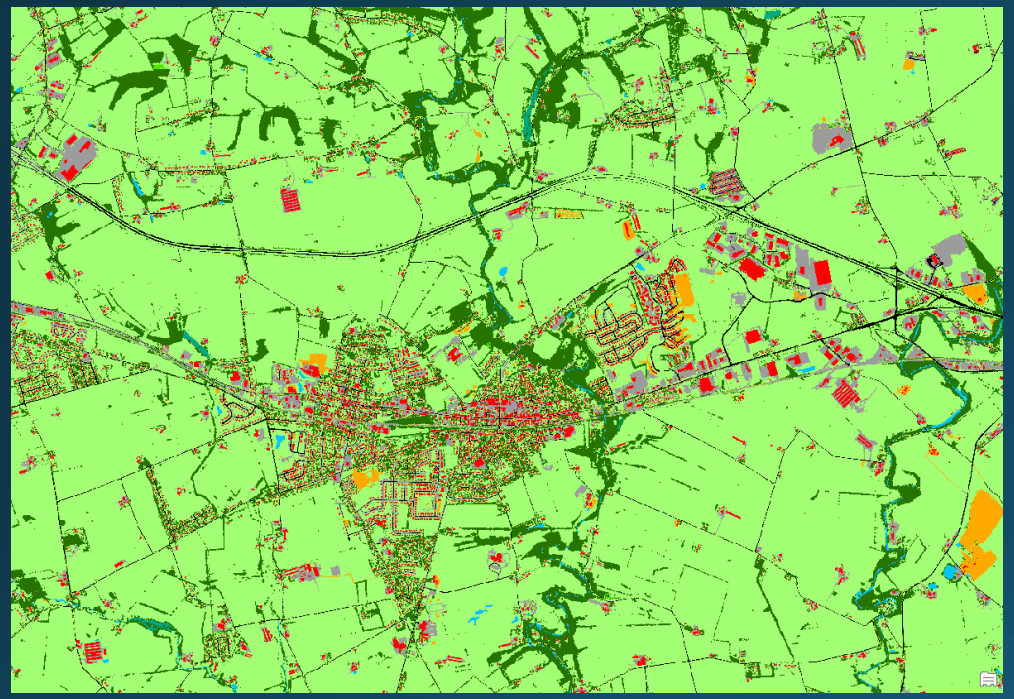
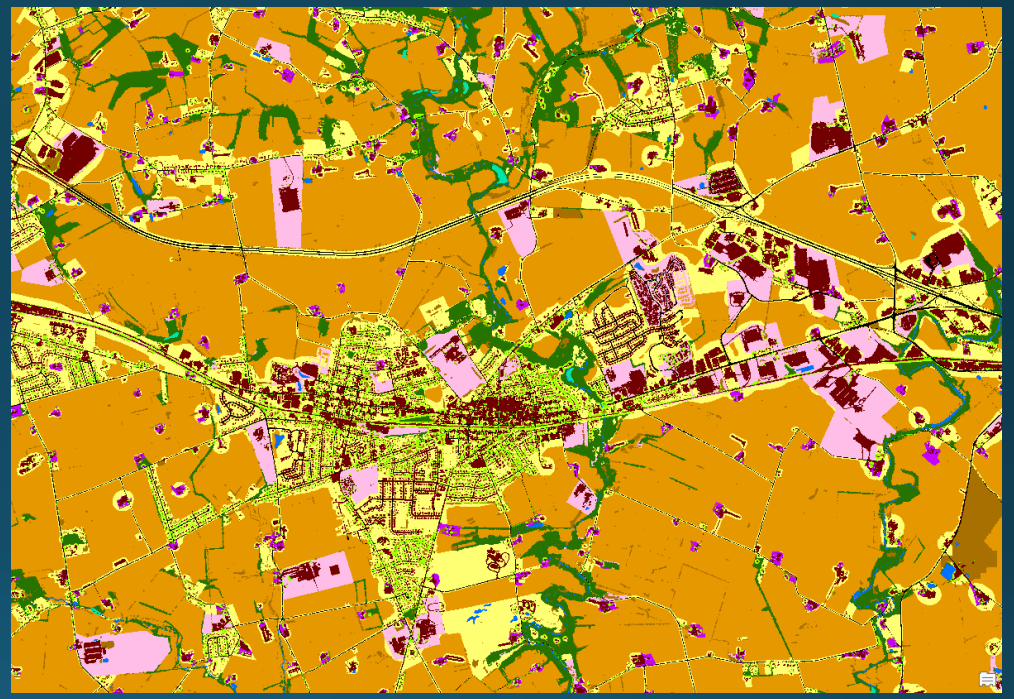
Objective 1 Land Use Modeling Updates





September 2, 2020: LUWG

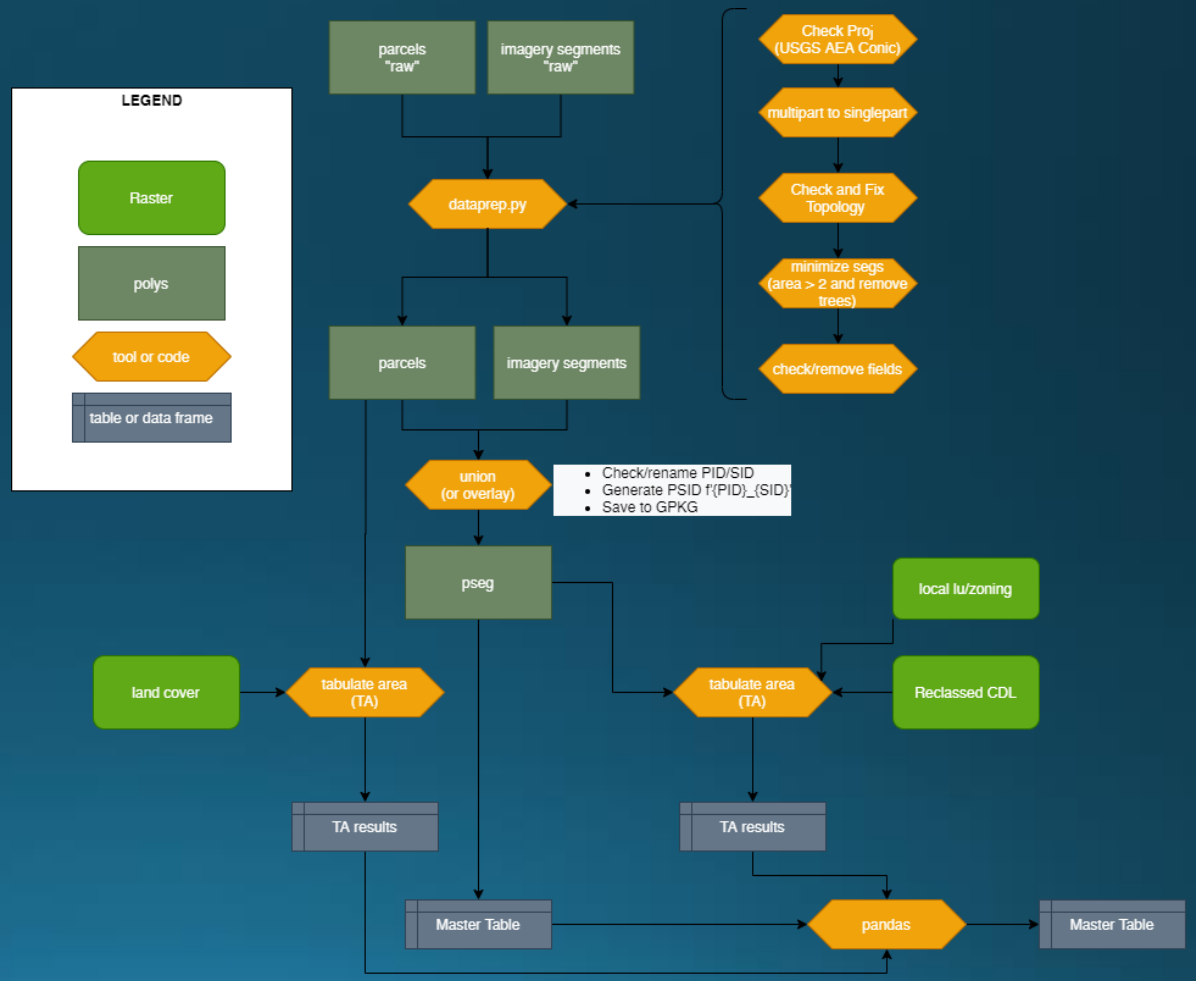
Jacob Czawlytko
jczawlytko@chesapeakeconservancy.org

Overview

- Update to land use model
  - Architecture
  - “Master table”
- Decide on Rail
- Agricultural classes vs Turf
  - Turf
  - Pasture
  - Crop
  - Fallow
  - Tree Crop

Model Progress

- Raster vs Polygon analysis
- Outputs to master table
  - Multiple queries
- Open Source
  - Geopandas, Fiona, Rasterio
- Code will be public



https://www.esri.com/arcgis-blog/products/product/data-management/how-to-use-ogc-geopackages-in-arcgis-pro/

Master Table

- Consistent attributes
- Massive size
- Tabular data reads faster
- Maximizes preprocessing
- Esri GDB vs Shapefile vs Geopackage
- Python Packages
  - Fiona, GeoPandas, Rasterio

source table	source col name	col name	description	datatype
	PAR_UID	PID	unique parcel ID	int
	UVM_UID	SID	unique segment ID	int
		PSEGID	unique pseg ID (PID_SID)	int
		p_area	parcel area	int
		s_area	segment area	int
		ps_area	unioned parcel segment (pseg) area	int
p_lc_tab.dbf	Value_1	p_lc1	parcel land cover tabulations	int
p_lc_tab.dbf	Value_2	p_lc2	parcel land cover tabulations	int
p_lc_tab.dbf	Value_3	p_lc3	parcel land cover tabulations	int
p_lc_tab.dbf	Value_4	p_lc4	parcel land cover tabulations	int
p_lc_tab.dbf	Value_5	p_lc5	parcel land cover tabulations	int
p_lc_tab.dbf	Value_6	p_lc6	parcel land cover tabulations	int
p_lc_tab.dbf	Value_7	p_lc7	parcel land cover tabulations	int
p_lc_tab.dbf	Value_8	p_lc8	parcel land cover tabulations	int
p_lc_tab.dbf	Value_9	p_lc9	parcel land cover tabulations	int
p_lc_tab.dbf	Value_10	p_lc10	parcel land cover tabulations	int
p_lc_tab.dbf	Value_11	p_lc11	parcel land cover tabulations	int
p_lc_tab.dbf	Value_12	p_lc12	parcel land cover tabulations	int
UVM segments in GDB	Class_name	s_lc	segment land cover classification	category
		p_pa	P/A Ratios for parcels	float
		s_pa	P/A Ratios for segs	float
		s_rail	segments intersecting with buffered rail	int
		s_tran	segments intersecting with buffered transmission lines	int
		?_road	something related to road RoW	int
		ps_cdl0	parcel cdl tabulation	int
		ps_cdl1	parcel cdl tabulation	int
		ps_cdl2	parcel cdl tabulation	int
		ps_cdl3	parcel cdl tabulation	int
		ps_cdl4	parcel cdl tabulation	int
		ps_ha	hole:area ratio	float
		ps_bldg	ps distance to building lc	int
lu_tab.csv	CBP_mask "Value"	p_luz	local mask (land use or zoning)	category
		lu_class	decided output land use class	category

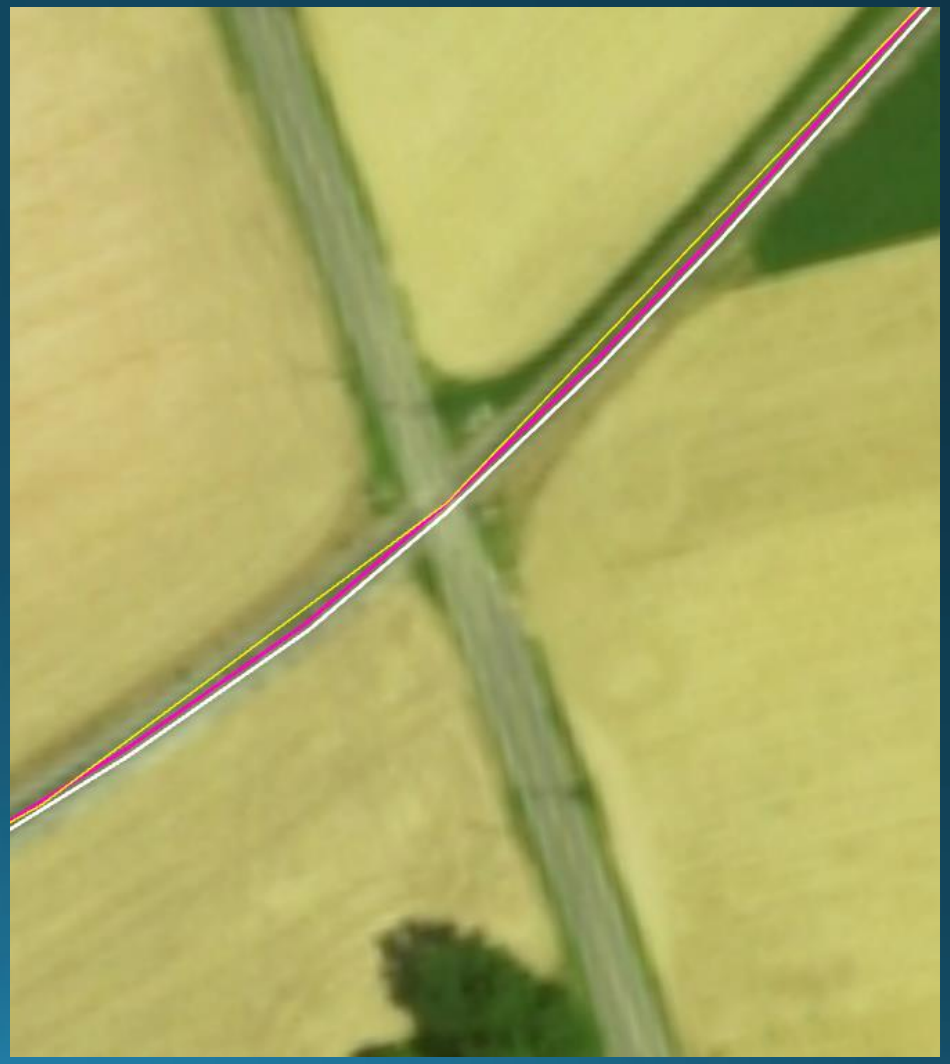
Railroad - Data Sources

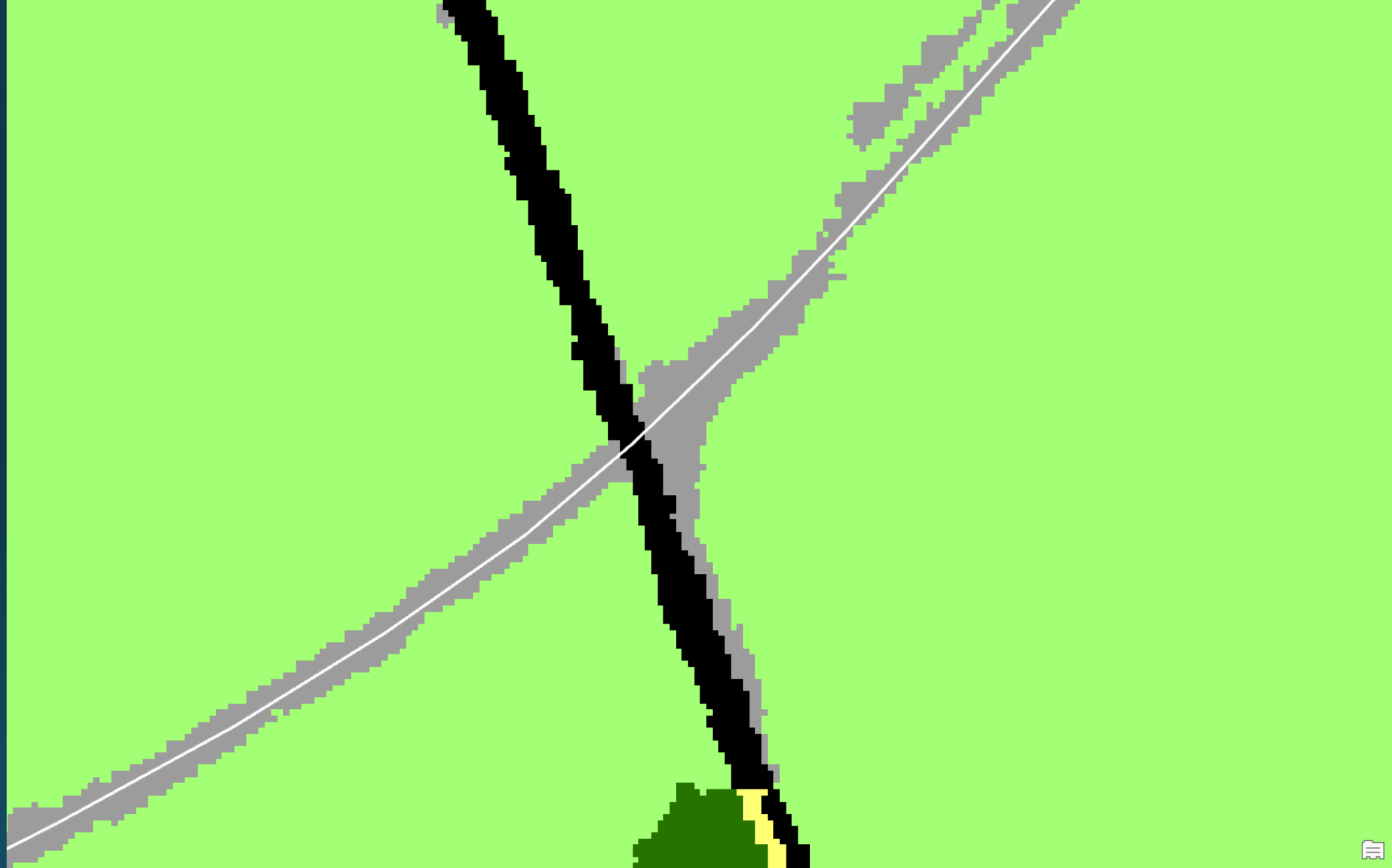
- Multiple Data sources
  - Open Street Map (OSM)
  - HERE (formerly Navteq)
  - Census TIGER/Line Rail
  - Local Data
    - limited

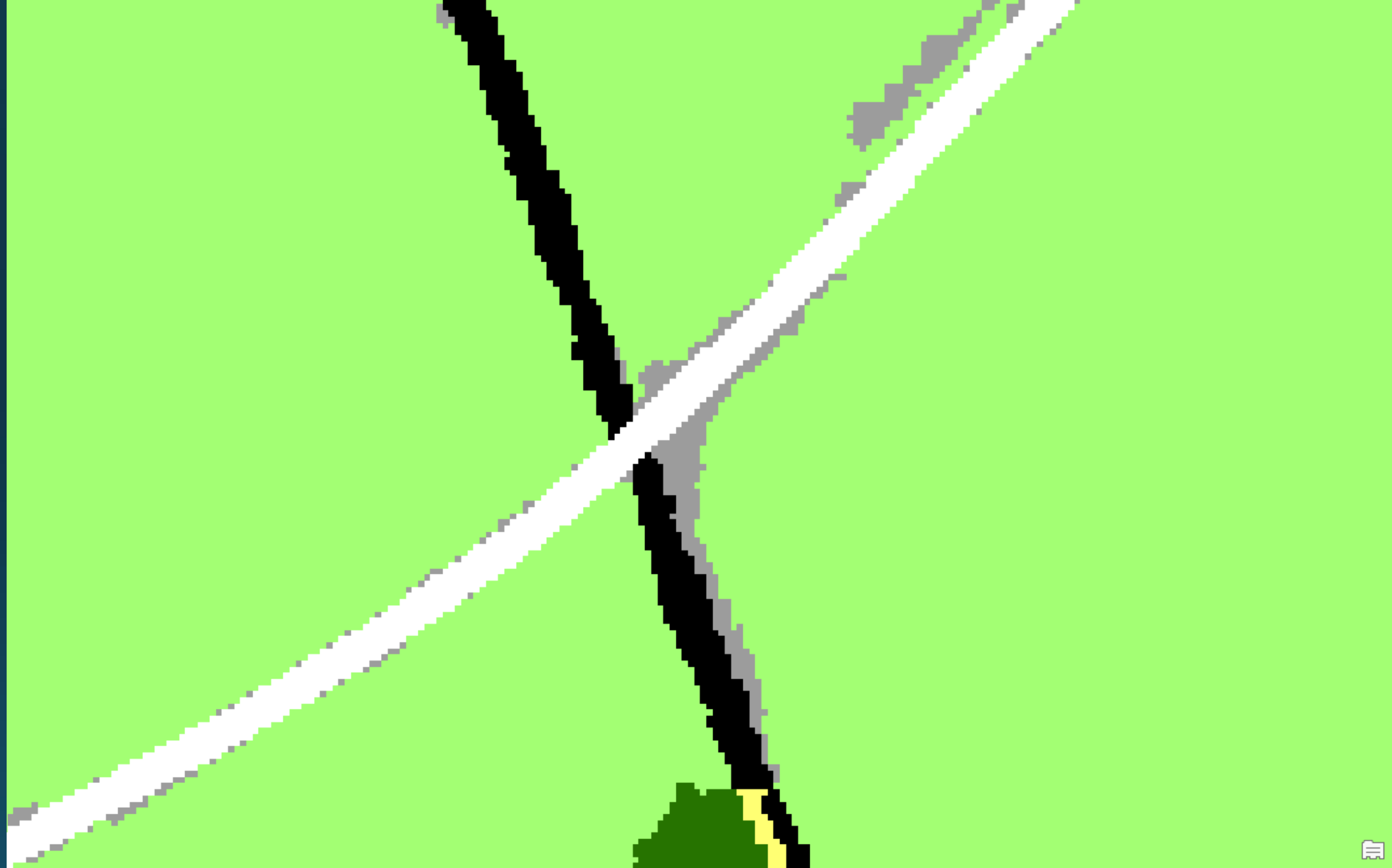
Photo credit: Daniel Callejas Sevilla

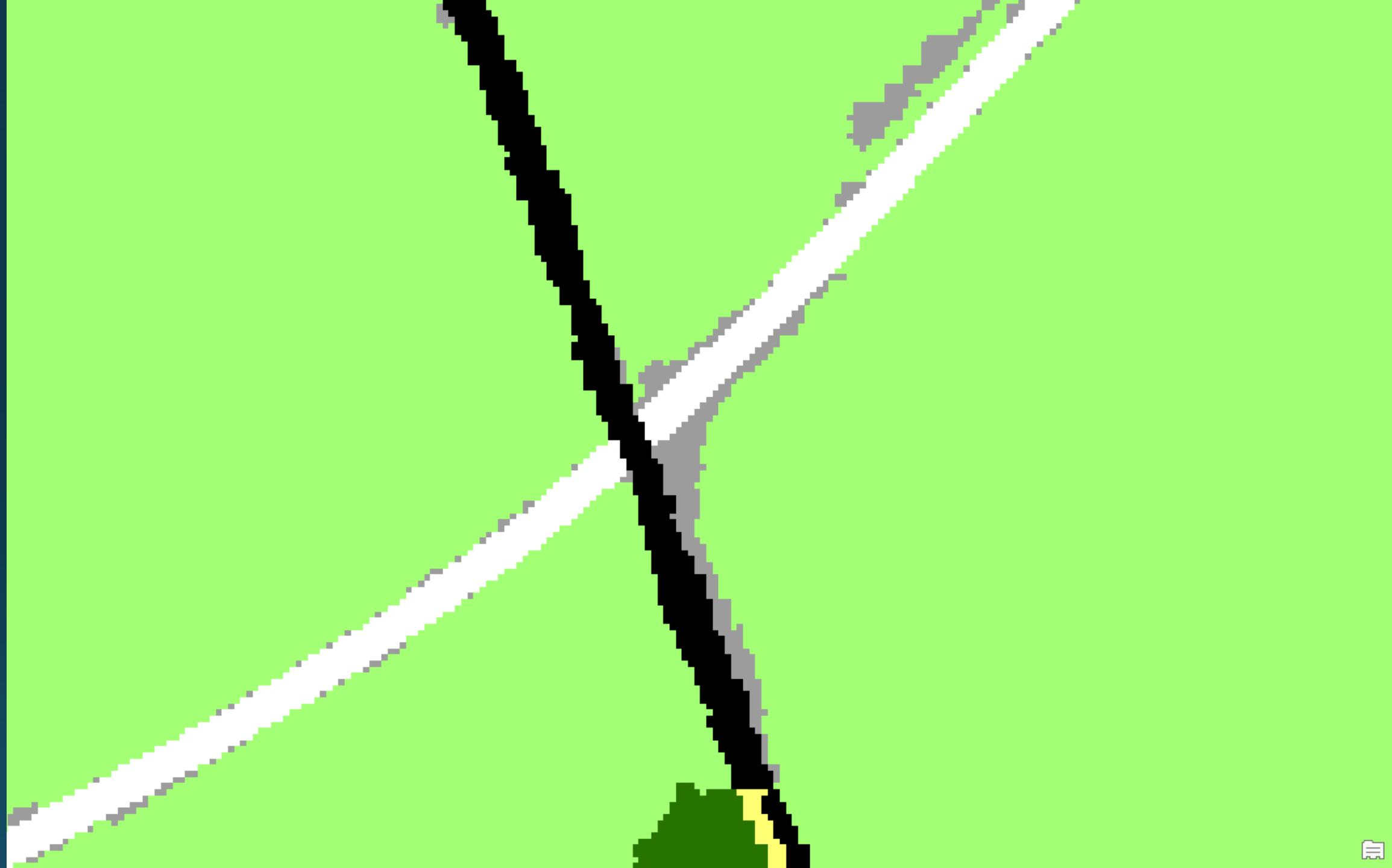
Railroad – Draft Methods

- Accuracy
  - Select best dataset or merge datasets
- Buffer centerlines by 3 meters
- Rasterize
- Where buffered rail exists, reclass LC
  - Roads -> Roads
  - Building -> buildings
  - Tree Canopy(TC) -> TC over Impervious Surface
  - Everything else -> Impervious





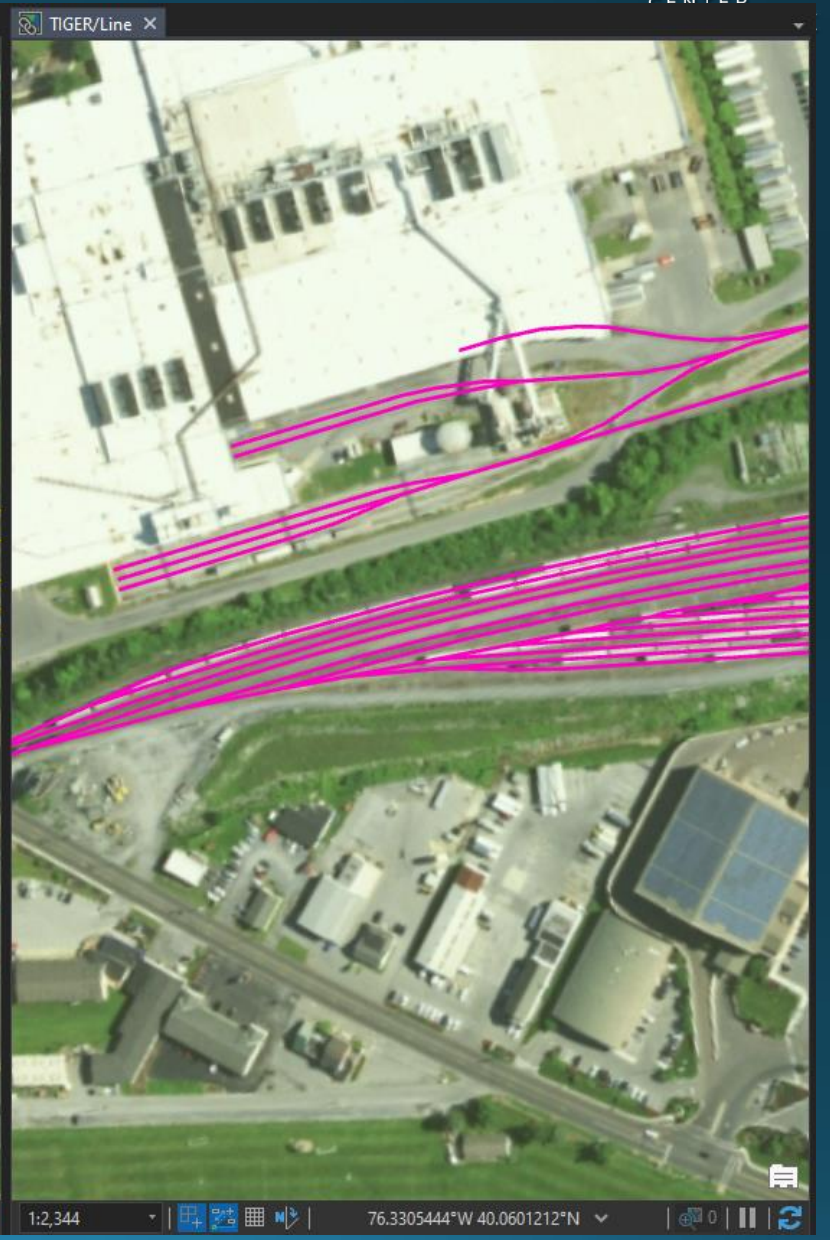




OSM

HERE (formerly Navteq)

Census TL



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CONSERVATION INNOVATION CENTER

OSM

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Census TL

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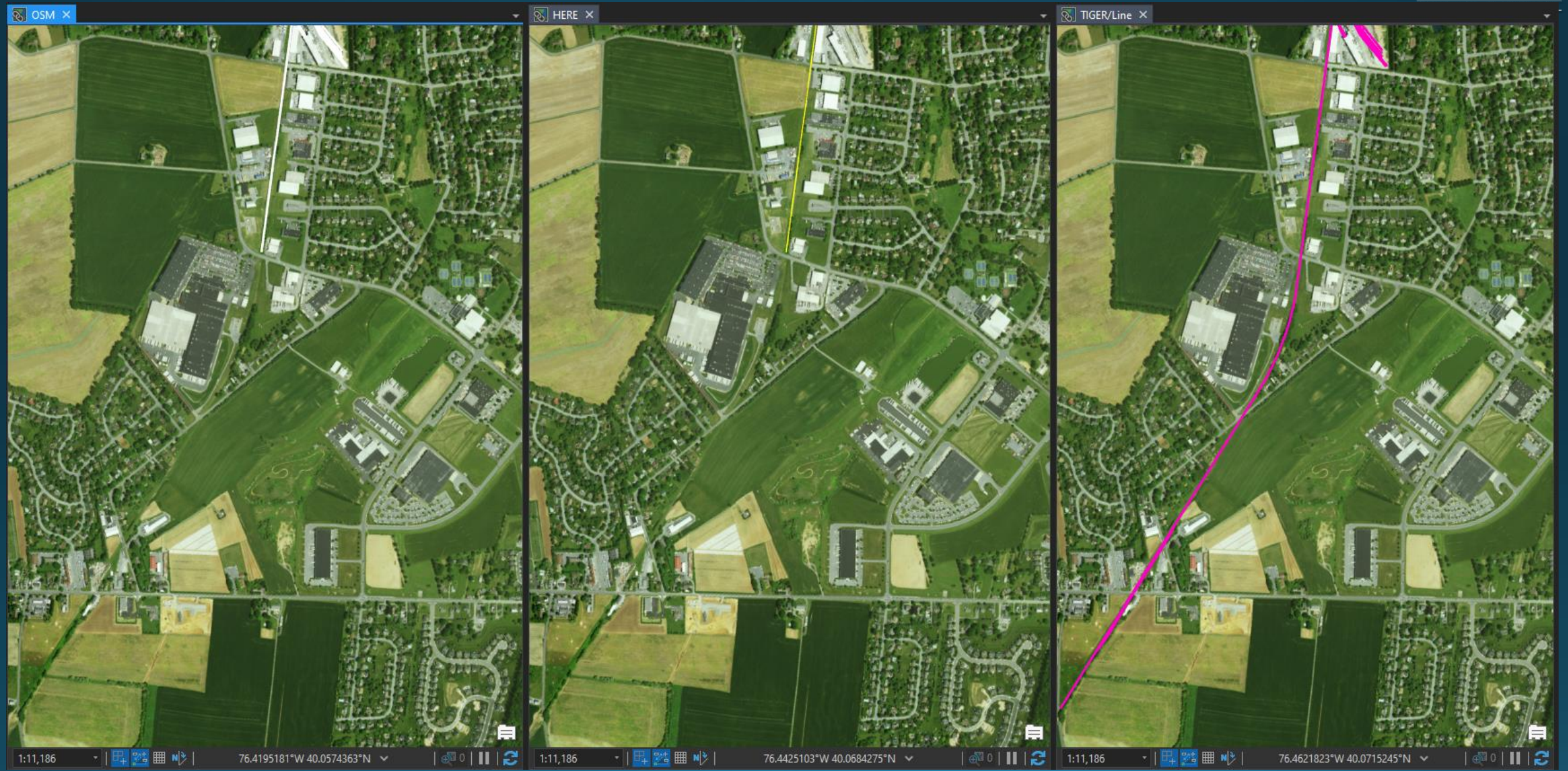
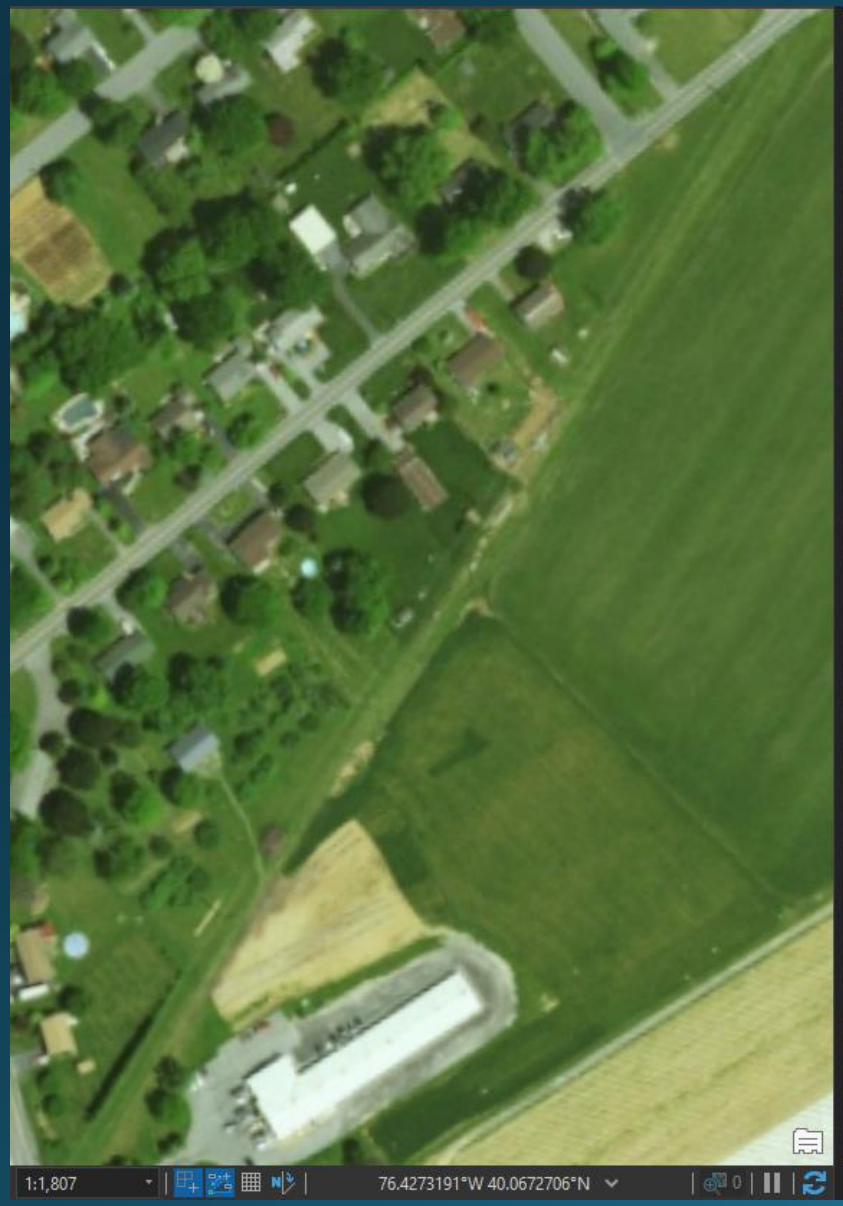
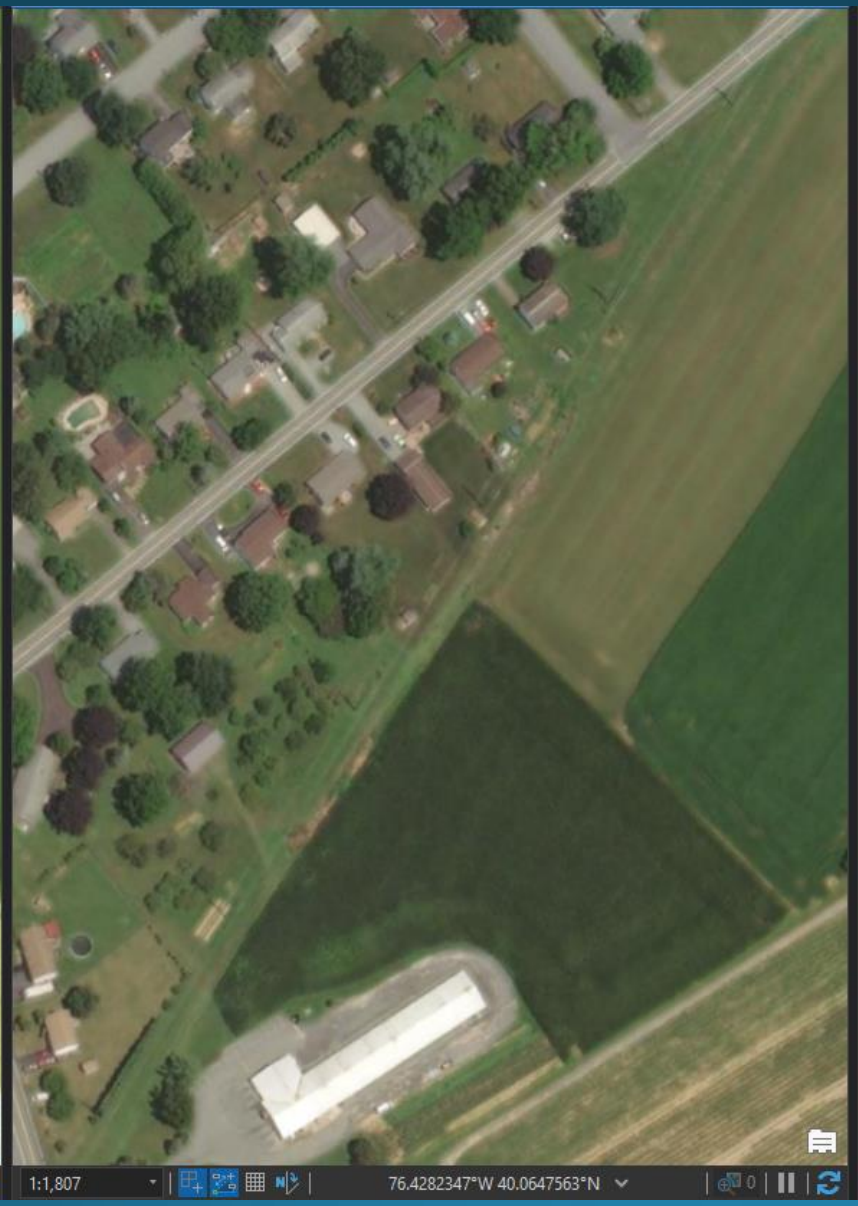


2017 NAIP Imagery

Esri Basemap

Census TL





Agriculture vs Turf Methods

- Agriculture
  - Pasture
  - Crop
  - Fallow
  - Tree Crops/Vineyards
- Using CDL
- Developing Master Table
- Adjusting queries

Deciding Turf LU – Logic

- For each pseg
  - If the following is true
    - Associated parcel
      - area =< 10 acres
      - includes => 93 m2 of any impervious
      - Local and ancillary data identified as turf
  - Then
    - Identify low vegetation segments within parcel
    - Classify land use as “turf”

Deciding Agricultural LU – Preprocessing CDL

- 3 years (2017, 2018, 2019)
- Simplify classification
  - Cropland
  - Orchards/Vineyards
  - Idle/Fallow
  - Pasture
- Filter using focal statistics (3x3 majority)
- Calculate pixel mode
  - If it does not have a mode, use CDL confidence layers to break tie
- Resample to 1m
- Tabulate area of reclassed, filtered, and resampled CDL

Deciding Agricultural LU – Logic

- Crop
  - Area >= 10000 and Crop CDL >= 20%
- Pasture/Hay
  - Exclude Crop
  - Area >= 10000 and Pasture CDL >= 20%
- Fallow/Idle
  - Exclude Crop + Pasture
  - Fallow CDL >= 20%
- Tree Crop
  - Exclude Crop + Pasture + Fallow
  - Tree Crop CDL >=20%


Orchard Vineyard
Pasture
Fallow
Cropland
Turf Grass
Mixed Open
Turf Grass
Fractional Turf
Agriculture
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New LU Turf/Ag Methods
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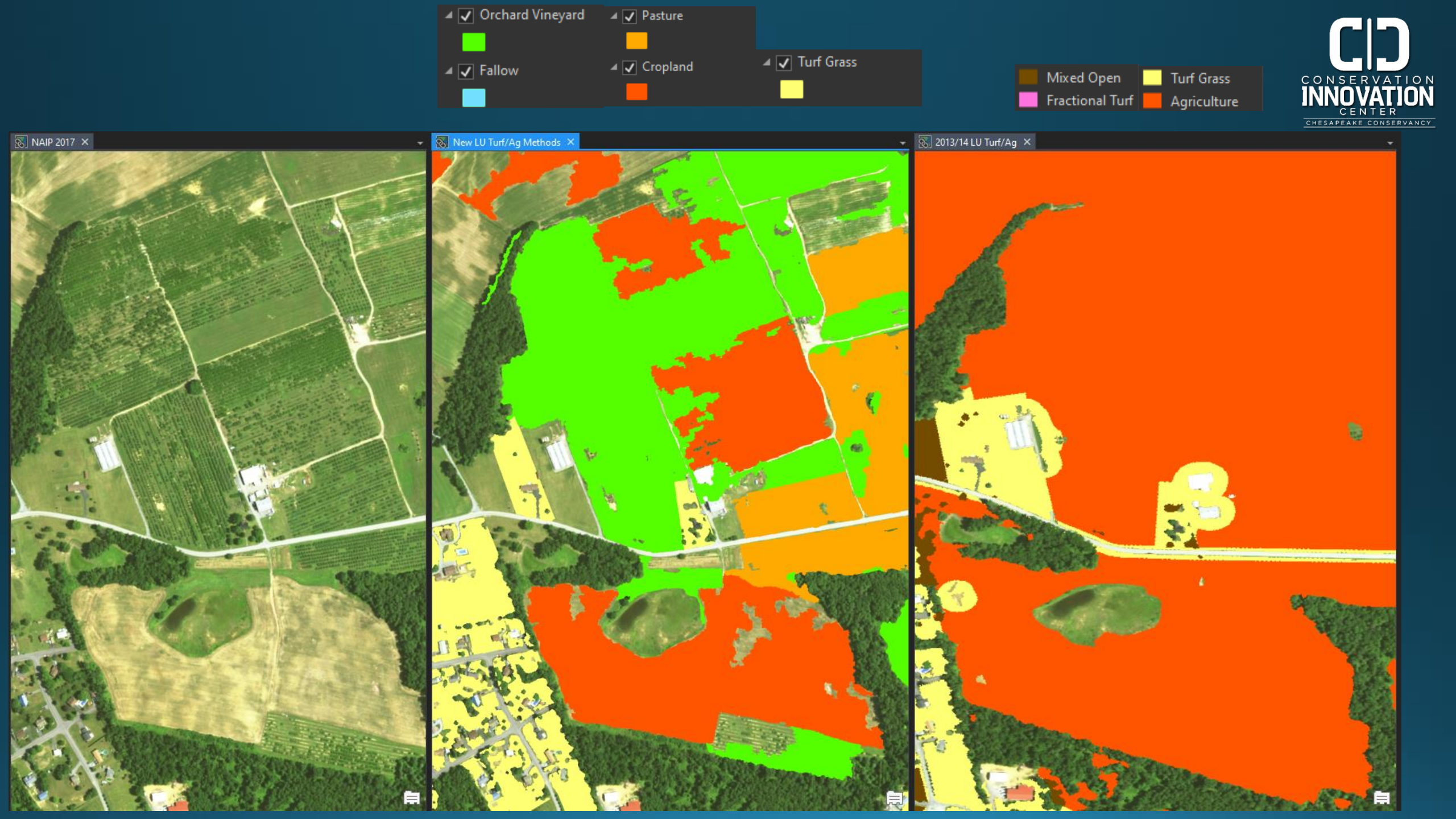
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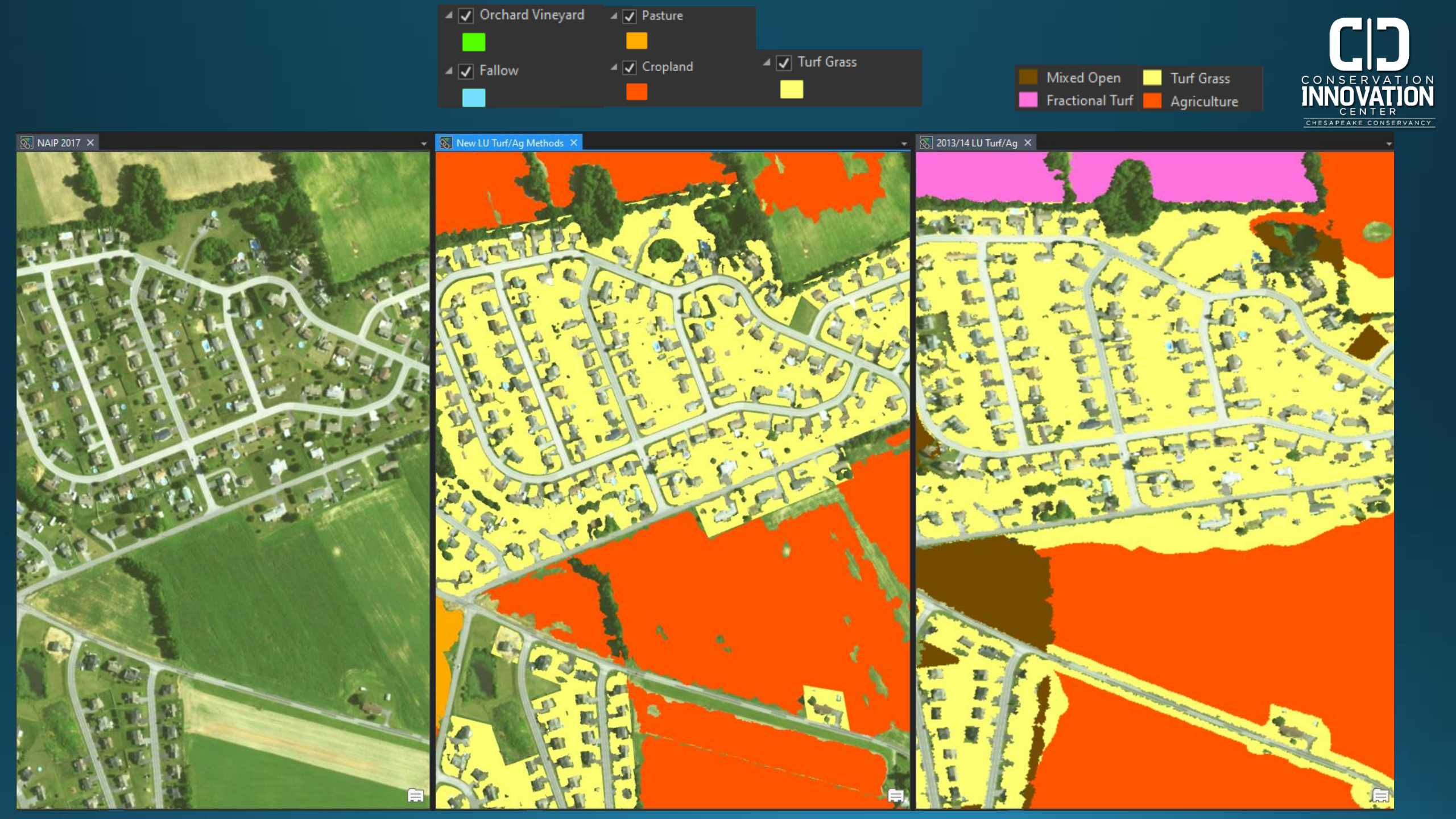
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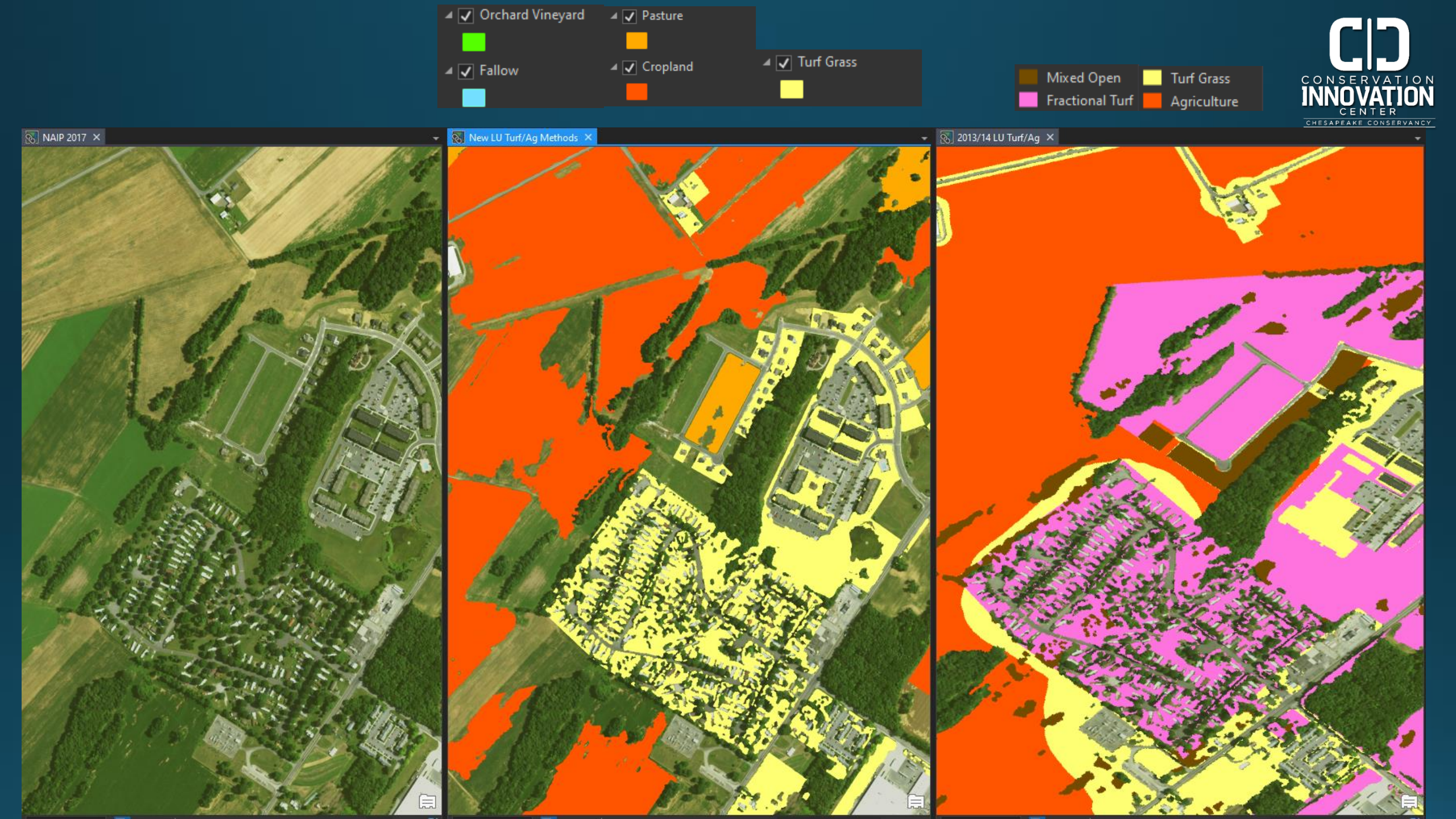
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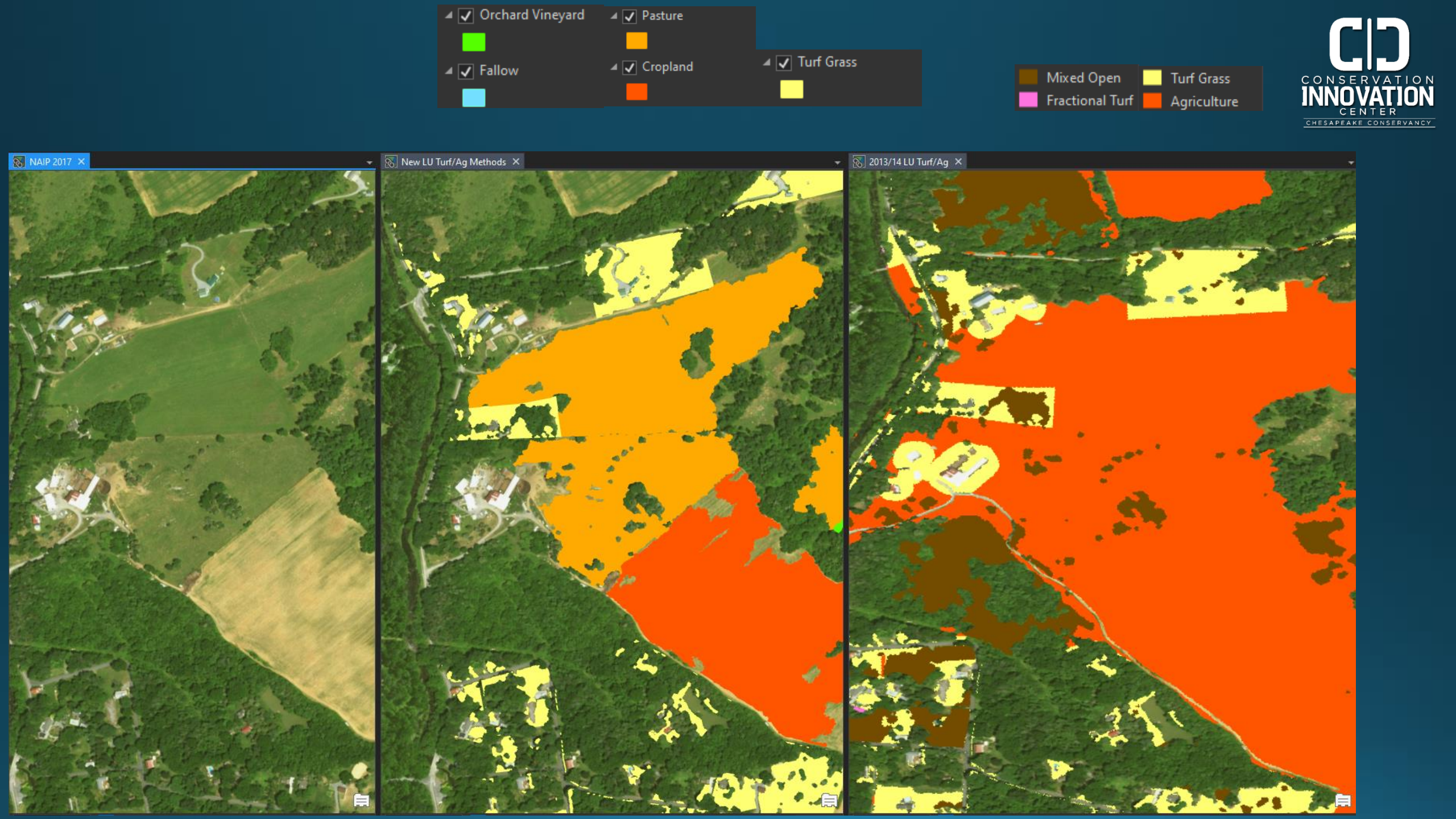
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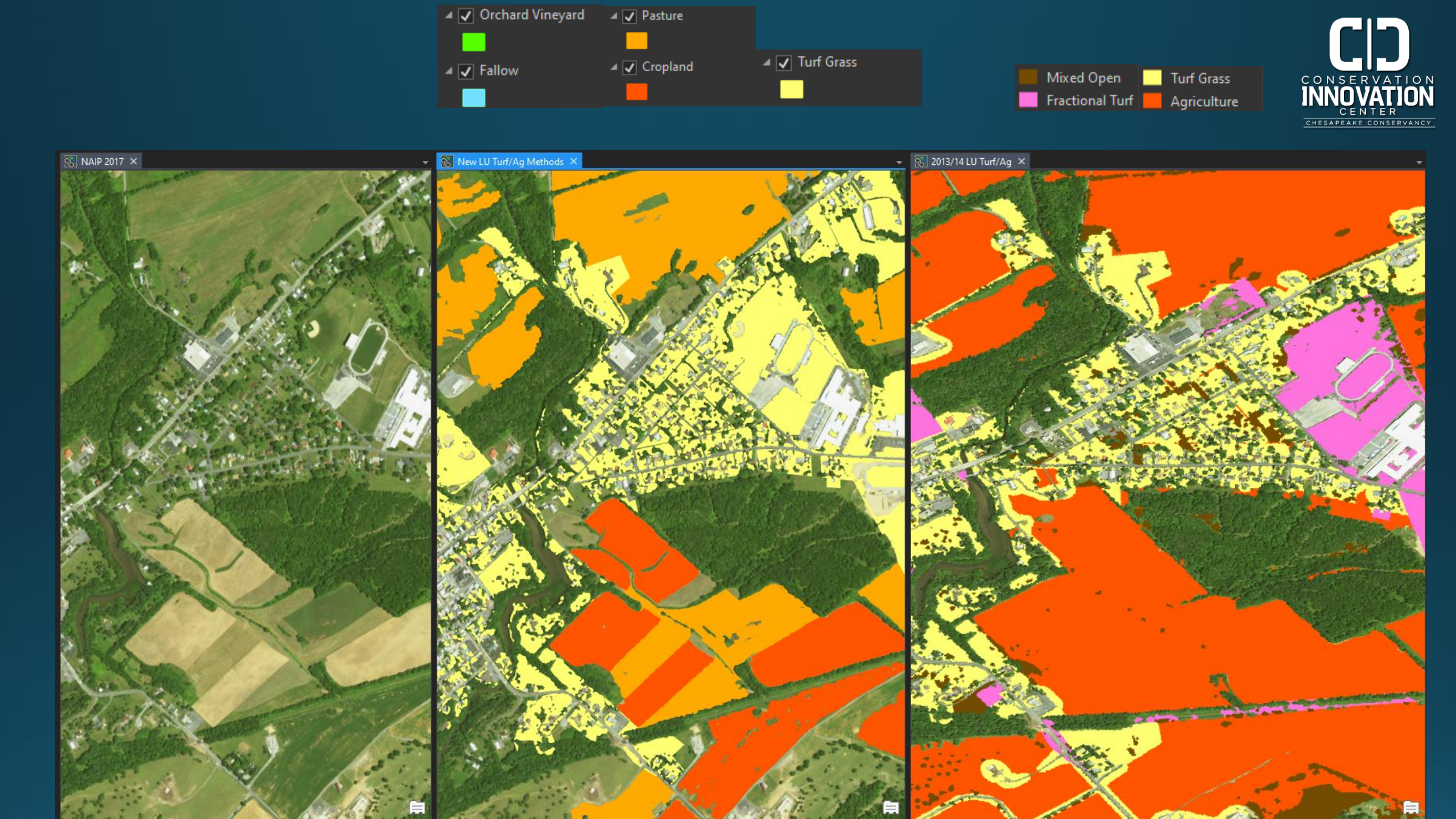
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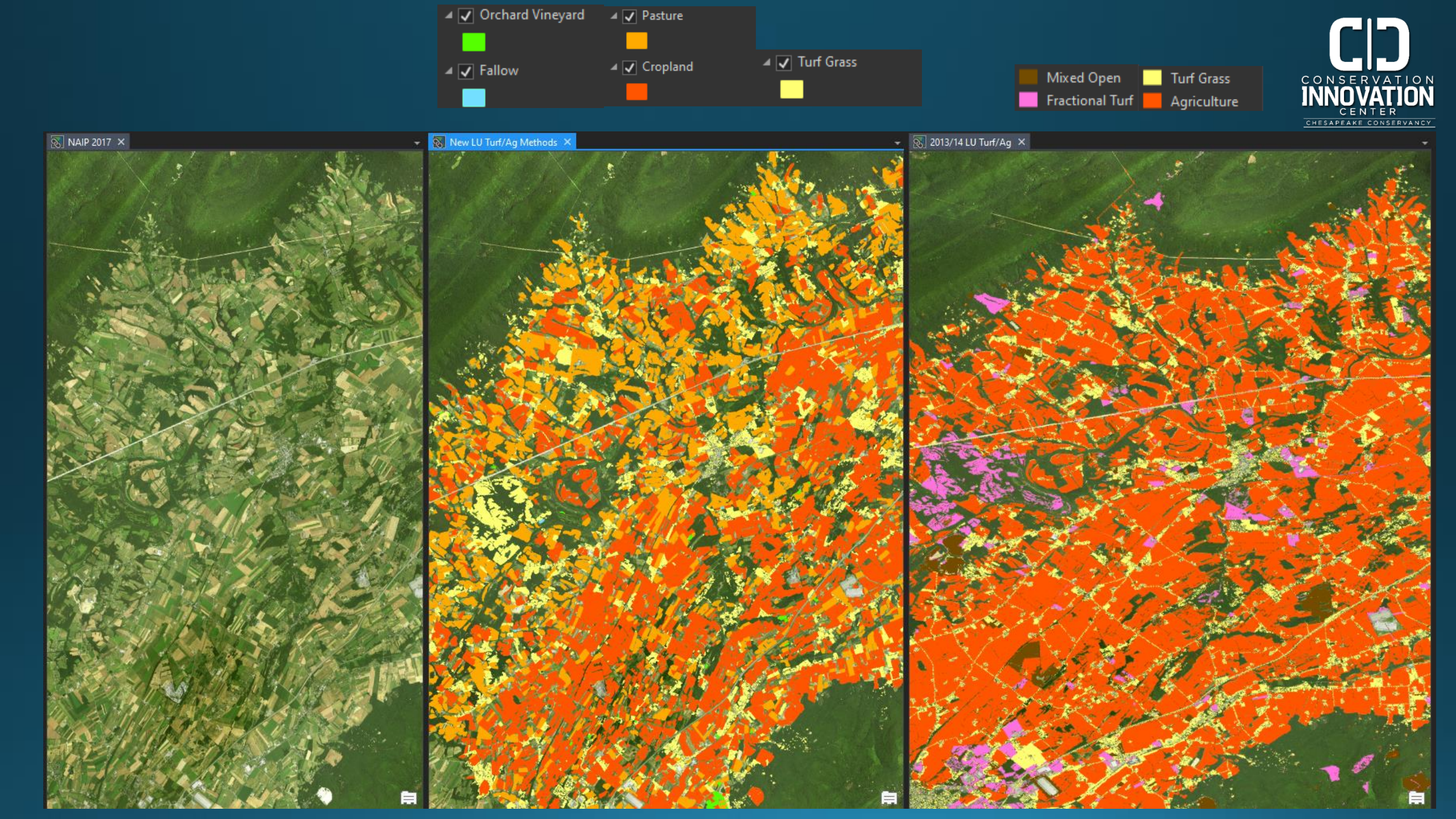
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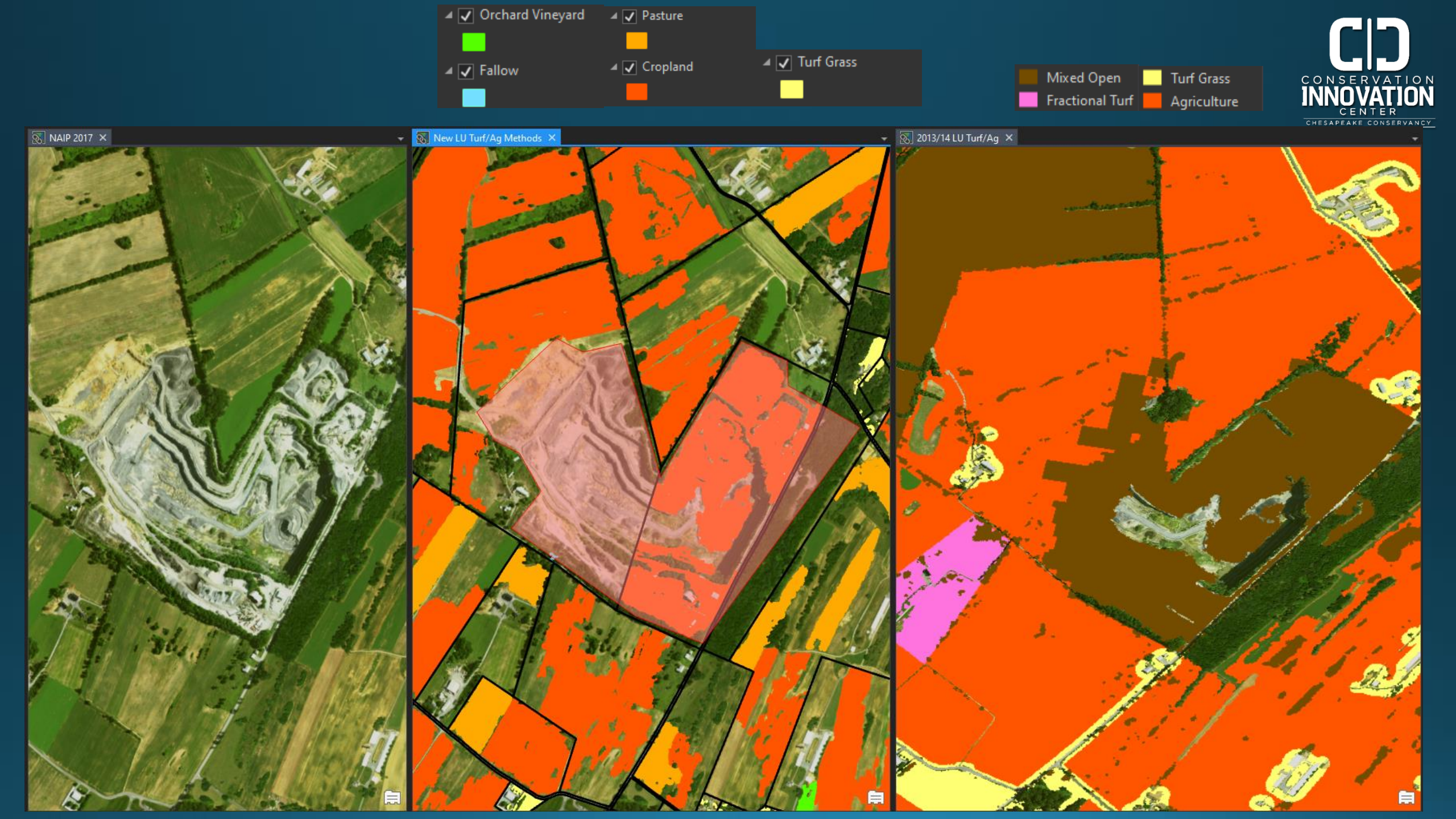
Deciding Agricultural LU – Refining Logic

- Order of operations
- Polygon geometry
  - Holes:area
  - Perimeter:area
  - Polsby Popper Index
- Local Land Use
  - What role?
  - “Fact checking”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Questions?

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