



2019 PSPS Events Wildfire Risk Analysis

A PUBLIC PRESENTATION OF PROJECT METHODS AND RESULTS

March 26th, 2021

David Buckley, COO, Technosylva
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TODAY'S PRESENTATION

Technosylva Principal Investigators



Joaquin Ramirez

President / CTO



David Buckley

Vice-President / COO

Purpose of the Presentation

1. Review the scope of the analysis
2. Present project tasks
3. Present data used
4. Present analysis methods applied
5. Present results of the analysis
6. Support questions and answers

PREFACE

- Increasing frequency of extreme weather events is occurring, that can lead to rapid fire spread and related destruction should an ignition occur
- Practice of de-energizing powerlines in response to these weather events has grown in use and prevalence, and is referred to as Public Safety Power Shutoff (PSPS)
- There is a need to better understand the risk situation occurring during these PSPS events
- Need for evolution and refinement of PSPS use
- CPUC engaged Technosylva (La Jolla, CA) to conduct advanced analysis for these 2019 PSPS events



Project Objectives

2019 PSPS Event Analysis

PROJECT SCOPE

A wildfire risk analysis has been conducted for each 2019 PSPS event, allowing the CPUC to better understand the severity of the weather conditions and the potential risks averted from wildfires that could have ignited from possible electric utility infrastructure ignition sources, based on damages sustained following the power shutoff.

PROJECT APPROACH

The project focuses on applying advanced fire modeling science to quantify the risk associated with possible ignitions from IOU assets during PSPS events.

The key component is the ability to utilize advanced fire spread modeling to analyze impacts from damages incurred during the PSPS event that would have led to fire ignitions.

ANALYSIS WORKFLOW

1



IOU identifies assets that were damaged during PSPS event.



2



Fire spread simulations are run for each damaged asset to quantify potential impacts, with the assumption that an ignition would have occurred if the line was not de-energized.



3



Rank the damage asset impacts to identify the most significant potential fires.

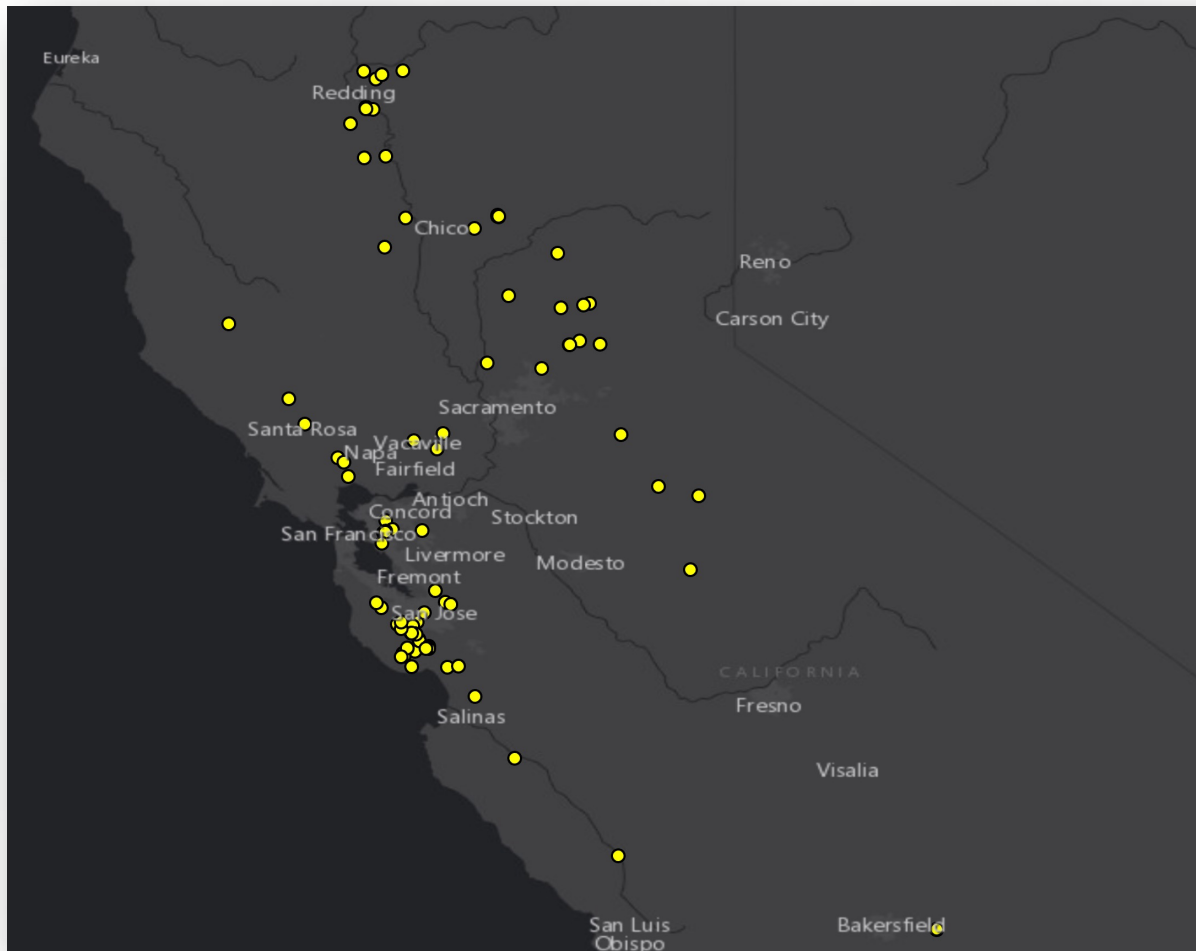


Data Used

2019 PSPS Event Analysis

DATA INPUTS

IGNITION LOCATIONS



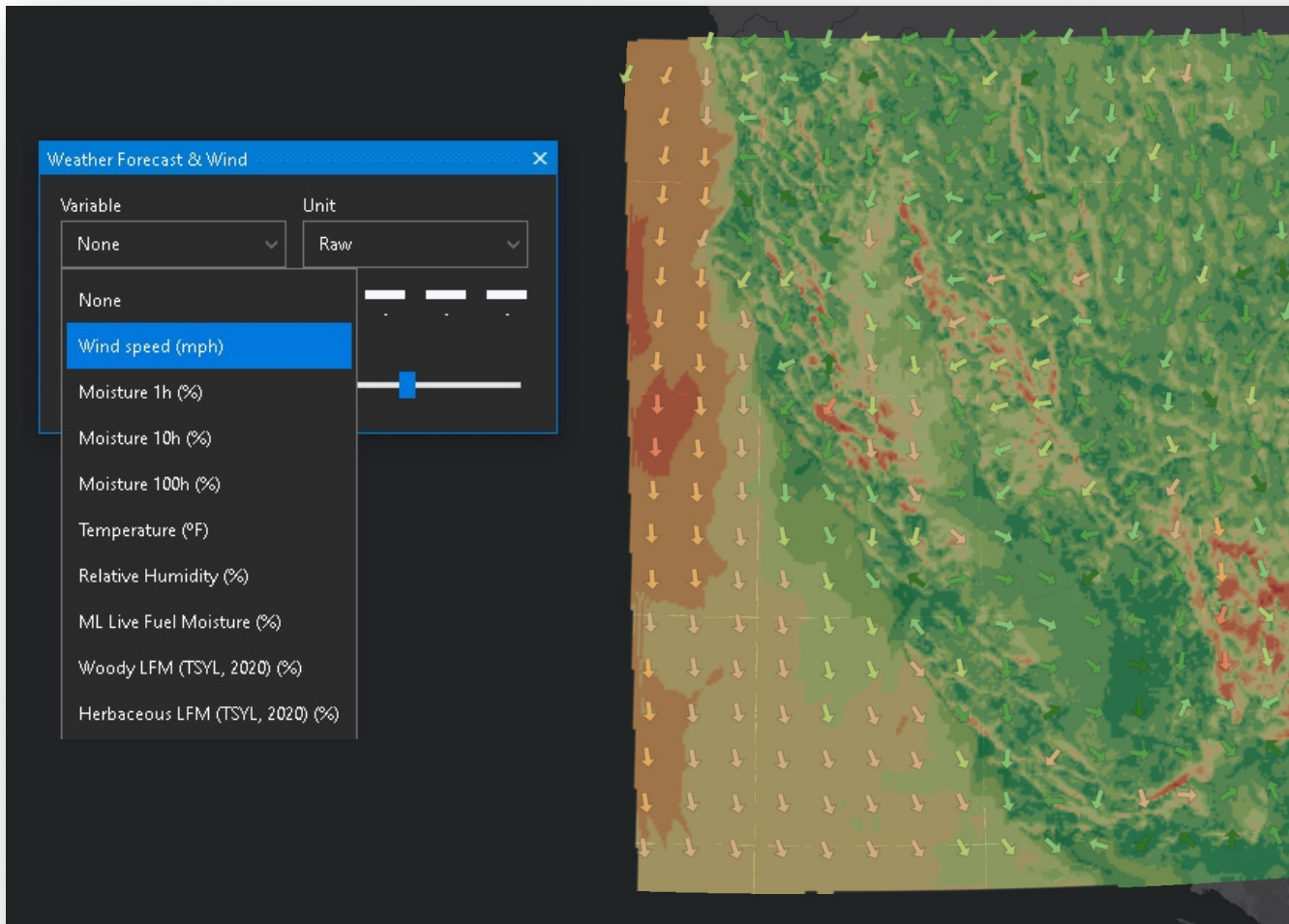
IGNITIONS

PSPS Damaged Assets

- Damaged asset locations and conditions provided by each IOU
- Damage incident locations used as ignition points
- Time of ignition estimated from analysis of weather data from PSPS event

DATA INPUTS

WEATHER DATA



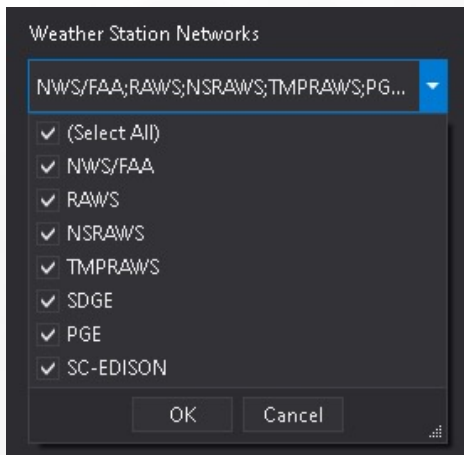
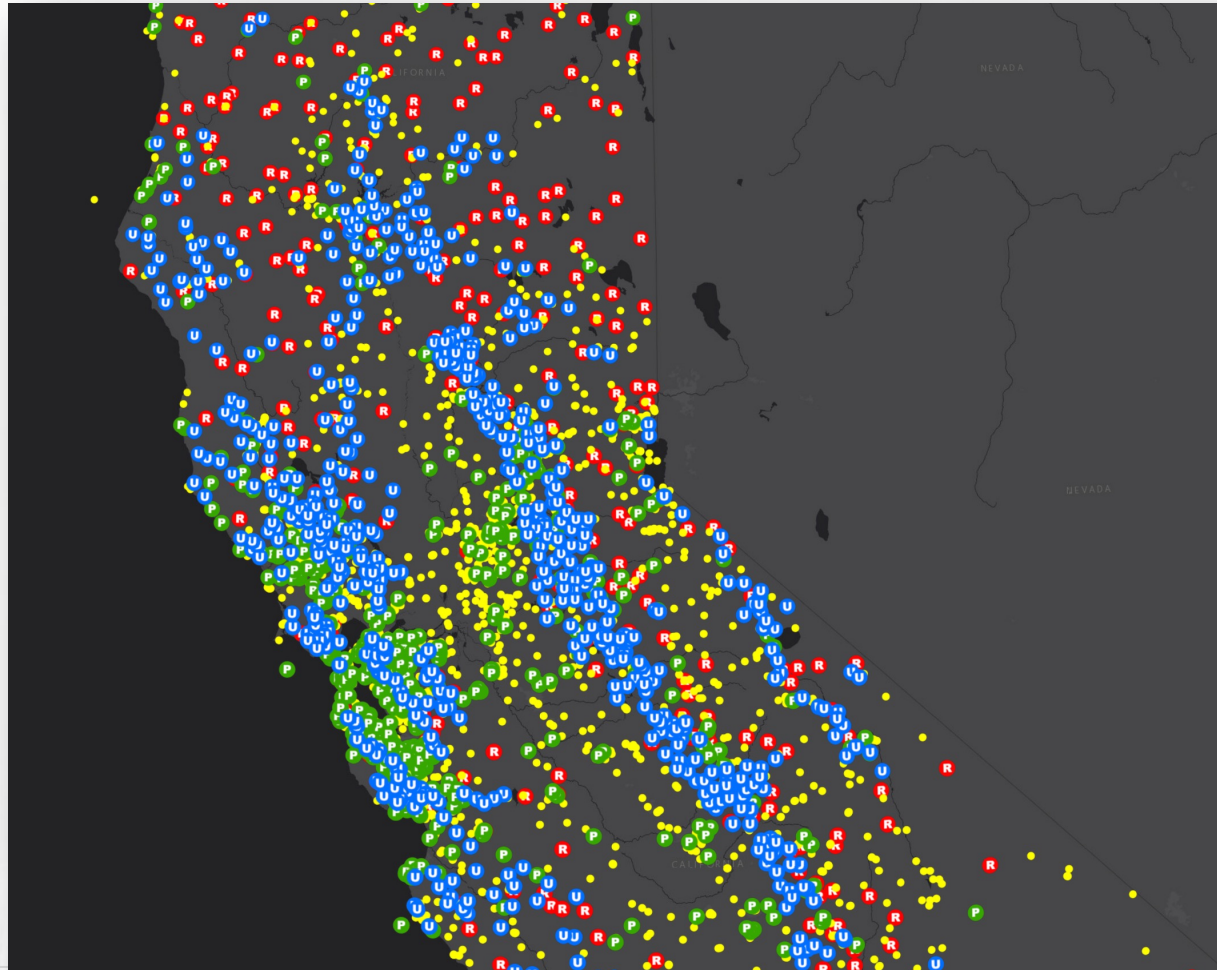
WEATHER DATA

High Resolution WRF Weather Data

- Daily 1 hour predictions for 80+ hour horizon
- 2 and 3 km resolution
- Provided by IOUs
- Varies in spatial and temporal resolution for different IOUs
- 72 to 84 hours

DATA INPUTS

WEATHER STATIONS DATA



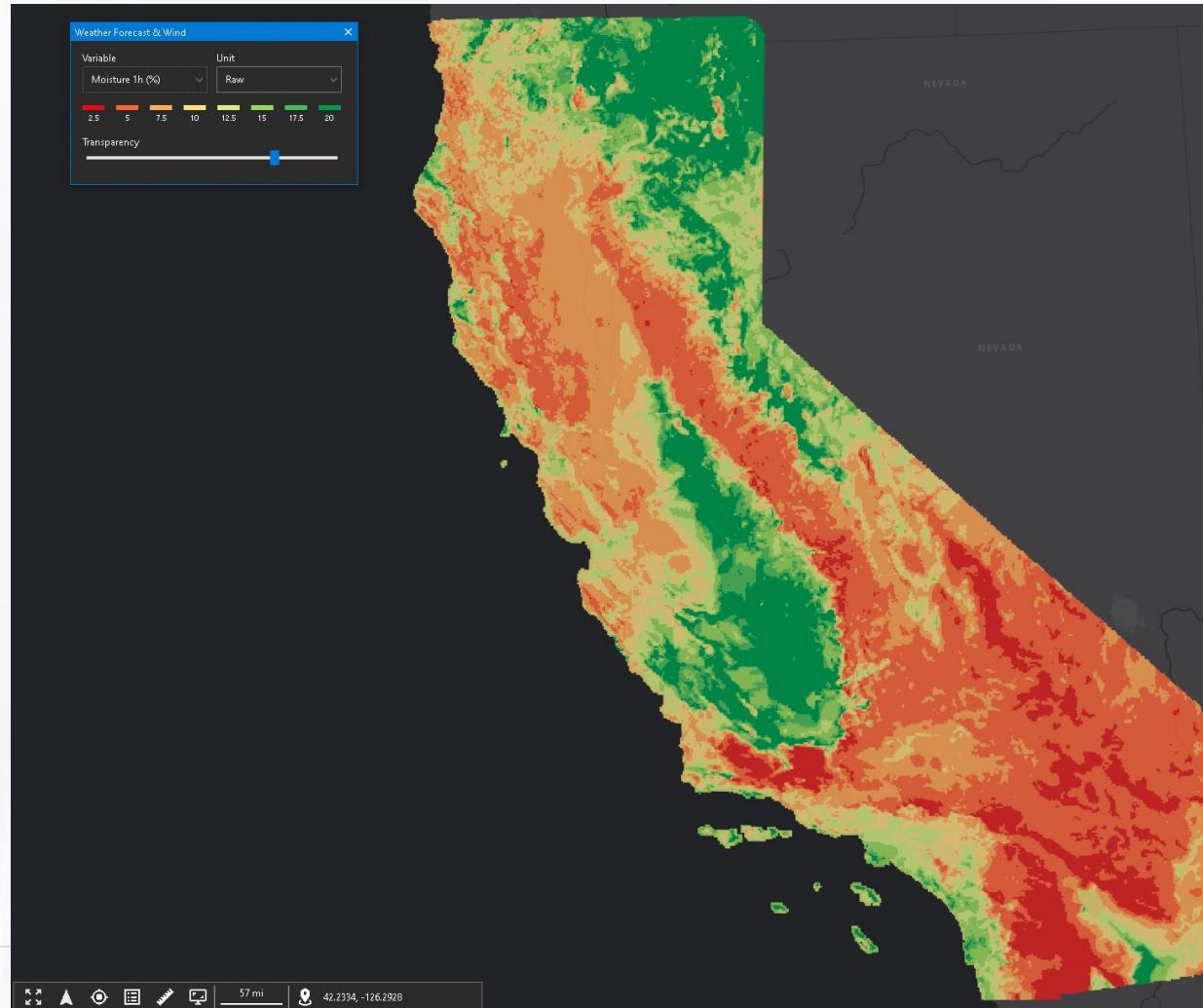
WEATHER STATIONS DATA

Weather Stations Network

- Densest network in the Nation
- Weather data observations every 10 min
- ~5,400 Wx stations

DATA INPUTS

FUEL MOISTURES



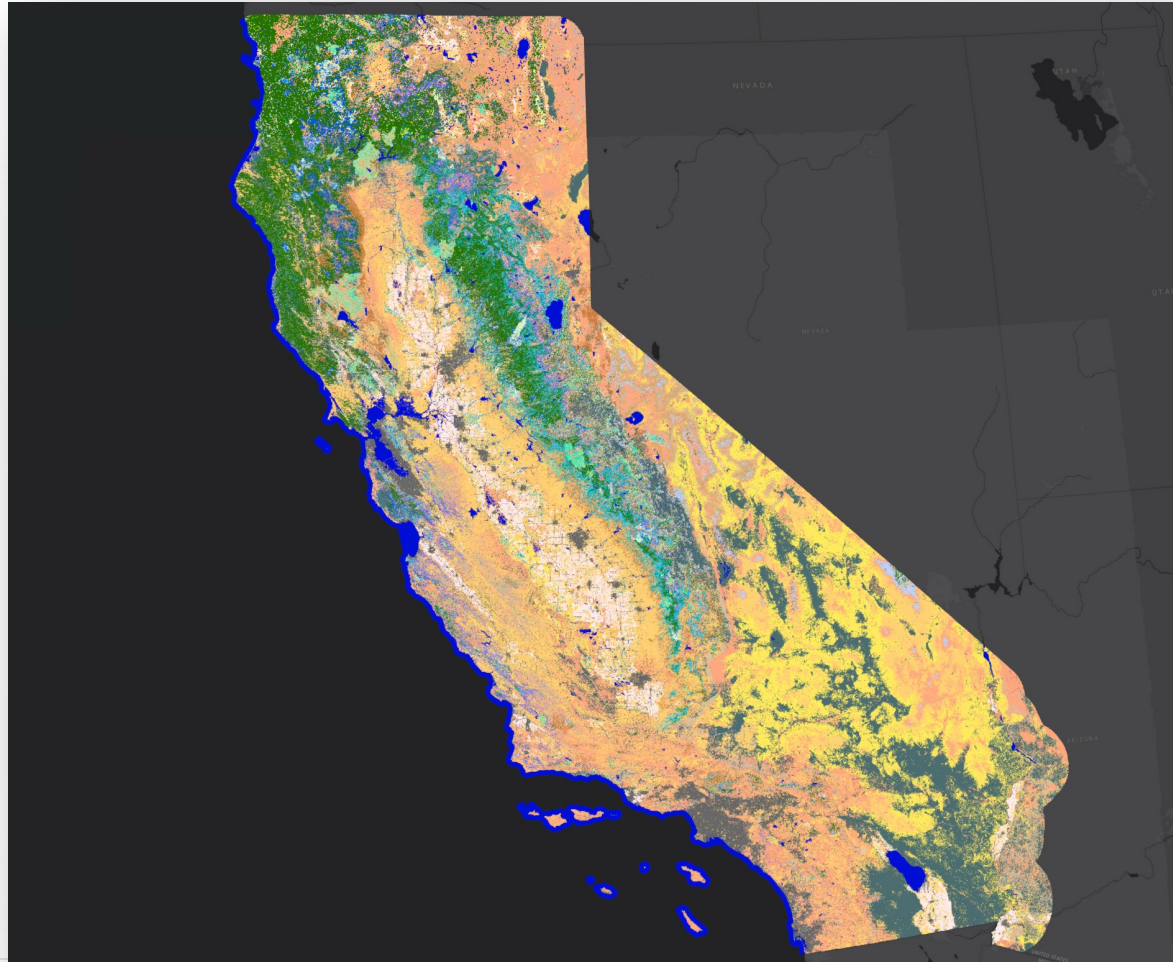
DFM & LFM DATA

Dead and Live Fuel Moisture Data

- Provided by IOUs based on custom models developed for California
- Consistent data provider for all three IOUs

DATA INPUTS

FUELS DATA



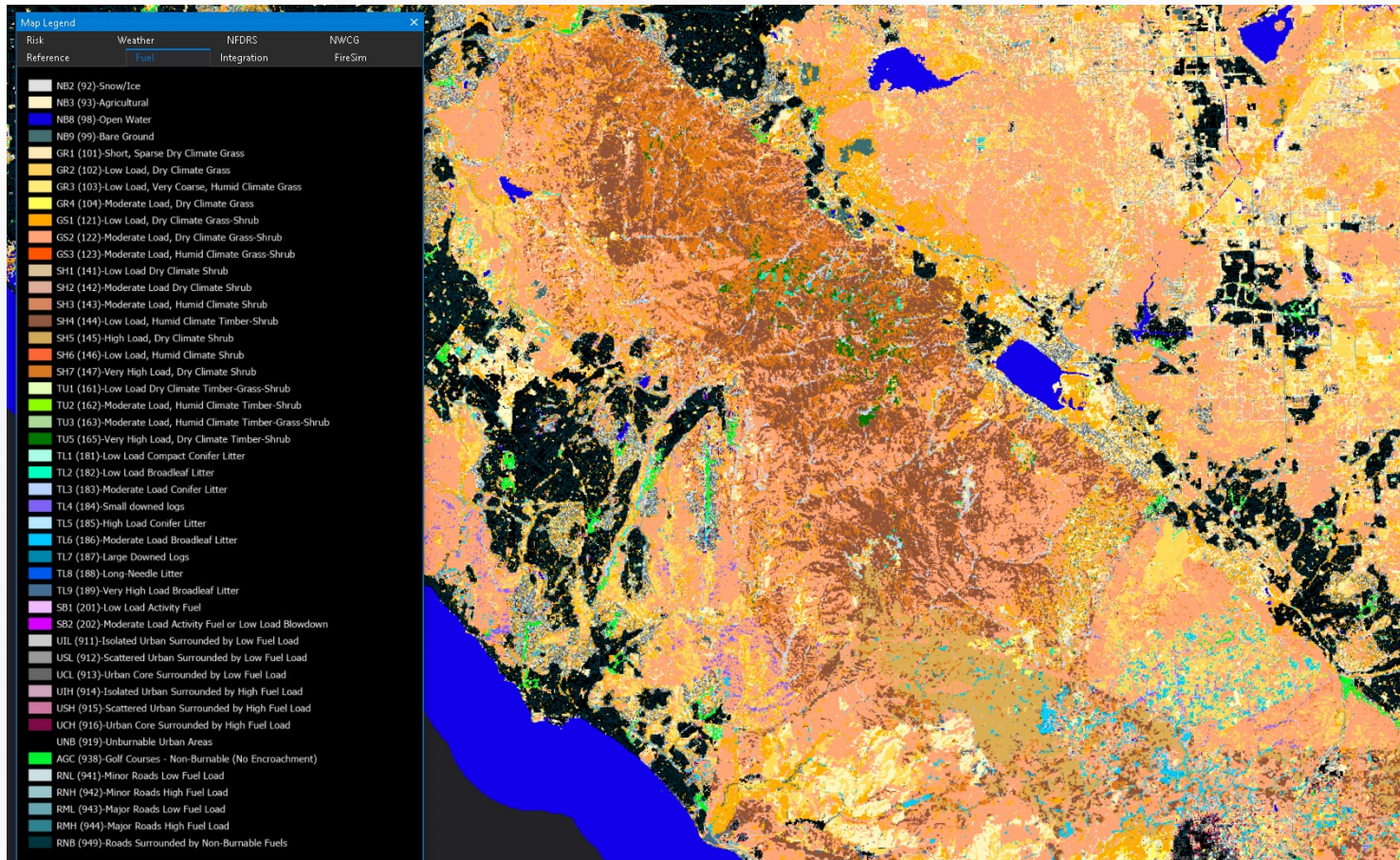
FUELS DATA

California Wide High Res Fuels

- 2016 data source, updated to reflect disturbances to 2019
- 2005 Fuel Model Set Classification
- 30 m cell resolution
- Includes custom WUI and local fuel models developed by Technosylva
- Calibrated with past fire behavior

DATA INPUTS

FUELS DATA



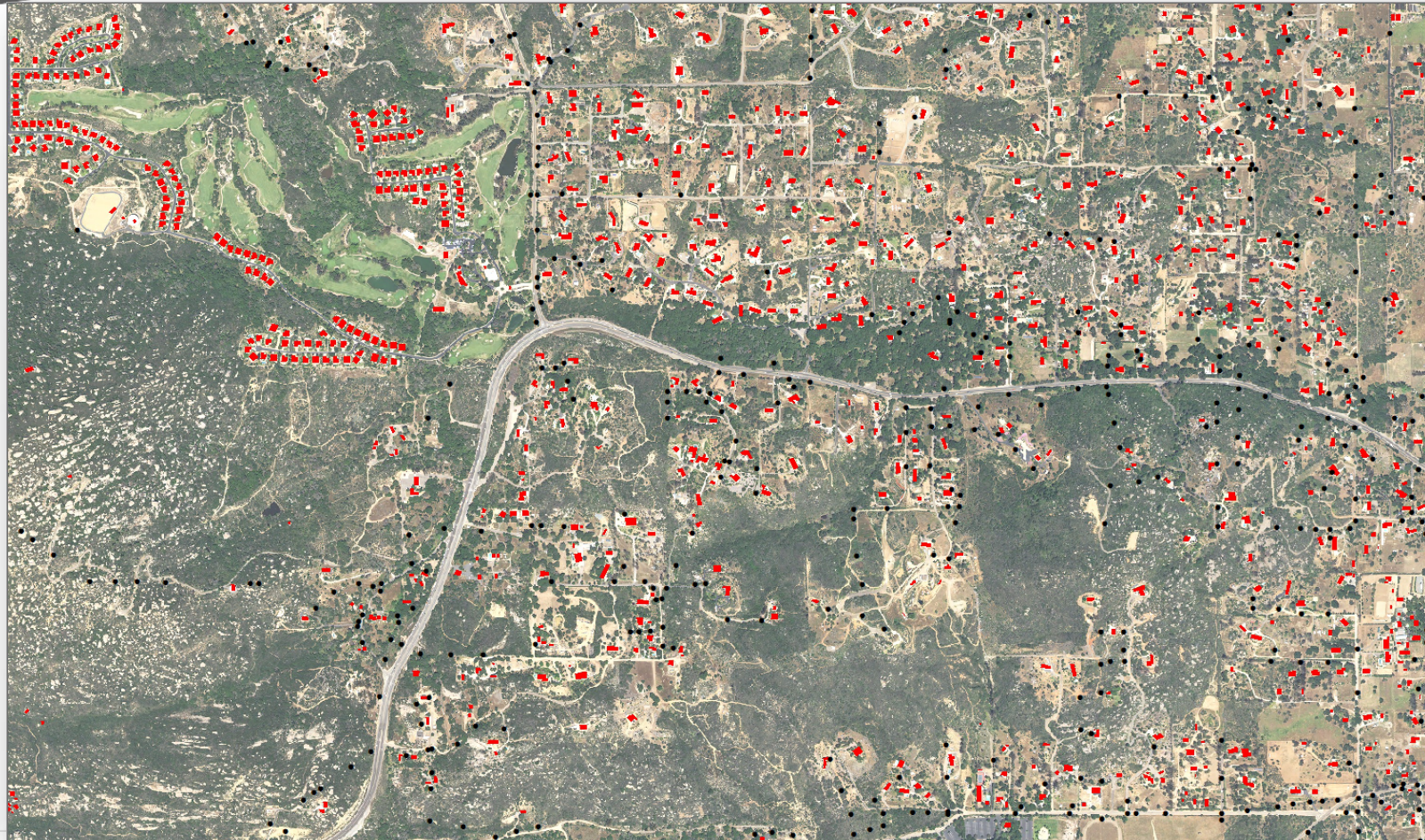
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DATA INPUTS

VALUES-AT-RISK DATA



VALUES-AT-RISK

BUILDINGS

Microsoft 2018 buildings dataset
enhanced by Technosylva with
340,000+ buildings

POPULATION

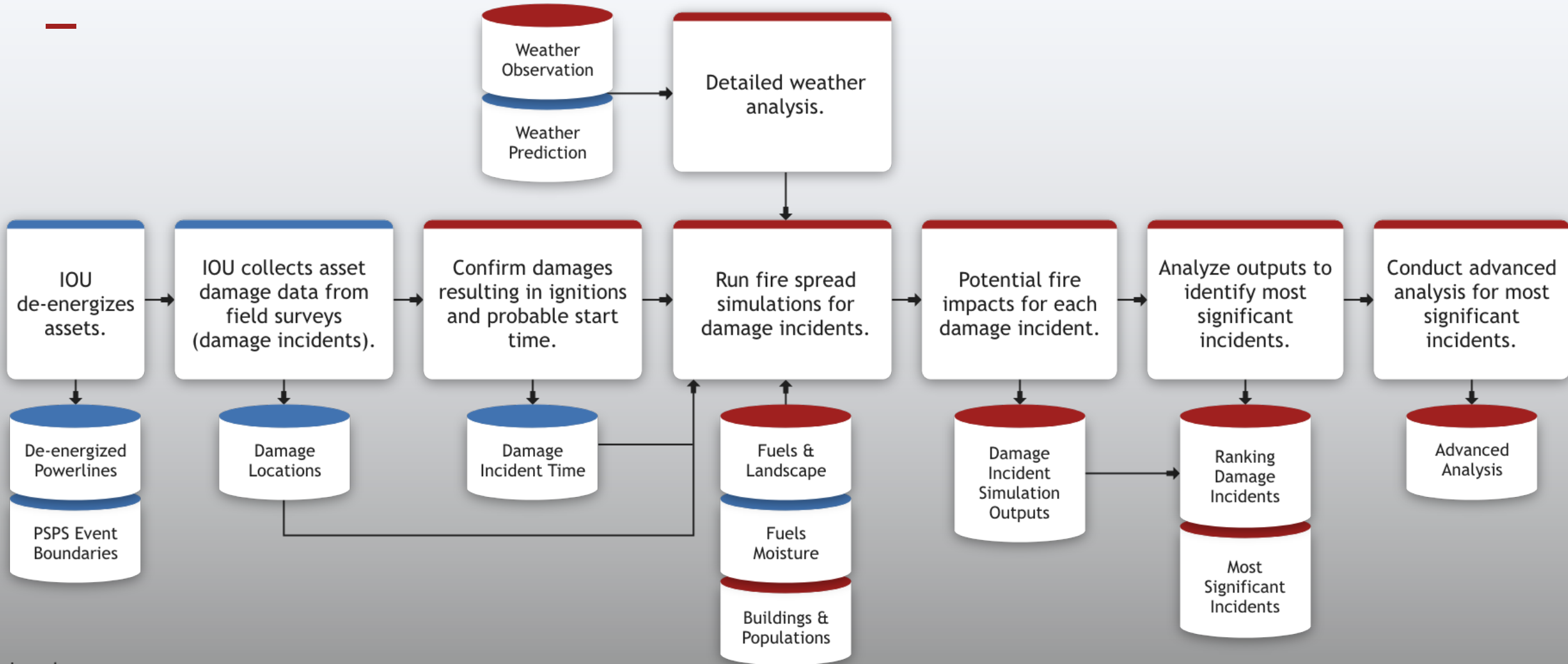
Oak Ridge NL LandScan 2018



Methods

2019 PSPS Event Analysis

Detailed Workflow



Legend

● IOU Process & Data

● Technosylva Process & Data technosylva.com

DAMAGE INCIDENT DATA

- Damaged asset locations, referred to as “damage incidents”, were captured by IOU field survey crews using GPS.
- The type of damage, asset identifier, photographs, and other information was collected to document the damage.
- IOU engineers evaluated the damage and determined the likelihood of arcing (if the system had remained energized), resulting in a probable ignition.
- An estimated time of damage was provided by the IOUs, ensuring the time occurred within PSPS event boundaries. Outage start and end times were used.
- Weather observation data was also used to determine the worst weather conditions during the PSPS event and aligned this to the damage time where appropriate.
- The damage location and time was used as ignition data.

CPUC PSPS EVENT WILDFIRE RISK ANALYSIS
FIRE SPREAD MODELING



- Simulations were performed using Technosylva's Wildfire Analyst™ Enterprise software - www.WildfireAnalyst.com
- Key capabilities include:
 - Advanced spread algorithms that incorporate custom fuels for WUI areas
 - Enhanced urban encroachment algorithms that incorporate building density and adjacent fuel loads
 - Includes both surface and crown fire condition analysis
 - Incorporates enhanced fuels input data to facilitate more accurate encroachment and impact analysis
 - Incorporates enhanced fuel moisture models developed through Machine Learning techniques
 - Includes surface spotting
 - Supports both deterministic and probabilistic modeling modes

In April 2019, the State of California published a

**REQUEST FOR
INNOVATIVE IDEAS**



CAL FIRE

**developed a concise
*wildfire management
problem statement*
to define the issue.**

01

Early Wildfire Detection

First responders and decision makers are faced with challenges of early wildfire detection, the ability to adequately dispatch the most appropriate emergency resources to the scene, and the ability to make appropriate public notifications.

02

Prediction of Wildfire's Path

Decision makers are further challenged to make a definitive prediction of the path of travel of a wildfire based on the terrain fuels, the current and predicted weather factors, and the topography.



Governor Newsom Announces Innovative Contract for Wildfire Prevention and Response



CALIFORNIA'S WILDFIRE

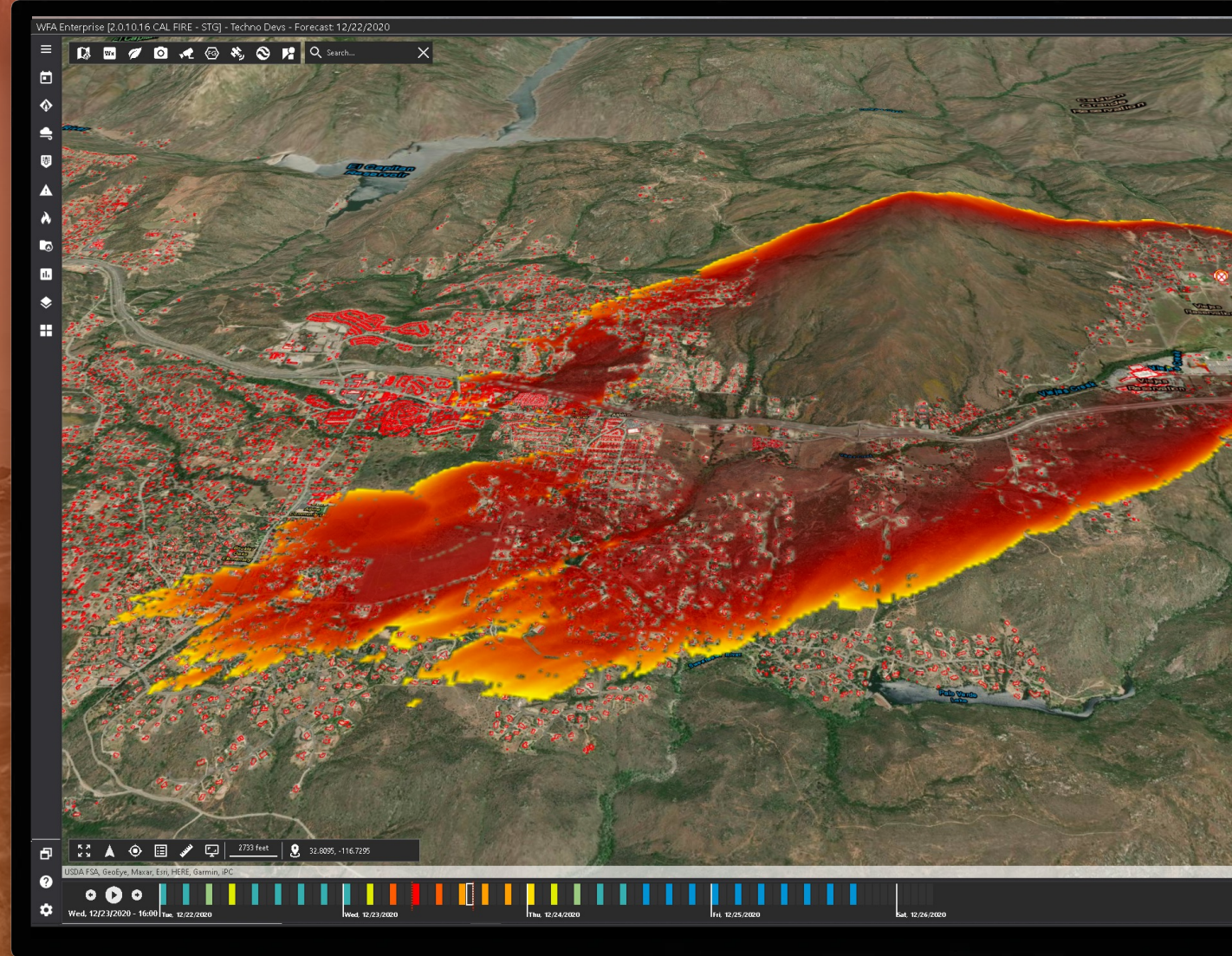


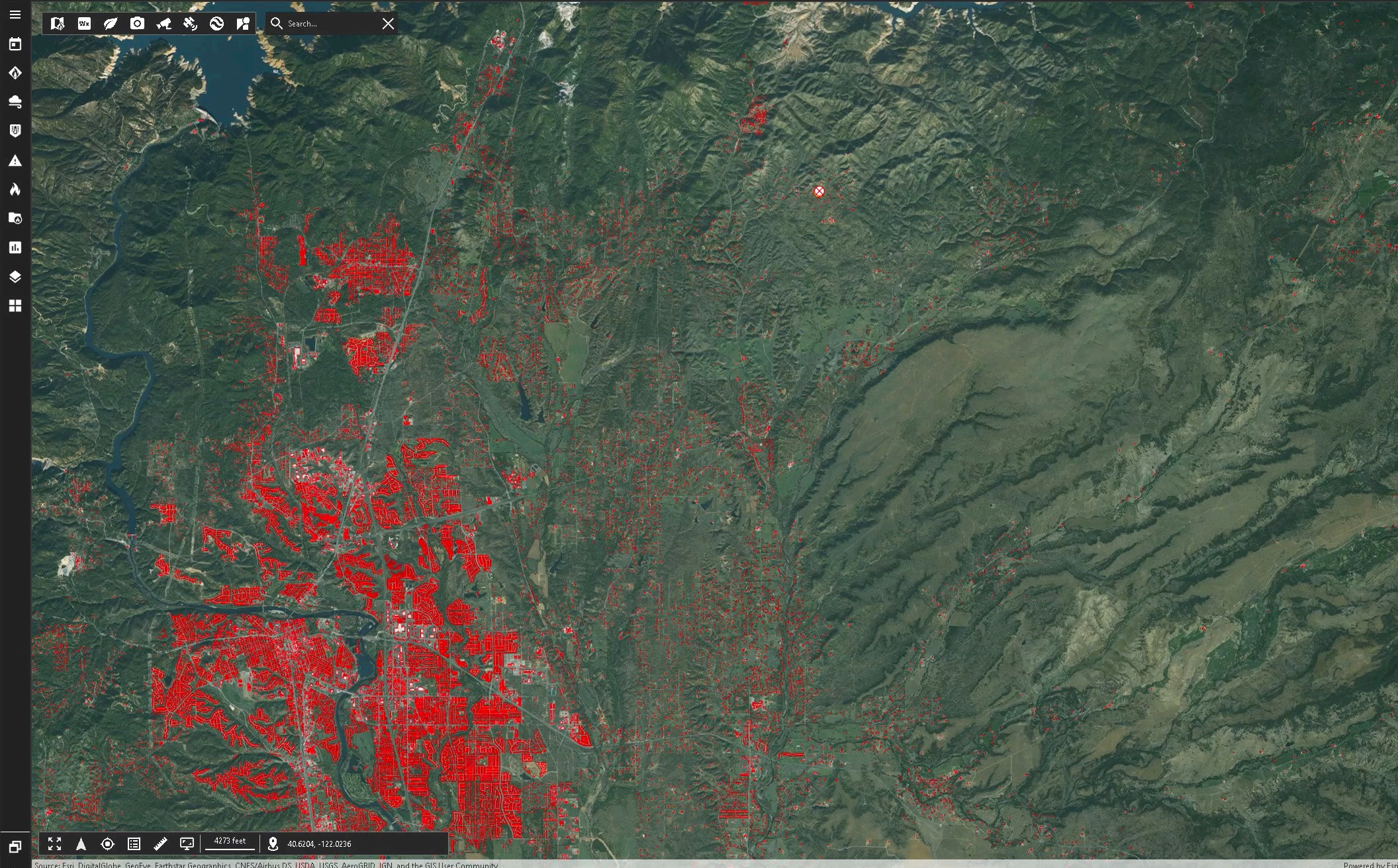
TECHNOLOGY SOLUTION.





Wildfire Analyst™ Enterprise





FireSim Inputs **Results**

SV18

10/09/2019 21:00 - 10/10/2019 21:00
 Created by: Damaged Asset
 Fuel Scenario:

Impact Analysis

Size	IAA	Buildings
23598.12 ac	5-Extreme	5527
Population Impacted		
7049		

[Open Impact Analysis Table](#)

IAA | Fire Behavior | Weather

5-Extreme

Size (1hr) 345083.5 ac | **Avg. Slope** 5%

Fire Behavior Index
 (3) - High: Fire spreads very rapidly presenting substantial resistance to control. Direct attack with firefighters must be supplemented with equipment and/or air support.

Flame Length 5.44 ft | **ROS** 44.9 ch/h

Growth Potential Index

GPI	Perimeter (1hr)	Area (a2/a1)
5 - Extreme	2.2 mi	238.9%

Simulation Animation

10/09/19 20:00

Fire Behavior Layer: None | Transparency:

Wind Visualization

Wind Barbs: | Wind Animation:

Comments

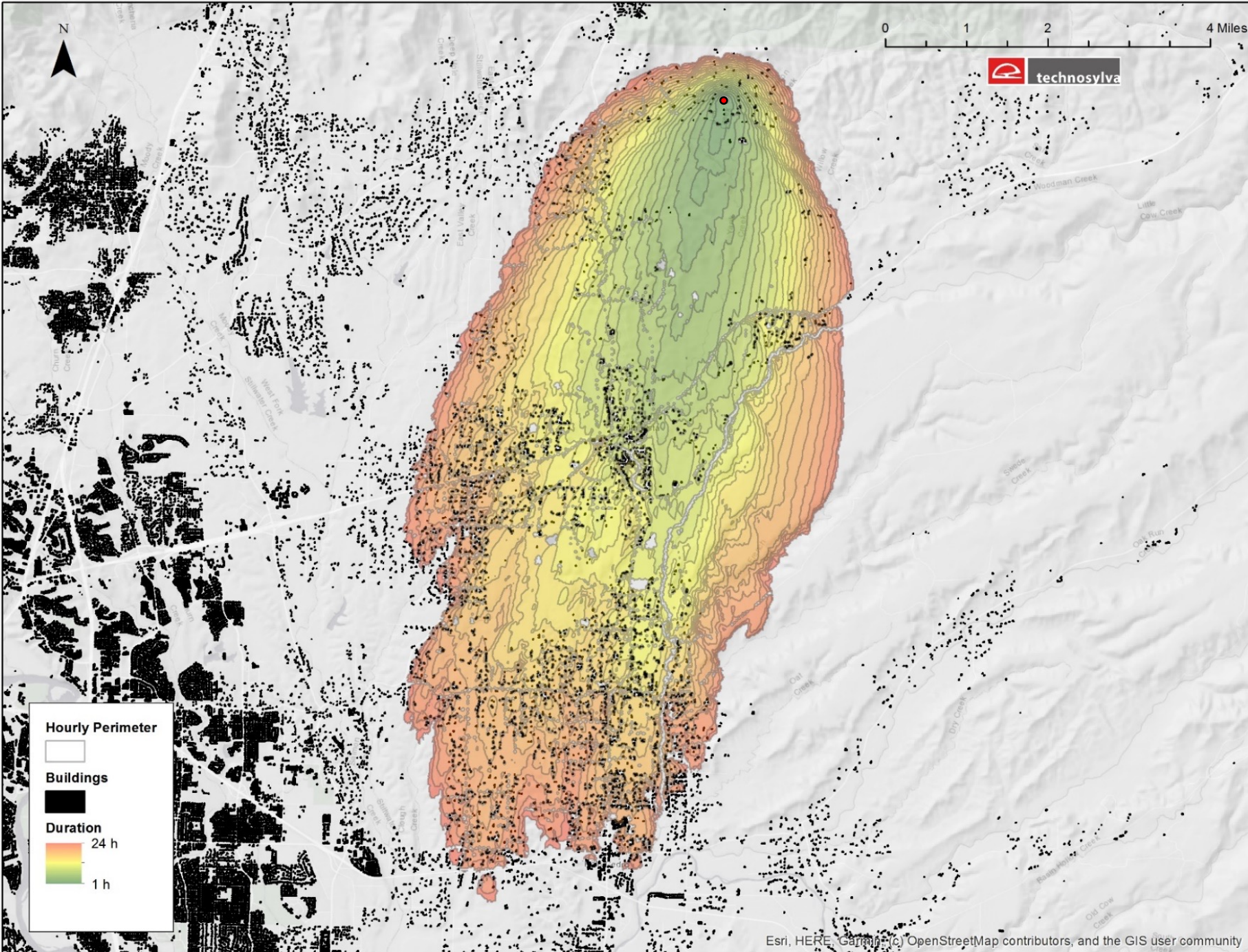
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community Powered by Esri

Wed, 10/09/2019 - 20:00 | Wed, 10/09/2019 | Thu, 10/10/2019 | Fri, 10/11/2019

FIRE SPREAD MODELING - DETERMINISTIC

- Fire simulations were run using a deterministic approach to calculate the estimated time of arrival and behavior characteristics of a fire.
- Simulations were run for 24 hour durations.
- Weather prediction data was used as input into the fire modeling. This data had a 2 km spatial resolution and 1-hour temporal resolution. This includes all the weather variables required for fire modeling.
- Both dead and live fuel moisture data was also used as input into the fire modeling. This data was derived using Machine Learning models developed from historical data.
- Surface and canopy fuels data was enhanced to reflect the latest updates for landscape disturbance including enhancement of WUI fuels with new models to facilitate advance urban encroachment algorithms.
- The WFA-E fire model accommodates both spatial and temporal changes in weather and fuel moisture data.

Deterministic Simulation for Each Incident



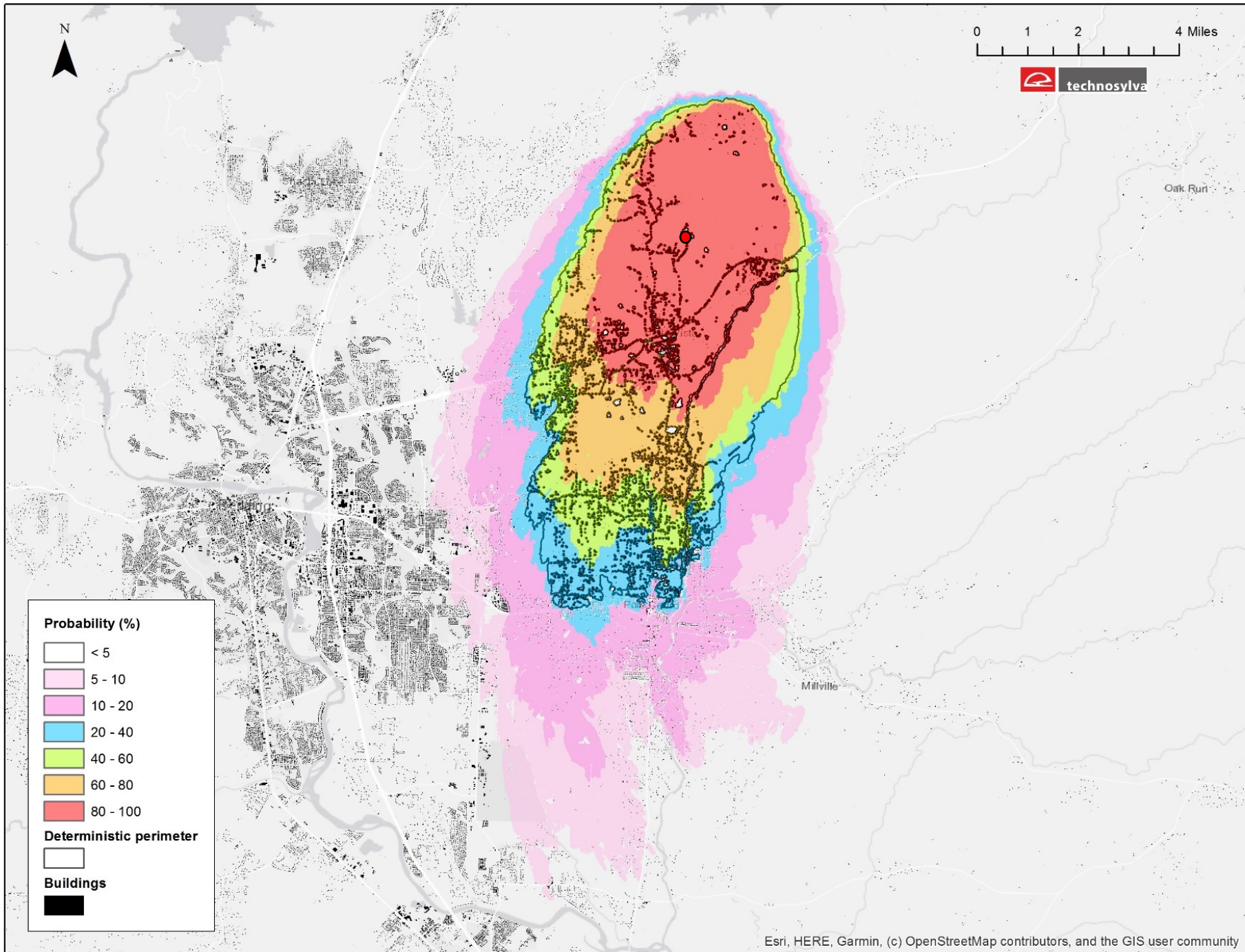
INCIDENT SUMMARY

Start Time	10/09/19 - 21:00
Duration (hrs)	24
Size (ac)	23,494
Initial Attack Assessment	5 - Extreme
No. of Buildings	2,027
Total Population	3,366
Average ROS	High

Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community

FIRE SPREAD MODELING - PROBABILISTIC

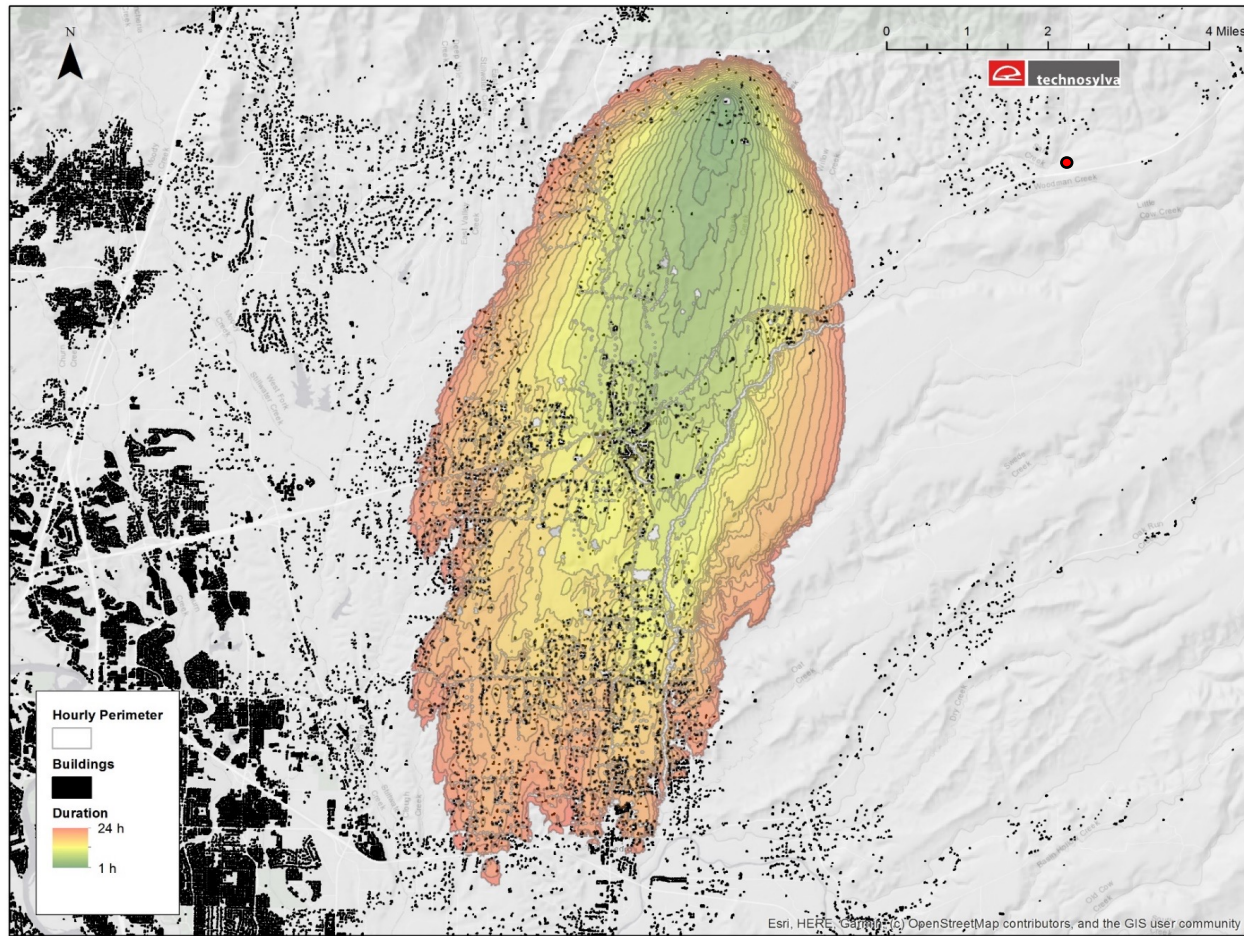
- For those damage incidents that were identified as “significant” due to impact results, a probabilistic fire simulation was also run.
- Probabilistic methods apply the same fire spread models (as deterministic), but with a variation of inputs to accommodate for possible variability of conditions.
- Wind speed, wind direction and dead fuel moisture are the varied inputs.
- This approach incorporates possible uncertainties in the input data.
- 100 different simulations were run for each probabilistic run.



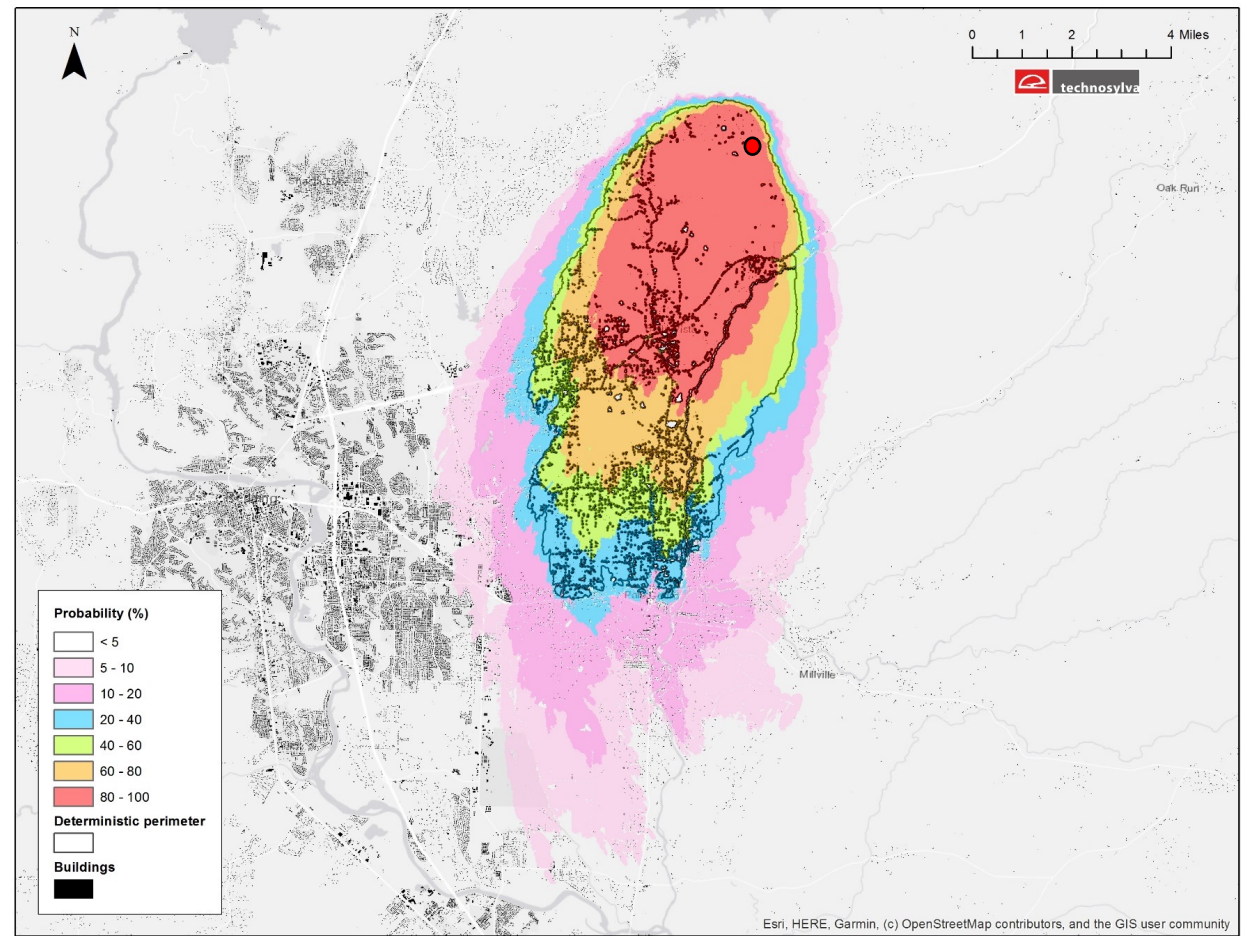
Probabilistic Simulation for Most Significant Incidents

INCIDENT SUMMARY	
Start Time	10/09/19 - 21:00
Duration (hrs)	24
Size (ac)	23,494
Initial Attack Assessment	5 - Extreme
No. of Buildings	2,027
Total Population	3,366
Average ROS	High

Deterministic Simulation



Probabilistic Simulation



CPUC PSPS EVENT WILDFIRE RISK ANALYSIS

INITIAL ATTACK ASSESSMENT

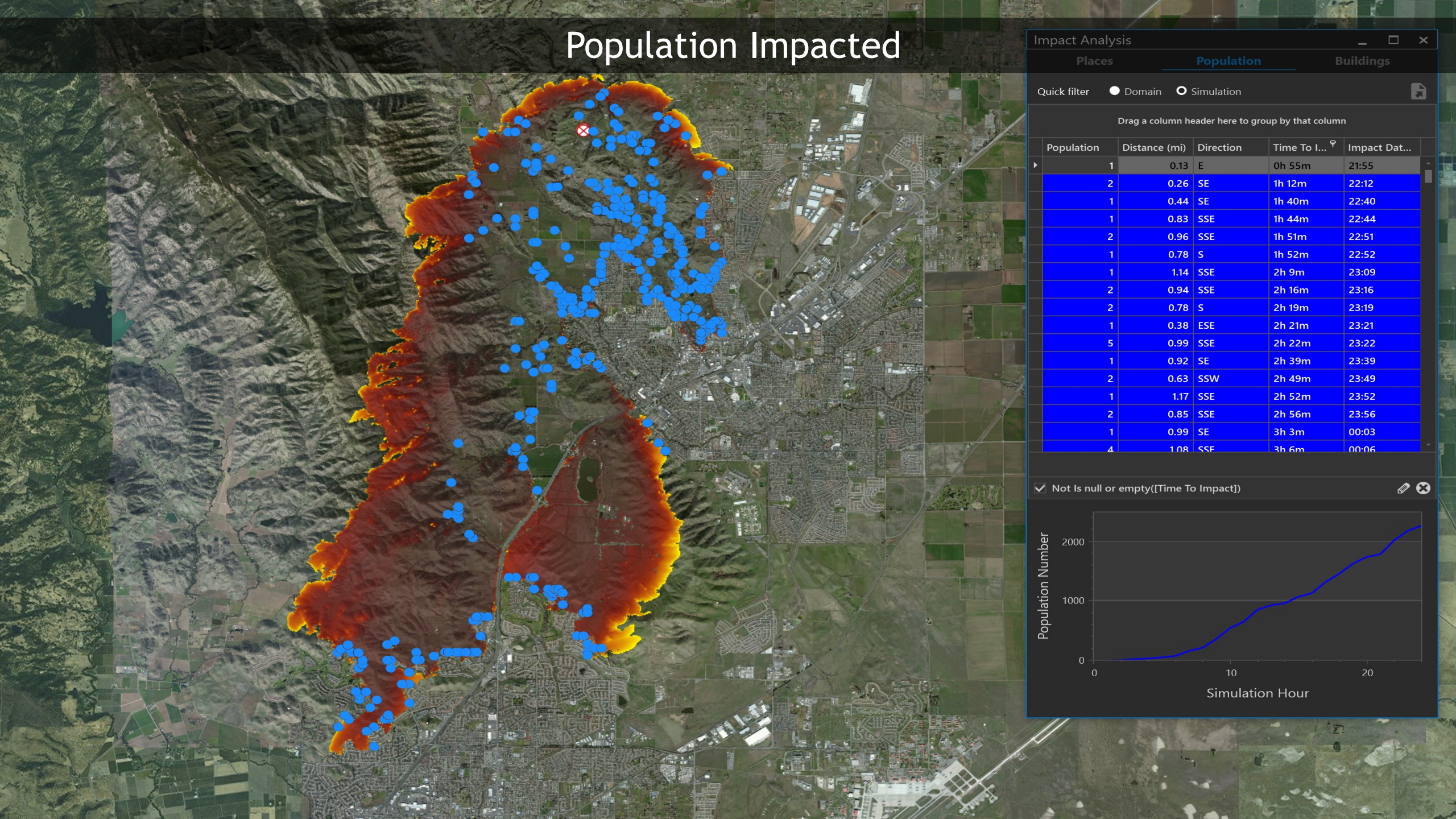
1	LOW
2	MODERATE
3	HIGH
4	VERY HIGH
5	EXTREME

- A metric was calculated for each fire simulation that identifies if the fire was likely to escape initial attack suppression and spread quickly.
- This metric is based on the fire behavior and growth characteristics in the first two hours.
- The metric has been field tested by CAL FIRE during the 2019 and 2020 fire season to differentiate fires.
- IAA helps to evaluate the fire spread simulations to identify those which are more likely to be longer duration and result in the estimated impacts.
- Fire simulations with low IAA values, i.e. 1 or 2, are likely to be contained within a few hours. Fire simulations with higher IAA values, i.e. 3 to 5, are more likely to escape initial attack and be longer duration fires.

IMPACT ANALYSIS

- Impact analysis outputs were calculated by overlaying the fire spread prediction Time of Arrival outputs with these layers:
 - Building Footprints (2018)
 - Population Count (2018)
- The results identify the number of features impacted by the fire. They do not show level of damage or loss (i.e. partially impacted or totally destroyed). Other factors and data, not readily available, would need to be considered to estimate level of impact.
- Acres burned was also calculated.

Population Impacted



Impact Analysis

Places Population Buildings

Quick filter Domain Simulation

Drag a column header here to group by that column

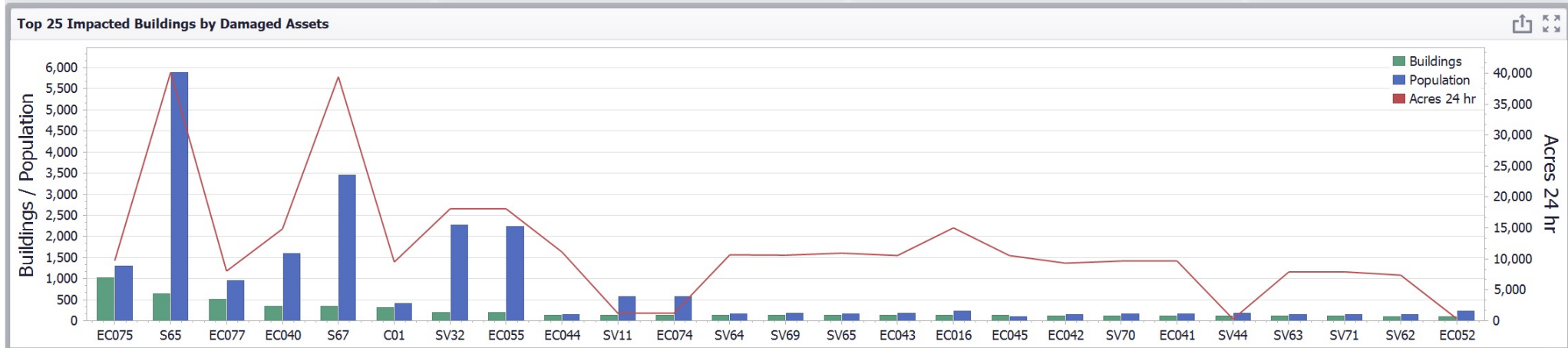
Population	Distance (mi)	Direction	Time To I...	Impact Dat...
1	0.13	E	0h 55m	21:55
2	0.26	SE	1h 12m	22:12
1	0.44	SE	1h 40m	22:40
1	0.83	SSE	1h 44m	22:44
2	0.96	SSE	1h 51m	22:51
1	0.78	S	1h 52m	22:52
1	1.14	SSE	2h 9m	23:09
2	0.94	SSE	2h 16m	23:16
2	0.78	S	2h 19m	23:19
1	0.38	ESE	2h 21m	23:21
5	0.99	SSE	2h 22m	23:22
1	0.92	SE	2h 39m	23:39
2	0.63	SSW	2h 49m	23:49
1	1.17	SSE	2h 52m	23:52
2	0.85	SSE	2h 56m	23:56
1	0.99	SE	3h 3m	00:03
4	1.08	SSE	3h 6m	00:06

Not Is null or empty([Time To Impact])

Population Number

Simulation Hour

Analysis of All Incident Simulations Per PSPS Event (example)



Damaged Assets 24h Simulations Results

Simulation Na...	Start time	Size (ac)	Acres 1st hr	Acres / hr	Buildings	Population	IAA	FBI	GPI	ROS ch/h	1st hr	Surface Flame Length (ft...
B07	10/10/2019 4:00 AM	32.9	3.05	1	40	226	1	1	1	1.29	0.462	
B08	10/10/2019 4:00 AM	20.3	1.8	1	0	179	1	1	1	0	0	
B09	10/10/2019 4:00 AM	53.8	2.78	2	46	378	1	1	1	0.538	0.447	
B10	10/10/2019 4:00 AM	53.8	2.78	2	44	378	1	1	1	0.538	0.447	
B12	10/10/2019 4:00 AM	56.9	2.77	2	49	120	1	1	1	0.196	0.206	
B14	10/10/2019 4:00 AM	1,682.9	3.48	70	0	193	2	1	3	0.302	0.478	
B22	10/10/2019 4:00 AM	58.4	2.78	2	0	57	1	1	1	0.153	0.072	
C01	10/10/2019 7:00 AM	9,509.3	32.9	396	314	418	4	2	5	21.2	3.54	
C15	10/10/2019 7:00 AM	200.2	3.45	8	0	15	1	1	1	0.544	0.57	
C16	10/10/2019 7:00 AM	136.6	3.41	6	47	44	1	1	1	0.347	0.371	
EC005	10/10/2019 7:00 AM	271.8	18.1	11	0	113	3	4	2	79.3	5.35	
EC010	10/10/2019 4:00 AM	177.9	3.81	7	31	61	1	1	1	0.522	0.795	
EC013	10/10/2019 4:00 AM	8.6	1.27	0	0	33	1	1	1	0.215	0.147	
EC016	10/10/2019 4:00 AM	15,025.8	161	626	125	234	5	4	4	76.5	6.34	
EC017	10/10/2019 4:00 AM	4.6	0	0	19	69	1	1	1	0	0	
EC020	10/10/2019 4:00 AM	242.3	4.1	10	1	0	2	1	2	0.84	1.51	
EC021	10/10/2019 7:00 AM	125.4	2.15	5	60	132	1	1	1	0	0	
EC022	10/10/2019 7:00 AM	148.7	3.22	6	76	136	1	1	1	0.227	0.258	
EC023	10/10/2019 4:00 AM	2,916.0	10.8	122	35	36	2	2	2	5.9	1.51	
EC028	10/10/2019 4:00 AM	256.1	3.53	11	23	74	1	1	1	0.558	0.88	

IDENTIFYING SIGNIFICANT FIRES

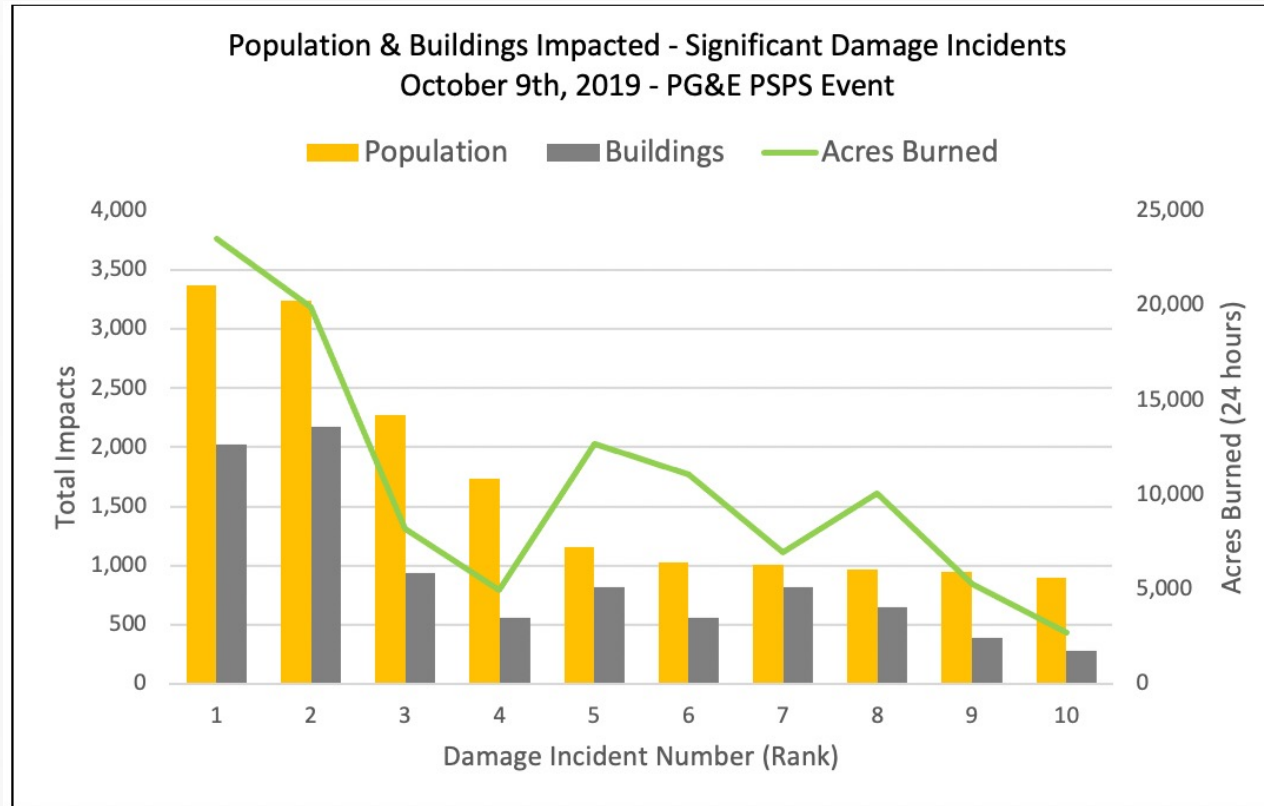
- All the fire simulations for a PSPS event were ranked based on the following criteria:
 - Total population impacted
 - Total buildings impacted
 - Size (acres burned)
 - Initial Attack Assessment (IAA) index
- A list of the most significant incidents was identified.
- This typically involved 5 to 10 incidents and varied depending on the impact results.
- Probabilistic fire simulations were conducted for these significant fires to accommodate for variability in key input conditions.
- Detailed summaries were developed for the significant fires.

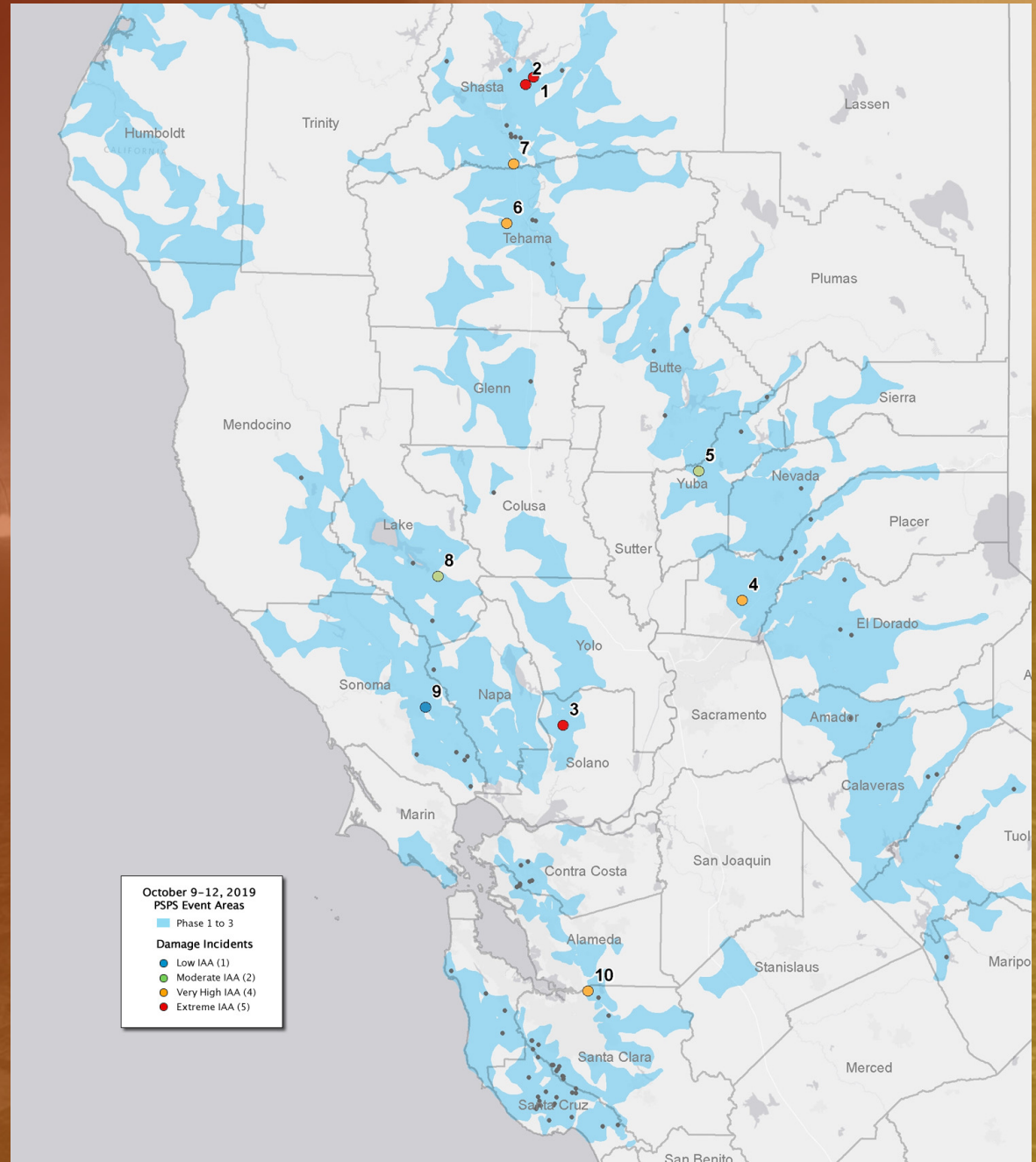
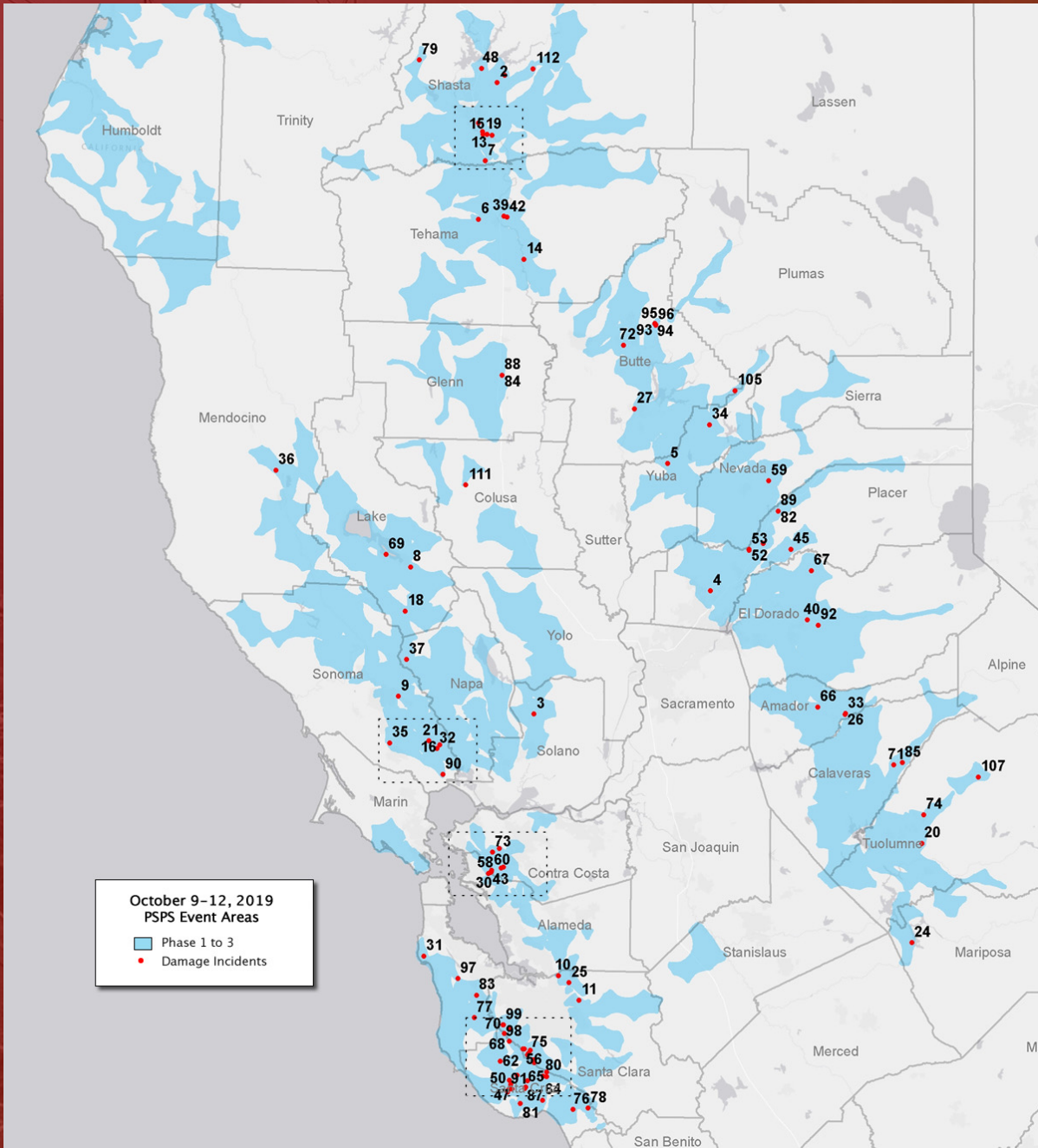
IDENTIFYING SIGNIFICANT FIRES

Damage Incident Rank	County	Population Impacted	Buildings Impacted	Acres Burned	IAA
1	Shasta	3,366	2,027	23,495	5
2	Shasta	3,245	2,173	19,911	5
3	Solano	2,269	941	8,162	5
4	Placer	1,732	559	4,929	4
5	Yuba	1,158	820	12,674	2
6	Tehama	1,028	560	11,076	4
7	Shasta	1,010	820	6,971	4
8	Lake	968	647	10,090	2
9	Sonoma	948	390	5,243	1
10	Santa Clara	894	275	2,686	4

● Low (1)
 ● Moderate (2)
 ● High (3)
 ● Very High (4)
 ● Extreme (5)

IDENTIFYING SIGNIFICANT FIRES







Results

2019 PSPS Event Analysis

RESULTS OVERVIEW

- The analysis was undertaken by each IOU for individual PSPS events.
- PSPS events with a high number of damage incidents were analyzed separately.
- Other PSPS events with a low number of damage incidents were analyzed individually and grouped together for reporting results.



Results – PG&E Events

2019 PSPS Event Analysis
Pacific Gas & Electric

PG&E PSPS EVENTS

IOU	PSPS Event Dates	Total Damages Reported	Damages Expected to Ignite a Fire
PG&E	June 7 th , 2019	5	1
PG&E	Sep. 23, 2019	4	4
PG&E	Oct 5, 2019	2	1
PG&E	Oct 9, 2019	193	116
PG&E	Oct 23, 2019	26	21
PG&E	Oct 26, 2019	441	422
PG&E	Nov 20, 2019	9	9



California Public Utilities Commission

2019 PSPS Event -Wildfire Analysis Report

Event Date: October 9 - 12, 2019

IOU: Pacific Gas & Electric

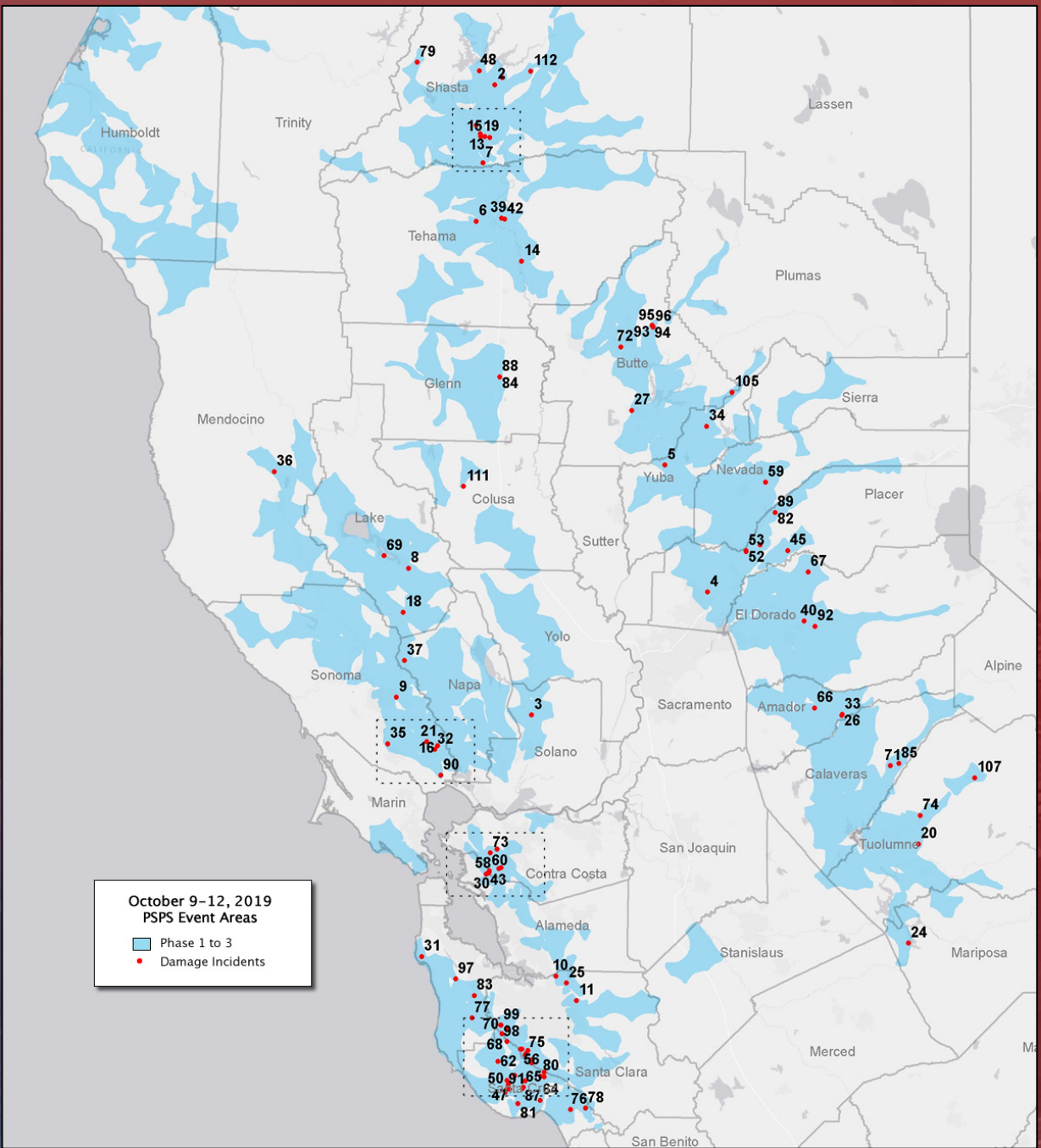
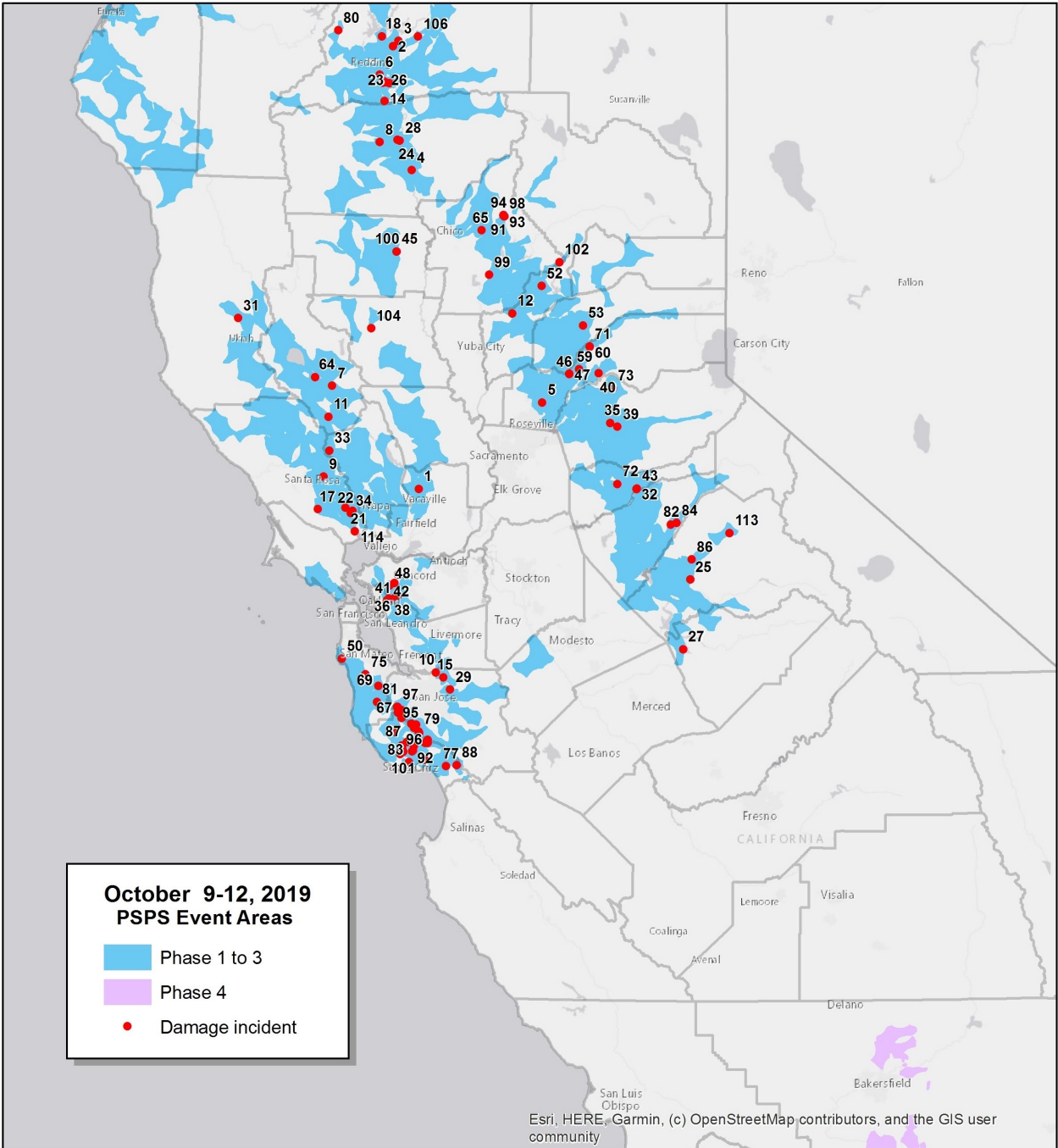
Prepared by:

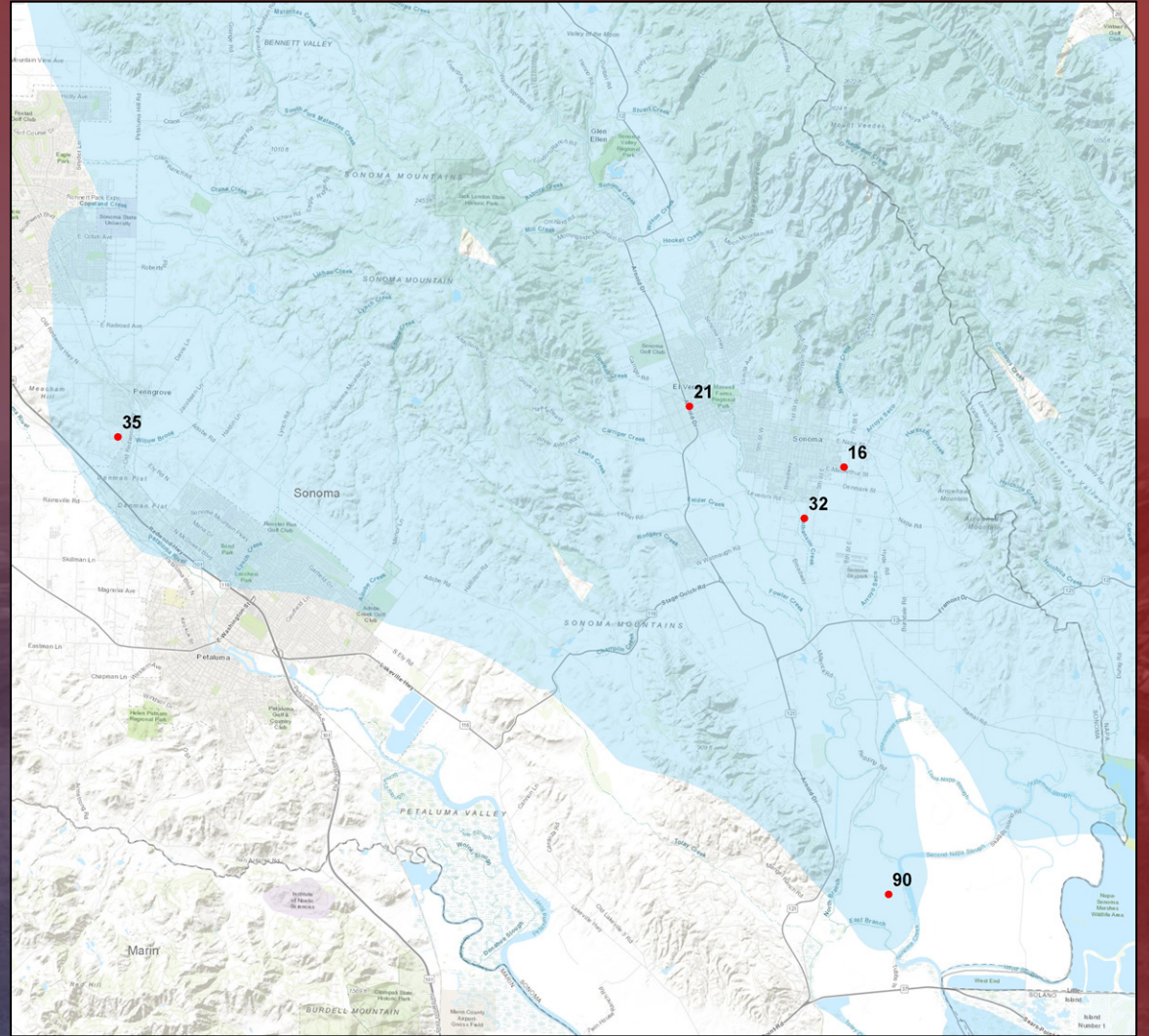
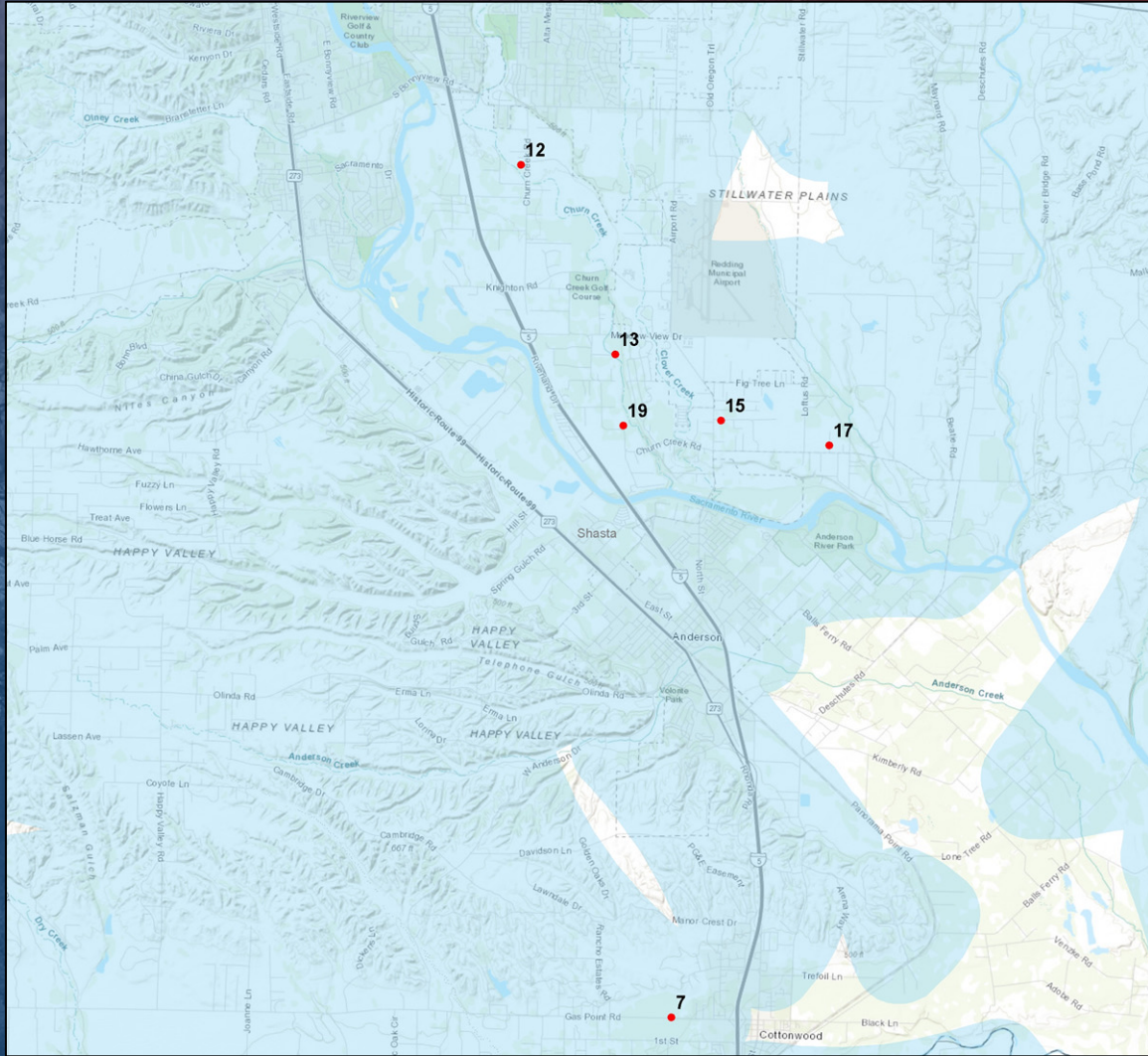
Technosylva Inc. (La Jolla, CA)

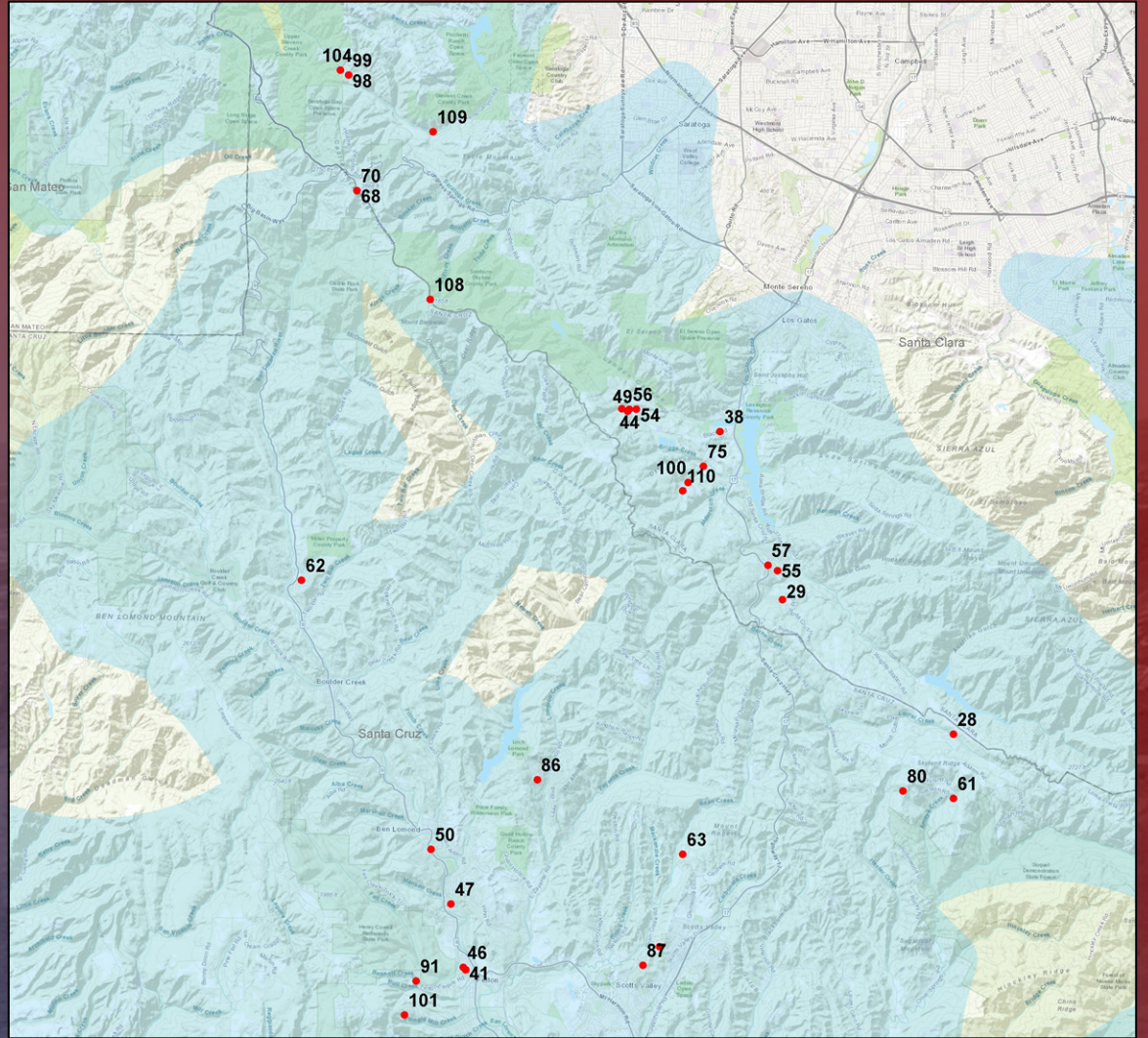
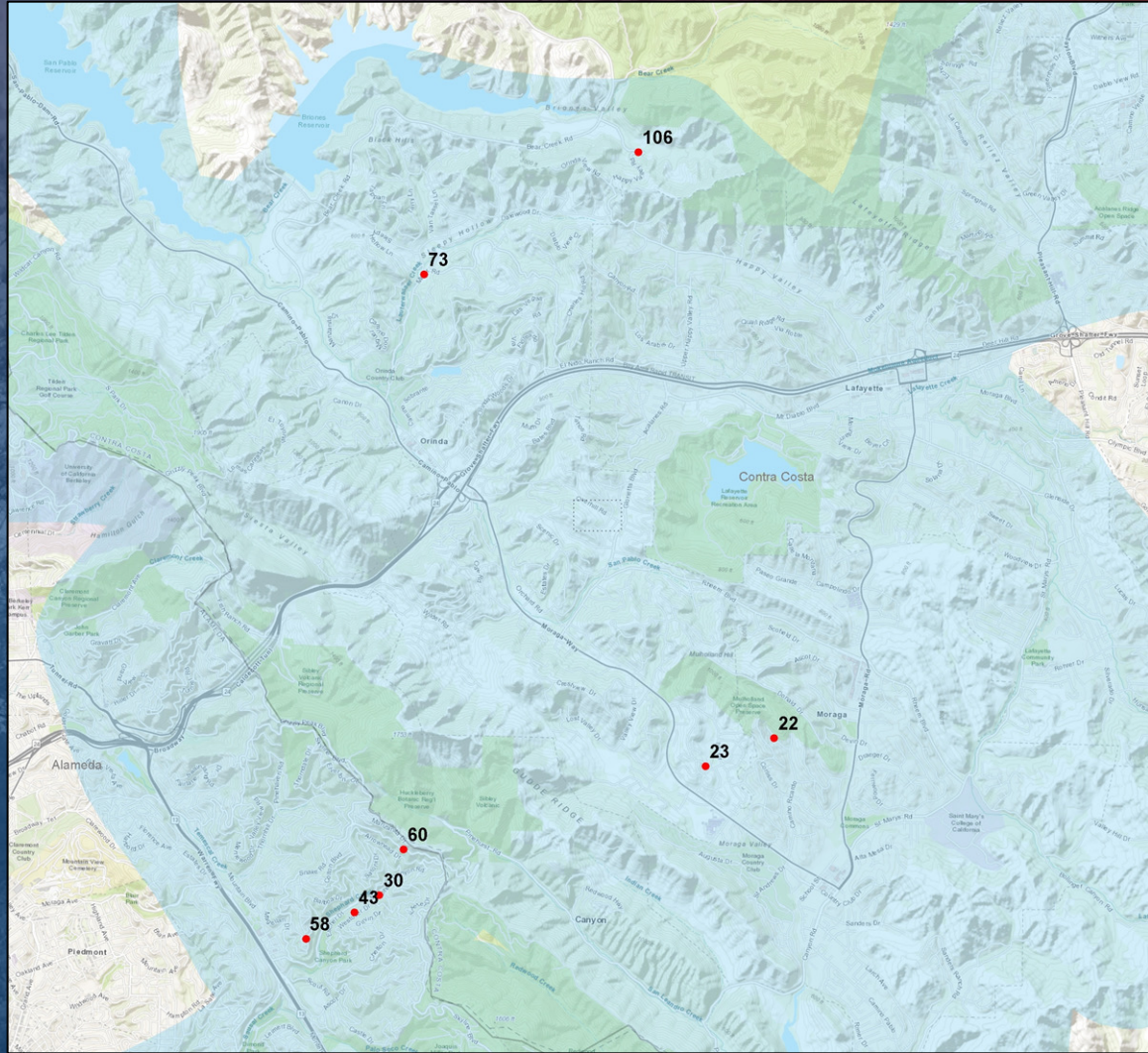


October 9-12, 2019

- 193 damaged assets reported by PG&E
- 116 were identified as potential to cause an ignition
- 114 were located near burnable fuels and were used to conduct the analysis



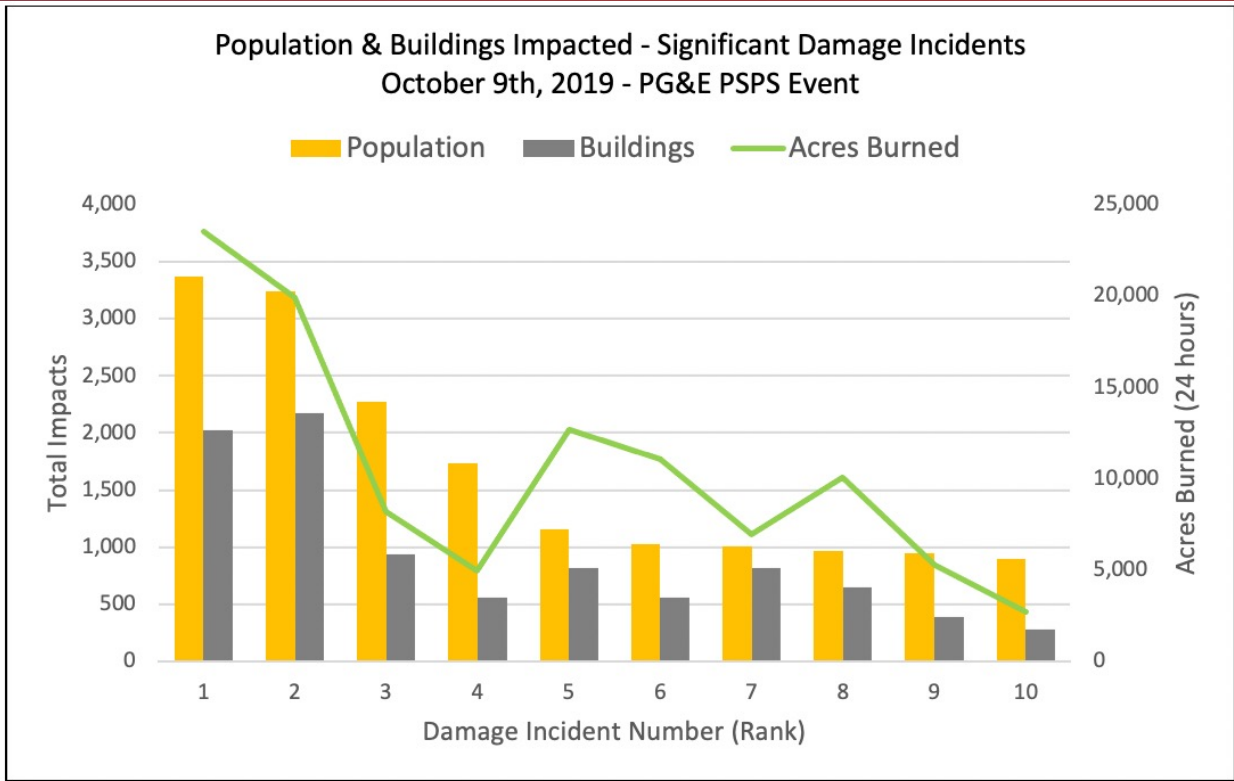


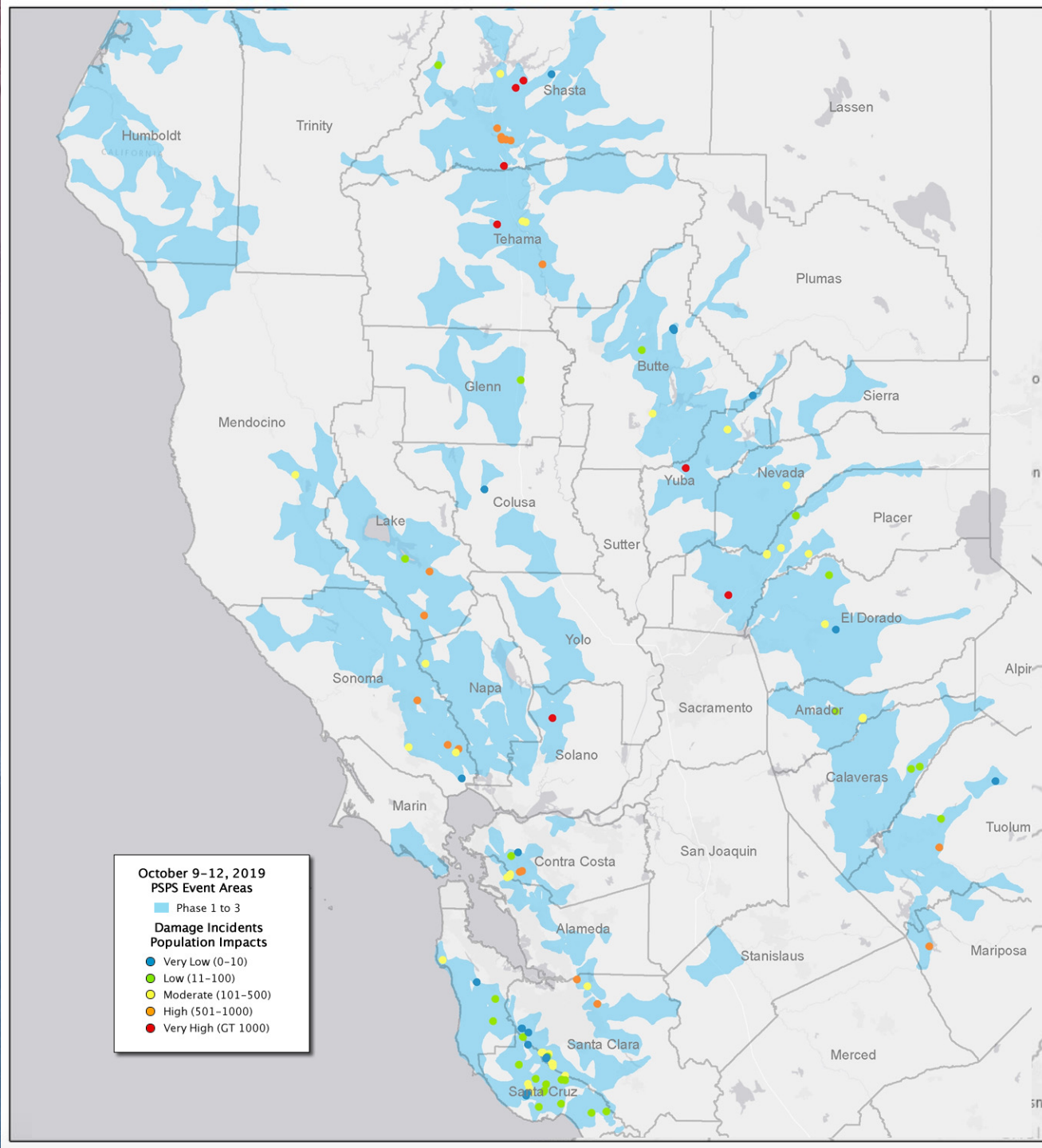


SIMULATION NAME	POP IMPACTED	BUILDINGS IMPACTED	FIRE SIZE POTENTIAL	COUNTY	RANK	IAA
SV18_PGE-PSPS-Oct9 10 2019	3366	2027	23,495	Shasta	1	5
SV05_PGE-PSPS-Oct9 10 2019	3245	2173	19,911	Shasta	2	5
SV32_PGE-PSPS-Oct9 10 2019	2269	941	8,162	Solano	3	5
SV49_PGE-PSPS-Oct9 10 2019	1732	559	4,929	Placer	4	4
EC040_PGE-PSPS-Oct9 10 2019	1158	820	12,674	Yuba	5	2
EC075_PGE-PSPS-Oct9 10 2019	1028	560	11,076	Tehama	6	4
SV25_PGE-PSPS-Oct9 10 2019	1010	820	6,971	Shasta	7	4
NC15_PGE-PSPS-Oct9 10 2019	968	647	10,090	Lake	8	2
NC60_PGE-PSPS-Oct9 10 2019	948	390	5,243	Sonoma	9	1
S51_PGE-PSPS-Oct9 10 2019	894	275	2,686	Santa Clara	10	4
S55_PGE-PSPS-Oct9 10 2019	880	494	4,090		11	4
SV17_PGE-PSPS-Oct9 10 2019	878	603	4,145		12	1
SV11_PGE-PSPS-Oct9 10 2019	860	654	1,212		13	5
SV08_PGE-PSPS-Oct9 10 2019	820	421	10,730		14	2
SV19_PGE-PSPS-Oct9 10 2019	812	412	935		15	2
NC08_PGE-PSPS-Oct9 10 2019	729	426	732		16	1
SV20_PGE-PSPS-Oct9 10 2019	702	350	1,233		17	4
NC12_PGE-PSPS-Oct9 10 2019	663	457	8,018		18	5
SV67_PGE-PSPS-Oct9 10 2019	650	312	980		19	5
C14_PGE-PSPS-Oct9 10 2019	623	303	3,453		20	2
EC081_PGE-PSPS-Oct9 10 2019	587	317	283		21	1
B19_PGE-PSPS-Oct9 10 2019	575	290	466		22	1
B22_PGE-PSPS-Oct9 10 2019	572	211	208		23	1
C01_PGE-PSPS-Oct9 10 2019	523	335	10,064		24	4
S87_PGE-PSPS-Oct9 10 2019	500	147	3,345		25	5
C27_PGE-PSPS-Oct9 10 2019	381	114	1,591		26	1
TL01_PGE-PSPS-Oct9 10 2019	375	139	257		27	1
S29_PGE-PSPS-Oct9 10 2019	367	116	911		28	1
S10_PGE-PSPS-Oct9 10 2019	319	56	337		29	1
B09_PGE-PSPS-Oct9 10 2019	318	63	57		30	1
B17_PGE-PSPS-Oct9 10 2019	310	141	1,049		31	4
NC06_PGE-PSPS-Oct9 10 2019	288	189	272		32	3
C28_PGE-PSPS-Oct9 10 2019	285	91	549		33	1
SV06_PGE-PSPS-Oct9 10 2019	267	147	4,531		34	2
NC22_PGE-PSPS-Oct9 10 2019	260	187	666		35	4
NC47_PGE-PSPS-Oct9 10 2019	250	50	356		36	1
NC44_PGE-PSPS-Oct9 10 2019	249	217	3,185		37	2
S15_PGE-PSPS-Oct9 10 2019	224	21	395		38	1
SV02_PGE-PSPS-Oct9 10 2019	223	103	92		39	2
SV38_PGE-PSPS-Oct9 10 2019	209	122	1,107		40	1
S71_PGE-PSPS-Oct9 10 2019	196	41	36		41	1
SV01_PGE-PSPS-Oct9 10 2019	186	102	278		42	2

Damage Incident Rank	County	Population Impacted	Buildings Impacted	Acres Burned	IAA
1	Shasta	3,366	2,027	23,495	5
2	Shasta	3,245	2,173	19,911	5
3	Solano	2,269	941	8,162	5
4	Placer	1,732	559	4,929	4
5	Yuba	1,158	820	12,674	2
6	Tehama	1,028	560	11,076	4
7	Shasta	1,010	820	6,971	4
8	Lake	968	647	10,090	2
9	Sonoma	948	390	5,243	1
10	Santa Clara	894	275	2,686	4

● Low (1)
 ● Moderate (2)
 ● High (3)
 ● Very High (4)
 ● Extreme (5)

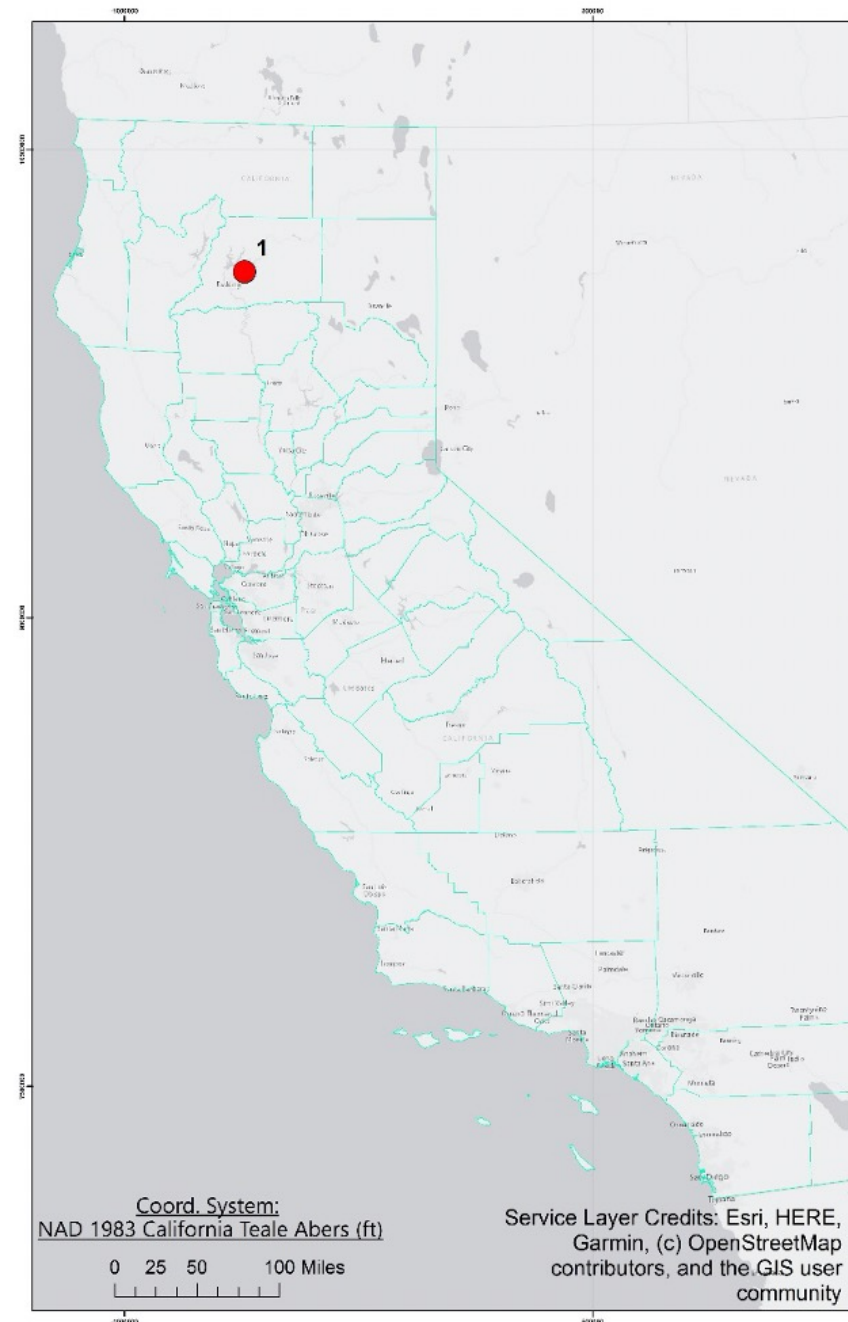


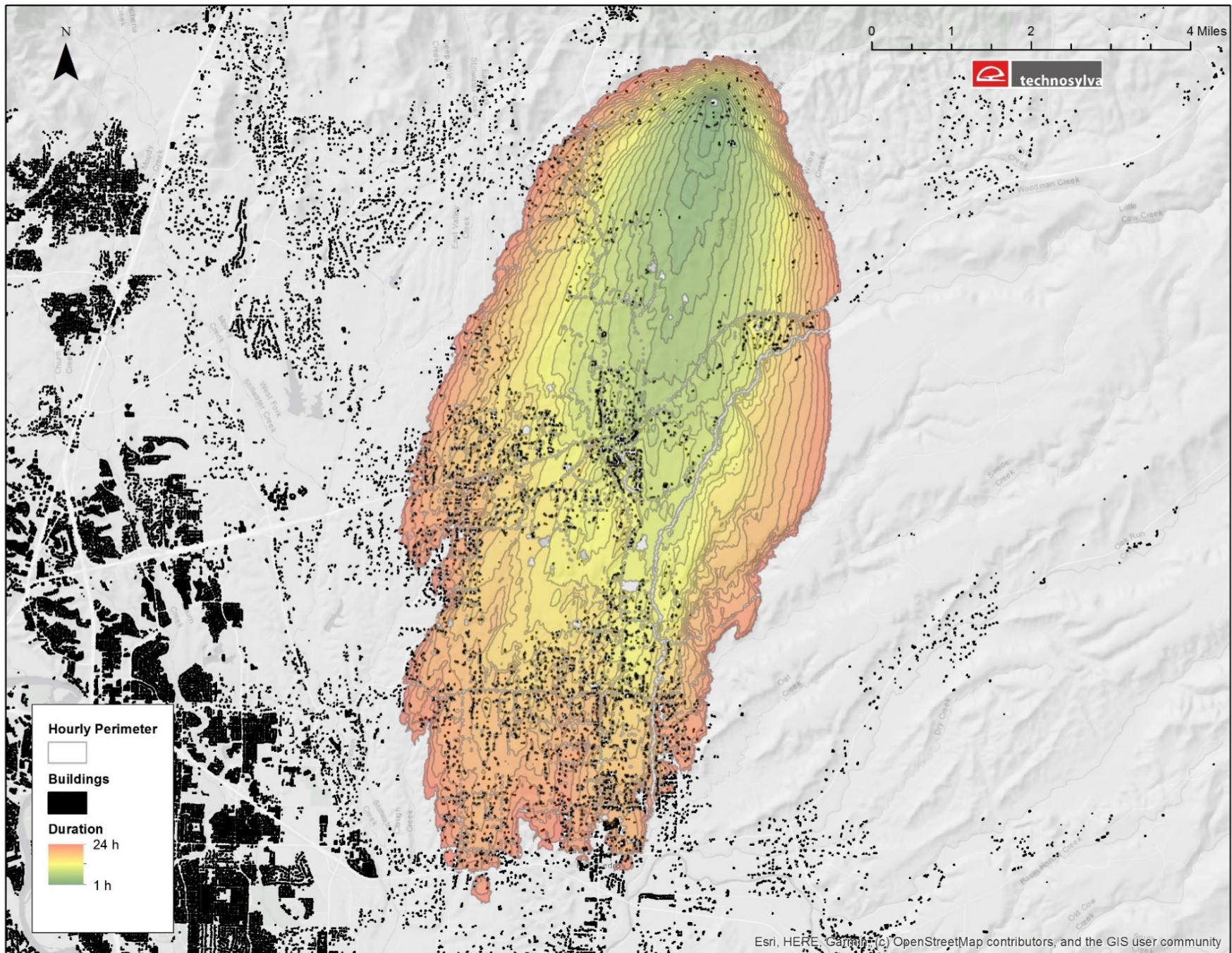


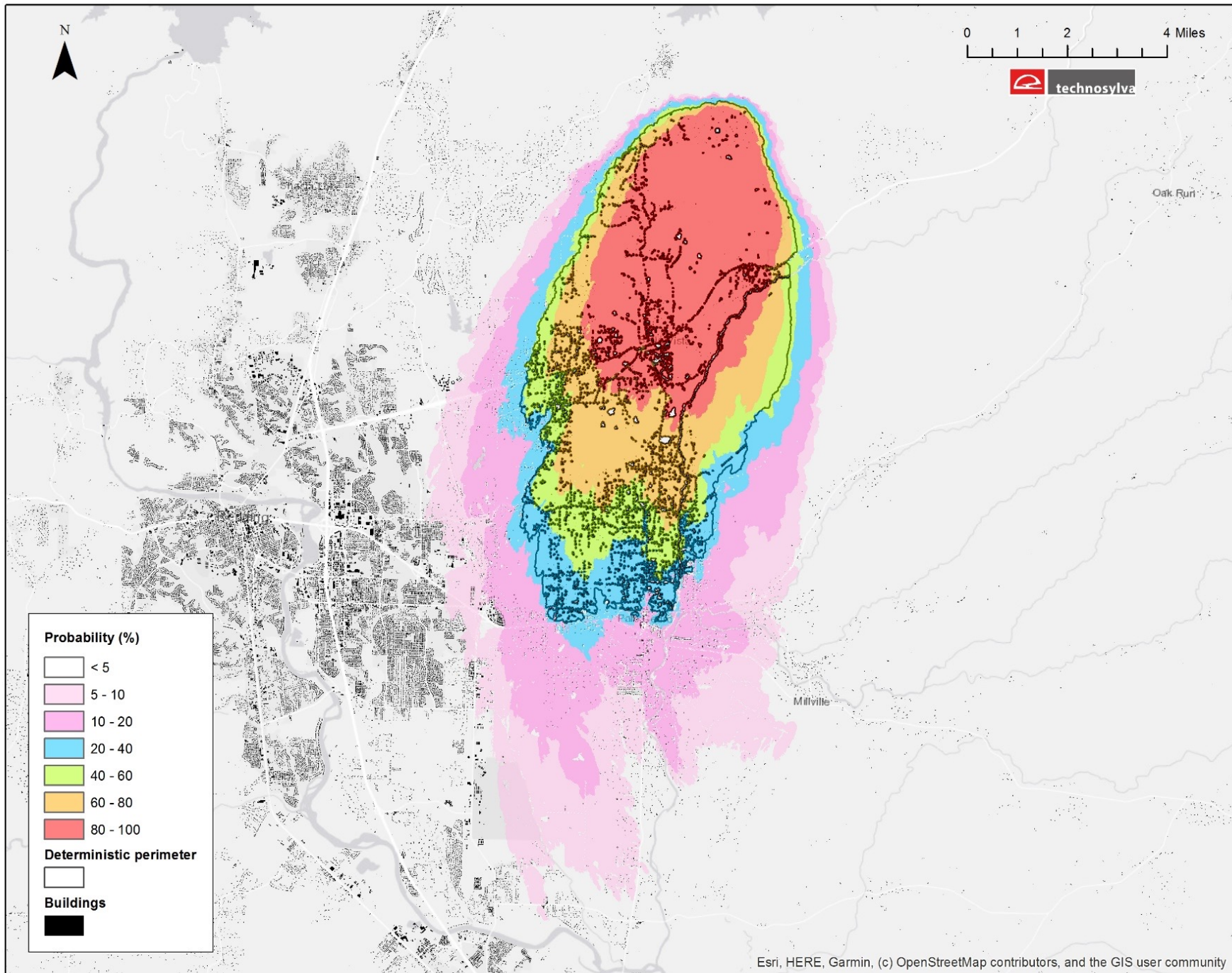
DAMAGE INCIDENT – 1

This incident is located in Northern California, mostly burning grass fuel types (GR1 and GR2) and grass and shrubs combined (GS2). Fire would spread very rapidly presenting substantial resistance to control with a fire perimeter of 2.2 mi in the first hour, resulting in an IAA of 5 (Extreme). In 2017-2018, there were several large fires near this incident location: CARR (219,651 ac), DELTA (63,505 ac) and HIRZ (40,608 ac). The fire impacts on buildings could be very high (more than 3,366 buildings threatened), even considering a low encroachment and low-moderate fire intensity. The amount of population threatened is the highest from the October 9 PSPS event. Modeled wind speed was higher than values recorded at the station.

INCIDENT SUMMARY	
Start Time	10/09/19 - 21:00
Duration (hrs)	24
Size (ac)	23,494
Initial Attack Assessment	5 - Extreme
No. of Buildings	2,027
Total Population	3,366
Average ROS	High



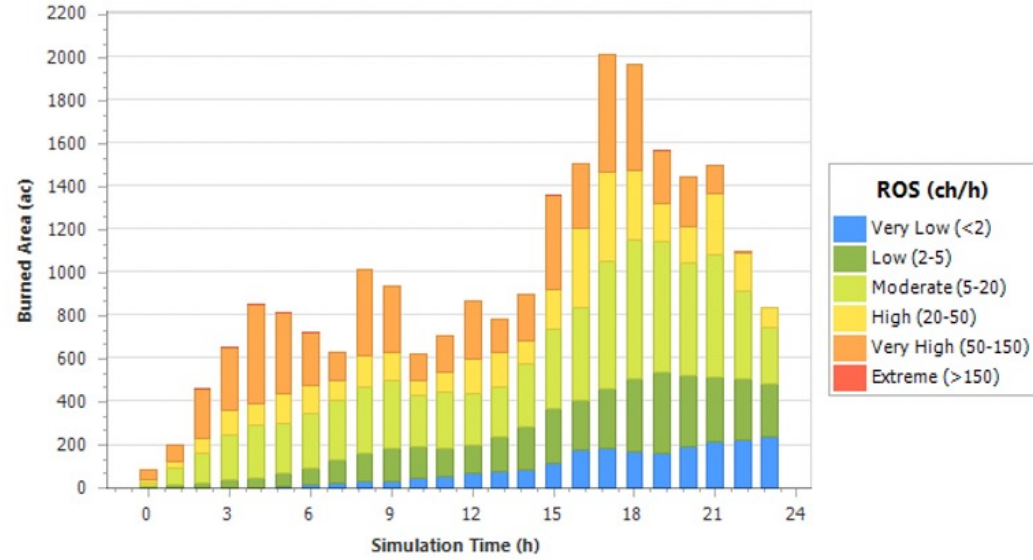




DAMAGE INCIDENT NO. 1

FIRE BEHAVIOR

Rate of Spread



WEATHER

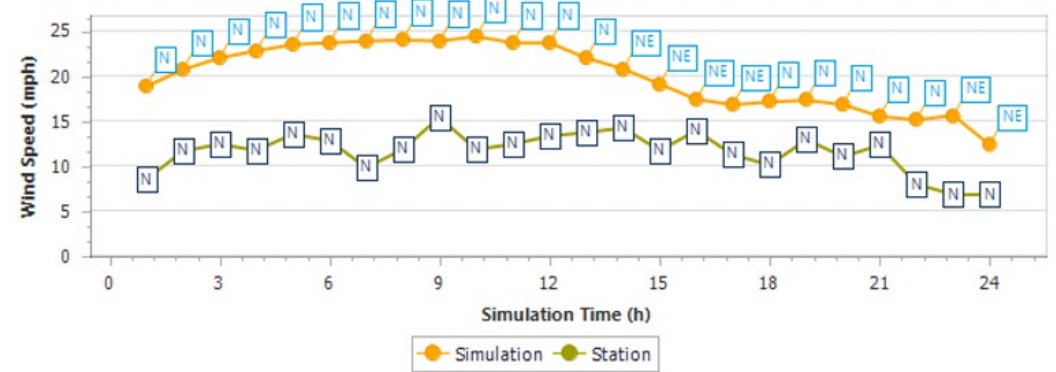
Nearest Station: Blue Sky Road

Station ID - PG307

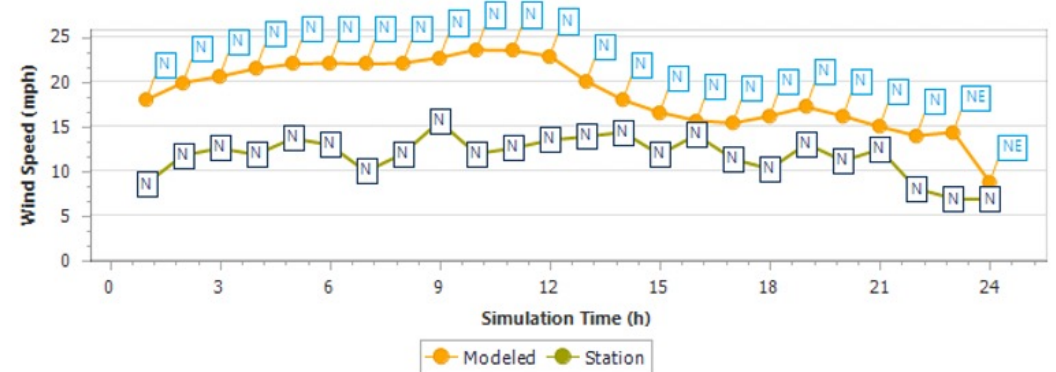
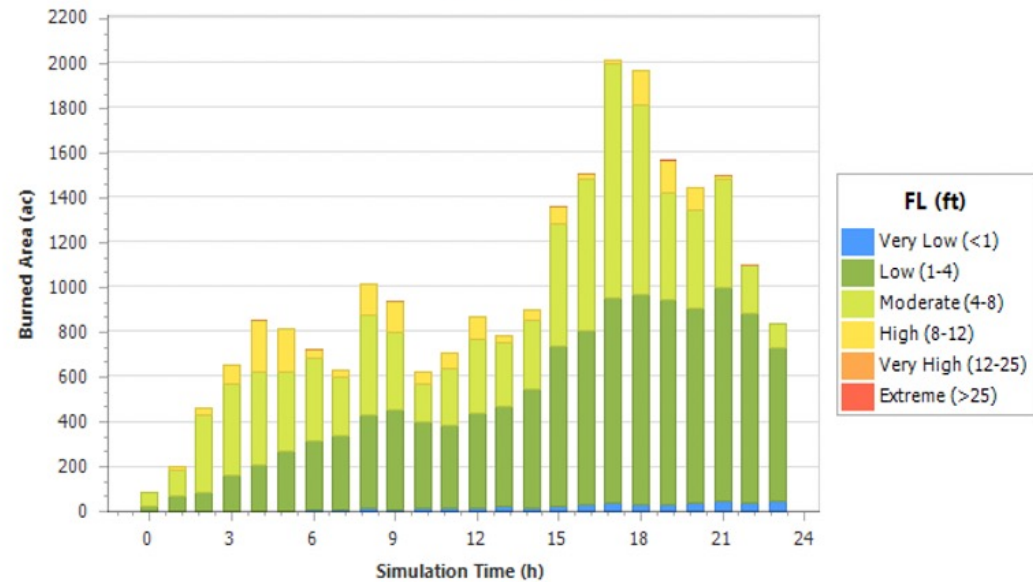
Weather station (Wx) elevation - 576 ft

Fire ignition point (IP) elevation - 433 ft

Distance between Wx and IP - 2.87 mi



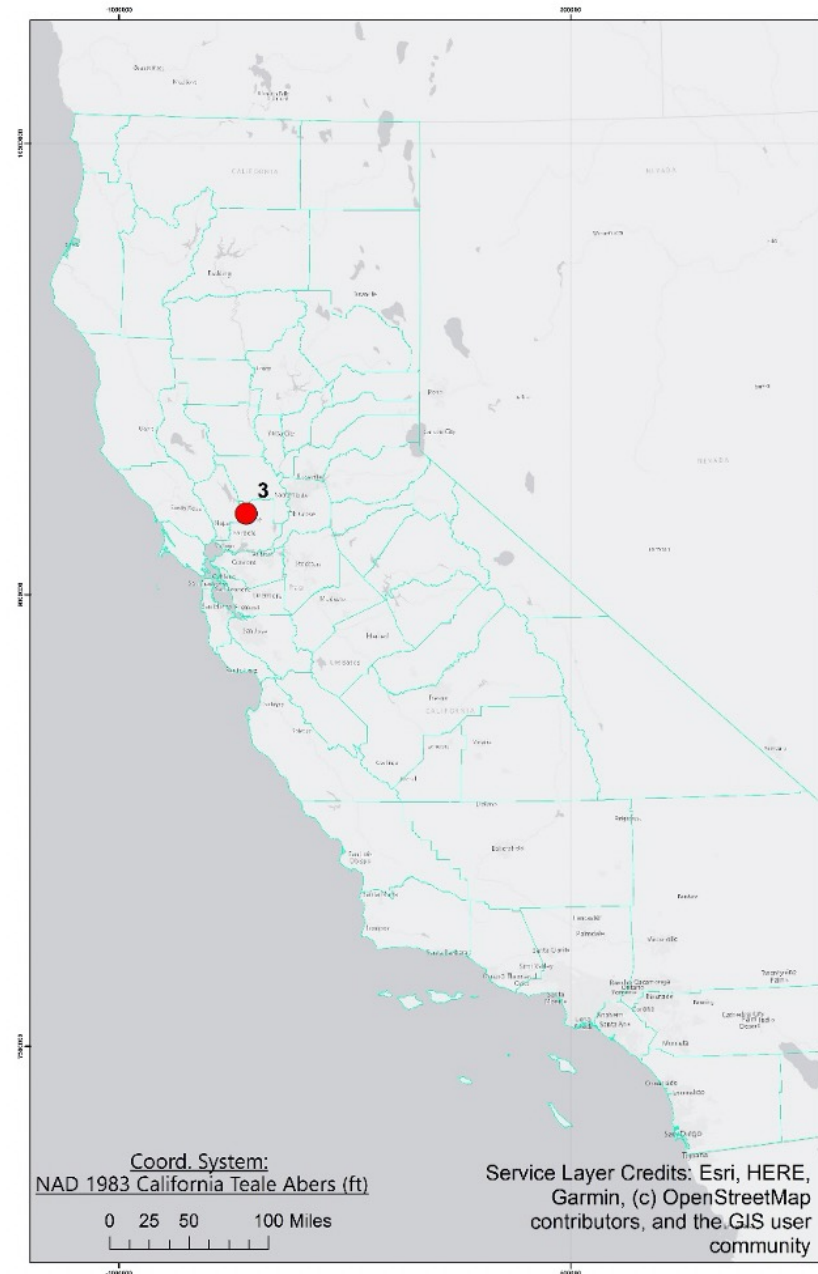
Flame Length

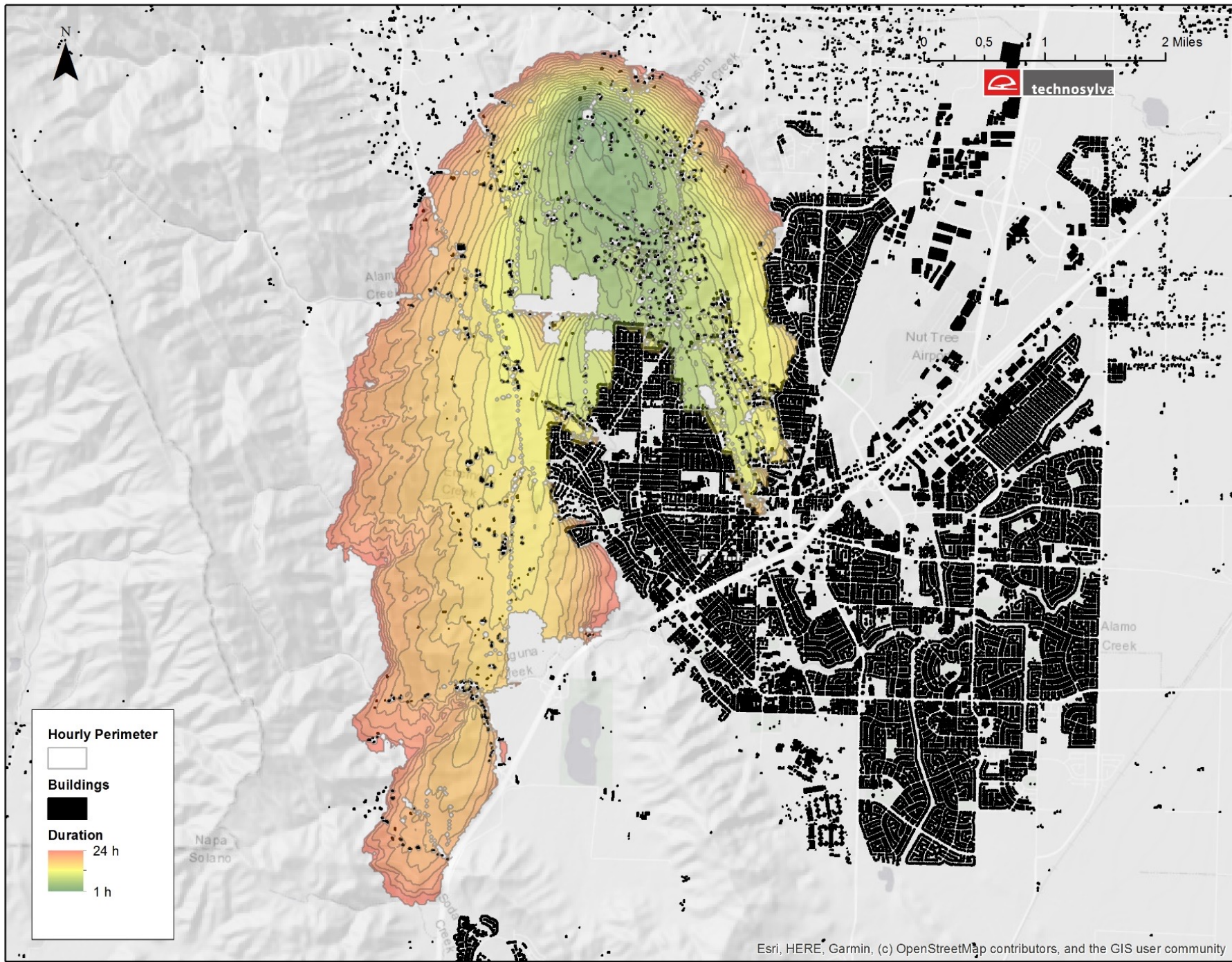


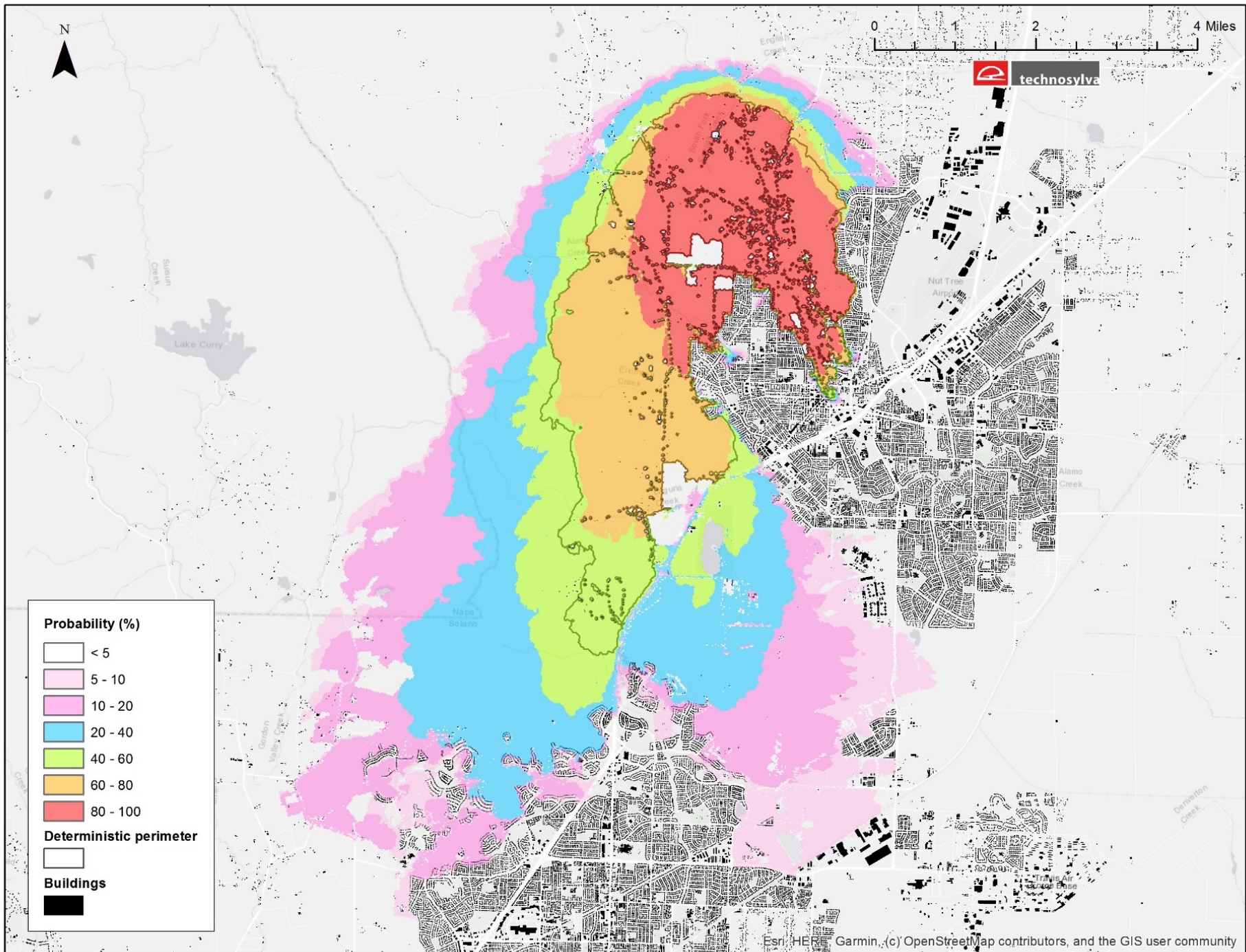
DAMAGE INCIDENT – 3

Fast fire driven by wind on grass fuels that may affect lots of buildings and population due to it starting near a Wildland Urban Interface area. The fire mostly spread on grass fuel types (GR1 and GR2) with a moderate rate of spread with almost 50 chains/hr and a fire perimeter of 1.7 mi in the first hour, resulting in an IAA of 5 (Extreme). The impact on population could be very high as shown in the summary table given a high ember exposure with some areas within the fire perimeter with high fire intensity. Modeled wind speed was slightly higher than values recorded at the station from hour 3 to 15. Values were similar during other times of the fire simulation.

INCIDENT SUMMARY	
Start Time	10/09/19 - 21:00
Duration (hrs.)	24
Size (ac)	8,162
Initial Attack Assessment	5 - Extreme
No. of Buildings	941
Total Population	2,269
Average ROS	Moderate-High



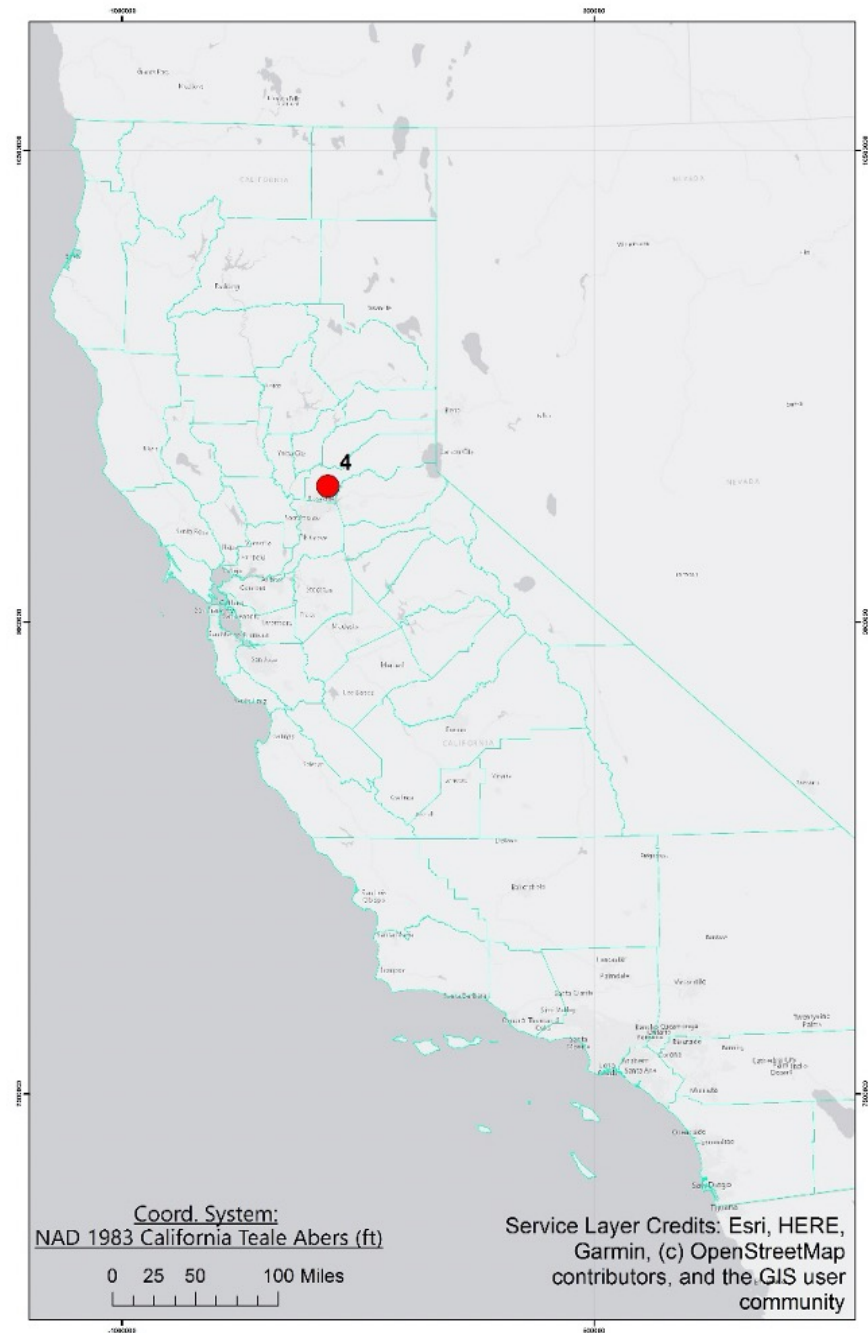


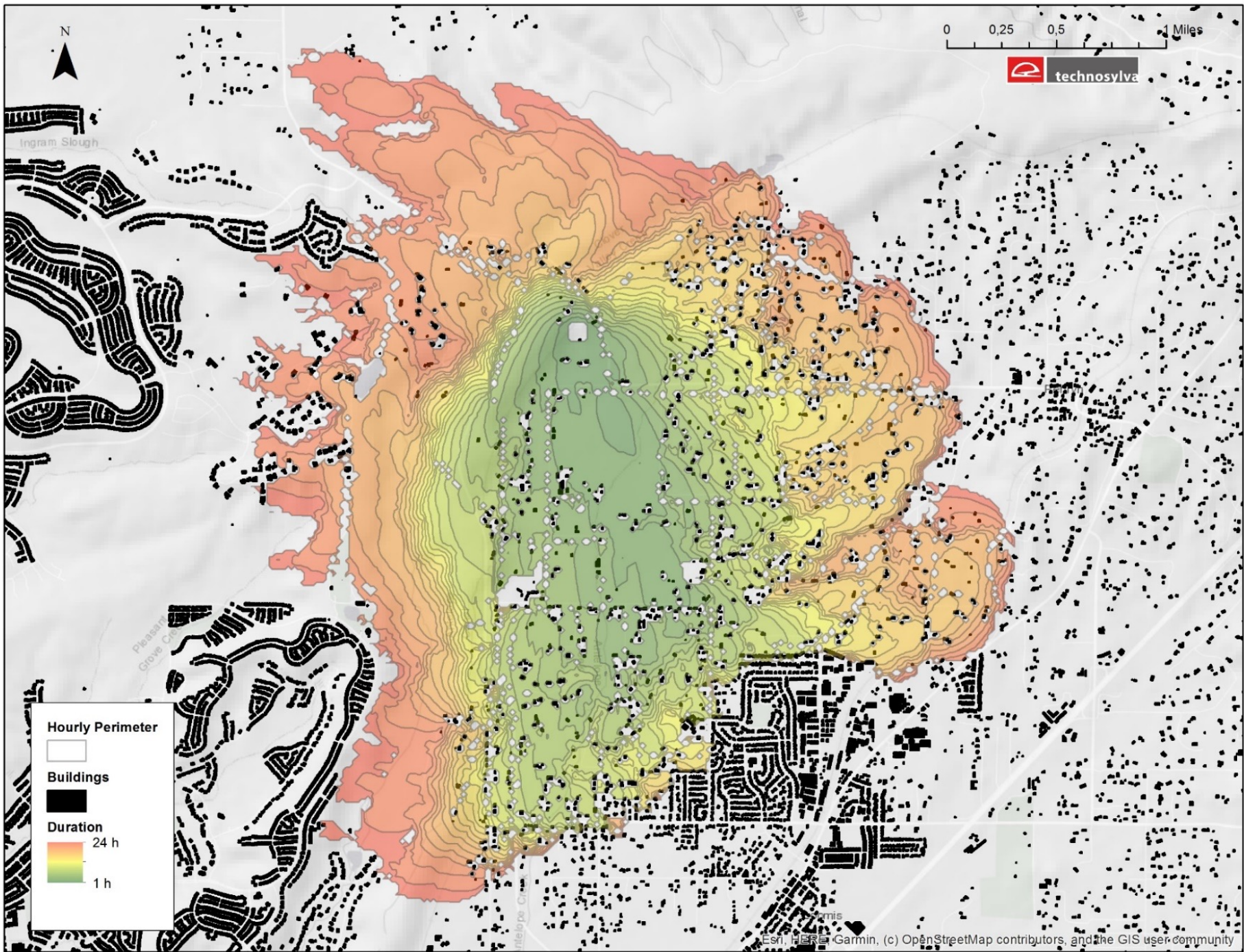


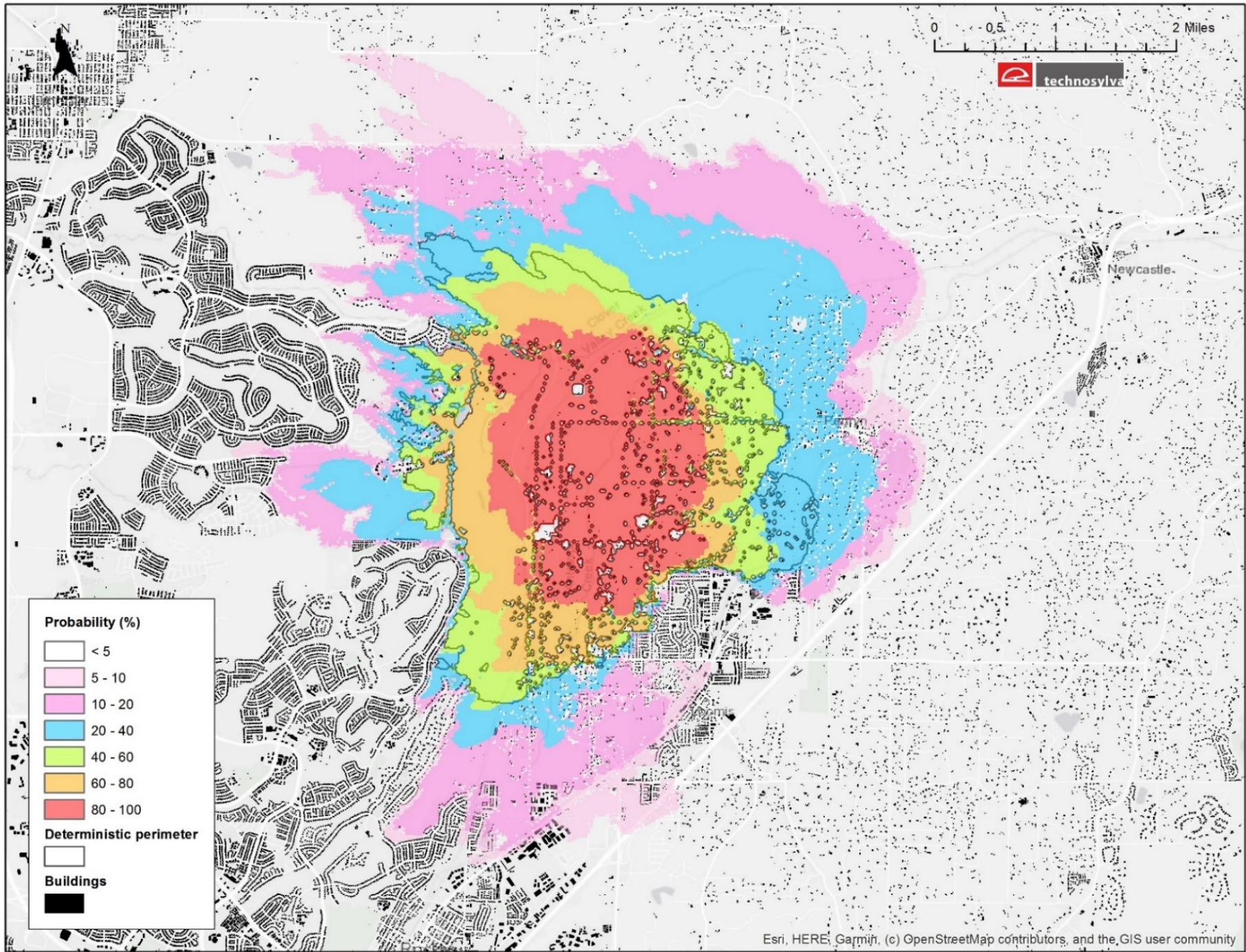
DAMAGE INCIDENT – 4

This incident is located north of Sacramento, in a high populated area with lots of buildings in a dense WUI. The fire would mostly spread on grass fuel types (GR2). The Rate of Spread is fast from the start with a medium rate of spread of 22 ch/hr and a fire perimeter of 1 mi in the first hour, resulting in an IAA of 4 (Very High). In the last decade there were a meaningful number of small and medium fires affecting WUIs. The largest one was the 2008 Gladding fire (1,089 ac). The fire impacts could be very high due to the WUI is near to the ignition and the number of buildings is very high although the fire intensity was low during all the fire.

INCIDENT SUMMARY	
Start Time	10/10/19 - 11:00
Duration (hrs)	24
Size (ac)	4,928
Initial Attack Assessment	4 - Very High
No. of Buildings	559
Total Population	1,732
Average ROS	Moderate









California Public Utilities Commission

2019 PSPS Event -Wildfire Analysis Report

Event Date: October 26 - 29, 2019

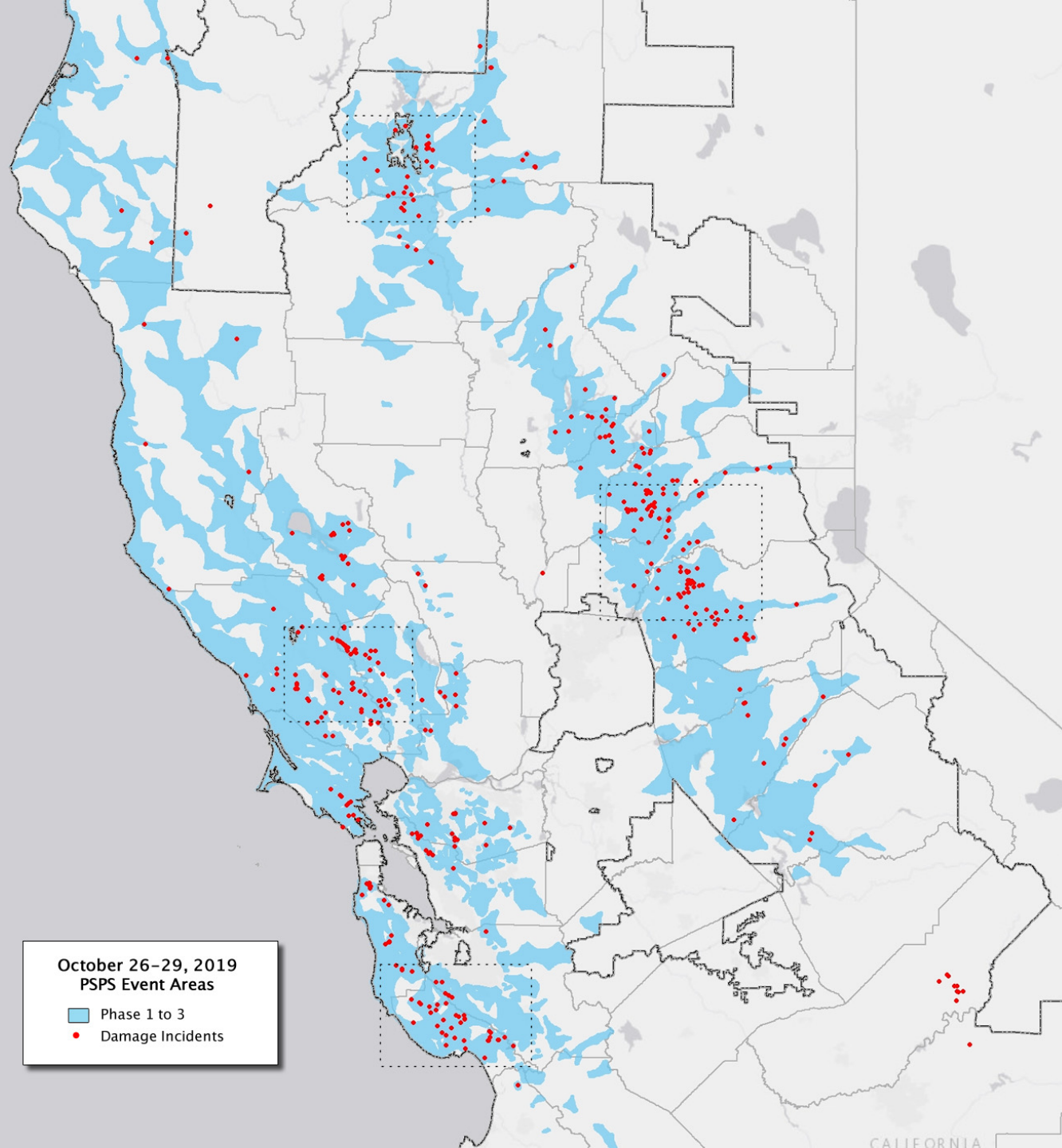
IOU: Pacific Gas & Electric

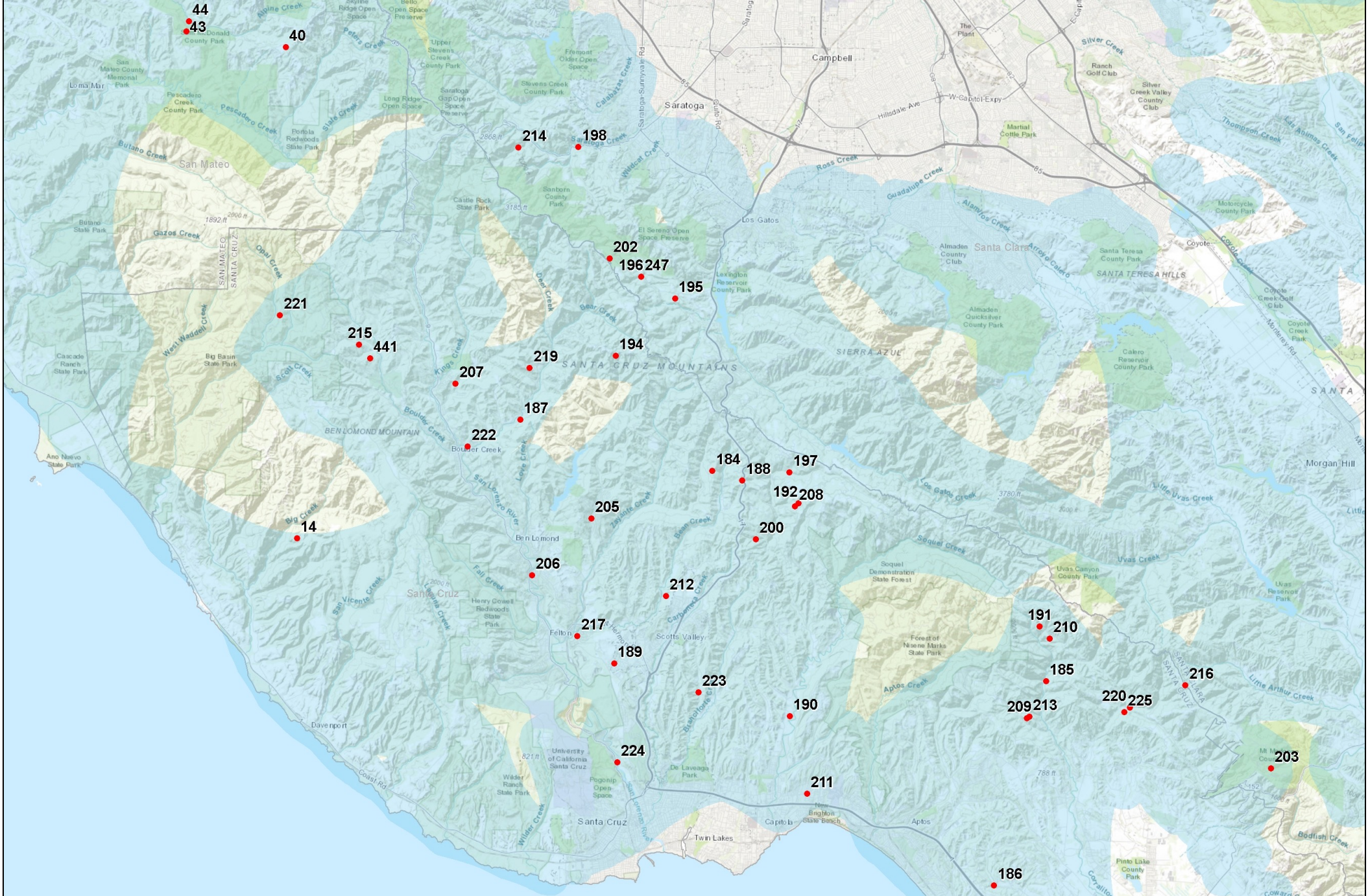
Prepared by:

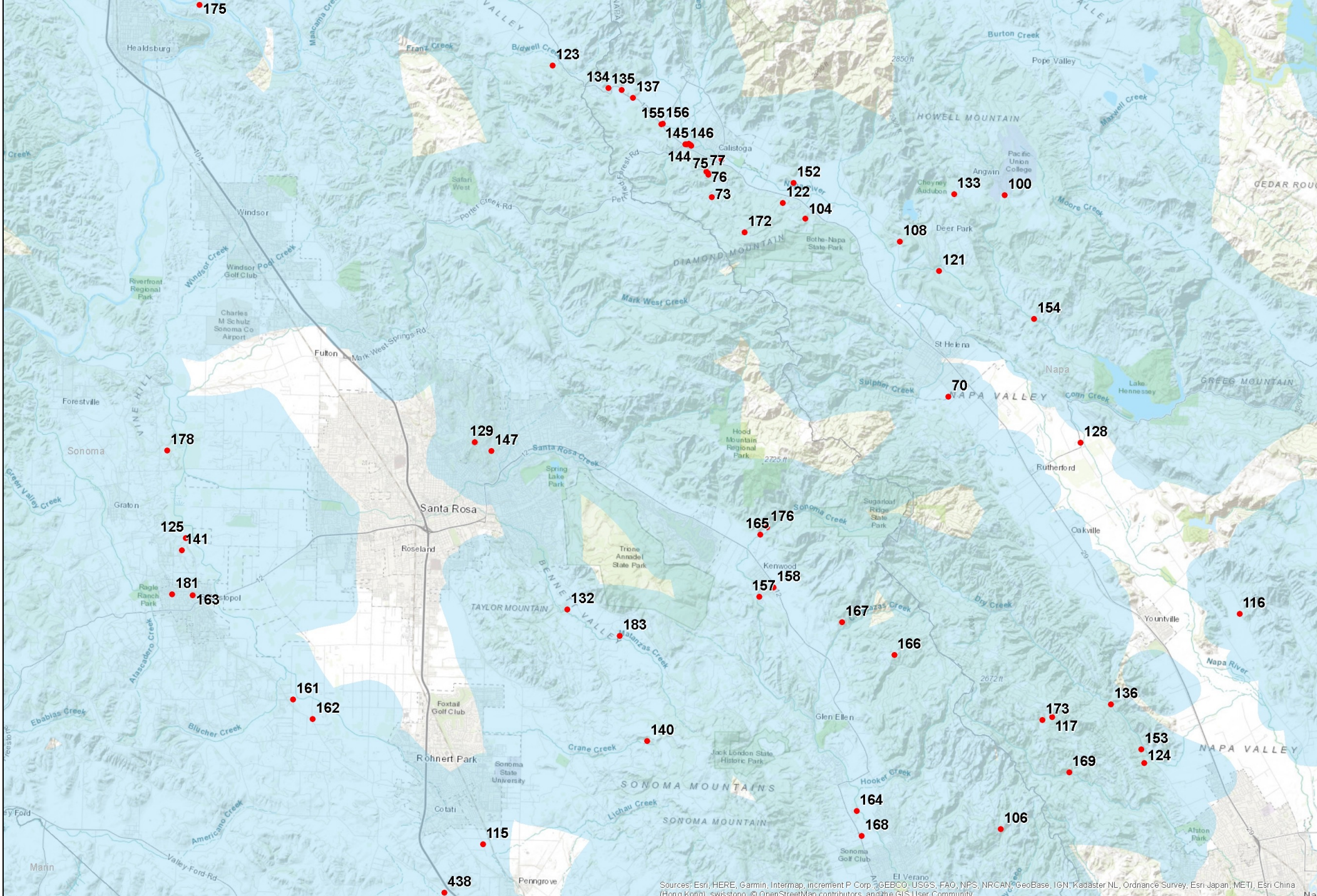
Technosylva Inc. (La Jolla, CA)

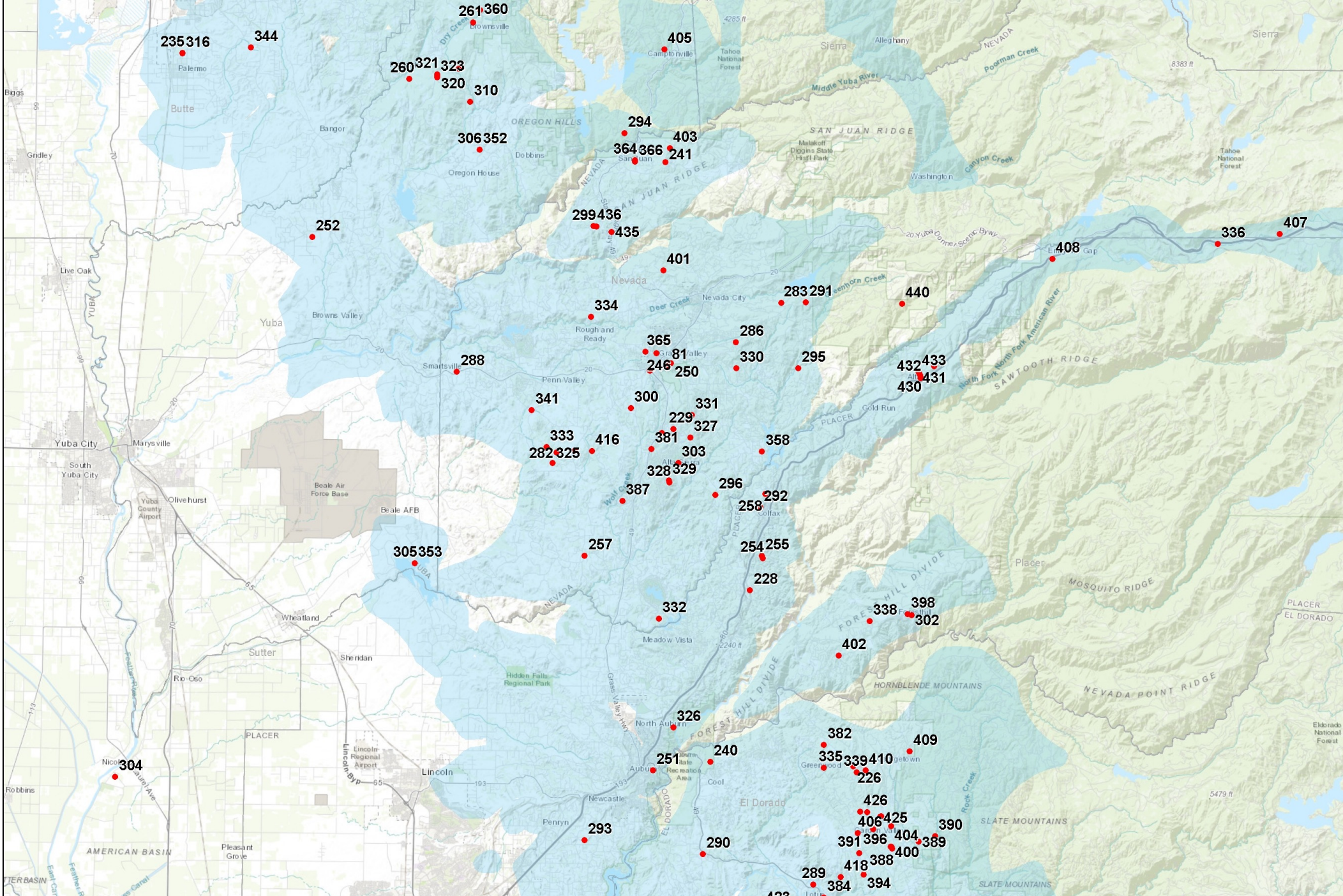
October 26-29, 2019

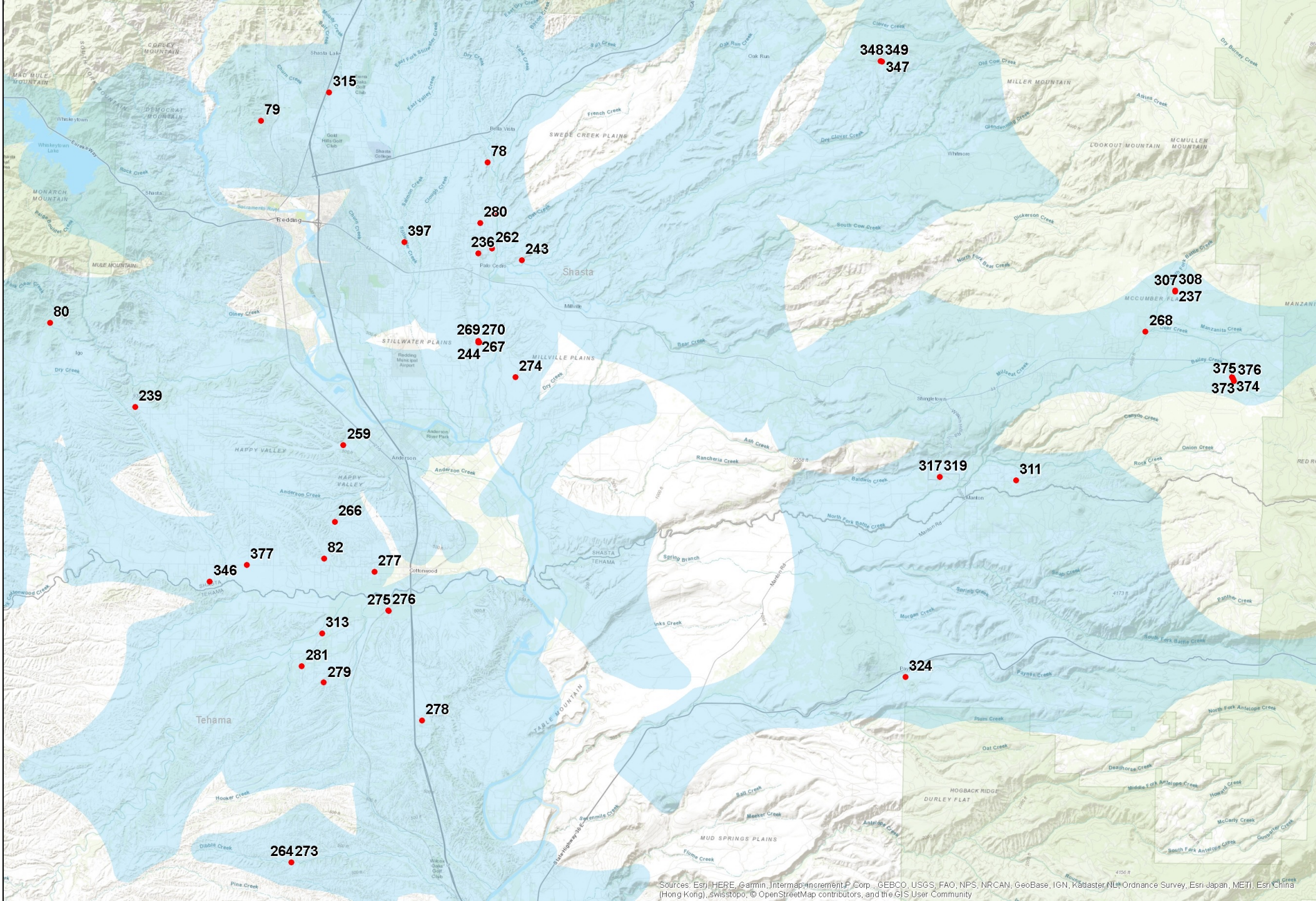
- 441 damaged assets reported by PG&E
- 422 were identified as potential to cause an ignition, and located within PSPS area boundary
- 422 were located near burnable fuels and were used to conduct the analysis









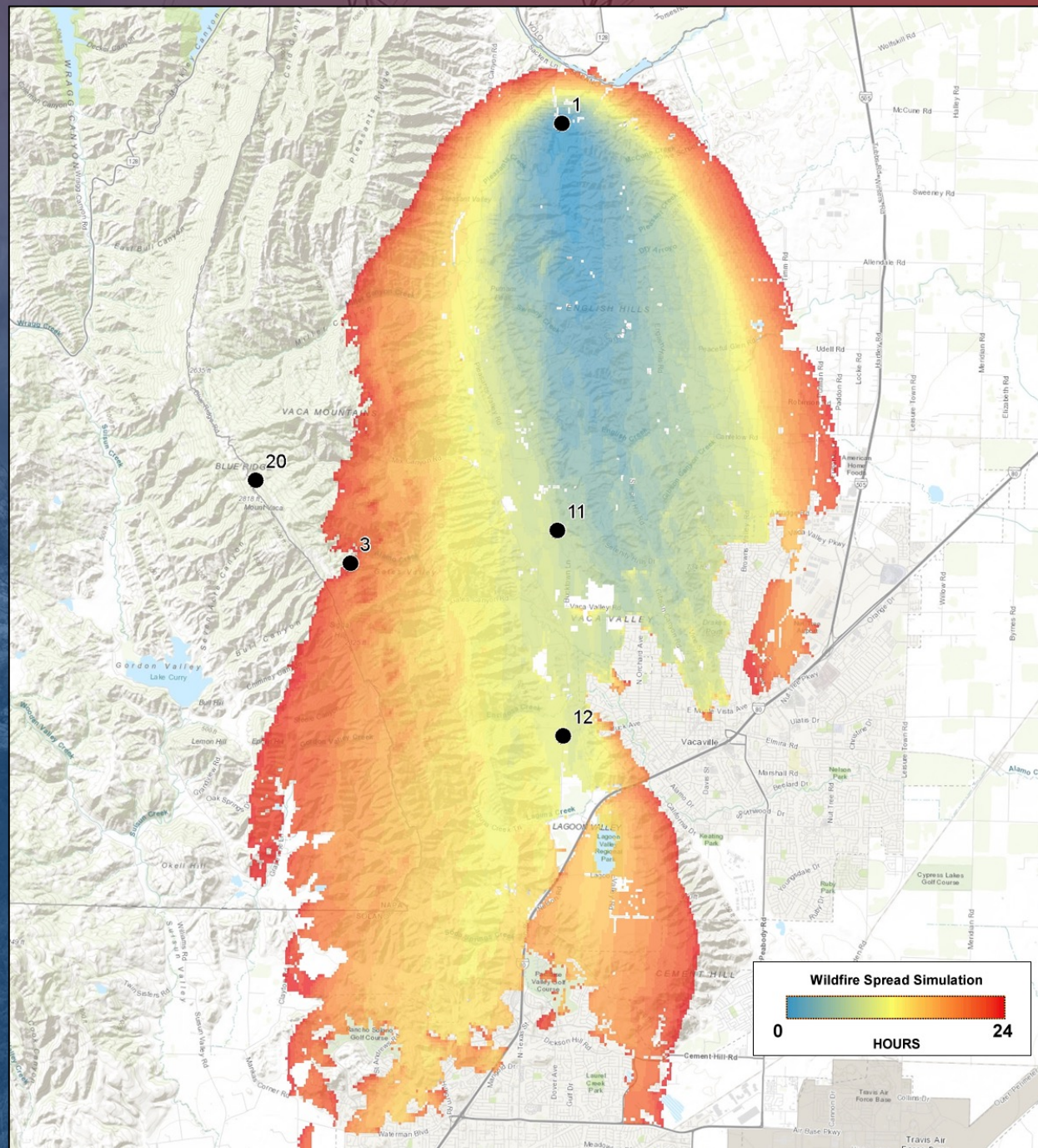


SIMULATION NAME	POP IMPACTED	BUILDINGS IMPACTED	FIRE SIZE POTENTIAL	RANK	IAA	INCLUDED
	13,384	6,927	50,228	1	5	Yes
SV-022	7,750	4,835	36,981	2	5	Yes
SV-255	7,211	3,169	30,076	3	5	Yes
NC-102	6,807	5,344	22,737	4	2	Yes
BA-088	6,425	1,163	15,771	5	4	Yes
SV-069	4,511	3,094	26,816	6	5	Yes
T-012	4,403	4,086	31,814	7	4	Yes
SV-127	4,255	1,587	8,599	8	4	Yes
NC-125	3,738	1,447	4,747	9	3	Yes
NC-163	3,418	1,838	17,710	10	2	Yes
SV-218	14,398	5,348	28,066	11	0	Cluster SV244
SV-150	11,036	3,584	17,488	12	0	Cluster SV244
SV-028	7,894	4,903	38,180	13	0	Cluster SV022
SV-076	7,846	4,950	38,934	14	0	Cluster SV022
MA-SV-009	7,504	6,149	31,520	15	0	Cluster SV022
SV-094	7,445	5,760	30,313	16	0	Cluster SV022
SV-070	7,174	4,676	37,543	17	0	Cluster SV022
SV-009	7,099	5,662	31,766	18	0	Cluster SV022
SV-075	7,025	4,582	35,870	19	0	Cluster SV022
SV-219	6,900	3,320	39,009	20	0	Cluster SV244
SV-020	6,513	4,765	27,780	21	0	Cluster SV022
SV-061	6,201	4,464	29,522	22	0	Cluster SV022
SV-027	5,906	4,154	38,206	23	0	Cluster SV022
NC-055	5,783	4,975	14,326	24	0	Cluster NC102
SV-279	5,135	3,552	14,097	25	0	Cluster SV022
SV-057	4,420	3,000	24,870	26	0	Cluster SV022
SV-088	4,314	2,803	29,483	27	0	Cluster SV069
SV-085	3,909	2,377	28,932	28	0	Cluster SV069
SV-225	3,848	1,310	16,122	29	0	Cluster
SV-115	3,114	2,379	7,988	30	0	
MA-SV-022	3,418	2,518	26,705	31	0	
NC-143	3,417	2,511	18,819	32	0	
NC-068	3,404	1,946	20,532	33	0	
NC-142	3,296	2,895	18,591	34	0	
NC-040	3,243	2,283	5,909	35	0	
NC-190	3,215	1,578	9,884	36	0	
MA-NC-019	3,147	1,755	16,663	37	0	



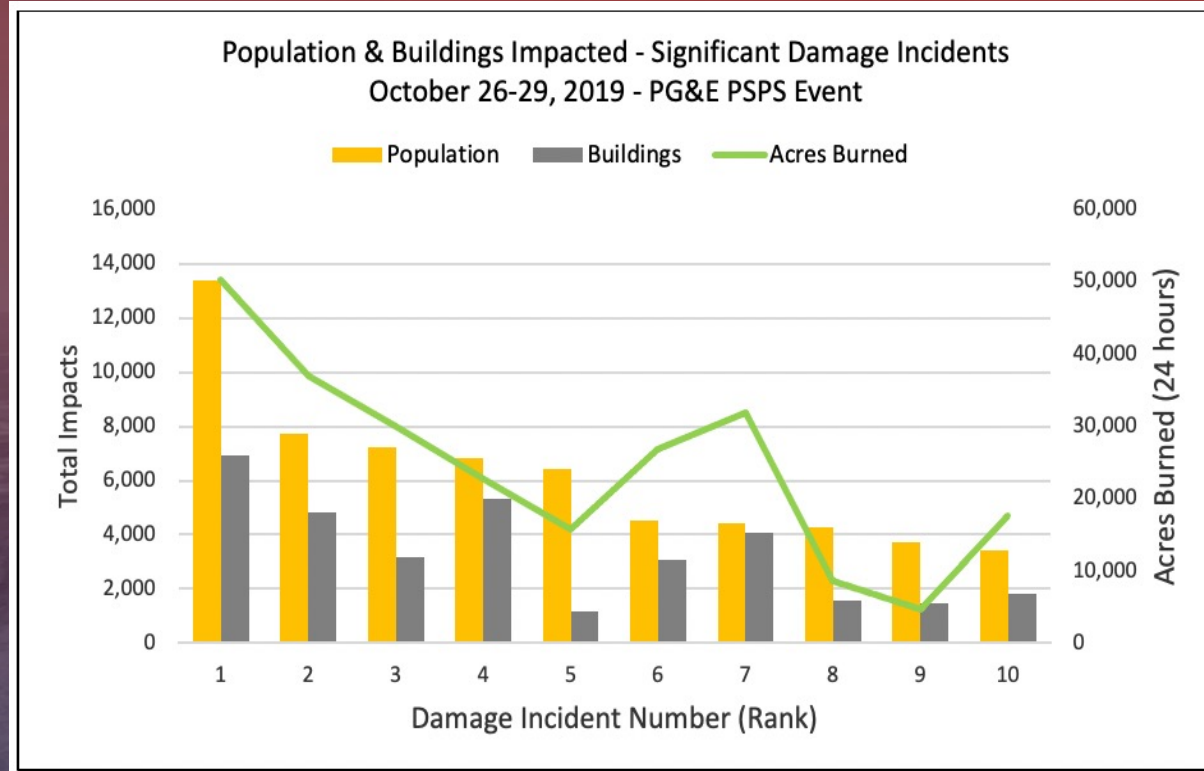
October 26-29, 2019 Incident Clusters

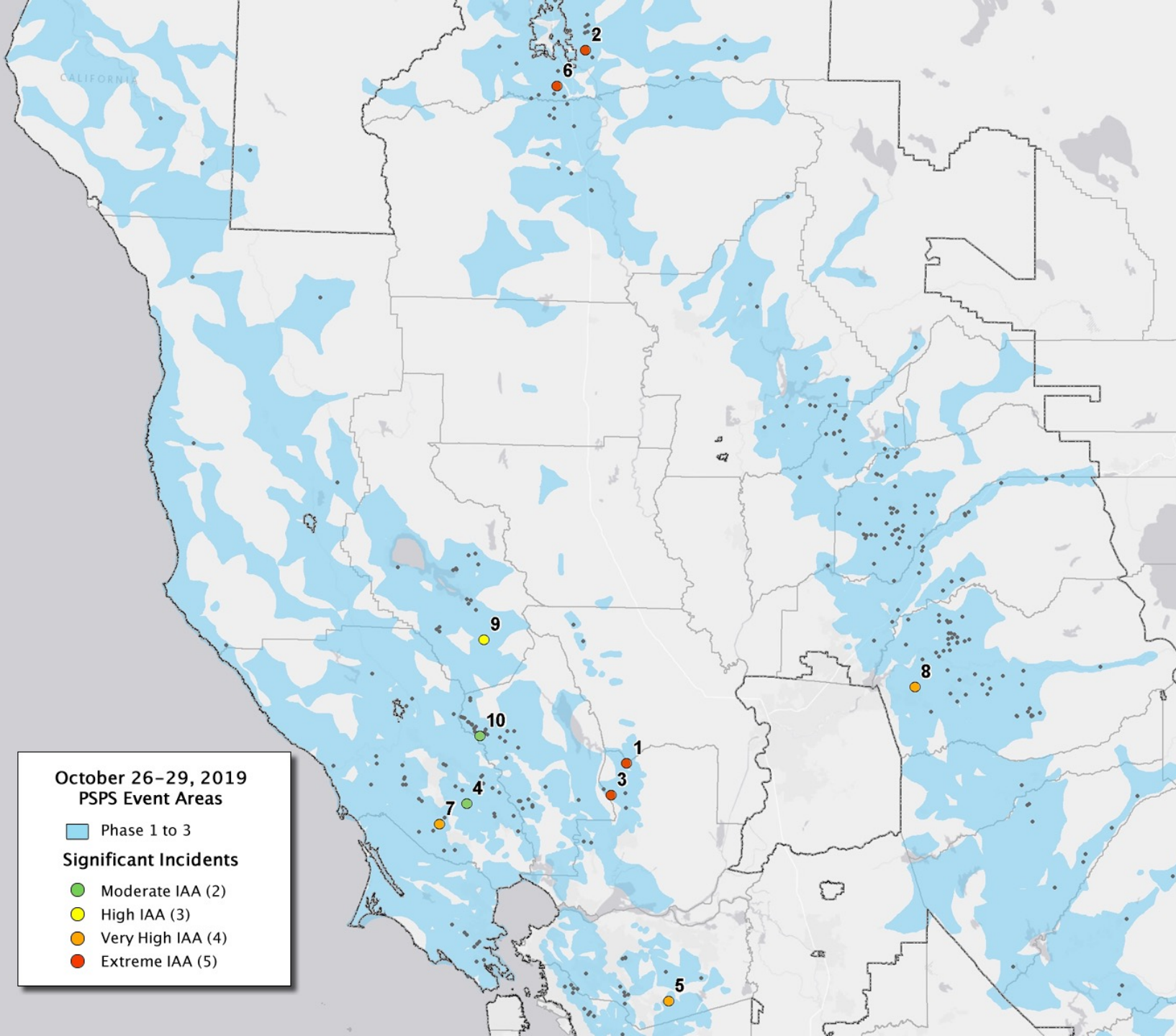
- In situations where a cluster of damage incidents exist, with the same ignition time, a single worst case incident simulation was selected
- Incidents 11 and 12 are excluded from consideration as they would have been quickly consumed by incident 1 simulation



Damage Incident	County	Population Impacted	Buildings Impacted	Acres Burned	IAA
1	Solano	13,384	6,927	50,228	5
2	Shasta	7,750	4,835	36,981	5
3	Solano	7,211	3,169	30,076	5
4	Sonoma	6,807	5,344	22,736	2
5	Contra Costa	6,425	1,163	15,771	4
6	Shasta	4,511	3,094	26,816	5
7	Sonoma	4,403	4,086	31,814	4
8	El Dorado	4,255	1,587	8,599	4
9	Lake	3,738	1,447	4,746	3
10	Napa	3,418	1,838	17,709	2

● Low (1)
 ● Moderate (2)
 ● High (3)
 ● Very High (4)
 ● Extreme (5)

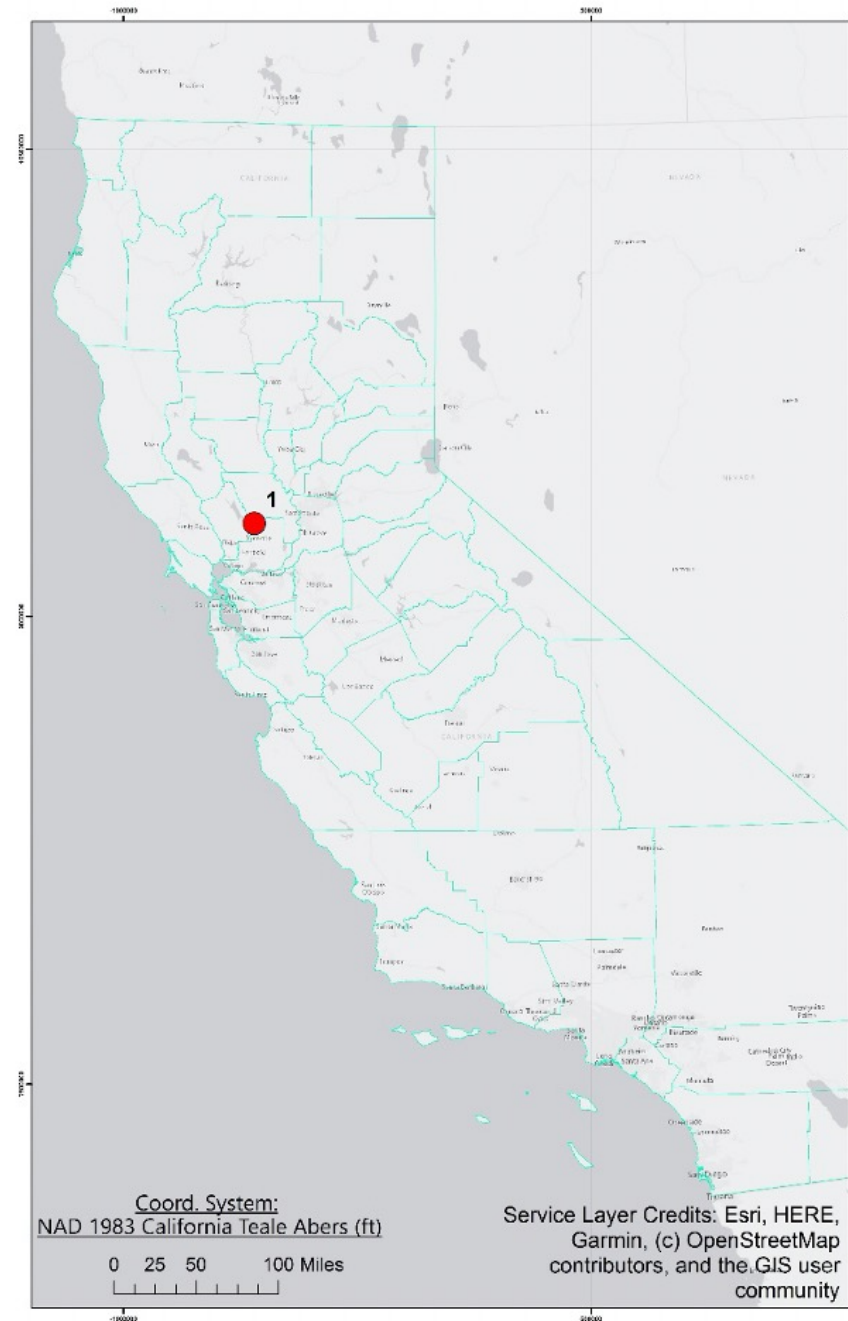


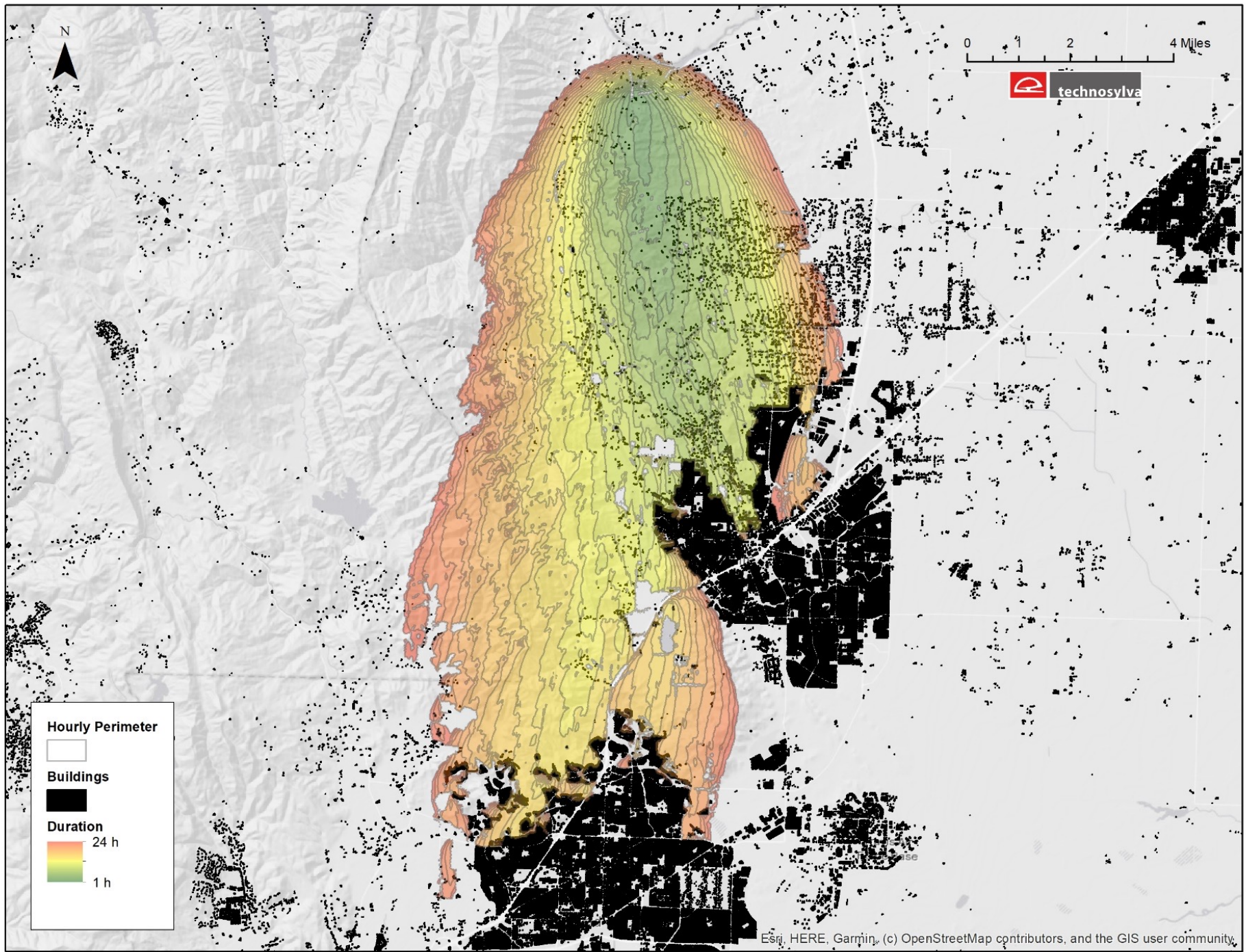


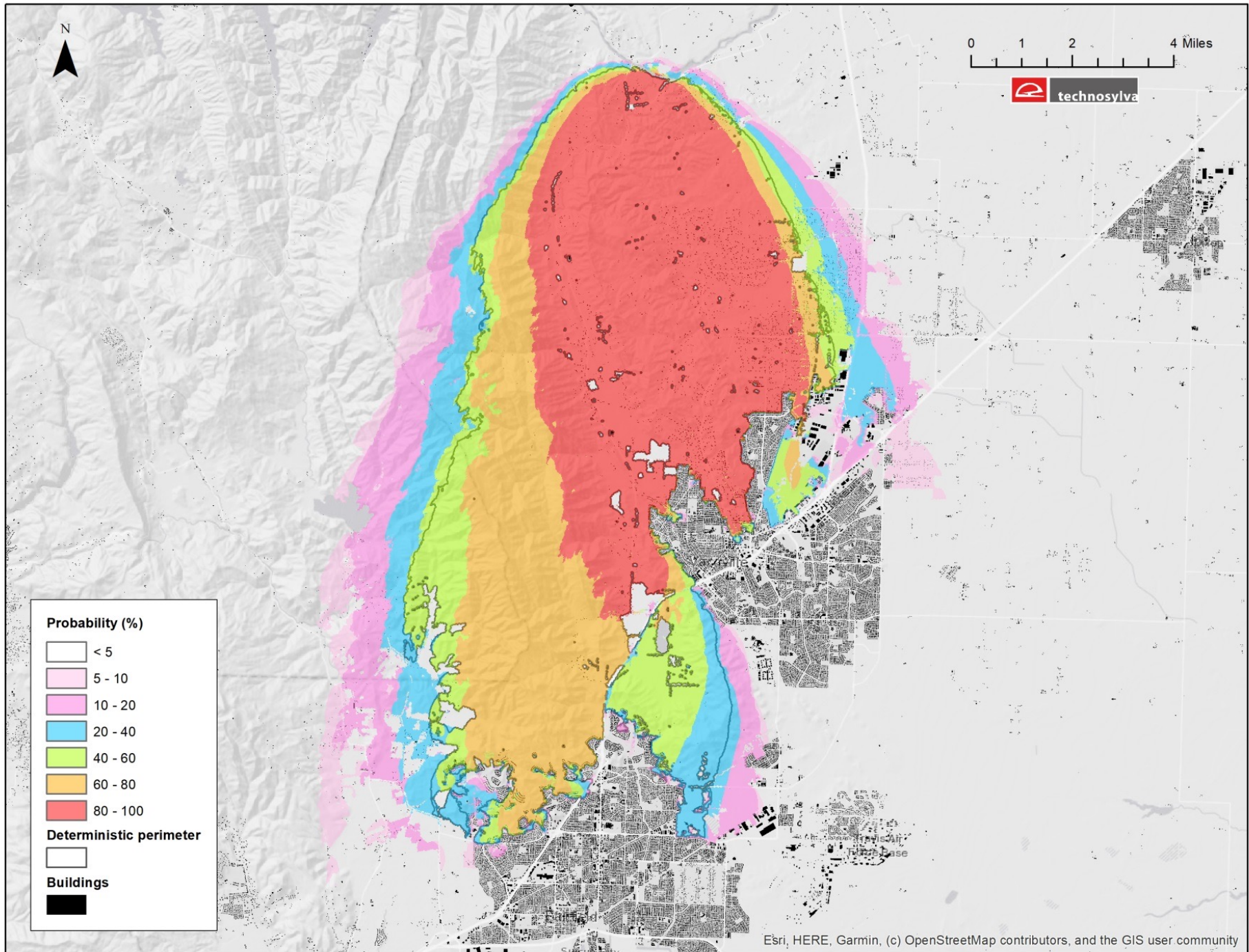
DAMAGE INCIDENT – 1

This damage incident is located in Vacaville near the San Francisco Bay. The fire would mostly burn grass fuel types and combined with shrubs with high wind speeds (20 mi/h) resulting in very high rate of spread exceeding 150 chains/hr in some areas of the fire giving rise an IAA = 5. The fire intensity would be low-moderate. The incident is located in a fire-prone area with lots of fires in the last years. The WRAGG fire in 2015 (8,051 ac) or the WINTER fire in 2017 (1,700 ac) are only two examples. The fire impacts on buildings could be very high (almost 7,300 buildings threatened), even considering low encroachment. The amount of population threatened in the October 26 PSPS event is the highest for this event.

INCIDENT SUMMARY	
Start Time	10/27/19 - 00:00
Duration (hr)	24
Size (ac)	50,228
Initial Attack Assessment	5 - Extreme
No. of Buildings	6,927
Total Population	13,384
Average ROS	High



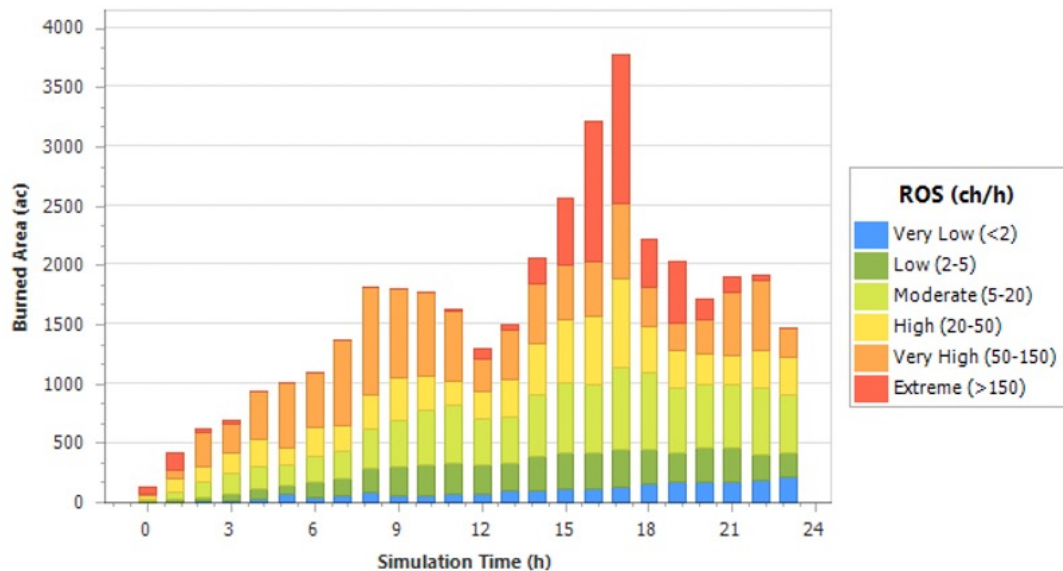




DAMAGE INCIDENT NO. 1

FIRE BEHAVIOR

Rate of Spread



WEATHER

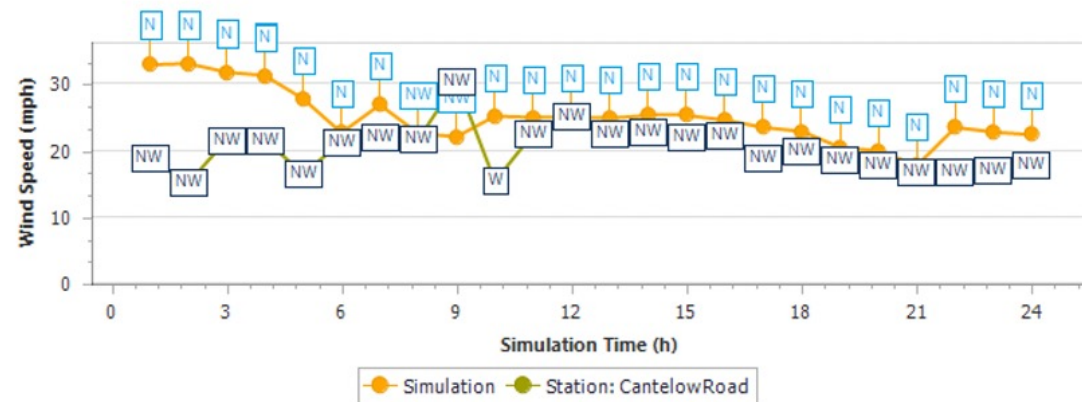
Nearest Station: Blue Sky Road

Station ID - PG431

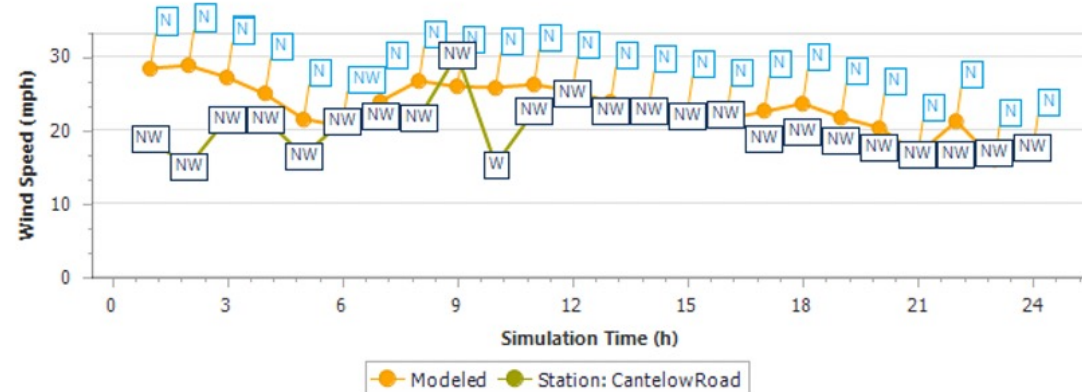
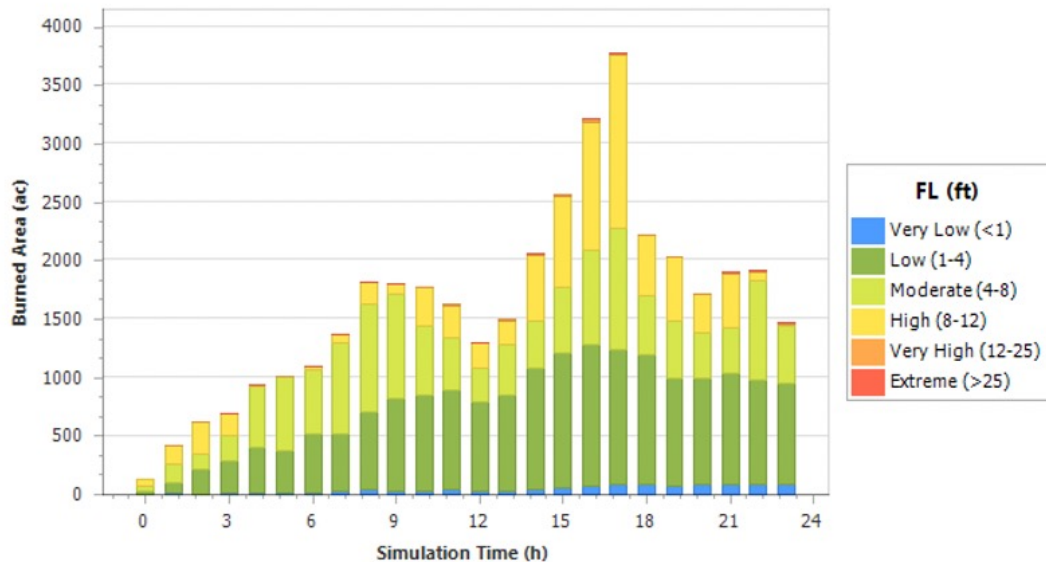
Weather station (Wx) elevation - 618 ft

Fire ignition point (IP) elevation - 164 ft

Distance between Wx and IP - 3.68 mi



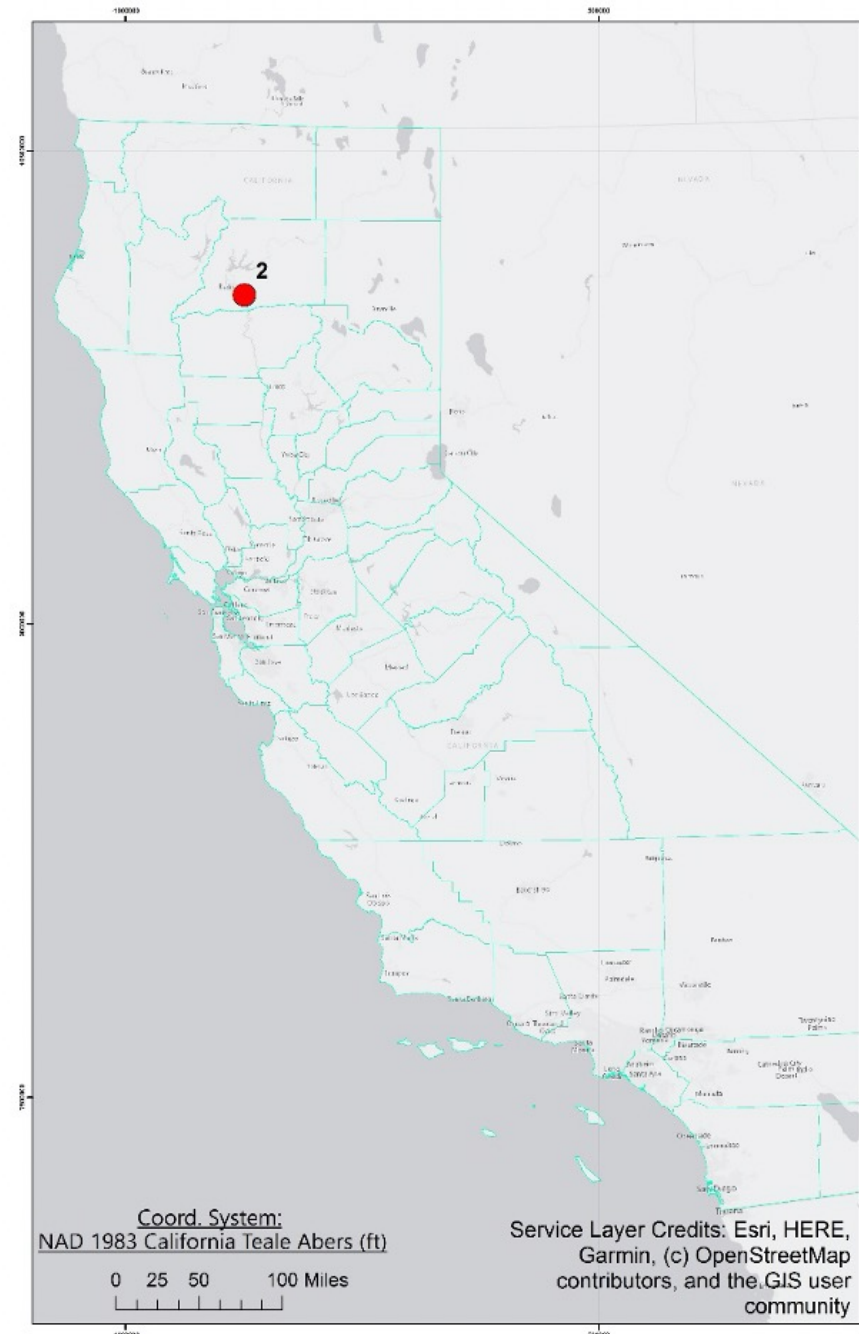
Flame Length

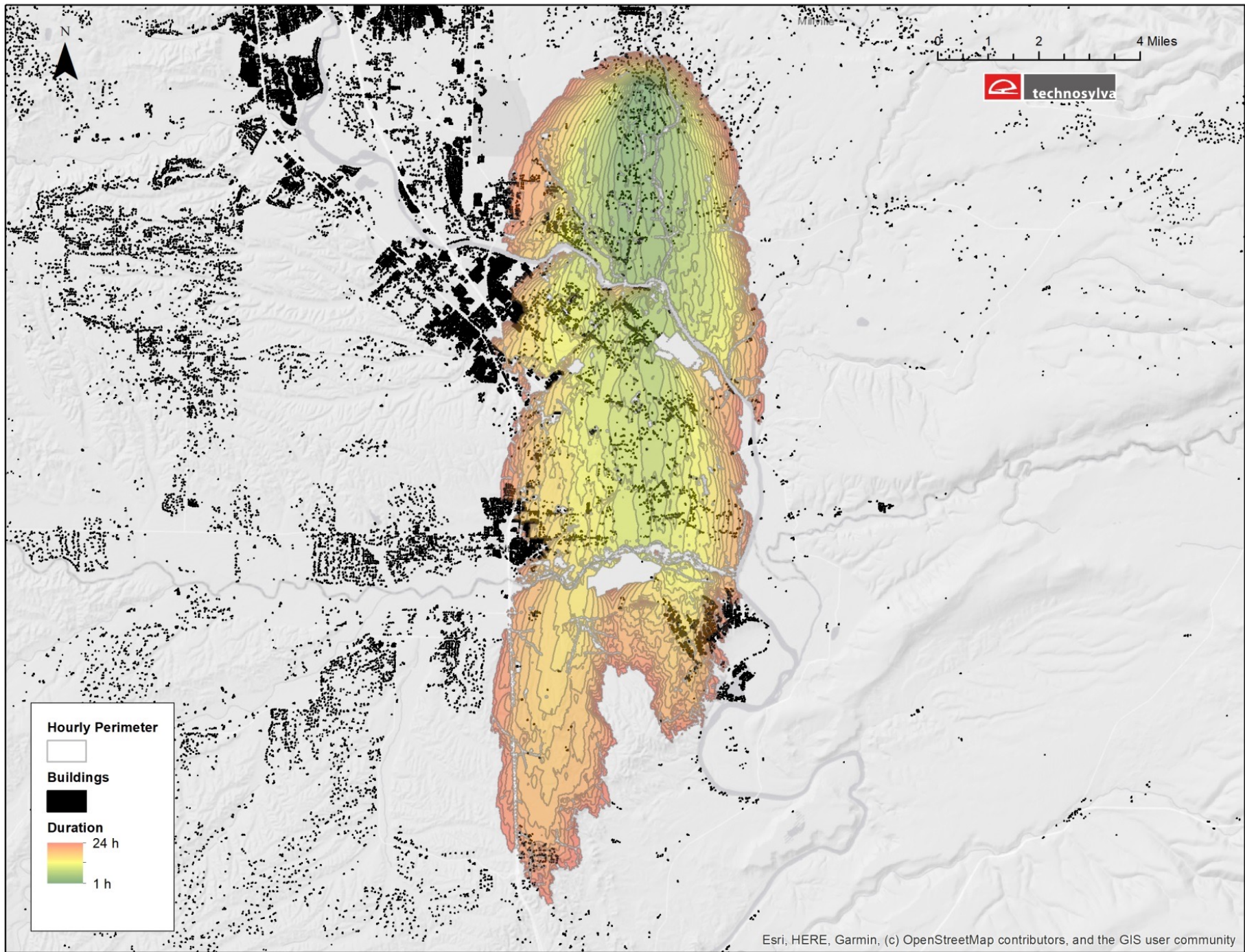


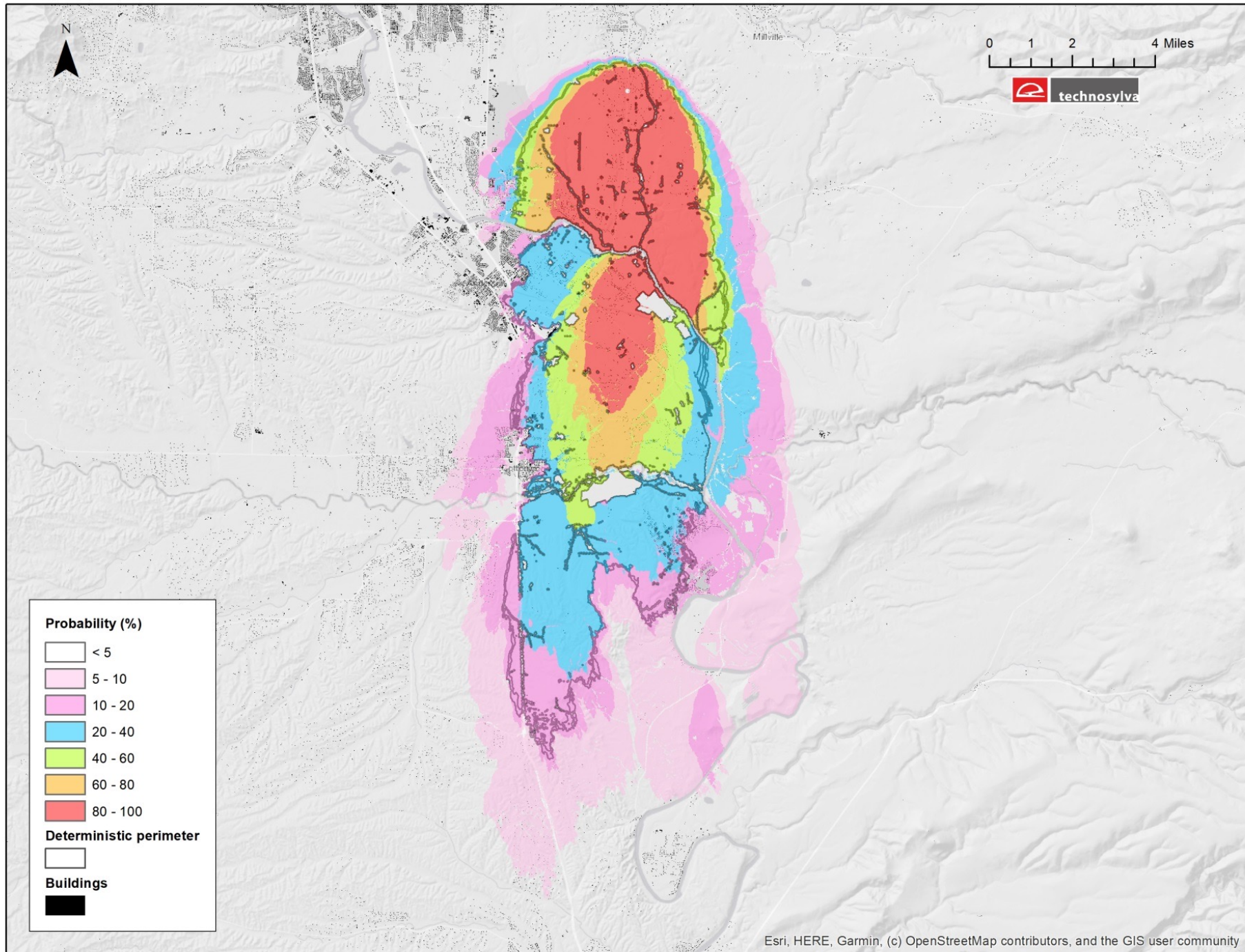
DAMAGE INCIDENT – 2

This incident is located in Redding in the county of Shasta, mostly burning grass fuel types (GR1 and GR2). Fire would spread very rapidly presenting substantial resistance to control with an IAA of 5 (Extreme) with high wind coming from north (20-25 mi/h) although the fire intensity would be low-moderate. Near the damage incident location, there were several large fires in the last decades: JONES (26,202 ac; 1999) and BEAR (10,441; 2004) are two examples. The fire impacts on buildings could be very high with lots of buildings threatened even considering a low encroachment during the fire due to the fuel types burned.

INCIDENT SUMMARY	
Start Time	10/27/19 - 00:00
Duration (hrs)	24
Size (ac)	36,981
Initial Attack Assessment	5 - Extreme
No. of Buildings	4,835
Total Population	7,750
Average ROS	High



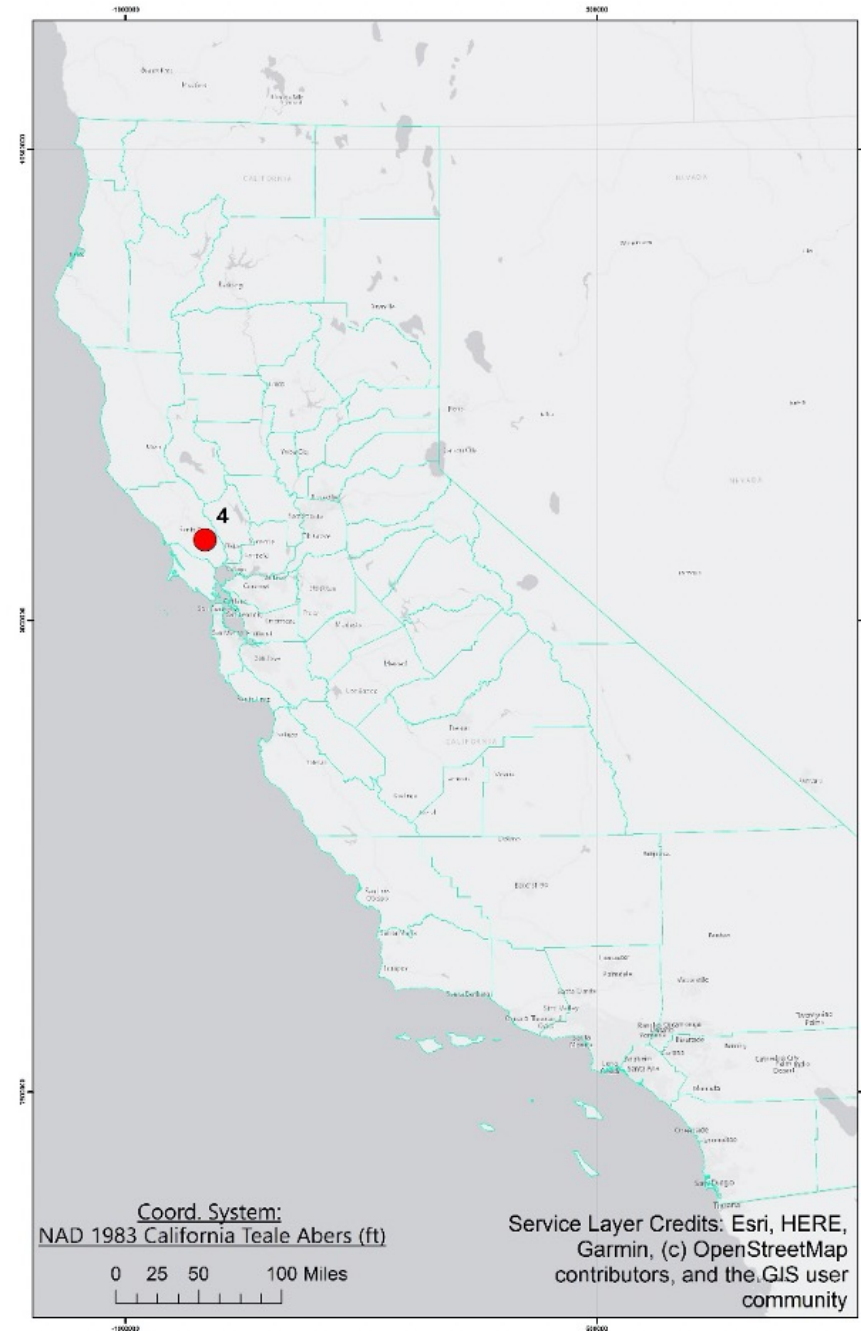


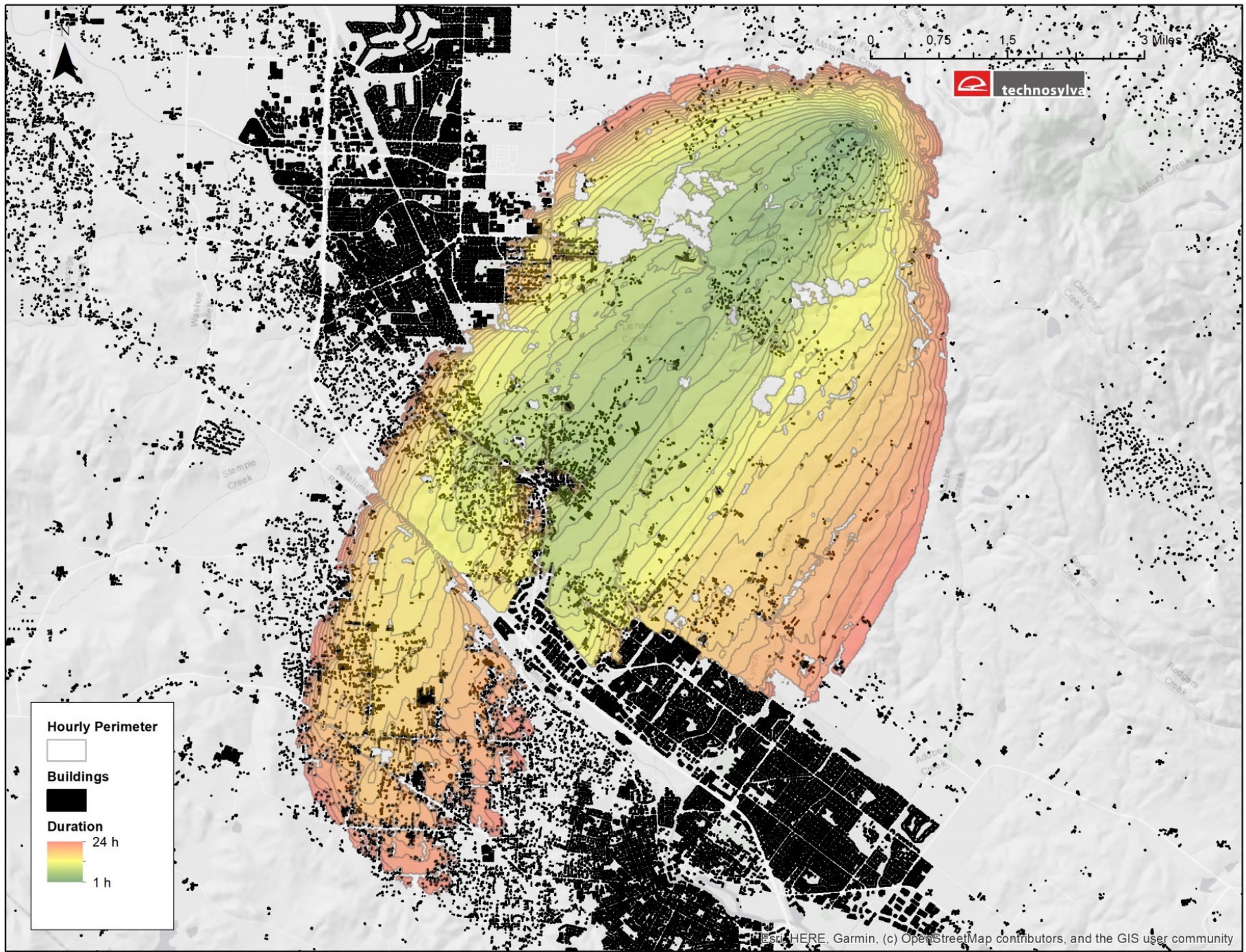


DAMAGE INCIDENT – 4

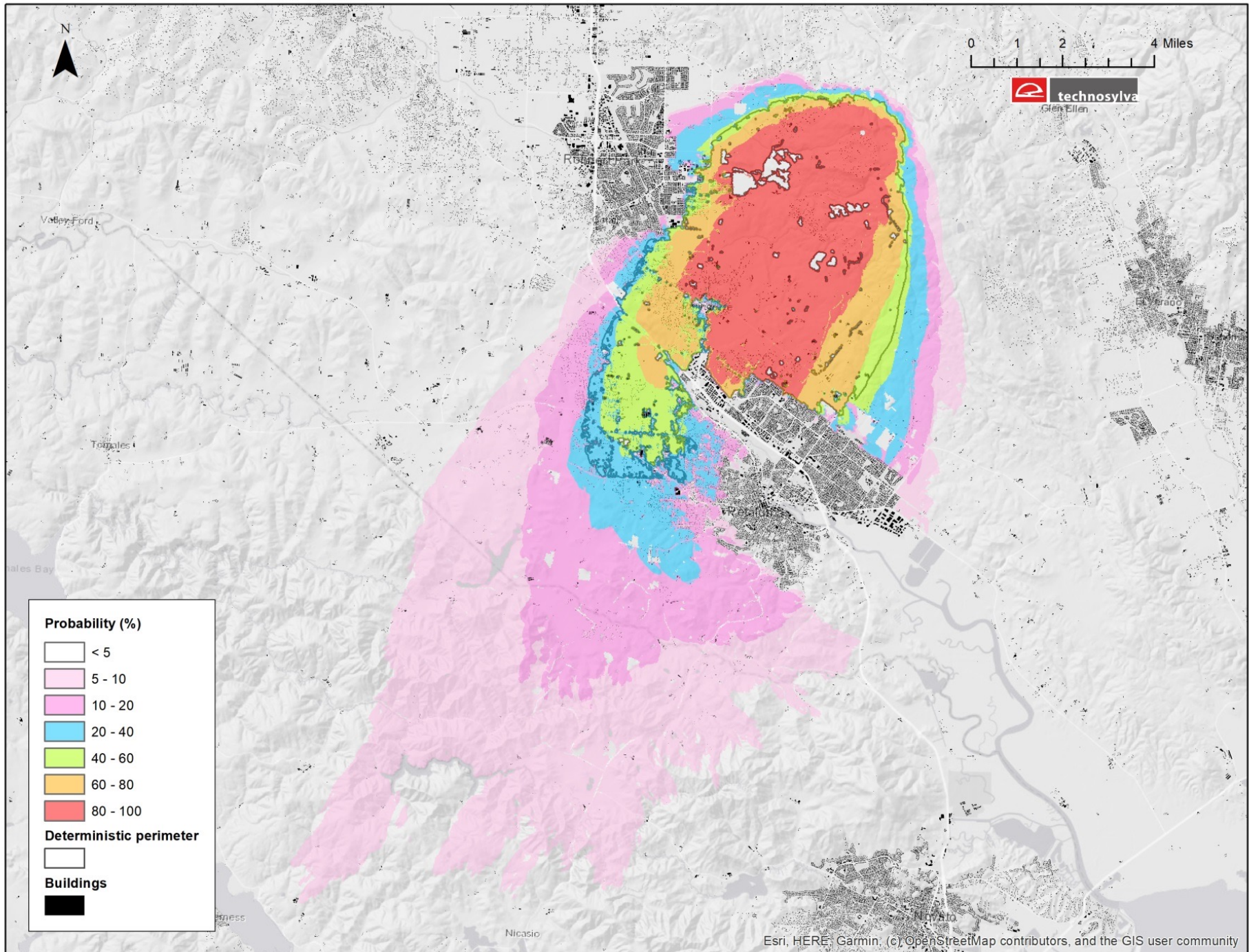
This incident is located north of San Francisco Bay where the fire could have directly impacted the dense Wildland Urban Interface of Petaluma, potentially causing losses in a high amount of buildings. It would be a wind driven fire (20 mi/h winds from NE on grass fuel types (GR2). The Rate of Spread would be high with moderate fire intensity. Historically, there were a several wildfires in the studied area such as the NUNS fire (55,797; 2017), or the P.G.& E.#5 fire in 1965.

INCIDENT SUMMARY	
Start Time	10/27/19 - 00:00
Duration (hr)	24
Size (ac)	22,736
Initial Attack Assessment	4 - Very High
No. of Buildings	5,344
Total Population	6,807
Average ROS	High










Hourly Perimeter
Buildings
Duration
24 h
1 h



Probability (%)

-  < 5
-  5 - 10
-  10 - 20
-  20 - 40
-  40 - 60
-  60 - 80
-  80 - 100

Deterministic perimeter



Buildings



PG&E PSPS EVENTS - SUMMARY OF ANALYSIS RESULTS

IOU	PSPS Event Dates	Total Damages Reported	Damages Expected to Ignite a Fire
PG&E	June 7 th , 2019	5	1
PG&E	Sep. 23, 2019	4	4
PG&E	Oct 5, 2019	2	1
PG&E	Oct 9, 2019	193	116
PG&E	Oct 23, 2019	26	21
PG&E	Oct 26, 2019	441	422
PG&E	Nov 20, 2019	9	9

Total Population Impacted	Total Buildings Impacted	Total Acres Burned
1,412	859	4,741
400	47	2,394
0	0	379
36,015	18,819	274,977
5,386	4,159	61,361
421,271	257,570	3,056,346
1,769	1,324	20,682



Results – SCE Events

2019 PSPS Event Analysis
Southern California Edison

CPUC 2019 PSPS EVENT RISK ANALYSIS

SCE PSPS EVENTS

IOU	PSPS Event Dates	Total Damages Reported	Damages Expected to Ignite a Fire
SCE	Jun 17, 2019	0	0
SCE	Jun 28, 2019	0	0
SCE	Jul 9, 2019	0	0
SCE	Jul 22, 2019	0	0
SCE	Aug 3, 2019	0	0
SCE	Aug 12, 2019	0	0
SCE	Sep 4, 2019	0	0
SCE	Sep 9, 2019	5	4
SCE	Sep 21, 2019	0	0
SCE	Oct 2, 2019	17	17
SCE	Oct 12, 2019	1	1
SCE	Oct 21, 2019	15	13
SCE	Oct 27, 2019	26	20
SCE	Nov 15, 2019	0	0
SCE	Nov 23, 2019	0	0

De-Energization Event	Start Time	Restoration Completed	Impacted customers
1	09-Sep-2010	19-Sep-2019	14,500
2	2-Oct-2019	12-Oct-2019	24,112
3	12-Oct-2019	21-Oct-2019	444
4	21-Oct-2019	26-Oct-2019	30,521
5	27-Oct-2019	4-Nov-2019	126,364



California Public Utilities Commission

2019 PSPS Event -Wildfire Analysis Report

Event Dates:

September 9-19, 2019
October 2-12, 2019
October 12-21, 2019
October 21-26, 2019
October 27-November 4, 2019

IOU: Southern California Edison (SCE)

Prepared by:

Technosylva Inc. (La Jolla, CA)



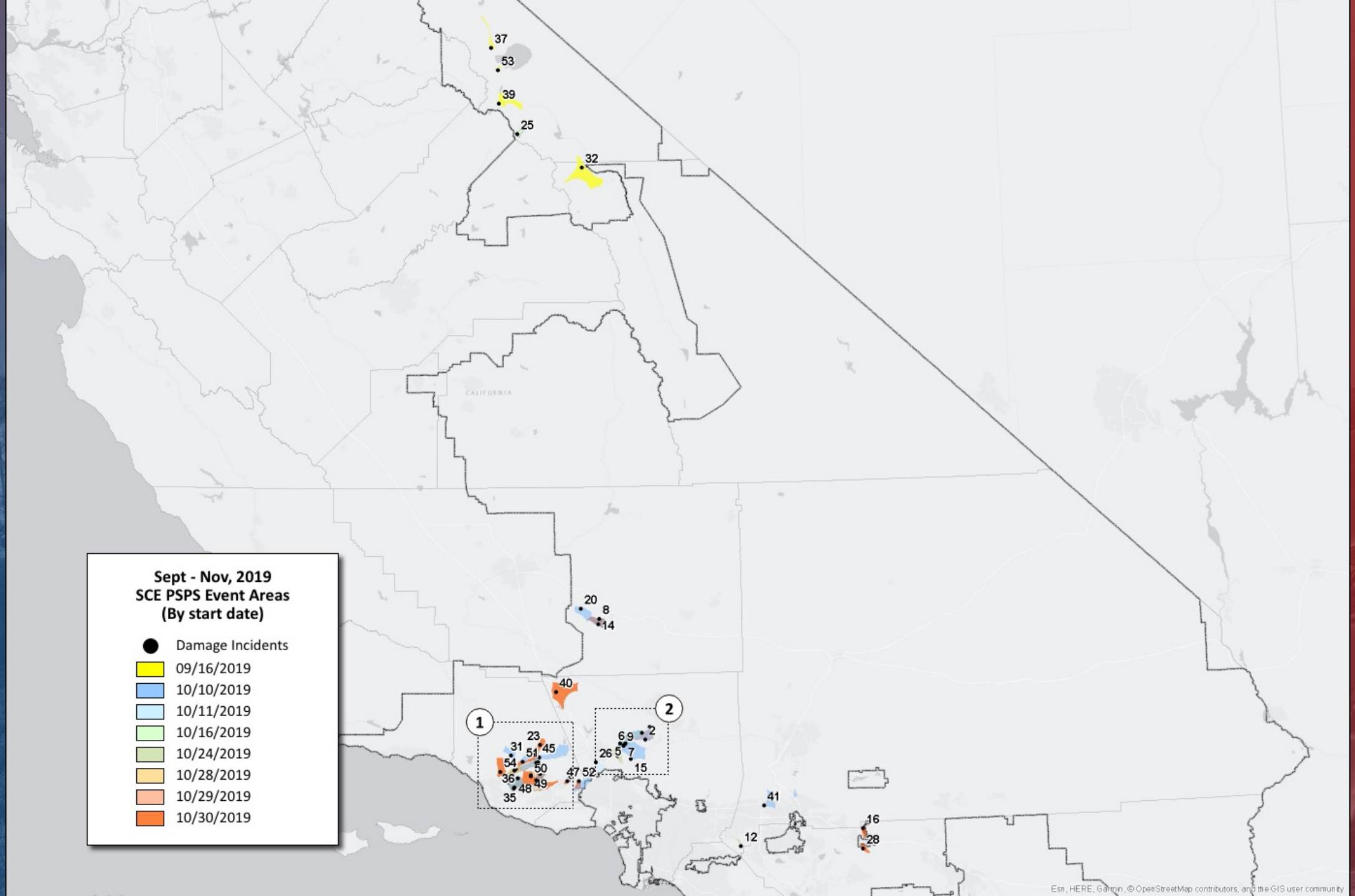
SCE - All PSPS Events

- 64 damaged assets reported by SCE
- 55 were identified as potential to cause an ignition
- 54 were located near burnable fuels and were used to conduct the analysis

SCE Event	PSPS Event De-energization Date	Total Damages Reported	Damages Expected to Ignite a Fire
1	Sep 16, 2019	5	4
2	Oct 10, 2019	17	17
3	Oct 16, 2019	1	1
4	Oct 24, 2019	15	12
5	Oct 28-30, 2019	26	20

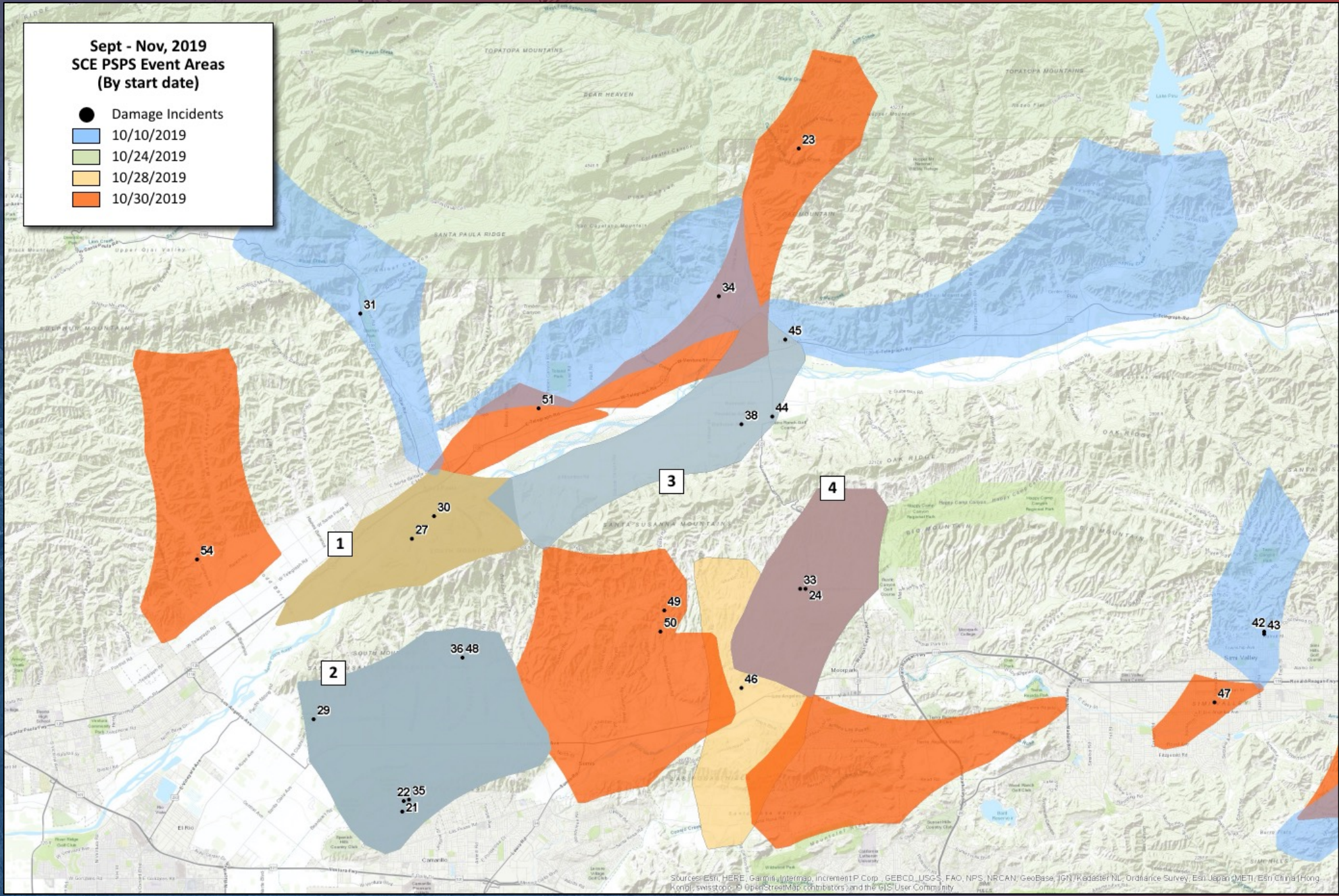
**Sept - Nov, 2019
SCE PSPS Event Areas
(By start date)**

- Damage Incidents
- 09/16/2019
- 10/10/2019
- 10/11/2019
- 10/16/2019
- 10/24/2019
- 10/28/2019
- 10/29/2019
- 10/30/2019



**Sept - Nov, 2019
SCE PSPS Event Areas
(By start date)**

- Damage Incidents
- 10/10/2019
- 10/24/2019
- 10/28/2019
- 10/30/2019

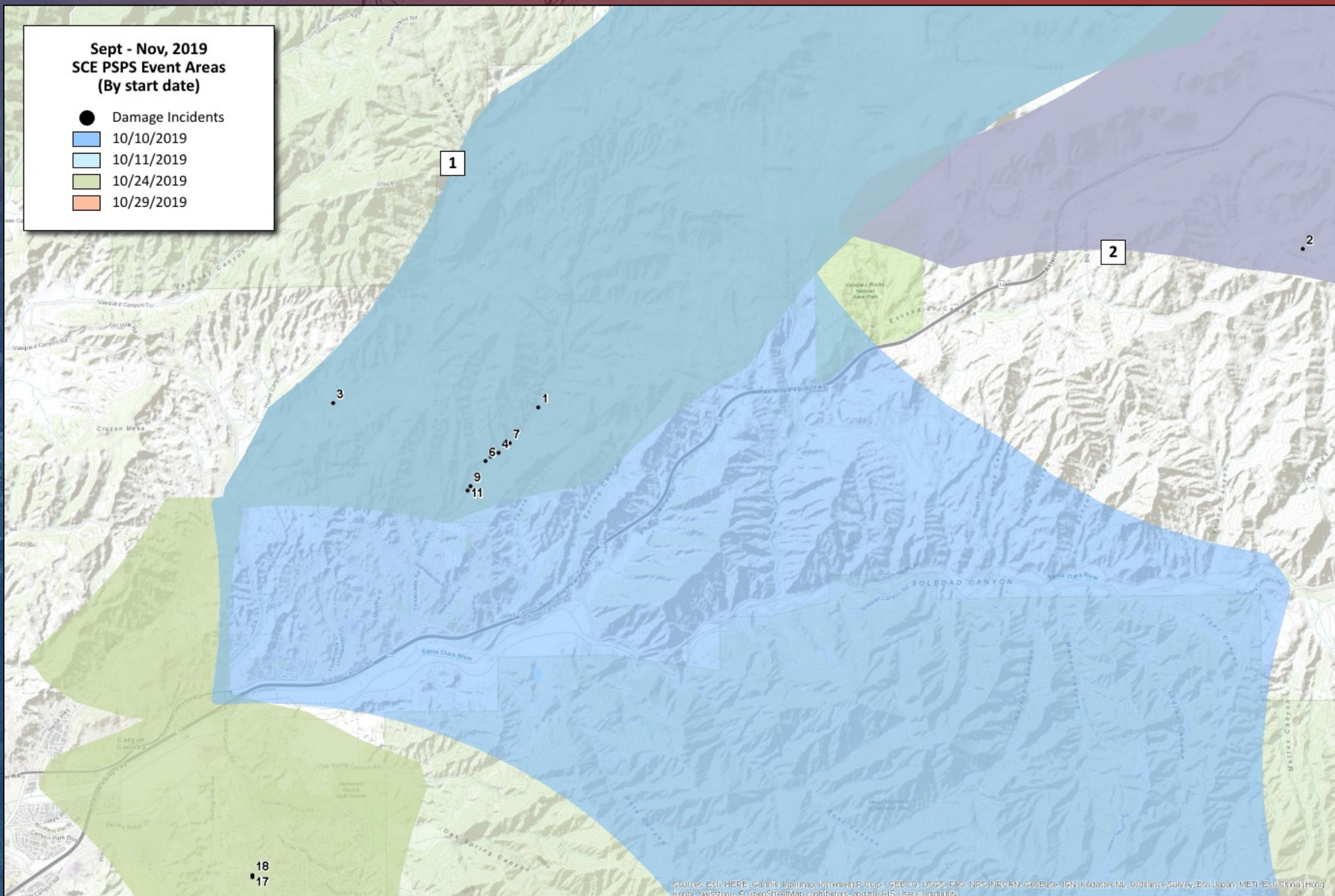


- Area 1 is an overlap of 10/24/19 and 10/30/19 events
- Area 2 is an overlap of 10/10/19, 10/24/19 and 10/30/19 events
- Area 3 is an overlap of 10/10/19 and 10/28/19
- Area 4 is an overlap of 10/10/19 and 10/30/19

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan (DETI), Esri China (Hong Kong), Swisstopo, OpenStreetMap contributors and the GIS User Community

Sept - Nov, 2019
SCE PSPS Event Areas
(By start date)

- Damage Incidents
- 10/10/2019
- 10/11/2019
- 10/24/2019
- 10/29/2019



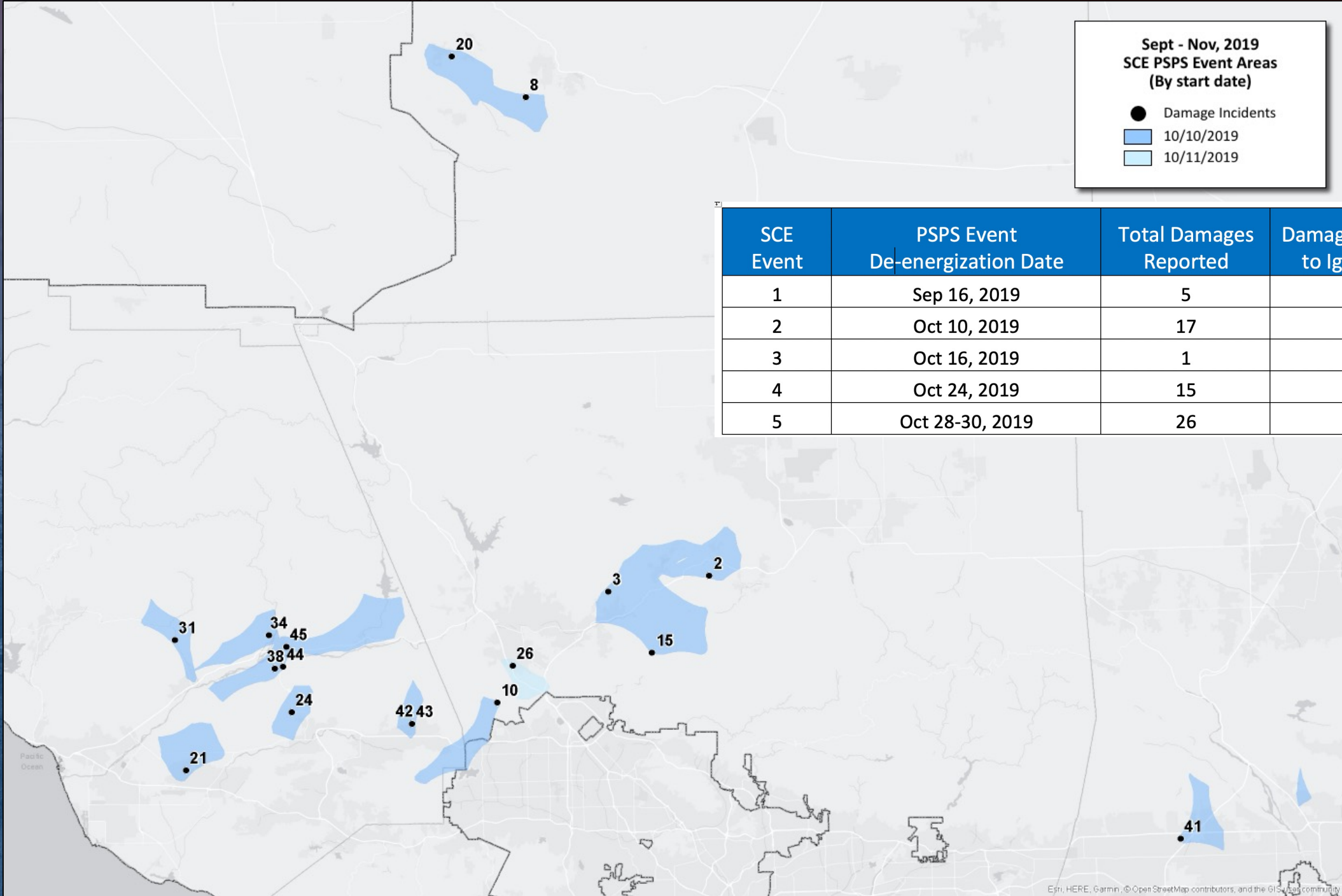
- Area 1 is an overlap of 10/10/19 and 10/24/19 events
- Area 2 is an overlap of 10/10/19 and 10/29/19 event

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, © OpenStreetMap contributors, and the GIS User Community

**Sept - Nov, 2019
SCE PSPS Event Areas
(By start date)**

- Damage Incidents
- 10/10/2019
- 10/11/2019

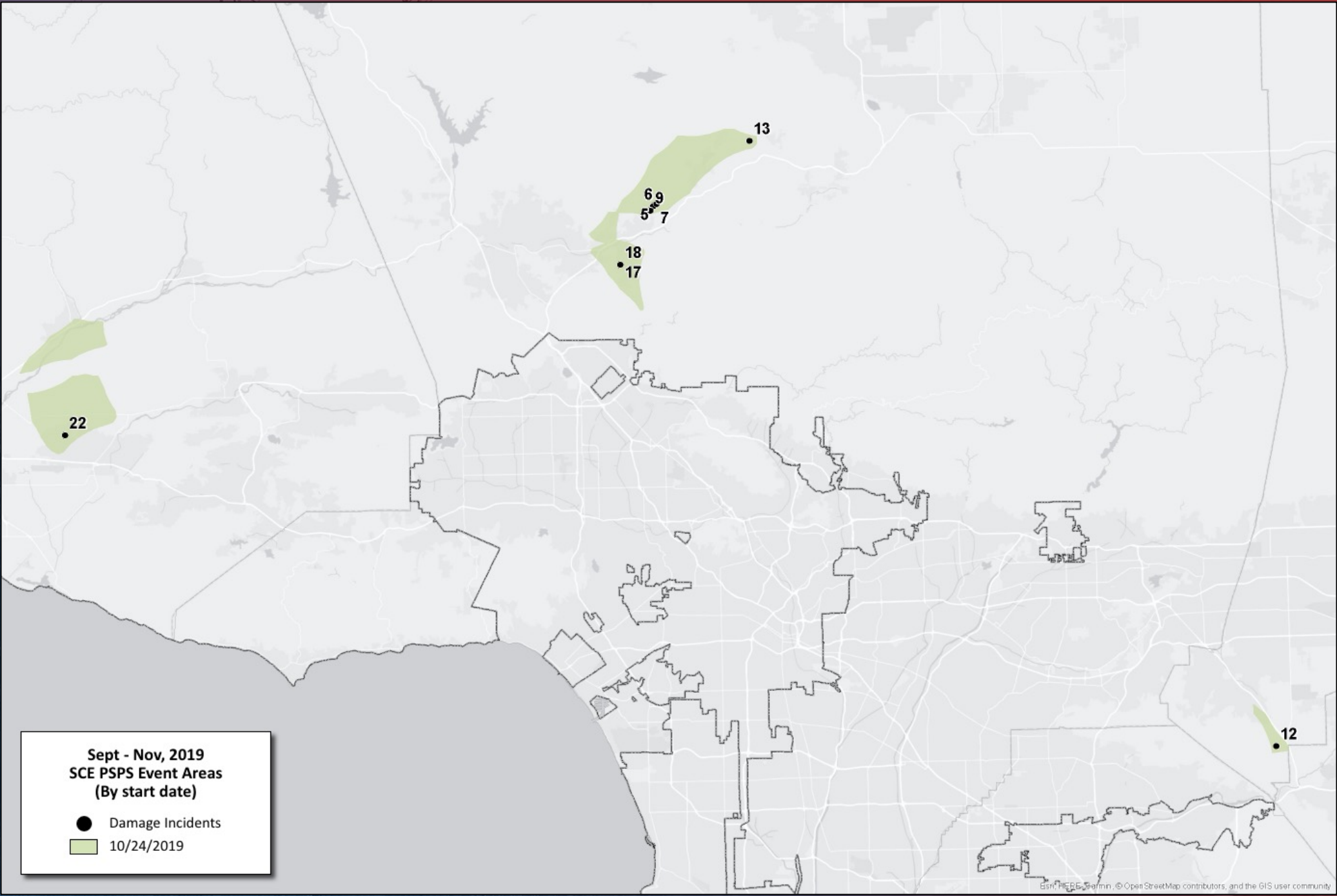
SCE Event	PSPS Event De-energization Date	Total Damages Reported	Damages Expected to Ignite a Fire
1	Sep 16, 2019	5	4
2	Oct 10, 2019	17	17
3	Oct 16, 2019	1	1
4	Oct 24, 2019	15	12
5	Oct 28-30, 2019	26	20



**Sept - Nov, 2019
SCE PSPS Event Areas
(By start date)**

- Damage Incidents
- 10/16/2019

25

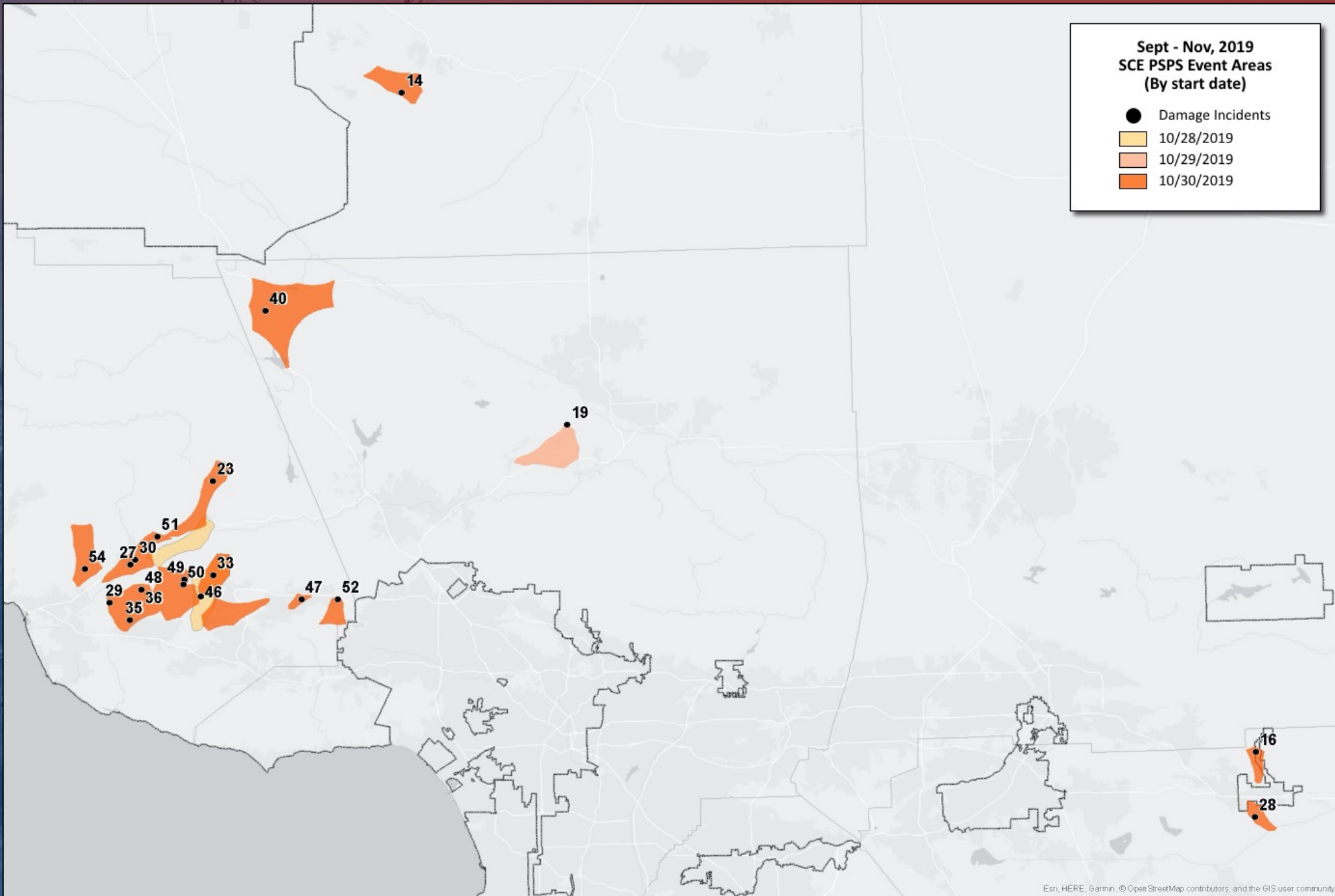


**Sept - Nov, 2019
SCE PPS Event Areas
(By start date)**

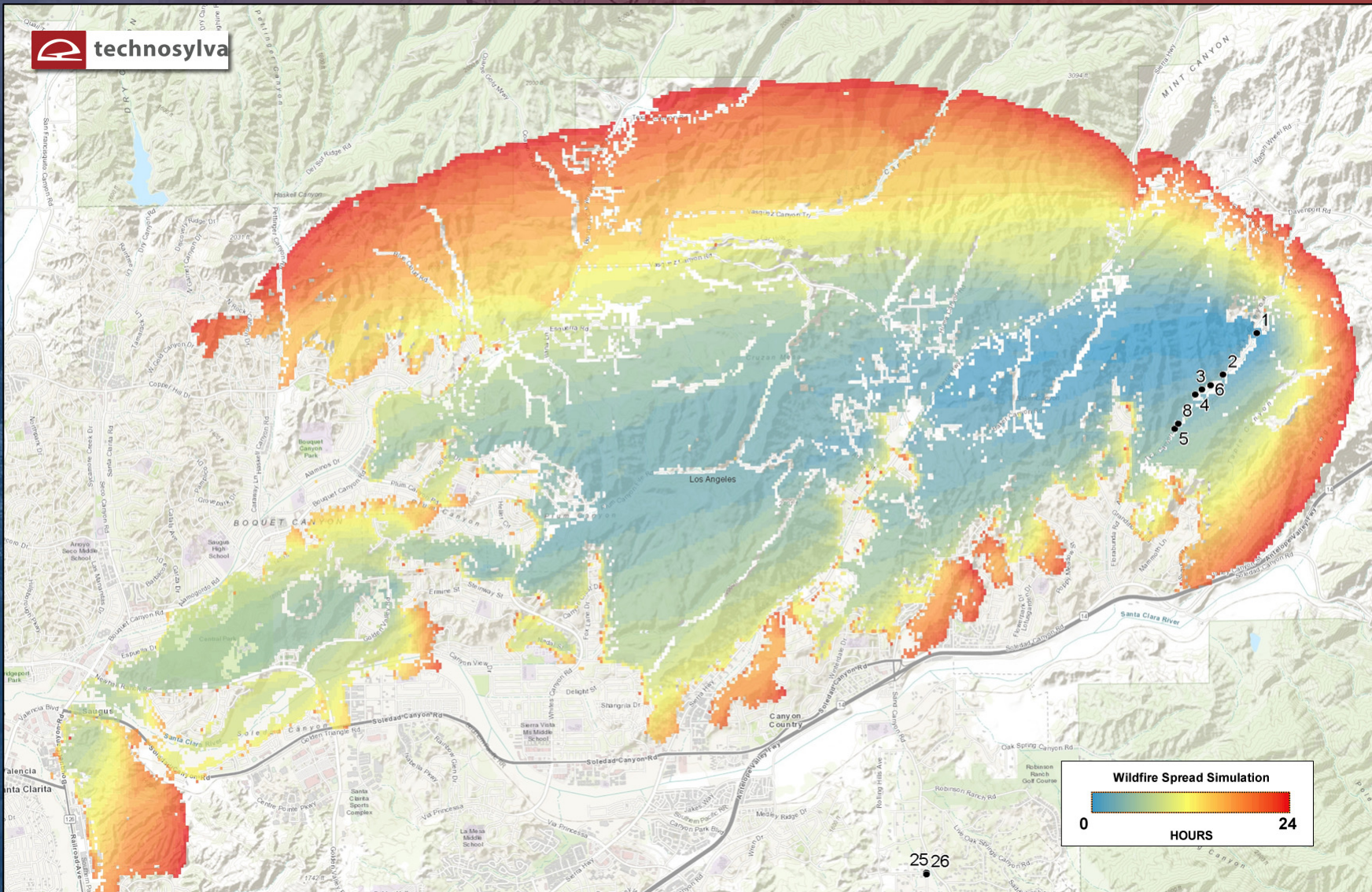
- Damage Incidents
- 10/24/2019

Sept - Nov, 2019
SCE PSPS Event Areas
(By start date)

- Damage Incidents
- 10/28/2019
- 10/29/2019
- 10/30/2019



SIMULATION NAME	IGNITION TIME	POP IMPACTED	BUILDINGS IMPACTED	FIRE SIZE POTENTIAL	RANK	IAA	INCLUDED
1155250E_SCE	10/24/2019 8:51	7,547	2,674	15,426	1		5 YES
695463E_SCE	10/10/19 8:43	7,467	3,716	42,151	2		5 YES
2227183E_SCE	10/10/19 11:00	6,566	2,220	14,032	3		5 YES
1155239E_SCE	10/24/2019 8:51	6,465	2,297	11,802	4		Cluster sim 1
1155238E_SCE	10/24/2019 8:51	6,294	2,245	11,451	5		Cluster sim 1
1155237E_SCE	10/24/2019 8:51	6,263	2,218	11,002	6		Cluster sim 1
1935201E_SCE	10/24/2019 8:51	5,804	2,096	12,338	7		Cluster sim 1
2125156E_SCE	10/10/19 11:45	5,515	1,600	22,845	8		3 YES
1248554E_SCE	10/24/2019 8:51	5,457	1,800	8,653	9		Cluster sim 1
1297632E_SCE	10/10/19 9:15	4,793	2,174	24,637	10		5 YES
1155231E_SCE	10/24/2019 8:51	4,574	1,577	8,144	11		Cluster sim 1
1199986E_SCE	10/24/2019 9:27	4,235	1,008	20,357	12		5 YES
4084149E_SCE	10/24/2019 8:51	4,135	3,147	36,899	13		5 YES
4416581E_SCE	10/30/2019 0:15	3,953	927	10,838	14		3 YES
1534727E_SCE	10/10/19 11:00	3,783	1,693	29,854	15		5 YES
1805911E_SCE	10/30/2019 8:51	2,967	2,163	19,378	16		4 YES
1383120E_SCE	10/24/2019 10:35	1,458	608	7,300	17		3 YES
2180760E_SCE	10/24/2019 10:35	1,450	604	7,111	18		Cluster sim 17
1186924E_SCE	10/29/2019 2:52	626	504	11,681	19		
2259214E_SCE	10/10/19 11:44	601	863	31,113	20		
877739E_SCE	10/10/19 13:47	268	182	171	21		
1147430E_SCE	10/24/2019 7:17	256	184	169	22		
1832320E_SCE	10/30/2019 23:02	246	185	7,270	23		
4315264E_SCE	10/10/19 9:10	235	153	946	24		
1864622E_SCE	10/16/2019 22:01	204	76	826	25		
1226594E_SCE	10/10/19 0:11	202	84	127	26		
121137E_SCE	10/30/2019 3:05	186	133	4,544	27		
2033687E_SCE	10/30/2019 2:09	147	355	23,439	28		
1500765E_SCE	10/30/2019 3:08	123	25	58	29		
4701073E_SCE	10/30/2019 3:05	115	152	4,652	30		
2143776E_SCE	10/10/19 22:23	108	177	12,804	31		



October 24th, 2019
Incident Clusters
In situations where a cluster of damage incidents exist, with the same ignition time, a single worst case incident simulation was selected

SCE Event	PSPS Event Dates	Total Damages Reported	Damages Expected to Ignite a Fire	Total Population Impacted	Total Buildings Impacted	Total Acres Burned
1	Sep 16, 2019	5	4	102	139	12,541
2	Oct 10, 2019	17	17	29,578	12,908	178,721
3	Oct 16, 2019	1	1	204	76	826
4	Oct 24, 2019	15	13	17,631	7,621	80,151
5	Oct 28-30, 2019	26	20	8,467	4,690	93,547
Total				55,982	25,434	365,786
Maximum				7,547	3,716	42,151
Average				1,191	541	7,783
Standard Deviation				2,185	938	11,259

- October 10th, 2019
5 of 17 incidents
- October 24th, 2019
4 of 12 incidents
- October 30th, 2019
2 of 20 incidents

October 10, 2019 - Significant Incidents

Damage Incident Rank	County	Population Impacted	Buildings Impacted	Acres Burned	IAA
2	Los Angeles	7,467	3,716	42,151	5
3	Los Angeles	6,566	2,220	14,032	5
8	Kern	5,515	1,600	22,845	5
10	Los Angeles	4,793	2,174	24,637	5
15	Los Angeles	3,783	1,693	29,854	3

● Low (1)
 ● Moderate (2)
 ● High (3)
 ● Very High (4)
 ● Extreme (5)

October 24, 2019 - Significant Incidents

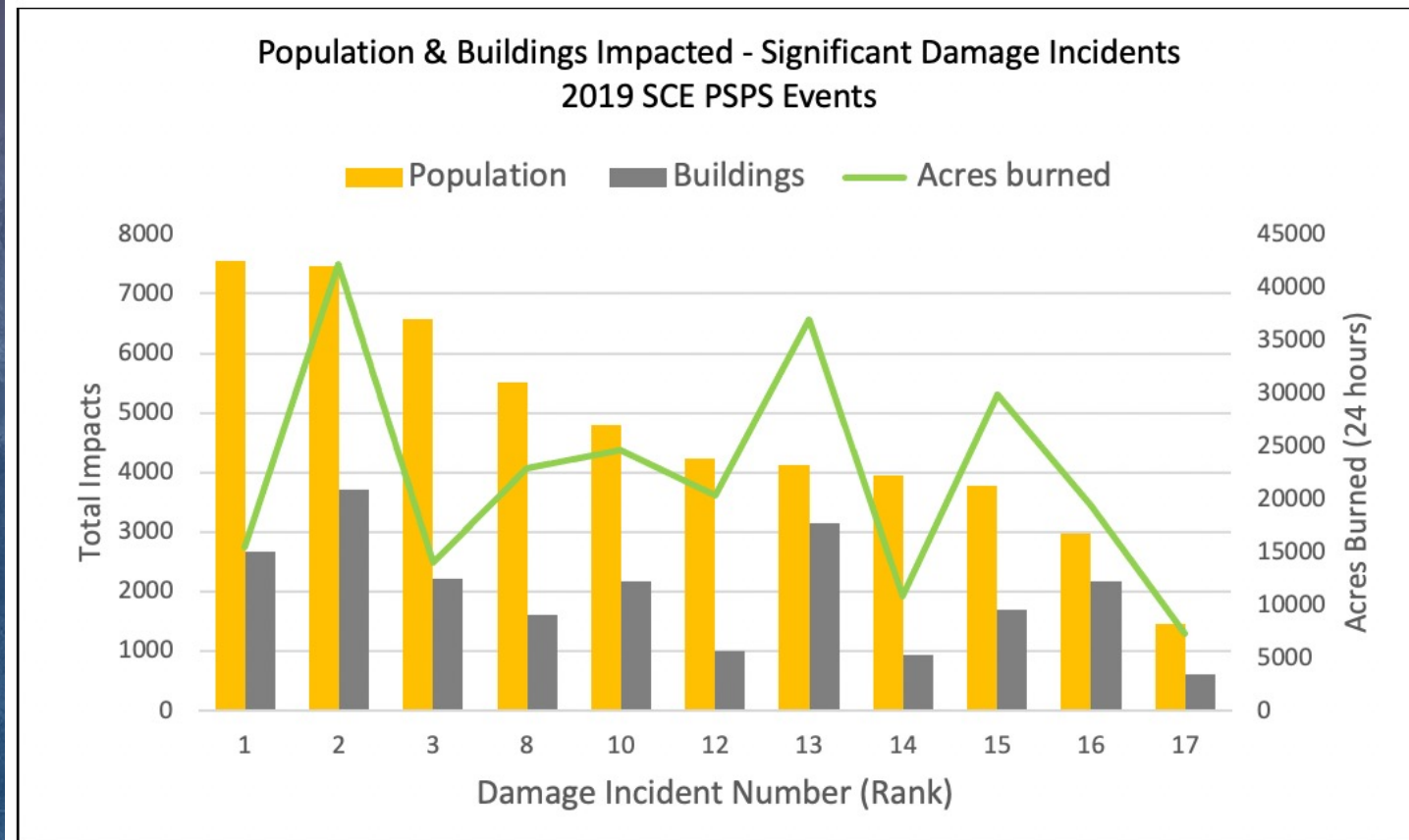
Damage Incident Rank	County	Population Impacted	Buildings Impacted	Acres Burned	IAA
1	Los Angeles	7,547	2,674	15,426	5
12	San Bernardino	4,235	1,008	20,357	5
13	Los Angeles	4,135	3,147	36,899	5
17	Los Angeles	1,458	608	7,300	3

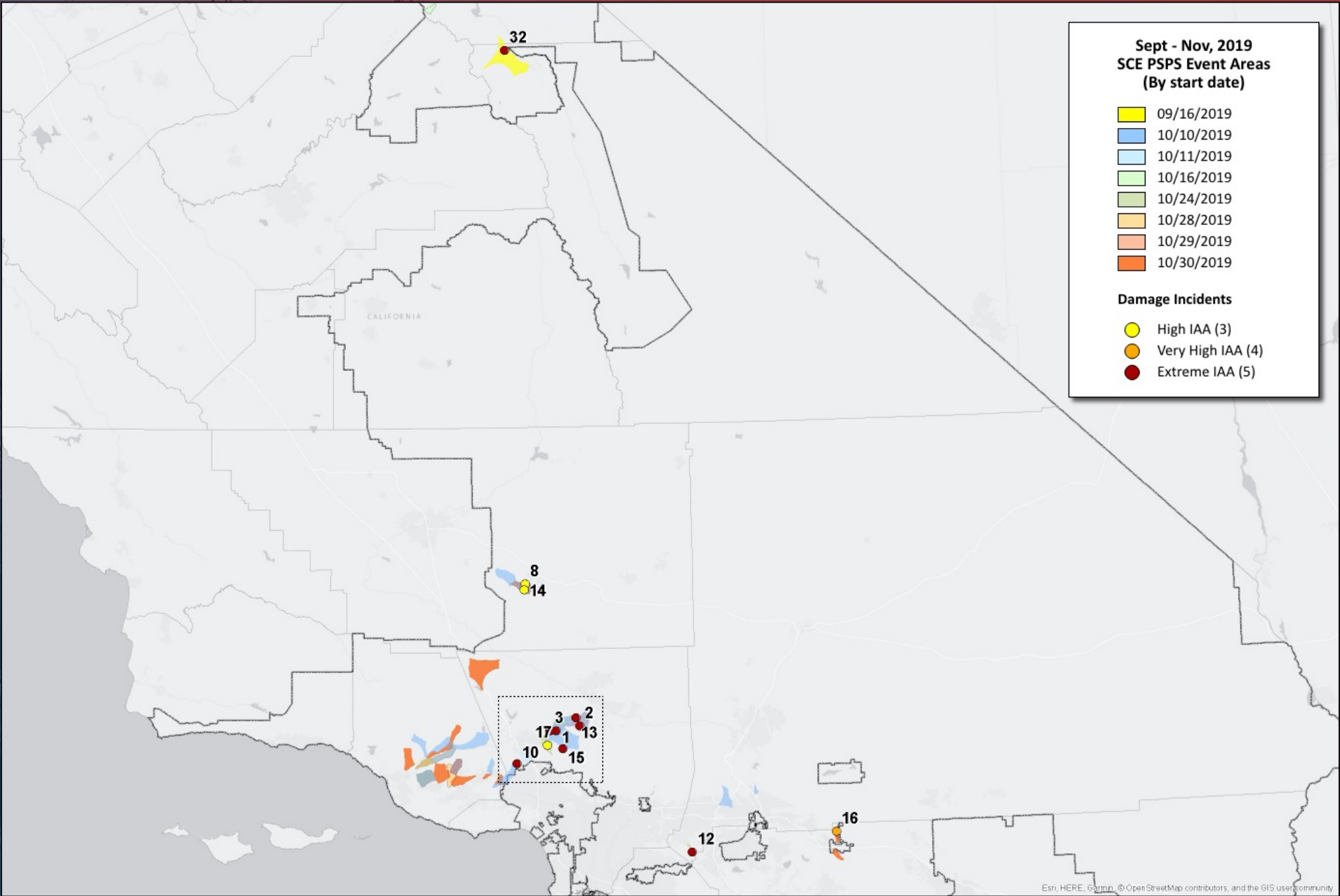
● Low (1)
 ● Moderate (2)
 ● High (3)
 ● Very High (4)
 ● Extreme (5)

October 28-30, 2019 - Significant Incidents

Damage Incident Rank	County	Population Impacted	Buildings Impacted	Acres Burned	IAA
14	Kern	3,953	927	10,838	3
16	Riverside	2,967	2,163	19,378	4

● Low (1)
 ● Moderate (2)
 ● High (3)
 ● Very High (4)
 ● Extreme (5)

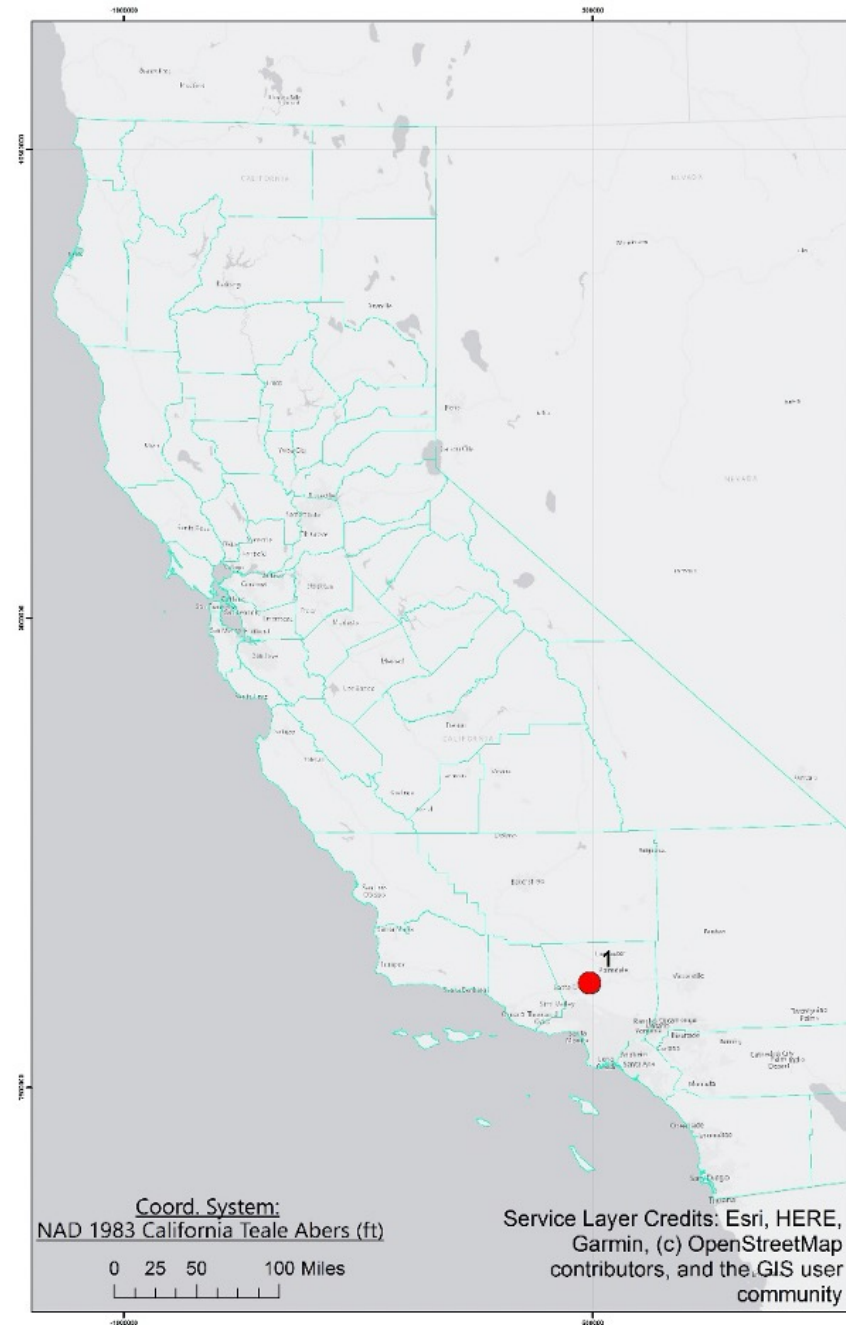


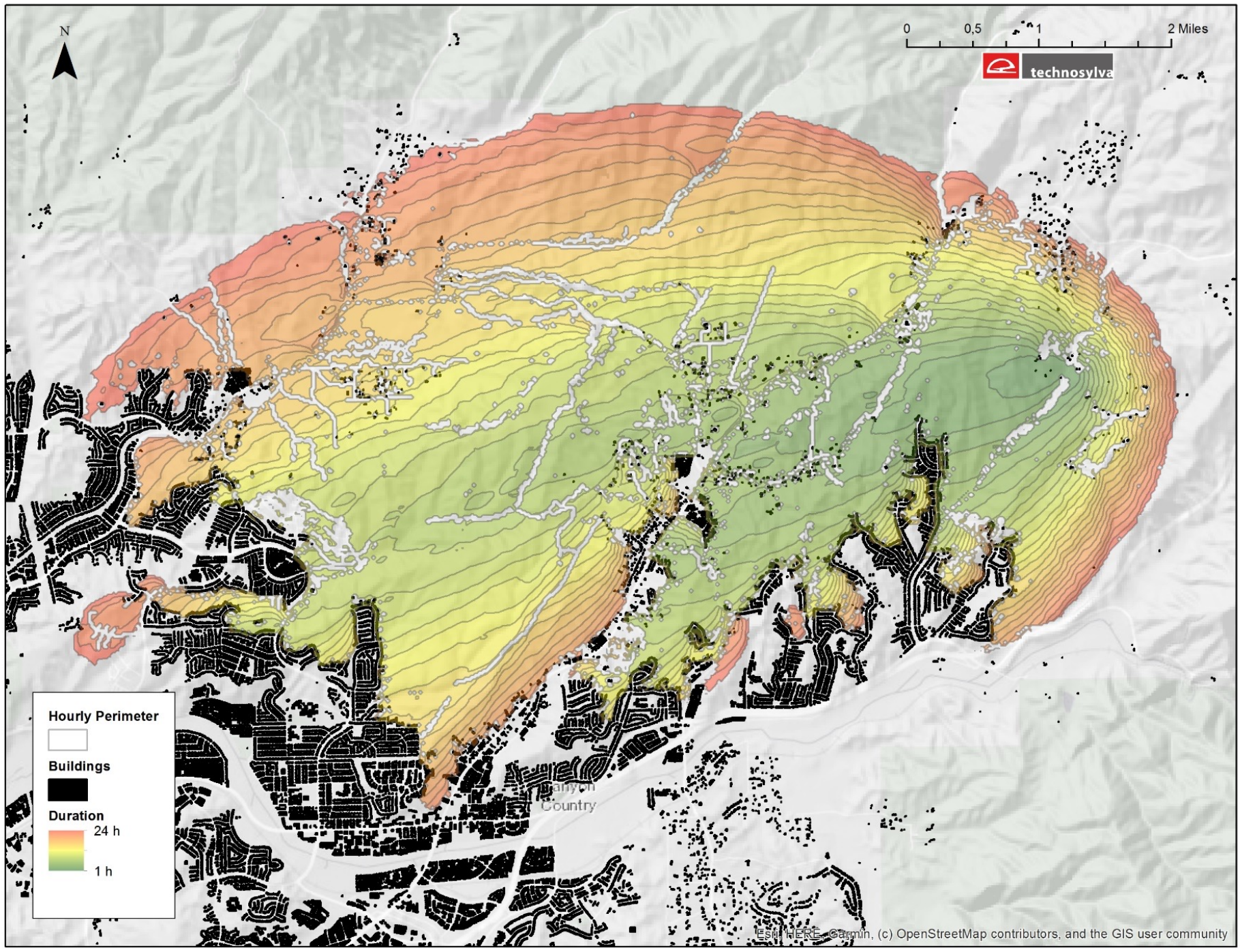


DAMAGE INCIDENT – 1

This incident is located near Mint Canyon and County Country Wildland Urban Interfaces. The fire could have started near urban areas creating the highest impact in terms of population considering all damage incidents in 2019 PSPS events for SCE (see incident summary table). Additionally, there were 6 more damage incidents near this one with similar expected fire impact. Therefore, the probability of having a significant fire in this location was high. Fire would spread very rapidly presenting high resistance to control with an IAA of 5 (Extreme) with an average wind speed of 20mi/h.

INCIDENT SUMMARY	
Start Time	10/24/2019 8:51
Duration (hr)	24
Size (ac)	15,425
Initial Attack Assessment	5 - Extreme
No. of Buildings	2,674
Total Population	7,547
Average ROS	Very high

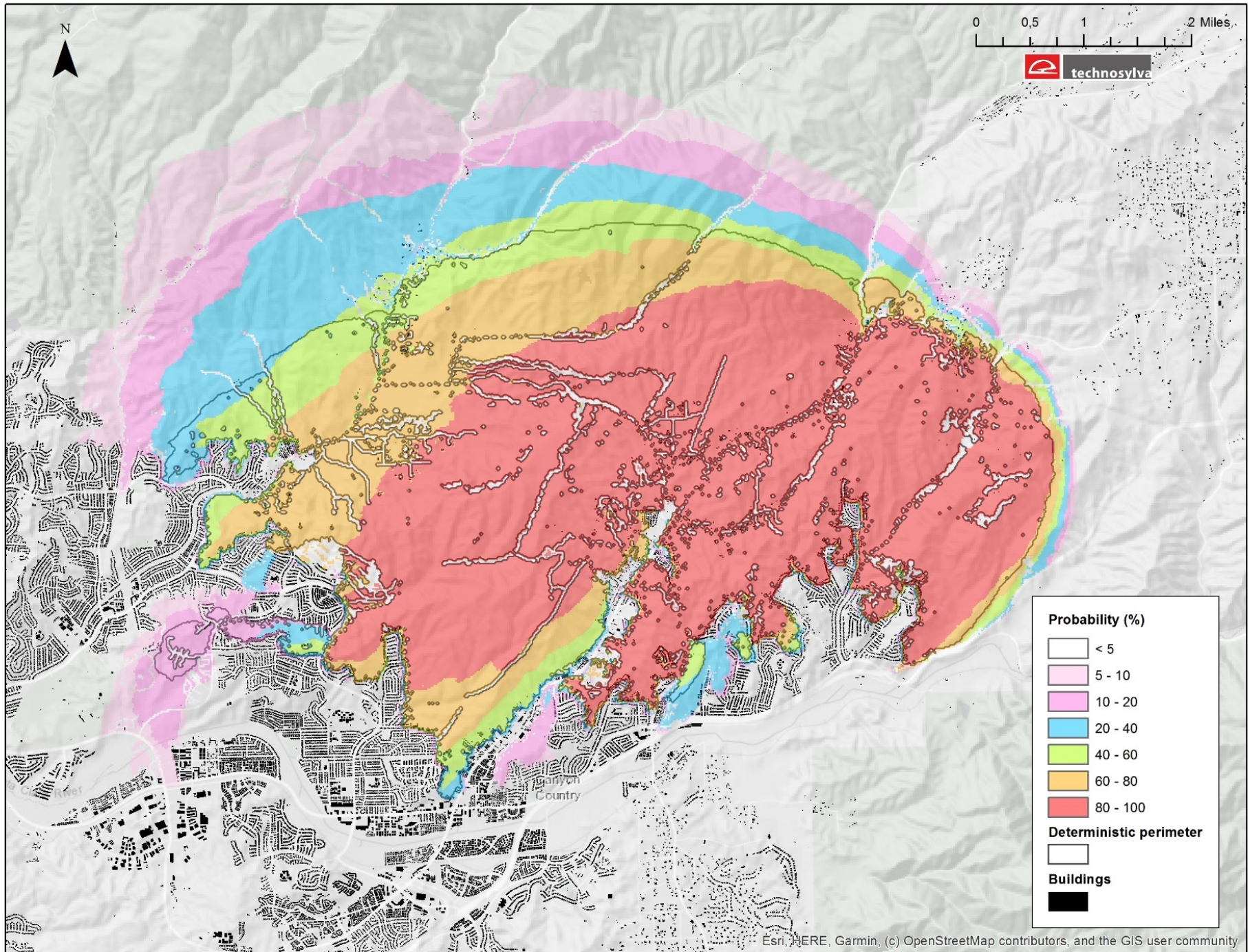




Hourly Perimeter
□

Buildings
■

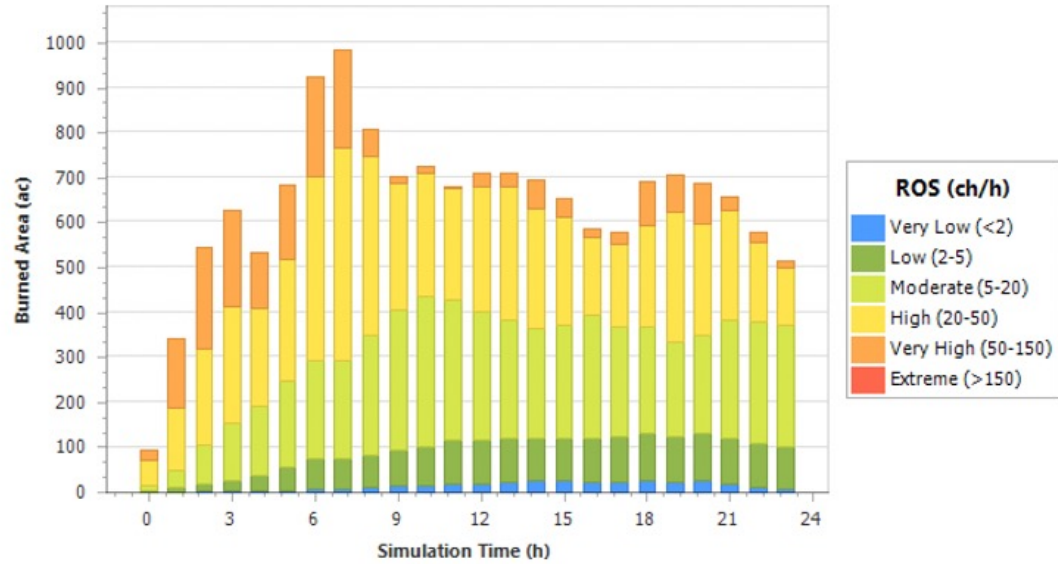
Duration
24 h
1 h



DAMAGE INCIDENT NO. 1

FIRE BEHAVIOR

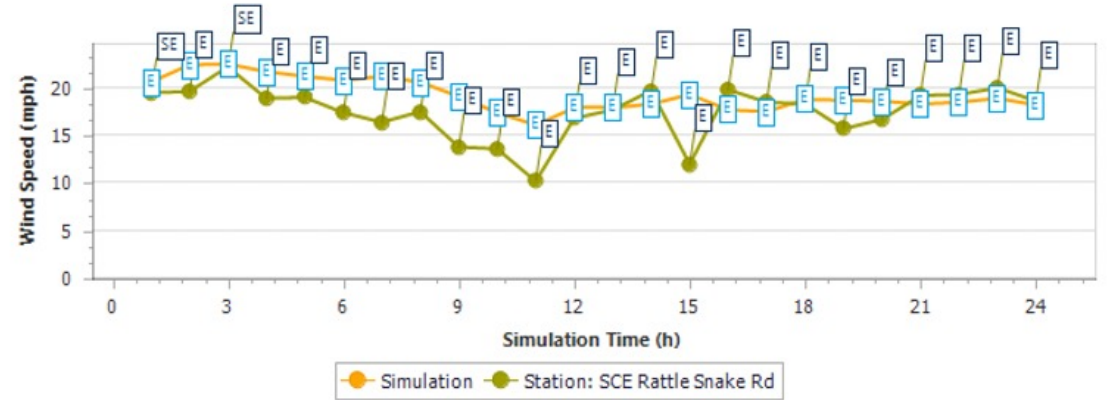
Rate of Spread



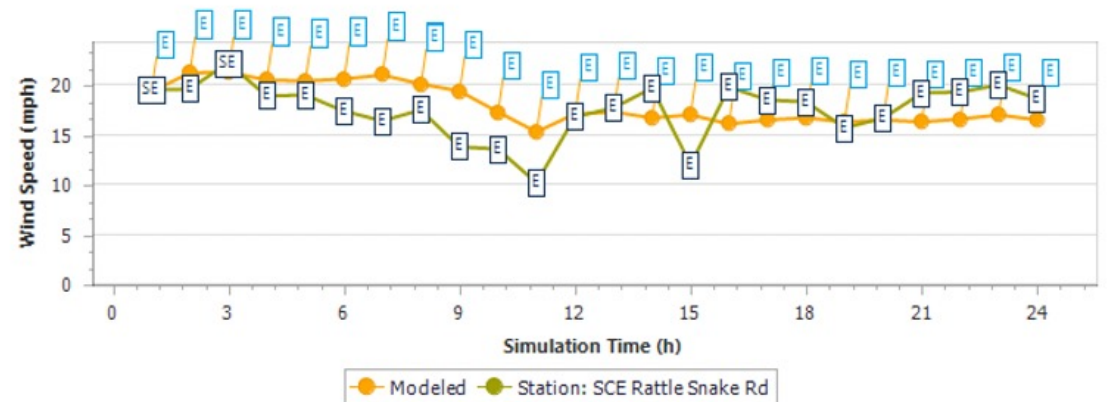
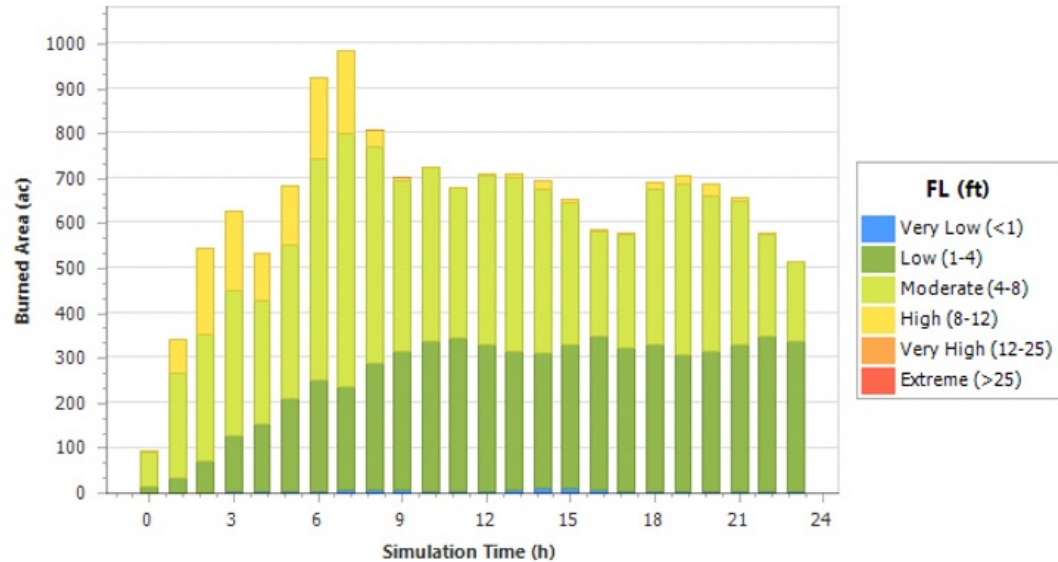
WEATHER

Nearest Station: SCE Rattle Snake Rd

Station ID - SE130
 Weather station (Wx) elevation - 2439 ft
 Fire ignition point (IP) elevation - 1933 ft
 Distance between Wx and IP - 0.68 mi



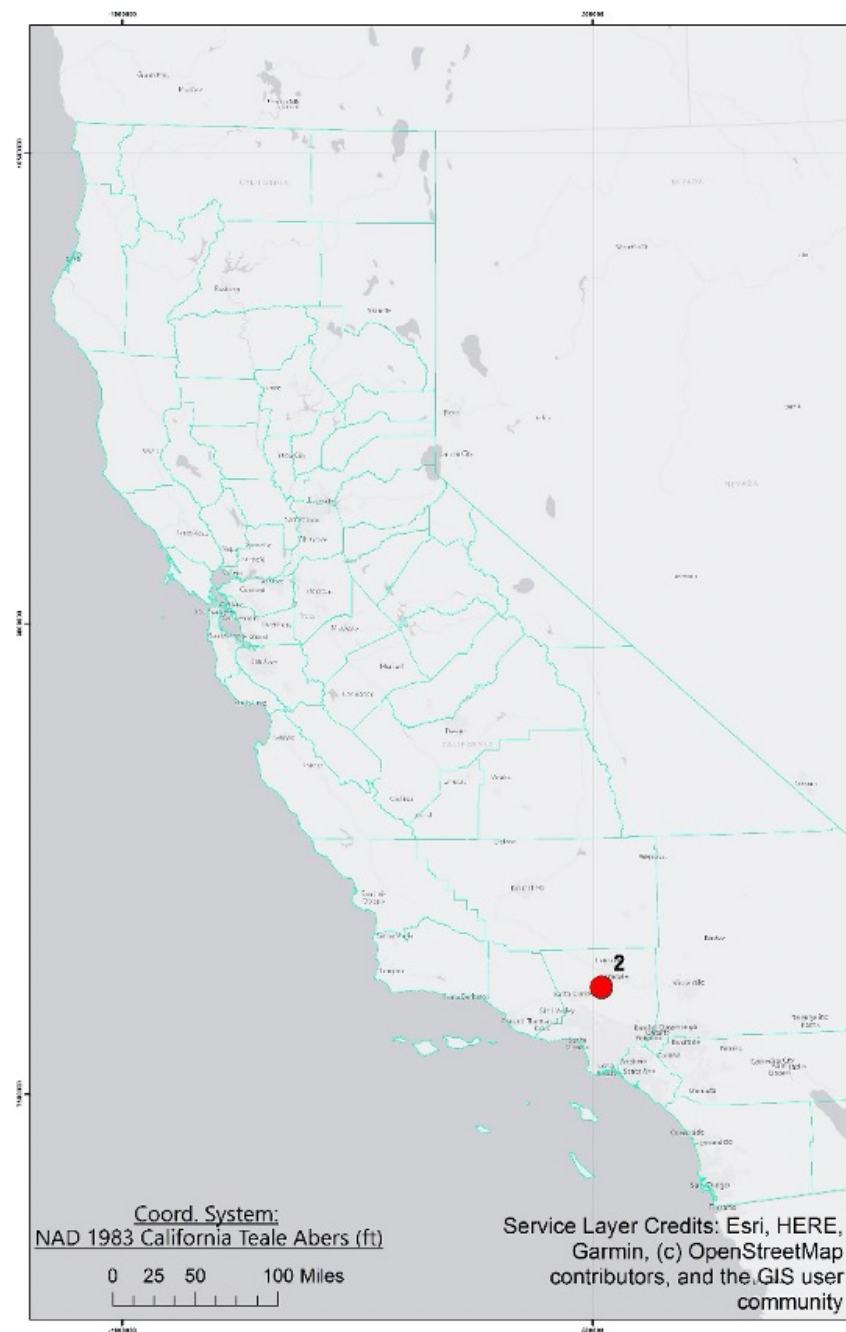
Flame Length

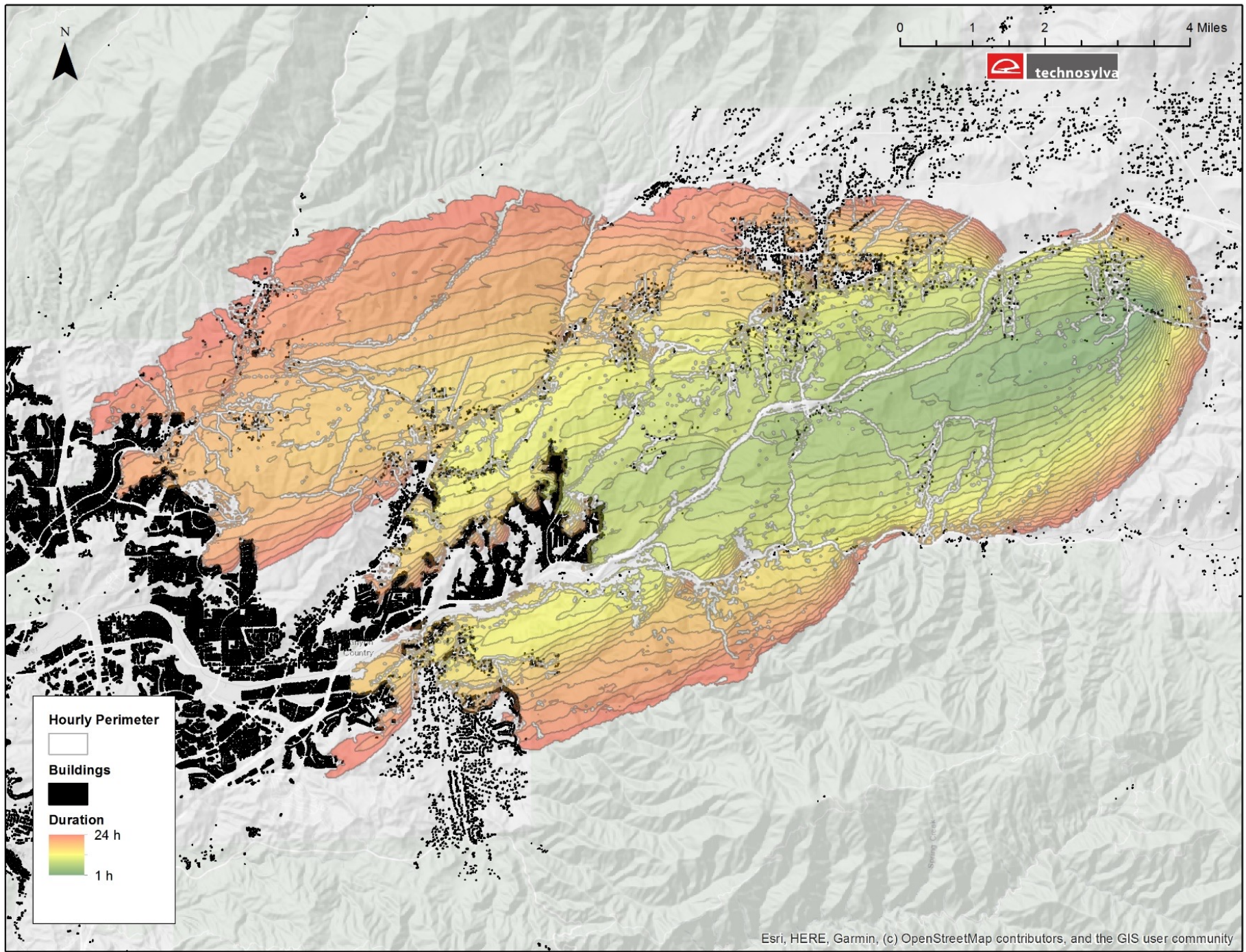


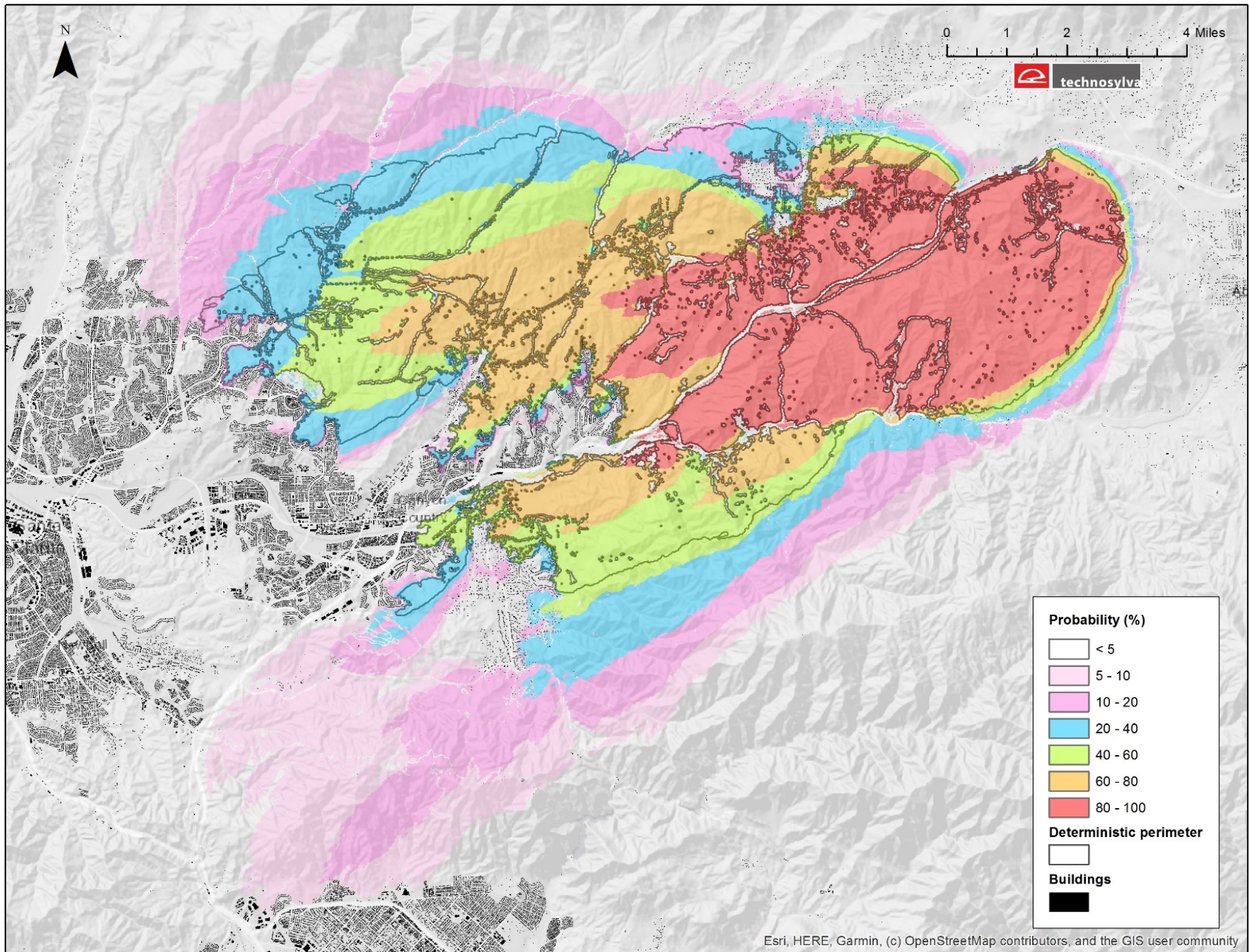
DAMAGE INCIDENT – 2

This incident is located near Mint Canyon and County Country Wildland Urban Interfaces. The fire could have started near urban areas creating the high impact in terms of population and building loss (see incident summary table). Fire would spread very rapidly presenting high resistance to control with an IAA of 5 (Extreme) with an average wind speed of 20mi/h. The fire intensity would be high in the head of the fire, potentially threatening lots of buildings. Modeled wind speed would be a slightly higher than measured at weather station.

INCIDENT SUMMARY	
Start Time	10/10/2019 8:43
Duration (hr)	24
Size (ac)	42,150
Initial Attack Assessment	5 - Extreme
No. of Buildings	3,716
Total Population	7,467
Average ROS	Very high







Probability (%)

- < 5
- 5 - 10
- 10 - 20
- 20 - 40
- 40 - 60
- 60 - 80
- 80 - 100

Deterministic perimeter



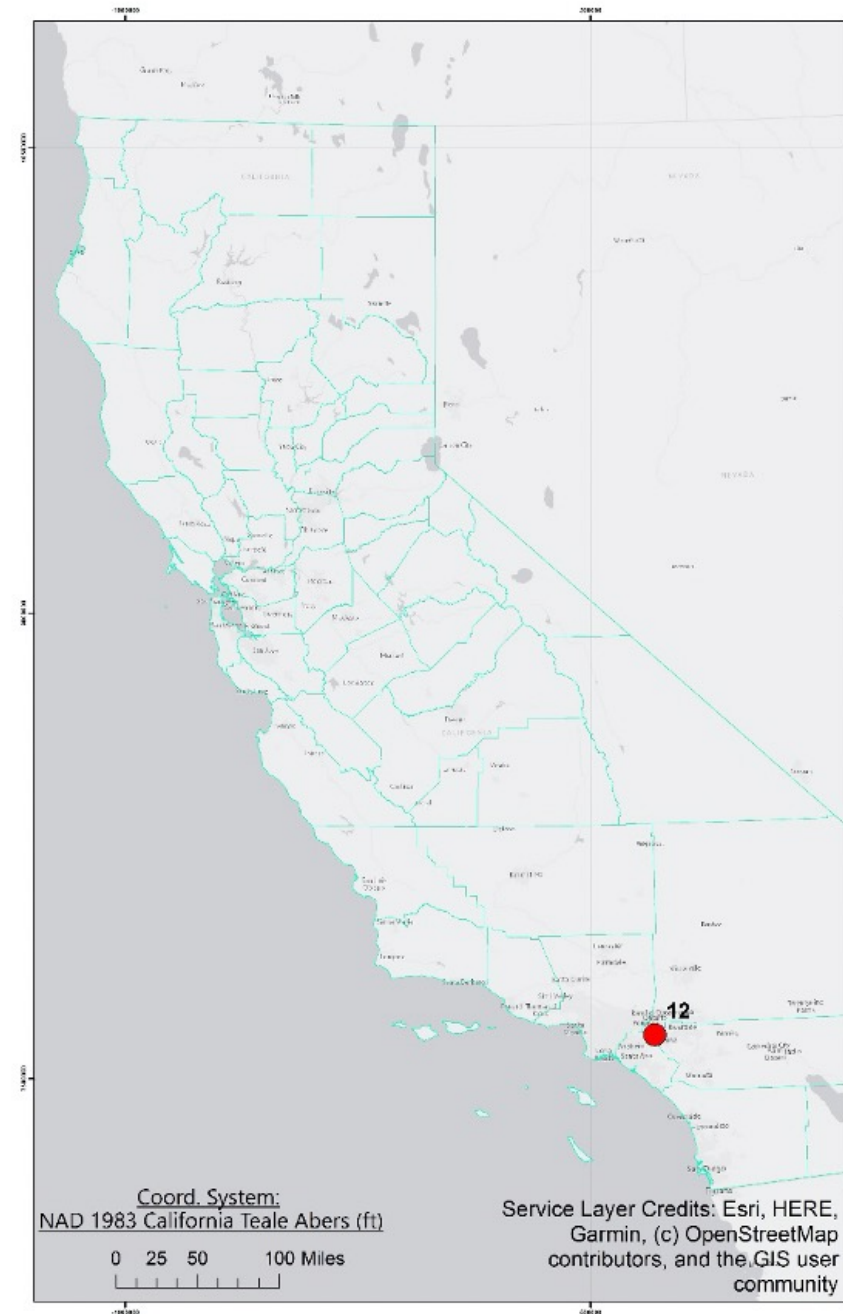
Buildings

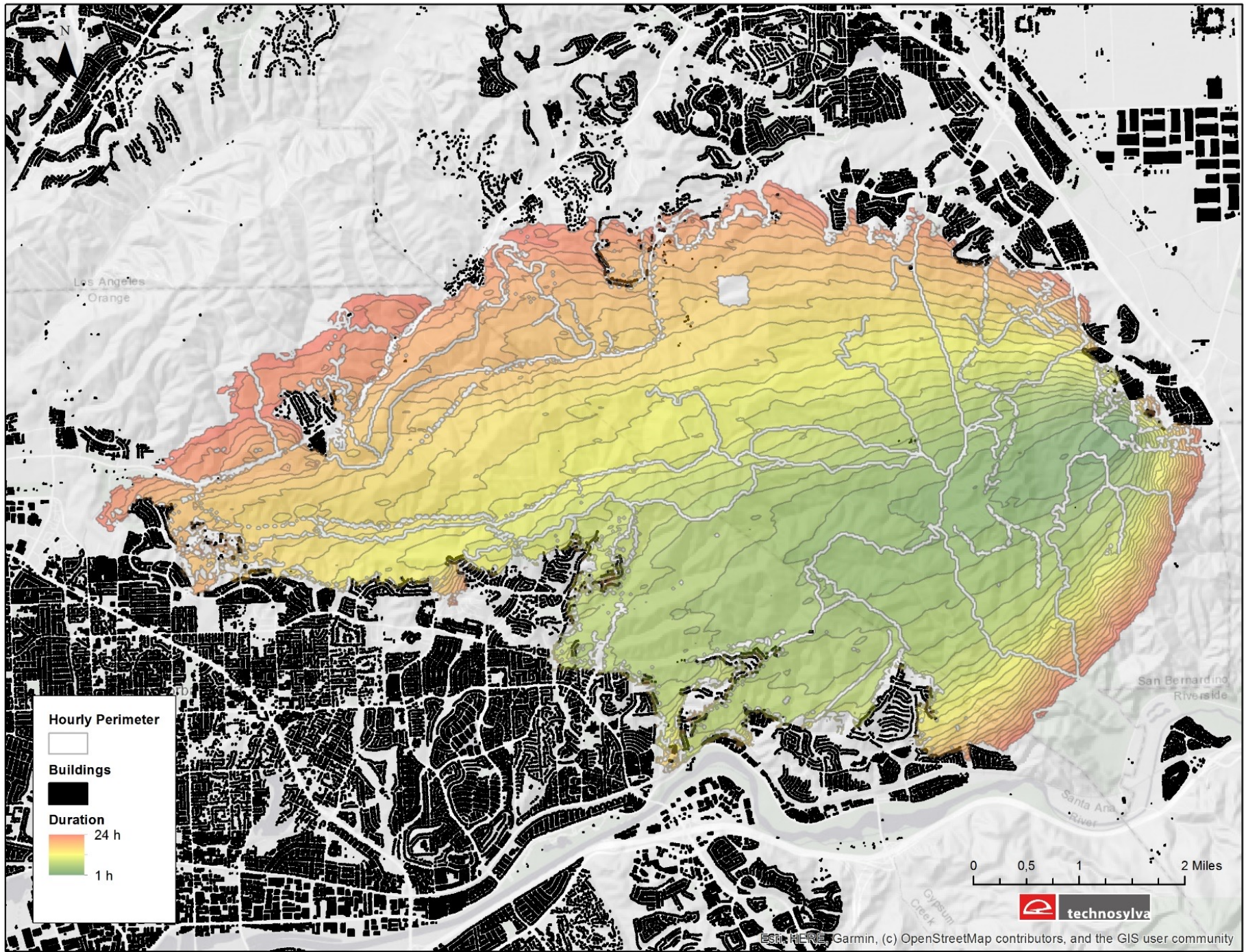


DAMAGE INCIDENT – 12

This damage incident is located in an area with lots of buildings and population. The fire could have impacted lots of scattered buildings and dense urban areas burning grass-shrub areas throughout the fire progression. The rate of spread would very high with moderate intensity driven by east winds (5-15 mi/h). Modeled wind speed was slightly higher than recorded at weather stations. The fire containment would be very difficult and could rapidly spread on the landscape, impacting lots of assets.

INCIDENT SUMMARY	
Start Time	10/24/2019 9:27
Duration (hrs.)	24
Size (ac)	20,357
Initial Attack Assessment	5 - Extreme
No. of Buildings	1,008
Total Population	4,235
Average ROS	Very high

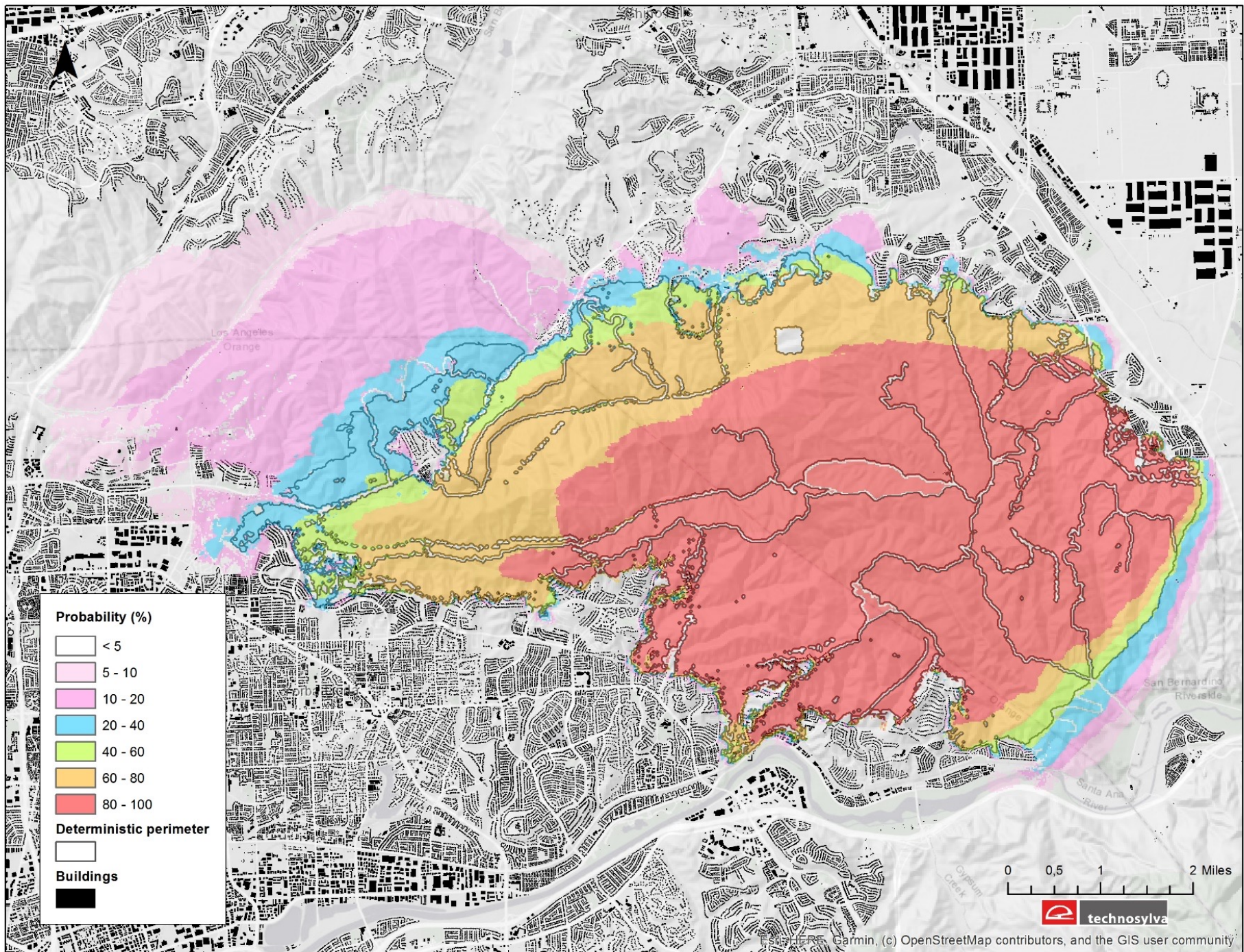




Hourly Perimeter
—
Buildings
■
Duration
24 h
1 h

0 0,5 1 2 Miles





SCE PSPS EVENTS - SUMMARY OF ANALYSIS RESULTS

IOU	PSPS Event Dates	Total Damages Reported	Damages Expected to Ignite a Fire	Total Population Impacted	Total Buildings Impacted	Total Acres Burned
SCE	Jun 17, 2019	0	0	0	0	0
SCE	Jun 28, 2019	0	0	0	0	0
SCE	Jul 9, 2019	0	0	0	0	0
SCE	Jul 22, 2019	0	0	0	0	0
SCE	Aug 3, 2019	0	0	0	0	0
SCE	Aug 12, 2019	0	0	0	0	0
SCE	Sep 4, 2019	0	0	0	0	0
SCE	Sep 9, 2019	5	4	102	139	12,541
SCE	Sep 21, 2019	0	0	0	0	0
SCE	Oct 2, 2019	17	17	29,578	12,908	178,721
SCE	Oct 12, 2019	1	1	204	76	826
SCE	Oct 21, 2019	15	13	17,631	7,621	80,151
SCE	Oct 27, 2019	26	20	8,467	4,690	93,547
SCE	Nov 15, 2019	0	0	0	0	0
SCE	Nov 23, 2019	0	0	0	0	0



Results – SD&E Events

2019 PSPS Event Analysis
San Diego Gas & Electric

SDG&E PSPS EVENTS

IOU	PSPS Event Dates	Total Damages Reported	Damages Expected to Ignite a Fire
SDG&E	Oct 10, 2019	0	0
SDG&E	Oct 24, 2019	6	6
SDG&E	Oct 28, 2019	9	9



California Public Utilities Commission

2019 PSPS Event -Wildfire Analysis Report

Event Date: October 20-November 1, 2019

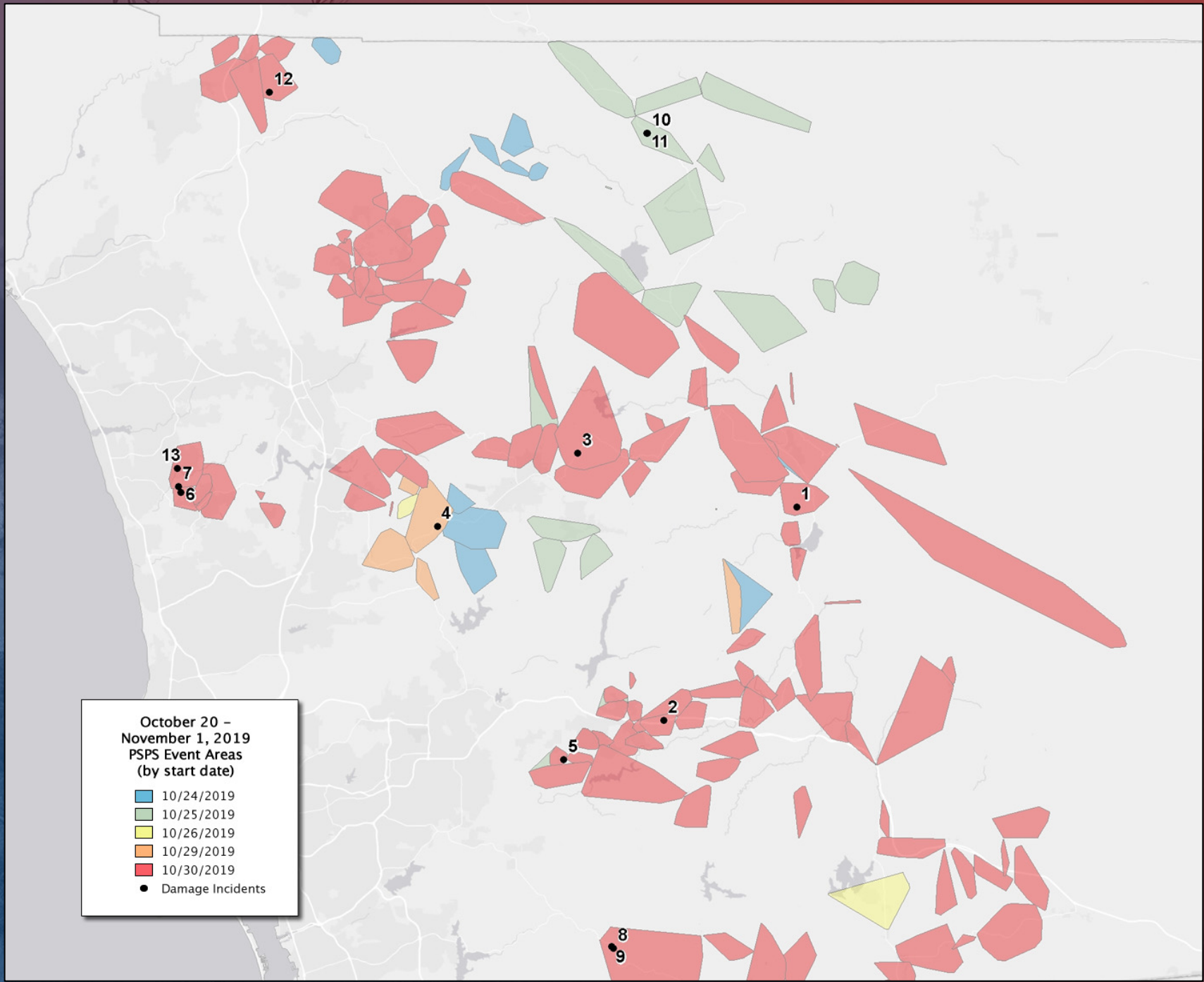
IOU: San Diego Gas & Electric

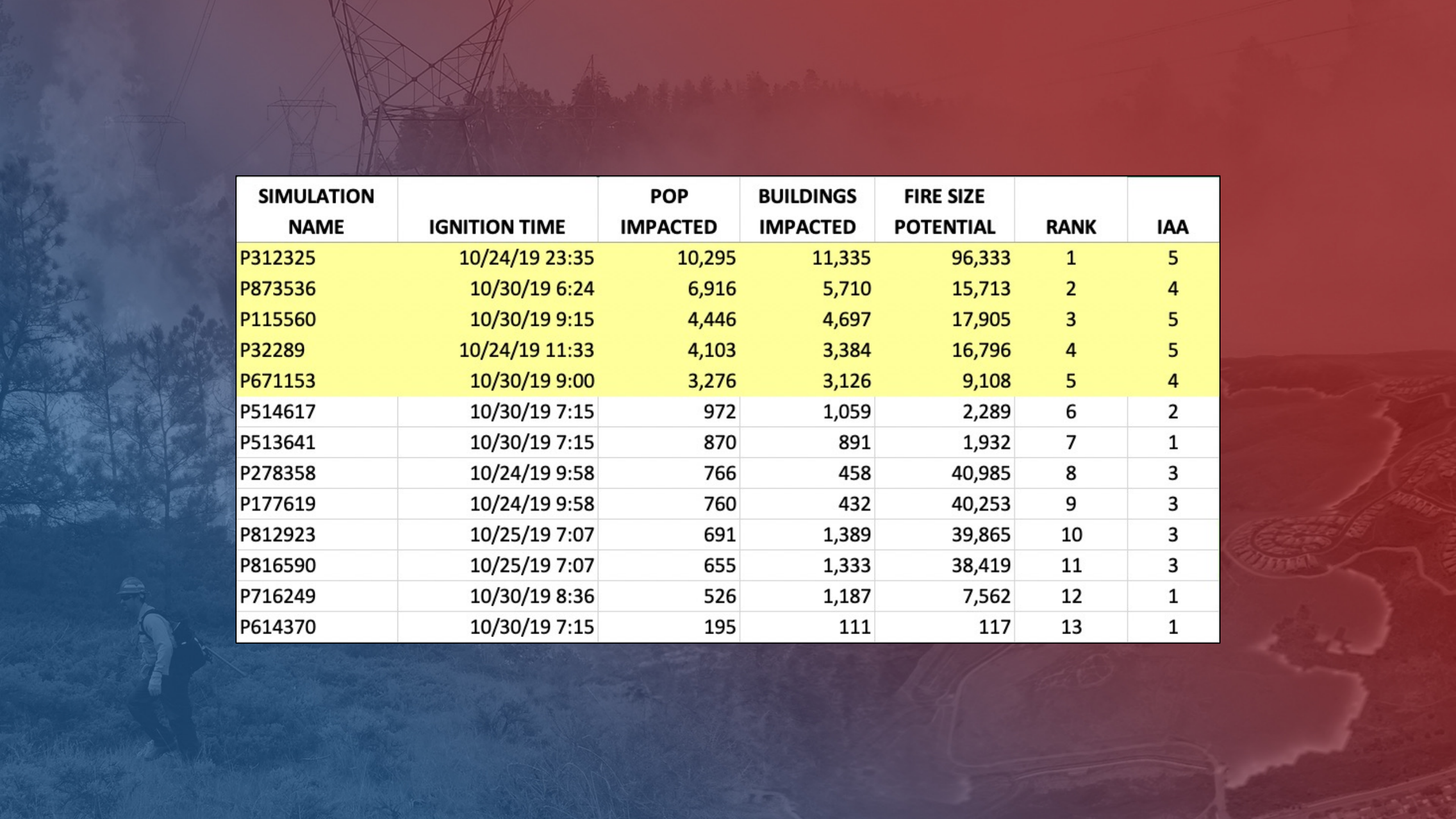
Prepared by:

Technosylva Inc. (La Jolla, CA)

SDG&E - All PSPS Events

- 15 damaged assets reported
- 13 were identified as potential to cause an ignition, and were used to conduct the analysis

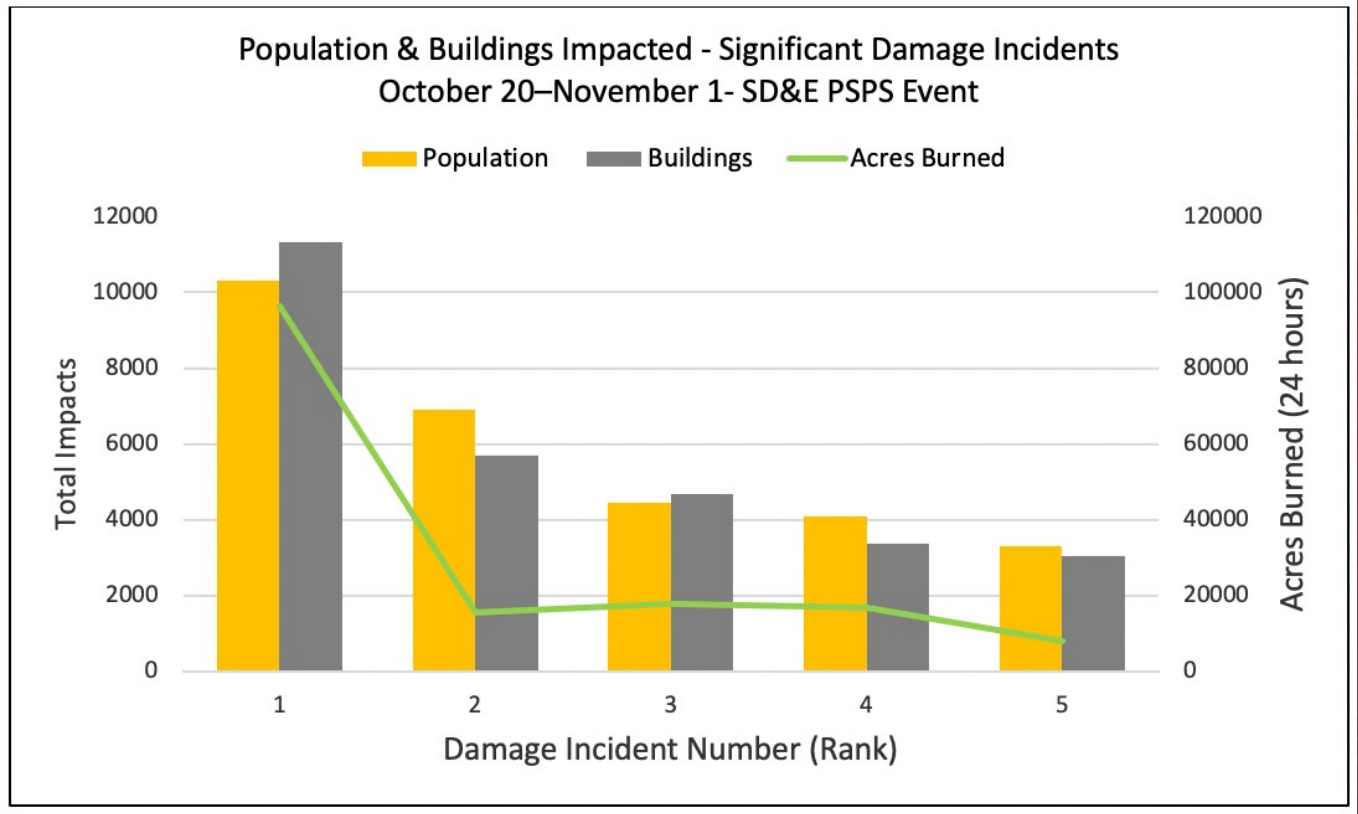


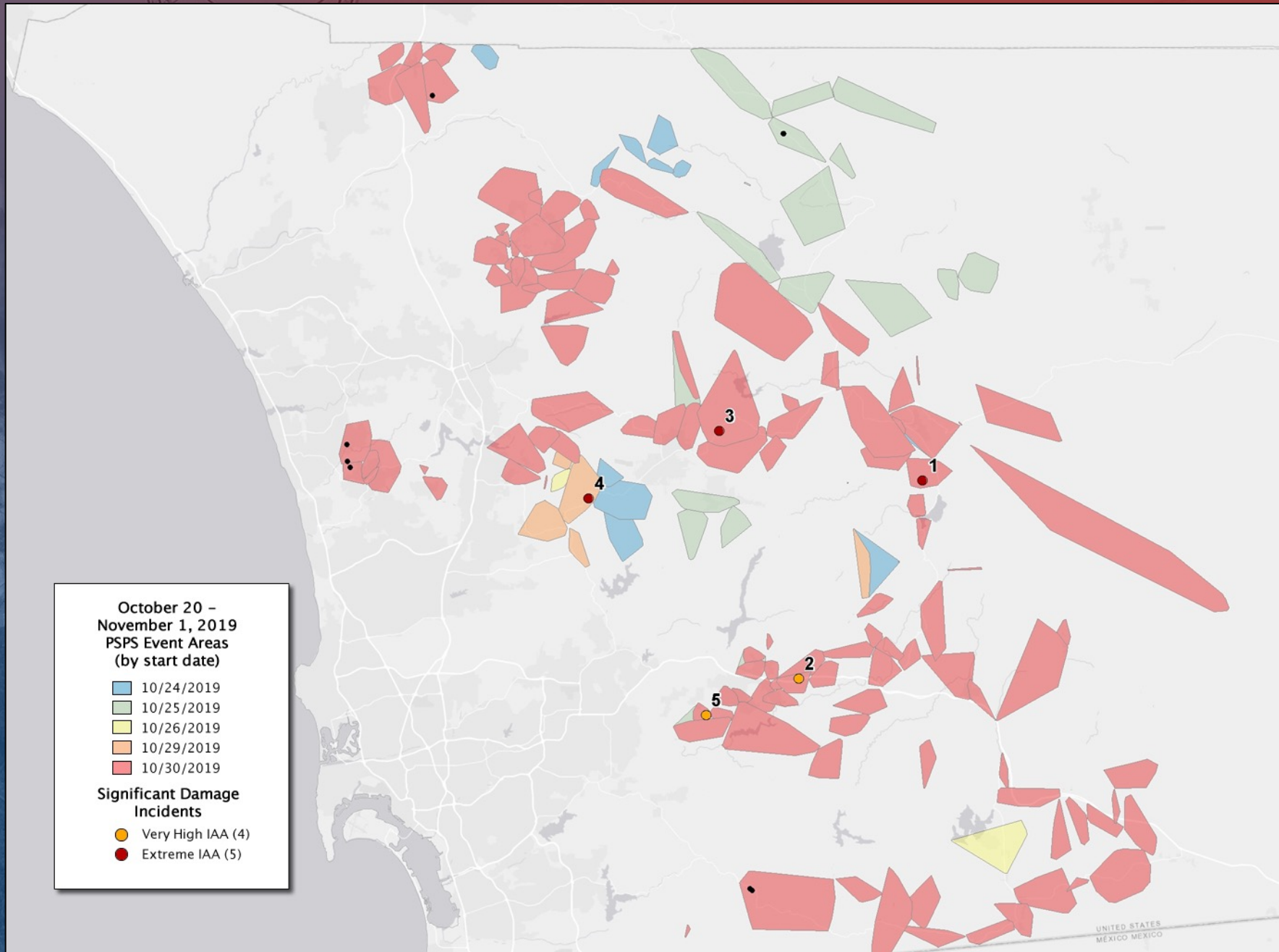


SIMULATION NAME	IGNITION TIME	POP IMPACTED	BUILDINGS IMPACTED	FIRE SIZE POTENTIAL	RANK	IAA
P312325	10/24/19 23:35	10,295	11,335	96,333	1	5
P873536	10/30/19 6:24	6,916	5,710	15,713	2	4
P115560	10/30/19 9:15	4,446	4,697	17,905	3	5
P32289	10/24/19 11:33	4,103	3,384	16,796	4	5
P671153	10/30/19 9:00	3,276	3,126	9,108	5	4
P514617	10/30/19 7:15	972	1,059	2,289	6	2
P513641	10/30/19 7:15	870	891	1,932	7	1
P278358	10/24/19 9:58	766	458	40,985	8	3
P177619	10/24/19 9:58	760	432	40,253	9	3
P812923	10/25/19 7:07	691	1,389	39,865	10	3
P816590	10/25/19 7:07	655	1,333	38,419	11	3
P716249	10/30/19 8:36	526	1,187	7,562	12	1
P614370	10/30/19 7:15	195	111	117	13	1

Damage Incident Rank	County	Population Impacted	Buildings Impacted	Acres Burned	IAA
1	San Diego	10,295	11,335	96,333	5
2	San Diego	6,916	5,710	15,713	4
3	San Diego	4,446	4,697	17,905	5
4	San Diego	4,103	3,384	16,796	5
5	San Diego	3,276	3,126	9,108	4

● Low (1)
 ● Moderate (2)
 ● High (3)
 ● Very High (4)
 ● Extreme (5)

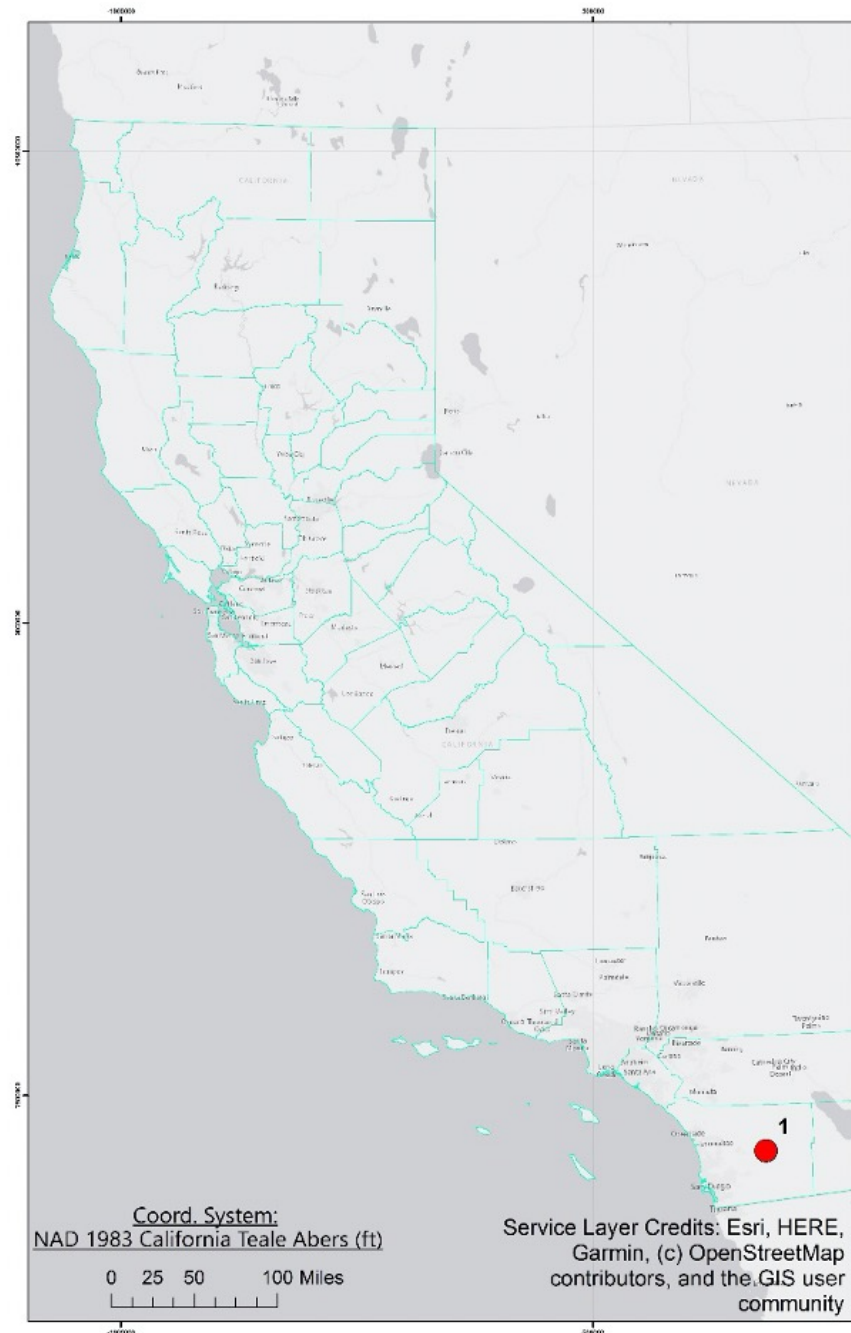


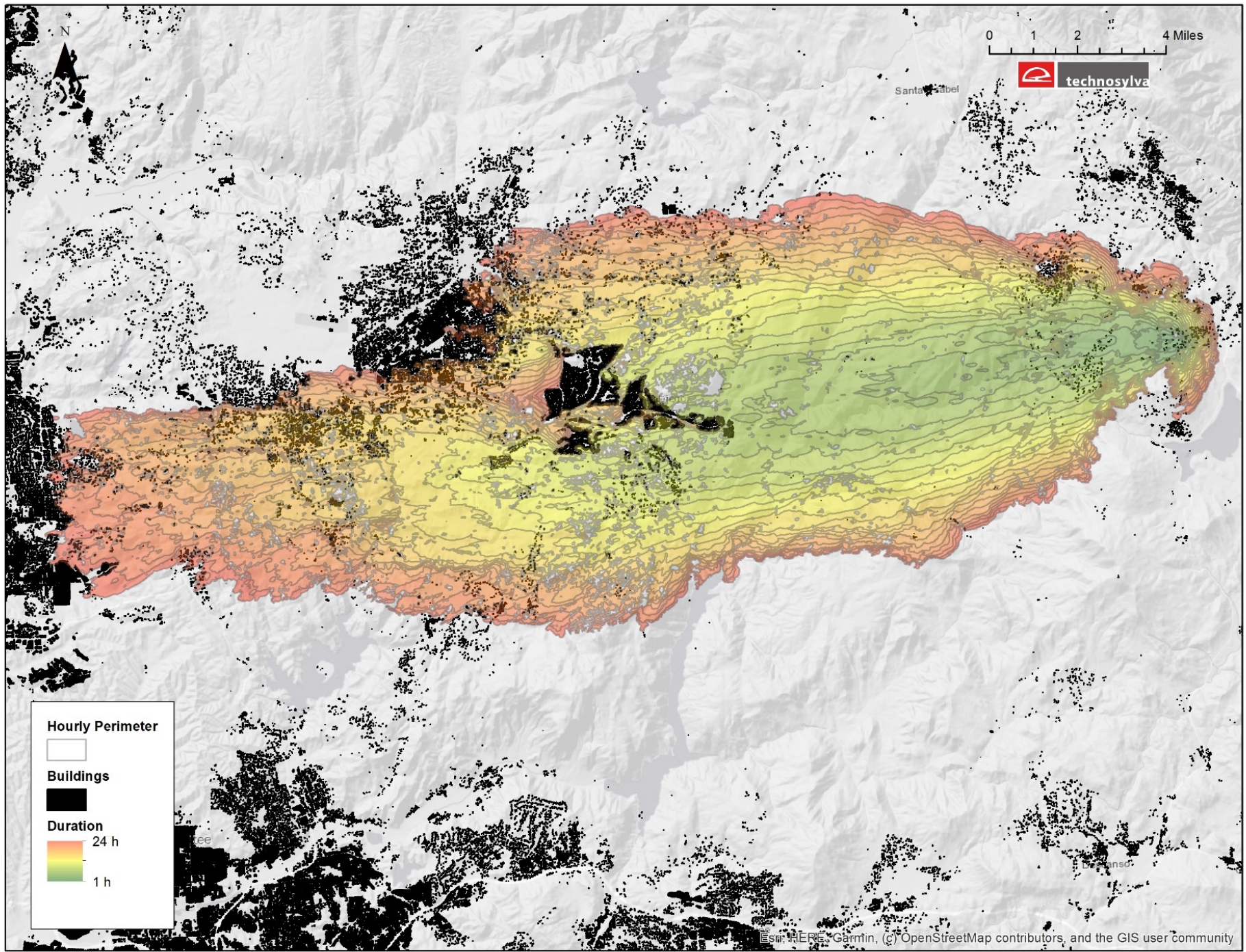


DAMAGE INCIDENT – 1

This damage incident could ignite a very large fire of almost 100,000 acres with direct impact to the city of Ramona and urban areas such as San Diego Country Estates. The fire could potentially reach Poway, impacting lots of buildings and population in dense urban areas throughout the fire spread as shown in the incident summary table and maps. The rate of spread would be very high with moderate-high intensity. The fire would be driven by high winds coming from east ranging between 20 and 30 mi/h. All this area was already burned by the Cedar fire in 2003 (280,278 ac).

INCIDENT SUMMARY	
Start Time	10/24/2019 - 23:35
Duration (hr)	24
Size (ac)	96,333
Initial Attack Assessment	5 - Extreme
No. of Buildings	11,335
Total Population	10,295
Average ROS	Very High





Hourly Perimeter

□

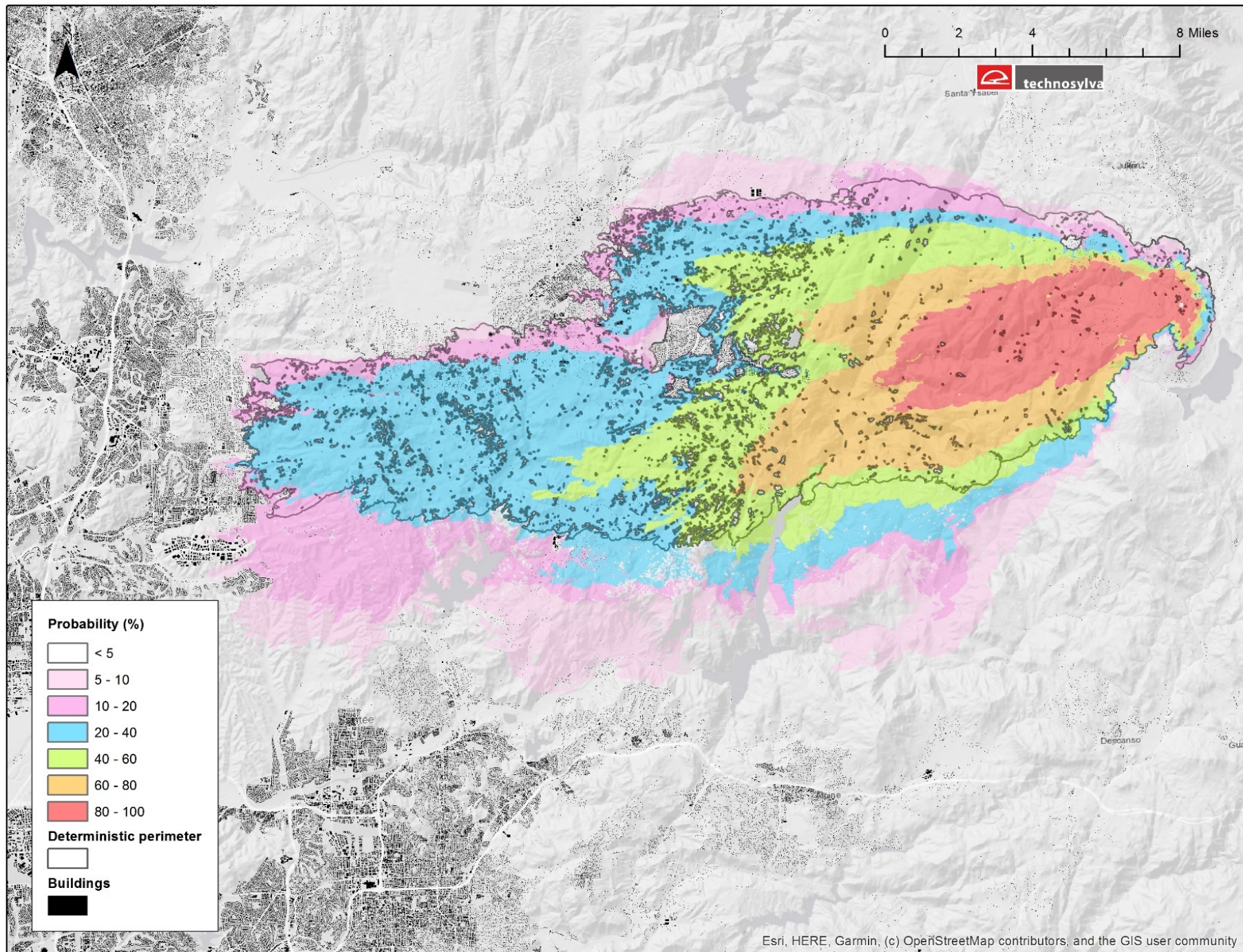
Buildings

■

Duration

24 h

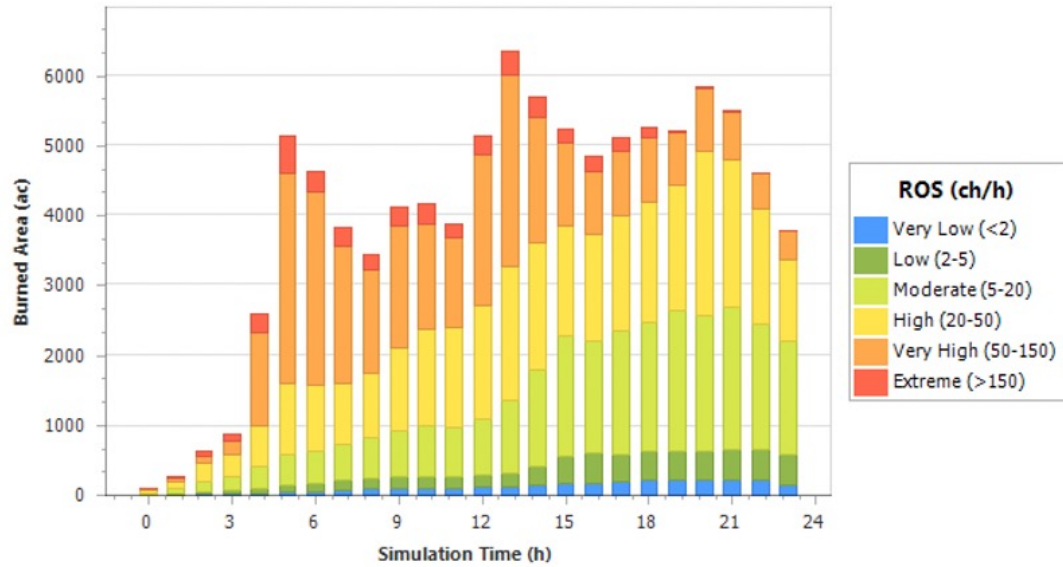
1 h



DAMAGE INCIDENT NO. 1

FIRE BEHAVIOR

Rate of Spread



WEATHER

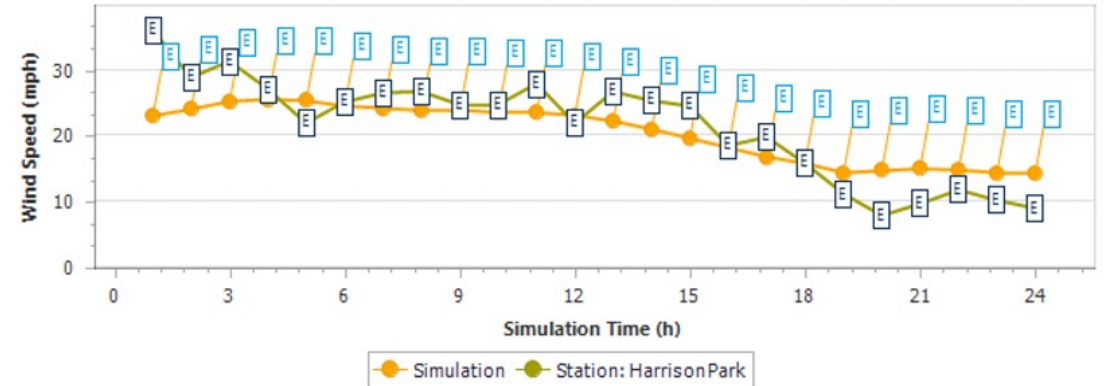
Nearest Station: Harrison Park

Station ID - PG139

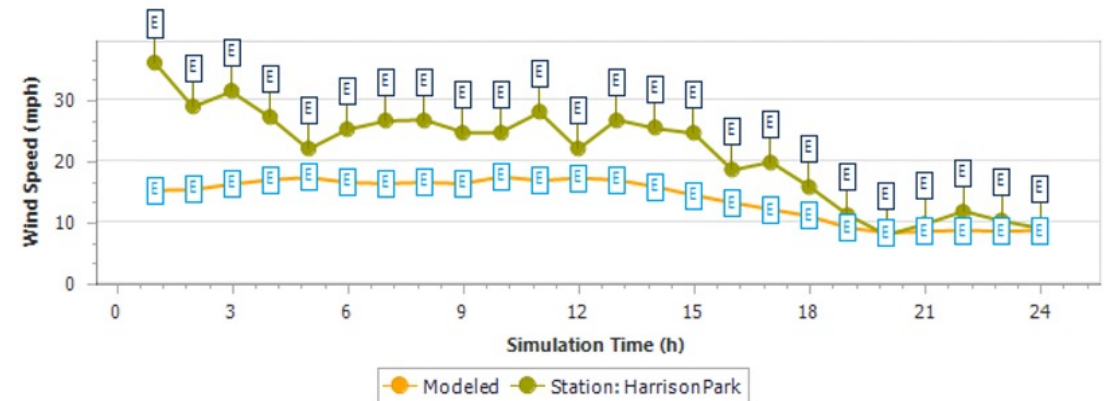
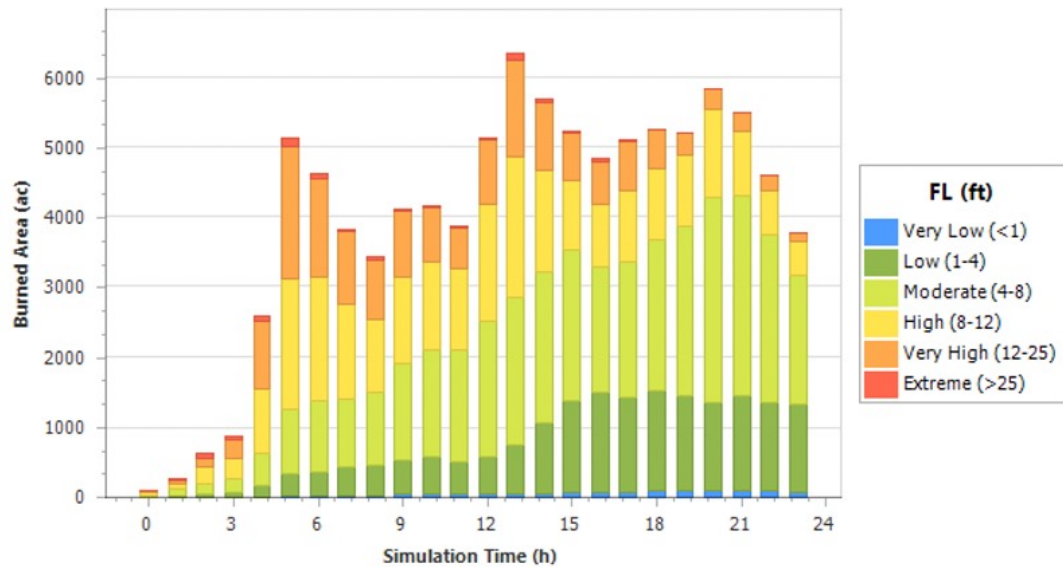
Weather station (Wx) elevation - 4861 ft

Fire ignition point (IP) elevation - 4649 ft

Distance between Wx and IP - 1.6 mi



Flame Length

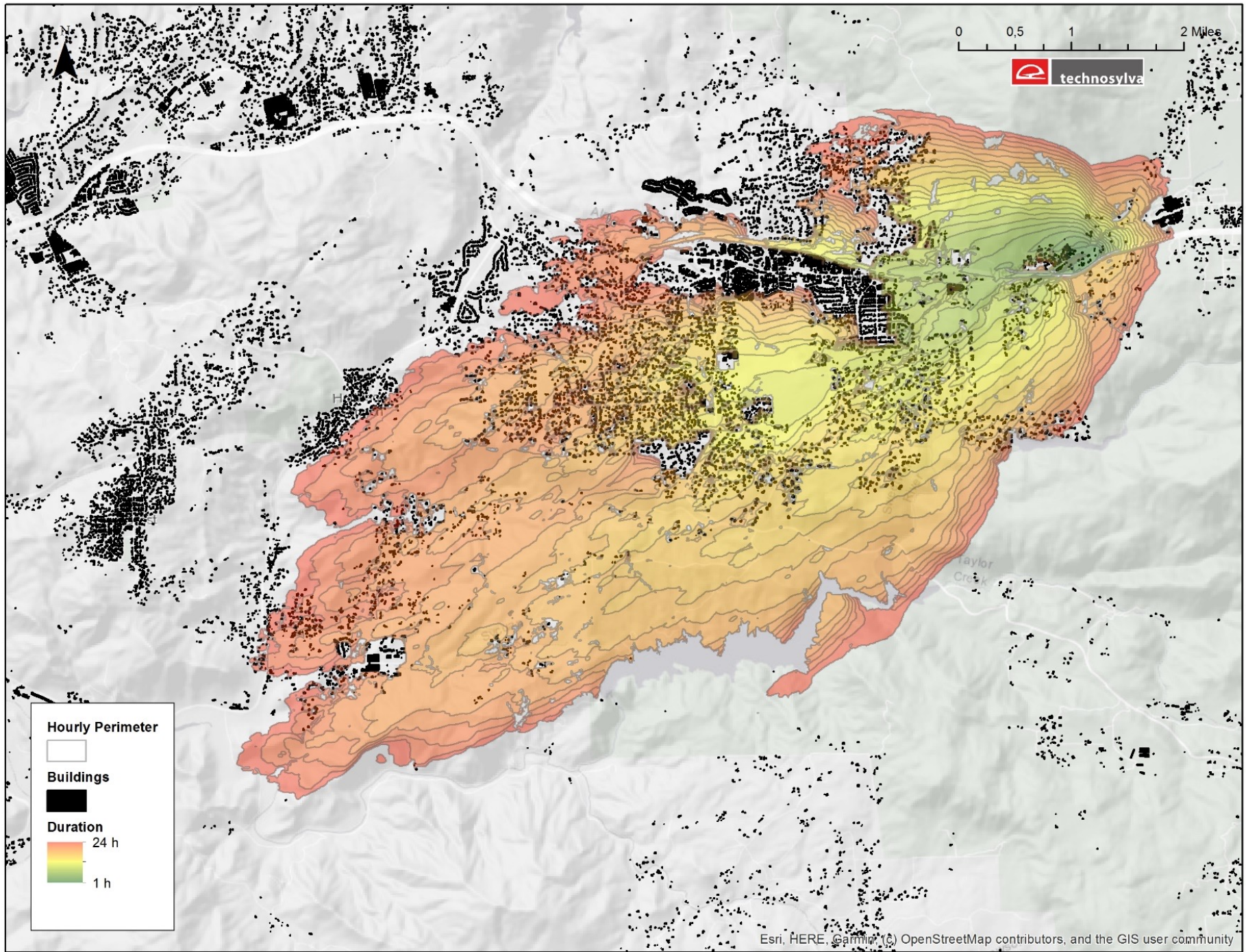


DAMAGE INCIDENT – 2

This incident is located in the south of San Diego County and could impact lots of scattered buildings throughout the progression and dense urban areas as reflected in the maps. It would have been a wind-driven fire with winds coming from East (20-25 mi/h) giving rise moderate-high rate of spread during all fire duration. Modeled winds are consistent with weather station records. The fire would burn a large area of shrub and grass and have a high difficulty of containment in the initial attack. The area was burned by the VIEJAS fire in 2001 (10,353 ac) and the LA LAGUNA fire in 1970 (174,158 ac).

INCIDENT SUMMARY	
Start Time	10/30/2019 6:24
Duration (hr)	24
Size (ac)	15,713
Initial Attack Assessment	4 – Very High
No. of Buildings	5,710
Total Population	6,916
Average ROS	High





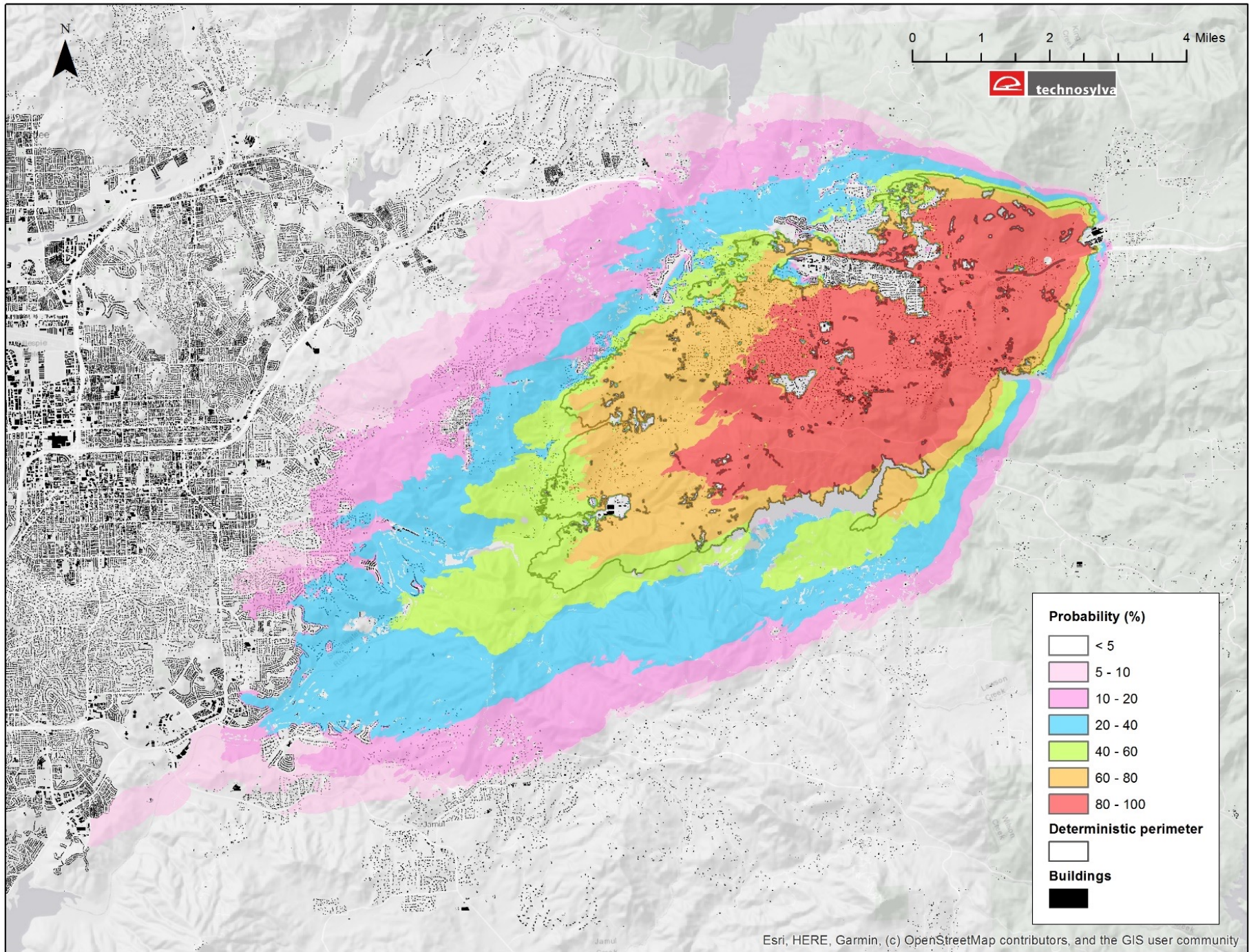
Hourly Perimeter
□

Buildings
■

Duration
24 h
1 h

0 0,5 1 2 Miles





SDG&E PSPS EVENTS - SUMMARY OF ANALYSIS RESULTS

IOU	PSPS Event Dates	Total Damages Reported	Damages Expected to Ignite a Fire
SDG&E	Oct 10, 2019	0	0
SDG&E	Oct 24, 2019	6	6
SDG&E	Oct 28, 2019	9	9

Total Population Impacted	Total Buildings Impacted	Total Acres Burned
0	0	0
1,346	2,722	78,824
33,125	32,390	248,993



Findings

2019 PSPS Event Analysis

IOU	PSPS Event Dates	Total Damages Reported	Damages Expected to Ignite a Fire	Total Population Impacted	Total Buildings Impacted	Total Acres Burned
PG&E	June 7 th , 2019	5	1	1,412	859	4,741
PG&E	Sep. 23, 2019	4	4	400	47	2,394
PG&E	Oct 5, 2019	2	1	0	0	379
PG&E	Oct 9, 2019	193	116	36,015	18,819	274,977
PG&E	Oct 23, 2019	26	21	5,386	4,159	61,361
PG&E	Oct 26, 2019	441	422	421,271	257,570	3,056,346
PG&E	Nov 20, 2019	9	9	1,769	1,324	20,682
SCE	Jun 17, 2019	0	0	0	0	0
SCE	Jun 28, 2019	0	0	0	0	0
SCE	Jul 9, 2019	0	0	0	0	0
SCE	Jul 22, 2019	0	0	0	0	0
SCE	Aug 3, 2019	0	0	0	0	0
SCE	Aug 12, 2019	0	0	0	0	0
SCE	Sep 4, 2019	0	0	0	0	0
SCE	Sep 9, 2019	5	4	102	139	12,541
SCE	Sep 21, 2019	0	0	0	0	0
SCE	Oct 2, 2019	17	17	29,578	12,908	178,721
SCE	Oct 12, 2019	1	1	204	76	826
SCE	Oct 21, 2019	15	13	17,631	7,621	80,151
SCE	Oct 27, 2019	26	20	8,467	4,690	93,547
SCE	Nov 15, 2019	0	0	0	0	0
SCE	Nov 23, 2019	0	0	0	0	0
SDG&E	Oct 10, 2019	0	0	0	0	0
SDG&E	Oct 24, 2019	6	6	1,346	2,722	78,824
SDG&E	Oct 28, 2019	9	9	33,125	32,390	248,993

FINDINGS & RECOMMENDATIONS

1. Large amount of damages for some PSPS events
2. Specific areas and assets are consistently identified as high risk
3. Impacts are highly dependent on varying environment and landscape conditions
4. Variability in the input data exists
5. Spread modeling prior to events can aid in PSPS decisions
6. IOUs would benefit from conducting similar analysis for damage data collected in future PSPS events
7. Need to standardize the post-event damage data collection format and criteria
8. Standardize the data format and criteria for IOU PSPS reporting

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Q&A DISCUSSION
