Interactive Map and Integration Capacity Analysis
User Guide

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SDG&E Interactive Map and Integration Capacity Analysis (ICA) User Guide

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Purpose

California Public Utilities Commission (CPUC) on Rulemaking 14-0808-13 issued on February 2015, required San Diego Gas & Electric (SDG&E) and other utilities to publish an Integration Capacity Analysis (ICA) map. The intended purpose of the ICA map is to help developers and contractors find potential sites for distributed energy resources (DER's). The analysis presented in the integration capacity map provides the feeder level integration capacity results at a section level or node level.

Access

URL: https://interconnectionmapsdge.extweb.sempra.com/

Technical Support

If you need assistance in viewing/registering or technical issues for the interactive map, contact us via sdgeinterconnectionmap@sdge.com.

Disclaimer

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Data Redaction

SDG&E complies with the 15/15 rule, that states: If a customer takes 15% or more of the total load of the circuit OR if a circuit holds 15 customers or less, then the data will qualify for data redaction.

On the interactive map the following will be considered:

- If a circuit fails the 15/15 rule, consumption, demand, and information derived from such data will be redacted from the map. Data will still be available as requested.

- If the portion of a circuit downstream from the SCADA sectionalizing device that was used for operational flexibility fails the 15/15 rule, only one (the minimum) value of the 576 points in the operational flexibility screen profile is provided for those downstream sections.

Circuit Level 15/15	SCADA Device Level 15/15	Aggregate Load Profile	Redacted ICA Operation Flexibility Data
Pass	Pass	No	No
Pass	Fail	No	Yes
Fail	Not applicable	No data provided on map	No data provided on map

Support Data

SDG&E Interactive Map and Integration Capacity Analysis (ICA) User Guide

Definitions

Integration Capacity Analysis (ICA)	Quantifies the maximum amount of power that can be injected to and drawn from the distribution system requiring minimal to no distribution upgrades or operational restrictions. It consists of determining the maximum amount of DERs that can be connected without adversely impacting SDG&E distribution system. ICA assumes short circuit duty characteristics of inverter-based technology.
Uniform Generation Opflex	ICA generation value, that accounts for Operational Flexibility. The values shown in the map are the "final" ICA results based on the most limiting power system criteria at the most limiting hour.
Uniform Generation	ICA generation value. The values shown in the map are the "final" ICA results based on the most limiting power system criteria at the most limiting hour.
Photovoltaic Opflex	ICA generation value, that accounts for Operational Flexibility. The values shown in the map are the "final" ICA results based on Nameplate for a Fix PV generator in MW's at 12 noon.
Photovoltaic	ICA generation value. The values shown in the map are the "final" ICA results based on Nameplate for a Fix PV generator in MW's at 12 noon.
Uniform Load	ICA Load value. The values shown in the map are the "final" ICA results based on the most limiting power system criteria at the most limiting hour.
Operational Flexibility (Opflex)	Amount of generation that can be installed without causing reverse power flow at the substation or at a SCADA device in the field.
Existing Generation	This value represents the amount of generating resources currently connected to the SDG&E system. The existing generation attribute includes all downstream resources. For example, the existing generation at the substation includes all existing generation connected to circuits downstream.
Queued Generation	This value represents the amount of generating resources currently requesting interconnection to the SDG&E system, but not yet online and operating. Queued Generation includes all downstream resources. For example, Queued Generation at a substation includes all Queued Generation connected to all circuits fed from that substation.
Total Generation	This value represents the sum of both Existing and Queued Generation. Total Generation includes all downstream resources. For example, Total Generation at a substation includes all Existing and Queued Generation connected to all circuits fed from that substation.
Customer type breakdown	Is a representation of the total percentage of customers on the circuit in which the selected segment is connected. The customers are sectioned as follows: Residential, Commercial, Industrial and Agricultural.
Circuit	Entire circuit from the substation circuit breaker to the end of line.
Line Section	Portion of circuit bounded by SCADA device(s) and/or substation circuit breaker.
Line Segment	Portion of a circuit bounded by nodes.
Megawatt (MW)	Is equivalent to 1,000 kilowatts (kW).
576 Values	Is obtained by selecting 24-hour period for a typical minimum and maximum load day for each of the 12 months in a calendar year.

Support Data

ICA Results Technical Criteria

Support Data

Generation ICA Components

Load ICA Components

Thermal	SSV	Voltage Fluctuation	Protection	Operational Flexibility	Thermal Load	SSV Load
Amount of generation that can be installed without causing thermal overloads anywhere in the system.	Amount of generation that can be installed without violating Rule 2 ($\pm$5% of nominal) Steady State Voltage (SSV).	Amount of generation that can be installed without causing a 3% variation in voltage.	Amount of generation that can be installed without causing protective violations.	Amount of generation that can be installed without causing reverse power flow at the substation or at a SCADA device.	Amount of load that can be installed without causing thermal overloads anywhere in the system.	Amount of load that can be installed without violating Rule 2 ($\pm$5% of nominal) Steady State Voltage (SSV).

Interactive Map

Map Navigation

1 Search Bar

Type an address, city, place, substation or circuit to zoom into that location.

2 Zoom Tools

    2.1 Zoom extent – resets to default elevation, service territory

    2.2 Next zoom – takes you one forward zoom level

    2.3 Previous zoom – takes you one back zoom level

    2.4 Zoom out – draw a rectangle on an area on the map to zoom out

    2.5 Zoom in – draw a rectangle on an area on the map to zoom in

    2.6 Panning – click and drag on the map to move the map location

    2.7 Bulk ICA download files – download ICA files for every circuit

    2.8 API

3 Specific Zoom Level Layer

    3.1 Substation Level – zooms to an elevation to display layer

    3.2 Grid Level – zooms to an elevation to display layer

    3.3 Section Level – zooms to an elevation to display layer

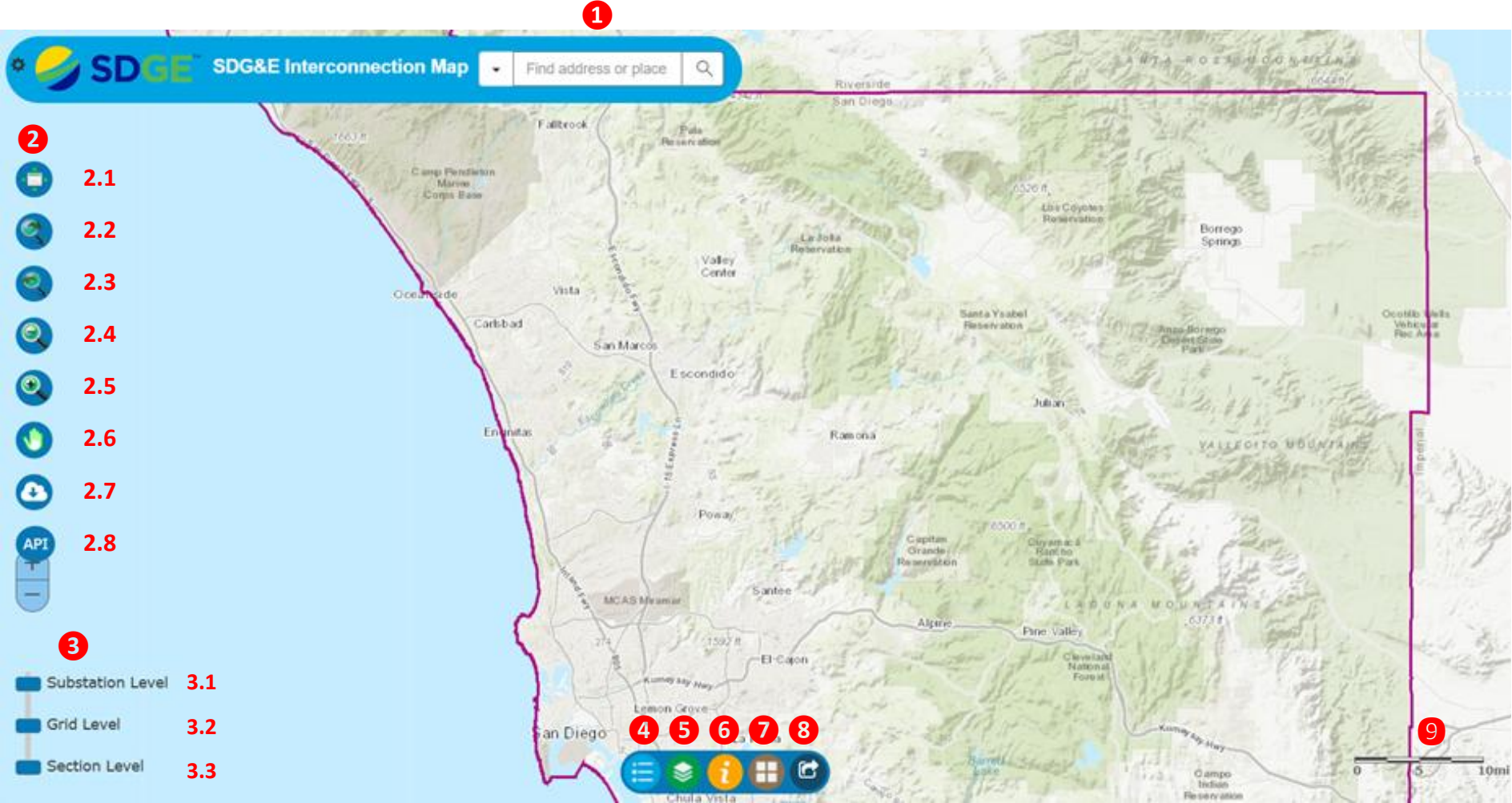**4** Legend – click to displays the values of the selected layer

5 Layer List – click to select the desire layer to view

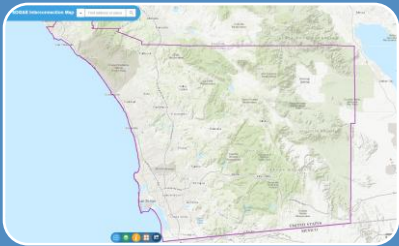**6** Information & User Guide

7 Base Map Gallery

8 Export Data

9 Elevation Map Display
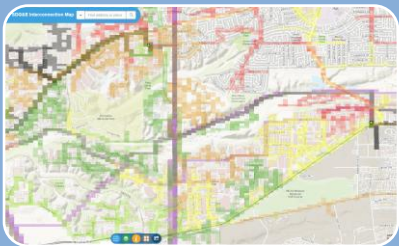
Elevation Map Display

The following attributes will be visible at following different elevations on the map.
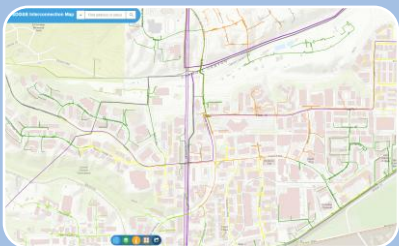

Service Territory

10 miles

Substations

2 miles

ICA Capacity - Grid Circuit Level

0.3 miles

ICA Capacity - Line Segment Level & Non 3-Phase Line Segments

600 feet

Interactive Map

Legend

Displays what the different color is representing, either attributes or value ranges of how many MW's can be added to the desired section of a circuit.

Red colors represent areas at maximum capacity.

❶ Click on the legend to show the color coding of what is being display in the map.
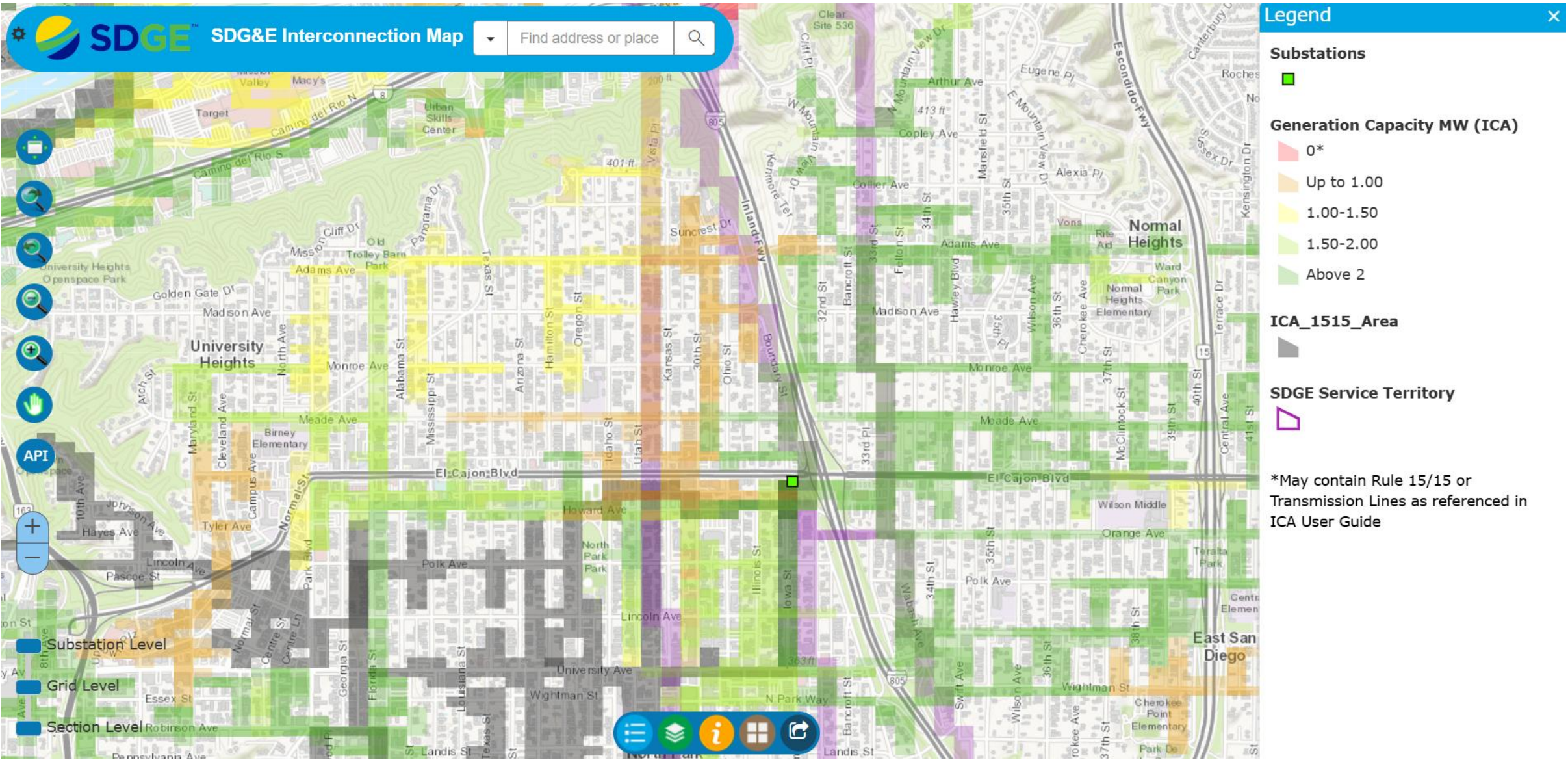
Interactive Map

Layer List

❶ Displays the list of available layers and indicates for which layers data has been loaded. Click to select the layer of interest.

❷ A window will appear on the right showing different layers that can be selected, only one layer may be selected at a time.

If - checkmark, the layer is turned on (visible). The map will be colored by selected layer. The default layer is ICA Generation Capacity.

Layers Descriptions

SDG&E Service Territory – Detail the area San Diego Gas & Electric serves.

Generation Capacity (MW) Layer – Detail information on how much generation capacity is available to connect to a circuit line sections in MW's.

Load Capacity (MW) Layer – Detail information on how much load capacity is available to connect to a circuit line sections in MW's.

Substations Layer – Overall information and location for Distribution Substations.

❸ For information on **DDOR, LNBA and GNA** layers reference the

Navigation Tools LNBA/DDOR User guide.

❹ High Fire Threat District overlay

❺ Transmission project overlay

❻ Last time the map layers were updated

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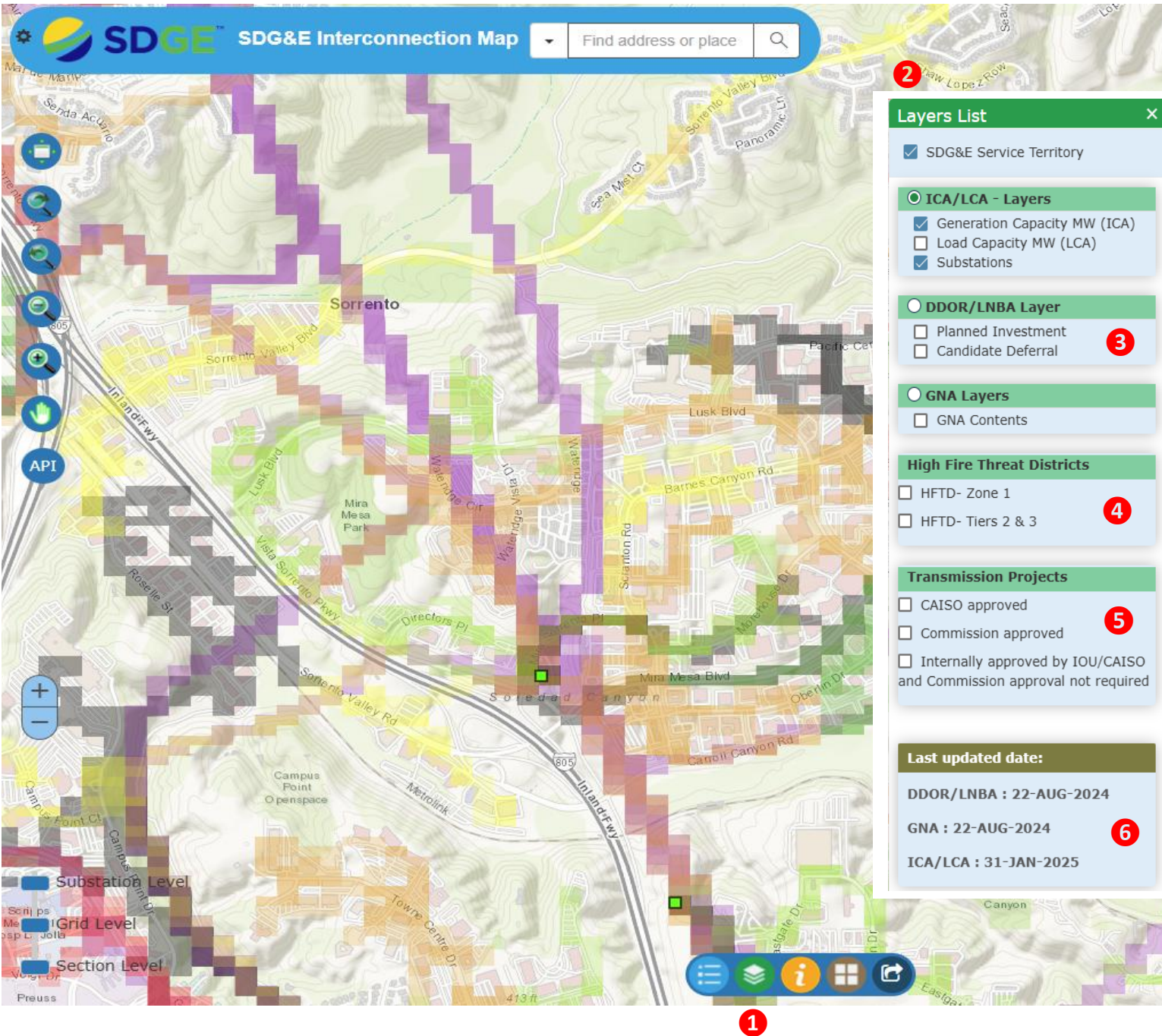
Layer Display Information

Substation Layer

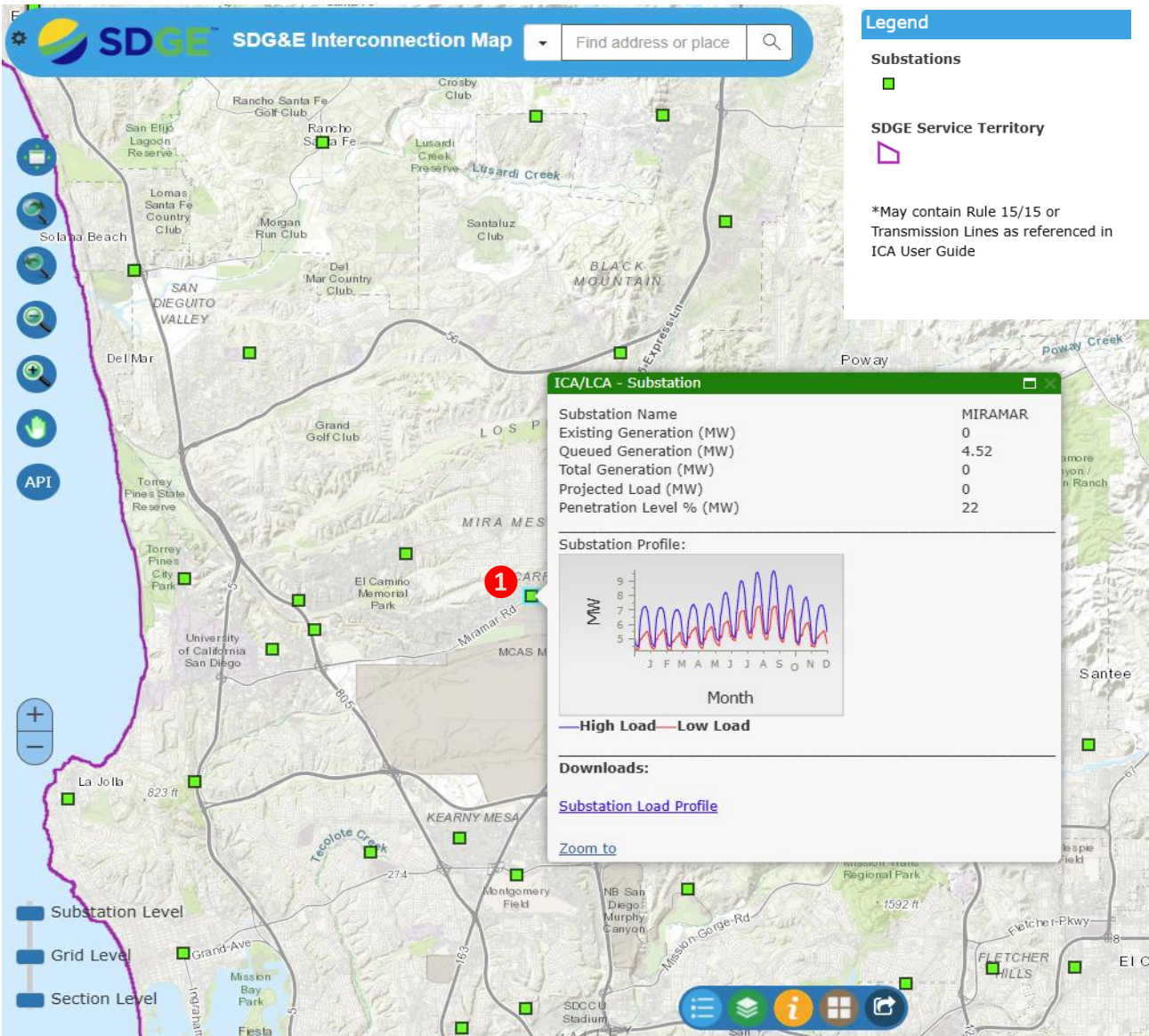This layer loads at 2 miles zoom level.

1 Click on any substation colored square and a pop-up window `ICA/LCA - Substation`

displaying the following information on the substation selected:

- Substation Information: Name, Existing Generation (MW), Queued Generation (MW),

    Total Generation (MW), Projected Load (MW), Penetration Level (MW)

- Load Profile - The Load Profile will display the forecasted High/Low

    Load for the substation by Month in MW's

- *Download Link – click "Substation Load Profile" to download the

    hour by hour load data set (576 values) of the selected substation

    *See download section for more information

NOTES:

- ICA results at the substation level are downloaded at the Grid and Section layers.

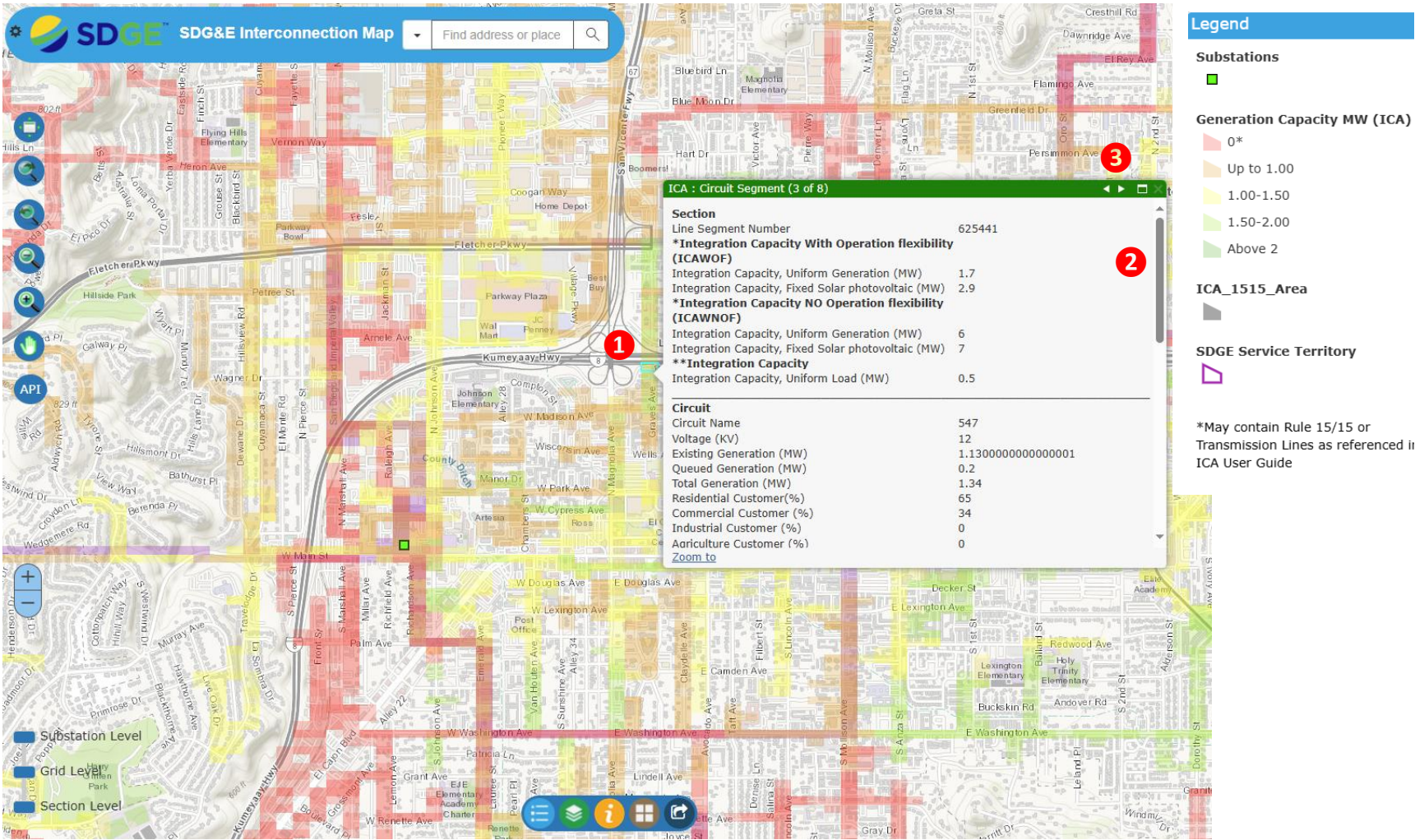## Circuit Layer

This layer loads at zoom level 0.3 mile.

❶ Click on any of the grids to have a pop-up window

ICA : Circuit Segment, displaying the following information:

- ICA Results: Line segment number, Uniform Generation Opflex (MW), Solar PV Opflex (MW), Uniform Generation No Opflex (MW), Solar PV No Opflex (MW), Uniform Load (MW)

- Circuit information: Circuit name, Voltage (kV), Existing Generation (MW), Queued Generation (MW), Total Generation (MW), and customer breakdown in Residential, Commercial, Industrial, Agricultural class

- Substation name

- Load profile of circuit - The Load profile will display the forecasted High/Low Load for the circuit by Month in MW's

- *Downloads: Circuit Load Profile, ICA Results, Translator
   *See download section for more information

❷ Scroll down to see all the available information on the pop-up.

❸ If more than one section is contained in the grid, you can toggle to the different line sections by clicking on the symbol.

Layer Display Information

Line Segment Layer

This layer loads at zoom level 600 ft.

1 Click on any of the color line sections to have a pop-up window

ICA : Circuit Segment. The information tab will display the

same information that is being display at the circuit level.

See previous page for information being display.
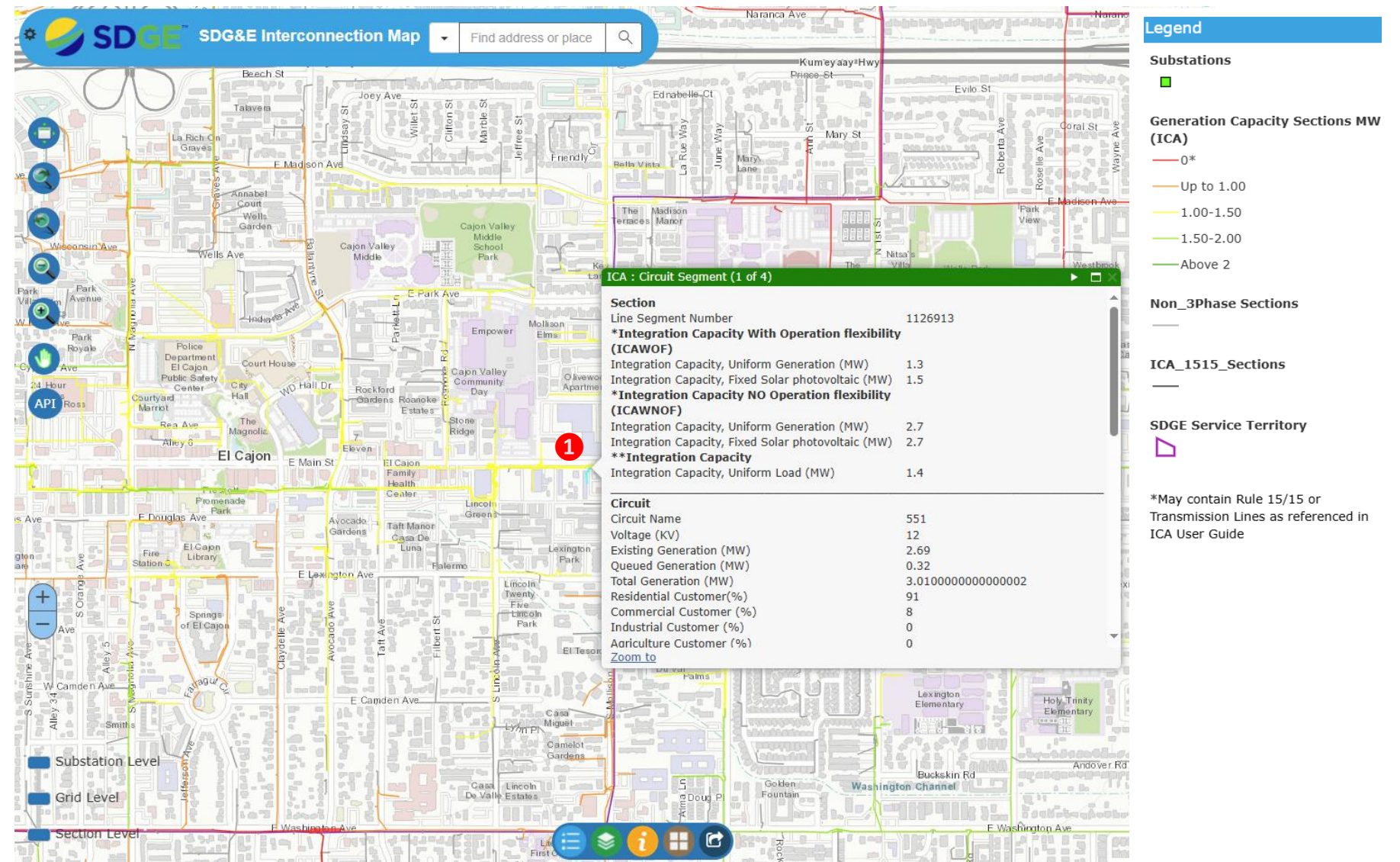
Non-3Phase Circuit Segments

❶ Click on the Non-3Phase line segments color in gray to have a pop-up window ICA: Circuit Segment, Non-3Phase, displaying the following information

- Section: Line Section Number

- Circuit: Circuit Name, Voltage (kV), Existing Generation (MW), Queued Generation (MW), Total Generation (MW), and customer breakdown in Residential, Commercial, Industrial, Agricultural class.

- Substation: Substation name

Update 10/07/2025
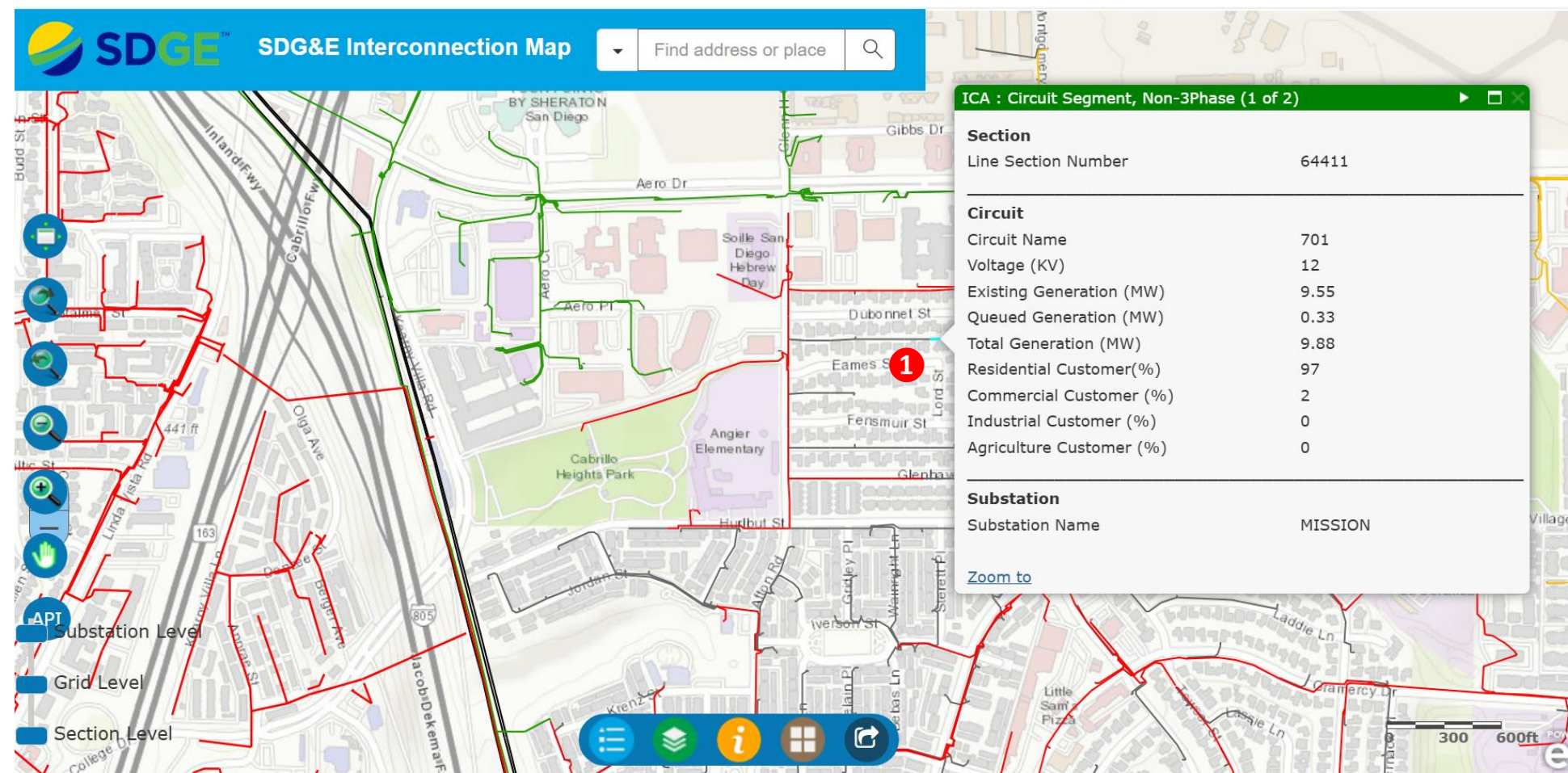
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How to Trace Non-3Phase Line Segments Back to Their Upstream Three-Phase Line Segment

Steps

❶ Enter in an address.

❷ Click on the Non-3Phase section to prompt a pop-up window with the circuit information.

❸ Trace back to the upstream 3-Phase line segment and zoom in to have a close look where the Non-3Phase connects to the 3-Phase line segment.

❹ Click on the 3-Phase line segment to prompt the information. Cross reference with the circuit of the Non-3Phase line segment and if the circuit matches, that is the ICA capacity available closest to the Non-3Phase section.
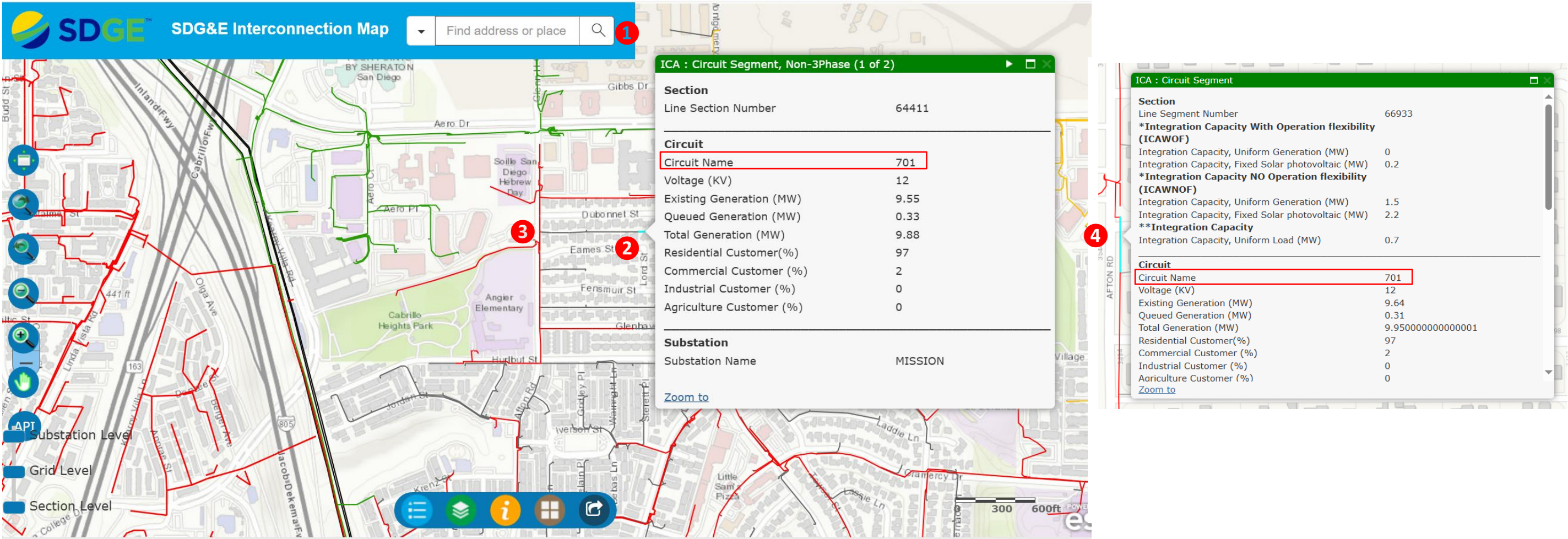
High Fire Threat District (HFTD) Overlay

This overlay allows users to view fire threat and tree mortality data information within the DRP Data Portal.

❶ Black outlined regions indicate Tree Mortality data

❷ Yellow regions indicate a HFTD of Tier 2, Red regions indicate a HFTD of Tier 3

<div style="writing-mode: vertical-rl;">**Layer Display Information**</div>
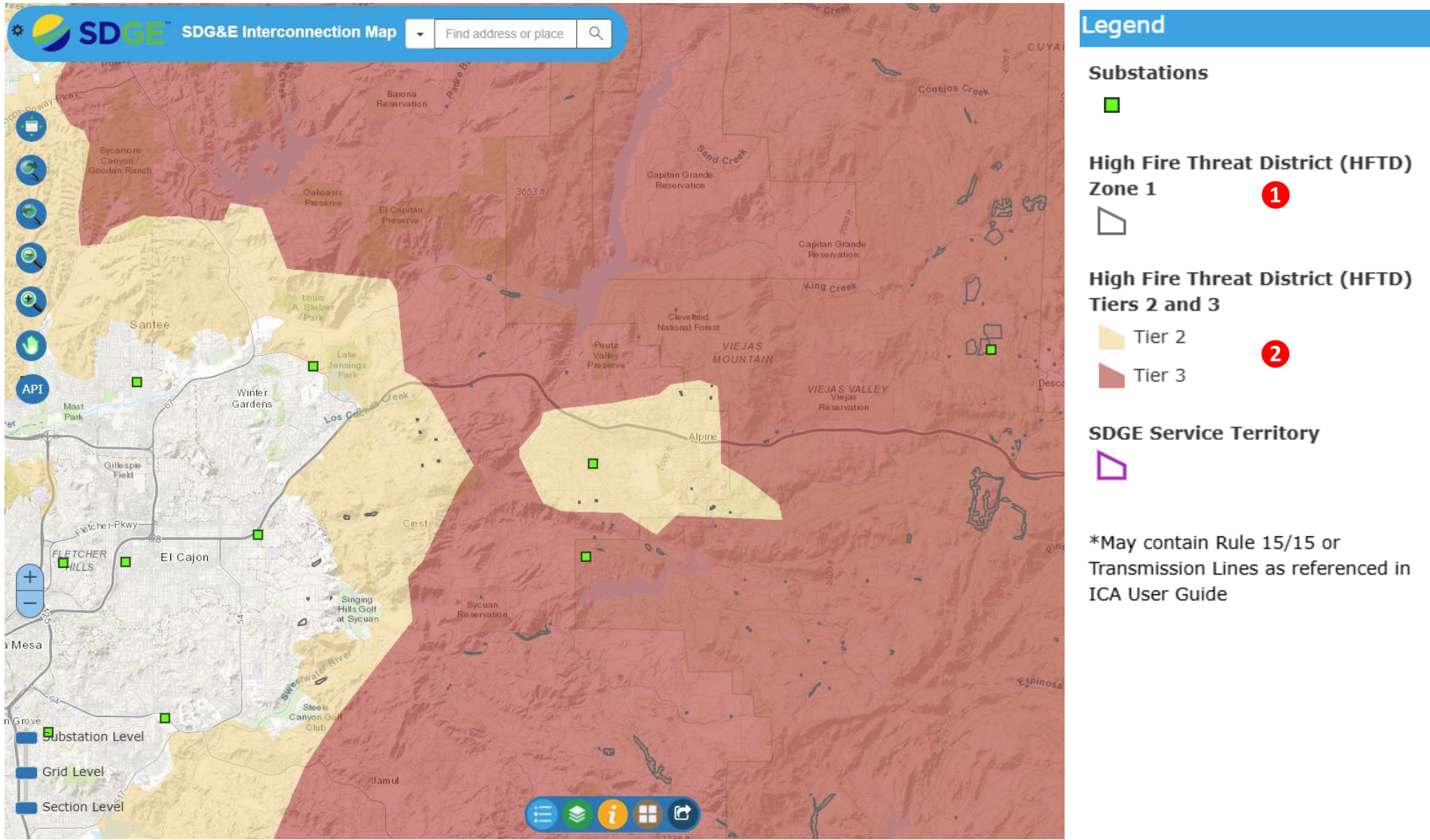
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Transmission Projects Overlay

SDG&E is including in the DRP data access portal a sortable layer that shows planned transmission projects whose primary drivers are comparable to the four distribution services identified by the Commission for deferral by DERs.

❶ Regions indicate "CAISO approved" transmission projects

❷ Regions indicate "Commission approved" transmission projects

❸ Regions indicate "Internally approved by IOU/CAISO and Commission approval not required" transmission projects
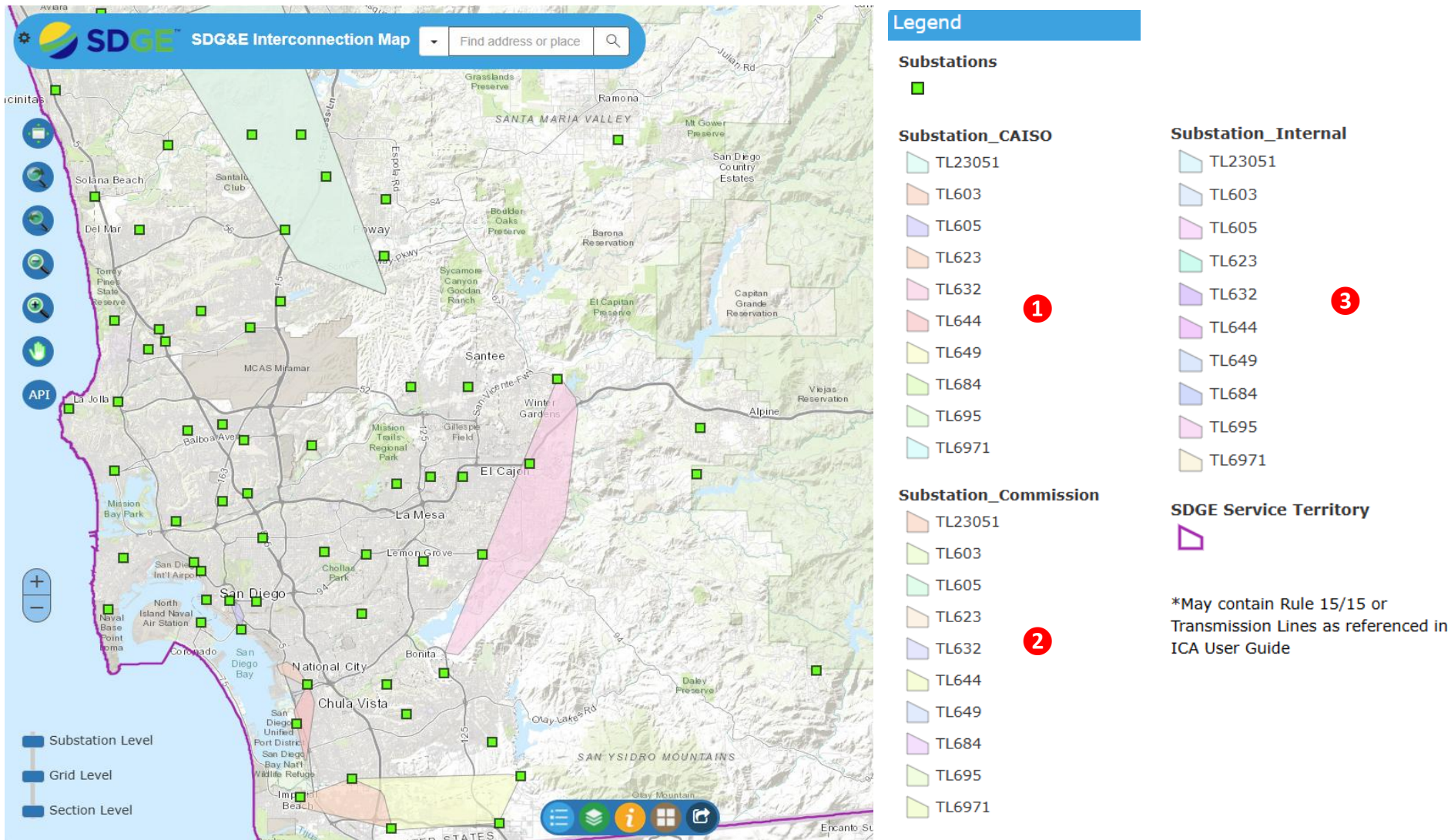
Downloads

Substation Layer

❶ Click on the *"Substation Load Profile"* link

❷ A zip file will be download containing a csv file with the selected substation load profile

❸ The file will contain the following information:

- Asset Name: Name of Substation
- Asset Type: Substation
- DER Forecast: Base (current year)
- Month
- Load Day: High Load/Low Load
- Units: kW
- Hours: 1-24

Downloads (sidebar)

❶

ICA/LCA - Substation	
Substation Name	DEL MAR
Existing Generation (MW)	24.48
Queued Generation (MW)	0.48
Total Generation (MW)	24.96
Projected Load (MW)	65.82
Penetration Level % (MW)	27

Substation Profile:

—High Load —Low Load

Downloads:

Substation Load Profile

Zoom to

❷
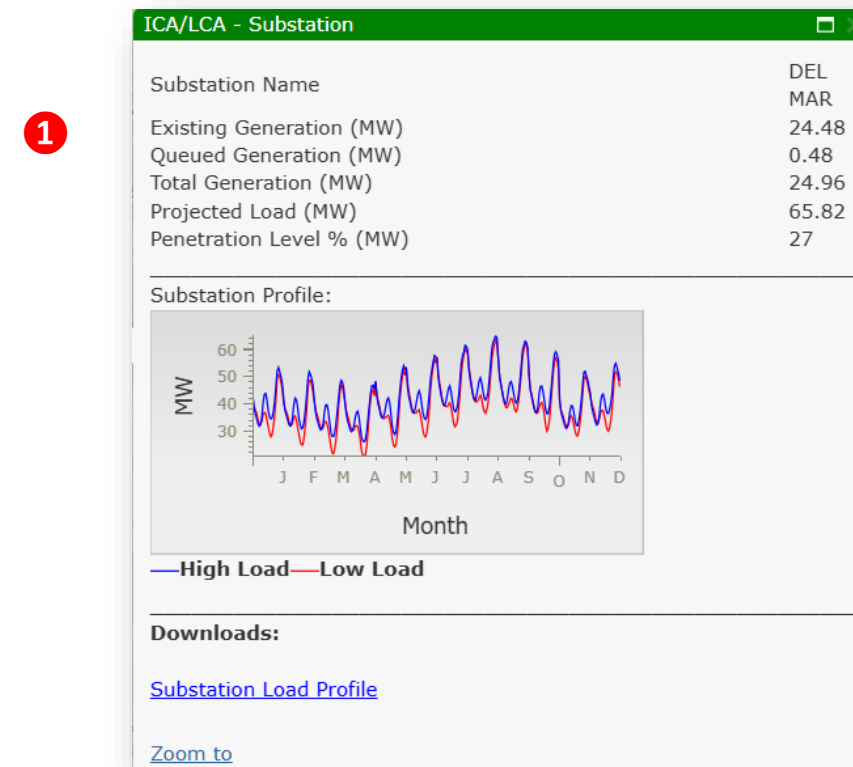
Name	Type	Compressed size	Password ...	Size
DEL_MAR.csv	Microsoft Excel Comma S...	3 KB	No	

❸

	A	B	C	D	E	F	G	H
	AssetNam	AssetType	DERForec	Month	LoadDay	Units	hour 1	hour 2
	DEL MAR	Substation	Base	1	High Load	KW	33820.25	30526.88
	DEL MAR	Substation	Base	1	Low Load	KW	28728.55	25702.17
	DEL MAR	Substation	Base	2	High Load	KW	32940.22	30106.32
	DEL MAR	Substation	Base	2	Low Load	KW	29077.81	26152.14

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Grid and Section Level Layer

❶ Click on the *"Circuit Load Profile"* link for the Circuit Load Profile that is feeding the section selected

    1.1 A zip file will be download containing a csv file with the selected section feeder load profile

    1.2 The file will contain the following information:

- Asset Name: Name of Circuit
- Asset Type: Circuit
- DER Forecast: Base (current year)
- Month
- Load Day: High Load/Low Load
- Units: kW
- Hours: 1-24

❷ Click on the "ICA Results" link to download the following files:

    2.1 **Section.csv** file containing hour by hour 576 ICA values for the section selected showing the different power system criteria values.

    2.2 **Section_Sub.csv** file contains the hour by hour 576 ICA values for the substation feeding the section selected.

    2.3 **Report Key.xlsx** describes the excel table headers from the hour by hour reports.

❸ Click to download the "Translator"

*The ICA translator is not an SDG&E tool. As agreed within the ICA Working Group, the ICA translator was developed and is maintained by Southern California Edison. It can be used to translate the technology-agnostic uniform generation or load ICA values into a desired, specific technology or portfolio of technologies.

❹ Click to download "LGP Template"

- For any questions about the LGP application, please email netmetering@sdge.com.

ICA : Circuit Segment

Section
Line Segment Number	94948

***Integration Capacity With Operation flexibility (ICAWOF)**
Integration Capacity, Uniform Generation (MW)	0.1
Integration Capacity, Fixed Solar photovoltaic (MW)	0.2

***Integration Capacity NO Operation flexibility (ICAWNOF)**
Integration Capacity, Uniform Generation (MW)	0.1
Integration Capacity, Fixed Solar photovoltaic (MW)	6.1

****Integration Capacity**
Integration Capacity, Uniform Load (MW)	0

Circuit
Circuit Name	66
Voltage (KV)	12
Existing Generation (MW)	2.26
Queued Generation (MW)	0
Total Generation (MW)	2.27
Residential Customer(%)	80
Commercial Customer (%)	18
Industrial Customer (%)	0
Agriculture Customer (%)	0
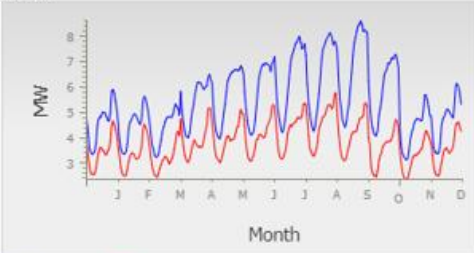
Substation
Substation Name	DEL MAR

Load Profile
Circuit

Downloads:
1. Circuit Load Profile
2. ICA Results
3. ***TRANSLATOR
4. LGP Template

Notes:
*Generation ICA assumes short circuit duty characteristics of inverter-based technology. Values presented on map reflect with operational flexibility (ICAWOF).Uniform Generation reflects the lowest hour value for the year. PV Generation reflects the available value of generation at 12 noon. For hour by hour values download the complete data set on the link provided.**Uniform Load reflects the lowest hour value for the year.***The ICA translator is not a SDG&E tool. As agreed within the ICA Working Group, the ICA translator was developed and is maintained by Southern California Edison.

1.1 94948_OH_LoadProfile.csv

1.2
AssetNam	AssetType	DERForeca	Month	LoadDay
66	Circuit	Base	1	High Load
66	Circuit	Base	1	Low Load
66	Circuit	Base	2	High Load
66	Circuit	Base	2	Low Load

2.1 94948_OH.csv
2.2 94948_OH_Sub.csv
2.3 Report KEY.xlsx

API (Application Programming Interface)

1 Click to export data

2 A window will appear on the right

3 Select one of the Extract Options

- **Extract by circuit** – Select the feeder desired to download data for entire circuit selected

4 Select one of the layers to extract

- **Generation Capacity MW (ICA)** – To download the maximum amount of capacity available to connect to the distribution system.

    4.1 Also you can select what to download, the options are by the following MW range
    - All
    - 0
    - Up to 1
    - 1-1.5
    - 1.5-2
    - Above 2

- **Load Capacity MW (LCA)** – maximum amount of power available to be drawn from the distribution system. And like Generation Capacity, the same ranges can be downloaded.

5 Select the export format

- **Shapefile**
- **CSV**
- **JSON**

6 Click to export the data

7 Please click on "Clear" to run a new query

   Note:

   For information on Candidate Deferral, Plan Investment and GNA layers reference the *Navigation Tools LNBA User guide*
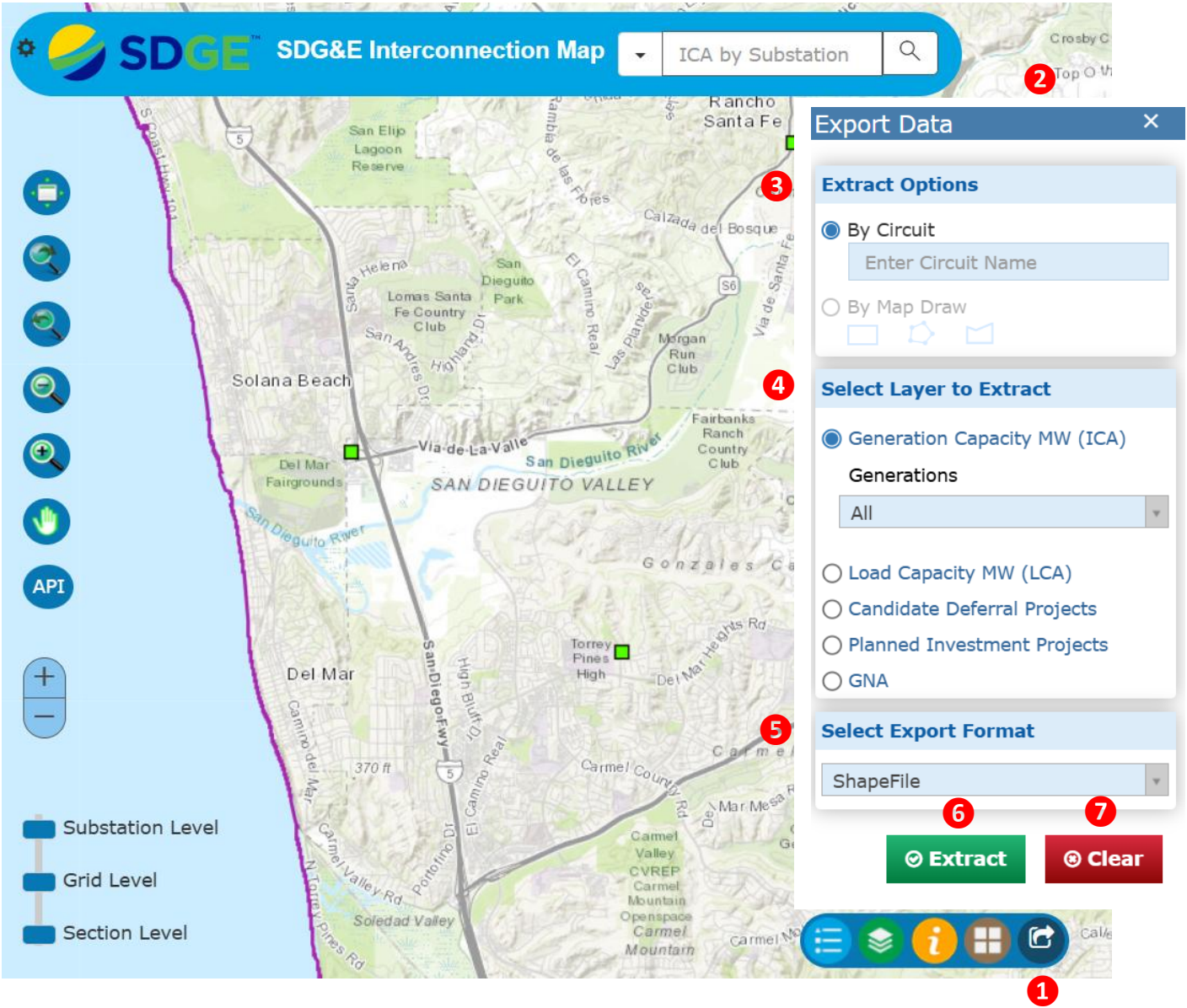
Appendix

Table I – The terminology and general definitions provided below are for context and terminology mapping between each IOU's ICA map. See respective user guides for utility-specific definitions.

SCE	PG&E	SDG&E	Definition
Substation Name	Substation Name / ID	Substation Name	Unique ID of substation
Circuit Name	Feeder Name / ID	Feeder ID	Unique ID of circuit / feeder
Node ID / Line Section ID	Node ID / CSV Line Section	Node ID / Line Segment Number	Unique ID where the integration capacity analysis is conducted
Circuit Voltage (kV)	Nominal Voltage (kV)	Voltage (kV)	Nominal voltage of feeder or substation
Existing / Queued / Total Generation (MW)	Existing / Queued / Total DG (kW)	Existing / Queued / Total Generation (MW)	Amount of installed / queued / total (installed and queued) generation, respectively
Residential, Commercial, Industrial, Agricultural, Other (%)	Residential, Commercial, Industrial, Agricultural, Other (number)	Residential, Commercial, Industrial, Agricultural (%)	Customer class designation
Month	Month	Month	Month used in calculating the ICA value
Hour	Hour	Hour of Day	Hour used in calculating the ICA value
Load Profile Type	Load Profile	Day Type	Typical minimum and maximum load profile day type
Uniform Generation Op Flex	Generation IC	ICA Uniform Gen	Amount of generation (fixed output) that can be installed at that location without any thermal, voltage, distribution protection, or operational flexibility violations at the time the integration capacity analysis was performed.
Uniform Generation	Generation IC w/out Op Flex	ICA Uniform Gen NOF	Amount of generation (fixed output) that can be installed at that location without any thermal, voltage, or distribution protection violations (NOT considering operational flexibility) at the time the integration capacity analysis was performed.

Solar PV Op Flex	Generic PV IC	Solar PV	Amount of PV generation that can be installed at that location without any thermal, voltage, distribution protection, or operational flexibility violations at the time the integration capacity analysis was performed.
Solar PV	Generic PV IC w/out Op Flex	Solar PV NOF	Amount of PV generation that can be installed at that location without any thermal, voltage, or distribution protection violations (NOT considering operational flexibility) at the time the integration capacity analysis was performed.
Thermal	IC Thermal	ICA Thermal	Amount of generation that can be installed without causing thermal violations at the time the integration capacity analysis was performed.
SSV	IC Voltage	ICA Voltage	Amount of generation that can be installed without causing steady state voltage violations at the time the integration capacity analysis was performed.
Voltage Fluctuation		ICA Voltage Delta	Amount of generation that can be installed without causing voltage variation violation at the time the integration capacity analysis was performed.
Protection	IC Protection	ICA Protection; ICA Reduction	Amount of generation that can be installed without causing protection violations at the time the integration capacity analysis was performed.
ICA Operational Flexibility	IC Safety	ICA Operation Flex	Amount of generation that can be installed without causing reverse power flow at SCADA devices at the time the integration capacity analysis was performed.
Uniform Load	Load IC	Load Uniform	Amount of load that can be installed at that location without any thermal or voltage violations at the time the integration capacity analysis was performed.
Thermal Load	IC Thermal	Load Thermal	Amount of load that can be installed without causing thermal violations at the time the integration capacity analysis was performed.
Volt Variation Load	IC Voltage	Load Voltage	Amount of load that can be installed without causing steady state voltage violations at the time the integration capacity analysis was performed.
SSV Load			Amount of load that can be installed without causing voltage variation violation at the time the integration capacity analysis was performed.