Watershed-level identification of impervious cover to remove from transportation facilities

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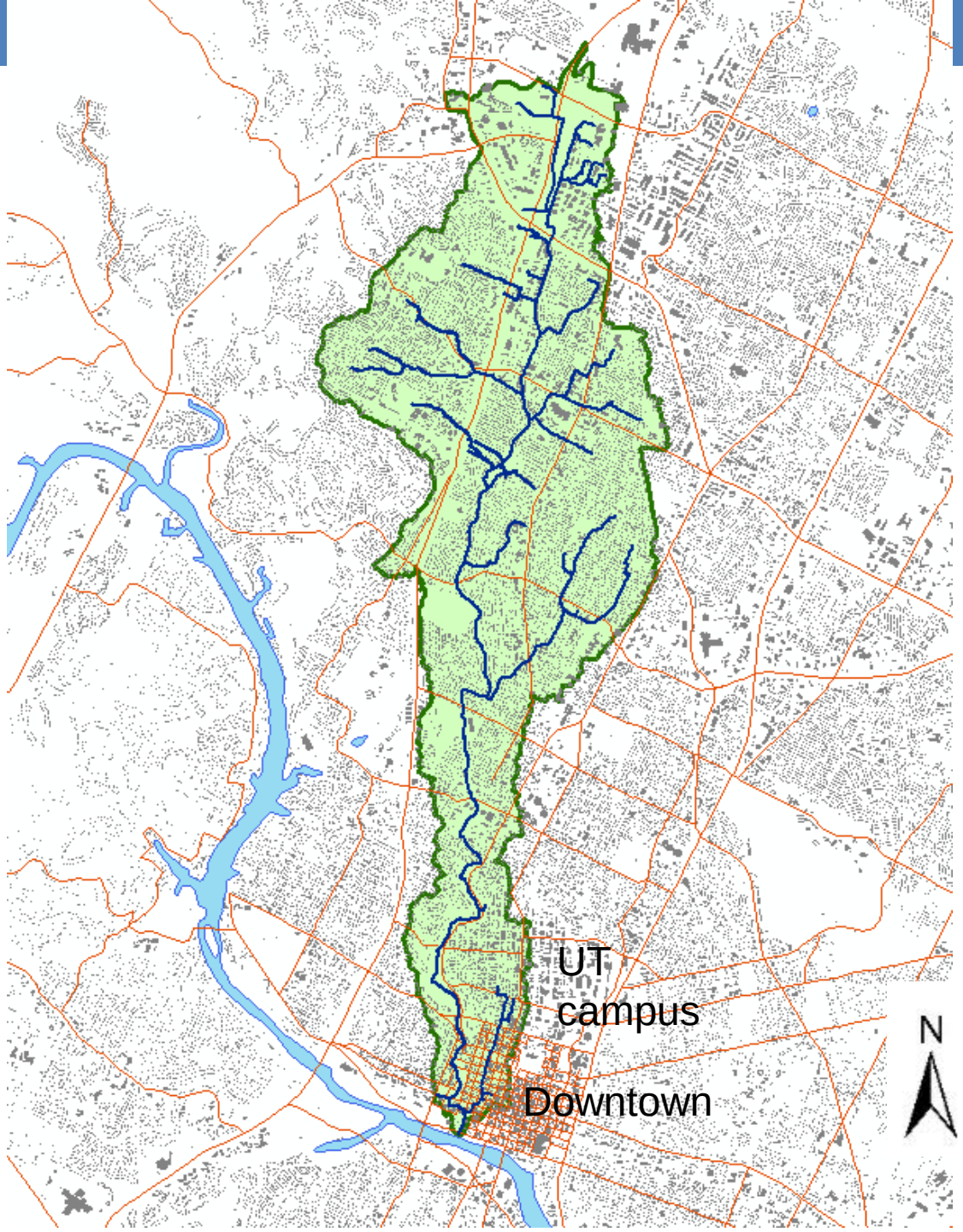
Presentation Overview

- Motivation
- Shoal Creek Watershed
- Priority Impervious Cover
- Eligible Facilities
- Next Steps



Motivation

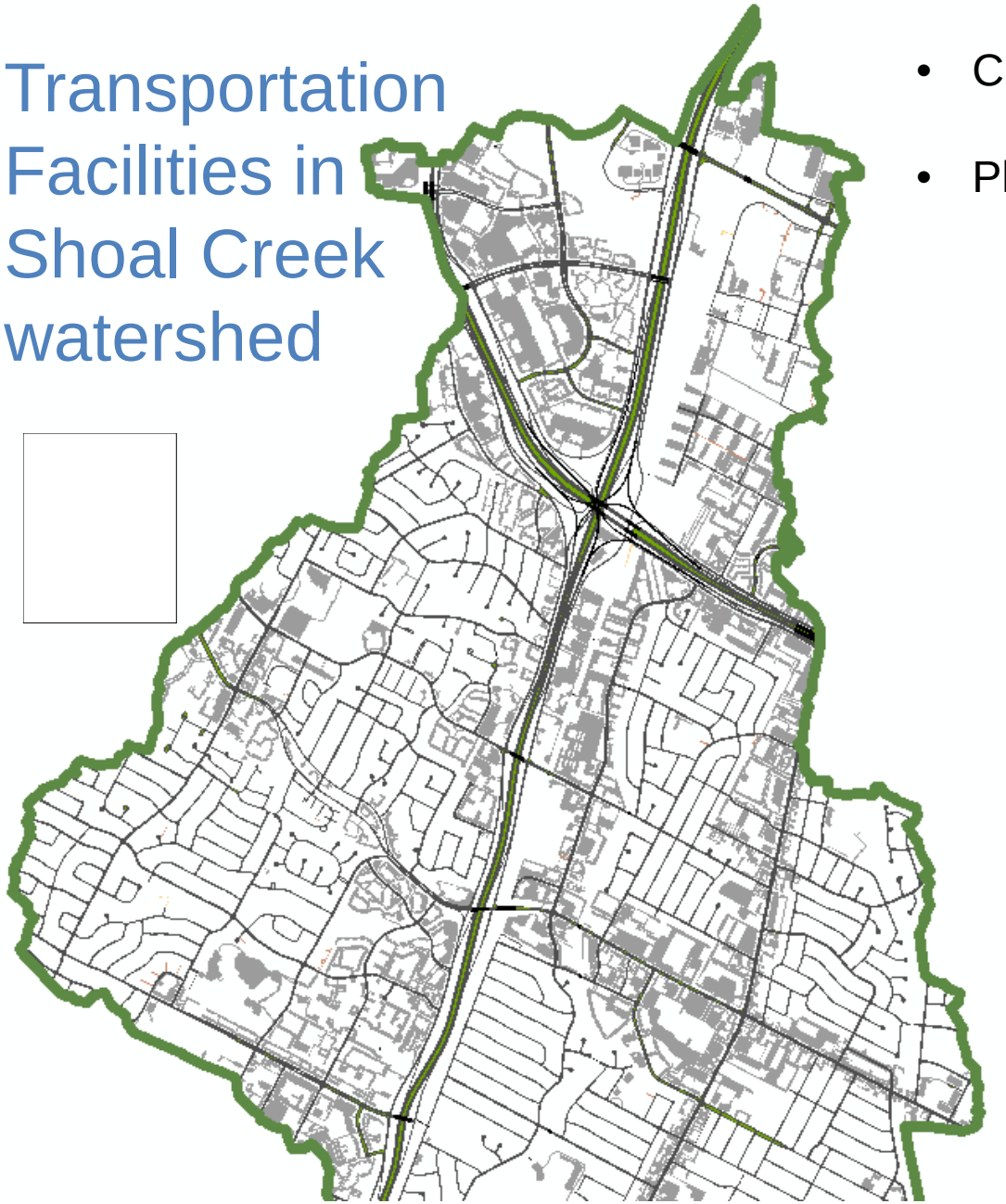
- Pipes and channelized creeks:
  - Decrease infiltration and evaporation
  - Increase frequency and flow rate

- As an alternative, remove existing impervious cover from transportation facilities:
  - Streets
  - Parking lots
  - Driveways

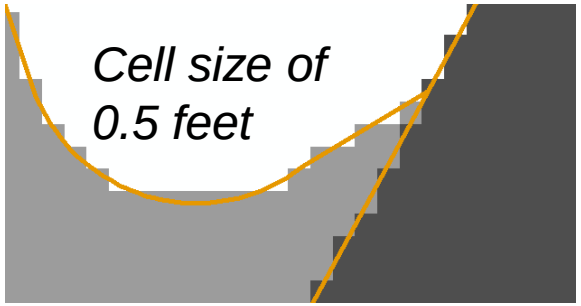
Examples of Removing Impervious Cover

Sources (L to R, clockwise):
Indyculturaltrail.org
City of Portland
City of Seattle

Transportation Facilities in Shoal Creek watershed



- City of Austin datasets from ftp site
- Planimetric Polygon → Raster



Type of Impervious Cover	% of Total Watershed Area
Streets	12.7%
Parking areas	12.3%
Buildings	17.8%

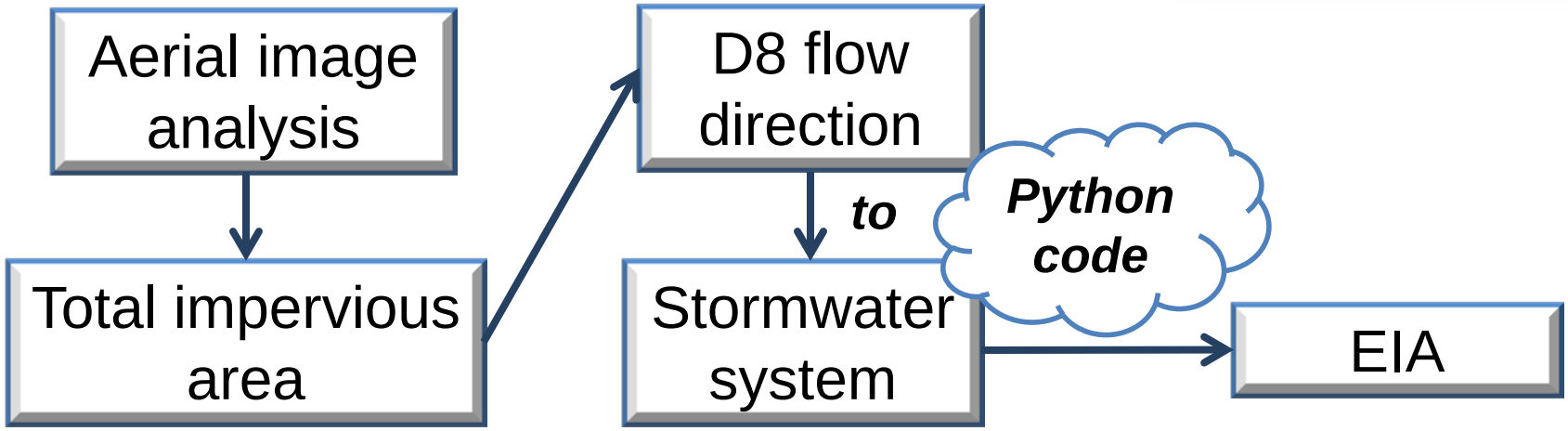
Prioritize Impervious Cover to Remove

- Effective impervious areas (EIA)

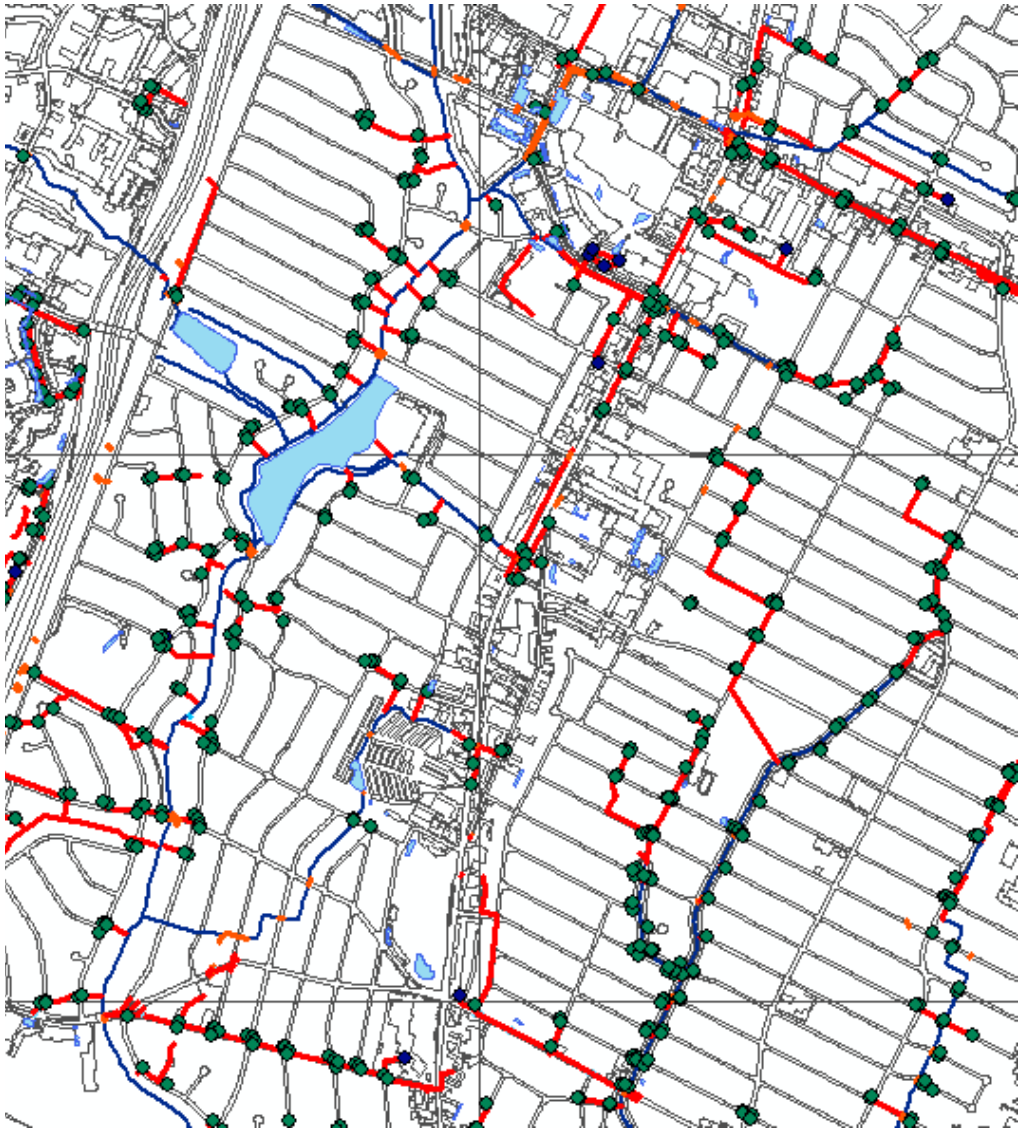
- Impervious areas within stream buffer

Methods of Estimating EIA

- Manual
  - Field investigations
- Statistical
  - Rainfall-runoff analysis
- Automated (GIS)

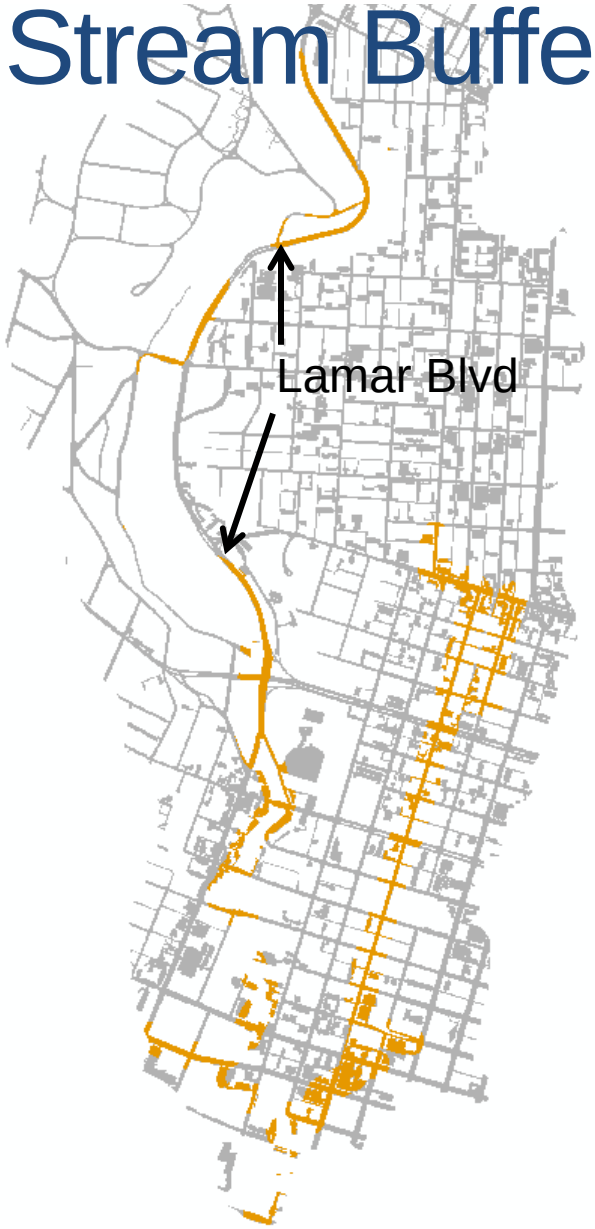


EIA in Shoal Creek



- Missing:
  - Curb & gutter locations
  - Stormwater system for entire watershed
- Assume all transportation facilities EIA

Stream Buffers Around Shoal Creek



Impervious Cover in Buffer	% of Total Watershed Area
Transportation	2.9%
Building	1.6%

Eligible Transportation Facilities

Roadways

Traffic Count **<** Traffic Capacity,

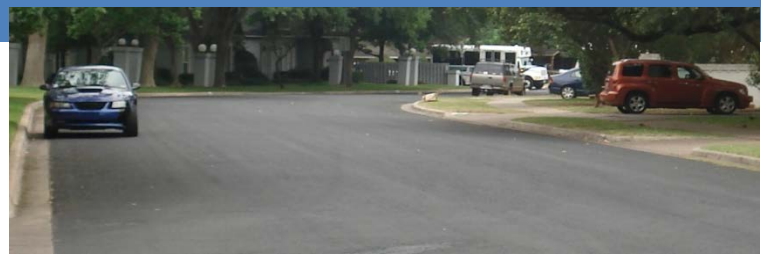
AND

Actual Street Width **>** Max. Street Width for Road Class

Parking Lots

Parking Space Count **>** Parking Space Requirements

Eligible Roadways



- Create composite raster value that gives:
  - road class
  - street width between centerline and street edge

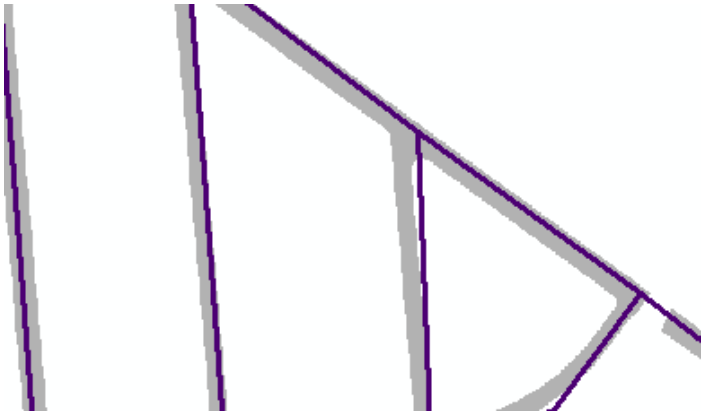
	Road class|Euclidian distance	Raster Value
Street feature	New field of road class values (e.g., 6 * 1000 = 6000)	
Raster 1	Euclidian allocate road class value	6000
Raster 2	Raster Euclidian distance (feet) from centerline	22
	Map algebra raster 1 + raster 2	+
New raster	Composite raster value	6022
	Conditional raster analysis If 6022 > 6012 (maximum half-street width for class 6), 1 0 Otherwise	1 (eligible)

Euclidian allocation (raster)

Road Class		Description	Max Half Street Width
4000	Major arterial	5 lanes	28 feet
5000	Minor arterial	3 lanes	18 feet
6000	Local street	2 lanes	12 feet
8000	Collector	2 lanes	15 feet

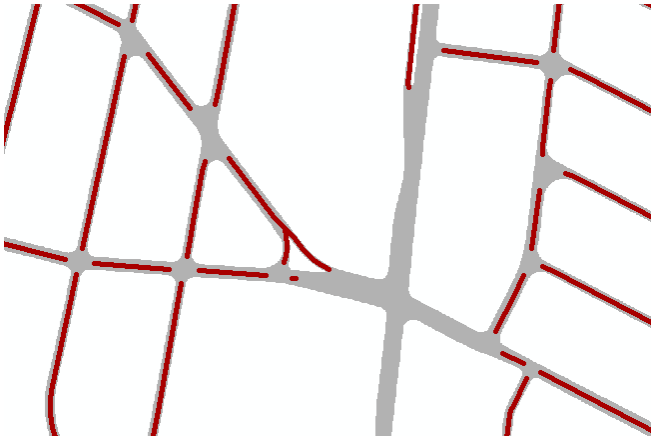
Euclidian distance (raster)

Problem: Street centerline ≠ centerline of raster streets



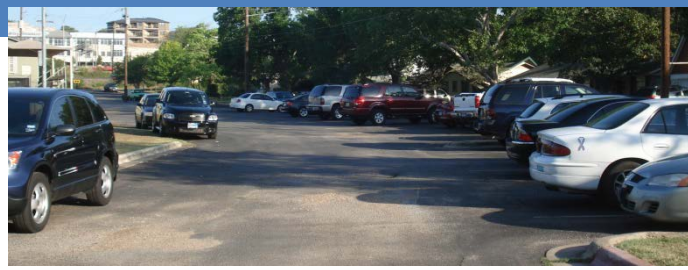
Solutions:

- ArcScan vectorization of transportation raster

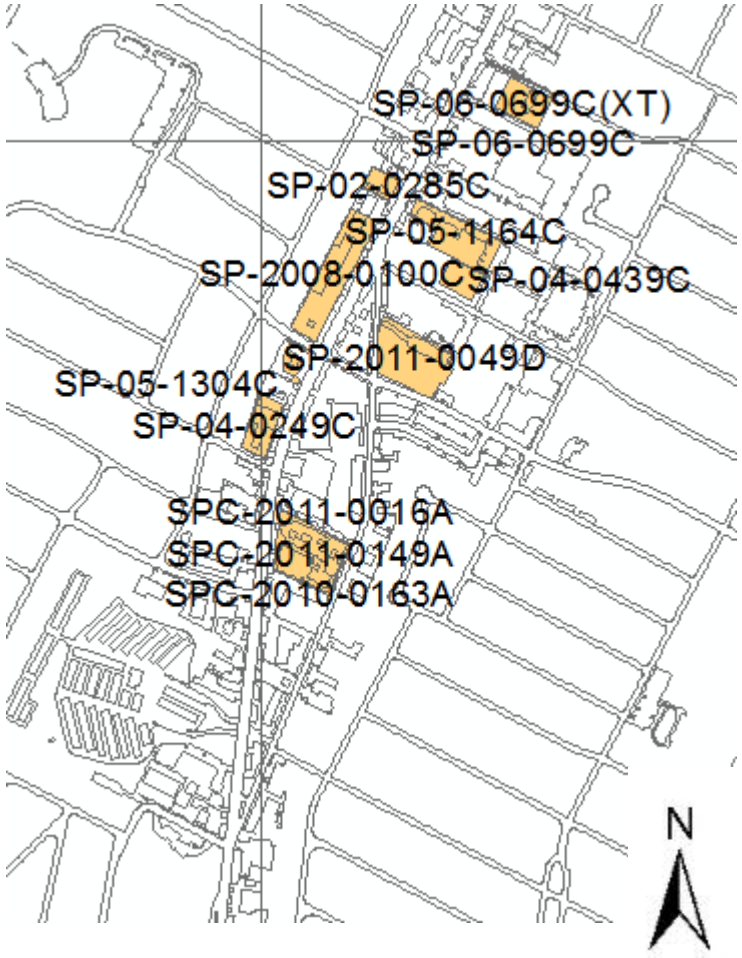


- Repair geometry
- Manual repair of centerlines

Eligible Parking Lots



- Site plan feature class: case #
- Development review website:
  - Gross floor area
  - Minimum/maximum parking requirements
  - Actual parking
- Assign 0/1 value to raster parking lot cells



Next Steps

- Map of eligible transportation facilities
- Map and area of priority impervious cover to remove
- HEC-HMS of before and after removal

In Closing…

- City of Austin data not “analysis ready”
- Provides sketch-planning level scan of potential to remove impervious cover from transportation facilities