



# Leveraging GIS in the Mining Industry

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# Safety Share – Summer Work

- **These tips can help prevent dangerous – or even DEADLY– heat-related symptoms:**
- Provide a work-rest regimen – acclimatization over an initial one- to two-week period, then frequent breaks and reasonably short work periods.
- Pace tasks to avoid exhaustion.
- Perform heavy tasks in cooler areas or at cooler times.
- Rotate personnel on hot jobs.
- Provide readily accessible cooler rest areas – 50 to 60 F (10 to 15 C).
- Provide cool drinking water 50 to 60 F (10 to 15 C) near workers at all times.
- Encourage or require all workers to drink a cup of water every 15 to 20 minutes.
- Avoid drinks with caffeine, alcohol and large amounts of sugar.
- Drink lightly salted water (one level tablespoon of salt per 15 quarts of water for general use).
- Caution against drinking extreme amounts of water; generally, no more than 12 quarts over a 24-hour period.
- Provide sunblock and proper protective clothing for individuals working in the sun.

• Source: US Dept. of Labor



**BURGEX**  
MINING CONSULTANTS



**MINERALOCITY**  
BY BURGEX INC.  
**MINING MADE VISIBLE**

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## Our Purpose:

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At Burgex, our purpose is to advance toward a sustainable future. To us, this means that future generations have the same or better quality of life compared to what we experience today. This depends on responsible mining and the ability to advance mineral exploration projects in the US.

# Why is GIS so important in the Mining Industry?

- Location is Everything!
- Mining plays a critical role in the building and sustaining of infrastructure, energy generation and distribution, and essentially everything we rely on now and in the future.
- Domestic supply of the critical minerals we rely on is more important now than ever.
- Miners , aggregate producers, downstream industries and suppliers to the industry depend on geospatially favorable locations for strategic decision making.



# Mapping Mines Across the United States

We intake data sources (including MSHA) and map mines across the US, utilizing various satellite imagery to validate Mining Operations.



## MINERALOCITY

BY BURGEX INC.

### MINING MADE VISIBLE

[Map Viewer](#)

**Analytics Page**



Information

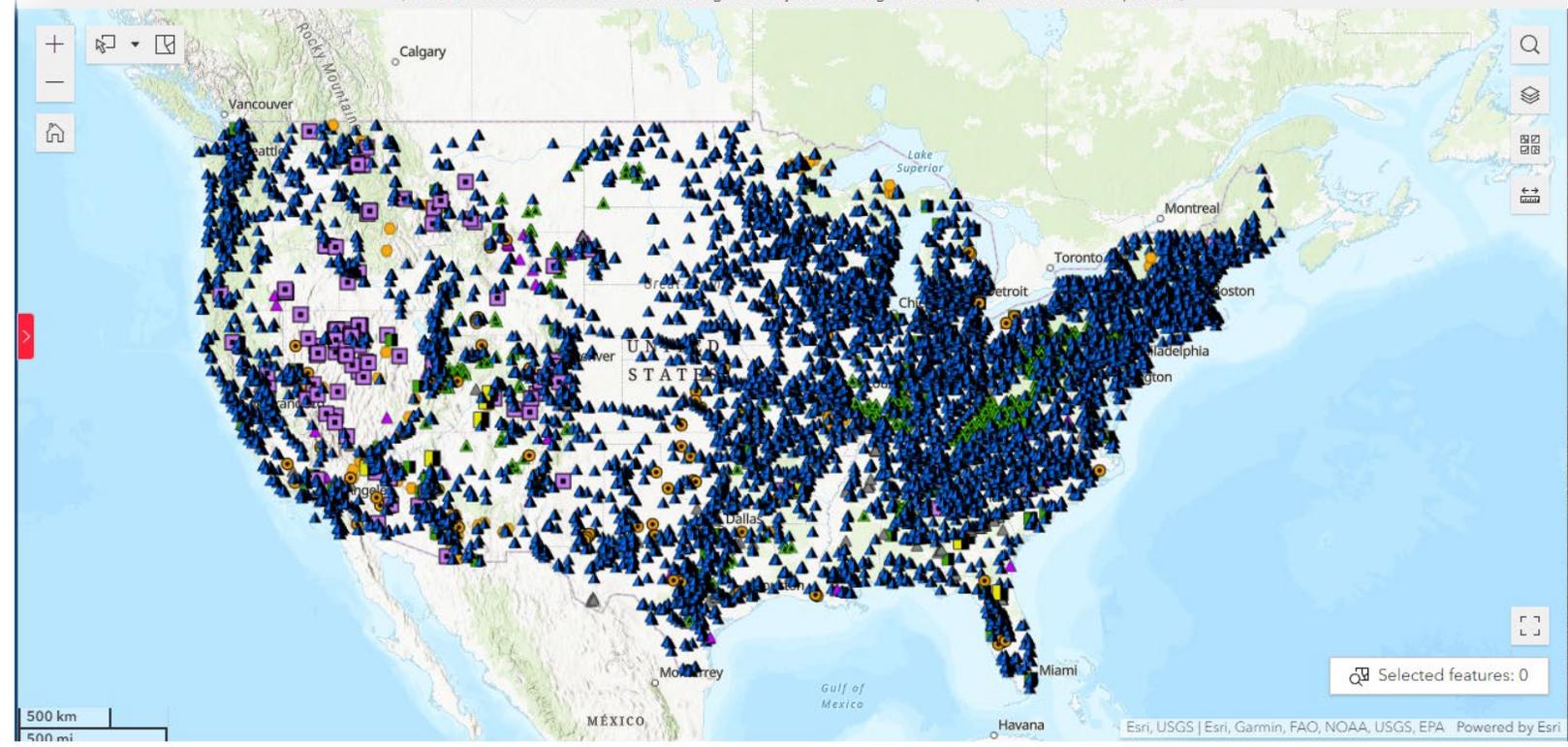
Drive Time Analysis

REGRID Parcel Data

[Data Summary](#) | [Filter](#) | [Legend](#) | [Export \(CSV\)](#)

**MOVE TO AREA OF INTEREST**

(The fields and text boxes as shown on the right will adjust according to what is captured within the map visual.)



**Data** | Charts

Estimated 2023 Population within map:  
**(Compiling Data)**

Estimated 2028 Population Forecast within map:  
**(Compiling Data)**

**Construction Aggregate Mines**  
7,012

**Base Metal Mines**  
79

**Precious Metal Mines**  
124

**Coal and Energy Minerals**  
891

**Rare Earths and Specialty Metals**  
13

**Cement and Lime**  
162

**Industrial Minerals**

**Dimension Stones**



# A place to see all Significant Operations

We then incorporate added data to give insight to the market.

- Population / 5 Year Forecast
- General Geology / Surficial Geology
- Drivetime Analysis
- Parcel Data

With added filtering and exporting options to see what you want to see.

The screenshot displays the MINERALCITY web application interface. At the top, there are navigation tabs for Home, Map Viewer, and Analytics Page. Below the navigation is a header for 'AREA OF INTEREST' with sub-sections for Geology Information, Drive Time Analysis, and REGRID Parcel Data. The main map area shows a heatmap overlay on a topographic map of Utah, with a text box indicating 'MOVE TO AREA OF INTEREST'. To the right of the map is a sidebar with a 'REGRID Parcel Data' section containing a table of population and mineral data:

Data	Charts
Estimated 2023 Population within map: 2,054,272	Estimated 2028 Population Forecast within map: 2,231,901
Construction Aggregate Mines: 47	Base Metal Mines: 3
Precious Metal Mines: 0	Coal and Energy Minerals: 0
Rare Earths and Specialty Metals: 0	Cement and Lime: 0
Industrial Minerals: 0	Dimension Stones: 0

Below the population data is a 'General Geologic Bodies' section with a table of geologic information:

Feature Info	Legend
<b>General Geologic Bodies</b>	
Laguna Springs Latite, Tintic Mountain Group, Packard Quartz Latite, and Apex Conglomerate	
STATE	UT
Geologic Unit Name	Laguna Springs Latite, Tintic Mountain Group, Packard Quartz Latite, and Apex Conglomerate
Geologic Unit Age (MIN)	Phanerozoic - Cenozoic - Tertiary, Paleogene - Oligocene
Geologic Unit Age (MAX)	Phanerozoic - Cenozoic - Tertiary, Paleogene - Late Eocene
1st Major Geologic Type	Latite
2nd Major Geologic Type	Quartz latite
3rd Major Geologic Type	
1st Minor Geologic Type	Conglomerate
2nd Minor Geologic Type	
3rd Minor Geologic Type	
Incidental Geology	
Indeterministic Geology	
Generalized Geology	Igneous, volcanic
Geologic Documentation	View

At the bottom of the interface, there is a search bar and a legend for the map. The legend includes the following items:

- Base Metals
- Cement and Lime
- Clays and Shales
- Coal and Energy Minerals
- Construction Aggregates
- Fertilizer Minerals
- Industrial Minerals

The bottom map shows a larger view of the United States with various colored markers indicating significant operations across the country.

# Construction Aggregates Consumption in the U.S.

## One Year of Crushed Stone, Sand & Gravel Consumption in the U.S.

Aggregates, which include raw materials such as sand, gravel and stone, are the building blocks of our cities and an integral part of the U.S. economy.

**How much of these materials will the U.S. consume in 2023?**

On average, each American will consume 8.5 tons of aggregates in 2023.

This visualization was created using the following density data:

 Crushed stone  
100 lb/ft<sup>3</sup>

 Sand & gravel  
120 lb/ft<sup>3</sup>



### Market Intelligence Made Simple

This visualization was produced using 2023 forecast data from **Mineralocity Aggregates**, the leading platform for construction aggregate mineral market intelligence in the U.S.

Mineralocity equips construction aggregate producers, suppliers of the industry, contractors and governmental and private analysts with actionable mineral market analysis research.



Learn more about  
Mineralocity Aggregates  
on [mineralocity.com](https://mineralocity.com)

# Leveraging GIS in Construction Aggregates

## Location is Everything.

- Construction aggregates are essential to urban and rural development as they are a cornerstone ingredient to road and infrastructure construction and maintenance.
- In many areas of the US, aggregate reserves are being depleted and existing operations are reaching end of life.
- Combined with increasing population (demand) results in the need for greenfield expansion.
- Aggregates being both cheap and heavy, the cost of transportation is high and directly impacts development projects fiscally and environmentally when not mined locally.
- Additionally, suppliers to the industry need to efficiently serve the needs of their clients in both metropolitan and rural areas.

These conditions make GIS analytics the perfect vehicle for market analysis and decision making.

# Mineralocity Aggregates

Burgex taking its Aggregate Market Analysis Process to a Nation-Wide Scale.



INCORPORATE OUR  
ANALYTIC PROCESS



INTERPOLATE DATA ON  
MASS SCALE



ANALYZE NEW INSIGHTS  
AND OUTCOMES



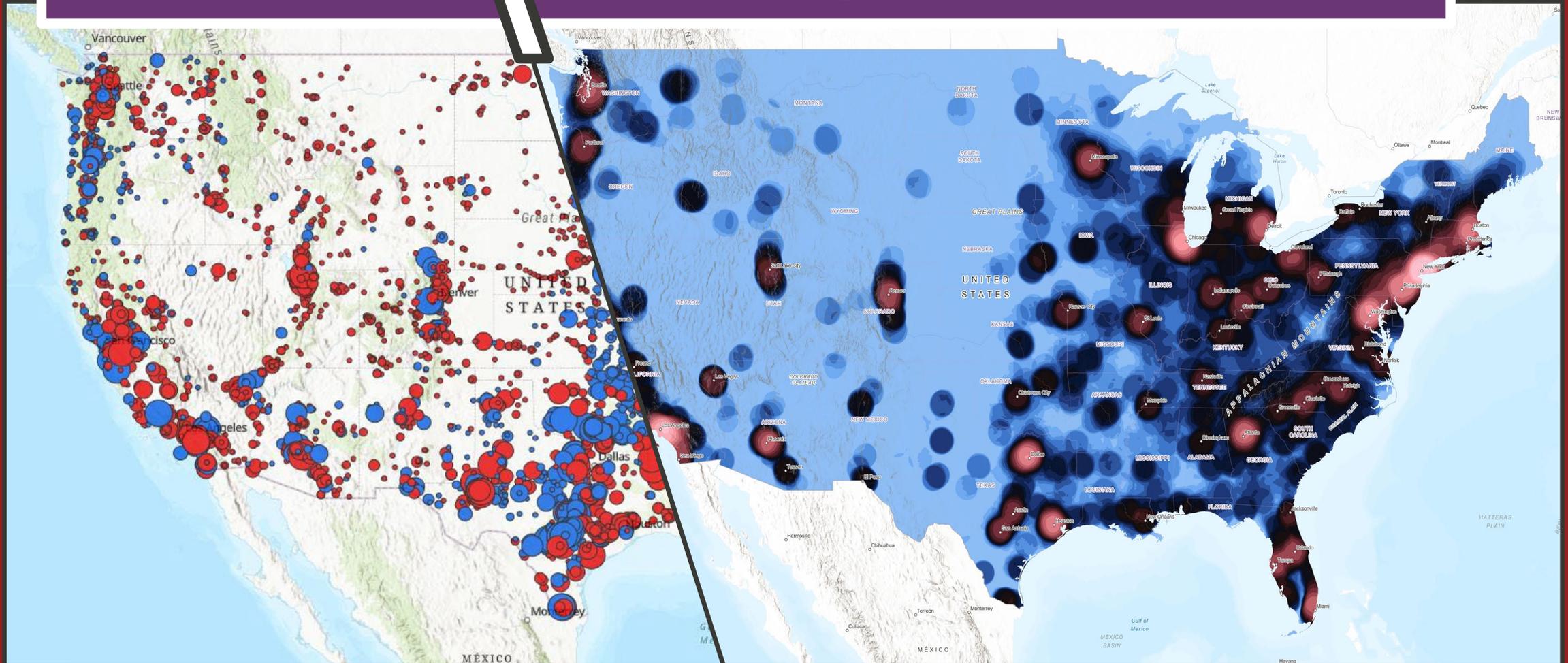
BRINGING IT TO THE  
RIGHT PLATFORM

# Mapping the Data

Capturing producers and population across the United States.

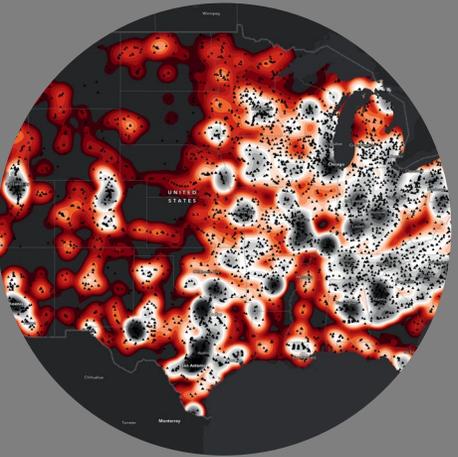
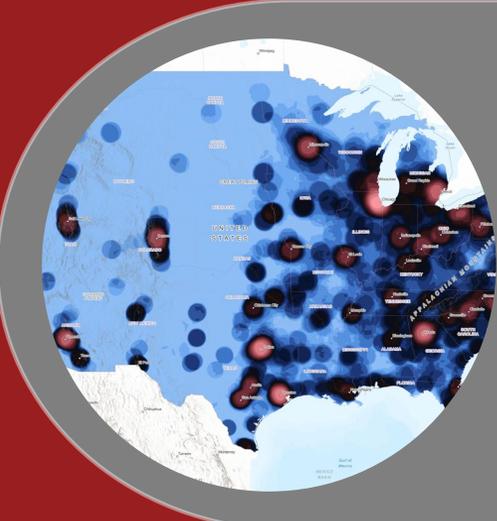
Aggregate Producers

Population Integration / Per Capita Demand



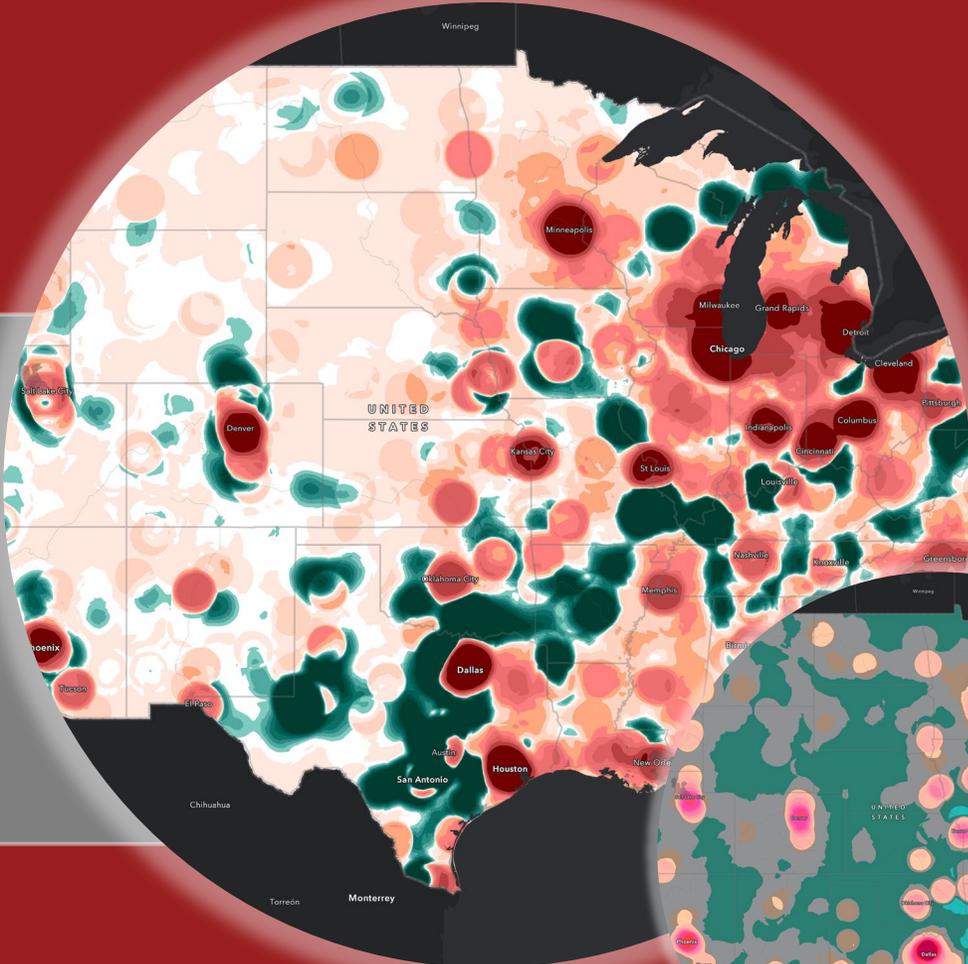
# Market Generation

Applied Market Parameter metrics to the data and generated Demand and Supply layers – then observed the differences.

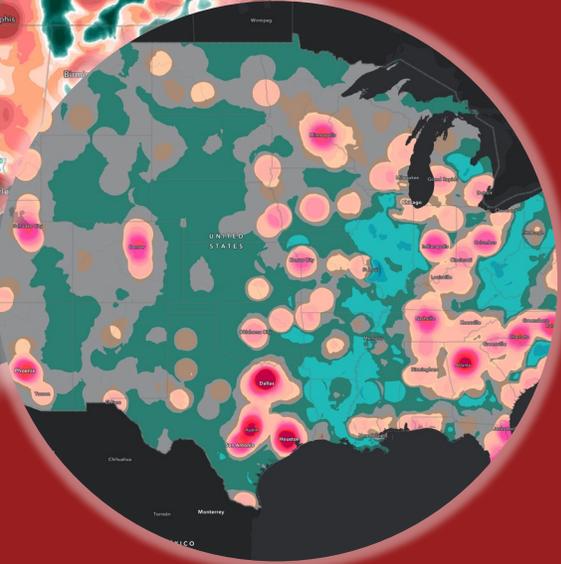


Demand (Estimated Population and Forecasted Population with Per-Capita calculated for every half mile)

Supply (Estimated Aggregate Production)



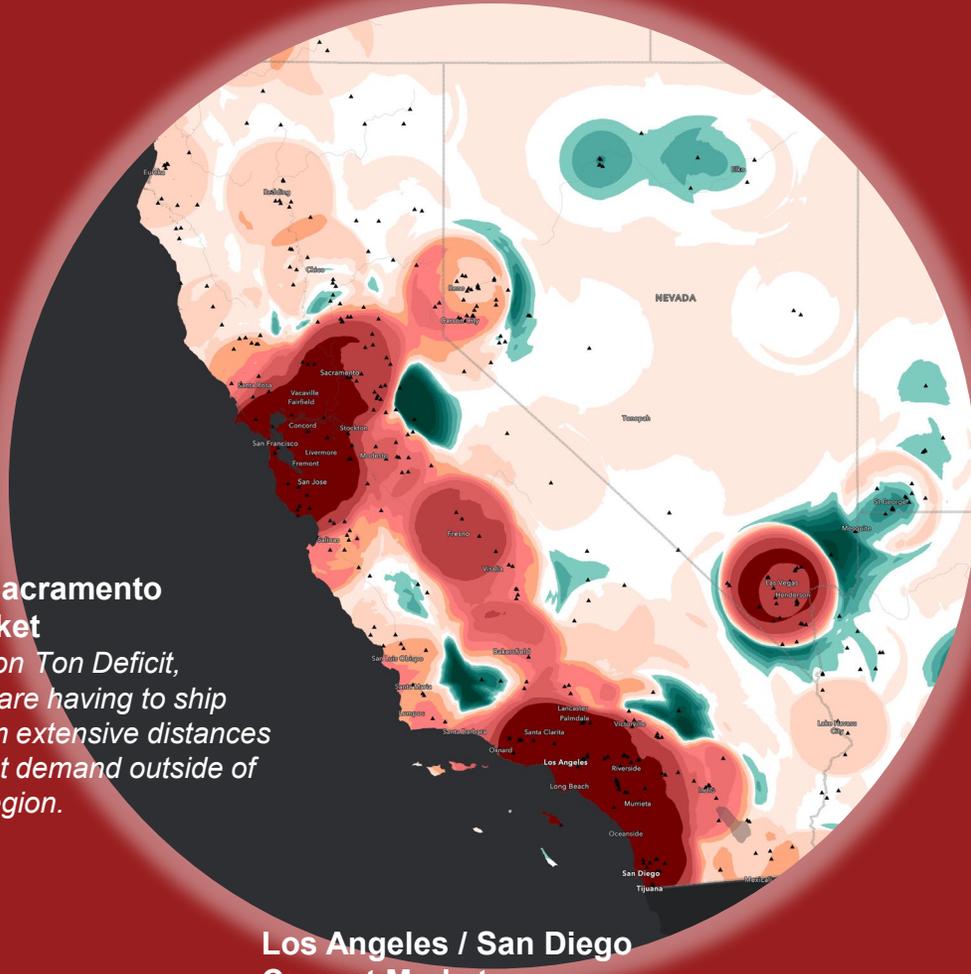
A visual representing estimated surplus / deficit regions at market scale for every half-mile.



A 5-year forecast of aggregate demand change at market-scale based on population forecast.

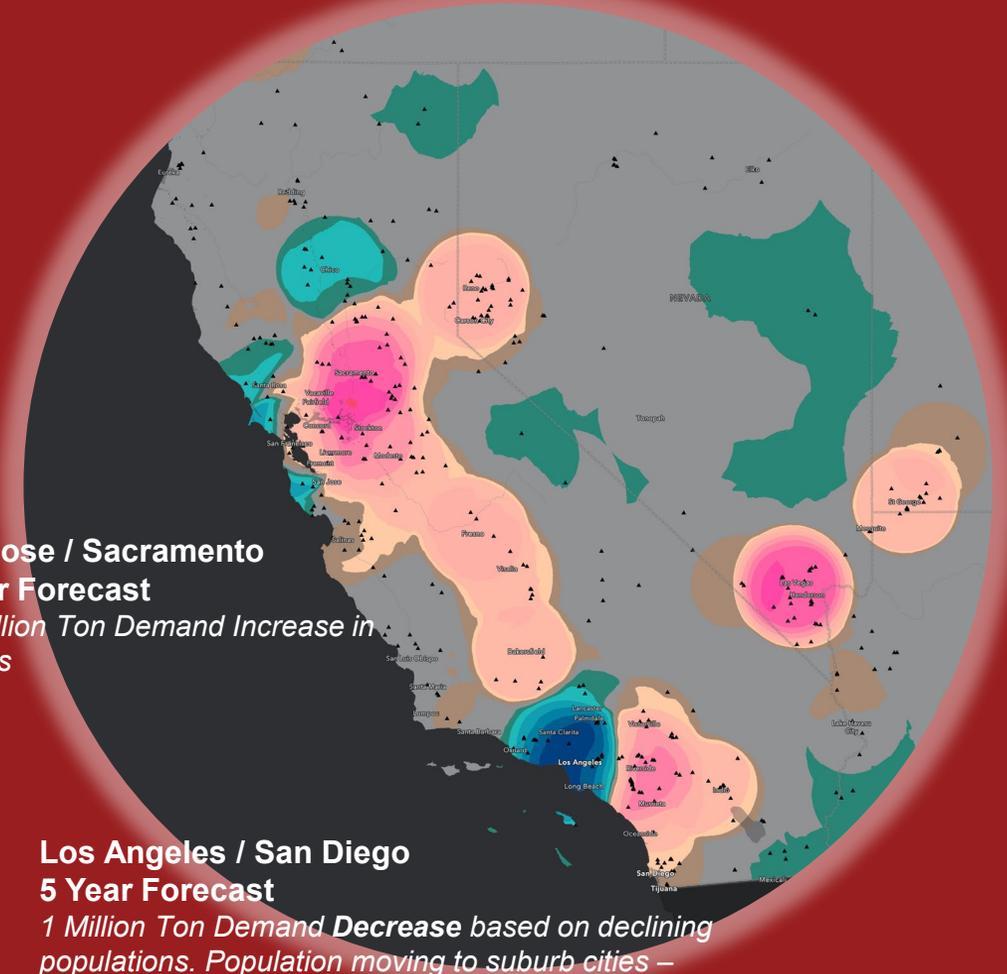
# Case Study: California

Observing California's Markets based on Local Supply / Demand Estimates and Forecasts.



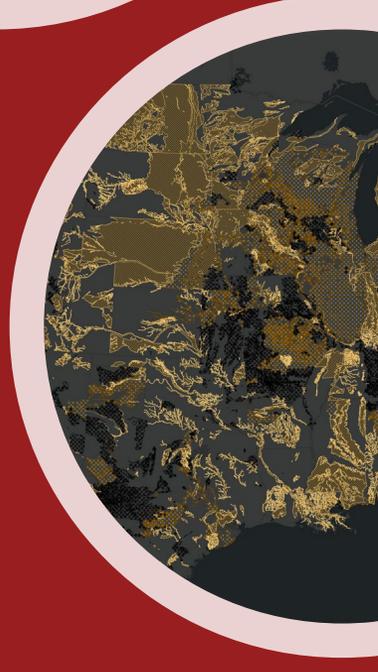
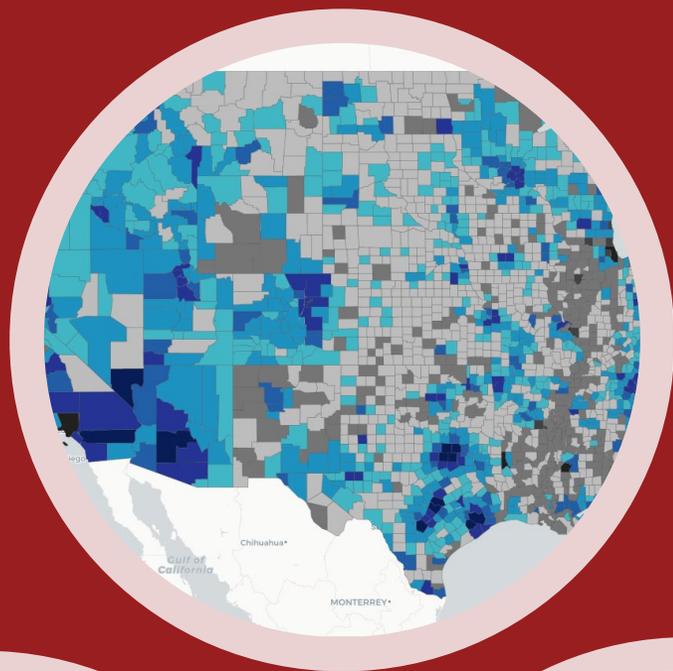
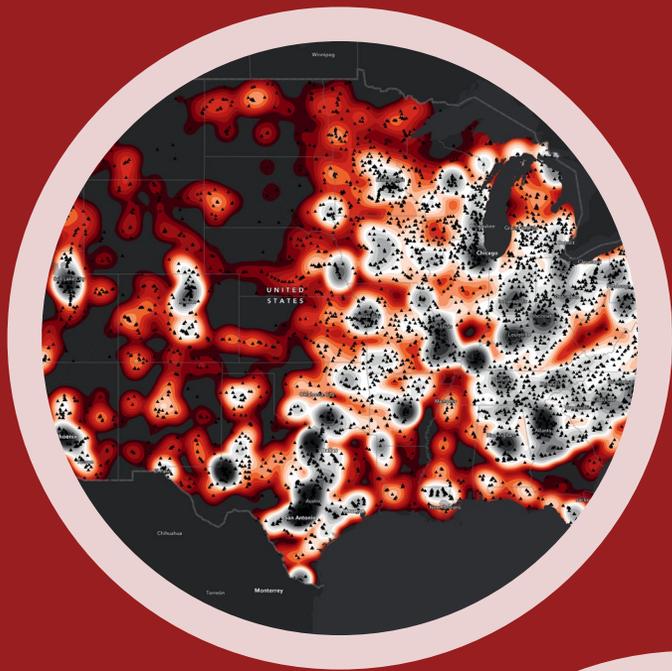
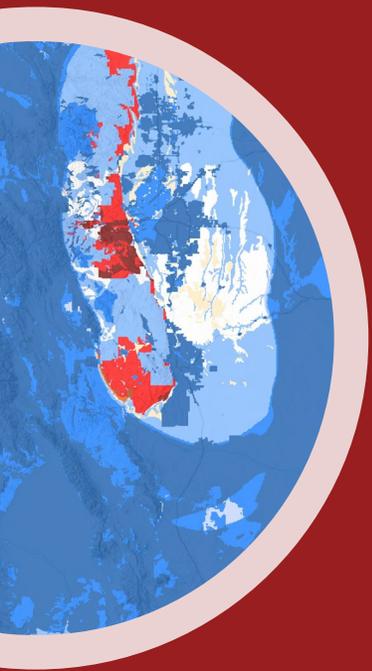
**San Jose / Sacramento  
Current Market**  
*Over 30+ Million Ton Deficit,  
meaning they are having to ship  
product in from extensive distances  
to meet market demand outside of  
their market region.*

**Los Angeles / San Diego  
Current Market**  
*Over 60+ Million Ton Deficit*



**San Jose / Sacramento  
5 Year Forecast**  
*1.5 Million Ton Demand Increase in  
5 years*

**Los Angeles / San Diego  
5 Year Forecast**  
*1 Million Ton Demand Decrease based on declining  
populations. Population moving to suburb cities –  
800k ton forecasted demand increase in Riverside  
Markets.*

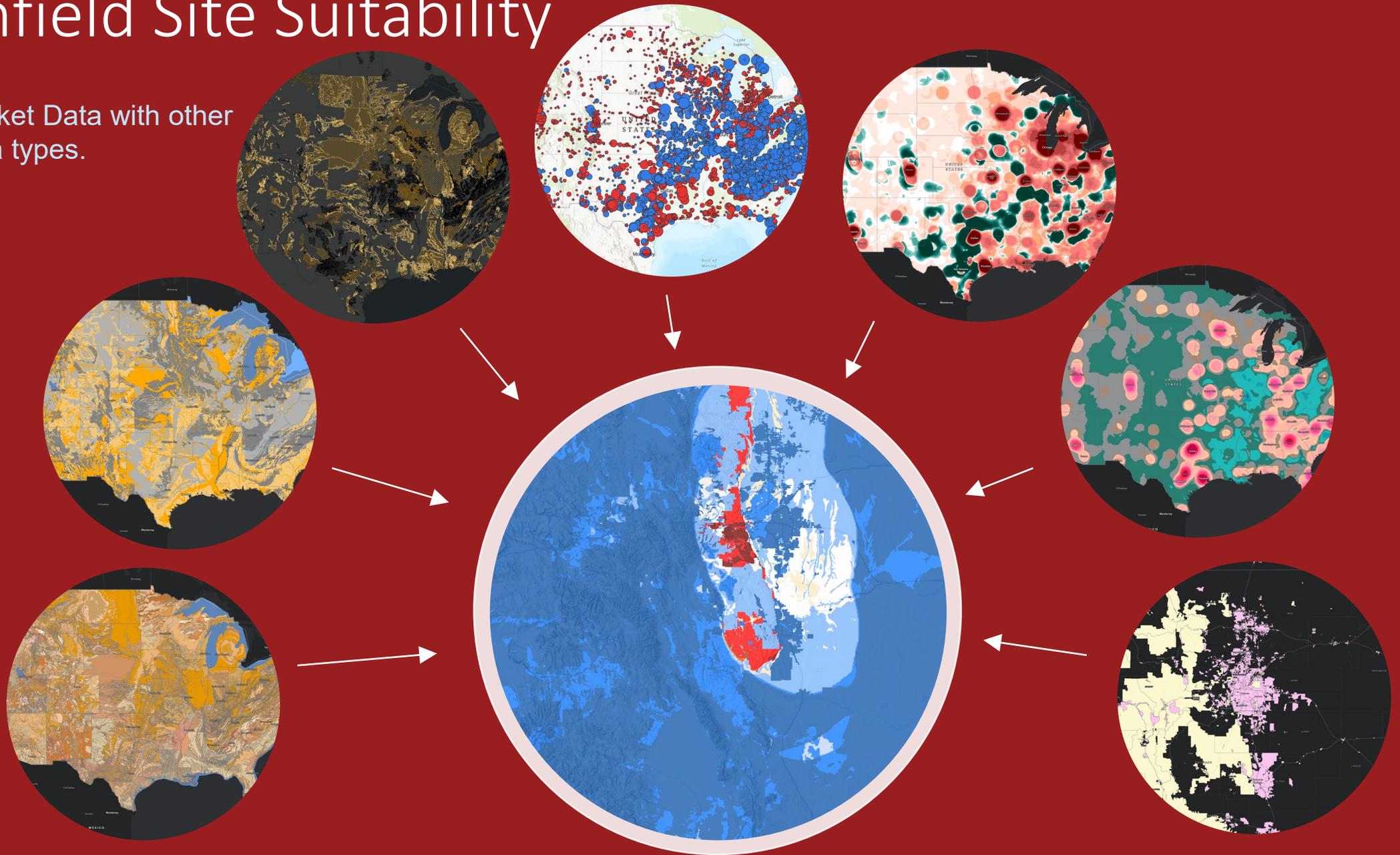


# Expanding on Market Knowledge

Tying together all bodies of data pertinent to the aggregate industry across the U.S.

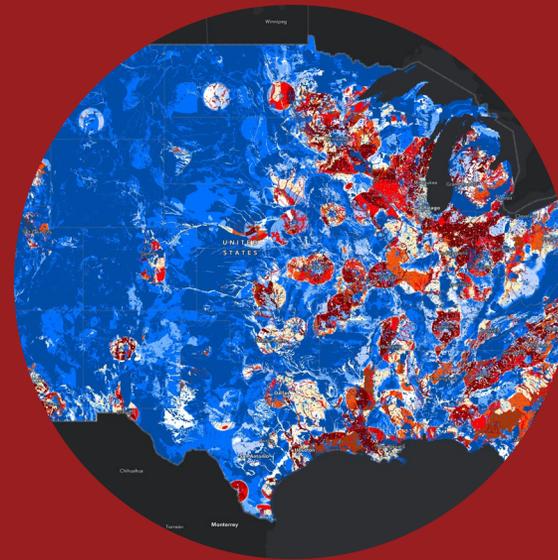
# Greenfield Site Suitability

Merging Market Data with other forms of data types.



# Site Suitability

Data brought together to give clarity to new aggregate site suitability based on market, geology, and area factoring.



AREA OF INTEREST    **GRID of Suitability / Opportunity**    Market Supply / Demand Estimates    Geology Information    Drive Time Analysis    Dodge Construction Data    REGRID Parcel Data

**Mineralocity Grid**    **Aggregate Grid**    Crushed Stone Grid    Sand / Gravel Grid

**Grid Feature Info**    Legend

**OVERALL MARKET POTENTIAL / SITE SUITABILITY**

**General Market Information**

MARKET DEMAND (for Aggregate Materials) (TONS)

Est. Market Demand	11,188,367
Est. Forecast Market Demand (2028)	11,576,072

MARKET SUPPLY (Crushed Stone, Sand/Gravel, Aggregated (Combined)) (TONS)

Est. Aggregate Market Supply	2,074,775
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ESTIMATED MARKET SURPLUS / DEFICIT (TONS)

Estimated Aggregate Market Surplus / Deficit (-) : Crushed Stone and Sand/Gravel equally factored	-9,113,592
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MARKET POPULATION AND FORECAST

Est. 2023 Market Population	1,442,044
Est. 2028 Market Population	1,493,681
Est. Market Population Change (2023 - 2028)	51,637

### Crushed Stone Geology & Production

SURFICIAL GEOLOGIC UNITS

Geologic Unit Name	Older Quaternary alluvium and marine deposits
Geologic Unit Age (Min)	Phanerozoic - Cenozoic - Quaternary - Pleistocene
Geologic Unit Age (Max)	Phanerozoic - Cenozoic - Quaternary - Pleistocene
1st Major Geologic Type	Coarse-detrital
2nd Major Geologic Type	
3rd Major Geologic Type	
1st Minor Geologic Type	Fine-detrital
2nd Minor Geologic Type	
3rd Minor Geologic Type	
Incidental Geology	
Indeterministic Geology	
Generalized Geology	Unconsolidated, undifferentiated
Geologic Documentation	View

### Federal / State Land Designation

Incorporated / Unincorporated Area	Unincorporated Area
Place	
Source 1 - Name	
Source 1 - Group	
Source 2 - Name	
Source 2 - Group	
Source 2 - Feature Type	

### Market Potential Grade

Aggregate (Stone and Sand) Market Grade	A+
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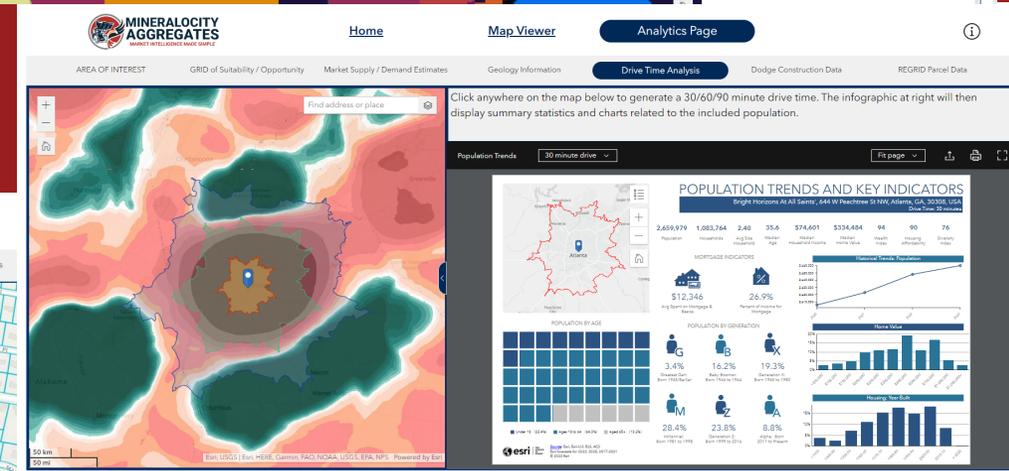
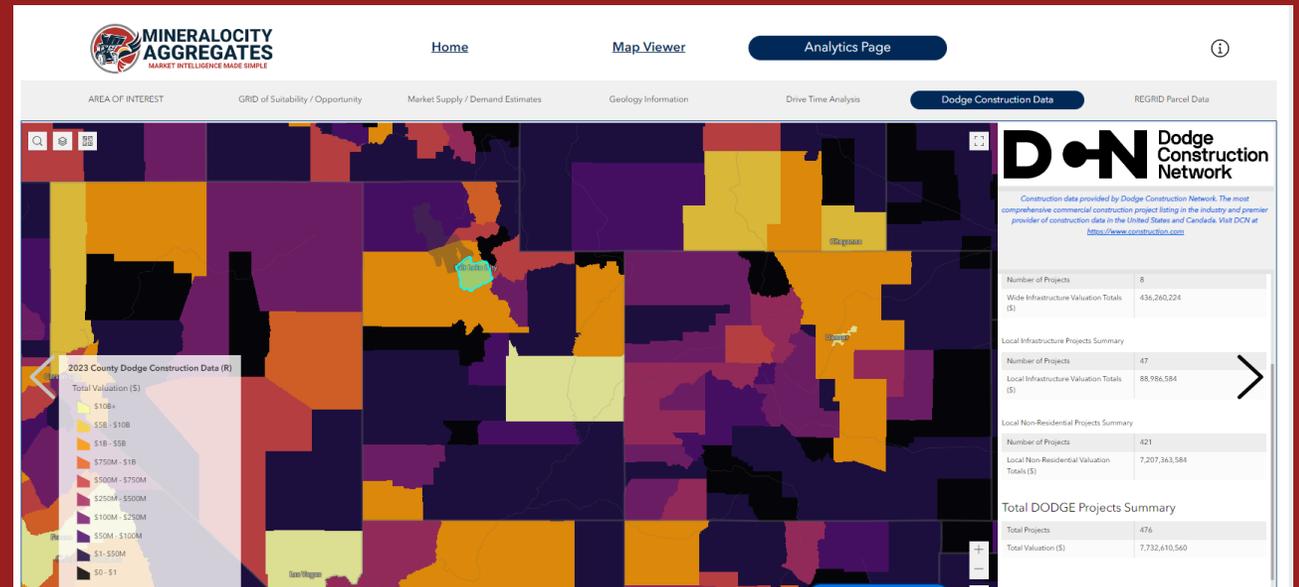
### DODGE Construction Network

COUNTY SUMMARY

DODGE Construction - Total projects within County	107
DODGE Construction - Project Valuations within County (\$)	1,690,140,032

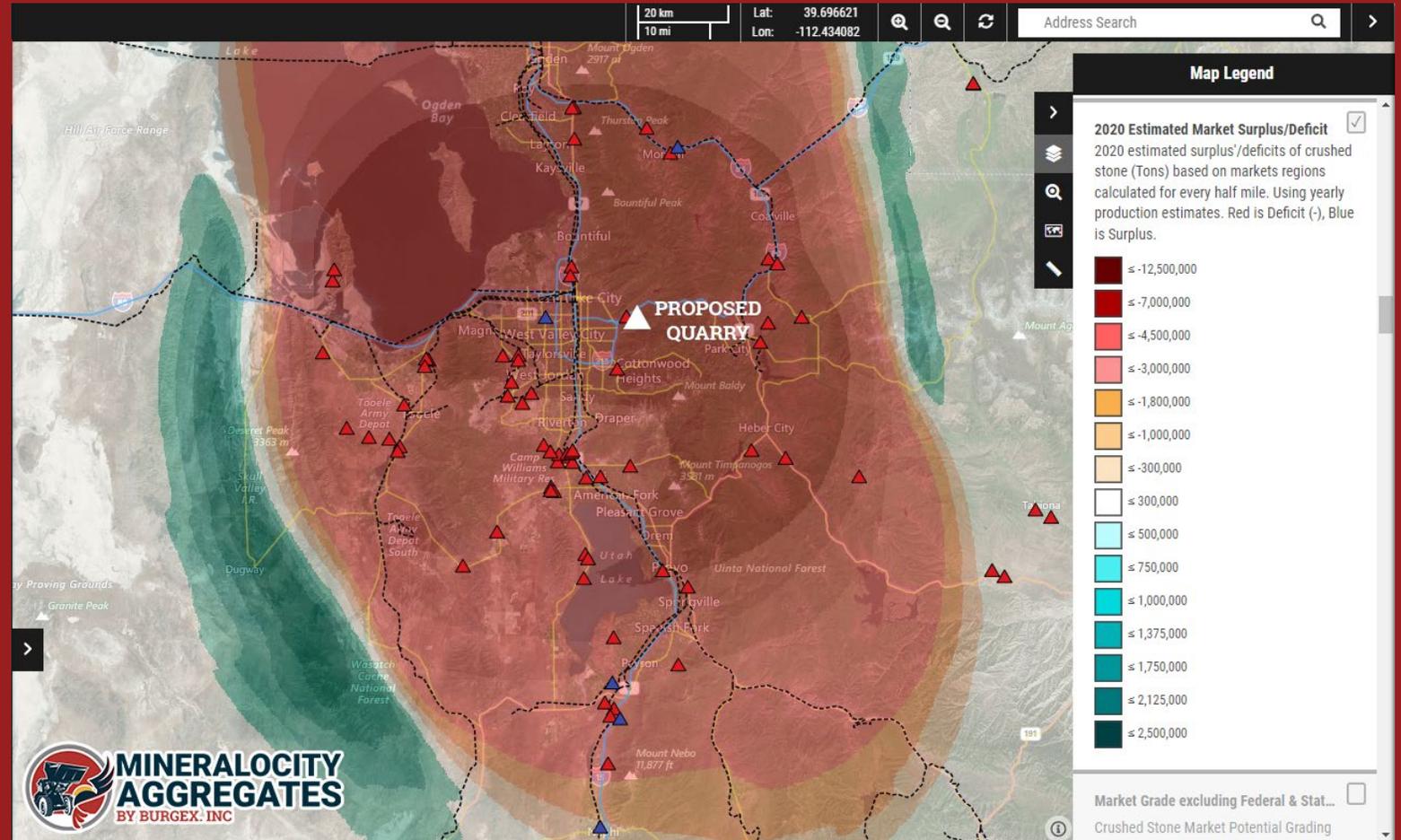
# Additional Data Sources

- Dodge Construction Data – Project Valuations
- Drive time analysis
- Regrid Parcel Data



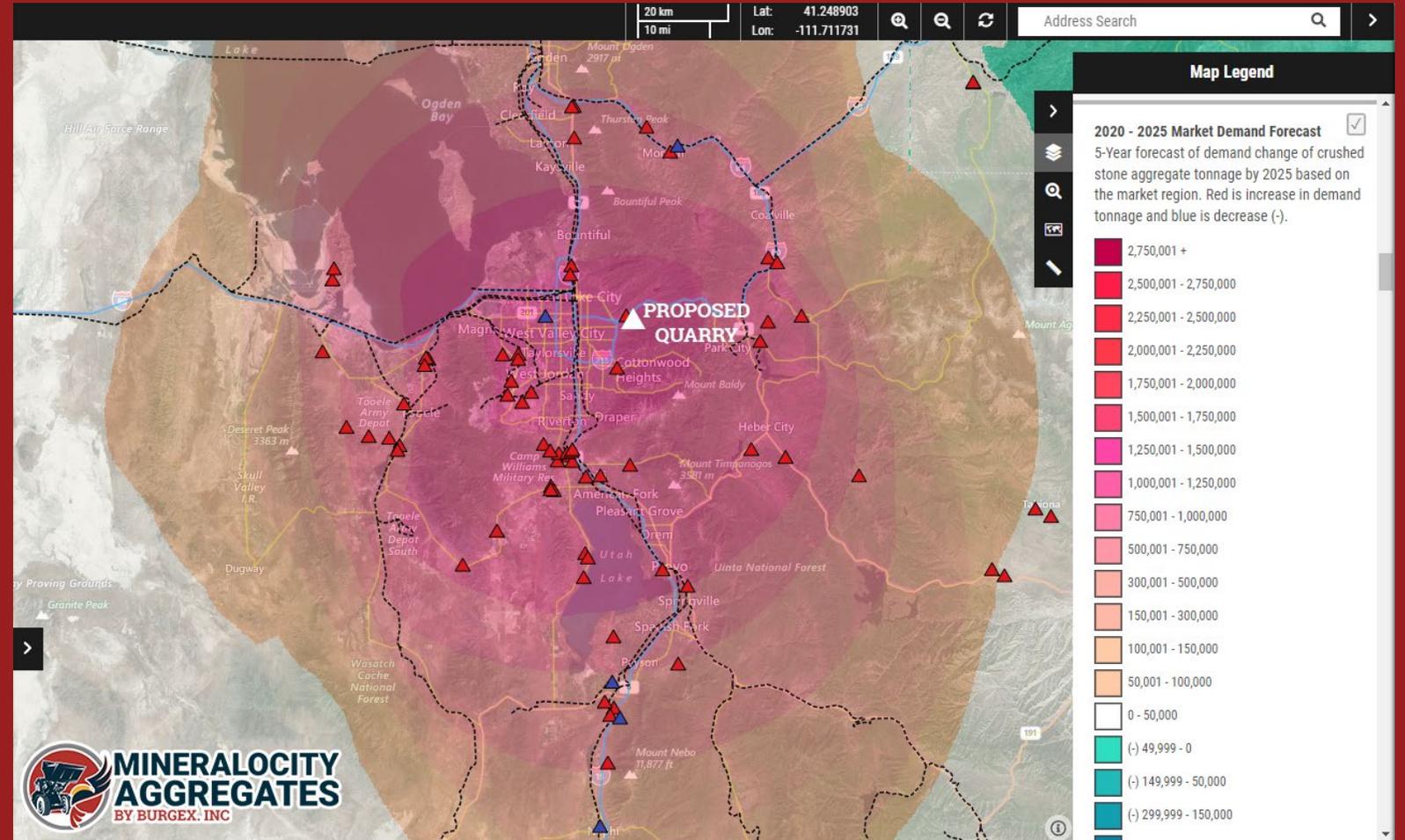
# Case Study: Wasatch Front Aggregates

- Salt Lake County, is one of the fastest growing regions in the Country.
- The area has seen a 15.75% population growth since 2010.
- According to Census.gov, Utah experienced the nation's fastest growth in housing units - 2.7% between July 1<sup>st</sup>, 2020 and July 1<sup>st</sup>, 2021.
- Demand for construction aggregate between 2020-2025 is projected to increase by over a million tons in annual consumption.



# Proposed Parley's Canyon Quarry

- There is a proposed quarry in Parley's Canyon
- Mineralcity Aggregates estimates a supply deficit 8.6 mt.
- This is material that is being shipped into the market, often by truck at a high cost.
- This deficit is projected to grow by over 1.2 mt through 2025.



# Proposed Parley's Canyon Quarry – Economic Impacts

Metric	Value	Notes
<b>Population Within 65 Mile Market Radius</b>	2,350,000	Approximately 75% of the total Utah population within the market radius.
<b>Estimated Annual Deficit within Market Radius</b>	~8,600,000 tons	Approximate tons of aggregates from other sources outside of the market radius.
<b>Projected Deficit Growth through 2025</b>	>1.2 million tons	Projected deficit growth approximately 200,000 tons a year within the market radius.
<b>Annual Deficit in Dollars (wholesale)</b>	>\$86 million Dollars	This is projected to grow to over \$100 million dollars annually by 2025.
<b>Estimated Potential Life of Mine Economic Impact</b>	>\$50 million Dollars	<ul style="list-style-type: none"> <li>Decreased costs for transportation impacts:                             <ul style="list-style-type: none"> <li>Costs of Infrastructure improvements (Asphalt costs escalated 36.9% year-over-year nationally between March 2021 and March 2022. Aside from of increasing oil and fuel costs, the costs of raw aggregates was significant)</li> <li>Improving housing affordability</li> <li>Cement, increased by 8.2%</li> <li>7.1% increase in ready mix costs.</li> </ul> </li> </ul>
<b>Proposed Construction Projects within Market Radius</b>	1,224	Source: Dodge Data & Analytics, Inc. and Mineralocity
<b>Dollar Value of Proposed Construction Projects</b>	\$18.5 billion Dollars	

## Non-Economic Impacts:

Shorter trucking distances result in:

- Reduced carbon footprint
- Less highway wear and tear resulting in less maintenance and emissions



Questions?

