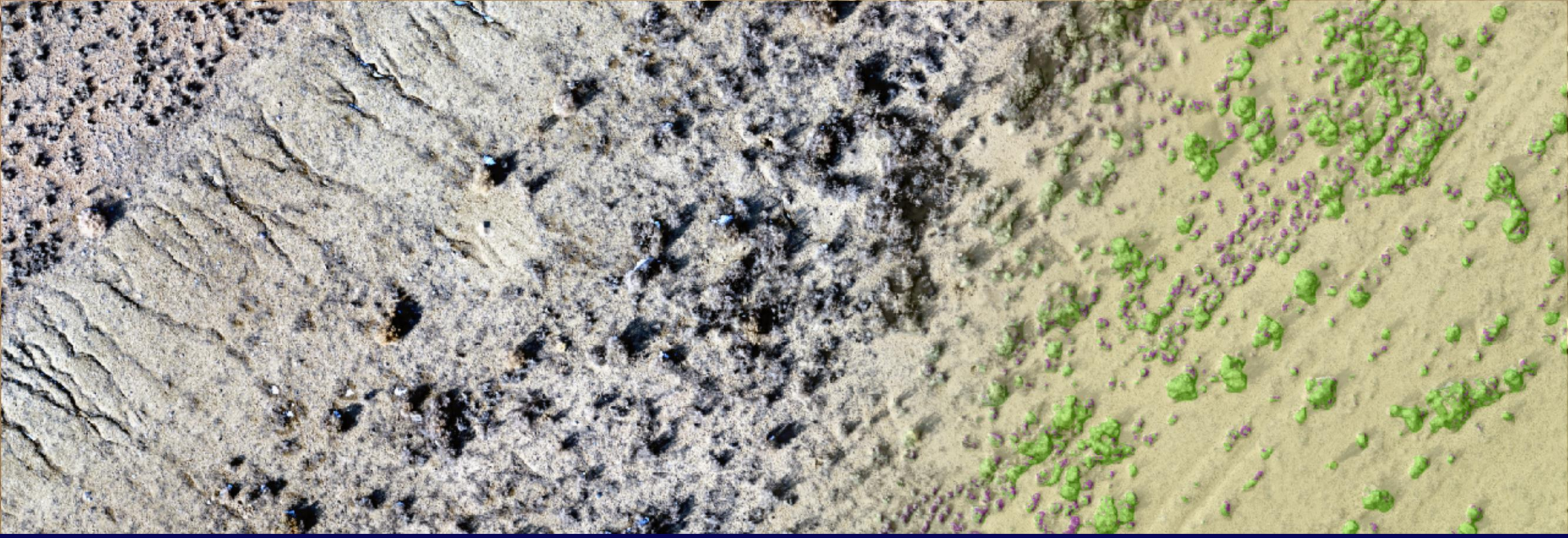


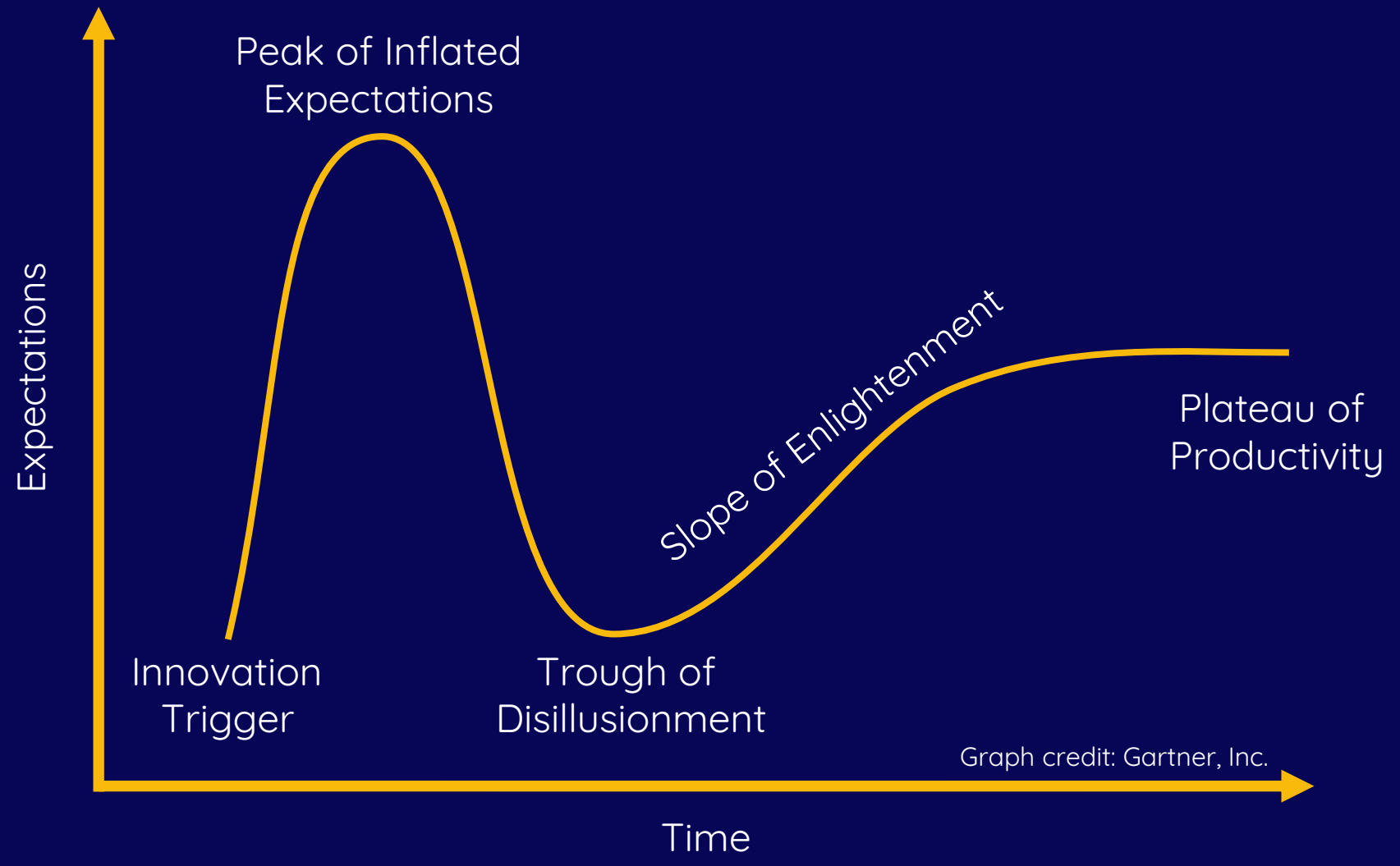
Leveraging Earth Observation Data and Artificial Intelligence to Improve Site Characterization

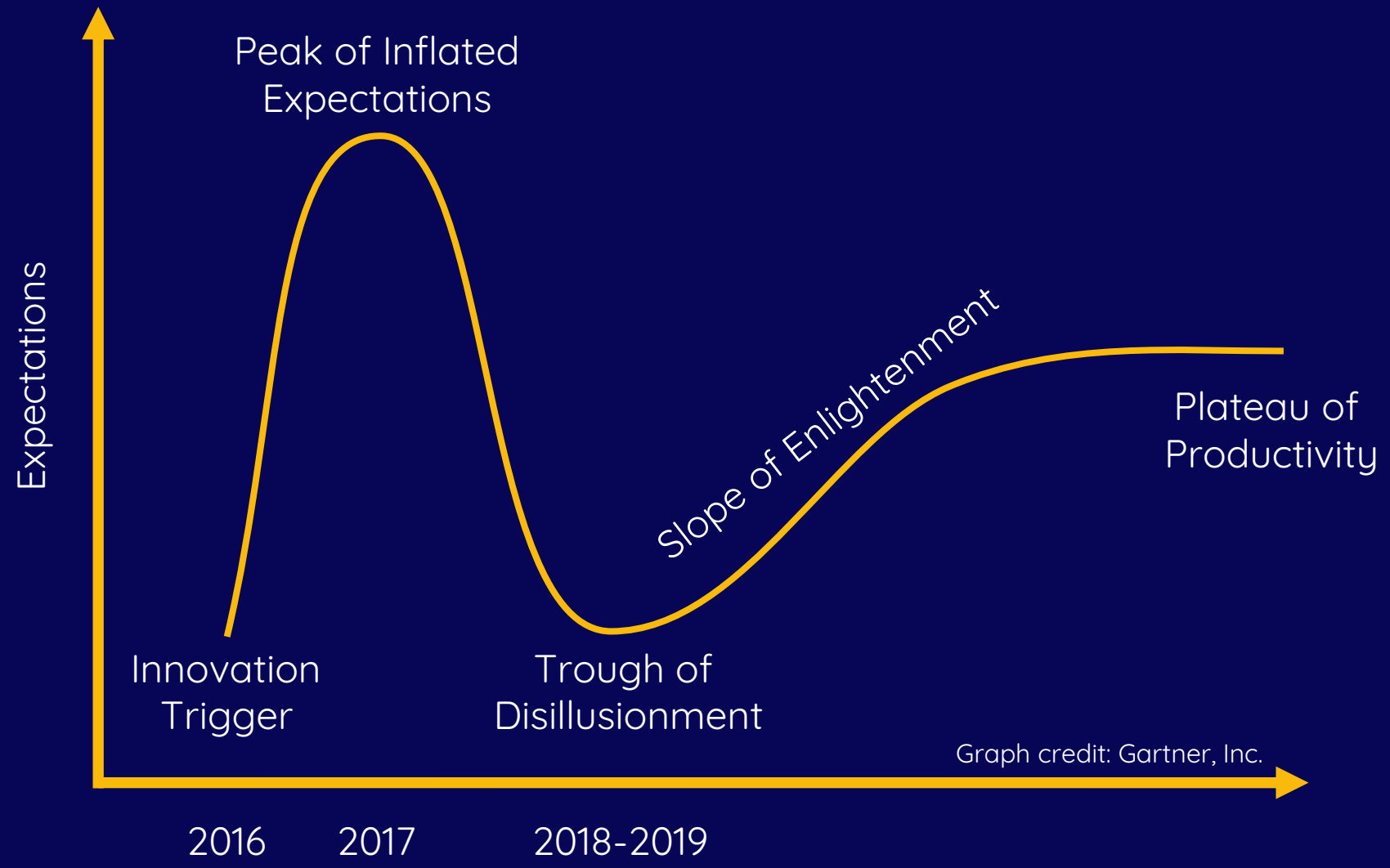
galago

RAMBOLL

Bright ideas. Sustainable change.

Jesse D. King, R.G.
Senior Consultant


Peak of Inflated Expectations
Expectations
Slope of Enlightenment
Plateau of Productivity
Innovation Trigger
Trough of Disillusionment
Graph credit: Gartner, Inc.
Time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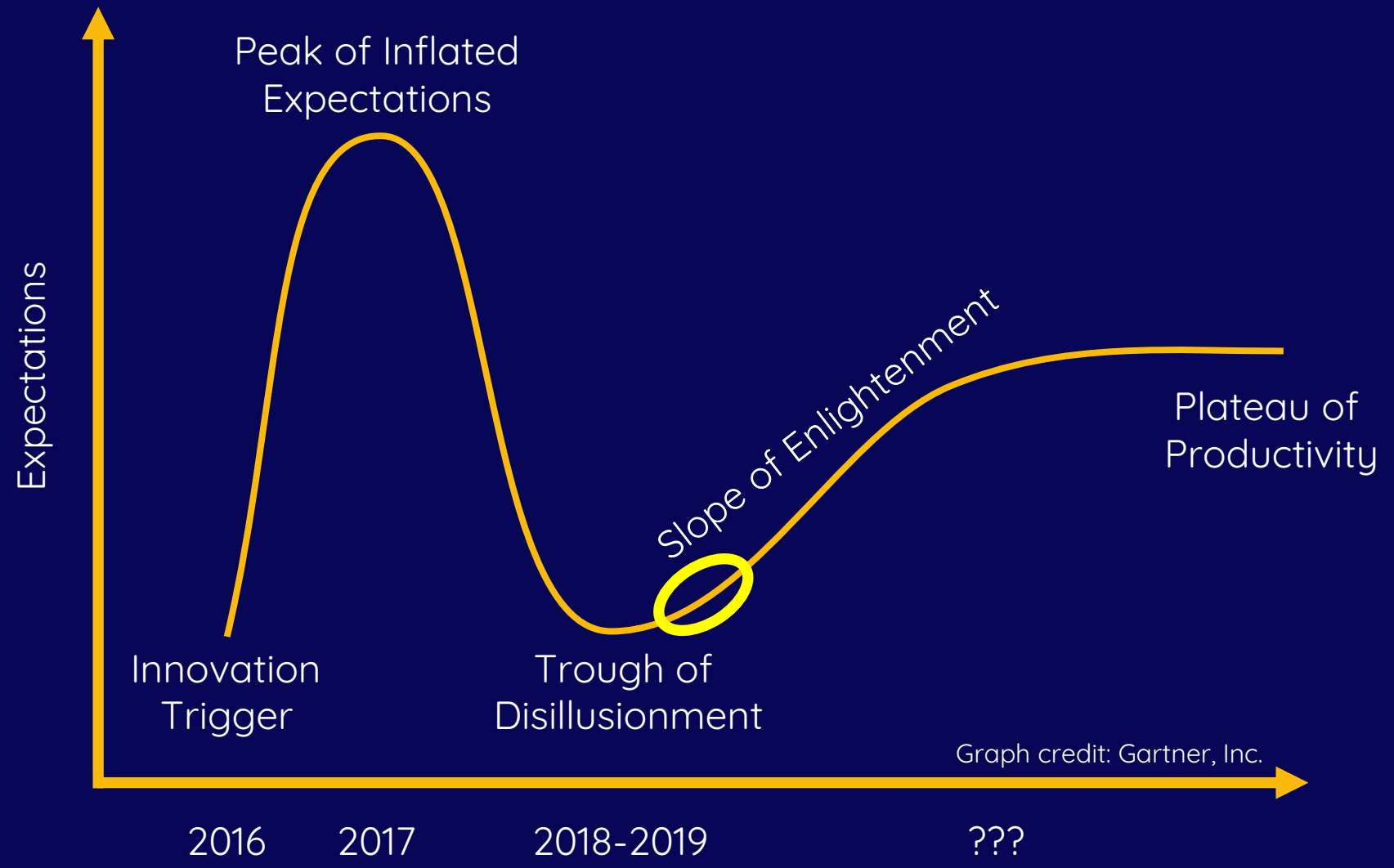
2016
2017
2018-2019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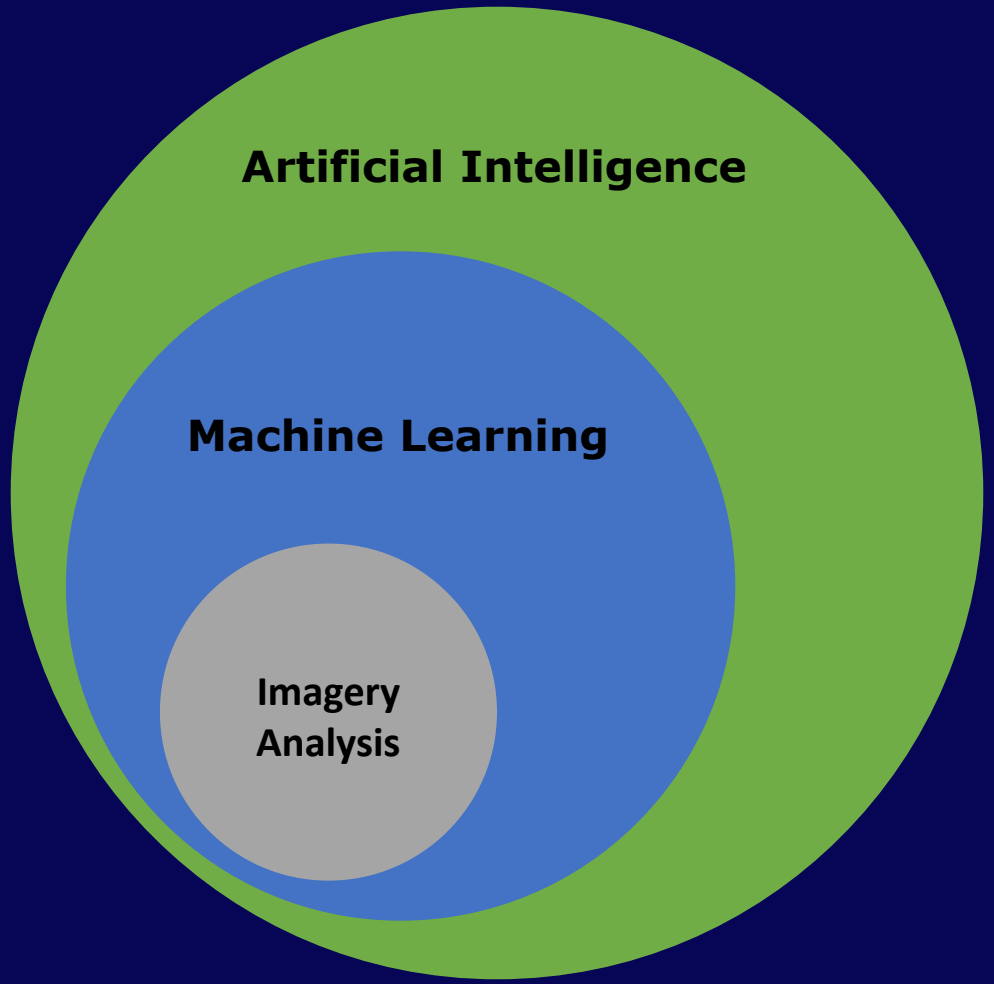
???


Artificial Intelligence
Machine Learning
Imagery Analysis

01

We use aerial and satellite imagery (this can be yours, ours, or third party) to take an inventory of your entire site.

02

Our AI-powered platform then analyses the health, growth, and distribution of vegetation in this imagery to spot signs of erosion, contamination and hydrologic issues.

03

You get a complete report which shows if, where, and how your site is deteriorating, with recommendations for what to do next.

Case Study Studies

1. Vegetation Reclamation Monitoring

2. Automated Erosion Monitoring

3. AML Feature Detection

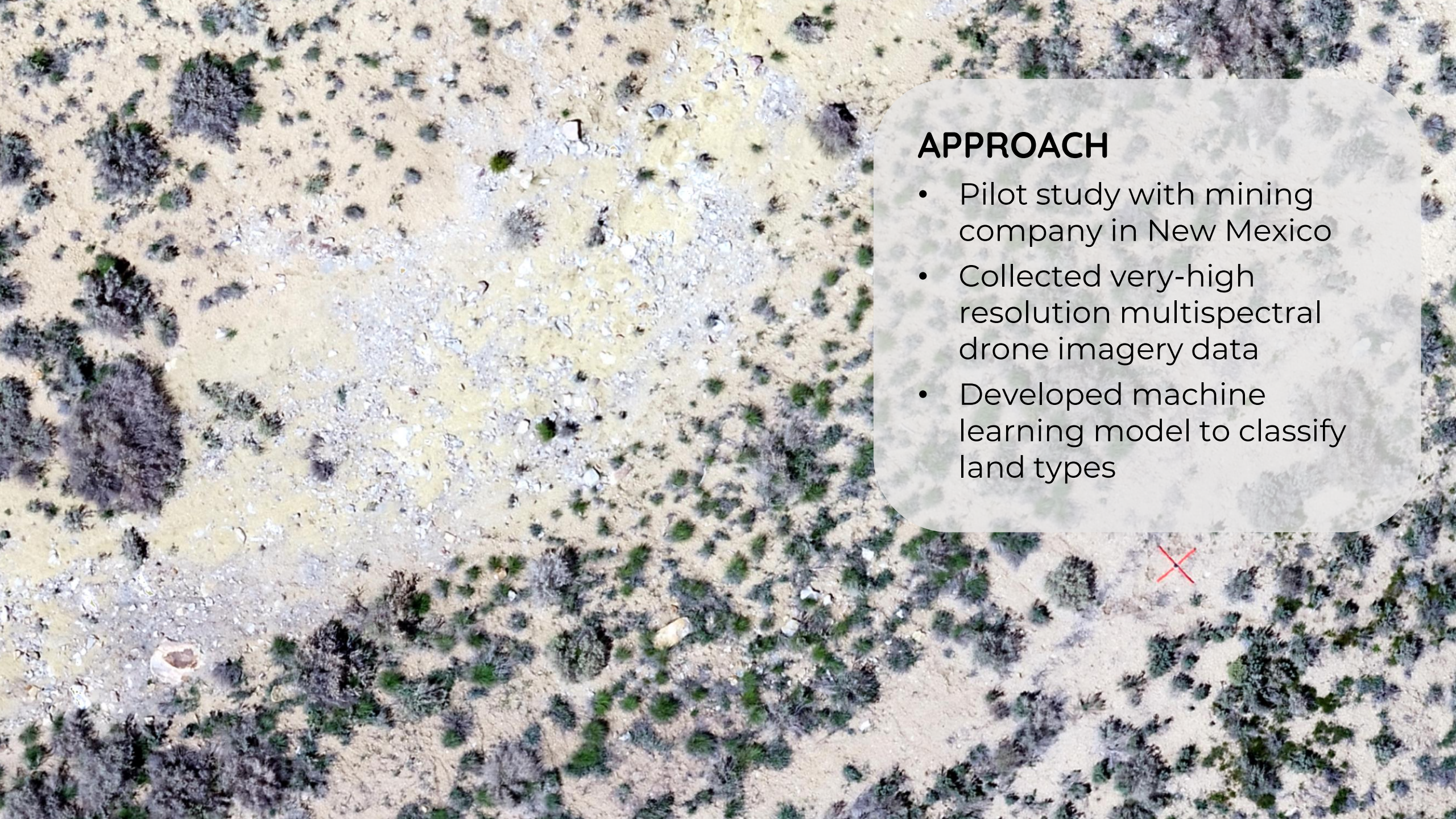
4. Road Network Monitoring

Case Study One

Vegetation Reclamation Monitoring

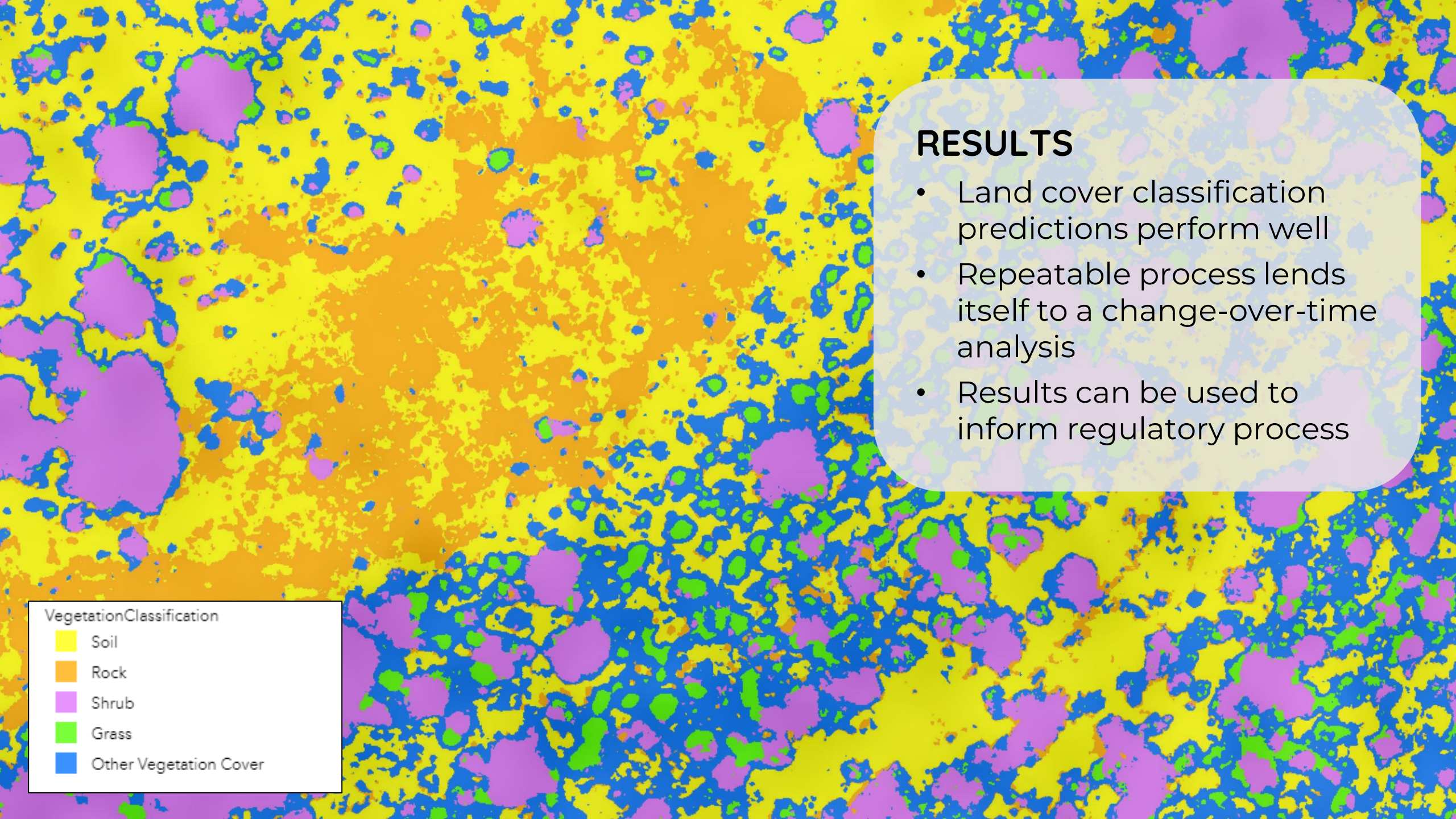
PROBLEM

- Monitoring occurs over thousands of acres
- Currently, linear transects across small areas are used to determine vegetative cover and invasive species
- Want overview of entire site; resolution of available imagery is too low



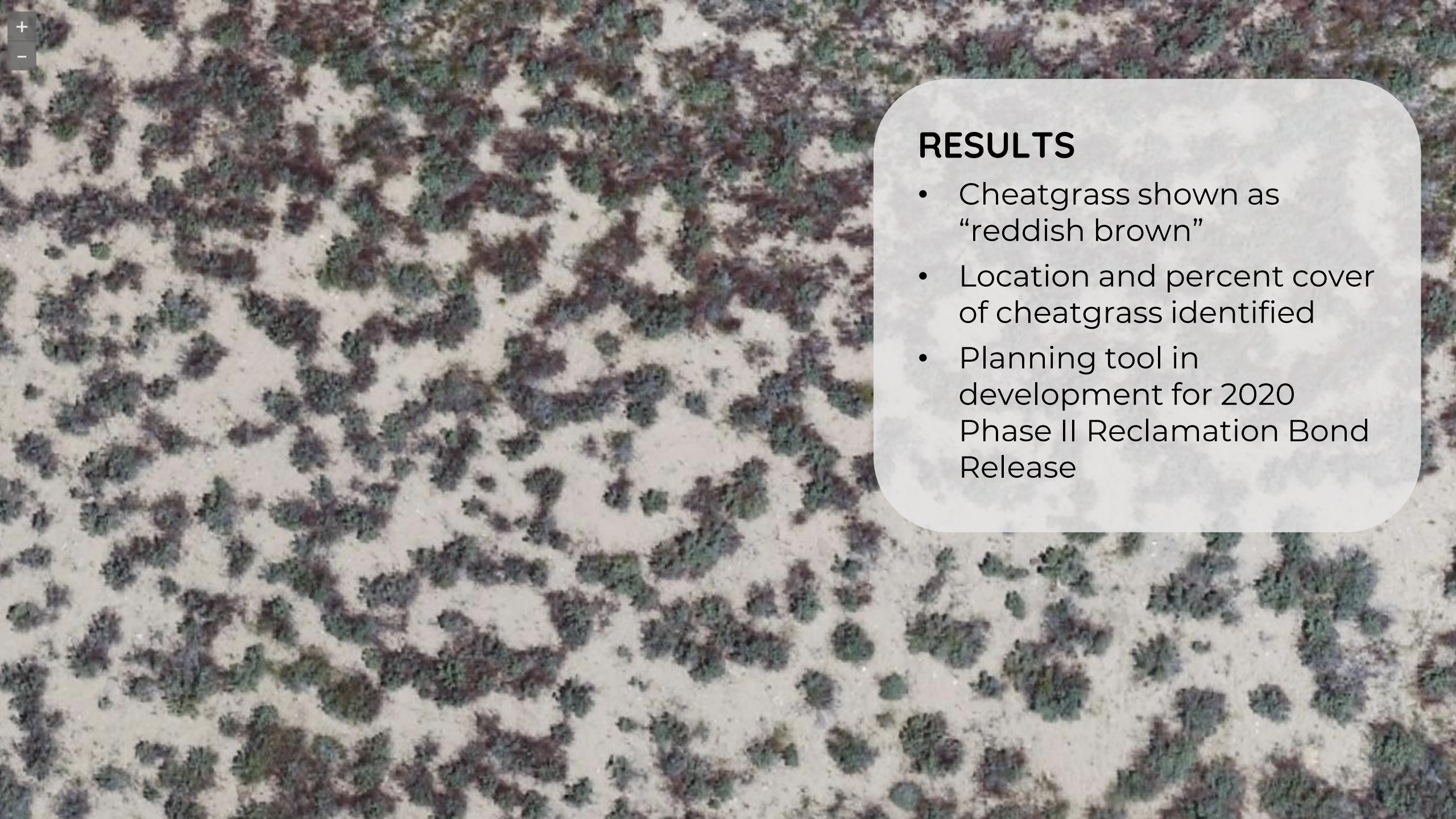
APPROACH

- Pilot study with mining company in New Mexico
- Collected very-high resolution multispectral drone imagery data
- Developed machine learning model to classify land types



RESULTS

- Land cover classification predictions perform well
- Repeatable process lends itself to a change-over-time analysis
- Results can be used to inform regulatory process



RESULTS

- Cheatgrass shown as “reddish brown”
- Location and percent cover of cheatgrass identified
- Planning tool in development for 2020 Phase II Reclamation Bond Release

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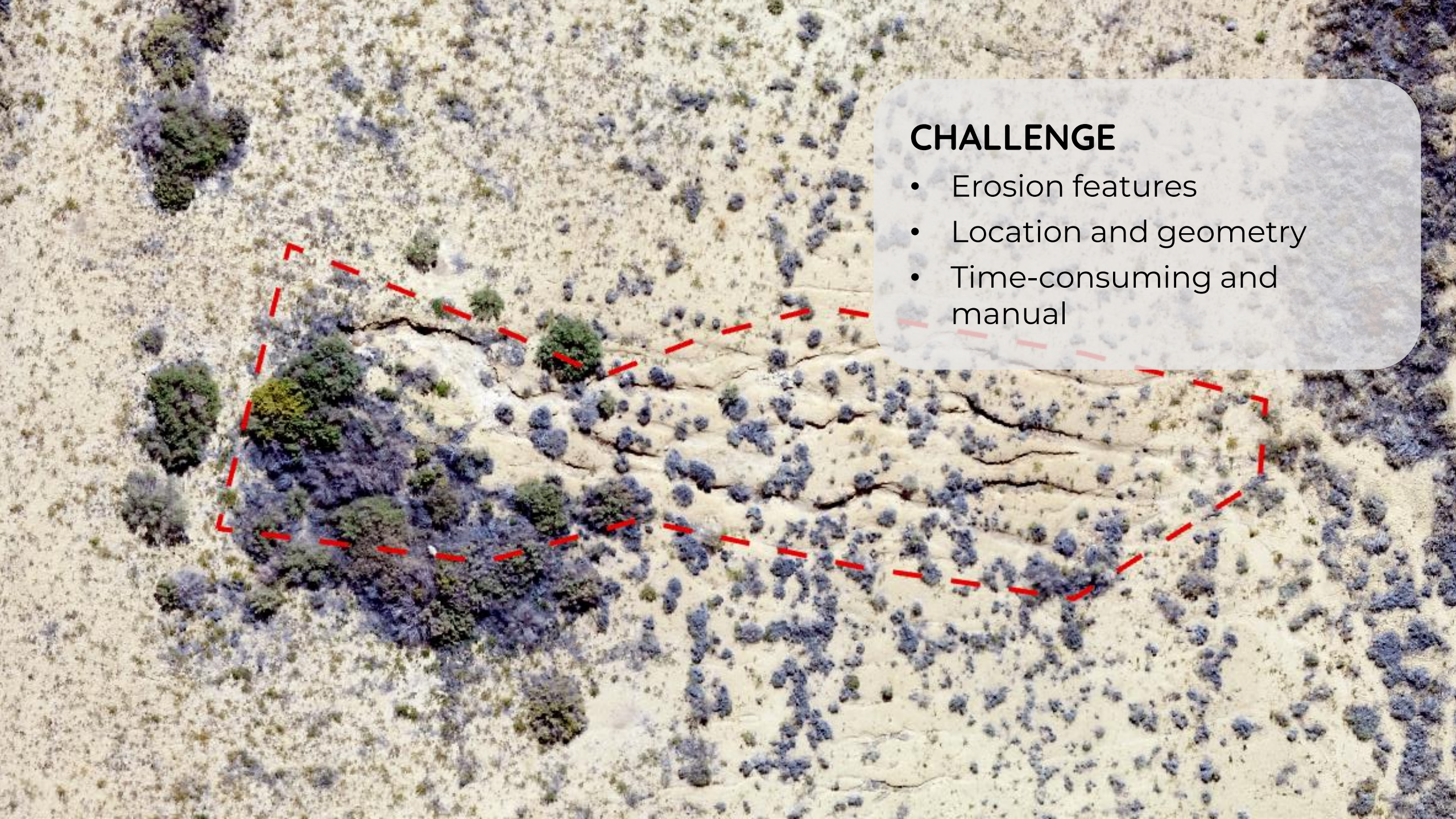
Case Study Two

Automated Erosion Monitoring



CHALLENGE

- Erosion features
- Location and geometry
- Time-consuming and manual

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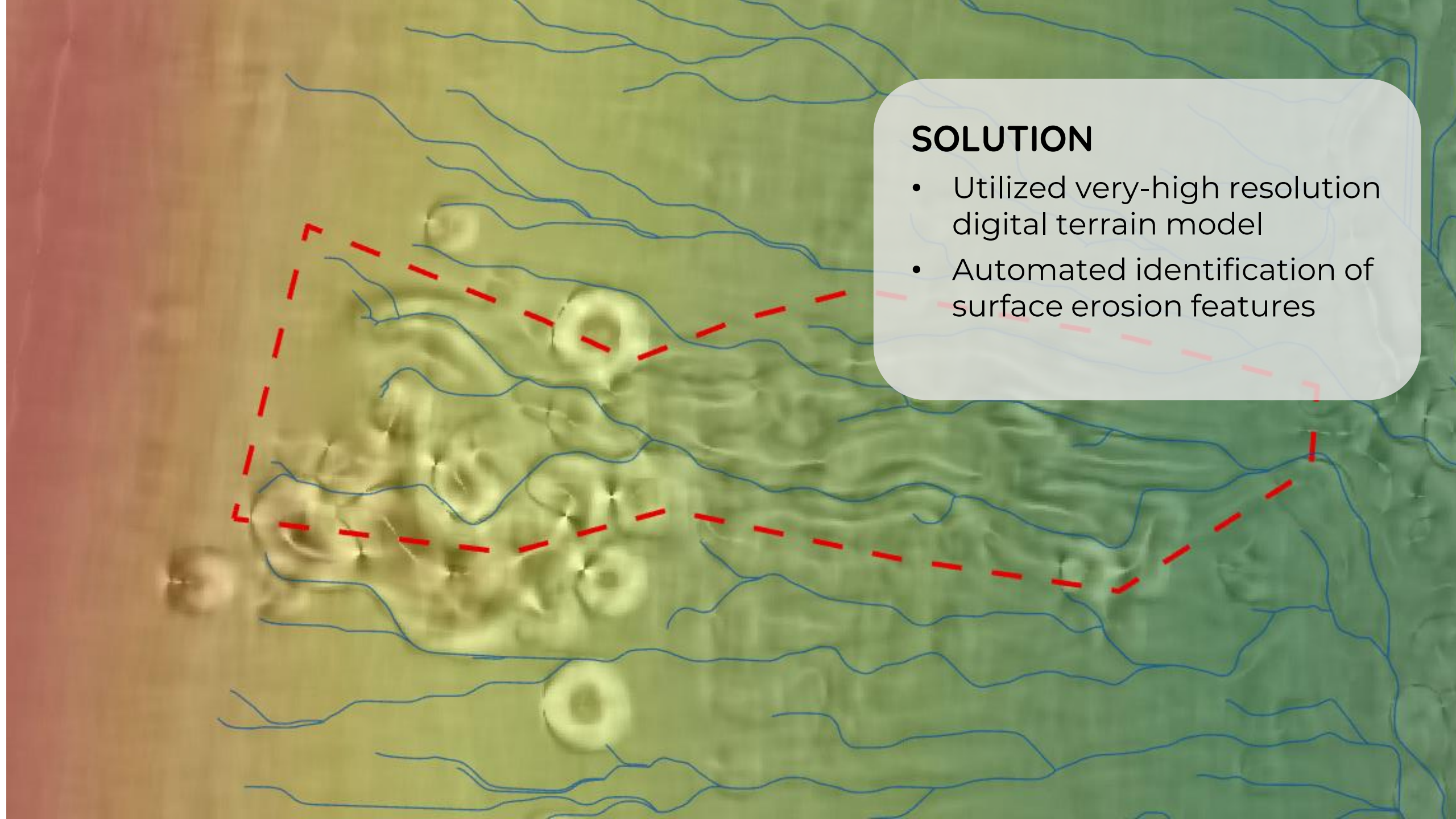
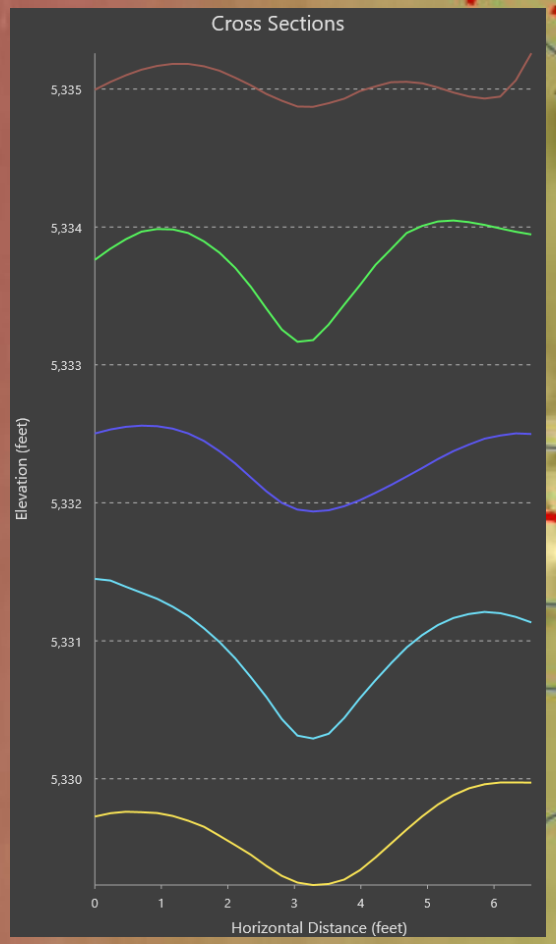


SOLUTION

- Utilized very-high resolution digital terrain model
- Automated identification of surface erosion features



RESULTS

- Developing automated extraction of 3D feature geometries
- Flag features for field inspections

Case Study Three

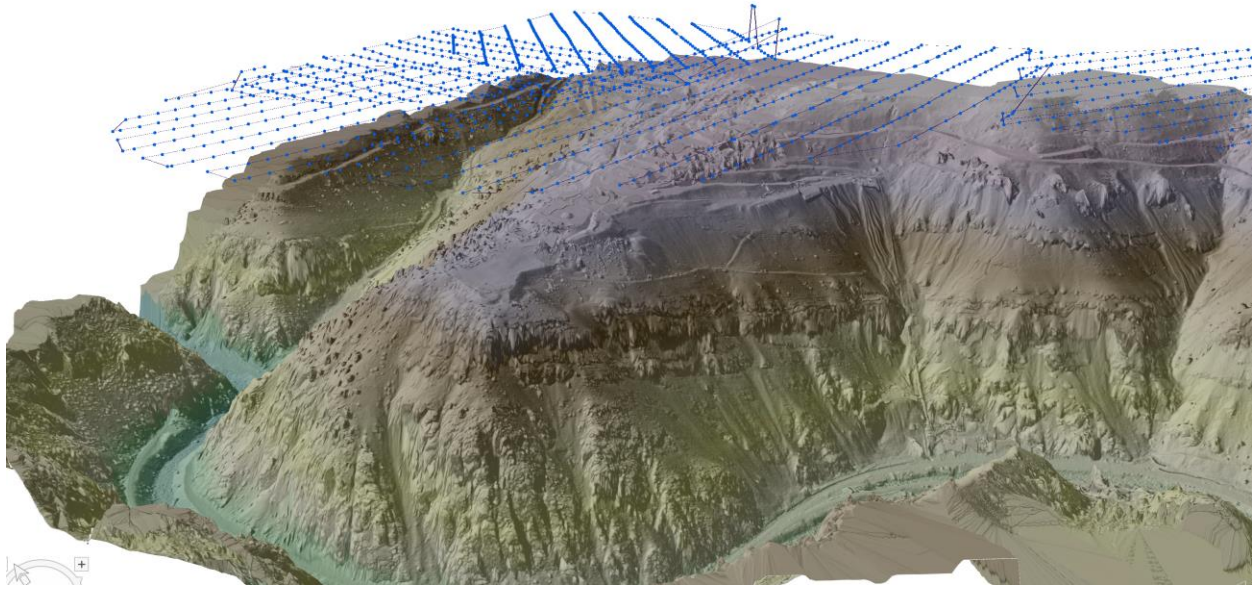
AML Feature Detection

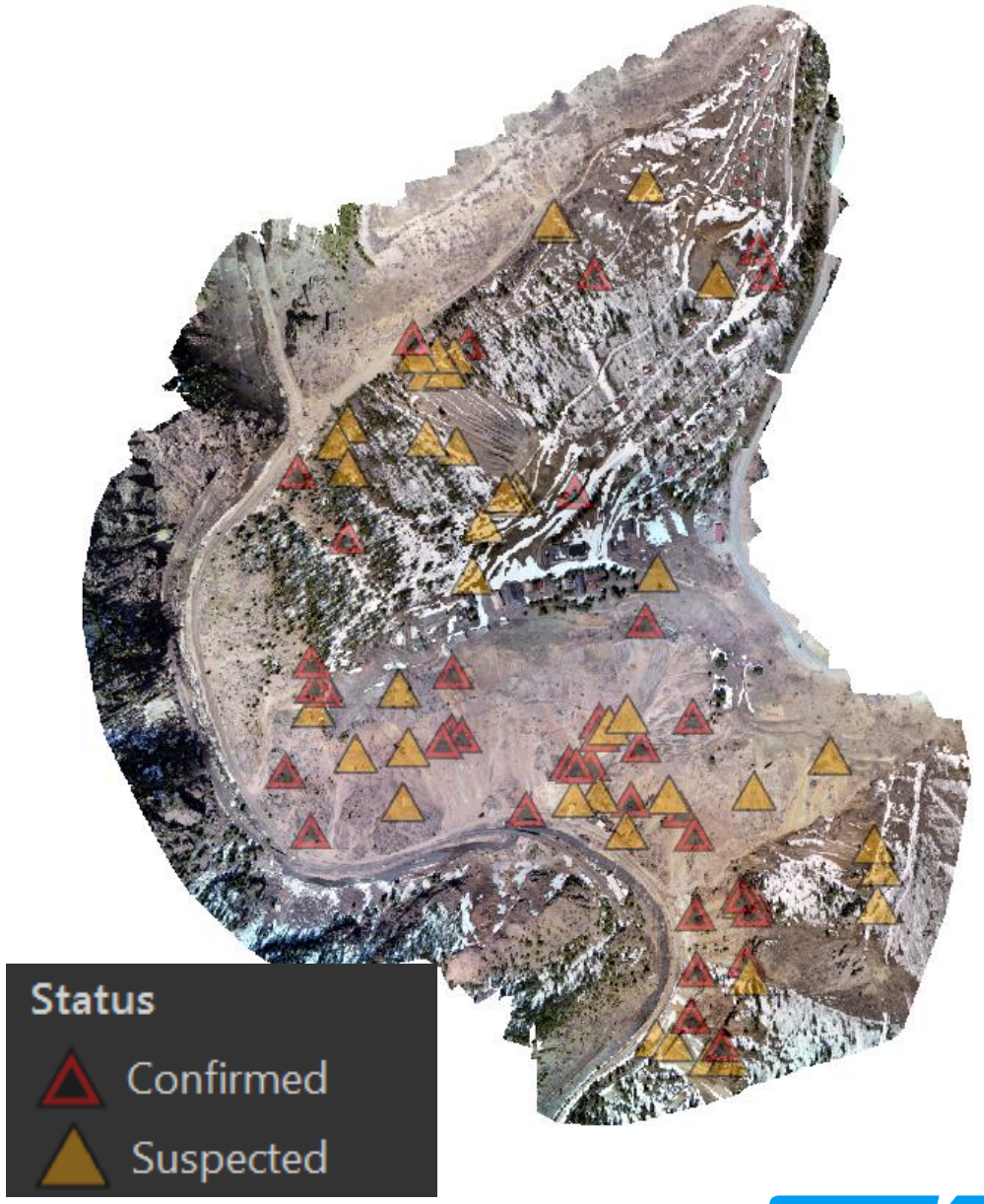
PROBLEM

- Superfund site with acid mine drainage issue
- Large area (450 acres)
- Needed to identify abandoned mine entrances (adits and shafts)
- Significant elevation change across the site

Adits & Shafts Identified

Prioritize openings for closure





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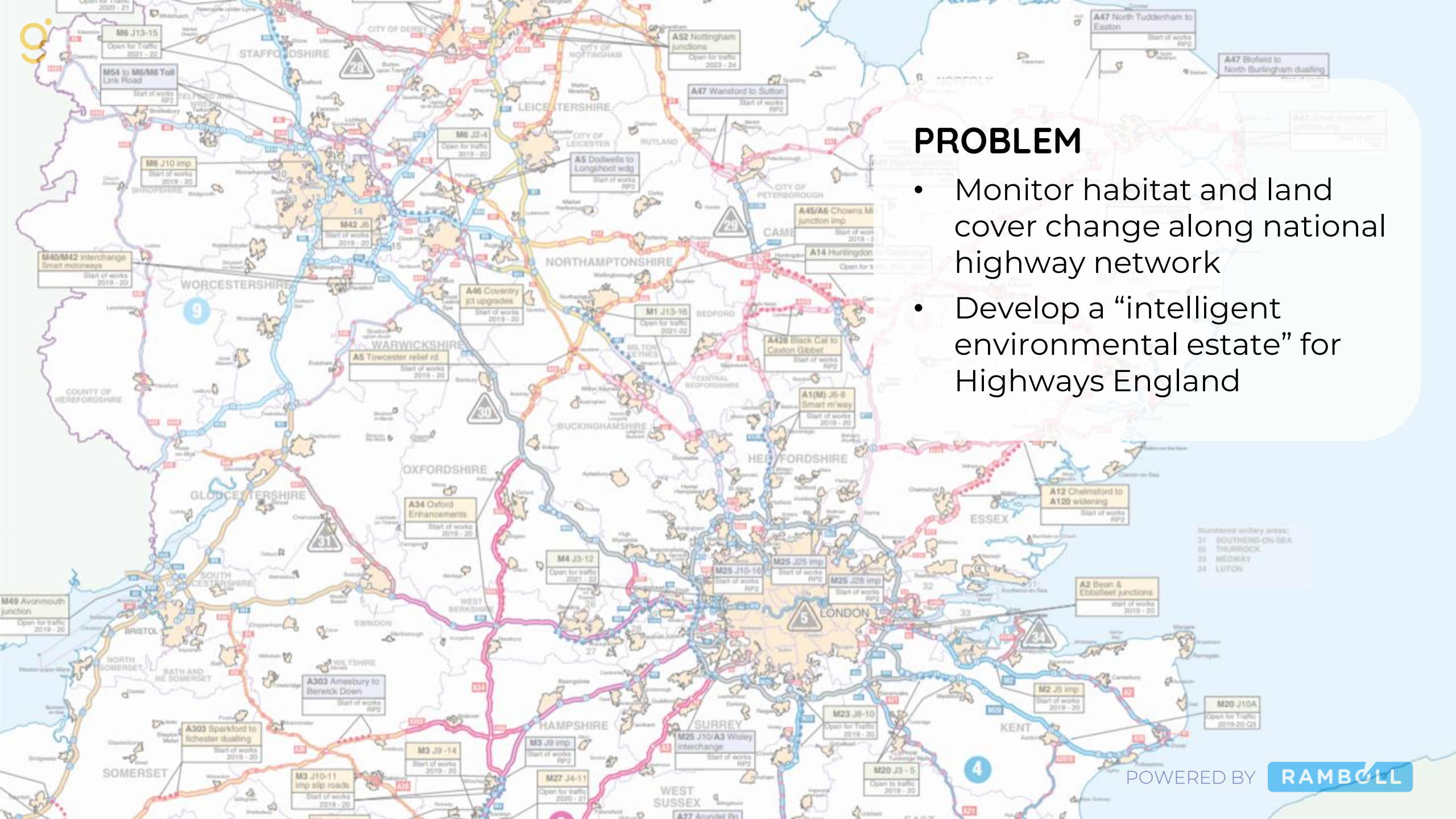
Case Study Four

Road Network Monitoring



PROBLEM

- Monitor habitat and land cover change along national highway network
- Develop a “intelligent environmental estate” for Highways England

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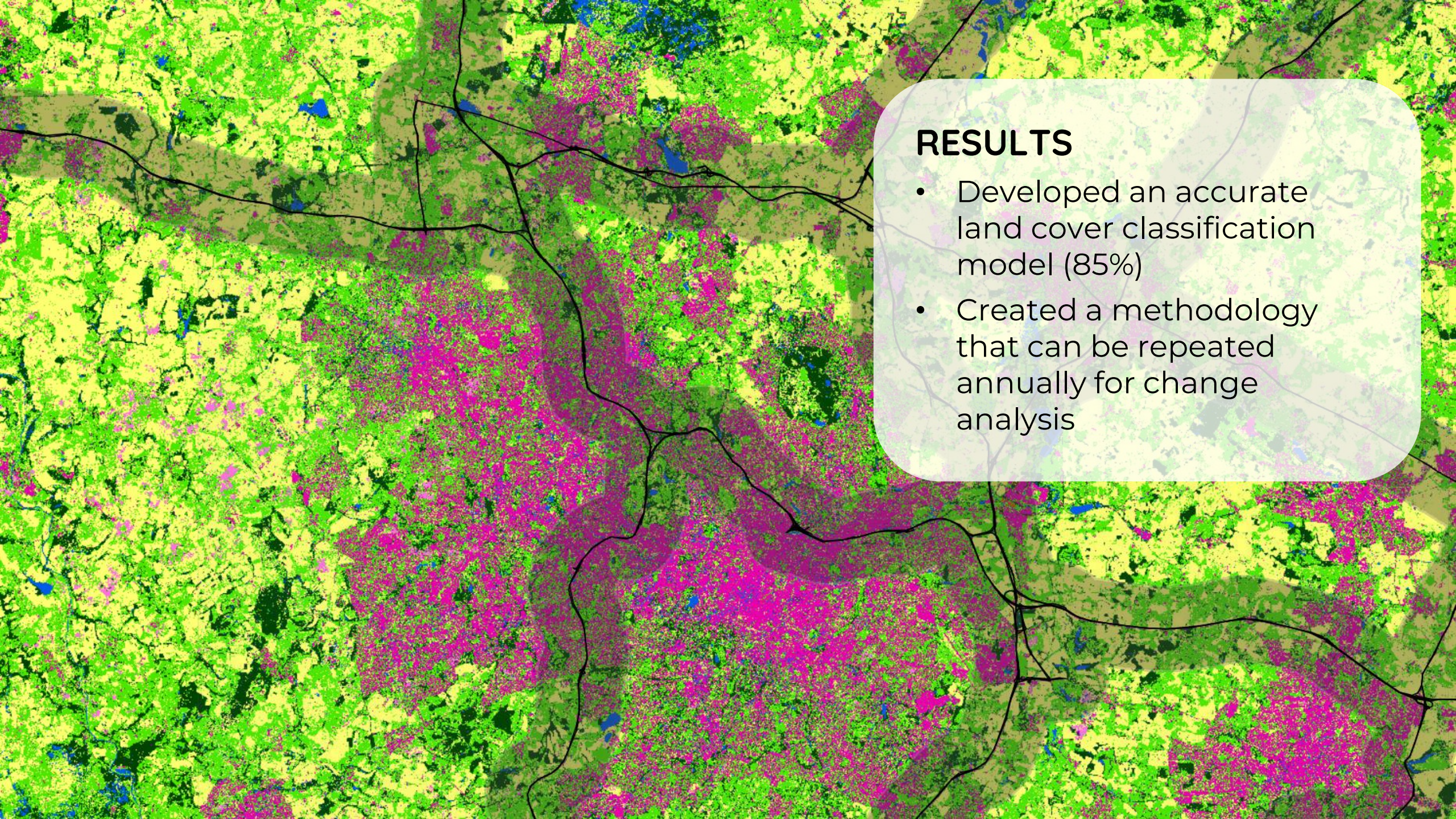
APPROACH

- Feasibility Study
- Used readily available satellite imagery with high temporal coverage (Sentinel-2)
- Developed customized data processing and modeling pipeline for land cover classification



RESULTS

- Developed an accurate land cover classification model (85%)
- Created a methodology that can be repeated annually for change analysis

Bright ideas. Sustainable change.

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