



The Secret MTB Trail System Hiding in Tucson

MY NETWORK-SUITABILITY DATASET LEVERAGES EXISTING INFRA FOR ENHANCED URBAN SHREDDING

THIS IS TUCSON.
(OUR CITY)

GREEN FEATURES ARE PARKS.
LINEAR PARKS WITH A
PAVED BIKE LOOP
ENCIRCLE THE CITY.

THE LINES ARE ALLEYS.
PLACES YOU CAN RIDE
MOUNTAIN BIKES
& GRAVEL BIKES.

BUT MOST ALLEYS
ARE TERRIBLE PLACES
TO RIDE.

SO
I FOUND
THE
GOOD
ONES.

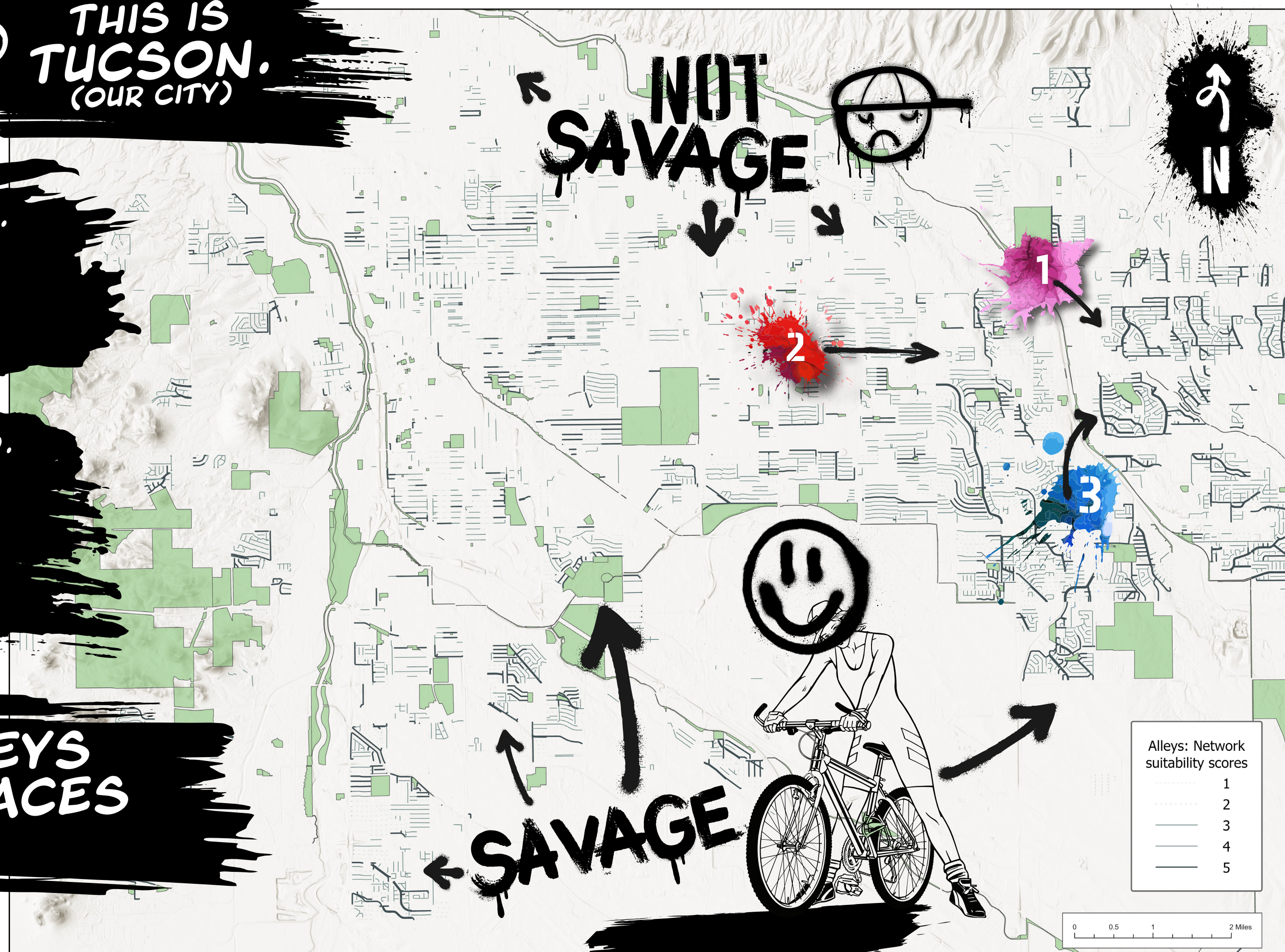
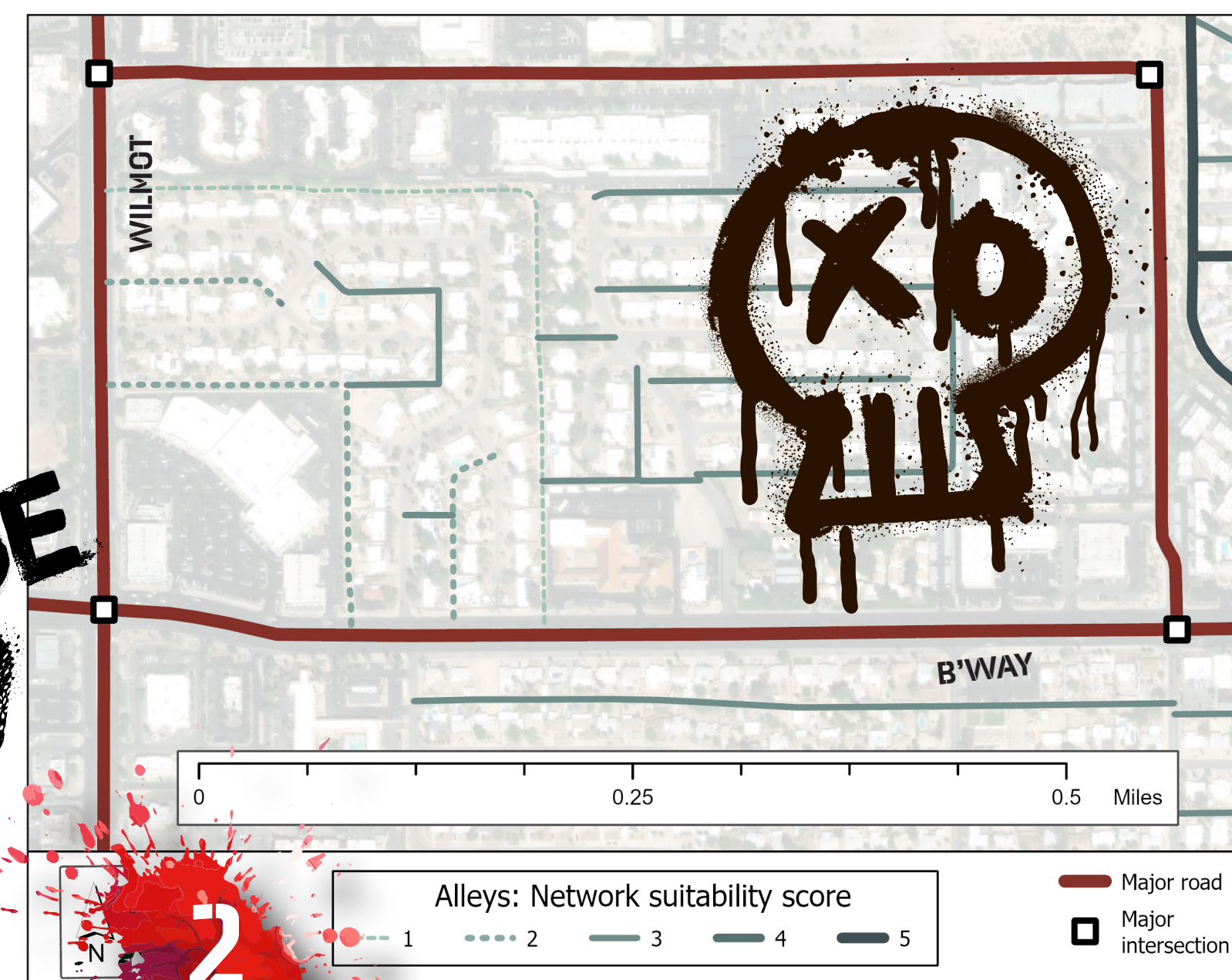
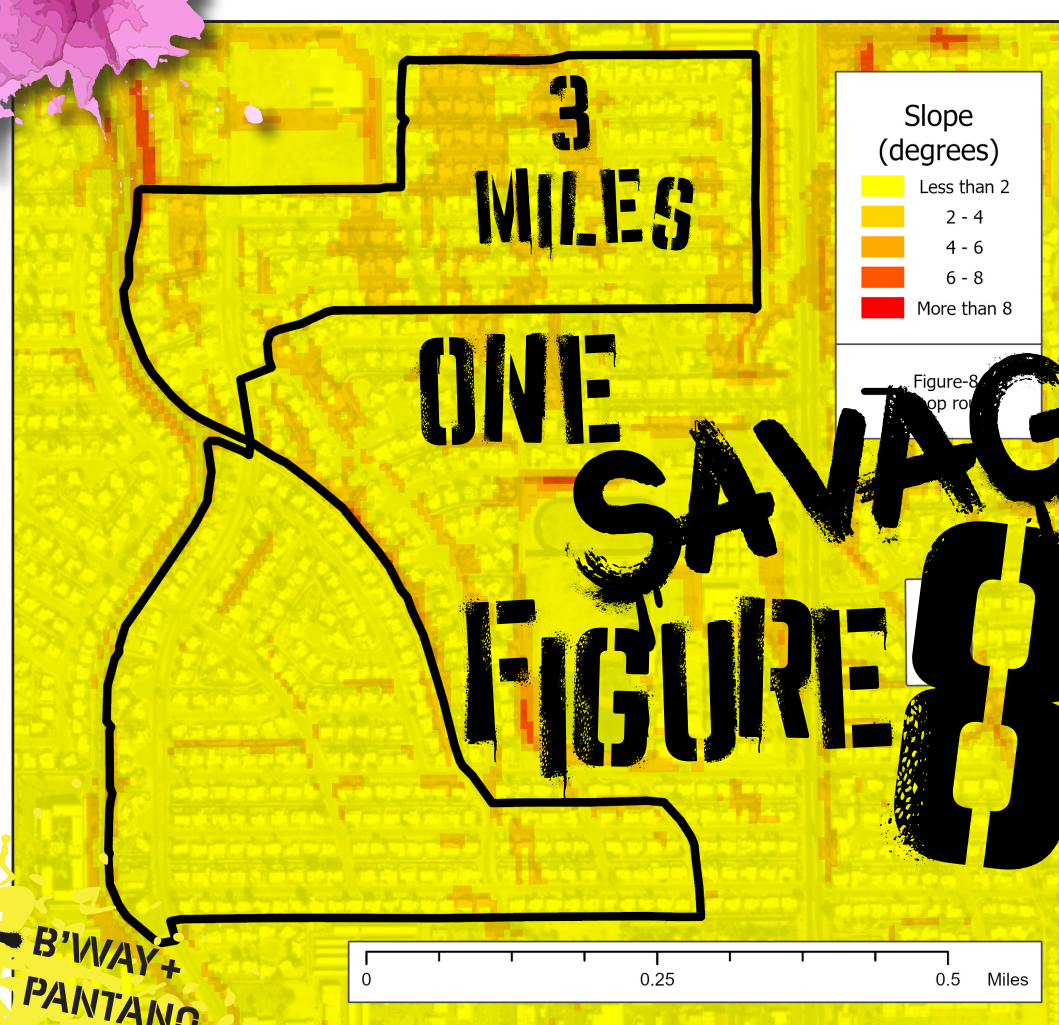


Figure 1. Segment slope analysis helped route the upper-right leg of this three-mile figure-eight loop. Most alleys are very flat, but alignment includes a mild 5° downhill section. Figure 2. Every home in this subdivision has an alley in its backyard. None of them go anywhere. The scoring function reflects that.



PEOPLE LOVE BIKES

Bikes are awesome. But people who like bikes have a **big problem**. We need more places to ride. Especially places with **dirt and gravel**. But Earth is covered with dirt and rocks. Why is it so hard to find?

Before a person rides a bike on dirt and rocks, the bikes rides on a car. The car rides on pavement. The pavement rides on top of a public right-of-way. The right-of-way is a legal fiction riding on top of dirt and rocks. **There's got to be a better way.**

It's time to cut out the middleman. No more time-consuming drives. No more expensive pavement. The immaterial legal fiction above the dirt and rock must remain. And that is where this dataset comes from.

TURNING ALLEYS INTO ASSETS

Every alley in Tucson is a potentially perfect blend of **dirt, rocks, and the legal fiction necessary for minimally restricted public access**. The city is full of alleys that people can already ride on. But they do not. Why?

The alleys are discontinuous. Navigation is non-intuitive. They don't appear on maps. Segments terminate at impassable arterial roads. Cyclists explorign the city by alleyway will find dead ends made of moving cars.

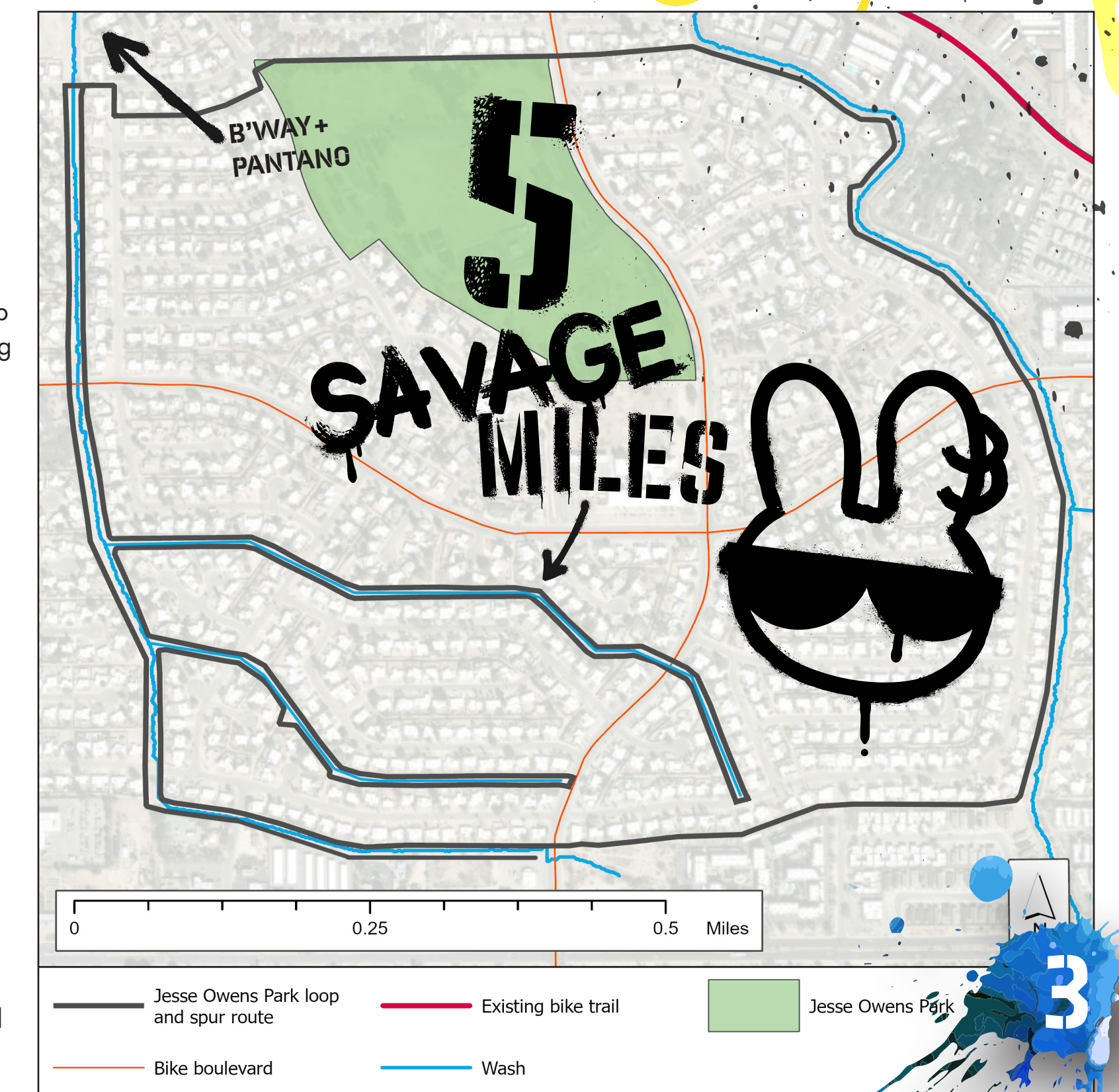
I solved this problem by analyzing individual alley segments for suitability within a low-stress trail network. The resulting dataset can be used to link publicly accessible, unpaved rights of way via bike-friendly arterial crossings and short sections of low-traffic streets.

NO WAY! HOW?

The dataset consists of individual alleyway segments. Each segment is associated with:

- Segment length (calculated distance between paved roads)
- Continuous alignment length (calculated alignment distance including straight-line road crossings)
- Maximum segment slope
- Arterial approach slope (where applicable)
- Nearby amenities (washes, parkland, bike trails, low-stress bike boulevards)
- Terminus proximity to signalized bike/pedestrian crossing (both current and planned)
- Terminus proximity to major intersections
- Terminus proximity to major road
- Synthetic metrics that combine the above information to determine every segment's overall suitability for network inclusion.

Proximity data is recorded via binary indicator variables. Features are considered either adjacent to a segment terminus or absent. A barrier- and amenity-based scoring function categorizes all alley segments into one of five groups.



DATA SOURCES

Alley alignments in the dataset are derived from OpenStreet-Map (OSM) via Overpass Turbo. OSM data agrees with plat data. No false positives (e.g., alley-like utility easements) were found.

Major road alignments are taken from ADOT's road classification dataset. Arterial crossing points are derived from OSM data on signalized crosswalks, as weak as a City of Tucson bike boulevard dataset. Bike-accessible trails and cycle path data were taken from Pima County and OSM, respectively. Slope attributes were calculated using a USGS digital elevation model. Wash network data is via Pima County.

FUTURE WORK

The existing dataset is a reasonable start with room for improvement. OSM segment and alignment lengths do not always represent the maximum unpaved point-to-point distance possible. A better network decomposition is desirable. Washes are an excellent trail amenity (open space and long alignments) but the data set requires additional cleanup.

Finally, the ADOT road categories are somewhat aggressive. Some low-traffic neighborhood roads are classified as "major collectors." This may be a result of classification changes made by ADOT in 2019. Those changes received pushback from the Tucson Department of Transportation and Mobility.

Figure 3. This loop-and-spur route is aligned almost entirely adjacent to washes and parkland, and it runs for more than five miles without ever crossing an arterial road. In spite of scoring function limitations, the scoring function still identifies the basic elements of this route. Final routes shown in this work were sketched manually using highly ranked segments identified by the scoring function. Future refinements could allow for automated route identification.

The route and the route shown in Figure 2 are located on opposite sides of Broadway Blvd. Connecting them via bike boulevards—designated low-stress surface roads—provides easy access to over eight miles of unpaved "trail."

THANK YOU