Phase 6 Land Use Database version 1

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Modeling Workgroup Meeting
USGS MD-DE-DC Water Science Center

U.S. Department of the Interior
U.S. Geological Survey

Chesapeake Bay 2017 Mid-Point Assessment

2010 TMDL

2025 All Practices Implemented

Goal: Determine whether the implementation the CBP Partnership's restoration strategies by 2025 will achieve water quality standards in the Bay.

Objective: Make this determination based on the best available science data, tools, BMPs, and lessons-learned.

#1 Priority: improve accuracy of land use/cover data.

Best available data = county & municipal level land use, land cover, parcels, sewer service areas, zoning, and other relevant information.

Land Use vs. Land Cover

- Low-density Residential
- Transportation
- Agriculture
- Rural conservation

- Impervious surfaces
- Tree canopy
- Herbaceous
- Barren

Phase 6 Land Uses

- Impervious-Roads
- Forests
- Turf Grass
- Open Space

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P6 Developed Land Uses

Impervious Roads (MIR, CIR, NIR): paved and unpaved roads and bridges as mapped by NAVTEQ 2013.

Impervious Non-Roads (MNR, CNR. NNR): buildings, driveways, sidewalks, parking lots, runways and some private roads as depicted by NLCD 2011 within developed areas.

Turf Grass (MTG, CTG, NTG): all herbaceous lands within developed areas (within 100m of secondary roads).

* Developed Areas =
- Blocks with > 0.2 du/acre (5-acre lots) (2010 Census);
- Airports, schools, shopping malls, and golf courses (NAVTEQ 2013);
- Roads (NAVTEQ 2013);
- Impervious surfaces >=20% (NLCD 2011).

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P6 Developed Land Uses

Tree Canopy (MTC, CTC, NTC): small fragments of trees or shrubs overhanging herbaceous cover. Note that we are also mapping TC over impervious surfaces (TCIR, TCINR) in case unique loading rates are developed for these land uses.

Construction (CON): reported acreage of land with Erosion & Sediment Control permits located inside/outside developed areas.

Reserved for Further Consideration

Extractive (EXT): reported acreage of permitted quarries, surface/strip mines, abandoned and reclaimed mines.

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P6 Natural Land Uses

Forest (FOR): contiguous patches of trees and shrubs, >= 1 acre circle (or 120-ft min width), assumed to have an unmanaged understory.

Wetlands (TWET, FWET, HWET): National Wetlands Inventory (NWI) non-pond, non-lake wetlands divided into tidal, floodplain, and headwater subclasses based on NWI attributes and landscape position.

Water (WAT): All waterbodies mapped by the National Hydrography Dataset, NWI ponds & lakes, and the National Land Cover Dataset (Open Water). Assumes all single-line streams are 15' wide.

Open Space (OS): barren and scrub/shrub cover in developed areas, small patches of scrub/shrub in rural areas, and potentially all small and/or linear patches of herbaceous areas (e.g., beaches, vacant lots, transmission line right-of-ways, junkyards, fairgrounds, gravel roads, railroads).

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P6 Natural Land Uses

Agriculture (AG): all lands that are not developed or natural

Reserved for Further Consideration

Commodity Crops (CRP): agricultural areas dominated by commodity crops as per the Cropland Data Layer 2008-2013.

Pasture/Hay (PAS): agricultural areas dominated by pasture/hay as per the Cropland Data Layer 2008-2013.

Specialty Crops (SCP): agricultural areas dominated by specialty crops as per the Cropland Data Layer 2008-2013.

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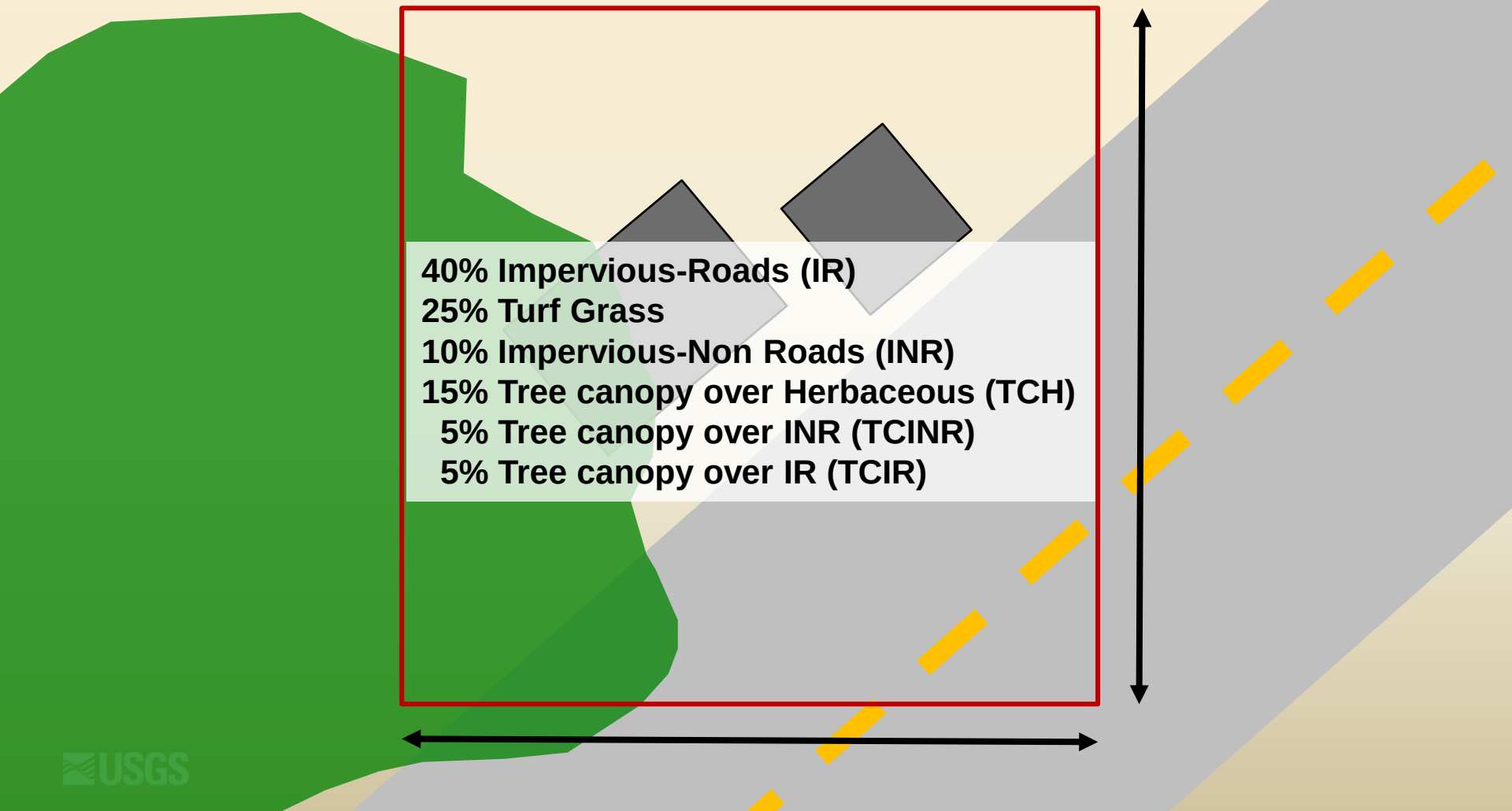
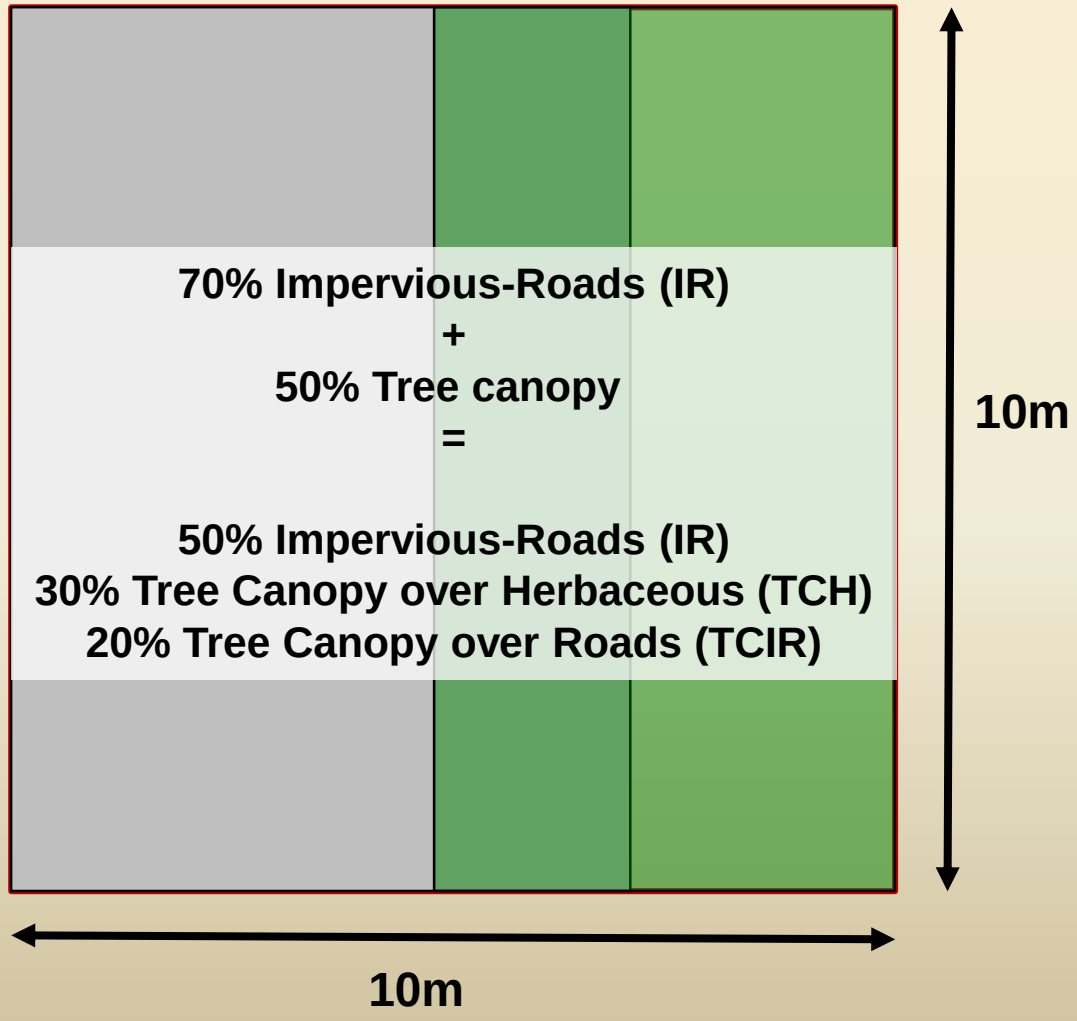
Phase 6 Land Use Database – from local data

- Fourteen different 10m resolution raster datasets
- Most with fractional and continuous pixel values



Phase 6 Land Use Database – from national data

- Assume minimal overlap among tree canopy, turf grass, and impervious surfaces within the same pixel.



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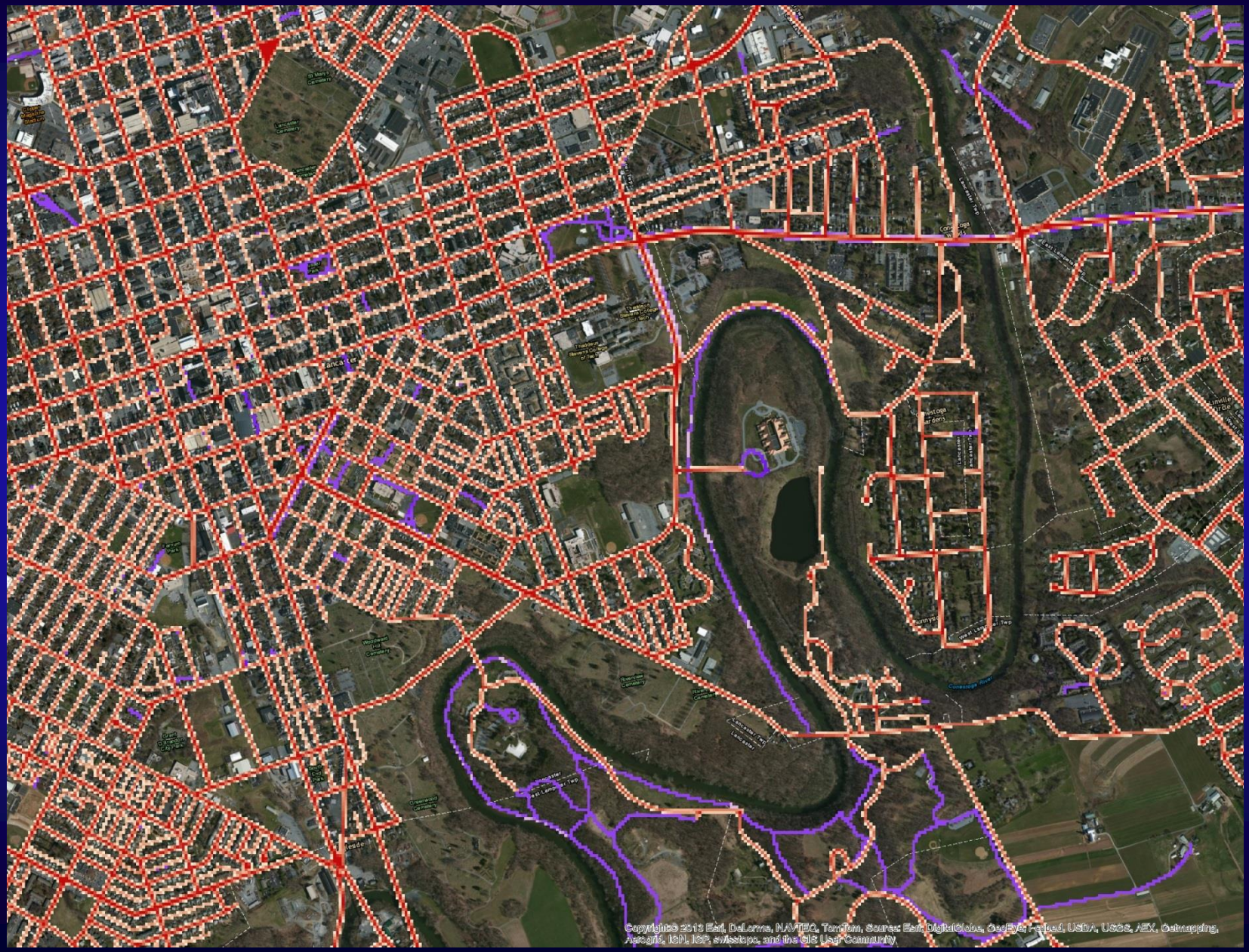
Regional vs Local Data: Roads



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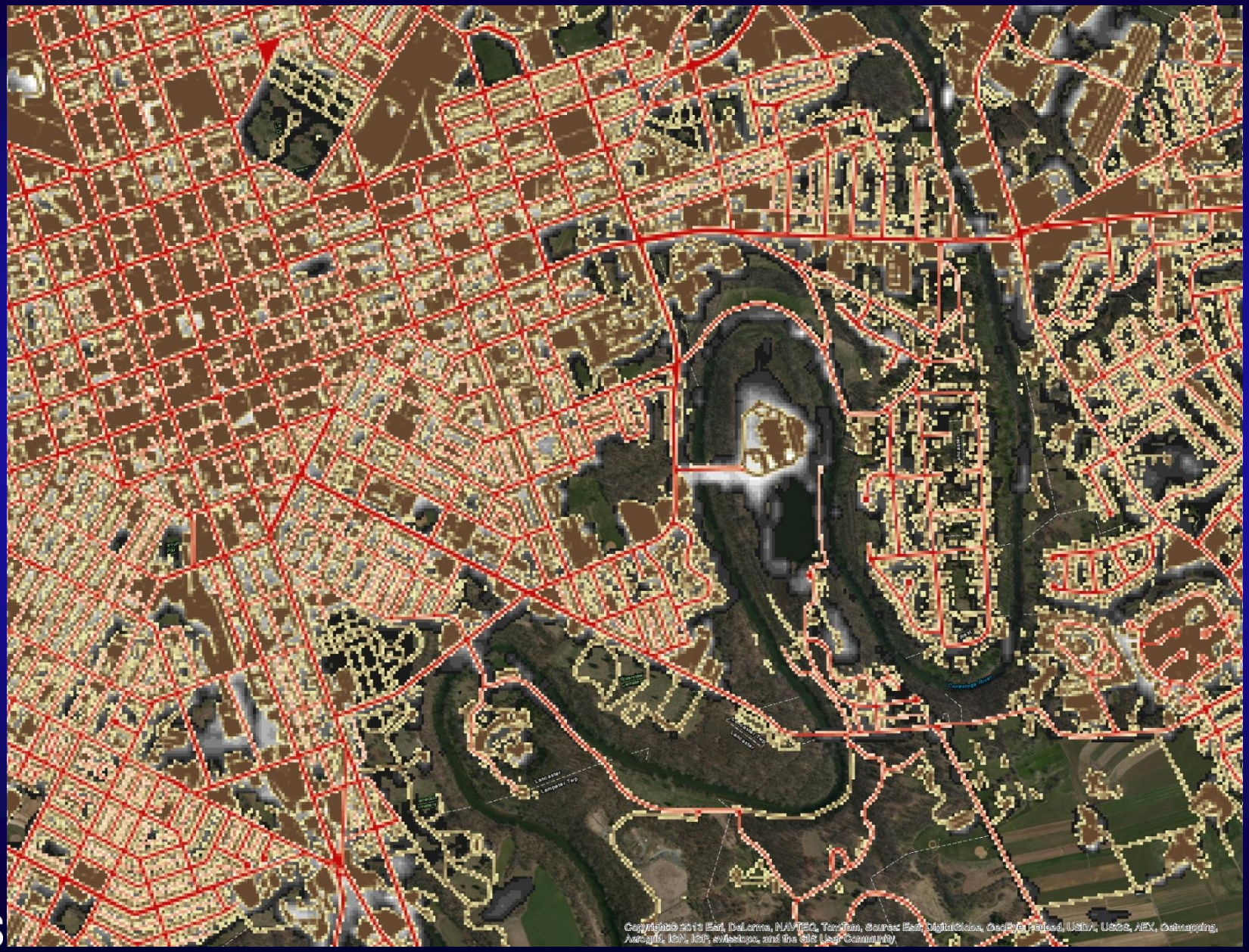
Regional vs. Local Data: Impervious Non-Roads



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Local vs. Regional Data: Forest and Tree Canopy

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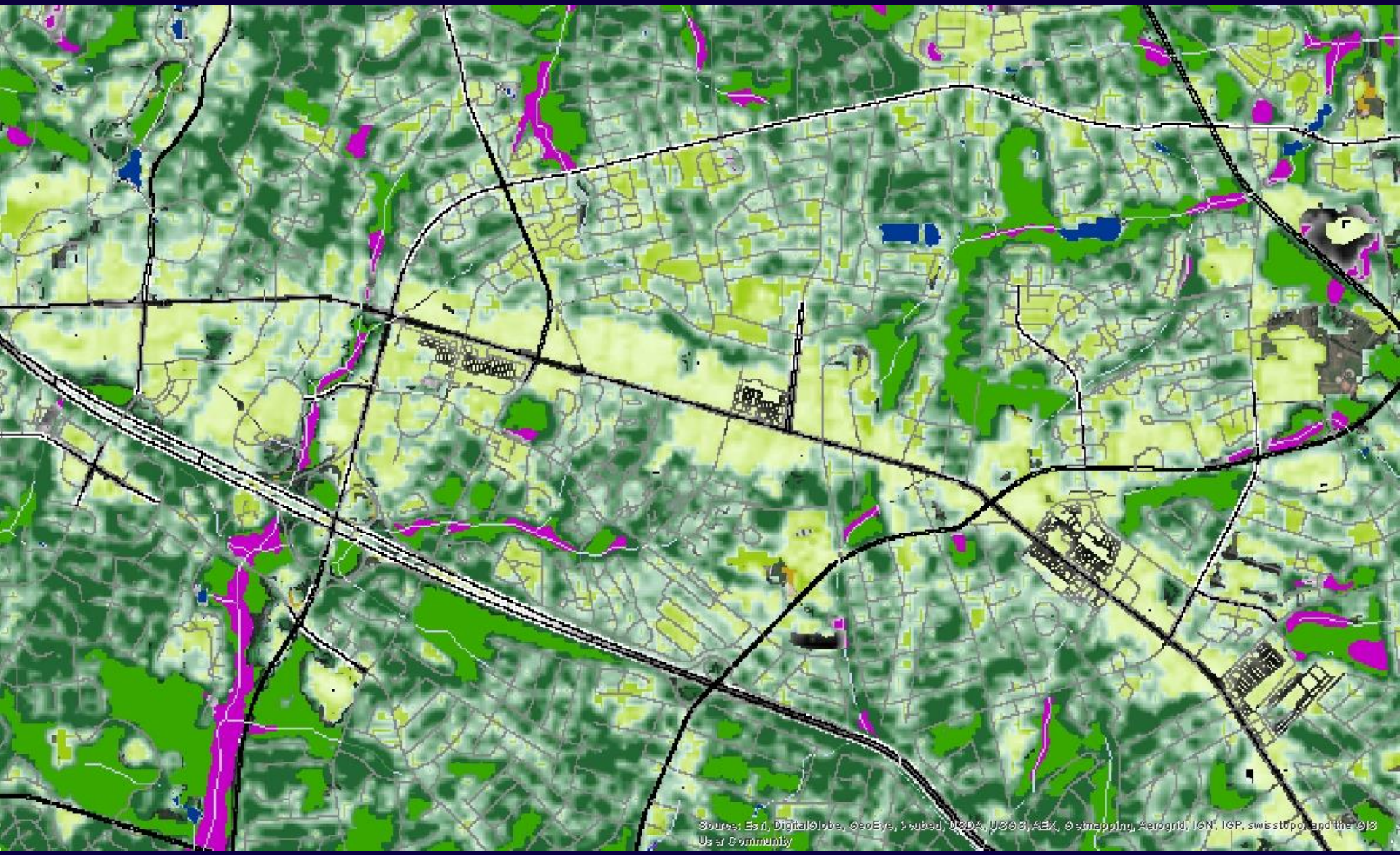
Suburbs of Richmond, VA (I-64 W of Dumbarton)



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WAT + WET + FOR + OS + IR + INR + TG + TCH

Suburbs of Harrisonburg, VA (I-81 N)

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WAT + WET + FOR + OS + IR + INR + TG + TCH

Suburbs of Harrisonburg, VA (I-81 N)

USGS

WAT + WET + FOR + OS + IR + INR + TG + TCH

Phase 6 Land Use Database for 2011 baseline
Rural Development from National Data

- Estimate total housing units outside developed lands
- Assume majority are single-detached units
- Assume rural average lot size = 2.24 acres (same as P532)
- Assume sampled acreage of impervious per lot (same as P532 (see table below)
- Multiply remaining portion of lot by (1- %tree canopy within 100m of roads).
- Add result to Turf Grass area.

Acreage of Impervious per Lot

Median	Suburban	Rural
DC	0.073	0.177
DE	0.116	0.149
MD	0.135	0.177
NY	0.095	0.113
PA	0.077	0.148
VA	0.085	0.150
WV	0.076	0.109
All States	0.094	0.140

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Extrapolating Land Uses from 2011 to 1984 - 2013

STEP 1.

Change in Total Housing Units (e.g., 2011 – 2006) *

Estimated percent of housing change associated with single unit building permits *

Ratio of Acres Developed to Total Housing Units =

Acres of Development (2011 – 2006)

STEP 2.

- Multiply portion of IR associated with INR by * % change in development and subtract from 2011 baseline.
- Multiply INR by % change in development and subtract from baseline.
- Multiply TG by % change in development and subtract from baseline.
- Multiply portion of TCH in developed areas by % change in development and subtract from baseline.

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Extrapolating Land Uses from 2011 to 1984 - 2013

STEP 3.

Adjust open space, forest, and mapped agricultural acreages based on observed changes in corresponding land cover classes from 2011 – 2006.

STEP 4.

Mass balance total acreage by adjusting area of Open Space, Forest, and Agricultural Land proportionally. Note that exact acreage of agricultural land comes from Census of Agriculture.

STEP 5.

Multiply estimates of Impervious Roads, Impervious Non-Roads, Turf Grass, and Tree Canopy over Herbaceous by 2011 proportions of those classes within MS4s and CSOs. These proportions are held constant through time.

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Coming Soon: 2013/14 High-res Land Cover Data

Derived from existing 1m leaf-on aerial imagery, leaf-off aerial imagery (where available), and LiDAR-derived digital surface models.

Produced by the Chesapeake Conservancy, University of Vermont, and another vendor for VA.

Paid for by the Chesapeake Bay Program Partners and VA legislature.

Classification:

- Water
- Wetlands (emergent only)
- Tree canopy
- Tree canopy over impervious roads
- Tree canopy over impervious structures
- Scrub/shrub
- Herbaceous/grass
- Barren
- Impervious Roads
- Impervious Structures etc.

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P6 Land Use Development and Review Schedule

May 2015	Complete regional land use dataset using nationally available data: Phase 6 Land Use Database v1 (P6LU_v1).
Jun - Aug 2015	Rolling jurisdictional proof-of-concept review of how CBP is using their data.
Sep 1, 2015	Deadline to incorporate local land use/cover data. Submit P6LU_v2 to CBP Modeling Team.
Sep 15 – May 16	Incorporate additional local data and high-res land cover into P6 Land Use Database (P6LU_v3).
Jan – Jul 2016	Rolling jurisdictional review of P6LU_v3 and CBPO response to comments.
Aug 2016	Finalization of P6LU_v3 database (1985 – 2014)
Sep 1, 2016	Submit P6LU_v3 database to CBP Modeling Team

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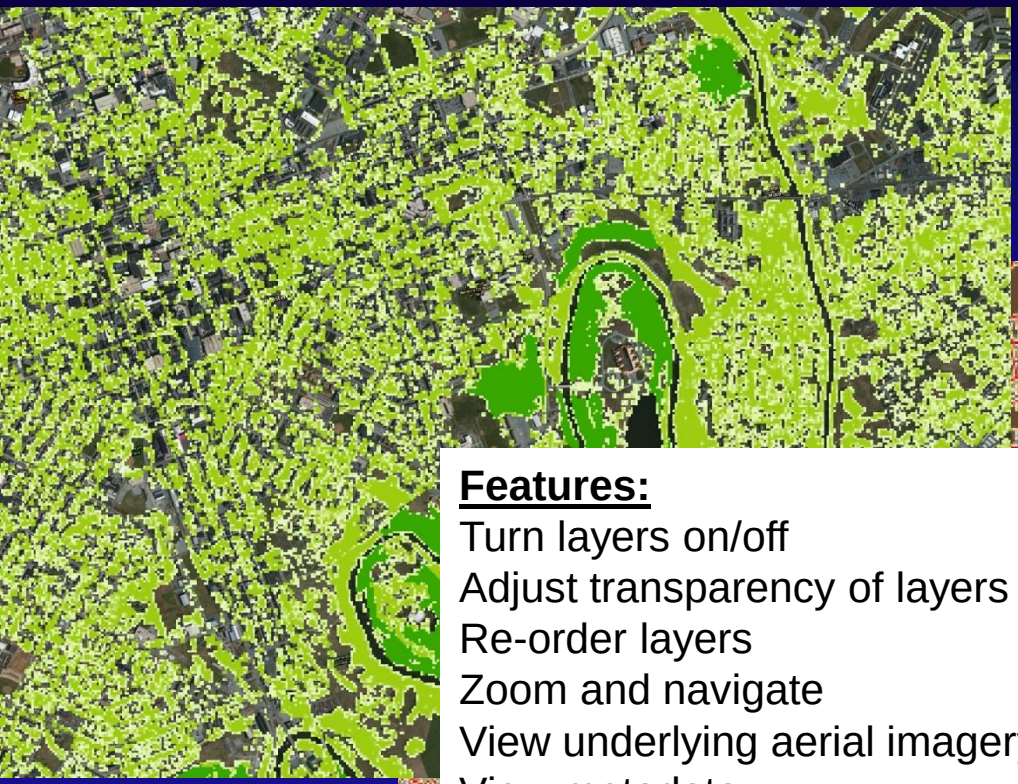
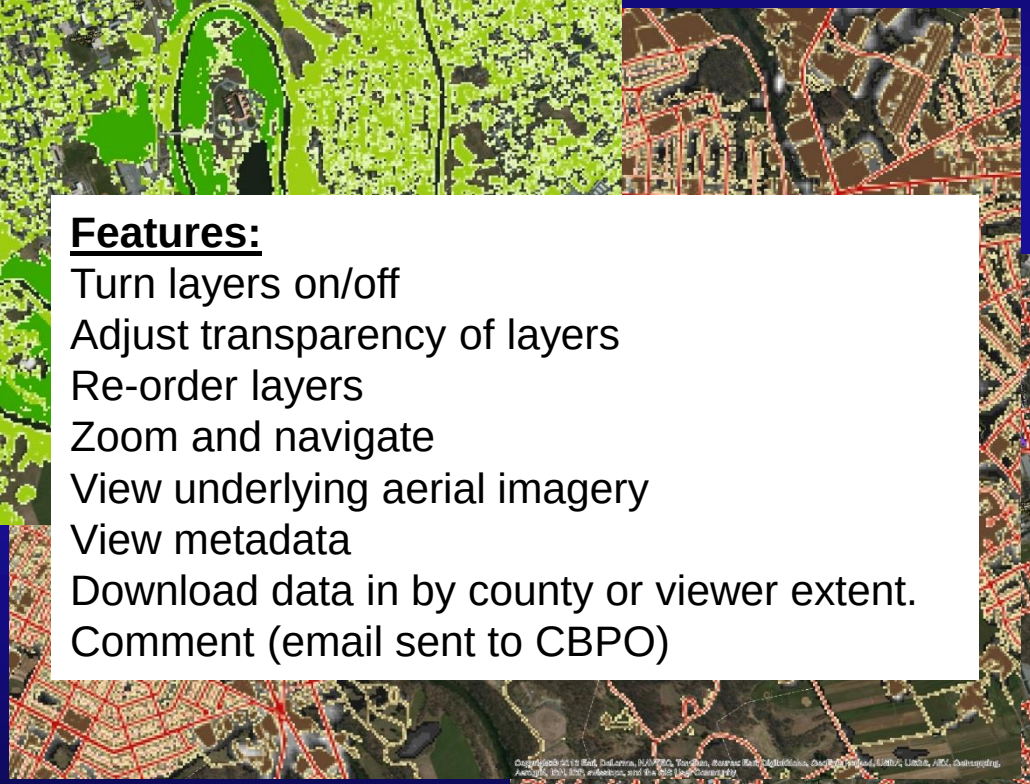
Phase 6 Land Use WebViewer (for jurisdictional review)





Features:

Turn layers on/off
Adjust transparency of layers
Re-order layers
Zoom and navigate
View underlying aerial imagery
View metadata
Download data in by county or viewer extent.
Comment (email sent to CBPO)

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