"Bringing the Parks to the People"

Park Proposal for the Village of Kronenwetter

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Executive Summary

Starting this project we aimed to know more about the Village of Kronenwetter. We wanted to know what pre-existing parks they had, the communities they served, and how the general population of Kronenwetter felt about the existing parks. To

see what they already had established, we referenced the outdoor recreation plan.

From the park plans we were able to determine that the Village of Kronenwetter did not have a park solely designated for nature immersion.

After meeting with Kronenwetter officials we were tasked with creating a park that is connective; they stressed the desire to connect with the preexisting bike paths, and that they had an end goal of eventually connecting Kronenwetter to Marathon County's trail system as a whole. It was stressed that they wanted to keep trails out of flood zones, and out of the wetlands. In addition they wanted facilities and parking requirements. One of the last requirements they wanted fulfilled is they wanted the park to be eligible for Knowles-Nelson Stewardship Grant.

Taking a closer examination of the Knowles-Nelson Stewardship Grant for the Recreational Trails Program we found that to be eligible for this grant we must fulfill the following requirements:

1. Maintenance and restoration of existing trails;
2. Development and rehabilitation of trailside and trailhead facilities and trail linkages;
3. Construction of new trails (with certain restrictions on federal lands*); and acquisition of easements and fee simple title to property for recreational trails or recreational trail corridors.

However, on top of all of these requirements there needs to be three types of trails present; non-motorized walking and biking trails, motorized ATV and snowmobile trails, and a diversified trail that can be used for walking, biking, ATV, and snowmobiling. We have successfully been able to create a non-motorized trail that fits into the grant requirements, but

looking at the outdoor recreational plans there are no plans for motorized, or diversified trails.

After validating what we needed to achieve the non-motorized trails standard of the grant we began to refine the ideas we had into clear and concise metrics. Our metrics for this project are:

- Making a scenic nature park in Kronenwetter Wisconsin
- Ability to connect the residents of Kronenwetter to nature
- In addition to the park we want to find and place a parking lot to make the park more accessible to those who want to bike, and walk in the scenic trails.
- Keeping the parking lots high and dry, outside of the flood zones.
- Placing trail heads as close to the parking lot as possible, making it intuitive to go from the parking lot to the trails.
- Adding bike repair stations, making this park appealing to those who bike.

With our metrics completed we were able to visit the village of Kronenwetter first hand; here we had the opportunity to look at the land we were working with. While walking on the existing trails, we discovered spots that were well traveled for potential future trails, and further consulted a representative of Kronenwetter to hear more about what he wanted from these trails.

Image 1.1: This image shows the view from the northeast point of interest.

With this new information we were able to undertake the process of planning MACK park (acronym of the GeoDesigner names).

Study Area Representation

The study area of the project is confined within the borders of the Village of Kronenwetter; specifically in the boundaries of the village parcels available to work within. The combined village parcels available to work within amount to 55.56 Acres. The site-specific geography of these parcels determines the suitability of different amenities within the park. In the greater village scale it is important to consider where the site is in relation to residents, other parks, and existing infrastructure when determining where and what park amenities to recommend. We gathered data and assessed the site based on current time period status in order to evaluate characteristics of the site to ensure accuracy and relevancy in our design.

The Following is a List of Data Sources, Creation, and Description

- **Floodplain**
  - Data layers depicting location and extend of floodplains in project area.
  - Source: Proposed floodplain data ArcMap package from AECOM vendor
  - 100 Year, 500 Year Polygon features
- **Existing Path Locations**
  - Data layers: Location of existing trails, village easement paths, bike routes connecting to site area
  - Source: Existing trails mapped via GPS at onsite field study, Kronenwetter bike routes and easement path digitized from PDF on Kronenwetter's website, Wausau Area Bike Routes shapefile downloaded from Marathon County GIS Data website
  - Line
- **Elevation**
  - Data showing elevation of site area
  - Source: Digital Elevation Model (DEM) and Hillshade raster files downloaded from AGOL Living Atlas WiDNR
  - Raster cells
- **Existing Parcel Data**
  - Parcel data throughout Kronenwetter, Village boundary
  - Source: Marathon County GIS Data website
  - Polygons
- **Park Walking Distance**
  - Data showing park access points and proximity for residents living near site service area
  - Source: Digitized park access points to run Network Analysis Tool on to create 1/2 mile increment walking distance zones
  - Polygons
- **Water, Sewer, Electricity**
  - Data showing existing locations of these lines to help evaluate placement of facilities requiring proximity to

these infrastructure types
    - Source: Digitized from PDF's: Electrical lines from WPS, Watermain and Sewer lines of Kronenwetter Map created by Marathon Technical Services LLC Consulting Engineers
    - Line, point
- **Soils (Hydrologic Group)**
    - Data that shows the type of soils present in site area to determine infiltration rate
    - Source: Soil Survey Geographic Database (SSURGO) soil data raster files downloaded from website, clipped the data to site area
    - Polygon
- **Land Cover**
    - Distinguishing open areas from forested
    - Source: Digitize LC polygons based on aerial imagery of site area
    - Polygon
- **Proposed Additions**
    - Bike trails, hiking trails, parking lot, proposed trail amenities
    - Source: Conducted suitability analyses and digitized findings
    - Line, polygon, point
- **Existing Park Amenities**
    - Existing trails, wellhouses, points of interest
    - Source: field visit, remote sensing digitizing
    - Line, polygon, point

Processes in the Study Area

Having talked about the scope of the study area as well as the goals, we made a trip out to the site in question to conduct our scoping. We brought GPS devices to keep track of notable features that were already on the site. The main things we found included existing walking paths, wildlife trails, tree-

stands, areas with particularly good vistas and well-established entry points to the park. After gathering the data, we compiled it to show important aspects of the existing state of the park. Using the data we gathered from our site visit as well as from the county, we were able to synthesize layers and created the following maps:

- Floodplain
- Soil Composition
- Elevation Data
- Existing Bike and Pedestrian Trails

As seen in the map, the portion of the floodplain which is most likely to flood covers up to the northern edge of the wetland, leaving most of the southern area in the park prone to flooding. Then further into the park, you see the 100-year floodplain covering most of the open area in the northern section but leaving most of the wooded section to the east

untouched. This is also seen with the 500-year floodplain however this projection covers more area to the northeast side of the park.

Map 1.1

This map displays soil hydrologic group data provided by the Soil Survey Geographic Database (SSURGO). Hydrologic group designations are used to represent infiltration rates following rain events. The soil data from within the study area falls within three classes.

- Group A
  - Soils composed of deep, well drained sands with high infiltration and low runoff.
- Group A/D
  - Soils with slow infiltration due to high water table, but fast infiltration and low runoff rates if drained.
- Group B/D

- Soils with slow infiltration due to high water table, but moderate infiltration and runoff rates if drained.
-

Map 1.2

There is little to no change in the park area. The most noticeable elevation changes can be seen in the south side as well as the east side. The south side sees a large drop in elevation due to the wetland and then just past the village's land it starts to rise uphill. Then to the east there is a small drop off towards the road. This small drop does not seem to influence the operating condition of the park. However, the wetland depression has helped to shape some of the existing trails in the area.

Map 1.3

The area already has characteristics of a functioning park. There are seven total entry points into the area that are used. Of six of these points, you can find clear paths around the area that people have been using as trails. These trails go down the access road, through open fields and through wooded areas. Upon further inspection, wildlife trails were found littered throughout the wooded area and the edges of the open area. While exploring the wildlife trails, we also came across multiple scenic vistas that give a nice display of certain areas of the park. In the southeastern wooded area two standing tree stands were found.

Map 1.4

This photo was taken during our second field visit to the study area.

It clearly shows a trail that has been used by both people and wildlife.

Picture 1.1

This map displays the existing bike trail network throughout both Kronenwetter (Light Orange) and Marathon County (Dark Orange). As shown, there are multiple paths that pass by the park parcels, but the park is not efficiently utilized.

Integrating this space into the greater bike trail system is a goal specified by Kronenwetter Village representatives.

Map 1.5

Using these maps to evaluate the area we are working with allows us to have a good overview of the study area and what it all contains. The standing condition of the park paired with the models we made granted us the ability to create maps showing the best suitable areas for improvements to be made within the park.

Suitability Evaluations

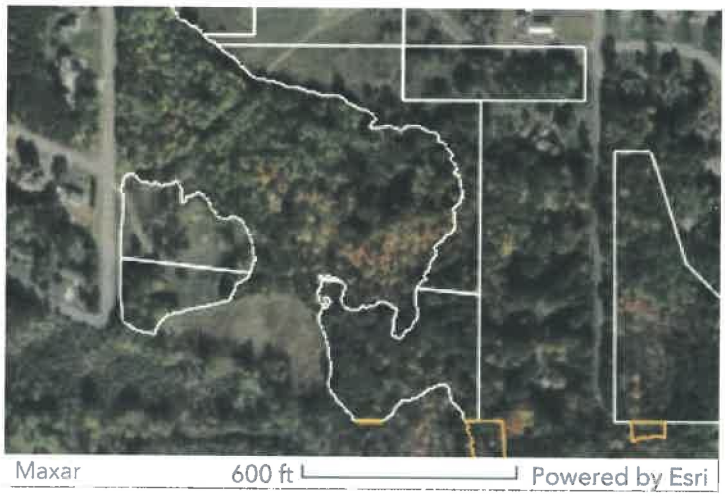
Parking Lot Suitability

In order to effectively assess the suitability of the landscape for a parking lot, we needed to determine which factors should be considered. The factors that proved to be important are as follows:

- Flooding Status
- Soil Type (Hydrologic Class)
- Open Areas vs. Forest Cover
- Proximity to Roads

- Proximity Neighboring Parcels

With criteria established, we were able to assess the site's suitability. First, we removed all areas within the floodplain (100 and 500 year).



Map 2.1: This map shows the process of floodplain erasure from the parcels.

Then, we assessed soil type, targeting well-drained soils.

Map 2.2: This map displays the soil hydrologic information as it relates to the floodplain.

This map shows that all of the soils outside of the floodplain are SSURGO Hydrologic Group A, which defines soils categorized by deep, well drained sands or gravelly sands. These soils observe high rates of infiltration and low runoff rates.

With no areas eliminated due to soil hydrologic class, we moved to open areas vs. forested cover. Ideally, a parking lot would be built within an area that is already open. Using our information discovered during field visits, partnered with remote sensing techniques, we were able to digitize the open areas within the parcels. We performed a union, joining the open area polygons to the site parcels with the floodplain removed.

Map 2.3: This map depicts floodplain (red) and open areas (green) within the proposed park boundaries.

Next, we created buffers to identify proximities to the neighboring residential parcels and to the road system. According to the, "American Trails," webpage, trail systems should be at least 100 feet from adjacent properties for privacy reasons. We applied the same logic to the parking lot criteria, creating a 100 foot buffer from neighbor property lines. As GeoDesigners, we decided that our ideal parking lot would be located between 50 and 100 feet off of the road. We wanted the lot to be off of the road, but not too far into the property that it would disrupt the natural processes. We conducted another union, combining the two buffers into the site parcel with open areas and excluding the floodplain.

Map 2.4: This map displays the 100 feet neighboring parcel buffer (blue) and the 50-100 feet range road buffer (green) as they occur within the study area.

With all of our criteria integrated within the feature layer, we needed to create a system for evaluating each polygon. With flooded areas eliminated and soil hydrologic class becoming an irrelevant evaluation criterion, the evaluation would occur for the open areas, proximity to residential parcels, and road proximity.

Areas within an open area were rated with a 1, while non-open areas received a 0. Areas within the 100 feet neighbor buffer were rated a 0 and all outside were rated with a 1. Areas within the 50-100 feet buffer were rated a 1 and all outside were rated a 0. After the ratings, a data field was created within the final layer, serving as a sum of all ideal factors. Polygons that fulfilled all three factors were rated a 3, which is considered highly suitable. If a polygon had 2 ideal factors, it is considered moderately suitable, and 1 factor is marginally suitable. If a polygon does not fulfill any of the three requirements, it is considered not suitable.

Map 2.5: This map shows the final parking lot suitability.

The results of this analysis identified one location as highly suitable for a parking lot. This location would be used to create alternative suitabilities, such as trail suitability and amenity suitability.

Trail Suitability

With the parking lot location established, we were able to focus our energy on trail placement. As a group, the criteria we decided on for trail placement is as follows:

- Must Begin and End at Trailhead (No Dead Ends)
- Must Connect Points of Interest
- Must Not Be in Floodplain
- Must Avoid Wetland + Well Houses
- Must Not Occur within 100 Feet of Adjacent Property Boundary

With this criteria established, we were able to narrow down the study area.

Shrinking the study area and adding the points of interest gave us a rough idea of what a trail system might look like.

According to the aforementioned, "American Trails," website, trails should not veer directly past scenic areas, but should be within 50-100 feet and have a perpendicular trail branch approach the site. In order to visualize this, we created a buffer which made a ring between 50 and 100 feet from each point. We decided to add the 100 and 500 year floodplain layers to help steer the trails away from potential wet areas.

3.1: This map displays the areas to avoid within the park parcels, floodplain data, and points of interest with buffers.

The final trail design managed to connect the parking lot to all scenic areas, while minimizing distance within the floodplain and maximizing distance outside. This process is as follows:

Maxar 200 ft Powered by Esri Maxar 200 ft Powered by Esri

Map 3.2: This feature displays the floodplain, areas of interest and possible trail extent within the parcels (left) and the trail design within the floodplain and areas of interest (right).

Ultimately, the final design is as follows:

Map 3.3: This map displays the final trail design within the study area.

Trail Amenities

The final suitability analysis that needed to be conducted was for park amenities. The important criteria for trail amenity placement is as follows:

- Near Trail Path (Within 15 Feet)
- Near Trailhead
- Equally Spaced
- Preferably in Open Areas (But Not Required)
- Near Points of Interest

For trail amenities, the most important factor is trail proximity. Amenities should not be more than 15 feet off of the trail. Trailheads serve as excellent checkpoints along a hiking, biking, or walking trail. Generally, appropriate trailhead amenities include signage, informational stations, restrooms, drinking fountains, bike racks, bike repair stations, and garbage receptacles. Ideally, park amenities should be equally spaced along the trail. Our GeoDesign team decided on 200 yard spacing, with a buffer of 50 feet in either direction. Certain park amenities such as tables and structures should be located in open areas rather than in forested land cover. Throughout the proposed park, we identified three points of interest during field visits that would end up taking priority.

To conduct the suitability analysis, we created a 15 foot buffer along the proposed trails, a 15 foot buffer around points of interest, a 50 foot buffer around equidistant points (every 200 Yards) along the trail, a 30 foot buffer around trailheads, and used the already digitized open area polygons. We joined each buffer to the parcel boundary and then filled in attributes for each polygon. The preliminary analysis is displayed below:

Map 4.1: This map shows all of the criteria buffers as they occur within the study area.

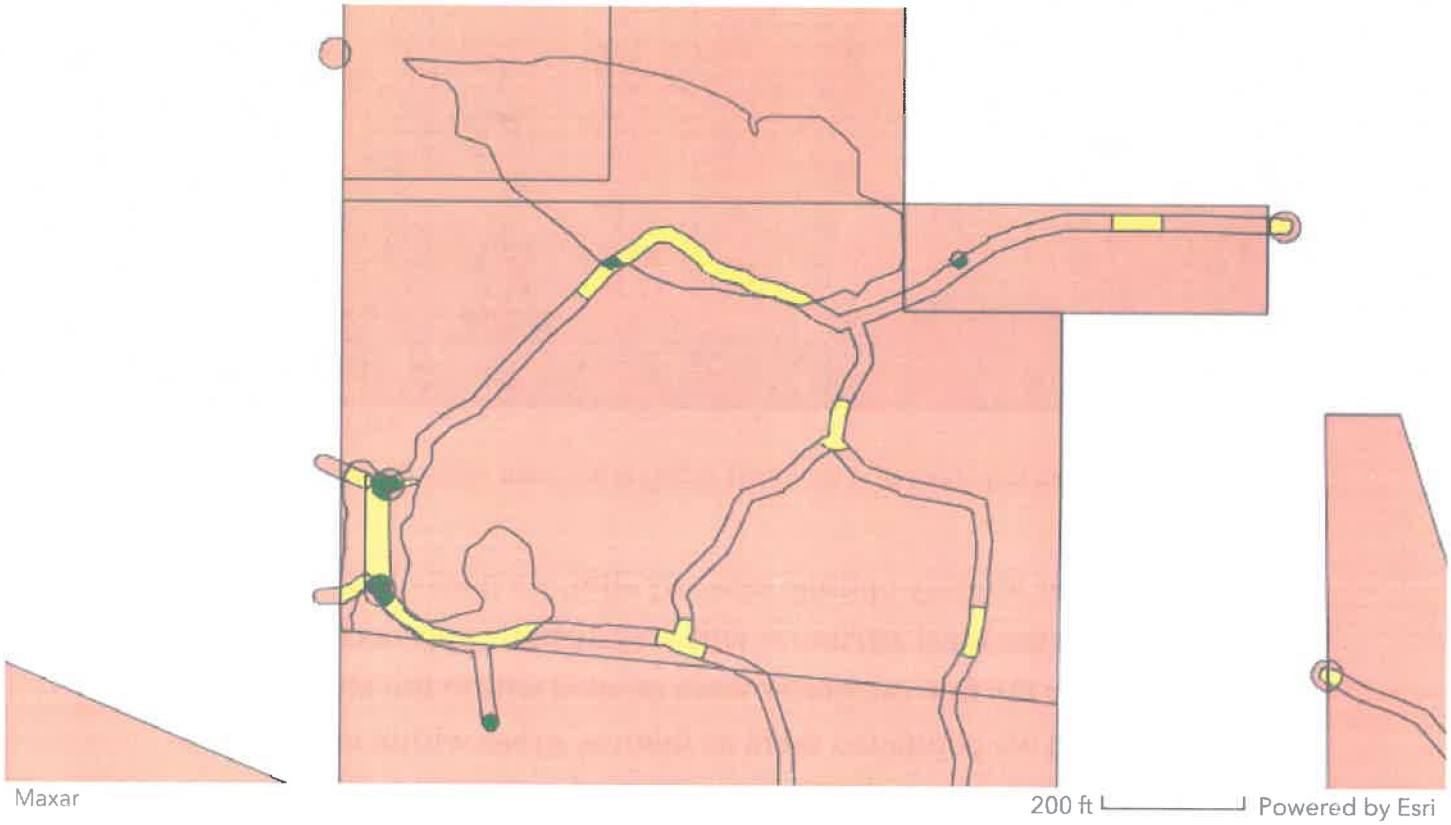
To further identify optimal amenity sites, we needed to populate the ideal attributes with a systematic approach. Fields for the five categories were created within the attribute table and we populated them as follows. Areas within an open area were designated with a 1 and all other areas a 0. Areas within 15 feet of the trail were assigned a 1 and all other areas a 0. Areas near the points of interest were assigned a 2, weighted for their importance, and all other areas a 0. Areas within the equidistant range were given a 1 and all other areas a 0. Lastly, areas near the trailhead were given a 1 and all other areas a 0.

Without a mathematical sum of each characteristic, the analysis was incomplete. A suitability sum field was created and we created an equation based on the importance of the criteria. The equation is as follows:

Suitability Sum = Trail Proximity × (Open Area + Point of Interest Proximity + Equidistant Sections + Trailhead

Proximity)

By multiplying the sum of the characteristics by the trail proximity, all areas outside of the 15 foot trail buffer were deemed not suitable. The results of the analysis are shown below:



Map 4.2: This map depicts the results of the trail amenities suitability model described above.

Proposed Changes and Impacts

Below is a map with all of the proposed changes integrated. Park Amenity Points can be seen throughout the area. Recommendations for the three amenity types listed, Mid-Trail, Point of Interest, and Trailhead are as follows.

- **Mid-Trail**
  - Benches
  - Informational Signage
  - Tables (If in Open Area)
- **Point of Interest**

- Benches
- Informational Signage
- Tables
- Railing to Block Off Hazards (if applicable)

- **Trailheads**
  - Signage
  - Informational Kiosks
  - Bike Racks + Repair Stations
  - Trash Receptacles
- **Trailheads (In Parking Lot)**
  - Informational Kiosks
  - Restrooms + Water Facilities
  - Bike Racks + Repair Stations
  - Seating
  - Trash Receptacles
  - Signage

Map 5.1: This map depicts the proposed changes to the study area. These changes include a parking lot, trails, trail amenities, bike trail additions, and buildings.

Dashboard 1.1: This dashboard displays the parcel count within half-mile increments of the proposed park.

This dashboard is representative of walking distance from residential parcels to our parks in .5-mile increments. We wanted to be able to look at how many residents are within 1.5 miles of MACK park. This shows how many households will potentially be impacted by the creation and addition of the park.

The main impact to the residents of Kronenwetter would be an increased amount of traffic to the park. The other important impact will be that residents will now have access to a unique park that they will be able to use for generations.

Changes Being Made to the Existing Park

We want to be able to change the existing trail system so that they are more accessible to the current population.

With our change models we want to add a parking lot to get more people to be able to drive here so that people outside of Kronenwetter are able to come into the park.

We want to add facilities for people to use in the park to accommodate guests. The main facilities we are looking to add

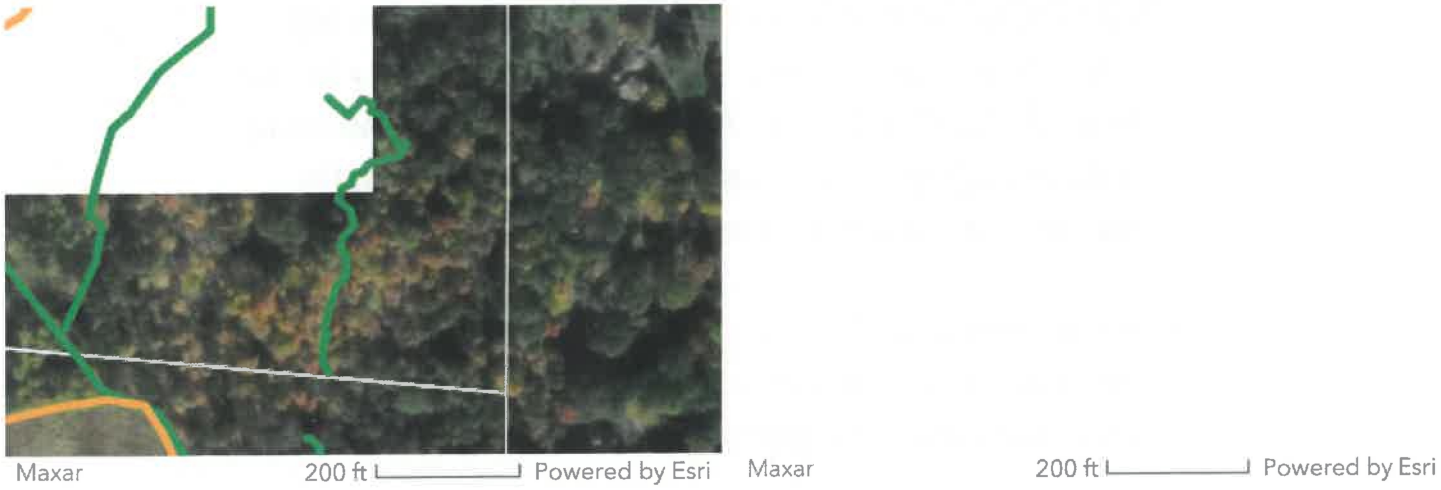
are bike repair stations and restrooms. The addition of a bike repair station makes it a more attractive park for bikers to come to since they know they will be able to fix their bike along the trails. This will add more connectivity from the village to the county.

We want to add a structure; a hard shelter would be the most ideal so that there could be picnic tables to allow for the park guests to spend more time enjoying nature.

There are several points throughout the map that we deemed to be a great fit for nature viewing. At these spots we have decided to add amenities such as benches so people are able to sit and enjoy the views for as long as they possibly can.

We designed a nature-based park since Kronenwetter does not currently have any parks that are purely nature-based.

Changes and Impacts for Trails



Map 5.2: This map displays the changes between current and proposed trails.

We propose that the main (bike) trail is made up of crushed stone. Crushed stone has a lot of positive impacts, it is great for drainage. It is ADA accessible, and it is easy to bike on due to the large size of the stone being able to bear more weight without slipping or rolling.

- The pricing for crushed rock on the bike trail would be approximately $16,622*. This number was calculated using the assumption that the trail will be 6" deep and 10' wide. The depth is to ensure that the trail will stay in place with minimal maintenance. It will also allow for the rocks to be more sturdy and stable for those who are biking across them.

- The cost for the hiking trails it would be approximately $6,307*. This trail would be 6" deep and 6' wide. The reasoning for the depth is the same as stated above, the width makes it large enough that hikers can walk side by side comfortably. With the width we have decided on the trail is also plenty wide for bikers to be able to get on as well if they choose. Reducing the width would significantly reduce trail clearing costs and lessen the impact on existing ecosystems.

- The cost of creating the scenic access trails would be approximately $264*. The scenic accesses serve to direct hikers to the more aesthetic areas of the park. These trails will be 3' wide and 6" deep. We made the decision of having them be 3' so that they are ADA complaint while also being small enough that it encourages few visitors to be in the area at a time to preserve the natural beauty.

- The greatest impact of this project is the overall cost. Using our price estimations, the combined hiking, scenic, and bike trails would cost approximately $23,193*.

One alternative to these options is using crushed granite on the bike trail and mulch for hiking and scenic access trails. The prices for this alternative are as follows:

- Bike trail would remain $16,622*
- Mulched Hiking Trails that are 6' wide and 3" deep would cost $3,153*

- Mulched Scenic Access Trails that are 3' wide and 3" deep would cost about $176*
- Total = $19,951*

One drawback on this alternative is the mulch would be very erodible during high water events. It would also significantly limit the bike-ability and potentially limit visitors that are wheelchair-bound.

We want our trails to be very scenic, we would love for guests of our parks to have the opportunity to see local wildlife in their natural habitats. This does come with some impacts as well.

Wildlife might be drawn away from some areas if visitors who come are too loud, stray off of the trail, or if they try to touch or interact with the animals.

**Pricing may vary, these prices are based off of cost of crushed rock and mulch wholesale as well as cost of labor and might not be truly representative of the final cost. Cost was also calculated under the assumption that the village didn't previously have access to materials.*

Parking Lot Changes and Impacts

The addition of a parking lot is crucial to the success of the park. Based on the polygon deemed suitable by the analysis, it has the capacity to have 22 stalls that are 20'x10' and 12" deep with a driving lane, if a structure (bathroom or pavilion) is added within that area it will be able to contain less stalls accordingly.

- The cost of the parking lot will be $9,043*
  - Based off of 9,766 square feet (not including 830 square feet for potential restroom or structure site).

- The cost of the drive will be $1,173*

The parking lot and drive will be made of crushed stone. The depth of the crushed stone will be 12" deep for both the drive and parking lot. This is the recommended safe depth of a road according to the Wisconsin Transport Bulletin. This depth is so that cars can safely drive on it without losing grip, this also will help with drainage in the spring, and makes it so vehicles are less likely to slip in the winter.

**Pricing may vary, these prices are based off of cost of crushed rock wholesale as well as cost of labor and might not be truly representative of the final cost. Cost was also calculated under the assumption that the village didn't previously have access to materials.*

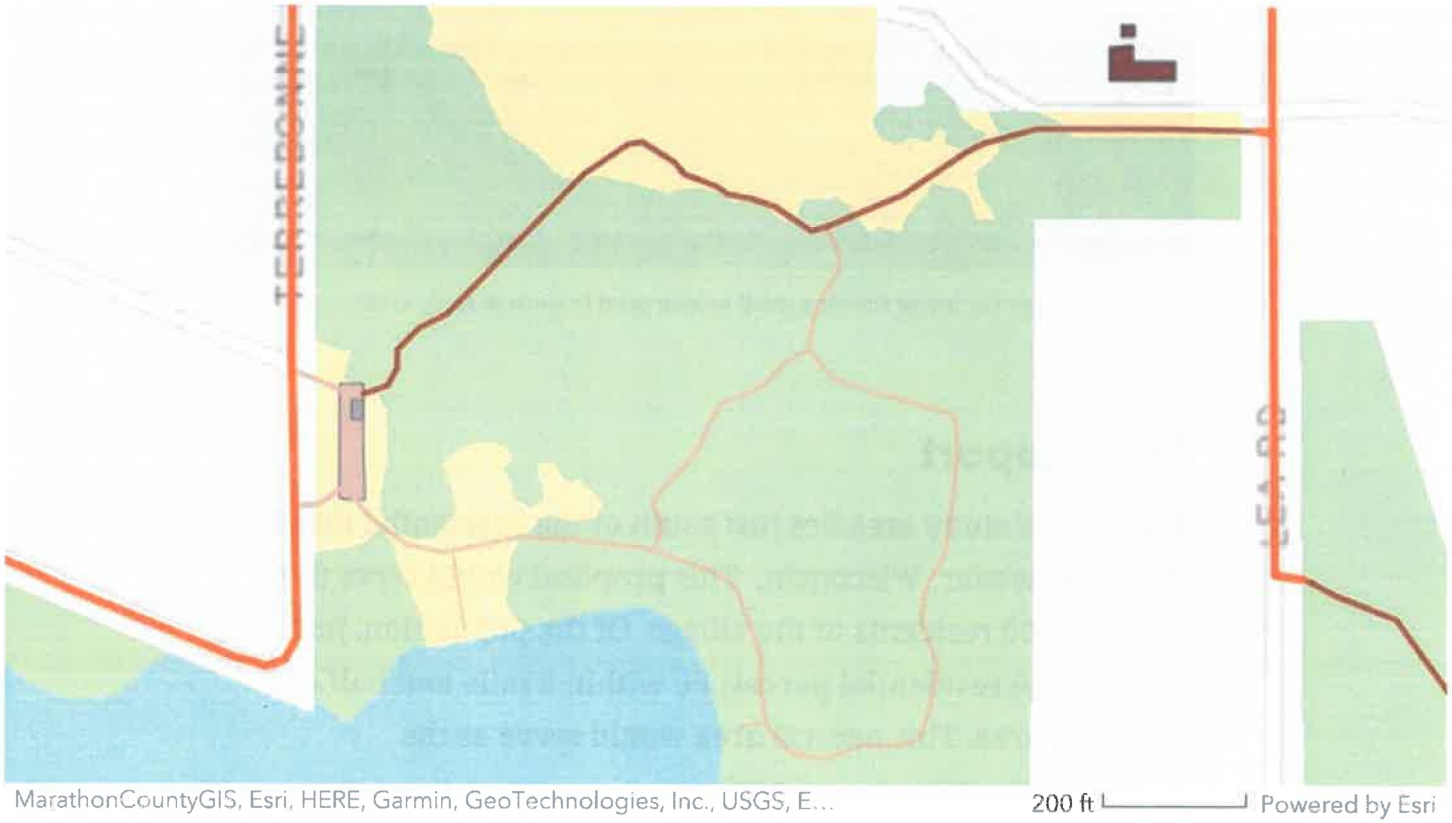
Image 1.3: Image showing small animal print in snow at study area.

Final Report

The 55 acre study area lies just south of the residential district of Kronenwetter, Wisconsin. This proposal would serve the almost 8,500 residents of the village. Of the population, just under 1,800 residential parcels lie within a mile and half of the study area. This natural area would serve as the community's only natural park.

A significant amount of the proposed park lies within the floodplain of Bull Junior Creek, which is a tributary of the Wisconsin River system. The areas outside of the floodplain observe sandy soils with high rates of infiltration and low rates of runoff, which are optimal for minimizing erosion. The park currently holds two well houses, with potential for a third in the near future. The area is already being used by residents, as there is one well-defined trail with a few other secondary trails used by both people and wildlife. The park is bordered on two sides by the existing bike trail network, with potential to provide a convenient link.

After running suitability analyses on parking lot, trail, and trail amenity placement, we were able to design a fully functional park that can be utilized by bikers, hikers, walkers, wildlife observers, and nature lovers. The linkage to the Kronenwetter and Marathon County bike system will prove to be a significant attraction for bringing people to the park.



Map 6.1: Final map showing all proposed changes within proposed park site.

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