Leveraging GIS in the Mining Industry

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MINERALOCITY BY BURGEX INC. MINING MADE VISIBLE

BURGEX MINING CONSULTANTS

SME – Utah Section 7.20.2023

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

Our Purpose:

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.

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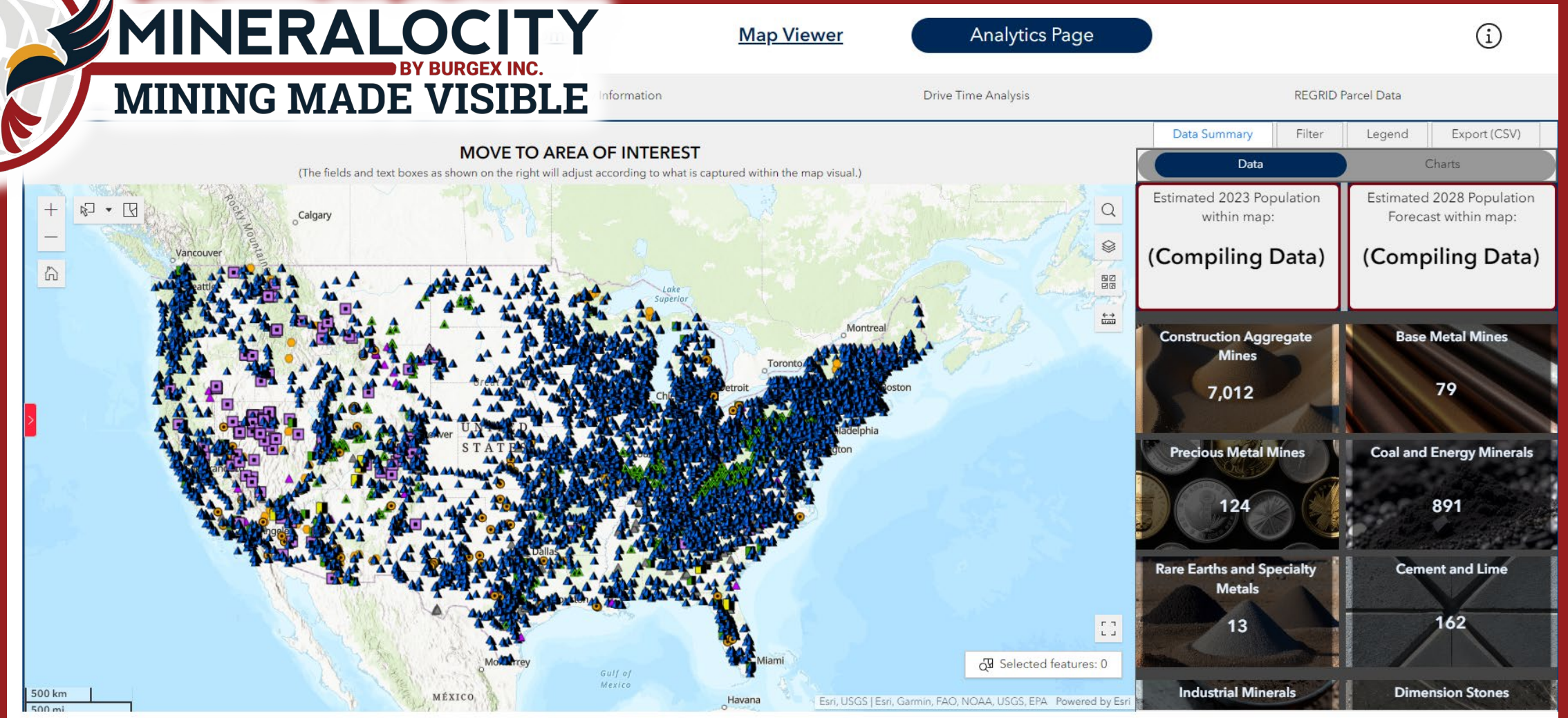
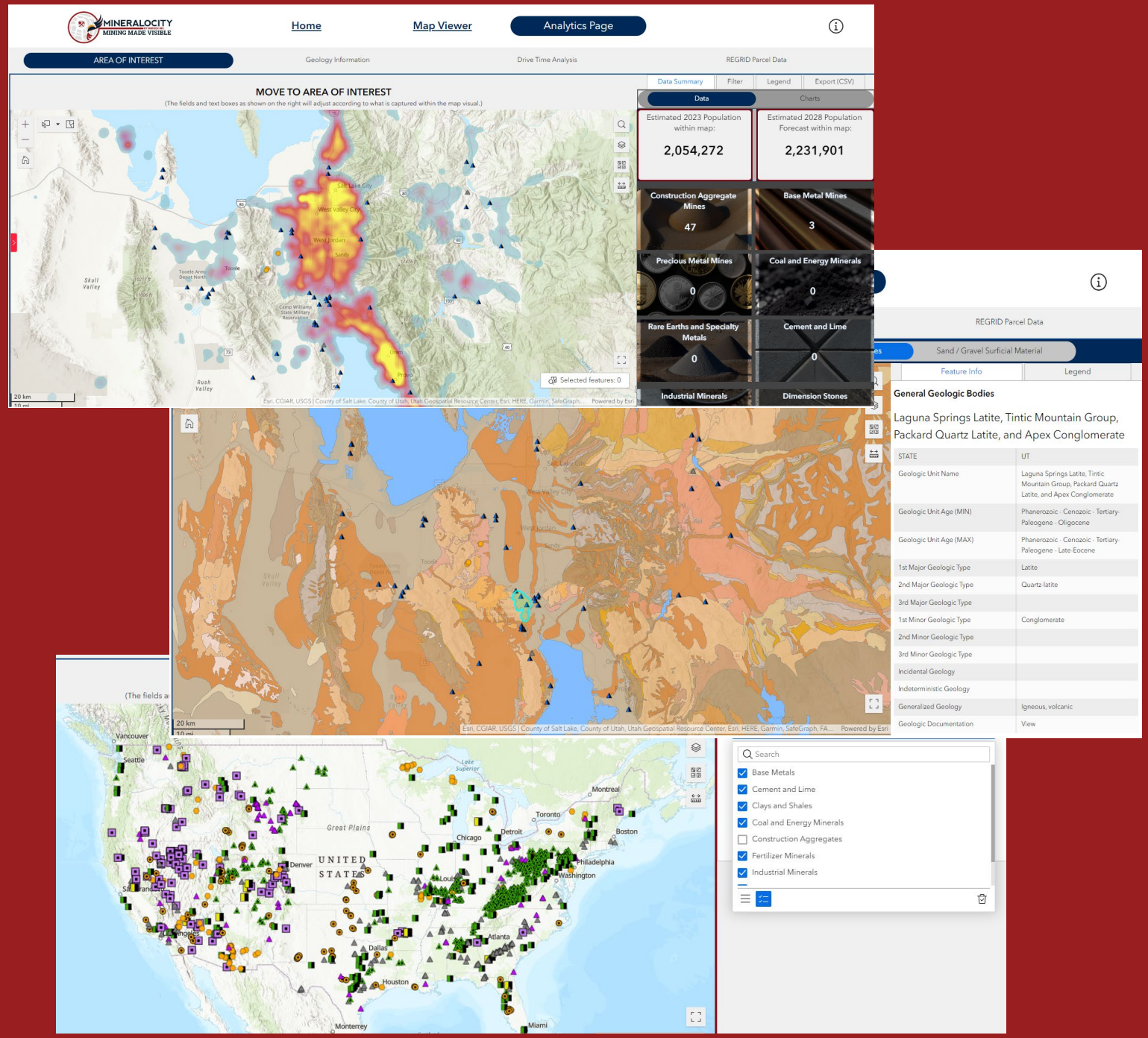


A place to see all Significant Operations

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.



Construction Aggregates Consumption in the U.S.

Leveraging GIS in Construction Aggregates

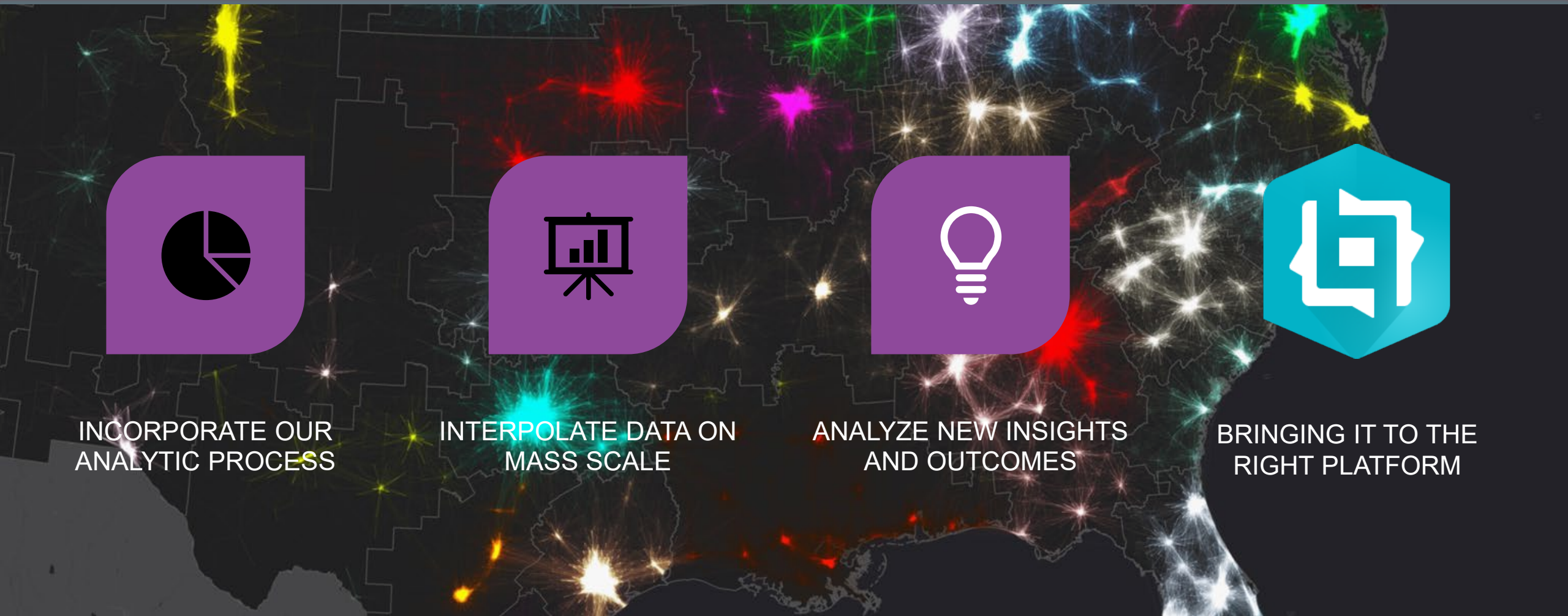
Location is Everything.

- 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

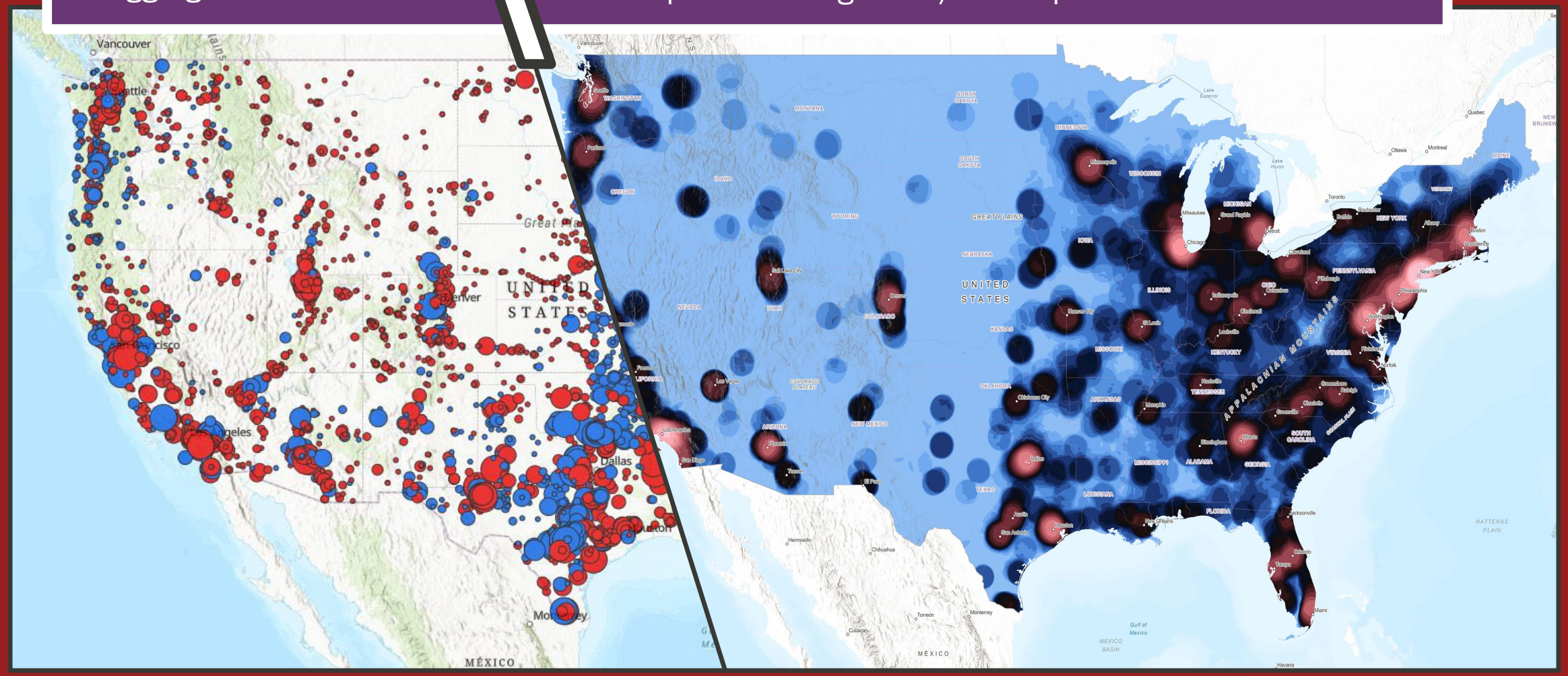
BRINGING IT TO THE RIGHT PLATFORM

Mapping the Data

Capturing producers and population across the United States.

Aggregate Producers

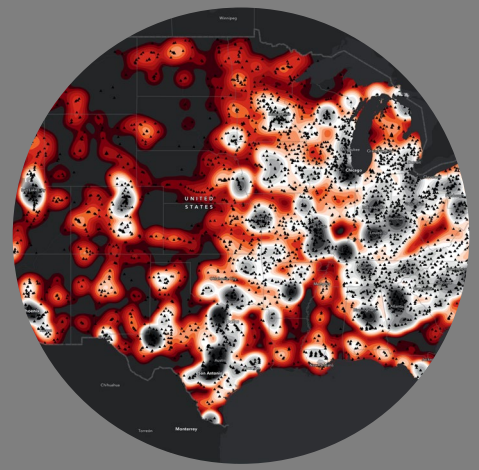
Population Integration / Per Capita Demand



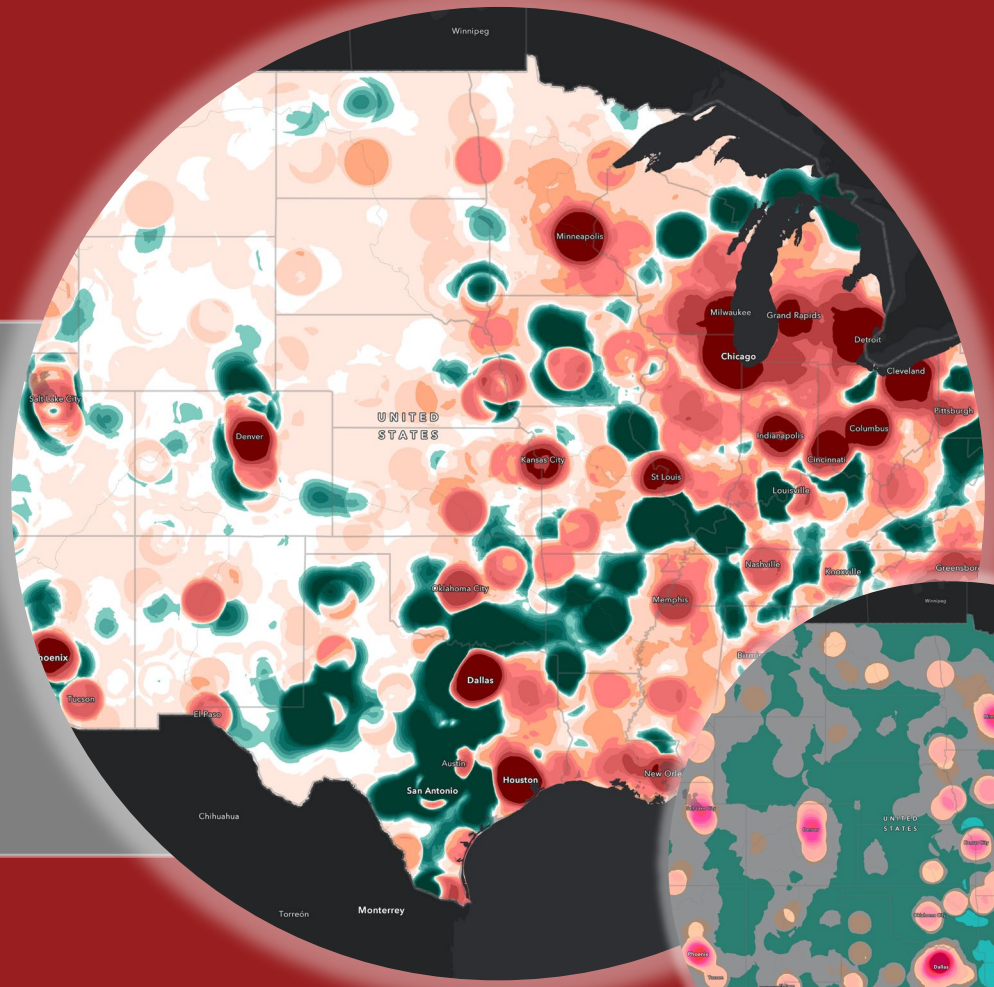
Market Generation

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

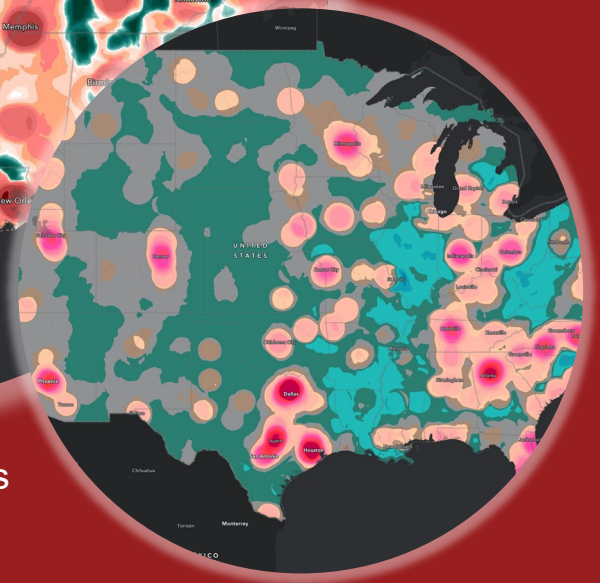
Demand (Estimated Population and Forecasted Population with Per-Capita calculated for every half mile)



Supply (Estimated Aggregate Production)



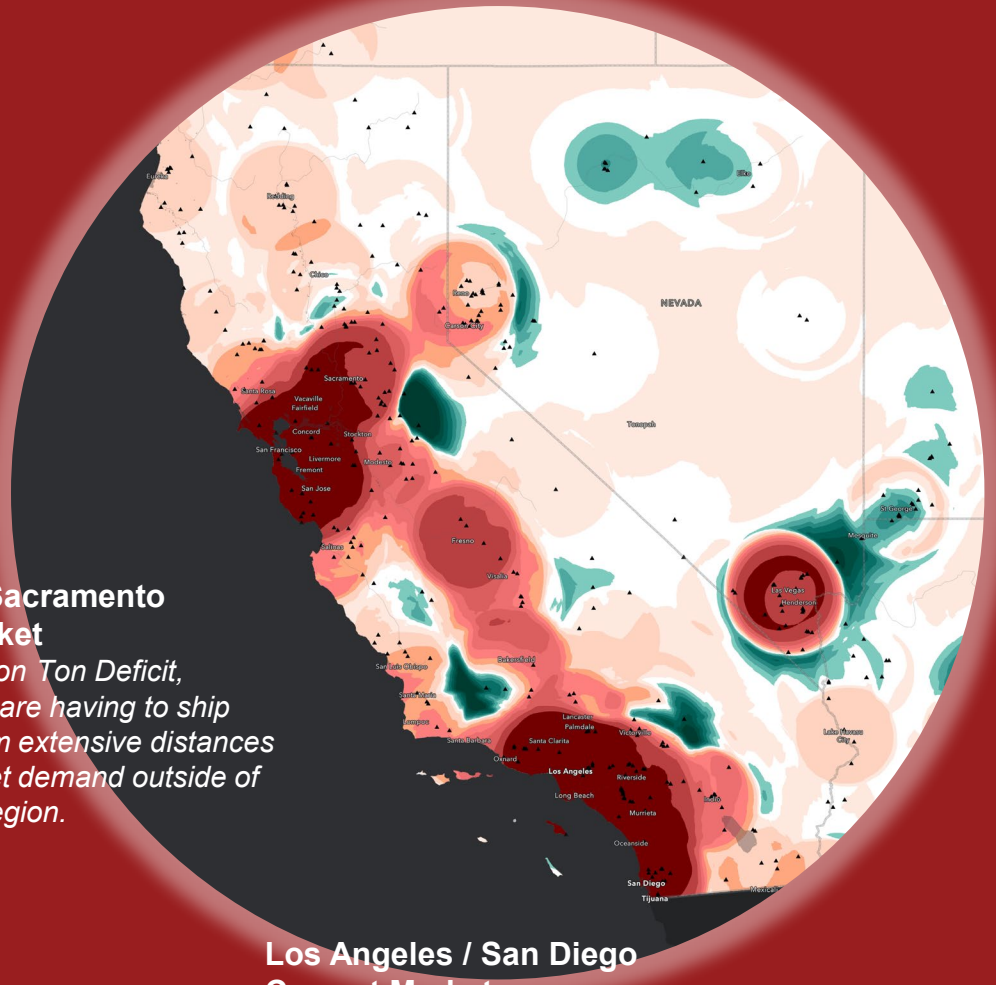
A visual representing estimated surplus / deficit regions at market scale for every half-mile.



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

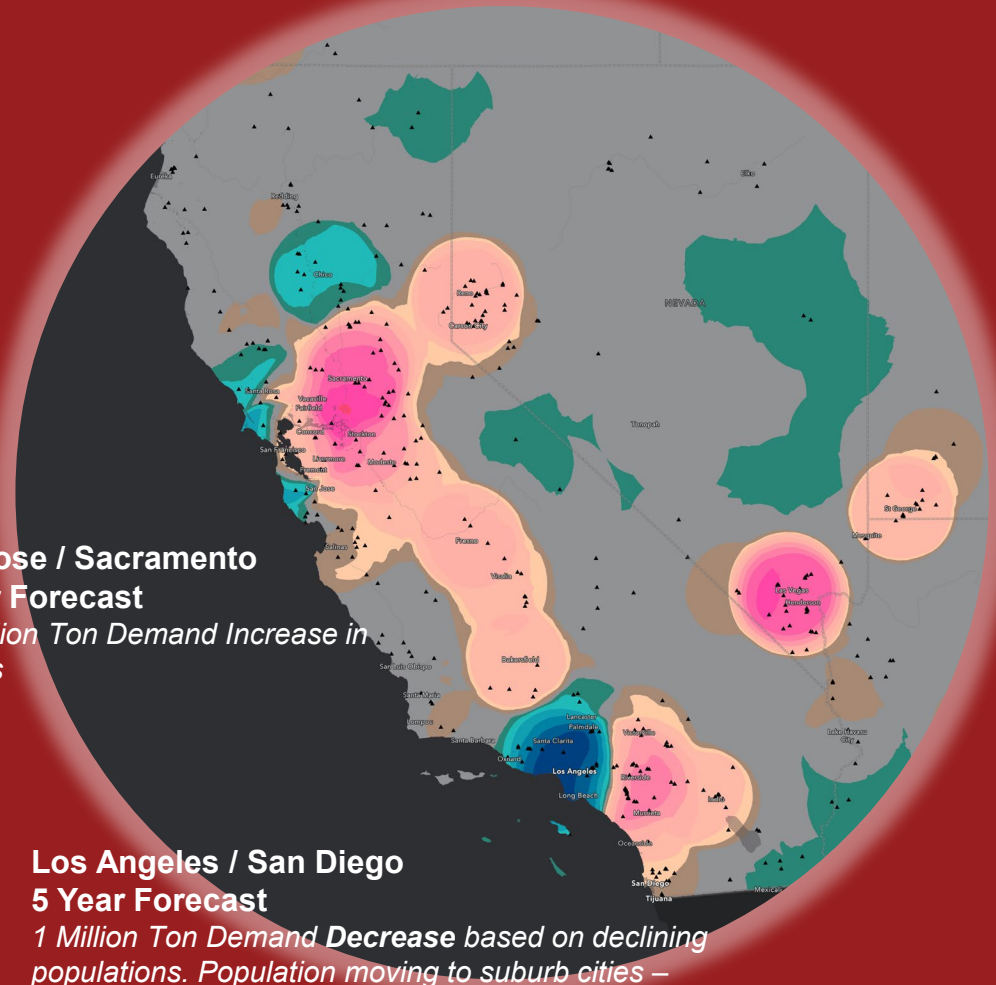
Case Study: California

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



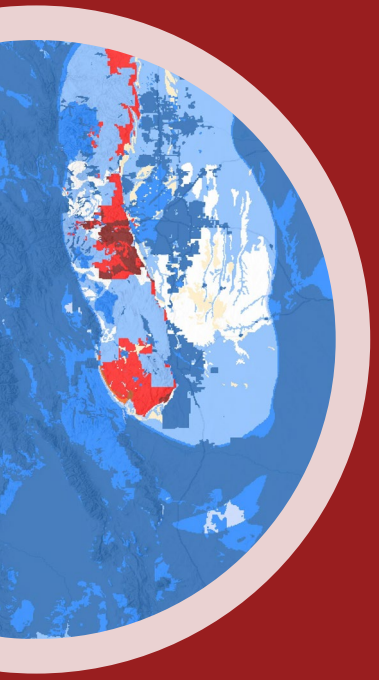
San Jose / Sacramento
Current Market
Over 30+ Million Ton Deficit, meaning they are having to ship product in from extensive distances to meet market demand outside of their market region.

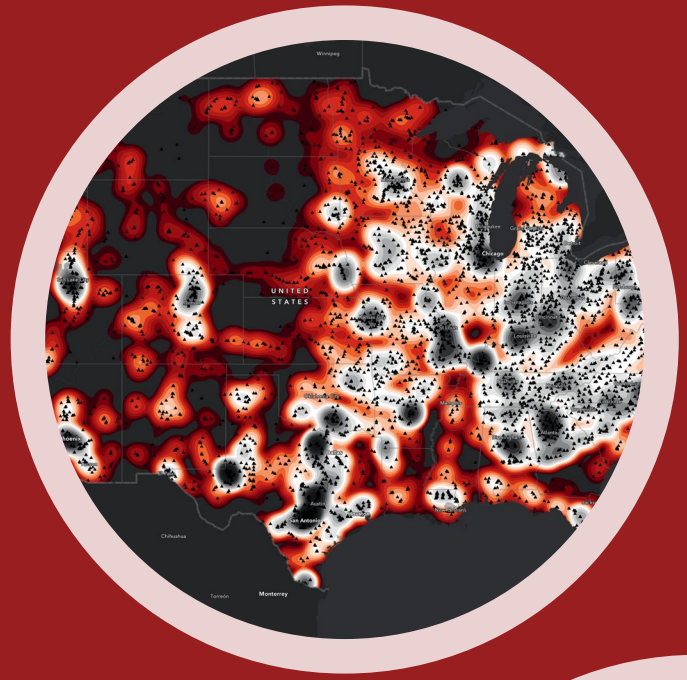
Los Angeles / San Diego
Current Market
Over 60+ Million Ton Deficit

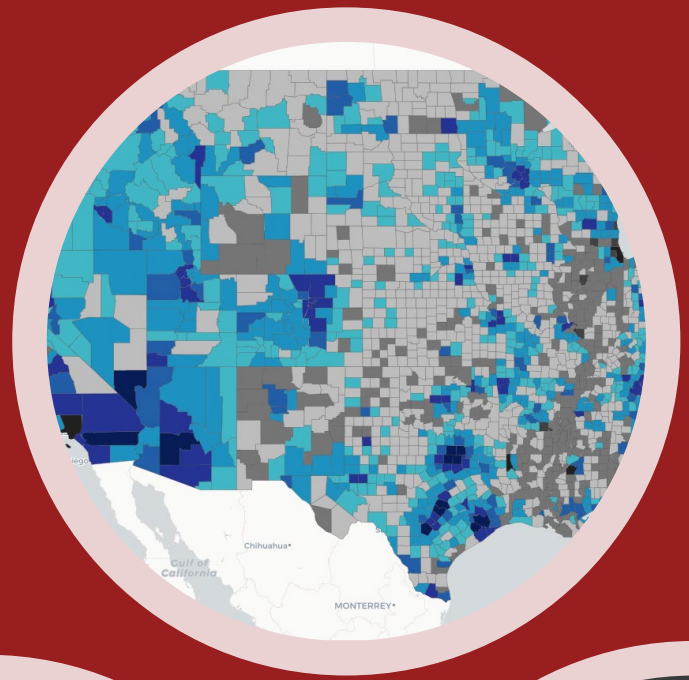


San Jose / Sacramento
5 Year Forecast
1.5 Million Ton Demand Increase in 5 years

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.*

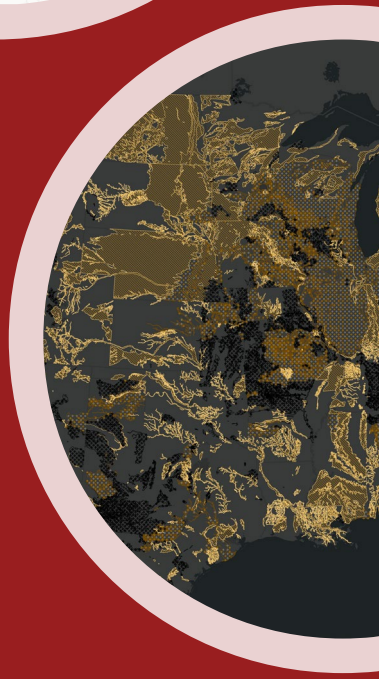






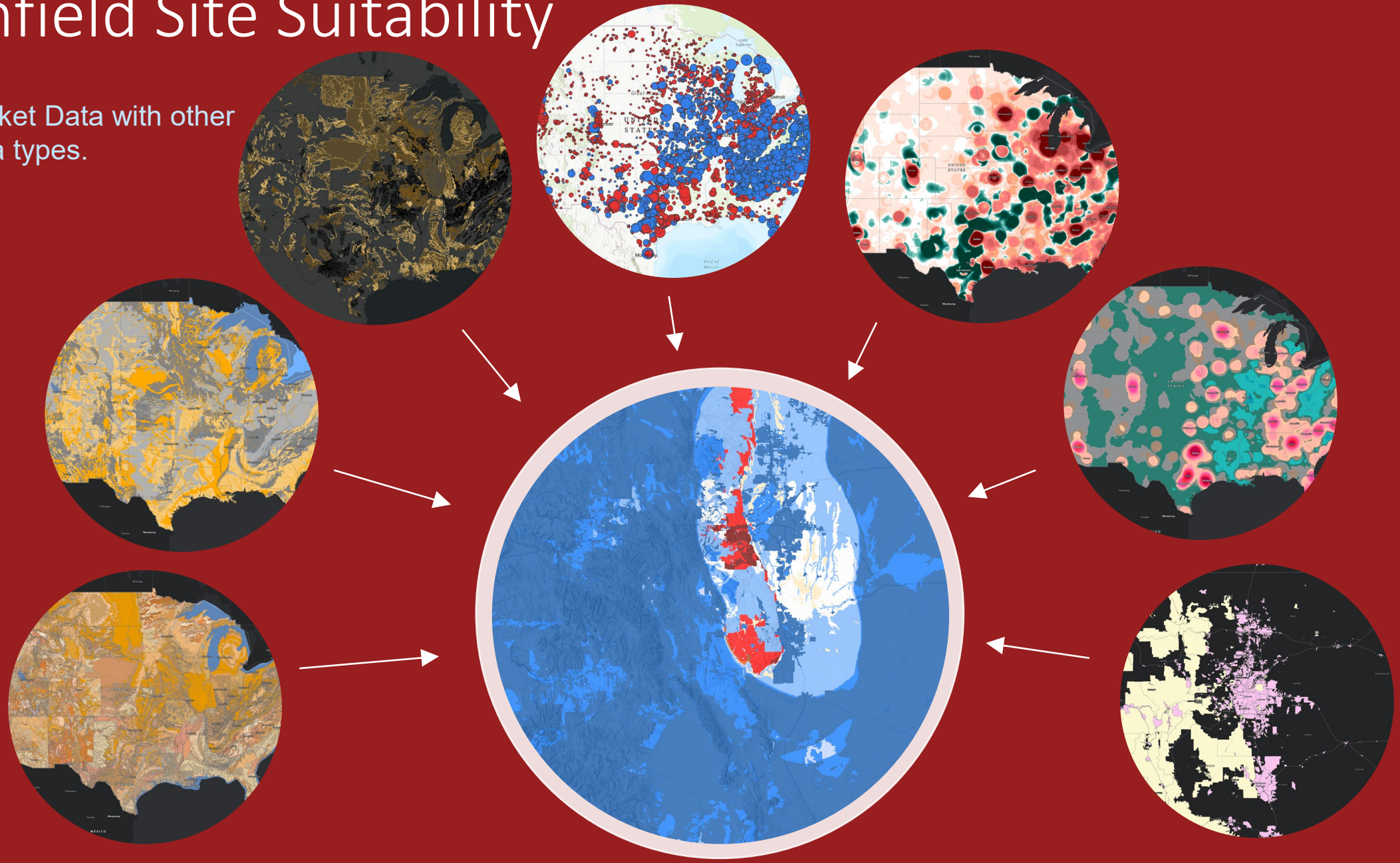
Expanding on Market Knowledge

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



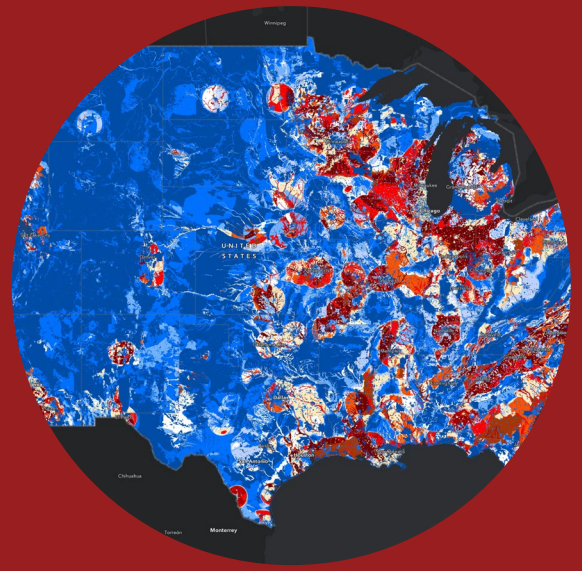
Greenfield Site Suitability

Merging Market Data with other forms of data types.



Site Suitability

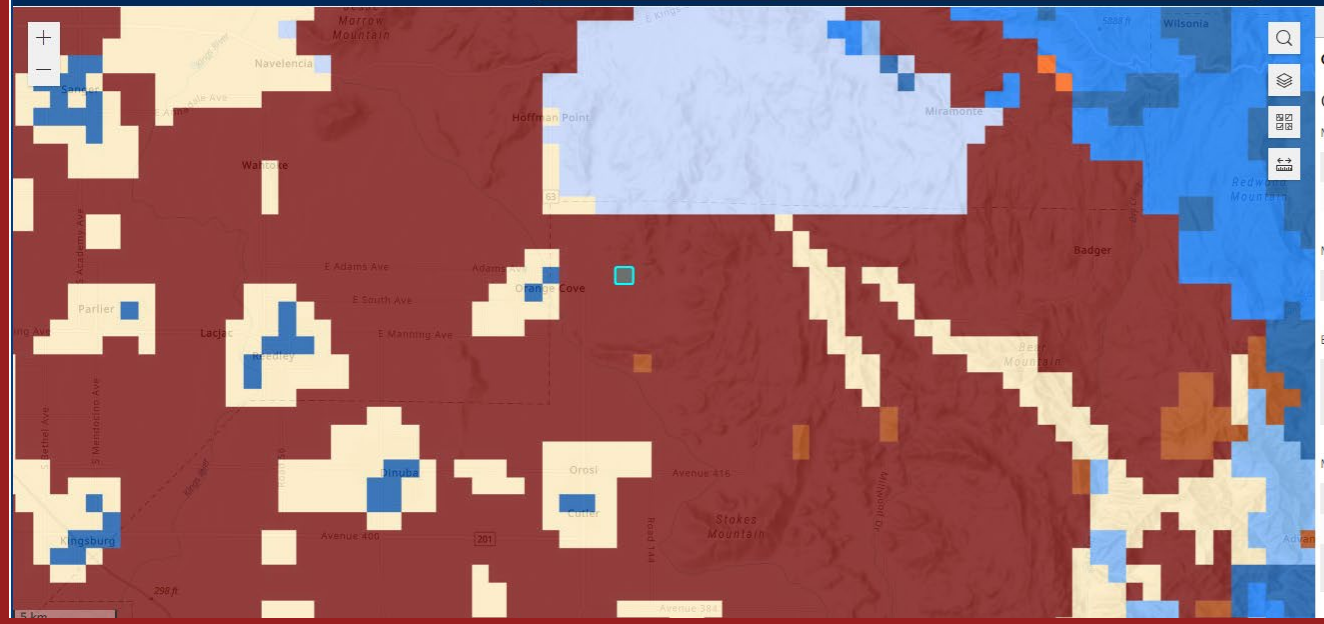
Data brought together to give clarity to new aggregate site suitability based on market, geology, and area factoring.



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

ESTIMATED MARKET SURPLUS / DEFICIT (TONS)

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

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 Unite 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+

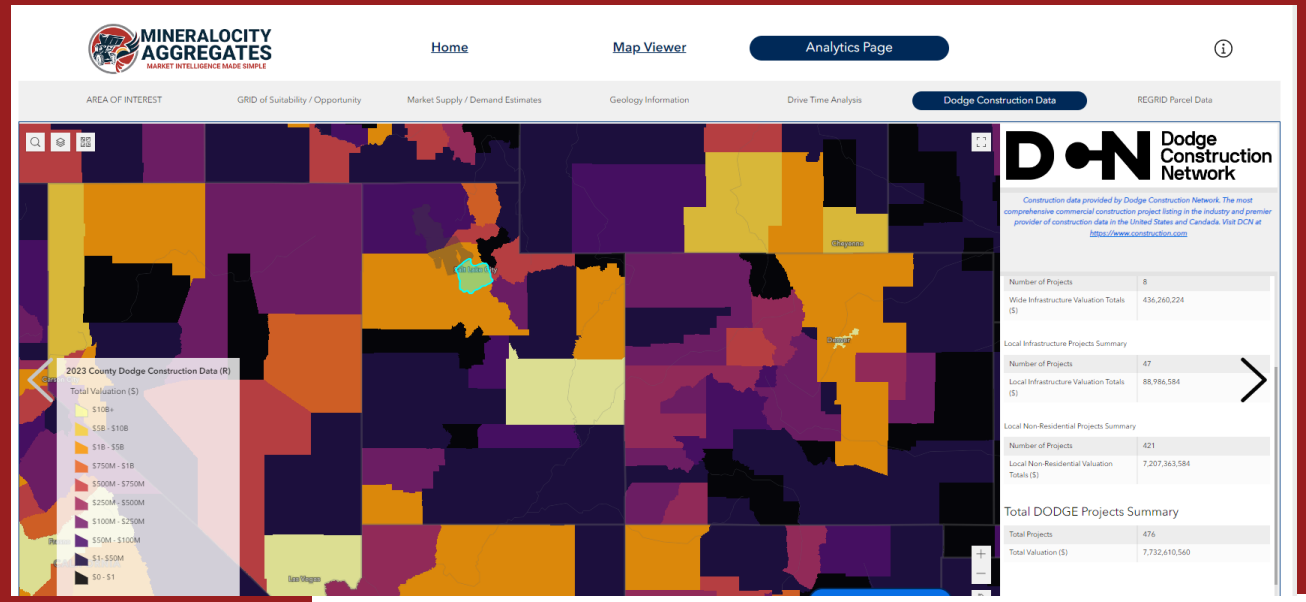
DODGE Construction Network

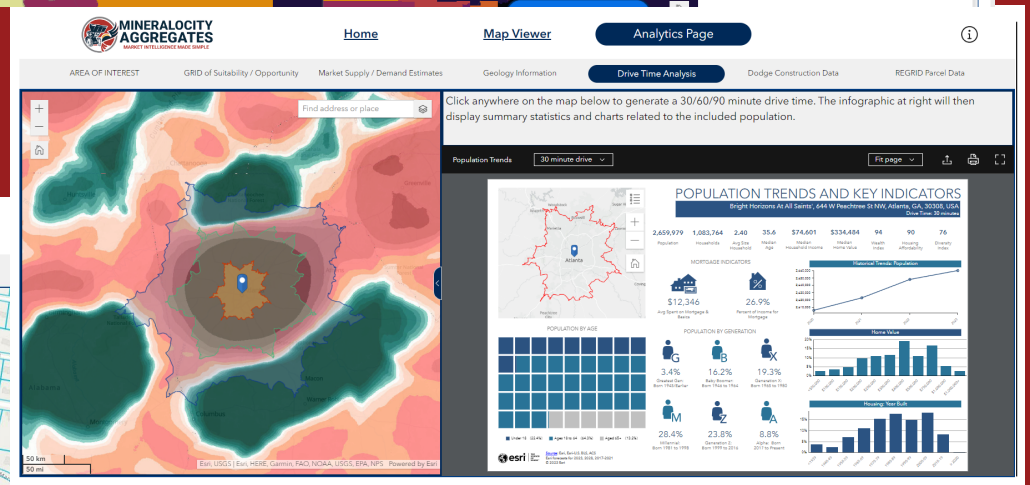
COUNTY SUMMARY

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

Additional Data Sources

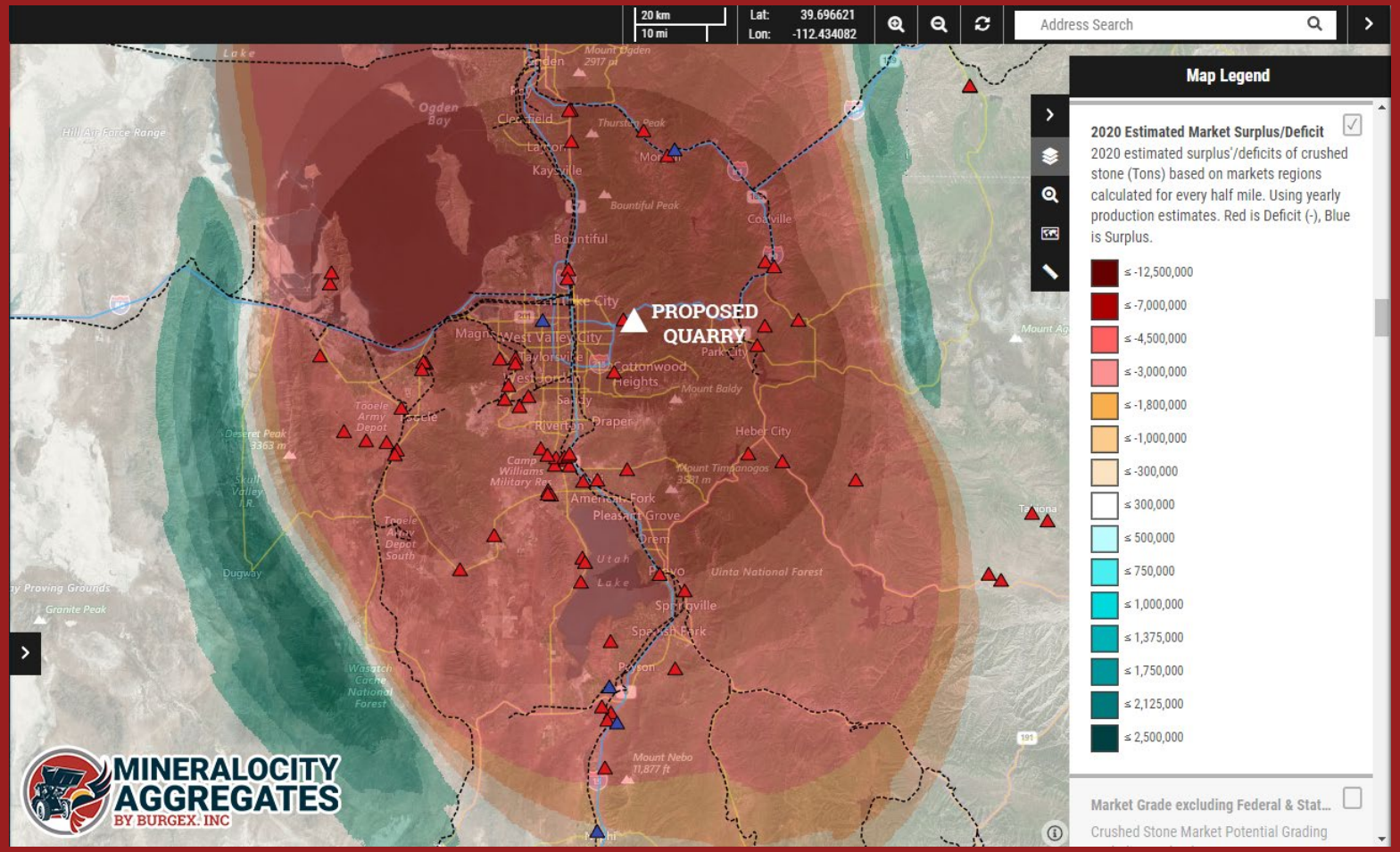
- Dodge Construction Data – Project Valuations
- Drive time analysis
- Regrid Parcel Data





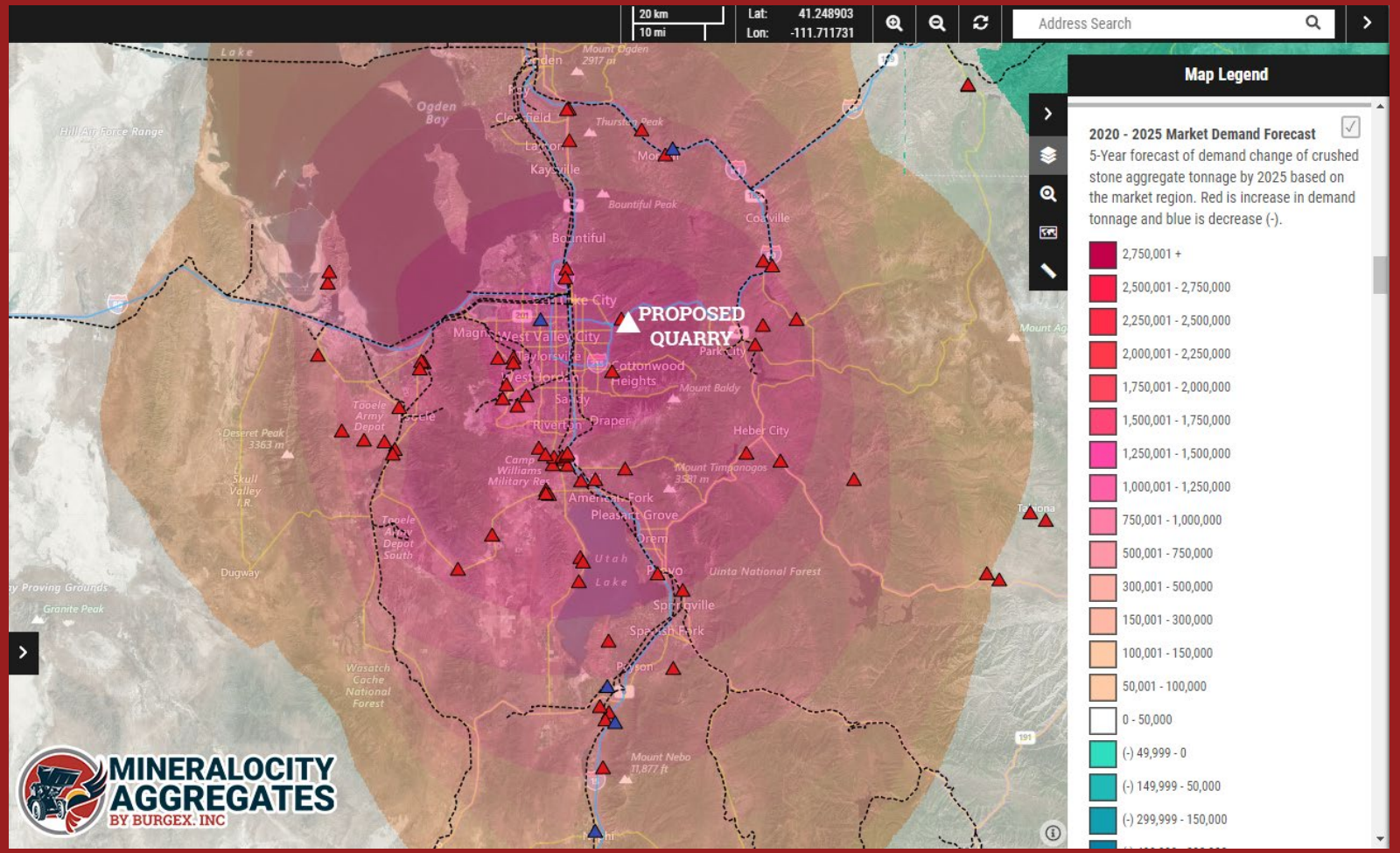
Case Study: Wasatch Front Aggregates

- 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 1st, 2020 and July 1st, 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
- Mineralocity 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
Population Within 65 Mile Market Radius	2,350,000	Approximately 75% of the total Utah population within the market radius.
Estimated Annual Deficit within Market Radius	~8,600,000 tons	Approximate tons of aggregates from other sources outside of the market radius.
Projected Deficit Growth through 2025	>1.2 million tons	Projected deficit growth approximately 200,000 tons a year within the market radius.
Annual Deficit in Dollars (wholesale)	>$86 million Dollars	This is projected to grow to over $100 million dollars annually by 2025.

Estimated Potential Life of Mine Economic Impact	>$50 million Dollars	• Decreased costs for transportation impacts:
		  • 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)
		  • Improving housing affordability
		  • Cement, increased by 8.2%
		  • 7.1% increase in ready mix costs.

Proposed Construction Projects within Market Radius	1,224	Source: Dodge Data & Analytics, Inc. and Mineralocity
Dollar Value of Proposed Construction Projects	$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

SME
UTAH SECTION

Questions?

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