Interactive Map and Integration Capacity Analysis User Guide

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Support Data

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 navigating the interactive map, contact us via sdgeinterconnectionmap@sdge.com.

Disclaimer

These maps are provided by SDG&E in accordance with requirements set forth by the California Public Utilities Commission. This map is not survey grade. SDG&E is not responsible for any party's use of or reliance upon these maps. SDG&E makes no warranties, express or implied, regarding the accuracy or quality of these maps. Replication of these maps is prohibited. The publication or distribution of data downloaded from the maps without SDG&E's express written consent is prohibited. SDG&E does not support the inappropriate use of this data that: (1) Puts the physical or cyber-security of the electric grid or gas pipelines at risk; (2) Violates customer privacy; (3) Compromises sensitive market data; or (4) Voids company intellectual property, patents, or trade secrets. SDG&E's provision of these maps is contingent on the above areas being unaffected. Certain technology used under license from AT&T Intellectual Property I, L.P.

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

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 with Operational Flexibility	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 without Operational Flexibility	ICA generation value, that does not account 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.
Solar Photovoltaic with Operational Flexibility	ICA generation value, that accounts for Operational Flexibility. The values shown in the map are the "final" ICA results based on Nameplate for a Fixed PV generator in MWs at 12 noon.
Solar Photovoltaic without Operational Flexibility	ICA generation value, that does not account Operational Flexibility. The values shown in the map are the "final" ICA results based on Nameplate for a Fixed PV generator in MWs 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	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 includes all downstream resources. For example, the existing generation at a 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. The queued generation includes all downstream resources. For example, queued generation at a substation includes all queued generation connected to circuits downstream.
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 circuits downstream.
Customer Type Breakdown	A representation of the total percentage of customers on the circuit in which the selected segment is connected. Types of customers: Residential, Commercial, Industrial and Agricultural.
Circuit	Entire circuit from the substation circuit breaker to the end of the line.
Line Section	Portion of a circuit bounded by SCADA device(s) and/or substation circuit breaker.
Line Segment	Portion of a circuit bounded by nodes.
Megawatt (MW)	Equivalent to 1,000 kilowatts (kW).
576 Values	Obtained by selecting 24-hour period for a typical minimum and maximum load day for each of the 12 months in a calendar year.

ICA Results Technical Criteria

ICA Limiting Criteria				
ICA Study Criteria	**Definition**	**Gen ICA**	**Load ICA**	**Data Range and Terms**
Steady State Voltage (SSV)	Max integration that can be installed without violating Rule 2 (Customer service voltage exceeding ± 5% on a 120V base.)	X	X	ICA Voltage & Load Voltage: ± 5%
Thermal	Max integration that can be installed without causing thermal overloads on equipment.	X	X	ICA Thermal & Load Thermal
Voltage Fluctuation	Max integration that can be installed without causing a voltage variation of limit.	X		ICA Voltage: + 3%
Protection	Max generation that can be installed without causing loss of end of line (EOL) visibility on our protection devices that can be hazardous to line crews.	X		ICA Protection
Operational Flexibility	Max generation that can be installed without causing reverse power flow (backfeed) at SCADA devices.	X		ICA Op-Flex

Interactive Map

Map Navigation

1 Search Bar

Type an address, city, 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 in the map to zoom out
- 2.5 Zoom in – draw a rectangle on an area in the map to zoom in
- 2.6 Panning – click and drag on the map to move the map location
- 2.7 Bulk ICA download – 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

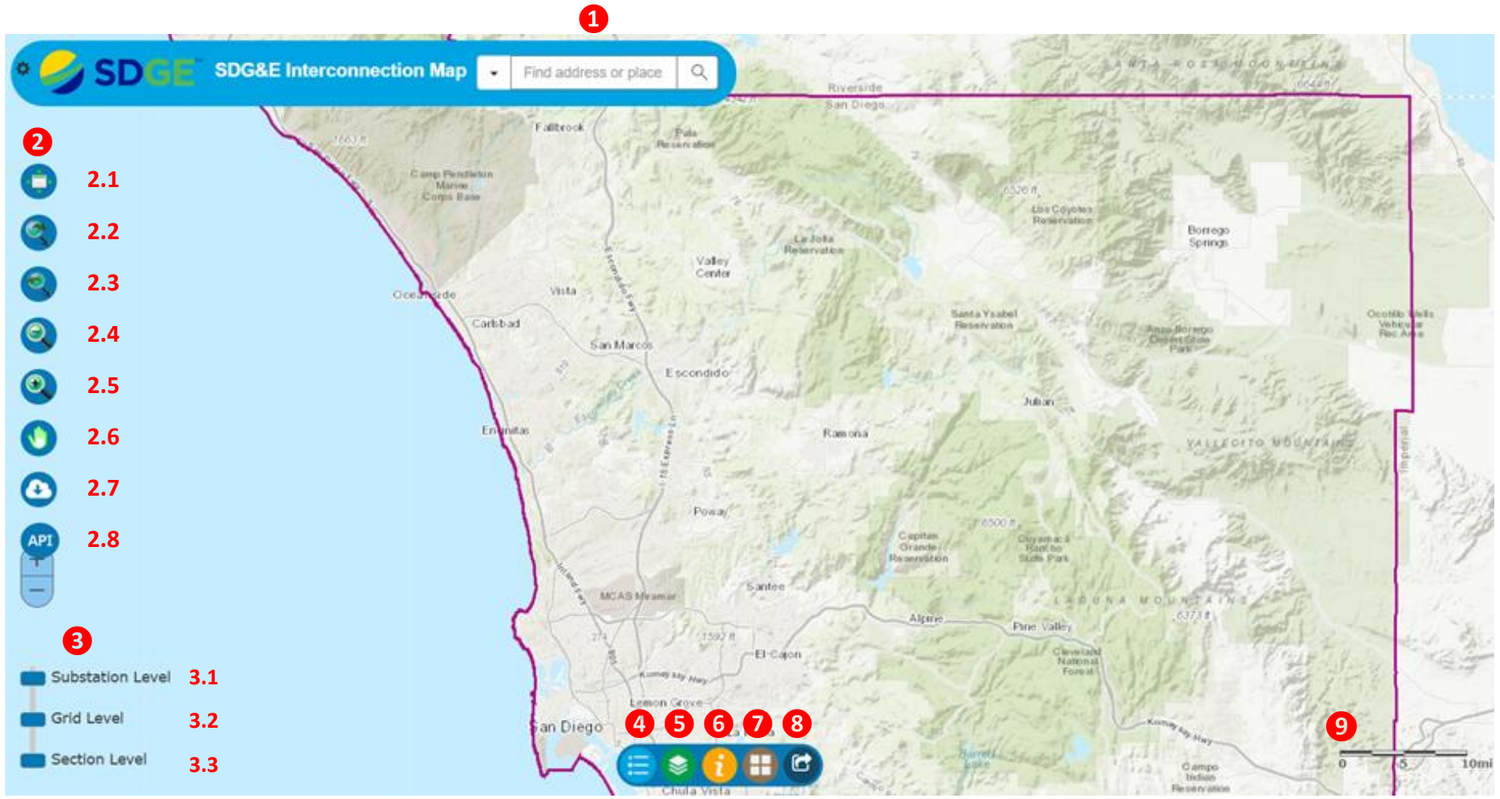
5 Layer List – click to select the desire layer to view

6 Information & User Guide

7 Base Map Gallery

8 Export Data

9 Elevation Map Display



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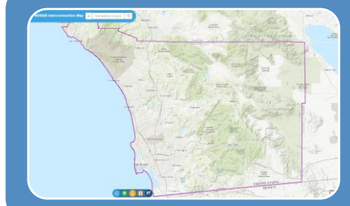
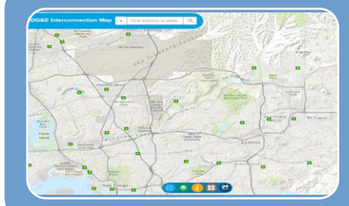
Elevation Map Display

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



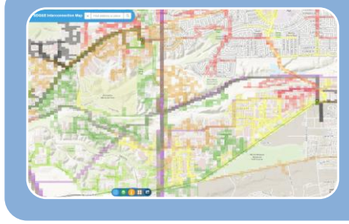
Service Territory

10 miles



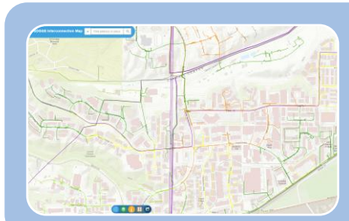
Substations

2 miles



ICA Capacity - Grid Circuit Level

0.3 miles



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

600 feet

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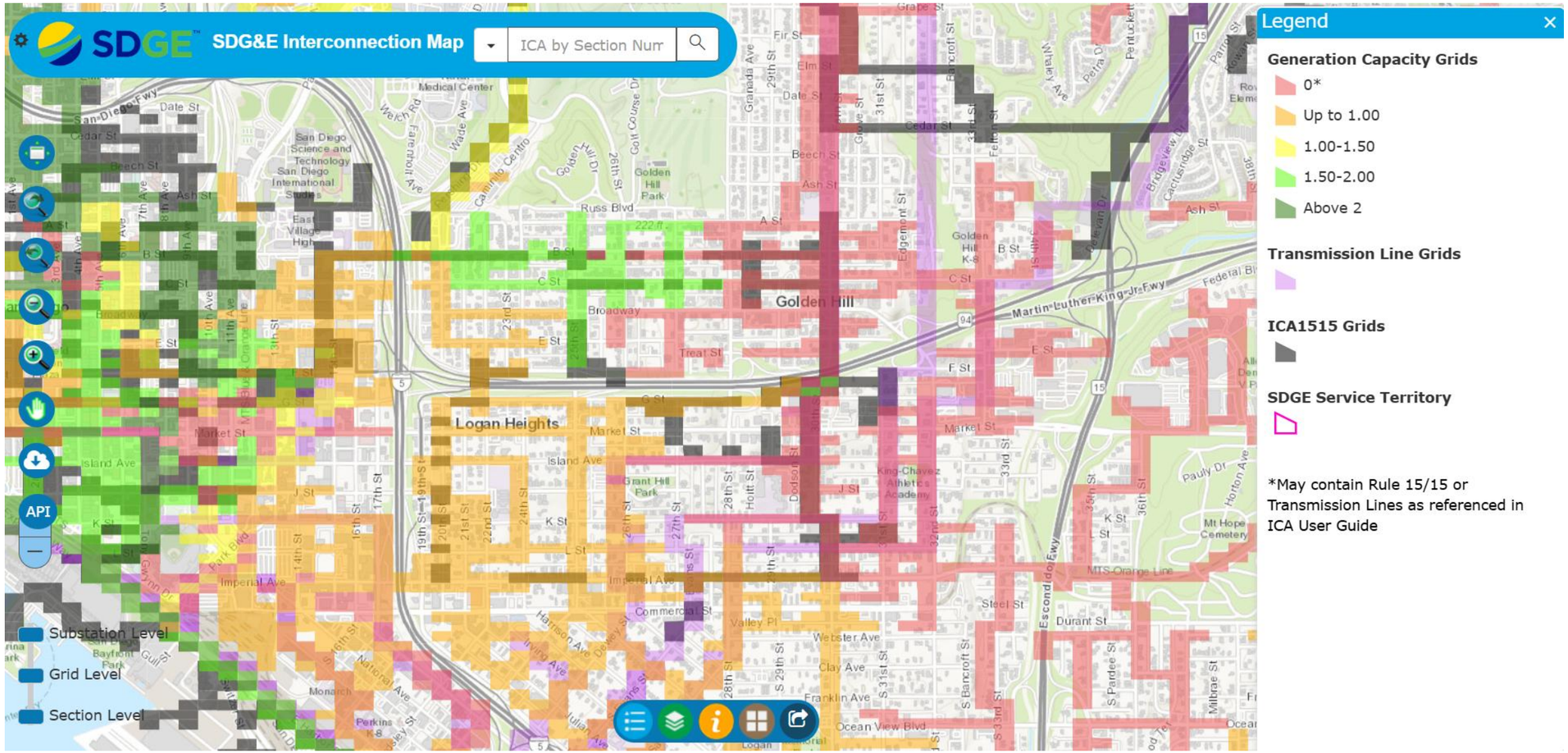
Legend

Displays what each color represents, either attribute types or value ranges indicating how many MW can be added to the selected section of the circuit.

Red colors represent areas that are at maximum capacity.

1. Click the legend to view the color coding displayed on the map.



1

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Layer List

1. Displays the list of available layers and indicates which layers have loaded data.

   Click to select the layer of interest.

2. A window will appear on the right showing the different layers that can be selected.

   Only one layer may be selected at a time.

   If a layer has a checkmark, it is turned on (visible).

   The map will be colored according to the selected layer.

   The default layer is ICA Generation Capacity.

Layers Descriptions

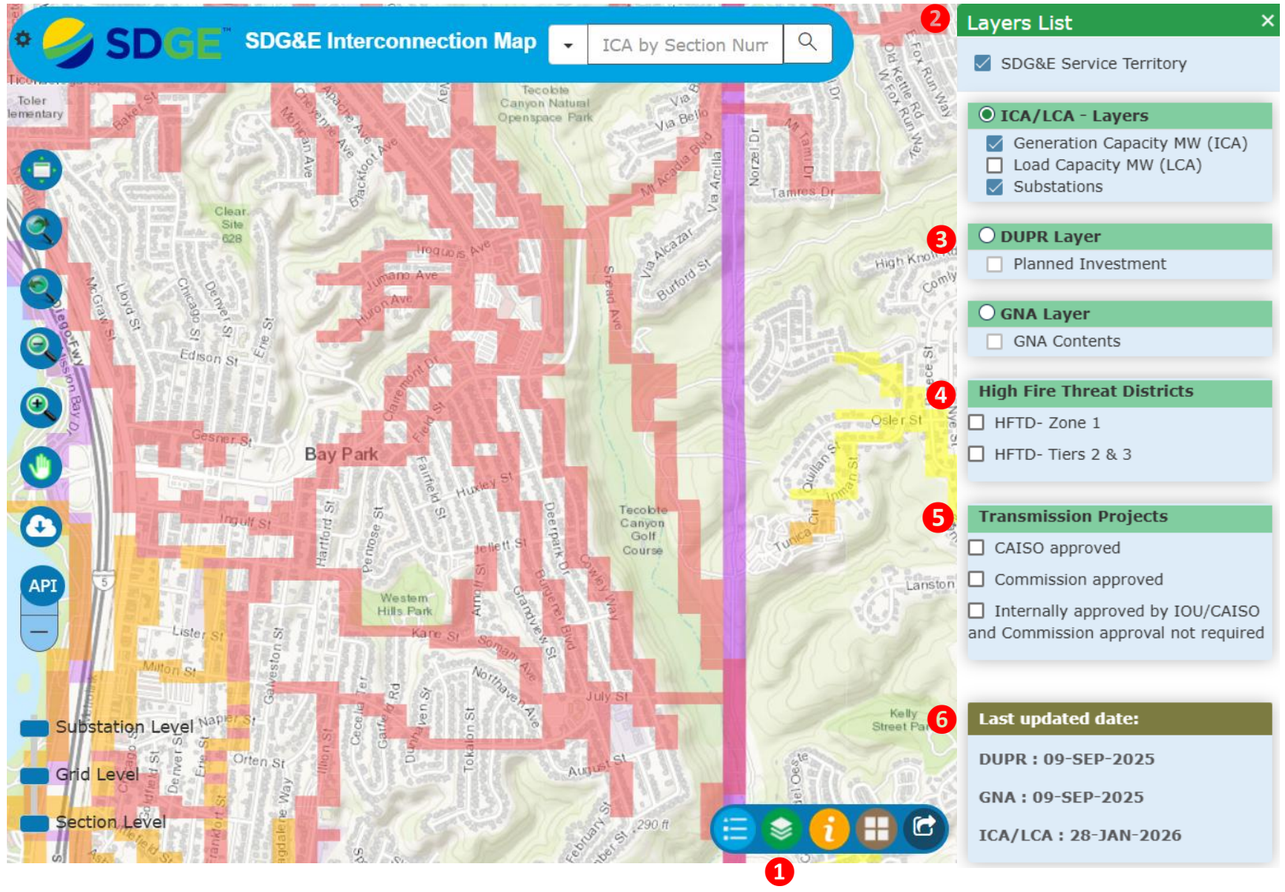
SDG&E Service Territory – A detailed area served by San Diego Gas & Electric.

Generation Capacity (MW) Layer – Information on how much generation capacity is available to connect to a circuit line section in MW.

Load Capacity (MW) Layer – Information on how much load capacity is available to connect to a circuit line section in MW.

Substations Layer – Overall information and location for Distribution Substations.

3. For more information on the **GNA and DUPR** layers, reference the *GNA/DUPR User guide.*
4. High Fire Threat District overlay
5. Transmission Projects overlay
6. Last time the map layers were updated



Layer Display Information

Substation Layer

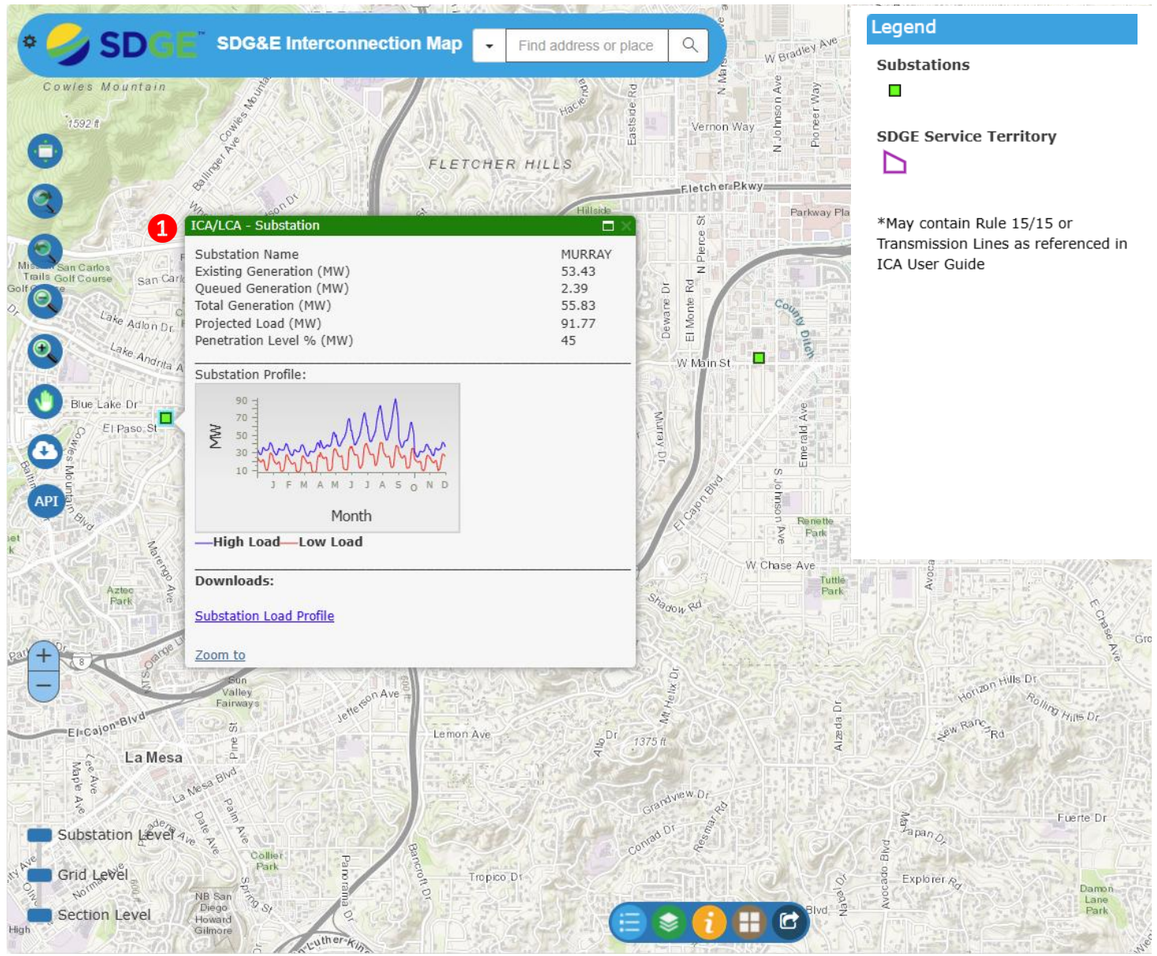
This layer loads at the 2-mile zoom level.

1. Click on any substation (colored square) to open the ICA/LCA - Substation pop-up window, which displays the following information for the selected substation:
    - Substation Information: Substation Name, Existing Generation (MW), Queued Generation (MW), Total Generation (MW), Projected Load (MW), Penetration Level (MW).
    - Substation Load Profile: Displays the forecasted high and low monthly load for the substation, measured in MW.
    - *Downloads: click “Substation Load Profile” to download the hour-by-hour load dataset (576 values) for the selected substation.

      *See download section for more information

NOTES:

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



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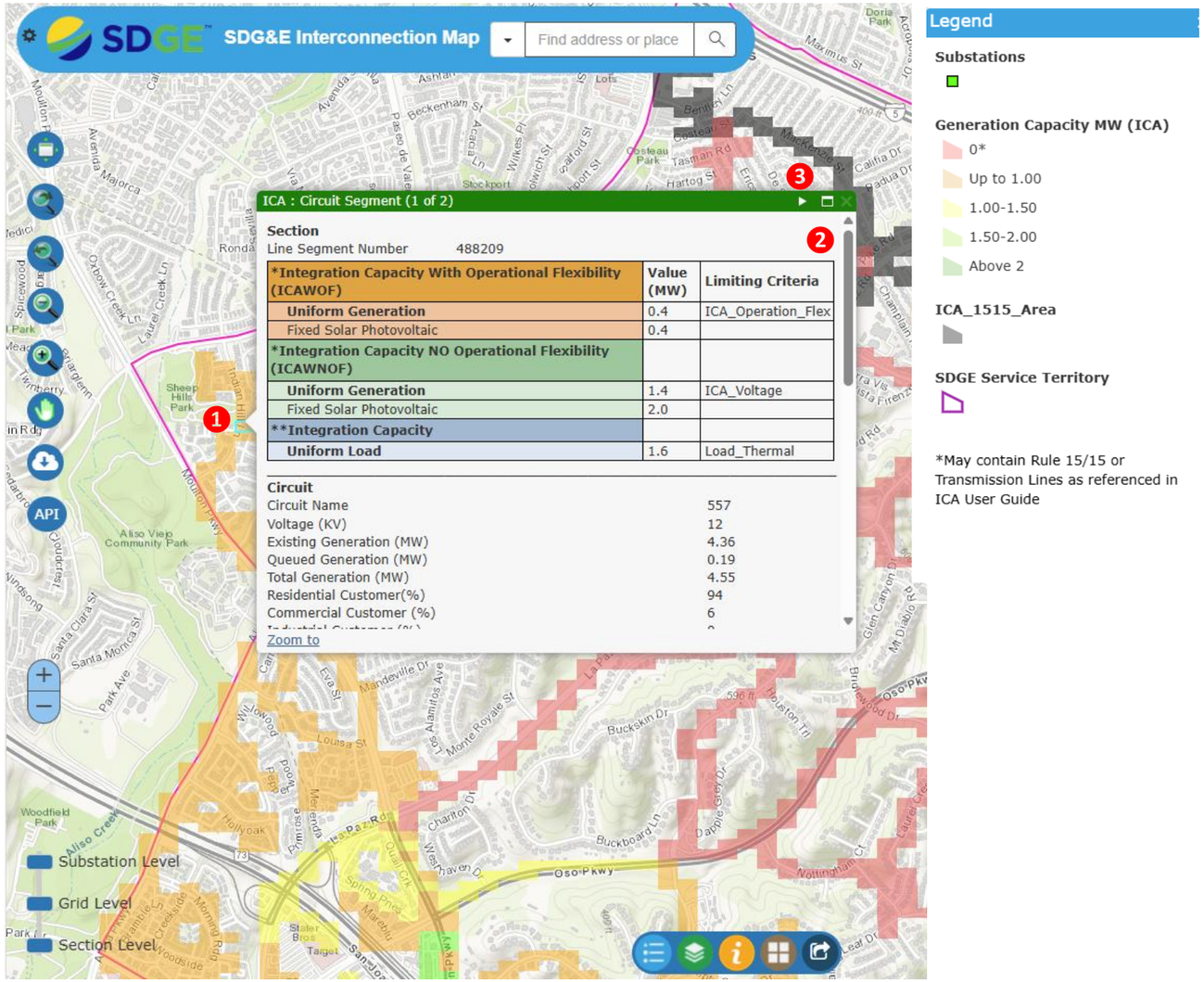
Circuit Layer

This layer loads at the 0.3-mile zoom level.

1. Click on any of the grids to open the ICA : Circuit Segment pop-up window, which displays the following information:
   - ICA Results: Line Segment Number, Uniform Generation With 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 Information: Substation Name
   - Circuit Load Profile: Displays the forecasted high and low monthly load for the circuit, measured in MW
   - *Downloads: Circuit Load Profile, ICA Results, LGP Template

   *See download section for more information
2. Scroll down to see all the available information on the pop-up.
3. If more than one section is included in the grid, you can toggle between the different line sections by clicking the symbol.



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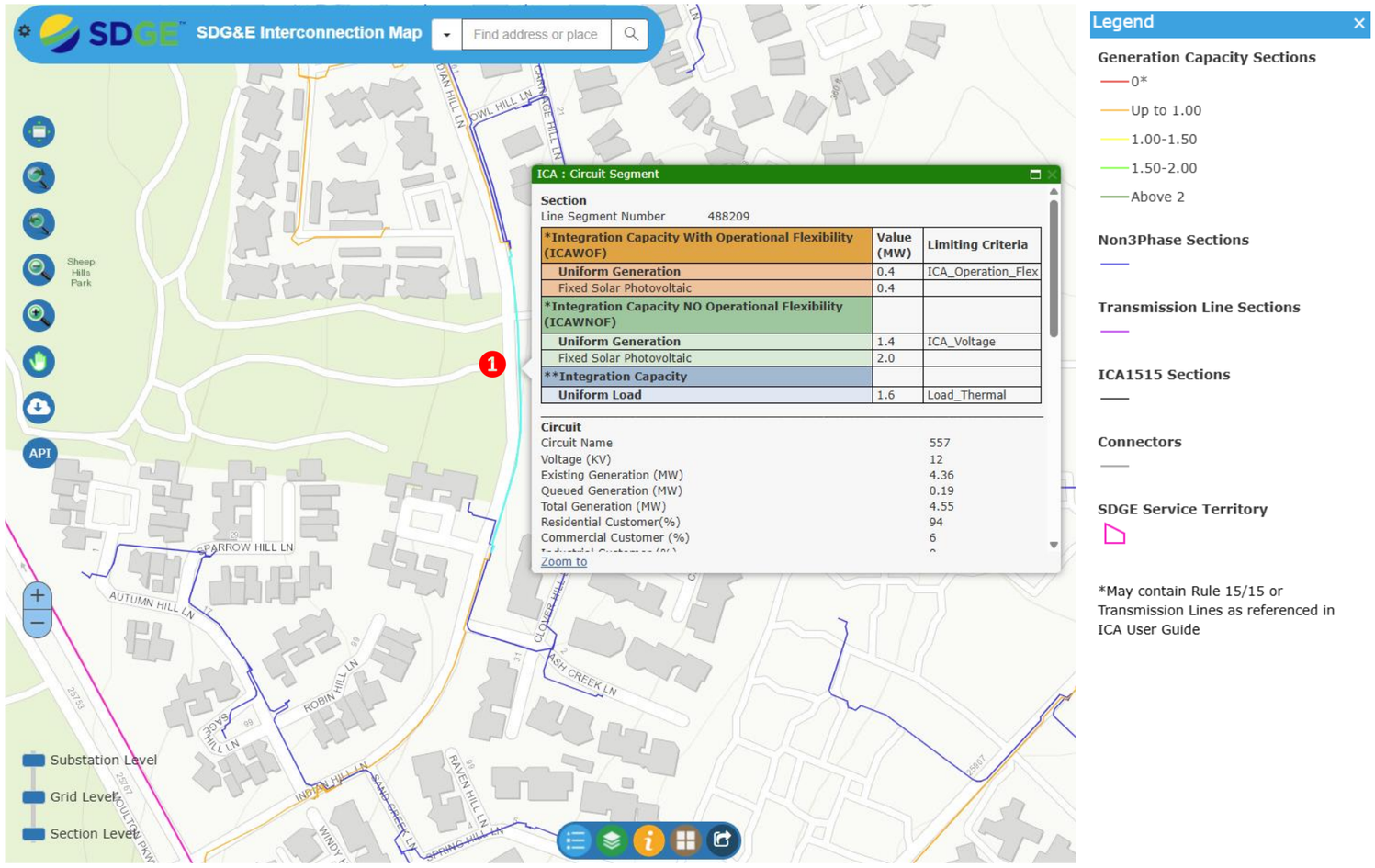
Line Segment Layer

This layer loads at the 600-ft zoom level.

1. Click on any of the colored line sections to open a pop-up window.

   ICA : Circuit Segment – The information tab will display the same information shown at the circuit level.

   See the previous page for details on the information displayed.



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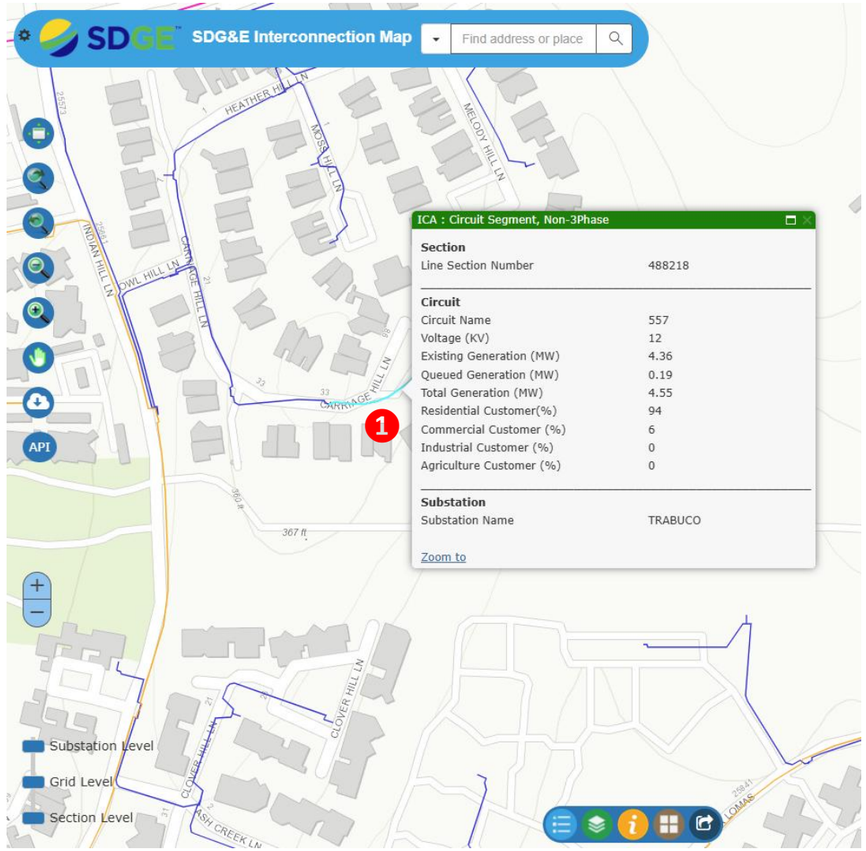
Non-3Phase Circuit Segments

1 Click on the Non-3Phase line segments color (shown in blue) to open a pop-up window titled ICA: Circuit Segment, Non-3Phase, which displays the following information:

- Section: Line Section Number
- 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 Information: Substation Name



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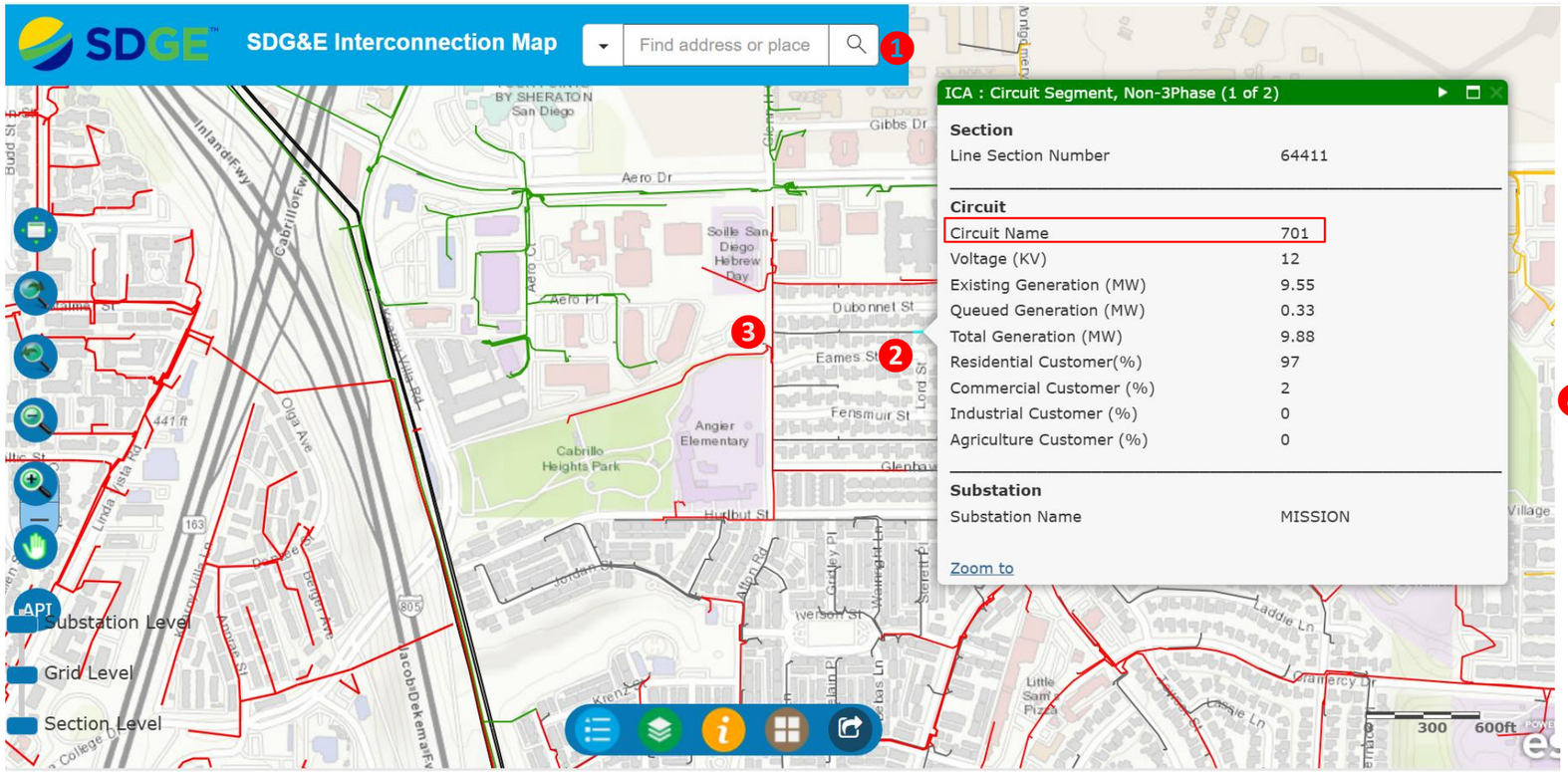
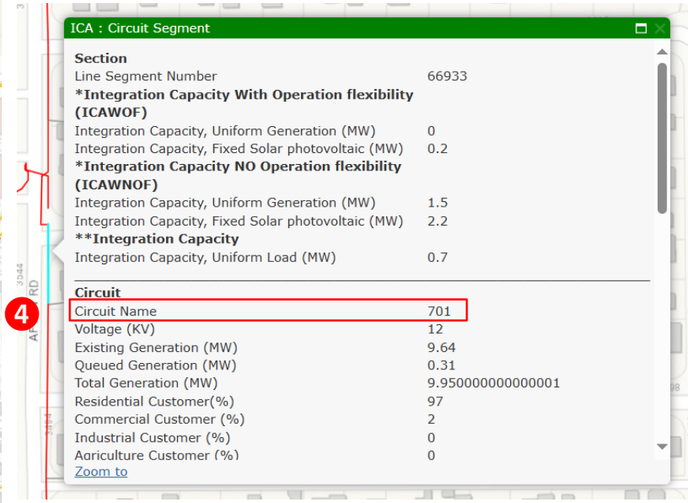
How to Trace Non-3Phase Line Segments Back to Their Upstream Three-Phase Line Segment

Steps

1. Enter an address.
2. Click on the Non-3Phase section to open a pop-up window displaying the circuit information.
3. Trace upstream to the 3-Phase line segment and zoom in to closely examine where the Non-3Phase section connects to the 3-Phase line segment.
4. Click on the 3-Phase line segment to view its information. Cross-reference it with the circuit of the Non-3Phase line segment. If the circuit matches, that is the ICA capacity available closest to the Non-3Phase section.





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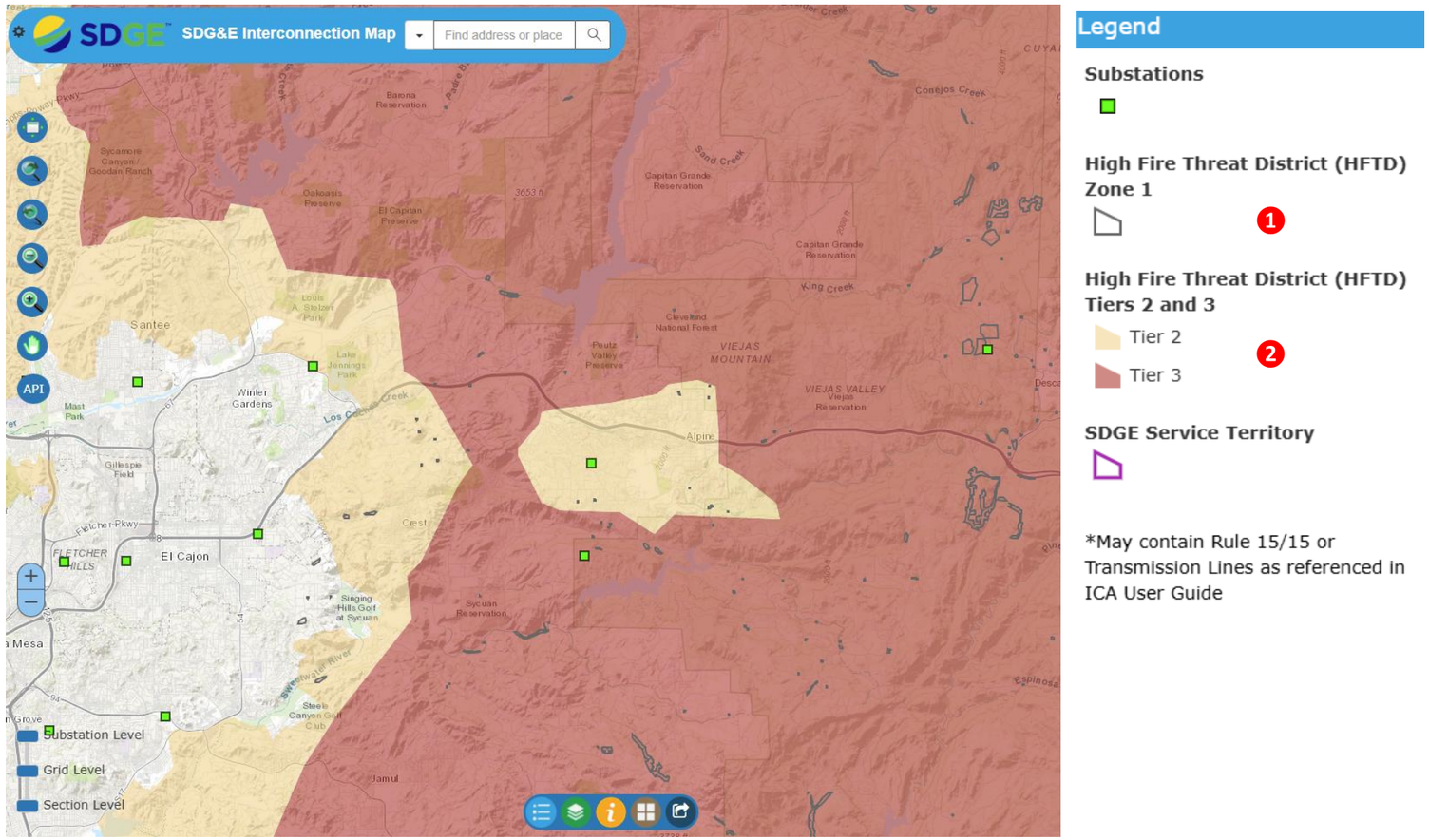
High Fire Threat District (HFTD) Overlay

This overlay allows users to view fire-threat and tree-mortality data.

1. Black-outlined regions indicate tree-mortality data.
2. Yellow regions indicate HFTD Tier 2 areas, and red regions indicate HFTD Tier 3 areas.



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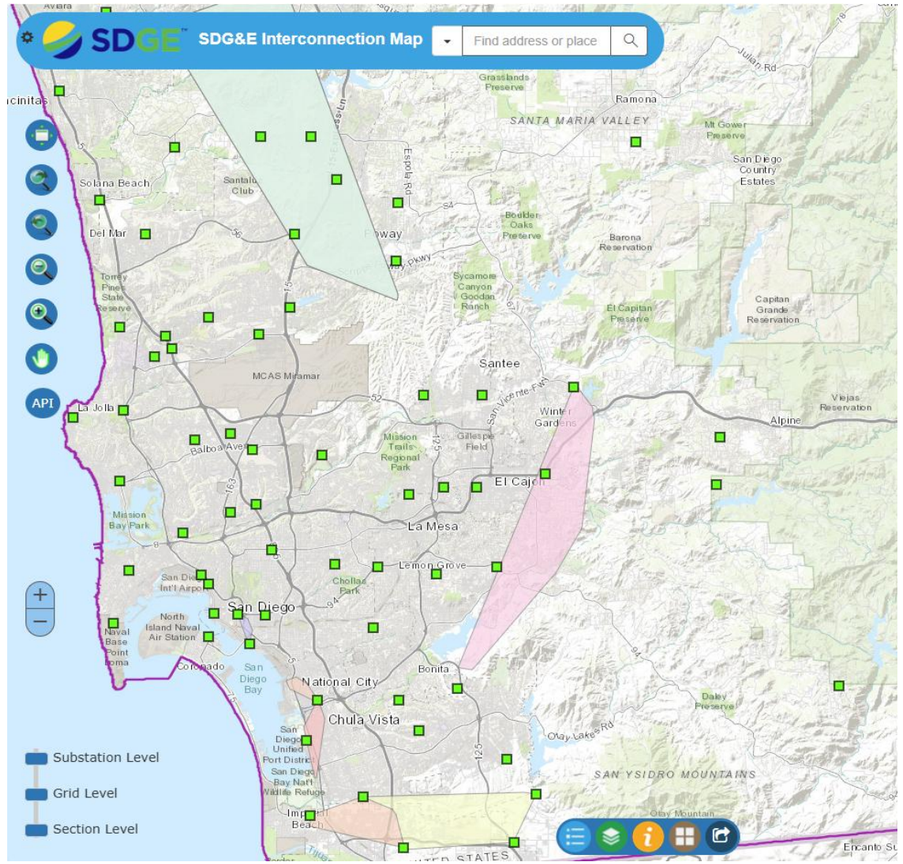
Transmission Projects Overlay

SDG&E is including a sortable layer that displays planned transmission projects whose primary drivers are comparable to the four distribution services identified by the Commission as eligible for deferral by DERs.

1. Regions indicate CAISO-approved transmission projects.
2. Regions indicate Commission-approved transmission projects.
3. Regions indicate internally approved by the IOU/CAISO (Commission approval not required) transmission projects.

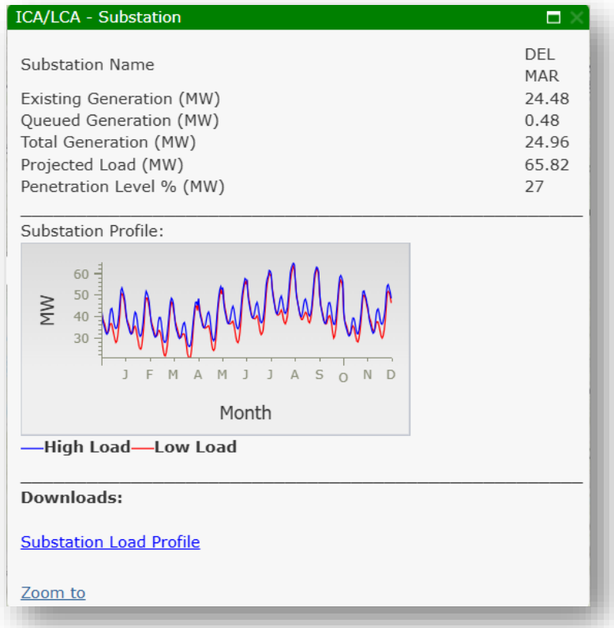


Downloads

Substation Layer

1. Click on the *"Substation Load Profile"* link.
2. A zip file will be downloaded containing a CSV file with the selected substation's load profile.
3. The file will contain the following information:
    - Asset Name: Substation Name
    - Asset Type: Substation
    - DER Forecast: Base (current year)
    - Month
    - Load Day: High Load/Low Load
    - Units: kW
    - Hours: 1-24

1



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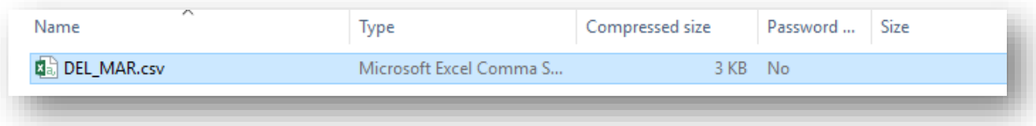

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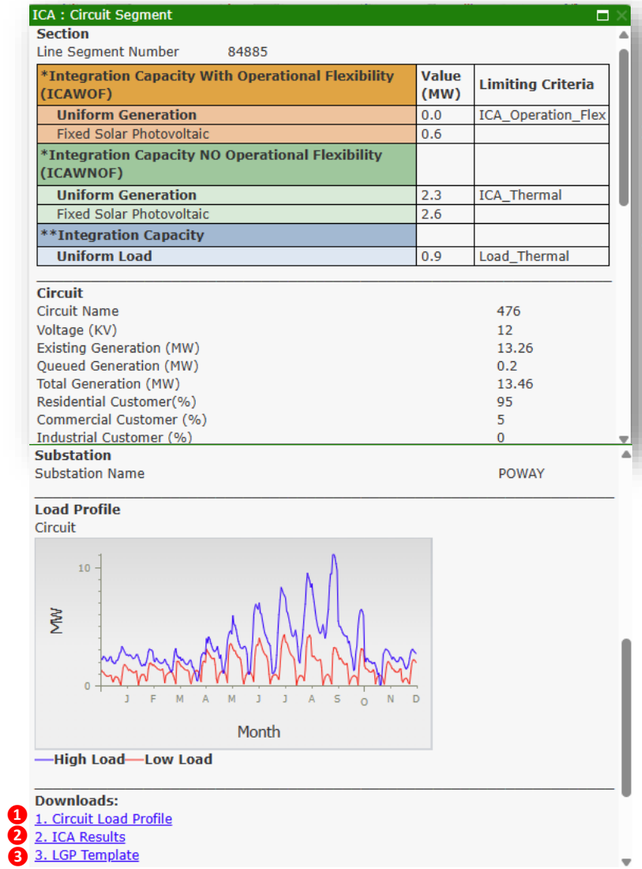
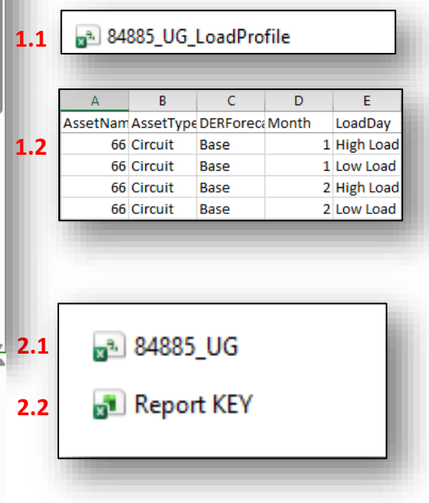
A	B	C	D	E	F	G	H
AssetNam	AssetType	DERForeca	Month	LoadDay	Units	hour 1	hour 2
DEL MAR	Substatior	Base	1	High Load	KW	33820.25	30526.88
DEL MAR	Substatior	Base	1	Low Load	KW	28728.55	25702.17
DEL MAR	Substatior	Base	2	High Load	KW	32940.22	30106.32
DEL MAR	Substatior	Base	2	Low Load	KW	29077.81	26152.14

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

Grid and Section Level Layer

1. Click on the *"Circuit Load Profile"* link for the circuit feeding the selected section.
   - 1.1 A zip file will be downloaded containing a CSV file with the selected section's feeder load profile
   - 1.2 The file will contain the following information:
     - Asset Name: Circuit Name
     - Asset Type: Circuit
     - DER Forecast: Base (current year)
     - Month
     - Load Day: High Load/Low Load
     - Units: kW
     - Hours: 1-24
2. Click on the "ICA Results" link to download the following files:
   - 2.1 **Section.csv** - contains hour-by-hour (576) ICA values for the selected section, showing the different power-system criteria.
   - 2.2 **Report Key.xlsx** - describes the Excel table headers used in the hour-by-hour reports.
3. Click to download "LGP Template"
   - For any questions about the Limited Generation Profile (LGP) application, please email netmetering@sdge.com.





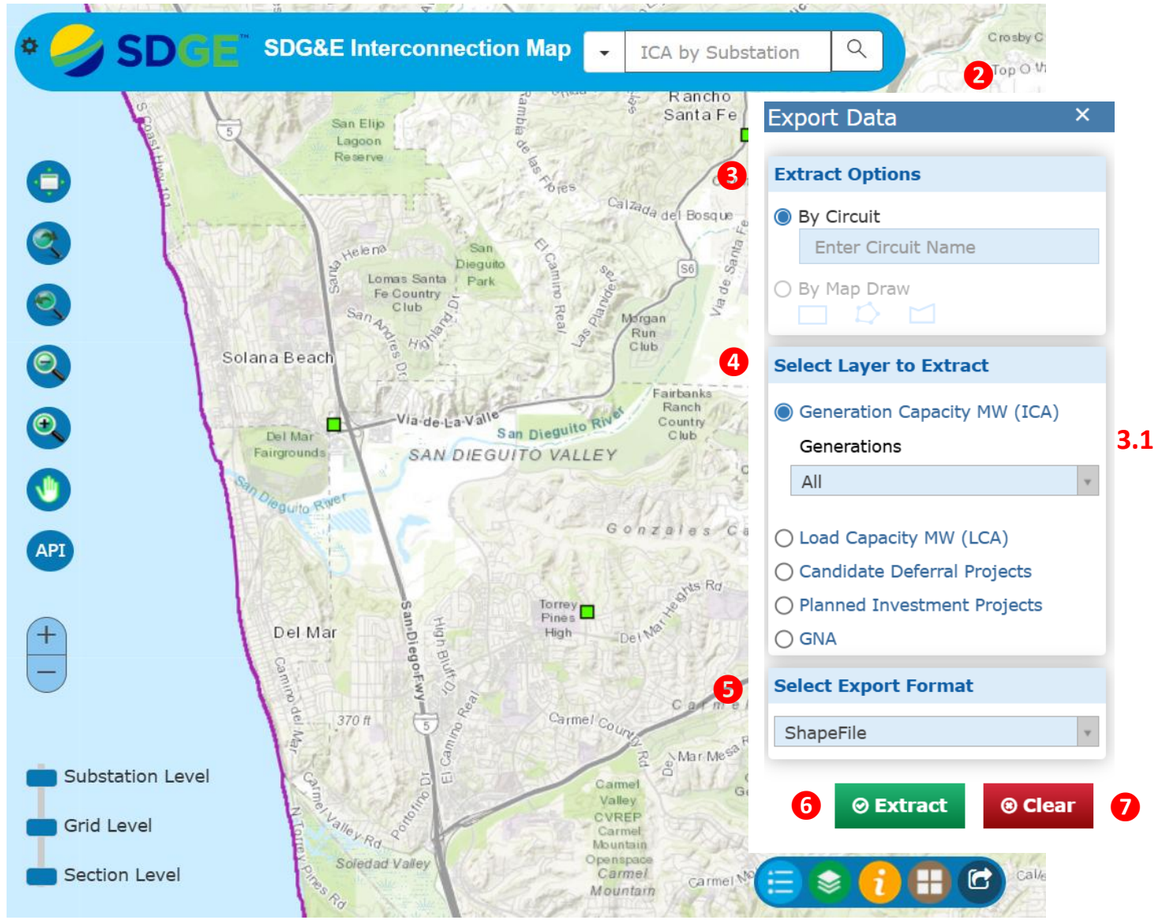
SDG&E Interactive Map and Integration Capacity Analysis (ICA) User Guide

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 desired feeder to download data for the entire circuit.
4. Select one of the layers to extract:
   - **Generation Capacity and Load Capacity MW (ICA/LCA)** – Downloads the maximum amount of capacity available to connect to the distribution system.
     - 3.1 You can select which MW range to download. Options include:
       - All
       - 0
       - Up to 1
       - 1-1.5
       - 1.5-2
       - Above 2
5. Select the export format
   - **Shapefile**
   - **CSV**
   - **JSON**
6. Click to export the data
7. Click “Clear” to run a new query

Note:

For information on Planned Investment and GNA layers, Refer to the *GNA/DUPR 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.