RAMBOLL

Instructions for Sac Metro Air District Minor Project and Strategic Area Project Health Effects Screening Tools

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Health Effects Screening Tools

Ramboll conducted photochemical and health effects modeling of hypothetical CEQA projects in Sacramento and neighboring counties with NO_X, ROG and $PM_{2.5}$ emissions at the 82 pounds/day maximum Threshold of Significance (TOS) level. A Minor Project Health Effects Screening Tool (Minor Project Tool) has been developed that allows the user to input the location of their proposed Project in latitude and longitude coordinates (using decimal degrees) and the Minor Project Tool outputs the estimated health effects at the 82 pounds/day emissions rate by spatial interpolating of the health effects from the 41 hypothetical projects locations (see Figure 1) where photochemical and health effects modeling was conducted. The Minor Project Tool will only estimate health effects for Project locations within the Sacramento Federal Nonattainment Area (SFNA[1]).

As not all users know the latitude/longitude of their Project, a Google Earth "kmz" file is provided that will allow the user to identify the latitude/longitude of their project.

Ramboll conducted additional photochemical and health effects modeling for five locations of Strategic Area Projects at different NO_X, ROG and $PM_{2.5}$ emission rates. A Strategic Area Project Health Effects Screening Tool (Strategic Area Project Tool) was developed where the user selects one the 5 modeled Strategic Area Project locations and inputs the NO_X, ROG and $PM_{2.5}$ emission rates for the Project. The Strategic Area Project Tool interpolates the health effects from the modeled emission rates to generate a health effects summary table for the user supplied emissions at the user selected location. The five modeled Strategic Area Project locations are provided in Table 1 and displayed in Figure 1.

Table 1.   Coordinates for 5 hypothetical Strategic Area Projects.

ID	Name	Latitude	Longitude	Location
A	Sacramento	38.579336	-121.494119	10th St. & K St.
B	Rancho Cordova	38.588080	-121.286765	Zinfandel Dr. & White Rock Rd.
C	Woodland	38.677388	-121.765759	Main St. & East St.
D	Vacaville	38.347954	-121.998058	Merchant St. & Lincoln Hwy.
E	West Roseville	38.765833	-121.359299	Fiddyment Rd. & Pleasant Grove Blvd.

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[1] The SFNA consists of Sacramento, Placer, El Dorado, Sutter, Yuba and Yolo Counties and the portions of Solano County that are within the Sacramento Valley

Figure 1. Locations of five strategic area Projects A-E used in the strategic area screening modeling (triangles), along with the 41 hypothetical Projects used in the minor Project analysis (circles with x). Also shown is the boundary of the SFNA in blue.
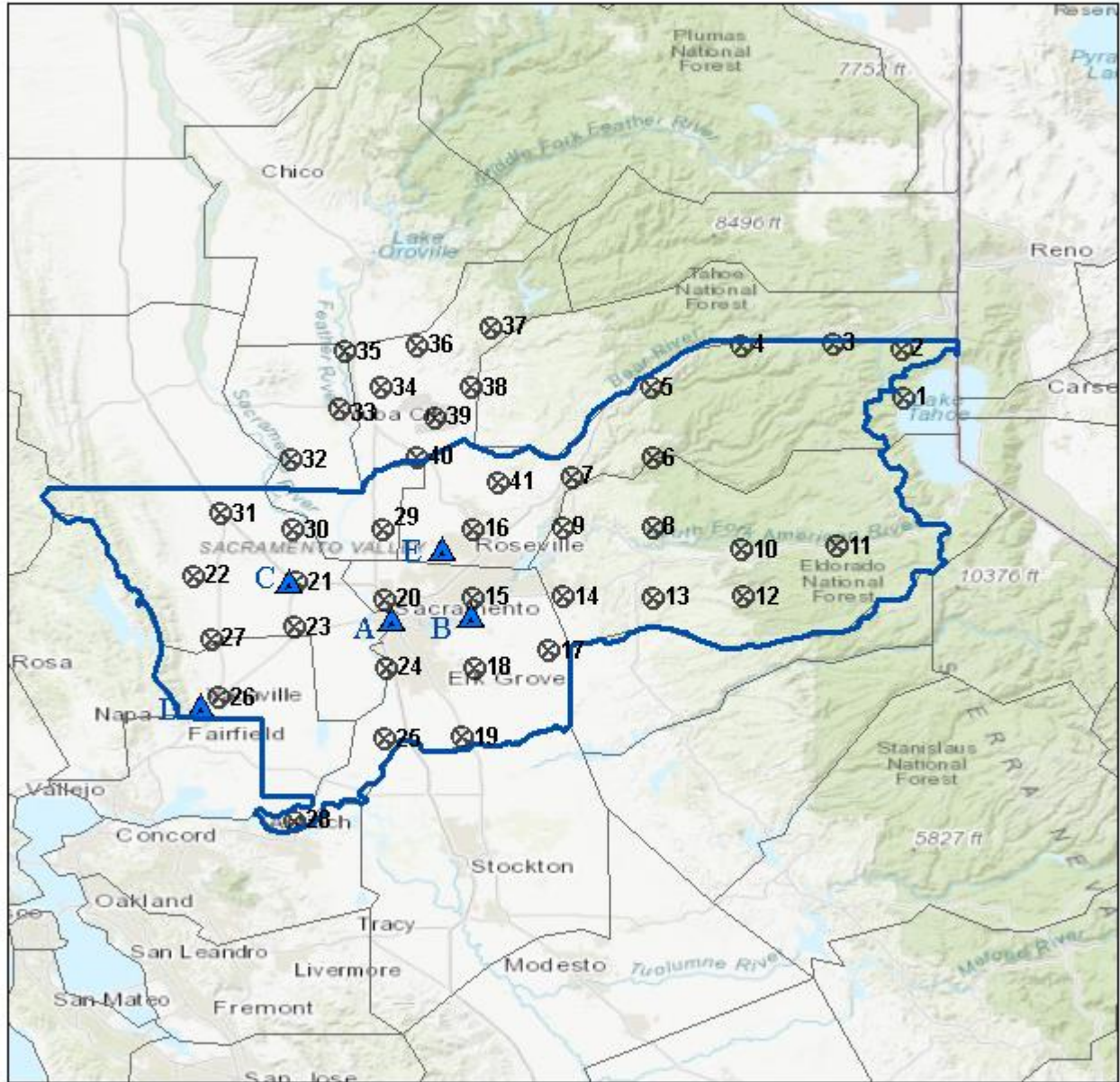
Example Applications

Two hypothetical example applications are discussed below, one for the Minor and one for the Strategic Area Project Tools.

The first hypothetical example is for a Minor Project that is located at Lakeridge Oaks on the shores of Folsom Lake. To get the latitude/longitude location of the proposed Project, the kmz file is used to open Google Earth. The Add Placemark function (top left of Google Earth) is used and pinned to the Project location that displays the latitude (38°42'39.37'') and longitude (121°6'16.69'') as shown in Figure 2. As the Minor Project Tool requires the use of decimal degrees, rather than degree, minute, second format for latitude and longitude, they are calculated as follows:

- 38.71094 = 38 + (42/60) + (39.37/3600)
- -121.10464 = [121 + (6/60) + (16.69/3600)] x -1.0

Note that latitudes are negative in the western hemisphere, so the Google Earth W longitude needs to be multiplied by -1.0. The latitude/longitude are then input into the Minor Project Tool and the tool interpolates the health effects from the 41 hypothetical Projects as shown in Table 2. For example, the Minor Project Tool estimates that for a Project located at Lakeridge Oaks with 82 lbs/day emissions of NO_X, ROG and $PM_{2.5}$ would have 1.75 pre-mature deaths per year due to its $PM_{2.5}$ concentrations, which is a 0.00095% increase in pre-mature deaths over the Background Health Incidence.

Figure 2. Use of Google Earth to calculate the latitude/longitude location for a Project located at Lakeridge Oaks on the shore of Folsom Lake.
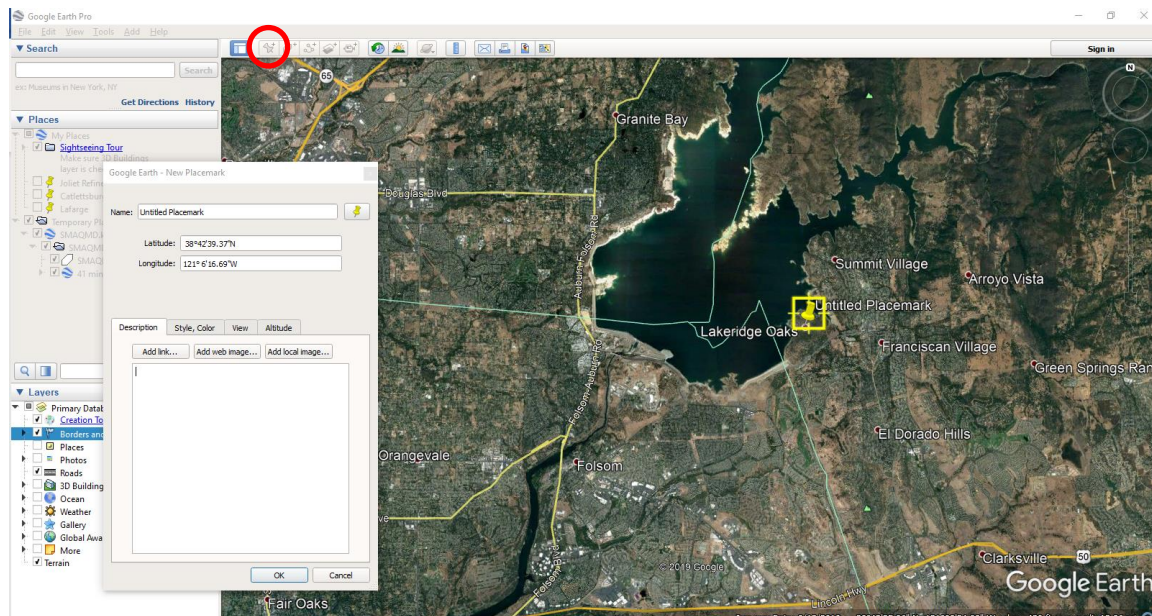
Table 2. Estimated Health Effects from the Minor Project Health Effects Screening Tool for a source located at Lakeridge Oaks on the shore of Folsom Lake.

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Minor Project Health Effects Tool

	A	B	C	D
4	Latitude	38.71094	<-- Step 1: Input latitude (Please chose a value between 38.0 and 39.7)	
5	Longitude	-121.10464	<-- Step 2: Input longitude (Please chose a value between -122.5 and -120.0)	

	PM2.5 Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean)	Percent of Background Health (%)
10	Emergency Room Visits, Asthma	0 – 99	0.55	0.00070
11	Mortality, All Cause	30 – 99	1.75	0.00095
12	Hospital Admissions, Asthma	0 – 64	0.034	0.00038
13	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 – 99	0.124	0.00012
14	Hospital Admissions, All Respirato	65 – 99	0.26	0.00029
15	Acute Myocardial Infarction, Nonf	18 – 24	0.000048	0.00028
16	Acute Myocardial Infarction, Nonf	25 – 44	0.004	0.00036
17	Acute Myocardial Infarction, Nonf	45 – 54	0.0095	0.00033
18	Acute Myocardial Infarction, Nonf	55 – 64	0.0153	0.00032
19	Acute Myocardial Infarction, Nonf	65 – 99	0.073	0.00036

	Ozone Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean)	Percent of Background Health (%)
24	Hospital Admissions, All Respirato	65 – 99	0.063	0.00007
25	Mortality, Non-Accidental	0 – 99	0.040	0.00003
26	Emergency Room Visits, Asthma	0 – 17	0.190	0.00079
27	Emergency Room Visits, Asthma	18 – 99	0.342	0.00062

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The second hypothetical example is for the Strategic Area Project Health Effects Screening Tool. The hypothetical Strategic Area Project is located in downtown Sacramento so Location A at 10th Street and K Street is selected (see Table 1 and Figure 1 for location). The assumed emissions for this example is 2xTOS rate for all three precursor pollutants (i.e., 164 pounds/day for NO_X, ROG and $PM_{2.5}$). Table 3 shows the results from the Strategic Area Project Tool for this hypothetical example. For example, there are 5.5 pre-mature deaths per year due to the hypothetical example Strategic Area Project $PM_{2.5}$ concentrations, which is a 0.0030% increase in pre-mature deaths over the Background Health Incidence due to existing $PM_{2.5}$ concentrations.

Table 3. **Estimated Health Effects from the Strategic Area Project Health Effects Screening Tool for a source located in downtown Sacramento (Location A at 10th & K streets) with NO_X, ROG and $PM_{2.5}$ emissions of 164 lbs/day.**

	A	B	C	D	F
1					
2	Infill Project Health Effects Tool				
3					
4	Infill Source	A. Sacramento	<-- Step 1: Input the source		
5	NOx Emissions	164	<-- Step 2: Input NOx		
6	ROG Emissions	164	<-- Step 3: Input ROG		
7	PM25 Emissions	164	<-- Step 4: Input PM2.5		
9					
10–11	PM2.5 Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean)	Percent of Background Health Incidence[3] (%)	
12	Emergency Room Visits, Asthma	0 - 99	2.197	0.0028	
13	Mortality, All Cause	30 - 99	5.503	0.0030	
14	Hospital Admissions, Asthma	0 - 64	0.141	0.0016	
15	Hospital Admissions, All Cardiovascular (less Myocardial Infarctions)	65 - 99	0.391	0.0004	
16	Hospital Admissions, All Respirato	65 - 99	0.771	0.0009	
17	Acute Myocardial Infarction, Nonfa	18 - 24	0.000	0.0012	
18	Acute Myocardial Infarction, Nonfa	25 - 44	0.017	0.0015	
19	Acute Myocardial Infarction, Nonfa	45 - 54	0.038	0.0013	
20	Acute Myocardial Infarction, Nonfa	55 - 64	0.064	0.0013	
21	Acute Myocardial Infarction, Nonfa	65 - 99	0.251	0.0012	
22					
23					
24–25	Ozone Health Endpoint	Age Range[1]	Incidences (per year)[2] (Mean)	Percent of Background Health Incidence[3] (%)	
26	Hospital Admissions, All Respirato	65 - 99	0.148	0.0002	
27	Mortality, Non-Accidental	0 - 99	0.092	0.0001	
28	Emergency Room Visits, Asthma	0 - 17	0.742	0.0031	
29	Emergency Room Visits, Asthma	18 - 99	1.202	0.0022	
30					

Health Incidences | Linear Model | (+)