



The influence of
**LANDSCAPE
FACTORS**
on transportation systems

Overview



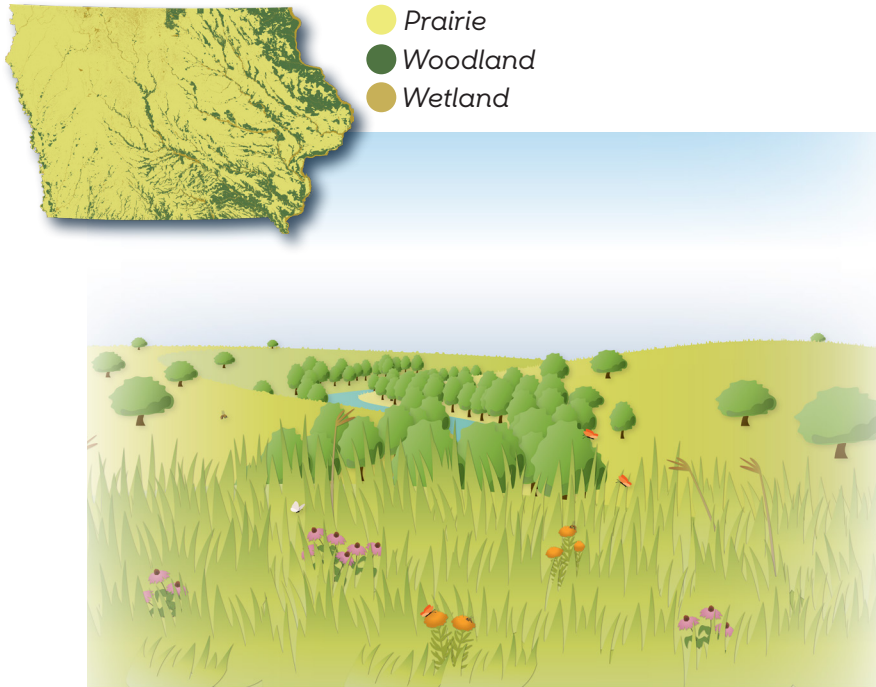
This presentation explores the relationship between the landscape and built systems in your community. Specifically, we will examine:

- The development of transportation systems and community land use over time
- How surface water and topography affect where communities and transportation systems develop
- The impact of groundwater (when present) on transportation and land use
- Benefits of trees and other vegetation and how trees in towns fit with transportation networks, main streets, and neighborhoods

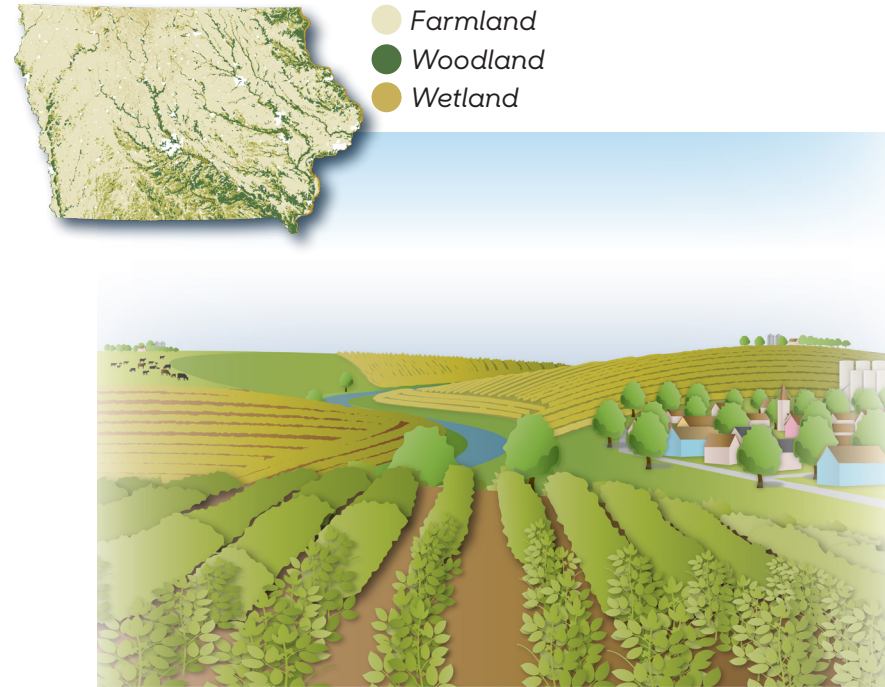
Waukon is the county seat of Allamakee County, the northeasternmost county in Iowa, in a region called the Driftless Area. This community of approximately 3,800 people is located between Decorah to the west and the Mississippi River to the east.

The town was founded in 1849 and was named after Chief John Waukon of the Ho-Chunk (a.k.a. Winnebago) Nation, one of the Native American tribes present in the region. In 1877, the Waukon & Mississippi Railroad, later part of the Milwaukee Railroad, connected the town with Waukon Junction to the east and supported its early iron mining industry. The mines closed in the 1930s, and the railroad was later abandoned in the 1960s.

Land Cover Changes Over Time



Historical Landscape



19th Century Landscape

The historical landscape of Iowa was dominated by prairie and savannas. Tree canopy was typically found in valleys along river corridors adjacent to scattered savannas, because the fires that maintained the prairies could not spread as easily in those places. Native plants such as switchgrass, little bluestem, coneflower, and milkweed are some of the more recognizable plants found in the diverse prairie landscape.

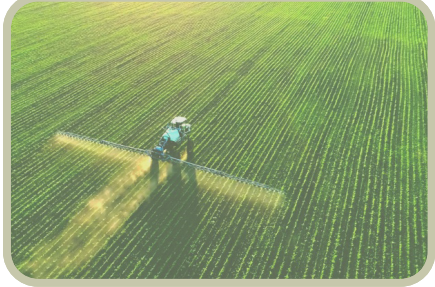
The once-dominant prairie has been replaced by agricultural fields, pasture lands, and small towns in the post-settlement Iowa landscape. Fire suppression and development have allowed for greater growth of wooded areas among the rural landscape and in town. At the same time, many wooded river corridors have narrowed to make more room for cropland.

Current Land Cover

Impervious Surfaces



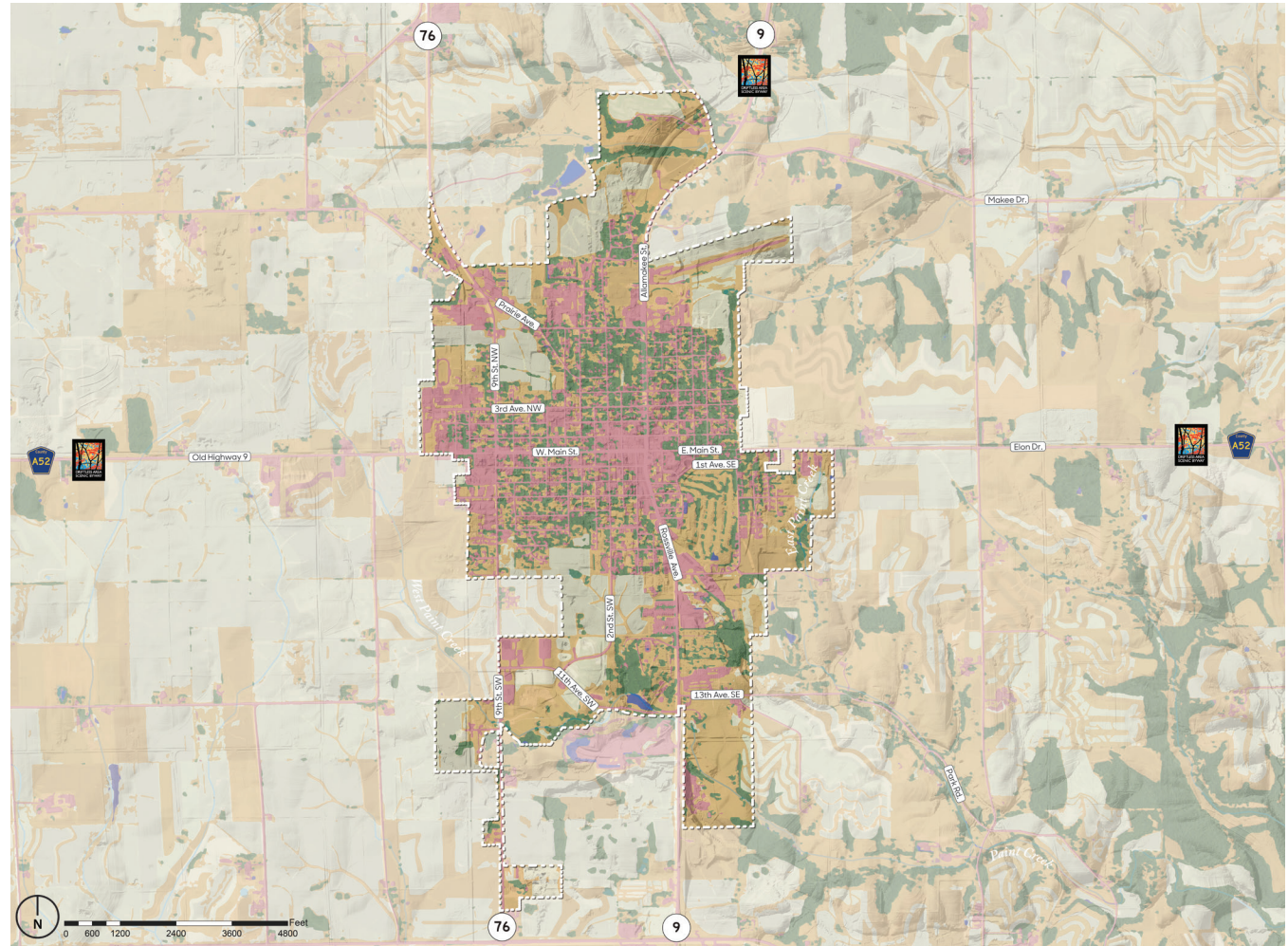
Agricultural Land



Grassland/Lawn

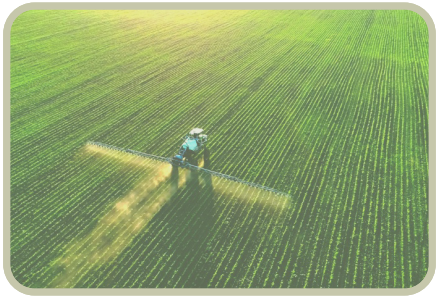


Tree Canopy



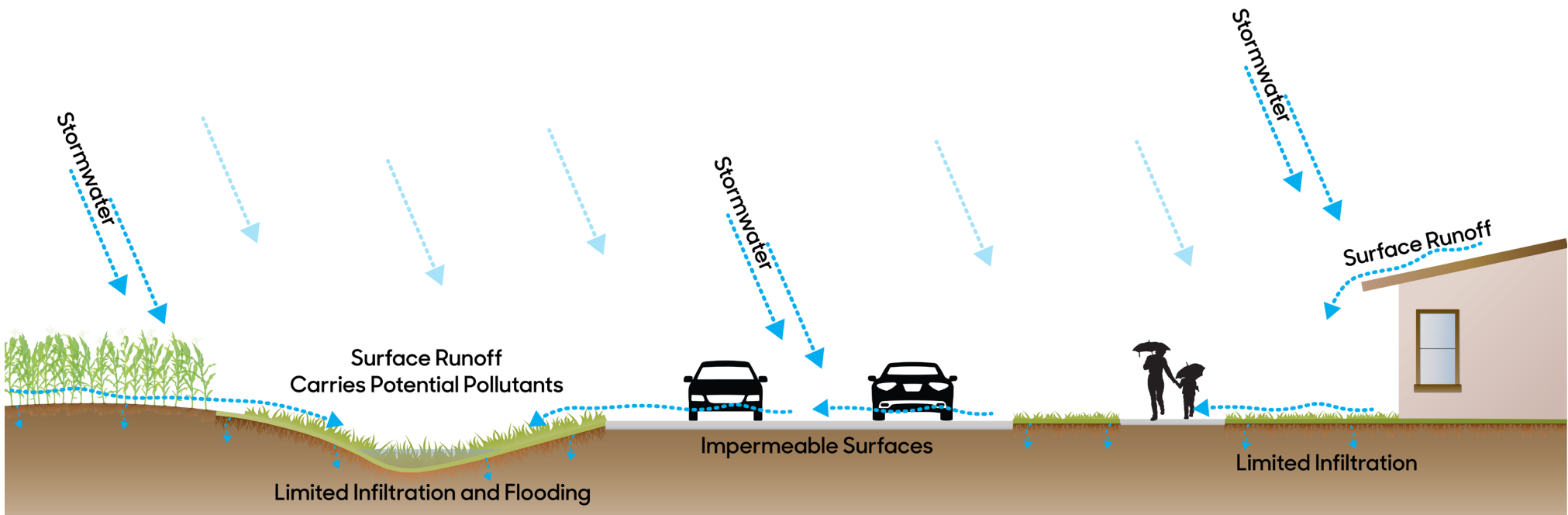
The land cover in most of Iowa's small towns today is a mix of residential lawns or neighborhood spaces dotted by trees. Streets and parking are paved and are sometimes flanked by sidewalks. Commercial and industrial zones are typically dominated by impervious surfaces.

Before settlement, the area around Waukon was covered primarily by savannas and woodlands. Today, it is mostly agriculture and grass, with multiple impervious-dominant areas in town. Tree canopy is relegated to along stream corridors and in residential areas, especially in the north side of town.



Impervious Surfaces, Agricultural Land, & Lawns

Impervious surfaces limit or prevent stormwater from infiltrating the ground and, in expansive areas, can create heat-island effects through stored and reflected heat. Agricultural land that is in annual crops and tilled provides limited infiltration, which can contribute to local flooding. Lawns can also limit infiltration, especially over compacted soil. All of these factors contribute to stormwater runoff and localized flooding, especially during intense rainfall.



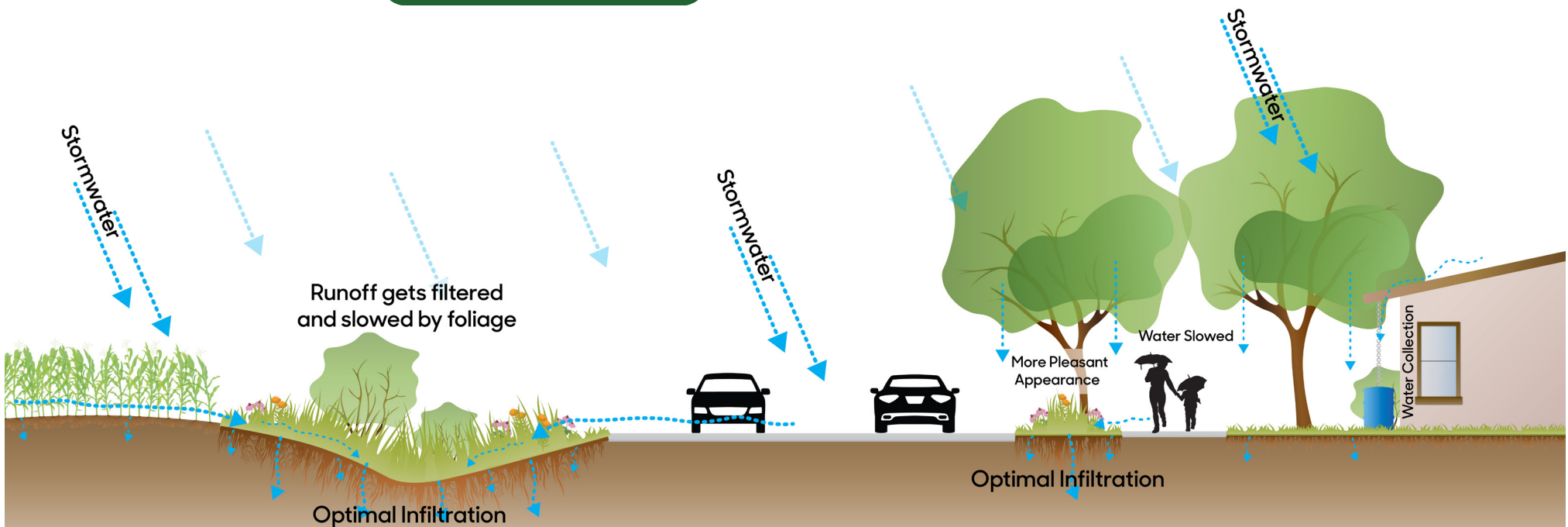
Vegetation Benefits



Grasslands & Tree Canopy

Native grasslands with deep-rooted plants aid in infiltrating stormwater, while dense foliage slows and filters stormwater from other areas. Practices such as bioswales and natural roadsides capitalize on these benefits to improve water quality.

Trees offer many advantages. They clean the air, create shade, and cool the atmosphere. Trees also intercept rainfall, which helps mitigate stormwater runoff and flooding. They consume groundwater, which lowers the water table and makes space for water storage below ground. Carefully chosen and placed trees create community identity and make spaces comfortable for residents. Grasslands and trees provide habitat for pollinators and birds, which provides enjoyment for residents.

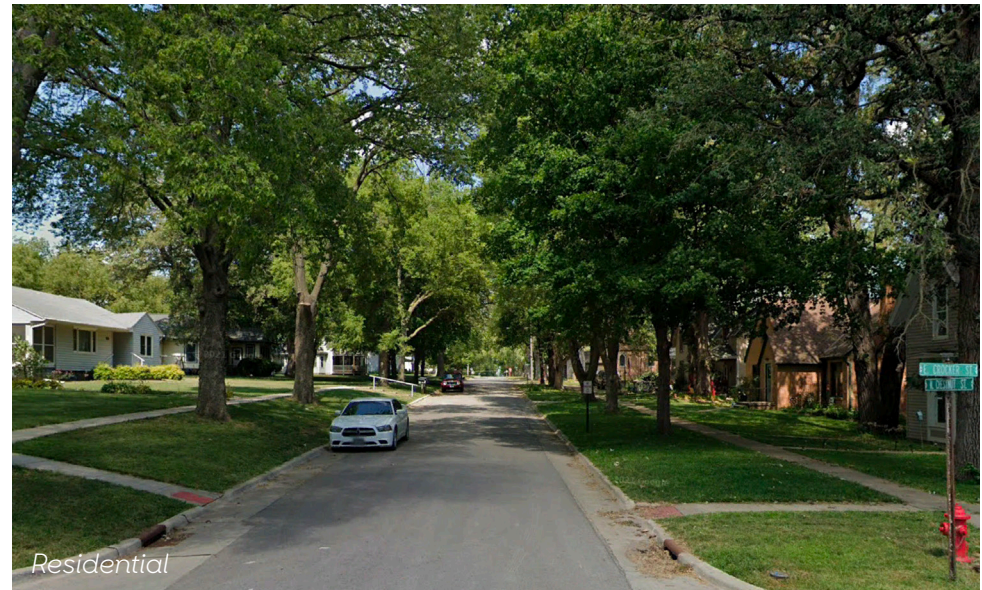




Example Streetscapes with Minimal Vegetation



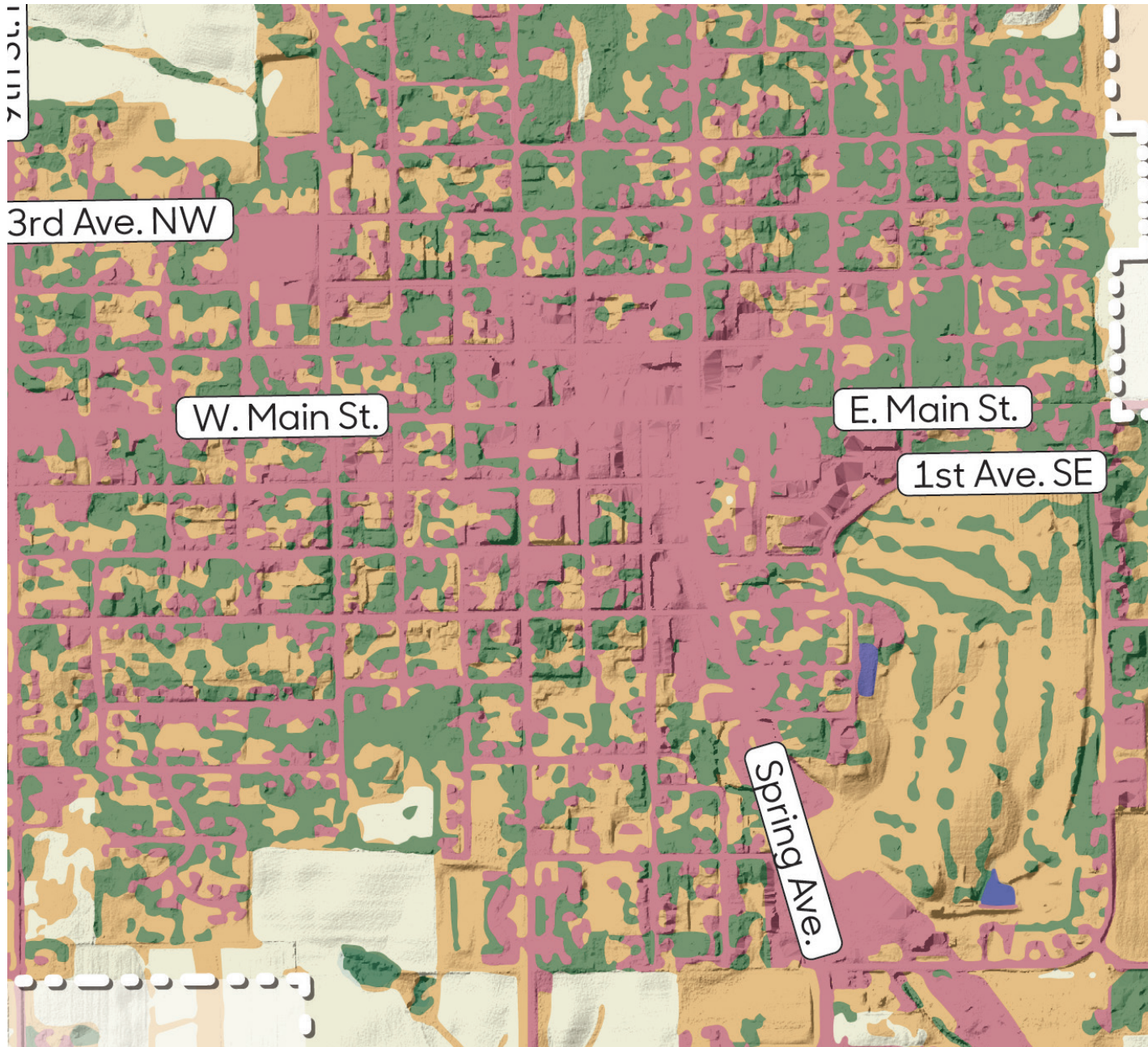
Example of Vegetated Streetscapes



Lack of street trees creates uncomfortable spaces that feel unwelcoming and exposed to the elements.

Street trees, shrubs, and planters along a roadway offer shade and protection from the elements, while also enhancing the experience of the street.

Vegetation Benefits



Land Use Map of Waukon, IA

Much of Waukon's commercial and industrial spaces are covered with impervious surfaces. In residential areas, there is more canopy cover and grass is also prominent.

Looking at the heart of your community, does your downtown core have trees?

How does this change as you move from the downtown into residential areas of town?

Reflecting on your own experiences, where do you feel most comfortable on a hot summer day?

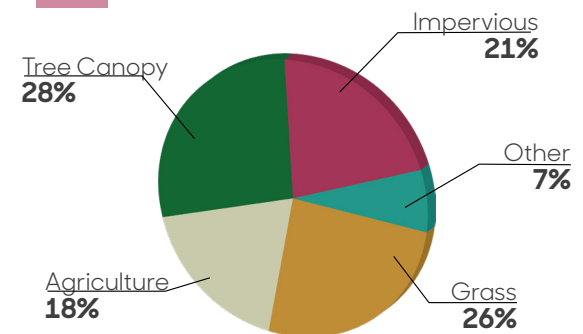
How do you think visitors see this space?

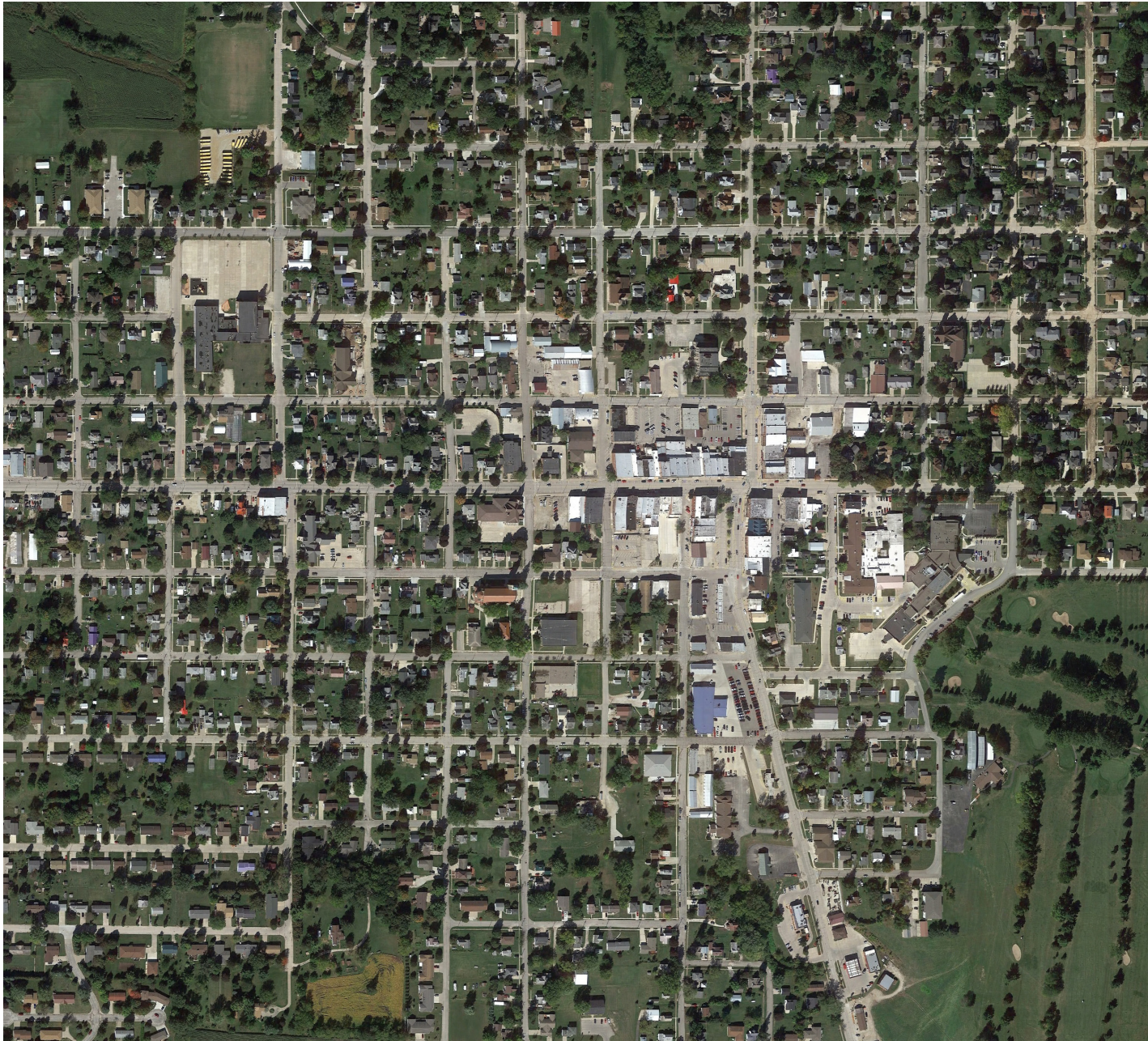
Legend

City Limits

Land Cover

- Water
- Agriculture
- Grass
- Tree Canopy
- Impervious





Aerial photograph of Waukon, IA

This photo shows that there are some trees in downtown that are not identified on the land cover map, and that vegetation in the residential areas is primarily open lawn with scattered trees.

Next time you are out in town, note what it feels like to be in areas where there are more trees and vegetated areas.

How does it feel to be in areas mostly dominated by impervious surfaces with minimal vegetation?

Do you notice a difference in how many people pause or gather in those spaces?

Surface Water Conditions

A watershed is an area defined by elevated boundaries that separate water flowing toward different rivers and creeks. These basins show the extent of a drainage area flowing to a single outlet point.

Where a community is located within its watershed(s) determines how much water flows into or through it. Location also influences the town's capacity to manage flooding issues. For example, a community located near the end of a watershed (close to the outlet point) will have little capacity for reducing the amount of water draining toward it from upland areas, and will receive greater volumes of water during flooding seasons than other communities located higher in the same watershed.

Development of channelized waterways, drainage tiles, and impervious surfaces also leads to increased quantities and speed of the water headed downstream; while a community located near the top of its watershed may not experience flooding, how it manages water will have a greater effect on neighboring communities downstream.

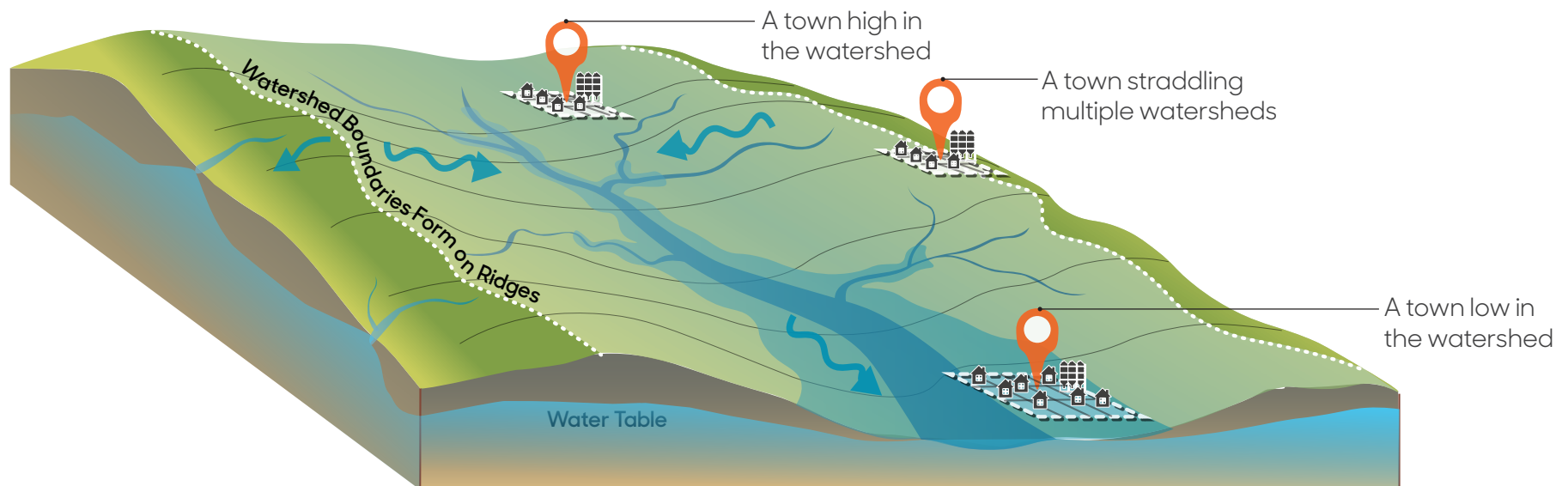
The map on the following page highlights your community within its surrounding watershed(s).

Where is your community located within the watershed(s)? Is water flowing to your community or away from it?

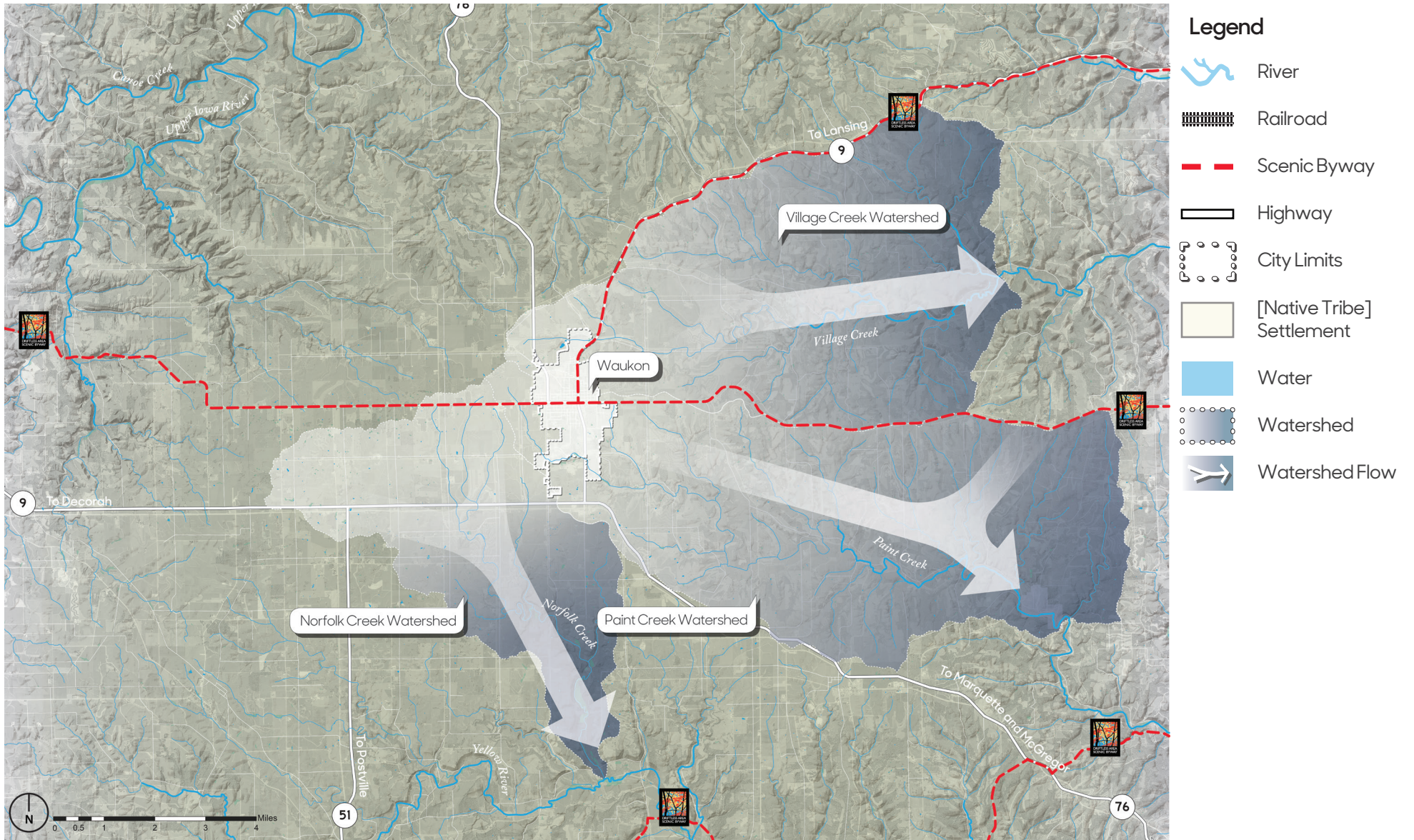
Is flooding an issue in your community?

How big is the watershed above your town? What conditions might increase or reduce flooding?

Are there conditions or practices happening in your community that could be creating risk for communities downstream from you?



Axonometric diagram of the physical characteristics of a watershed.



Watershed map of Waukon, IA

Waukon is situated at the top of three different watersheds, so most of the stormwater flows through and out from town rather than toward it. The Paint Creek watershed is the most affected by actions done in Waukon, because most of the water passing through town flows into Paint Creek.

Settlement Patterns

The elevation and flow map on the following page displays topographic differences in elevation using a combination of contour lines and the color gradient depicted in the legend.

During their construction in the 19th century, railroads were able to stretch across the relatively flat land of much of north-central Iowa. This was very useful, as constructing tracks on steep slopes was typically not cost-effective because of the difficulty for trains to climb them.

However, not all of Iowa's terrain is flat. In areas such as the Loess Hills in the west, the rolling prairie in the south, and the Driftless Area in the northeast, railroads would often follow the lengths of river corridors, because this allowed the trains to follow shallower slopes along banks and hillsides.

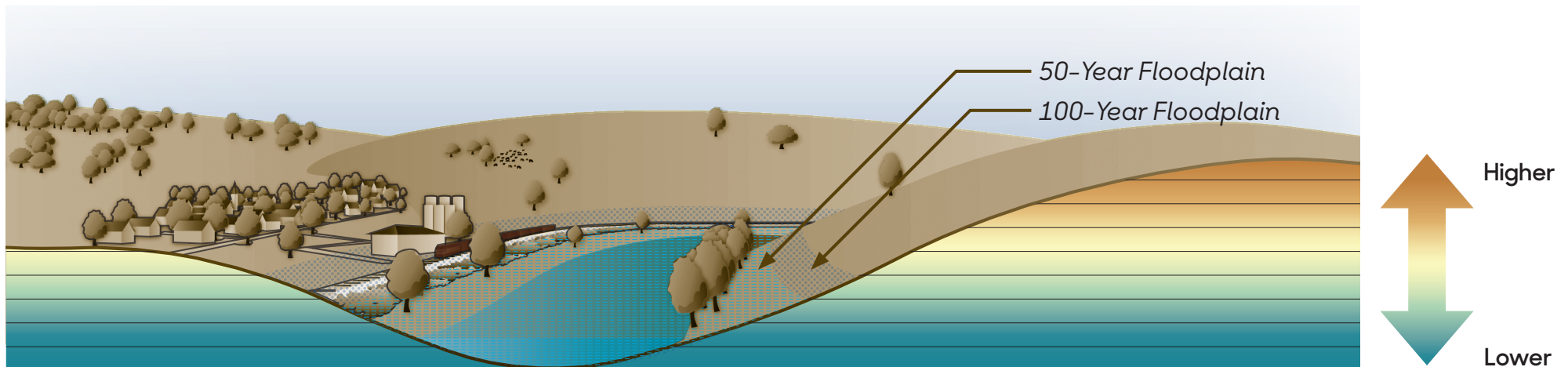
Many towns across Iowa were built with the railroads. However, Waukon was founded just before the arrival of the railroads, so the community needed to find a strategic connection to the Mississippi River across a 600-foot difference in elevation and 16 miles distance.

Note the relationship of your community to the surrounding elevation: is it located in a valley, on high ground, or is it split between the two?

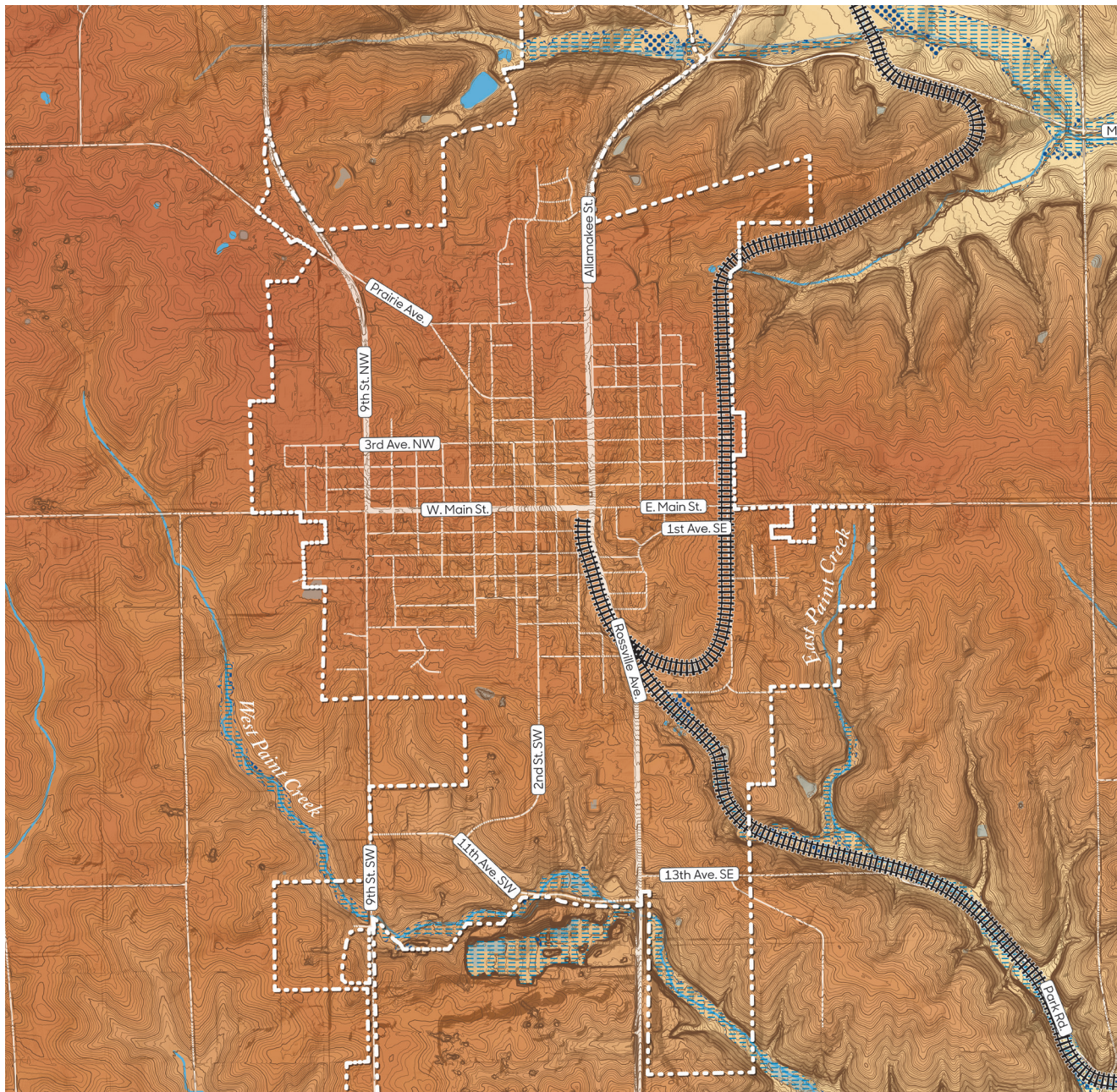
Which parts of the community are low or high in the landscape?

Why might this be the case?

What landform conditions might have driven development decisions?



Sectional diagram depicting the scale of elevation in relation to topographic features and development patterns.



Legend

- ○ ○ ○ ○ Trail
- River
- City Limits
- Road
- Historical Railroad
- Water
- 2ft Contours
- 100-Year Flood
- 500-Year Flood
- Higher Elevation
↓
Lower Elevation

Elevation and flow map of Waukon, IA

Waukon is situated in a high-elevation area in the county, with a depression running through downtown leading to Paint Creek. Historically, the railroad followed Paint Creek's corridor toward Waukon Junction.

Landscape Changes of the Driftless Area

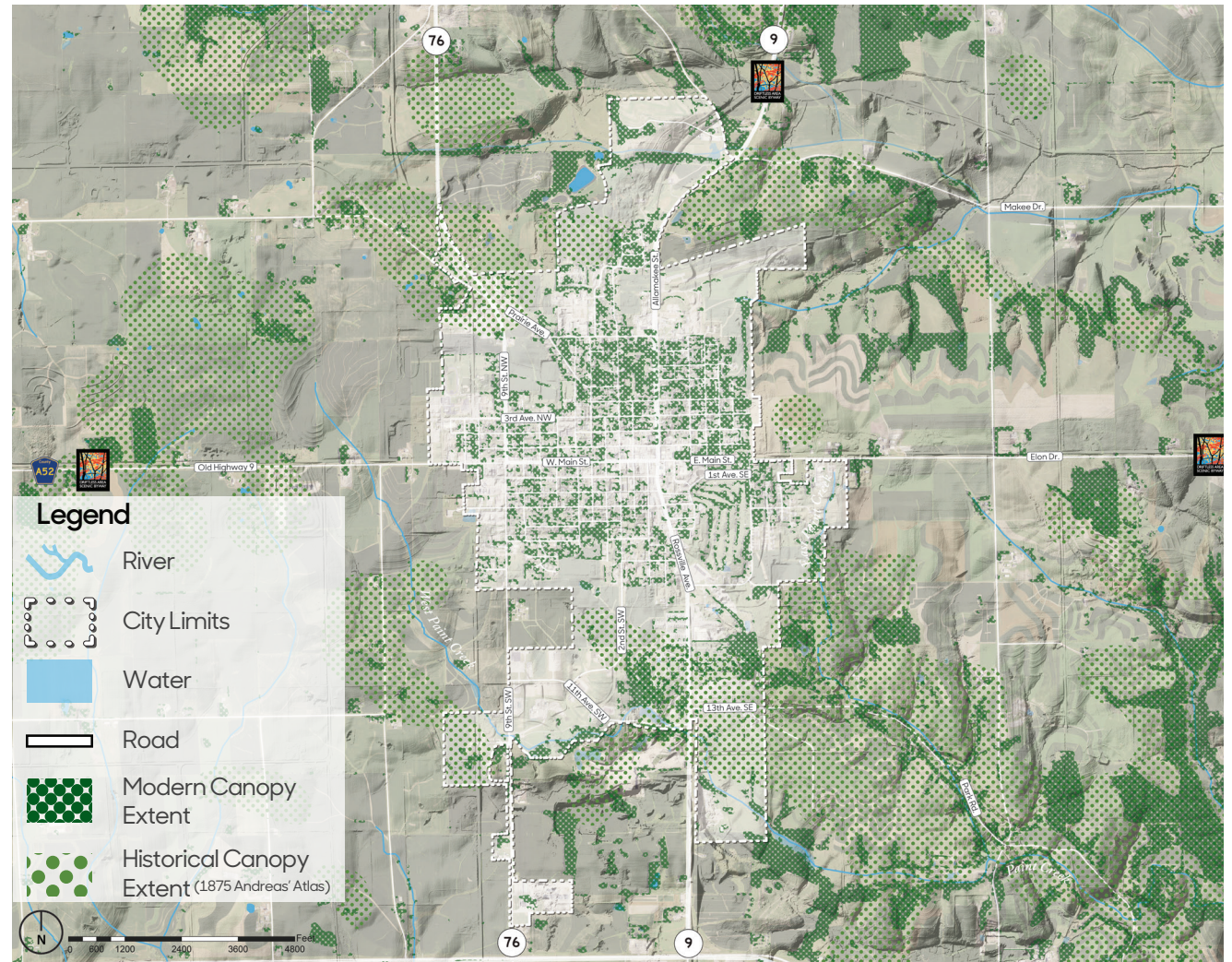
The Driftless Area is a region of Iowa, Wisconsin, Illinois, and Minnesota that was never covered by glaciers during the last ice age, resulting in an uneven terrain of tall limestone bluffs and narrow valleys. The limestone in these hills is highly erodible, and over time developed deep gullies and sinkholes.

The hills and valleys of the Driftless Area prevented fires that had dominated the prairies from spreading, allowing woodlands and savannas to form. When Iowa was settled by European Americans, many of the woodlands of the Driftless Area were cleared for agriculture and logging for houses.

As you travel the region around your town, can you notice any patterns about where woodlands or tree cover remains?

What characteristics link these places together? Have these characteristics affected how your town has developed?

How has your town's development affected the canopy cover of the area in and around your town?



Canopy Analysis Map of Waukon, IA

Much of the savanna and woodland present in 1875 have been replaced by agricultural land. In town, canopy cover has grown where prairie once was.

