DEVELOPMENT SERVICES
DEPARTMENT

CITY OF SACRAMENTO
CALIFORNIA

300 Richards Blvd.
SACRAMENTO, CA
95811

MEMORANDUM

Date: October 23, 2008

To: Mayor Fargo and Members of the City Council

From: Ellie Ellie Buford, Principal Planner

SUBJECT: Creamery Project (P07-123) Draft Mitigated Negative Declaration and Comment Letters

Enclosed is a CD including the Draft Mitigated Negative Declaration (MND) for the Creamery Project/P07-123 and all comments received on the document. The project is scheduled to be heard at the October 28, 2008 meeting. The MND was revised after the close of the public review period to address minor revisions. Additionally, in response to the comment letter from SMAQMD and also related to the letter from the Sacramento Montessori School conditions for construction emissions and operational issues have been added to the project approval. The letter from the Sacramento Montessori school raises other issues that staff believes are related to the project design and neighborhood and not the environmental review.

The project conditions of approval include implementation of the project *Air Quality Management Plan* endorsed by the SMAQMD on September 16, 2008 which is also included on the CD. This is required to address concerns related to greenhouse gas emissions. If you have any questions please call me at 808-5935.

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City Attorney's Office
City Manager's office

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APPENDIX A

Screening Health Risk Assessment

Crystal Cream & Butter Company Redevelopment

Screening Health Risk Assessment of DPM from Railways

Prepared for:
Cornice Development Company, Inc.
1415 L Street, Suite 250
Sacramento, California 95814

Submitted to:
City of Sacramento

Prepared by:
ENVIRON International Corporation
Emeryville, California

Date:
April 2008

Project or Version Number:
03-20394A

ENVIRON

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Acronyms

ARB	California Air Resources Board
DPM	diesel particulate matter
HRA	health risk assessment
SMAQMD	Sacramento Metropolitan Air Quality Management District
UP	Union Pacific
USEPA	United States Environmental Protection Agency

1 Introduction and Project Description

This technical report has been prepared to evaluate the potential cancer risk due to diesel particulate matter (DPM) for a new development that may result from its location proximate to railway lines in Sacramento. The redevelopment of the old Crystal Cream & Butter Company site ("Redevelopment"), an 8.2-acre area covering approximately three blocks in downtown Sacramento as shown in Figure 1, will include 100,000 square feet of commercial office space and three hundred residential units. The Redevelopment site is located to the south of railway lines (part of the Sacramento Regional Transit District Light Rail System and the Union Pacific lines) and approximately half a mile from the nearest freeway (Interstate-5).

The California Air Resource Board (ARB) published land use guidance[1] that raises concerns about locating sensitive receptors (which include residential communities) near freeways or heavily traveled roadways. The ARB guidance suggests that a site specific health risk assessment (HRA) should be performed to characterize the health risks of a given development project, when sensitive land, including residential land, uses are sited closer than 500 feet from a freeway or other high traffic roadway.

To address the need of a separate site specific health risk assessment for every sensitive land use project that does not meet the siting distance recommendation from the ARB, Sacramento Metropolitan Air Quality Management District (SMAQMD) published The Recommended Protocol For Evaluating The Location Of Sensitive Land Uses Adjacent To Major Roadways, to provide guidance to local land use planners on how to assess potential cancer risk of sensitive receptors exposed to DPM from major roadways[2].

Because the Redevelopment site is located more than 500 feet from the nearest freeway and the Inter-Modal Transit Hub, this report addresses the potential exposure to diesel particulate matter from the travelling locomotives on the nearby railway lines. The screening approach recommended in the SMAQMD guidance was applied to the potential DPM impact from the railway in the report prepared by ENVIRON for the nearby Sacramento Railyards redevelopment project in 2007.[3] This analysis implemented the same screening methodology.

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[1] Air Resources Board (ARB). 2005. *Air Quality and Land Use Handbook: A Community Health Perspective.* April.

[2] Sacramento Metropolitan Air Quality Management District (SMAQMD). 2007. *Recommended Protocol for Evaluating the Location of Sensitive Land Uses Adjacent to Major Roadways*

[3] ENVIRON. 2007. *Draft Screening Health Risk Assessment of DPM from Freeway and Railway, Appendix O of Sacramento Railyards Draft Environmental Impact Report.* July. http://www.cityofsacramento.org/dsd/projects/railyards/deir/, accessed April 7, 2008.

2 Screening HRA of Railway DPM Emissions

The Redevelopment project has planned residences close to railway lines that run through downtown Sacramento. The DPM emitted by the train locomotives results in potential cancer risks. For this reason, the ARB guidance4 advised against siting sensitive receptors nearby rail yards. The approach described in the SMAQMD guidance does not directly address the railway lines. However, as implemented in the 2007 Sacramento Railyards HRA,5 the equivalent freeway traffic volume was estimated for the DPM emissions from the railway lines, and the screening tables were then used to assess the DPM cancer risks in a similar fashion as the freeway DPM emissions.

2.1 DPM Emissions from Freight Trains

Based on the information provided in the Railyards HRA,[6] Union Pacific (UP) operates the freight trains that travel on the nearby railways. Since engine information is not available for those freight trains, the emissions information for UP locomotives from the Roseville Rail Yard Study,[7] as summarized in Table 1, was used to estimate the DPM emissions of the freight trains. At an average traveling speed of 30 miles per hour[8], the locomotives' notch setting is estimated to be Notch 5[9]. The average Notch 5 DPM emission rate (0.101 gram per second-locomotive) for all the UP line-haul locomotives in the Roseville study was used.

The activity of the freight train locomotives were estimated from the following parameters:

- Average number of freight trains per day is estimated to be 14[10].
- Average number of locomotives per train is 2.9[11].

[4] ARB. 2005. *Air Quality and Land Use Handbook: A Community Health Perspective.* April.

[5] ENVIRON. 2007. *Draft Screening Health Risk Assessment of DPM from Freeway and Railway, Appendix O of Sacramento Railyards Draft Environmental Impact Report.* July. http://www.cityofsacramento.org/dsd/projects/railyards/deir/, accessed April 7, 2008.

[6] Ibid.

[7] ARB. 2004. *Roseville Rail Yard Study.* October.

[8] ENVIRON. 2007. *Draft Screening Health Risk Assessment of DPM from Freeway and Railway, Appendix O of Sacramento Railyards Draft Environmental Impact Report.* July. http://www.cityofsacramento.org/dsd/projects/railyards/deir/, accessed April 7, 2008.

[9] For notches 1 through 4, the maximum speed in each notch is approximately 8 mph per notch setting, based on the Roseville study.

[10] ENVIRON. 2007. *Draft Screening Health Risk Assessment of DPM from Freeway and Railway, Appendix O of Sacramento Railyards Draft Environmental Impact Report*. July. http://www.cityofsacramento.org/dsd/projects/railyards/deir/, accessed April 7, 2008.

[11] Average number of locomotives per train in the Roseville study.

The freight train emissions in gram per mile-hr were calculated using the following formula:

> [Average Notch 5 Emission Rate (g/s/locomotive)] x [3600 (s/hr)] / [Average Speed (mile/hr)] x [Average Number of Locomotives per Train (locomotives/train)] x [Average Number of Freight Trains per Day (trains/day)]

The calculations of the freight train emissions are laid out in the upper half of Table 2. The total DPM emissions from the UP freight train locomotives were estimated to be 493 grams per day over one mile of railway.

It is assumed that the freight trains do not idle near the Redevelopment site in downtown Sacramento.

2.2 DPM Emissions from Passenger Trains

DPM are also emitted from locomotives for passenger rail services operated by Amtrak, Capitol Corridor, and the San Joaquin Corridor. Forty passenger trains per day, including four Amtrak trains, 32 Capitol Corridor trains, and four San Joaquin Corridor trains, were projected for September 2006[12].

For the passenger trains, one locomotive engine per train is assumed[13]. Information was provided for three passenger train engines and they are summarized in Table 3[14]. Since the engine composition of the passenger train fleet is unknown, the fleet average rated power output was estimated to be the average of the three engines listed in Table 3, resulting in a value of 2,408 horsepower. The actual power demand of the engines would be lower than the rated power for a single engine train moving through an urban area. Thus, a 50% load factor was assumed to account for the low speed and the flat terrain in Sacramento.

Since these engines were all likely manufactured prior to 2001 and no specific emission information is available, the United State Environmental Protection Agency (USEPA) Tier 0 controlled DPM emission factor for line-haul engines (0.32 gram per brake horsepower-hour) was selected[15]. It should be noted that these Tier 0 emission factors are the current standards for these engines. The future year standards require retrofitting and result in much lower DPM emission factors (0.22 gram per bhp-hr for Tier 0 engines[16]). Therefore, the emissions

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[12] ENVIRON. 2007. *Draft Screening Health Risk Assessment of DPM from Freeway and Railway, Appendix O of Sacramento Railyards Draft Environmental Impact Report.* July. http://www.cityofsacramento.org/dsd/projects/railyards/deir/, accessed April 7, 2008.

[13] Ibid.

[14] Ibid.

[15] USEPA. 1997. *Emission Factors for Locomotives.* December. http://www.epa.gov/otaq/regs/nonroad/locomotv/frm/42097051.pdf, accessed July 20 2007.

[16] USEPA. 2008. Final Rule: Control of Emissions of Air Pollution from Locomotives and Marine Compression-Ignition Engines Less Than 30 Liters per Cylinder. March 14.

estimated based on the current emission factors will be an over-estimate for the future residents.

The passenger train emissions in grams per mile-hr were calculated using the following formula:

> [USEPA Tier 0 Locomotive Emission Rate (g/hp-hr/locomotive)] x [Average Rated Power Output (hp)] x [Load Factor (-)] / [Average Speed (mile/hr)] x [Average Number of Locomotives per Train (locomotives/train)] x [Average Number of Freight Trains per Day (trains/day)]

The calculations of the passenger train emissions are laid out in the lower half of Table 2. The DPM emissions from the travelling passenger train locomotives were estimated to be 514 grams per day over one mile of railway.

Since the Redevelopment site is over 500 feet away from the intermodal facility, the exposures to the DPM emissions from idling passenger train locomotives were not assessed.

2.3 Screening Analysis

In order to follow a similar screening procedure as the freeway DPM emissions, the DPM emissions from the freight trains and the passenger trains were summed up to be 1,007 grams per day over one mile of railway. Table 4 summarized the EMFAC2007 relative traffic volume and vehicle DPM emission rates used by SMAQMD in 2007 for the calculation of the screening look-up table[17]. As shown in Table 4, the daily distribution of the traffic volumes and DPM emission rates assumed by SMAQMD is equivalent to 0.465 gram daily DPM emissions for each peak hour vehicle mile traveled. Dividing the total railway emissions for this project, 1,007 grams per day-mile, by the 0.465 gram daily DPM emissions per peak hour vehicle mile traveled, results in an equivalent peak hour traffic volume of 2,166 vehicles per hour.

The project area is located to the south (upwind) of the east-west railroad tracks, as shown in Figure 1. In this case, the upper matrix of Table 1 from the SMAQMD guidance should be applied. According to the screening process, the peak hour traffic is rounded up to 4,000, the nearest entry in Table 1 from the SMAQMD guidance. Based on this table, no matter where the new residence is placed within the Redevelopment site, the cancer risks from the locomotive DPM are considered less than the evaluation criteria selected by SMAQMD (446 per million) and a site specific HRA is not recommended.

http://www.epa.gov/otaq/regs/nonroad/420d07001.pdf, accessed March 26, 2007

[17] Sacramento Metropolitan Air Quality Management District (SMAQMD). 2007. Recommended Protocol for Evaluating the Location of Sensitive Land Uses Adjacent to Major Roadways

2.4 Uncertainties

This SMAQMD screening approach was initially devised to address the HRA of freeway DPM emissions. Although this equivalent traffic approach approximates the emissions aspect of a HRA, the release characterizations of vehicle exhaust (such as release height and release momentum) are very different from those of locomotives exhaust. However, locomotive's higher stack and stronger upward momentum generally facilitates air dispersion and would result in lower DPM concentrations and cancer risks.

Secondly, the activity levels of the locomotives are based on the current operations and the emission rates are based on the existing engines. It is possible that the activity of trains will increase and the existing engines will be replaced by newer engines that conform to stricter emission standards. These two factors could offset each other and are unlikely to change the conclusion of this screening analysis.

As noted earlier, the selected USEPA Tier 0 DPM emission factor of line-haul engines is the current standard, and the future year standards require retrofitting and result in significantly lower DPM emission factors for Tier 0 engines[18]. Thus, the emissions estimated based on the current emission factors will be an over-estimate for the future residents.

It is also noted that the screening procedure provides a methodology for assessing cancer risk only, and there are potential short term health risks of living near freeways and major roadways. The SMAQMD guidance pointed out that studies have shown that living near major roadways is associated not only with increased cancer risk, but with short term adverse health impacts such as reduced lung function and increased asthma hospitalizations. At this time, very little information exists on how to quantify the adverse short term health impacts of living near railways.

[18] ENVIRON. 2007. *Los Angeles – Hobart Railyard TAC Emission Inventory.* http://www.arb.ca.gov/railyard/hra/env_hobart_eirpt.pdf, accessed July 20, 2007

Tables

Table 1: Union Pacific Locomotive Emissions Rate (g/s)
Crystal Cream & Butter Company
Sacramento, CA

Locomotive Class	Idle	Notch-1	Notch-2	Notch-3	Notch-4	Notch-5	Notch-6	Notch-7	Notch-8
GP-3x	0.0106	0.0086	0.0306	0.0517	0.0589	0.0742	0.1158	0.1286	0.1689
GP-4x	0.0122	0.0096	0.0343	0.0661	0.0715	0.0919	0.1416	0.1661	0.2217
GP-50	0.0072	0.0142	0.0396	0.0838	0.0864	0.1094	0.1844	0.2015	0.2577
GP-60	0.0044	0.0138	0.037	0.0813	0.0863	0.106	0.1831	0.2039	0.2578
SD-7x	0.0067	0.0114	0.0183	0.0436	0.0675	0.0892	0.1041	0.132	0.1637
SD-90	0.017	0.0139	0.0275	0.0711	0.1177	0.156	0.0915	0.0717	0.2593
Dash-7	0.0092	0.0169	0.0194	0.0372	0.0558	0.0858	0.1219	0.1256	0.1436
Dash-8	0.0106	0.0194	0.0222	0.0428	0.0642	0.0986	0.1403	0.1442	0.1653
Dash-9	0.0083	0.0104	0.0231	0.0643	0.0969	0.1204	0.1586	0.188	0.2504
C60-A	0.0197	0.019	0.0218	0.0772	0.065	0.0767	0.0865	0.0633	0.1008
Average	0.01059	0.01372	0.02738	0.06191	0.07702	0.10082	0.13278	0.14249	0.19892

Source:
ARB. 2004. Roseville Rail Yard Study. October.

Table 2: Estimation of Locomotive Emissions
Crystal Cream & Butter Company
Sacramento, CA

Parameter	Value	Unit	Notes
Freight Trains			
UP Locomotive Emission Rate at Notch 5	0.10082	g/s-locomotive	Table 1
	363	g/hr-locomotive	= Emission Rate (g/s-locomotive)] x 3600 (s/hr)
Projected Train Speed	30	mile/hr	2007 Sacramento Railyards HRA
Average Emission Factor	12.1	g/mile-locomotive	= [Average Notch 5 Emission Rate (g/hr/locomotive)] / [Average Speed (mile/hr)]
Average Number of Locomotives	2.91	locomotive/train	Table C-2, Roseville Rail Yard Study
Average Number of Freight Trains per Day	14	train/day	UP estimated that 12 to 14 trains use the rail line, according to email communication from Mr. Bodipo-Memba on July 16, 2007.
Freight Train Emission Rates over One Mile of Railway	493	g/day-mile	= [Average Emission Factor (g/mile-locomotive)] x [Average Number of Locomotives per Train (locomotive/train)] x [Average Number of Freight Trains per Day (train/day)]
Passenger Trains			
USEPA Tier 0 Locomotive Emission Factor	0.32	g/bhp-hr-locomotive	Table 4, Emission Factors for Locomotives
Average Rated Power Output	2408	hp	Table 3
Load Factor	50%	-	Assumed to account for lower speeds and the flat terrain in Sacramento
Locomotive Emission Rate	385	g/hr-locomotive	= [USEPA Tier 0 Locomotive Emission Rate (g/hp-hr-locomotive)] x [Average Rated Power Output (hp)] x [Load Factor (-)]
Projected Train Speed	30	mile/hr	2007 Sacramento Railyards HRA
Average Emission Factor	12.8	g/mile-locomotive	= [Average Line Haul Emission Rate (g/bhp-hr)] / [Average Speed (mile/hr)]
Average Number of Locomotives	1	locomotive/train	2007 Sacramento Railyards HRA
Average Number of Passenger trains per Day	40	train/day	2007 Sacramento Railyards HRA
Passenger Train Emission Rates over One Mile of Railway	514	g/day-mile	= [Average Emission Factor (g/mile-locomotive)] x [Average Number of Locomotives per Train (locomotive/train)] x [Average Number of Freight Trains per Day (train/day)]
Total Emission Rates over One Mile of Railway	1,007	g/day-mile	= UP Emissions + Amtrak Emissions

Sources:

ARB. 2004. Roseville Rail Yard Study. October.
USEPA. 1997. Emission Factors for Locomotives. December. http://www.epa.gov/otaq/regs/nonroad/locomotv/frm/42097051.pdf, accessed July 20 2007.
ENVIRON. 2007. Draft Screening Health Risk Assessment of DPM from Freeway and Railway, Appendix O of Sacramento Railyards Draft Environmental Impact Report. July. http://www.cityofsacramento.org/dsd/projects/railyards/deir/, accessed April 7, 2008.

Table 3: Summary of Passenger Locomotives
Crystal Cream & Butter Company
Sacramento, CA

Passenger Locomotive Engine	Build Date	Power Output (hp)
F59PH1- Electro Motive Diesel (EMD- a subsidiary of GM)	1993-	3000
P42- Genesis (Built by GE)	1996-2001	1073
P32- Dash 8 (Built by GE)	1984-1991	3150
Average		2408

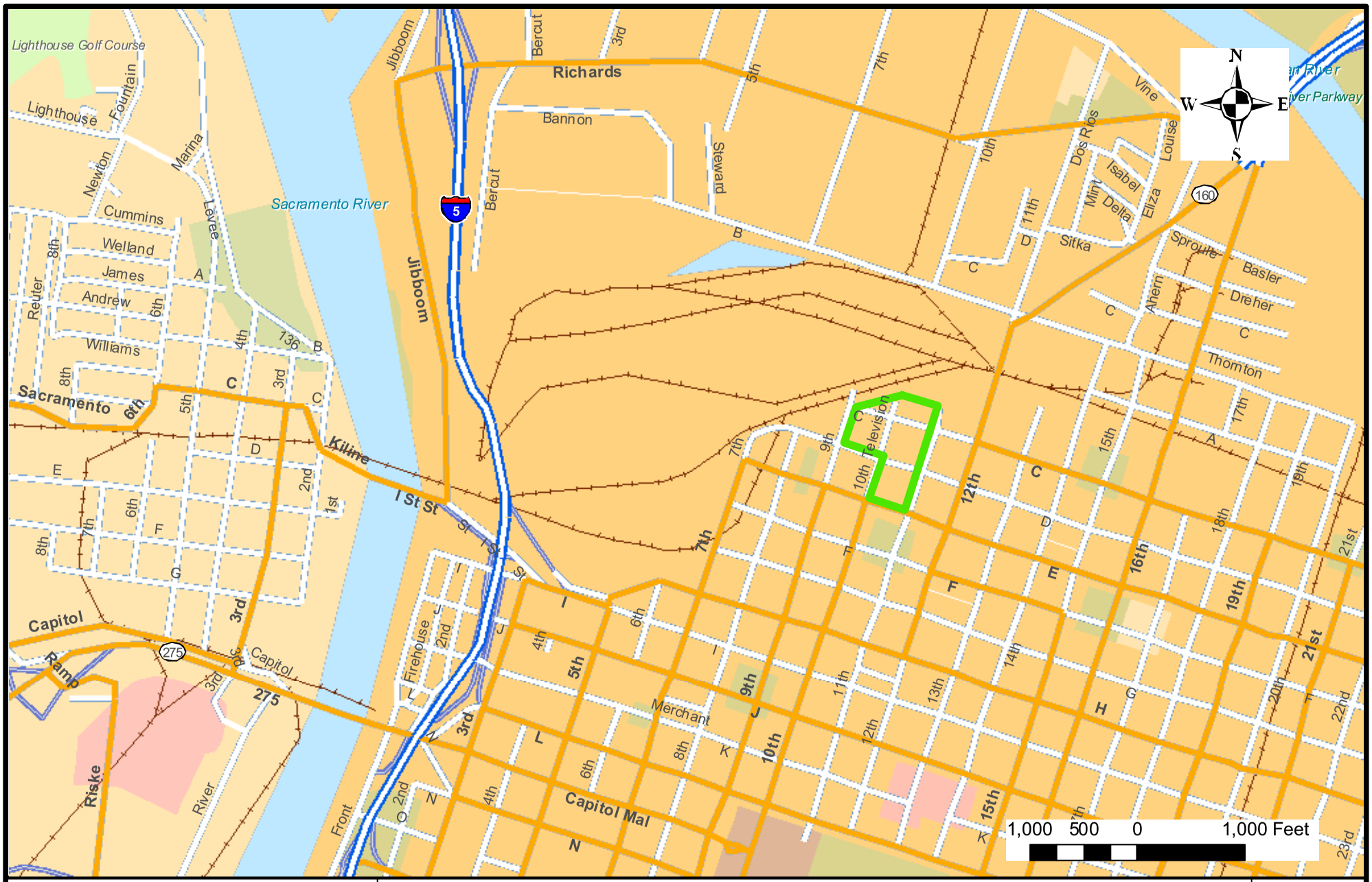
Source:
ENVIRON. 2007. Draft Screening Health Risk Assessment of DPM from Freeway and Railway, Appendix O of Sacramento Railyards Draft Environmental Impact Report. July. http://www.cityofsacramento.org/dsd/projects/railyards/deir/, accessed April 7, 2008.

Table 4: EMFAC2007 Relative Traffic Volume and Vehicle DPM Emission Rates
Crystal Cream & Butter Company
Sacramento, CA

Time of day	Relative Vehicle Miles Traveled (VMT/Peak Hour VMT)	DPM Emission Rate (g/VMT)	DPM Emission Rate (g/Peak Hour VMT)
Hr 00	0.15	0.072	0.011
Hr 01	0.061	0.059	0.004
Hr 02	0.071	0.101	0.007
Hr 03	0.039	0.367	0.014
Hr 04	0.067	0.106	0.007
Hr 05	0.12	0.089	0.011
Hr 06	0.465	0.062	0.029
Hr 07	0.938	0.034	0.032
Hr 08	0.887	0.036	0.032
Hr 09	0.56	0.051	0.029
Hr 10	0.587	0.049	0.029
Hr 11	0.734	0.044	0.032
Hr 12	0.757	0.038	0.029
Hr 13	0.747	0.038	0.028
Hr 14	0.858	0.029	0.025
Hr 15	0.873	0.029	0.025
Hr 16	0.918	0.031	0.028
Hr 17	1	0.025	0.025
Hr 18	0.692	0.021	0.015
Hr 19	0.517	0.021	0.011
Hr 20	0.398	0.036	0.014
Hr 21	0.405	0.035	0.014
Hr 22	0.303	0.024	0.007
Hr 23	0.228	0.031	0.007
Daily DPM Emissions (g/Peak Hour VMT)			0.465

Source:
Sacramento Metropolitan Air Quality Management District (SMAQMD). 2007.
Recommended Protocol for Evaluating the Location of Sensitive Land Uses Adjacent to Major Roadways.
Table 3

Figures



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6001 Shellmound St., Suite 700, Emeryville, CA 94608

Location of Redevelopment Site
Crystal Cream & Butter Company
Sacramento, CA

Legend

Approximate Site Boundary

Figure 1

Drafter:	Date:	Contract Number:	Approved:	Revised: