ROWing Through Fall Creek

Baseline Analysis of The Mapleton Fall Creek Neighborhood

Environmental Practicum
Butler University Fall 2012

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I. Introduction

History of R.O.W.

Over the past decade, Indianapolis has joined a growing number of cities that have become more aware of the environment and its impact on the way people live. The Livability Challenge in 2010 jump-started Indianapolis on the path to improve many environmental aspects of the city, including its waterways. Due to old infrastructure, Indianapolis faces a major problem with its combined sewage outflow (CSO) system. Its design causes Indianapolis's CSO system to overflow into its water supply nearly every time it rains (Sabalow). While pollution on Earth has been increasing each year, public education about wildlife habitats, ecosystems and waterways has not (Worldometers). This lack of education has contributed to the general public not understanding where their water comes from. Indianapolis has effectively turned its back on the waterways. As a result, Indianapolis has created a problem that can wait no longer to be fixed. With no general understanding of watersheds, connectedness among Indianapolis's waterways or the importance of healthy water, how will the city successfully improve its water quality and quality of life for the citizens of Indianapolis? Indianapolis community members have modified the Livability Challenge previously in place and created the Reconnecting to Our Waterways initiative (R.O.W). The focus of R.O.W is not to just unveil the waterways that have been lost over the course of Indianapolis's growth as a city, but also to help the community reconnect to these waterways.

The R.O.W. initiative grew out of the Livability Challenge sponsored by CEOs for Cities. The Livability Challenge asked cities to provide "access to art, good design, and nature every day" (CEOs for Cities). One of the initiatives that came out of the Livability Challenge was to reconnect to the White River in Indianapolis. Around the same time as the Livability Challenge, the Indianapolis Museum of Art commissioned an installation called "Flow: Can You See the River?" by artist Mary Miss (Indianapolis Museum of Art). This art installation increased consciousness of the White River in Indianapolis and spurred multiple neighborhood efforts to improve the watersheds. Indianapolis was ready to give back to its waterways and R.O.W. was born. R.O.W. is a grassroots movement involving multiple partners throughout the city who are interested in revitalizing the river (R.O.W.). It is not simply focused on improving the water quality itself, but takes a holistic approach to improving the waterways in Indianapolis and making the city more livable by highlighting watershed health and natural beauty.

Project Overview

The main purpose of R.O.W. is to promote safety, well-being, beauty, connectivity, pride, and respect within our communities. Six elements were designed to accomplish this: Aesthetics, Connectivity, Ecology, Economics, Safety, and Well-Being. These elements were thought to be most beneficial to the community, both now and in the future. The class worked with three of these elements: Connectivity, Aesthetics, and Ecology. When it comes to connectivity, the goal is for the neighborhood to have better access to their waterways. The idea is in a 10 minute walk or 20 minute bike ride from anywhere in the community that will bring residents to the waterway and to different destination points. Some factors that could influence the resident's ability to do this are the existence of sidewalks and pedestrian lighting, all of which encompass what is called "Complete Streets". For the second element, aesthetics, the goal is to provide art, nature, and beauty every day for everyone. Right now, many neighborhoods do not have access to this. The last element, ecology, will deal with a wide variety of things. It is already known how polluted the waterways are and what negative effects Combined Sewage Overflows (CSO) have on them. However, there are other things we can do to improve the ecological conditions in the area. Tree planting, invasive species removal, water quality, and educating people about the waterways will all go into improving the ecology.

Problem Statement

In every neighborhood, residents are part of a large watershed. Watersheds are complex systems that every community within Indianapolis is connected to. The water from your house runs into a local river and that river ultimately runs off into larger bodies of water and ends in oceans. The Indianapolis watershed flows into the Mississippi River. However, one problem is that many residents do not know how watersheds work, nor how their individual actions can affect the water. R.O.W.'s goal is to help educate people about this and how they can help to improve their actions and behaviors to benefit the water.

The environmental practicum will investigate the three elements, providing input to the R.O.W. committee and ultimately leading to the development of metrics that allow for tracking progress towards the ultimate goals, which will also be set by the class. In addition, the members of the environmental practicum will give a unique perspective to the R.O.W. project, as young-adult community members are a large focus area for the project. The findings of the environmental practicum will be presented to the R.O.W. committee upon completion of the course.

The Reconnecting to Our Waterways initiative is focusing on six areas of the river: West Indianapolis & Near Westside, Mid-North & Fall Creek, Lafayette Square & Eagle Creek, Midtown & Central Canal, Near Eastside & Pogue's Run, and Southeast & Pleasant Run (R.O.W.). The environmental practicum will focus on the Mid-North and Fall Creek neighborhoods.

Mapleton Fall Creek Neighborhood

The Mapleton Fall Creek neighborhood (MFCN) is bordered by Fall Creek Parkway Drive on the east and south, 38th Street to the north, and Meridian Street to the west. As of 2010, this area was 1.32 square miles with 7,057 residents. Of those 7,057 residents, 5,556 were over the age of eighteen years. There were 3,168 total households within the area. Minorities accounted for 5,263 residents at that time. In regards to income, 1,202 households claimed their income to fall between $25,000 and $49,999. This was the most common choice among the income distribution. Although, 223 households had public assistance income and 226 households claimed their income to be $100,000+, being the high and low ends of the spectrum. There were 249 families living in poverty in the neighborhood and of those 249, 179 were families in poverty with related children under the age of eighteen. Education statistics backed the income statistics of the time. While there were no high school dropouts, in 2010, 1,623 of the residents possessed a high school diploma. 1, 143 residents possessed a bachelor's degree. Of the 7,057 residents in 2010, 1,337 residents had obtained their associates degree. In total, there were 4,571 housing units in the MFCN. Of these 4,571 housing units, 1,403 housing units were vacant. Owned properties accounted for 1,125 housing units, while rented properties accounted for 2,043. In 2010, property crime accounted for 64.75% of all crime, while the remaining 35.25% was attributed to violent crimes and simple assaults. (SAVI.org)

II. Evaluation & Results

AESTHETICS:
Aesthetics is inclusive of both art and design. It involves the use of natural beauty to create a visually pleasing environment. This element integrates man-made design with natural design and art. Aesthetics is the idea of beauty for every person, every day by restoring the natural beauty and using art installations to enhance the community.

The class will assess the character of the neighborhood and how cohesive it is. Neighborhood character will be based not only on how cohesive the neighborhood is within the area, but within the neighborhood as a whole. It is the hope that the rich history of Mapleton-Fall Creek be preserved through its architecture and its neighborhood buildings.

The class will look at over 100 houses that fall within the Mapleton-Fall Creek area. Analysis of the neighborhood will include gas stations, schools, grocery options, churches and a few other components. Figure 3 shows the proportional correspondence between these neighborhood attributes. Churches, bus stops and apartment complexes have the highest prominence within the community. There are 14 churches, 60 bus stops and 10 apartment complexes. There is a lack of food options in this specific area. The class discovered in the MFC neighborhood there is one grocery store and 5 fast food and take out restaurants. There is a farmer's market along 38th Street, but this market has limited options and is not a consistent source of produce and food.

The class found, when looking at neighborhood character, there are very similar characteristics among the houses and neighborhoods. The major area of focus was based on a square area extending west to east streets of College Ave and Central and the north and south between 34th Street and 29th Street. However, MFCN as a whole was studied, with the triangular boundaries of 38th Street, Meridian Street and Falls Creek. The class drove from street to street analyzing the neighborhood characters, as well as taking pictures of the various houses. It was found that there is consistency within the MFCN on the use of vibrant colors. No two houses are designed the exact same, however they collectively created a cohesive aesthetic unique to historical MFC. The data sheet consists of looking at factors such as how many resources are available as well as the house styles that appear in the neighborhood.

The metric for aesthetics will be a survey that will be given to members of the MFCN community. The survey will assess opinions on how visually pleasing areas surrounding the waterway appear to be, in addition to what factors influence the community members most when it comes to visiting the area.

The results of the aesthetics survey show several trends in the members of the MCFN community. Most residents only visit the Fall Creek waterway area for recreational purposes on occasion. It can also be seen from the survey results that most MFCN residents feel resting areas and parks are in the biggest need for improvement.

The third metric that will be used for aesthetics is an inventory of amenities. Natural beauty arising from the waterway and nature is very important, but there is another factor, amenities can also be used to increase the visual appeal of an area. Several things will be determined including what amenities are present, how many are there, and what condition they are in. The amenities that will

be looked at include trashcans, benches, water fountains, art installations, waste receptacles for dogs, and community centers (gardens, parks, farms, town hall, etc.). A visual survey of the MFC area will be used for gathering this data. Each amenity will be counted and assessed for condition. From this data it will then be determined what areas need the most work and attention.

CONNECTIVITY:
The class defines connectivity as the relationships, beliefs and accessibility one has in relation to the waterways within Indianapolis. The goal of the Connectivity element is the idea of a "10-minute walk" or a "20-minute bike ride".

For the connectivity element, the class will decide how realistic it would be for people to reach the waterways in terms of safety. The metric used will be a risk assessment. The class will focus on factors that will have an impact on resident's connection to the water, such as sidewalk accessibility, safety and pedestrian lighting. A safety rating will be established through a physical survey from 0 - 5 based on sidewalk conditions, lighting, and Complete Streets criteria. Complete Streets include sidewalks, bike lanes or paved shoulders, safe crossing opportunities, median island, accessible pedestrian signals, and curb extensions (Smart Growth America, 2010). Maps will be provided to show where the safest routes currently are and where trouble areas are that should be improved.

Following the completion of the Complete Streets analysis, numerous problem areas were identified in the Mapleton Fall Creek Neighborhood. To conduct the analysis, sidewalk conditions, lighting, curb extensions, buffer areas, bike lanes, and bus lanes, were all analyzed. The group picked seven target locations and at these locations rated each of these conditions on a scale of 1 through 5. A rating of 5 was excellent, while a rating of zero meant none were found. Bike lanes, bus lanes, and curb extensions were a main concern as the group found none in the area. An average for the other three focus areas was calculated in order to give an overall idea of how well the neighborhood was doing as a whole in these aspects. Sidewalk conditions rated the highest at a 3.7. Next were buffer areas at 1.57 and lastly lighting with only a 1. A more detailed analysis can be found in Figure 1, which gives the ratings by target location and condition.

The data analyzed by the class thus far indicates the streets are middle to low quality in terms of being considered a complete street. The sidewalks are in the overall best condition, but many were found to be narrow and very close to the street where cars drive. Many street crossings painted on the ground have faded. Lighting is also a concern because the neighborhood lacks pedestrian lighting that could be used to make the sidewalks safer when walking at night and late afternoon. Bus and bike lanes are the biggest problem for the neighborhood. The lack of these lanes makes this a very difficult form of transportation for neighborhood residents. Improving these aspects will improve connectivity by making the neighborhood safer and more accessible.

The class will also examine the number of access points to the river within a given stretch of land. This will help serve as a representation of whether or not the community members are able to easily and safely access the river within a reasonable distance from their home.

The metric the class will use to measure this is counting and documenting the number of access points along Fall Creek that are available to the public. Along with the quantitative measurement of this element, there will be a qualitative measurement. The class will document what type of access point each is, its location and amount of accessibility. In addition, factors that will make it a better access point for the community and ways of increasing safety for the community members will be documented.

This metric found two stoplights, five crosswalks and two parking lots within the area of study. These numbers reflect a lack of connectivity between the community and waterways of Indianapolis. Fall Creek Parkway is not pedestrian friendly, making stoplights and crosswalks more important for the safety of the MFCN residents.

A third metric the class will use for connectivity is the community's general awareness of and relationship with the river. Aspects of this metric will analyze and asses the community's awareness of their physical proximity to the waterway, the awareness of their impact on water conditions, and their awareness of what role the river plays in their daily lives.

To measure the community's connectivity to their waterway, surveys that address these conditions will be conducted. Having an understanding the current conditions will create a baseline from which ROW can improve upon.

The data from the behavioral and attitudes survey shows several over-arching trends that could be useful to ROW. The results, within the sample population, suggest that very few people know the current status of water quality in Fall Creek. The results also suggest that the sample population does not know where the water they use and drink on a daily basis comes from.

ECOLOGY:
Ecology is a broad element that relates to species, water quality and general habitat. R.O.W. will improve the physical, chemical and biological measures of water quality.

The class will perform a stream assessment along Fall Creek. The assessment data sheet includes various questions related to the overall composition and condition of the stream. The Reach Level Assessment is composed of rating conditions such as water clarity, shading and wildlife. The final reach accessibility consists of a rating of 1-5 as well as determining if the stream environment is good, fair or difficult.

The class will look at three different stretches of Fall Creek and perform a Unified Stream Assessment for each section. During the assessment, different attributes of the river will be analyzed, including habitat, vegetation, banks, erosion, and floodplain, as seen in Figures 3 - 6. This shows the results from each of the Fall Creek sections.

Overall, the conditions of the sections sampled are suboptimal; two of the sections have this rating, while the third has a rating of marginal. The 38th Street bridge to the Monon has an overall score of 87, the area from the Monon to the 30th Street bridge has a score of 94, and the 30th Street bridge to Central Avenue area has a score of 74, all out of a possible 160 points.

As the Fall Creek waterway flows closer to downtown Indianapolis, the condition of the river decreases. This could be due to many factors. The most probable factor, and also the most detrimental, is the result from human activities. As the river flows and the neighborhood becomes more encroached with residents and urban settings, the implications and effects on the river also increases. The increase in human activities and settlements has led to an increase in erosion on the river banks and also to a less spacious buffer area between the river and residential areas. With the more populous areas surrounding the river, it greatly affects the health of the river and the quality of its water.

The class will develop a metric to measure the amount of honeysuckle cover there is in the Fall Creek cor-

ridor. Honeysuckle is an invasive plant in Indiana and throughout the states. It is in many cases creates a monoculture by choking out all other native plants. Honeysuckle hurts ecosystems in that it diminishes native plants and hurts plant species diversity. It outcompetes natives by growing quickly and growing tall. It shades other understory species and is spread easily by birds, which enjoy its red berries.

The honeysuckle metric is aimed at providing a base measure for honeysuckle coverage before any removal interventions are established. The numbers of honeysuckle stems in sixteen-five by three yards plots were counted. Eight of these plots were in a section of Fall Creek that is not maintained in any way. The other eight were in a section that is a designated as park area and is maintained by invasive species removal and herbicide application.

The honeysuckle stem count was much greater in the non-maintained section of Fall Creek, compared to the maintained section. The honeysuckle in this area is abundant and covers most of the other vegetation. In the maintained section, there is almost no honeysuckle cover, but there is also not much other understory vegetation. It appears that the methods used in order to diminish honeysuckle cover may have also diminished native species in the area.

The final metric that will be used to assess ecology is a water quality assessment. This will take into consideration a combination of factors that influence water quality. The class contacted the Marion County Health Department, who compiles water quality tests that have been conducted over the past five months along the Mapleton/Fall Creek sector.

The water quality assessment for Fall Creek includes the total dissolved solids, dissolved oxygen, nitrates, and E.coli samples. The total dissolved solids of a river is a good indication of the health of that river, but in this case, it may be difficult to conclude results solely from this factor because there are a number of combined sewage overflow sites along this sector of the River, which will have a major impact on our test results.

If there is an excess of total dissolved solids, it may be too dense and difficult for sunlight to penetrate the water and reach plants at the bottom, thus preventing photosynthesis from happening. If there is a lack of total dissolved solids in the water, it is possible for too much sunlight to penetrate the water and excel photosynthesis to an unhealthy level, and also increase the temperature of the water, which adversely affects all organisms in the water. Total dissolved solids are often introduced to the Creek through runoff, lawn fertilizer, animal waste, and soil erosion.

E.coli is typically introduced to the Creek by animal waste, and human waste when the combined sewer overflows are opened during periods of heavy rain. E.coli is a bacterium that can cause illness and death if not treated. It is important for recreational walkers to pick up animal waste along the Creek in order to avoid or decrease the introduction of E.coli into the Creek. It is especially important to understand the E.coli levels in Fall Creek, in order to inform the public when and when not to visit the Creek or go near the water. Typically, the E.coli levels will be higher after a rainfall and if the CSO system is active (EPA).

Dissolved oxygen varies seasonally, such that cold water holds more and warm water holds less. Dissolved oxygen is extremely important for the survival of plants and animals living in the Creek. If there is not enough dissolved oxygen in the water, it may indicate that not enough photosynthesis is occurring, which means other organisms in the water are not able to maintain sufficient oxygen to survive, and they can literally suffocate. Most static bodies of water maintain a healthy amount of dissolved oxygen because the movement of the water draws in oxygen. However, the CSO system in the MFCN emits many undesirable pollutants into the Creek, and those pollutants often use the oxygen in the water, leaving very little for the

native species of the Creek (EPA).

Nitrates are essential plant nutrients, but in excess, can cause water quality problems. As mentioned above, many pollutants that enter the Creek can suck the oxygen out of the water. Nitrates are an example of such a pollutant, often introduced to the water from lawn fertilizers. Excess nitrates can cause hypoxia, or dangerously low levels of dissolved oxygen. When combined with phosphates, excess nitrates can cause dangerously high acceleration of plant growth, especially phytoplankton, which may change the availability of nutrients in the water for other organisms. This process is sometimes referred to as eutrophication, or unnatural aging of a body of water. Combined sewer overflows are a source of excess nitrates that enter the Creek, from runoff, lawn chemicals, and animal waste (EPA).

III. Summary

Recommendations

AESTHETICS:
For the future, R.O.W. and other community organizations will focus on providing more easily accessible resources for the MFCN residents. There will be more consideration of how neighborhoods are designed and what resources can be found in that area. The class found that there is a lack of yard space and space between houses. It is important for neighbors to interact with one another. However there should also be some sense of privacy and personal space. Aesthetics begins to overlap with complete the streets in some areas, but looking at yard space, the majority of houses are within a few feet from the street. This is not an ideal design, especially for families with children as safety is important--noise levels increase and risk also increases. One area R.O.W. will focus on is increasing sidewalk width, sidewalk buffers and the distance between the street and the houses. In addition, R.O.W. will continue rehabbing homes in the MFCN area, and will continue to stay true to their historical styles. The houses in MFC are more modern but they continue to resemble the houses that were first built in MFC. See Figure 2.

The Mapleton Fall Creek Development Corporation has begun to rehab homes and the homes that have been rehabbed are greatly increasing the pleasing look of the neighborhood. R.O.W. will consider putting a program into place that involves volunteers or workers who work to rehab a projected amount of homes during the year. These aspects will create a more social and interactive community. It will draw other communities to visit the MFCN area. It is then that R.O.W. will incorporate the connectivity element to encourage interaction, enjoyment and appreciation of the waterway.

R.O.W. will put effort towards increasing the number of rest areas along the walkways. In addition, lighting along the pathways will be increased. The areas along the waterway will continue to be maintained, but education about the benefits of maintaining an area will also be provided to the MFCN residents. As these improvements are made, residents will become more open and comfortable with the idea of visiting the waterway area on a more regular basis.

The MFCN will greatly benefit from an increased number of amenities. There are currently many areas in the MFCN that have little to no public amenities. Many of the current amenities are deteriorated to the point that they actually do more harm for the area than good. There are trash cans present that make the area look run down. Installation of new trashcans and benches will both serve to give people places to sit and throw their trash away as well as make the area look newer and well maintained. It will also be beneficial for water fountains and waste receptacles for dogs to be installed in parks to help promote kids playing and people walking their dogs. Another observation made was the vast number of vacant homes. These vacant lots have a greater likelihood of having trash littered in the yards, as well as having overgrown lots. By increasing the number of trashcans in these areas it will be possible to help decrease the amount of trash littered on these abandoned lots. It was apparent that the area has deteriorated over time, the amenities present were a very good source of that observation. By replacing or re-facing the current amenities and adding more the overall feel of the neighborhood would be lifted from deteriorating to up-and-coming.

CONNECTIVITY:
The results of the Complete Streets analysis show a great need for improvement in the Mapleton Fall Creek area in order to improve connectivity. The analysis shows the area is heavily lacking in lighting, curb extensions, bus, and bike lanes. R.O.W. will work to improve connectivity by improving or adding these features to the community. The lighting found in the community is all street lighting and there are no path lights for pedestrians. Curb extensions will also make it safer for people to cross streets and will encourage more walking. Bus and bike lanes, while not as feasible to implement, will also greatly improve connectivity and encourage use. R.O.W. will not put their resources into improving sidewalks, as they are in pretty good condition. Instead, R.O.W. will focus on making the community safer by implementing curb extensions and pedestrian lighting. They will also work to provide bike and bus lanes. Incorporating these aspects into the neighborhood will improve connectivity.

Due to the lack of crosswalks and stoplights found in the focus area, R.O.W. will make effort to work with the city of Indianapolis to make Fall Creek Parkway and surrounding areas more pedestrian friendly. Increasing the number of crosswalks will improve pedestrian and driver safety. It will also make residents more likely to visit the waterway area.

The survey of MFCN residents shows many people do not know where their water comes from. Increasing people's awareness on the source of their water will have a positive effect on the quality of that source. If people knew where their water comes from and know the effect they have on it, they will treat that source more respectfully.

A question the survey asked was, "Would you be interested in learning more about your relationship with Fall Creek?" It appears that the sample population is overwhelmingly interested in learning more. Moving forward, it will be the responsibility of R.O.W. to use this information and to decide whether providing this knowledge to the Fall Creek community will be beneficial to the R.O.W. initiative.

ECOLOGY:
The results from the Stream Assessment show that the three sections of Fall Creek that were sampled are at least of marginal conditions and quality. There are also some areas of the river that are suboptimal. Overall, the condition of the river is in good shape and offers potential to be revived into a thriving waterway, for both human use and for habitats for wildlife and plant life.

A major way to improve the river is to expand the buffer areas surrounding the river. This will limit the amount of human activities near the water, mostly by residential living areas, and will reduce its harming effects on the water. By having R.O.W. reassess the condition and quality of the water and make efforts to vitalize the surroundings, it will create an attraction for human interests and wildlife populations.

Manual honeysuckle removal, followed by seeding of native species in order to encourage native species growth in the area, will be the most effective plan for R.O.W. This will allow for the discouragement of honeysuckle growth, while encouraging native species to grow in the same area.

Based on data from the Marion County Health Department, it appears that the combined sewer overflows have an impact on the water quality, but it varies on a monthly basis, depending on rainfall. The results for E.coli are inconclusive at this point, because there is not enough data to compare a full year, and the levels appear to fluctuate randomly, or based on rainfall. The nitrate levels increase later in the year, possibly due

to the drought over the summer, which caused levels to go down, and then rise with rainfall. It also appears that dissolved oxygen levels rise with the later months, possibly due to cooling temperatures, because dissolved oxygen is more prevalent in colder water. The total dissolved solids fluctuate similar to the E.coli, but the results are inconclusive.

Figure 1: Field Notes Neighborhood Character

	Location	Sidewalk conditons	lighting	curb extensions	Buffer area ~~medians~~	Bike Lanes/ Bus lanes?
Site #1	Central & 33RD	level & no cracks 5	Streetlights no ped. light 3	0	parked cars 3	0
Site #2						
Site #3	central & 32ND	level, no cracks, grass, not well kept 4	no lights 0	0	same 3	0
Site #4	Central & 28TH	level, no cracks, no grass 5	some street lights 2	0	3	0
Site #5	College & 30TH	level, no cracks, low maintenance 4	few street lights (only one side) 2	0	3	0
Site #6	Broadway & 30TH	level, no cracks 4	0	0	(1)	0
Site #7	Ruckle & 29TH	level, no cracks, no maintence 3	0	0	parked cars (one side) 2	0
Site #8	Park	cracked overgrown * 1	broken st. light 0	0	0	0
Site #9						

Figure 2: Neighborhood Character Photos

L

Figure 3: Stream Assessemnet Worksheet A

RCH

Reach Level Assessment

SURVEY REACH ID: FC-1	WTRSHD/SUBSHD: Fall Creek	DATE: 11/11/12	ASSESSED BY: Kelly

START	END	GPS ID:
TIME: 12:30 AM/PM LMK: ____	TIME: 1:01 AM/PM LMK: 6	
LAT 39° 49' 31.2" LONG 86° 07' 50.6"	LAT 39° 49' 13.1" LONG 86° 08' 11.7"	
DESCRIPTION: 38th Street Bridge	DESCRIPTION: Manon	

RAIN IN LAST 24 HOURS ☐ Heavy rain ☐ Steady rain ☑ None ☐ Intermittent ☐ Trace

PRESENT CONDITIONS ☐ Heavy rain ☐ Steady rain ☐ Intermittent ☑ Clear ☐ Trace ☐ Overcast ☐ Partly cloudy

SURROUNDING LAND USE: ☐ Industrial ☐ Commercial ☑ Urban/Residential ☐ Suburban/Res ☐ Forested ☐ Institutional ☐ Golf course ☐ Park ☐ Crop ☐ Pasture ☐ Other:

AVERAGE CONDITIONS *(check applicable)*

BASE FLOW AS % CHANNEL WIDTH
☐ 0-25% ☐ 50%-75%
☐ 25-50 % ☑ 75-100%

DOMINANT SUBSTRATE
☐ Silt/clay (fine or slick) ☐ Cobble (2.5 –10")
☐ Sand (gritty) ☐ Boulder (>10")
☑ Gravel (0.1-2.5") ☐ Bed rock

WATER CLARITY ☑ Clear ☐ Turbid *(suspended matter)*
☐ Stained *(clear, naturally colored)* ☐ Opaque *(milky)*
☐ Other *(chemicals, dyes)*

AQUATIC PLANTS IN STREAM
Attached: ☑ none ☐ some ☐ lots
Floating: ☑ none ☐ some ☐ lots

WILDLIFE IN OR AROUND STREAM
(Evidence of)
☐ Fish ☐ Beaver ☐ Deer
☑ Snails ☐ Other:

STREAM SHADING (water surface)
☐ Mostly shaded (≥75% coverage)
☑ Halfway (≥50%)
☐ Partially shaded (≥25%)
☐ Unshaded (< 25%)

CHANNEL DYNAMICS
☐ Unknown

☐ Downcutting	☐ Bed scour
☐ Widening	☐ Bank failure
☐ Headcutting	☑ Bank scour
☐ Aggrading	☐ Slope failure
☐ Sed. deposition	☐ Channelized

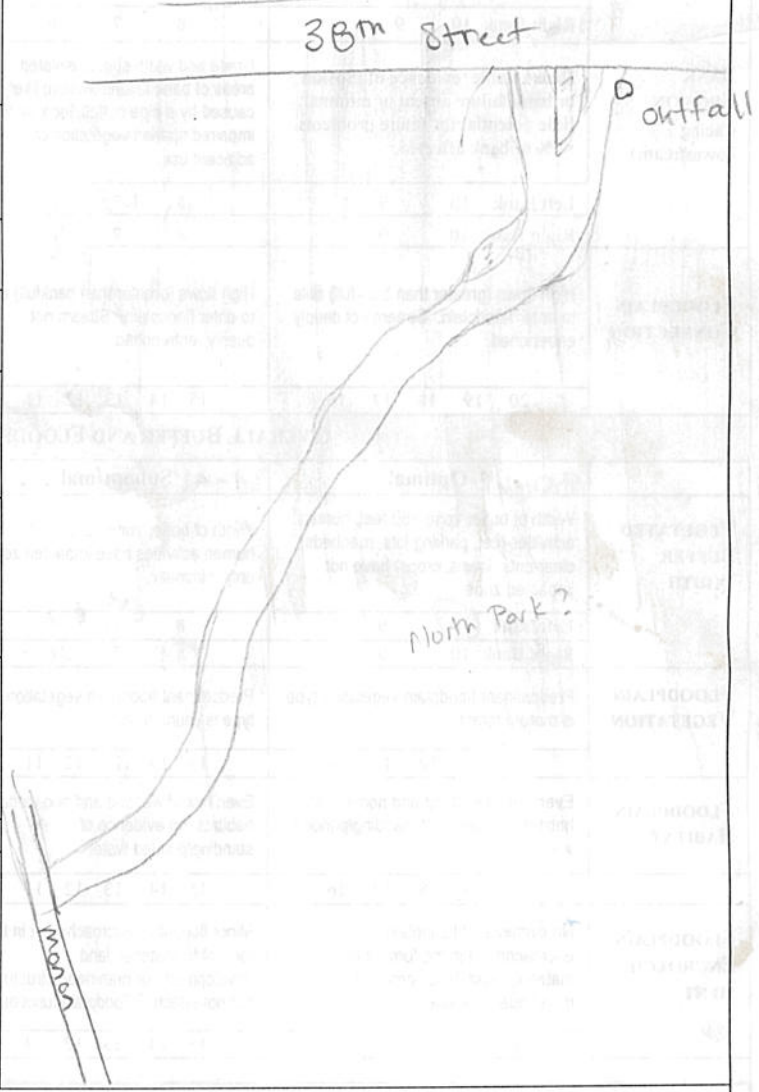
CHANNEL DIMENSIONS *(FACING DOWNSTREAM)*
Height: LT bank _____ (ft)
RT bank _____ (ft)
Width: Bottom _____ (ft)
Top _____ (ft)

REACH ACCESSIBILITY

5	4	3	2	1
Good: Open area in public ownership, sufficient room to stockpile materials, easy stream channel access for heavy equipment using existing roads or trails.	**Fair:** Forested or developed area adjacent to stream. Access requires tree removal or impact to landscaped areas. Stockpile areas small or distant from stream.		**Difficult.** Must cross wetland, steep slope, or sensitive areas to get to stream. Few areas to stockpile available and/or located a great distance from stream. Specialized heavy equipment required.	

REACH SKETCH AND SITE IMPACT TRACKING

Simple planar sketch of survey reach. Track locations and IDs for all site impacts within the survey reach (OT, ER, IB,SC, UT, TR, MI) as well as any additional features deemed appropriate. Indicate direction of flow



NOTES: *(biggest problem you see in survey reach)*

REPORTED TO AUTHORITIES ☐ YES ☐ NO

* Look down stream to determine L+R bank *

L

Figure 4: Stream Assessemnet Worksheet B

RCH

Reach Level Assessment

SURVEY REACH ID: FC-1	WTRSHD/SUBSHD: Fall Creek	DATE: 11/11/12	ASSESSED BY: Kelly

START	END	GPS ID:
TIME: 12:30 AM/PM LMK: _____	TIME: 1:01 AM/PM LMK: 1	
LAT 39° 49' 31.2" LONG 86° 07' 50.6"	LAT 39° 49' 13.1" LONG 86° 08' 11.7"	
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SURROUNDING LAND USE: ☐ Industrial ☐ Commercial ☑ Urban/Residential ☐ Suburban/Res ☐ Forested ☐ Institutional ☐ Golf course ☐ Park ☐ Crop ☐ Pasture ☐ Other:

AVERAGE CONDITIONS *(check applicable)*

BASE FLOW AS % CHANNEL WIDTH ☐ 0-25% ☐ 25-50 % ☐ 50%-75% ☑ 75-100%

DOMINANT SUBSTRATE
☐ Silt/clay (fine or slick) ☐ Cobble (2.5 –10")
☐ Sand (gritty) ☐ Boulder (>10")
☑ Gravel (0.1-2.5") ☐ Bed rock

WATER CLARITY ☑ Clear ☐ Turbid *(suspended matter)* ☐ Stained *(clear, naturally colored)* ☐ Opaque *(milky)* ☐ Other *(chemicals, dyes)*

AQUATIC PLANTS IN STREAM Attached: ☑ none ☐ some ☐ lots; Floating: ☑ none ☐ some ☐ lots

WILDLIFE IN OR AROUND STREAM (Evidence of) ☐ Fish ☐ Beaver ☐ Deer ☑ Snails ☐ Other:

STREAM SHADING (water surface)
☐ Mostly shaded (≥75% coverage)
☑ Halfway (≥50%)
☐ Partially shaded (≥25%)
☐ Unshaded (< 25%)

CHANNEL DYNAMICS

☐ Unknown	☐ Downcutting	☐ Bed scour
	☐ Widening	☐ Bank failure
	☐ Headcutting	☑ Bank scour
	☐ Aggrading	☐ Slope failure
	☐ Sed. deposition	☐ Channelized

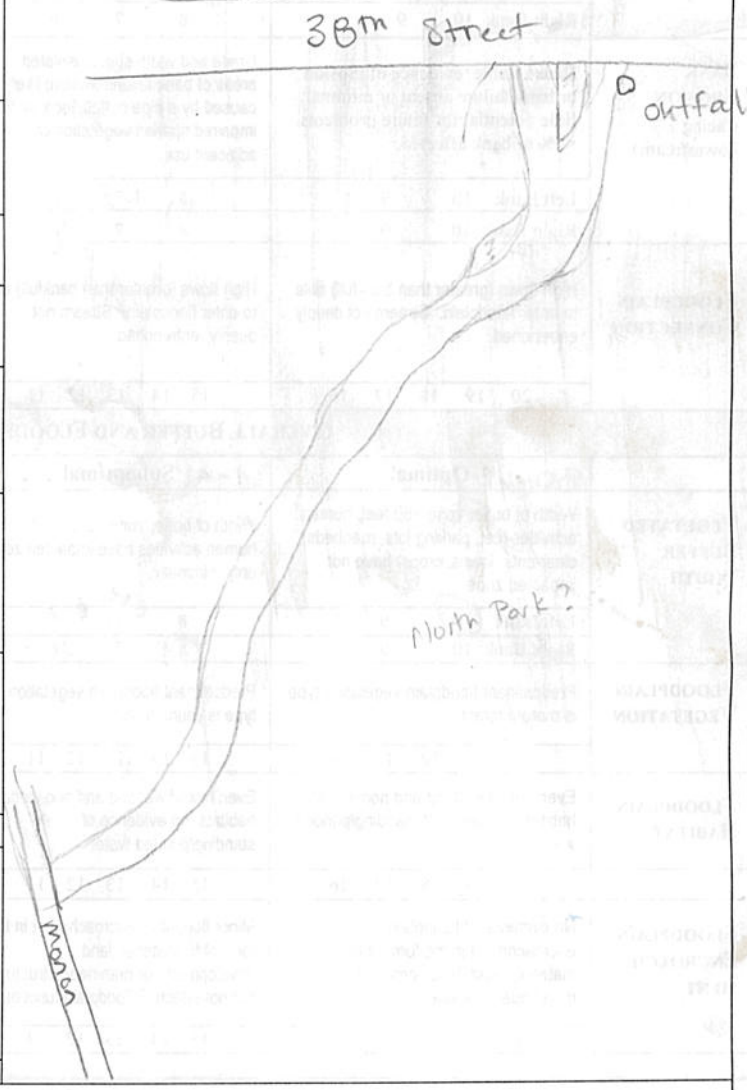
CHANNEL DIMENSIONS *(FACING DOWNSTREAM)*
Height: LT bank _____ (ft)
RT bank _____ (ft)
Width: Bottom _____ (ft)
Top _____ (ft)

REACH ACCESSIBILITY

5	4	3	2	1
Good: Open area in public ownership, sufficient room to stockpile materials, easy stream channel access for heavy equipment using existing roads or trails.	**Fair:** Forested or developed area adjacent to stream. Access requires tree removal or impact to landscaped areas. Stockpile areas small or distant from stream.		**Difficult.** Must cross wetland, steep slope, or sensitive areas to get to stream. Few areas to stockpile available and/or located a great distance from stream. Specialized heavy equipment required.	

REACH SKETCH AND SITE IMPACT TRACKING

Simple planar sketch of survey reach. Track locations and IDs for all site impacts within the survey reach (OT, ER, IB,SC, UT, TR, MI) as well as any additional features deemed appropriate. Indicate direction of flow



NOTES: *(biggest problem you see in survey reach)*

REPORTED TO AUTHORITIES ☐ YES ☐ NO

* Look down stream to determine L+R bank *

L

Figure 5: Stream Assessemnet Worksheet C

Reach Level Assessment **RCH**

SURVEY REACH ID: FC-1	WTRSHD/SUBSHD: Fall Creek	DATE: 11/11/12	ASSESSED BY: Kelly

START	END	GPS ID:
TIME: 12:30 AM/PM LMK: ____	TIME: 1:01 AM/PM LMK: 1	
LAT 39° 49' 31.2" LONG 86° 07' 50.6"	LAT 39° 49' 13.1" LONG 86° 08' 11.7"	
DESCRIPTION: 38th Street Bridge	DESCRIPTION: Manon	

RAIN IN LAST 24 HOURS ☐ Heavy rain ☐ Steady rain ☑ None ☐ Intermittent ☐ Trace

PRESENT CONDITIONS ☐ Heavy rain ☐ Steady rain ☐ Intermittent ☑ Clear ☐ Trace ☐ Overcast ☐ Partly cloudy

SURROUNDING LAND USE: ☐ Industrial ☐ Commercial ☑ Urban/Residential ☐ Suburban/Res ☐ Forested ☐ Institutional ☐ Golf course ☐ Park ☐ Crop ☐ Pasture ☐ Other:

AVERAGE CONDITIONS *(check applicable)*

BASE FLOW AS % CHANNEL WIDTH ☐ 0-25% ☐ 25-50 % ☐ 50%-75% ☑ 75-100%

DOMINANT SUBSTRATE
☐ Silt/clay (fine or slick) ☐ Cobble (2.5 –10")
☐ Sand (gritty) ☐ Boulder (>10")
☑ Gravel (0.1-2.5") ☐ Bed rock

WATER CLARITY ☑ Clear ☐ Turbid *(suspended matter)* ☐ Stained *(clear, naturally colored)* ☐ Opaque *(milky)* ☐ Other *(chemicals, dyes)*

AQUATIC PLANTS IN STREAM Attached: ☑ none ☐ some ☐ lots; Floating: ☑ none ☐ some ☐ lots

WILDLIFE IN OR AROUND STREAM *(Evidence of)* ☐ Fish ☐ Beaver ☐ Deer ☑ Snails ☐ Other:

STREAM SHADING *(water surface)*
☐ Mostly shaded (≥75% coverage)
☑ Halfway (≥50%)
☐ Partially shaded (≥25%)
☐ Unshaded (< 25%)

CHANNEL DYNAMICS

☐ Unknown	☐ Downcutting	☐ Bed scour
	☐ Widening	☐ Bank failure
	☐ Headcutting	☑ Bank scour
	☐ Aggrading	☐ Slope failure
	☐ Sed. deposition	☐ Channelized

CHANNEL DIMENSIONS *(FACING DOWNSTREAM)*
Height: LT bank _____(ft)
RT bank _____(ft)
Width: Bottom _____(ft)
Top _____(ft)

REACH ACCESSIBILITY

5	4	3	2	1
Good: Open area in public ownership, sufficient room to stockpile materials, easy stream channel access for heavy equipment using existing roads or trails.	**Fair**: Forested or developed area adjacent to stream. Access requires tree removal or impact to landscaped areas. Stockpile areas small or distant from stream.			**Difficult.** Must cross wetland, steep slope, or sensitive areas to get to stream. Few areas to stockpile available and/or located a great distance from stream. Specialized heavy equipment required.

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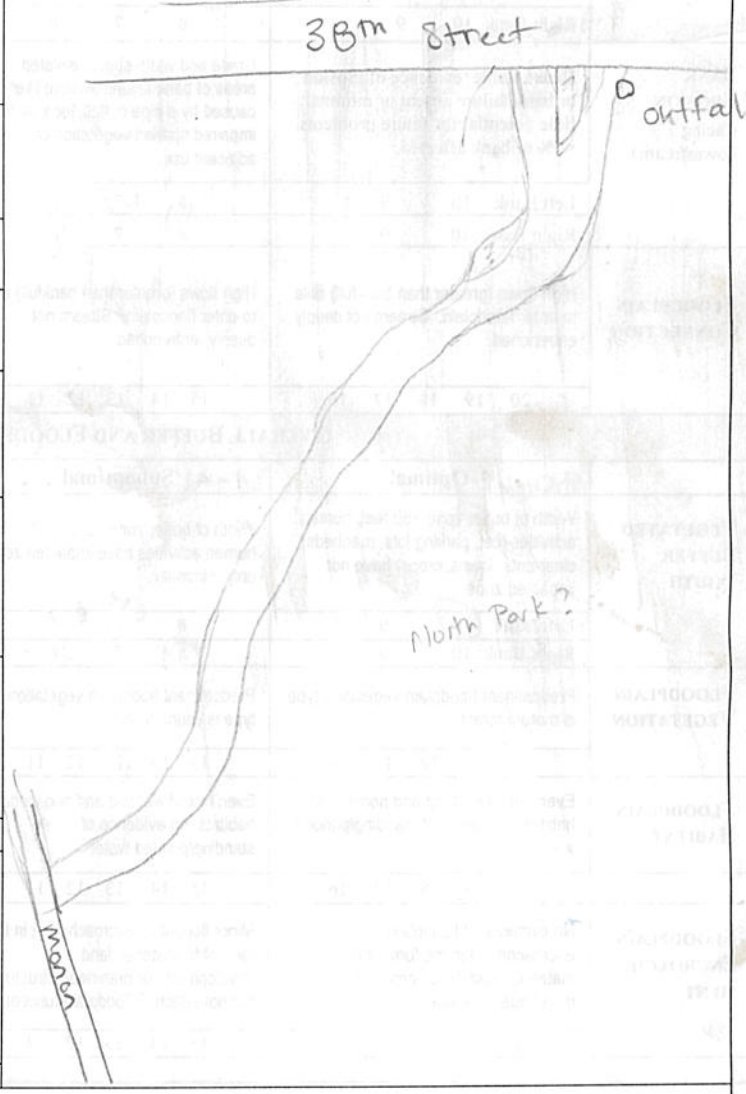


NOTES: *(biggest problem you see in survey reach)*

REPORTED TO AUTHORITIES ☐ YES ☐ NO

* Look down stream to determine L+R bank *

Figure 6: Stream Assessemnet Score Card

80 - 63 62 - 41 40 - 19 18 - 0

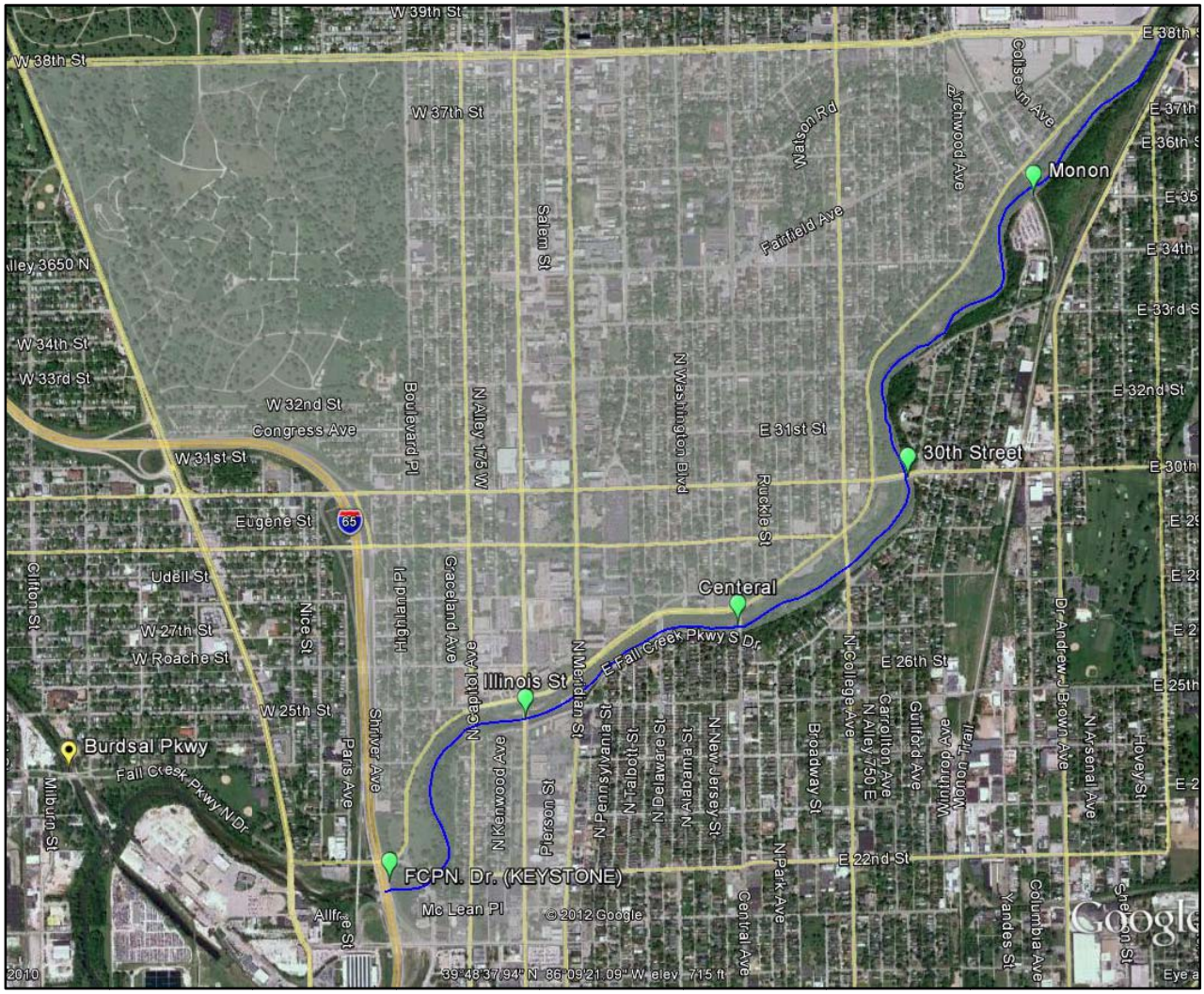
	Optimal	Suboptimal	Marginal	Poor
OVERALL STREAM CONDITION				
IN-STREAM HABITAT *(May modify criteria based on appropriate habitat regime)*	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
VEGETATIVE PROTECTION *(score each bank, determine sides by facing downstream)*	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 9	8 7 6	(5) 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 (4) 3	2 1 0
BANK EROSION (facing downstream)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Grade and width stable; isolated areas of bank failure/erosion; likely caused by a pipe outfall, local scour, impaired riparian vegetation or adjacent use.	Past downcutting evident, active stream widening, banks actively eroding at a moderate rate; no threat to property or infrastructure	Active downcutting; tall banks on both sides of the stream eroding at a fast rate; erosion contributing significant amount of sediment to stream; obvious threat to property or infrastructure.
	Left Bank 10 9	8 7 6	(5) 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 (4) 3	2 1 0
FLOODPLAIN CONNECTION	High flows (greater than bankfull) able to enter floodplain. Stream not deeply entrenched.	High flows (greater than bankfull) able to enter floodplain. Stream not deeply entrenched.	High flows (greater than bankfull) **not** able to enter floodplain. Stream deeply entrenched.	High flows (greater than bankfull) **not** able to enter floodplain. Stream deeply entrenched.
	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
OVERALL BUFFER AND FLOODPLAIN CONDITION				
	Optimal	**Suboptimal**	**Marginal**	**Poor**
VEGETATED BUFFER WIDTH	Width of buffer zone >50 feet; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, crops) have not impacted zone.	Width of buffer zone 25-50 feet; human activities have impacted zone only minimally.	Width of buffer zone 10-25 feet; human activities have impacted zone a great deal.	Width of buffer zone <10 feet: little or no riparian vegetation due to human activities.
	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 (7) 6	5 4 3	2 1 0
FLOODPLAIN VEGETATION	Predominant floodplain vegetation type is mature forest	Predominant floodplain vegetation type is young forest	Predominant floodplain vegetation type is shrub or old field	Predominant floodplain vegetation type is turf or crop land
	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
FLOODPLAIN HABITAT	Even mix of wetland and non-wetland habitats, evidence of standing/ponded water	Even mix of wetland and non-wetland habitats, no evidence of standing/ponded water	Either all wetland or all non-wetland habitat, evidence of standing/ponded water	Either all wetland or all non-wetland habitat, no evidence of standing/ponded water
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
FLOODPLAIN ENCROACH-MENT	No evidence of floodplain encroachment in the form of fill material, land development, or manmade structures	Minor floodplain encroachment in the form of fill material, land development, or manmade structures, but not effecting floodplain function	Moderate floodplain encroachment in the form of filling, land development, or manmade structures, some effect on floodplain function	Significant floodplain encroachment (i.e. fill material, land development, or man-made structures). Significant effect on floodplain function
	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1 0

Sub Total In-stream: 46 /80 + Buffer/Floodplain: 48 /80 = **Total** Survey Reach 94 /160

Overall = Subop.

Figure 7: Study Area

Fall Creek: Mid-North



Focus Area:

From 38th Street to Interstate 65

Neighborhoods:

- Mapleton- Fall Creek: 38th Street to Meridian
- Near Northside: Meridian, 21st, Interstate 65, Fall Creek
- Near NW- Riverside: Meridian, Fall Creek, Dr. MLK Jr. St., and 38th St

Stream Length: 3.14 miles (5,046 meters)

Number of Sampling sites:

- Unified Stream Assessment: 5
- Health Department Water Quality sampling site: 4

Figure 8: Honeysuckle Ratios

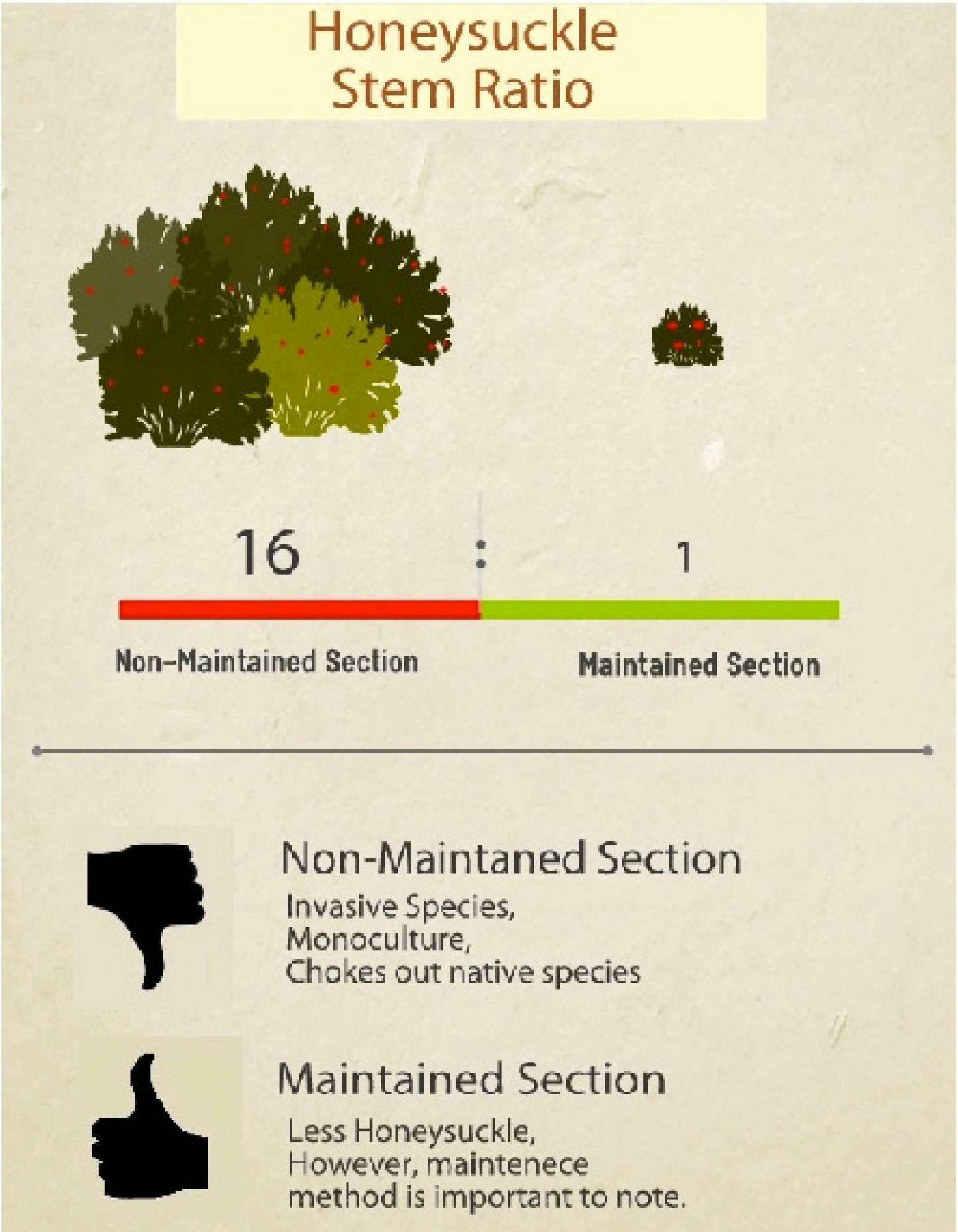


Figure 9: Survey Results: Increasing Visits

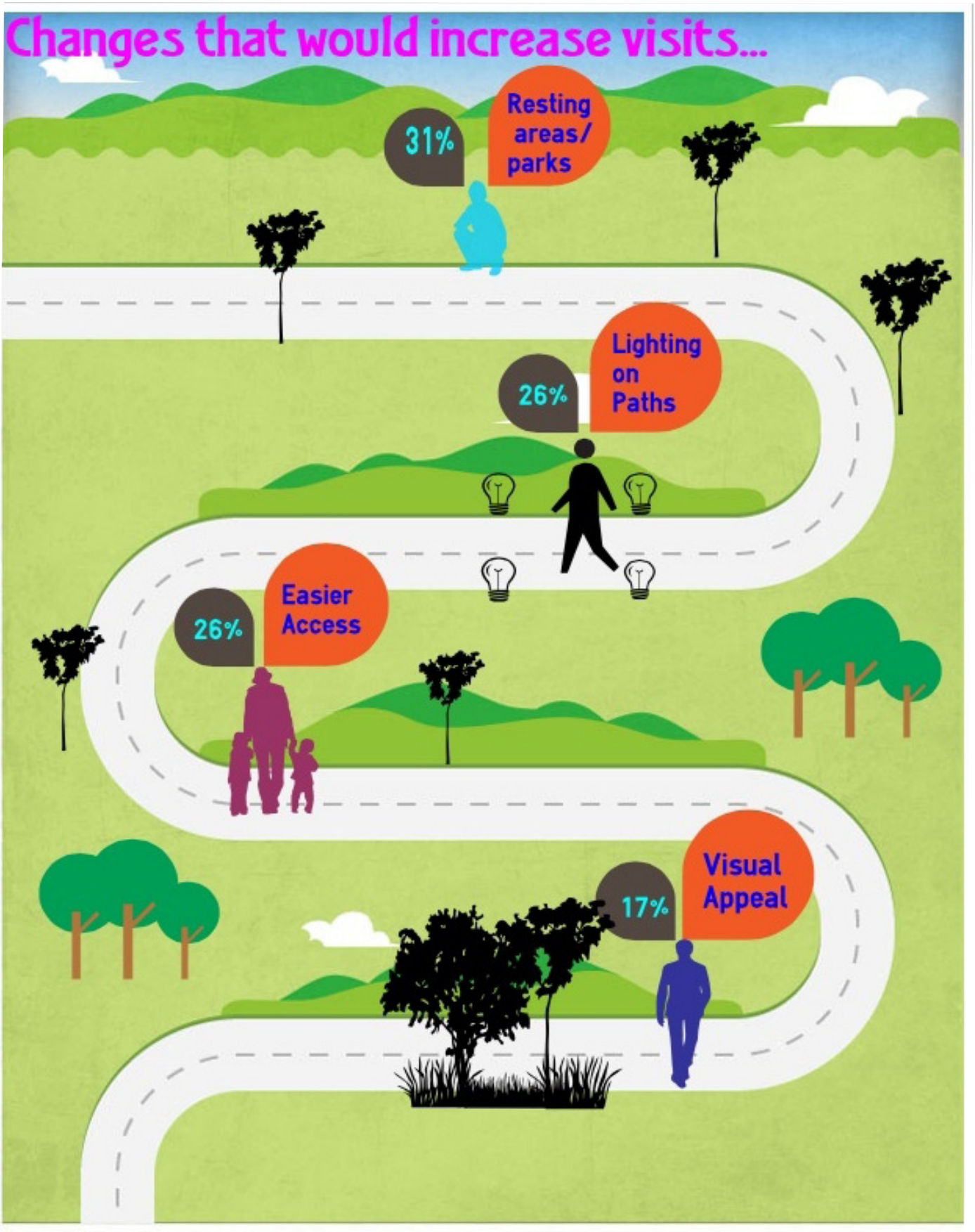


Figure 10: Survey Results: Accessing Fall Creek

Figure 11: Survey Results: Knowledge Assessment

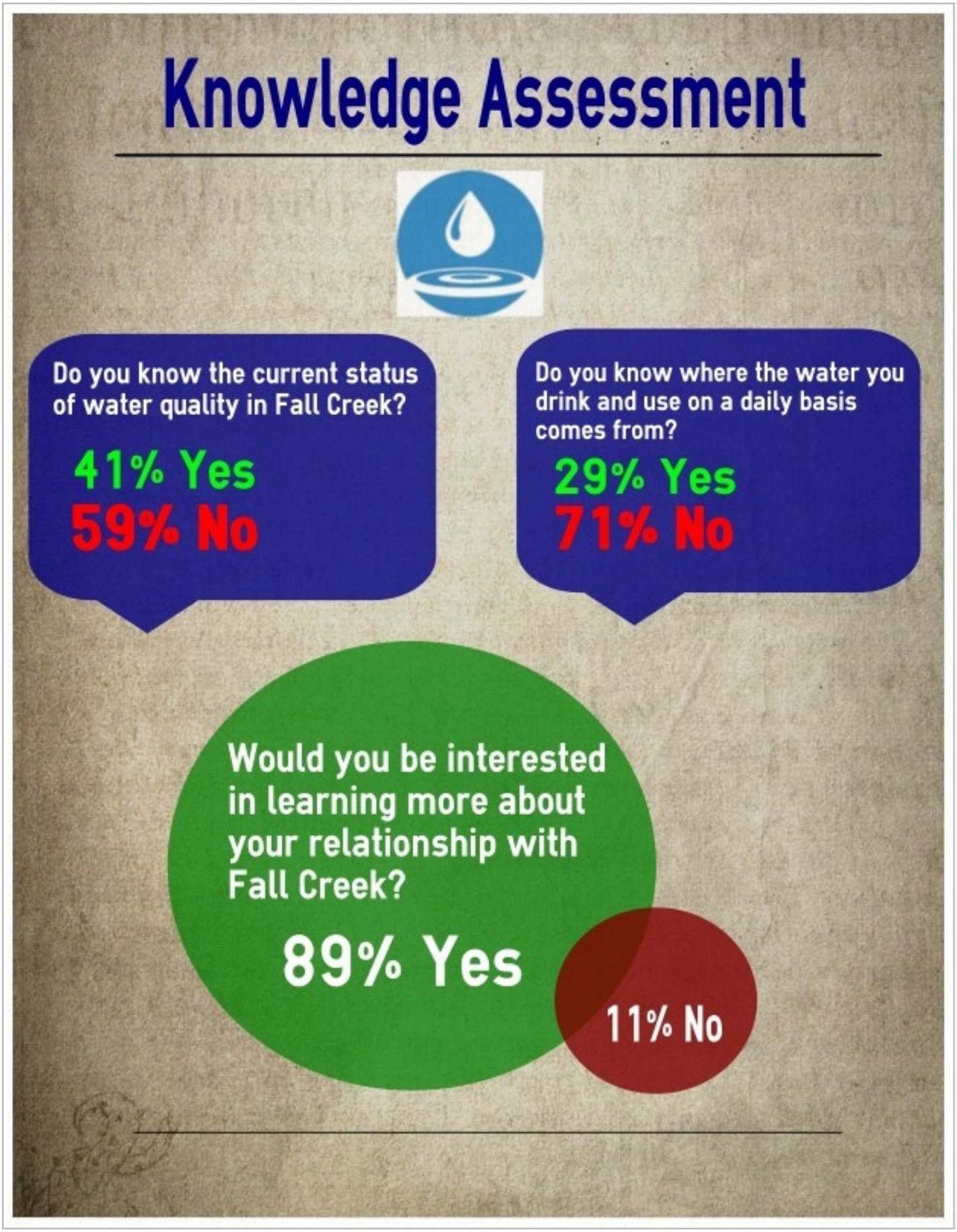
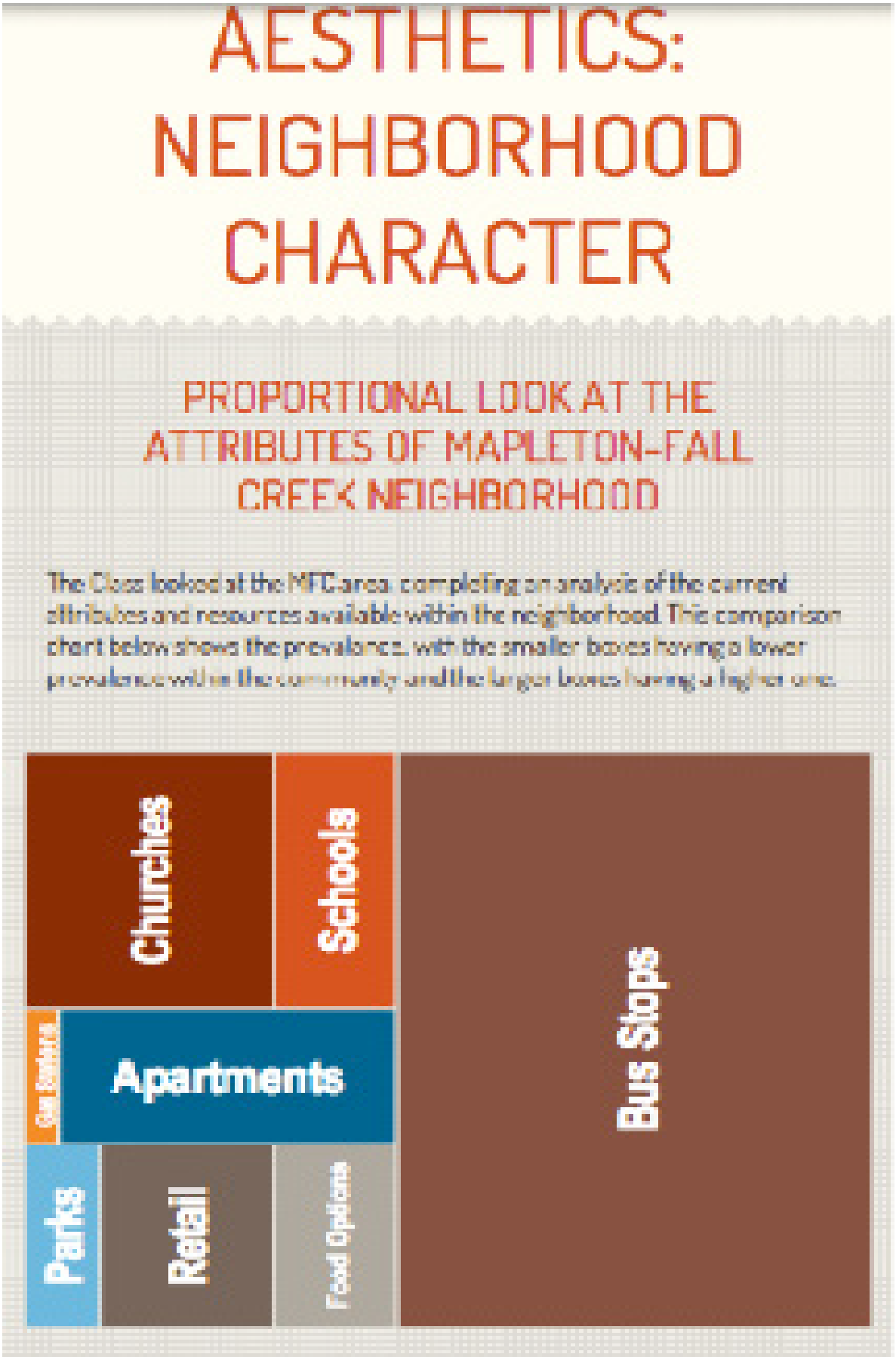


Figure 12: Aesthetics



V. Appendices

A. IRB Approval Letter

BUTLER UNIVERSITY

Institute for Research and Scholarship
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Indianapolis, Indiana 4620
(317) 940-9766
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INSTITUTIONAL REVIEW BOARD

DATE: November 2, 2012

TO: Rachel Culp, Marjorie Hennessy

FROM: Joel Martin
Chair, Institutional Review Board

RE: IRB Protocol

TITLE: Reconnecting to Our Waterways (ROW): Fall Creek Evaluation

SUBMISSION TYPE: New Study

On behalf of the Institutional Review Board (IRB), I am pleased to announce that your application for research involving human subjects has been approved as exempt as of the date of this memo. As such, there will be no further review of your protocol, and you are cleared to begin the procedures outlined in your protocol.

As an exempt study, there is no requirement for continuing review. Your protocol will remain on file with the IRB as a matter of record. Although your study is exempt from a continuing review, you and your research team are not exempt from ethical research practices and should therefore employ all protections for your participants and their data which are appropriate to your project.

Please note the following conditions apply to all IRB approvals:
1. No subjects may be involved in any study procedure prior to the IRB approval date.

2. All unanticipated or serious adverse events must be reported to the Institute for Research and Scholarship within 5 days.

3. All protocol modifications must be IRB approved prior to implementation unless they are intended to reduce risk. This includes any change of investigator, or site address.

4. All protocol deviations must be reported to the IRB within 5 working days.

5. All recruitment materials and methods must be approved by the IRB prior to being used.

I offer my congratulations on your approval and wish you success on your research. Should you desire additional assistance or clarification, please call me at 9971 or email jmmarti1@butler.edu.

B. Aesthetics Survey

The results of this survey will be used to assess community member's visual preference for the area surrounding the Fall Creek waterway throughout the Fall Creek neighborhood.

1. Below are two photos of the area along the Fall Creek waterway. Circle the picture you like most. Why do you like that picture the most?

   _____

   _____

Picture #1

Picture #2

2. Circle the number that best corresponds to your feeling about the picture below.

1	2	3	4	5
Least Desirable				Most Desirable

3. Circle the number that best corresponds to your feeling about the picture below.

1	2	3	4	5
Least Desirable				Most Desirable

4. How much does appearance of the area surrounding the Fall Creek waterway impact how much time you spend doing activities new it?

1	2	3	4	5
No Impact		Neutral		A lot

5. On average, how often do you visit the Fall Creek waterway area for recreational purposes? (Check one)
   Never ____
   Once in a while ____
   Once a week ____
   Between two and five times a week ____
   Everyday ____

6. What would make you more likely to visit the area? (Check one)
   Visually appealing (fewer overgrown areas, etc.) ____
   Lighting along walking path(s) ____
   Access ____
   Resting areas/parks along the walking path ____
   Nothing would change the likelihood of me visiting ____
   Other (please say what it is) ____

7. Age (4lease check one)
   0 – 14 _____
   15 – 24 _____
   25 – 34 _____
   35 – 44 _____
   45 – 54 _____
   55+ _____
   Prefer not to answer _____

8. Gender (please check one)
   Male _____
   Female _____
   Prefer not to answer _____

9. Zip code _____

10. Income (Please check one)
    $0 – 24,999 _____
    $25,000 – 49,999 _____
    $50,000 – 99,999 _____
    $100,000+ _____
    Prefer not to answer_____

C. Behavior and Attitudes Survey

Behavior & Attitudes Survey:

1. How far do you live from Fall Creek?	• Very Far • Far • Close • Very Close
2. How many blocks do you live from the creek?	# of blocks: _____
3. How often do you visit the creek?	• Never • Rarely • Occasionally • Often • Very often
4. If you visit the creek, how do you get there?	• Walk • Bicycle • Drive • Other_____
5. What activities do you perform while at the creek?	• Hiking • Fishing • Swimming • Bird Watching • Other _____
6. Do you know about the current status of water quality in the creek?	• Yes • No
7. Do you know where the water you drink and use on a daily basis comes from?	• Yes • If yes, where? _____ • No
8. Would you be interested in learning more about your relationship with the creek?	• Not interested • Interested • Very interested
9. Gender	• Male • Female
10. Age	• _____
11. Zipcode	• _____

V. References

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