MARK PESTRELLA, CHAIR
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April 13, 2023

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SUNSHINE CANYON LANDFILL COMMUNITY ADVISORY COMMITTEE DATA REVIEW REPORT AND HEALTH RISK ASSESSMENT

Enclosed for your consideration is the Health Risk Assessment Report (Report) dated September 2022, prepared by ECORP Consulting, Inc. The Report was commissioned by and prepared for the Sunshine Canyon Landfill Community Advisory Committee. The objective of the Report is to determine the incremental increase in particulate matter (PM) concentration in the area surrounding the Sunshine Canyon Landfill (SCL) and discuss potential health risk associated due to operations at SCL.

Based on the review of the Report, the Los Angeles County Solid Waste Management Committee/Integrated Waste Management Task Force (Task Force) is concerned that the operations at the SCL without appropriate mitigating measures may result in a significant incremental contribution to PM concentrations, diesel and landfill emissions, and elevated health risk in the surrounding community. With increased emissions and PM concentrations, the residents of the communities neighboring the Sunshine Canyon City/County Landfill might continue to experience odor nuisance problems and potential health effects.

It is beneficial that the health and air quality agencies who are pursuing a common goal of mitigating the impact of the landfill's operations on the surrounding community health and safety be aware of this report. The Task Force believes that the results from these studies and assessments will enable the involved agencies to better understand the long-term health risks in the area and take appropriate actions under their respective purviews to mitigate ongoing problem.

With the goal of protecting the public health and safety of the residents and the communities neighboring Sunshine Canyon City/County Landfill (Landfill), the Task Force also respectfully requests that the County Public Health and South Coast Air Quality

Management review and analyze the Report and provide the Task Force with comments within the next 30 days.

As background information, the Task Force was formed pursuant to Chapter 3.67 of the Los Angeles County Code and the California Integrated Waste Management Act of 1989 (Assembly Bill 939, as amended). The Task Force is responsible for coordinating the development of all major solid waste planning documents prepared for the County of Los Angeles and the 88 cities in Los Angeles County. The Task Force also addresses issues impacting the system on a Countywide basis including, but not limited to, ensuring the conformance of the in County solid waste disposal facilities with the Los Angeles County Countywide Siting Element.

Should you have any questions regarding this matter, please contact Mr. Mike Mohajer, of the Task Force, at MikeMohajer@gmail.com or at (909) 592-1147.

Sincerely,

Margaret Clark

Margaret Clark
Los Angeles County Solid Waste Management Committee/
Integrated Waste Management Task Force
Council Member, City of Rosemead

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Enc.

cc: Supervisor Lindsey Horvath (Blake Clayton)
Supervisor Kathryn Barger (Stephanie English)
Los Angeles County Department of Public Health (Barbara Ferrer, Evan Cohen, Muntu Davis, Karen Gork, Dorcas Hanson-Lugo)
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Sunshine Canyon Landfill Community Advisory Committee (Wayde Hunter)
Each Member of the Los Angeles County Board of Supervisors
Each Member of the Los Angeles County Solid Waste Management Committee/ Integrated Waste Management Task Force
Each Member of the Facility and Plan Review Subcommittee

Sunshine Canyon Landfill Community Advisory Committee Data Review Report and Health Risk Assessment

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Prepared For:

Sunshine Canyon Landfill Community Advisory Committee
16911 San Fernando Mission Boulevard
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Prepared By:

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

September 2022

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LIST OF ACRONYMS AND ABBREVIATIONS

µg/m3	Micrograms per cubic meter; ppm = parts per million
BC	Black carbon
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
DPM	Diesel particulate matter
MATES	Multiple Air Toxic Exposure Studies
mph	Miles per hour
NAAQS	National Ambient Air Quality Standards
NO_2	Nitrogen dioxide
NO_x	Nitric oxides
NWS	National Weather Service
O_3	Ozone
OEHHA	Office of Environmental Health Hazard Assessment
PM	Particulate matter
PM_{10}	Coarse particulate matter
$PM_{2.5}$	Fine particulate matter
SCAQMD	South Coast Air Quality Management District
SCL	Sunshine Canyon Landfill
SCL-CAC	Sunshine Canyon Landfill - Community Advisory Committee
SoCAB	South Coast Air Basin
STI	Sonoma Technology Incorporated
TACs	Toxic air contaminants
USEPA	U.S. Environmental Protection Agency
VCAPCD	Ventura County Air Pollution Control District

1.0 INTRODUCTION

The purpose of this report is to determine the incremental increase in particulate matter (PM) concentration in the area surrounding the Sunshine Canyon Landfill (SCL) due to operations at said facility. Two types of PM are analyzed; 1) PM with an aerodynamic diameter under 10 micrometers (PM_{10}) and 2) PM generated from operation of diesel equipment or diesel particulate matter (DPM), generally under one micrometer. PM_{10} has been recognized by the U.S. Environmental Protection Agency (USEPA) and various other air quality regulatory bodies as being harmful to human health at certain levels. DPM is a subset of PM which is emitted from the combustion of diesel fuel and has been found to be especially harmful to human health at any level and accounts for over 66 percent of air toxic health risk in the region surrounding the SCL (SCAQMD 2021).

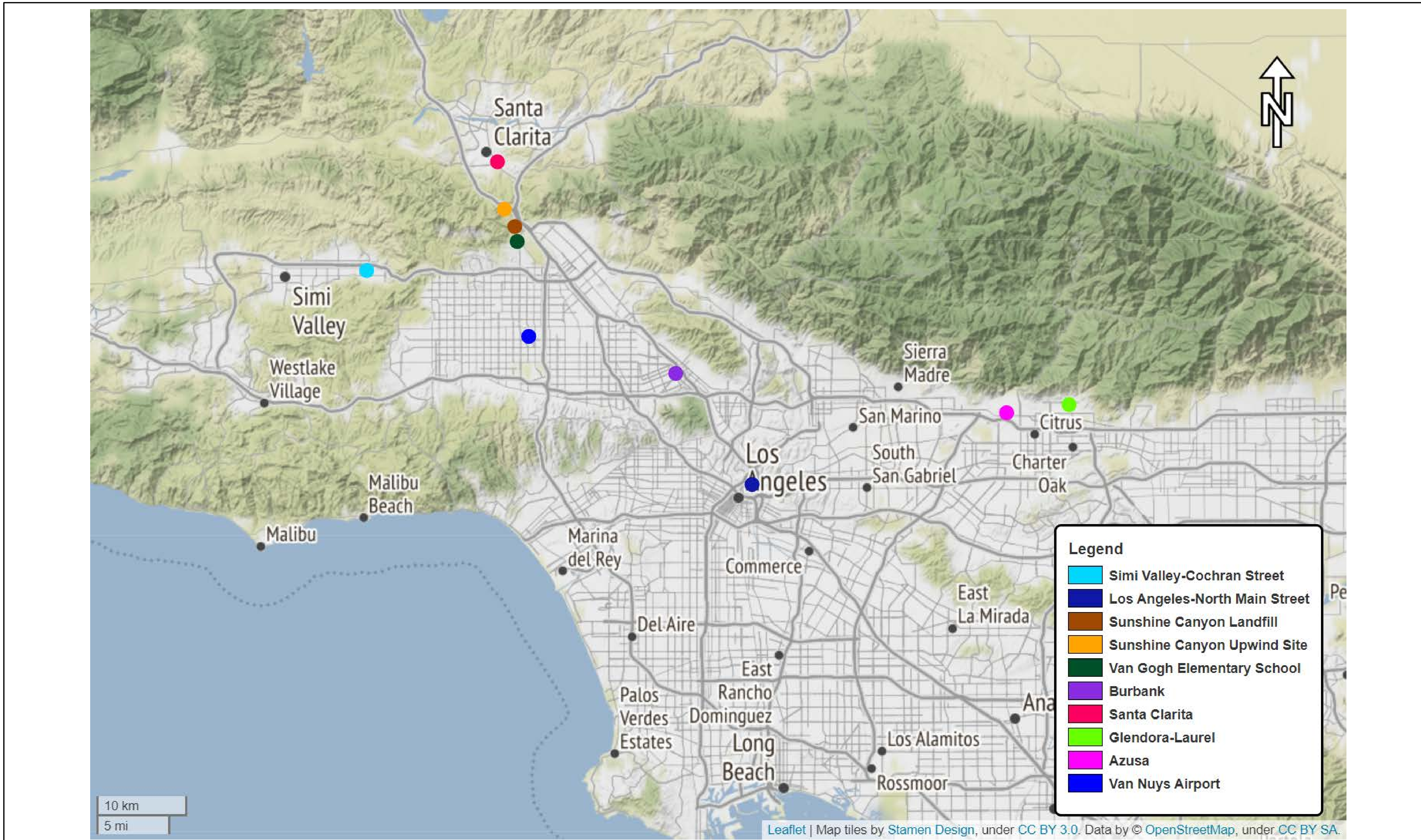
This study utilized over 10 years of PM_{10}, DPM and wind monitoring data provided by the SCL in tandem with calculated emissions and dispersion modeling to estimate the contribution of both DPM and PM_{10} from the SCL in the surrounding community. The findings of this study show that SCL operations result in a significant incremental increase in PM_{10} and DPM concentrations in the surrounding community. In addition, this report shows that an "Upwind" Monitoring Site at the SCL is vital to properly quantify the full amount of PM_{10} and DPM emissions generated at SCL. In 2001, two fixed air quality monitoring sites were established by operators of the SCL. One monitoring site is located on the southern edge of the SCL (Landfill Site). The second site is situated on the Van Gogh Charter School campus located within the adjoining community of Granada Hills (Community Site). A third site collected the same parameters for most of 2016 and the beginning of 2017 to the north (Upwind) of the SCL. These sites were established to monitor PM_{10}, black carbon (BC) as a surrogate for DPM, wind direction, and wind speed, in fulfillment of the stipulations set forth in the City of Los Angeles' Conditions of Approval for the expansion of the Sunshine Canyon Landfill.

Monitored PM_{10} data and modeled concentrations both showed that activities at the SCL frequently result in measurable concentration increases of over the 2.5 $\mu g/m^3$ (micrograms per cubic meter) threshold established by the local air quality control officer (South Coast Air Quality Management District) and occasionally resulting in exceedances of the 50 $\mu g/m^3$ 24-hour California Ambient Air Quality Standard (CAAQS). Monitored data was compared to the Upwind Site when available and to nearby regulatory monitoring stations in the surrounding communities. In addition, directional data was considered and combined with the concentration data in graphical form which shows defined emissions patterns by direction and speed. The modeled data relies upon operational data provided by the landfill; regulatory emission factors and models; meteorological data provided by the SCL (SCL 2021), and data from the South Coast Air Quality Management District (SCAQMD) (SCAQMD 2022). As shown in this report, the link between all 24-hour modeled scenarios and monitoring data is evident, whereas contribution from the SCL to the annual PM_{10} concentration is muted by the numerous other sources in the air basin encompassing the SCL and vicinity (the South Coast Air Basin).

DPM was analyzed utilizing Black Carbon (BC) data collected by the SCL combined with data provided by SCAQMD for reference. BC is highly correlated with DPM and has been used as a proxy for DPM in the South Coast Air Basin (SoCAB) and other areas tracking diesel emissions for the past 20 years (SCAQMD

2020). This study analyzed the significance of the SCL as a source of DPM utilizing SCAQMD health risk guidelines (SCAQMD 2008) and California health risk guidelines (OEHHA 2017). The current regulatory and scientific methods to analyze the health risk from DPM are based on annual concentrations and focus on cancer and chronic (non-cancer) health effects. Thus, annual concentrations and emissions were utilized in the analysis of DPM. As with the PM_{10}, the SCL is one amongst many sources of DPM in the SoCAB and its contribution to the annual average concentration is muted in the annual concentrations. The tools to calculate DPM emissions are highly sophisticated and modeling results correspond to monitored data, as does PM_{10}. In addition, directional analysis graphs are available in Attachment A of this report.

Figure 1 presents the locations of the monitoring stations discussed in this report. The stations on the figure are operated by the SCL (STI 2021) and SCAQMD (CARB 2022) and collect various meteorological and/or pollutant data.



Map Date: *05/02/2022*
Photo (or Base) Source: *OpenStreetMaps, SCL, SCAQMD*

Figure 1. Monitoring Station Locations

2021-248

2.0 PM_{10} DATA REVIEW AND INCREMENTAL ANALYSIS

PM_{10} is classified as a criteria pollutant under the federal Clean Air Act. Criteria air pollutants are defined as those pollutants for which the federal and state governments have established air quality standards for outdoor or ambient concentrations to protect public health with a determined margin of safety. The study area is classified as a non-attainment area of PM_{10} by the state and federal regulators. California and National Ambient 24-hour Air Quality Standards (CAAQS and NAAQS) are promulgated by the California Air Resources Board (CARB) and the USEPA, respectively, and identify levels of concentrations deemed hazardous to human health. Annual standards are established for sustained exposure while 24-hour standards are established to prevent negative health effects from acute events. The hourly data collected is averaged over 24 hours and compared to the CAAQS and NAAQS in the annual monitoring reports prepared by the SLC operator. The SCAQMD has developed thresholds for areas to determine if a land use's contribution to pollutant concentrations in the surrounding community is significant. These thresholds are 2.5 $\mu g/m^3$ of PM_{10} over a 24-hour period and 1.0 $\mu g/m^3$ annually.

PM_{10} concentration data is currently collected hourly at two monitoring sites operated by the SCL. A third monitoring site located north of the Landfill (Upwind Site), was positioned near the end of 2015 and subsequently removed in June 2017. Data collected during this period between the end of 2015 and middle of 2017, when there was a sensor located upwind and downwind of the SCL, provides a more complete view of the air quality at and around the SCL compared with the time periods when no data collected upwind of the SLC.

With winds from the north to northeast sectors, the SCL's contribution to the community is identified by subtracting the concentration of the Upwind Site from that of the Community Site at Van Gogh Elementary School. The SCAQMD also operates multiple PM_{10} monitoring sites throughout the SoCAB. Table 2-1 presents the correlation between the SCL Community Site at Van Gogh Elementary School and three of the closet SCAQMD monitoring sites with the same type of PM_{10} monitoring instrument. Glendora-Laurel and Simi Valley-Cochran Street were selected as "background" stations to determine the incremental PM_{10} contribution from the SCL. These sights had the highest correlated concentrations to the concentrations measured at the SCL Community Site as seen in Table 2-1. Table 2-1 also presents the data recovery at the SCL Community Site for context.

Table 2-1. SCL Community Site at Van Gogh Elementary School Daily PM_{10} Correlations with Nearby SCAQMD/Ventura County APCD Sites

Year	Community Site - Van Gogh Elementary Daily PM_{10} Correlation			Van Gogh Elementary Data Recovery
	Los Angeles-North Main St. (SCAQMD)	Glendora-Laurel (SCAQMD)	Simi Valley-Cochran (Ventura County APCD)	
2015	0.55	0.83	0.85	81 %
2016	0.43	0.70	0.79	84 %
2017	0.55	0.69	0.80	100 %
2018	0.50	0.82	0.87	99 %
2019	0.53	0.37	0.74	98 %
2020	0.77	0.75	0.87	90 %
2021	0.72	0.81	0.87	97 %
All	**0.53**	**0.60**	**0.76**	**93 %**

To find the 24-hour periods with the maximum incremental contribution from SCL during the Upwind Sensor's period of operation, all days over 50 $\mu g/m^3$ at the SCL Community Site at Van Gogh Elementary School were gathered as presented in Table 2-2. 50 $\mu g/m^3$ is the 24-hour CAAQS threshold. Table 2-2 also presents the differences between the background sites and the Van Gogh Community Site and the two sites up and down wind of the SCL. During periods of winds from the north, the difference between the PM_{10} concentration at the Van Gogh Community Site and the average of the Simi Valley and Glendora "background" sites is representative of the incremental contribution from the SCL to PM_{10} concentrations in the surrounding community. With stable winds, the difference between the Upwind and Downwind sites can be looked at as the incremental contribution to PM_{10} concentrations from the SCL at the site boundary.

Table 2-2. SCL Community Site at Van Gogh Elementary School 24-Hour CAAQS Exceedance Days with SCL Upwind Site

Date	Daily [1] PM_{10} Concentrations ($\mu g/m^3$)						
	Van Gogh Elementary School	Glendora/ Laurel	Simi Valley-Cochran Street	Van Gogh - Community Average [2]	SCL Downwind (South)	SCL Upwind (North)	SCL Downwind – SCL Upwind [3]
6/1/2016	50.25	43.52	31.67	**12.66**	48.42	54.63	**-6.21**
7/22/2016	50.67	46.83	38.67	**7.92**	182.88	65.92	**+116.96**
7/23/2016	51.42	50.96	41.50	**5.19**	75.46	69.96	**+5.50**
7/30/2016	128.88	74.63	166.17	**8.48**	152.79	209.38	**-56.59**
9/22/2016	91.29	40.17	63.42	**39.50**	110.41	80.75	**+29.66**
9/23/2016	52.94	47.50	41.38	**8.50**	109.87	45.42	**+64.45**
12/2/2016	76.21	42.87	23.04	**43.26**	245.04	83.63	**+161.41**
12/19/2016	81.77	13.75	13.92	**67.94**	374.67	19.67	**+355.00**

(1) Daily Average is from 12AM to 12AM
(2) Daily Average at Van Gogh Site – Average of Daily Average of Glendora (SCAQMD) and Simi Valley Cochran St. (VCAPCD)
(3) Daily Average of SCL Downwind – Daily Average

Hourly wind data at the SCL monitoring sites was made available for this review and was reviewed with the hourly concentration data for this discussion.

- Winds during 6/1/2016 were generally from the south to southwest with a daily average of 5 mph, thus the CAAQS exceedance on this day was not driven by emissions from the SCL.

- High winds (over 50 mph) from the north through the Newhall pass starting the evening of 7/21/2016 and persisting through the morning of the 7/23/2016 and their effects on dust during operations at the SCL appear to be the cause of the 24-hour exceedances on these days. Hourly concentrations for the SCL Downwind Site are highest during the periods of high winds from the north with measured concentrations at the Community Site at Van Gogh Elementary School sharing the same general pattern.

- During 7/30/2016 high winds from the south resulted in very high concentrations at various monitoring sites throughout the SoCAB. It is likely that this exceedance was caused by an event not related to the SCL.

- No wind data was made available by the SCL during the exceedances on 9/22/2016 and 9/23/2016, however the large difference in SCL upwind and downwind concentrations suggests that the difference between the Community Site at Van Gogh Elementary School and the background sites could be primarily attributed to SCL operations.

- 12/2/2016 and 12/19/2016 both saw similar conditions as 7/22/2016 – 7/23/2016: very high winds from the North driving higher concentrations resulting in an exceedance.

Table 2-3 presents examples of high concentrations at the Community Monitoring Site at Van Gogh Elementary School during the period after the Upwind sensor was removed. Similar scenarios can be viewed during this time. However, it is harder to establish an incremental increase due to the removal of the Upwind sensor.

Table 2-3. SCL Community Site at Van Gogh Elementary School 24-Hour CAAQS Exceedance Days after Upwind Site Removed

Date	Daily PM_{10} Concentrations (µg/m^3)					SCL Daily Vector Average Winds (mph / direction)
	SCL Downwind (South)	Van Gogh Elementary School	Glendora / Laurel	Simi Valley Cochran Street	Van Gogh - Community Average	
12/4/2017	455.69	108.13	48.71	45.79	**60.88**	44 / N
12/17/2017	210.05	54.46	19.91	36.13	**26.44**	44 / N
4/9/2019	193.27	52.75	39.63	59.25	**3.31**	16 / NW
11/26/2019	188.29	123.33	61.29	93.92	**45.73**	2 / N
1/19/2021	227.41	70.26	34.96	63.71	**20.93**	14 / NE
2/25/2021	555.80	84.25	51.54	52.88	**32.04**	33 / NW

(1) Daily Average is from 12AM to 12AM
(2) Daily Average at Van Gogh Site – Average of Daily Average of Glendora (SCAQMD) and Simi Valley Cochran St. (Ventura County APCD)

Emissions and dispersion modeling of the SCL's operational PM_{10} emissions resulted in similar incremental increases in community concentration levels as seen in the monitored data. Table 2-4 presents the modeled incremental contribution to PM_{10} concentrations in the areas surrounding the SCL. The emissions were calculated using regulatory emission factors and activity data provided by the SCL. Dispersion or transport of the pollutants from the SCL sources was modeled using the AERMOD regulatory dispersion model. The AERMOD model has been developed by the EPA and is commonly used for planning and permitting of sources of harmful air pollutant emissions.

Table 2-4 presents the results of the modeling analysis for both Source Configuration 1 and Source Configuration 2. Source Configuration 1 has example sources modeled at various locations within the SCL site boundary. Source Configuration 2 treats the SCL as a large "bowl" and combines emissions from all sources into one large source covering the entire are of the SCL for dispersion modeling. The "bowl" configuration overall resulted in lower offsite concentrations. Higher concentrations are see surrounding the SCL area, with lower concentrations in the community.

Multiple meteorological datasets were used for modeling due to issues with the wind sensor at the Community Site at Van Gogh Elementary School. The two sets of wind data were necessary due to issues with the Van Gogh Community Site wind sensor. The closest available data (Van Nuys Airport) was utilized in place of missing data from the SCL site. A second run was conducted utilizing data only from Van Nuys Airport as well, to be conservative. The processed meteorological data for the Community Site at Van Gogh Elementary School includes noticeably lower wind speeds to the Van Nuys site.

In addition to the meteorological data and source configurations, Urban and Rural scenarios were included in the modeling analysis. The Urban dispersion characteristics were utilized to represent the regulatory defaults. The Rural dispersion characteristics were utilized to better represent the characteristics of the modeling domain as the modeled sources and much of the modeling domain are in a rural area. Thus, the rural characteristics are assumed to be more accurate while the urban characteristics can be used to compare the SCL incremental contribution to regulatory thresholds. Per the isopleths presented in Attachment A of this document, the urban dispersion settings result in higher concentrations closer to the modeled sources while the rural settings resulted in the incremental contribution being spread out over a larger area and higher concentrations within the community. The measured worst-case 24-hour PM_{10} concentrations as presented above are in closer alignment with results from the rural model run scenarios.

Table 2-4. Dispersion Modeling Results – Maximum Modeled Residential PM_{10} Concentration

Wind Data	Source Configuration	PM_{10} Concentration (µg/m^3)	
		24 Hour	Annual
Rural Configuration			
Van Gogh Community Site	Configuration 1 (Sources)	>200	8 – 10
Van Gogh Community Site	Configure 2 (Open Pit)	100 – 200	8 - 10
Van Nuys Airport Site	Configuration 1 (Sources)	50 - 100	4 - 6
Van Nuys Airport Site	Configure 2 (Open Pit)	20 - 50	5 - 6
Urban Configuration (Regulatory Default)			
Van Gogh Community Site	Configuration 1 (Sources)	50 - 60	2
Van Gogh Community Site	Configure 2 (Open Pit)	40 - 50	3
Van Nuys Airport Site	Configuration 1 (Sources)	70 - 80	8
Van Nuys Airport Site	Configure 2 (Open Pit)	50 - 60	7

The ranges presented in Table 2-4 are representative of the modeled increase in PM_{10} concentrations throughout Granada Hills community directly to the south of the SCL operations. Graphics showing the modeled concentrations in the area surrounding the SCL utilizing isopleths can be found in Attachment A of this document.

3.0 DPM HEALTH RISK MODELING BLACK CARBON DATA REVIEW

DPM is considered a toxic air contaminant (TAC) by CARB, TACs are a group of pollutants of concern. TACs are considered either carcinogenic or noncarcinogenic based on the nature of the health effects associated with exposure to the pollutant. There are many different types of TACs, with varying degrees of toxicity. The solid emissions in diesel exhaust are DPM. In 1998, California identified DPM as a TAC based on its potential to cause cancer, premature death, and other health problems (e.g., asthma attacks and other respiratory symptoms). Those most vulnerable are children (whose lungs are still developing) and the elderly (who may have other serious health problems). DPM differs from other TACs in that it is not a single substance but rather a complex mixture of hundreds of substances. Diesel exhaust is a complex mixture of particles and gases produced when an engine burns diesel fuel. DPM is a concern because it causes lung cancer; many compounds found in diesel exhaust are carcinogenic. DPM includes the particle-phase constituents in diesel exhaust. DPM emissions from the SCL include on-road and off-road mobile equipment and a few stationary engines.

DPM is a small component of PM_{10} and is generally emitted at much lower concentrations. However, the health effects from DPM are much more significant than other PM_{10} components and therefore, the overall contribution of the SCL on DPM concentrations will be examined using the incremental increase in (Cancer) risk which is commonly displayed as additional cancer cases in a million. The SCAQMD threshold for significance in terms of planning of new sources and permitting of current sources is 10 additional cases in a million people.

The methodology for calculating DPM emissions, as well as the methodology for meteorological data processing to model DPM dispersion, is identical to PM10, as described in the previous section and in Attachment A of this document. Landfill sources of DPM are shown in Table 3-1.

Table 3-1. DPM Pollutant Source Configuration Scenarios

Emissions Activity	Modeled Source Type	
	Configuration 1	Configuration 2
Off-road Equipment	Volume	Open Pit
Truck Trip - Exhaust	Line Volume	Open Pit
Onsite Idling	Volume	Open Pit

In addition to DPM concentration, the associated health risk for DPM exposure was modeled. Health risk was modeled using the latest software utilized by CARB and SCAQMD with regulatory defaults. Specifically, the HARP2 (22094) air dispersion and risk tool was used consistent with current models and the latest SCAQMD MATES study. The calculations used to determine the cancer risk are beyond the scope of this report but can be reviewed on the HARP2 website (https://ww2.arb.ca.gov/resources/documents/harp-air-dispersion-modeling-and-risk-tool). 30- and 70-year residential scenarios were modeled for this analysis, as presented below. Current significance levels vary throughout California but are generally an increased cancer risk of 10 persons per one million people. Table 3-2 presents the results of the modeling analysis for the various scenarios. It should be noted that there are other pollutants emitted from the SCL which contribute to cancer health risk, however DPM is the primary driver of cancer risk and was the only pollutant included in the modeling calculations for this analysis.

Table 3-2. Risk Modeling Results – Maximum Cancer Risk

Wind Data	Source Configuration	Risk (In a million)	
		30 Year	70 Year
Rural Configuration			
Van Gogh Community Site	Configuration 1 (Sources)	25	50
Van Gogh Community Site	Configure 2 (Open Pit)	25	35
Van Nuys Airport Site	Configuration 1 (Sources)	15	20
Van Nuys Airport Site	Configure 2 (Open Pit)	15	20
Urban Configuration (Regulatory Default)			
Van Gogh Community Site	Configuration 1 (Sources)	17	19
Van Gogh Community Site	Configure 2 (Open Pit)	10	12
Van Nuys Airport Site	Configuration 1 (Sources)	45	50
Van Nuys Airport Site	Configure 2 (Open Pit)	19	25

Sensors were used to collect BC concentrations at the SCL for the same period as PM10 concentrations were collected. The same charts were produced and included in Attachment A of this document during the same 'worst case' or maximum exposure period. Directional patters in BC concentrations are evident in both onsite (South and North) and the Community Site at Van Gogh Elementary School. Annual patterns for BC are relatively consistent with the MATES V Burbank Monitoring Station operated by SCAQMD. BC data is generally only collected in areas with high amounts of diesel equipment and truck operation, thus an analysis similar to that conducted in Tables 2-1 through 2-3 was not possible.

4.0 CONCLUSION

As shown in Table 4-1, the analysis of modeled and monitored concentrations and health risk shows that operations at the SCL result in a significant incremental contribution to PM_{10} concentrations and elevated health risk in the surrounding community. Incremental contributions to PM_{10} concentrations at residential areas appear to be up to 68 μg/m^3 from the monitoring data and over 100 μg/m^3 from the modeled data. PM_{10} 24-hour modeling results are consistent with monitoring data, when available. Incremental annual PM_{10} concentrations are difficult to observe in the monitoring data but appear to be approximately 8 – 10 μg/m^3 from the modeling data. The modeling conducted on DPM emissions from SCL-related operations at and in the immediate area (1,000 feet) of the SCL are over twice the level of significance utilized in multiple regulator scenarios. Data problems with the SCL wind sensors made modeling of multiple scenarios necessary. For all planning and permitting purposes a health conservative approach is taken, thus the "worst-case" results are presented in Table 4-1. Only monitored values during the period that the Upwind sensor was deployed are presented in Table 4-1. An Upwind sensor is needed for monitoring-based analysis of a source's contribution, especially with such a strong directional component.

Table 4-1. Results – Sunshine Canyon Landfill Incremental Contribution to Surrounding Community

Scenario	Modeled Value	Monitored Value	SCAQMD Significance Threshold	Units
24-hour PM_{10} Concentration	> 200	68	2.5	μg/m3
Annual PM_{10} Concentration	8 - 10	--	1.0	μg/m3
DPM 70 Year Cancer Risk	50	--	10	In a million

5.0 REFERENCES

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LIST OF Attachments

ATTACHMENT A

Detailed Analysis with Calculations and Figures

Sunshine Canyon Landfill Community Advisory Committee Data Review Report and Health Risk Assessment
Technical Attachment

Prepared For:

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Prepared By:

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ENVIRONMENTAL CONSULTANTS

September 2022

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$\mu g/m^3$	Micrograms per cubic meter; ppm = parts per million
BAM	Beta attenuation monitor
BC	Black carbon
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
DPM	Diesel particulate matter
FEM	Federal eqivalent method
MATES	Multiple Air Toxic Exposure Studies
mph	Miles per hour
NAAQS	National Ambient Air Quality Standards
NO_2	Nitrogen dioxide
NO_x	Nitric oxides
NWS	National Weather Service
O_3	Ozone
OEHHA	Office of Environmental Health Hazard Assessment
PM	Particulate matter
PM_{10}	Coarse particulate matter
$PM_{2.5}$	Fine particulate matter
SCAQMD	South Coast Air Quality Management District
SCL-CAC	Sunshine Canyon Landfill - Community Advisory Committee
SoCAB	South Coast Air Basin
STI	Sonoma Technology Incorporated
TACs	Toxic air contaminants
USEPA	U.S. Environmental Protection Agency
WHO	World Health Organization

1.0 INTRODUCTION

In 2001, two fixed air quality monitoring sites were established by operators of the Sunshine Canyon Landfill. One monitoring site is located on the southern edge of the Sunshine Canyon Landfill (Landfill Site). The second site is situated on the Van Gogh Charter School campus located within the adjoining community of Granada Hills (Community Site). These sites were established to monitor particulate matter less than 10 microns in aerodynamic diameter (PM_{10}), black carbon (BC) as a surrogate for diesel particulate matter (DPM), wind direction, and wind speed, in fulfillment of the stipulations set forth in the City of Los Angeles' Conditions of Approval for the expansion of the Sunshine Canyon Landfill within the corporate boundaries of the City of Los Angeles and subsequent conditions set forth by the County of Los Angeles Department of Regional Planning and Public Works, governing ambient air quality monitoring for the County portion of the Landfill. (A third monitoring site located north of the Landfill (Upwind Site), was positioned near the end of 2015 and subsequently removed in June 2017.)

Beginning in 2007, the ambient monitoring protocol was revised to incorporate continuous sample collection whereas previous monitoring was limited to four events per year. November 2018 marked the completion of 11 years of continuous monitoring and meteorology data collection at the two monitoring locations. Air quality monitoring reports[1] were prepared to present the data captured by the monitoring and are formatted in a manner that presents a compilation of current and prior year monitoring events.

Appointed by the Los Angeles City Council, Los Angeles County Board of Supervisors and Los Angeles Unified School District, the Sunshine Canyon Landfill-Community Advisory Committee (SCL-CAC) has the responsibility to be informed of the operations of the Sunshine Canyon Landfill and report to its management and their municipal oversight organizations, the concerns of the community. The SCL-CAC contends the air quality monitoring reports provide a voluminous amount of data without providing context to the extent that identified pollutant concentrations affect public health. While the data is robust there is no interpretation which informs the community of its significance.

This report has been commissioned by the SCL-CAC to interpret and evaluate the available data presented in the air quality monitoring reports in order to concisely and understandably characterize the impact of landfill emissions on the health of individuals who reside within the local community. This analysis aims to make the following data accessible and user-friendly to the public:

- An evaluation of the implications of over 12 years of monitoring data conducted by the Sunshine Canyon Landfill operator.
- A comparison of other monitoring data collected by the South Coast Air Quality Management District (SCAQMD), the air pollution control officer for the region, and other agencies.

[1] The air quality monitoring reports, prepared by Sonoma Technology Inc., can be accessed via direct link at: https://planning.lacity.org/about/commissions-boards-hearings#sunshine Depending on the search engine used, additional steps may be required as follows: A. Navigate to: https://planning.lacity.org/ B. Click "About" tab (top left) C. Under "Meetings" (middle), Click "Commissions, Boards, & Hearings" D. Once on this page, you will see a Header to Click "Sunshine Canyon"

- Pollutant concentrations in the adjoining community as a result of the activities conducted as part of the routine operations of the Sunshine Canyon Landfill.
- The air quality standards governing the region and a calculated (modeled) health risk assessment of the activities conducted as part of the routine operations of the Sunshine Canyon Landfill.

Using the information from 11 years of continuous monitoring and meteorology data collection at the two monitoring locations coupled with current regulatory models, other data received from the operator of the Sunshine Canyon Landfill such as details surrounding the number of garbage collection haul trucks traveling to and from the landfill and offroad equipment employed at the landfill, and observational data collected by various agencies, this report provides context surrounding the landfill's estimated contribution to PM_{10} and DPM concentrations in the surrounding neighborhoods. While regulatorily required data is presented in this report and regulatory models are used, this report itself is for informational purposes only and does not represent the opinions of any regulatory bodies.

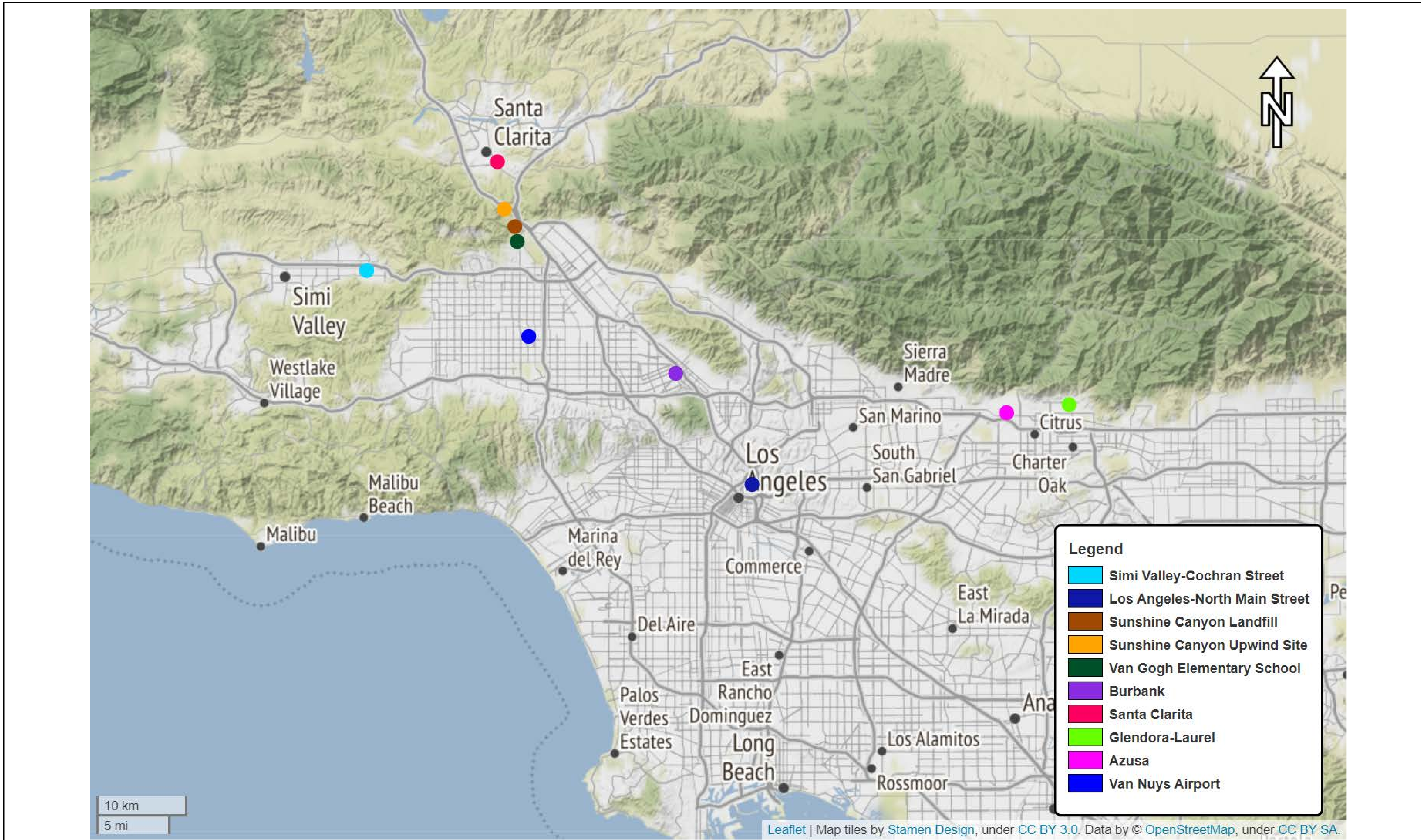
As previously described, in 2001 two fixed air quality monitoring sites were established by the operator of the Sunshine Canyon Landfill. This report divides the data collected by the operator of the Landfill and related modeling analysis into two sections, the first focusing on PM_{10} and the second on DPM. The two different pollutants are generally regulated in two different ways: PM_{10} concentrations are compared against National and California Ambient Air Quality Standards (NAAQS and CAAQS) while DPM is converted into a number representing the intensity of potential health risk. DPM cannot be measured directly but is quantified using BC measurements.[2] The effects of the landfill on surrounding PM_{10} concentrations are more evident through measured data, while the DPM/BC analysis relies more heavily on modeled data and calculated emissions.

The Sunshine Canyon Landfill is located in the northwestern section of the South Coast Air Basin (SoCAB). The SoCAB is home to many sources of air pollution and some of the highest levels of associated health risk in the United States (SCAQMD 2021). There are many air quality monitors, gridded data products, modeling tools and academic studies to utilize when quantifying pollutant concentrations and associated health risk in the SoCAB. These sources of information can be used to inform the public, permitting decisions, and land use policy decisions. The data collected by the Sunshine Canyon Landfill operator are "used to characterize ambient PM_{10} and BC concentrations on a neighborhood scale, in the context of the SoCAB, and to evaluate the impact of landfill operations on air quality in the community" (STI 2021). The instruments used at the Sunshine Canyon Landfill are federal equivalent method (FEM) and similar quality, thus data collected from these instruments can be comparable to data collected by regulatory agencies for California and Federal regulatory purposes.

Figure 1 presents the three sites which have been used by the Sunshine Canyon Landfill to collect particulate matter and meteoritical data along with the other sites utilized in this analysis for the purpose of comparison. In addition to the pollutant concentration data, meteorological data is also included in this

[2] It is noted that BC concentrations are included within any measured PM_{10} concentration, yet 90 percent of DPM is less than 1 micron (PM_1). The smaller size and composition of DPM makes it especially harmful as it reaches deeper into the lungs and is composed of more harmful materials.

analysis. The site is positioned in an area with multiple topographical influences on air flow. For instance, wind, as experienced at the Landfill, is channeled through the Newhall Pass producing measured hourly onsite wind speeds of over 80 miles per hour (mph). Thus, Figure 1 utilizes a topographical base map to illustrate differences in elevation and proximity to large features.



Map Date:*05/02/2022*
Photo (or Base) Source: *OpenStreetMaps, SCL, SCAQMD*

Figure 1. Monitoring Station Locations

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Wind data is presented as wind roses which show 'petals' from 16 different wind directions representing the frequency of wind blowing from a direction. Figure 2 shows measured wind data from selected stations available for modeling along with data collected by the Sunshine Canyon Landfill operator. The petals of the wind roses represent the frequency at the direction that the wind is blowing from. Thus, the petal on the top or north section of a wind rose represents winds coming from the north.

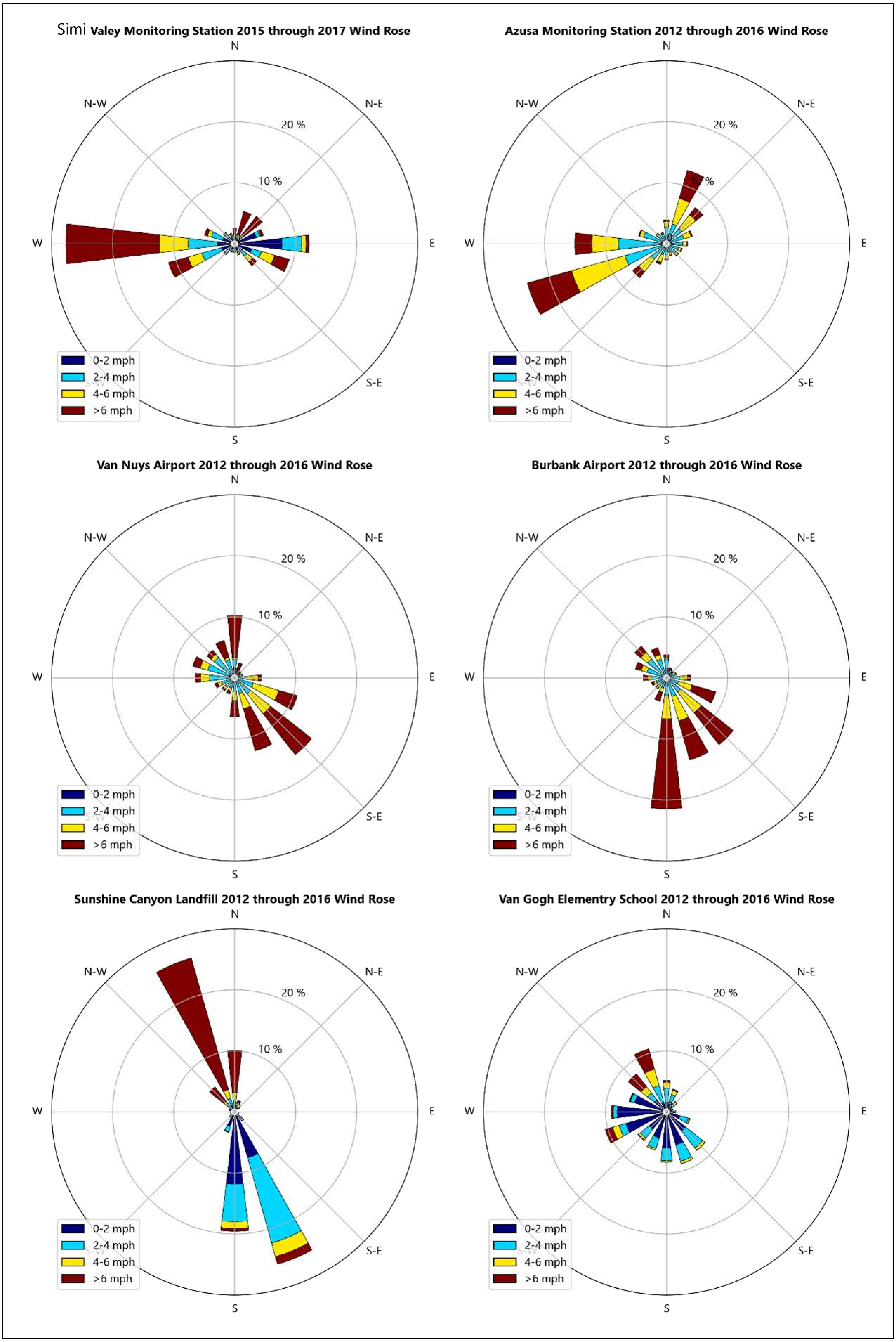

Figure 2. Wind Roses - Sunshine Canyon Landfill & Surrounding Sites

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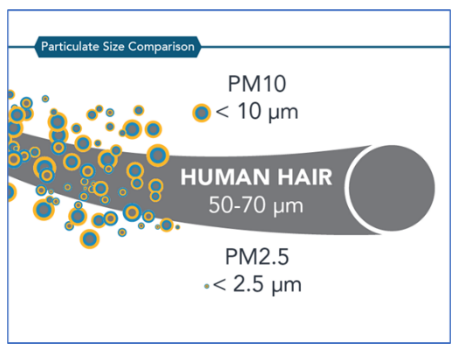
2.0 PM$_{10}$ DATA REVIEW AND INCREMENTAL ANALYSIS

2.1 Background

PM$_{10}$ is classified as a criteria pollutant under the federal Clean Air Act. Criteria air pollutants are defined as those pollutants for which the federal and state governments have established air quality standards for outdoor or ambient concentrations to protect public health with a determined margin of safety. Criteria pollutants are regulated by the Environmental Protection Agency (USEPA) with most enforcement and implementation delegated to state and local air quality agencies, such as the California Air Resources Board (CARB) and SCAQMD. Criteria pollutants include PM$_{10}$, fine particulate matter (PM$_{2.5}$), nitrogen oxide (NO$_x$), carbon monoxide (CO), ozone (O$_3$) and sulfur dioxide (SO$_2$) among a few others. The USEPA and CARB designate air basins or portions of air basins and counties as being in "attainment" or "nonattainment" for each of the criteria pollutants. Areas that do not meet the standards are classified as nonattainment areas. The NAAQS (other than O$_3$, PM$_{10}$ and PM$_{2.5}$ and those based on annual averages or arithmetic mean) are not to be exceeded more than once per year. The NAAQS for O$_3$, PM$_{10}$, and PM$_{2.5}$ are based on statistical calculations over one- to three-year periods, depending on the pollutant. The CAAQS are not to be exceeded during a three-year period. The primary criteria pollutants of concern in the SoCAB are O$_3$, PM$_{10}$ and PM$_{2.5}$. The region is currently designated as a nonattainment area for the federal O$_3$ and PM$_{2.5}$ standards and is also a nonattainment area for the state standards for O$_3$, PM$_{2.5}$ and PM$_{10}$ (CARB 2019).

Particulate matter is monitored by both manual and real-time instruments. The manual instruments consist of a filter that is weighed before and after a sampling period (generally 24 hours), the difference between the two weight measurements and the flow through the instrument are used to calculate the concentration of the particulates. The most common real-time measurement method is similar to the manual testing in that it has a filter, however the filter is on a spool and the concentration is determined by shining beta rays through the filter and measuring the amount blocked by the particulate matter deposited on the filter. The Beta Attenuation Monitor (BAM) has a sample period of one hour that includes time for particle deposition on the filter 'tape', measurement with beta rays, and movement of the filter tape. PM$_{10}$ and PM$_{2.5}$ are the most common particulate sizes to be measured by both methods and are presented relative to the size of a human hair (see insert). All PM$_{10}$ data included in this analysis are from BAM instruments. Thus, no instrument corrections or instrument to instrument comparisons are discussed in this report.



2.2 PM$_{10}$ Modeling Analysis

2.2.1 PM$_{10}$ Modeling Methodology

Emissions Calculations

This report provides PM$_{10}$ emission calculations intended to capture emissions from all sources related to operations at the Sunshine Canyon Landfill. Calculated PM$_{10}$ emissions include fugitive dust resulting from

Landfill-related vehicle traffic and material storage and handling. PM_{10} emissions from all natural sources, such as dust emissions from Santa Ana wind events or emissions related to wildfires, are not included in this modeling exercise. In addition, the modeled emission calculations contained in this report do not account for any transportation sources located over 1,000 feet from the Sunshine Canyon Landfill. Operational data used to calculate the emissions can be found in Appendix A, which includes calculation data in tabular format with source information.

Stationary and mobile sources are regulated differently and generally by different regulatory bodies. Stationary sources are primarily regulated by the regional air pollution control officer, SCAQMD, while mobile sources are regulated by CARB. Thus, the SCAQMD regulates all stationary sources at the Landfill through a permitting process while the mobile sources onsite must adhere to CARB's on-road and offroad diesel regulations. Both stationary and mobile sources are included in this analysis.

Meteorological Data Processing

AERMET was used to process the meteorological data collected at the Van Gogh Monitoring Site. The AERMET provides a general-purpose meteorological preprocessor for organizing available meteorological data into a format suitable for use by the AERMOD air quality dispersion model, using hourly surface observations from the National Weather Service (NWS), Federal Aviation Administration, or other sources (AERMOD is a steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain). Per SCAQMD guidance, the ADJ_U* option was used for all modeling calculations (USEPA 2021). ADJ_U* is now a regulatory option in the AERMOD modeling system, which adjusts the surface friction velocity parameter in the surface file (SCAQMD 2021).

Wind Speed and direction from the Van Gogh Elementary Site were combined with San Diego (NKX) upper air data and supplemental meteorological parameters from the Van Nuys Airport monitoring site for the "Van Gogh" modeling calculations. A secondary meteorological scenario using SCAQMD's Van Nuys preprocessed meteorological data was also utilized. Wind roses for all relevant sites used to inform meteorological conditions can be seen in Figure 2 above. As previously described, wind roses display the frequency of the wind by direction and speed. The petals of the wind roses represent the frequency at the direction that the wind is blowing from. Thus, the petal on the top or north section of a wind rose represents winds coming from the north.

In is noted that valid wind speed and direction data has not been collected at the Landfill-operated Van Gogh 'Community' Monitoring Site by the Landfill operator since 2017 due to a database issue associated with the monitoring and meteorology data collection (STI 2021). This lack of data is problematic and places greater uncertainly on the validity of the rest of the dataset prepared by the Landfill operator, since the "missing" data equates to approximately 50 percent of the total wind data collected at the Community Site. The missing data from the Van Gogh 'Community' Monitoring Site was substituted by the landfill operator with data collected at a SCAQMD-operated monitoring station in Glendora, at least 40 miles to the east of the Sunshine Canyon Landfill. There was no "AERMOD ready" meteorological for the Glendora site, so it was not considered for this analysis. Additionally, as seen in Figure 1, there are monitoring stations substantially closer to the Landfill than the Glenora site and thus employed in this analysis as being more representative than the Glendora monitoring site.

Dispersion Modeling

This analysis includes dispersion modeling conducted using AERMOD version 21112. Two separate source configuration scenarios, known hereafter as Configuration 1 and Configuration 2, were modeled. Configuration 1 utilizes line volume sources, volume sources, area sources, and point sources to represent the PM_{10} emissions generated from onsite Landfill sources. Configuration 2 utilizes an open pit source to simulate emissions from operations spread out throughout the Sunshine Canyon Landfill area. Both source configuration scenarios assumed an operational schedule of 6:00 A.M. to 6:00 P.M., Monday through Friday and 7:00 A.M. through 12:00 P.M. on Saturdays. Both configurations are representative of "health conservative" scenarios to be consistent with other similar analysis (OEHHA 2018). Health conservative means that sources have been placed as close as possible to sensitive receptors for modeling purposes in order to obtain a worst-case scenario. In addition, as explained in the report section of this document Urban and Rural Monitoring configurations were utilized.

Each source configuration modeling scenario is shown in Table 2-1 below. Detailed modeling source files can be found in Appendix B of this document.

Table 2-1. PM_{10} Pollutant Source Configuration Scenarios

Emissions Activity	Modeled Source Type	
	Configuration 1	Configuration 2
Offroad Equipment	Volume	Open Pit
Truck Trip – Exhaust	Line Volume	Open Pit
Onsite Idling	Volume	Open Pit
Paved Road Fugitive Dust	Line Volume	Open Pit
Unpaved Road Fugitive Dust	Line Volume	Open Pit
Flare Combustion	Points	Open Pit
Wind Erosion – Material Piles	Area	Open Pit
Drop Points	Points	Open Pit

2.2.2 PM_{10} Modeling Concentration Results

Table 2-2 presents the results of the modeling analysis for both Configuration 1 and Configuration 2. Isopleths for each scenario can be found in Appendix B of this document. The results of the modeling are fairly consistent with monitored data. The processed meteorological data for the Van Gogh Site includes noticeably lower wind speeds which likely resulted in the conditions which led to the significantly higher PM_{10} concentrations.

Table 2-2. Dispersion Modeling Results – Maximum Modeled Residential PM_{10} Concentration

Wind Data	Source Configuration	PM_{10} Concentration (µg/m^3)	
		24 Hour	Annual
Van Gogh Community Site (Collected by Landfill Operator) Supplemented by Van Nuys Airport Site)	Configuration 1 (Sources)	>200	8 – 10
	Configure 2 (Open Pit)	100 – 200	8 - 10
Van Nuys Airport Site	Configuration 1 (Sources)	50 - 100	4 – 6
	Configure 2 (Open Pit)	20 – 50	5 - 6

2.3 Monitored PM_{10} Data Review

PM_{10} data is currently collected hourly at the two monitoring sites operated by the Sunshine Canyon Landfill. As previously stated, a third monitoring site located north of the Landfill (Upwind Site), was positioned near the end of 2015 and subsequently removed in June 2017. The hourly data collected is averaged over 24 hours and compared to California and National Ambient 24-hour Air Quality Standards (CAAQS and NAAQS) in the annual monitoring reports prepared by the Landfill operator. CAAQS and NAAQS are promulgated by CARB and the USEPA, respectively, and identify levels of concentrations deemed hazardous to human health. CAAQS standards are generally lower than the NAAQS; however, there is a greater difference in the PM_{10} standard than most other pollutant standards. For instance, the PM_{10} 24-hour NAAQS is 150 micrograms per cubic meter (µg/m^3) while the CAAQS is 50 µg/m^3. As a further point in comparison, the latest World Health Organization (WHO) 24-hour standard is 45 µg/m^3. All standards have been established utilizing the latest science to identify the point concentration levels of a pollutant can become harmful to human health. Annual standards are established for sustained exposure while 24-hour standards are established to prevent negative health effects from acute events.

Figure 3 shows the rolling 24-hour PM_{10} concentrations over the period of record at the Landfill-operated monitoring stations minus the upwind station. In addition to the Landfill-operated sites, the Ventura County Air Pollution Control District's Simi Valley monitoring site and the SCAQMD's Glendora-Laurel air quality monitoring site are included for context as they are located west and east of the Sunshine Canyon Landfill, respectively, and are in similar proximities to roadway and other sources. In addition to the concentration data at these sites, the 24-hour NAAQS and CAAQS are displayed along with the PM_{10} concentrations experienced during the Saddle Ridge Wildland Fire event.

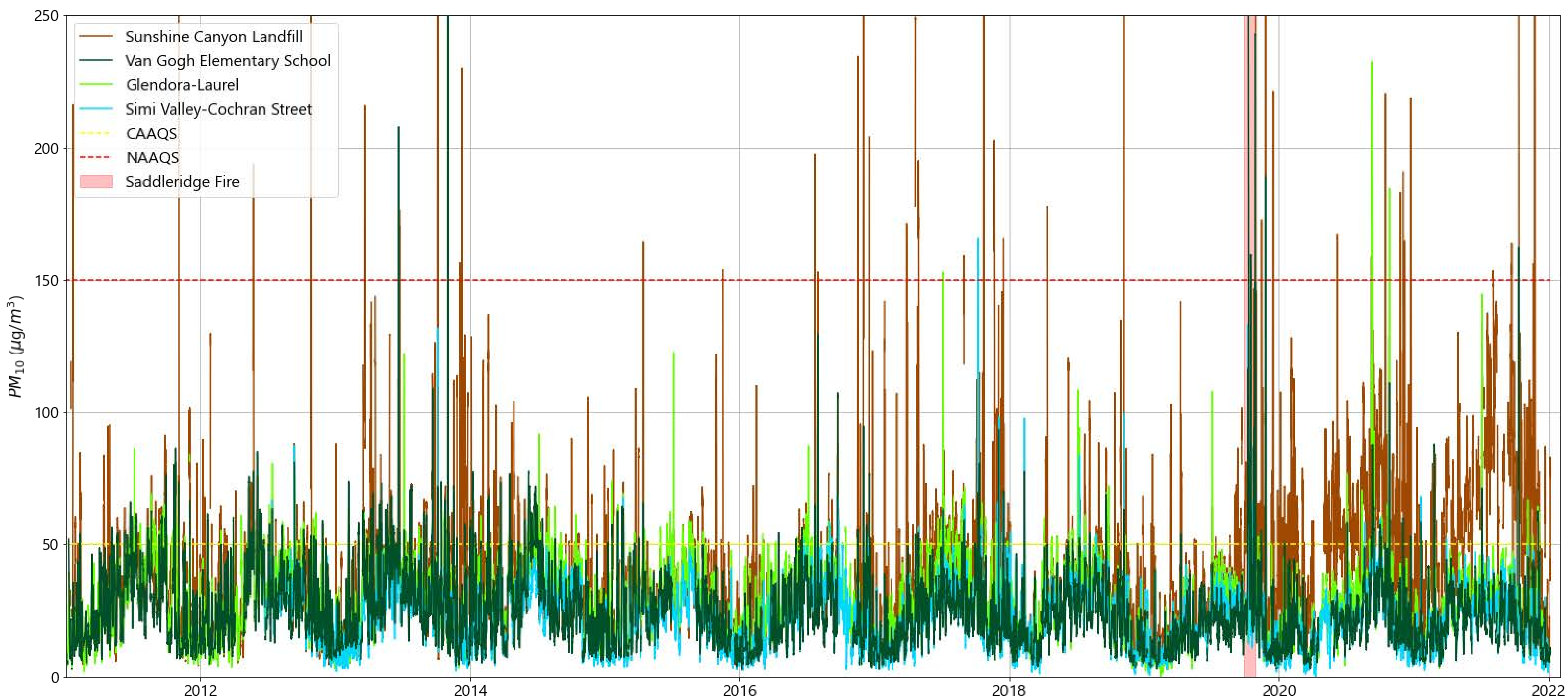


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Photo (or Base) Source: *ECORP Consulting 2022*

Figure 3. 24-Hour PM_{10} Average Concentrations 2011 - 2021

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As shown in Figure 3, a relatively constant pattern of higher overall concentrations occurs during the summer and spring months, during periods of high winds, during the day, and during cooler nights. However, there are exceedances of the 50 ug/m^3 CAAQS throughout the year at all sites. This pattern is constant with the rest of the SoCAB.

Figure 4 shows the annual average PM_{10} concentrations over the period of record at the Landfill-operated monitoring stations.

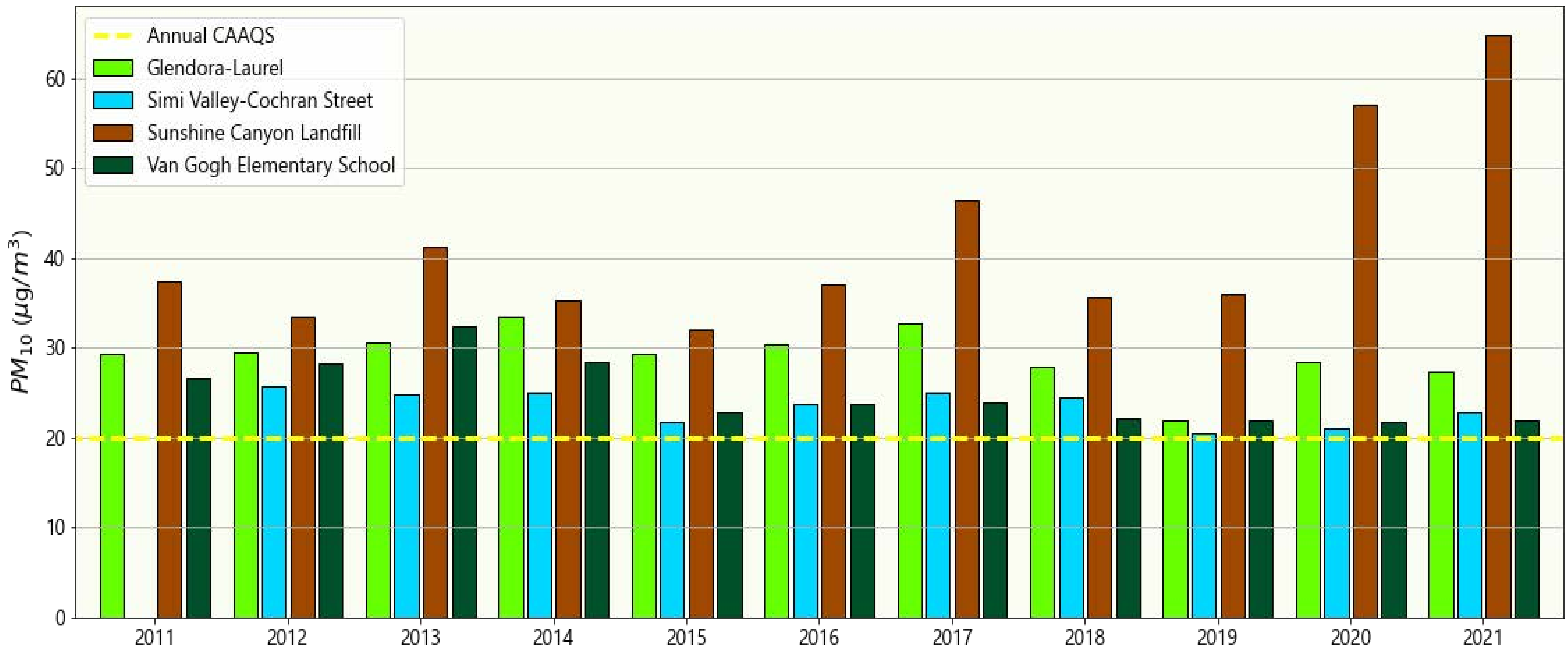

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Photo (or Base) Source: *ECORP Consulting 2022*

Figure 4. Annual PM_{10} Average Concentrations 2011 - 2021

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Figure 5 presents the difference between the daily average PM_{10} concentrations at the Van Gogh Monitoring Site and the average of the Glendora and Simi Valley daily average PM_{10} concentrations. The most noticeable difference is during the Saddle Ridge wildland fire event in late 2019. However, there are multiple other periods with 'spikes' signaling the effects of a localized source on measured PM_{10} concentrations at the Community Site. While this is not a perfect tool for determining localized effects, it can be used to identify the periods when there are localized effects. The daily Glendora and Simi Valley Sites have correlation values of 0.56 and 0.63 with the Van Gogh Community Site's daily PM_{10} values, respectively, as calculated by Microsoft excel CORREL function. The rolling 24-hour averages during winter months can be found in Appendix B of this document. The timeseries graphs in Appendix B show that there are time periods of higher correlation than others, but all three sites generally track closely.

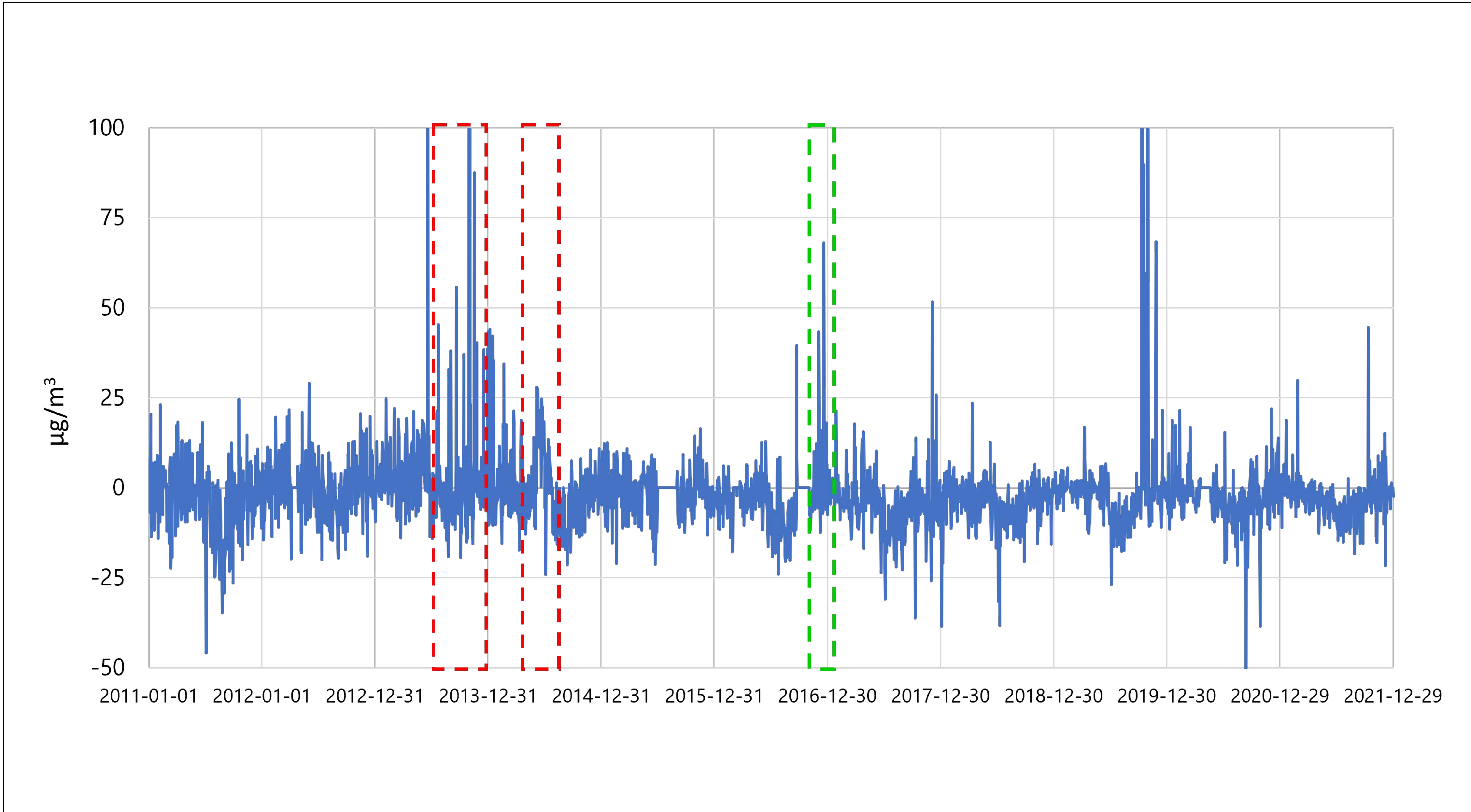

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Figure 5. PM_{10} Concentration Difference Between Background and Van Gogh Monitoring Stations

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PM_{10} concentrations during selected periods are displayed via the pollution plots below and in Appendix B of this document. Pollution plots display the direction and magnitude of wind 'blowing from' as the location and the concentration displayed as the 'color of' a point on a chart. Pollution plots can be overlayed on maps to provide context. The higher value points are put over the lower value points as higher values are of greater concern than lower values. Pollution plots at the Van Gogh Monitoring Site were available up to June 2017, as there is no valid wind data at this station after this time. Specific time periods of concern were graphed in Figure 5 above for further analysis using the pollution plots shown in Figures 6 and 7. The shape of pollution plots are similar to wind rose when created for the same time period, however the 'y' direction in the pollution plots represents speed while the 'y' direction of the wind rose depicts frequency. Any points on the pollution plot figures (see Figure 6 and 7) below that are not in dark blue are considered elevated PM_{10} concentrations as 50 $\mu g/m^3$ is the excepted short-term standard.

The figures below represent the periods of elevated PM_{10} data at the Van Gogh Elementary School. The analysis periods for Figures 6 and 7 are identified in Figure 5 in red. (Figure 5 also has a section outlined in green which identifies the period of analysis for the extended analysis in Appendix B.)

Figure 6 presents the data from June 1, 2013, through December 31, 2013, at the Van Gogh Site. During this time, the majority of the higher PM_{10} concentrations occur during periods of light winds from various directions, with a clear elevated concentrations from the SoCAB to the south of the site. Periods with lighter winds have less favorable dispersion conditions, including low capping inversion layers that frequently result in the elevated concentrations. Figure 6 also identifies elevated hourly PM_{10} measurements coming from the northern sectors during times with higher winds. As shown, during periods of high winds from the north there are variable PM_{10} concentrations including measurements above 100 $\mu g/m^3$, which is indicative of a localized source in the northern direction. The only large source to the north of the Van Gogh Community Site is the Sunshine Canyon Landfill.

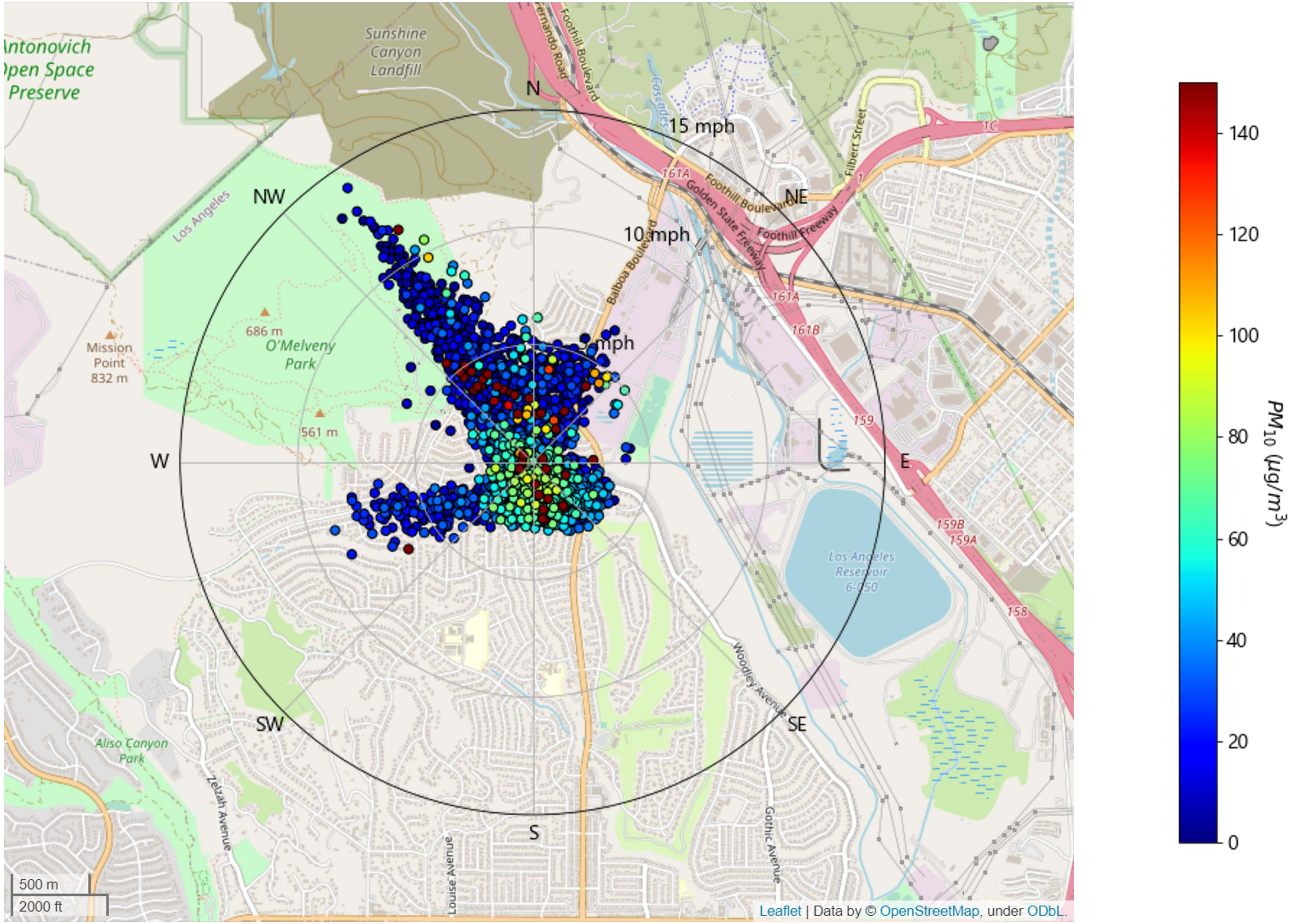

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Figure 6. PM_{10} Concentrations with Wind Speed and Direction at Van Gogh Community Site (6/1/2013 - 12/31/2013)

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Figure 7 presents data from a period with overall lower winds, however there are similar patterns as seen in Figure 6. There is a defined influence from the SoCAB seen as the elevated concentrations from lighter winds from the southern sectors. There are also elevated concentrations from the northern sectors during periods of higher and low wind speeds showing the influence of the Sunshine Canyon Landfill.

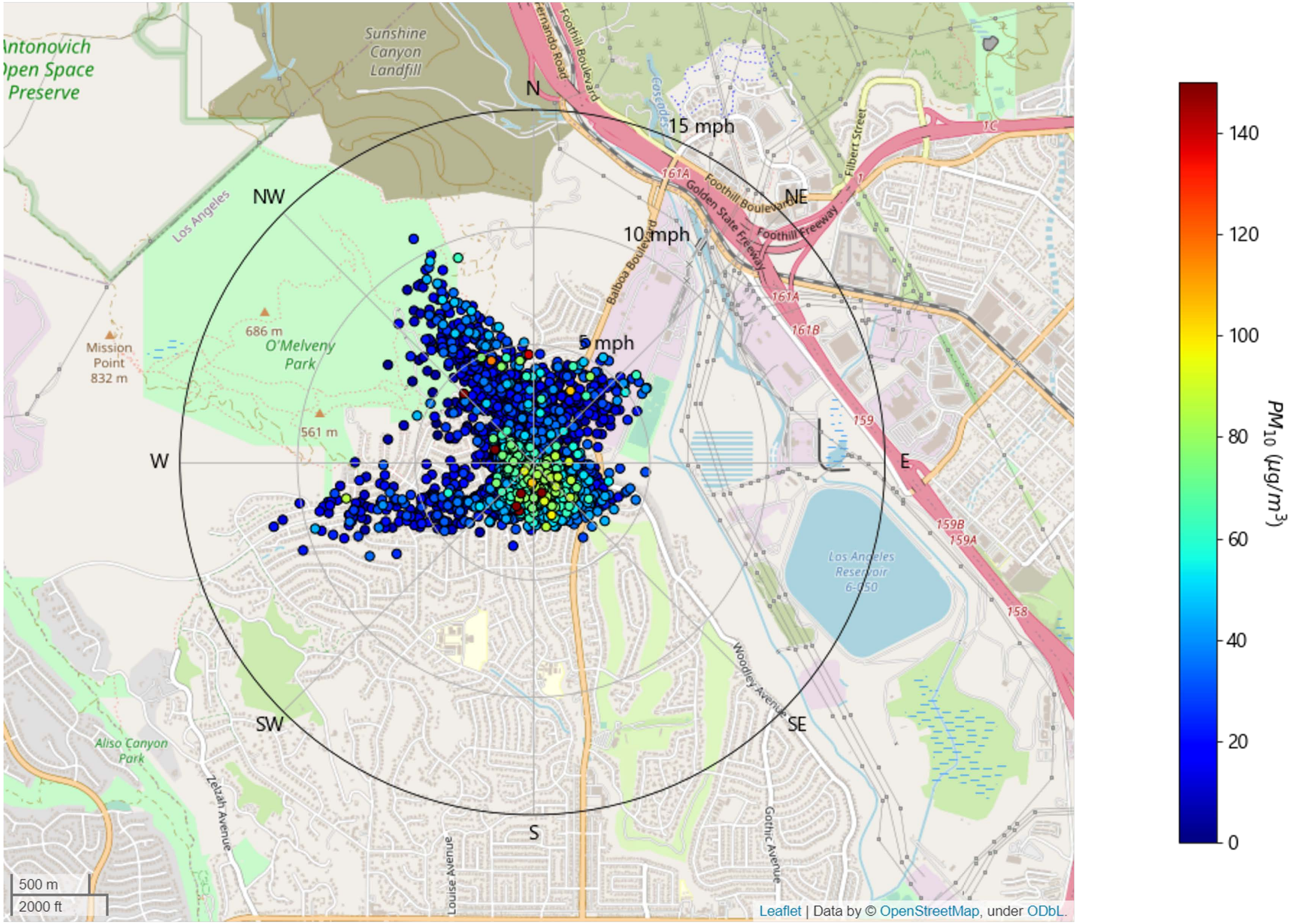

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Figure 7. PM_{10} Concentrations with Wind Speed and Direction at Van Gogh Community Site (2/1/2014 - 5/31/2014)

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The figures in Appendix B (Figures B.1 through B.8) present the pollution plots for all Landfill-operated monitoring sites with time series graphs which appear to represent the worst-case or maximum Sunshine Canyon Landfill contribution to PM_{10} concentrations scenario from available data. The timeseries graph, which includes the Simi Valley and Glendora sites, show that there are elevated PM_{10} concentrations at the Landfill-operated monitoring sites (including the Van Gogh Community Monitoring Site) that are not seen at the other sites. There are also very clear directional components from the direction of the Landfill at the Landfill Site and Community Site monitoring stations. On December 19, 2016, the a daily average concentration was measured at the Landfill Site at 374 $\mu g/m^3$ compared to a 20 $\mu g/m^3$ daily average seen at the Upwind Site on the same day. On the same day, the Van Gogh Community Site daily average was 81 $\mu g/m^3$ higher than the Simi/Glendora average and 68 $\mu g/m^3$ higher than the Upwind Site. These values are similar to the dispersion modeling results of the 'worst case' scenario identified by modeling calculations and presented in this report. Heavy winds during the day mixed with poor dispersion conditions during the night along with continued Landfill operations look to be the primary influencers of this high PM_{10} concentration event.

There have been days with elevated concentrations observed at the Van Gogh Community Site and the Landfill Site after 2017, however the Upwind Site has no longer been in operation and no wind data at the Van Gogh Community Site is available during this time. Thus, December 2016 is used as the representative worst-case scenario for PM_{10} concentrations.

December 2016 is used as the representative worst-case scenario for DPM/BC concentrations as well. As shown below, the DPM/BC concentrations showed elevated concentrations from the landfill's direction, however appeared to be driven primarily by wind speed. The SoCAB DPM/BC contribution during periods of poor dispersion is evident in the Van Gogh Community Site's DPM/BC pollution plot with elevated concentrations present, but less evident from the northern sectors. As DPM/BC particles are smaller than dust (PM_{10}), they generally do not travel as far and localized effects are not as easy to spot. However, the effects from these smaller particles are evident in lower concentrations as described in the DPM/BC modeling section below.

3.0 DPM HEALTH RISK AND BLACK CARBON DATA REVIEW

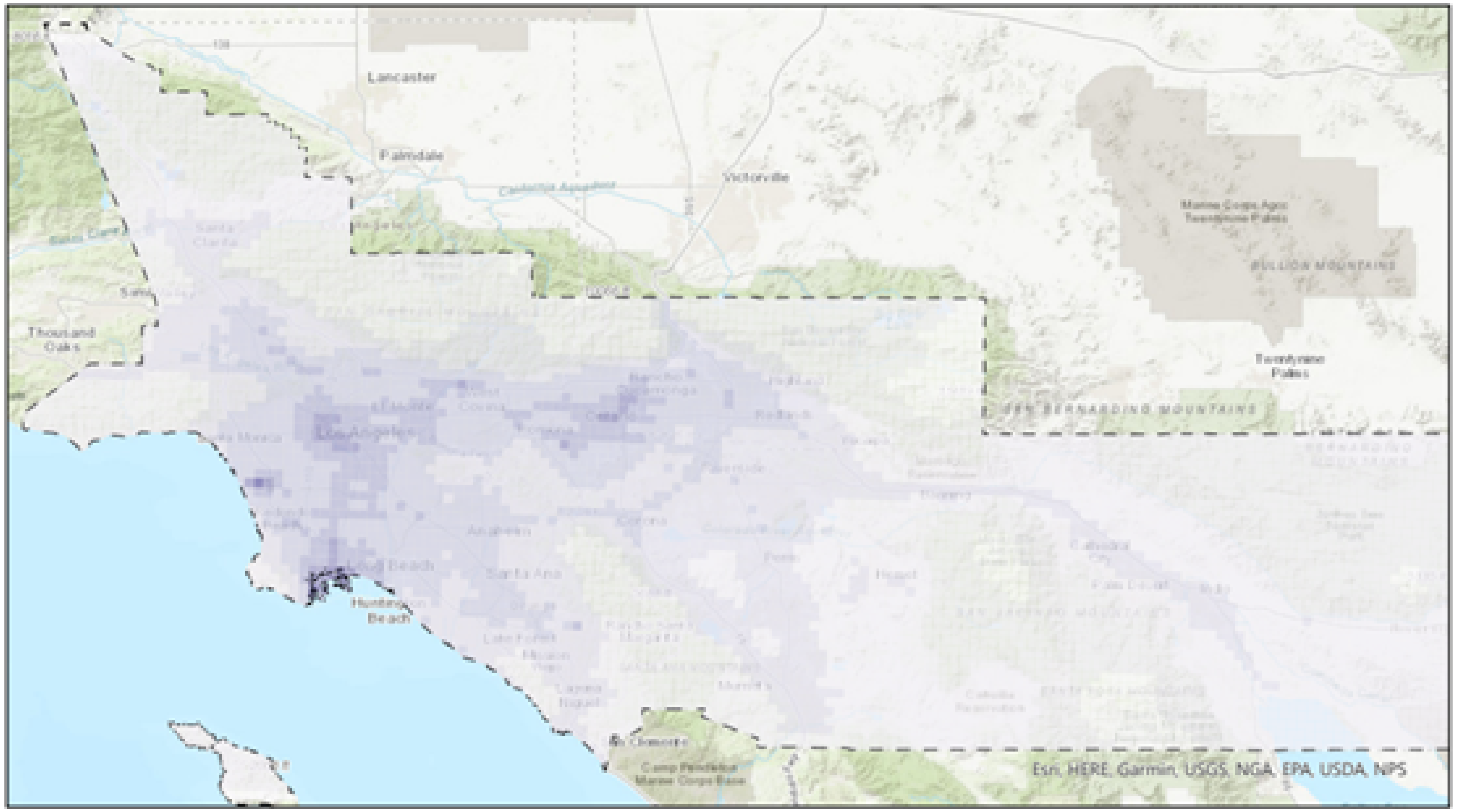
3.1 Diesel Particulate Matter Background

DPM is considered a toxic air contaminant (TAC) by CARB, TACs are a group of pollutants of concern. TACs are considered either carcinogenic or noncarcinogenic based on the nature of the health effects associated with exposure to the pollutant. There are many different types of TACs, with varying degrees of toxicity. The solid emissions in diesel exhaust are known as diesel particulate matter (DPM). In 1998, California identified DPM as a TAC based on its potential to cause cancer, premature death, and other health problems (e.g., asthma attacks and other respiratory symptoms). Those most vulnerable are children (whose lungs are still developing) and the elderly (who may have other serious health problems). DPM differs from other TACs in that it is not a single substance but rather a complex mixture of hundreds of substances. Diesel exhaust is a complex mixture of particles and gases produced when an engine burns diesel fuel. DPM is a concern because it causes lung cancer; many compounds found in diesel exhaust are carcinogenic. DPM includes the particle-phase constituents in diesel exhaust. DPM emissions from the Sunshine Canyon Landfill include on-road and off-road mobile equipment and a few stationary engines.

The SCAQMD has conducted five Multiple Air Toxics Exposure Studies (MATES) with the first one published in 1987 and the latest study released in 2021, utilizing 2018 data. The latest two MATES studies have included various gridded data products produced using large scale health risk modeling including all significant sources across the SoCAB. Figure 8 shows the breakdown of the health risk by pollutant in the zip code representing the Community Site (91344), as modeled in the MATES V (2018) study. Like most of the SoCAB, the risk from DPM constitutes approximately 65 percent of the total cancer risk. Benzene is the second largest contributor to risk and is also largely a result of on-road sources and vehicle filling stations. In the 91344-zip code, the overall modeled health risk is an increased cancer risk in 368 persons per one million people, as calculated for the latest SCAQMD MATES V study. In general, the calculated health risk is reducing year over year in the SoCAB as evidenced by the fact that the calculated risk in the MATES IV study was significantly higher than MATES V.

As further shown in Figure 8, the risk is greatest in areas with the most traffic and industrial areas such as the Ports of Los Angeles and Long Beach. The majority of the risk across the SoCAB is a result of DPM exposure, and this is consistent with the health risk breakdown in the Granada Hills area. Other large DPM sources in proximity to the Landfill Site and Van Gogh Community Site are primarily roadway sources. However, risk from DPM, which is a localized pollutant, is likely to vary across the grid cell to some extent.

Cancer Risk - MATES V, Multi-Pathway



Residential Air Toxics Cancer Risk Calculated from Model Data in Grid Cells

Cancer Risk [per million]

- 0 - 100
- 101 - 250
- 251 - 400
- 401 - 550
- 551 - 700
- 701 - 850
- 851 - 1000
- 1001 - 1150
- 1151 - 1300
- 1301 - 1450
- 1451 - 1600
- 1601 - 4800
- South Coast AQMD Boundary

Map Date: *5/2/2022*
Photo (or Base) Source: *SCAQMD 2022*

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Figure 8. MATES V Gridded Cancer Risk Map

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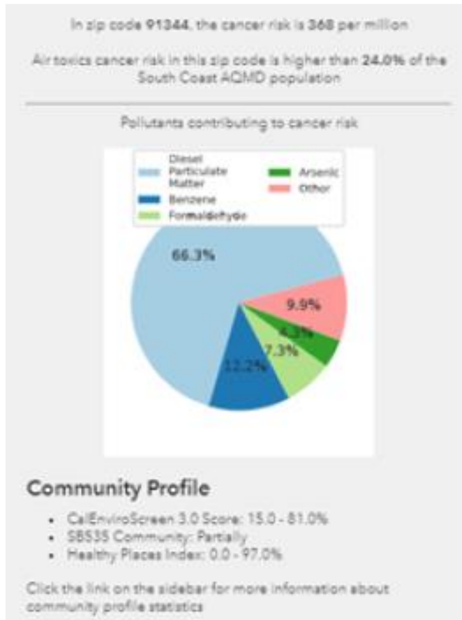
The following insert identifies the breakdown of the risk drivers, as obtained from SCAQMD's MATES V website (SCAQMD 2021), for the 91344 (Granada Hills) zip code. As shown, health risk is primarily driven by DPM exposure. On-road sources such as garbage trucks and other heavy-duty trucks associated with the Sunshine Canyon Landfill are likely captured in the MATES V risk analysis, as roadways sources and fleet mixes are extensively studied. It is unclear if the non-road diesel equipment is included in the MATES V risk determinations.



3.2 Diesel Particulate Matter Modeling Analysis

3.2.1 Diesel Particulate Matter Modeling Methodology

The methodology for calculating DPM emissions as well as the methodology for meteorological data processing to model DPM dispersion, is identical to PM_{10}, as described in Section 2.2.1 above. It is noted however, that Sunshine Canyon Landfill sources of PM_{10} differ slight from its sources of DPM. Landfill sources of DPM are shown in Table 3-1.

Table 3-1. DPM Pollutant Source Configuration Scenarios

Emissions Activity	Modeled Source Type	
	Configuration 1	Configuration 2
Off-road Equipment	Volume	Open Pit
Truck Trip - Exhaust	Line Volume	Open Pit
Onsite Idling	Volume	Open Pit

In addition to DPM concentration, the associated health risk was modeled. Health risk was modeled using the latest software utilized by CARB and SCAQMD with regulatory defaults. Specifically, the HARP2 (22094) air dispersion and risk tool was used consistent with current models and the latest SCAQMD MATES study. The calculations used to determine the cancer risk are beyond the scope of this report, but can be reviewed on the HARP2 website (https://ww2.arb.ca.gov/resources/documents/harp-air-dispersion-modeling-and-risk-tool). 30- and 70-year residential scenarios were modeled for this analysis as presented below. Current significance levels vary throughout California but are generally an increased cancer risk in 10 persons per one million people. The SCAQMD risk levels are 10 in a million for significance in various context. Mobile and stationary sources are regulated separately, but as discussed above are both modeled together for this analysis.

3.3 Diesel Particulate Matter Health Risk Modeling Results

Table 3-2 presents the results of the modeling analysis for the various scenarios. Isopleths for each scenario are available in Appendix B of this document. As with the PM_{10}, the results of the modeling are fairly consistent with monitored data. It should be noted that there is additional cancer health risk as a result of pollutants other than DPM at the Landfill, but for the purposes of this report, only DPM was included in the modeling calculations.

Table 3-2. Health Risk Modeling Results – Maximum Modeled Residential DPM Concentration

Wind Data	Source Configuration	Cancer Risk (per Million)	
		30-Year	70-Year
Van Gogh Community Site (Collected by Landfill Operator)	Configuration 1 (Sources)	20 - 50	50
	Configure 2 (Open Pit)	20 – 50	20 - 50
Van Nuys Airport Site	Configuration 1 (Sources)	10 - 20	20
	Configure 2 (Open Pit)	10 – 20	10 - 20

3.4 Monitored Black Carbon Data Review

Aethalometers were used to collect BC at the Sunshine Canyon Landfill for the same period that PM_{10} was being collected. The same charts were produced and included in Appendix B of this document during the same 'worst case' or maximum exposure period. Directional patters in BC concentrations are evident in both onsite (South and North). Annual patterns for BC are relatively constant with the MATES V Burbank Station. Timeseries graphs are available in Appendix B but were not included in this document as there is less comparison data available for BC from other sources.

4.0 REFERENCES

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Sonoma Technology Incorporated. 2021. Thirteenth Annual Report of Ambient Air Quality Monitoring at Sunshine Canyon Landfill and Van Gogh Elementary School: A Thirteen-Year Summary November 22, 2007–November 21, 2020. Accessed at: https://planning.lacity.org/about/commissions-boards-hearings#sunshine

South Coast Air Quality Management District. 2021. Multiple Air Toxics Exposure Study in the South Coast AQMD. Accessed at: http://www.aqmd.gov/docs/default-source/planning/mates-v/mates-v-final-report-9-24-21.pdf?sfvrsn=6

U.S. Environmental Protection Agency. 2021. User's Guide for the AERMOD Meteorological Preprocessor (AERMET). Accessed at: https://gaftp.epa.gov/Air/aqmg/SCRAM/models/met/aermet/aermet_userguide.pdf

LIST OF APPENDICIES

APPENDIX A

Emissions Calculations

Sunshine Canyon Landfill
Emissions Summary

Table A-1. Maximum Daily Criteria Pollutant Emissions					
	AERMOD	Daily Emissions (lbs/day)		Annual Emissions (tpy)	
Emissions Activity	Source Type	PM_{10}	DPM	PM_{10}	DPM
Mobile Emissions					
Nonroad Equipment	Volume	9.25	9.25	1.32	1.32
Truck Trip - Exhaust	Line Volume	0.09	0.09	0.013	0.01
Onsite Idling	Volume	0.14	0.14	0.02	0.02
Stationary Emissions					
Paved Road Fugitive Dust	Line Volume	234.08	-	33.47	-
Unpaved Road Fugitive Dust	Line Volume	2,027.61	-	289.95	-
Flare Combustion (From SCAQMD Inventory)	Points	62.24	-	8.90	-
Wind Errosion - Material Piles	Area	207.70	-	37.91	-
Drop Points	Points	4.98	-	0.02	-
	Total Emissions	**2,546.10**	**9.49**	**371.61**	**1.36**

Sunshine Canyon Landfill
Diesel Fired Offroad Equipment Pollutant Emissions Calculations

Table A-2. Equipment Information						
Description	**Number**	**Horsepower**	**Load Factor**	**Fuel Type**	**Hours per Day**	**Days per Year**
100K Pound Class Waste Compactors	6	300	0.42	diesel	6	286
D8/D9 Class Bulldozers	7	600	0.42	diesel	6	286
D6R LGP Class Bulldozer	2	800	0.42	diesel	6	286
325 Excavator	1	800	0.42	diesel	6	286
Motor Grader	1	600	0.42	diesel	6	286
4000 Gallon Water Trucks	3	500	0.42	diesel	6	286
637 Scrapers	2	500	0.42	diesel	6	286
627 Scrapers	1	500	0.42	diesel	6	286
621 Water Wagon (8000 gallons)	1	600	0.42	diesel	6	286
A40 Articulating Dump Truck	1	600	0.42	diesel	6	286
Light Plants	10	50	0.42	diesel	6	286
Fuel/Lube Truck	2	300	0.42	diesel	6	286
Wheel Loader	1	250	0.42	diesel	6	286
Pick-up Trucks	14	285	0.42	gasoline	6	286
Mechanic Trucks	4	285	0.42	gasoline	6	286
EnviroCover Deployer	2	350	0.42	diesel	6	286

Source: JTD Amendment App Package (Revised 2018) page 682 of 813 based off of 12,100 tpd Waste

Table A-3. Nonroad EPA Emission Factors by Engine Size and Tier				
	DPM Emission Rate (g/bhp-hr)			
	Tier 2	**Tier 4t**	**Tier 4f**	
Fuel Type	**50%**	**25%**	**25%**	**Composite**
25 < hp < 50	0.45	0.075	0.03	0.251
hp > 175	0.15	0.075	0.03	0.101

Notes: Tier 4t is 2011 "transitional" standard and 4f is the 2015 final standard

Per SCL current (2022) Engine mix is assumed to be 50% Tier 2 and 50% Tier 4 (25%t and 25%f)

Equations:

1. Daily Emissions (lb/day) = Operation Time (hr/day) * Horsepower * load factor (%) / 453 (g/lb)
2. Annual Emissions (tpy) = Daily Emissions (lb/day) * 286 (dpy) / 2,000 (lb/ton)

Sunshine Canyon Landfill
Diesel Fired Offroad Equipment Pollutant Emissions Calculations

Table A-4. Nonroad Emissions		
	DPM Emission Rate	
Equipment	**lb/day**	**tpy**
100K Pound Class Waste Compactors	1.01	0.14
D8/D9 Class Bulldozers	2.37	0.34
D6R LGP Class Bulldozer	0.90	0.13
325 Excavator	0.45	0.06
Motor Grader	0.34	0.05
4000 Gallon Water Trucks	0.84	0.12
637 Scrapers	0.56	0.08
627 Scrapers	0.28	0.04
621 Water Wagon (8000 gallons)	0.34	0.05
A40 Articulating Dump Truck	0.34	0.05
Light Plants	0.70	0.10
Fuel/Lube Truck	0.34	0.05
Wheel Loader	0.14	0.02
Pick-up Trucks		
Pick-up Trucks		
Mechanic Trucks	0.64	0.09
Total	**9.25**	**1.32**

Acronyms

CO	carbon monoxide	PM	particulate matter
CO_2	carbon dioxide	PM_{10}	PM less than 10 microns in diameter
N_2O	nitrous oxide	$PM_{2.5}$	PM less than 2.5 microns in diameter
NOx	nitrogen oxide	g/bhp-hr	grams per break horsepower hour

Sunshine Canyon Landfill
Diesel Truck Exhaust Emission Calculations

Table A-5. Modeled Roadway Dimensions (All Scenarios)				
Roadway Link Description	AERMOD ID	Length (miles)	Width (m)	Area (m^2)
Paved	SLINE1	0.88	7.4	10,466
Unpaved	SLINE2	1.00	7.4	11,954

(1) All roadways modeled as two lanes with standard 3.7 meter width per lane.

(2) Site to Montague captures eastbound and westbound traffic

(3) Onsite Milage estimated as average round trip onsite.

Table A-6. Total Trip Information (All Scenarios)	
Trip Type	Trips
Average Daily Trips[1]	800

(1) Average Daily Truck trips are are one way.

Table A-7. Vehicle EMFAC2021 Emission Rates (All Scenarios)			
	PM_{10} Exhaust Emission Rates (g/mi)		
Vehicle Type	5 mph	15 mph	Composite
T7 SWCV Class 8	0.043	0.027	0.014

(1) DPM rates EMFAC2021 PM_{10} 2022 exhaust emission factors for Heavy-Heavy Duty Solid Waste Collection Truck.

(2) Composite factor is 80% @ 15 mph + 20% @ 5 mph

Table A-8. Modeled Roadway Trip Information - Onsite Trucks			
	Trip Information		
Roadway Link	Percentage Total Trips	Peak Hourly	Average Daily
Paved	100%	72.7	800.0
Unpaved	100%	72.7	800.0

Table A-9. Calculated Emissions from Onsite Truck Trips			
	Calculated Emissions DPM/PM_{10}		
Roadway Link	Peak Hourly (lbs/hr)	Average Daily (lbs/day)	Annual (tpy)
Paved	0.0040	0.04	0.0062
Unpaved	0.0045	0.05	0.0071
Total Onsite Truck Emissions	0.0085	0.0931	0.0133

Sunshine Canyon Landfill
Onsite Idline Emissions

Table A-10. Calculated Emissions from all Modeled Sources (All Scenarios)						
On-Site Idle Emissions	**Emission Factor (g/hour)**	**Idling Time (min)**	**Daily Trucks**	**Peak Hourly (lbs/hr)**	**Average Daily (lbs/day)**	**Annual (tpy)**
Project Trucks	0.328	15	800	0.0132	0.1448	0.02
Total per Modeled Area Source (1)				0.0132	0.1448	0.02

Sources:

(1) DPM emission rates represented using EMFAC2021 PM_{10} 2022 exhaust emission factors for Trucks.

Sunshine Canyon Landfill
Paved Surfaces Criteria Pollutant Emissions Calculations

Table A-11. Surfaces Operational Data			
Parameter/Type	**Value**	**Units**	**Data Source/Assumption Justification**
Daily Throughput by Material Stage			
Trucks Travel Distance	2	mi/trip	
Daily Trips	800	trips/day	
Annual Operations	286	days/year	
Trucks Weight	33	tons	EMFAC 2021 T7 SWCV Class Category
Silt Loading	2	grams/m^2	AP-42 Section 13.2.1, Table 13.2.1-2
PM_{10} Particle Size Multiplier	0.00220	lb/VMT	AP-42 Section 13.2.1, Table 13.2.1-1

Equations:

1. $$E = k(sL)^{0.91} \times W^{1.02}$$

Table A-12. Surfaces Calculated Emissions				
Description	**PM_{10} Emissions**			
	Lb/mi	**lb/hr**	**lb/day**	**tpy**
Trucks	0.15	21.28	234.08	33.47
Total			**234.08**	**33.47**

Notes and Acronyms:

Notes

(1) Hourly emissions assume deliveries are evenly spread out over 12 hours per day.

Formula 1 Source - AP-42 Section 13.2.4.3 Equation 1.

Acronyms

grams/m^2	grams per square meter	PM	particulate matter
lb/hr	pounds per hour	PM_{10}	PM less than 10 microns in diameter
lb/mi	pounds per mile	$PM_{2.5}$	PM less than 2.5 microns in diameter
lb/VMT	pounds per vehicle mile traveled	RT	round trip
mi/yr	mile per year	tpy	tons per year

Sunshine Canyon Landfill
Unpaved Surfaces Emissions Calculations

Table A-13. Surfaces Operational Data			
Parameter/Type	**Value**	**Units**	**Data Source/Assumption Justification**
Daily Throughput by Material Stage			
Trucks Travel Distance	2	mi/trip	
Daily Trips	800	trips/day	
Annual Operations	286	days/year	
Trucks Weight	33	tons	EMFAC 2021 T7 SWCV Class Category
Surface Material Silt Content	3	%	Domain Knowladge
AP-42 Empirical Constant a	0.90	--	AP-42 Section 13.2.1, Table 13.2.2-2
AP-42 Empirical Constant b	0.45	--	AP-42 Section 13.2.1, Table 13.2.2-2
PM_{10} Particle Size Multiplier (k)	1.50000	lb/VMT	AP-42 Section 13.2.1, Table 13.2.2-2

Equations:

1. $$E = k\left(\frac{s}{12}\right)^{a}\left(\frac{W}{3}\right)^{b}$$

Table A-14. Surfaces Calculated Emissions				
Description	**lb/mi**	**lb/hr**	**lb/day**	**tpy**
Trucks	1.27	1.84E+02	2,027.61	289.95
Total			**2,027.61**	**289.95**
Total			**4,055.22**	**579.90**

Sunshine Canyon Landfill

Unpaved Surfaces Emissions Calculations

Notes and Acronyms:

Notes

(1) Hourly emissions assume deliveries are evenly spread out over 11 hours per day.

Formula 1 Source - AP-42 Section 13.2.4.3 Equation 1.

Acronyms

grams/m^2	grams per square meter	PM	particulate matter
lb/hr	pounds per hour	PM_{10}	PM less than 10 microns in diameter
lb/mi	pounds per mile	$PM_{2.5}$	PM less than 2.5 microns in diameter
lb/VMT	pounds per vehicle mile traveled	RT	round trip
mi/yr	mile per year	tpy	tons per year

Sunshine Canyon Landfill
Wind Erosion Particulate Emissions Calculations

Table A-15. Large Aggregate Piles Operational Data			
Parameter/Type	**Value**	**Units**	**Data Source/Assumption Justification**
Aggregate Pile Dimensions			
Aggregate Pile Volume	20	MM ft^3	
Aggregate Pile Area	18	acres	
Average Height of Pile	25	ft	Estimation
Other Operational Parameters			
Silt Content	3	(%)	
Rainfall Days over 1"	30	days	
Time Wind Exceeds 12 mph	70	(%)	SCL Weather Data
Calculated Surface Area	102,000	ft^2	(L*H*2 + W*H*2 + L*W)*1.2
Wind Speed	8	mph	SCL Collected Data

Table A-16. AP-42 Particle Size Multipliers			
Parameter	**Value**	**Units**	**Reference**
PM_{10} Particle Size Multiplier	0.50	unitless	U.S. EPA Control of Open Fugitive Dust Sources
$PM_{2.5}$ Particle Size Multiplier	0.075	unitless	U.S. EPA Control of Open Fugitive Dust Sources

Equations:

1. $$\mathbf{EF = 1.7\left(\frac{s}{1.5}\right)\left(\frac{365-p}{235}\right)\left(\frac{f}{15}\right)(daily\ lb/acre)}$$

Table A-17. Calculated Emissions						
	EF (daily lb/acre)		**Daily Emissions (lb/day)**		**Annual Emissions (tpy)**	
Description	**PM_{10}**	**DPM**	**PM_{10}**	**DPM**	**PM_{10}**	**DPM**
Aggregate Pile Volume	11.31	-	207.70	-	37.91	-
Total			**207.70**	**-**	**37.91**	**-**

Notes and Acronyms:

Notes

Equation 1 Symbols: s = silt content; p = days per year with 0.01 inches or more rain; f = time wind exceeds 12 mph

Equation 1 Source: AP-42 Section 13.2.4.3, Equation 1

Acronyms

EF	emission factor	mph	miles per hour
ft^2	square foot	PM	particulate matter
ft^3	cubic feet	PM_{10}	PM less than 10 microns in diameter
lb/acre	pounds per acre	$PM_{2.5}$	PM less than 2.5 microns in diameter
lb/hr	pounds per hour	tpy	tons per year
mm	million		

Sunshine Canyon Landfill

Drop Point Particulate Matter Emissions Calculations

Table A-18. Material Transfer Operational Data		
Parameter/Type	**ton/day**	**ton/year**
Sand	10,000	100,000
Slag	-	-
Cover	10,000	100,000
Clay/dirt mix	-	-
Clay	10,000	100,000
Fly ash	-	-
Misc. fill materials	10,000	100,000

Table A-19. AP-42 Material Data		
Parameter/Type	**Silt Content**	**Moisture Content**
Sand	2.60	7.40
Slag	3.80	3.60
Cover	9.00	12.00
Clay/dirt mix	9.20	14.00
Clay	6.00	10.00
Fly ash	80.00	27.00
Misc. fill materials	12.00	11.00
Other Operational Parameters		
Wind Speed	8.0	mph

Table A-20. AP-42 Particle Size Multipliers			
Parameter	**Value**	**Units**	**Reference**
PM_{10} Particle Size Multiplier	0.35	unitless	AP-42 Section 13.2.4.3
$PM_{2.5}$ Particle Size Multiplier	0.053	unitless	AP-42 Section 13.2.4.3

Equations:

1. $$EF\left(\frac{lb}{ton}\right) = particle\ size\ multiplier \times 0.0032 \times \frac{\left(\frac{wind\ speed(mph)}{5}\right)^{1.3}}{\left(\frac{moisture\ content(\%)}{2}\right)^{1.4}}$$

Sunshine Canyon Landfill

Drop Point Particulate Matter Emissions Calculations

Table A-21. Calculated Emissions			
	EF	**Daily**	**Annual**
Description	**lb/ton**	**lb/day**	**tpy**
Sand	3.30E-04	3.30	33.04
Slag	9.06E-04	-	-
Cover	1.68E-04	1.68	16.79
Clay/dirt mix	1.35E-04	-	-
Clay	2.17E-04	2.17	21.68
Fly ash	5.40E-05	-	-
Misc. fill materials	1.90E-04	1.90	18.97
	Total	**4.98**	**0.02**

Notes and Acronyms

Notes

Formula 1 Source - AP-42 Section 13.2.4.3 Equation 1.

Acronyms

tpy	tons per year	PM_{10}	PM less than 10 microns in diameter
mph	miles per hour	$PM_{2.5}$	PM less than 2.5 microns in diameter
lb/ton	pound per ton	lb/hr	pounds per hour
PM	particulate matter		

APPENDIX B

Monitoring Data Supplemental Charts and Modeled Isopleths

Figure B-1. Winter PM_{10} Concentrations 2011 through 2015

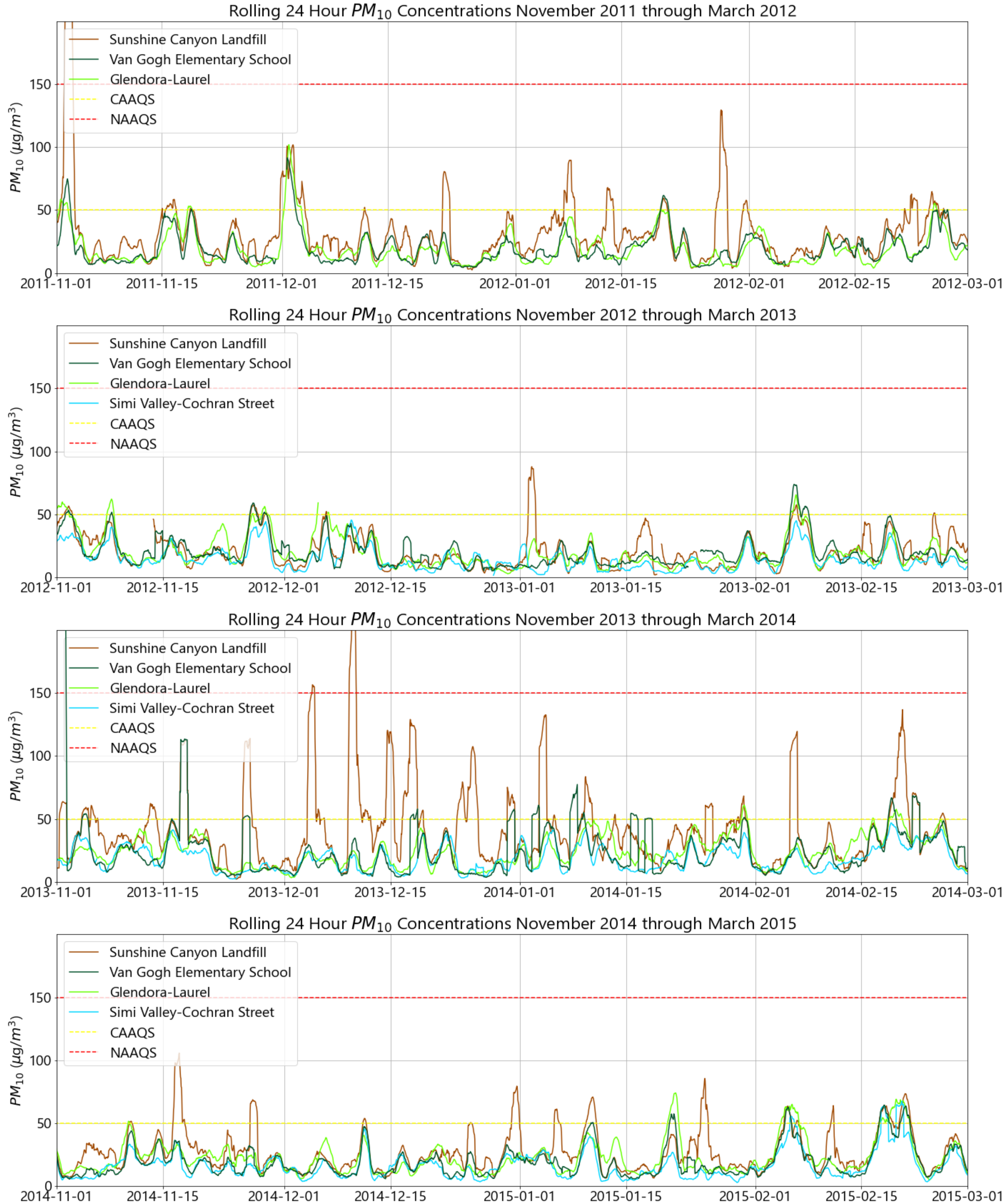


Figure B-2. Winter PM_{10} Concentrations 2015 through 2019

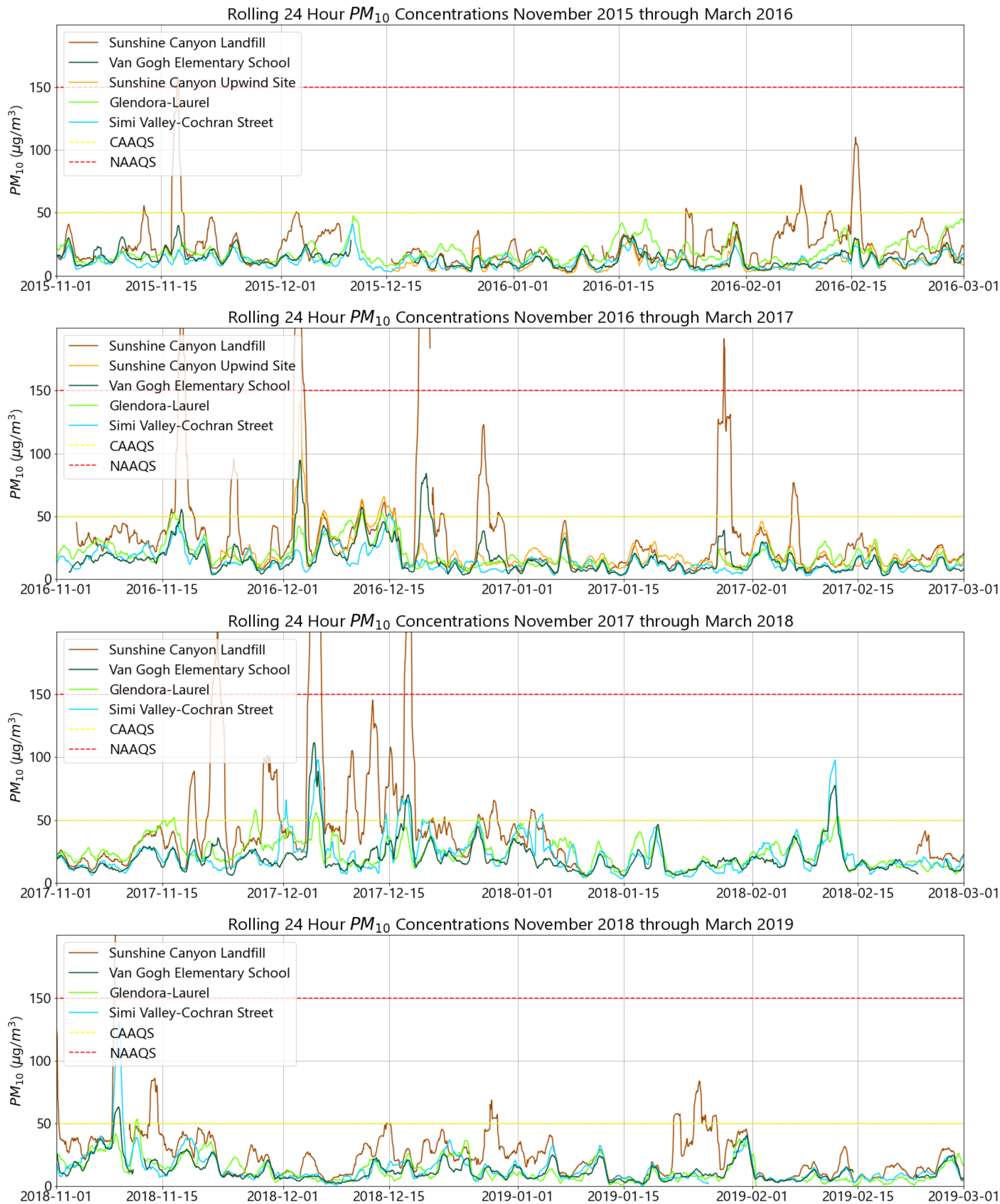
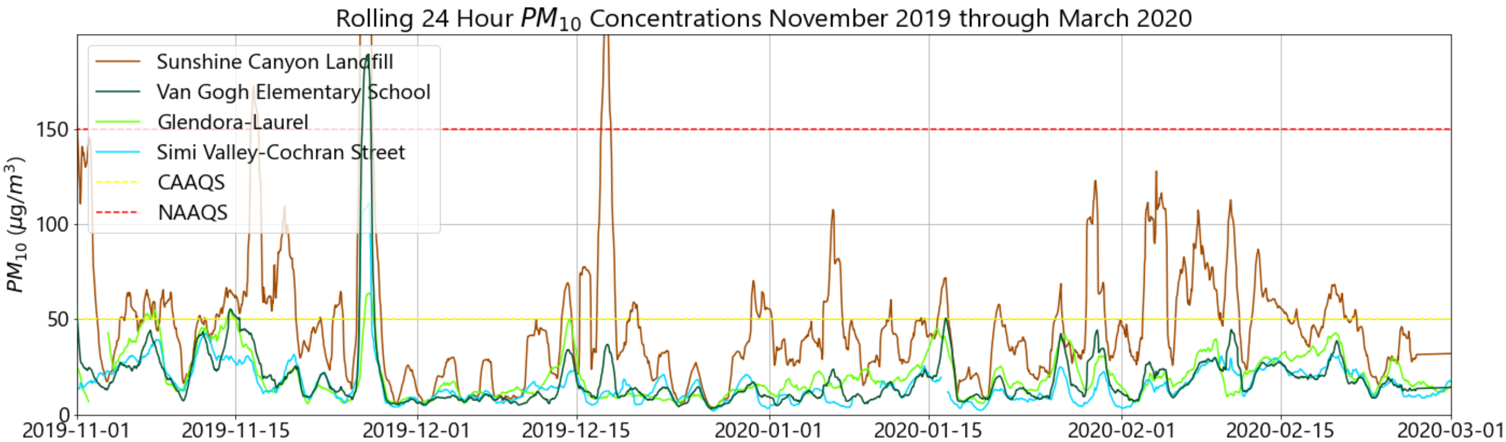
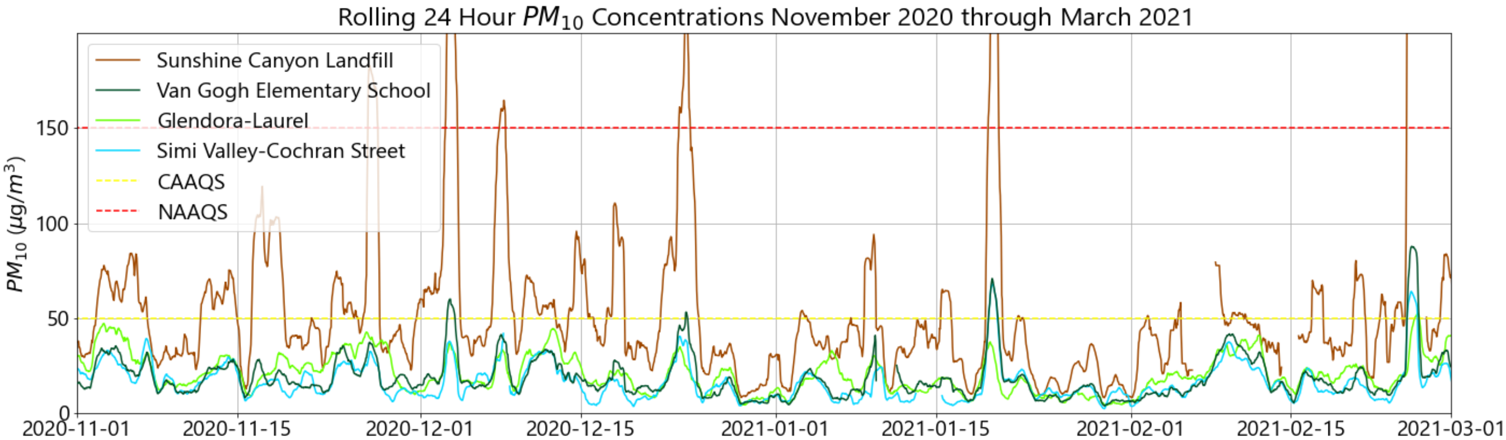


Figure B-3. Winter PM_{10} Concentrations 2019 through 2022





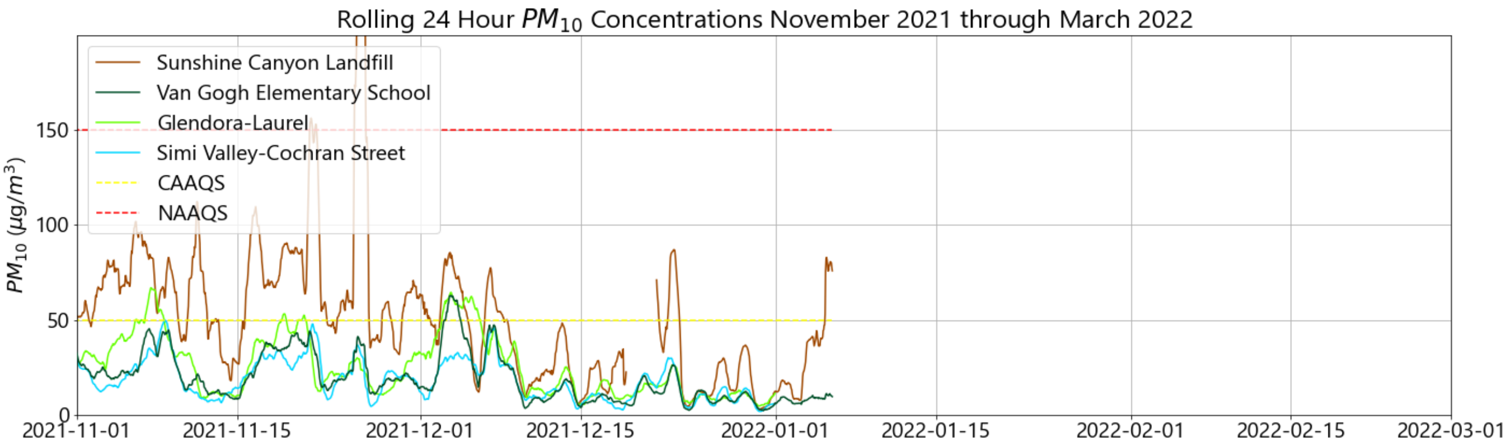


Figure B-4. Winter Black Carbon Concentrations 2011 through 2015

Figure B-5. Winter Black Carbon Concentrations 2015 through 2019

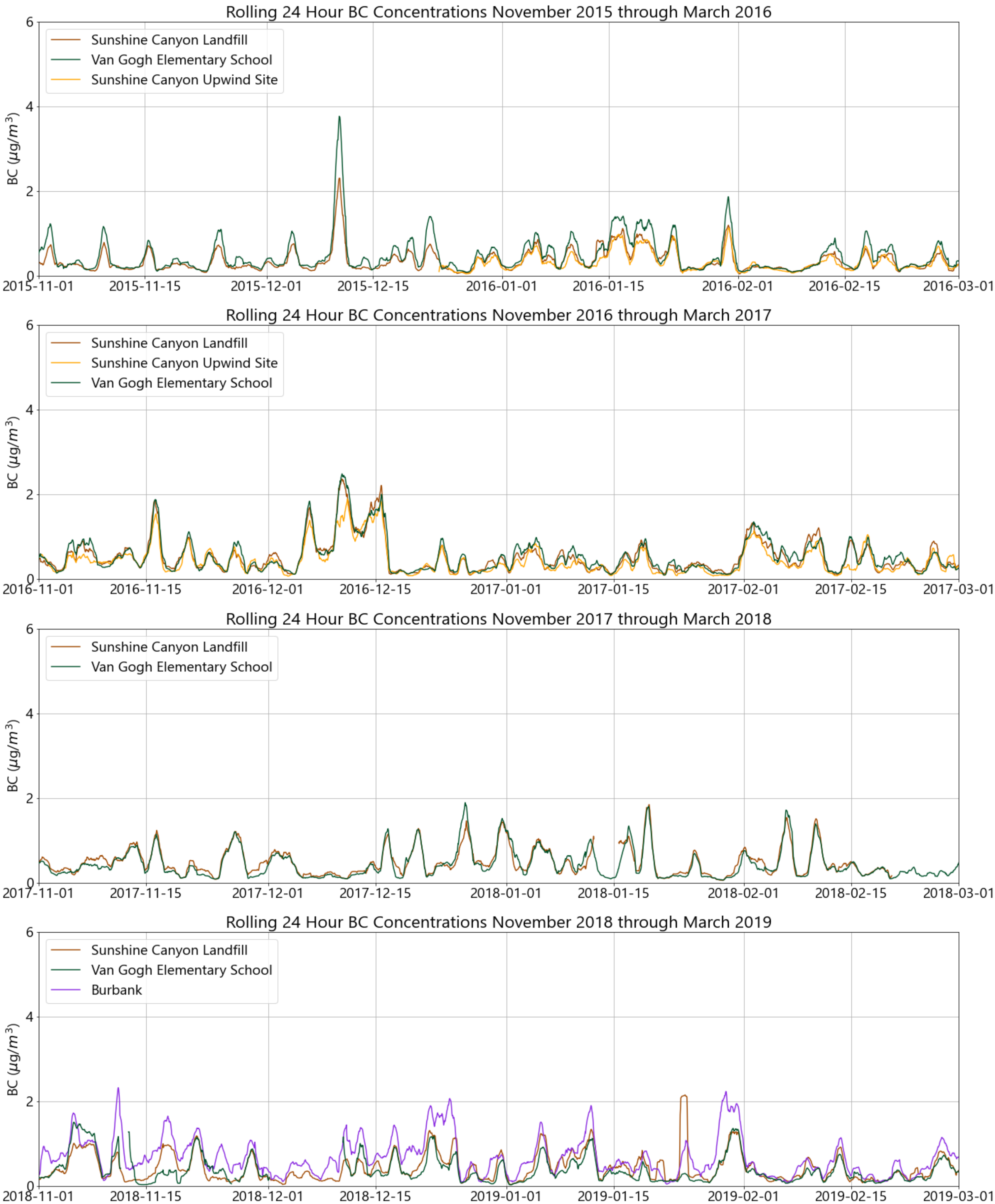


Figure B-6. Winter Black Carbon Concentrations 2019 through 2021

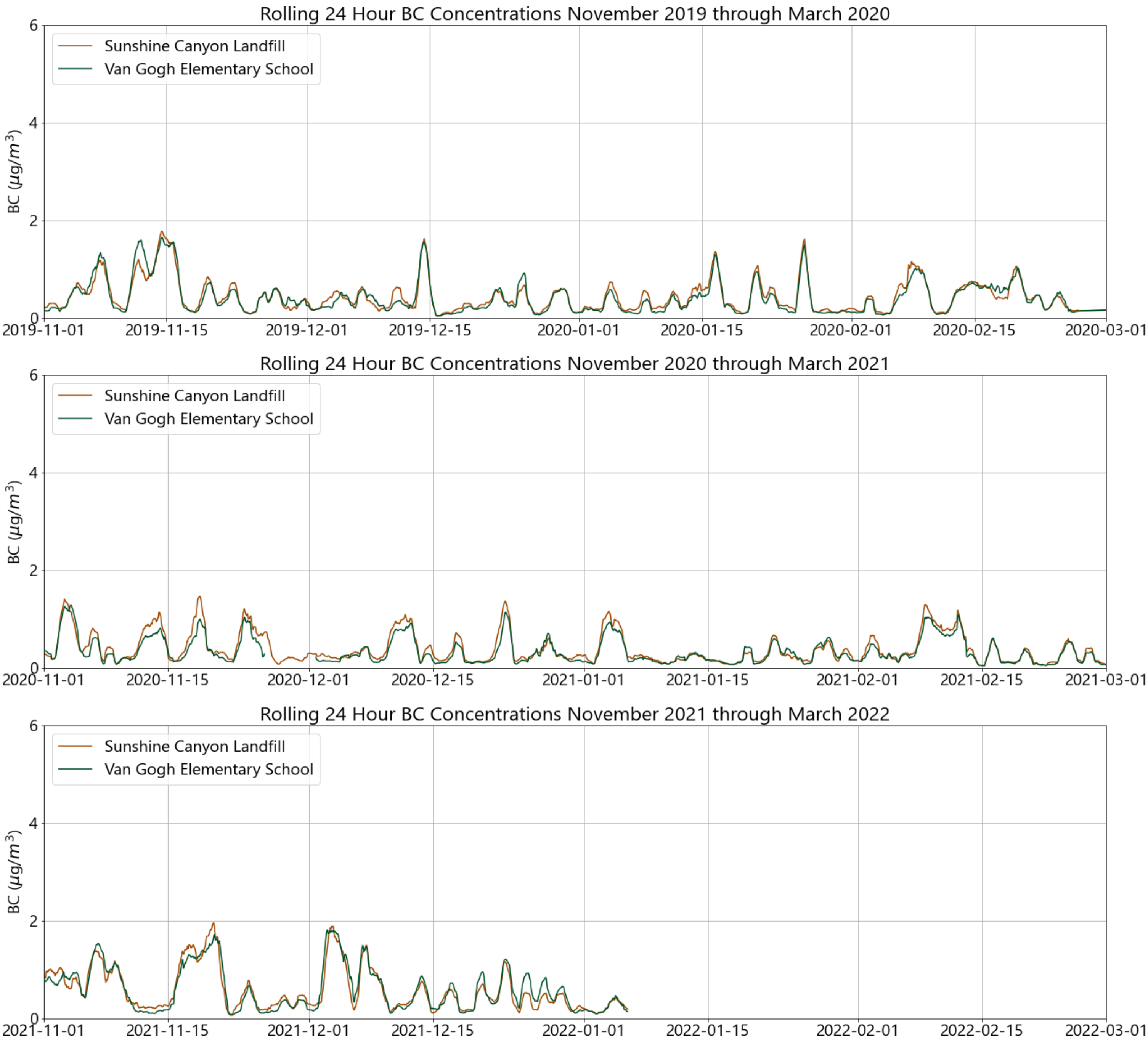


Figure B-7. SCL Monitoring Site Location Chart

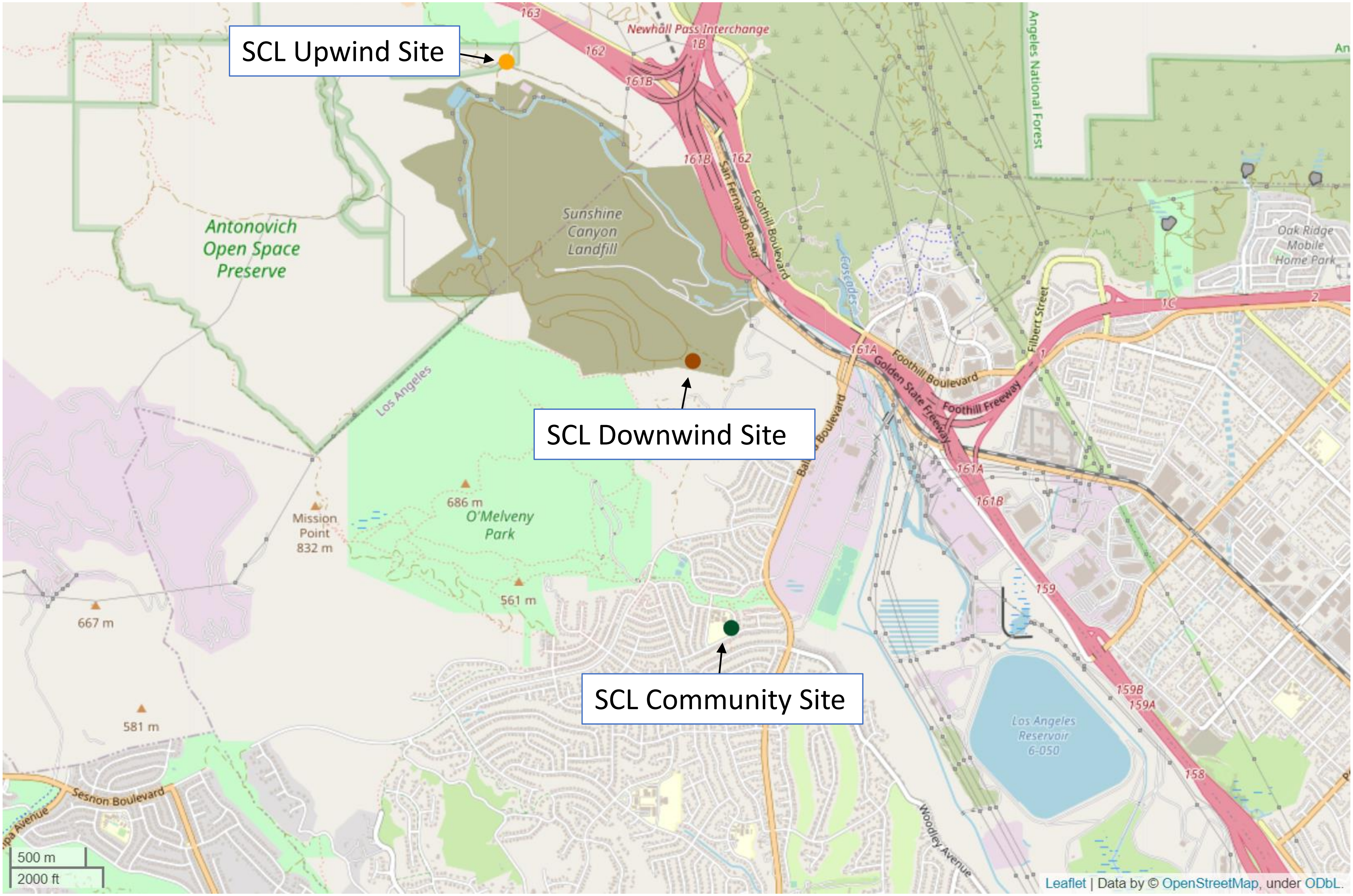


Figure B-8. SCL PM10 Monitoring Data with Background Sites – Dec 1, 2016 through Jan 1, 2017

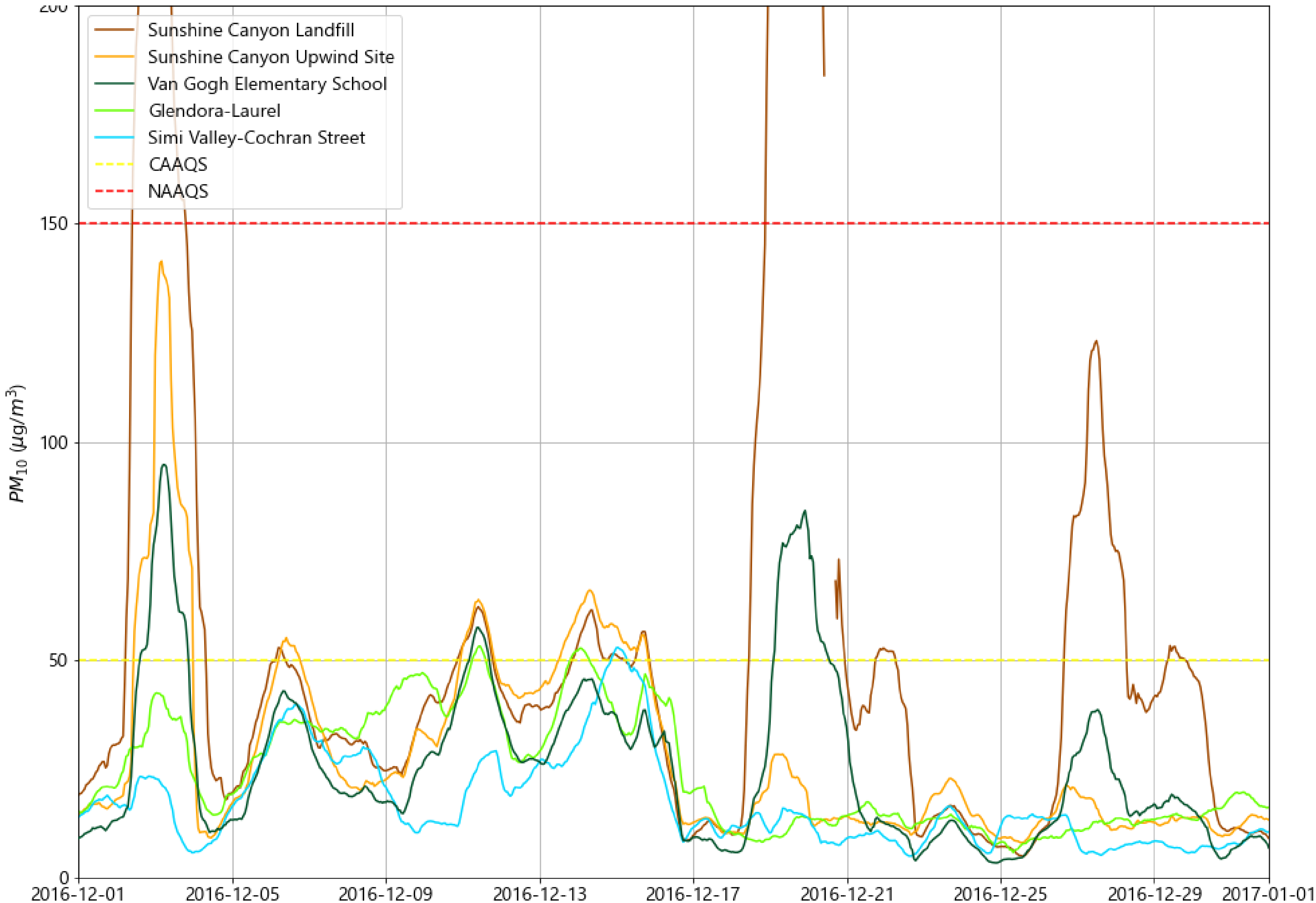


Figure B-9. SCL Downwind PM_{10} Pollution Plot Dec 1, 2016 through Jan 1, 2017

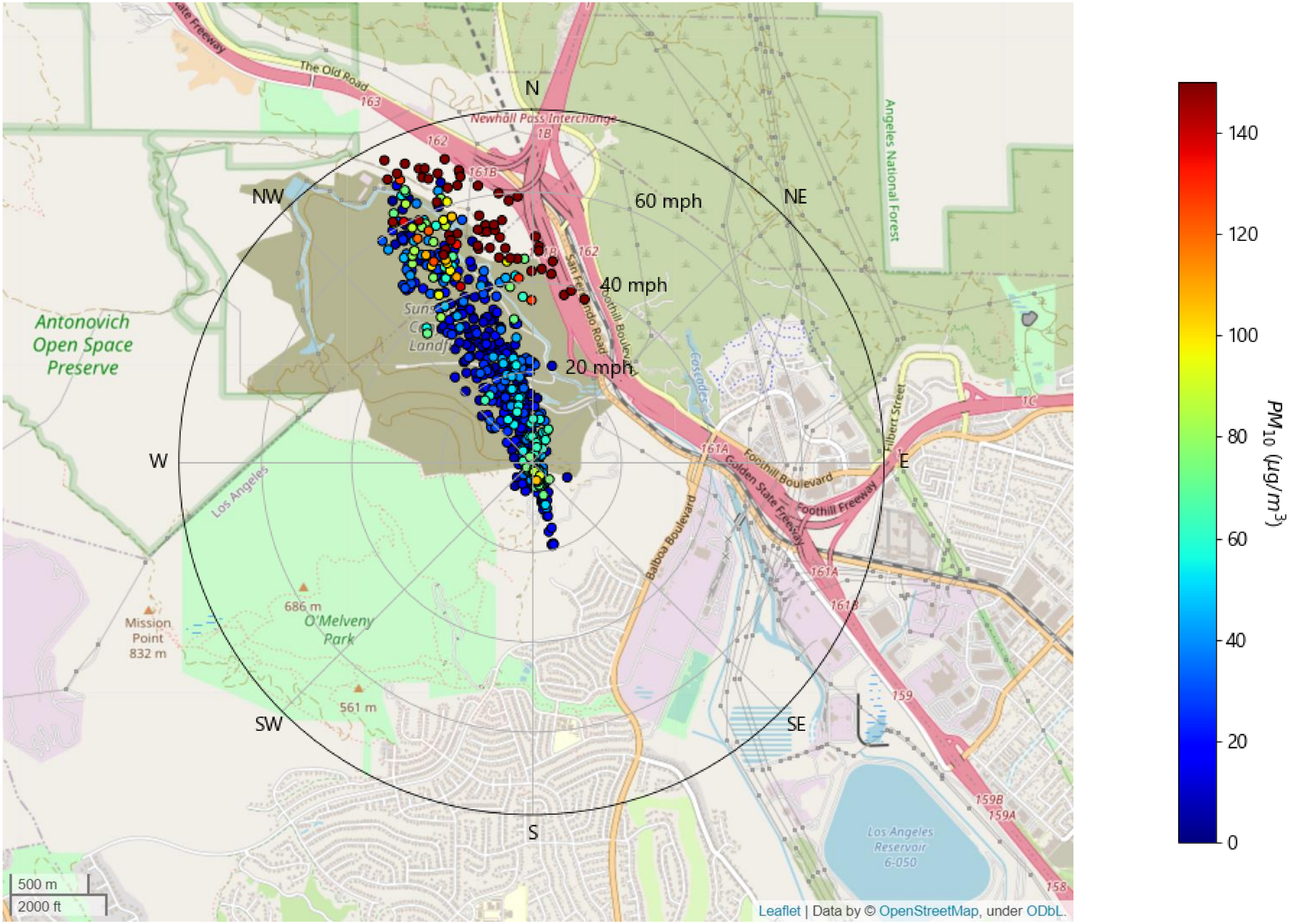


Figure B-10. Van Gogh School PM_{10} Pollution Plot Dec 1, 2016 through Jan 1, 2017

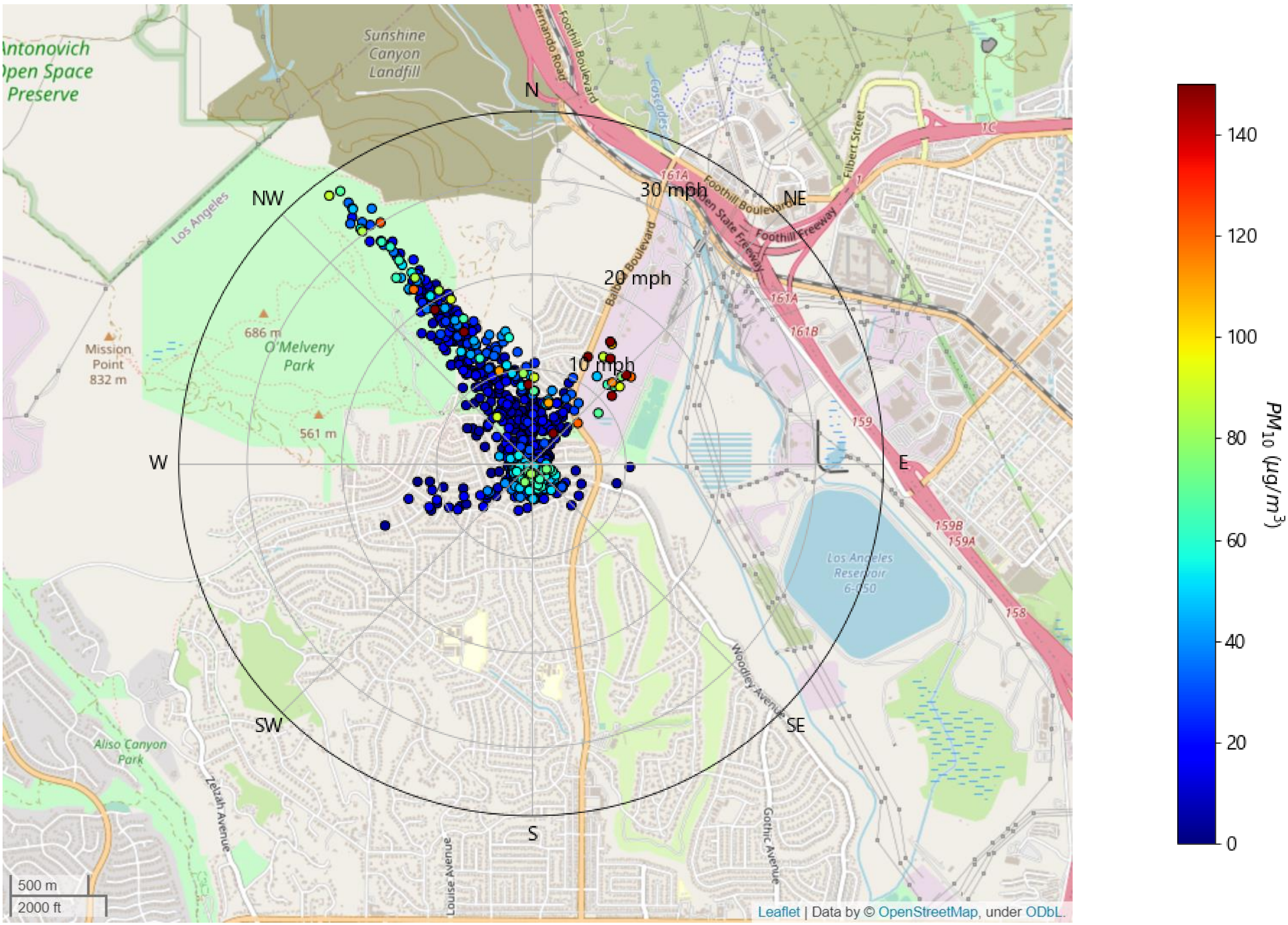


Figure B-11. SCL Upwind PM_{10} Pollution Plot Dec 1, 2016 through Jan 1, 2017

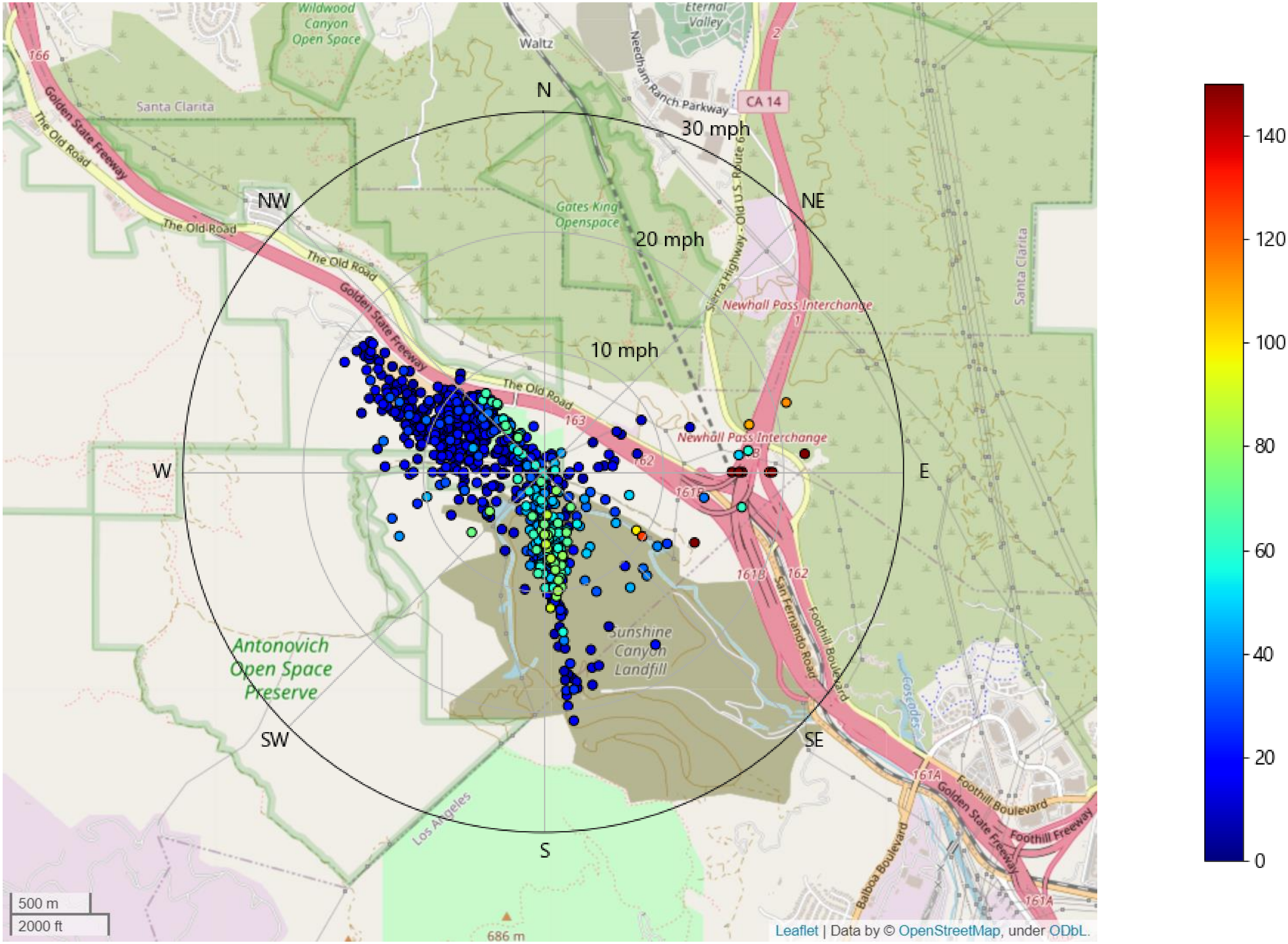


Figure B-12. SCL Hourly Black Carbon Concentrations – December 2016

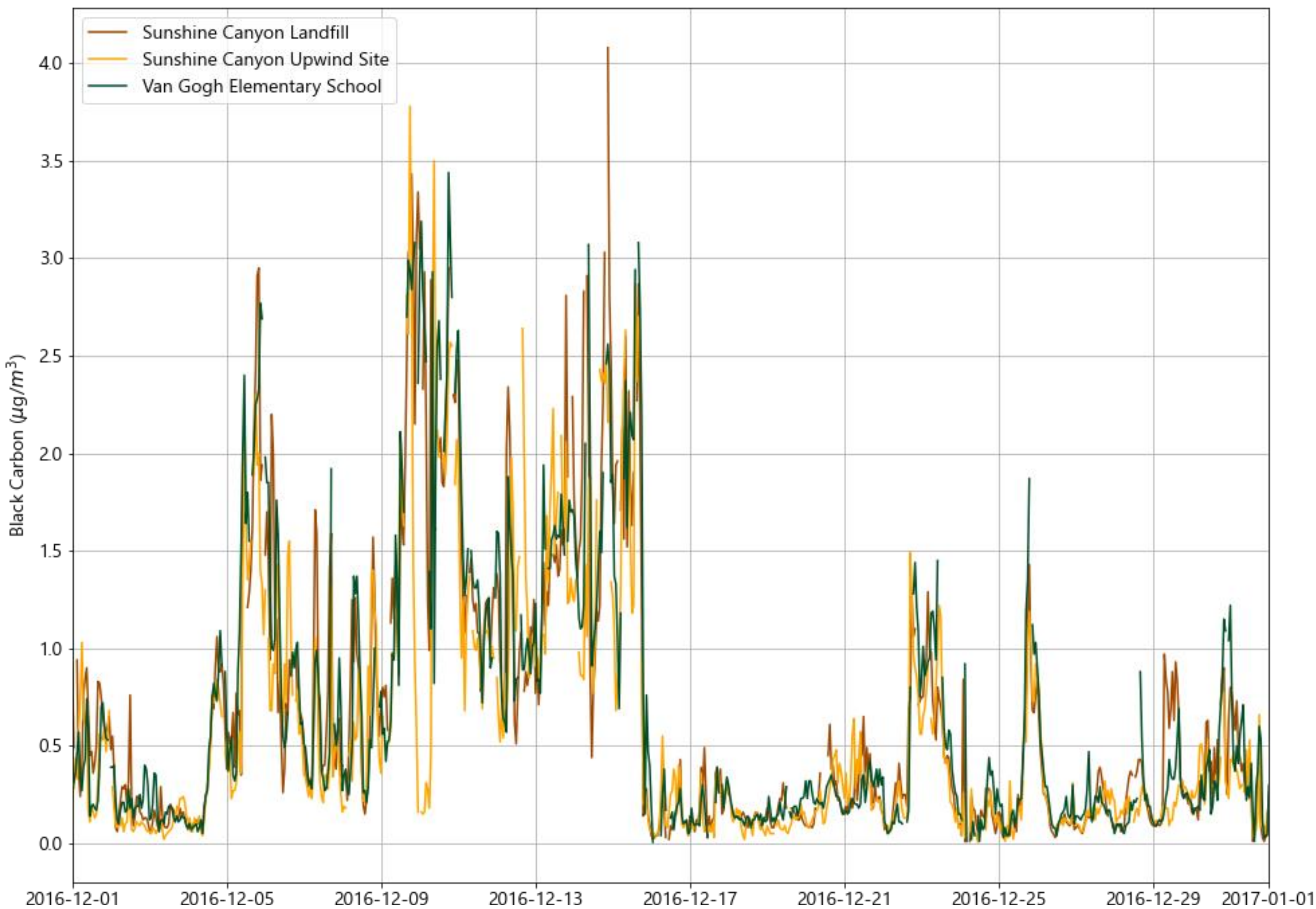


Figure B-13. SCL Downwind Black Carbon Pollution Plot – Dec 1, 2016 through Jan 1, 2017

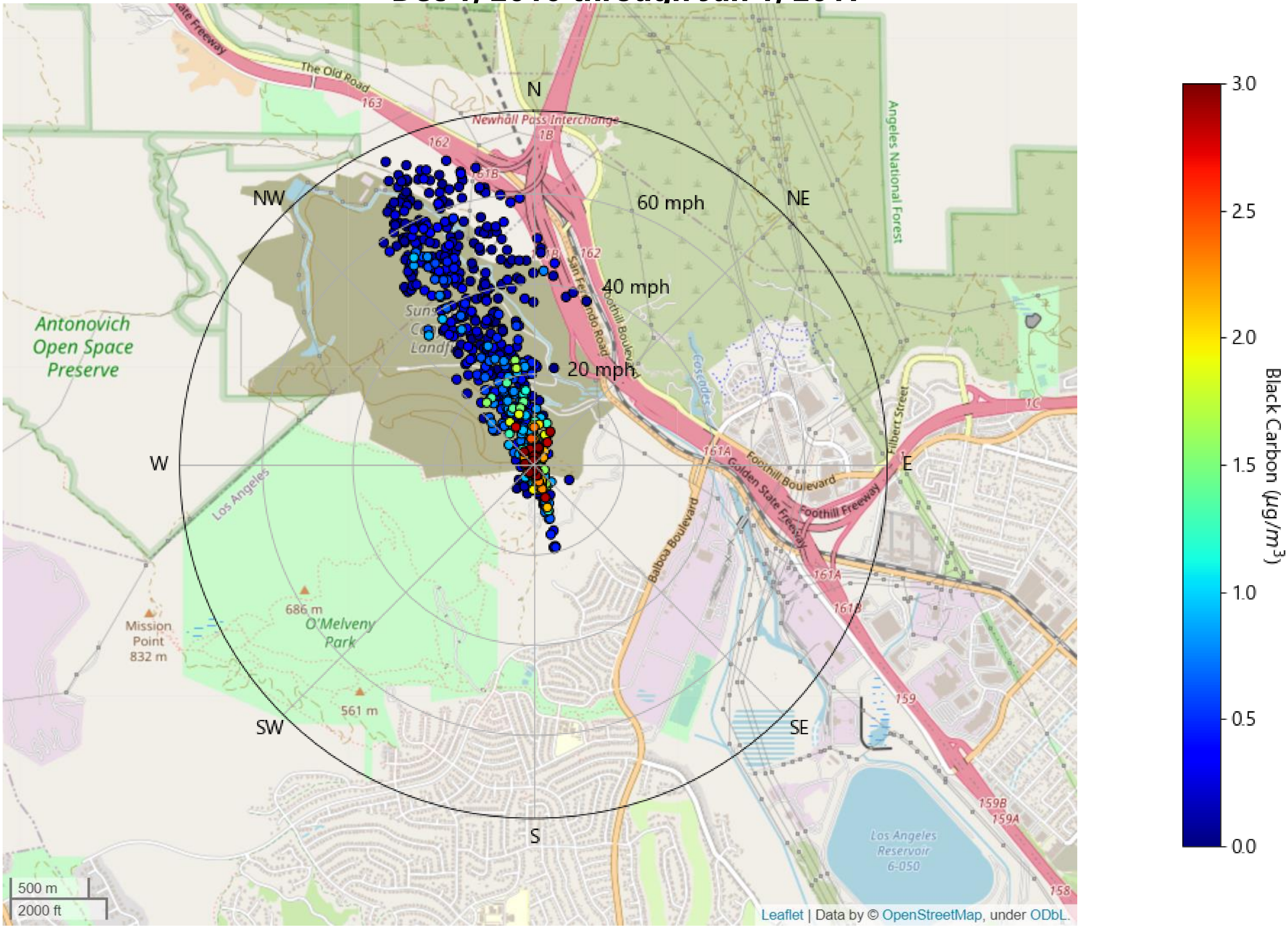


Figure B-14. Van Gogh School Black Carbon Pollution Plot – Dec 1, 2016 through Jan 1, 2017

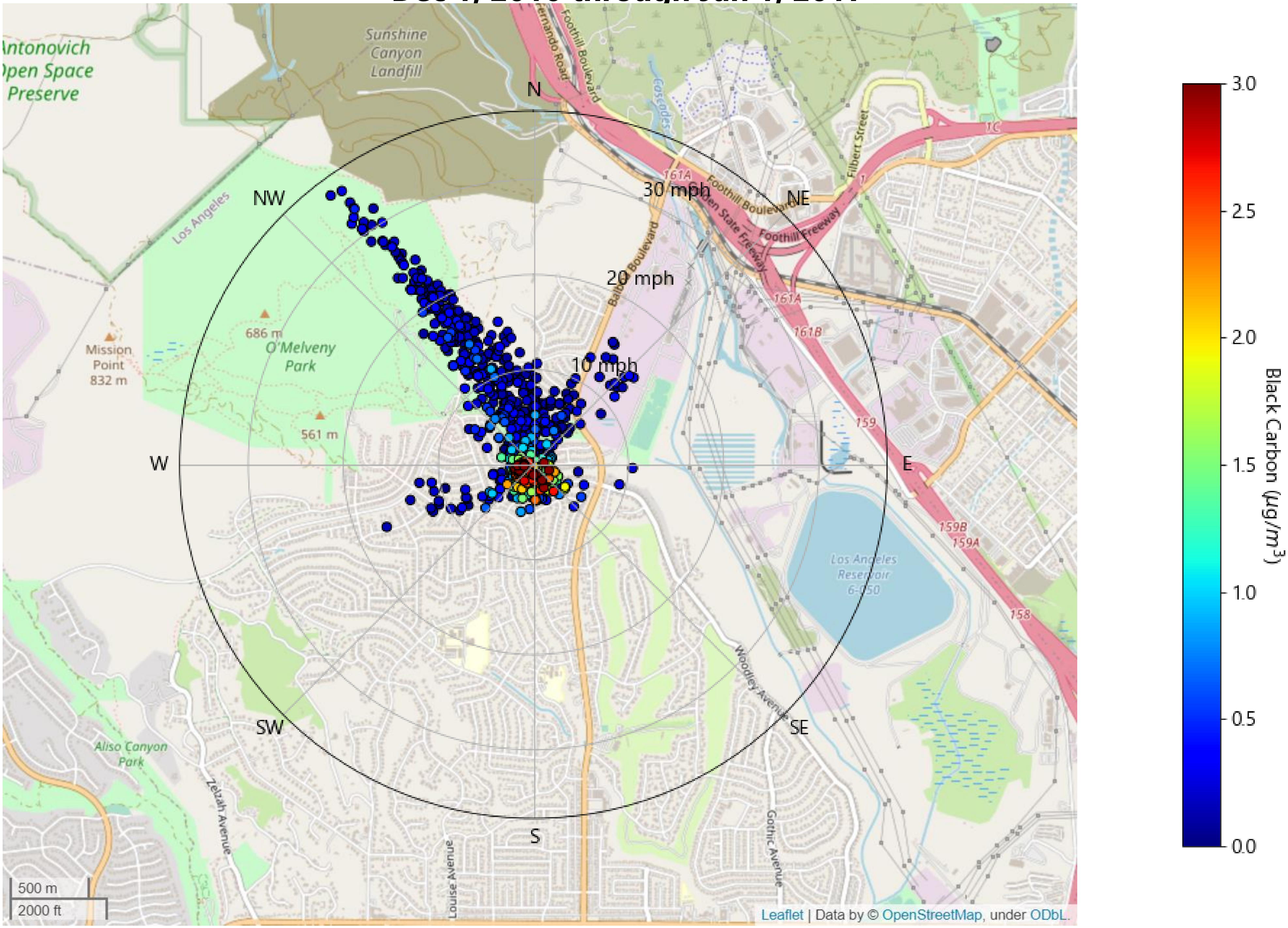
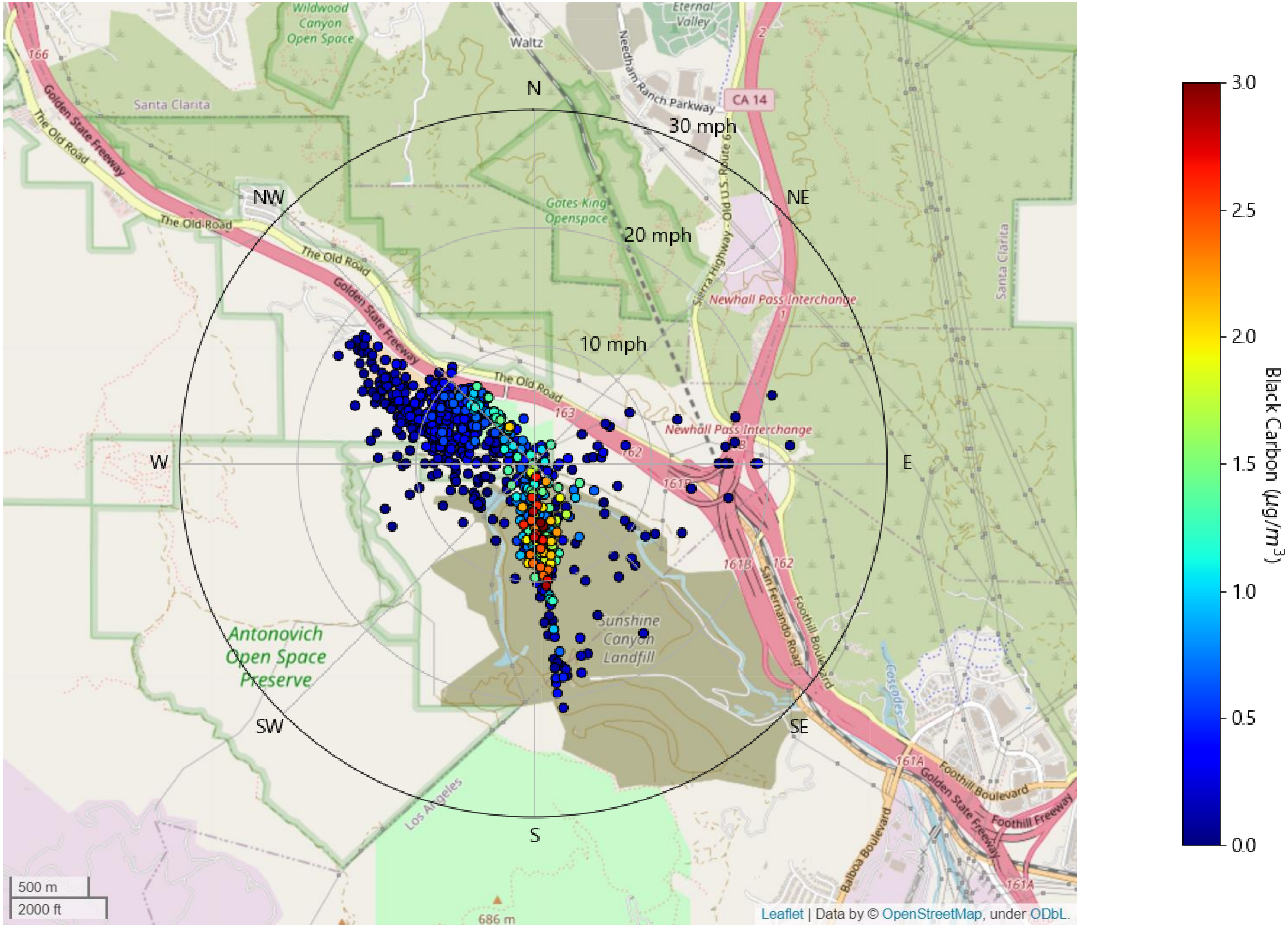


Figure B-15. SCL Upwind PM_{10} Pollution Plot Dec 1, 2016 through Jan 1, 2017



Rural Isopleths

Figure B-16. Modeled 24-Hour PM_{10} Conc. – Van Gogh Wind (Open Pit)

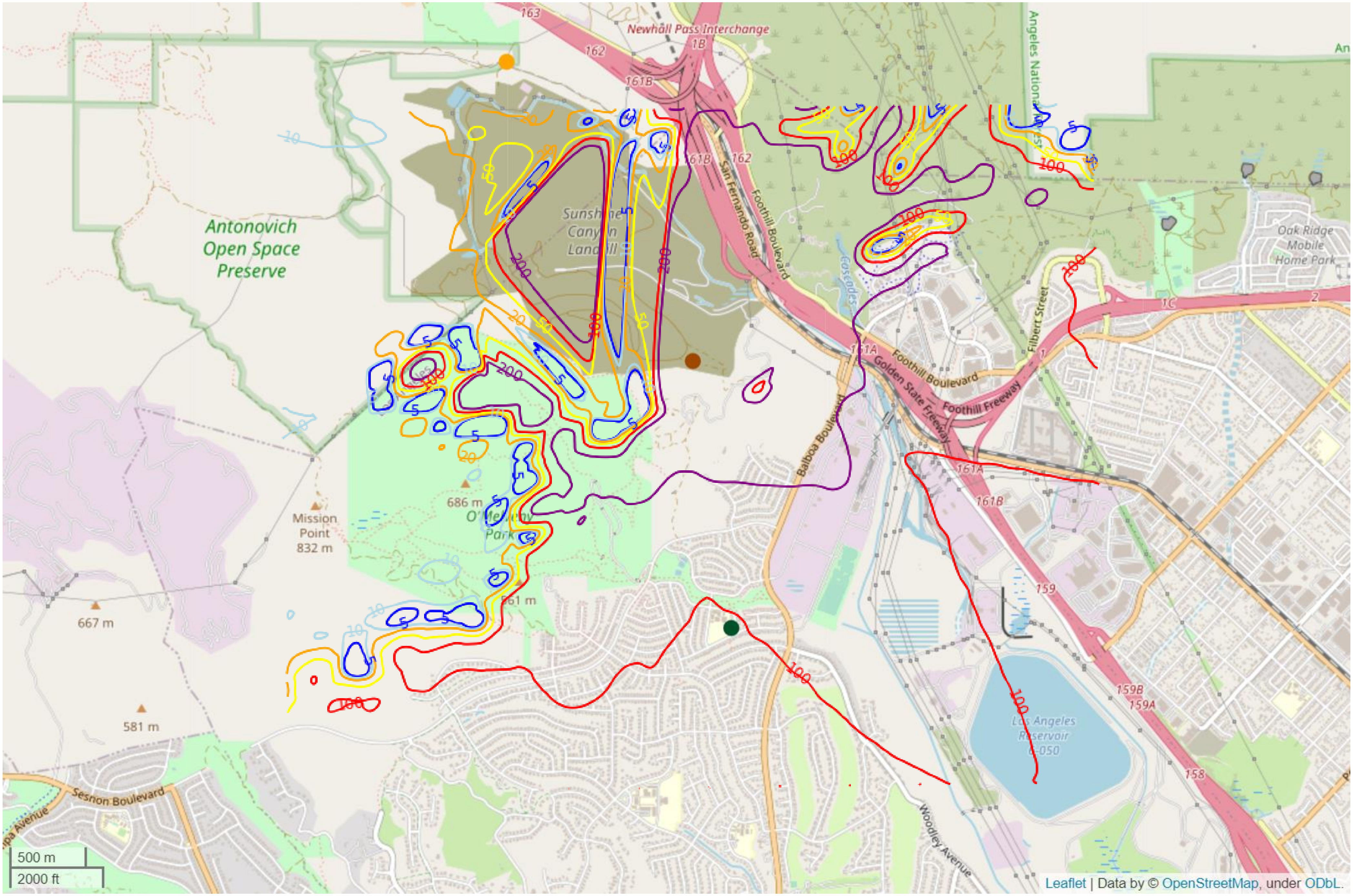


Figure B-17. Modeled 24-Hour PM_{10} Conc. – Van Gogh Wind (Multiple Sources)

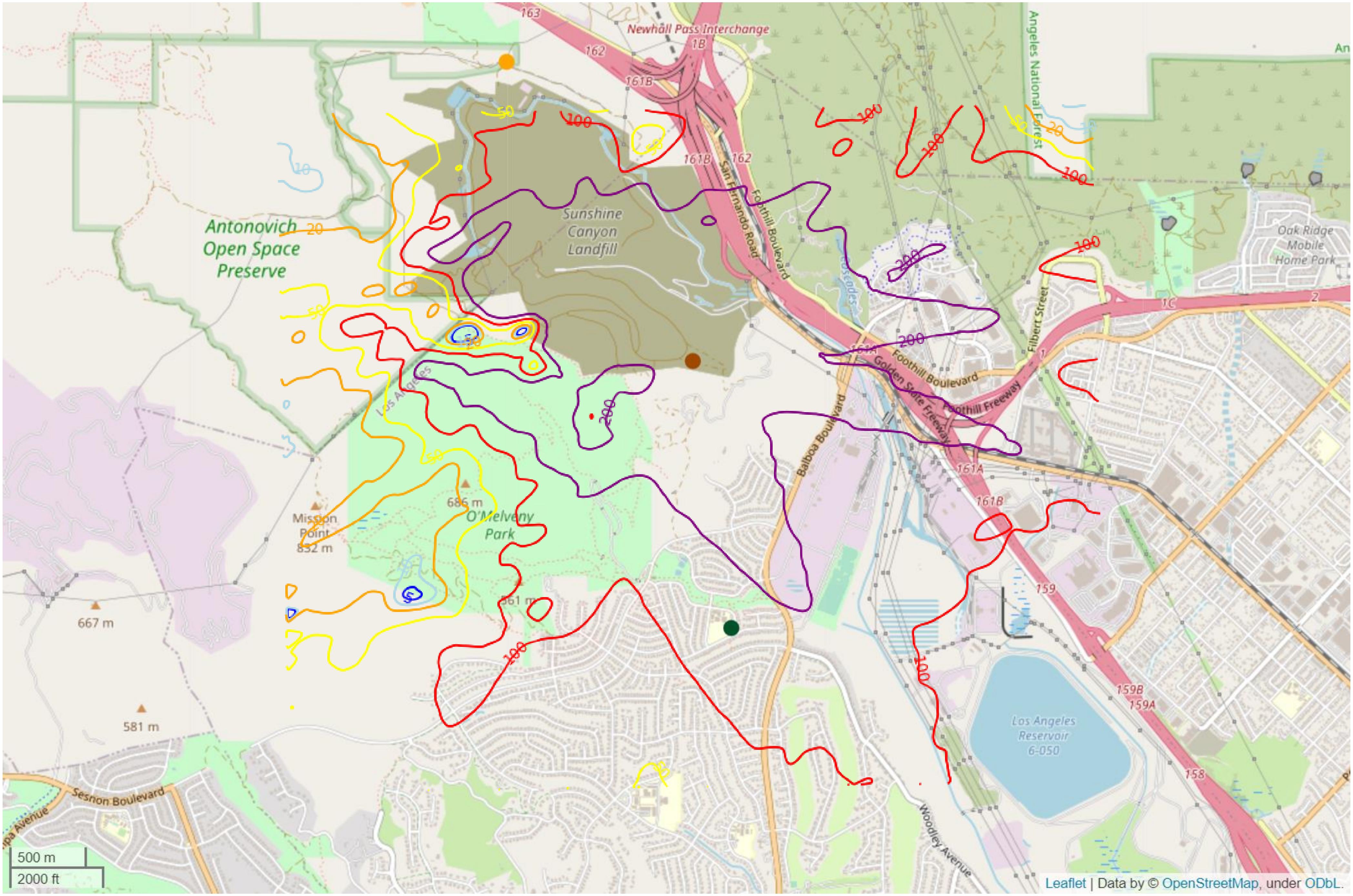


Figure B-18. Modeled 24-Hour PM_{10} Conc. – Van Nuys Wind (Open Pit)

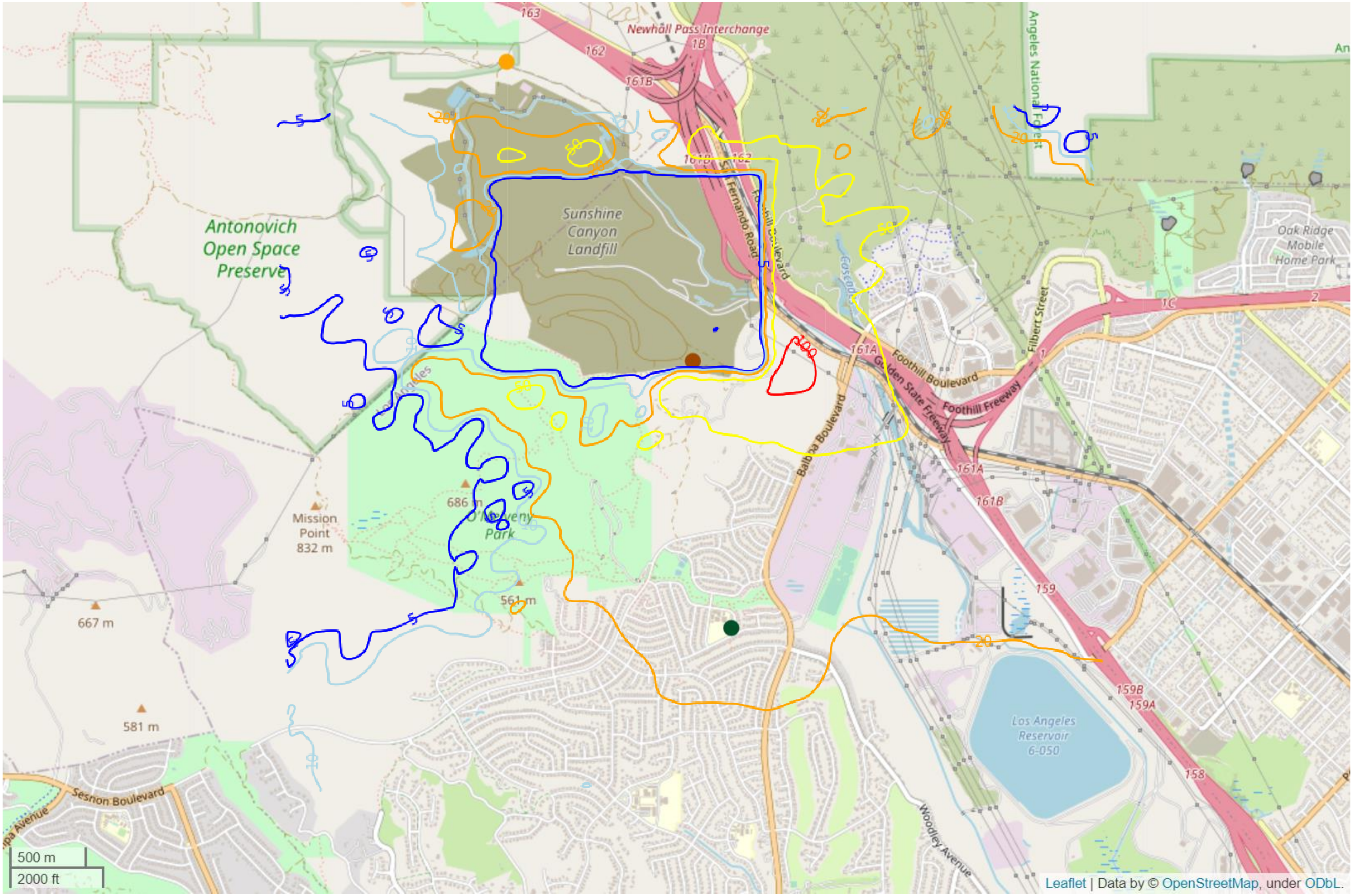


Figure B-19. Modeled 24-Hour PM_{10} Conc. – Van Nuys Wind (Multiple Sources)

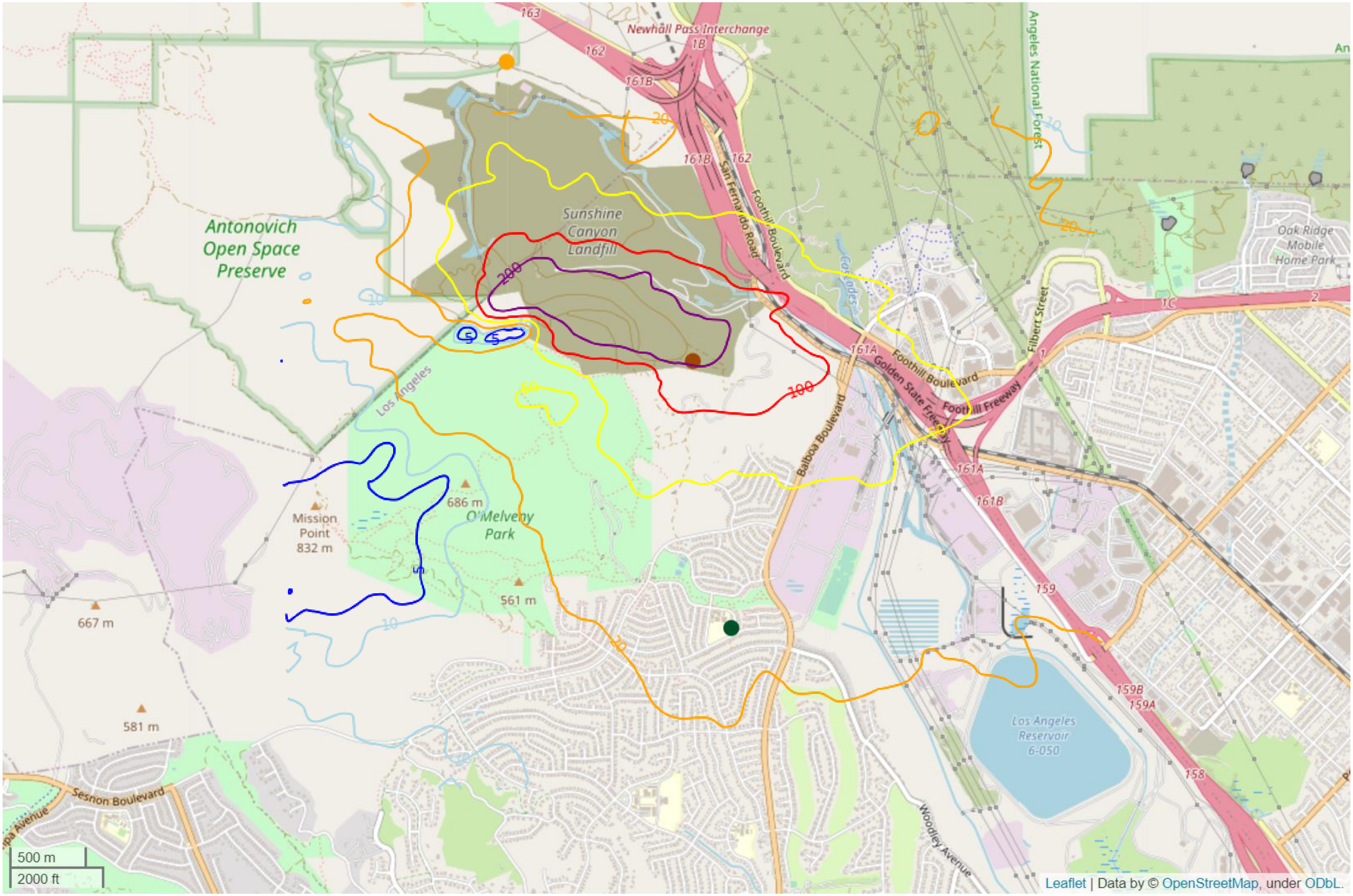


Figure B-20. Modeled Annual PM_{10} Conc. – Van Gogh Wind (Open Pit)

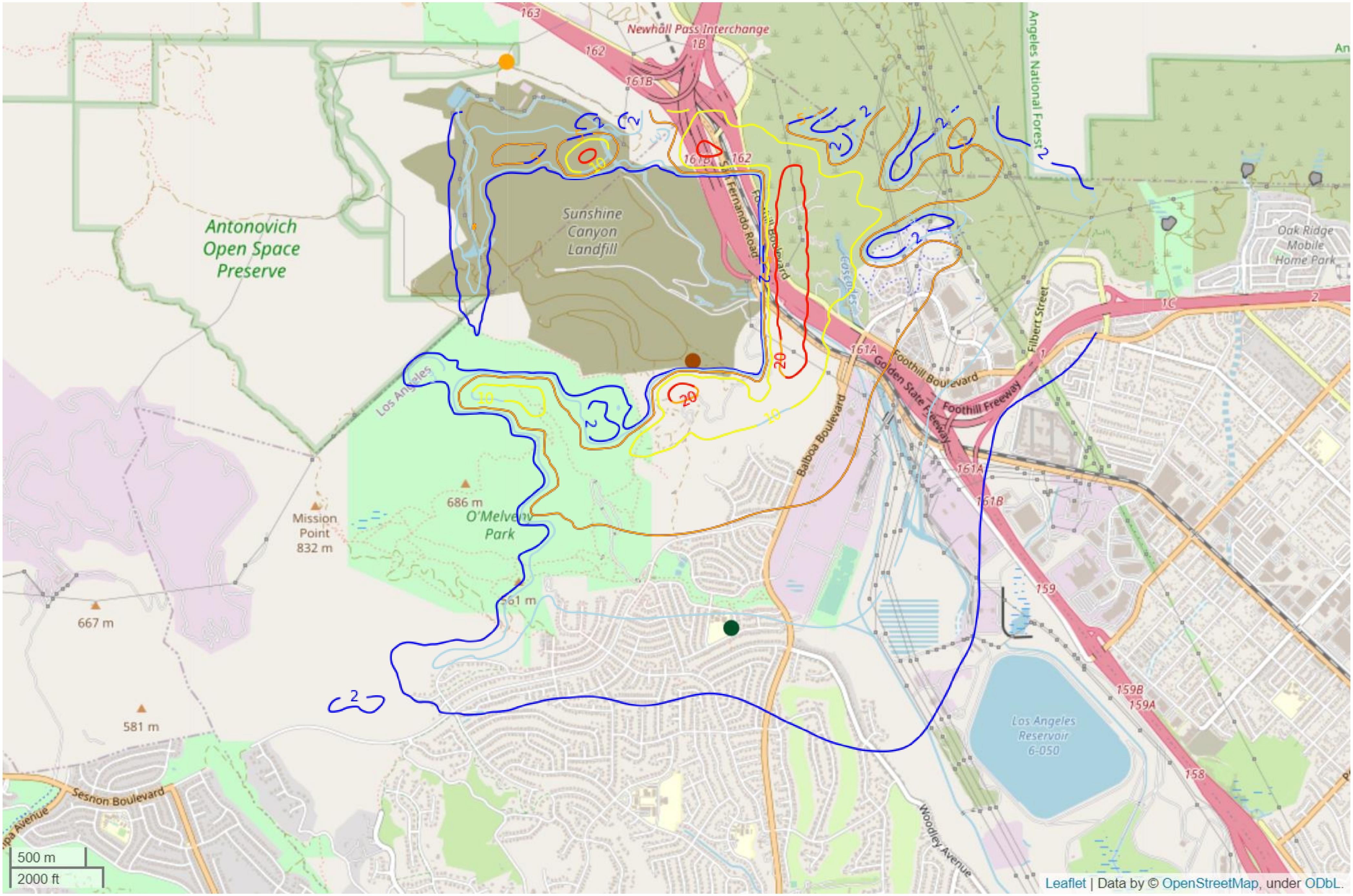


Figure B-21. Modeled Annual PM_{10} Conc. – Van Gogh Wind (Multiple Sources)

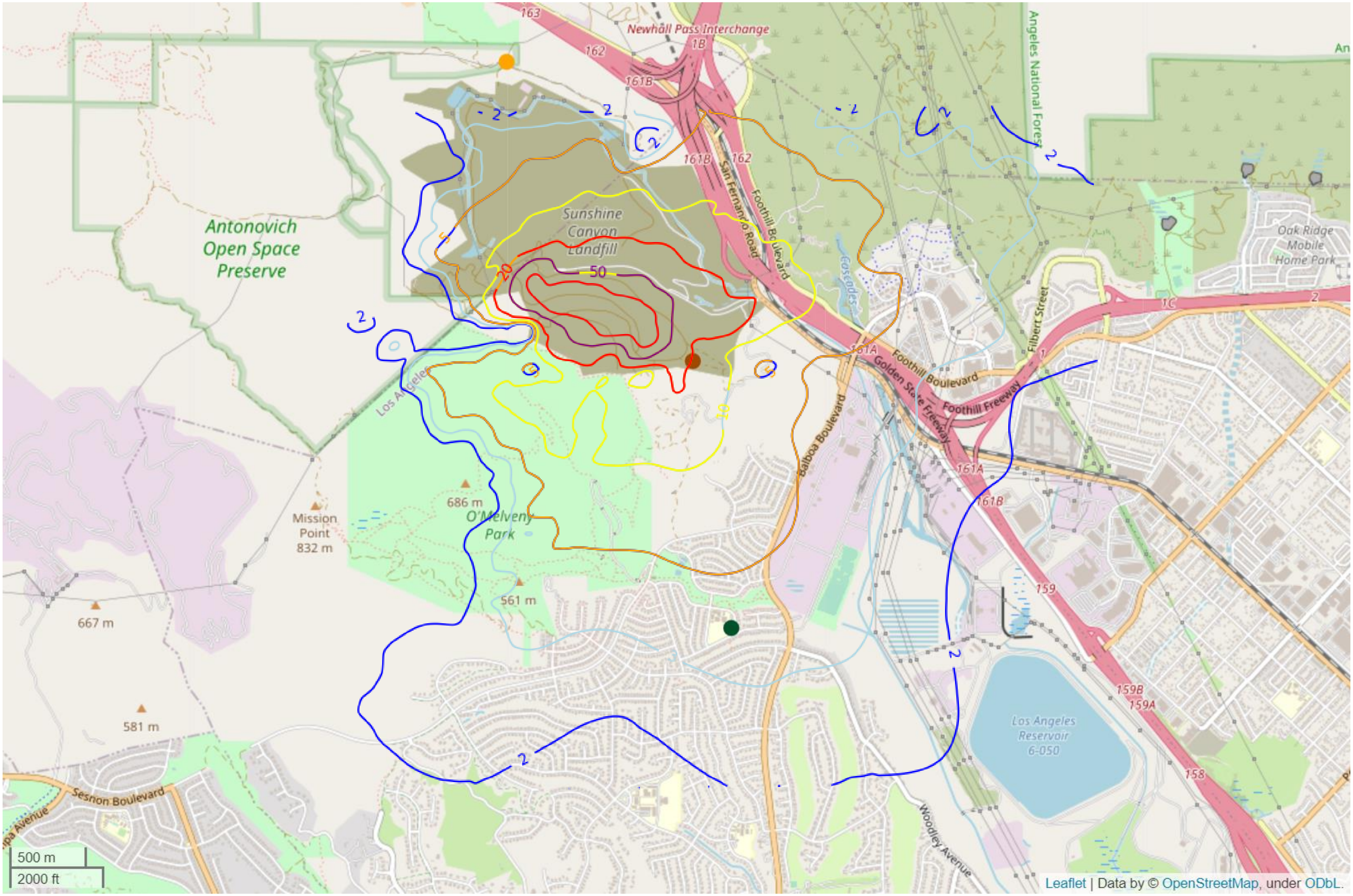


Figure B-22. Modeled Annual PM_{10} Conc. – Van Nuys Wind (Open Pit)

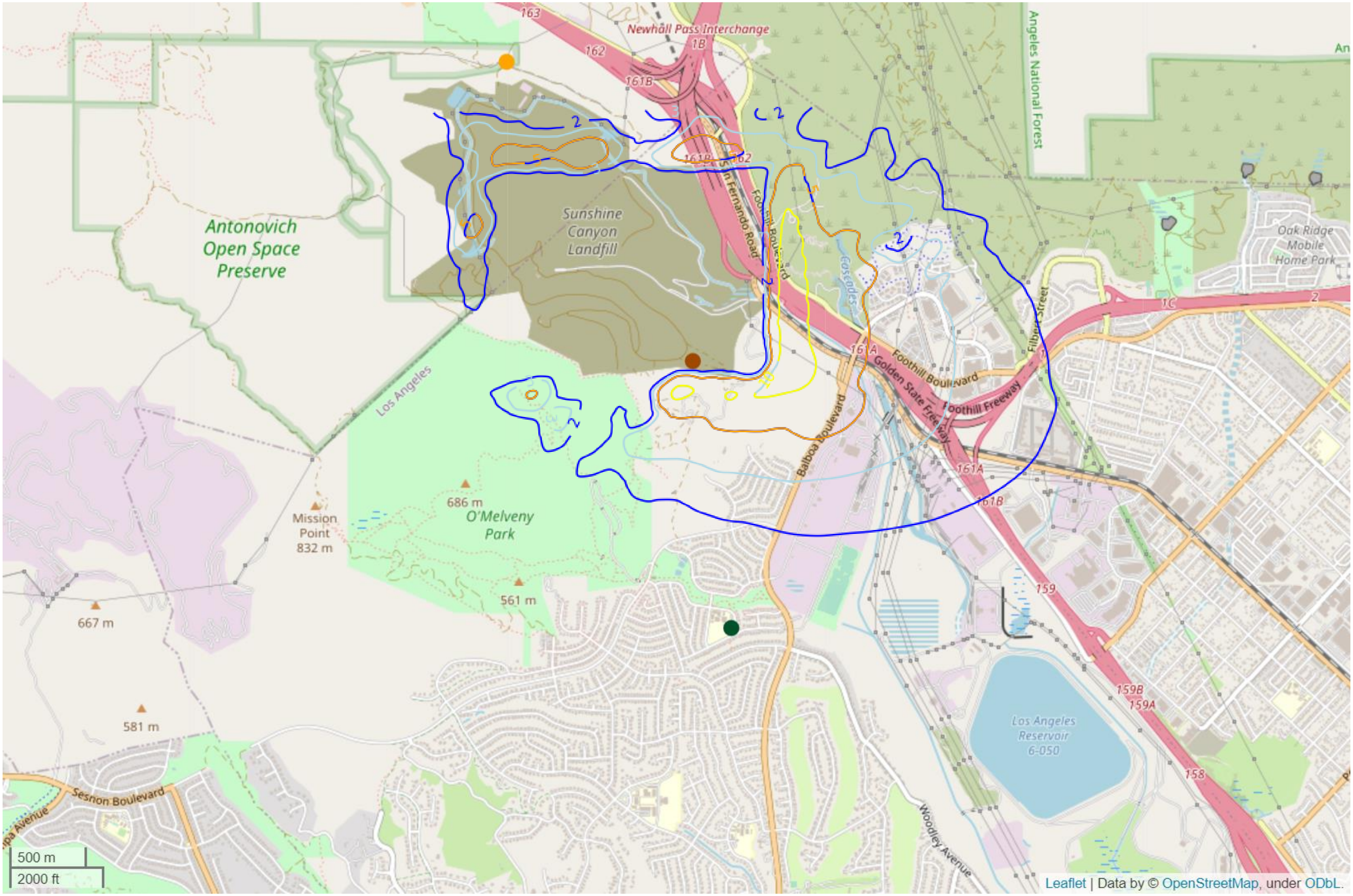


Figure B-23. Modeled Annual PM_{10} Conc. – Van Nuys Wind (Multiple Sources)

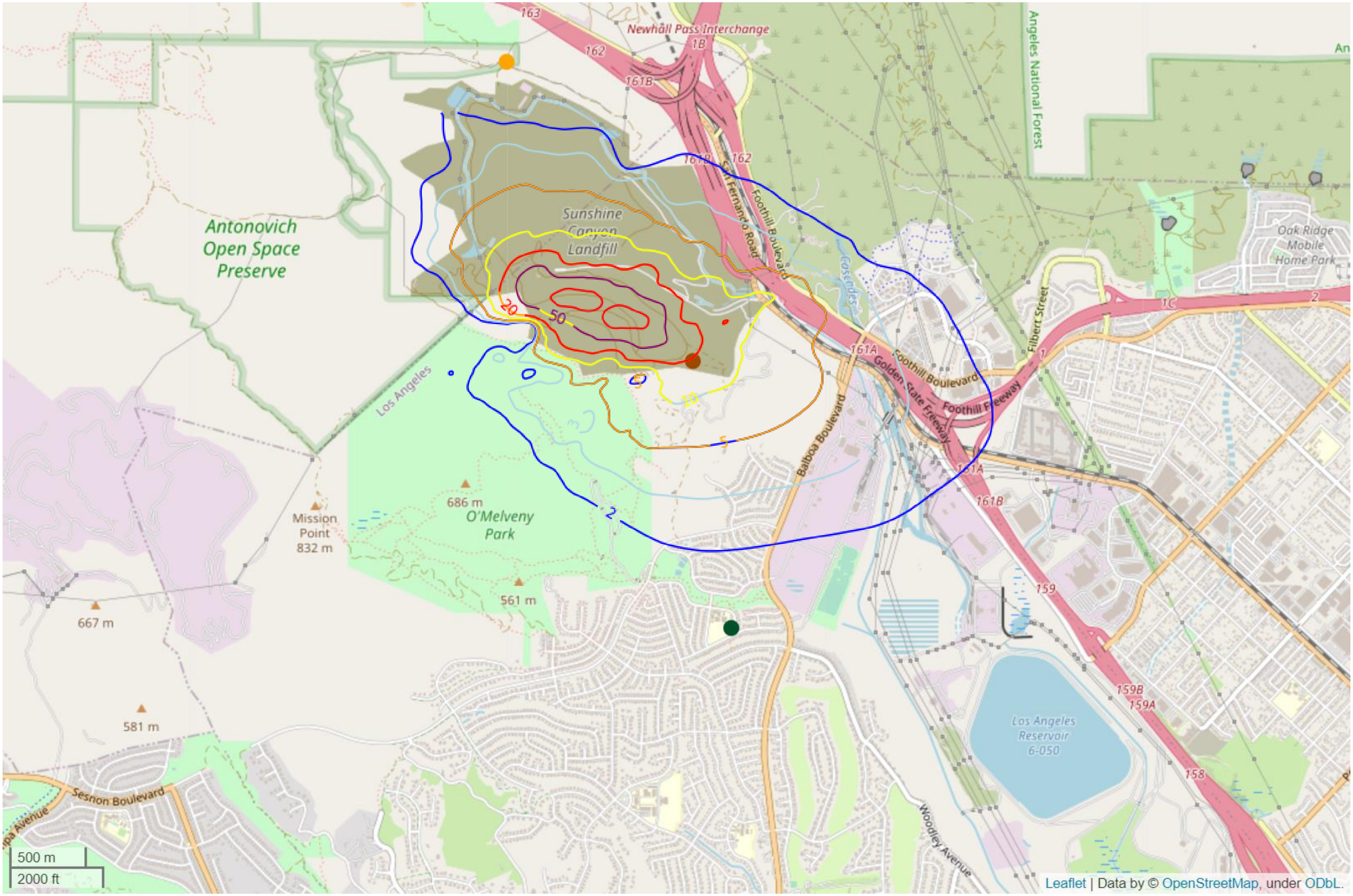


Figure B-24. Modeled 30-yr DPM Cancer Risk – Van Gogh Wind (Open Pit)

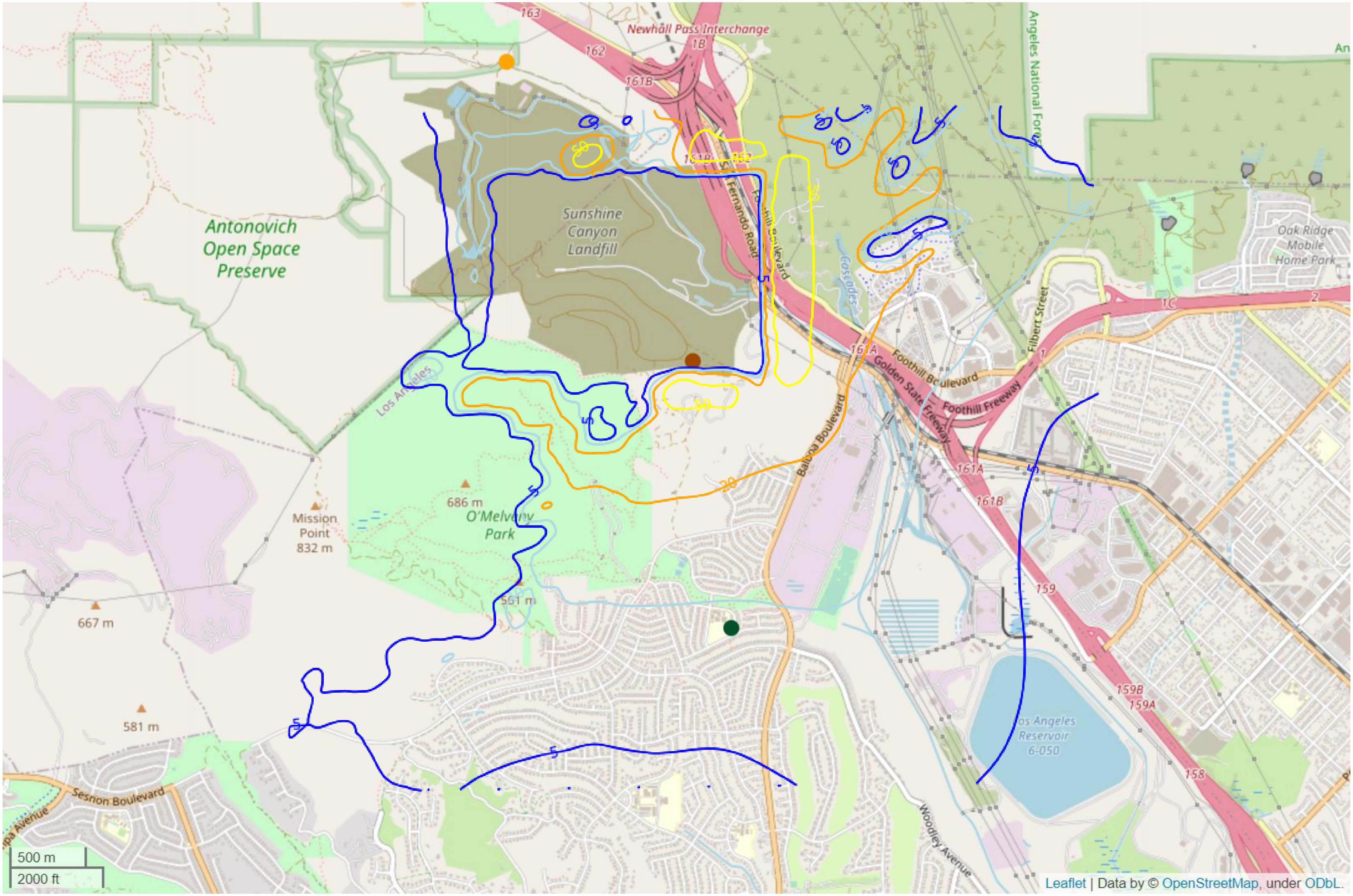


Figure B-25. Modeled 70-yr DPM Cancer Risk – Van Gogh Wind (Open Pit)

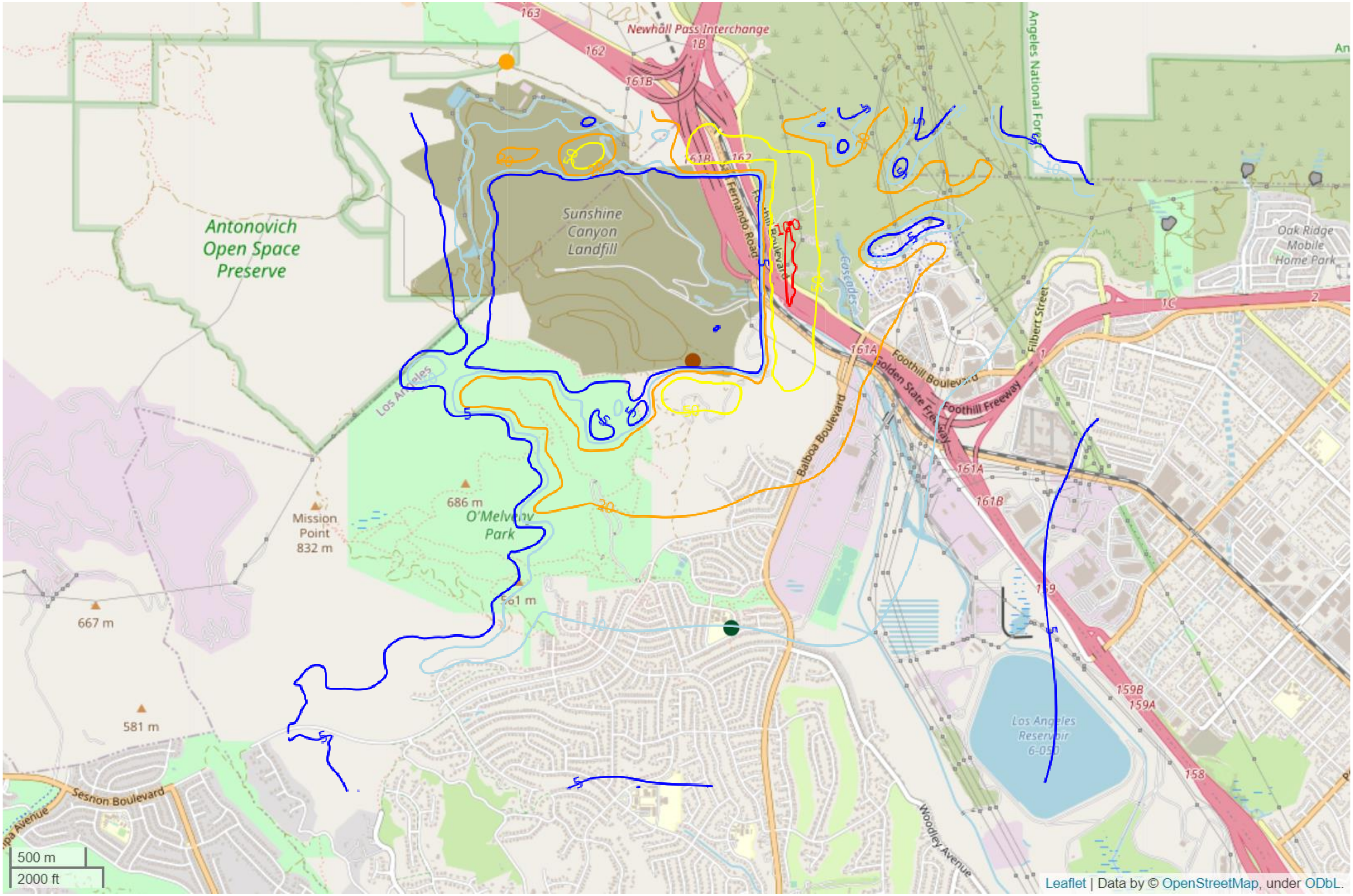


Figure B-26. Modeled 30-yr DPM Cancer Risk – Van Gogh Wind (Multiple Sources)

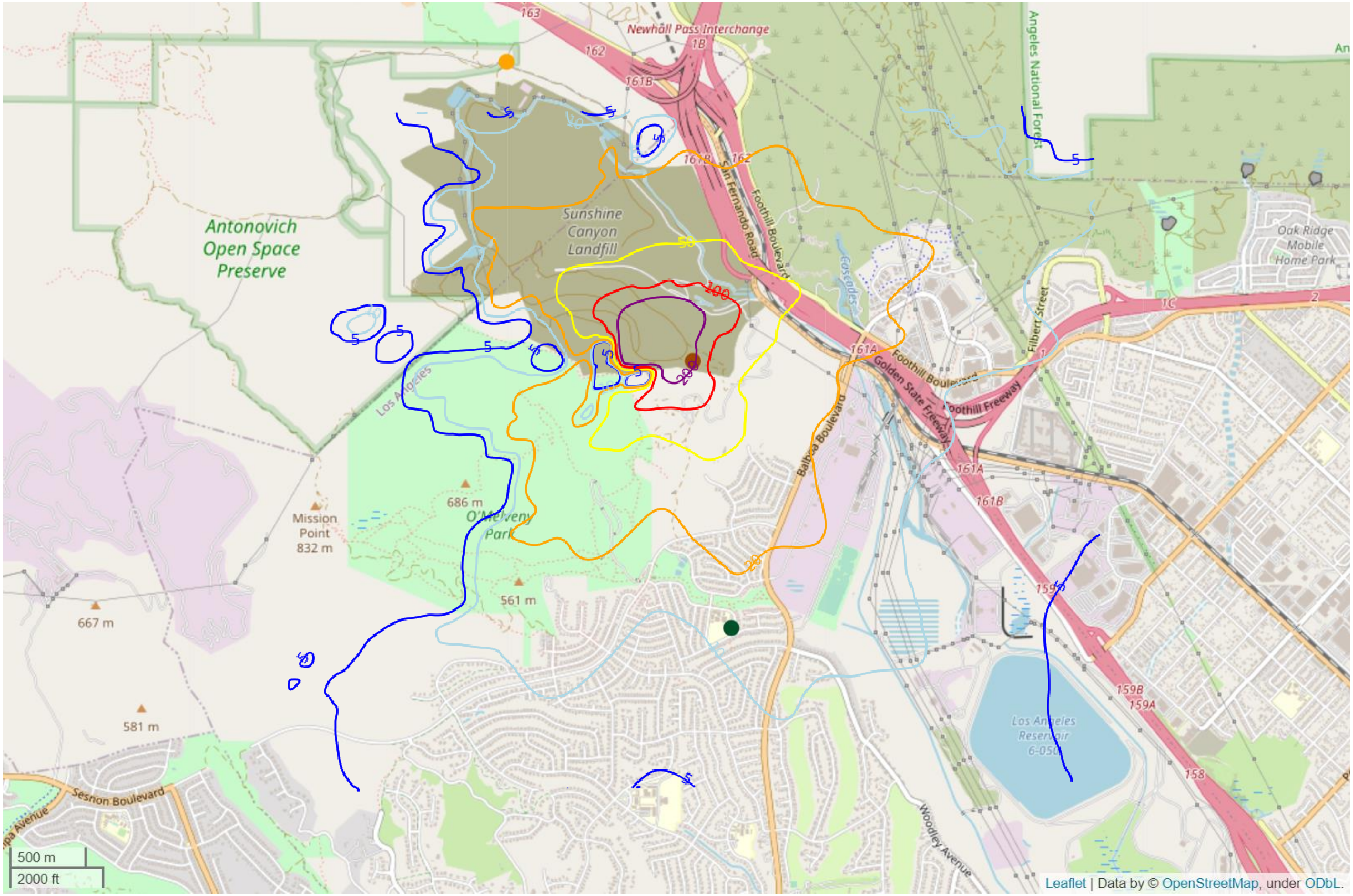


Figure B-27. Modeled 70-yr DPM Cancer Risk – Van Gogh Wind (Multiple Sources)

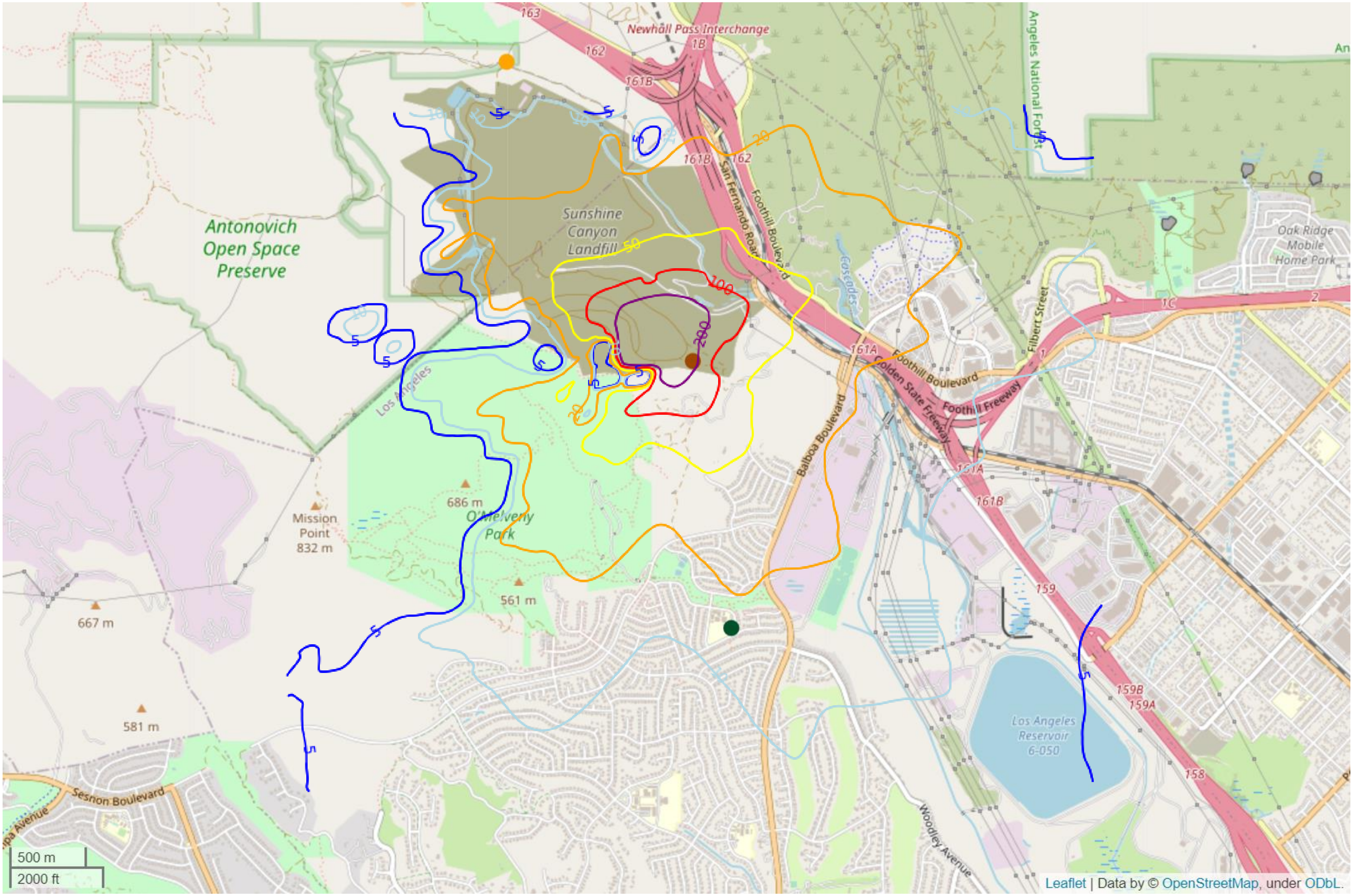


Figure B-28. Modeled 30-yr DPM Cancer Risk – Van Nuys Wind (Open Pit)

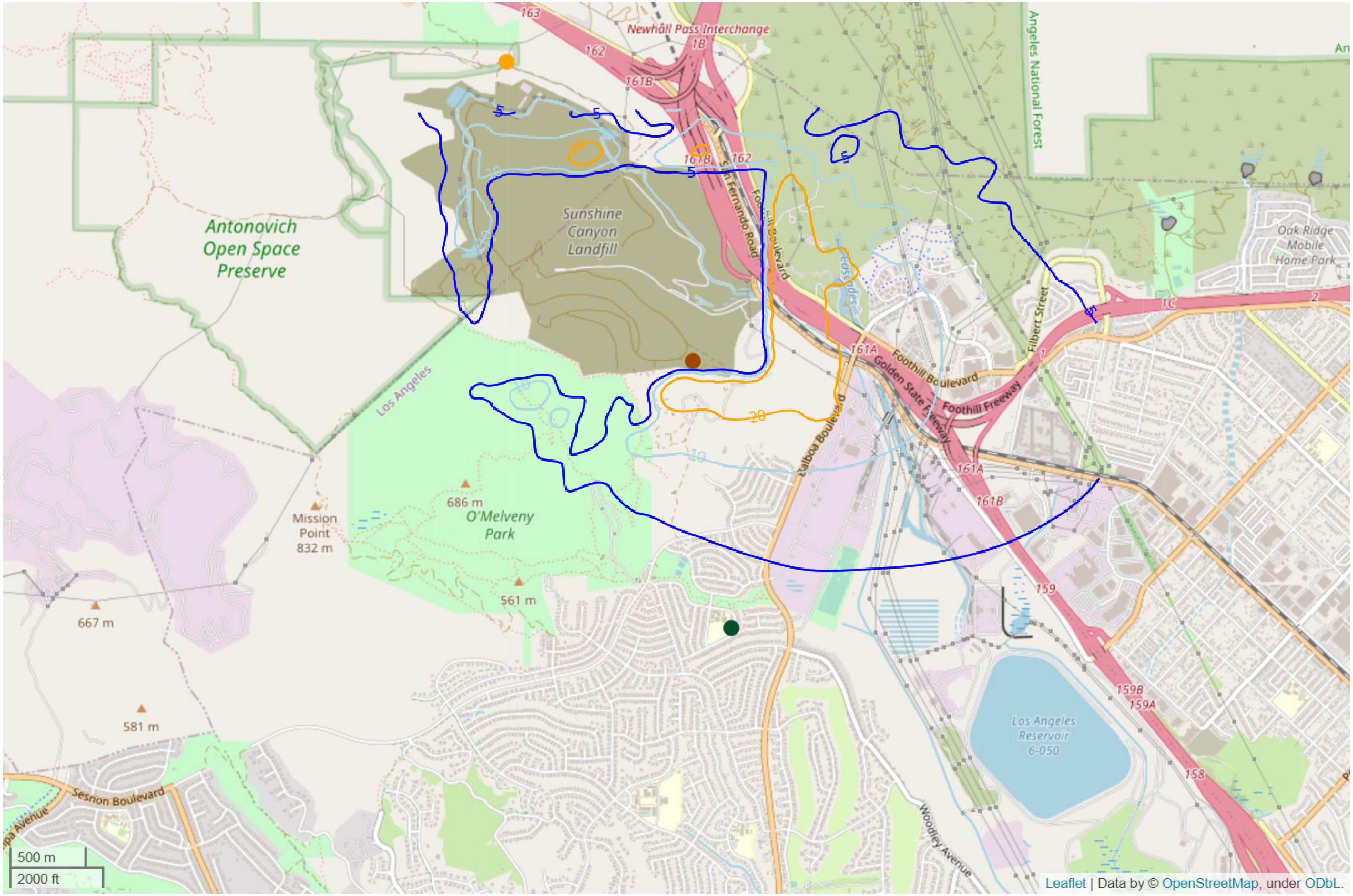


Figure B-29. Modeled 70-yr DPM Cancer Risk – Van Nuys Wind (Open Pit)

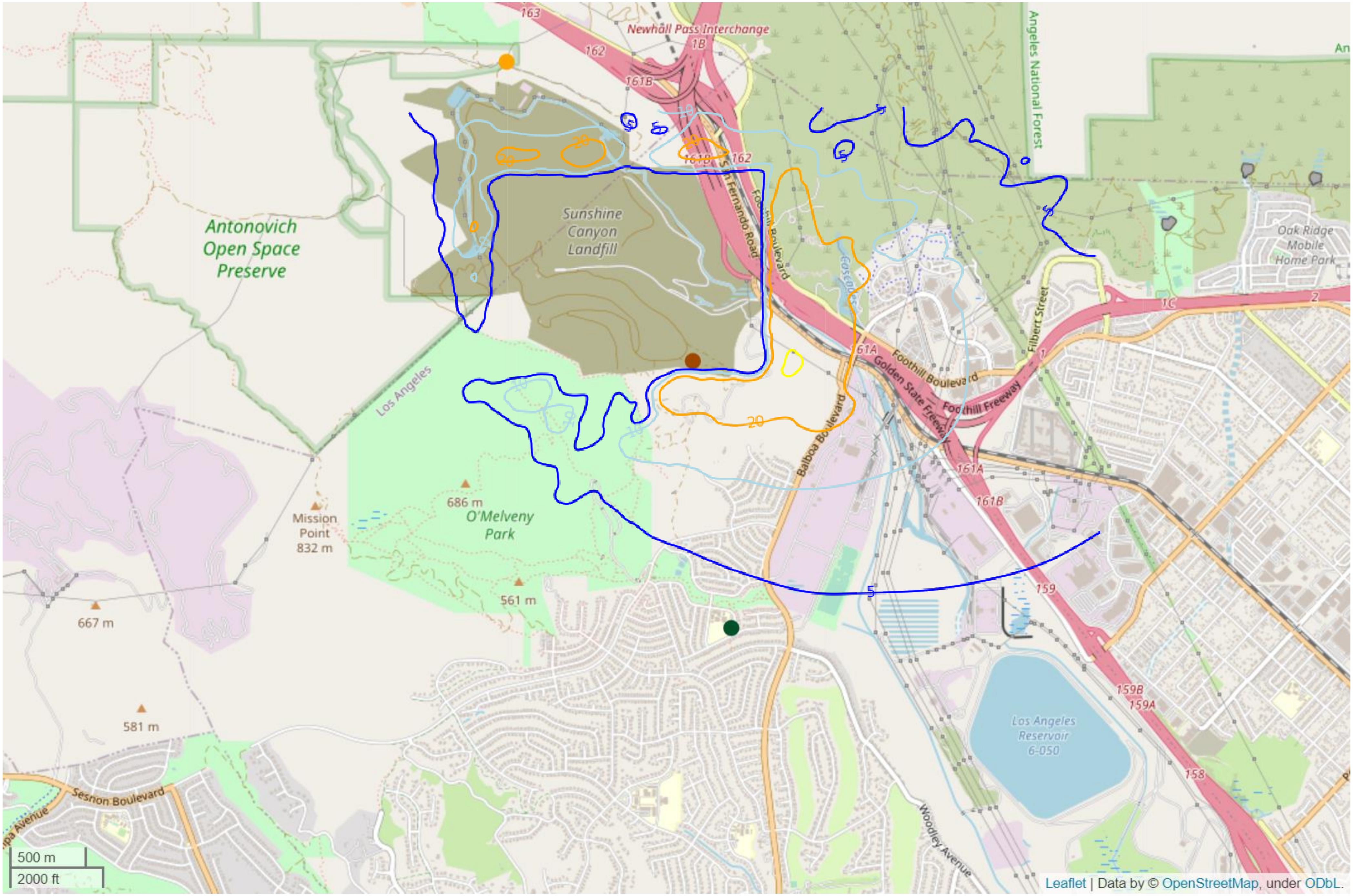


Figure B-30. Modeled 30-yr DPM Cancer Risk – Van Nuys Wind (Multiple Sources)

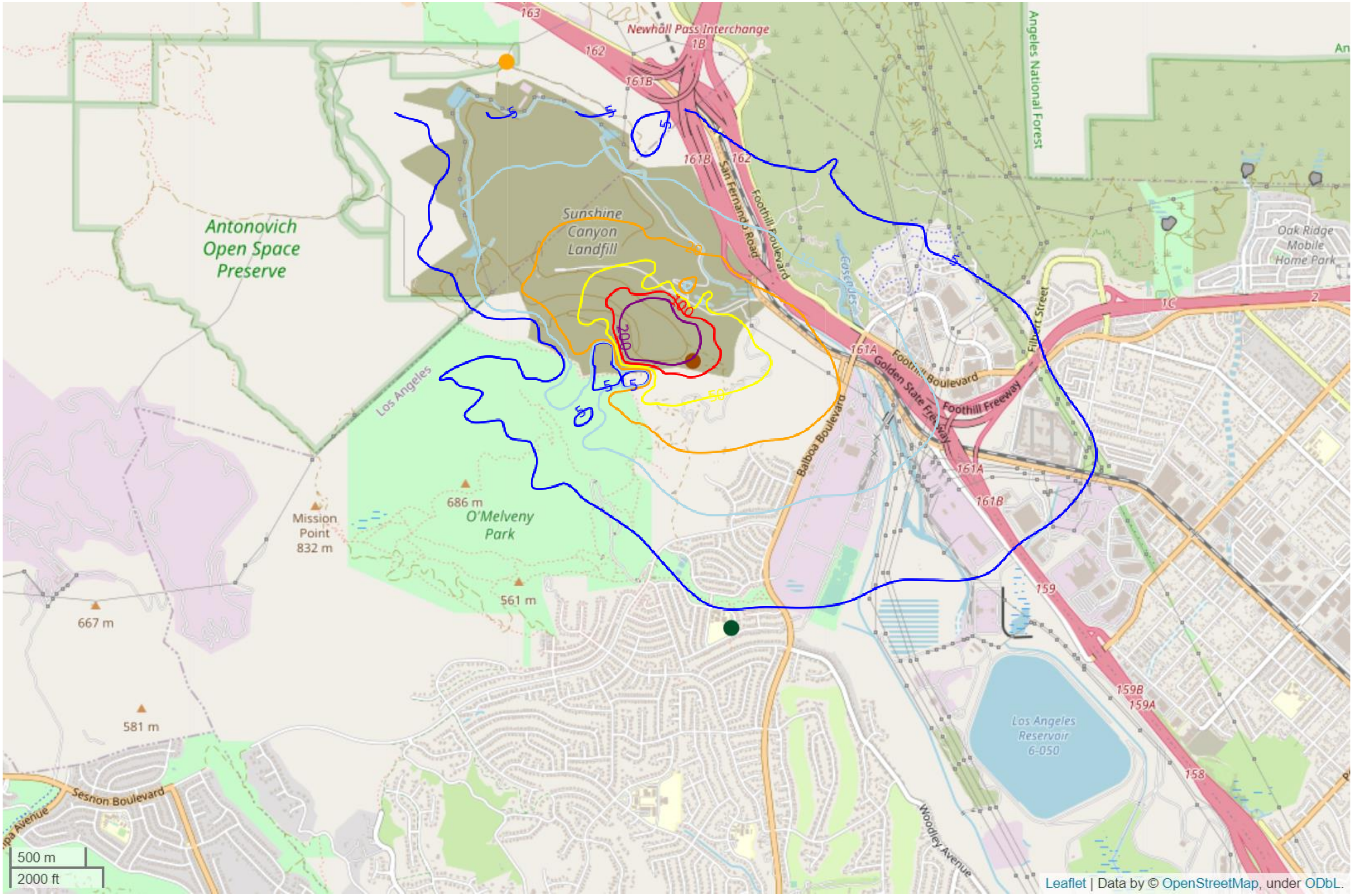
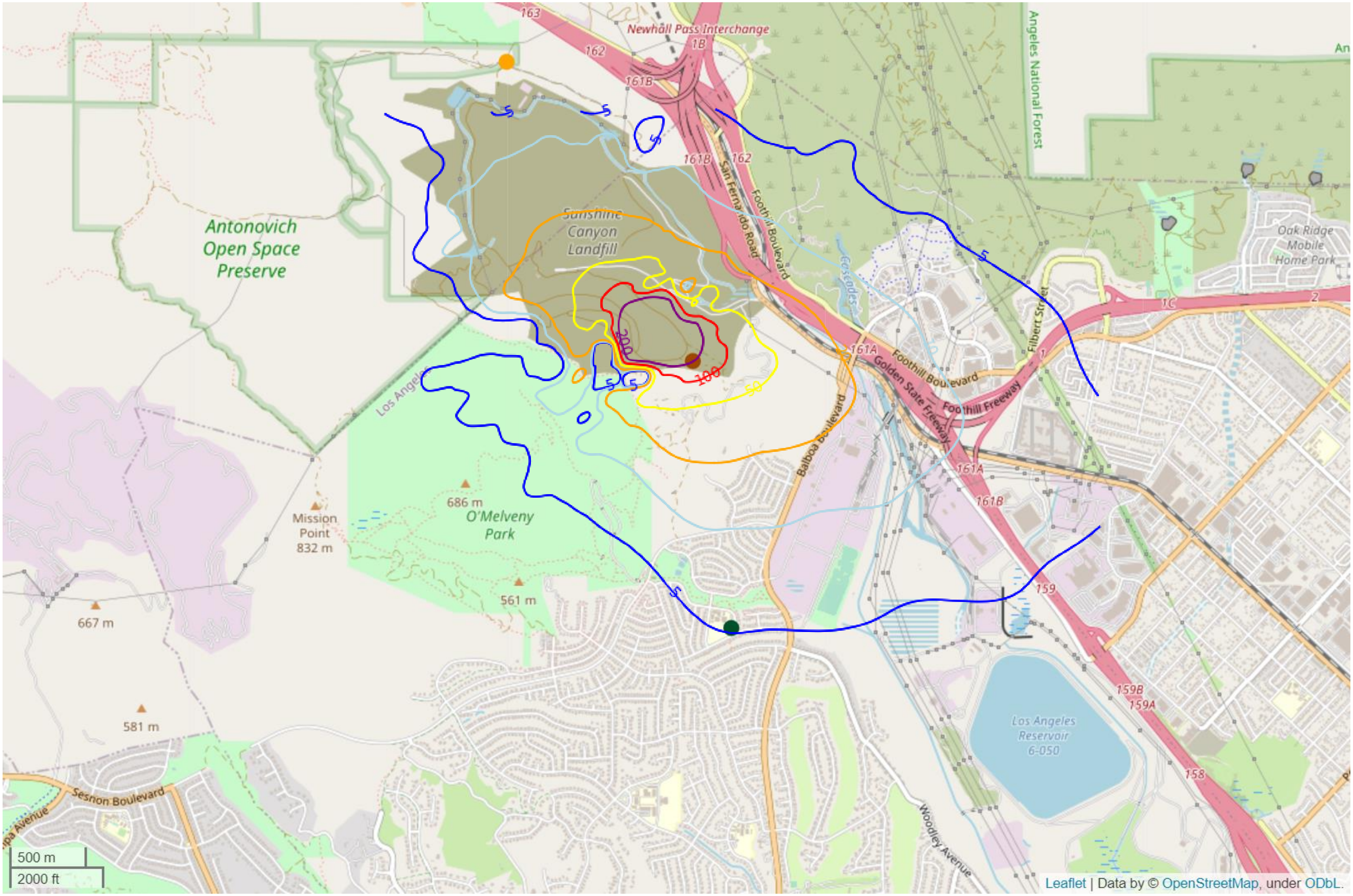


Figure B-31. Modeled 70-yr DPM Cancer Risk – Van Gogh Wind (Multiple Sources)



Urban Isopleths (Regulatory)

Figure B-32. Modeled Urban 24-Hour PM_{10} Conc. – Van Gogh Wind (Open Pit)

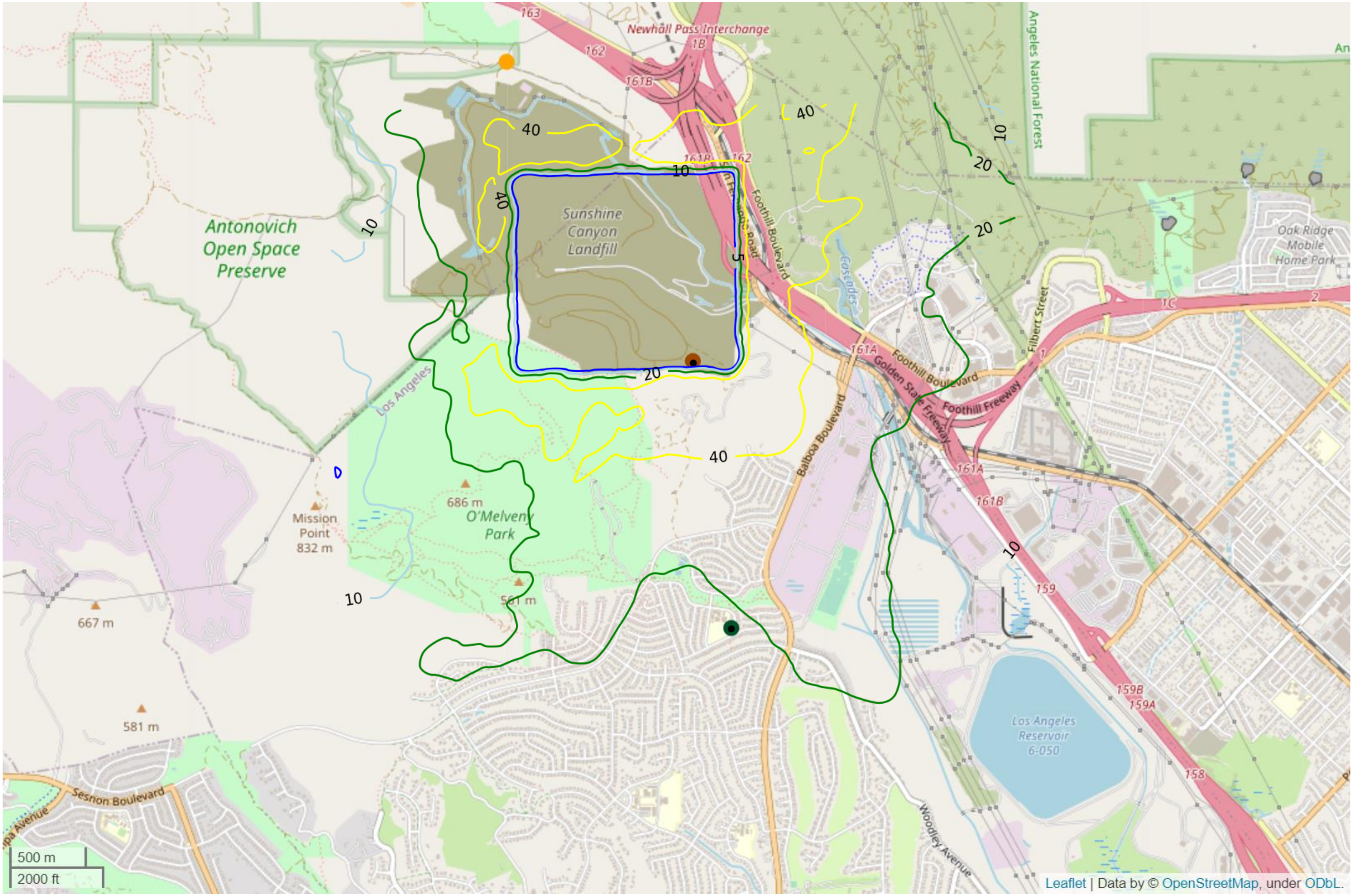


Figure B-33. Modeled Urban 24-Hour PM_{10} Conc. – Van Gogh Wind (Multiple Sources)

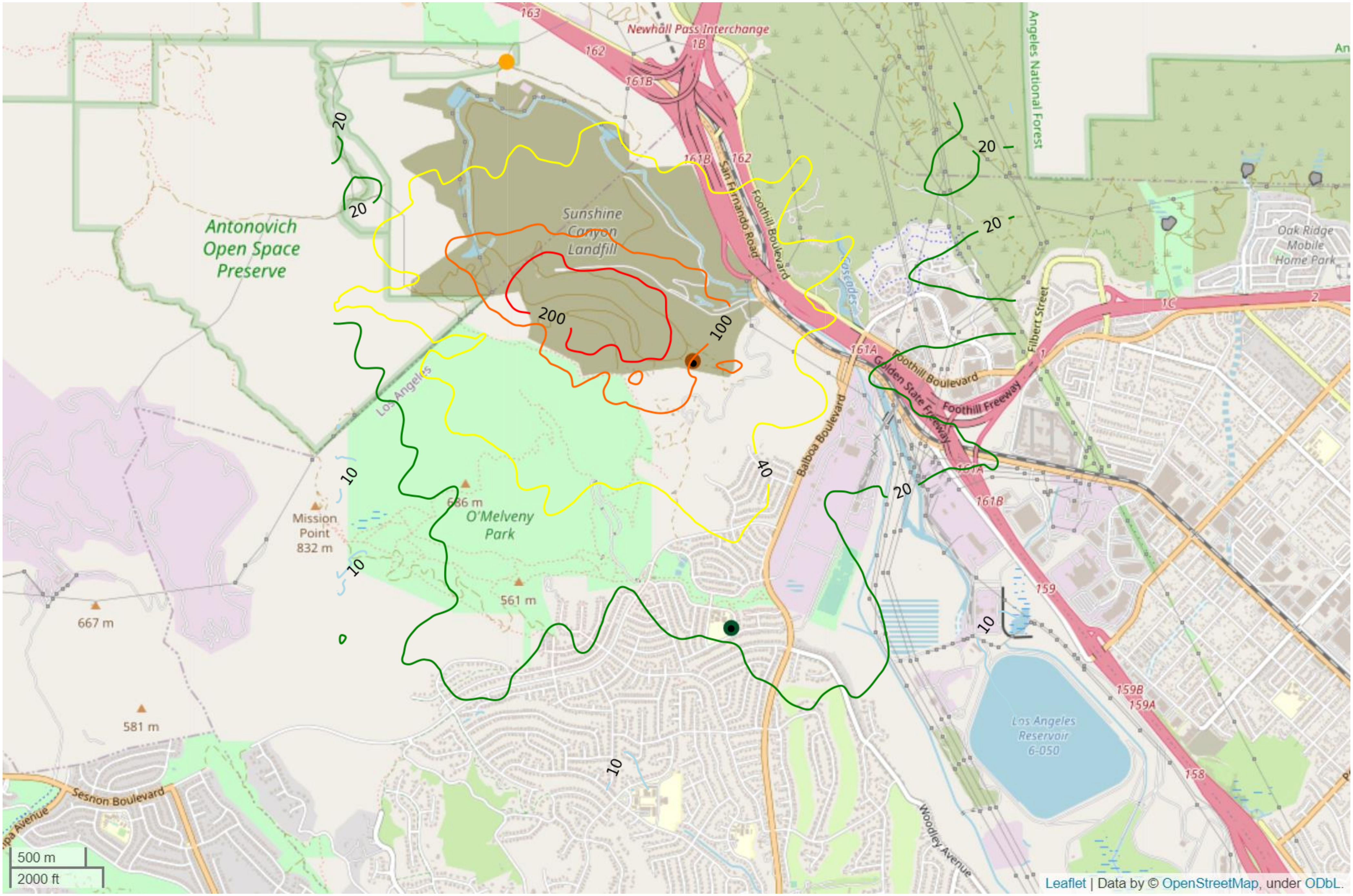


Figure B-34. Modeled Urban 24-Hour PM_{10} Conc. – Van Nuys Wind (Open Pit)

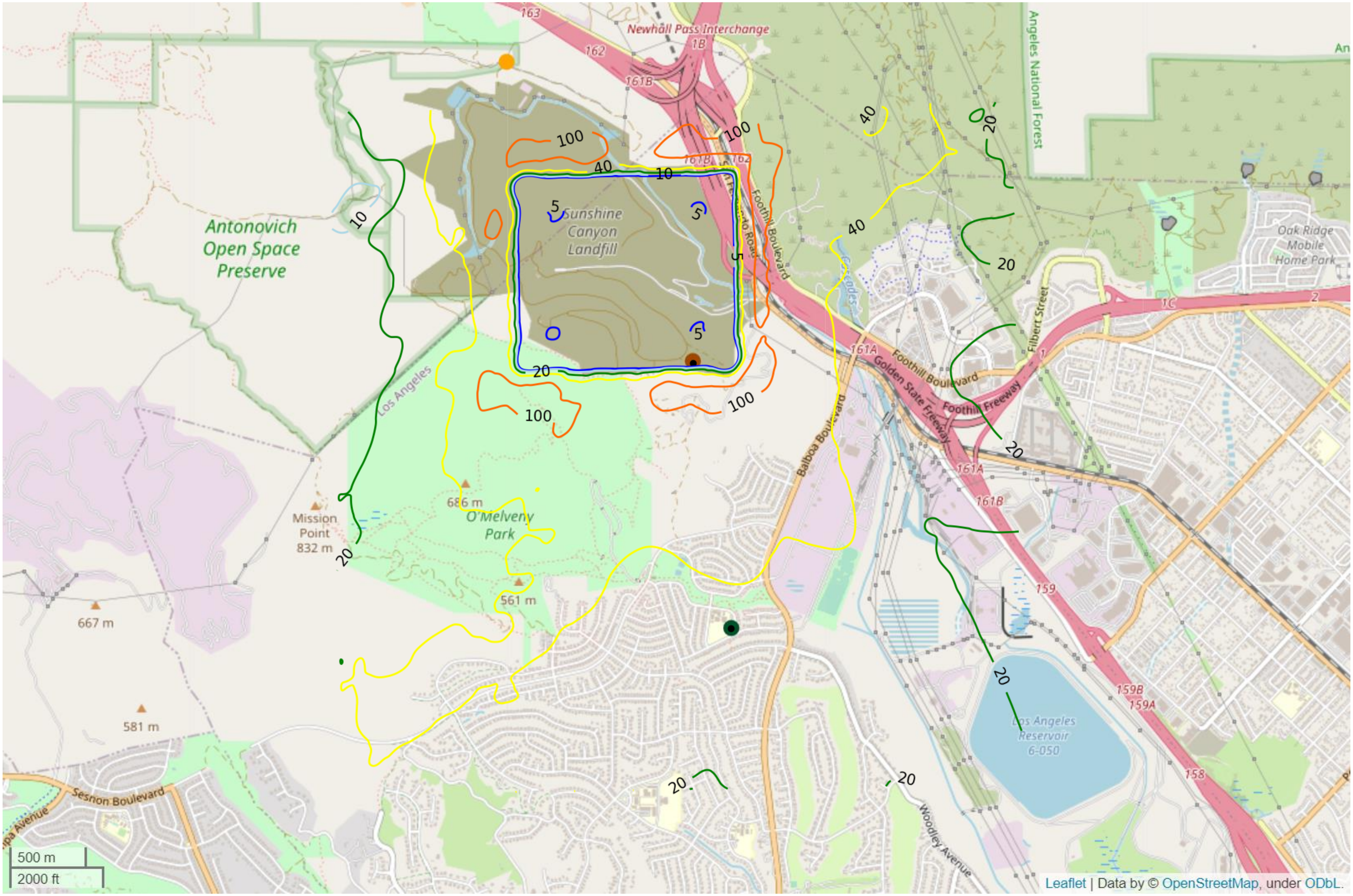


Figure B-35. Modeled Urban 24-Hour PM_{10} Conc. – Van Nuys Wind (Multiple Sources)

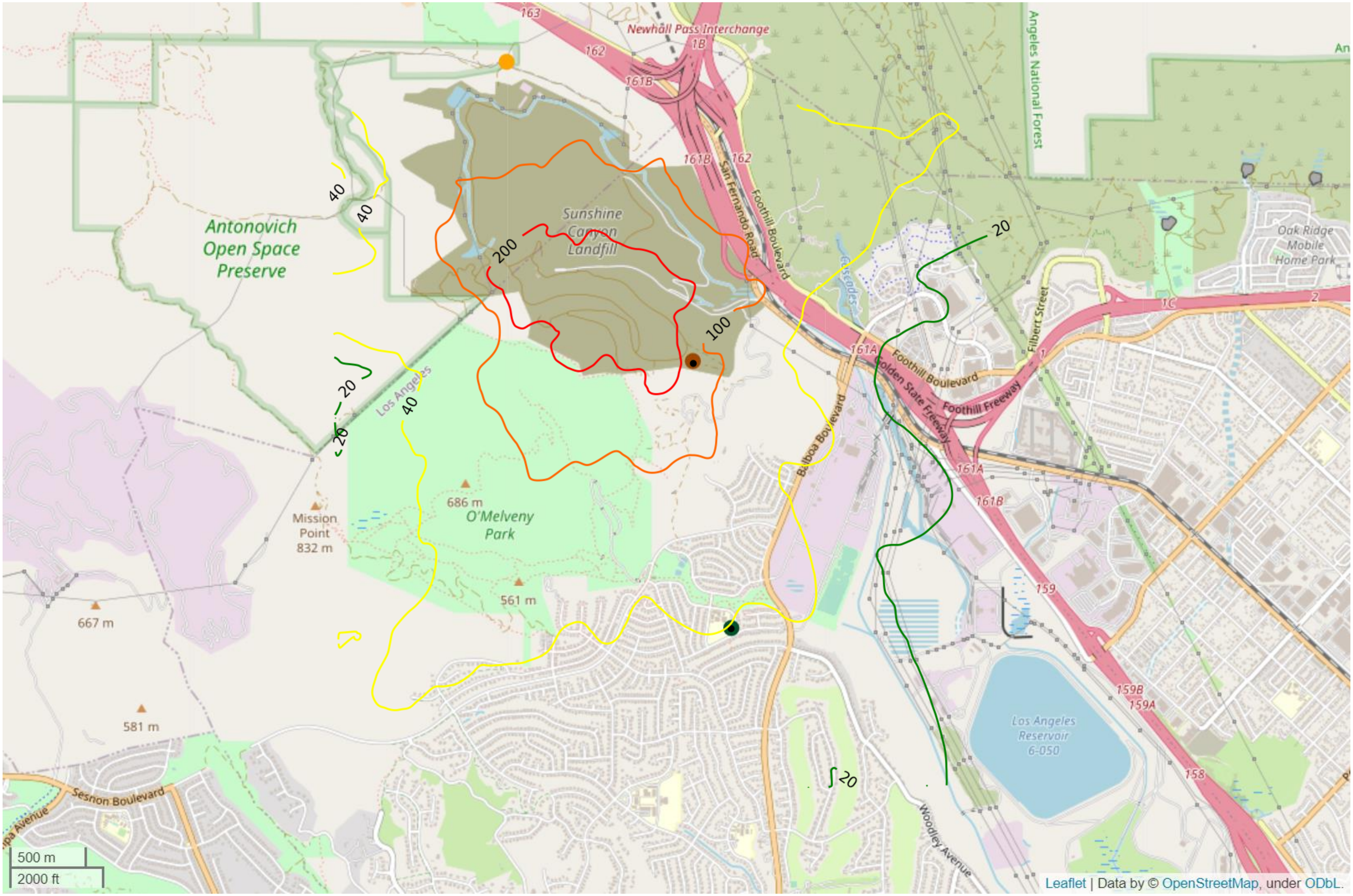


Figure B-36. Modeled Urban Annual PM_{10} Conc. – Van Gogh Wind (Open Pit)

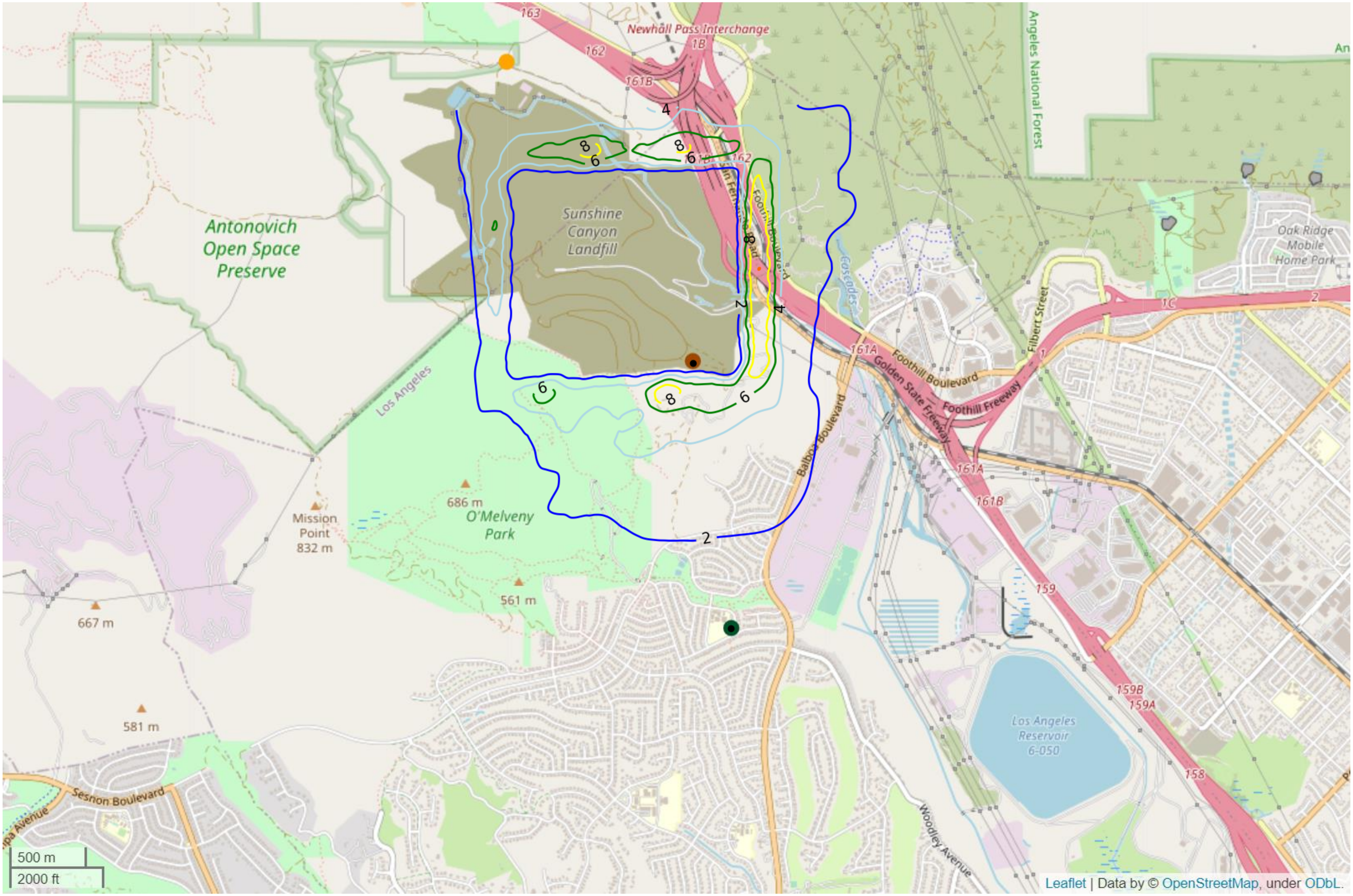


Figure B-37. Modeled Urban Annual PM_{10} Conc. – Van Gogh Wind (Multiple Sources)

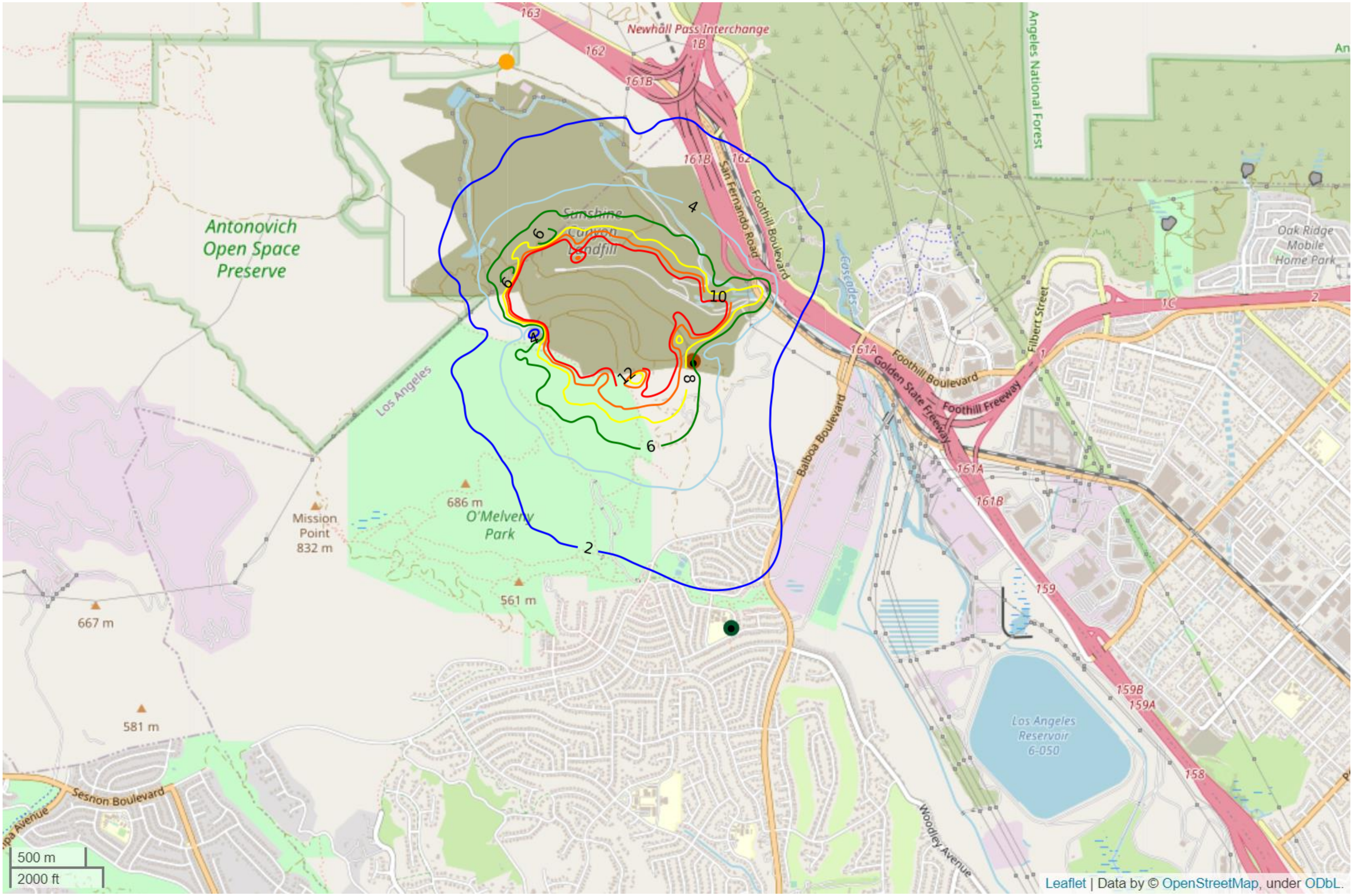


Figure B-38. Modeled Urban Annual PM_{10} Conc. – Van Nuys Wind (Open Pit)

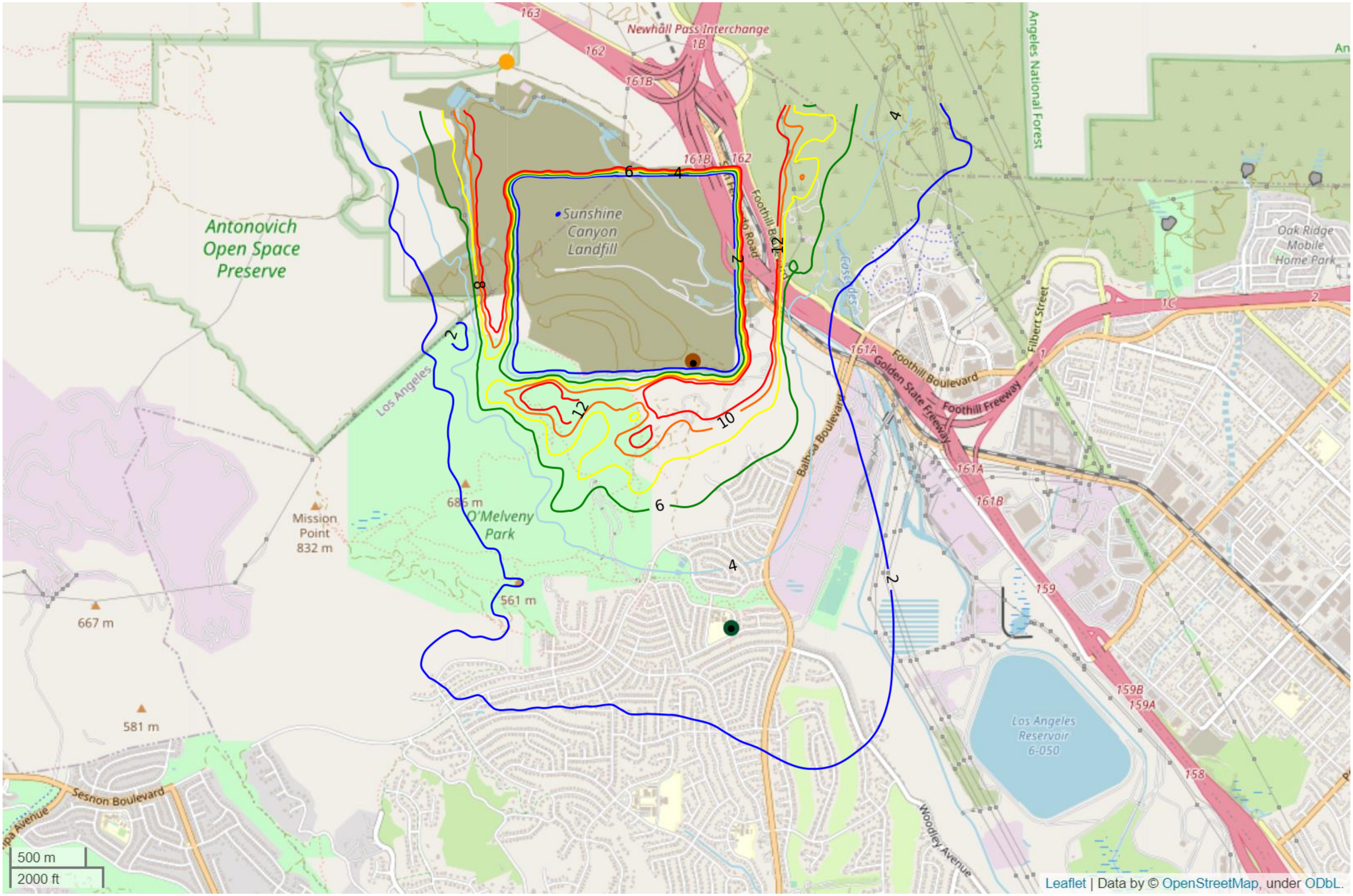


Figure B-39. Modeled Urban Annual PM_{10} Conc. – Van Nuys Wind (Multiple Sources)

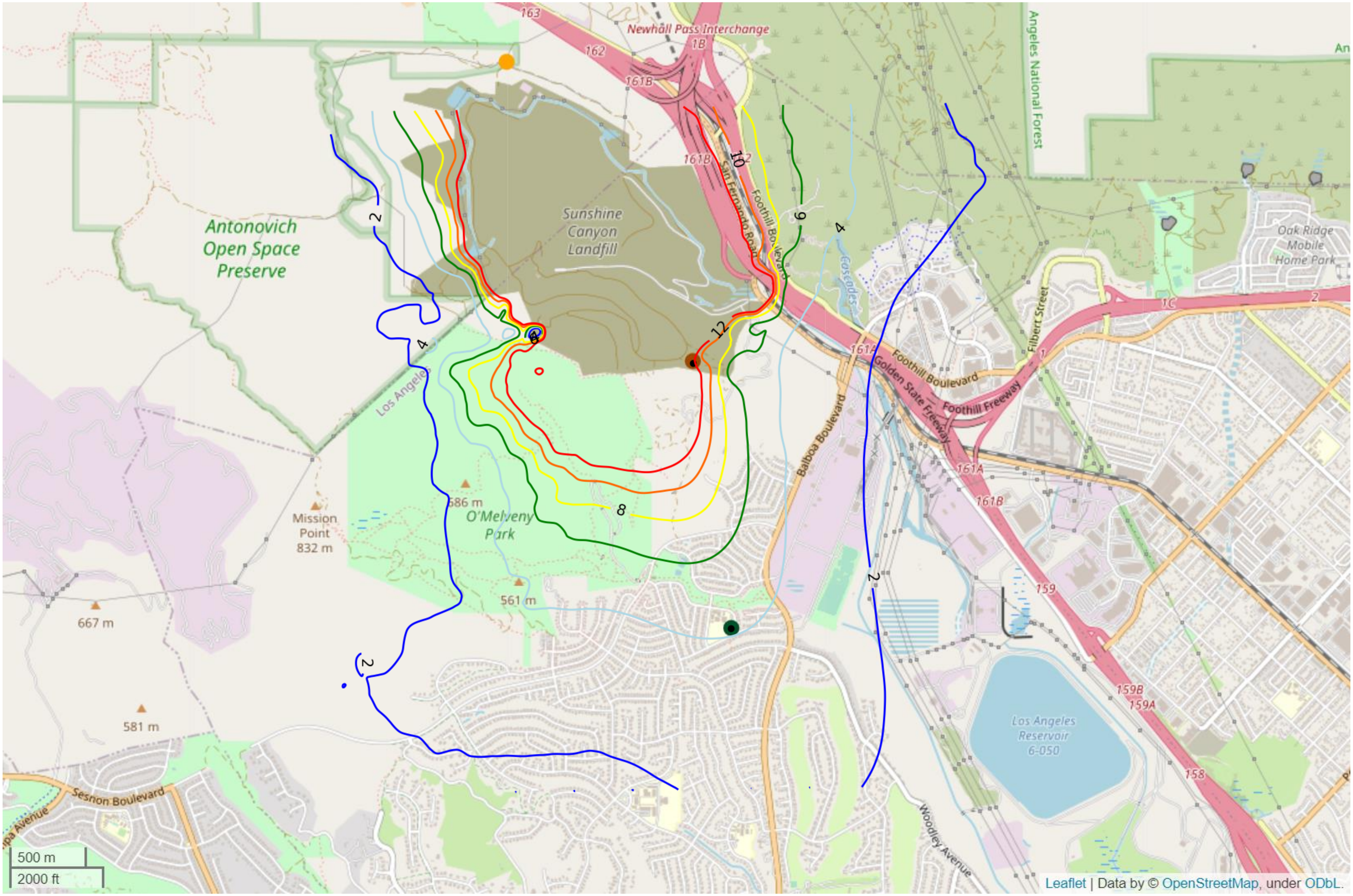


Figure B-40. Modeled Urban 30-yr DPM Cancer Risk – Van Gogh Wind (Open Pit)

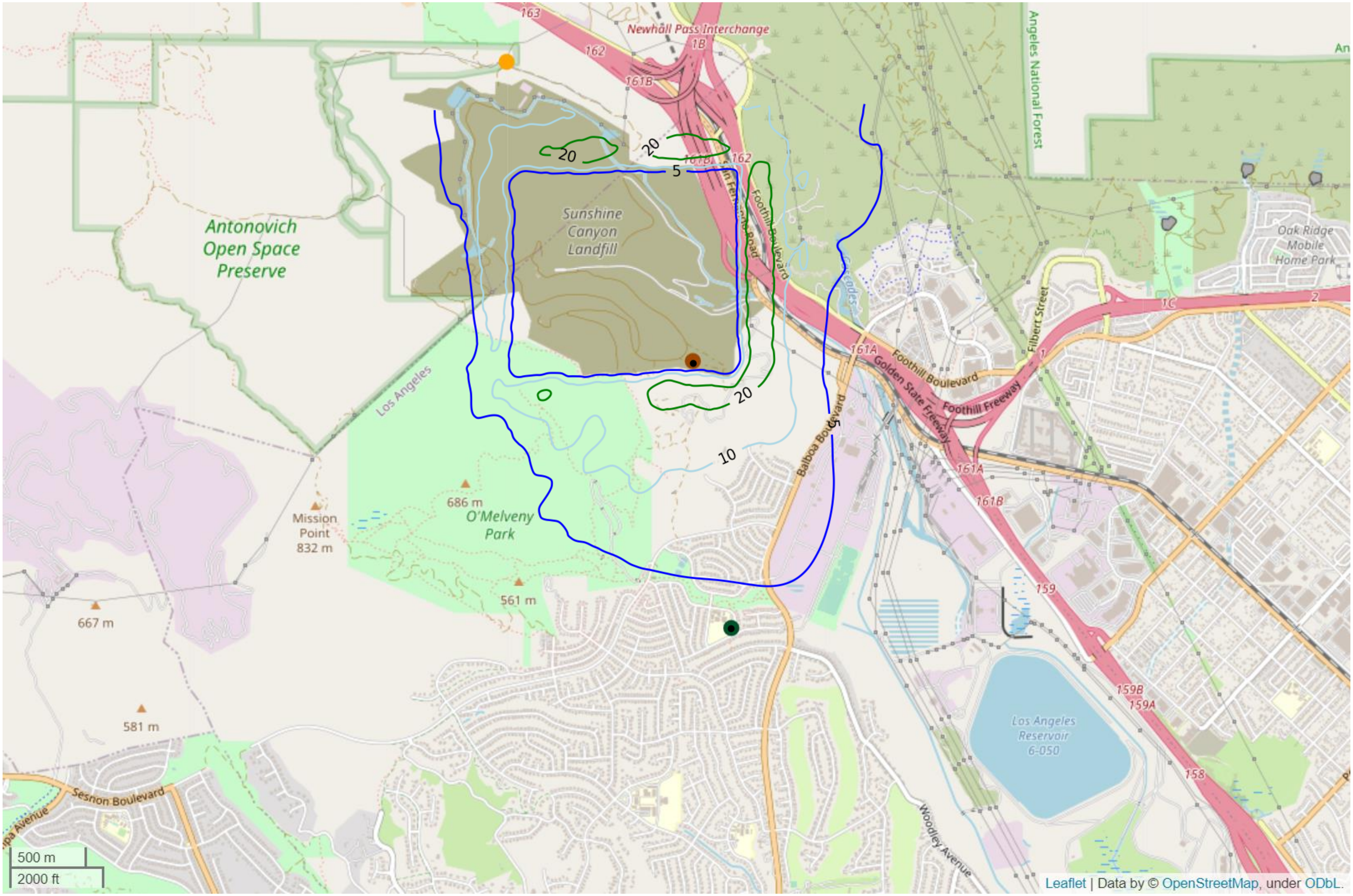


Figure B-41. Modeled Urban 70-yr DPM Cancer Risk – Van Gogh Wind (Open Pit)

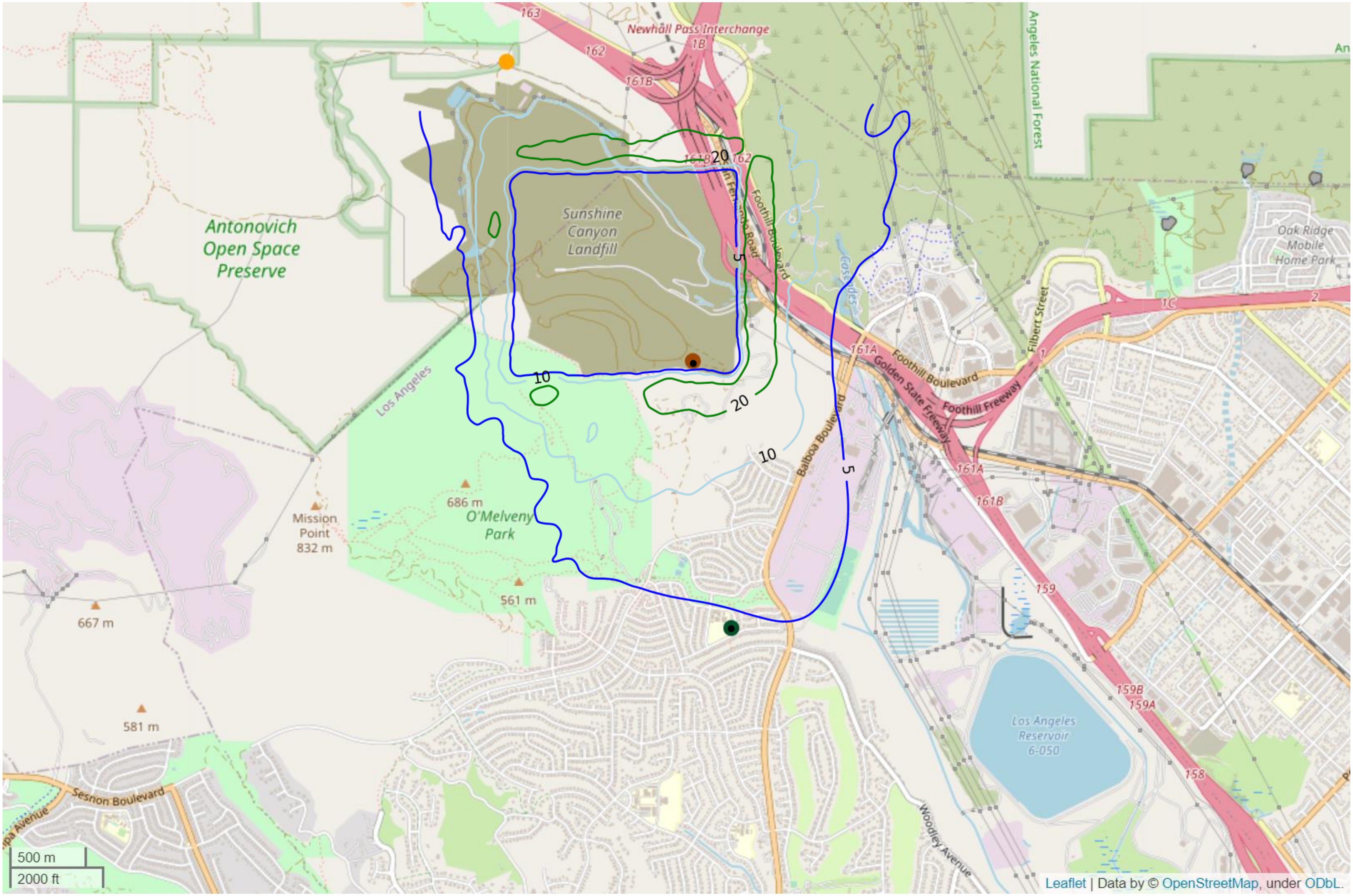


Figure B-42. Modeled 30-yr DPM Cancer Risk – Van Gogh Wind (Multiple Sources)

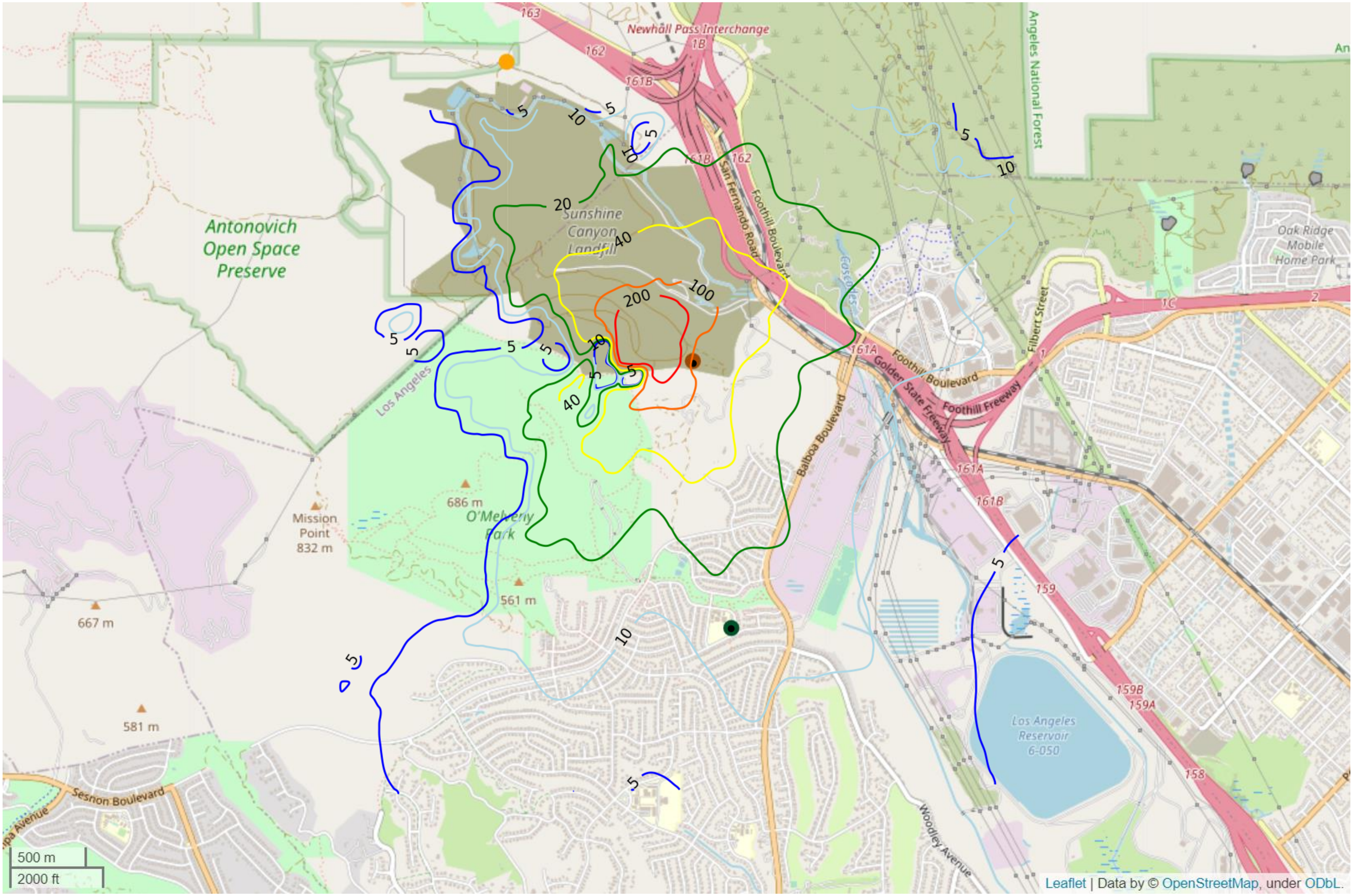


Figure B-43. Modeled 70-yr DPM Cancer Risk – Van Gogh Wind (Multiple Sources)

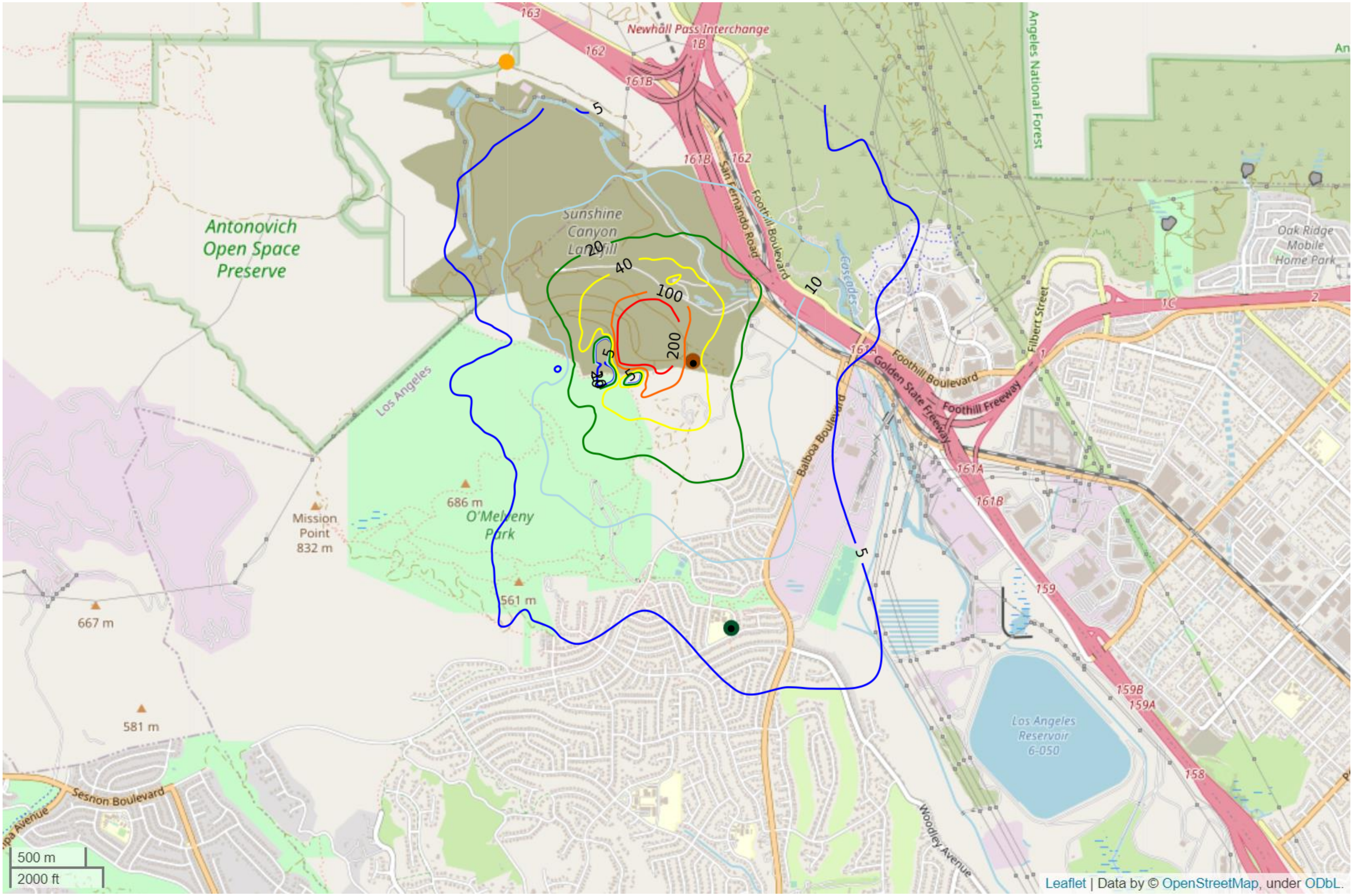


Figure B-44. Modeled 30-yr DPM Cancer Risk – Van Nuys Wind (Open Pit)

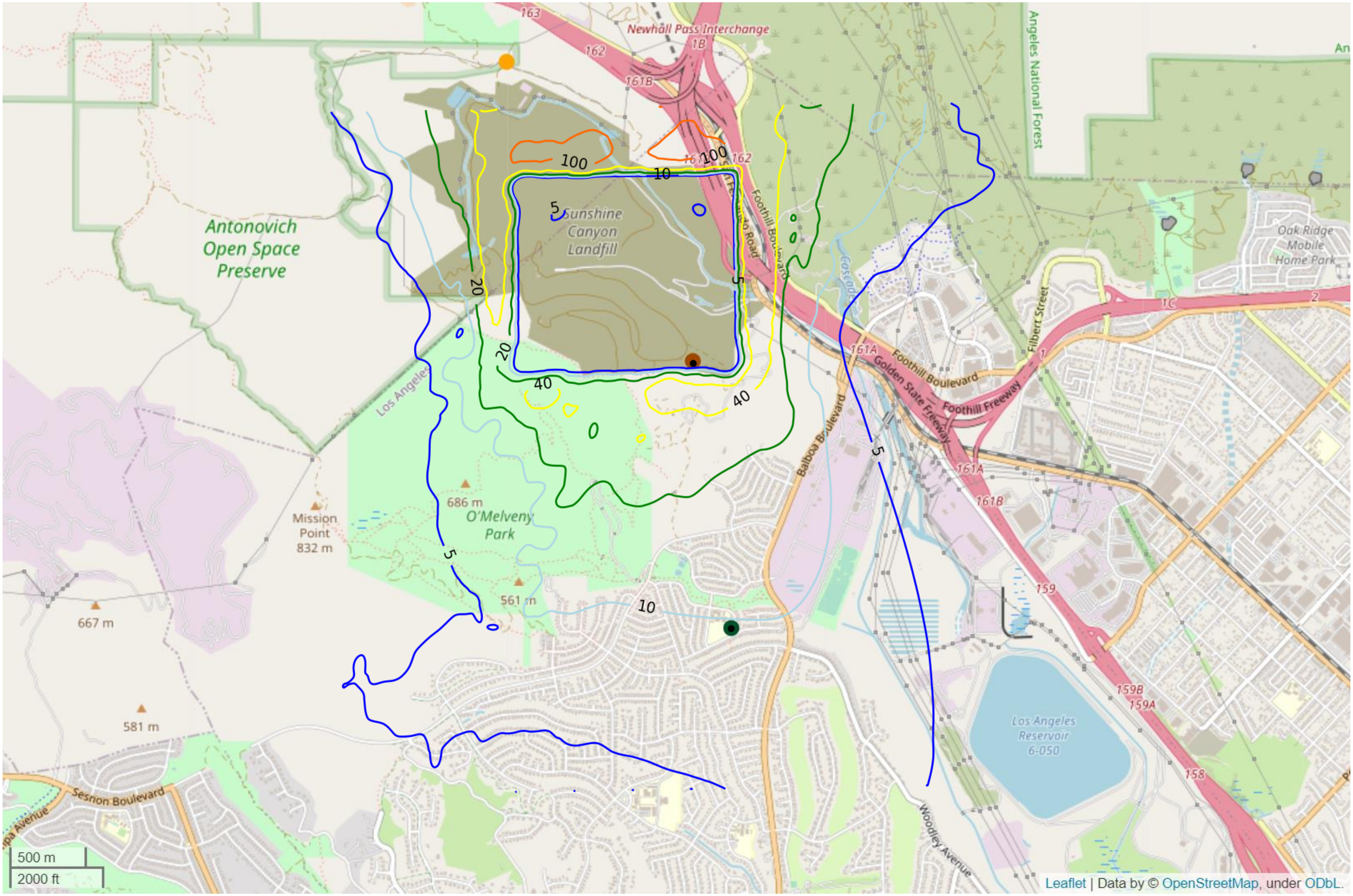


Figure B-45. Modeled 70-yr DPM Cancer Risk – Van Nuys Wind (Open Pit)