



Geospatial Solutions for Land Administration Management

Begoña Verdejo Herreras

Senior Business Development Engineer EMEA
Government, Transportation and Defence



Creating Smart Digital Realities

Put data to work for real impact

Data capture
& transfer

Data visualisation
& analysis

Real Impact

Productivity + Efficiency + Stability
= **Cost Control, Output, Performance**

Real world

Digital twin

Physical
activities

Defined
actions

Land Usage applications & Technology

Much more than
a classification



Smart Monitoring architecture

Industry segments
depending on Land Usage classification



HxGN Content Program

The largest library of high-resolution aerial imagery, elevation data, 3D models and analytics across North America and Europe.

The aerial data is orthorectified, accurate and available at multiple resolutions.

Elevating the Imagery Market to New Heights

Hexagon Geospatial Content Solutions (GCS): Leica Content Mapper

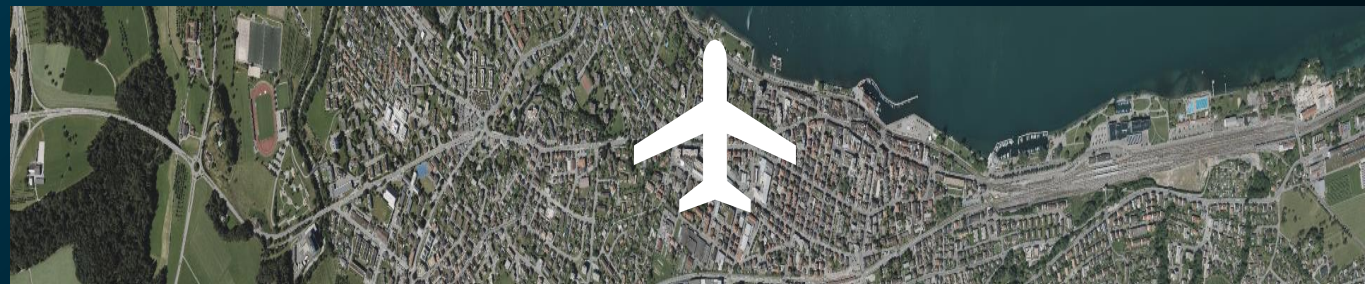


Leica Content Mapper

Collect data more quickly and efficiently without the sacrifice



Leica City Mapper



Hexagon Content Program

Data Products and Features



Ground Controlled



Photogrammetric
Quality Standards



Machine Learning
Ready



Consistent
Sensor
Tech & Flight
Plans

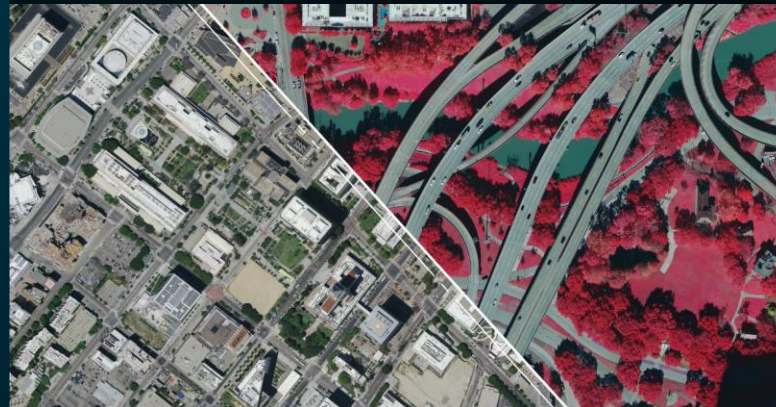


4-Band
Data
(RGBN)



Cloud Hosted
(AWS)

Orthophotos (4-band)



- One-foot GSD wide area coverage (soon 6-inch)
- 6-inch GSD urban area coverage
- Available for streaming & download
- Ideal as a land base for GIS applications

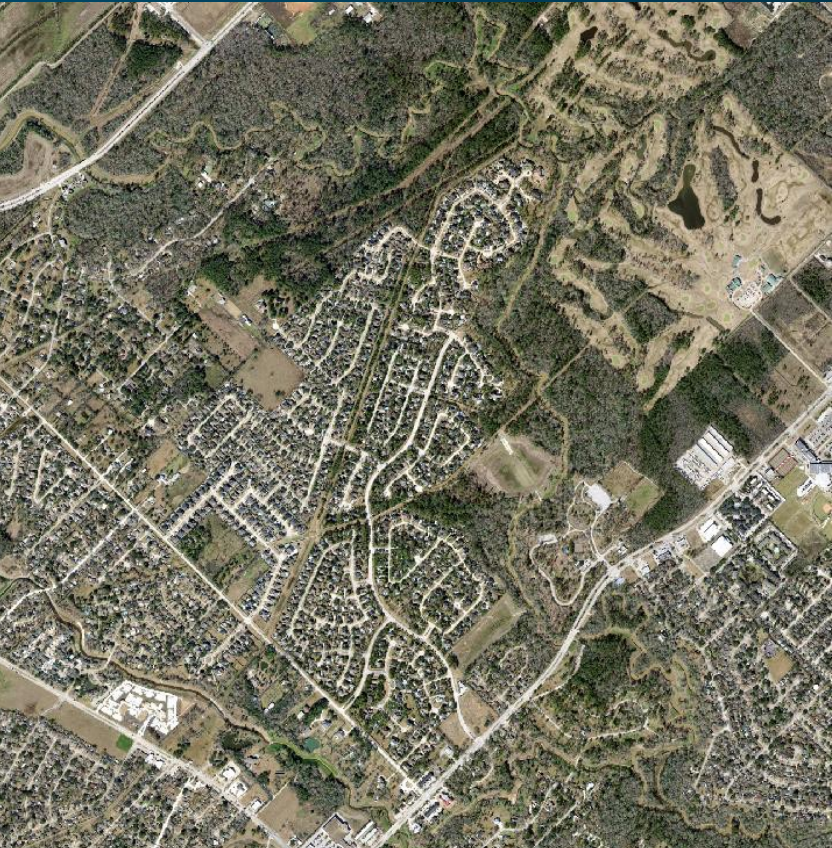
Elevation Products & Stereo Imagery



- DSM and Stereo imagery available for one-foot and 6-inch GSD data
- Broad coverage of the US and Europe
- Ideal to extract 3D vector maps and clutter

Hexagon Content Program

Data and Derivative Products



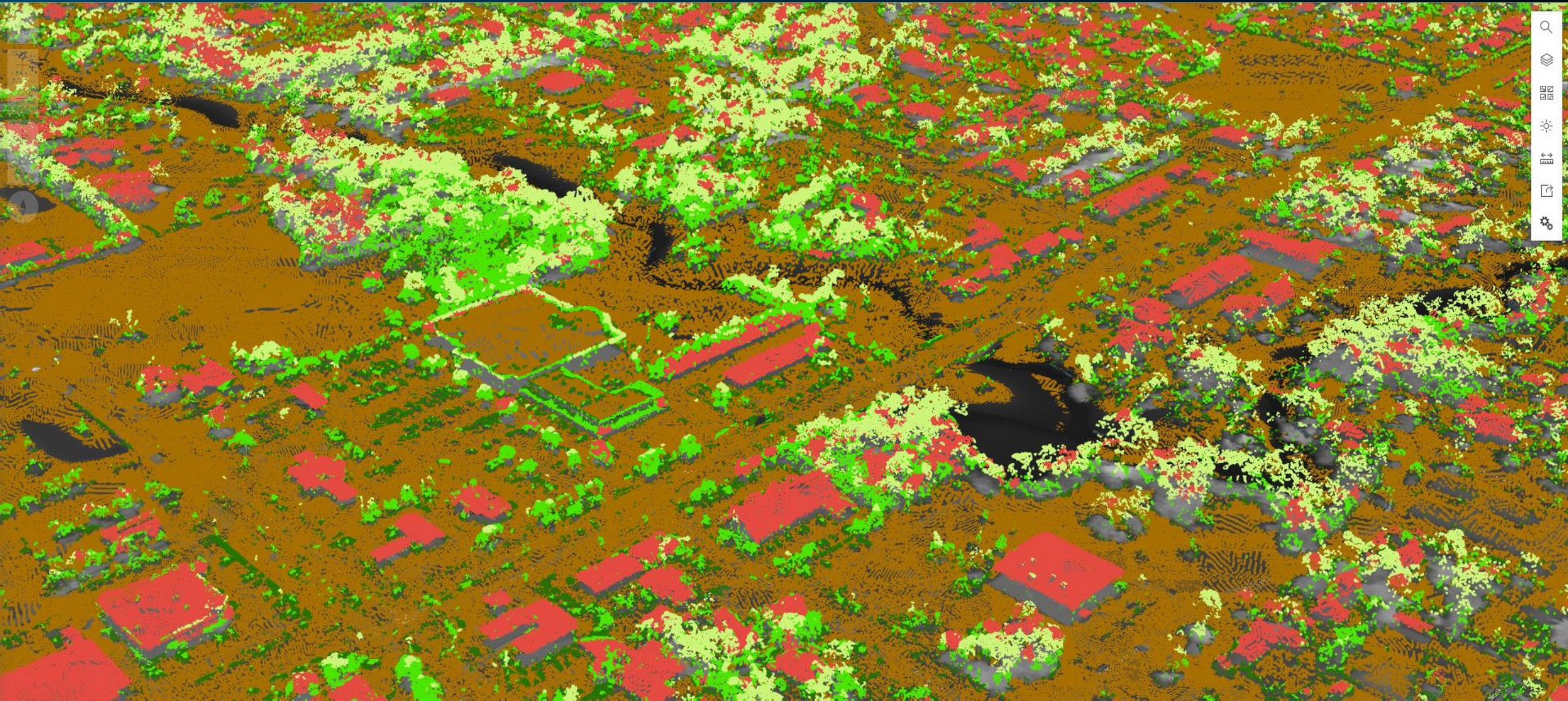
Houston, 15 cm Orthophoto

Houston, 15 cm Orthophoto

Houston, 20 cm DSM

Hexagon Content Program

Complete data stack and derivative products available





HEXAGON SIG Solutions

All the professional tools to process data and extract useful Information from images.

The datasets will be classified and catalog for multiple purposes

Land usage detection by Image classification



Connect

- Comprehensive support for imagery, radar and vector
- Many built-in sensor models for accurate orthorectification
- Support for point clouds
- Use of 3D image models by Photogrammetry

Process

- Hundreds of image analysis and geospatial processing operators
- Intuitive user interface to build and test processing models
- Ortho-mosaicking and compression
- Powerful automation, extensive set of export formats

Understand

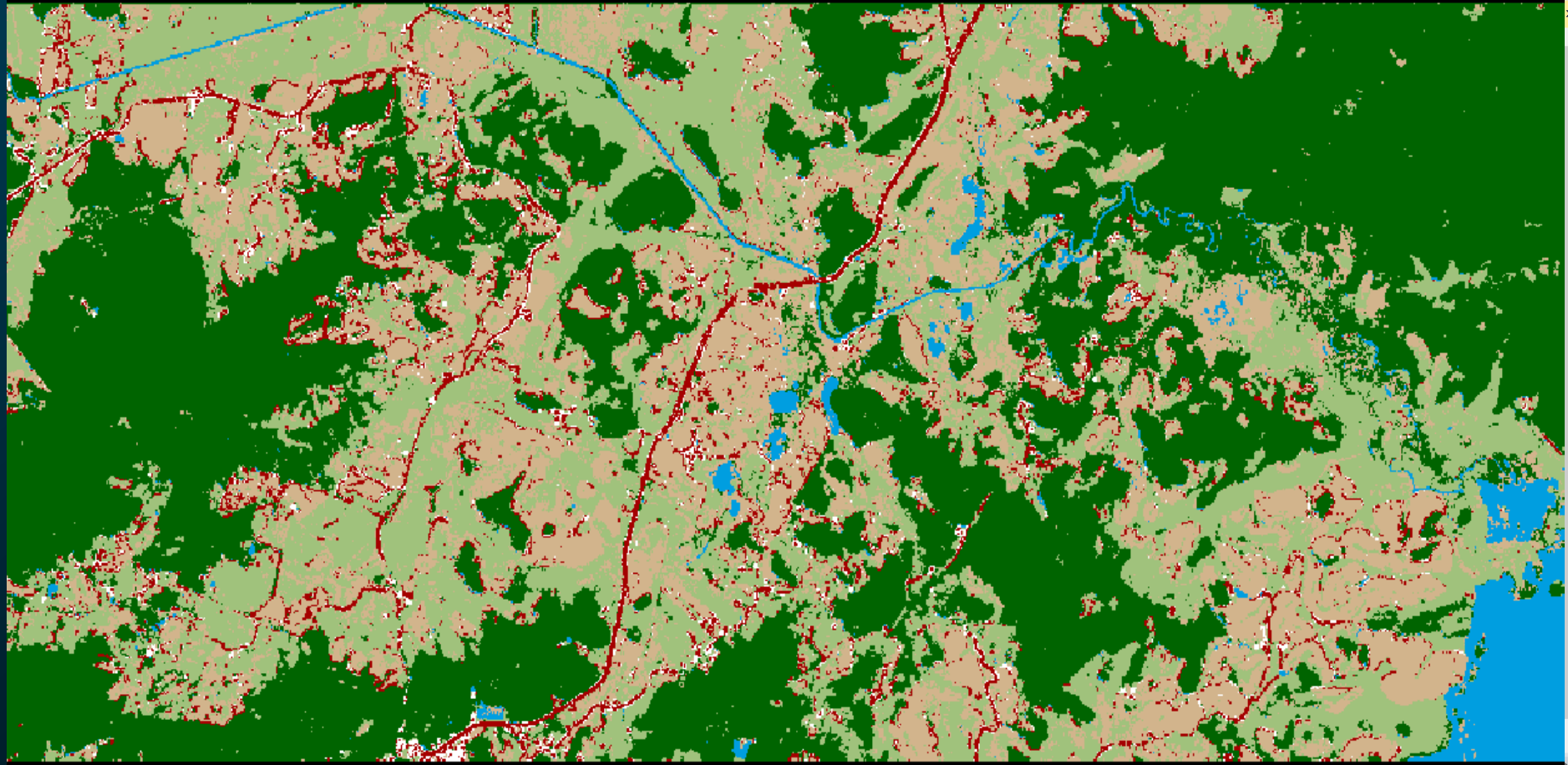
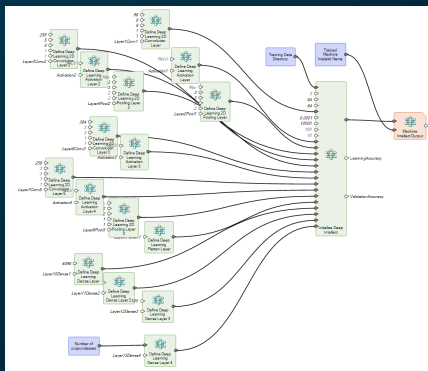
- Change detection
- Build and analyze terrain surface models
- Object recognition through deep learning and other machine intelligence algorithms
- Used by 10000s of data analysts daily in defense, earth observation, education, insurance, transportation, disaster response and crop monitoring

Deep learning classification categories

- Semantic segmentation
- Object detection
- Instance segmentation



Google



Arial images (NADIR & Oblique)



- | | |
|-------------|----------------|
| Roof | Impervious |
| Structure | Agriculture |
| Boat | Tree |
| Bridge | Vehicle |
| Water | Retaining Wall |
| Terrace | Railway |
| Solar Panel | Sand |
| Wall | Shrub |
| Dirt Road | Train |
| Grass | Stairs |
| Facade | Sports Field |
| Object | Rock |
| Airplane | |

Landcover (25 classes)



Spatial Modeler

Impervious from Landcover

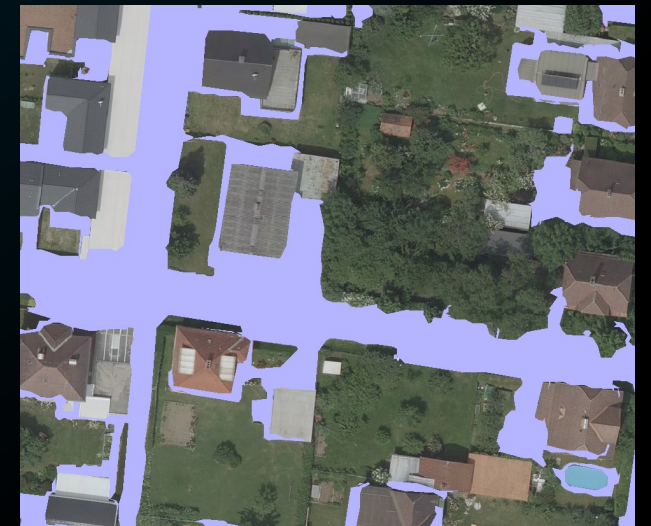


Per-class Probabilities (0 – 255)

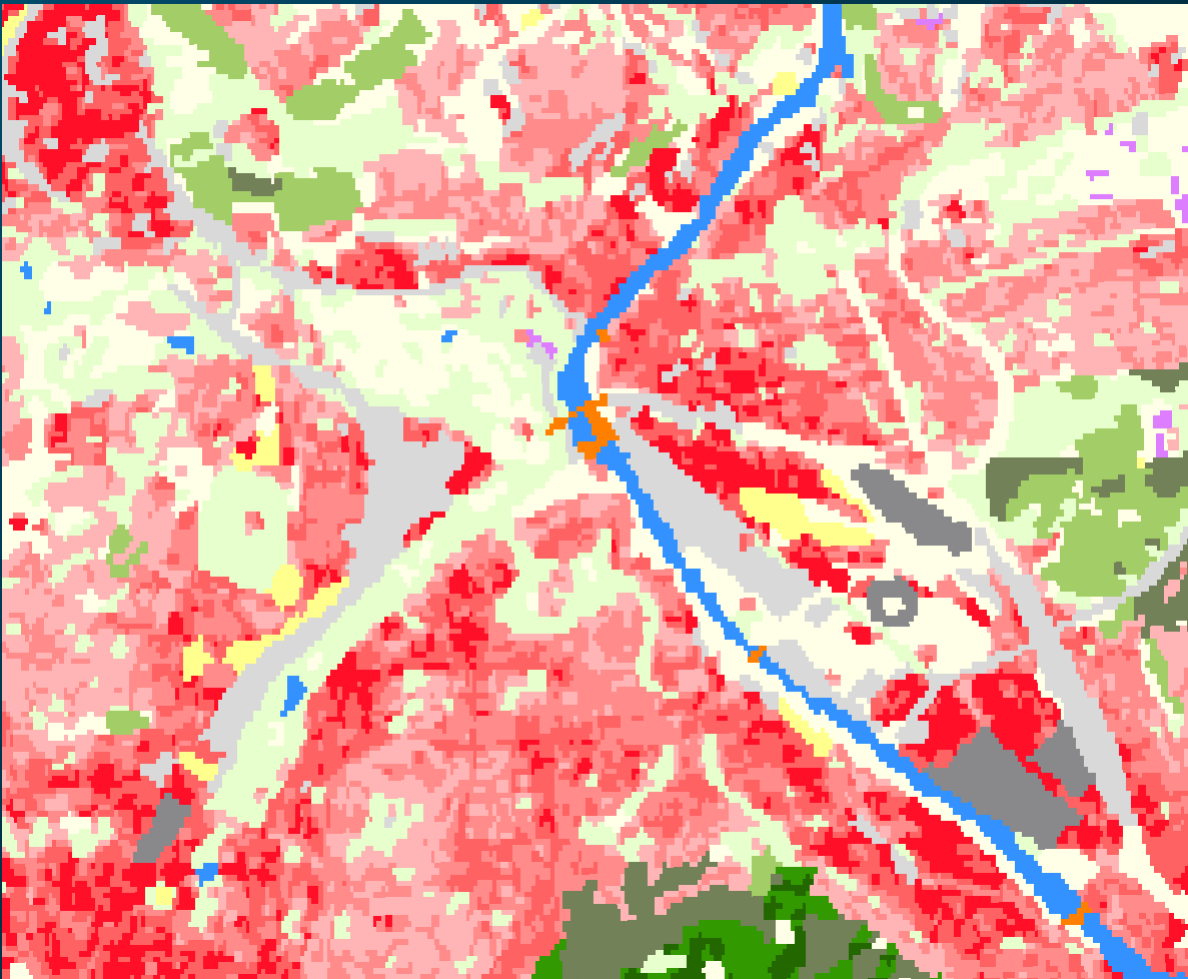


Spatial Modeler

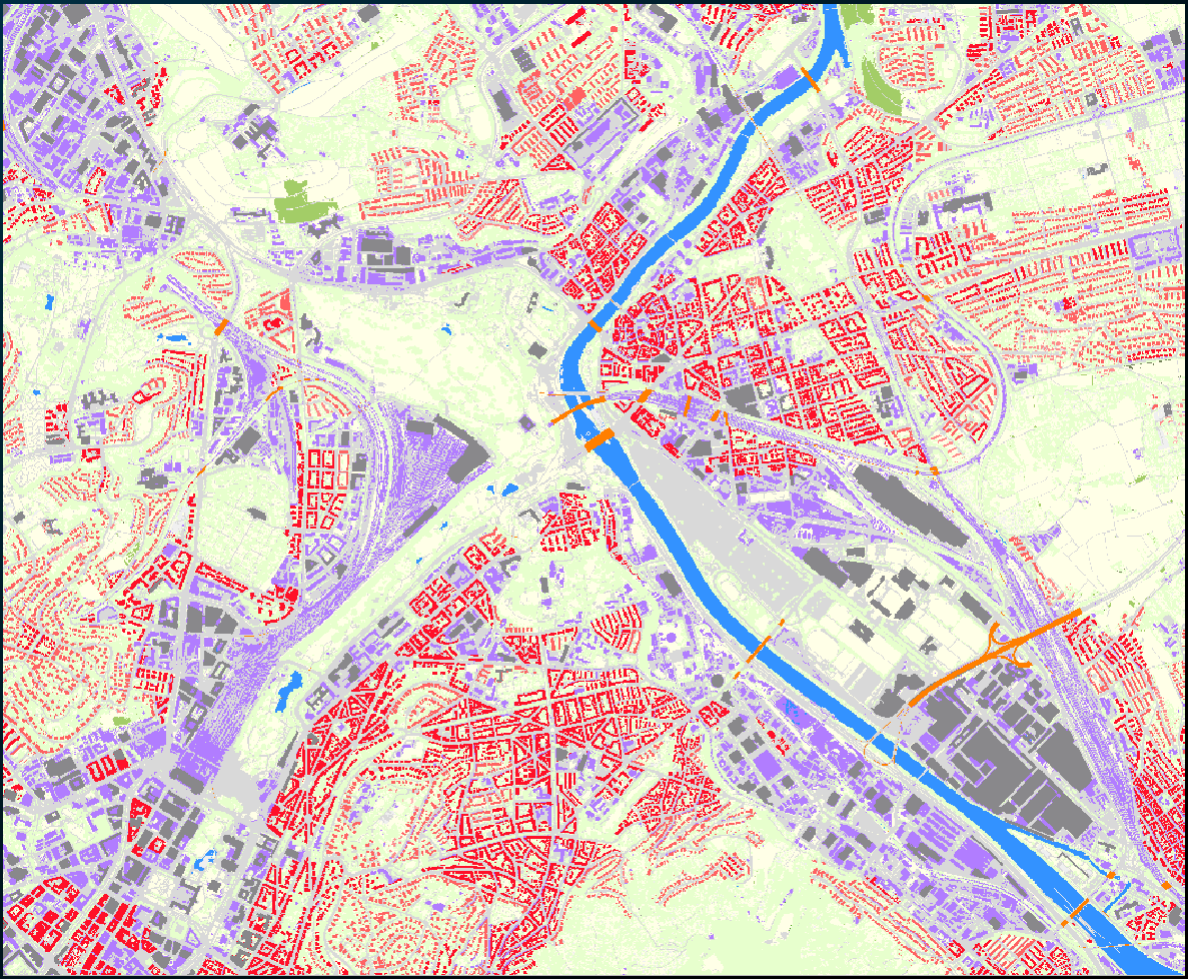
Impervious from Landcover & Probabilities



Clutter Map City of Stuttgart























Date: 2002
5m resolution, based on **satellite** data



Date: 2021
1m resolution, based on **HxGN** Content



MAP LAYERS

-  Vector 
-  Clutter Map 
-  Clutter Map (1m) 
-  Clutter Map (5m) 
-  Raster 
-  Orthophotos 
-  Open Street Map 
-  Germany 
-  DEM (1m) 
-  DSM (0.8m) 



2D

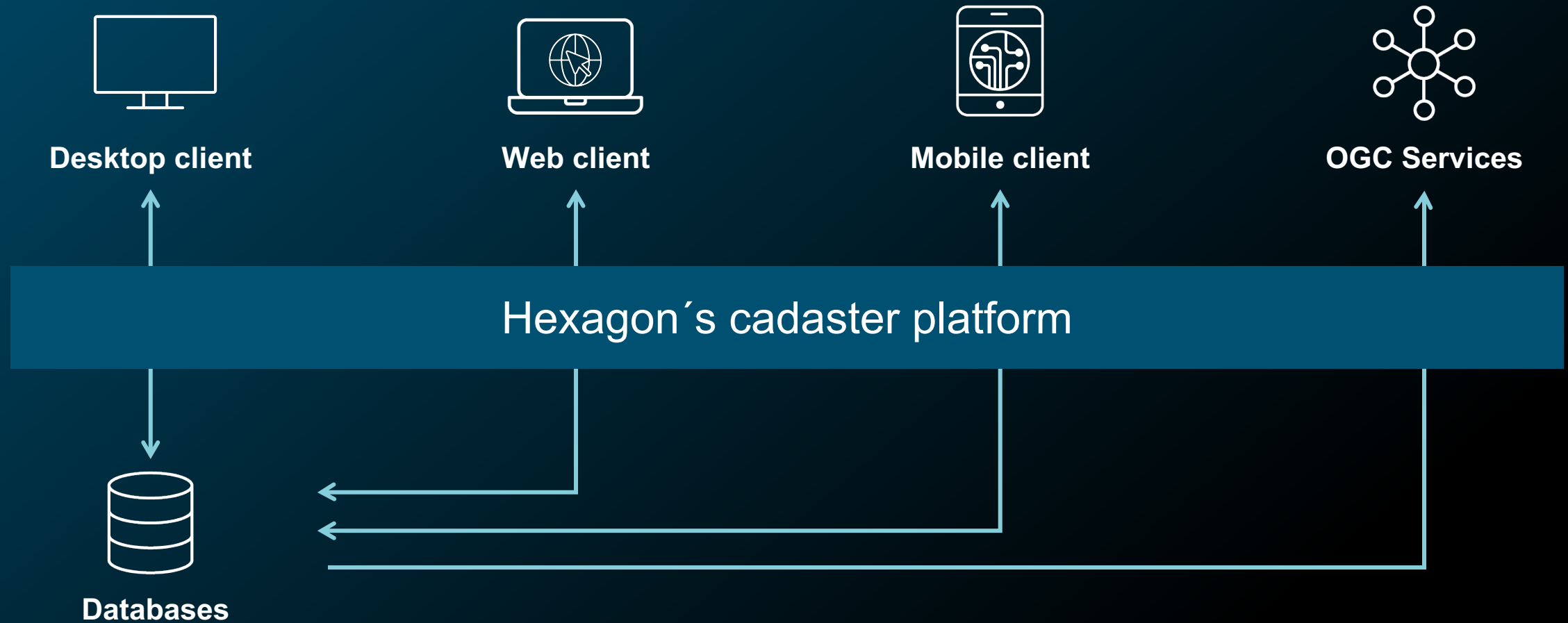






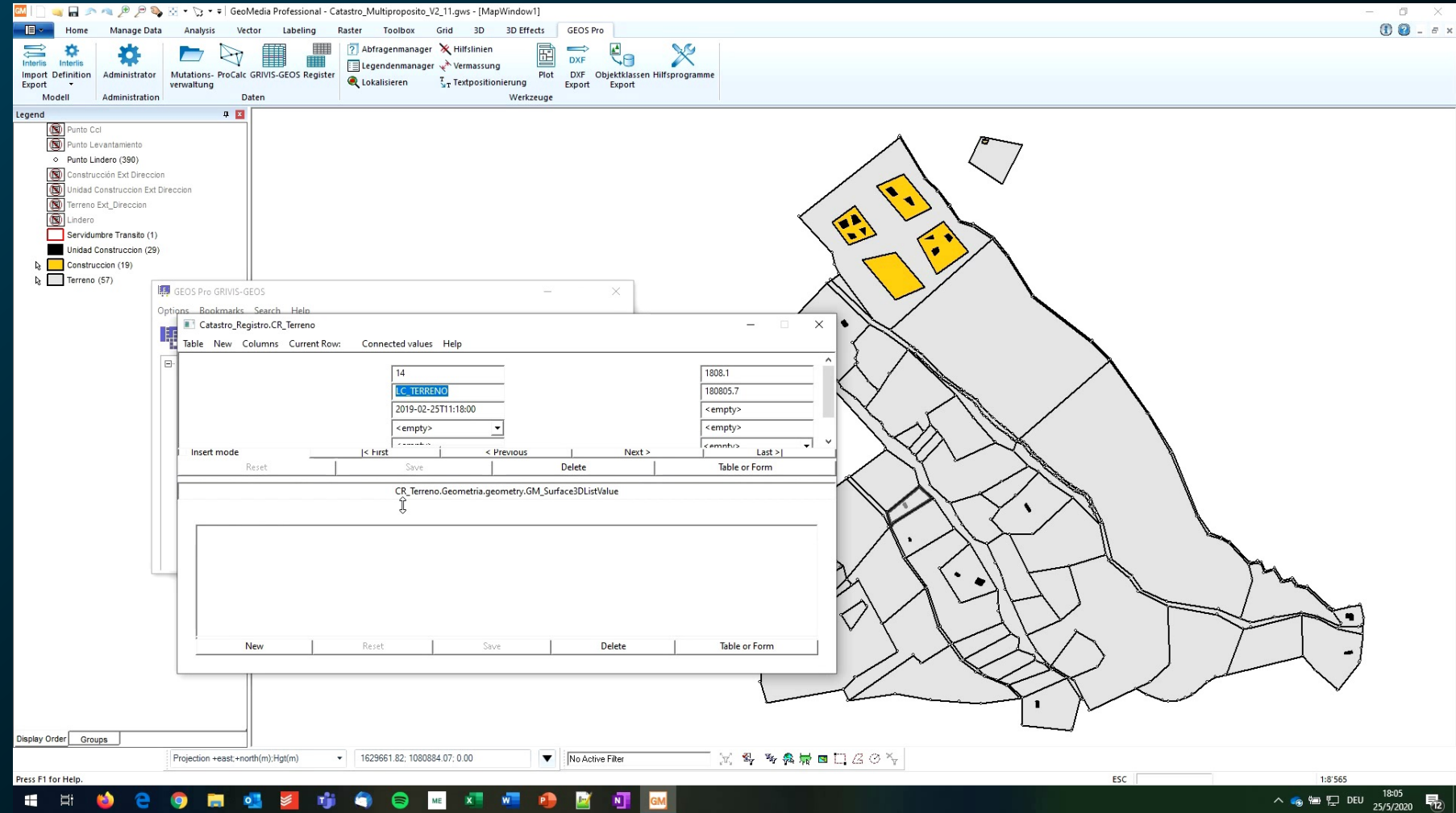
URBAN

Hexagon's SIG Cadaster Solution



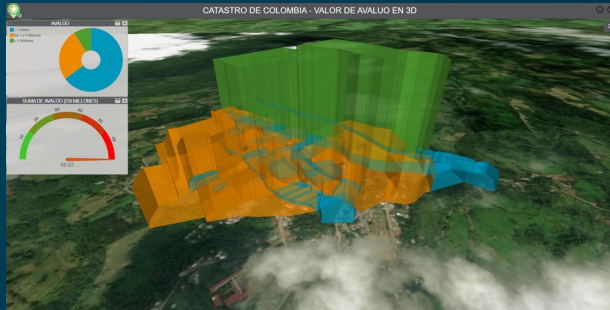
Desktop applications for professional data maintenance

- Geometries generation
- Automatic bulk attribution
- Quality controls



Web client for analysis and publishing

- Data Analysis in 2D 3D 4D



Analizador de Terrenos

No es seguro | mappent.intergraph.eu/BrowserClient/#id=92bb6aad-4d56-4476-a308-12d26706f8b0&ttenant=catastro

CATASTRO DE COLOMBIA - TERRENOS EN LA PALMA (LADM_COL)

Área (m²)

- < 2000m²
- de 2001 a 5000m²
- de 5001 a 10000m²
- de 10001 a 25000m²
- > 25000m²

SUMA DE AVALÚO (EN MILLONES)

11.98

FECHA

March April May June July August September October November

10:18 24/5/2020

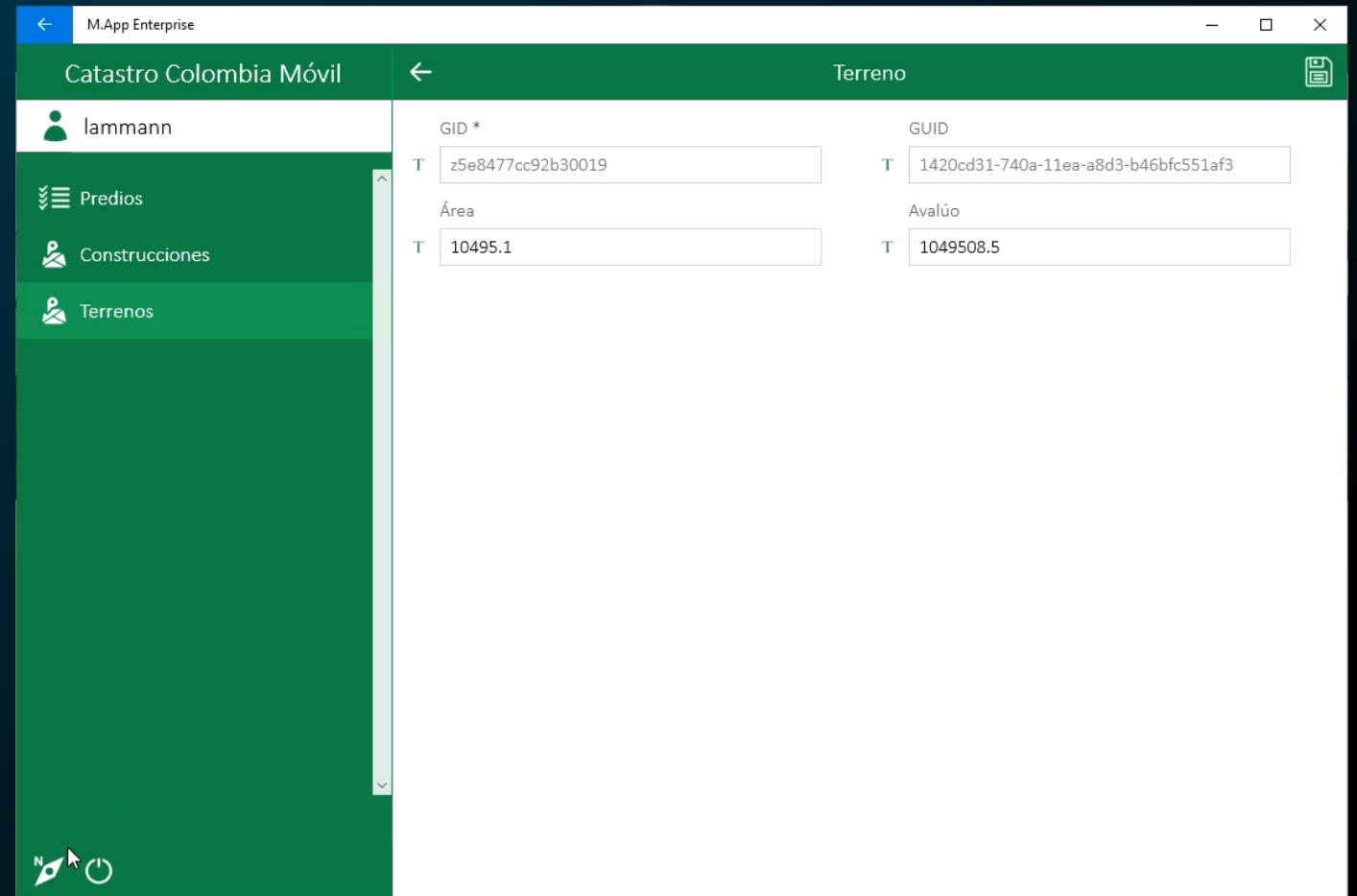
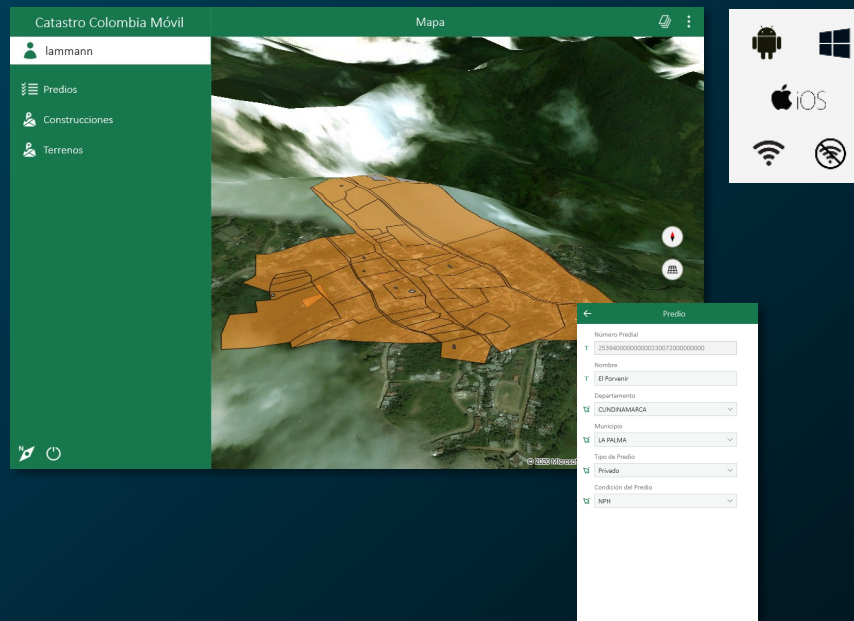
- Internal & External publishing

OL Terreno

ID Terreno	AREA	VALOR	VALOR
AMONGORRAL U.C. TERRENO	0	0,0	0,0
AMONGORRAL U.C. TERRENO	0	0,0	0,0
AMONGORRAL U.C. TERRENO	0	0,0	0,0
AMONGORRAL U.C. TERRENO	0	0,0	0,0
U.C. TERRENO	14	1000,0	1000,0
U.C. TERRENO	16	1000,0	1000,0
U.C. TERRENO	40	1000,0	1000,0
U.C. TERRENO	1	1000,0	1000,0
U.C. TERRENO	3	1000,0	1000,0
U.C. TERRENO	5	1000,0	1000,0
U.C. TERRENO	6	1000,0	1000,0

Mobile Application for verification , update & control

- Data capturing on the field
- Field review and documentation
- Online sync to server



OGC Services Cadaster integration

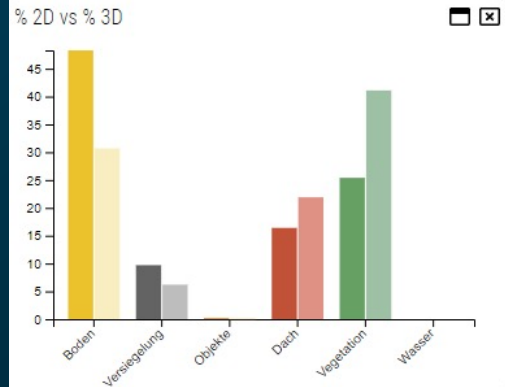
- OGC WMS, WMTS, WFS
- Any Coordinate Sstem
- Any GIS Platform integration

```
This XML file does not appear to have any style information associated with it. The document tree is shown below.
▼ <Capabilities xmlns:xlink="http://www.w3.org/1999/xlink" xmlns="http://www.opengis.net/wms" version="1.3.0">
  <Service>
    <Name>WIS</Name>
    <Title>Catastro</Title>
    <KeywordList/>
    <OnlineResource xlink:href="http://mappent.intergraph.eu/api/v1/geoservices/wms/catastro/catastro" xlink:type="simple"/>
  </Service>
  <Capability>
    <Request>
      <GetCapabilities...</GetCapabilities>
      <GetMap...</GetMap>
      <GetFeatureInfo...</GetFeatureInfo>
    </Request>
    <Layer>
      <Title>Catastro</Title>
      <KeywordList/>
      <CRS>EPSG:3116</CRS>
      <CRS>EPSG:3857</CRS>
      <EX_GeographicBoundingBox>
        <westBoundLongitude>-74.394437292991341</westBoundLongitude>
        <eastBoundLongitude>-74.385419491907484</eastBoundLongitude>
        <southBoundLatitude>5.3571509890190026</southBoundLatitude>
        <northBoundLatitude>5.3661893156513436</northBoundLatitude>
      </EX_GeographicBoundingBox>
      <BoundingBox CRS="EPSG:3116" minx="964873" miny="1084157" maxx="965872" maxy="1085156"/>
      <BoundingBox CRS="EPSG:3857" minx="-8281550.8773079161" miny="597226.1372207416" maxx="-8280547.020281859" maxy="598236.70065977366"/>
      <Style>
        <Name>Default</Name>
      </Style>
    </Layer>
    <Layer queryable="1">
      <Name>Terreno_nuevo_llive</Name>
      <Title>Terreno_nuevo_llive</Title>
      <KeywordList/>
      <CRS>EPSG:3116</CRS>
      <CRS>EPSG:3857</CRS>
      <EX_GeographicBoundingBox>
        <westBoundLongitude>-74.394437292991341</westBoundLongitude>
        <eastBoundLongitude>-74.385419491907484</eastBoundLongitude>
        <southBoundLatitude>5.3571509890190026</southBoundLatitude>
        <northBoundLatitude>5.3661893156513436</northBoundLatitude>
      </EX_GeographicBoundingBox>
      <BoundingBox CRS="EPSG:3116" minx="964873" miny="1084157" maxx="965872" maxy="1085156"/>
      <BoundingBox CRS="EPSG:3857" minx="-8281550.8773079161" miny="597226.1372207416" maxx="-8280547.020281859" maxy="598236.70065977366"/>
      <Style>
        <Name>Default</Name>
      </Style>
    </Layer>
    <Layer queryable="1">
      <Name>Construccion_nueva_llive</Name>
      <Title>Construccion_nueva_llive</Title>
      <KeywordList/>
      <CRS>EPSG:3116</CRS>
      <CRS>EPSG:3857</CRS>
      <EX_GeographicBoundingBox>
        <westBoundLongitude>-74.394437292991341</westBoundLongitude>
        <eastBoundLongitude>-74.385419491907484</eastBoundLongitude>
        <southBoundLatitude>5.3571509890190026</southBoundLatitude>
        <northBoundLatitude>5.3661893156513436</northBoundLatitude>
      </EX_GeographicBoundingBox>
      <BoundingBox CRS="EPSG:3116" minx="964873" miny="1084157" maxx="965872" maxy="1085156"/>
      <BoundingBox CRS="EPSG:3857" minx="-8281550.8773079161" miny="597226.1372207416" maxx="-8280547.020281859" maxy="598236.70065977366"/>
    </Layer>
  </Capability>
</Capabilities>
```

19

Allgemein
Gemarkung 020201
Nummer 6521
Fläche 36.287 m²

Flächen	
Boden	17.592 m ²
Versiegelung	3.551 m ²
Objekte	69 m ²
Dach	5.968 m ²
Vegetation	9.244 m ²
Wasser	0 m ²
Baumvolumen	117.656 m ³
Gebäudevolumen	37.707 m ³



Dashboard - Landnutzung

Karte



2D
▲
+
-
📍

Navigation and control icons: close, layers, camera, pan, zoom, filter, and search.



Layer Tree

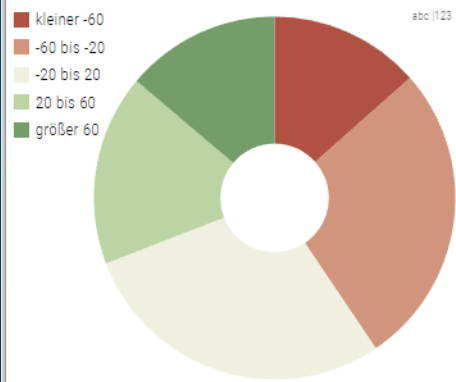
- HSPC Hamburg
- Geobasisdaten
- Nachhaltigkeit
 - CO2 Indikator Flurstücke
 - kleiner -60
 - 60 bis -20
 - 20 bis 20
 - 20 bis 60
 - größer 60
- Opacity
- NAVLOG
- Landcover
- DTK 250.000
- WebAtlas light
- BKG DOP 20
- Open Street Map
- Digitales Geländemodell



100m | |

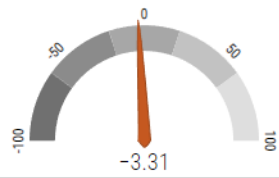
60,634 von 60,634 Flurstücken

CO2 Indikator

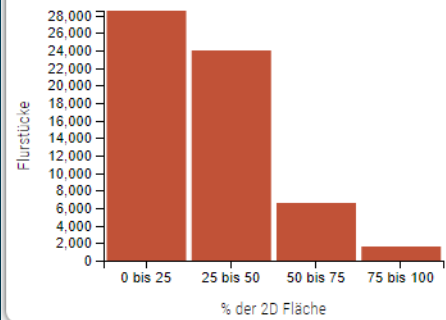


Flurstücksnummer

Durchschnitt CO2 Indikator



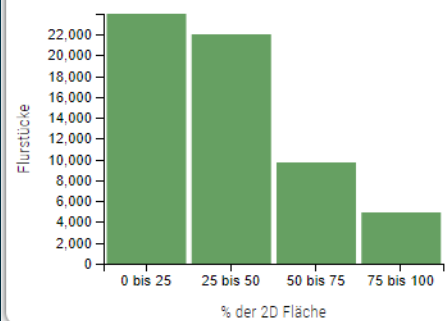
Gebäudeflächen



Gebäudevolumen in Tausend m³

155,454

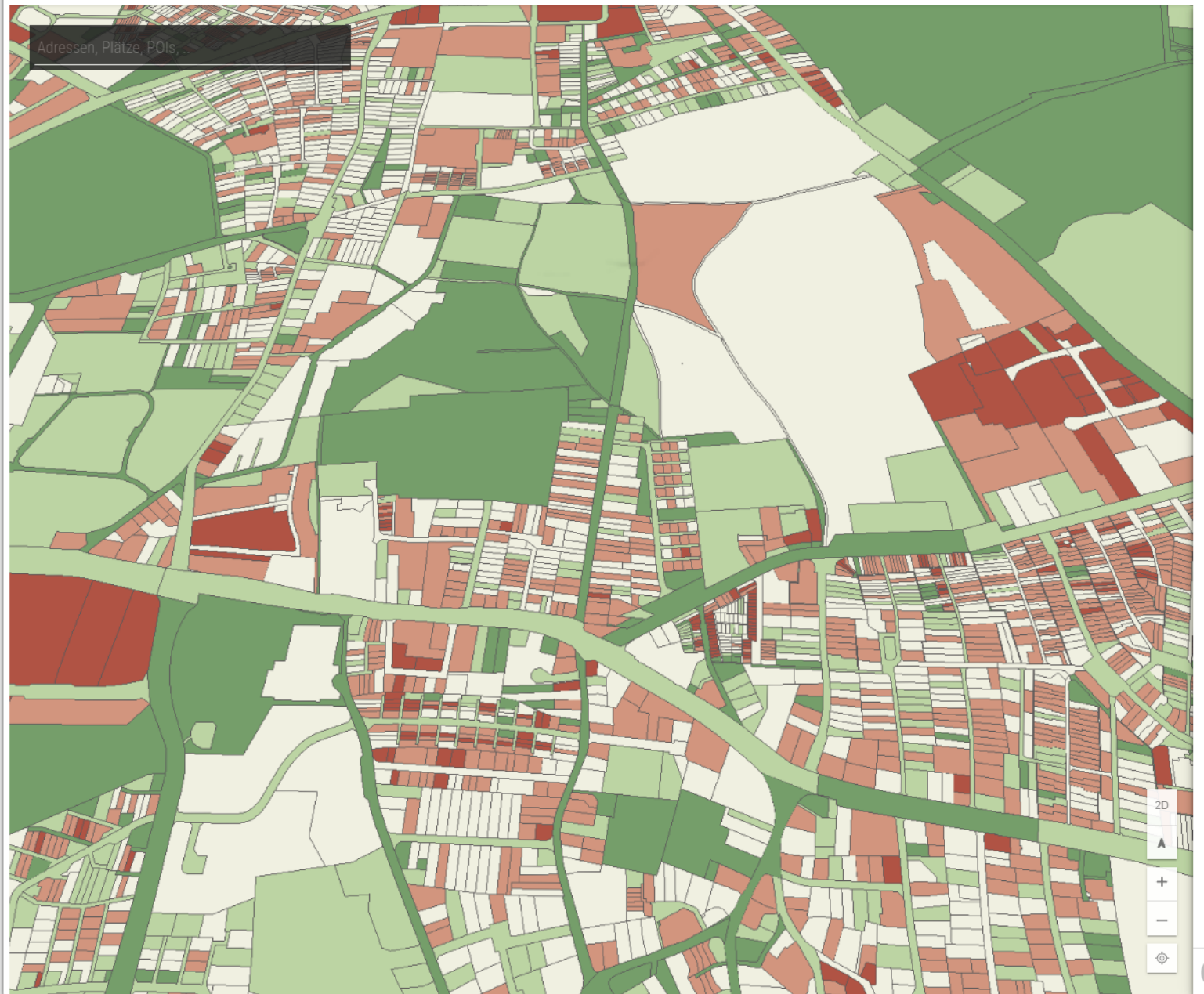
Vegetation



Baumvolumen in Tausend m³

454,406

Karte



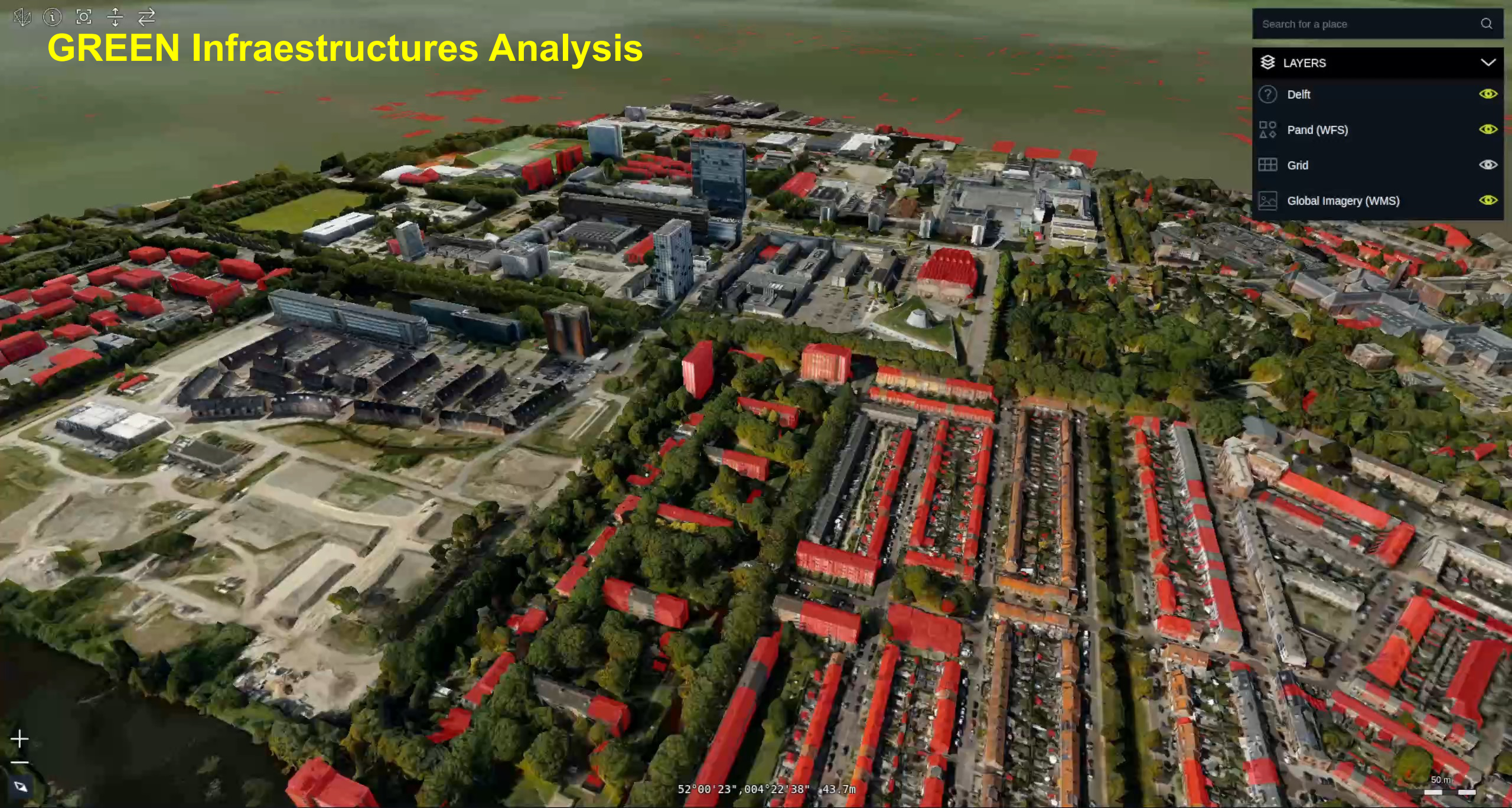
Intelligent cities

Applications

Trees Areas Analysis



GREEN Infrastructures Analysis



Search for a place

- LAYERS
- Delft
- Pand (WFS)
- Grid
- Global Imagery (WMS)

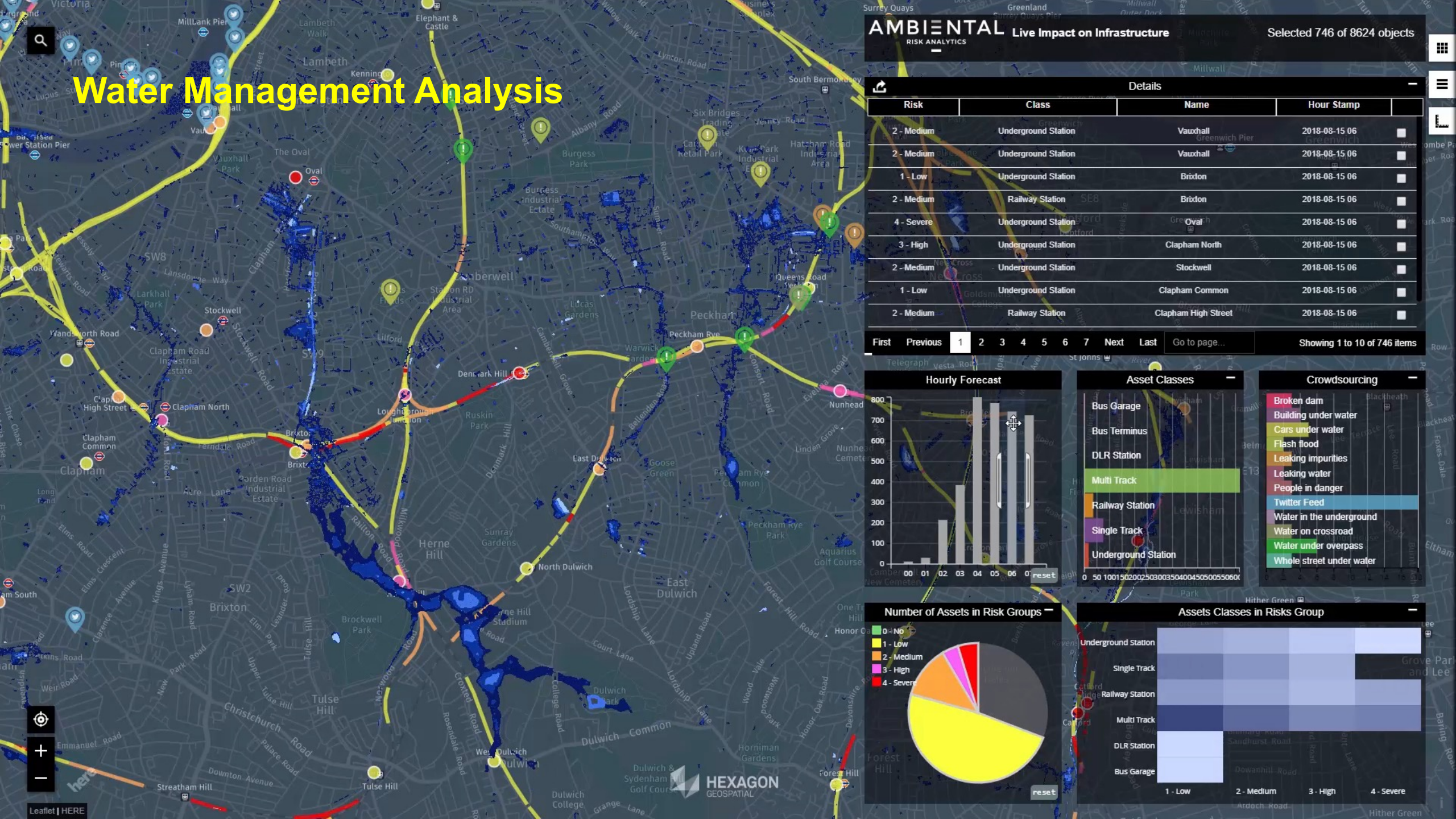
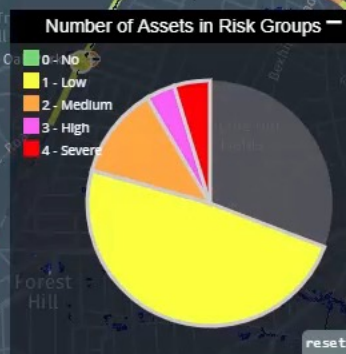
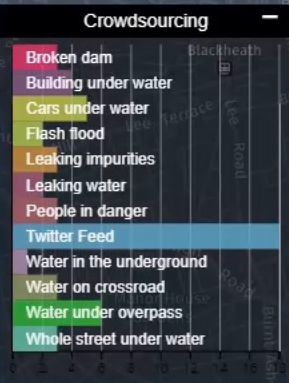
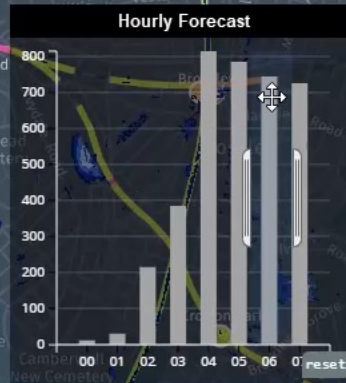
52°00'23", 004°22'38" 43.7m

50 m

Water Management Analysis

Details				
Risk	Class	Name	Hour Stamp	
2 - Medium	Underground Station	Vauxhall	2018-08-15 06	<input type="checkbox"/>
2 - Medium	Underground Station	Vauxhall	2018-08-15 06	<input type="checkbox"/>
1 - Low	Underground Station	Brixton	2018-08-15 06	<input type="checkbox"/>
2 - Medium	Railway Station	Brixton	2018-08-15 06	<input type="checkbox"/>
4 - Severe	Underground Station	Oval	2018-08-15 06	<input type="checkbox"/>
3 - High	Underground Station	Clapham North	2018-08-15 06	<input type="checkbox"/>
2 - Medium	Underground Station	Stockwell	2018-08-15 06	<input type="checkbox"/>
1 - Low	Underground Station	Clapham Common	2018-08-15 06	<input type="checkbox"/>
2 - Medium	Railway Station	Clapham High Street	2018-08-15 06	<input type="checkbox"/>

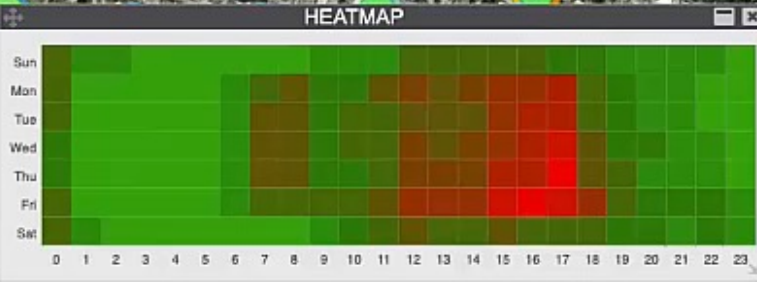
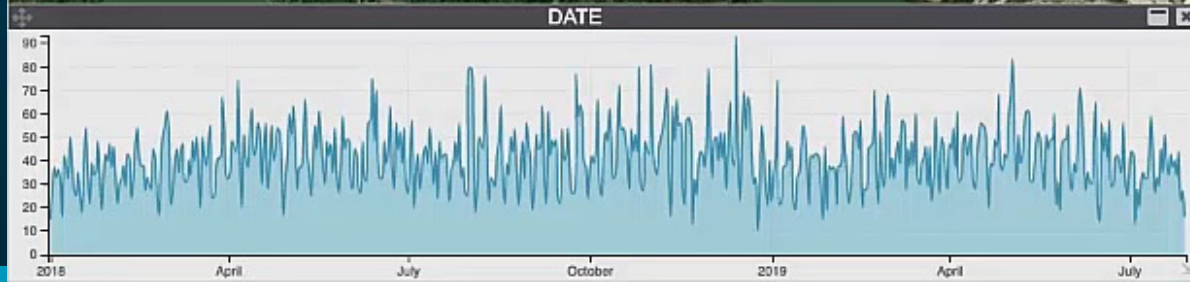
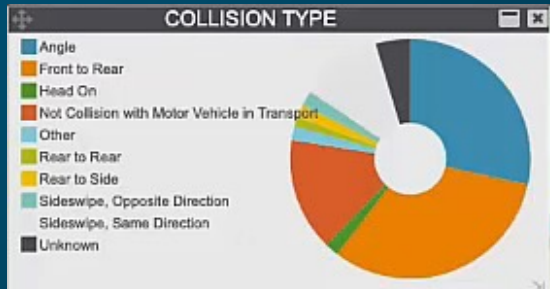
First Previous **1** 2 3 4 5 6 7 Next Last Go to page... Showing 1 to 10 of 746 items



Traffic Analysis - CO2 calculations



Traffic incidents Management



A low-angle, upward-looking photograph of a dense forest. The image captures the vertical trunks of numerous trees, with sunlight filtering through the dense canopy of green leaves, creating a dappled light effect. The perspective is from the forest floor, looking up towards the sky. The overall tone is natural and serene.

FORESTRY

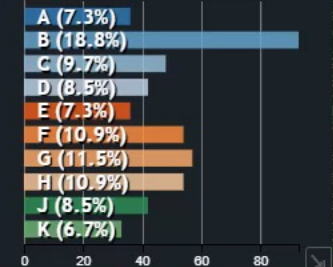


RISK PROBABILITY

Low Risk : 23 (5%)
Medium Risk : 5 (1%)
High Risk : 467 (94%)



RIGHT-OF-WAY CORRIDOR



SEGMENT BIOMASS

430.65 (tons/100m²)

SEGMENT AREA

34,515.76 (ha)

DATE SEARCH

2016-09-12 Apply

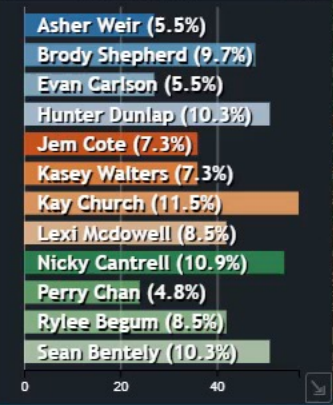
SEGMENT SEARCH

A114 Apply

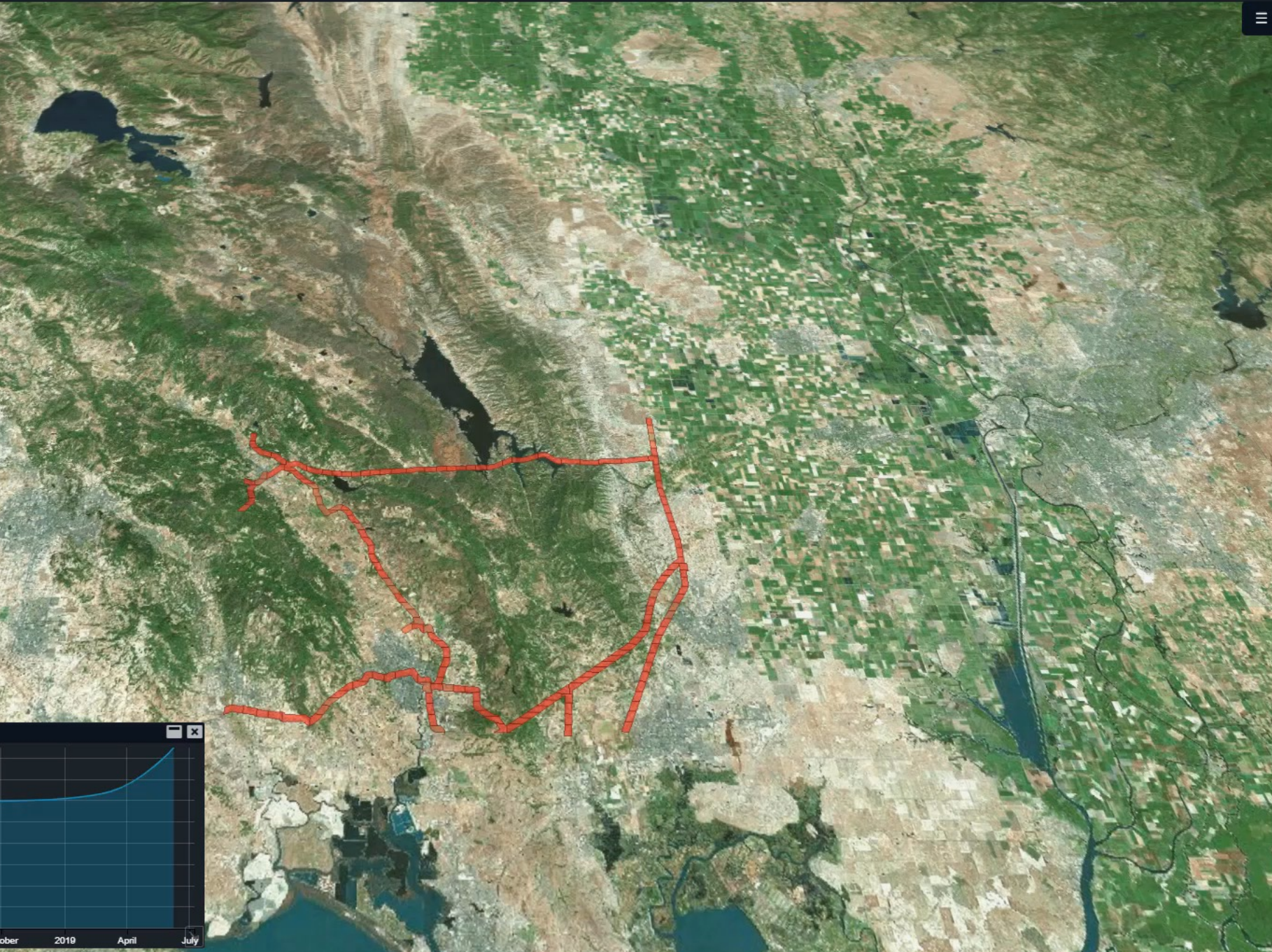
CLEARING COSTS (MIO. \$)



SUPERVISOR



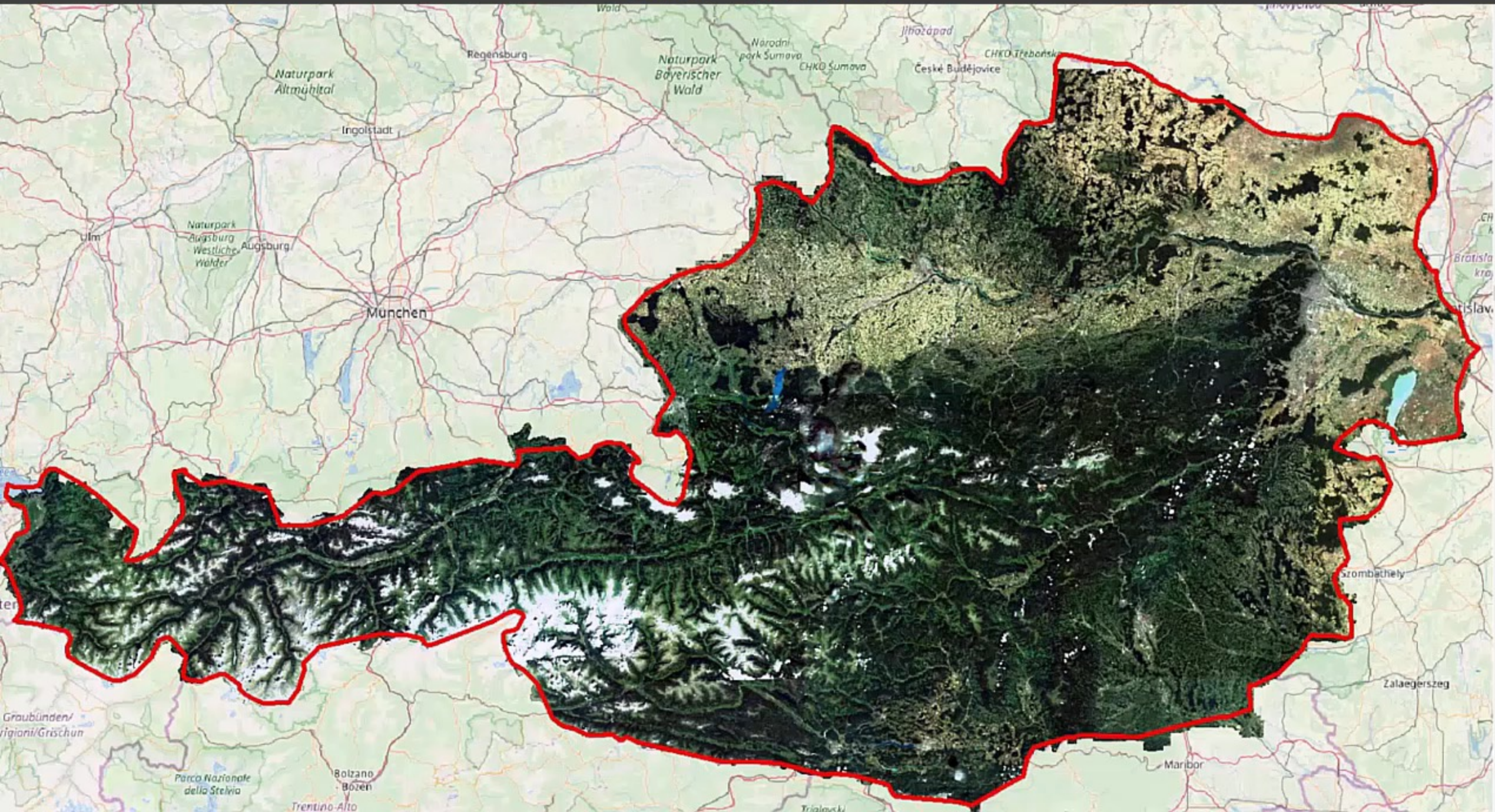
REPORTING





AGRICULTURE

Austria – Image Mosaic



Conclusion

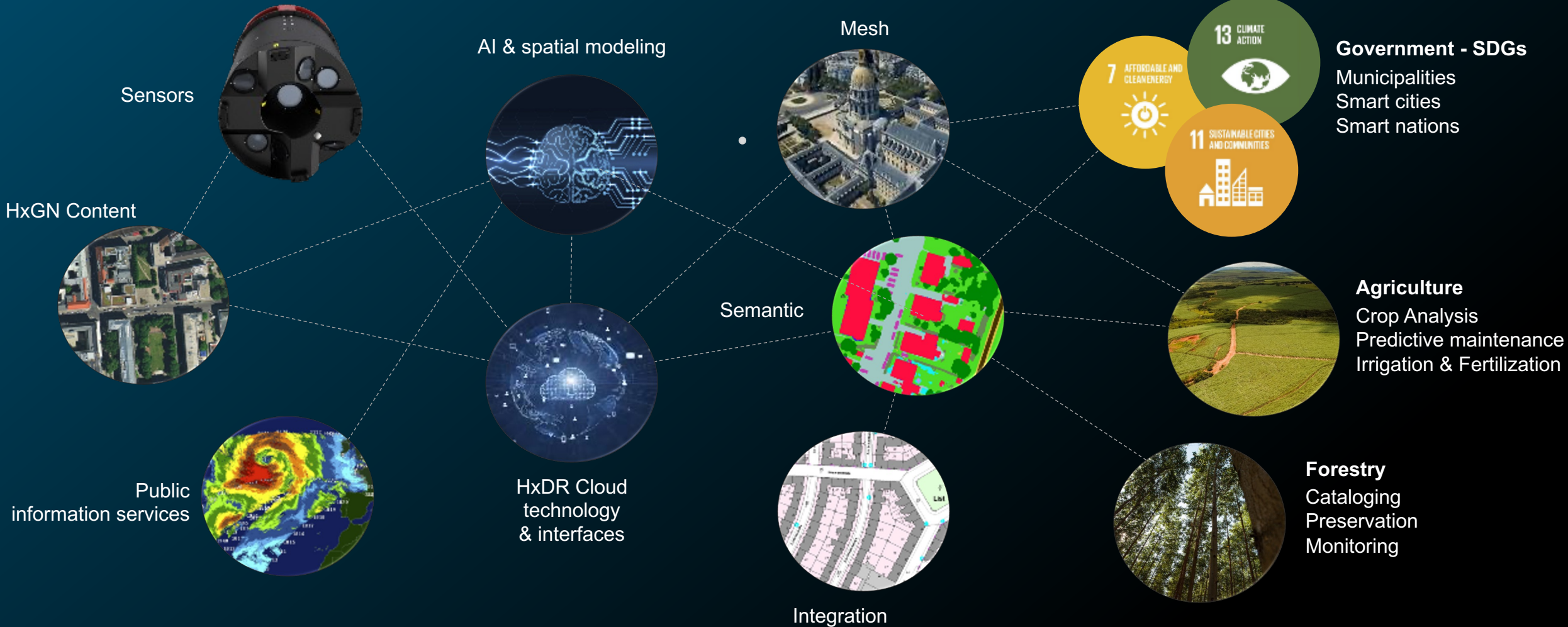
Hexagon Ecosystem: from Sensor to Solution

Sources

Technologies

Digital Twins

Software Solutions



Thank you

begona.verdejo@hexagon.com