Supplemental Material
Received at the Meetings of
City Council
Redevelopment Agency
Housing Authority
Financing Authority

For

January 22, 2008

Items #13 and 14: Fiscal Year 2007 Comprehensive Annual Financal Report and FY2007/08 Midyear Report

a. Powerpoint presentation submitted to the City Council by Leyne Milstein the City's Budget Manager.

Items #16: Greenbriar

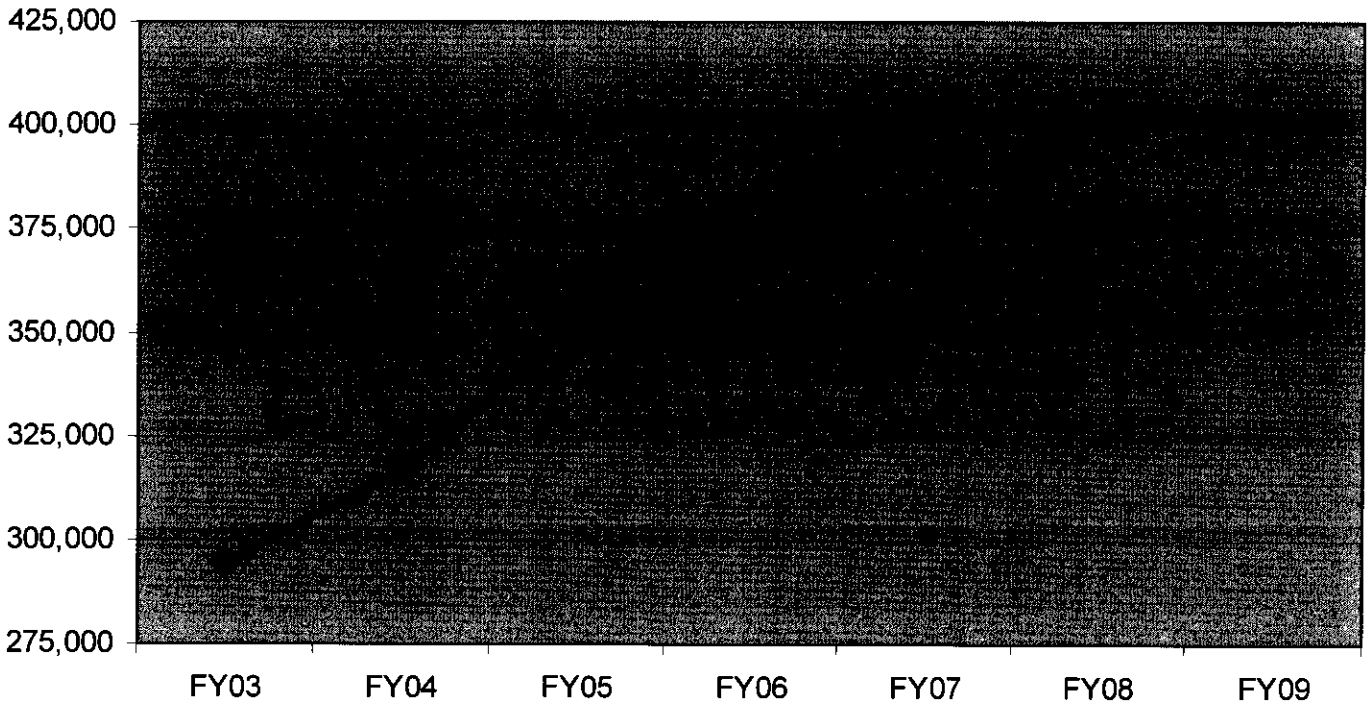
a. Spreadsheet and Maps related to Greenbriar entitled: Open Space, Species and Agriculture" Projects Impacts and Mitigations.
b. Letter submitted to the City Council by William D. Kopper regarding the Greenbriar Development.
c. Letter submitted to the City Council by Judith Lamare sharing her concerns regarding the Greenbriar Development.
d. Comments submitted to the City Council by by Barry L. Wasserman regarding the Greenbriar Development.
e. Letter submitted to the City Council by Steve Hatalla, Natomas Chamber of Commerce regarding the Greenbriar Project endorsement.
f. Purple sheet 16-2 submitted to the City Council by Tom Buford, Senior Planner regarding Greenbriar (P05-069) Changes to the Resolution, Findings and Mitigation Monitoring and Reporting Plan.
g. Purple sheet 16-3 (Greenbriar Powerpoint presentation) submitted to the City Council by Arwen Wacht.
h. Purple sheet 16-4 submitted to the City Council by Arwen Wacht regarding Greenbriar PUD Guideline Revisions.
i. Purple sheet 16-5 (Greenbriar correspondence) submitted to the City Council by Arwen Wacht.

FY2006/07 CAFR
FY2007/08 Midyear

January 22, 2008

Overall Budget Status

FY03-07 Actual Revenue, FY08-09 Budgeted Revenue
(in $000s)



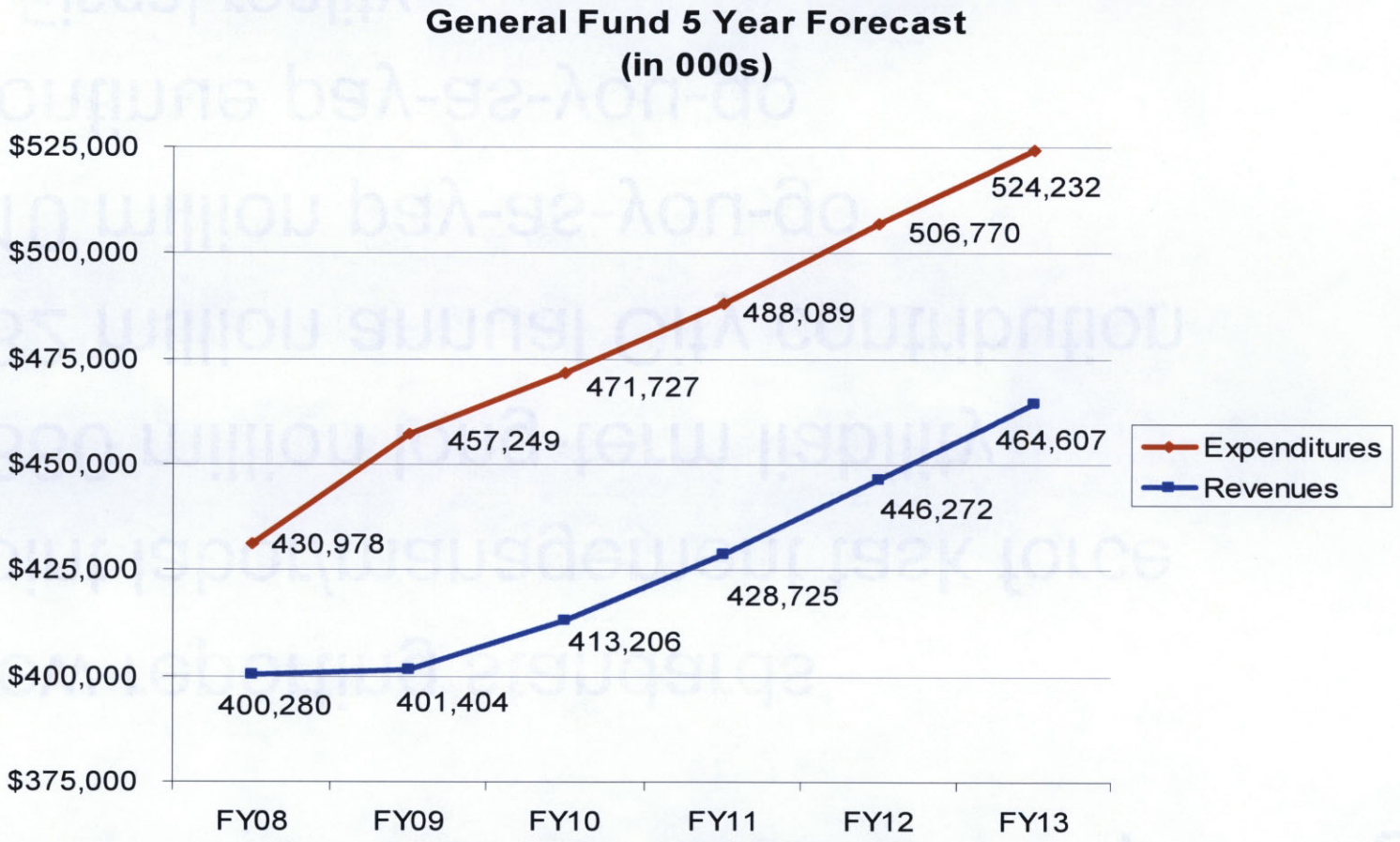
FY2006/07 Results

- Successful audit with two recommendations.
- Closed General Fund with positive results using extraordinary measures.
- Utilize fund balance to hedge FY08 results.
- Most Enterprise Funds ended the year positive.

FY2007/08 Midyear

- Tax Revenue Issues
- Departmental Issues
- Recommended Current Year Adjustments
- Five Year Forecast

Five Year Forecast



Retiree Medical Benefit Reporting

- New reporting standards
- Joint labor/management task force
- $380 million long-term liability
- $32 million annual City contribution
- $10 million pay-as-you-go
- Continue pay-as-you-go
  - Fiscal reality
  - High likelihood of changes in health care

Greenbriar
Open Space, Species and Agriculture: Project Impacts and Mitigation[1]

IMPACTS

Project Impacts

Impact to Open Space

577.0 acres (Total Project Acreage)
- 30.7 acres (Lone Tree Canal Corridor)[2]
- 27.5 acres (Freeway Buffers) [3]
- 26.9 acres (MAP Direct Impacts on Greenbriar, previously mitigated by MAP) [4]
491.9 acres

Impact to Species

577.0 acres (Total Project Acreage)
- 30.7 acres (Lone Tree Canal Corridor) [2]
- 51.2 acres (MAP Direct and Indirect Impacts on Greenbriar, previously mitigated by MAP) [4]
495.1 acres **

** Impact to Swainson's Hawk = 495.1 acres. Impact to GGS = 58.87 (55.56 permanent and 3.31 temporary; note GGS impacts include both aquatic and upland buffer)

MITIGATION

Open Space Mitigation

Lone Tree Canal Corridor	30.7 [2]
Freeway Buffer	27.5
Detention Basin/Lake	37.9
Spangler	235.4
Tsakopoulos 65 (Cummings + Natomas 130)	65.0
West Lakeside Buffer	15.9
Unidentified Site as required by EIR (Within Natomas Basin and Consistent with 1994 Guidelines)	49.0
Unidentified Site (Within Natomas Basin), pursuant to County Board Of Supervisors action on November 27, 2007	30.5 [5]
Total	**491.9**

Mitigation Ratio[6]: 1:1

[1]/ All numbers are rounded to nearest tenth. Unless otherwise indicated, all numbers were obtained from the Environmental Impact Report and/or the Effects Analysis prepared for the Greenbriar project.
[2]/ This number was obtained from a GIS calculation produced by Wood Rodgers.
[3]/ This number was obtained from a GIS calculation produced by Wood Rodgers.
[4]/ This number was obtained from a GIS calculation produced by Wood Rodgers based on the Final EIS for the Metro Air Park Habitat Conservation Plan, prepared by the US Fish and Wildlife Service dated July 2001.
[5]/ This number was not identified in the Greenbriar EIR, however the applicant has since committed to providing this additional acreage.

Total Species Habitat Mitigation [7]		
Lone Tree Canal Corridor		30.7 [2]
Spangler		235.4
Tsakopoulos 65 (Cummings + Natomas 130)		65.0
Unidentified Site as required by EIR (Within Natomas Basin and Consistent with 1994 Guidelines)		49.0
Unidentified Site (Within Natomas Basin)		30.5 [5]
	Total	**410.6**
Mitigation Ratio[8]**: 0.83:1**		
GGS Habitat Mitigation [7]		
Lone Tree Canal Corridor		30.7 [2]
Spangler		190.0
Tsakopoulos 65 (Cummings + Natomas 130)		14.4 [9]
	Total	**235.1**
Swainson's Hawk Habitat Mitigation [7]		
Lone Tree Canal Corridor		25.5 [10]
Spangler		100.6
Tsakopoulos 65 (Cummings + Natomas 130)		54.9 [11]
Unidentified Site as required by EIR (Within Natomas Basin and Consistent with 1994 Guidelines)		49.0
Unidentified Site (Within Natomas Basin)		30.5 [5]
	Total	**260.5**
Mitigation Ratio[12]**: 0.53:1** (consistent with 1994 Guidelines)		
Agricultural Land		
Spangler (Approx. 87% Prime Ag Land)		45.4 [13]
Tsakopoulos 65 (Approx. 81% Prime Ag Land)		47.7
Unidentified Site as required by EIR (Within Natomas Basin and Consistent with 1994 Guidelines)		49.0
Unidentified Site (Within Natomas Basin)		30.5 [5]
	Total	**172.6**

[6]/ To mitigate at ratios required by the Natomas Joint Vision MOU, project must provide open space mitigation lands at a ratio of 1:1, or 491.9 acres.

[7] / The distribution between Swainson's hawk and GGS mitigation may change pending additional scientific review, further negotiations with the Wildlife Agencies, and preparation of an EIS.

[8]/ To mitigate at ratios required by the Natomas Basin HCP, the project must provide species mitigation at a ratio of 0.5:1, or 247.5 acres.

[9]/ Number represents 4.3 acres of upland and 10.1 acres of wetland/open water.

[10]/ Number represents the upland/dry portion of the Corridor.

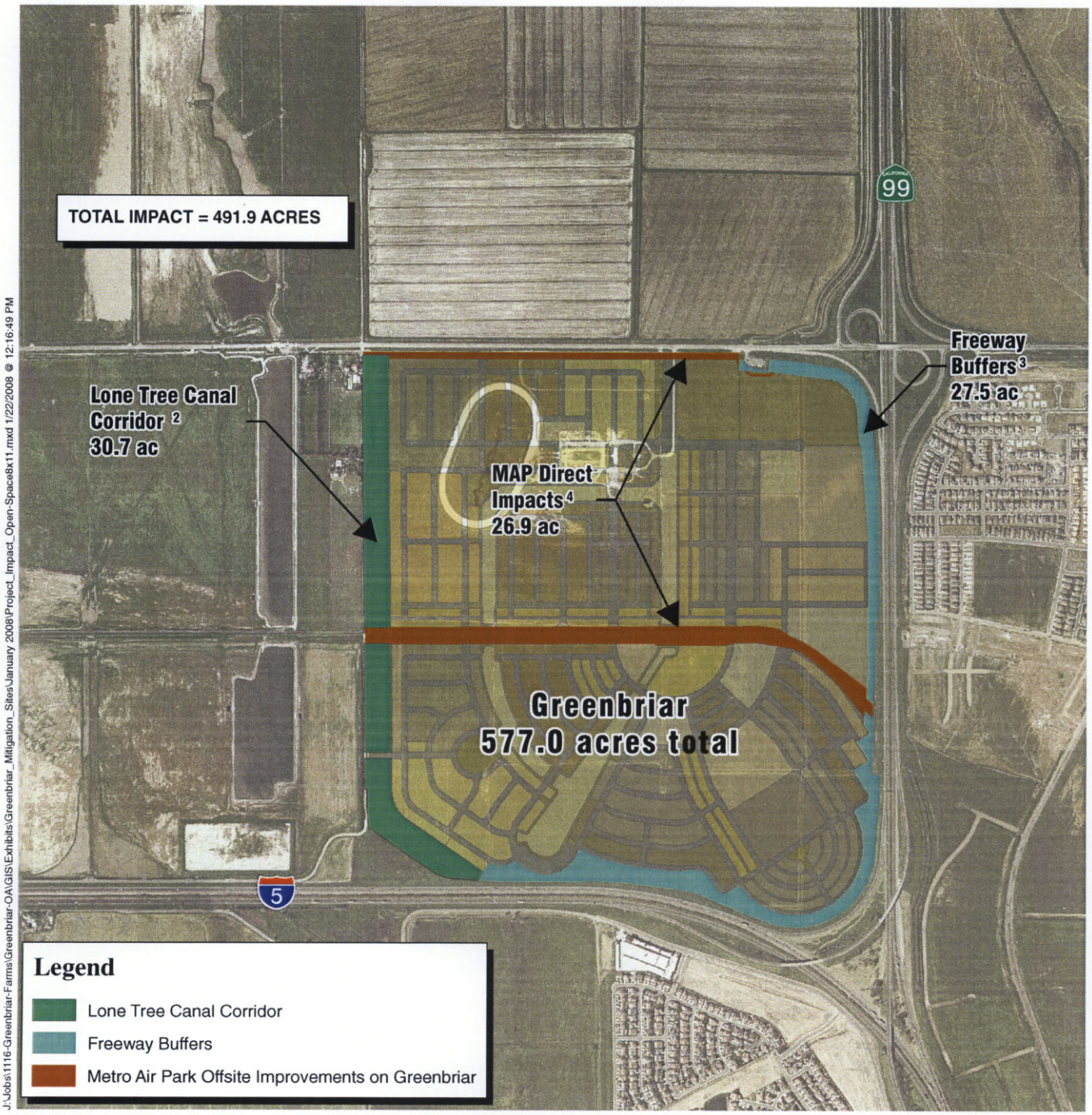
[11]/ Number includes 1.8 acres of potential nesting habitat that is also present at this site; the 1.8 acres is not included in 0.5:1 mitigation ratio for Swainson's hawk foraging because it is not foraging habitat.

[12]/ To mitigate at ratios required by the Department of Fish and Game 1994 Guidelines, the project must provide managed hawk mitigation lands at a ratio of 0.5:1, or 247.7 acres.

[13]/ This number represents a small percentage of the Spangler site, because Spangler will be largely converted from rice to managed marsh for habitat mitigation.

Project Impacts to Open Space

January 22, 2008



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NOTES:

1. All numbers are rounded to nearest tenth. Unless otherwise indicated, all numbers were obtained from the Environmental Impact Report and/or the Effects Analysis prepared for the Greenbriar project.
2. This number was obtained from a GIS calculation produced by Wood Rodgers.
3. This number was obtained from a GIS calculation produced by Wood Rodgers.
4. This number was obtained from a GIS calculation produced by Wood Rodgers based on the Final EIS for the Metro Air Park Habitat Conservation Plan, prepared by the US Fish and Wildlife Service dated July 2001.

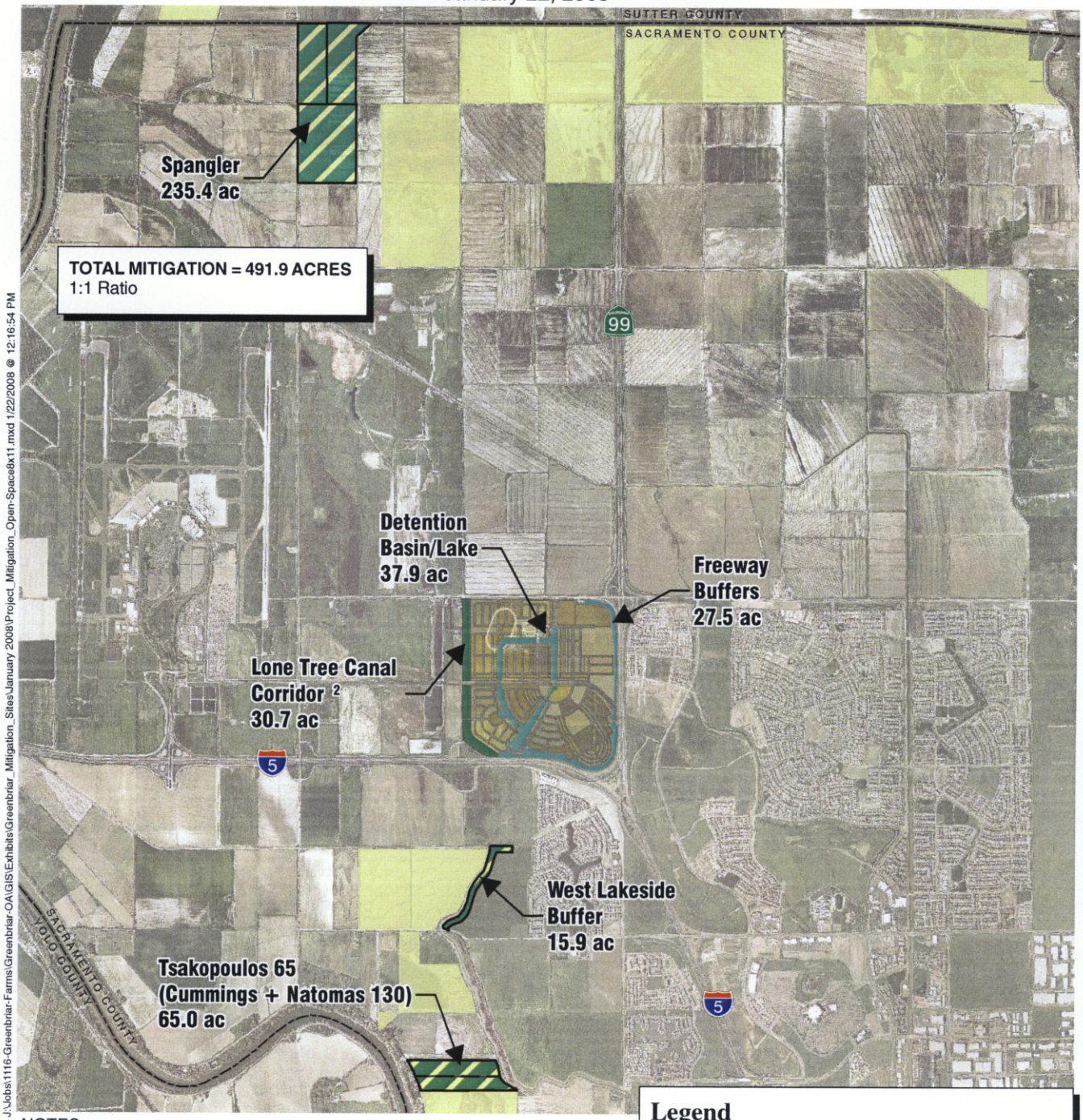
NORTH

0 750 1,500 3,000 Feet

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS
3301 C Street, Bldg. 100-B Tel: 916.341.7760
Sacramento, CA 95816 Fax: 916.341.7767

Open Space Mitigation

January 22, 2008



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Legend

- Lone Tree Canal Corridor
- Detention Basin/Lake and Freeway Buffers
- Off-Site Mitigation
- Existing Natomas Basin Conservancy Preserve

NOTES:

1. All numbers are rounded to nearest tenth. Unless otherwise indicated, all numbers were obtained from the Environmental Impact Report and/or the Effects Analysis prepared for the Greenbriar project.
2. This number was obtained from a GIS calculation produced by Wood Rodgers.

Not Shown on Exhibit

- 49.0 acre unidentified site as required by EIR (within Natomas Basin and consistent with 1994 guidelines).
- 30.5 acre unidentified site (within Natomas Basin), pursuant to County Board of Supervisors action on November 27, 2007. This number was not identified in the Greenbriar EIR, however the applicant has since committed to providing this additional acreage.

NORTH

0 2,500 5,000 10,000

Feet

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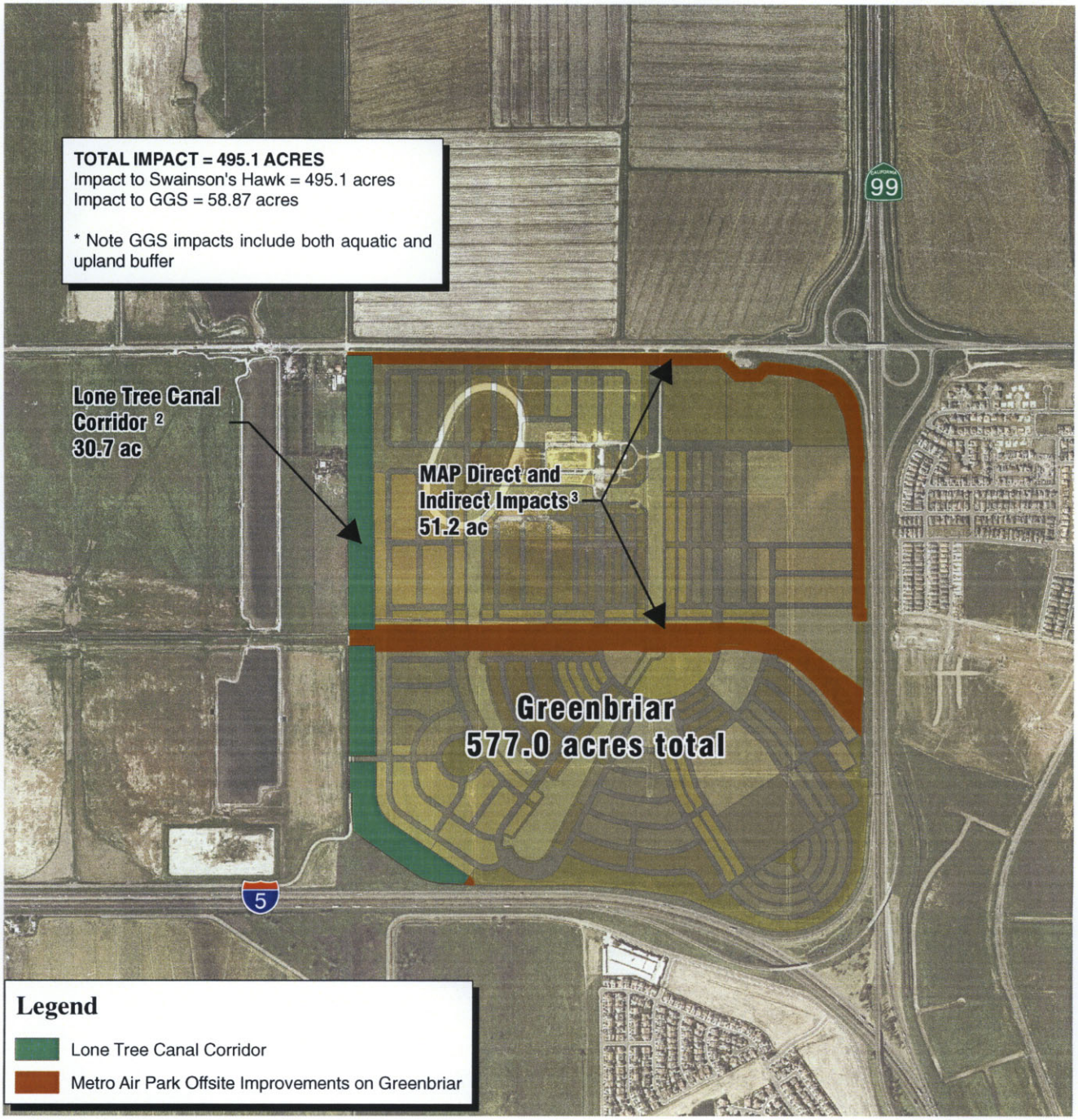
Project Impacts to Species

January 22, 2008



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NOTES:

1. All numbers are rounded to nearest tenth. Unless otherwise indicated, all numbers were obtained from the Environmental Impact Report and/or the Effects Analysis prepared for the Greenbriar project.
2. This number was obtained from a GIS calculation produced by Wood Rodgers.
3. This number was obtained from a GIS calculation produced by Wood Rodgers based on the Final EIS for the Metro Air Park Habitat Conservation Plan, prepared by the US Fish and Wildlife Service dated July 2001.

NORTH

0 750 1,500 3,000 Feet

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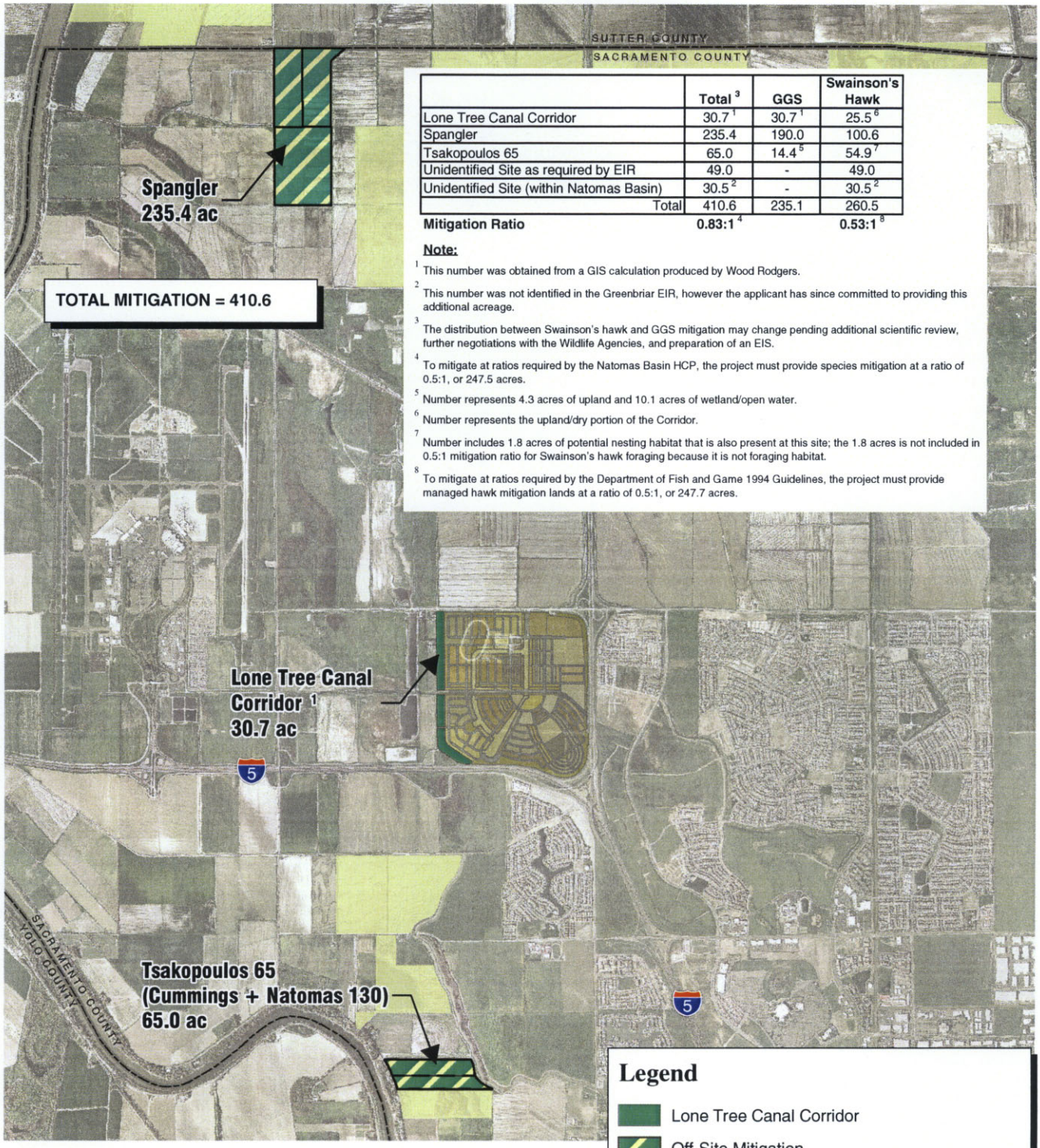
Sacramento, CA 95816 Fax: 916.341.7767

Species Habitat Mitigation

January 22, 2008



	Total [3]	GGS	Swainson's Hawk
Lone Tree Canal Corridor	30.7 [1]	30.7 [1]	25.5 [6]
Spangler	235.4	190.0	100.6
Tsakopoulos 65	65.0	14.4 [5]	54.9 [7]
Unidentified Site as required by EIR	49.0	-	49.0
Unidentified Site (within Natomas Basin)	30.5 [2]	-	30.5 [2]
Total	410.6	235.1	260.5
Mitigation Ratio	**0.83:1** [4]		**0.53:1** [8]

Note:

[1] This number was obtained from a GIS calculation produced by Wood Rodgers.

[2] This number was not identified in the Greenbriar EIR, however the applicant has since committed to providing this additional acreage.

[3] The distribution between Swainson's hawk and GGS mitigation may change pending additional scientific review, further negotiations with the Wildlife Agencies, and preparation of an EIS.

[4] To mitigate at ratios required by the Natomas Basin HCP, the project must provide species mitigation at a ratio of 0.5:1, or 247.5 acres.

[5] Number represents 4.3 acres of upland and 10.1 acres of wetland/open water.

[6] Number represents the upland/dry portion of the Corridor.

[7] Number includes 1.8 acres of potential nesting habitat that is also present at this site; the 1.8 acres is not included in 0.5:1 mitigation ratio for Swainson's hawk foraging because it is not foraging habitat.

[8] To mitigate at ratios required by the Department of Fish and Game 1994 Guidelines, the project must provide managed hawk mitigation lands at a ratio of 0.5:1, or 247.7 acres.

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Not Shown on Exhibit

- 49.0 acre unidentified site as required by EIR (within Natomas Basin and consistent with 1994 guidelines).
- 30.5 acre unidentified site (within Natomas Basin), pursuant to County Board of Supervisors action on November 27, 2007. This number was not identified in the Greenbriar EIR, however the applicant has since committed to providing this additional acreage.

NORTH

0 2,500 5,000 10,000 Feet

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Record

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Paralegal
Kristin Rauh

January 22, 2008

City Council
City of Sacramento
915 I Street
Sacramento, CA 95814

RE: Greenbriar Development

Dear Members of the City Council:

I represent Environmental Council of Sacramento, Inc., Friends of The Swainson's Hawk, Inc., Rudolph L. Bargas, Jacob C. Snyder, and Charles T. Link. These are their comments. I also include the comments of all other individuals and entities in these comments. My clients oppose the Greenbriar Development Project. My clients also ask the City Council not to certify the Environmental Impact Report for the Greenbriar Development Project because it is inadequate.

In my letter of January 15, 2008, I referenced a study in *Lancet* by Dr. W. James Gauderman indicating the health risks associated with the Project. The attached report from Dr. Camille Sears further emphasizes that the Health Risk Assessment completed by the authors of the EIR was not appropriate. This Health Risk Assessment was previously deemed to be inadequate by the State of California Office of Environmental Health Hazard Assessment. The attached report from Dr. Sears further explains why the Environmental Health Risk Assessment in the EIR does not reflect the health risks associated with the Project.

The attached report from Mr. Steve Pettyjohn of The Acoustics & Vibration Group, Inc. addresses the EIR's failure to complete a noise study in accordance with normal protocol and the inadequacy of the noise study in the Project EIR. As Mr. Pettyjohn shows in his letter, the noise impacts of noise sources in the surrounding environment will be much greater than predicted in the Environmental Impact Report. We incorporate into our comments on the Final Environmental Impact Report the letters of Dr. Camille Sears, and The Acoustics & Vibration Group, Inc. letter by Mr. Steve Pettyjohn.

Approval of the Greenbriar Project at this time is ill conceived because the Project is located in an unsafe flood zone. We have included as an attachment to these comments the report "A

California Challenge - Flooding in the Central Valley" (October 15, 2007), prepared by an Independent Review Panel for the Department of Water Resources. We have also attached a press report about the moratorium on development in North Natomas because of inadequate flood protection.

Sincerely,

WILLIAM D. KOPPER

WDK:kgr
attachments

Camille Sears 502 W. Lomita Ave., Ojai, CA 93023

Tel: (805) 646-2588 Fax: (805) 646-6024 e-mail: camille.marie@sbcglobal.net

January 21, 2008

William Kopper, Esq.
417 E Street
Davis, CA 95616

Re: Greenbriar Final Environmental Impact Report
Mobile Source Health Risk Assessment Comments

I. Introduction

As you requested, I reviewed the community health risk assessment prepared for the Greenbriar Final Impact Report (FEIR) dated August 2007. In particular, I focused on the November 21, 2005 Greenbriar Farms Development Health Risk Assessment (HRA) prepared by Sierra Research, and Section 6.2 of the FEIR. This HRA, which is included in its entirety in Appendix G to the FEIR, calculates excess cancer risks and noncancer exposures to the Greenbriar project location caused by mobile sources on adjacent roadways (I-5 and Hwy-99).

The FEIR reports an excess cancer risk of 29 per million, at the residence location closest to the freeways (about 209 feet).[1] The standard regulatory significance threshold for excess cancer risks is 10 per million, which implies that the FEIR would identify this exposure as a significant impact. The FEIR, however, uses a convoluted set of assumptions to find that the 29 per million risk is less than significant.

Furthermore, the 29 per million risk calculation is based on flawed methods and assumptions that substantially understate the real risk. For example, the FEIR HRA reports values that are roughly ten times lower than the risks estimated by the California Air Resources Board for a similar setting.[2] The FEIR HRA manages this feat by reducing future toxic air contaminant emissions along I-5 and Hwy-99; however the FEIR never discloses what levels of emissions were actually used in the HRA.

Since the FEIR did not disclose many key inputs used in the HRA risk calculations, I resorted to preparing my own risk analysis. Using site-specific data, standard HRA protocols, and reliable inputs, I calculated excess cancer risks at the Greenbriar site that are over ten times higher than the levels reported by Sierra Research. The risks I calculated are consistent with the findings of the California Air Resources Board and other researchers.[3]

The FEIR HRA clearly underestimates excess cancer risks at the Greenbriar site and incorrectly assigns a finding of no significant impact to the risks from off-site mobile sources.

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[1] FEIR, pp. 6-28.
[2] Sierra Research, Greenbriar Farms Development Health Risk Assessment, November 21, 2005, pp. 10-11.
[3] California Air Resources Board, Air Quality and Land Use Handbook: A Community Perspective, April 2005, p. 6.

Summaries of my FEIR HRA comments are as follows:

- Through a novel method of calculating and then characterizing risk, the FEIR incorrectly finds that off-site mobile emissions will cause less than significant excess cancer risk impacts at the Greenbriar site (Comment III);
- The FEIR fails to disclose key inputs used in the HRA. Without listing emissions data and model input options, the public cannot fully know which assumptions were used and how the HRA was actually prepared (Comment IV);
- I prepared an HRA, using reliable and widely-accepted methods, finding that off-site mobile emissions will cause significant excess cancer risk impacts at the Greenbriar site (Comment V);
- In addition to the faulty HRA, the FEIR failed to assess PM_{10} and $PM_{2.5}$ ambient air concentrations resulting from on-site project construction. The FEIR should have modeled the impacts to verify compliance with State and Federal Ambient Air Quality Standards (Comment VI).

II. Qualifications

My comments on the FEIR HRA and modeling, presented below, are based on over 25 years of professional experience performing air quality and toxics exposure analyses. I hold BS and MS degrees in Atmospheric Science from UC Davis. I was the senior air quality modeler and air toxics program coordinator for the Santa Barbara County Air Pollution Control District (SBAPCD), where I worked for approximately nine years. At the SBAPCD, I was responsible for air quality modeling and meteorological analyses used for the District's PSD and NSR permitting, as well as the County's CEQA and land use permitting requirements. I also sited many meteorological stations that collected data for dispersion modeling and health risk assessments.

While at the SBAPCD, I co-developed the mathematical, computer-based model for predicting community exposures to toxic air pollutants. This health risk assessment model was distributed by CAPCOA, the California Air Pollution Control Officers' Association. CAPCOA is a voluntary association of state and local government officials, largely engineers and scientists, responsible for air pollution control in California. The computer model I co-developed (ACE2588) has been used by air districts throughout the state in evaluating AB 2588 submissions by facilities covered by the law, and used extensively by consultants who prepared AB 2588 submissions for the facilities. I provided technical support on using this model for over 10 years, until it was replaced with the California Air Resources Board (CARB) program, HARP. Recipients of this support included regulatory agencies, industrial sources, and consulting firms.

For the past 15 years I have been a private consultant, specializing in regulatory agency and litigation support. My clients include the California Attorney General's Office, the Los Angeles County District Attorney's Office, the California Office of Environmental Health Hazard Assessment (OEHHA), various air pollution control agencies, CAPCOA, and many private

firms. I have prepared over 300 complete air toxics health risk assessments and well over 1,000 air dispersion modeling analyses. I have successfully provided expert testimony in numerous Federal and State Court cases. My curriculum vitae is attached.

Following are my comments on the Greenbriar FEIR HRA.

III. The FEIR Incorrectly Finds that Off-Site Mobile Emissions will Cause Less Than Significant Excess Cancer Risk Impacts at the Greenbriar Site

The FEIR HRA is problematic for a number of reasons. The first, and perhaps most obvious, concern is the relatively low excess cancer risk results calculated by the FEIR HRA. As mentioned above, the FEIR HRA reports values that are roughly ten times lower than the risks estimated by the California Air Resources Board for residences near roadways.[4] Sierra Research explains that this discrepancy exists because they used site-specific conditions and a reduction in future vehicle emissions.[5] This justification, however, is based on flawed methods and assumptions.

Most significantly, Sierra Research's HRA incorporates their estimates of future toxic air contaminant (TAC) emissions, which they believe will be lower than present rates. The problem with this approach is whether anyone can accurately know what future roadway TAC emissions will be. For this reason, regulatory agencies do not use future emission predictions in calculating excess cancer risks (nor do they use historical emission rates, even when they know the past exposures were much higher). In essence, current emission rates are used as the basis for excess cancer risk calculations.

The method of using the most-recent year of air emissions data as the basis for the HRA is also used in other California regulatory programs, such as the Air Toxics "Hot Spots" Act (AB 2588).[6] This is true even if it is known that a company will be forced to phase out a particular chemical in less than 70-years due to legal or other restrictions. In other words, California does not try to "crystal-ball" what will happen in the future.

Commenting on the FEIR HRA, OEHHA states that it is inappropriate to use yet-to-be realized emission reductions in the HRA. OEHHA writes:

> In the present case, one highway bordering the proposed development is Interstate 5, the main car and truck route from the Mexican to the Canadian border. Although per-vehicle emissions in California vehicles are expected to decrease, this will be partially offset by an increased total number of vehicles in the future. As a result of the North American Free Trade Agreement, the possible presence

[4] Sierra Research, Greenbriar Farms Development Health Risk Assessment, November 21, 2005, pp. 10-11.
[5] Id., cover page.
[6] Health & Safety Code §44300, et seq.

> on Interstate 5 of trucks registered in Mexico, where emissions are unregulated, may offset any reductions in emissions of vehicles registered in the United States.[7]

And since heavy duty truck emissions emit the majority of diesel particulates (and cause the majority of excess cancer risk) along I-5 and Hwy-99, it will be nearly impossible to predict future risks from these potentially huge sources of unregulated emissions.

To make matters worse, the FEIR HRA then uses a novel approach to characterize their calculated risks. The FEIR attempts to compare the risks at Greenbriar to existing and future background risks, and then discounts future risks due to anticipated air toxics emission reductions.[8] I have prepared several hundred HRAs in California, and reviewed hundreds more, and this is the first time I've encountered this risk characterization approach. It would be an understatement to say that the FEIR HRA risk characterization method deviates from accepted practices. It is only through this unique interpretation of risks that the FEIR identifies the impact at Greenbriar as less than significant.

In practice, current environmental exposures, as either air concentrations or dose, are used as input to 70-year risk calculations using OEHHA-approved cancer potency or unit risk values. The resulting chemical-specific environmental exposures are then compared to the either the AB 2588 or Proposition 65 significant risk levels of 10 per million to verify warning compliance. This is the method I applied in my HRA (discussed in Section V below), and it is the same method I've used in every AB 2588 and Proposition 65 environmental exposure analysis I've prepared in the last 18 years.

This is also consistent with SMAQMD protocol for preparing HRAs. In response to the FEIR HRA approach of trying to reduce cancer risk by assuming shorter exposure periods, the SMAQMD states:

> The District does not agree with the protocol used in those arguments to discount the cancer risk. We embrace OEHHA's 70 year risk protocol and do not discount it. In addition, we do not compare today's risk with that which will be achieved in the distant future after the ARB Risk Reduction Plan takes effect.[9]

In essence, the FEIR is inventing its own method of risk characterization, which appears to be an attempt to discount exposures and support a less than significant risk finding.

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[7] Letter from George Alexeeff, OEHHA, to Mr. Larry Greene, SMAQMD, September 26, 2007, pp. 1-2.
[8] FEIR, pp. 6-27 to 6-29.
[9] Letter from Jeane Borkenhagen, SMAQMD, to Mr. Tom Buford, City of Sacramento, Environmental Planning Service, March 26, 2007, p.3.

IV. The FEIR HRA Fails to Identify Key Inputs

The FEIR HRA does not show any of the emission rates it used as input to their dispersion modeling. Furthermore, the HRA did not disclose many of the key dispersion model inputs or outputs. Because of these flaws, the reviewing public does not know which options and assumptions went into the model. For these unknown inputs, the HRA is essentially a "black box." We do know that the HRA uses anticipated lower future emission rates in their risk assessment (an inappropriate practice), but we do not know what they are.

Without the off-site mobile source emission estimates, it is impossible to know how the HRA was actually prepared. I contacted the Sacramento Air Quality Management District (SMAQMD) and asked if they had the model input or output files used by Sierra Research in preparing the FEIR HRA. They did not have the files.[10] This raises a concern as to whether anyone outside of Sierra Research has actually seen the emission calculations that went in to the HRA.

The lack of information on how the FEIR HRA was prepared made my review much more difficult that it should have been. The only way to verify whether the FEIR HRA was at all reliable was for me to recreate the HRA from scratch. I prepared such an analysis, using widely accepted and reliable emission calculation and dispersion modeling methods. I calculated emissions from off-site mobile sources and performed dispersion modeling and risk calculations. The HRA I prepared is described in Section V. below.

V. Diesel Particulate Emissions from Off-Site Mobile Sources Cause Significant Excess Cancer Risks at the Greenbriar Site

Since the lack of emissions information and model option details in the FEIR HRA precluded a detailed verification of toxic air contaminant risks, I prepared an HRA of I-5 and Hwy-99 roadway emissions to facilitate my review. My HRA includes only diesel PM_{10} emissions from heavy-heavy duty trucks, which I believe will cause the majority of the excess cancer risks at Greenbriar. If time allows, diesel PM_{10} emissions from small trucks and light duty autos, and other TACs can be added to my HRA. In this sense, the HRA I prepared will underpredict the total risks as it does not include all the TACs from mobile sources.

In preparing my HRA, I reviewed the SMAQMD recommended protocol for preparing HRAs from mobile sources.[11] This protocol includes recommendations for emission calculation methods, dispersion model options, meteorological data, and excess cancer risk calculations. My HRA is consistent with the SMAQMD recommended protocol, except where their general

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[10] Personal communication with Jim Jester, SMAQMD, January 16, 2008.
[11] SMAQMD Recommended Protocol for Evaluating the Location of Sensitive Land Uses Adjacent to Major Roadways, Technical Appendix, Version 1.0, September 2007.

recommendations deviate from site-specific conditions at Greenbriar. I discuss these situations below.

Dispersion Model

The SMAQMD recommends the CAL3QHCR dispersion model for preparing health assessments from mobile source emissions.[12] CAL3QHCR has numerous features that make it useful and appropriate for calculating air concentrations near a roadway. CAL3QHCR, however, is not very practical for preparing HRAs that require numerous receptor points – such as when preparing isopleths to show regions of exposure. For example, CAL3QHCR allows only 60 receptors per run.[13] The HRA I prepared required over 3,400 receptors, which would entail making 57 CAL3QHCR runs for each year of modeled meteorological data. Since I modeled five years of meteorological data, 385 CAL3QHCR runs would be necessary to perform my analysis. Again, this is entirely impractical, and as explained below, unnecessary.

Instead of CAL3QHCR, I used the USEPA ISCST3 model, v. 020235. ISCST3 is being phased out, in favor of AERMOD, which would also be preferable to CAL3QHCR for preparing graphical isopleths of excess cancer risks and other exposure levels. I contacted the SMAQMD and asked whether they had meteorological data ready for using AERMOD, instead of ISCST3. I was informed that the SMAQMD is not yet ready to release meteorological data for running AERMOD.[14] Both ISCST3 and CAL3QHCR use the same meteorological data, while AERMOD requires additional inputs not yet available for use in the SMAQMD.

Before preparing my HRA, I performed a comparison of model results between CAL3QHCR and ISCST3. I used a link of I-5, south of the proposed Greenbriar site. I calculated emissions based on Caltrans annual average daily traffic counts for that location, and input equivalent emission rates into each model. For ISCST3, I used AREAPOLY sources to define the roadway emission location. An AREAPOLY source is an ISCST3 area source with a shape that can be defined by up to 20 vertices.

To be consistent with the SMAQMD recommended protocol, I used 1987 meteorological data from Sacramento Executive Airport and urban dispersion coefficients. I calculated annual-average PM_{10} concentrations at 18 receptor locations, ranging from the edge of the roadway to 1500 meters away, and on both sides of the road.

The results of my comparison are shown in the following table. The outcomes from these two models compare very favorably, with ISCST3 predicting, on average, about 11% lower impacts than CAL3QHCR. Using ISCST3 instead of CAL3QHCR will result in functionally equivalent results, and will offer many advantages for preparing a graphical isopleth of excess cancer risks

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[12] Id., p. 5.
[13] Ekhoff, Peter, and Thomas Braverman, CAL3QHCR User's Guide, September 1995, p. 3-7.
[14] Personal communication with Brian Krebs, SMAQMD.

and other health impacts. The ISCST3 and CAL3QHCR inputs, which show the model options and inputs I used, are presented in Appendix A.

Rec Number	Location	XUTM	YUTM	ISCST3 Annual Average ($\mu g/m^3$)	CAL3QHCR Annual Average ($\mu g/m^3$)	ISCST3/ CAL3QHCR %
1	0m west	627419	4280034	1.50	1.87	80.3%
2	50m west	627369	4280041	0.36	0.39	92.8%
3	100m west	627320	4280048	0.18	0.19	93.1%
4	200m west	627221	4280063	0.07	0.07	99.3%
5	300m west	627122	4280077	0.04	0.04	91.4%
6	400m west	627023	4280092	0.02	0.02	113.7%
7	500m west	626924	4280106	0.02	0.02	78.7%
8	1000m west	626429	4280179	0.01	0.00	
9	1500m west	625935	4280251	0.00	0.00	
10	0m east	627468	4280026	2.55	2.82	90.4%
11	50m east	627518	4280019	0.85	0.88	97.1%
12	100m east	627567	4280012	0.40	0.46	87.8%
13	200m east	627666	4279997	0.13	0.16	81.3%
14	300m east	627765	4279983	0.05	0.06	81.3%
15	400m east	627864	4279968	0.02	0.03	82.4%
16	500m east	627963	4279954	0.02	0.02	76.6%
17	1000m east	628458	4279881	0.00	0.00	
18	1500m east	628952	4279809	0.00	0.00	
					Average:	89.0%

Furthermore, the USEPA uses ISCST3 to model roadway line source TAC emissions. From the USEPA:

> Previous model evaluation studies with roadways have shown that in ISCST3 modeling roads as volume sources gave similar results to modeling the roads as area sources (EPA, 1995c). However, modeling as area sources is more resource efficient. Additional sensitivity studies (Personal Communication, Brode, 2001) showed that the aspect ratios (ratio of roadway length to roadway width) can be increased from the present 1 to 10 up to 1 to 100 without degrading model performance. For the above reasons, in this example application, roads are modeled as ISCST3 area sources with aspect ratios up to 100.[15]

Based on this USEPA recommendation, and the nearly equivalent results between ISCST3 and CAL3QHCR, the ISCST3 model is appropriate for modeling roadway emissions as area sources.

[15] USEPA, Example Application of Modeling Toxic Air Pollutants in Urban Areas, EPA-454/R-02-003, June 2002, pp. 14-15.

Dispersion Coefficients

Dispersion coefficients are a site-specific input, and are determined based on whether the area surrounding the project site is urban or rural. The SMAQMD recommends urban dispersion coefficients for preparing health assessments from mobile source emissions.[16] While this recommendation may be appropriate for urban areas in the Sacramento area, it is clearly inappropriate for the rural setting at Greenbriar.

The USEPA and other air regulatory agencies routinely use a land use procedure to determine whether rural or urban dispersion coefficients apply to a site. In essence, the land use is studied in a three-kilometer circle surrounding the project location. If more than 50% of the area is urban and developed, then urban dispersion parameters are to be used. Otherwise, rural dispersion coefficients are appropriate.[17]

I examined the land use in a three-kilometer circle surrounding the Greenbriar site using a geographical information system (ArcView) and georeferenced satellite imagery from 2006. The map of this analysis is shown in Figure 1. This map clearly shows that at least 75% of the area in a three-kilometer circle surrounding the site is rural and undeveloped. Based on this analysis, I used rural dispersion coefficients in my HRA. The SMAQMD should revise its recommended protocol to use more reliable model inputs in the rural areas of its District.

The FEIR itself also confirms the rural setting at Greenbriar:

> The County of Sacramento specifies LOS D for rural areas and LOS E for urban areas as the minimum acceptable level of service for the roadways and intersections that fall under its jurisdiction. Because the project study area is considered rural, LOS D was used as the minimum acceptable LOS standard for all the study intersections that fall under the County's jurisdiction.[18]

Since the FEIR HRA does not disclose which dispersion coefficients they modeled, it remains to be seen whether they used inappropriate urban dispersion coefficients in their Greenbriar analysis.

Meteorological Data

There are essentially two available meteorological data sets for use in the SMAQMD: Sacramento Executive Airport (from 1985 through 1989) and McClellan Air Force Base (from 1992 through 1996). The SMAQMD recommends using 1987 meteorological data from

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[16] SMAQMD Recommended Protocol for Evaluating the Location of Sensitive Land Uses Adjacent to Major Roadways, Technical Appendix, Version 1.0, September 2007, p. 12.
[17] United States Environmental Protection Agency, November 9, 2005, Guideline on Air Quality Models. 40 CFR 51, Appendix W, Section 7.2.3.
[18] FEIR, Section 6.1.3 (p. 6.1-15).

Sacramento Executive Airport for preparing exposures from roadway emissions.[19] Here again, the SMAQMD is using a one-size fits all approach, when each data set is more appropriate (site-specific) to different areas of the District.

For urban areas near the city of Sacramento, and points south, Sacramento Executive Airport data will be most appropriate. For areas north of Sacramento, McClellan Air Force Base meteorological data should be considered. For the Greenbriar site, the McClellan Air Force Base data are closer, and most representative of the project conditions.

I examined the wind frequency distributions from each of these two stations. Wind directions from each of the 16 cardinal compass points are shown in tables included in Appendix B, along with the percentage of winds that emanate from each of the 22.5 degree sectors centered on that direction. The frequency of winds, by wind speed category and for all hours, are listed for each of these sectors. In addition, Appendix B includes stability class frequency distributions, and wind roses (graphical representations of wind speed and direction frequency distributions).

Worth noting is the number of calm hours measured at Sacramento Executive Airport. From 1985 through 1989 there are 8,888 hours calm hours (hours with wind speed = 0 meter per second). This amounts to over 20% of the total hours labeled as calm, which has a decided effect on modeled air concentrations. This is because models such as CAL3QHCR and ISCST3 "throw out" all calm hours when the reported wind speed is 0 meter/second, as it cannot be modeled. In essence, a meteorological data set with many calm hours is deleting the very conditions that lead to the highest modeled impacts. On the other hand, McClellan AFB has only about 3.3% calms over a five-year period.

With respect to the number of years of data to model, the USEPA Guideline on Air Quality Models states:

> Five years of representative meteorological data should be used when estimating concentrations with an air quality model. Consecutive years from the most recent, readily available 5-year period are preferred.[20]

For being the most representative data for the Greenbriar site, and most recent meteorological measurements available, I used five years of McClellan AFB meteorological data in my HRA.

And as a comparative study, I used both McClellan AFB and Sacramento Executive Airport data in an analysis of excess cancer risks (as part of the modeling analysis to be described in greater detail below). Calculating excess cancer risks with both meteorological data sets, and overlaying 100 per million risks isopleths onto satellite imagery, shows that the results for the two site

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[19] SMAQMD Recommended Protocol for Evaluating the Location of Sensitive Land Uses Adjacent to Major Roadways, Technical Appendix, Version 1.0, September 2007, p. 7.

[20] United States Environmental Protection Agency, November 9, 2005, Guideline on Air Quality Models. 40 CFR 51, Appendix W, Section 8.3.1.2.a.

locations are similar, but with noticeable differences (see Figure 2). For example, the calculated risks appear to be comparable, but the location of the peak exposure areas are offset from each other. For this and the other reasons discussed above, the SMAQMD may want to consider recommending using the most site-specific data set for each particular project, rather than only one data set for all conditions. This is already the norm at most air districts in California.

Modeled Receptors

A required output from my HRA is a graphical display of exposures overlaid onto a satellite imagery map. For this component, I modeled 3,416 discrete receptors (locations where the model calculates air concentrations). In 100 meter increments, I modeled receptors in the easting range from 623,500 to 629,000 meters and in the northing range from 4,278,500 to 4,284,500 meters. Since I modeled the roadway emissions as AREAPOLY sources, the receptors were treated in flat terrain. As discussed above, the CAL3QHCR model is not appropriate for calculating impacts at the number of receptors needed for a graphical display of exposures.

Emissions Data

I used the EMFAC 2007 model to calculate diesel PM_{10} emissions from heavy-heavy duty trucks (HHDT) traveling along I-5 and Hwy-99, adjacent to the Greenbriar site. I focused my HRA on this vehicle source type because the diesel PM_{10} emissions will be culpable for the majority of the downwind excess cancer risks.

I assessed only Sacramento County emissions in EMFAC 2007, and I used a vehicle speed of 55 miles per hour. Diesel PM_{10} emission rates are insensitive to temperature and humidity, so these parameters do not affect the calculated emissions.

For heavy-heavy duty trucks, EMFAC 2007 calculates a PM_{10} emission factor of 0.651 g/mile. Furthermore, EMFAC 2007 shows that 93.9% of the HHDT travel (in VMT) in Sacramento County is from diesel-fueled vehicles. In running EMFAC 2007, I limited the model years to the period from 1985 through 2007, rather than including older trucks dating back to 1965. And consistent with SMAQMD protocol and OEHHA recommendations, I used these emission levels for the duration of the exposure period.

For calculating emissions input to the dispersion model, I combined the EMFAC 2007 PM_{10} emission factor with vehicle traffic counts on I-5 and Hwy-99 in the Greenbriar vicinity. I analyzed five sections of these roadways, and calculated emissions for each segment using segment length and the PM_{10} emission factor, as shown in the following table. Each of these roadway segments is divided into a number of AREAPOLY sources for modeling in ISCST3. The locations of these AREAPOLY sources that cover I-5 and Hwy-99 are shown in Figure 3.

Road Area (Segment)	Total Segment Length (m)	HHDT 55 mph DPM EF (g/mi)	HHDT 55 mph DPM EF (g/m)	Segment Total DPM/ Vehicle (g)
I-5 S. of I-5/99 Intersection	2080	0.651	4.05E-04	8.41E-01
I-5 N. of I-5/99 Intersection	2615	0.651	4.05E-04	1.06E+00
99 N. of I-5/99 Intersection	2275	0.651	4.05E-04	9.20E-01
I-5 - 99 Interchange West	550	0.651	4.05E-04	2.22E-01
I-5 - 99 Interchange East	690	0.651	4.05E-04	2.79E-01

I obtained vehicle traffic counts from Caltrans.[21] Traffic count data are available through 2006, and I used annual average daily traffic (AADT) values for each year from 2000 through 2006, and then averaged the seven values. Furthermore, Caltrans AADT count data are listed for trucks by number of axles: 2, 3, 4, and 5-plus. I included only trucks with three or more axles in my HHDT analysis. This is an appropriate assumption as 88% of the HHDT AADT counts on these roadways are from trucks with five or more axles. The HHDT emissions by roadway segment are shown in the table below.

Road Area (Segment)	Average Number of HHDT Vehicles/day	% Diesel Trucks	Total Segment DPM (g/day)	Total Segment DPM (g/s)	Total Segment Area (m^2)	Total Segment DPM ($g/(s\text{-}m^2)$)
I-5 S. of I-5/99 Intersection	9349	93.9%	7.39E+03	8.55E-02	1.04E+05	8.192E-07
I-5 N. of I-5/99 Intersection	8694	93.9%	8.63E+03	9.99E-02	1.22E+05	8.218E-07
99 N. of I-5/99 Intersection	3074	93.9%	2.66E+03	3.07E-02	8.82E+04	3.485E-07
I-5 - 99 Interchange West	1537	93.9%	3.21E+02	3.72E-03	4.47E+04	8.317E-08
I-5 - 99 Interchange East	1537	93.9%	4.03E+02	4.66E-03	3.81E+04	1.224E-07

Combining HHDT AADT counts with the PM_{10} emission factor (in g/mile), the roadway segment lengths, and the percent of the trucks that use diesel fuel, I calculated the daily total diesel PM_{10} emissions for each roadway segment.[22] I converted these daily emission rates into hourly averages in grams/second and then divided these values by the roadway segment area to produce the $g/(s\text{-}m^2)$ units required for area source modeling. These area source emission rates are constant for each hour of the day and represent an average of the daily (and yearly) emissions. This is equivalent to a Tier 1 approach in CAL3QHCR.

[21] Available at: http://traffic-counts.dot.ca.gov/

[22] For the interchanges between I-5 and Hwy-99, I used the HHDT AADT counts from Hwy-99 N. of I-5/99 Intersection, and apportioned the counts equally to each half.

For modeling purposes, however, I developed hourly scaling emission factors to adjust the daily average emissions for each hour of the day. Using EMFAC 2007 and producing hourly burden outputs, I examined the hourly HHDT VMT for Sacramento County by hour of the day. I used this VMT data to develop hourly emission scaling factors to apply to the daily average emissions calculated by EMFAC 2007. These scaling factors, which are shown in the following table, are used as input to ISCST3 in the form of the EMISFACT HROFDY keyword. Since I assessed only one vehicle type (HHDT), and PM_{10} emission factors are insensitive to time of day and weather conditions, only hourly VMT levels are needed to calculate the hourly scaling factors. This is equivalent to a Tier 2 approach in CAL3QHCR.

Hour	VMT/1000	EMISFACT HROFDY
1	26	0.956
2	9	0.331
3	19	0.698
4	46	1.691
5	24	0.882
6	36	1.323
7	52	1.911
8	42	1.544
9	35	1.286
10	41	1.507
11	42	1.544
12	41	1.507
13	37	1.360
14	38	1.397
15	28	1.029
16	17	0.625
17	25	0.919
18	11	0.404
19	17	0.625
20	8	0.294
21	22	0.809
22	20	0.735
23	8	0.294
24	9	0.331
Total:	653	24.000
Average:	27.21	1.000

HRA Results

I used the ISCST3 dispersion model to calculate 24-hour and five-year-average diesel PM_{10} air concentrations at 3,416 discrete receptors in the Greenbriar project area. My receptor grid covered all the modeled roadways, the Greenbriar site, and areas beyond the project location.

This modeling area allows me to prepare exposure and risk isopleths for graphically displaying the model results. The ISCST3 input file I used in this analysis is shown in Appendix C.

Exposure to diesel engine exhaust is recognized by the California EPA and other agencies as a significant public health risk – in urban areas it is the largest contributor to inhalation excess cancer risk. Although there are many toxic constituents in diesel exhaust, e.g. benzene, aldehydes, and metals, it is diesel particulate matter (DPM) that is the greatest concern. The State of California developed a cancer unit risk value for DPM, which is used for preparing inhalation health risk assessments. DPM is a very potent carcinogen – on a gram-per-gram basis it is over ten times more potent than benzene. The established unit risk value for DPM is 3.0E-04 $(\mu g/m^3)^{-1}$.[23]

I used modeled five-year-average ambient DPM air concentrations (in $\mu g/m^3$) to calculate residential excess cancer risks in the Greenbriar project area. I calculated residential risks (as a measure of per million chances) by multiplying modeled five-year-average air concentrations by the DPM unit risk value of 3.0E-04 $(\mu g/m^3)^{-1}$. This is the standard, widely-used method for calculating 70-year excess cancer risk exposures.

Excess cancer risks from I-5 and Hwy-99 HHDT DPM emissions are shown in Figures 4 and 5. These figures depict 70-year excess cancer risks using only HHDT DPM emissions and do not include other TAC emissions from trucks, buses, and automobiles. As such, these figures will tend to understate the total excess cancer risks.

Nevertheless, it is clear that excess cancer risks at the Greenbriar site are on the order of hundreds per million, not the 29 per million peak risk value presented in the FEIR. For example, the 300 per million risk isopleth (30 times the significance level), extends at least 500 feet into the Greenbriar development. And the 100 per million excess cancer risk (10 times the significance level) covers about 2/3 of the Greenbriar site, extending over 3,000 feet into the proposed development area.

In several ways, the Greenbriar site is in an almost worst-case location for TAC exposure. It is adjacent to both I-5 and Hwy-99, and the interchange between these two heavily-traveled roadways. In addition, the prevailing southerly winds (winds coming from the south), entrains roadway emissions along I-5 before transporting them directly over the Greenbriar site. The southerly winds blowing along and over I-5 accumulate emissions, resulting in significantly higher downwind exposures than when the wind blows across (perpendicular to) the roadway.

It is important to remember that the HRA I prepared uses the same methods that the State and local air agencies apply in preparing analyses for regulatory compliance. The FEIR HRA protocol, at least where it can be deciphered by the reviewing public, deviates from this accepted

[23] Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values, Updated April 25, 2005.

practice. This helps to explain how the FEIR HRA manages to report such low excess cancer risks from I-5 and Hwy-99, even though they represent a large emission source of TACs.

In addition to excess cancer risks, I calculated 24-hour and five-year-average DPM air concentrations surrounding the Greenbriar development site. Beyond being a potent carcinogen, DPM also contributes to non-cancer health impacts, such as asthma, bronchitis, and overall decreased lung function. OEHHA raised these concerns in their review of the FEIR HRA, and they point out that the FEIR does not adequately address these adverse health impacts caused by traffic-related pollution.[24] I agree with OEHHA's findings on this issue.

Exposures to five-year-average and 24-hour average DPM concentrations are shown in Figures 6 and 7, respectively. The FEIR should have included this type of non-cancer exposure analysis, but it did not. Figures 6 and 7 show elevated air concentrations of DPM at the Greenbriar site. The adverse health effects from these exposures should have been discussed in the FEIR, and should have included considerable consultation with OEHHA.

VI. The FEIR Failed to Assess PM_{10} and $PM_{2.5}$ Ambient Air Concentrations Resulting from On-Site Project Construction Emissions

The FEIR identifies that short-term construction-generated emissions would cause significant air impacts. Furthermore, the FEIR states:

> Construction-generated emissions of NO_x would exceed the SMAQMD's significance threshold of 85 lbs/day, and because of the project's size, PM_{10} emissions would result in or substantially contribute to emission concentrations that exceed the CAAQS.[25]

The FEIR fails, however, to identify the degree to which construction PM_{10} emissions would likely exceed the California Ambient Air Quality Standards (CAAQS). Relying on my experience in modeling similar projects, construction emissions from the Greenbriar Project would likely result in air concentrations exceeding the 24-hour CAAQS, and perhaps the annual average CAAQS for PM_{10}, and the federal and state $PM_{2.5}$ standards as well. The FEIR remains silent on the impacts of construction $PM_{2.5}$ emissions, which will emanate mainly from diesel-fueled equipment.

The FEIR should have included a detailed air dispersion modeling analysis to assess the post-mitigation impacts from construction activities. This assessment should have included both fugitive dust and diesel-combustion emissions from all construction activities. Without this information, the FEIR cannot properly identify whether the proposed mitigation measures will be meaningfully effective.

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[24] Letter from Melanie Marty, OEHHA, to Mr. Larry Greene, SMAQMD, December 11, 2007; Letter from George Alexeeff, OEHHA, to Mr. Larry Greene, SMAQMD, September 26, 2007.
[25] FEIR, p. 6.2-16.

VII. Conclusion

The FEIR is inadequate in assessing the health risks from off-site mobile source emissions at the Greenbriar site. First, FEIR HRA should have been transparent to the reviewer – instead, none of the emissions modeled in the HRA were shown in the FEIR. Second, the FEIR HRA relies on inappropriate future emissions calculations and modeling methods that will underestimate the health risks at Greenbriar. To make matters worse, the FEIR then applies a novel and unacceptable rationale to find that these already underestimated health risks cause less than significant impacts.

The HRA I prepared, using widely-approved methods, clearly shows that excess cancer risks at the Greenbriar site are at least 30 times higher than the accepted significance thresholds. The FEIR HRA finding of less than significant impacts from off-site mobile source emissions is flawed and inappropriate.

Thank you for the opportunity to comment on the Greenbriar FEIR HRA and associated air dispersion modeling.

Sincerely,

Camille Sears

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Attachment: CV

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Sincerely,

Camille Sears

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Attachment: CV

Figure 1:
Three Kilometer Radius
For Determining Rural/Urban Dipsersion

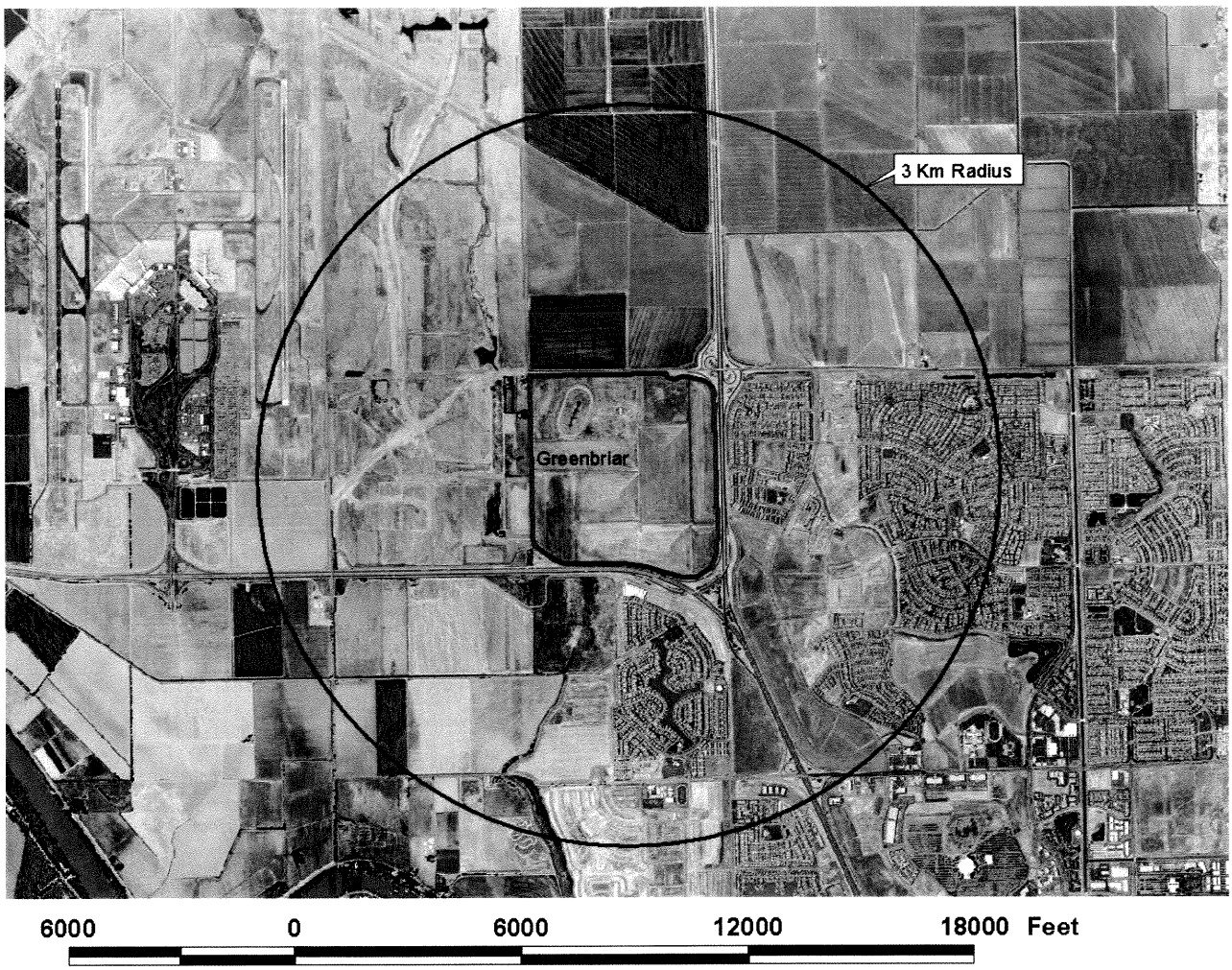

Figure 2:
Excess Cancer Risks from Truck Diesel Exhaust
Comparing 100 per million Risk Isopleths
McClellan AFB Met Data, 1992 - 1996 v.
Sacramento Executive Met Data, 1985 - 1989