



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

prepared by Iowa State University

# Overview



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

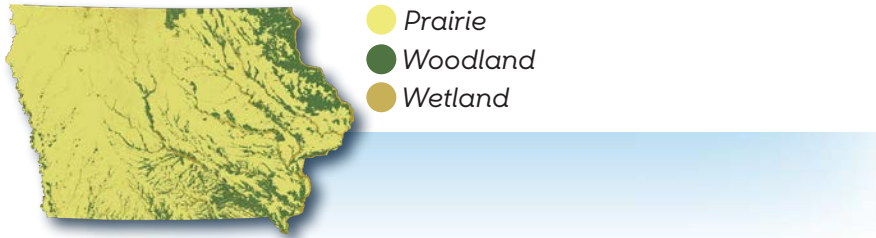
- The development of transportation systems and community land use over time
- How surface water and topography affect where communities and transportation systems develop
- The impact of groundwater (when present) on transportation and land use
- Benefits of trees and other vegetation and how trees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

Corydon is the county seat of Wayne County in Southern Iowa and is home to just over 1,500 people. It is located at the intersection of Highways 2 and Highway 14, which connect it to Centerville to the east, Leon to the west, and Osceola to the north. Corydon is in the Southern Iowa Drift Plain, which is characterized by low, rolling hills; fertile loess soil; and greater woodland density along slopes and streams.

The community was established in 1851 soon after its platting. The founders couldn't decide on a name, so agreed to play a game of poker, with the winner earning the naming rights. Judge Seth Anderson, the winner, named the town for his hometown of Corydon, Indiana.

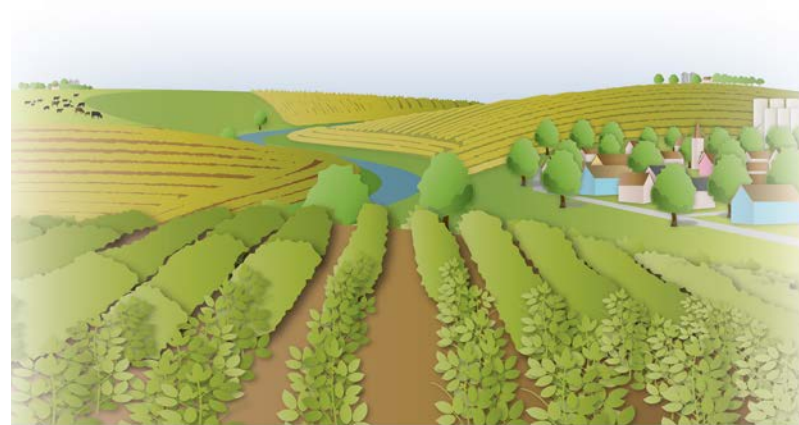
The Burlington Railroad was built through Corydon in 1879. During a public meeting regarding the railroad's arrival, Jesse James robbed the Ocochock Bank with no resistance. Later, in 1911, the Rock Island Railroad connected the town with Kansas City. The Burlington Railroad connections to Corydon would be abandoned in the late 1950s through 1980s.

# Land Cover Changes Over Time



**Historical 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.



**19th Century 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



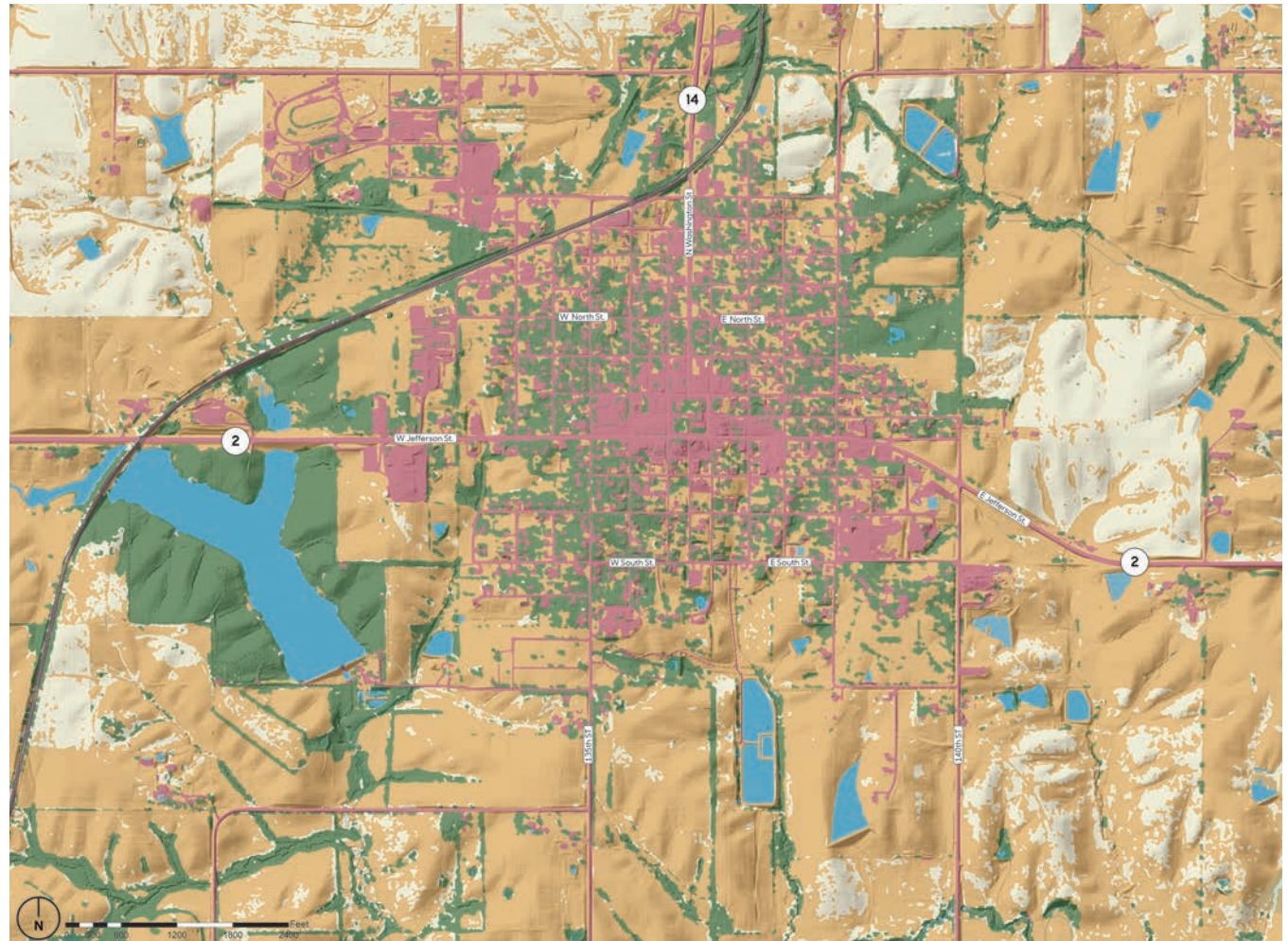
## Agricultural Land



## Grassland/Lawn



## Tree Canopy



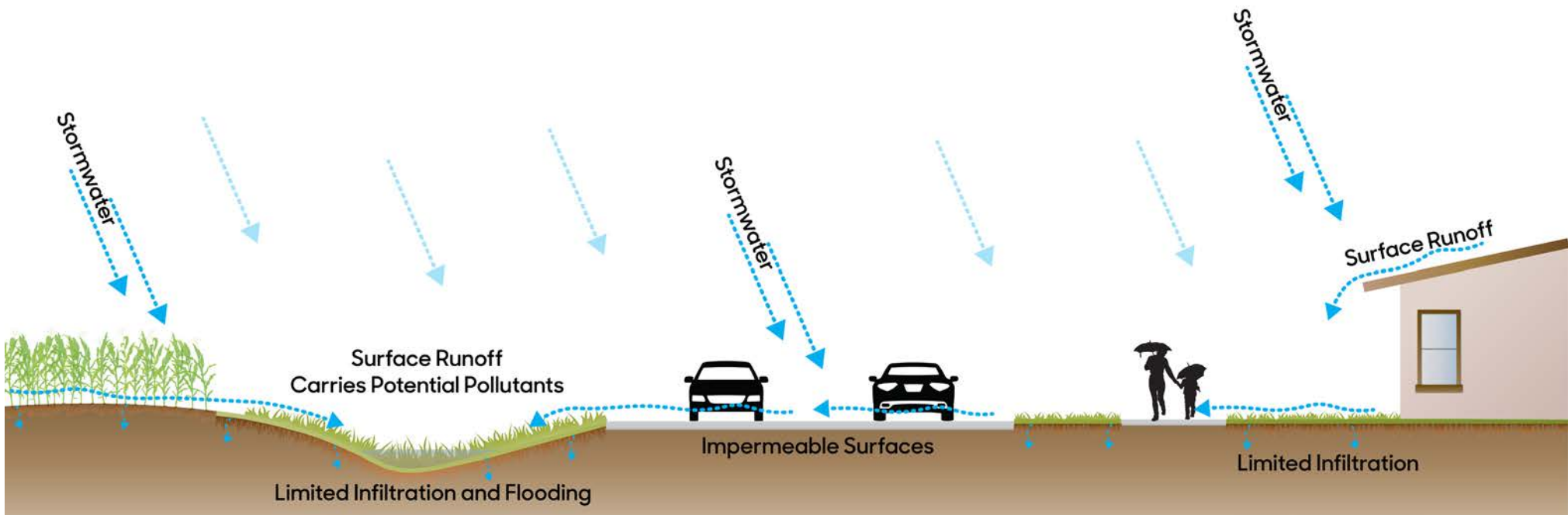
The land cover in most of Iowa's small towns today is a mix of residential lawns or neighborhood spaces dotted by trees. Streets and parking are paved and are sometimes flanked by sidewalks. Commercial and industrial zones are typically dominated by impervious surfaces.

Historically, the land surrounding Corydon was a vast prairie in the Loess Flats and Till Plains ecoregion within the Southern Iowa Drift Plain. As settlement increased, the prairie was converted to agriculture—namely hayfields—evidenced by the large amount of grass present today. Hay cultivation would have been easier to manage than traditional row cropping because of the hills, protruding stream fingers, and susceptibility to erosion.



## 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.



# Groundwater Concerns

The depth to the water table refers to the distance from the surface that groundwater fully saturates soil. In places with a high water table (zero or only a few feet below the surface), groundwater can well up and cause localized flooding. Rivers and natural lakes are generally areas where the water table is above the ground. These rivers and lakes receive most of their water from groundwater with some surface-water runoff from rain or snowmelt. This is why rivers can still be seen even if it hasn't rained in a while.

High water tables can have effects beyond just surface pooling, such as in the case of "frost boils." Frost boils result from groundwater freezing during winter and forming bubbles of ice called "ice lenses" that expand and push up from the ground. When the ice thaws, the frost boils collapse, leaving a divot in the surface. With certain kinds of flexible pavement, such as asphalt or gravel, these frost boils form potholes.



Diagram of the effects of a high water table on foundations and basements.

High groundwater tables can also have detrimental effects on one's home. Houses with basements surrounded by a high water table develop cracks or damaged walls due to water pressure. Typically a tile drain mitigates some of these effects, but wet foundations can require "dewatering," which can be expensive. Developing landscapes with high water tables requires more expensive maintenance, construction, and paving. Creating public spaces or parks in these areas makes good sense.

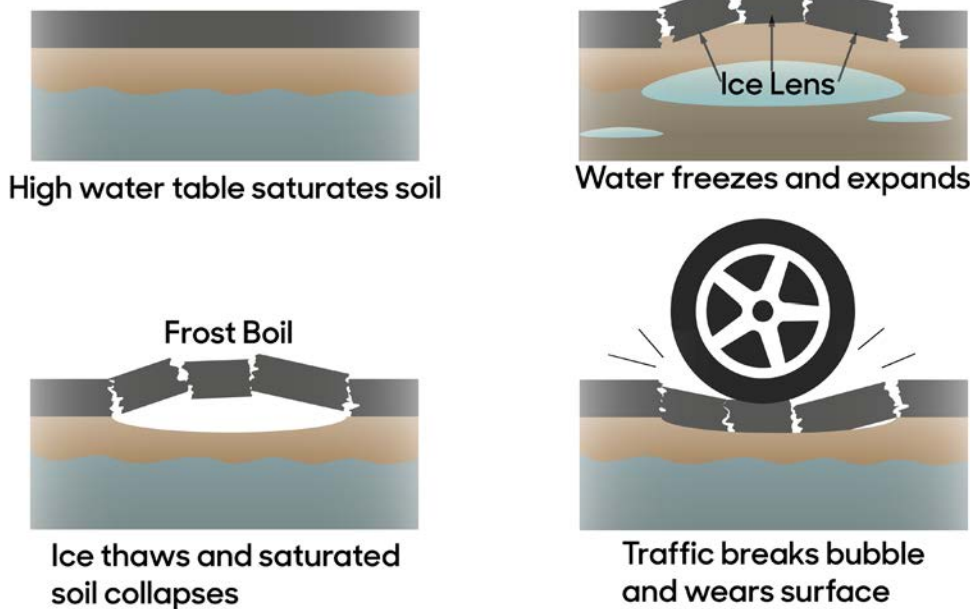
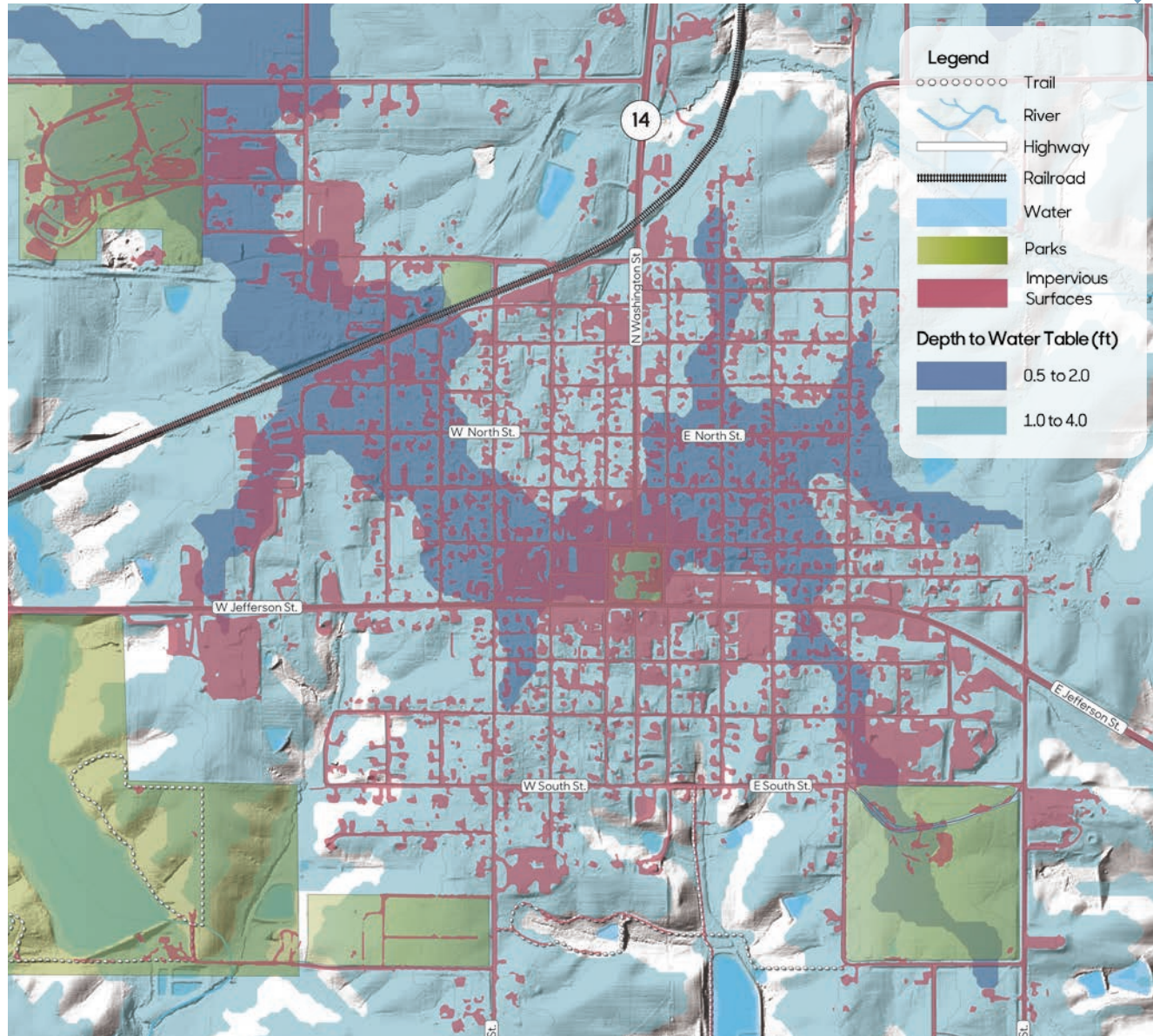


Diagram of the process by which frost boils affect roadways.

## Example Community



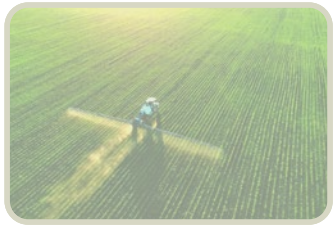
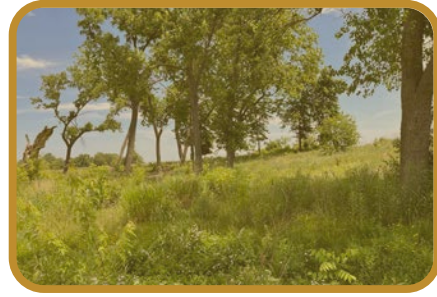
Emmetsburg's high water table has caused repeated damage on streets and even parking lots. The highway shows signs of continual repairs.



Groundwater and impervious surface map of Corydon, IA  
Nearly all of Corydon has a high water table. The highest water tables (0.5–2.0 ft) form a band from the northwest portion of the community through the center of town.

Looking at your town map, are there areas where the high water table and impervious surfaces overlap? Next time you are in this part of town, note local pavement conditions. Do you see signs of cracks or buckling? Has the surface been patched multiple times?

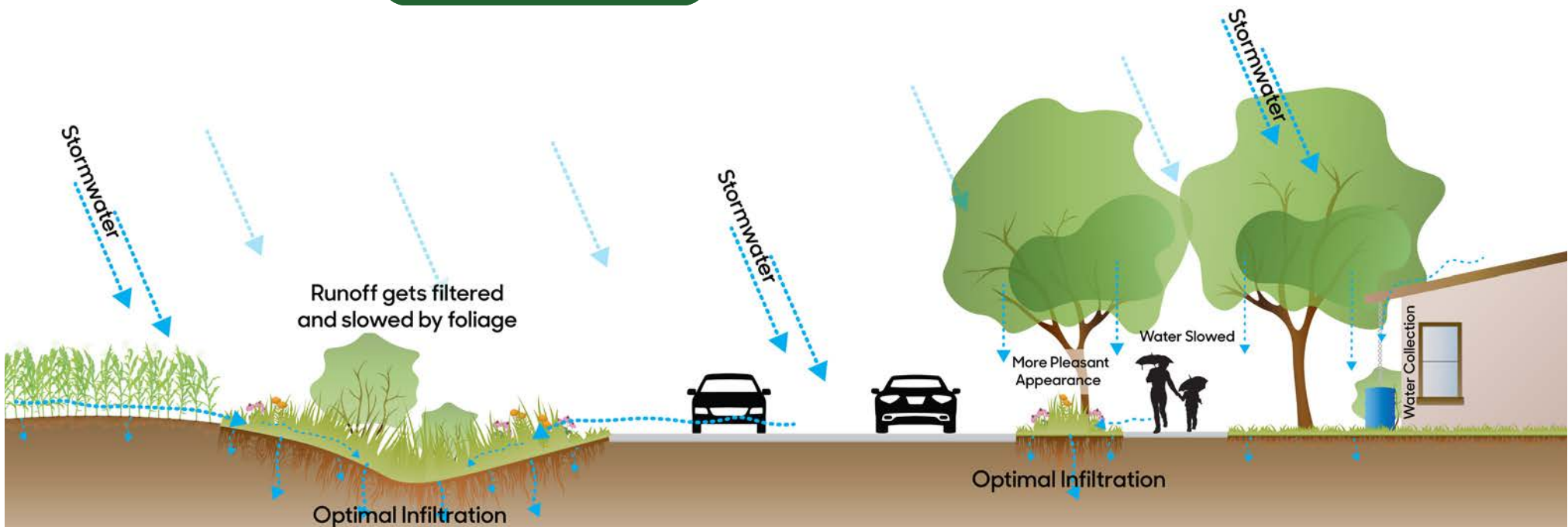
# Vegetation Benefits



## 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. They 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.



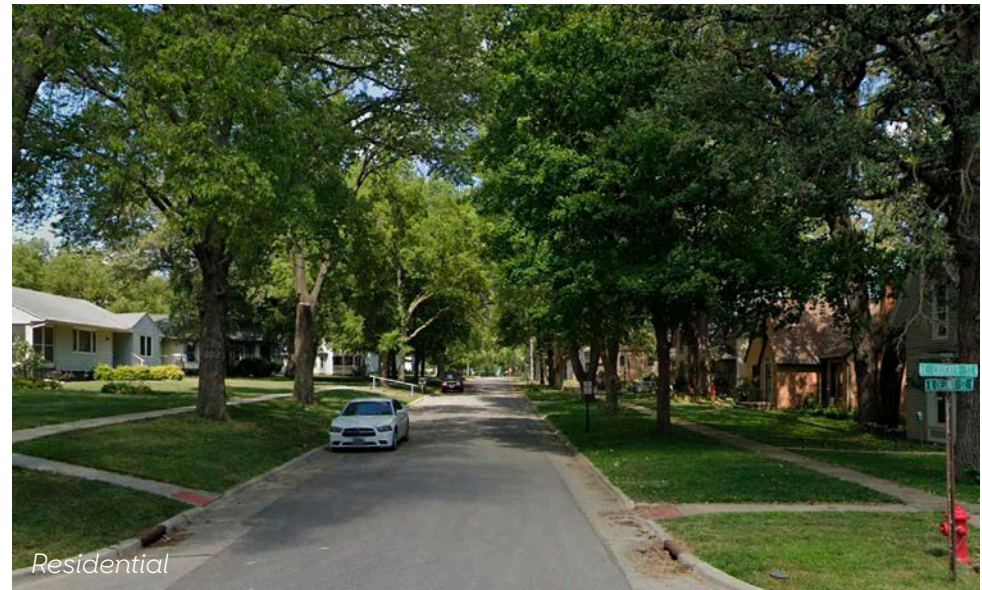




## Example Streetscapes with Minimal Vegetation



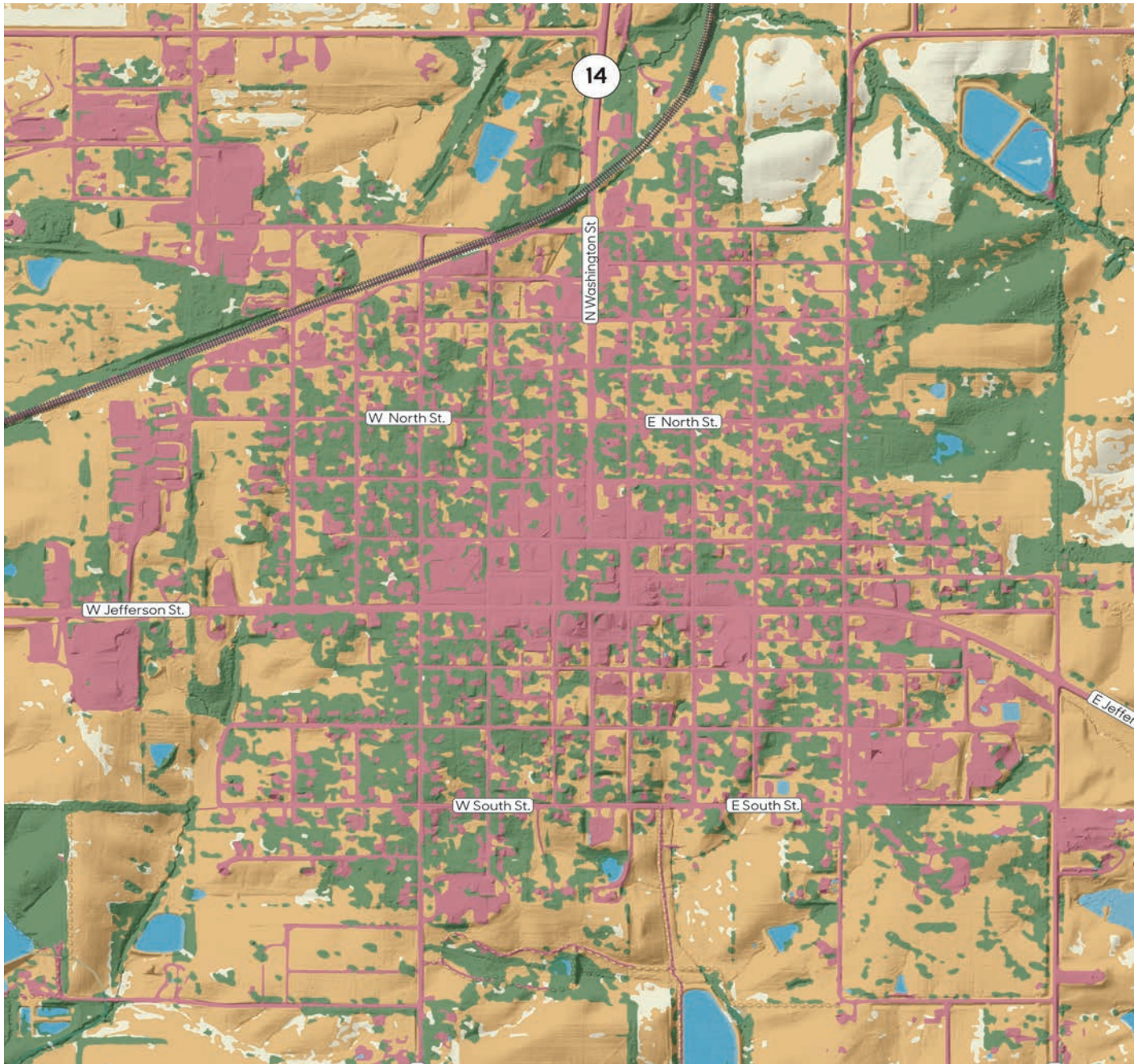
## Example of Vegetated Streetscapes



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 Corydon, IA  
 Downtown Corydon is marked by a high quantity of impervious surfaces, with the central square forming an island of canopy cover. Residential areas outside of downtown have much more canopy cover.

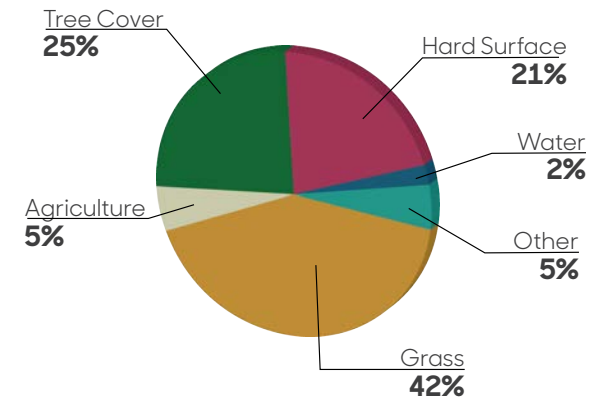
Looking at the heart of your community, does your downtown core have trees?

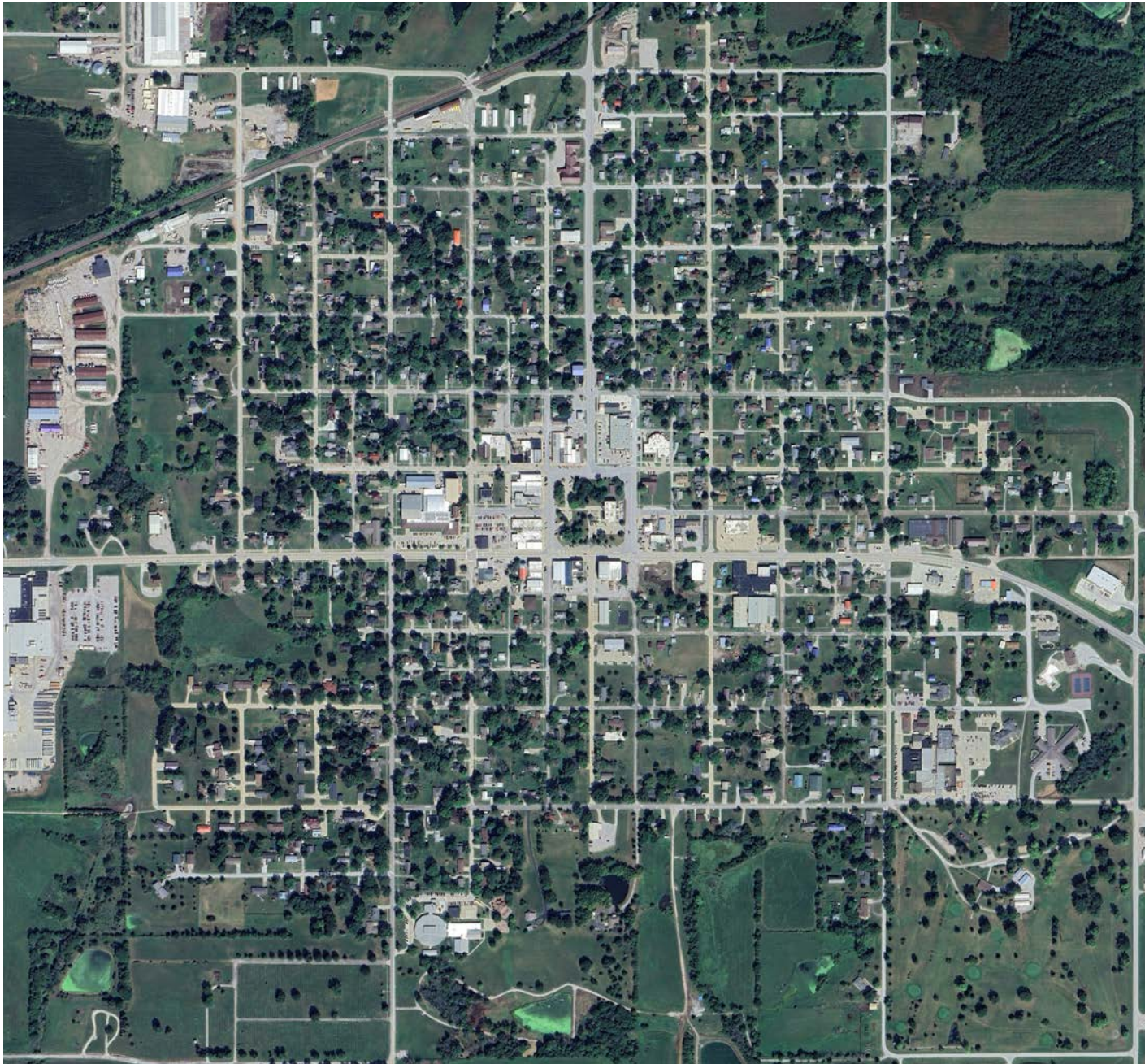
How does this change as you move from the downtown into residential areas of town?

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

How do you think visitors see this space?

## Land Cover





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?

*Aerial photograph of Corydon, IA*

*A large number of roads and lawns in the residential parts of town and downtown—especially on the eastern side—have relatively little tree cover, which can make those areas excessively hot and uncomfortable.*

# 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, managing water will have a greater effect on neighboring communities downstream.

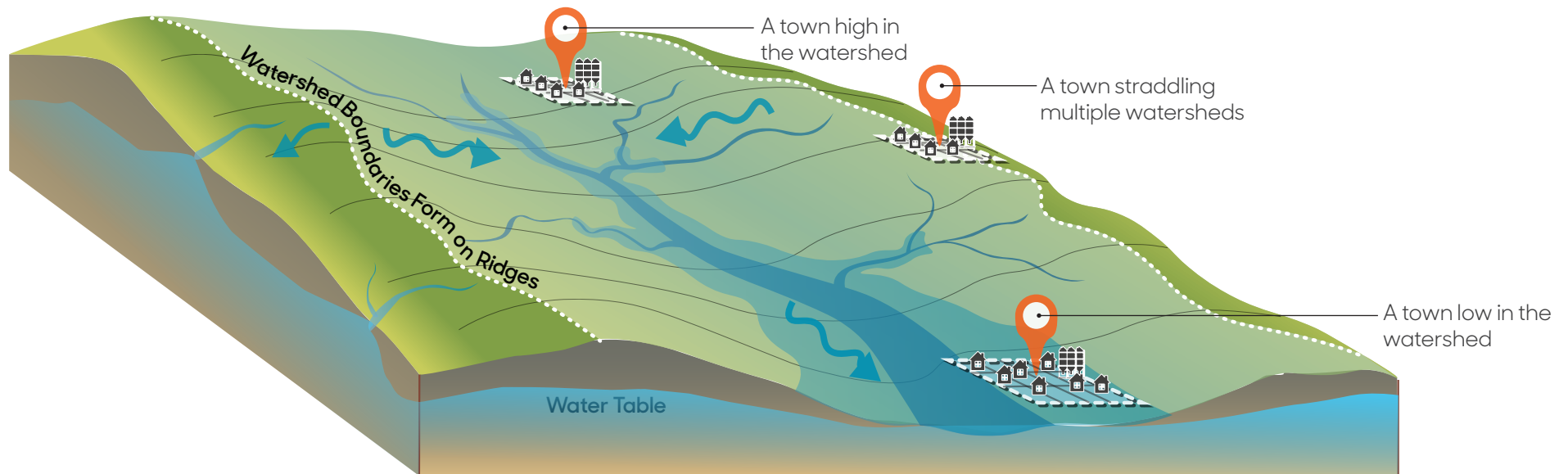
The map on the following page highlights your community within its surrounding watershed(s).

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.*



### Legend

-  River
-  Railroad
-  Scenic Byway
-  Highway
-  City Limits
-  Water
-  Watershed
-  Watershed Flow

Watershed map of Corydon, IA  
 Corydon sits at the north edge of, though still fully within, the West Jackson Creek Watershed, which flows northeast toward the Chariton River.

# Settlement Patterns

The elevation and flow map 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.

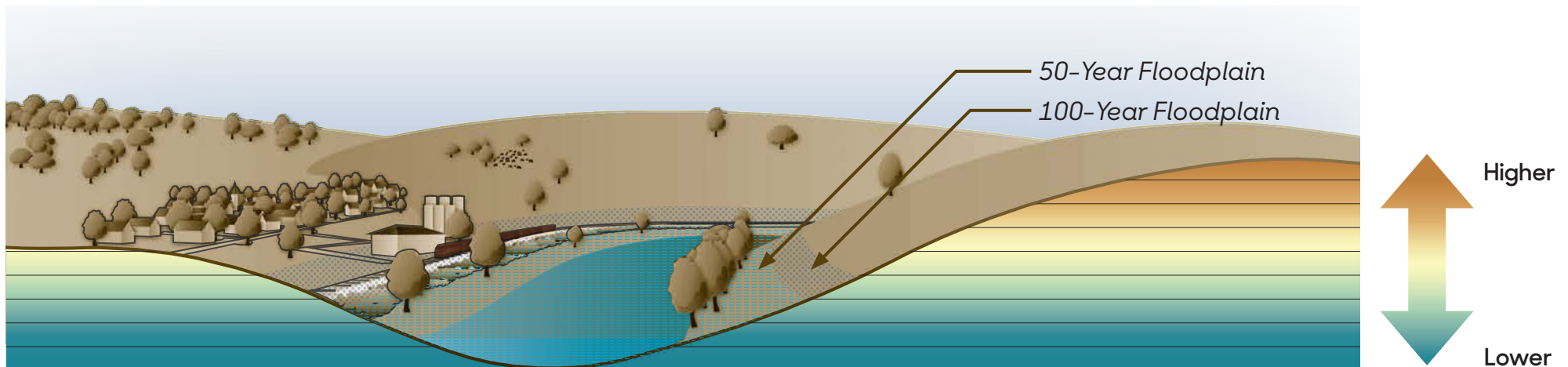
Unlike many Iowa towns that were established concurrently with the railroads, Corydon did not have a railroad constructed through town until nearly 30 years after its settlement. Getting to Corydon from Alexandria, MO, necessitated finding ways to cross the rolling hills of the region. Contrary to typical methods of following corridors, the railroads opted to construct levees and bridges across the rivers to navigate across the relatively level hilltops.

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?

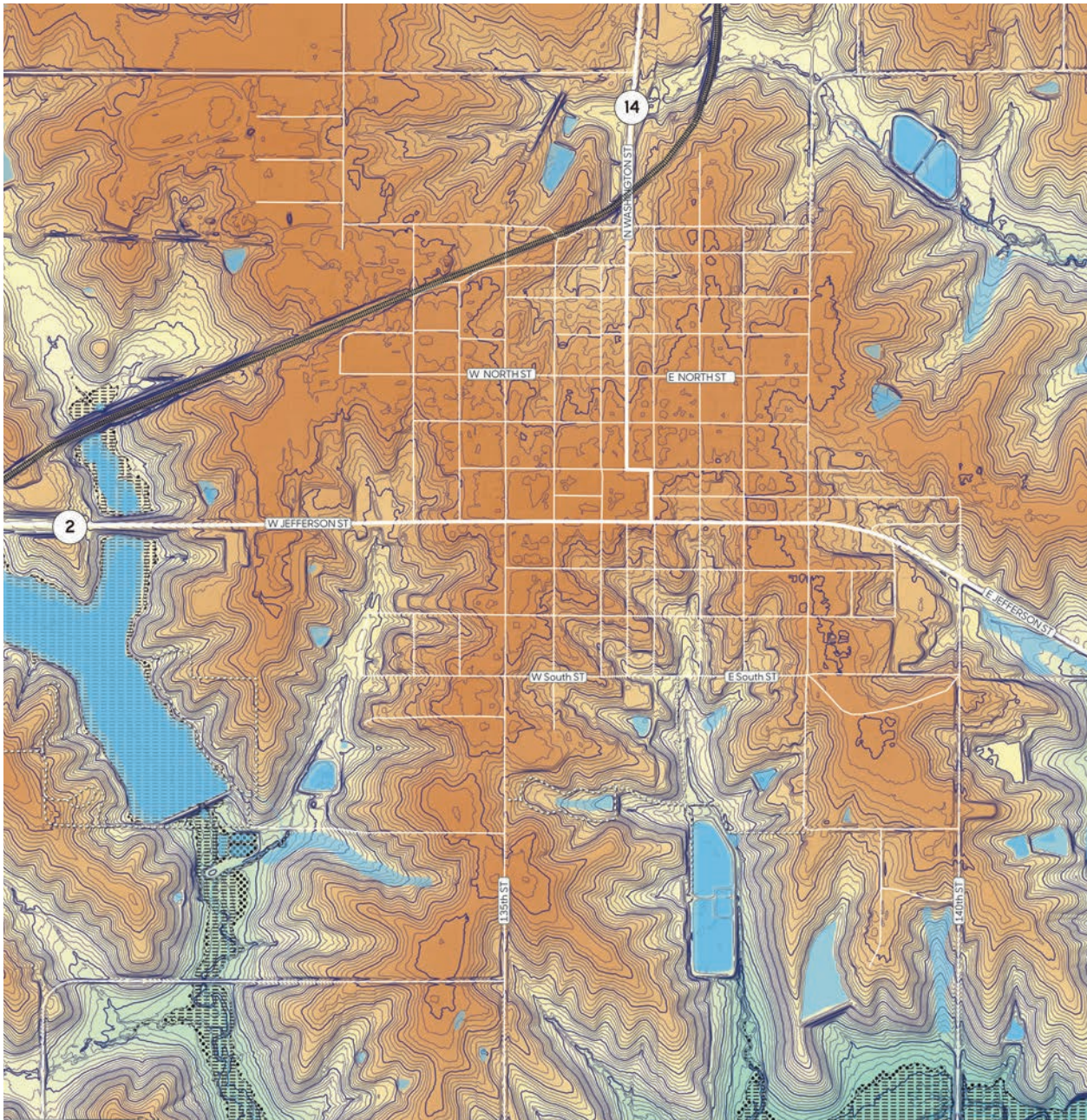
Which parts of the community are low or high in the landscape?

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
-  Water
-  2ft Contours
-  100 -Year Flood
-  500 -Year Flood
-  Higher Elevation  
↓  
Lower Elevation

Elevation and flow map of Corydon, IA

Corydon is situated at the top of a hill outside of the floodplains of the nearby West Jackson Creek and its tributaries. The remnant railroad levees can still be seen just north of Corydon Lake and north of town and west of Highway 14.