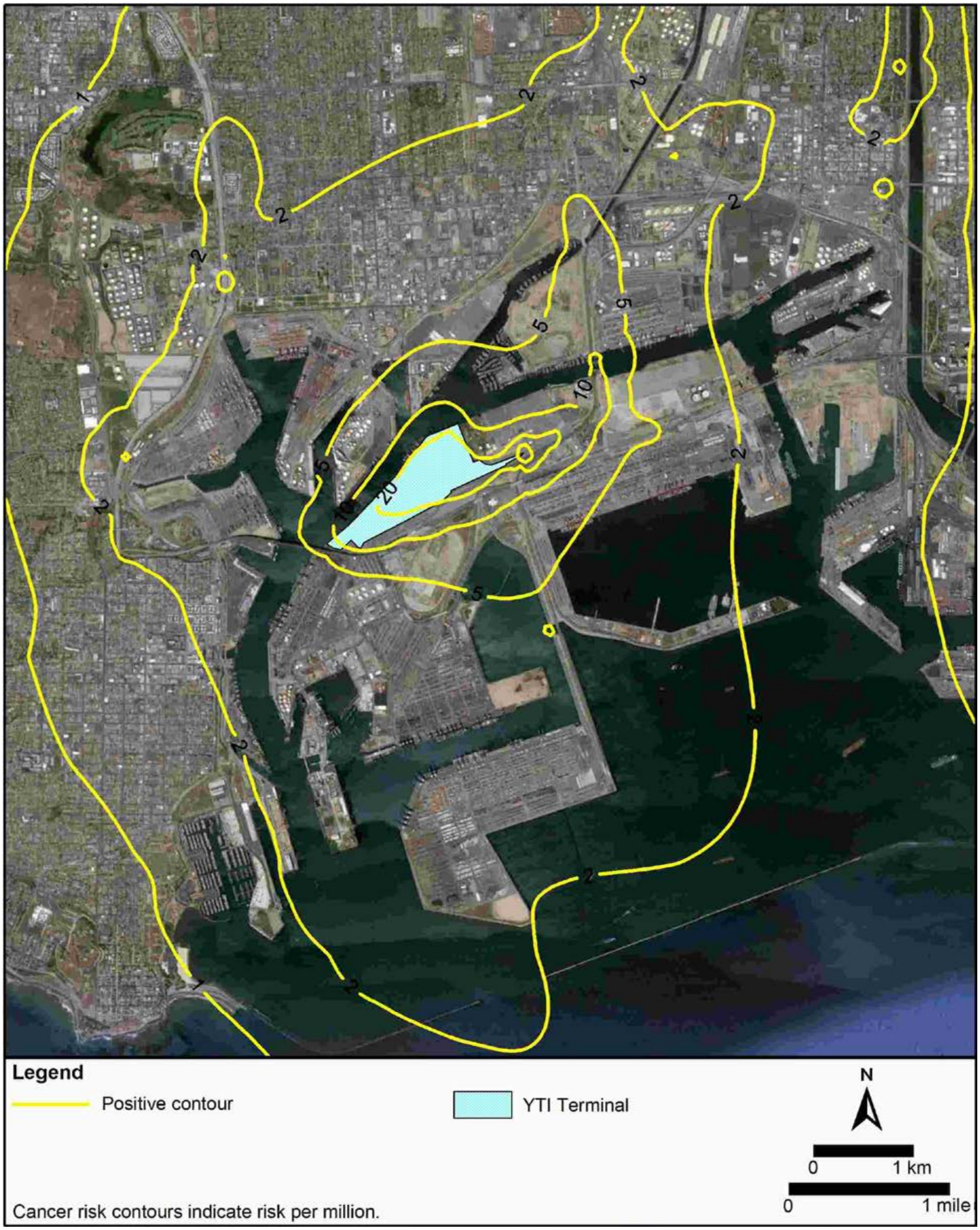


Figure 7-6. Isopleths of Residential Lifetime Cancer Risk: Absolute Proposed Project without Mitigation

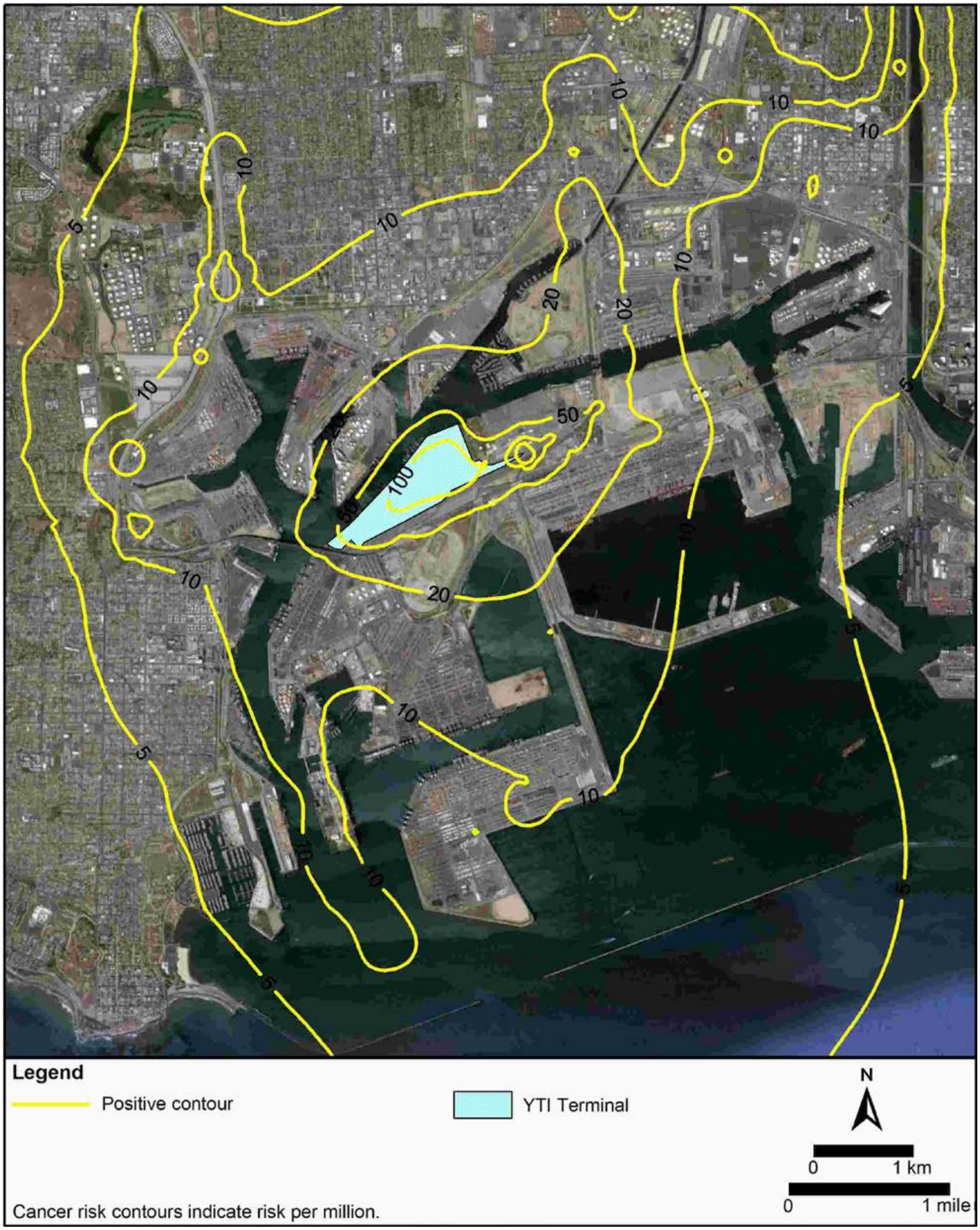


Figure 7-7. Isopleths of Occupational Lifetime Cancer Risk: Absolute Proposed Project without Mitigation

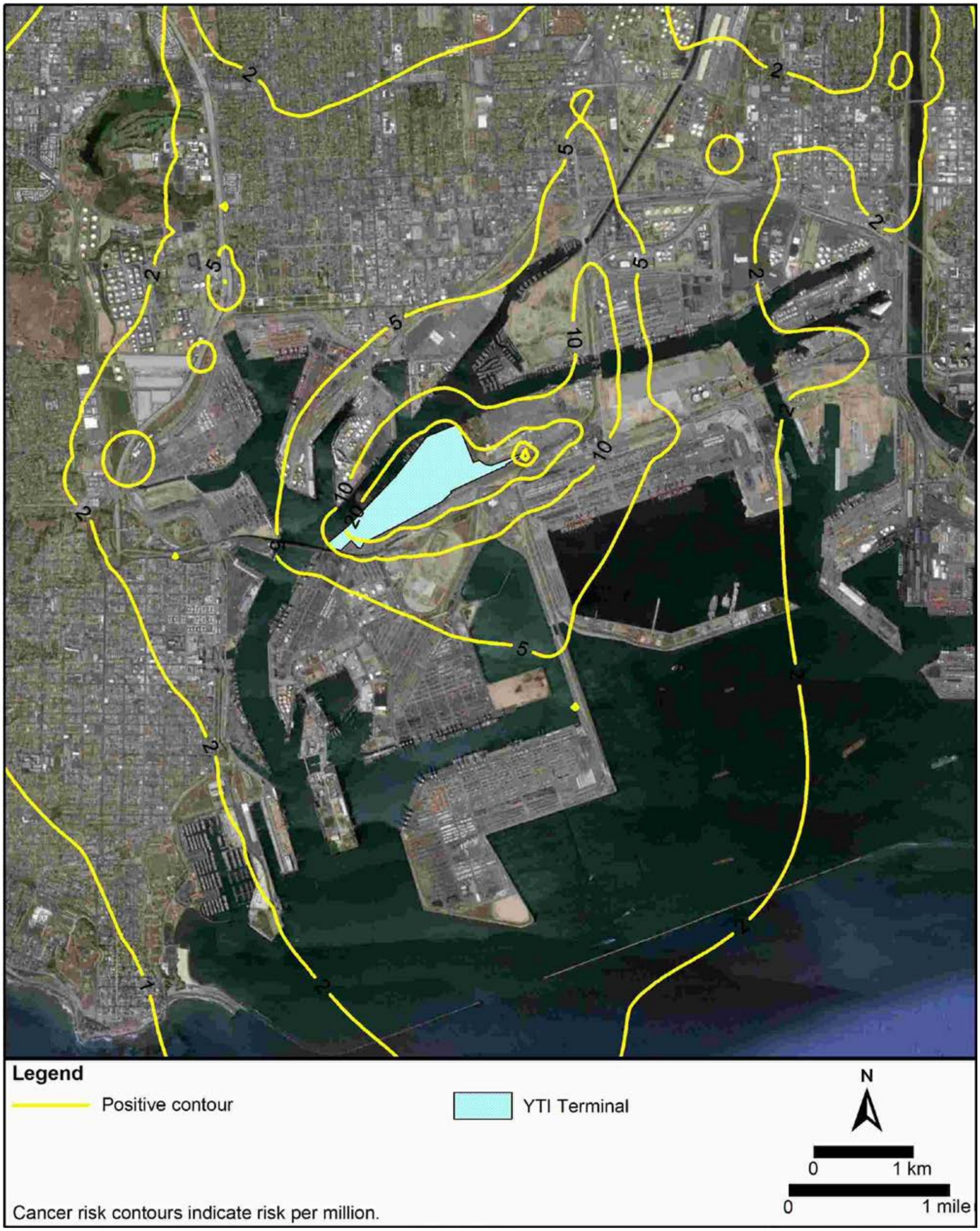


Figure 7-8. Isopleths of Residential Lifetime Cancer Risk: Proposed Project without Mitigation Minus NOP CEQA Baseline

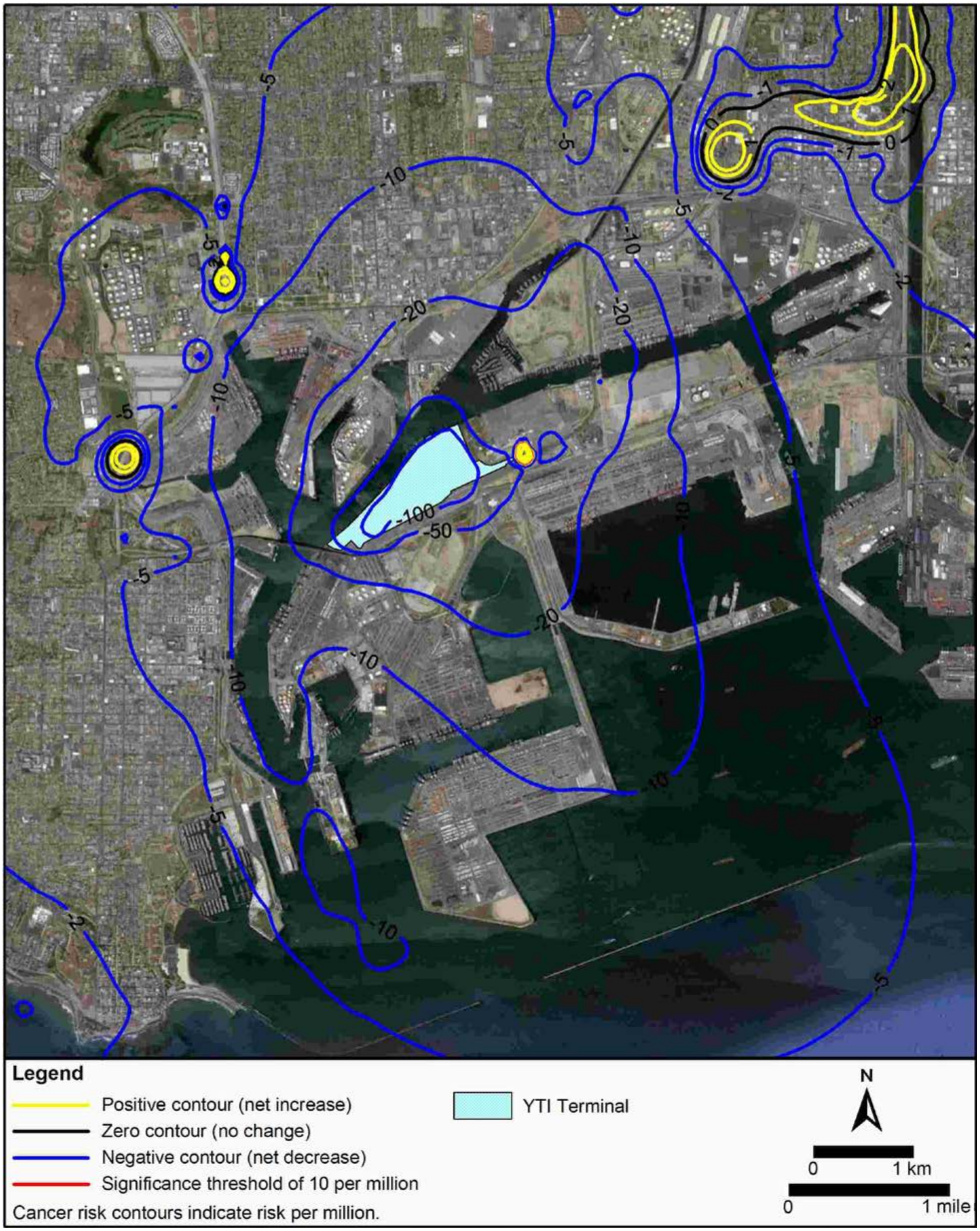


Figure 7-9. Isopleths of Occupational Lifetime Cancer Risk: Proposed Project without Mitigation Minus NOP CEQA Baseline

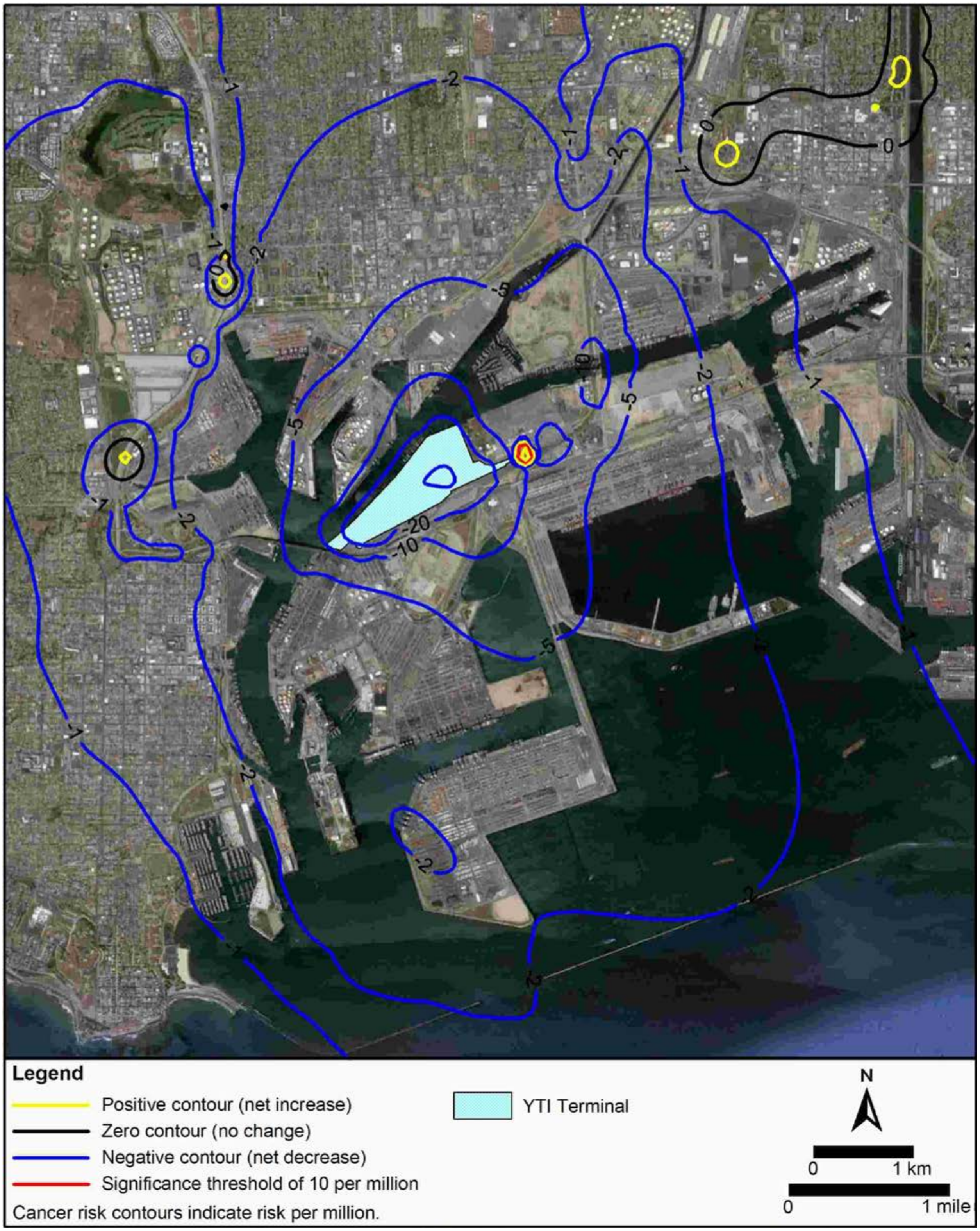


Figure 7-10. Isopleths of Residential Lifetime Cancer Risk: Proposed Project without Mitigation Minus Future CEQA Baseline

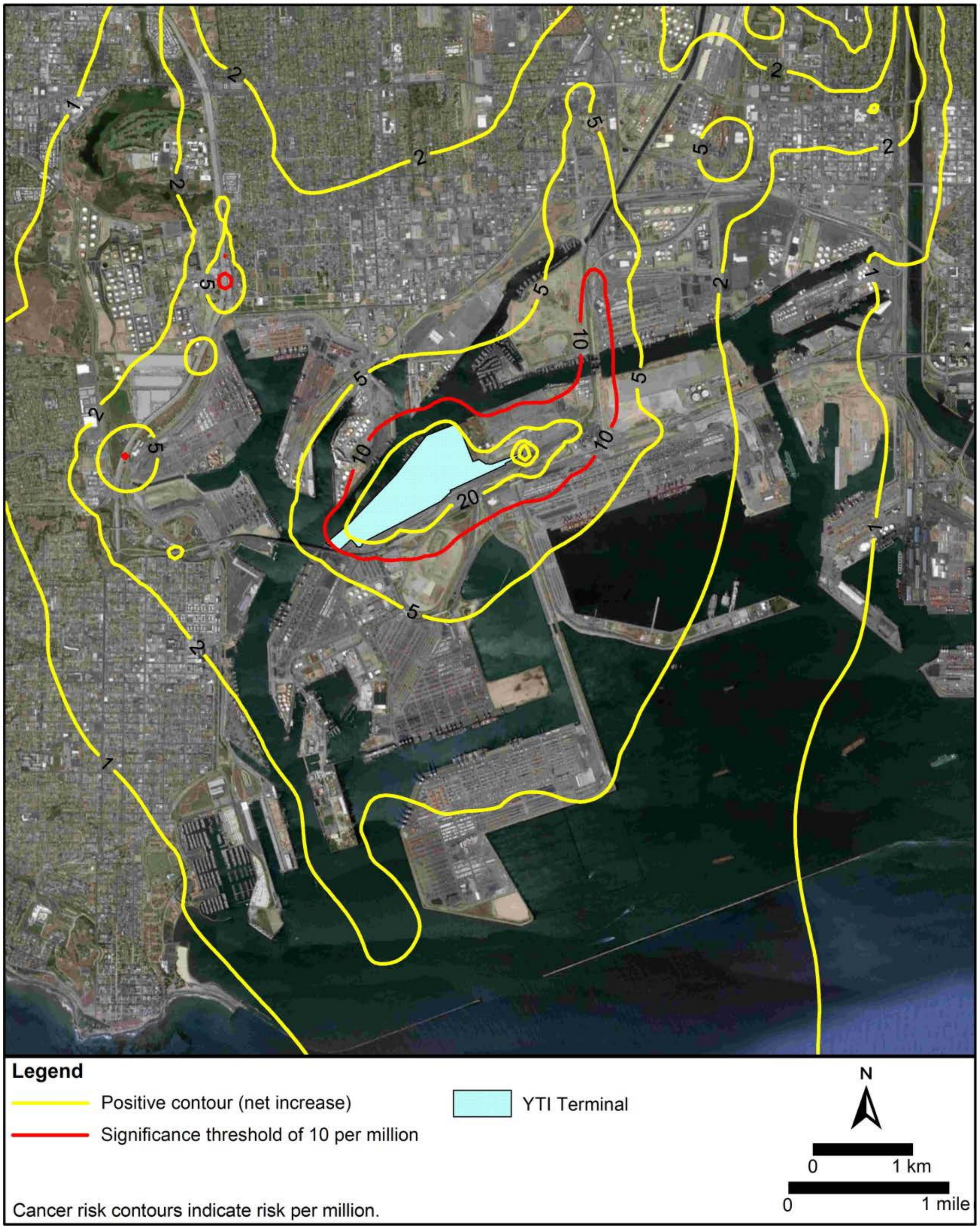
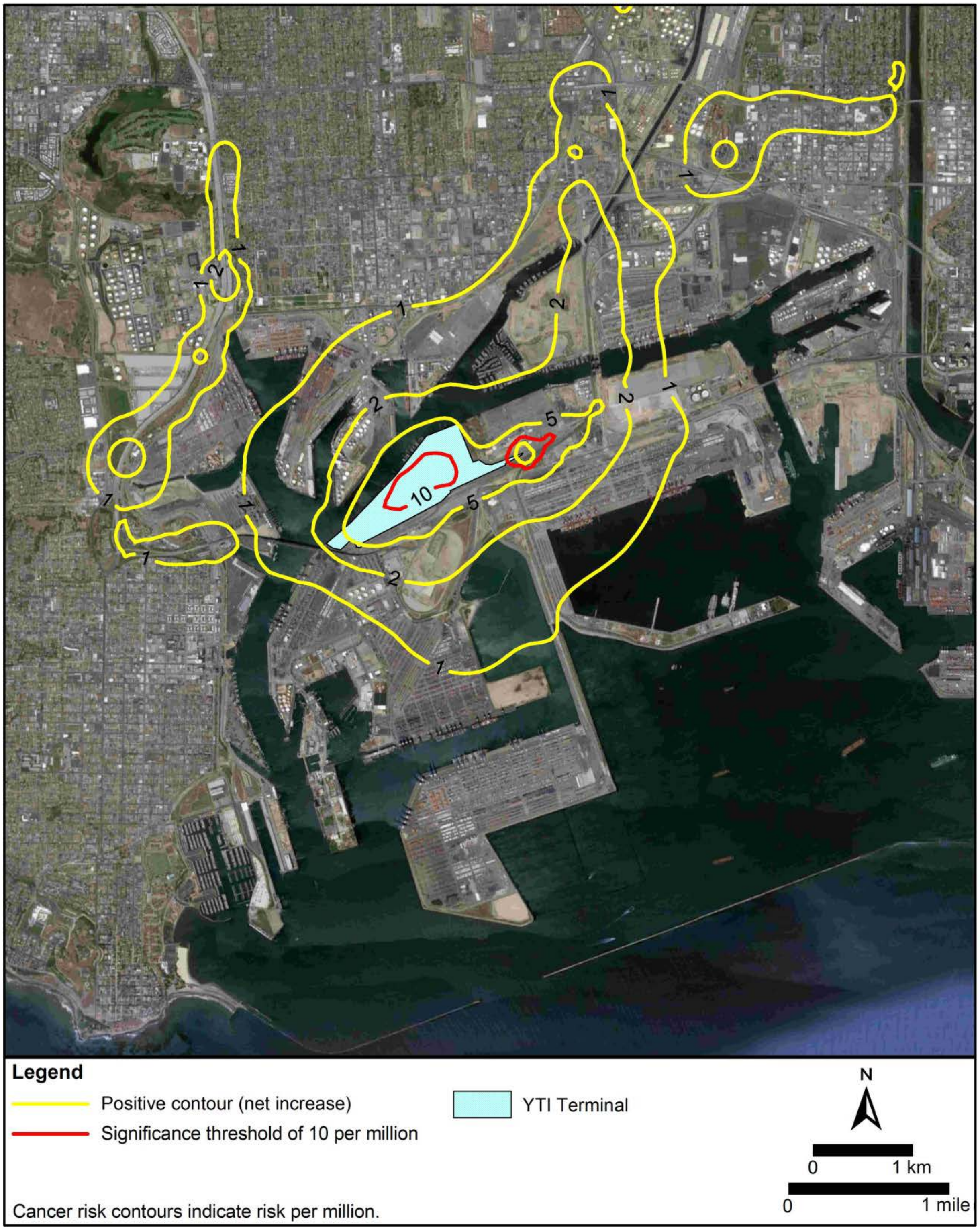


Figure 7-11. Isopleths of Occupational Lifetime Cancer Risk: Proposed Project without Mitigation Minus Future CEQA Baseline



7.1.1.2 NEPA Incremental Impacts

Table 7-3 presents the maximum NEPA health impacts associated with the proposed Project without mitigation. The results for cancer risk and noncancer effects include the maximum impact from the proposed Project alone (prior to subtracting baseline), the maximum impact from the NEPA baseline, and the maximum NEPA increment (Project minus NEPA baseline). The results for cancer burden include the estimated additional number of cancer cases associated with the proposed Project relative to the NEPA baseline (NEPA increment). The table shows the following:

- Cancer Risk - The maximum incremental cancer risk is predicted to be less than the significance threshold at all receptor types.
- Cancer burden – The cancer burden NEPA increment is predicted to be less than the significance threshold.
- The maximum chronic hazard index is predicted to be less than the significance threshold at all receptor types.
- The maximum acute hazard index is predicted to be less than the significance threshold at all receptor types.

A table showing the percent contribution to the NEPA increment is not included because all impacts under NEPA would be below significance thresholds.

Figure 7-12 shows the MEI locations for cancer, chronic non-cancer, and acute non-cancer incremental impacts.

Figure 7-13 and Figure 7-14 show the cancer risk isopleths for the NEPA baseline for residential and occupational receptors, respectively. Figure 7-15 and Figure 7-16 show the unmitigated NEPA increment for residential and occupational receptors, respectively.

Table 7-3. Maximum Incremental NEPA Health Impacts Associated With the Proposed Project Without Mitigation

Health Impact	Receptor Type	Maximum Predicted Impact			Significance Threshold
		Proposed Project	NEPA Baseline	NEPA Increment	
Cancer Risk	Residential - on Land	23 × 10-6 23 in a million	21 × 10-6 21 in a million	3 × 10-6 3 in a million	10 × 10-6 10 in a million
	Residential - in Marina	37 × 10-6 37 in a million	33 × 10-6 33 in a million	4 × 10-6 4 in a million	
	Occupational	94 × 10-6 94 in a million	85 × 10-6 85 in a million	9 × 10-6 9 in a million	
	Sensitive	10 × 10-6 10 in a million	9 × 10-6 9 in a million	1 × 10-6 1 in a million	
	Student	0.7 × 10-6 0.7 in a million	0.5 × 10-6 0.5 in a million	0.2 × 10-6 0.2 in a million	
	Recreational	17 × 10-6	15 × 10-6	2 × 10-6	

Health Impact	Receptor Type	Maximum Predicted Impact			Significance Threshold
		Proposed Project	NEPA Baseline	NEPA Increment	
		17 in a million	15 in a million	2 in a million	
Chronic Hazard Index	Residential - on Land	0.09	0.08	0.007	1
	Residential - in Marina	0.1	0.1	0.004	
	Occupational	0.6	0.5	0.2	
	Sensitive	0.08	0.07	0.005	
	Student	0.08	0.07	0.006	
	Recreational	0.1	0.1	0.01	
Acute Hazard Index	Residential - on Land	0.5	0.4	0.1	1
	Residential - in Marina	0.7	0.6	0.3	
	Occupational	1.1	1.0	0.6	
	Sensitive	0.5	0.4	0.1	
	Student	0.4	0.3	0.1	
	Recreational	0.7	0.6	0.3	
Cancer Burden				**NEPA Increment**	0.5
				0.04	

Notes:

1. The NEPA increment represents the Project minus NEPA baseline.
2. Each result shown in the table represents the modeled receptor location with the maximum impact or increment. The impacts or increments at all other receptors would be less than the values in the table.
3. The displayed values for the Project and baseline impacts do not necessarily subtract to equal the displayed NEPA increment because they may occur at different receptor locations.
4. Construction emissions were modeled with the operational emissions for the determination of health impacts.
5. An increment less than zero means the Project impact would be less than the baseline impact at all modeled receptors.

Figure 7-12. MEI Locations for NEPA Health Increments – Proposed Project without Mitigation

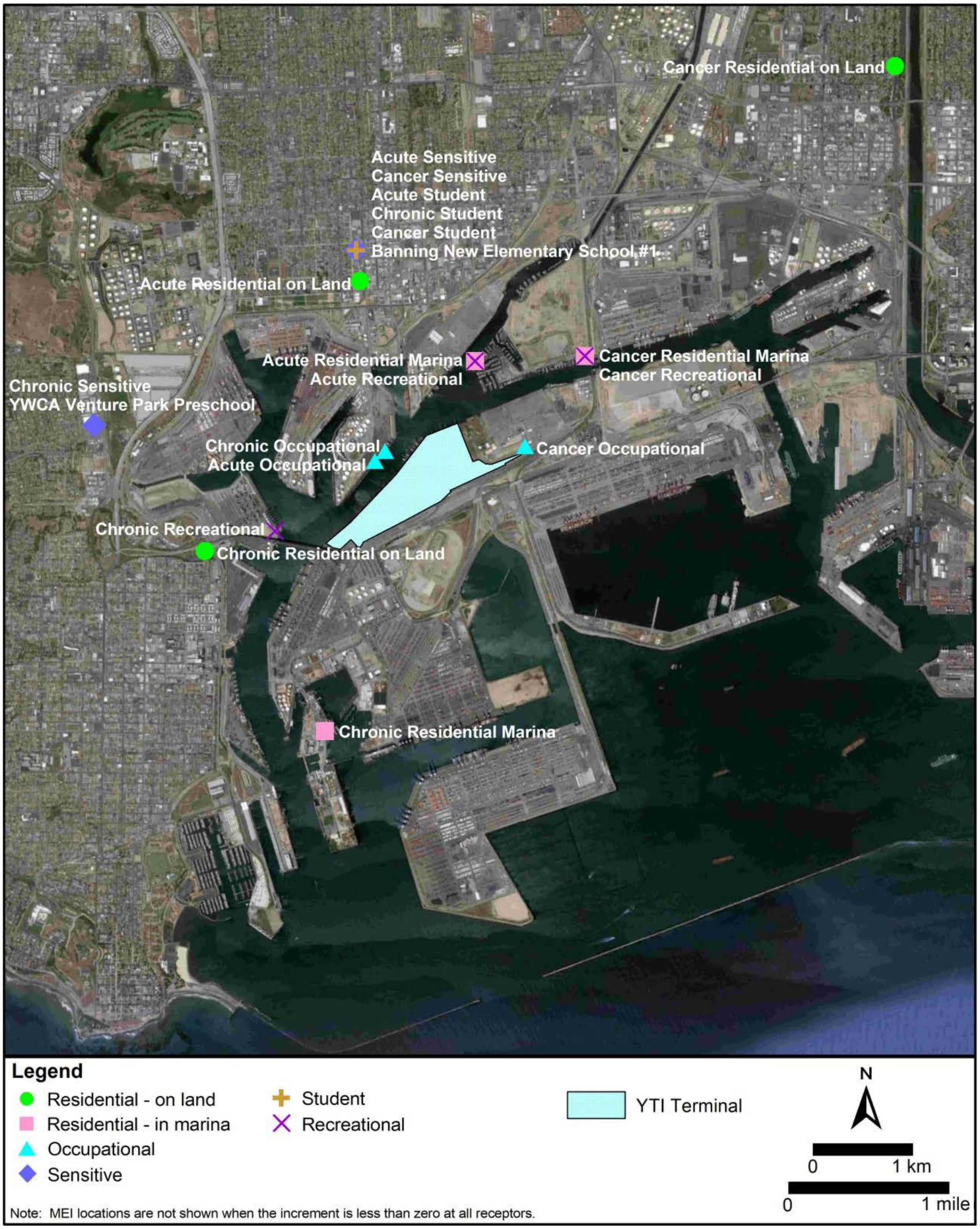


Figure 7-13. Isopleths of Residential Lifetime Cancer Risk: NEPA Baseline

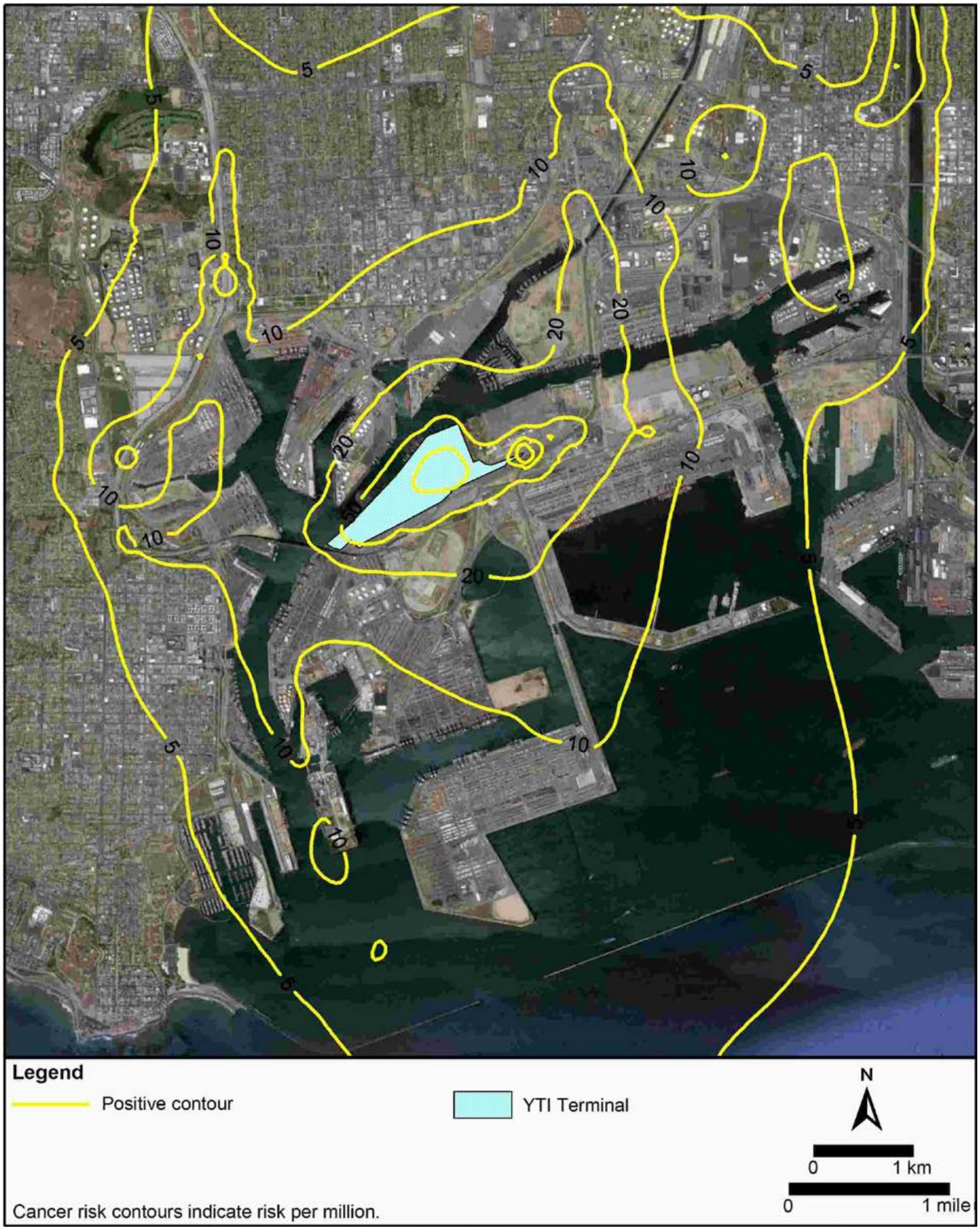


Figure 7-14. Isopleths of Occupational Lifetime Cancer Risk: NEPA Baseline

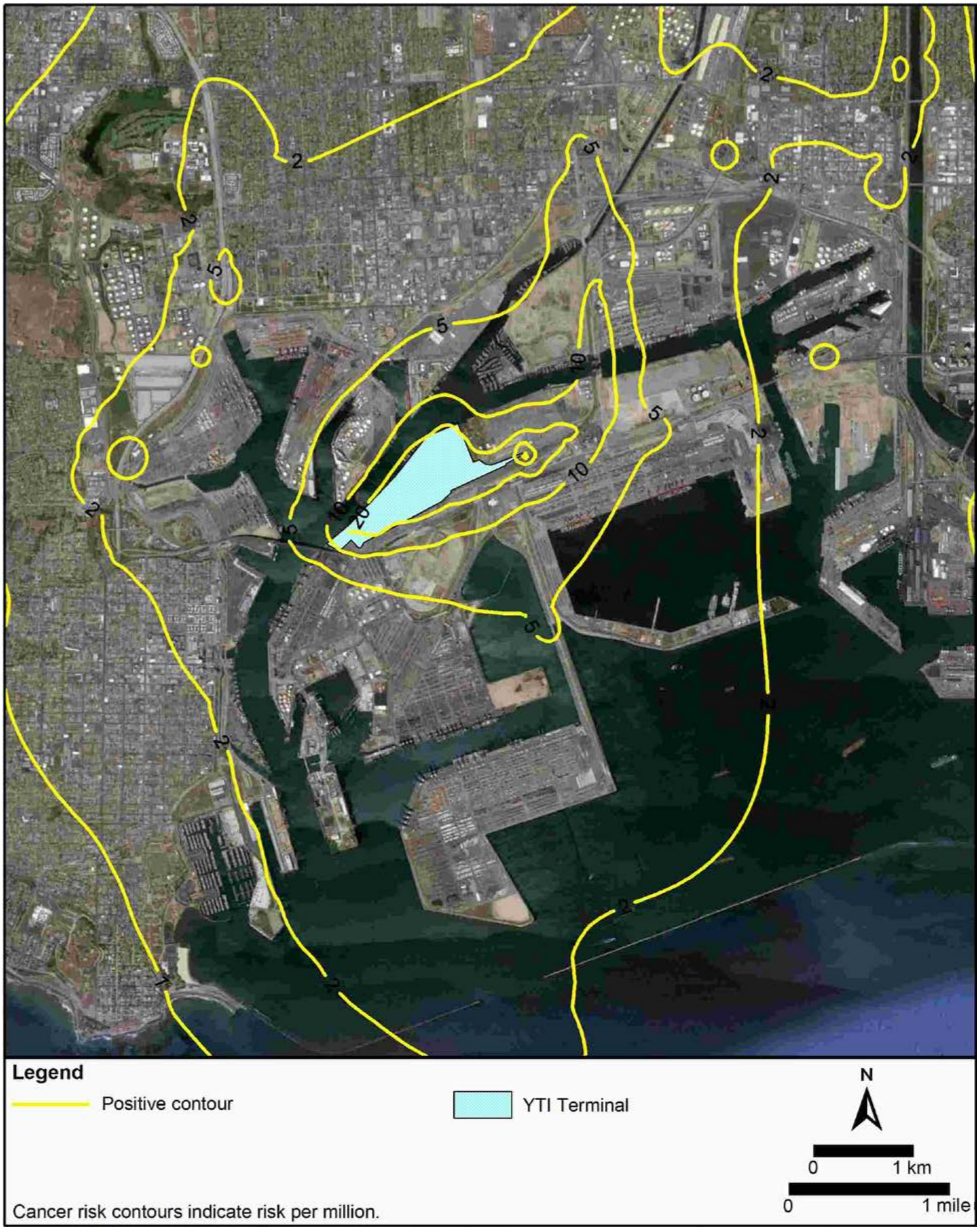


Figure 7-15. Isopleths of Residential Lifetime Cancer Risk: Proposed Project without Mitigation Minus NEPA Baseline

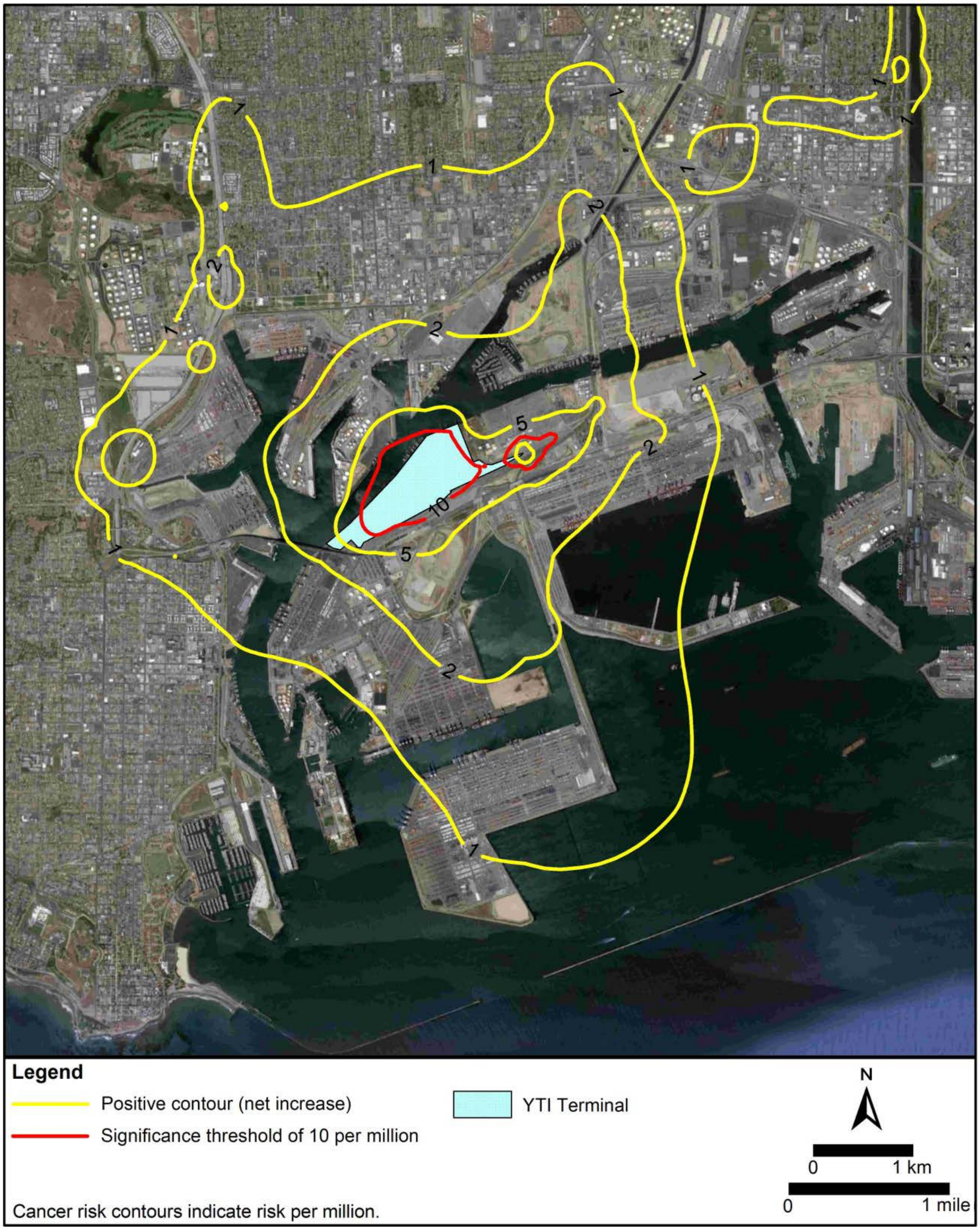
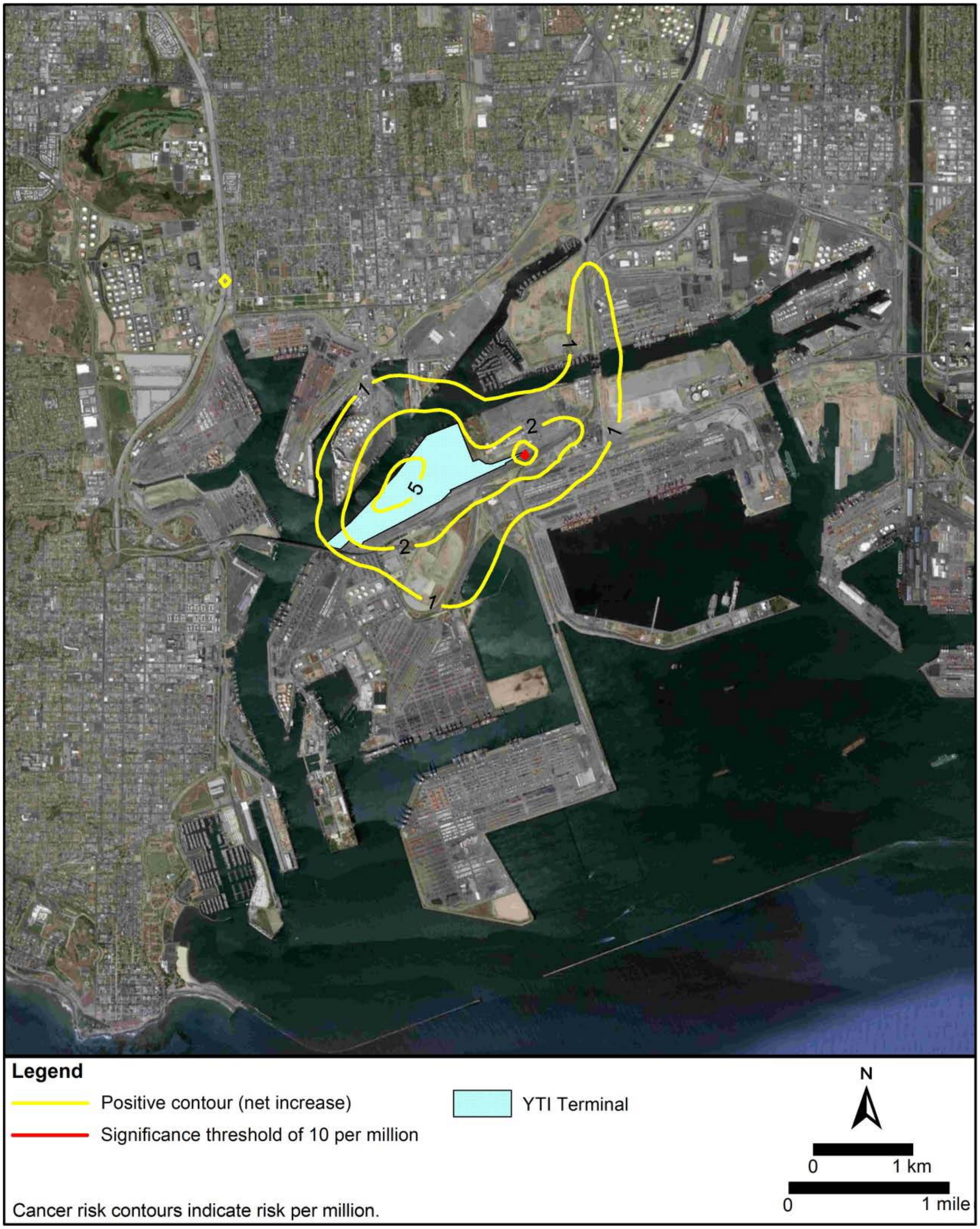


Figure 7-16. Isopleths of Occupational Lifetime Cancer Risk: Proposed Project without Mitigation Minus NEPA Baseline



7.1.2 Mitigated Impacts

7.1.2.1 CEQA Incremental Impacts

Table 7-4 presents the maximum CEQA health impacts associated with the mitigated proposed Project. The table shows that in relation to the NOP CEQA baseline, cancer risk would not change appreciably from the unmitigated scenario because cancer risk would be driven by truck exhaust, for which mitigation beyond the Clean Truck Program is not feasible. The table also shows that in relation to the Future CEQA baseline, cancer risk would not change appreciably from the unmitigated scenario because cancer risk would be driven by locomotive and truck exhaust, for which project-level mitigation not feasible. EIS/EIR Section 3.2.4 contains a detailed discussion of mitigation measures.

Table 7-5 shows the percent contribution to cancer risk for the NOP and Future CEQA increments for each modeled source group associated with residential and offsite occupational exposure. The NOP and Future CEQA increments would be less than 1 for non-cancer chronic and acute impacts and are therefore not presented in the table.

Figure 7-17 shows the MEI locations for cancer, chronic non-cancer, and acute non-cancer incremental impacts, following mitigation.

Figure 7-18 through Figure 7-23 show isopleths of the mitigated absolute proposed Project cancer risks for residential and occupational receptors, the mitigated NOP CEQA cancer risk increments for residential and occupational receptors, and the mitigated Future CEQA cancer risk increments for residential and occupational receptors, respectively.

Table 7-4. Maximum Incremental CEQA Health Impacts Associated with the Proposed Project with Mitigation

Health Impact	Receptor Type	Maximum Predicted Impact					Significance Threshold
		Proposed Project	**NOP CEQA Baseline**	**NOP CEQA Increment**	**Future CEQA Baseline**	**Future CEQA Increment**	
Cancer Risk	Residential - on Land	23 × 10-6 23 in a million	26 × 10-6 26 in a million	5 × 10-6 5 in a million	19 × 10-6 19 in a million	6 × 10-6 6 in a million	10 × 10-6 10 in a million
	Residential - in Marina	36 × 10-6 36 in a million	85 × 10-6 85 in a million	<0	25 × 10-6 25 in a million	**11 × 10-6** **11 in a million**	
	Occupational	94 × 10-6 94 in a million	75 × 10-6 75 in a million	**19 × 10-6** **19 in a million**	63 × 10-6 63 in a million	**31 × 10-6** **31 in a million**	
	Sensitive	10 × 10-6 10 in a million	23 × 10-6 23 in a million	<0	8 × 10-6 8 in a million	3 × 10-6 3 in a million	
	Student	0.6 × 10-6 0.6 in a million	0.7 × 10-6 0.7 in a million	0.05 × 10-6 0.05 in a million	0.7 × 10-6 0.7 in a million	0.05 × 10-6 0.05 in a million	
	Recreational	16 × 10-6 16 in a million	39 × 10-6 39 in a million	2 × 10-6 2 in a million	12 × 10-6 12 in a million	5 × 10-6 5 in a million	
Chronic Hazard Index		**Proposed Project**	**NOP CEQA Baseline** [3]	**NOP CEQA Increment** [3]			1
	Residential - on Land	0.08	0.1	<0			

Health Impact	Receptor Type	Maximum Predicted Impact: Proposed Project	NOP CEQA Baseline	NOP CEQA Increment	Future CEQA Baseline	Future CEQA Increment	Significance Threshold
	Residential - in Marina	0.1	0.2	<0			
	Occupational	0.6	0.4	0.2			
	Sensitive	0.07	0.1	<0			
	Student	0.07	0.1	<0			
	Recreational	0.1	0.2	0.003			
Acute Hazard Index	Residential - on Land	0.5	0.4	0.1			1
	Residential - in Marina	0.6	0.6	0.2			
	Occupational	1.1	0.9	0.4			
	Sensitive	0.4	0.3	0.1			
	Student	0.3	0.3	0.1			
	Recreational	0.6	0.6	0.2			
Cancer Burden				**NOP CEQA Increment**		**Future CEQA Increment**	0.5
				0.002		0.13	

Notes:

1. Exceedances of the significance thresholds are in bold. The significance thresholds apply only to the increments.
2. The NOP CEQA increment represents the Project minus NOP CEQA baseline. The Future CEQA increment represents the Project minus Future CEQA baseline. The Future CEQA baseline and Future CEQA increments are only applicable to cancer risk because cancer risk is based on long-term (multiple-year) exposure periods.
3. Chronic and acute impacts are considered short-term impacts and are determined by comparing project-related impacts to the NOP CEQA baseline, the baseline at the time of the NOP in 2012.
4. Each result shown in the table represents the modeled receptor location with the maximum impact or increment. The impacts or increments at all other receptors would be less than the values in the table.
5. The displayed values for the Project and baseline impacts do not necessarily subtract to equal the displayed CEQA increments because they may occur at different receptor locations.
6. Construction emissions were modeled with the operational emissions for the determination of health impacts.
7. An increment less than zero means the Project impact would be less than the baseline impact at all modeled receptors.

Table 7-5. Source Contributions to Cancer Risk at the CEQA Increment MEIs – Proposed Project with Mitigation

Source Category	Cancer Risk MEI Receptor: Residential NOP CEQA Increment	Residential Future CEQA Increment	Occupational NOP CEQA Increment	Occupational Future CEQA Increment
Container Ships - Anchorage	0.2%	0.2%	0.0%	0.0%
Container Ships - Hoteling	1.3%	2.8%	0.6%	0.6%
Container Ships - Transit	3.1%	4.1%	0.6%	0.6%
Container Ships - Total	4.6%	7.1%	1.2%	1.2%
Assist Tugboats	0.2%	0.4%	0.1%	0.1%

Source Category	Cancer Risk MEI Receptor			
	Residential NOP CEQA Increment	Residential Future CEQA Increment	Occupational NOP CEQA Increment	Occupational Future CEQA Increment
Locomotives	2.0%	65.7%	13.4%	13.4%
Container Trucks - Off Site	92.0%	22.0%	80.3%	80.3%
Container Trucks - On Site	0.3%	1.6%	2.8%	2.8%
Container Trucks - Total	92.3%	23.6%	83.1%	83.1%
Cargo Handling Equipment	0.8%	2.8%	1.2%	1.2%
Construction Activity	0.0%	0.0%	0.0%	0.0%
Transport Refrigeration Units	0.0%	0.1%	0.1%	0.1%
Worker Trips	0.1%	0.3%	0.9%	0.9%
Note: Contributions are from proposed Project sources prior to subtracting baseline.				

Figure 7-17. MEI Locations for CEQA Health Increments – Proposed Project with Mitigation

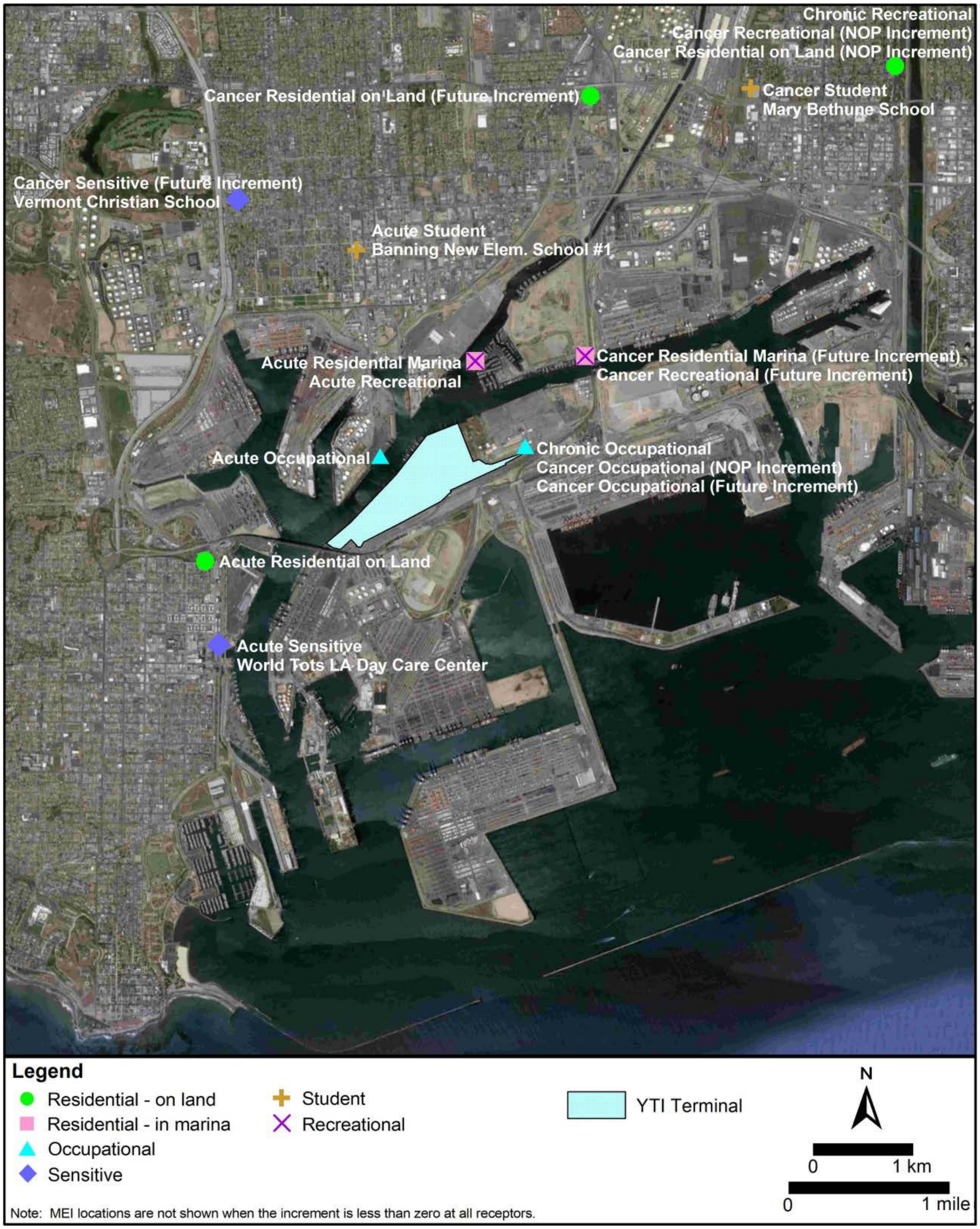


Figure 7-18. Isopleths of Residential Lifetime Cancer Risk: Absolute Proposed Project with Mitigation

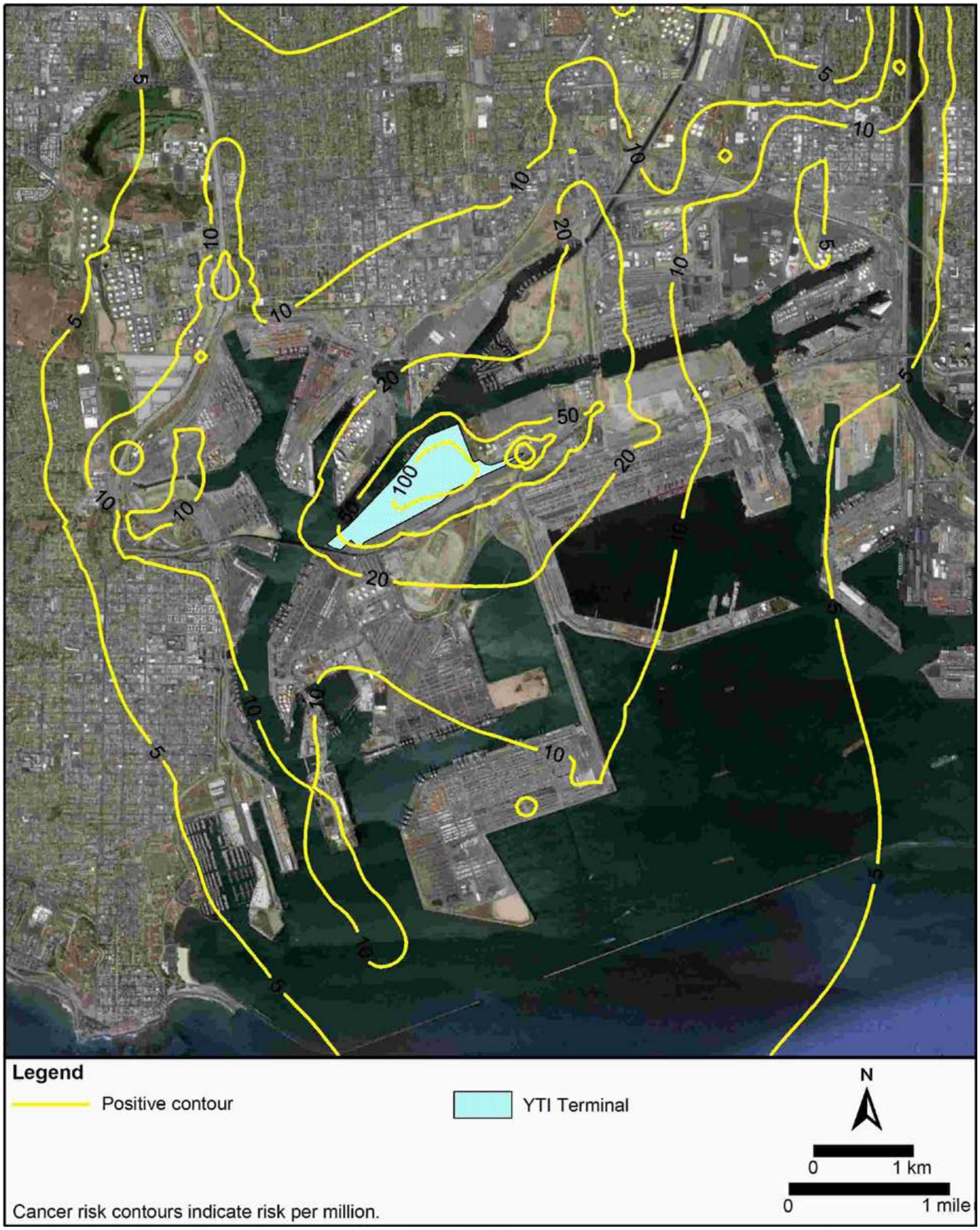


Figure 7-19. Isopleths of Occupational Lifetime Cancer Risk: Absolute Proposed Project with Mitigation

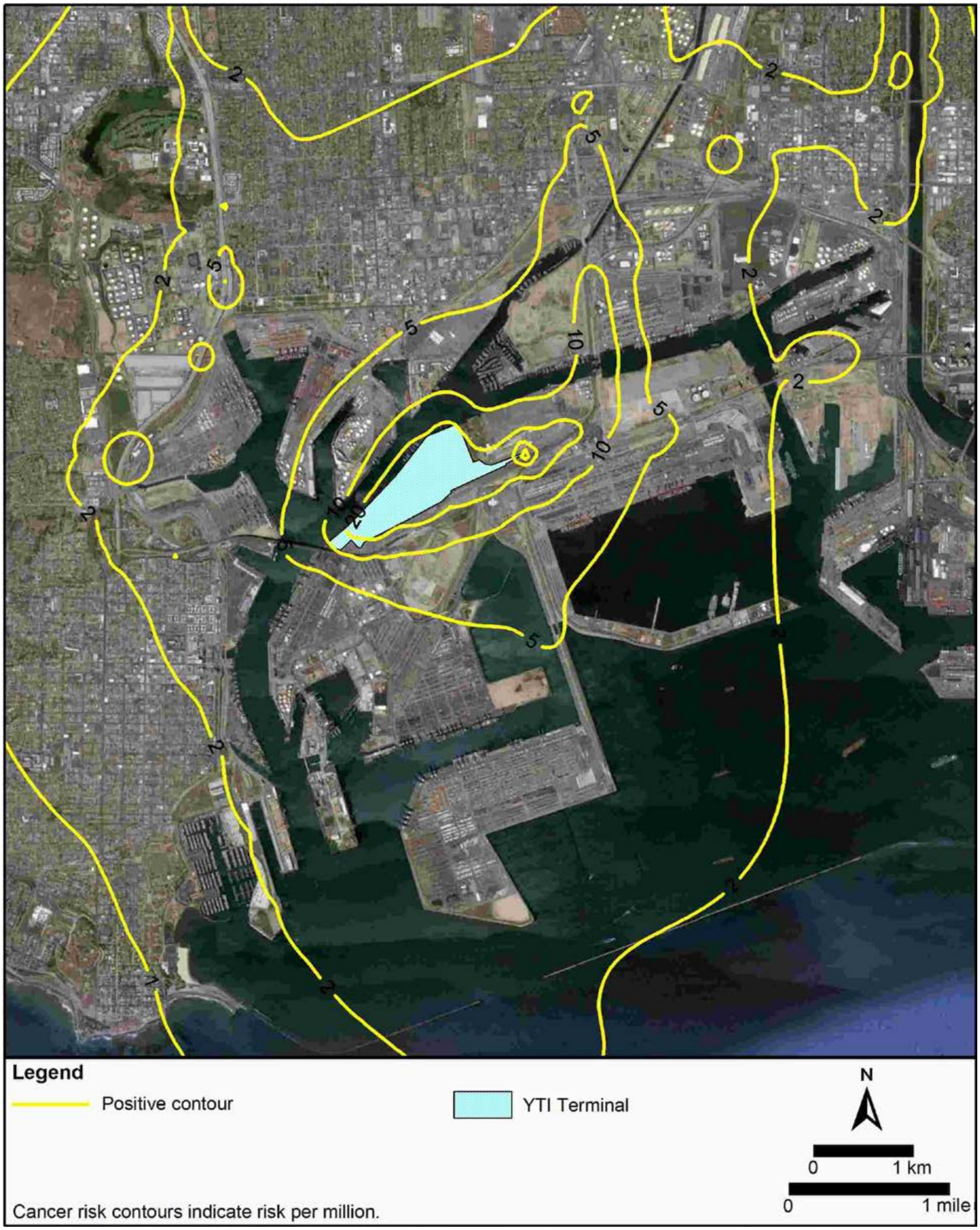


Figure 7-20. Isopleths of Residential Lifetime Cancer Risk: Proposed Project with Mitigation Minus NOP CEQA Baseline

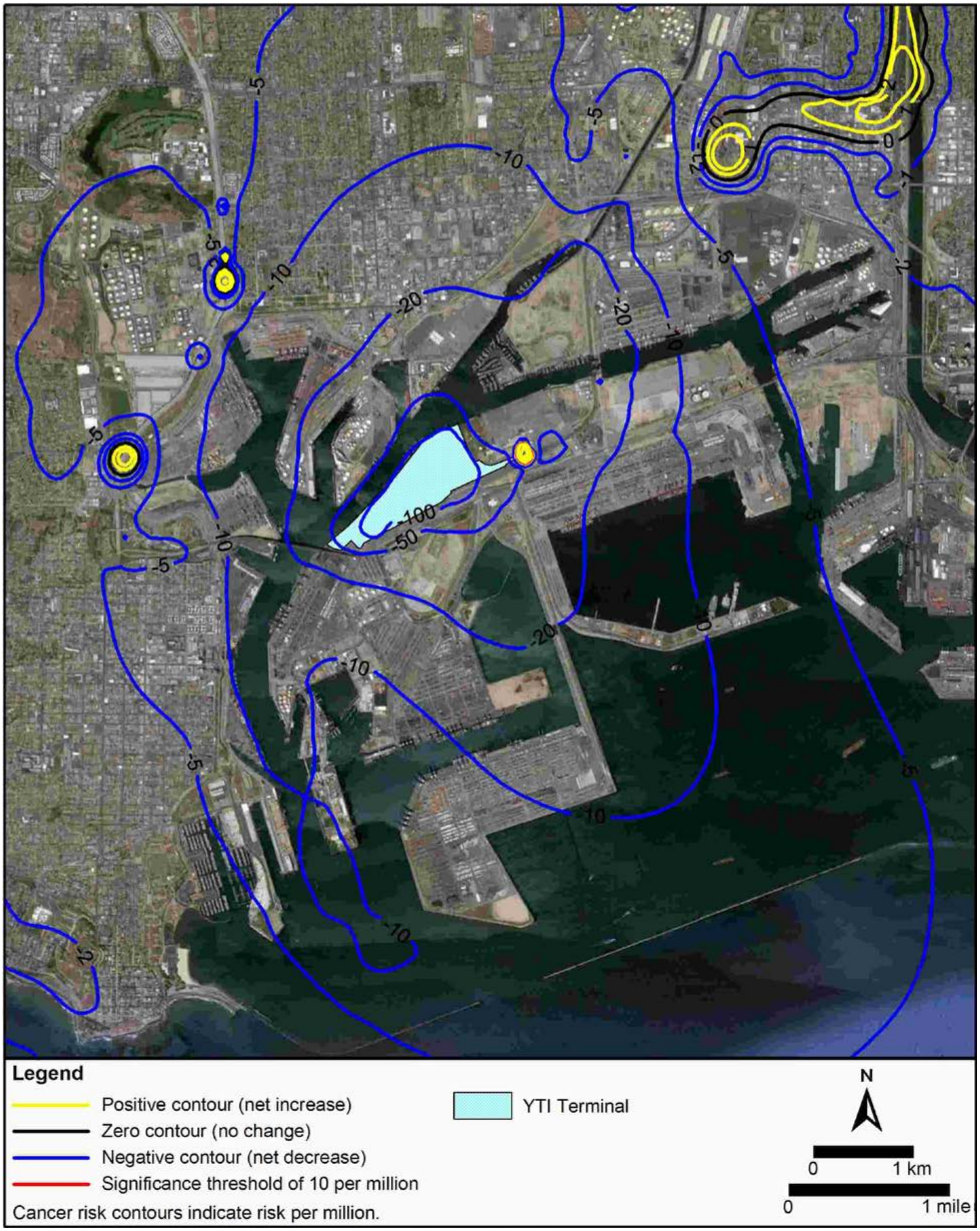


Figure 7-21. Isopleths of Occupational Lifetime Cancer Risk: Proposed Project with Mitigation Minus NOP CEQA Baseline

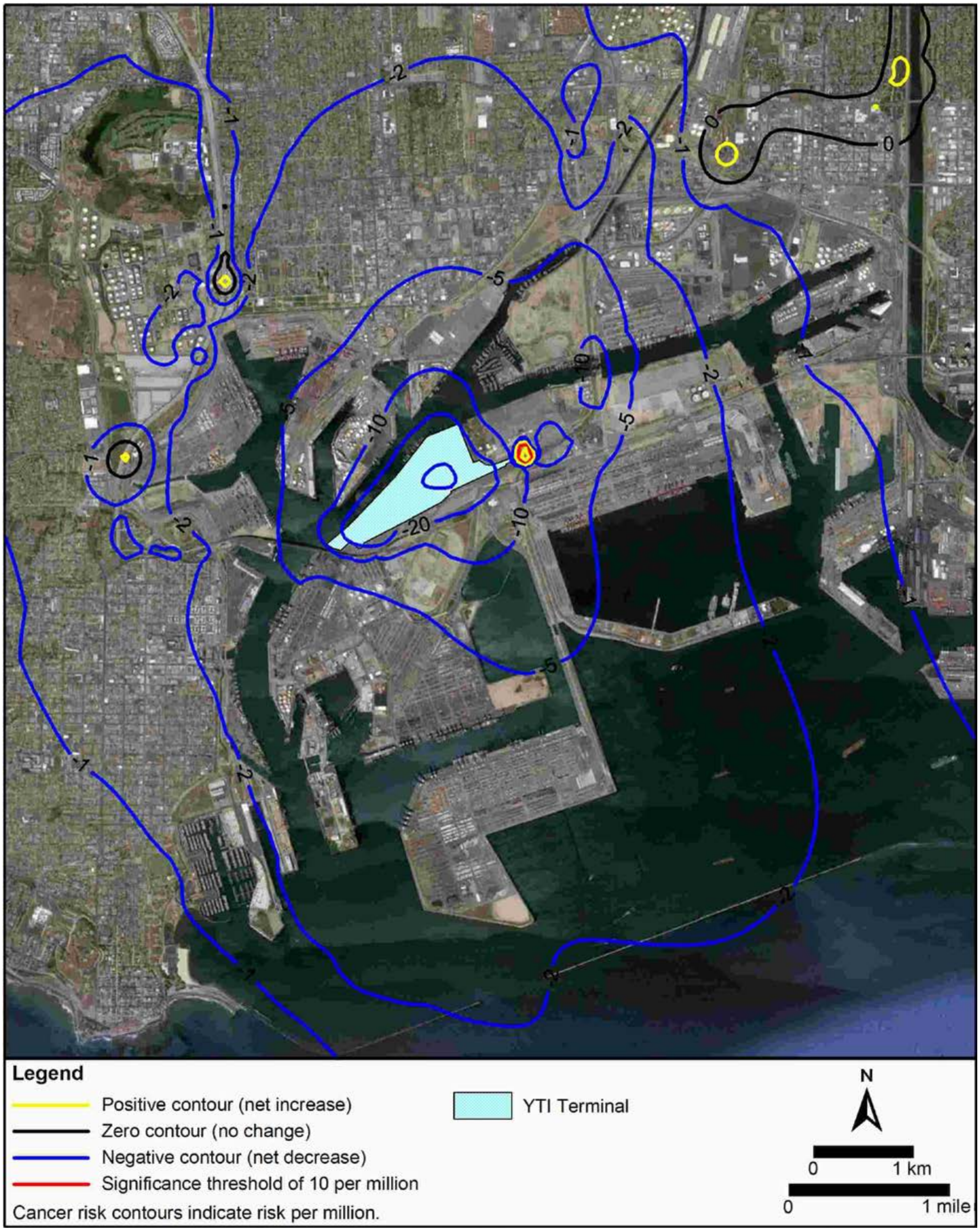


Figure 7-22. Isopleths of Residential Lifetime Cancer Risk: Proposed Project with Mitigation Minus Future CEQA Baseline

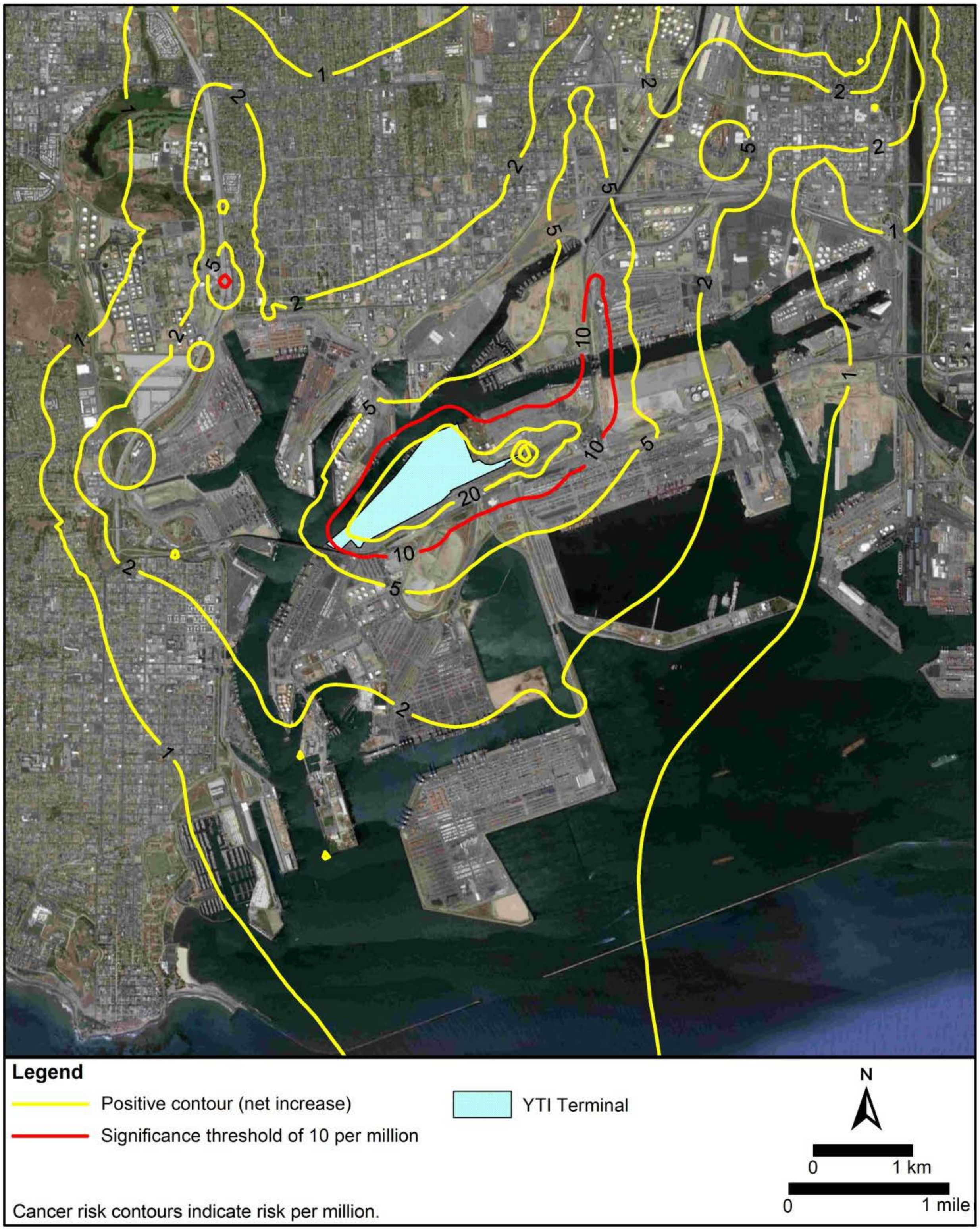


Figure 7-23. Isopleths of Occupational Lifetime Cancer Risk: Proposed Project with Mitigation Minus Future CEQA Baseline

7.1.2.2 NEPA Incremental Impacts

Tables showing NEPA impacts following mitigation are not presented; mitigation is not required since unmitigated impacts would be less than significance thresholds.

7.2 Alternatives

7.2.1 Unmitigated Impacts

7.2.1.1 Alternative 1

Table 7-6 presents the maximum CEQA health impacts associated with Alternative 1. The table shows the following:

- Cancer Risk
  - In relation to the NOP CEQA baseline, the maximum incremental cancer risk is predicted to be less than the significance threshold at all receptor types except the occupational receptor. Cancer risk at the occupational receptor would equal the significance threshold.
  - In relation to the Future CEQA baseline, the maximum incremental cancer risk is predicted to be less than the significance threshold at all receptor types except the occupational receptor. Cancer risk at the occupational receptor would exceed the significance threshold.
- Cancer burden and non-cancer chronic and acute impacts would be below significance thresholds.
- Particulates: Morbidity and Mortality: Operation of Alternative 1 would result in a maximum off-site 24-hour $PM_{2.5}$ concentration increment that would not exceed the SCAQMD significance threshold of 2.5 µg/m3 (see EIR/EIS Section 3.2.4). Because the operational $PM_{2.5}$ concentrations would be less than significant and would not exceed the Port's criterion for calculating morbidity and mortality attributable to PM, potential mortality and morbidity effects were not quantified for this Alternative.
- NEPA does not require analysis of Alternative 1, the No Project Alternative.

Figure 7-24 shows the MEI locations for cancer, chronic non-cancer, and acute non-cancer incremental impacts for Alternative 1.

Table 7-6. Maximum Incremental CEQA Health Impacts Associated with Alternative 1, No Project Alternative

Health Impact	Receptor Type	Maximum Predicted Impact					Significance Threshold
		No Project	NOP CEQA Baseline	NOP CEQA Increment	Future CEQA Baseline	Future CEQA Increment	
Cancer Risk	Residential - on Land	21 × 10-6 21 in a million	26 × 10-6 26 in a million	2 × 10-6 2 in a million	19 × 10-6 19 in a million	5 × 10-6 5 in a million	10 × 10-6 10 in a

Health Impact	Receptor Type	Maximum Predicted Impact: No Project	NOP CEQA Baseline	NOP CEQA Increment	Future CEQA Baseline	Future CEQA Increment	Significance Threshold
	Residential - in Marina	33 × 10-6 33 in a million	85 × 10-6 85 in a million	<0	25 × 10-6 25 in a million	7 × 10-6 7 in a million	million
	Occupational	85 × 10-6 85 in a million	75 × 10-6 75 in a million	**10 × 10-6** **10 in a million**	63 × 10-6 63 in a million	**22 × 10-6** **22 in a million**	
	Sensitive	9 × 10-6 9 in a million	23 × 10-6 23 in a million	<0	8 × 10-6 8 in a million	2 × 10-6 2 in a million	
	Student	0.5 × 10-6 0.5 in a million	0.7 × 10-6 0.7 in a million	0.03 × 10-6 0.03 in a million	0.7 × 10-6 0.7 in a million	0.03 × 10-6 0.03 in a million	
	Recreational	15 × 10-6 15 in a million	39 × 10-6 39 in a million	1 × 10-6 1 in a million	12 × 10-6 12 in a million	3 × 10-6 3 in a million	
Chronic Hazard Index		**No Project**	**NOP CEQA Baseline [3]**	**NOP CEQA Increment [3]**			1
	Residential - on Land	0.08	0.1	<0			
	Residential - in Marina	0.1	0.2	<0			
	Occupational	0.5	0.4	0.1			
	Sensitive	0.07	0.1	<0			
	Student	0.07	0.1	<0			
	Recreational	0.1	0.2	0.00008			
Acute Hazard Index	Residential - on Land	0.4	0.4	0.05			1
	Residential - in Marina	0.6	0.6	0.06			
	Occupational	0.9	0.9	0.08			
	Sensitive	0.4	0.3	0.05			
	Student	0.3	0.3	0.03			
	Recreational	0.6	0.6	0.06			
Cancer Burden				**NOP CEQA Increment**	**Future CEQA Increment**		0.5
				0.0005	0.07		

Notes:

1. Exceedances of the significance thresholds are in bold. The significance thresholds apply only to the increments.
2. The NOP CEQA increment represents the Project minus NOP CEQA baseline. The Future CEQA increment represents the Project minus Future CEQA baseline. The Future CEQA baseline and Future CEQA increments are only applicable to cancer risk because cancer risk is based on long-term (multiple-year) exposure periods.
3. Chronic and acute impacts are considered short-term impacts and are determined by comparing project-related impacts to the NOP CEQA baseline, the baseline at the time of the NOP in 2012.
4. Each result shown in the table represents the modeled receptor location with the maximum impact or increment. The impacts or increments at all other receptors would be less than the values in the table.
5. The displayed values for the No Project and baseline impacts do not necessarily subtract to equal the displayed CEQA increments because they may occur at different receptor locations.
6. An increment less than zero means the No Project impact would be less than the baseline impact at all modeled receptors.

Figure 7-24. MEI Locations for CEQA Health Increments – Alternative 1, No Project Alternative

7.2.1.2 Alternative 2

Table 7-7 presents the maximum CEQA health impacts associated with Alternative 2 without mitigation. The table shows the following:

- Cancer Risk
  - In relation to the NOP CEQA baseline, the maximum incremental cancer risk is predicted to be less than the significance threshold at all receptor types except the occupational receptor. Cancer risk at the occupational receptor would equal the significance threshold.
  - In relation to the Future CEQA baseline, the maximum incremental cancer risk is predicted to be less than the significance threshold at all receptor types except the occupational receptor. Cancer risk at the occupational receptor would exceed the significance threshold.
- Cancer burden and non-cancer chronic and acute impacts would be below significance thresholds.
- Particulates: Morbidity and Mortality: Operation of Alternative 2 would result in a maximum off-site 24-hour $PM_{2.5}$ concentration increment that would not exceed the SCAQMD significance threshold of 2.5 µg/m3 (see EIR/EIS Section 3.2.4). Because the operational $PM_{2.5}$ concentrations would be less than significant and would not exceed the Port's criterion for calculating morbidity and mortality attributable to PM, potential mortality and morbidity effects were not quantified for this Alternative.
- The No Federal Action Alternative would have the same conditions as the NEPA baseline. Therefore, there would be no incremental difference between Alternative 2 and the NEPA baseline and Alternative 2 would result in no impacts under NEPA.

Figure 7-25 shows the MEI locations for cancer, chronic non-cancer, and acute non-cancer incremental impacts for Alternative 2.

Table 7-7. Maximum Incremental CEQA Health Impacts Associated with Alternative 2, No Federal Action Alternative without Mitigation

Health Impact	Receptor Type	Maximum Predicted Impact					Significance Threshold
		Alternative 2	NOP CEQA Baseline	NOP CEQA Increment	Future CEQA Baseline	Future CEQA Increment	
Cancer Risk	Residential - on Land	21 × 10-6 21 in a million	26 × 10-6 26 in a million	2 × 10-6 2 in a million	19 × 10-6 19 in a million	5 × 10-6 5 in a million	10 × 10-6 10 in a million
	Residential - in Marina	33 × 10-6 33 in a million	85 × 10-6 85 in a million	<0	25 × 10-6 25 in a million	7 × 10-6 7 in a million	
	Occupational	85 × 10-6 85 in a million	75 × 10-6 75 in a million	**10 × 10-6** **10 in a million**	63 × 10-6 63 in a million	**22 × 10-6** **22 in a million**	
	Sensitive	9 × 10-6 9 in a million	23 × 10-6 23 in a million	<0	8 × 10-6 8 in a million	2 × 10-6 2 in a million	
	Student	0.5 × 10-6 0.5 in a million	0.7 × 10-6 0.7 in a million	0.03 × 10-6 0.03 in a million	0.7 × 10-6 0.7 in a million	0.03 × 10-6 0.03 in a million	

Health Impact	Receptor Type	Maximum Predicted Impact: Alternative 2	NOP CEQA Baseline	NOP CEQA Increment	Future CEQA Baseline	Future CEQA Increment	Significance Threshold
	Recreational	15 × 10-6 15 in a million	39 × 10-6 39 in a million	1 × 10-6 1 in a million	12 × 10-6 12 in a million	3 × 10-6 3 in a million	
		Alternative 2	**NOP CEQA Baseline [3]**	**NOP CEQA Increment [3]**			
Chronic Hazard Index	Residential - on Land	0.08	0.1	<0			1
	Residential - in Marina	0.1	0.2	<0			
	Occupational	0.5	0.4	0.1			
	Sensitive	0.07	0.1	<0			
	Student	0.07	0.1	<0			
	Recreational	0.1	0.2	0.00009			
Acute Hazard Index	Residential - on Land	0.4	0.4	0.06			1
	Residential - in Marina	0.6	0.6	0.07			
	Occupational	1.0	0.9	0.1			
	Sensitive	0.4	0.3	0.06			
	Student	0.3	0.3	0.04			
	Recreational	0.6	0.6	0.08			
Cancer Burden				**NOP CEQA Increment**		**Future CEQA Increment**	0.5
				0.0005		0.07	

Notes:

1. Exceedances of the significance thresholds are in bold. The significance thresholds apply only to the increments.
2. The NOP CEQA increment represents the Alternative minus NOP CEQA baseline. The Future CEQA increment represents the Alternative minus Future CEQA baseline. The Future CEQA baseline and Future CEQA increments are only applicable to cancer risk because cancer risk is based on long-term (multiple-year) exposure periods.
3. Chronic and acute impacts are considered short-term impacts and are determined by comparing project-related impacts to the NOP CEQA baseline, the baseline at the time of the NOP in 2012.
4. Each result shown in the table represents the modeled receptor location with the maximum impact or increment. The impacts or increments at all other receptors would be less than the values in the table.
5. The displayed values for the Alternative and baseline impacts do not necessarily subtract to equal the displayed CEQA increments because they may occur at different receptor locations.
6. Construction emissions were modeled with the operational emissions for the determination of health impacts.
7. An increment less than zero means the Alternative impact would be less than the baseline impact at all modeled receptors.

Figure 7-25. MEI Locations for CEQA Health Increments – Alternative 2, No Federal Action Alternative without Mitigation

7.2.1.3 Alternative 3

Table 7-8 presents the maximum CEQA health impacts associated with Alternative 3 without mitigation. The table shows the following:

- Cancer Risk
  - In relation to the NOP CEQA baseline, the maximum incremental cancer risk is predicted to be less than the significance threshold at all receptor types except the occupational receptor. Cancer risk at the occupational receptor would exceed the significance threshold.
  - In relation to the Future CEQA baseline, the maximum incremental cancer risk is predicted to be less than the significance threshold at all receptor types except the marina-based residential and the occupational receptors. The cancer risk increment at the marina-based residential and occupational receptors would exceed the significance threshold.
- Cancer burden and non-cancer chronic and acute impacts would be below significance thresholds.
- Particulates: Morbidity and Mortality: Operation of Alternative 3 would result in a maximum off-site 24-hour $PM_{2.5}$ concentration increment that would not exceed the SCAQMD significance threshold of 2.5 µg/m3 (see EIR/EIS Section 3.2.4). Because the operational $PM_{2.5}$ concentrations would be less than significant and would not exceed the Port's criterion for calculating morbidity and mortality attributable to PM, potential mortality and morbidity effects were not quantified for this Alternative.

Table 7-9 presents the presents the maximum NEPA health impacts associated with Alternative 3 without mitigation. The table shows that the cancer risk, cancer burden, and non-cancer chronic and acute impacts would be less than significance thresholds at all receptor types.

Figure 7-26 shows the MEI locations for cancer, chronic non-cancer, and acute non-cancer CEQA incremental impacts for Alternative 3. Figure 7-27 shows the MEI locations for cancer, chronic non-cancer, and acute non-cancer NEPA incremental impacts for Alternative 3.

Table 7-8. Maximum Incremental CEQA Health Impacts Associated with Alternative 3, Reduced Project Alternative without Mitigation

Health Impact	Receptor Type	Maximum Predicted Impact					Significance Threshold
		Alternative 3	**NOP CEQA Baseline**	**NOP CEQA Increment**	**Future CEQA Baseline**	**Future CEQA Increment**	
Cancer Risk	Residential - on Land	23 × 10-6 23 in a million	26 × 10-6 26 in a million	5 × 10-6 5 in a million	19 × 10-6 19 in a million	6 × 10-6 6 in a million	10 × 10-6 10 in a million
	Residential - in Marina	37 × 10-6 37 in a million	85 × 10-6 85 in a million	<0	25 × 10-6 25 in a million	**11 × 10-6** **11 in a million**	
	Occupational	94 × 10-6 94 in a million	75 × 10-6 75 in a million	**19 × 10-6** **19 in a million**	63 × 10-6 63 in a million	**31 × 10-6** **31 in a million**	

Health Impact	Receptor Type	Maximum Predicted Impact: Alternative 3	NOP CEQA Baseline	NOP CEQA Increment	Future CEQA Baseline	Future CEQA Increment	Significance Threshold
	Sensitive	11 × 10-6 11 in a million	23 × 10-6 23 in a million	<0	8 × 10-6 8 in a million	3 × 10-6 3 in a million	
	Student	0.7 × 10-6 0.7 in a million	0.7 × 10-6 0.7 in a million	0.07 × 10-6 0.07 in a million	0.7 × 10-6 0.7 in a million	0.07 × 10-6 0.07 in a million	
	Recreational	17 × 10-6 17 in a million	39 × 10-6 39 in a million	2 × 10-6 2 in a million	12 × 10-6 12 in a million	5 × 10-6 5 in a million	
Chronic Hazard Index		**Alternative 3**	**NOP CEQA Baseline** [3]	**NOP CEQA Increment** [3]			1
	Residential - on Land	0.09	0.1	0.001			
	Residential - in Marina	0.1	0.2	<0			
	Occupational	0.6	0.4	0.2			
	Sensitive	0.08	0.1	<0			
	Student	0.08	0.1	<0			
	Recreational	0.1	0.2	0.005			
Acute Hazard Index	Residential - on Land	0.6	0.4	0.2			1
	Residential - in Marina	0.6	0.6	0.2			
	Occupational	1.1	0.9	0.6			
	Sensitive	0.5	0.3	0.2			
	Student	0.4	0.3	0.2			
	Recreational	0.6	0.6	0.3			
Cancer Burden				**NOP CEQA Increment**	**Future CEQA Increment**		0.5
				0.002	0.23		

Notes:

1. Exceedances of the significance thresholds are in bold. The significance thresholds apply only to the increments.
2. The NOP CEQA increment represents the Alternative minus NOP CEQA baseline. The Future CEQA increment represents the Alternative minus Future CEQA baseline. The Future CEQA baseline and Future CEQA increments are only applicable to cancer risk because cancer risk is based on long-term (multiple-year) exposure periods.
3. Chronic and acute impacts are considered short-term impacts and are determined by comparing Alternative-related impacts to the NOP CEQA baseline, the baseline at the time of the NOP in 2012.
4. Each result shown in the table represents the modeled receptor location with the maximum impact or increment. The impacts or increments at all other receptors would be less than the values in the table.
5. The displayed values for the Alternative and baseline impacts do not necessarily subtract to equal the displayed CEQA increments because they may occur at different receptor locations.
6. Construction emissions were modeled with the operational emissions for the determination of health impacts.
7. An increment less than zero means the Alternative impact would be less than the baseline impact at all modeled receptors.

Table 7-9. Maximum Incremental NEPA Health Impacts Associated with Alternative 3, Reduced Project Alternative without Mitigation

Health Impact	Receptor Type	Maximum Predicted Impact			Significance Threshold
		Alternative 3	NEPA Baseline	NEPA Increment	
Cancer Risk	Residential - on Land	23 × 10-6 23 in a million	21 × 10-6 21 in a million	3 × 10-6 3 in a million	10 × 10-6 10 in a million
	Residential - in Marina	37 × 10-6 37 in a million	33 × 10-6 33 in a million	4 × 10-6 4 in a million	
	Occupational	94 × 10-6 94 in a million	85 × 10-6 85 in a million	9 × 10-6 9 in a million	
	Sensitive	11 × 10-6 11 in a million	9 × 10-6 9 in a million	1 × 10-6 1 in a million	
	Student	0.7 × 10-6 0.7 in a million	0.5 × 10-6 0.5 in a million	0.1 × 10-6 0.1 in a million	
	Recreational	17 × 10-6 17 in a million	15 × 10-6 15 in a million	2 × 10-6 2 in a million	
Chronic Hazard Index	Residential - on Land	0.09	0.08	0.01	1
	Residential - in Marina	0.1	0.1	0.008	
	Occupational	0.6	0.5	0.2	
	Sensitive	0.08	0.07	0.01	
	Student	0.08	0.07	0.01	
	Recreational	0.1	0.1	0.02	
Acute Hazard Index	Residential - on Land	0.6	0.4	0.2	1
	Residential - in Marina	0.6	0.6	0.2	
	Occupational	1.1	1.0	0.5	
	Sensitive	0.5	0.4	0.1	
	Student	0.4	0.3	0.1	
	Recreational	0.6	0.6	0.2	
Cancer Burden				**NEPA Increment** 0.06	0.5

Notes:
1. The NEPA increment represents the Alternative minus NEPA baseline.
2. Each result shown in the table represents the modeled receptor location with the maximum impact or increment. The impacts or increments at all other receptors would be less than the values in the table.

3. The displayed values for the Alternative and baseline impacts do not necessarily subtract to equal the displayed NEPA increment because they may occur at different receptor locations.
4. Construction emissions were modeled with the operational emissions for the determination of health impacts.
5. An increment less than zero means the Alternative impact would be less than the baseline impact at all modeled receptors.

Figure 7-26. MEI Locations for CEQA Health Increments – Alternative 3, Reduced Project Alternative without Mitigation

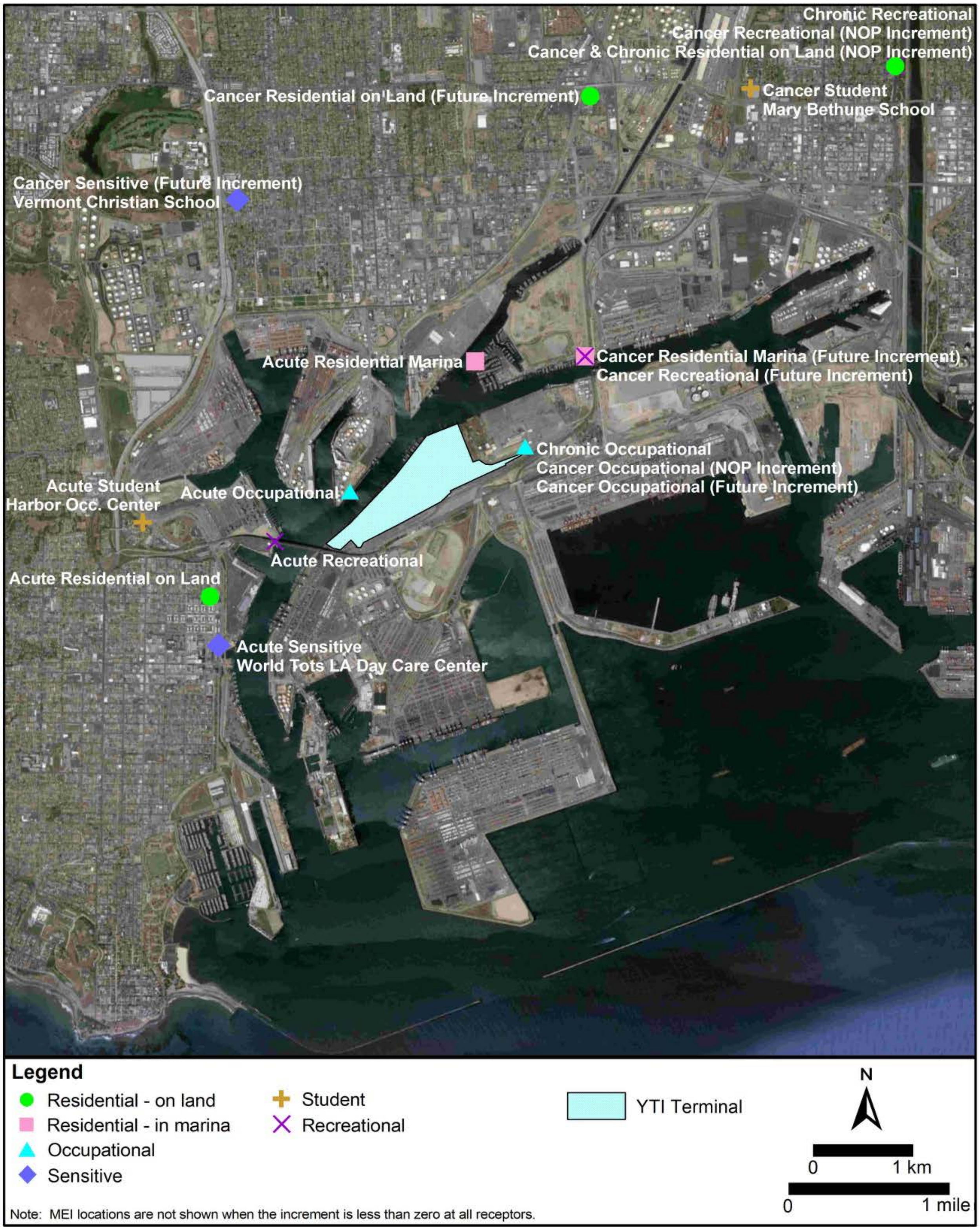
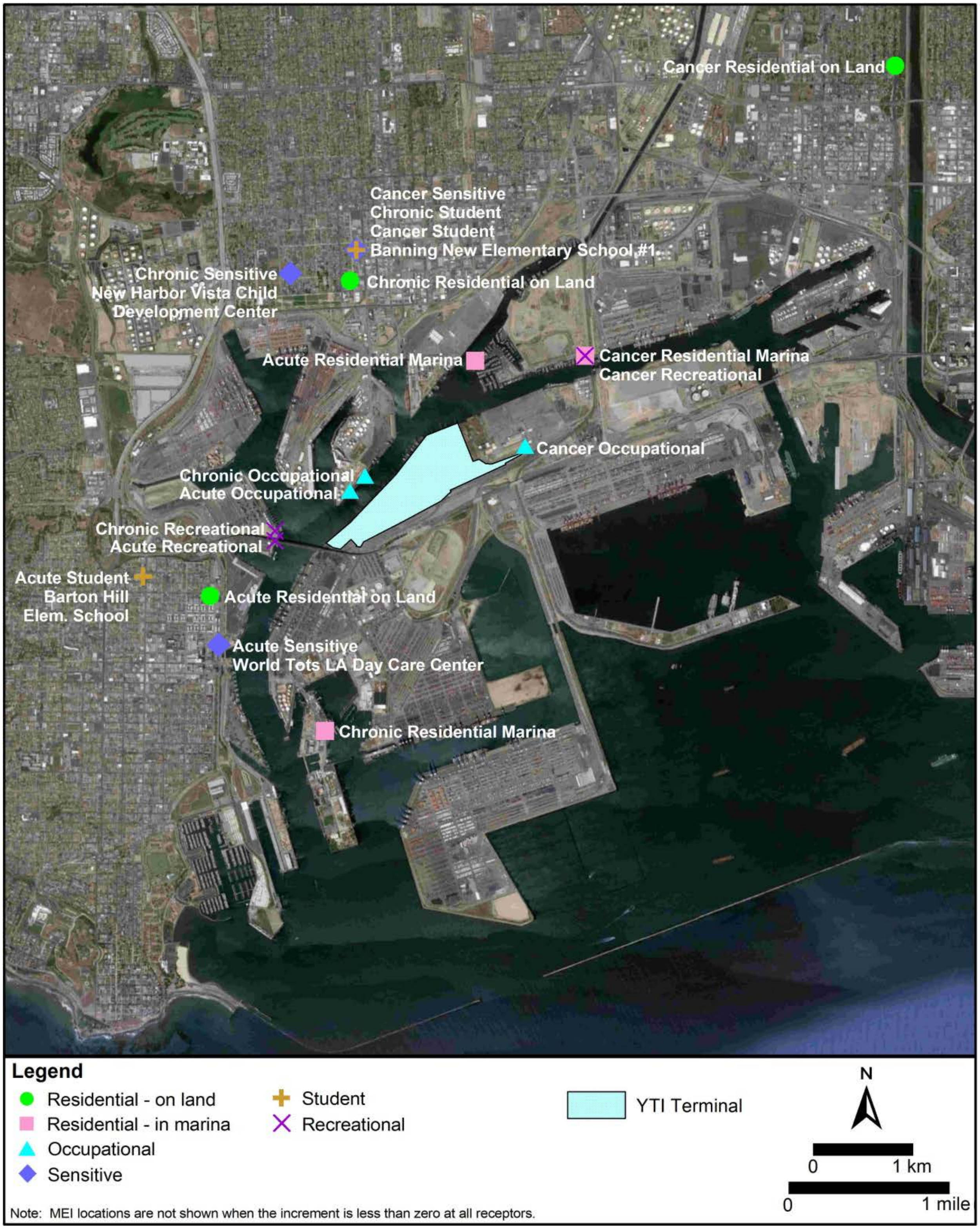


Figure 7-27. MEI Locations for NEPA Health Increments – Alternative 3, Reduced Project Alternative without Mitigation



7.2.2 Mitigated Impacts

7.2.2.1 Alternative 1

Mitigation is not required under CEQA for Alternative 1 because there would be no discretionary action subject to CEQA.

7.2.2.2 Alternative 2

Table 7-10 presents the maximum CEQA health impacts associated with Alternative 2, following mitigation. The table shows that in relation to the NOP CEQA baseline, cancer risk would not change appreciably from the unmitigated scenario because cancer risk would be driven by truck exhaust, for which mitigation beyond the Clean Truck Program is not feasible. The table also shows that in relation to the Future CEQA baseline, cancer risk would not change appreciably from the unmitigated scenario because cancer risk would be driven by truck exhaust, for which project-level mitigation not feasible.

Figure 7-28 shows the MEI locations for cancer, chronic non-cancer, and acute non-cancer incremental impacts for Alternative 2 with mitigation.

Table 7-10. Maximum Incremental CEQA Health Impacts Associated with Alternative 2, No Federal Action Alternative with Mitigation

Health Impact	Receptor Type	Maximum Predicted Impact					Significance Threshold
		Alternative 2	**NOP CEQA Baseline**	**NOP CEQA Increment**	**Future CEQA Baseline**	**Future CEQA Increment**	
Cancer Risk	Residential - on Land	21 × 10-6 21 in a million	26 × 10-6 26 in a million	2 × 10-6 2 in a million	19 × 10-6 19 in a million	4 × 10-6 4 in a million	10 × 10-6 10 in a million
	Residential - in Marina	32 × 10-6 32 in a million	85 × 10-6 85 in a million	<0	25 × 10-6 25 in a million	7 × 10-6 7 in a million	
	Occupational	85 × 10-6 85 in a million	75 × 10-6 75 in a million	**10 × 10-6** **10 in a million**	63 × 10-6 63 in a million	**22 × 10-6** **22 in a million**	
	Sensitive	9 × 10-6 9 in a million	23 × 10-6 23 in a million	<0	8 × 10-6 8 in a million	2 × 10-6 2 in a million	
	Student	0.5 × 10-6 0.5 in a million	0.7 × 10-6 0.7 in a million	0.03 × 10-6 0.03 in a million	0.7 × 10-6 0.7 in a million	0.03 × 10-6 0.03 in a million	
	Recreational	15 × 10-6 15 in a million	39 × 10-6 39 in a million	1 × 10-6 1 in a million	12 × 10-6 12 in a million	3 × 10-6 3 in a million	
Chronic Hazard Index		**Alternative 2**	**NOP CEQA Baseline** [3]	**NOP CEQA Increment** [3]			1
	Residential - on Land	0.08	0.1	<0			
	Residential - in Marina	0.1	0.2	<0			
	Occupational	0.5	0.4	0.1			
	Sensitive	0.07	0.1	<0			
	Student	0.07	0.1	<0			

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<tr><td></td><td>Recreational</td><td>0.1</td><td>0.2</td><td colspan="3">0.00007</td><td></td></tr>
<tr><td rowspan="6">Acute Hazard Index</td><td>Residential - on Land</td><td>0.4</td><td>0.4</td><td colspan="3">0.06</td><td rowspan="6">1</td></tr>
<tr><td>Residential - in Marina</td><td>0.6</td><td>0.6</td><td colspan="3">0.07</td></tr>
<tr><td>Occupational</td><td>1.0</td><td>0.9</td><td colspan="3">0.1</td></tr>
<tr><td>Sensitive</td><td>0.4</td><td>0.3</td><td colspan="3">0.06</td></tr>
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<tr><td>Recreational</td><td>0.6</td><td>0.6</td><td colspan="3">0.08</td></tr>
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<tr><td>0.0004</td><td colspan="2">0.03</td></tr>
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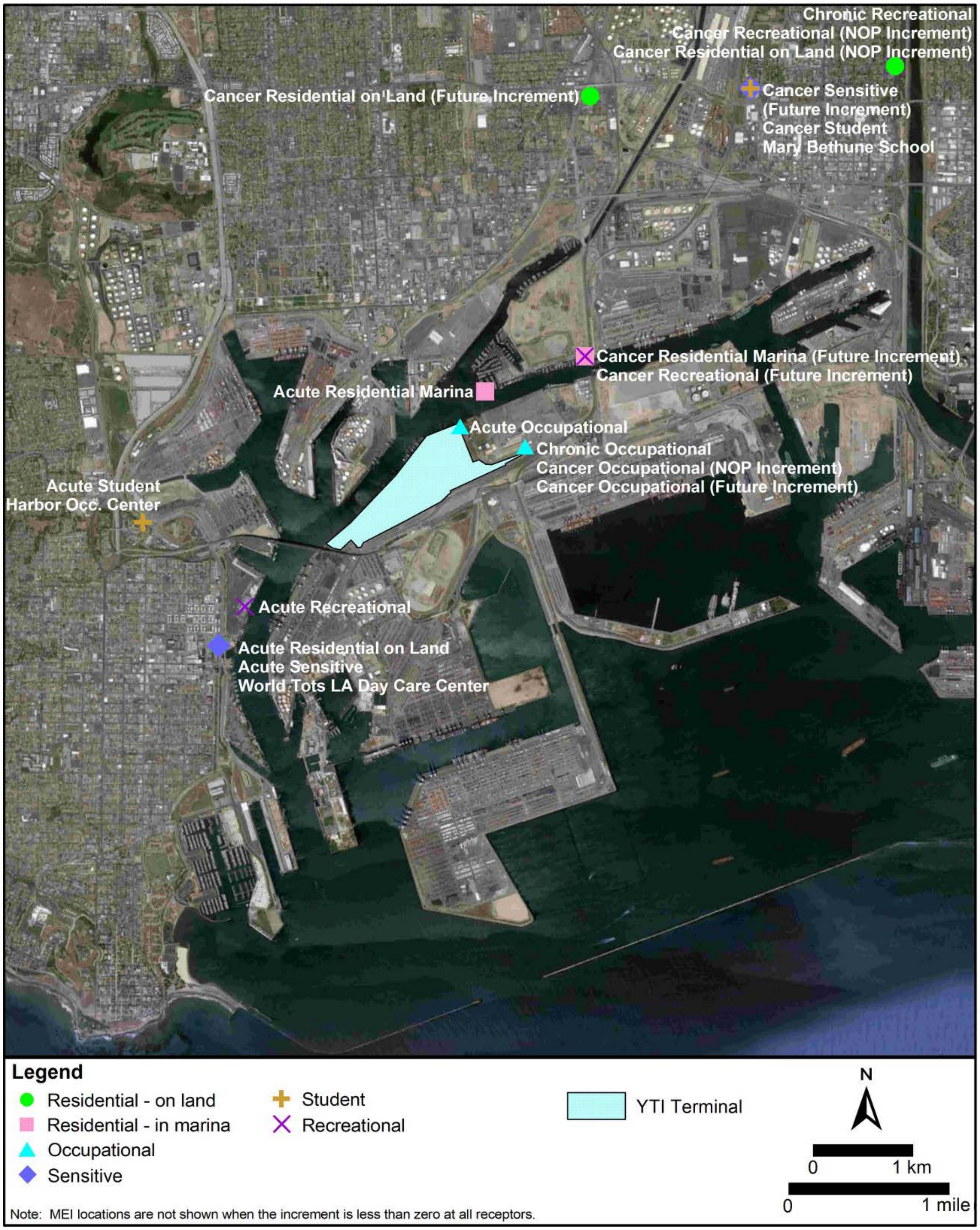
Notes:

1. Exceedances of the significance thresholds are in bold. The significance thresholds apply only to the increments.
2. The NOP CEQA increment represents the Alternative minus NOP CEQA baseline. The Future CEQA increment represents the Alternative minus Future CEQA baseline. The Future CEQA baseline and Future CEQA increments are only applicable to cancer risk because cancer risk is based on long-term (multiple-year) exposure periods.
3. Chronic and acute impacts are considered short-term impacts and are determined by comparing project-related impacts to the NOP CEQA baseline, the baseline at the time of the NOP in 2012.
4. Each result shown in the table represents the modeled receptor location with the maximum impact or increment. The impacts or increments at all other receptors would be less than the values in the table.
5. The displayed values for the Alternative and baseline impacts do not necessarily subtract to equal the displayed CEQA increments because they may occur at different receptor locations.
6. Construction emissions were modeled with the operational emissions for the determination of health impacts.
7. An increment less than zero means the Alternative impact would be less than the baseline impact at all modeled receptors.

Figure 7-28. MEI Locations for CEQA Health Increments – Alternative 2, No Federal Action Alternative with Mitigation



7.2.2.3 Alternative 3

Table 7-11 presents the maximum CEQA health impacts associated with Alternative 3, following mitigation. The table shows that in relation to the NOP CEQA baseline, cancer risk would not change appreciably from the unmitigated scenario because cancer risk would be driven by truck exhaust, for which mitigation beyond the Clean Truck Program is not feasible. The table also shows that in relation to the Future CEQA baseline, cancer risk would not change appreciably from the unmitigated scenario because cancer risk would be driven by truck and locomotive exhaust, for which project-level mitigation not feasible. Tables showing NEPA impacts following mitigation are not presented; mitigation is not required under NEPA since unmitigated impacts would be less than significance thresholds.

Figure 7-29 shows the MEI locations for cancer, chronic non-cancer, and acute non-cancer incremental impacts for Alternative 3 with mitigation.

Table 7-11. Maximum Incremental CEQA Health Impacts Associated with Alternative 3, Reduced Project Alternative with Mitigation

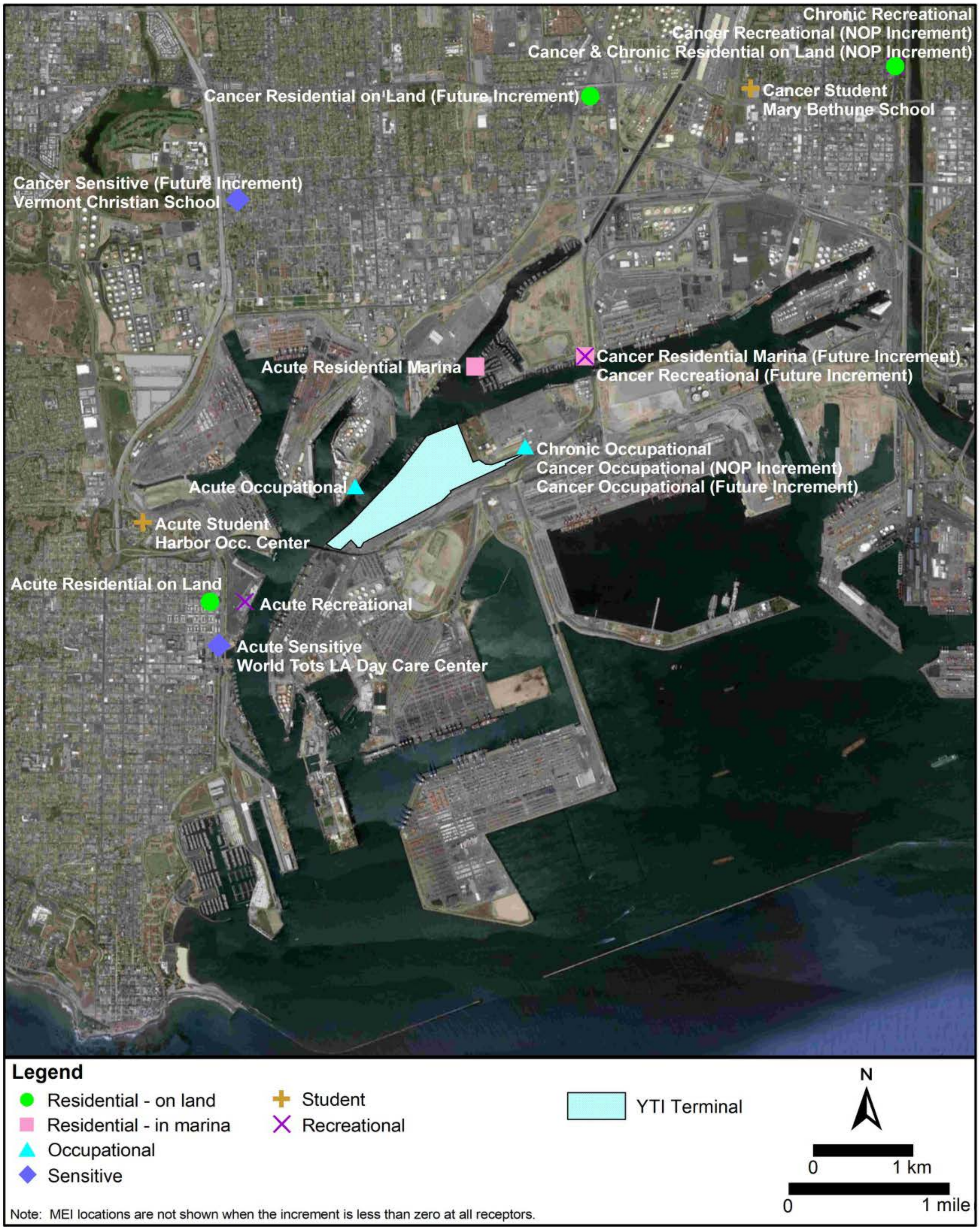
Health Impact	Receptor Type	Maximum Predicted Impact					Significance Threshold
		Alternative 3	NOP CEQA Baseline	NOP CEQA Increment	Future CEQA Baseline	Future CEQA Increment	
Cancer Risk	Residential - on Land	23 × 10-6 23 in a million	26 × 10-6 26 in a million	5 × 10-6 5 in a million	19 × 10-6 19 in a million	6 × 10-6 6 in a million	10 × 10-6 10 in a million
	Residential - in Marina	36 × 10-6 36 in a million	85 × 10-6 85 in a million	<0	25 × 10-6 25 in a million	**11 × 10-6** **11 in a million**	
	Occupational	94 × 10-6 94 in a million	75 × 10-6 75 in a million	**19 × 10-6** **19 in a million**	63 × 10-6 63 in a million	**31 × 10-6** **31 in a million**	
	Sensitive	10 × 10-6 10 in a million	23 × 10-6 23 in a million	<0	8 × 10-6 8 in a million	3 × 10-6 3 in a million	
	Student	0.6 × 10-6 0.6 in a million	0.7 × 10-6 0.7 in a million	0.05 × 10-6 0.05 in a million	0.7 × 10-6 0.7 in a million	0.05 × 10-6 0.05 in a million	
	Recreational	17 × 10-6 17 in a million	39 × 10-6 39 in a million	2 × 10-6 2 in a million	12 × 10-6 12 in a million	5 × 10-6 5 in a million	
Chronic Hazard Index		**Alternative 3**	**NOP CEQA Baseline** [3]	**NOP CEQA Increment** [3]			1
	Residential - on Land	0.09	0.1	0.001			
	Residential - in Marina	0.1	0.2	<0			
	Occupational	0.6	0.4	0.2			
	Sensitive	0.08	0.1	<0			
	Student	0.08	0.1	<0			
	Recreational	0.1	0.2	0.005			
Acute Hazard Index	Residential - on Land	0.5	0.4	0.2			1
	Residential - in Marina	0.6	0.6	0.2			

<table>
<tr><th rowspan="2">Health Impact</th><th rowspan="2">Receptor Type</th><th colspan="5">Maximum Predicted Impact</th><th rowspan="2">Significance Threshold</th></tr>
<tr><th>Alternative 3</th><th>NOP CEQA Baseline</th><th>NOP CEQA Increment</th><th>Future CEQA Baseline</th><th>Future CEQA Increment</th></tr>
<tr><td rowspan="4"></td><td>Occupational</td><td>1.1</td><td>0.9</td><td colspan="3">0.3</td><td rowspan="4"></td></tr>
<tr><td>Sensitive</td><td>0.5</td><td>0.3</td><td colspan="3">0.2</td></tr>
<tr><td>Student</td><td>0.4</td><td>0.3</td><td colspan="3">0.1</td></tr>
<tr><td>Recreational</td><td>0.6</td><td>0.6</td><td colspan="3">0.2</td></tr>
<tr><td rowspan="2">Cancer Burden</td><td rowspan="2" colspan="3"></td><td colspan="2">NOP CEQA Increment</td><td>Future CEQA Increment</td><td rowspan="2">0.5</td></tr>
<tr><td colspan="2">0.002</td><td>0.18</td></tr>
</table>

Notes:

1. Exceedances of the significance thresholds are in bold. The significance thresholds apply only to the increments.
2. The NOP CEQA increment represents the Alternative minus NOP CEQA baseline. The Future CEQA increment represents the Alternative minus Future CEQA baseline. The Future CEQA baseline and Future CEQA increments are only applicable to cancer risk because cancer risk is based on long-term (multiple-year) exposure periods.
3. Chronic and acute impacts are considered short-term impacts and are determined by comparing project-related impacts to the NOP CEQA baseline, the baseline at the time of the NOP in 2012.
4. Each result shown in the table represents the modeled receptor location with the maximum impact or increment. The impacts or increments at all other receptors would be less than the values in the table.
5. The displayed values for the Alternative and baseline impacts do not necessarily subtract to equal the displayed CEQA increments because they may occur at different receptor locations.
6. Construction emissions were modeled with the operational emissions for the determination of health impacts.
7. An increment less than zero means the Alternative impact would be less than the baseline impact at all modeled receptors.

Figure 7-29. MEI Locations for CEQA Health Increments – Alternative 3, Reduced Project Alternative with Mitigation



8.0 Risk Uncertainty

Health risk assessments such as the one presented in this Appendix are not intended to provide estimates of the absolute health risk or expected incidence of disease in a population, but instead, are conducted to allow comparisons of the potential health impacts of different alternatives. Consistent with agency guidelines and standard approaches to regulatory risk assessment, this risk assessment used health-protective (conservative) assumptions selected by regulatory agencies to "err on the side of health protection in order to avoid underestimation of risk to the public" (OEHHA 2003). As an example of the conservative assumptions used in this risk assessment, residential receptors are considered to be exposed to TACs while individuals are present at the same outdoor location for 365 days per year for 70 years, breathing continuously at a rate that is at the 80th percentile of breathing rates for the population.

OEHHA has provided a discussion of risk uncertainty, which is reiterated here (OEHHA 2003).

There is a great deal of uncertainty associated with the process of risk assessment. The uncertainty arises from lack of data in many areas necessitating the use of assumptions. The assumptions used in these guidelines are designed to err on the side of health protection in order to avoid underestimation of risk to the public. Sources of uncertainty, which may either overestimate or underestimate risk, include: 1) extrapolation of toxicity data in animals to humans, 2) uncertainty in the estimation of emissions, 3) uncertainty in the air dispersion models, and 4) uncertainty in the exposure estimates. Uncertainty may be defined as what is not known and may be reduced with further scientific studies. In addition to uncertainty, there is a natural range or variability in the human population in such properties as height, weight, and susceptibility to chemical toxicants. Scientific studies with representative individuals and large enough sample size can characterize this variability.

Interactive effects of exposure to more than one carcinogen or toxicant are also not necessarily quantified in the HRA. Cancer risks from all emitted carcinogens are typically added, and hazard quotients for substances impacting the same target organ system are added to determine the hazard index (HI). Many examples of additivity and synergism (interactive effects greater than additive) are known. For substances that act synergistically, the HRA could underestimate the risks. Some substances may have antagonistic effects (lessen the toxic effects produced by another substance). For substances that act antagonistically, the HRA could overestimate the risks.

Other sources of uncertainty, which may underestimate or overestimate risk, can be found in exposure estimates where little or no data are available (e.g., soil half-life and dermal penetration of some substances from a soil matrix).

The differences among species and within human populations usually cannot be easily quantified and incorporated into risk assessments. Factors including metabolism, target site sensitivity, diet, immunological responses, and genetics may influence the response to toxicants. The human population is much more diverse both genetically and culturally (e.g., lifestyle, diet) than inbred experimental animals. The intraspecies variability among humans is expected to be much greater than in laboratory animals. Adjustment for tumors at multiple sites induced by some carcinogens could result in a higher potency. Other uncertainties arise 1) in the assumptions underlying the *dose-response model used, and 2) in extrapolating from large experimental doses, where, for example, other toxic effects may compromise the assessment of carcinogenic potential, to usually much smaller environmental doses. Also, only single tumor sites induced by a substance are usually considered. When epidemiological data are used to generate a carcinogenic potency, less uncertainty is involved in the extrapolation from workplace exposures to environmental exposures. However, children, a subpopulation whose hematological, nervous, endocrine, and immune systems, for example, are still developing and who may be more sensitive to the effects of carcinogens on their developing systems, are not included in the worker population and risk estimates based on occupational epidemiological data are more uncertain for children than adults. Finally, the quantification of each uncertainty applied in the estimate of cancer potency is itself uncertain.*

Thus, risk estimates generated by an HRA should not be interpreted as the expected rates of disease in the exposed population but rather as estimates of potential risk, based on current knowledge and a number of assumptions. Additionally, the uncertainty factors integrated within the estimates of non-cancer RELs are meant to err on the side of public health protection in order to avoid underestimation of risk. Risk assessment is best used as a ruler to compare one source with another and to prioritize concerns. Consistent approaches to risk assessment are necessary to fulfill this function.

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