APPENDIX A
Health and Safety Plans

Appendix A1 – Tamarack Creek Health and Safety Plan
Appendix A2 – Johnson Creek Health and Safety Plan

SITE-SPECIFIC
HEALTH AND SAFETY
PLAN

Prepared for:

Tamarack Creek - Stream and Wetland Restoration
Southfield

Prepared by:

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ECT No. 180611

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DOCUMENT REVIEW

The dual signatory process is an integral part of Environmental Consulting & Technology, Inc's (ECT's) Document Review Policy No. 9.03. All ECT documents undergo technical/peer review prior to dispatching these documents to any outside entity.

This document has been authored and reviewed by the following employees:

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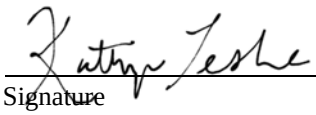	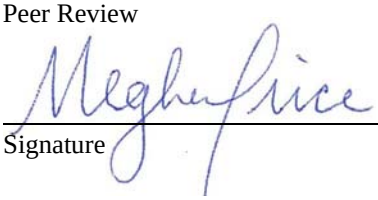
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LIST OF APPENDICES

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LIST OF ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
CPR	cardiopulmonary resuscitation
DEET	n,n-diethyl-meta-toluamide
ECT	Environmental Consulting & Technology, Inc.
HASP	health and safety plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
POW	Powassan
PPE	personal protective equipment
RNA	Ribonucleic acid
SDS	Safety data sheets
SHSR	Site Health and Safety Representative
Site	Area where wetland is being constructed site at Tamarack Creek
WNV	West Nile Virus

1.0 OVERVIEW

This site-specific health and safety plan (HASP) was developed in accordance with the provisions of Title 29 Code of Federal Regulations (CFR) Part 1910.120(b)(4) for employees of Environmental Consulting & Technology, Inc**.** (ECT) who are required to be perform monitoring and construction oversight activities for the Tamarack Creek - Stream and Wetland Restoration Project. Intrusive site activities to which this plan applies includes site assessment, ecological monitoring and construction oversight. Note that this plan will be modified as appropriate if additional work tasks are authorized.

This plan consists of several sections which address the typical hazards and corresponding controls associated with the described site activities, along with site-specific biological and physical hazards unique to the site. Plan sections address the following topics, as appropriate:

- Safety and Health Risk Analysis (**Section 2.0**)
- Employee Training Assignments (**Section 3.0**)
- Personal Protective Equipment (**Section 4.0**)
- Medical Surveillance (**Section 5.0**)
- Site Control (**Section 6.0**)
- Emergency Response Plan (**Section 7.0**)
- Near miss and incident reporting **(Section 8.0)**
- Health and Safety Plan Acknowledgement **(Section 9.0)**

Appendices to the plan include:

A. Site Map
B. Phone Numbers and Addresses to Nearby Hospitals
C. Near miss/ Incident report form.

Enforcement of this plan is the responsibility of the Project Manager and Safety Supervisor. Contact information is provided in the table below.

Name	**Title/Contact**
John O'Meara ECT	Project Manager W: 734-272-0754 M: 734-740-7000
Meghan Price ECT	Task Manager; Site Health and Safety Rep W: 313-963-6600 M: 313-587-6409
Sheldon Nozik ECT	Corporate Health and Safety Manager W: 734-272-0853 M: 716-908-5808
Note: M- mobile phone; W- work (office) phone	

1.1 SITE DESCRIPTION

The project site consists of a segment of Tamarack Creek and vacant woodland and wetland areas adjacent to the creek. The project site is located at Ten Mile Rd and Evergreen Rd, west of John C Lodge Freeway, in Southfield, MI, within a highly urbanized area adjacent to office buildings and parking lots and residential properties. Tamarack Creek is in the Rouge River Watershed, an identified area of concern (AOC) under the Great Lake Water Quality Agreement.

1.2 SCOPE OF WORK

ECT personnel will be involved in ecological monitoring and construction oversight for the Tamarack Creek Restoration Project. The specific project tasks that will involve ECT personnel include general site

assessments, fish monitoring, wetland delineation, threatened and endangered species assessments, sediment sampling and construction oversight.

1.3 EMERGENCY CONTACTS

ECT field personnel shall have mobile phones available while onsite.

Emergency numbers are as follows:

911	Fire
911	Police
911	Life-Threatening Medical Emergency
(248) 796-5500	Unsafe condition: Southfield Police Department

All employee injuries must be promptly reported to **Meghan Price**, the Site Health and Safety Representative (SHSR). If 911 is called for a life-threatening medical emergency, the SHSR will afterwards contact **WorkCare** at 888-449-7787 with information about the injury including the employee's name, injury location on employee's body, employee's home office, contact information, medical destination, and other information as directed. The SHSR should then also contact the Human Resources Department in Gainesville at 352-332-0444, the Corporate Health and Safety Manager (**Sheldon Nozik**) at 734-272-0853, and the Project Manager (**John O'Meara**) at 734-272-0754.

1.4 FIRST AID AND MEDICAL

Prior to starting of work, field workers should be educated on first aid measures. At least one person in the field should be trained to provide first aid. A first aid box should be present either in the field vehicle or in the work area. If a person is injured in the work area immediate medical assistance should be provided. One of the field crew should contact SHSR and report as soon as possible. The SHSR will contact WorkCare at 888-449-7787 with information about the injury including the employee's name, injury location on employee's body, employee's home office, contact information, and other information as directed. If first aid is appropriate, a WorkCare clinician will advise of applicable first aid measures. If a clinic visit is required, WorkCare will contact a clinic to initiate the response and will provide an address for the clinic.

The SHSR should then also contact the Human Resources Department in Gainesville at 352-332-0444, the Corporate Health and Safety Manager (Sheldon Nozik) at 734-272-0853, and the Project Manager (John O'Meara) at 734-272-0754.

The **telephone number and addresses for nearby hospitals** and **police precinct** are provided in **Appendix B**.

After injured employees are cared for, and when it is safe to do so, one person of the field crew should document the circumstances of the injury for use in conducting the Incident Investigation.

2.0 SAFETY AND HEALTH RISK ANALYSIS

The following sections review possible biological and physical hazards that might be associated with the site.

2.1 PHYSICAL HAZARDS

Physical hazards potentially present at the site include extreme weather conditions, equipment handling, uneven walking surfaces etc.

2.1.1 ECOLOGICAL MONITORING / SITE ASSESSMENTS

Pre and post construction ecological monitoring and site assessments will be conducted by ECT. This will involve site walks to take observations, vegetation and habitat surveys, sampling sediment, and monitoring site hydrology. These activities involve both physical hazards such slips and falls, cold and/or heat stress, and equipment hazards, as well as the biological hazards listed in Section 2.3. ECT personnel must review relevant operating manuals or be trained on field equipment use prior to the on-site implementation.

PPE for this activity includes:

- Proper protective clothing (long pants and long sleeves).
- Walking boots or waterproof boots (depending on conditions).
- Hard hats and safety vests (if heavy equipment is at the site).
- Nitrile gloves (when handling site samples of unknown composition).

2.1.2 CONSTRUCTION OVERSIGHT

ECT personnel will perform periodic site visits for visual inspections of construction. Project construction activities will involve use of heavy equipment (excavators & backhoes etc.) and construction materials. This has both physical and noise hazards. It is the responsibility of ECT construction oversight crew to make sure the subcontractors follow health and safety procedures. If it is noticed that HASP procedures are not followed properly by the subcontractors, the ECT field crew should report to the site safety officer.

Controls

- Field crew should be aware of their surroundings in the project site.
- Field personnel should be at least 50 ft away from heavy equipment. Communication (signaling) is important while working in construction sites. Workers should notify the equipment operators while moving around heavy equipment.
- PPE should be worn at all time during construction oversight.
- If any person is injured, he or should be given medical assistance immediately.

Minimum level of PPE for construction oversight includes:

- High visibility safety vests
- Hard hats
- Ear plugs while working near heavy equipment
- Any other PPE as requested/required by the contractor.

2.1.3 FISH MONITORING ACTIVITIES

Backpack Electrofishing

Health and safety are very critical while working with electrical equipment. The energy transmitted from the backpack electrofishing equipment is enough to cause physical harm a person. Electrofishing should be done with a minimum of a two-person crew when using a single anode. The team lead is responsible for the overall health and safety of the field crew. The team lead or at least one of the crew members should be CPR trained. Prior to the field work the crew should be briefed on the procedures to be followed for electrofishing. Additionally, all crew members should know the nearest urgent care or hospital location in the event of medical emergencies.

The major hazard associated with electrofishing is electrical shock. Backpack electrofishing equipment is powered by a battery which powers the anode. Backpack electrofishing should not be performed in water greater than thigh depth.

Controls

- The operator and personnel working with the operators should read the instructions in manual and SOP for the specific type of electrofishing equipment they would be using.
- Operations should be stopped during severe weather conditions (rain or thunderstorm).
- Crew members should be trained to use the electrofishing equipment.
- One of the crew members should be CPR trained/certified.
- PPE must be used while performing electroshocking. PPE includes working gloves, long handed nets, and rubber boots in good condition.
- Equipment should be maintained in safe conditions. Visual inspection should be performed before the use of equipment. All electrical systems should be insulated properly.

- Field personnel must wear lifejackets.

2.1.4 MANUAL LIFTING

Background

The hazards associated with improper material handling include being struck by a load, losing control of a load, physically overexerting oneself, and exceeding equipment capacities. Such accidents can lead to injuries (e.g., abrasions, bruises, and broken bones) and even loss of life. Material-handling accidents account for a sizable percentage of all occupational injuries that occur in every work area including construction and general industry. The risk of injury is not confined to manual lifting of heavy objects. Some lost-time injuries have even occurred in office situations where lifting is infrequent and involves only small items.

Controls

The following are seven profoundly important rules for lifting. Carefully applied they will help you prevent injury.

- Stop and think before you lift. Most lifting injuries occur when you are rushed or preoccupied.
- Keep heavy objects close to your body.
- When lifting heavy objects practice:
    - Spreading your feet wide apart.
    - Sticking out your chest and tucking in your chin.
    - Tightening your stomach muscles.
    - Keeping your back upright.
    - Bending your knees not your back.
    - Keeping your shoulders parallel to the floor as much as possible.
- When carrying a load over a long distance or for a long time, shift the load occasionally from one side to the other side and change position. Every half-hour put the load down and stretch your arms over your head while breathing in deeply.
- Do not lift and twist your back at the same time.
- Do not lean forward without bending your knees.
- Avoid lifting objects above the level of your shoulders.

Aside from proper lifting, the key to safe handling of equipment and materials is to think through each task, anticipate difficulties and take nothing for granted. A deliberate approach is the best way to avoid injuries.

2.1.5 UNEVEN WALKING SURFACES

Background

Slips, trips and falls are among the most common incidents at these sites that lead to employee injuries. The combination of uneven terrain and distracted employees can easily lead to falls. Falls can lead to impaling wounds if the employee happens to fall on an exposed sharp surface such as rebar, broken concrete, and/or glass. Again, extreme caution combined with slow movements can minimize potential injury.

Controls

Common sense rules provide the best means to avoid uneven walking surface-related injuries.

- Do not run while on-site, unless required to do so to escape an emergency situation.
- Do not walk backward.
- Practice and implement the technique of including the vertical peripheral view into your movements. Most people remember to look left and right before crossing a street – at this site you must also look down before taking steps.
- Try to look several feet ahead when traversing the site.
- Use good housekeeping procedures to minimize the accumulation of trip hazards.

2.1.6 WALKING IN WADERS

Background

Field work involving ECT personnel may require the use of waders to move through water depths for which rubber boots do not suffice. Walking in waders increases the hazard of walking on dry land as they are bulky and can restrict movement, and the use of waders in water involve hazards associated with moving water and obscured underwater conditions. The following controls and the controls listed in the previous section for uneven walking surfaces provide the best means to avoiding incidents.

Controls

- Take small, shuffling steps when wading through water
- Verify safe/firm footing before stepping
- When entering water, use access points with small slopes and minimal tripping hazards
- Always wear personal flotation devices
- Never enter water if the depth is unknown
- Do not enter water with swift current
- As with all field work, employ the buddy system

2.2 COLD STRESS

Background

Prolonged exposure to freezing or cold temperatures may cause serious health problems such as trench foot, frostbite and hypothermia. In extreme cases, including cold-water immersion, exposure can lead to death.

Danger signs include uncontrolled shivering, slurred speech, clumsy movements, fatigue and confused behavior. Danger signs also include changes in skin color. For example, a pale appearance in fingers, toes, cheeks or noses that should be rosy from the cold can be an indication of frostbite. Another symptom of frostbite is loss of feeling in extremities.

More severe reaction to cold is called hypothermia, which occurs when the body temperature drops to less than 90 Fahrenheit. Symptoms of hypothermia include uncontrollable shivering, slow speech, memory lapses, frequent stumbling, drowsiness and exhaustion.

Workers are advised to avoid alcohol and smoking when in extreme cold. It constricts blood flow to the skin and can contribute to frostbite or hypothermia.

If any of the danger signs are observed, call for emergency help.

Controls

- Recognize the environmental and workplace conditions that may be dangerous.
- Learn the signs and symptoms of cold-induced illnesses and injuries and what to do to help workers.
- Train workers about cold-induced illnesses and injuries.
- Encourage workers to wear proper clothing for cold, wet and windy conditions, including layers that can be adjusted to changing conditions.
- Be sure workers in extreme conditions take a frequent short break in warm dry shelters to allow their bodies to warm up.
- Try to schedule work for the warmest part of the day.
- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- Use the buddy system – work in pairs so that one worker can recognize danger signs.
- Drink warm, sweet beverages (sugar water, sports-type drinks) and avoid drinks with caffeine (coffee, tea, sodas or hot chocolate) or alcohol.
- Eat warm, high-calorie foods such as hot pasta dishes.
- Remember, workers face increased risks when they take certain medications, are in poor physical condition or suffer from illnesses such as diabetes, hypertension or cardiovascular disease.

Inform a safety officer if they believe they (or another employee) are suffering cold-related symptoms.

2.3 HEAT STRESS

Background

Four environmental factors affect the amount of stress a worker faces in a hot work area: temperature, humidity, radiant heat (such as from the sun or a furnace) and air velocity. Perhaps most important to the level of stress an individual can face are personal characteristics such as age, weight, fitness, medical condition and acclimatization to the heat.

The body reacts to high external temperature by circulating blood to the skin which increases skin temperature and allows the body to give off its excess heat through the skin. However, if the muscles are being used for physical labor, less blood is available to flow to the skin and release the heat.

Sweating is another means the body uses to maintain a stable internal body temperature in the face of heat. However, sweating is effective only if the humidity level is low enough to permit evaporation and if the fluids and salts lost are adequately replaced.

If the body cannot dispose of excess heat, it will store it. When this happens, the body's core temperature rises and the heart rate increases. As the body continues to store heat, the individual begins to lose concentration and has difficulty focusing on a task, may become irritable or sick and often loses the desire to drink. The next stage is most often fainting, and death is possible if the person is not removed from the heat stress.

Heat stroke, the most serious health problem for workers in hot environments, is caused by the failure of the body's internal mechanism to regulate its core temperature. Sweating stops, and the body can no longer rid itself of excess heat. Signs include (1) mental confusion, delirium, loss of consciousness, convulsions or coma; (2) a body temperature of 106 degrees F or higher; and (3) hot dry skin which may be red, mottled, or bluish. Victims of heat stroke will die unless treated promptly.

Heat exhaustion results from loss of fluid through sweating when a worker has failed to drink enough fluids or take in enough salt or both. The worker with heat exhaustion still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. The skin is clammy and moist, the complexion pale or flushed, and the body temperature normal or slightly higher.

Heat cramps, painful spasms of the muscles, are caused when workers drink large quantities of water but fail to replace their bodies' salt loss. Tired muscles – those used for performing the work – are usually the ones most susceptible to cramps. Cramps may occur during or after working hours.

Fainting (heat syncope) may be a problem for the worker acclimatized to a hot environment who simply stands still in the heat. Victims usually recover quickly after a brief period of lying down.

Heat rash, also known as prickly heat, may occur in hot and humid environments where sweat is not easily removed from the surface of the skin by evaporation. When extensive or complicated by infection, heat rash can be so uncomfortable that it inhibits sleep and impedes a worker's performance or even results in temporary total disability.

Dehydration is a health issue related to heat stress for personnel working in field. Construction oversight works will require the crew to be in the field for long hours which puts them at high risk of dehydration. Dehydration occurs when the person takes in substantially less water than the amount of water lost. Dehydration can pose a serious risk to health. It also decreases the productivity of the person.

Controls

- Regularly drink fluids, either water or electrolyte solutions.
- Be familiar with symptoms of heat-related stress.
- Inform a safety officer if they believe they (or another employee) are suffering heat-related symptoms.

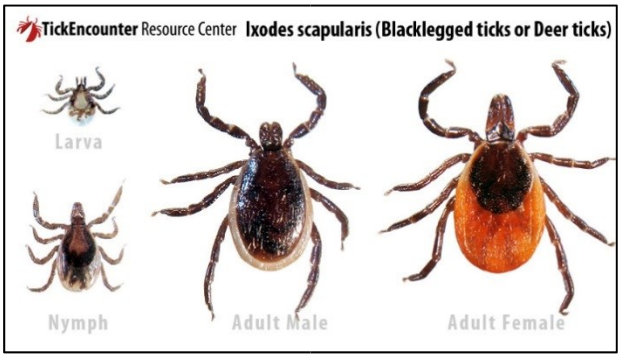
2.4 BIOLOGICAL HAZARDS

The routes for biological hazards include contact with water, bites from infected ticks and/or mosquitoes, and exposure to poisonous plants.

2.4.1 LYME DISEASE

Background

Lyme disease is caused by a bacterium transmitted through the bite of an infected tick. Ticks usually live through the late spring to early fall in tall grassed and vegetated areas, waiting to climb onto a host. Deer ticks, or blacklegged ticks, are the most common for spreading Lyme disease in the north-central United States. Adult and pre-mature (nympth) ticks are both susceptible to spreading the disease. Most of the time, the tick must be attached to the host for 36 to 48 hours before the bacterium can be transmitted.



Symptoms

Between 3 to 30 days after the bite, symptoms of Lyme disease include: fever, chills, muscle and joint aches, swollen lymph nodes, and erythema migrans rash. If left untreated, symptoms after months of the tick bite include: severe headaches, stiff neck, arthritis, facial palsy, intermittent pain in tendons and muscles, irregular heartbeat, dizziness, inflammation of the brain/spinal cord, nerve pain, tingling in the extremities, and problems with short-term memory.

Treatment

To remove ticks that are embedded in skin, utilize a tick key, or use tweezers or fingers to carefully grasp the tick as close to the skin as possible and pull slowly upward, avoiding twisting or crushing the tick. Do not try to burn or smother the tick. Cleanse the bite area with soap and water, alcohol, or household antiseptic. Note the date and location of the bite and save the tick in a secure container such as an empty pill vial or film canister. A bit of moistened paper towel placed inside the container will keep ticks from drying out. Keep the tick to give to a doctor, to test if the tick is a carrier for Lyme disease. The earlier one is diagnosed and treated, the easier and faster the recovery will be. Antibiotics (doxycycline, amoxicillin, and cefuroxime axetil) are used for oral treatment. If left untreated, the disease can turn into "chronic Lyme disease", and antibiotics will be less affective.

Controls

Use tick repellent (n,n-diethyl-meta-toluamide [DEET], picaridin, or IR3535 on skin; permethrin on clothes) when working in long grassed and vegetated areas. Wear long pants and shirts, preferably light colored to easily identify ticks. Tuck pants into socks and use duct tape to wrap around cuffs to prevent exposure. Complete an inspection of equipment and clothing throughout the day and before going home. At home, immediately shake out clothes and put in the dryer on high heat for 10 minutes to kill any ticks. Conduct a full-body tick check, especially focusing on hard to see areas: the belly button, scalp, armpits, and behind the knees.

2.4.2 POWASSAN VIRUS

Background

Powassan (POW) virus is a ribonucleic acid (RNA) virus that causes inflammation of the brain. POW virus is transmitted through the bite of an infected tick. Ticks usually live during the late spring to early fall in tall grassed and vegetated areas, waiting to climb onto a host. Most cases of POW virus have occurred in the northeastern and Great Lakes regions of the United States. It is unknown how long the tick needs to be attached to spread the virus.

Symptoms

Symptoms can occur between one week to one month after the tick bite, but some people affected may not show symptoms. Symptoms include: fever, headache, vomiting, weakness, seizures, encephalitis (swelling

of the brain), and meningitis (swelling of spinal cord and brain membrane). About half of survivors will have permanent neurological symptoms. About 10% of POW virus cases are fatal.

Treatment
Follow tick removal procedure described above for LYME DISEASE. Keep the tick to give to a doctor, to test if the tick is a carrier for POW. There are no medications to treat POW virus. Hospitalization may be needed for cases of encephalitis and meningitis.

Controls
Same as described above for LYME DISEASE.

2.4.3 WEST NILE VIRUS

Background
West Nile Virus (WNV) is a virus that causes fever and/or inflammation to the brain. Transmission occurs through the bite of an infected mosquito. People with autoimmune diseases are most susceptible. Even though WNV is most common in tropical regions, the virus has spread globally since the 1990's.

Symptoms
About 70-80% of people infected do not show signs of symptoms. Usually occurring within two to 15 days after the bite, symptoms include: headache, body aches, joint pains, vomiting, diarrhea, and rash. Fatigue and weakness after recovery can last for weeks to a month. Less than 1% of people infected will develop neurological problems, including: high fever, stiff neck, coma, seizures, encephalitis, and meningitis.

Treatment
There are no vaccines or medication to treat WNV. Over-the-counter pain relievers can be used to reduce fever and symptoms. Hospitalization may be needed for cases of severe dehydration, encephalitis, or meningitis.

Controls
Use bug repellent (DEET, picaridin, IR3535, and lemon eucalyptus on skin; permethrin on clothes) when working outdoors. Wear long pants and shirts to eliminate exposed skin. Head nets can be worn to provide protection to the face.

2.5 PUBLIC SAFETY

The project site is in a public park. People who visit the park may be curious about the construction activities. Construction will involve use of heavy equipment and other construction materials. Public should not be encouraged to enter the construction area. Proper signs must be installed to notify the public.

3.0 EMPLOYEE TRAINING ASSIGNMENTS

All employees, supervisors, and management working on site that are exposed to health and safety hazards shall receive training before they are permitted to engage in activities that could expose them to health hazards. The training may include: first aid, personal protective equipment (PPE), field equipment, and health and safety risks.

4.0 PERSONAL PROTECTIVE EQUIPMENT

PPE is designed to protect employees from serious workplace injuries or illnesses resulting from contact with chemical, radiological, biological, physical, electrical, mechanical, or other workplace hazards. Besides face shields, safety glasses, hard hats, and safety shoes, PPE includes a variety of devices and garments such as goggles, coveralls, gloves, vests, earplugs, and respirators.

The minimum level of protection required for employees includes:

- Work boots/shoes

- Reflective safety vests
- Long pants

Additional PPE requirements exist for specific site activities. ECT personnel should refer to Section 2.0 for more information regarding the additional PPE requirements for a particular site activity.

5.0 MEDICAL SURVEILLANCE

Not applicable.

6.0 SITE CONTROL

The site control program includes, at a minimum:

- A site map;
- A list of phone numbers of all the employees that are involved in the project, the PM and SHSR;
- Site communications, including alerting means for emergencies; SOPs or safe work practices; and
- Phone numbers and addresses of nearby hospitals.

A general map of the restoration site is included as **Appendix A** to this plan.

Site communication may consist of cell phone usage. The primary method of alerting emergency personnel is by dialing 911.

Appendix B contains addresses and phone numbers of the closest hospitals near the project area. Employees should be aware of the nearest intersection in the event of emergency communications with 911. In the event that an employee becomes severely injured and requires immediate medical attention, the employee must be transported by an ambulance. For minor injuries, contact a WorkCare clinician to advise first aid measures. If a clinic visit is required, WorkCare will contact a clinic to initiate the response and will provide an address for the clinic.

Appendix B also contains the address of the Southfield Police Department, if a non-emergency situation arises.

7.0 EMERGENCY RESPONSE PLAN

Following is an emergency response plan for use in the event of:

- Violent weather;
- Fire;
- Medical emergency; and
- Vandalism/Criminal Activity.

7.1 Violent weather

Violent weather (thunderstorm, tornado, high winds) can occur with minimal notice based on local weather conditions. In the event that lightning is observed in the vicinity of the site, employees are to avoid water, high ground, open spaces, solitary tall trees, and metal objects. Seek shelter and remain in shelter for duration of lightening event and 30 minutes after last observed lightning strike. If shelter is not available, you should:

- Crouch down with both feet together. Do not lie down or place your hands on the ground.
- Do not stand near other people. Keep a minimum distance of 15 feet apart.
- If you are outside and you feel your hair stand on end, this is an indication that lightning is about to strike. You should bend forward, putting your hands on your knees.
- Inside of a shelter, stay away from doors, windows and avoid water. Electrical appliances (e.g. computers, power tools) should be turned off and unplugged. If appliances can't be unplugged (e.g. telephones), stay away from them.

- Persons injured by lightning do not carry an electrical charge and can be handled safely. Administer first aid/cardiopulmonary resuscitation (CPR) to a lightning victim if you're qualified to do so. Send for help immediately.

If heavy winds occur, seek shelter immediately. Remember that loose material can become airborne.

7.2 Fire

In the event of an incipient stage (beginning, small) fire, employees should notify adjacent individuals of this situation and exit the area. Only employees trained in the use of fire extinguishers should attempt to use an extinguisher.

In the event of an out-of-control fire, employees are to exit the site as quickly as possible and assemble for head count.

7.3 Medical Emergency

If an employee observes an individual being injured or exhibiting signs/symptoms of illness, they should immediately notify as many individuals as necessary (preferably the nearest safety or site supervisor) of the situation.

Employees certified in CPR may administer help if they feel they are qualified.

At least one employee should be sent to the site entrance to direct responding emergency services personnel to the appropriate location.

7.4 Vandalism/criminal activity

Should an employee observe suspicious activity or feel threatened, they should leave the area and call the police.

8.0 NEAR MISS AND INCIDENT REPORTING

OSHA defines a near miss as an incident in which no property was damaged and no personal injury was sustained, but where, given a slight shift in time or position, damage or injury easily could have occurred. Near misses also may be referred to as close calls, near accidents, accident precursors, injury-free events and, in the case of moving objects, near collisions etc. Near misses are very important to be noticed and documented for better and a safe workplace. A few examples of near misses are: worker tripping over an object or slippery conditions but manages to balance the fall without getting hurt, almost getting hit or hurt by a broken-field equipment etc.

Before starting the field work, training should be provided by the SHSR on identifying and documenting near misses. At the event a near miss is observed the field crew or the personnel should record it with a brief detail on the location it happened, time, job site and the field crew involved in it. Field near miss form is attached in **Appendix C**.

The near miss form should then be sent to the corporate health and safety manager. The health and safety manager should consult with the SHSR to investigate the situation and provide corrective actions or precautions to avoid a potential accident in the future. If more than one crew is involved in a project, the SHSR should address the near miss to the other field crews and make sure they are aware of the situation.

9.0 HEALTH AND SAFETY PLAN ACKNOWLEDGEMENT

By signing this form, I acknowledge that I have reviewed the Site-Specific Health and Safety Plan for the Site.

Name (Printed)	Signature

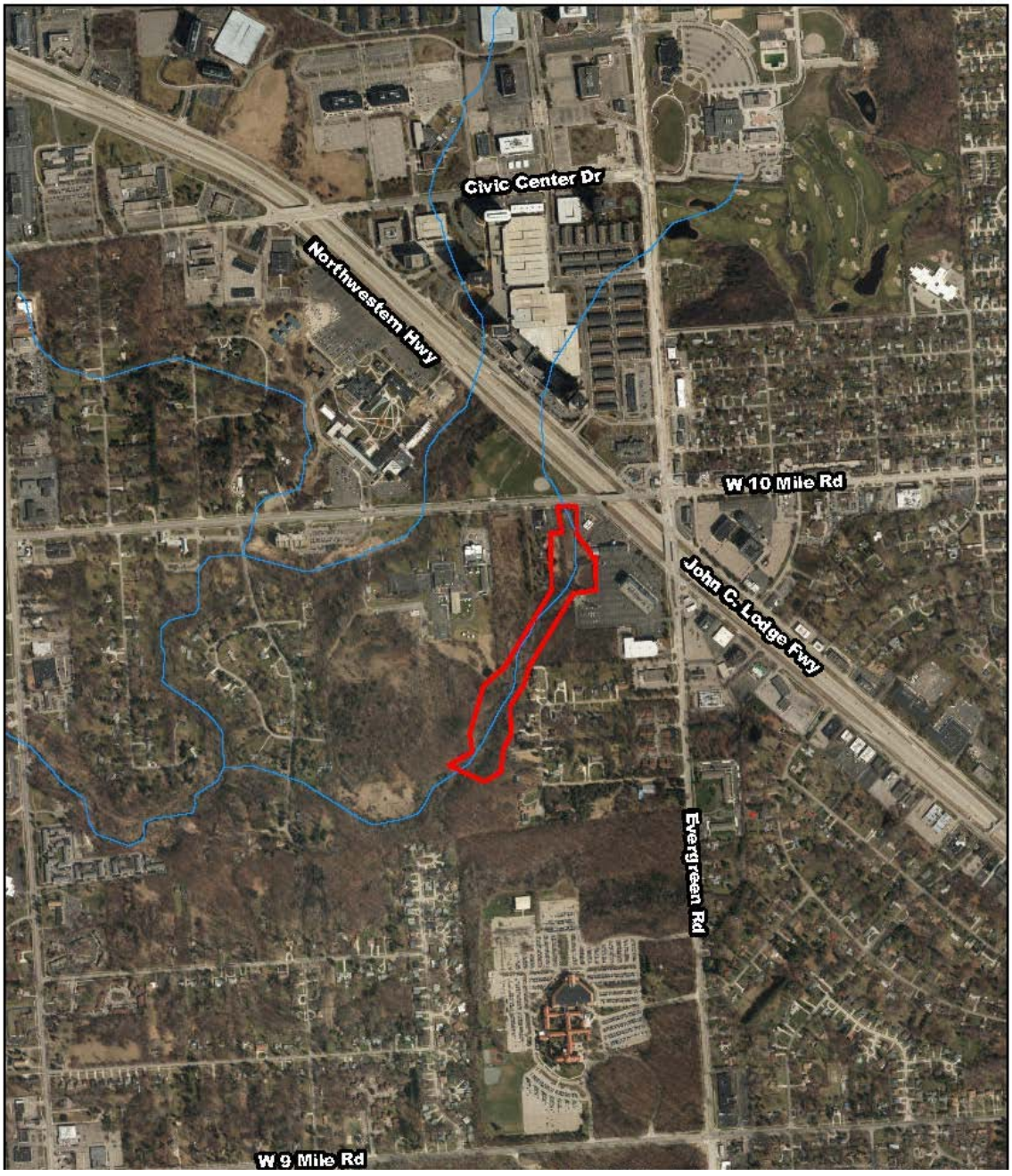
Orientation Provided By: _____

Date: _____

Appendix A. Site Maps

Tamarack Creek Project Site: Located at Ten Mile Rd and Evergreen Rd, west of John C Lodge Freeway Southfield Township, MI

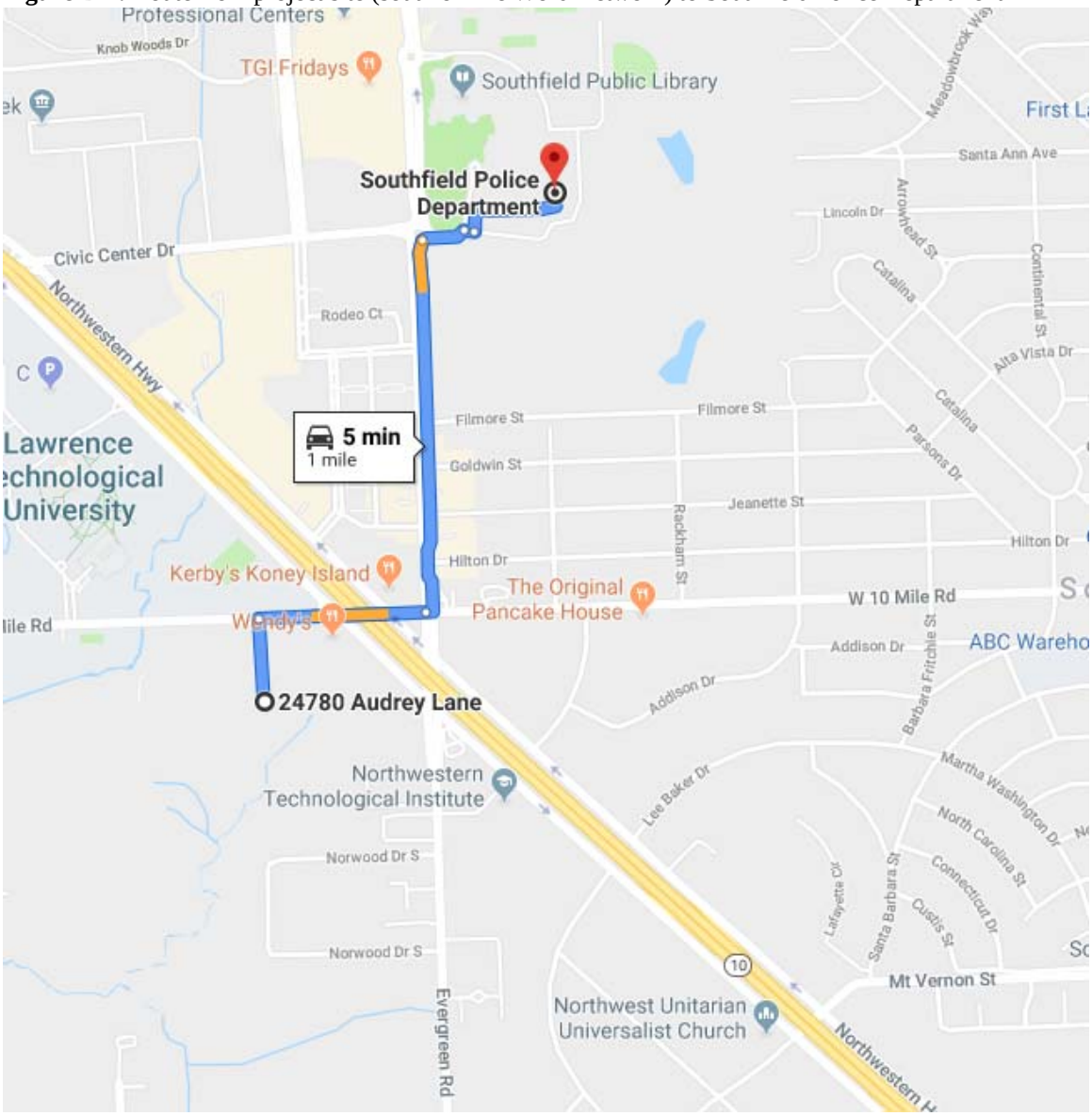
Figure A-1: Map with the Tamarack Creek Project Site outlined in red.



Appendix B. Police, Hospital and Urgent Care Information

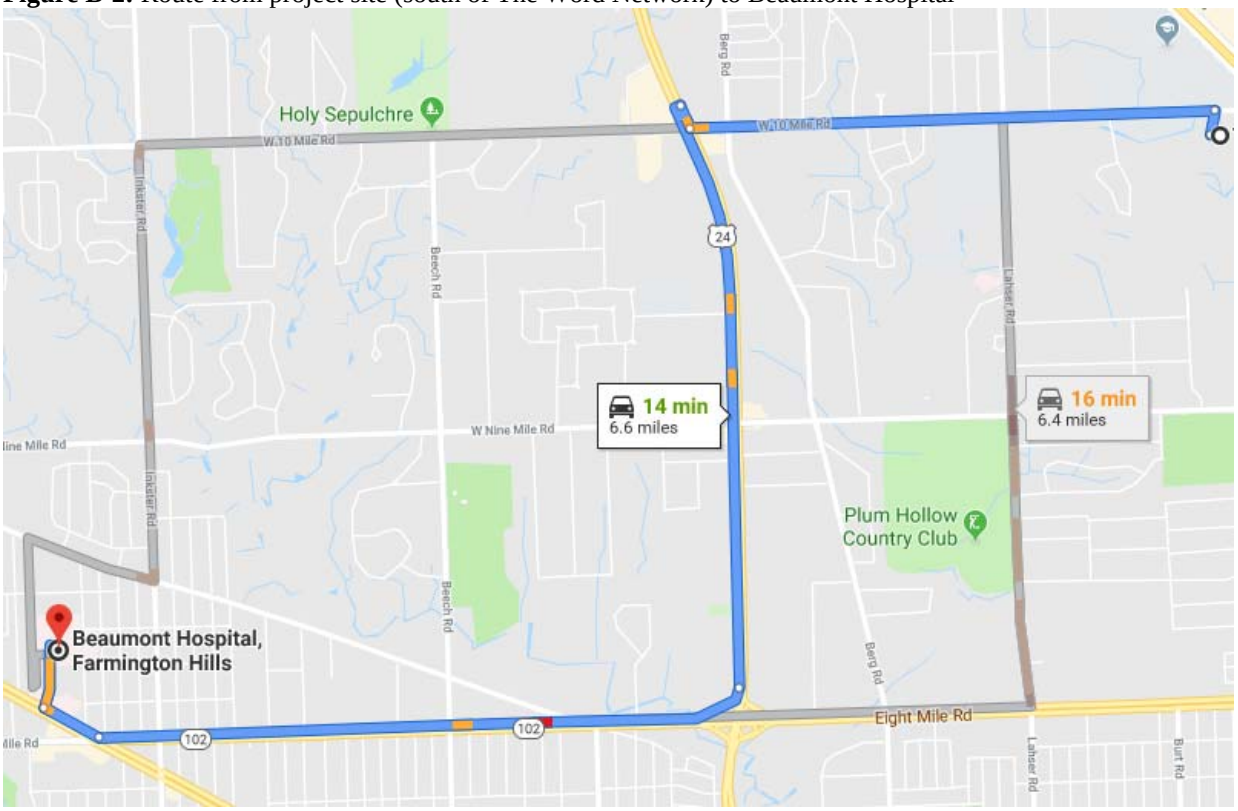
Southfield Police Department
26000 Evergreen Rd. Southfield, MI 48076
(248) 796-5500

Figure B-1: Route from project site (south of The Word Network) to Southfield Police Department



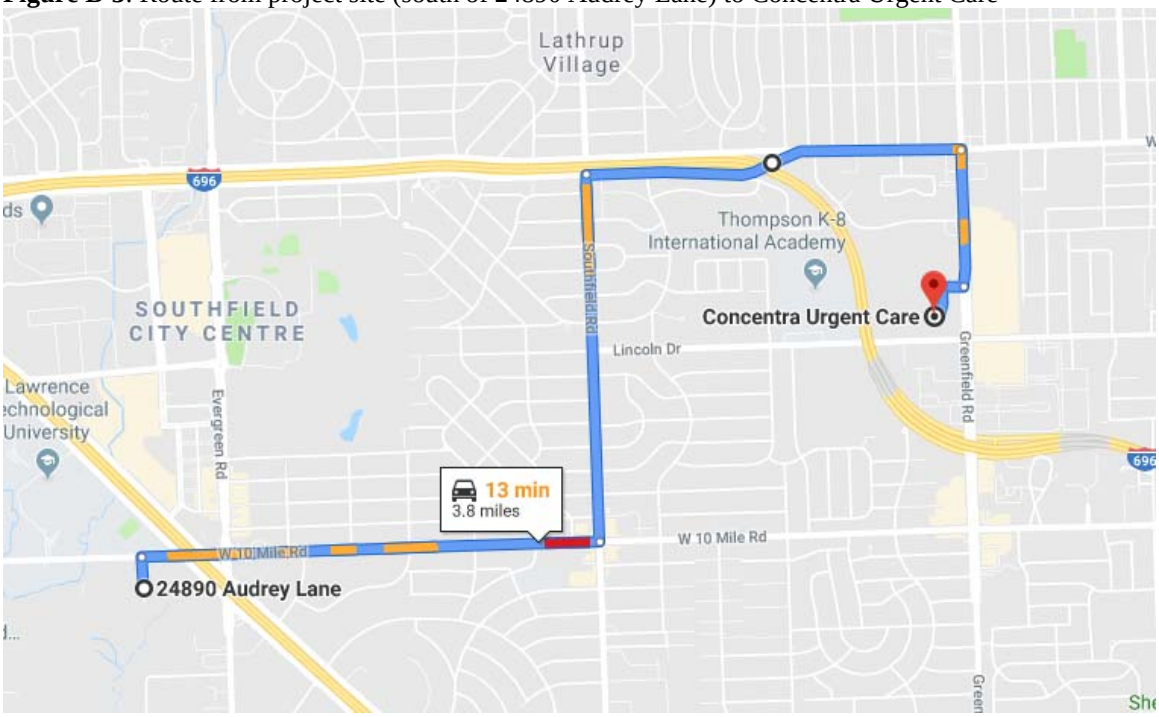
Beaumont Hospital, Farmington Hills
28050 Grand River Ave. Farmington Hills, MI 48336
(248) 471-8000

Figure B-2: Route from project site (south of The Word Network) to Beaumont Hospital



Concentra Urgent Care
26185 Greenfield Rd, Southfield, MI 48075
(248) 569-2040

Figure B-3: Route from project site (south of 24890 Audrey Lane) to Concentra Urgent Care



Appendix C. Near Miss/ Incident Report Form

ECT Environmental Consulting & Technology, Inc.

INCIDENT/INJURY/ NEAR MISS REPORT FORM

PART I

Individual Involved: ☐ Employee ☐ Affiliate Employee ☐ Visitor ☐ Customer

☐ Contractor _____ ☐ Other _____

Incident: ☐ Injury/Illness/Fatality ☐ Near Miss ☐ Fire ☐ Spill/Release ☐ Motor Vehicle Incident

☐ Permit Violation ☐ Explosion ☐ Bomb Threat ☐ Other _____

General Information

Date of Incident: Day: ☐S ☐M ☐T ☐W ☐T ☐F ☐S Time: _____ ☐a.m./☐p.m.

Location of Incident: _____ Supervisor's Name: _____

Date Reported to Supervisor: Time Reported to Supervisor: _____ ☐a.m./☐p.m.

Project Number: _____ Site Location: _____

Accident/Injury/Near Miss—Personnel Information

Name _____ _____ _____ Employee # _____ Age _____ ☐M ☐F
Last First MI

If Contractor/Visitor: Company/Visitor Name: _____ Business Phone: _____

Company/Visitor Address: _____

_____

Job Title: _____ Type of Injury: _____

Body Part(s) Affected: _____

Medical Treatment Provided: ☐ EMT ☐ Hospital ☐ First Aid ☐ Other _____

EMT Name: _____ Hospital Name: _____

Witness to Incident: _____ _____ _____
Last First MI

Witness to Incident: _____ _____ _____
Last First MI

Description of Incident—Detailed Sequence of Events (attach additional pages as necessary)

PART II

Employees Interviewed

Last Name	First Name	MI	Job Title

Description of Root Causes

Description of Contributing Causes

Follow-up Corrective Actions

Corrective Action	Work Order No. (if applicable)	Responsible Person	Estimated Completion Date	Actual Completion Date

Investigation Team

Investigator:

Last _____ First _____ Job Title _____ Date _____

Investigator:

Last _____ First _____ Job Title _____ Date _____

Investigator:

Last _____ First _____ Job Title _____ Date _____

Investigator:

Last _____ First _____ Job Title _____ Date _____

Closure Approval

Office Manager

Print _____ Signature _____ Date _____

SITE-SPECIFIC
HEALTH AND SAFETY
PLAN

Prepared for:

Johnson Creek – Fish Hatchery Park Restoration
Northville

Prepared by:

2200 Commonwealth Blvd., Suite 300, Ann Arbor, MI 48105-2957

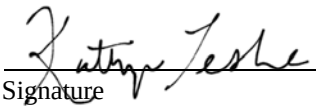
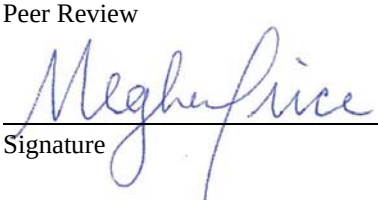
ECT No. 180611

July 2019

DOCUMENT REVIEW

The dual signatory process is an integral part of Environmental Consulting & Technology, Inc's (ECT's) Document Review Policy No. 9.03. All ECT documents undergo technical/peer review prior to dispatching these documents to any outside entity.

This document has been authored and reviewed by the following employees:

Kathryn Teske	Meghan Price
Author	Peer Review
	
Signature	Signature
08/06/2019	08/06/2019
Date	Date

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LIST OF APPENDICES

Appendix A. Site Maps
Appendix B. Police, Hospital and Urgent Care Information
Appendix C. Near Miss/ Incident Report Form

LIST OF ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
CPR	cardiopulmonary resuscitation
DEET	n,n-diethyl-meta-toluamide
ECT	Environmental Consulting & Technology, Inc.
HASP	health and safety plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
POW	Powassan
PPE	personal protective equipment
RNA	Ribonucleic acid
SDS	Safety data sheets
SHSR	Site Health and Safety Representative
Site	Area where wetland is being constructed site at Johnson Creek
WNV	West Nile Virus

1.0 OVERVIEW

This site-specific health and safety plan (HASP) was developed in accordance with the provisions of Title 29 Code of Federal Regulations (CFR) Part 1910.120(b)(4) for employees of Environmental Consulting & Technology, Inc**.** (ECT) who are required to be perform monitoring and construction oversight activities for the Johnson Creek – Fish Hatchery Park Restoration Project. Intrusive site activities to which this plan applies includes site assessment, ecological monitoring and construction oversight. Note that this plan will be modified as appropriate if additional work tasks are authorized.

This plan consists of several sections which address the typical hazards and corresponding controls associated with the described site activities, along with site-specific biological and physical hazards unique to the site. Plan sections address the following topics, as appropriate:

- Safety and Health Risk Analysis (**Section 2.0**)
- Employee Training Assignments (**Section 3.0**)
- Personal Protective Equipment (**Section 4.0**)
- Medical Surveillance (**Section 5.0**)
- Site Control (**Section 6.0**)
- Emergency Response Plan (**Section 7.0**)
- Near miss and incident reporting **(Section 8.0)**
- Health and Safety Plan Acknowledgement **(Section 9.0)**

Appendices to the plan include:

A. Site Map
B. Phone Numbers and Addresses to Nearby Hospitals
C. Near miss/ Incident report form.

Enforcement of this plan is the responsibility of the Project Manager and Safety Supervisor. Contact information is provided in the table below.

Name	**Title/Contact**
John O'Meara ECT	Project Manager W: 734-272-0754 M: 734-740-7000
Meghan Price ECT	Task Manager; Site Health and Safety Rep W: 313-963-6600 M: 313-587-6409
Sheldon Nozik ECT	Corporate Health and Safety Manager W: 734-272-0853 M: 716-908-5808
Jill Rickard Northville Township	Township Engineer W: 248-662-0497
Note: M- mobile phone; W- work (office) phone	

1.1 SITE DESCRIPTION

The project site consists of a segment of Johnson Creek, vacant woodland and wetland areas adjacent to the creek, and a stormwater detention pond. The project site is bounded by Fish Hatchery Park to the west and residences along Fairbrook road to the east. Johnson Creek is a tributary of the Middle Rouge River, an identified area of concern (AOC) under the Great Lake Water Quality Agreement. The habitat within the project site has been degraded due to sedimentation, streambank hardening, and loss of vegetation. The restoration project will remove the accumulated sediment and naturalize the banks to restore the fish habitat and remove beneficial use impairments.

1.2 SCOPE OF WORK

ECT personnel will be involved in ecological monitoring and construction oversight for the Johnson Creek Habitat Restoration Project. The specific project tasks that will involve ECT personnel include:

- General site assessment
- Stream stability assessment
- Vegetation mapping
- Threatened and endangered species analysis
- Fish monitoring
- Sediment characterization

1.3 EMERGENCY CONTACTS

ECT field personnel shall have mobile phones available while onsite.

Emergency numbers are as follows:

911	Fire
911	Police
911	Life-Threatening Medical Emergency
248-349-9400	Unsafe condition: Northville Police Department

All employee injuries must be promptly reported to **Meghan Price**, the Site Health and Safety Representative (SHSR). If 911 is called for a life-threatening medical emergency, the SHSR will afterwards contact **WorkCare** at 888-449-7787 with information about the injury including the employee's name, injury location on employee's body, employee's home office, contact information, medical destination, and other information as directed. The SHSR should then also contact the Human Resources Department in Gainesville at 352-332-0444, the Corporate Health and Safety Manager (**Sheldon Nozik**) at 734-272-0853, and the Project Manager (**John O'Meara**) at 734-272-0754.

1.4 FIRST AID AND MEDICAL

Prior to starting of work, field workers should be educated on first aid measures. At least one person in the field should be trained to provide first aid. A first aid box should be present either in the field vehicle or in the work area. If a person is injured in the work area immediate medical assistance should be provided. One of the field crew should contact SHSR and report as soon as possible. The SHSR will contact WorkCare at 888-449-7787 with information about the injury including the employee's name, injury location on employee's body, employee's home office, contact information, and other information as directed. If first aid is appropriate, a WorkCare clinician will advise of applicable first aid measures. If a clinic visit is required, WorkCare will contact a clinic to initiate the response and will provide an address for the clinic.

The SHSR should then also contact the Human Resources Department in Gainesville at 352-332-0444, the Corporate Health and Safety Manager (Sheldon Nozik) at 734-272-0853, and the Project Manager (John O'Meara) at 734-272-0754.

The **telephone number and addresses for nearby hospitals** and **police precinct** are provided in **Appendix B**.

After injured employees are cared for, and when it is safe to do so, one person of the field crew should document the circumstances of the injury for use in conducting the Incident Investigation.

2.0 SAFETY AND HEALTH RISK ANALYSIS

The following sections review possible biological and physical hazards that might be associated with the site.

2.1 PHYSICAL HAZARDS

Physical hazards potentially present at the site include extreme weather conditions, equipment handling, uneven walking surfaces, etc.

2.1.1 ECOLOGICAL MONITORING / SITE ASSESSMENTS

Pre and post construction ecological monitoring and site assessments will be conducted by ECT. This will involve site walks to take observations, vegetation and habitat surveys, sampling sediment, and stream stability assessments. These activities involve both physical hazards such slips and falls, cold and/or heat stress, and equipment hazards, as well as the biological hazards listed in Section 2.3. ECT personnel must review relevant operating manuals or be trained on field equipment use prior to the on-site implementation.

PPE for this activity includes:

- Proper protective clothing (long pants and long sleeves).
- Walking boots or waterproof boots (depending on conditions).
- Hard hats and safety vests (if heavy equipment is at the site).
- Nitrile gloves (when handling site samples of unknown composition).

2.1.2 CONSTRUCTION OVERSIGHT

ECT personnel will perform periodic site visits for visual inspections of construction. Project construction activities will involve use of heavy equipment (excavators & backhoes etc.) and construction materials. This has both physical and noise hazards. It is the responsibility of ECT construction oversight crew to make sure the subcontractors follow health and safety procedures. If it is noticed that HASP procedures are not followed properly by the subcontractors, the ECT field crew should report to the site safety officer.

Controls

- Field crew should be aware of their surroundings in the project site.
- Field personnel should be at least 50 ft away from heavy equipment. Communication (signaling) is important while working in construction sites. Workers should notify the equipment operators while moving around heavy equipment.
- PPE should be worn at all time during construction oversight.
- If any person is injured, he or should be given medical assistance immediately.

Minimum level of PPE for construction oversight includes:

- High visibility safety vests
- Hard hats
- Ear plugs while working near heavy equipment
- Any other PPE as requested/required by the contractor.

2.1.3 FISH MONITORING ACTIVITIES

Backpack Electrofishing

Health and safety are very critical while working with electrical equipment. The energy transmitted from the backpack electrofishing equipment, or backpack shocker, is enough to cause physical harm a person. Electrofishing should be done with a minimum of a two-person crew when using a single anode. The team lead is responsible for the overall health and safety of the field crew. The team lead or at least one of the crew members should be CPR trained. Prior to the field work the crew should be briefed on the procedures to be followed for electrofishing. Additionally, all crew members should know the nearest urgent care or hospital location in the event of medical emergencies.

The major hazard associated with electrofishing is electrical shock. Backpack shocker equipment is powered by a NiCad battery. Backpack electrofishing should not be performed in water greater than thigh depth.

Controls

- The operator and personnel working with the operators should read the instructions in manual and SOP for the specific type of electrofishing equipment they would be using.
- Operations should be stopped during severe weather conditions (rain or thunderstorm).
- Crew members should be trained to use the electrofishing equipment.
- One of the crew members should be CPR trained/certified.
- PPE must be used while performing electroshocking. PPE includes working gloves, long handed nets, and rubber boots in good condition.
- Equipment should be maintained in safe conditions. Visual inspection should be performed before the use of equipment. All electrical systems should be insulated properly.
- Field personnel must wear lifejackets.
- Field personnel should follow common sense rules to avoid slips/trips/falls, particularly when wading in the water with the backpack shocker (Section 2.1.5)

2.1.4 MANUAL LIFTING

Background

The hazards associated with improper material handling include being struck by a load, losing control of a load, physically overexerting oneself, and exceeding equipment capacities. Such accidents can lead to injuries (e.g., abrasions, bruises, and broken bones) and even loss of life. Material-handling accidents account for a sizable percentage of all occupational injuries that occur in every work area including construction and general industry. The risk of injury is not confined to manual lifting of heavy objects. Some lost-time injuries have even occurred in office situations where lifting is infrequent and involves only small items.

Controls

The following are seven profoundly important rules for lifting. Carefully applied they will help you prevent injury.

- Stop and think before you lift. Most lifting injuries occur when you are rushed or preoccupied.
- Keep heavy objects close to your body.
- When lifting heavy objects practice:
    - Spreading your feet wide apart.
    - Sticking out your chest and tucking in your chin.
    - Tightening your stomach muscles.
    - Keeping your back upright.
    - Bending your knees not your back.
    - Keeping your shoulders parallel to the floor as much as possible.
- When carrying a load over a long distance or for a long time, shift the load occasionally from one side to the other side and change position. Every half-hour put the load down and stretch your arms over your head while breathing in deeply.
- Do not lift and twist your back at the same time.
- Do not lean forward without bending your knees.
- Avoid lifting objects above the level of your shoulders.

Aside from proper lifting, the key to safe handling of equipment and materials is to think through each task, anticipate difficulties and take nothing for granted. A deliberate approach is the best way to avoid injuries.

2.1.5 UNEVEN WALKING SURFACES

Background

Slips, trips and falls are among the most common incidents at these sites that lead to employee injuries. The combination of uneven terrain and distracted employees can easily lead to falls. Falls can lead to impaling wounds if the employee happens to fall on an exposed sharp surface such as rebar, broken concrete, and/or glass. Again, extreme caution combined with slow movements can minimize potential injury.

Controls

Common sense rules provide the best means to avoid uneven walking surface-related injuries.

- Do not run while on-site, unless required to do so to escape an emergency situation.
- Do not walk backward.
- Practice and implement the technique of including the vertical peripheral view into your movements. Most people remember to look left and right before crossing a street – at this site you must also look down before taking steps.
- Try to look several feet ahead when traversing the site.
- Use good housekeeping procedures to minimize the accumulation of trip hazards.

2.1.6 WALKING IN WADERS

Background

Field work involving ECT personnel may require the use of waders to move through water depths for which rubber boots do not suffice. Walking in waders increases the hazard of walking on dry land as they are bulky and can restrict movement, and the use of waders in water involve hazards associated with moving water and obscured underwater conditions. The following controls and the controls listed in the previous section for uneven walking surfaces provide the best means to avoiding incidents.

Controls

- Take small, shuffling steps when wading through water
- Verify safe/firm footing before stepping
- When entering water, use access points with small slopes and minimal tripping hazards
- Always wear personal flotation devices
- Never enter water if the depth is unknown
- Do not enter water with swift current
- As with all field work, employ the buddy system

2.2 COLD STRESS

Background

Prolonged exposure to freezing or cold temperatures may cause serious health problems such as trench foot, frostbite and hypothermia. In extreme cases, including cold-water immersion, exposure can lead to death.

Danger signs include uncontrolled shivering, slurred speech, clumsy movements, fatigue and confused behavior. Danger signs also include changes in skin color. For example, a pale appearance in fingers, toes, cheeks or noses that should be rosy from the cold can be an indication of frostbite. Another symptom of frostbite is loss of feeling in extremities.

More severe reaction to cold is called hypothermia, which occurs when the body temperature drops to less than 90 Fahrenheit. Symptoms of hypothermia include uncontrollable shivering, slow speech, memory lapses, frequent stumbling, drowsiness and exhaustion.

Workers are advised to avoid alcohol and smoking when in extreme cold. It constricts blood flow to the skin and can contribute to frostbite or hypothermia.

If any of the danger signs are observed, call for emergency help.

Controls

- Recognize the environmental and workplace conditions that may be dangerous.
- Learn the signs and symptoms of cold-induced illnesses and injuries and what to do to help workers.
- Train workers about cold-induced illnesses and injuries.
- Encourage workers to wear proper clothing for cold, wet and windy conditions, including layers that can be adjusted to changing conditions.
- Be sure workers in extreme conditions take a frequent short break in warm dry shelters to allow their bodies to warm up.
- Try to schedule work for the warmest part of the day.

- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- Use the buddy system – work in pairs so that one worker can recognize danger signs.
- Drink warm, sweet beverages (sugar water, sports-type drinks) and avoid drinks with caffeine (coffee, tea, sodas or hot chocolate) or alcohol.
- Eat warm, high-calorie foods such as hot pasta dishes.
- Remember, workers face increased risks when they take certain medications, are in poor physical condition or suffer from illnesses such as diabetes, hypertension or cardiovascular disease.

Inform a safety officer if they believe they (or another employee) are suffering cold-related symptoms.

2.3 HEAT STRESS

Background

Four environmental factors affect the amount of stress a worker faces in a hot work area: temperature, humidity, radiant heat (such as from the sun or a furnace) and air velocity. Perhaps most important to the level of stress an individual can face are personal characteristics such as age, weight, fitness, medical condition and acclimatization to the heat.

The body reacts to high external temperature by circulating blood to the skin which increases skin temperature and allows the body to give off its excess heat through the skin. However, if the muscles are being used for physical labor, less blood is available to flow to the skin and release the heat.

Sweating is another means the body uses to maintain a stable internal body temperature in the face of heat. However, sweating is effective only if the humidity level is low enough to permit evaporation and if the fluids and salts lost are adequately replaced.

If the body cannot dispose of excess heat, it will store it. When this happens, the body's core temperature rises and the heart rate increases. As the body continues to store heat, the individual begins to lose concentration and has difficulty focusing on a task, may become irritable or sick and often loses the desire to drink. The next stage is most often fainting, and death is possible if the person is not removed from the heat stress.

Heat stroke, the most serious health problem for workers in hot environments, is caused by the failure of the body's internal mechanism to regulate its core temperature. Sweating stops, and the body can no longer rid itself of excess heat. Signs include (1) mental confusion, delirium, loss of consciousness, convulsions or coma; (2) a body temperature of 106 degrees F or higher; and (3) hot dry skin which may be red, mottled, or bluish. Victims of heat stroke will die unless treated promptly.

Heat exhaustion results from loss of fluid through sweating when a worker has failed to drink enough fluids or take in enough salt or both. The worker with heat exhaustion still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. The skin is clammy and moist, the complexion pale or flushed, and the body temperature normal or slightly higher.

Heat cramps, painful spasms of the muscles, are caused when workers drink large quantities of water but fail to replace their bodies' salt loss. Tired muscles – those used for performing the work – are usually the ones most susceptible to cramps. Cramps may occur during or after working hours.

Fainting (heat syncope) may be a problem for the worker acclimatized to a hot environment who simply stands still in the heat. Victims usually recover quickly after a brief period of lying down.

Heat rash, also known as prickly heat, may occur in hot and humid environments where sweat is not easily removed from the surface of the skin by evaporation. When extensive or complicated by infection, heat rash can be so uncomfortable that it inhibits sleep and impedes a worker's performance or even results in temporary total disability.

Dehydration is a health issue related to heat stress for personnel working in field. Construction oversight works will require the crew to be in the field for long hours which puts them at high risk of dehydration.

Dehydration occurs when the person takes in substantially less water than the amount of water lost. Dehydration can pose a serious risk to health. It also decreases the productivity of the person.

Controls

- Regularly drink fluids, either water or electrolyte solutions.
- Be familiar with symptoms of heat-related stress.
- Inform a safety officer if they believe they (or another employee) are suffering heat-related symptoms.

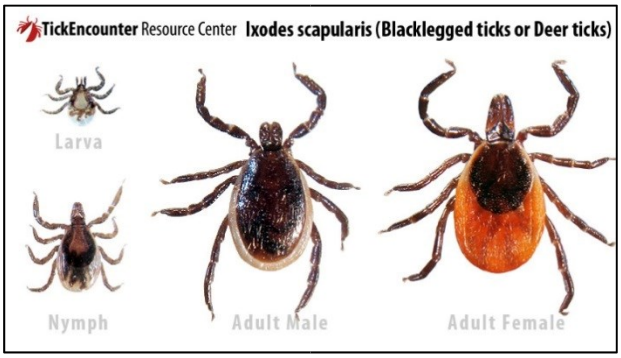
2.4 BIOLOGICAL HAZARDS

The routes for biological hazards include contact with water, bites from infected ticks and/or mosquitoes, and exposure to poisonous plants.

2.4.1 LYME DISEASE

Background

Lyme disease is caused by a bacterium transmitted through the bite of an infected tick. Ticks usually live through the late spring to early fall in tall grassed and vegetated areas, waiting to climb onto a host. Deer ticks, or blacklegged ticks, are the most common for spreading Lyme disease in the north-central United States. Adult and pre-mature (nympth) ticks are both susceptible to spreading the disease. Most of the time, the tick must be attached to the host for 36 to 48 hours before the bacterium can be transmitted.



Symptoms

Between 3 to 30 days after the bite, symptoms of Lyme disease include: fever, chills, muscle and joint aches, swollen lymph nodes, and erythema migrans rash. If left untreated, symptoms after months of the tick bite include: severe head-aches, stiff neck, arthritis, facial palsy, intermittent pain in tendons and muscles, irregular heartbeat, dizziness, inflammation of the brain/spinal cord, nerve pain, tingling in the extremities, and problems with short-term memory.

Treatment

To remove ticks that are embedded in skin, utilize a tick key, or use tweezers or fingers to carefully grasp the tick as close to the skin as possible and pull slowly upward, avoiding twisting or crushing the tick. Do not try to burn or smother the tick. Cleanse the bite area with soap and water, alcohol, or household antiseptic. Note the date and location of the bite and save the tick in a secure container such as an empty pill vial or film canister. A bit of moistened paper towel placed inside the container will keep ticks from drying out. Keep the tick to give to a doctor, to test if the tick is a carrier for Lyme disease. The earlier one is diagnosed and treated, the easier and faster the recovery will be. Antibiotics (doxycycline, amoxicillin, and cefuroxime axetil) are used for oral treatment. If left untreated, the disease can turn into “chronic Lyme disease”, and antibiotics will be less affective.

Controls

Use tick repellent (n,n-diethyl-meta-toluamide [DEET], picaridin, or IR3535 on skin; permethrin on clothes) when working in long grassed and vegetated areas. Wear long pants and shirts, preferably light colored to easily identify ticks. Tuck pants into socks and use duct tape to wrap around cuffs to prevent exposure. Complete an inspection of equipment and clothing throughout the day and before going home. At home, immediately shake out clothes and put in the dryer on high heat for 10 minutes to kill any ticks. Conduct a full-body tick check, especially focusing on hard to see areas: the belly button, scalp, armpits, and behind the knees.

2.4.2 POWASSAN VIRUS

Background

Powassan (POW) virus is a ribonucleic acid (RNA) virus that causes inflammation of the brain. POW virus is transmitted through the bite of an infected tick. Ticks usually live during the late spring to early fall in tall grassed and vegetated areas, waiting to climb onto a host. Most cases of POW virus have occurred in the northeastern and Great Lakes regions of the United States. It is unknown how long the tick needs to be attached to spread the virus.

Symptoms

Symptoms can occur between one week to one month after the tick bite, but some people affected may not show symptoms. Symptoms include: fever, headache, vomiting, weakness, seizures, encephalitis (swelling of the brain), and meningitis (swelling of spinal cord and brain membrane). About half of survivors will have permanent neurological symptoms. About 10% of POW virus cases are fatal.

Treatment

Follow tick removal procedure described above for LYME DISEASE. Keep the tick to give to a doctor, to test if the tick is a carrier for POW. There are no medications to treat POW virus. Hospitalization may be needed for cases of encephalitis and meningitis.

Controls

Same as described above for LYME DISEASE.

2.4.3 WEST NILE VIRUS

Background

West Nile Virus (WNV) is a virus that causes fever and/or inflammation to the brain. Transmission occurs through the bite of an infected mosquito. People with autoimmune diseases are most susceptible. Even though WNV is most common in tropical regions, the virus has spread globally since the 1990's.

Symptoms

About 70-80% of people infected do not show signs of symptoms. Usually occurring within two to 15 days after the bite, symptoms include: headache, body aches, joint pains, vomiting, diarrhea, and rash. Fatigue and weakness after recovery can last for weeks to a month. Less than 1% of people infected will develop neurological problems, including: high fever, stiff neck, coma, seizures, encephalitis, and meningitis.

Treatment

There are no vaccines or medication to treat WNV. Over-the-counter pain relievers can be used to reduce fever and symptoms. Hospitalization may be needed for cases of severe dehydration, encephalitis, or meningitis.

Controls

Use bug repellent (DEET, picaridin, IR3535, and lemon eucalyptus on skin; permethrin on clothes) when working outdoors. Wear long pants and shirts to eliminate exposed skin. Head nets can be worn to provide protection to the face.

2.5 PUBLIC SAFETY

The project site is in a public park. People who visit the park may be curious about the construction activities. Construction will involve use of heavy equipment and other construction materials. Public should not be encouraged to enter the construction area. Proper signs must be installed to notify the public.

3.0 EMPLOYEE TRAINING ASSIGNMENTS

All employees, supervisors, and management working on site that are exposed to health and safety hazards shall receive training before they are permitted to engage in activities that could expose them to health hazards. The training may include: first aid, personal protective equipment (PPE), field equipment, and health and safety risks.

4.0 PERSONAL PROTECTIVE EQUIPMENT

PPE is designed to protect employees from serious workplace injuries or illnesses resulting from contact with chemical, radiological, biological, physical, electrical, mechanical, or other workplace hazards. Besides face shields, safety glasses, hard hats, and safety shoes, PPE includes a variety of devices and garments such as goggles, coveralls, gloves, vests, earplugs, and respirators.

The minimum level of protection required for employees includes:

- Work boots/shoes
- Reflective safety vests
- Long pants

Additional PPE requirements exist for specific site activities. ECT personnel should refer to Section 2.0 for more information regarding the additional PPE requirements for a particular site activity.

5.0 MEDICAL SURVEILLANCE

Not applicable.

6.0 SITE CONTROL

The site control program includes, at a minimum:

- A site map;
- A list of phone numbers of all the employees that are involved in the project, the PM and SHSR;
- Site communications, including alerting means for emergencies; SOPs or safe work practices; and
- Phone numbers and addresses of nearby hospitals.

A general map of the restoration site is included as **Appendix A** to this plan.

Site communication may consist of cell phone usage. The primary method of alerting emergency personnel is by dialing 911.

Appendix B contains addresses and phone numbers of the closest hospitals near the project area. Employees should be aware of the nearest intersection in the event of emergency communications with 911. In the event that an employee becomes severely injured and requires immediate medical attention, the employee must be transported by an ambulance. For minor injuries, contact a WorkCare clinician to advise first aid measures. If a clinic visit is required, WorkCare will contact a clinic to initiate the response and will provide an address for the clinic.

Appendix B also contains the address of the Livonia Police Department and Westland Police Department, if a non-emergency situation arises.

7.0 EMERGENCY RESPONSE PLAN

Following is an emergency response plan for use in the event of:

- Violent weather;
- Fire;
- Medical emergency; and
- Vandalism/Criminal Activity.

7.1 Violent weather

Violent weather (thunderstorm, tornado, high winds) can occur with minimal notice based on local weather conditions. In the event that lightning is observed in the vicinity of the site, employees are to avoid water, high ground, open spaces, solitary tall trees, and metal objects. Seek shelter and remain in shelter for duration of lightening event and 30 minutes after last observed lightning strike. If shelter is not available, you should:

- Crouch down with both feet together. Do not lie down or place your hands on the ground.
- Do not stand near other people. Keep a minimum distance of 15 feet apart.
- If you are outside and you feel your hair stand on end, this is an indication that lightning is about to strike. You should bend forward, putting your hands on your knees.
- Inside of a shelter, stay away from doors, windows and avoid water. Electrical appliances (e.g. computers, power tools) should be turned off and unplugged. If appliances can't be unplugged (e.g. telephones), stay away from them.
- Persons injured by lightning do not carry an electrical charge and can be handled safely. Administer first aid/cardiopulmonary resuscitation (CPR) to a lightning victim if you're qualified to do so. Send for help immediately.

If heavy winds occur, seek shelter immediately. Remember that loose material can become airborne.

7.2 Fire

In the event of an incipient stage (beginning, small) fire, employees should notify adjacent individuals of this situation and exit the area. Only employees trained in the use of fire extinguishers should attempt to use an extinguisher.

In the event of an out-of-control fire, employees are to exit the site as quickly as possible and assemble for head count.

7.3 Medical Emergency

If an employee observes an individual being injured or exhibiting signs/symptoms of illness, they should immediately notify as many individuals as necessary (preferably the nearest safety or site supervisor) of the situation.

Employees certified in CPR may administer help if they feel they are qualified.

At least one employee should be sent to the site entrance to direct responding emergency services personnel to the appropriate location.

7.4 Vandalism/criminal activity

Should an employee observe suspicious activity or feel threatened, they should leave the area and call the police.

8.0 NEAR MISS AND INCIDENT REPORTING

OSHA defines a near miss as an incident in which no property was damaged and no personal injury was sustained, but where, given a slight shift in time or position, damage or injury easily could have occurred. Near misses also may be referred to as close calls, near accidents, accident precursors, injury-free events and, in the case of moving objects, near collisions etc. Near misses are very important to be noticed and documented for better and a safe workplace. A few examples of near misses are: worker tripping over an object or slippery conditions but manages to balance the fall without getting hurt, almost getting hit or hurt by a broken-field equipment etc.

Before starting the field work, training should be provided by the SHSR on identifying and documenting near misses. At the event a near miss is observed the field crew or the personnel should record it with a brief detail on the location it happened, time, job site and the field crew involved in it. Field near miss form is attached in **Appendix C**.

The near miss form should then be sent to the corporate health and safety manager. The health and safety manager should consult with the SHSR to investigate the situation and provide corrective actions or precautions to avoid a potential accident in the future. If more than one crew is involved in a project, the SHSR should address the near miss to the other field crews and make sure they are aware of the situation.

9.0 HEALTH AND SAFETY PLAN ACKNOWLEDGEMENT

By signing this form, I acknowledge that I have reviewed the Site-Specific Health and Safety Plan for the Site.

Name (Printed)	Signature

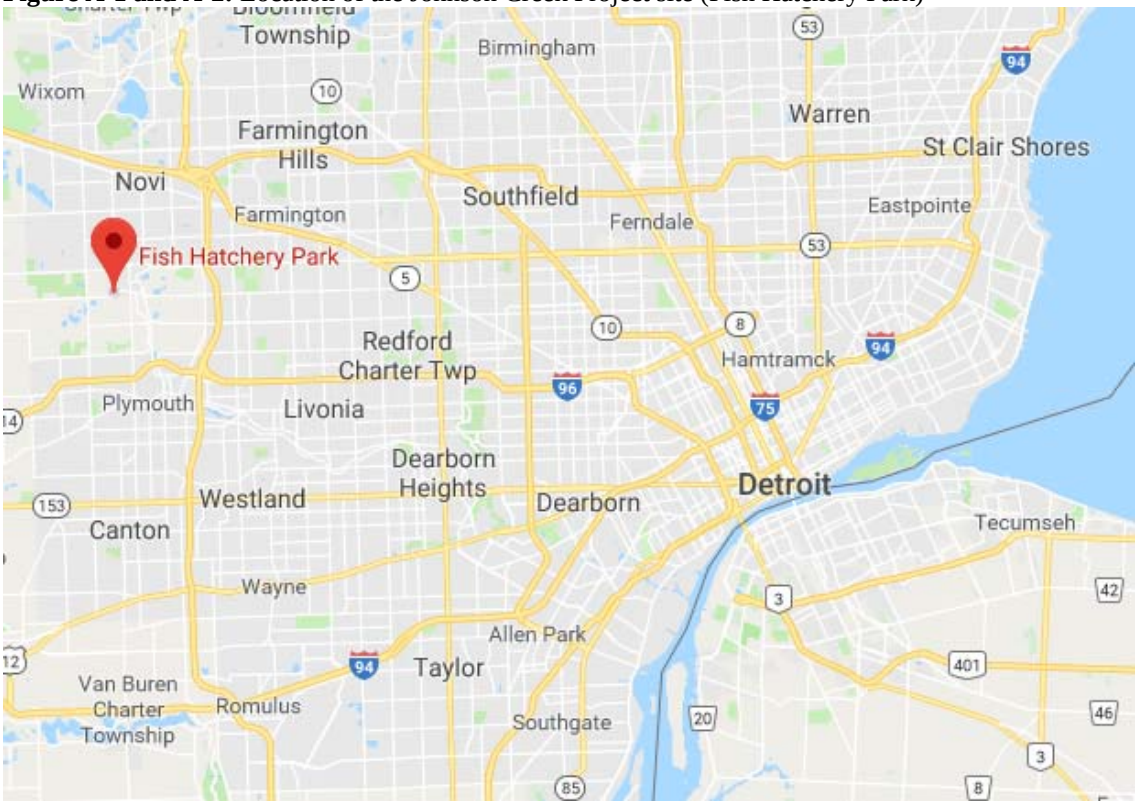
Orientation Provided By: _____

Date: _____

Appendix A. Site Maps

Johnson Creek Project Site: Located at Fish Hatchery Park off W Seven Mile Rd, west of S Center St and east of N Beck Rd.

Figure A-1 and A-2: Location of the Johnson Creek Project site (Fish Hatchery Park)



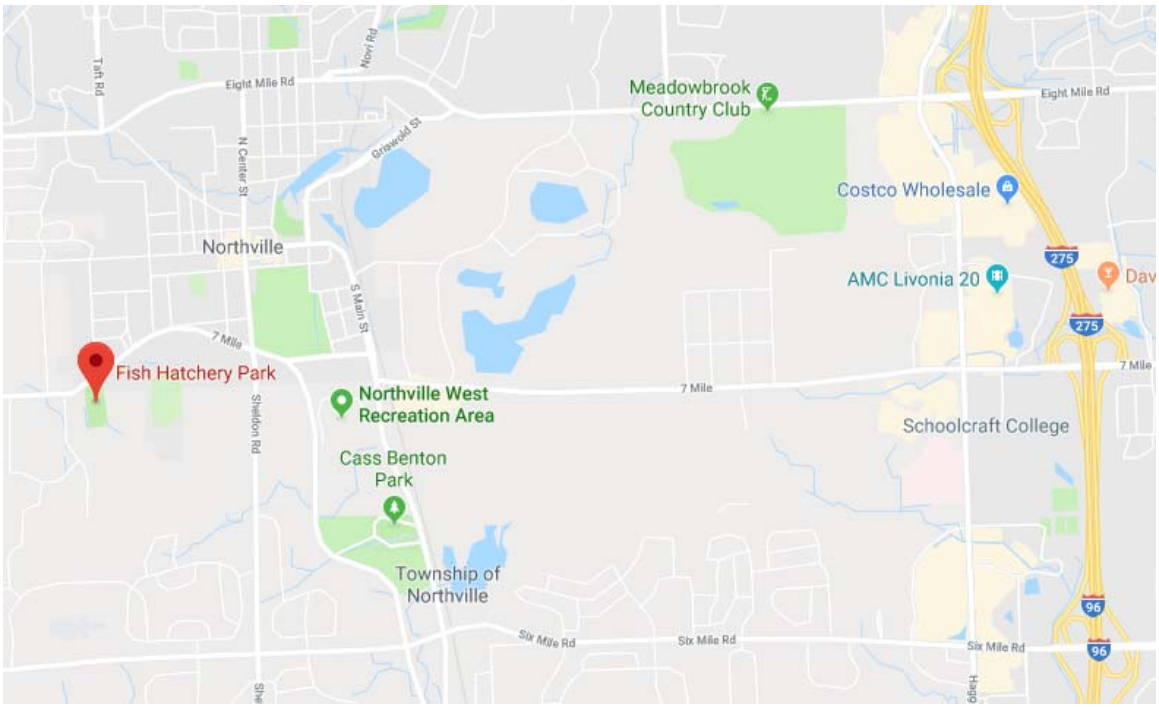
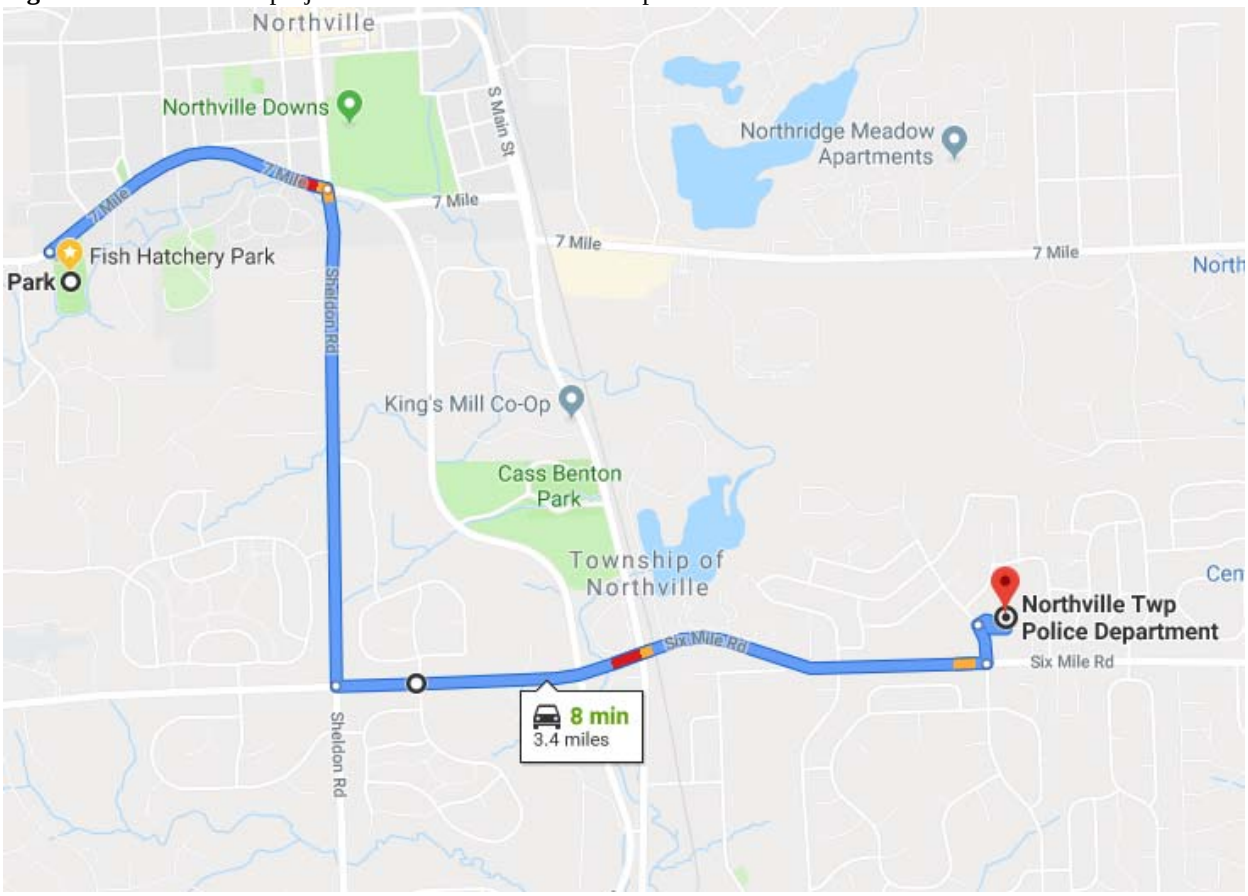


Figure A-3: Johnson Creek restoration site.

Appendix B. Police, Hospital and Urgent Care Information

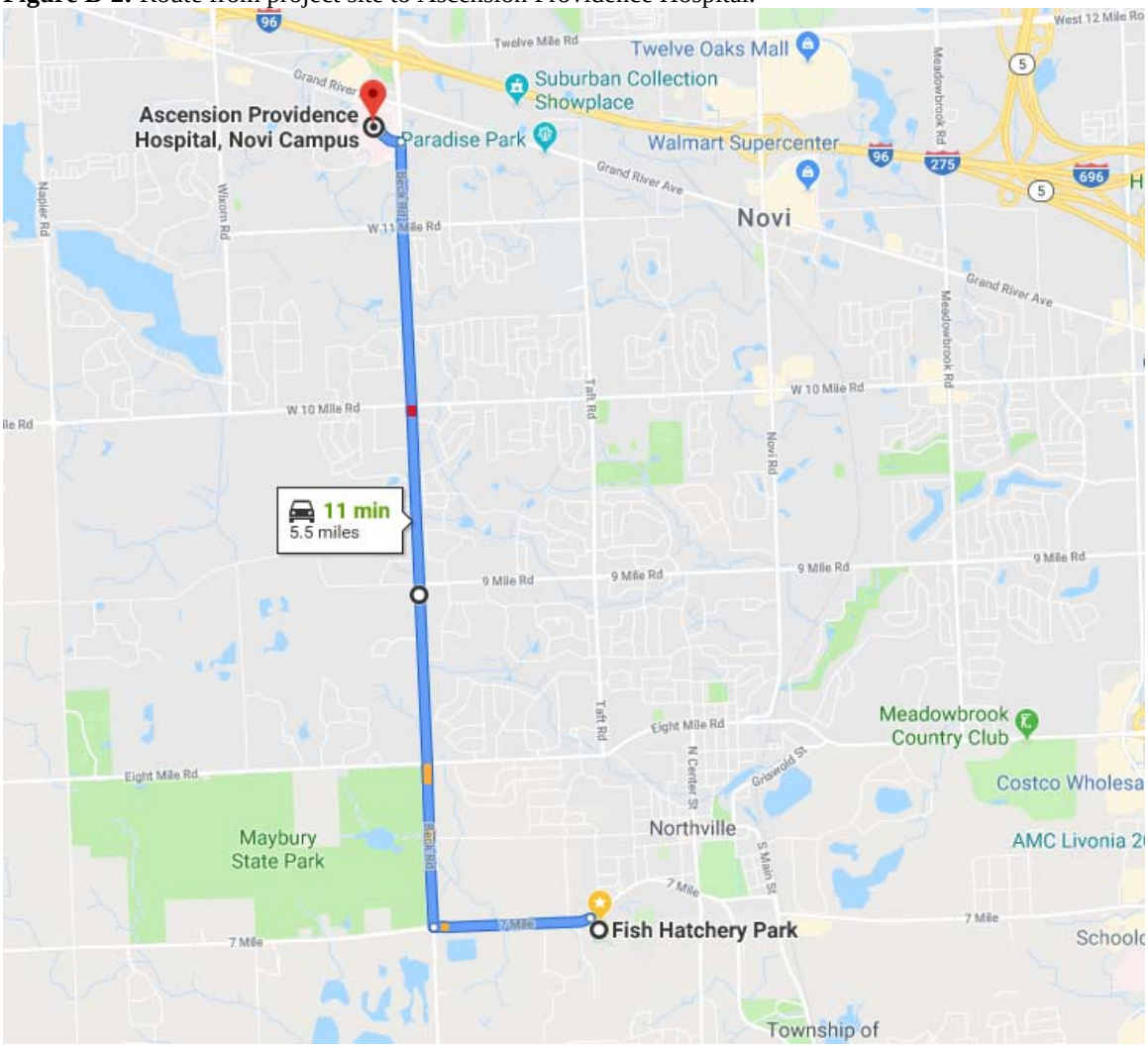
Northville Police Department (8 minutes)
41600 Six Mile Rd. Northville, MI 48168
(248) 349-9400

Figure B-1: Route from project site to Northville Police Department



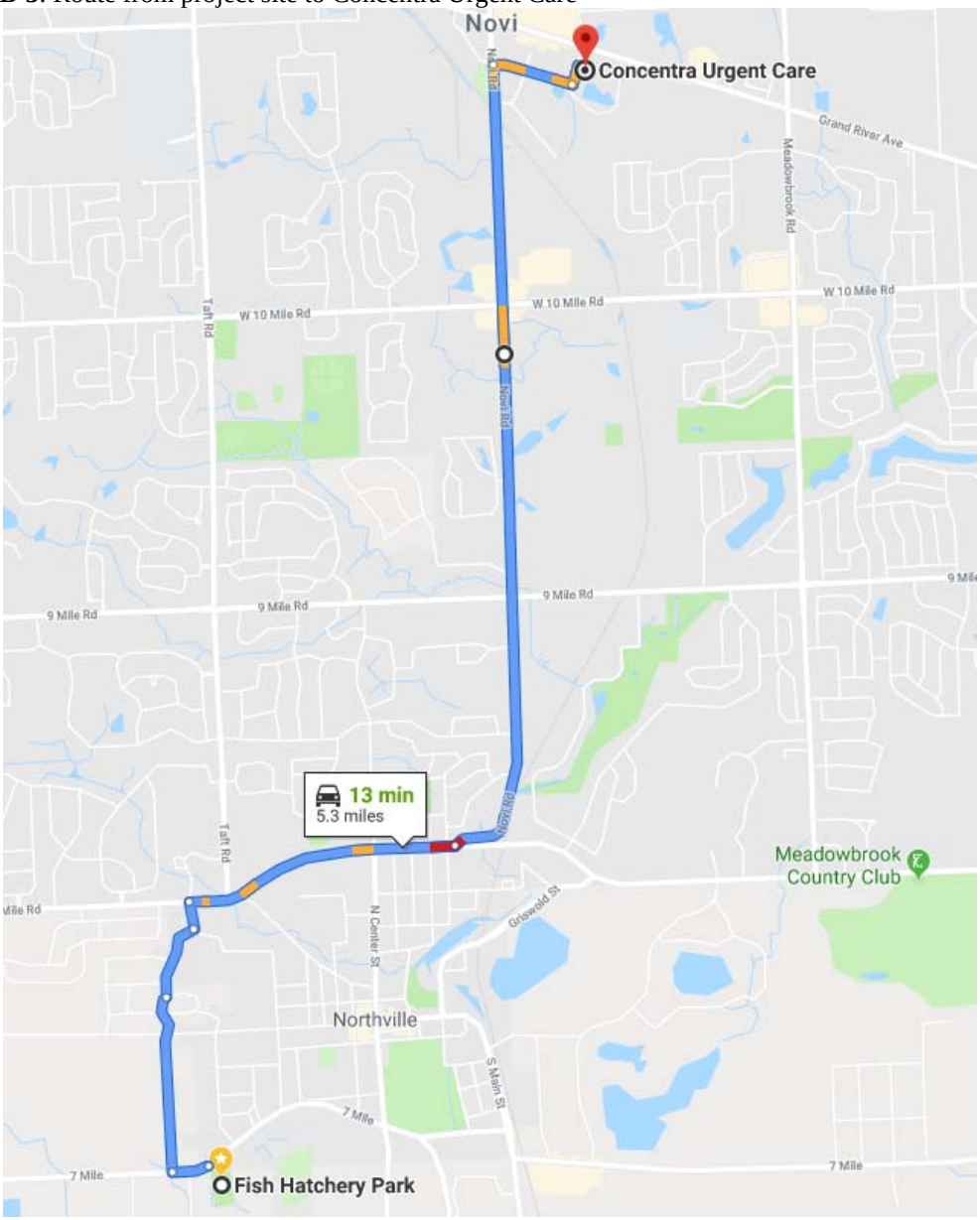
Ascension Providence Hospital, Novi Campus (11 minutes)
47601 Grand River Ave. Novi, MI 48374
(248) 465-4100

Figure B-2: Route from project site to Ascension Providence Hospital.



Concentra Urgent Care (13 minutes)
42875 Grand River Ave Ste 101, Novi, MI 48375
(284) 478-1616

Figure B-3: Route from project site to Concentra Urgent Care



Appendix C. Near Miss/ Incident Report Form

ECT Environmental Consulting & Technology, Inc.

INCIDENT/INJURY/ NEAR MISS REPORT FORM

PART I

Individual Involved: ☐ Employee ☐ Affiliate Employee ☐ Visitor ☐ Customer

☐ Contractor _____ ☐ Other _____

Incident: ☐ Injury/Illness/Fatality ☐ Near Miss ☐ Fire ☐ Spill/Release ☐ Motor Vehicle Incident

☐ Permit Violation ☐ Explosion ☐ Bomb Threat ☐ Other _____

General Information

Date of Incident: Day: ☐S ☐M ☐T ☐W ☐T ☐F ☐S Time: _____ ☐a.m./☐p.m.

Location of Incident: _____ Supervisor's Name: _____

Date Reported to Supervisor: Time Reported to Supervisor: _____ ☐a.m./☐p.m.

Project Number: _____ Site Location: _____

Accident/Injury/Near Miss—Personnel Information

Name _____ _____ _____ Employee # _____ Age _____ ☐M ☐F
Last First MI

If Contractor/Visitor: Company/Visitor Name: _____ Business Phone: _____

Company/Visitor Address: _____

_____

Job Title: _____ Type of Injury: _____

Body Part(s) Affected: _____

Medical Treatment Provided: ☐ EMT ☐ Hospital ☐ First Aid ☐ Other _____

EMT Name: _____ Hospital Name: _____

Witness to Incident: _____ _____ _____
Last First MI

Witness to Incident: _____ _____ _____
Last First MI

Description of Incident—Detailed Sequence of Events (attach additional pages as necessary)

PART II

Employees Interviewed

Last Name	First Name	MI	Job Title

Description of Root Causes

Description of Contributing Causes

Follow-up Corrective Actions

Corrective Action	Work Order No. (if applicable)	Responsible Person	Estimated Completion Date	Actual Completion Date

Investigation Team

Investigator:

Last _____ First _____ Job Title _____ Date _____

Investigator:

Last _____ First _____ Job Title _____ Date _____

Investigator:

Last _____ First _____ Job Title _____ Date _____

Investigator:

Last _____ First _____ Job Title _____ Date _____

Closure Approval

Office Manager

Print _____ Signature _____ Date _____

APPENDIX B
Public Education Project Flyers

Appendix B1 – Tamarack Creek Public Education Flyer
Appendix B2 – Johnson Creek Public Education Flyer

Tamarack Creek Stream & Wetland Habitat Restoration

In partnership with: Southfield the center of it all™ · Great Lakes RESTORATION

$2,718,183 in grant funds provided by the Great Lakes Restoration Initiative (GLRI) through the U. S. Environmental Protection Agency (USEPA) for design and implementation

The Tamarack Creek Stream & Wetland Habitat Restoration will:

- Restore wetland and stream to provide habitat for valuable fish and wildlife and to manage invasive species.
- Construct habitat structures to increase fish & wildlife diversity.
- Improve water quality within the Rouge River watershed.

The Alliance of Rouge Communities (ARC) received grant funding from the Great Lakes Restoration Initiative (GLRI) U. S. Environmental Protection Agency (USEPA) for design and construction of the Tamarack Creek Stream & Wetland Habitat Restoration Project as part of its effort to restore habitat and improve the water quality in the Rouge River watershed.

The Rouge River watershed is a designated Area of Concern (AOC) under the Great Lakes Water Quality Agreement (GLWQA) and has three Beneficial Use Impairments (BUIs) associated with fish and wildlife habitat: Degraded Fish and Wildlife Populations, Degradation of Benthos, and Loss of Fish and Wildlife Habitat. The Rouge River Advisory Council (RRAC), the Public Advisory Council (PAC) for the Rouge AOC, in March 2016 approved a list of projects that need to be completed to remove the Rouge AOC habitat BUIs. The Tamarack Creek Stream & Wetland Habitat Restoration Project is considered to have a significant impact on the removal of the BUIs.

Tamarack Creek is a tributary of Evans Creek and the Middle Rouge River. As much of its drainage area is urbanized, it receives large quantities of uncontrolled stormwater runoff. The high channel velocities caused by large peak flows have led to bank erosion and sedimentation of instream habitat. Additionally, excessive velocity is destabilizing substrates that are important for fish and macroinvertebrate habitat. The Tamarack Creek Stream and Wetland Restoration project addresses these habitat impairments and increases fish and wildlife diversity and productivity.

In order to address the habitat impairments, restoration of Tamarack Creek is necessary in conjunction with wetland restoration to help improve hydrology and in-stream flows. Wetland restoration will include the repair of wetland hydrology, management of invasive species, and planting native wetland plants to diversify the flora. An outlet structure will be constructed to increase storage capacity within the wetland and to allow water from the wetland to drain slowly into Tamarack Creek. The stream habitat will be restored by expanding the floodplain to allow Tamarack Creek to convey larger stormwater flows without causing excessive velocities and destabilizing substrate. The new floodplain will be planted with native plants and trees, which will add wildlife habitat diversity and value. The banks and stream bed will be further stabilized with woody debris habitat structures.

Conditions prior to restoration:

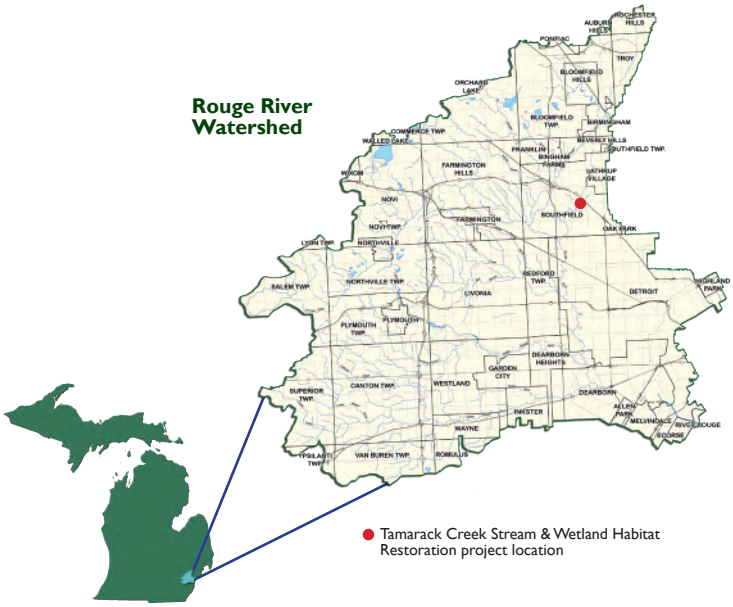
Existing stream conditions

Existing wetland conditions

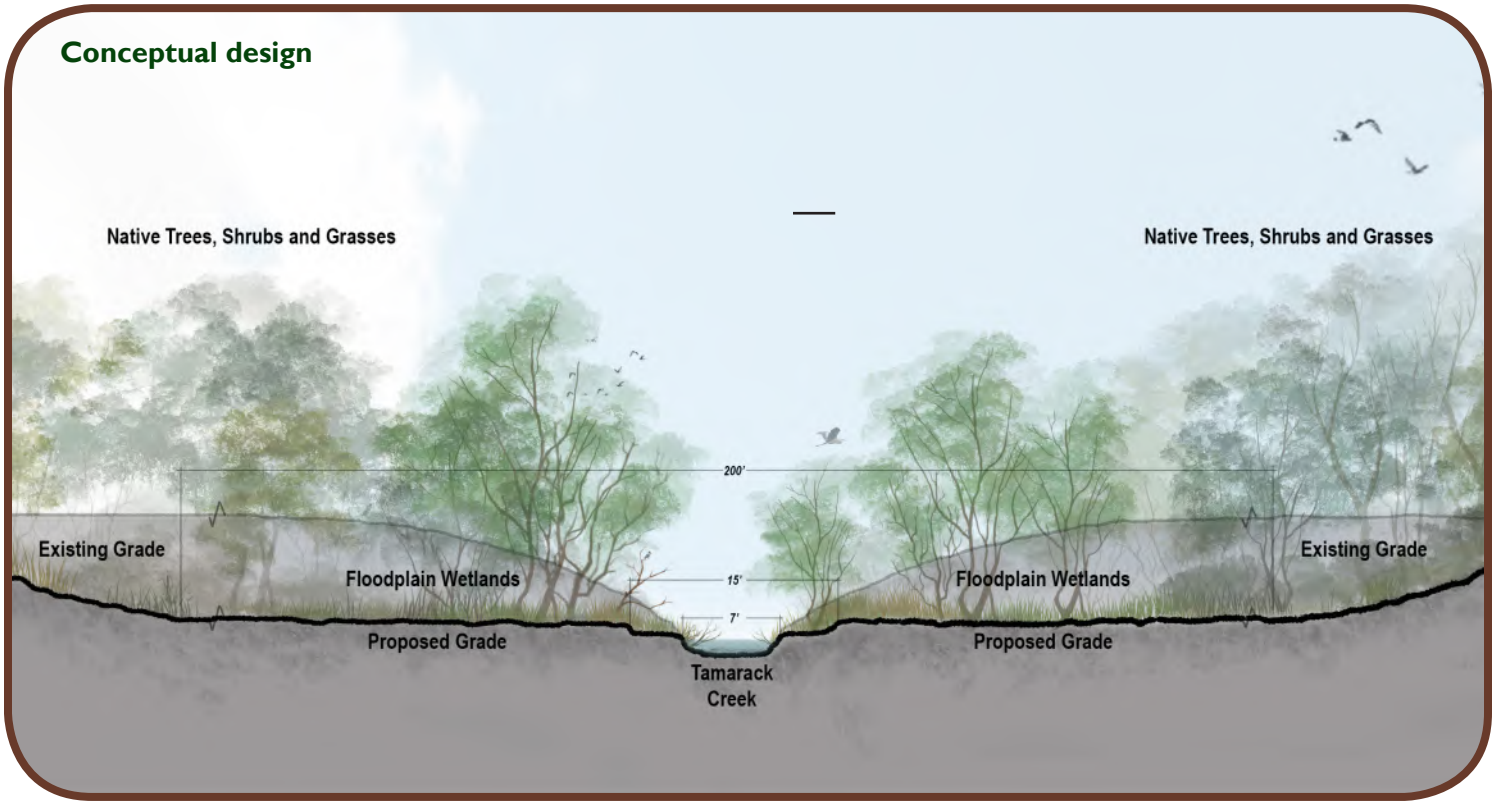
This project is funded through grants from the Great Lakes Restoration Initiative Environmental Protection Agency (grant number GL-00E002344-0 & GL-00E0278-0)

The completion of the Tamarack Creek Stream & Wetland Restoration project will produce:

- 20 constructed habitat structures
- 2 acres of restored wetland
- 1,000 feet of restored floodplain
- 1,800 feet of restored stream



Conceptual design



About the Alliance of Rouge Communities

The ARC is a 501(c)(3) non-profit organization consisting of local municipalities, counties, educational institutions and stewardship groups working together to improve the Rouge River. Founded in 2005, the ARC is funded by membership dues from local governments and supported by grants. The ARC and its partners work cooperatively to meet water quality requirements mandated by the state's stormwater permit and to restore beneficial uses, such as canoeing, fishing and other recreational activities, to the Rouge River. That means better water quality for less cost to its members!

For more information about this project and other ARC activities visit our website at: www.allianceofrougecommunities.com

This project is funded through a grant from the Great Lakes Restoration Initiative Environmental Protection Agency (grant number GL-00E02344-0 & G:-00E02478-0)

Alliance of Rouge Communities
OURS TO PROTECT
Working together, restoring the river

Johnson Creek Fish Hatchery Park Habitat Restoration

In partnership with:

$1,173,176 in grant funds provided by the Great Lakes Restoration Initiative (GLRI) through the U. S. Environmental Protection Agency (USEPA) for design and implementation

The Johnson Creek - Fish Hatchery Park Habitat Restoration Project will:

- Restore stream and pond to provide habitat for valuable fish and wildlife.
- Improve fish passage between pond and stream.
- Improve water quality within the Rouge River watershed.

The Alliance of Rouge Communities (ARC) received grant funding from the Great Lakes Restoration Initiative (GLRI) U. S. Environmental Protection Agency (USEPA) for the Johnson Creek – Fish Hatchery Park Habitat Restoration design and implementation project as part of its effort to restore the only remaining cold-water fishery in the Rouge River.

The Rouge River watershed is a designated Area of Concern (AOC) under the Great Lakes Water Quality Agreement (GLWQA) and has three Beneficial Use Impairments (BUIs) associated with fish and wildlife habitat: Degraded Fish and Wildlife Populations, Degradation of Benthos, and Loss of Fish and Wildlife Habitat. The Rouge River Advisory Council (RRAC), the Public Advisory Council (PAC) for the Rouge AOC, in March 2016 approved a list of projects that need to be completed to remove the Rouge AOC habitat BUIs. The Johnson Creek Fish Hatchery Park Habitat Restoration Project is considered to have a significant impact on the removal of the BUIs.

The only public access point to Johnson Creek is Fish Hatchery Park, which was the first registered fish hatchery in the nation. Fish and wildlife habitat associated with Johnson Creek have been lost and impacted by sedimentation, loss or conversion of riparian vegetation, and streambank armoring, reducing its viability as a cold-water fishery (the only one remaining in the Rouge River). A spring-fed pond, which flows into Johnson Creek, has been degraded by sediment-laden stormwater runoff from the unimproved parking lot at Fish Hatchery Park. The resulting sediment has been deposited into the pond to a point where it is less than 18 inches deep. This sediment escapes from the pond through the outlet structure and is impairing the stream bottom habitat in Johnson Creek. In addition to this, streambanks in the park have been impacted by the removal of native vegetation and historic placement of a concrete wall.

To address this concern and to restore the habitat at Johnson Creek, the project naturalizes the streambanks, removes accumulated sediment in the pond, modifies the pond outlet to create a fish passage channel between the pond and the creek, and installs a vegetated bioswale to improve water quality of runoff. In addition to these improvements, the project includes the planting of over 250 native trees and over 300 native shrubs.

Conditions prior to restoration:

Concrete wall channelizing creek

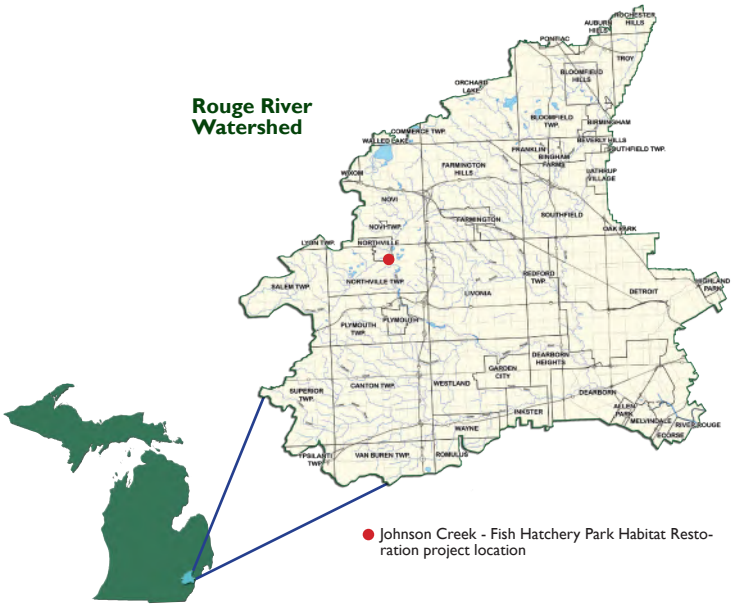
Existing outlet

Existing pond conditions

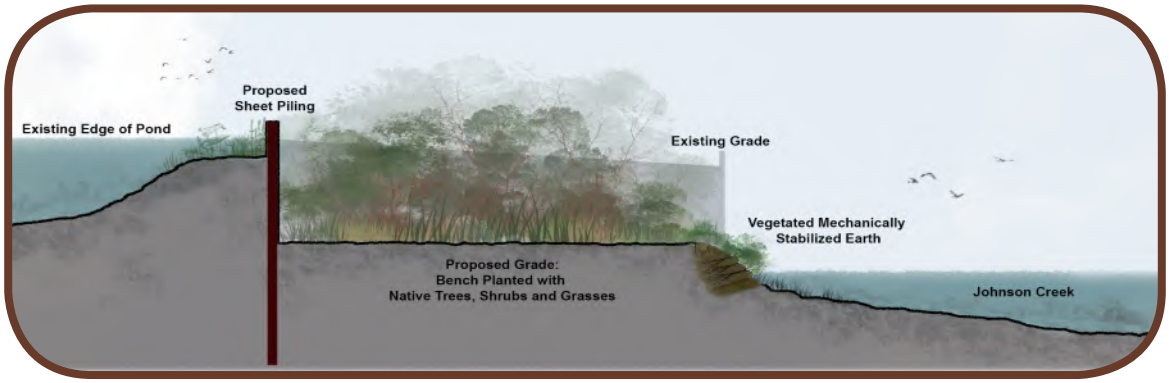
This project is funded through a grant from the Great Lakes Restoration Initiative Environmental Protection Agency (grant number GL-00E002344-0 & GL-00E02478-0)

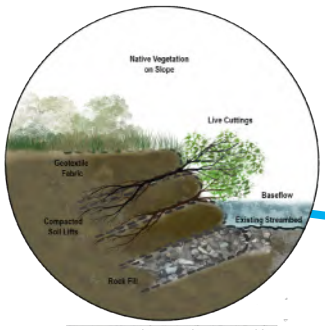
The Johnson Creek – Fish Hatchery Park Habitat Restoration Project will:

- Naturalize and stabilize 1,050 ft. of Johnson Creek's streambank for improved wildlife habitat
- Remove 2,000 cubic yards of sediment in Fish Hatchery Pond to create deeper water for fish habitat
- Modify the outlet of the pond to create a fish passage channel between the pond and the creek
- Install vegetative swale to filter stormwater from the parking lot before entering the pond

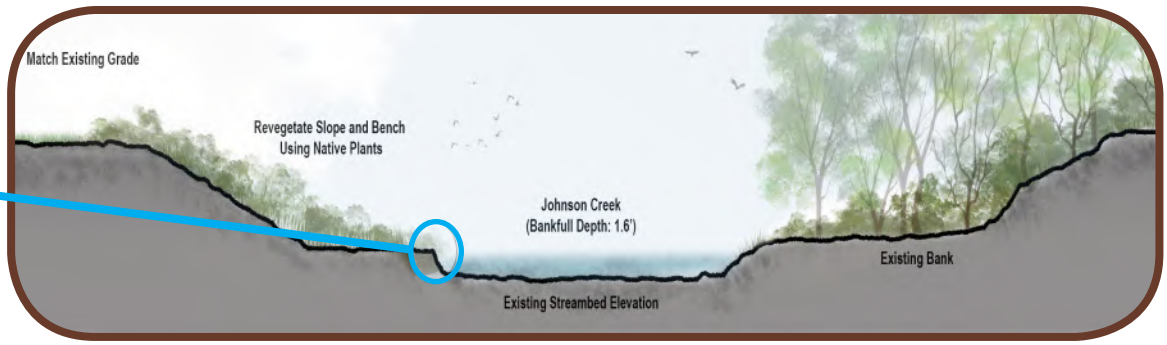


Conceptual designs





Vegetated mechanically stabilized earth detail



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For more information about this project and other ARC activities visit our website at: www.allianceofrougecommunities.com

This project is funded through a grant from the Great Lakes Restoration Initiative Environmental Protection Agency (grant number GL-00E02344-0 & GL-00E02478-0)

Alliance of Rouge Communities
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Working together, restoring the river

APPENDIX C
Geomorphic Assessment Memo

M E M O R A N D U M ..... January 22, 2019

TO: John O'Meara, Environmental Consulting & Technology, Inc. (ECT)

FROM: Susan Rusinowski, ECT

CC: Marty Boote, ECT; Alice Bailey, ECT; Abby Teener, ECT; Shelby Dix, ECT.

RE: Geomorphic Assessment—Tamarack and Johnson Creeks
ECT Project No. 180611

A geomorphic assessment was conducted at Tamarack Creek on November 29th, 2018 and December 6th, 2018. A geomorphic assessment was conducted at Johnson Creek Fish Hatchery on December 6th, 2018. The geomorphic assessment method included using the Rosgen bank erosion hazard index (BEHI) rating and cross-section surveys. Characteristics of the BEHI rating include bank height, root density, root depth, bank angle, and surface protection. BEHI scores are also adjusted based on bank material and other factors, such as stratification. Table 1 and 2 show the BEHI ratings for Johnson and Tamarack Creeks, accordingly.

BEHI #	Total Score	BEHI Category
Reach 1		
1	44	Low
Reach 2		
1	45.5	Low
2	45.5	Low
Reach 3		
1	45.5	Low

Table 1: Johnson Creek BEHI Ratings

BEHI #	Total Score	BEHI Category
Reach 1		
1	17	Low
2	14	Low
Reach 2		
1	15	Low
2	22.5	Moderate
Reach 3		
1	19.5	Low
2	17	Low
3	1	Very Low
4	6	Very Low

Table 2: Tamarack Creek BEHI Ratings

A significant factor to note during the geomorphic assessment at Johnson Creek was that one side of the creek being assessed was a concrete wall, and the other side a

typical stream bank. All BEHI ratings for both Johnson and Tamarack Creek were low or very low.

A sieve analysis was performed to analyze sediment data taken during the geomorphic assessment in Tamarack Creek. All sediment samples in Tamarack Creek were majority sand with smaller percentages of gravel. Three sediment samples each were taken in reaches 1 and 3, and one sample in reach 2. This sediment data was used to analyze sediment transport and channel stability. Tractive force, a general measure of average shear stress along the channel bed, was calculated for each cross-section two ways: in Table 3, it is calculated using average bankfull depth and in Table 4, it is calculated using maximum bankfull depth. The tractive force was compared to D_{84}, the incipient particle diameter. These two parameters were compared in a ratio to assess if the shear stress produced by average and maximum bankfull discharges are likely to cause channel erosion and instability. The results for sediment analyses are shown in Table 3 and 4 below, showing that all reaches are capable at some point of transporting all bed material.

Tamarack Creek							
Reach	Cross-Section	D_{50} (mm)	D_{84} (mm)	D_{84} (cm)	Tractive Force (cm)	Tractive Force/D_{84}	Stable?
1	1	4.4	19	1.9	2.50	1.3	Yes
	2	1.7	6.3	0.63	2.34	3.7	No
	3	1.1	6.7	0.67	2.30	3.4	No
2	1	0.58	1.6	0.16	4.16	26.0	No
3	1	0.44	4.1	0.41	0.96	2.3	No
	2	1.3	6.1	0.61	0.74	1.2	Yes
	3	0.61	4.2	0.42	0.67	1.6	No

Table 3: Channel Bed Material Analysis using Average Bankfull Depth

Tamarack Creek							
Reach	Cross-Section	D_{50} (mm)	D_{84} (mm)	D_{84} (cm)	Tractive Force (cm)	Tractive Force/D_{84}	Stable?
1	1	4.4	19	1.9	3.89	2.0	No
	2	1.7	6.3	0.63	3.19	5.1	No
	3	1.1	6.7	0.67	2.66	4.0	No
2	1	0.58	1.6	0.16	6.30	39.4	No
3	1	0.44	4.1	0.41	1.24	3.0	No
	2	1.3	6.1	0.61	1.12	1.8	No
	3	0.61	4.2	0.42	0.79	1.9	No

Table 4: Channel Bed Material Analysis using Maximum Bankfull Depth

Cross-section surveys were conducted during the geomorphic assessment and the data input into the Ohio Department of Natural Resources' Reference Reach Spreadsheet for channel survey data management. Three cross sections were surveyed in Johnson Creek and eight cross sections surveyed in Tamarack Creek across 4 reaches. The dimensions of these cross sections and channel bed material were used to classify the stream type, shown in Table 5 below. Using the Rosgen morphological classification system, it was determined that the stream types for all reaches of Tamarack Creek are E-5 streams and Johnson Creek is an E6 stream, shown in Table 5 below.

Tamarack Creek					
Reach	Cross-sectional Area (sq. ft.)	Bankfull Width (ft.)	Entrenchment Ratio	Width: depth ratio	Stream Type
1	19.9	12.5	2.3	7.9	E5
2	19.6	10.6	2.7	5.8	E5
3	22.6	14.1	2.3	8.7	E5
4	14.3	11.2	2.4	8.8	E5
Johnson Creek Fish Hatchery					
1	35.7	19.4	2.1	10.5	E6

Table 5: Channel Dimensions and Stream Type Classification

Additionally, shear stress and unit stream power for each cross-section were calculated using channel dimensions, channel slope, and discharge rate. The results are in Table 6 below.

Tamarack Creek				
Reach	Cross-Section	Discharge Rate (cfs)	Shear Stress (lb/sq.ft)	Unit Stream Power (lb/ft/s)
1	1	91.9	0.44	2.3
	2	80.9	0.41	2.0
	3	84.1	0.41	2.0
2	1	111.1	0.71	4.8
3	1	76.5	0.17	0.56
	2	49.0	0.14	0.37
	3	49.2	0.13	0.32
Johnson Creek Fish Hatchery				
1	1	165.5	0.47	2.3
	2	172.9	0.53	2.9
	3	194.6	0.61	4.0

Table 6: Channel Forces and Power

ECT Environmental Consulting & Technology, Inc.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Alliance of Rouge Communities (ARC)	Tamarack Creek	180611

Area No.	Date:
1	11/29/18

Direction Photo Taken:

West
Downstream Right Bank
Reach #1

Description:

Exposed tree roots and bank indicating channel widening and erosion.

Taken by: Marty Boote

Area No.	Date:
2	11/29/18

Direction Photo Taken:

Southwest
Downstream
Reach #1

Description:

Exposed tree roots and bank indicating erosion and widening of channel.

Taken by: Marty Boote

ECT Environmental Consulting & Technology, Inc.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Alliance of Rouge Communities (ARC)	Tamarack Creek	180611

Area No.	Date:
3	11/29/18

Direction Photo Taken:

Northeast
Upstream Right Bank
Reach #1

Description:

Exposed tree roots and banks, tree trunk in the middle of the channel caused by excessive sedimentation of channel widening.

Taken by: Marty Boote

Area No.	Date:
4	11/29/18

Direction Photo Taken:

Southeast
Downstream Left Bank
Reach #1

Description:

Unvegetated sidebar indicating excessive sedimentation and channel widening.

Taken by: Marty Boote

ECT Environmental Consulting & Technology, Inc.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Alliance of Rouge Communities (ARC)	Tamarack Creek	180611

Area No.	Date:
5	11/29/18

Direction Photo Taken:

East
Downstream Left Bank
Reach #3

Description:

Exposed tree roots and high slumping banks indicating erosion at toe in Reach 3. However, the BEHI is low due to clay soils.

Taken by: Marty Boote

Area No.	Date:
6	9/27/18

Direction Photo Taken:

East
Downstream Left Bank
Reach #3

Description:

Similar to Area No. 5, exposed tree roots and high slumping banks indicate erosion at toe in Reach 3. However, the BEHI is low due to clay soils.

Taken by: Marty Boote

ECT Environmental Consulting & Technology, Inc.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Alliance of Rouge Communities (ARC)	Tamarack Creek	180611

Area No.	Date:
7	11/29/18

Direction Photo Taken:

West
Downstream Right Bank
Reach #3

Description:

Exposed tree roots and bank, leaning trees indicating channel widening.

Taken by: Marty Boote

Area No.	Date:
8	11/29/18

Direction Photo Taken:

Northwest
Upstream
Reach #3

Description:

Exposed infrastructure (pipe), headcuts from fallen trees, and leaning trees on both sides of the creek.

Taken by: Marty Boote

ECT Environmental Consulting & Technology, Inc.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Alliance of Rouge Communities (ARC)	Tamarack Creek	180611

Area No.	Date:
9	11/29/18

Direction Photo Taken:

Southwest
Downstream
Reach #3

Description:

Exposed tree roots and banks, tree trunk in the middle of the channel caused by channel widening and erosion.

Taken by: Marty Boote

Area No.	Date:
10	9/27/18

Direction Photo Taken:

Southwest
Downstream
Reach #4

Description:

Exposed fence post concrete indicating erosion and widening of channel. Headcut present.

Taken by: Marty Boote

ECT Environmental Consulting & Technology, Inc.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Alliance of Rouge Communities (ARC)	Johnson Creek	180611

Area No.	Date:
1	12/06/18

Direction Photo Taken:

Northeast
Downstream Right Bank

Description:

Large woody debris blocking channel flow.

Taken by: Marty Boote

Area No.	Date:
2	12/06/18

Direction Photo Taken:

Southwest
Upstream right bank

Description:

Undermining of wall due to high energy flows, resulting in concrete spalling.

Taken by: Marty Boote

ECT Environmental Consulting & Technology, Inc.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Alliance of Rouge Communities (ARC)	Johnson Creek	180611

Area No.	Date:
3	12/06/18

Direction Photo Taken:

South
Upstream left bank

Description:

Large woody debris blocking channel flow.

Taken by: Marty Boote

Area No.	Date:
4	12/14/18

Direction Photo Taken:

South
Upstream left bank

Description:

Large woody debris blocking channel flow.

Taken by: Marty Boote

ECT Environmental Consulting & Technology, Inc.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Alliance of Rouge Communities (ARC)	Johnson Creek	180611

Area No.	Date:
5	12/14/18

Direction Photo Taken:

Southwest
Upstream right bank

Description:

Woody debris jam has caused flow diversion over point bar.

Taken by: Marty Boote

APPENDIX D
Vegetation and Wetland Characterization Summaries

Appendix D1 – Tamarack Creek Vegetation and Wetland Characterization Summary

Appendix D2 – Johnson Creek Vegetation and Wetland Characterization Summary

TAMARACK CREEK RESTORATION VEGETATION, HABITAT, AND WETLAND CHARACHTERIZATION SUMMARY

As a preliminary data gathering field investigation, a wetland evaluation and vegetation type mapping was performed for Tamarack Creek project located in Section 27 of Southfield Township (01N, 10E), Oakland County, Michigan.

The project site is specifically located at Ten Mile Rd and Evergreen Rd, west of John C Lodge Freeway. The site investigation focused on an approximately 14-acre area [Area of Investigation (AOI)]. The goal of the site investigation was to assess wetland characteristics, characterize vegetation zones, determine approximate invasive species areas to address, and identify potential habitat improvement options. The investigation was completed on November 28 and December 19, 2018. An additional investigation was completed on July 18, 2019 in order to extend the AOI to the southwest along Tamarack creek and confirm nearby wetland lines.

Site Descriptions

The project site consists of a segment of Tamarack Creek and vacant woodland and wetland areas adjacent to the creek. The project site is located within a highly urbanized area adjacent to office buildings and parking lots and residential properties.

Methodology

The methodology used to identify wetlands described herein was consistent with the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and the U.S. Army Corps of Engineers (USACE) wetland delineation procedures described in the USACE's *Wetlands Delineation Manual – Technical Report Y-87-1* (January 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northeast-Northcentral Region (January 2012).*

Wetlands are characterized according to three diagnostic parameters: vegetation, soils, and hydrology. Plant species associated with wetland versus upland conditions were identified and checked against the National List of Plant Species (Lichvar et al. 2016). Soil profiles were examined by using a tile spade to dig to a depth of approximately 14 inches below the ground surface. Horizon thickness,

color, texture, and presence of hydromorphic (water-formed) features were noted and compared against the U.S. Department of Agriculture, Natural Resources Conservation Service's (USDA-NRCS) Field Indicators of Hydric Soils in the United States (USDA-NRCS 2017). Primary and secondary indicators of hydrology, as described in the USACE's 87 Manual and Regional Supplement, were used to confirm wetland hydrology.

Survey methodology for the wetland investigation included meander surveys throughout the AOI to assess existing vegetation structure and composition, soil conditions, and hydrology. Prior to the field investigation, ECT gathered and reviewed existing available site information. These resources included National Wetland Inventory (NWI) mapping, the Natural Resources Conservation Service (NRCS) soil survey, USGS Topographic mapping, and current and historical aerial photography.

During site inspections, eight (8) wetland (Wetlands 1-8) were documented (Site Characteristics Map, **Appendix A**). Site Photographs depicting conditions at the time of the site investigation are provided in **Appendix B** and Wetland Data Forms are provided in **Appendix C**.

Concurrently, descriptive vegetation types were identified and noted. These areas were determined based on generalized quality, overstory composition, and characterization of understory plants which indicate regeneration.

Wetland Characteristics

Wetlands are defined by the Natural Resources and Environmental Protection Act (NREPA), 1994, PA 451, as amended (Act 451), as:

"...land characterized by the presence of water at a frequency and duration sufficient to support and that under normal circumstances does support wetland vegetation or aquatic life and is commonly referred to as a bog, swamp, or marsh..."

ECT confirmed the existence of wetlands on the project site and has mapped the approximate wetland boundaries (see attached *Vegetation and Wetlands Map*). For mapped wetlands, hydrology was assessed based on several indicators including, saturation at the soil surface, inundation on aerial, watermarks, and concave or depressional surfaces. Hydric soils were determined using indicators such as depleted

matrix, redox dark surface, and thick dark surface. Refer to *Wetland Data Forms* (Appendix C) for wetland specific soils data.

Wetlands 1-3 were emergent wetlands that were dominated by common reed. Vegetation included reed canary grass (*Phalaris arundinacea*), hybrid cattail (*Typha x glauca*), and common reed (*Phragmites australis*).

Wetland 4 was a scrub-shrub wetland. Vegetation included common buckthorn (*Rhamnus cathartica*), black raspberry (*Rubus occidentalis*), Common horsetail (*Equisetum arvense*), Glossy buckthorn (*Rhamnus frangula*), and Black willow (*Salix nigra*).

Wetlands 5 and 6 were forested wetlands within a mature southern forest cover. Vegetation found included riverbank grape (*Vitis riparia*), side-flowering aster (*Aster lateriflorus*), fowl manna grass (*Glyceria striata*), cursed crowfoot (*Ranunculus sceleratus*), creeping Charlie (*Glehoma hederacea*), jewelweed (*Impatiens capensis*), tussock sedge (*Carex stricta*), Canada bluegrass *(Poa compressa*), fringed loosestrife (*Lysimachia ciliata*), common horsetail (*Equisetum arvense*), sensitive fern (*Onoclea sensibilis*), black raspberry (*Rubus occidentalis*), basswood *(Tilia americana*), musclewood (*Carpinus caroliniana*), cottonwood (*Populus deltoides*), and swamp white oak (*Quercus bicolor*).

Wetlands 7 and 8 were scrub-shrub wetlands within the mature southern forest. Vegetation generally included common buckthorn (*Rhamnus cathartica*), American beech (*Fagus grandifolia*), black willow (*Salix nigra*), American elm (*Ulmus americana*), glossy buckthorn (*Frangula alnus*), silky dogwood (*Cornus amomum*), Christmas fern (*Polystichum acrostichoides*), side-flowering aster (*Aster lateriflorus*), jewelweed (*Impatiens capensis*), bur-reed species (Sparganium spp.), cursed crowfoot (*Ranunculus sceleratus*), pennywort (*Hydrocotyle spp.),* and creeping Charlie (*Glehoma hederacea*).

All wetlands delineated in this AOI are within 500 ft of a stream, Tamarack Creek, and are therefore regulated by EGLE, with the exception of Wetlands 1 and 2. Wetlands 1 and 2 are incidental wetlands that have developed in a stormwater basin constructed by MDOT in the 1960s. As such, they are exempt under Part 303, Wetland Protection, of Act 451.

Upland Characteristics

Upland conditions were found throughout the AOI, typically at higher elevations than the mapped wetlands, and demonstrated upland vegetation and non-hydric soils.

Primarily, the upland characteristics are consistent with a disturbed southern forest (see attached *Vegetation and Wetlands Map*). Vegetation generally includes: tall goldenrod (*Solidago altissima*), multiflora rose (Rosa multiflora), honeysuckle (*Lonicera spp.*), common buckthorn (*Rhamnus cathartica*), glossy buckthorn (*Rhamnus frangula*), box-elder (*Acer negundo*), black willow (*Salix nigra*), American elm (*Ulmus americana*), and cottonwood (*Populus deltoides*).

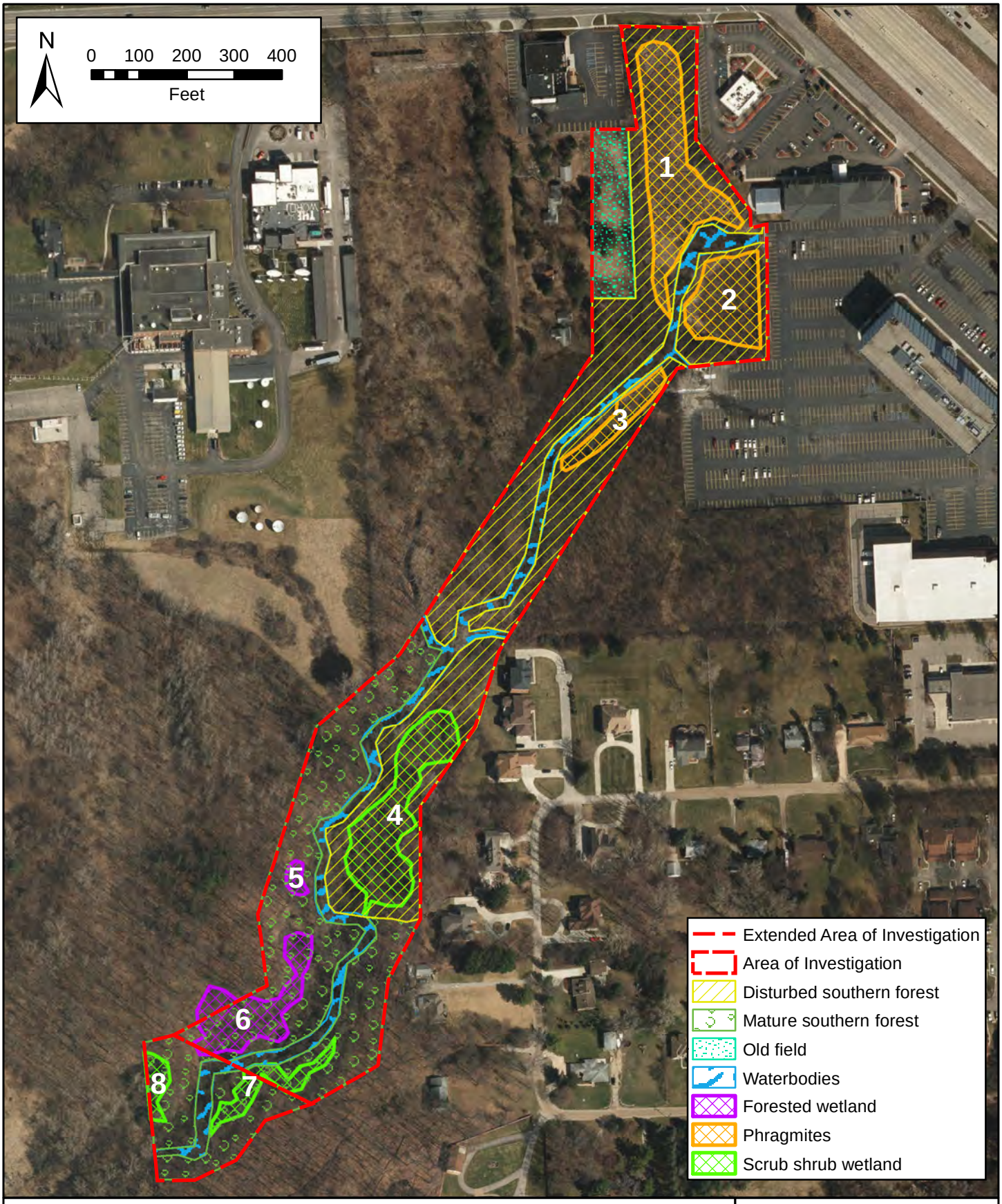
In the south-western portion of the AOI, the upland was more characteristic of an undisturbed mature southern forest (see attached *Vegetation and Wetlands Map*). Vegetation in this upland area included Pennsylvania sedge (Carex pennsylvanica), wild geranium (*Geranium maculatum*), jack-in-the-pulpit (*Arisaema triphyllum*), witch hazel (*Hamamelis virginiana*), ironwood (Ostrya virginiana), eastern white pine (Pinus strobus), white oak (*Quercus alba*), northern red oak (Quercus rubra), sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), pignut hickory (*Carya glabra*), basswood (*Tilia americana*), box-elder (*Acer negundo*), black cherry (*Prunus serotina*), and tulip tree (*Liriodendron tulipifera).*

Habitat Assessment

Invasive shrubs such as honeysuckle (*Lonicera spp.*), common buckthorn (*Rhamnus cathartica*), and glossy buckthorn (*Rhamnus frangula*) were common throughout the disturbed forest (see *Vegetation and Wetlands Map*). BMP's to avoid spreading these invasive species during project implementation is recommended.

APPENDIX A

Mapping



Vegetation and Wetlands Map

Tamarack Creek

Alliance of Rouge Communities

7/23/2019 ECT, Inc Project: 18-0611

ECT Environmental Consulting & Technology, Inc.

P:\Alliance of Rouge Communities\Grant Projects\2018 EPA Rouge Habitat\Tamarack - Southfield\3_Data-Dwgs-Maps\GIS\Tamarack_MSPS_extendedAOI.mxd
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APPENDIX B

Site Photographs

Photograph 1. View of Wetland 1 facing north

Photograph 2. View of Wetland 2 near surface water discharge from parking lot

Photograph 3. View of Wetland 2 near culvert

Photograph 4. Wetland 2

Photograph 5. Wetland 3 facing north

Photograph 6. Wetland 3

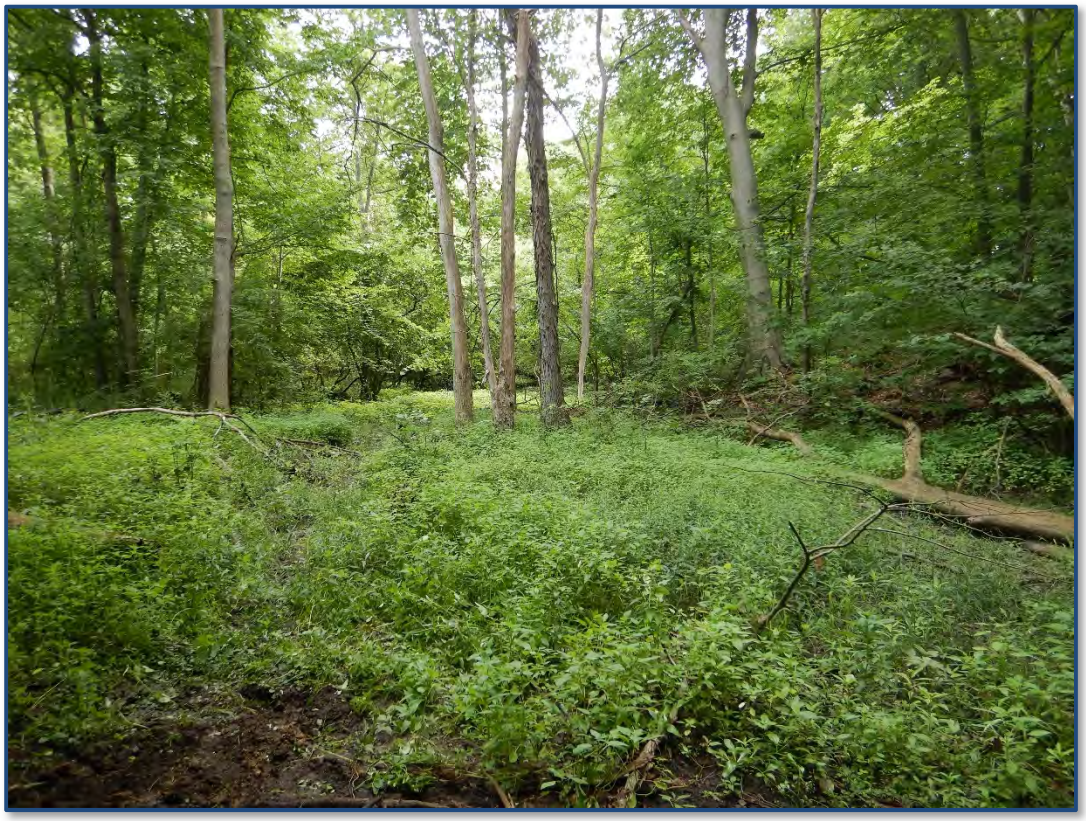
Photograph 7. Wetland 4

Photograph 8. Wetland 5

Photograph 9. View of Wetland 5

Photograph 10. Wetland 5 with oxbow-type standing water

Photograph 11. View of Wetland 6



Photograph 12. Wetland 7

Photograph 13. View of Wetland 7 soil pit

Photograph 14. Wetland 8

Photograph 15. View of Wetland 8 standing water

Photograph 16. Floodplain deposit soil sample showing non-hydric soils

APPENDIX C

Wetland Data Forms

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Tamarack Creek City/County: Southfield Twp, Oakland County Sampling Date: 11-28

Applicant/Owner: Alliance of Rouge Communities State: MI Sampling Point: 1

Investigator(s): Lauren Edson, Matt Carmer Section, Township, Range: Sec 27, T01N, R10E

Landform (hillside, terrace, etc.): depression Local relief (concave, convex, none): _____ Slope %: _____

Subregion (LRR or MLRA): LRR L Lat: 42.471677 Long: -83.243479 Datum: WGS1984

Soil Map Unit Name: Sloan silt loam NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: Wetland 1

Remarks: (Explain alternative procedures here or in a separate report.)
Representative of Wetlands 1-3

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ____ Depth (inches): ____

Water Table Present? Yes ____ No ____ Depth (inches): ____

Saturation Present? Yes ____ No ____ Depth (inches): ____
(includes capillary fringe)

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: 1

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Herb Stratum (Plot size:)			
1. *Phragmites australis*	100	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 =Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		200 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 3/1						Loamy/Clayey	
9-15	10YR 3/1		10YR 3/4	10			Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Tamarack Creek City/County: Southfield Twp, Oakland County Sampling Date: 11-28

Applicant/Owner: Alliance of Rouge Communities State: MI Sampling Point: 2

Investigator(s): Lauren Edson, Matt Carmer Section, Township, Range: Sec 27, T01N, R10E

Landform (hillside, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope %: _____

Subregion (LRR or MLRA): LRR L Lat: 42.467906 Long: -83.246094 Datum: WGS1984

Soil Map Unit Name: Sloan-Marlette association NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: Wetland 4

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ____ Depth (inches): ____

Water Table Present? Yes ____ No ____ Depth (inches): ____

Saturation Present? Yes ____ No ____ Depth (inches): ____

(includes capillary fringe)

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: 2

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Juglans nigra*	60	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	60	=Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. *Rhamnus cathartica*	40	Yes	FAC
2. *Cornus amomum*	20	Yes	FACW
3.			
4.			
5.			
6.			
7.			
	60	=Total Cover	
Herb Stratum (Plot size:)			
1. *Carex stricta*	30	Yes	OBL
2. *Epilobium coloratum*	10	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	x 1 =	40
FACW species	20	x 2 =	40
FAC species	40	x 3 =	120
FACU species	60	x 4 =	240
UPL species	0	x 5 =	0
Column Totals:	160 (A)		440 (B)

Prevalence Index = B/A = 2.75

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 3/1						Loamy/Clayey	
9-15	10YR 3/1		10YR 3/4	10			Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Tamarack Creek City/County: Southfield Twp, Oakland County Sampling Date: 11-28

Applicant/Owner: Alliance of Rouge Communities State: MI Sampling Point: 3

Investigator(s): Lauren Edson, Matt Carmer Section, Township, Range: Sec 27, T01N, R10E

Landform (hillside, terrace, etc.): depression Local relief (concave, convex, none): _____ Slope %: _____

Subregion (LRR or MLRA): LRR L Lat: 42.467057 Long: -83.246831 Datum: WGS1984

Soil Map Unit Name: Sloan-Marlette association NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: Wetland 6

Remarks: (Explain alternative procedures here or in a separate report.)
Representative of Wetlands 5 and 6

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No ____	Depth (inches): ____
Water Table Present?	Yes ____	No ____	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No ____	Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: 3

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Ulmus americana*	60	Yes	FACW
2. *Populus deltoides*	40	Yes	FAC
3. *Tilia americana*	20	No	FACU
4.			
5.			
6.			
7.			
	120	=Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. *Rhamnus cathartica*	40	Yes	FAC
2. *Cornus amomum*	20	Yes	FACW
3. *Carpinus caroliniana*	20	Yes	FAC
4.			
5.			
6.			
7.			
	80	=Total Cover	
Herb Stratum (Plot size:)			
1. *Carex stricta*	30	Yes	OBL
2. *Aster lateriflorus*	10	Yes	FACW
3. *Poa compressa*	10	Yes	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 87.5% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30	x 1 =	30
FACW species	90	x 2 =	180
FAC species	100	x 3 =	300
FACU species	30	x 4 =	120
UPL species	0	x 5 =	0
Column Totals:	250 (A)		630 (B)

Prevalence Index = B/A = 2.52

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL Sampling Point 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 3/1						Loamy/Clayey	
9-15	10YR 3/1		10YR 3/4	10			Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Tamarack Creek City/County: Southfield Twp, Oakland County Sampling Date: 7/18/19

Applicant/Owner: Alliance of Rouge Communities State: MI Sampling Point: 6

Investigator(s): Lauren Edson, Summer Roberts Section, Township, Range: Sec 27, T01N, R10E

Landform (hillside, terrace, etc.): depression Local relief (concave, convex, none): _____ Slope %: _____

Subregion (LRR or MLRA): LRR L Lat: 42.466968 Long: -83.246818 Datum: WGS1984

Soil Map Unit Name: Sloan-Marlette association NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: Wetland 6

Remarks: (Explain alternative procedures here or in a separate report.)
Representative of Wetlands 5 and 6 - updated boundary

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): ____
Water Table Present?	Yes ____	No ____	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No ____	Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: 6

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Ulmus americana*	35	Yes	FACW
2. *Acer saccharinum*	25	Yes	FACW
3. *Tilia americana*	5	No	FACU
4. *Carya glabra*	5	No	FACU
5.			
6.			
7.			
	70	=Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. *Rhamnus cathartica*	40	Yes	FAC
2. *Cornus amomum*	20	Yes	FACW
3. *Carpinus caroliniana*	20	Yes	FAC
4. *Frangula alnus*	5	No	FAC
5.			
6.			
7.			
	85	=Total Cover	
Herb Stratum (Plot size:)			
1. *Carex stricta*	5	No	OBL
2. *Aster lateriflorus*	10	Yes	FACW
3. *Poa compressa*	10	Yes	FACU
4. *Impatiens capensis*	10	Yes	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 87.5% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	100	x 2 =	200
FAC species	65	x 3 =	195
FACU species	20	x 4 =	80
UPL species	0	x 5 =	0
Column Totals:	190 (A)		480 (B)

Prevalence Index = B/A = 2.53

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/1						Mucky Loam/Clay	
4-20	10YR 2/1		10YR 5/6	30			Mucky Loam/Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- X Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Tamarack Creek City/County: Southfield Twp, Oakland County Sampling Date: 7/18/19

Applicant/Owner: Alliance of Rouge Communities State: MI Sampling Point: 7

Investigator(s): Lauren Edson, Summer Roberts Section, Township, Range: Sec 27, T01N, R10E

Landform (hillside, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope %: _____

Subregion (LRR or MLRA): LRR L Lat: 42.466466 Long: -83.247065 Datum: WGS1984

Soil Map Unit Name: Sloan-Marlette association NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No _____	**within a Wetland?** **Yes** X **No** _____
Wetland Hydrology Present?	Yes X	No _____	If yes, optional Wetland Site ID: Wetland 7

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No _____	Depth (inches): _____
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 4

Wetland Hydrology Present? **Yes** X **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: 7

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Carya cordiformis*	5	No	FAC
2. *Carpinus caroliniana*	5	No	FAC
3. *Tilia americana*	30	Yes	FACU
4. *Acer rubrum*	20	Yes	FAC
5. *Quercus alba*	5	No	FACU
6.			
7.			
	65	=Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. *Rhamnus cathartica*	40	Yes	FAC
2. *Cornus amomum*	20	Yes	FACW
3. *Fraxinus pennsylvanica*	15	Yes	FACW
4.			
5.			
6.			
7.			
	75	=Total Cover	
Herb Stratum (Plot size:)			
1. *Carex stricta*	30	Yes	OBL
2. *Lysimachia nummularia*	15	No	FACW
3. *Impatiens capensis*	40	Yes	FACW
4. *Ranunculus hispidus*	5	No	FAC
5. *Leersia oryzoides*	5	No	OBL
6. *Sanicula odorata*	5	No	FAC
7. *Carex intumescens*	2	No	FACW
8.			
9.			
10.			
11.			
12.			
	102	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 85.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	35	x 1 =	35
FACW species	92	x 2 =	184
FAC species	80	x 3 =	240
FACU species	35	x 4 =	140
UPL species	0	x 5 =	0
Column Totals:	242 (A)		599 (B)

Prevalence Index = B/A = 2.48

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 3/1						Loamy/Clayey	
7-14	10YR 6/2		10YR 5/6	15	C		Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Tamarack Creek City/County: Southfield Twp, Oakland County Sampling Date: 7/18/19

Applicant/Owner: Alliance of Rouge Communities State: MI Sampling Point: 8

Investigator(s): Lauren Edson, Summer Roberts Section, Township, Range: Sec 27, T01N, R10E

Landform (hillside, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope %: _____

Subregion (LRR or MLRA): LRR L Lat: 42.466515 Long: -83.247641 Datum: WGS1984

Soil Map Unit Name: Sloan-Marlette association NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No _____	**within a Wetland?** **Yes** X **No** _____
Wetland Hydrology Present?	Yes X	No _____	If yes, optional Wetland Site ID: Wetland 8

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- x Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No _____	Depth (inches): _____
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes x	No _____	Depth (inches): 2

Wetland Hydrology Present? **Yes** X **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: 8

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix nigra*	45	Yes	OBL
2. *Carpinus caroliniana*	5	No	FAC
3. *Ulmus americana*	20	Yes	FACW
4. *Fraxinus pennsylvanica*	10	No	FACW
5.			
6.			
7.			
	80	=Total Cover	

Sapling/Shrub Stratum (Plot size:)			
1. *Frangula alnus*	40	Yes	FAC
2. *Cornus amomum*	20	Yes	FACW
3. *Fraxinus pennsylvanica*	15	Yes	FACW
4.			
5.			
6.			
7.			
	75	=Total Cover	

Herb Stratum (Plot size:)			
1. *Carex stricta*	30	Yes	OBL
2. *Lysimachia nummularia*	25	Yes	FACW
3. *Impatiens capensis*	10	No	FACW
4. *Ranunculus hispidus*	5	No	FAC
5. *Parthenocissus quinquefolia*	5	No	FACU
6. *Cinna arundinacea*	2	No	FACW
7.			
8.			
9.			
10.			
11.			
12.			
	77	=Total Cover	

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	75	x 1 =	75
FACW species	102	x 2 =	204
FAC species	50	x 3 =	150
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	232 (A)		449 (B)

Prevalence Index = B/A = 1.94

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 4/1						Loamy/Clayey	
8-20	10YR 4/2		10YR 4/6	20	C		Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

JOHNSON CREEK FISH HATCHERY PARK VEGETATION AND WETLAND CHARACHTERIZATION SUMMARY

As a preliminary data gathering field investigation, a wetland evaluation and vegetation type mapping was performed for Johnson Creek Fish Hatchery Park project located in Sections 03, 04, 09, and 10 of Northville Township (01S, 08E), Wayne County, Michigan.

The project site is specifically located at Fish Hatchery Park off W Seven Mile Rd, west of S Center St and east of N Beck Rd. The site investigation focused on an approximately 5-acre area [Area of Investigation (AOI)]. The goal of the site investigation was to assess wetland characteristics, characterize vegetation zones, determine approximate invasive species areas to address, and identify potential habitat improvement options. The investigation was completed on November 28 and December 14, 2018.

Site Descriptions

The project site consists of a segment of Johnson Creek and vacant woodland and wetland areas adjacent to the creek. The AOI is bounded by Fish Hatchery Park to the west, a stormwater detention pond, and residences along Fairbrook Rd to the east.

Methodology

The methodology used to identify wetlands described herein was consistent with the Michigan Department of Environment, Great Lakes and Energy (EGLE) formerly, Michigan Department of Environmental Quality (MDEQ) and the U.S. Army Corps of Engineers (USACE) wetland delineation procedures described in the USACE's *Wetlands Delineation Manual – Technical Report Y-87-1* (January 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northeast-Northcentral Region (January 2012).*

Wetlands are characterized according to three diagnostic parameters: vegetation, soils, and hydrology. Plant species associated with wetland versus upland conditions were identified and checked against the National List of Plant Species (Lichvar et al. 2016). Soil profiles were examined by using a tile spade to dig to a depth of approximately 14 inches below the ground surface. Horizon thickness,

color, texture, and presence of hydromorphic (water-formed) features were noted and compared against the U.S. Department of Agriculture, Natural Resources Conservation Service's (USDA-NRCS) Field Indicators of Hydric Soils in the United States (USDA-NRCS 2017). Primary and secondary indicators of hydrology, as described in the USACE's 87 Manual and Regional Supplement, were used to confirm wetland hydrology.

Survey methodology for the wetland investigation included meander surveys throughout the AOI to assess existing vegetation structure and composition, soil conditions, and hydrology. Prior to the field investigation, ECT gathered and reviewed existing available site information. These resources included National Wetland Inventory (NWI) mapping, the Natural Resources Conservation Service (NRCS) soil survey, USGS Topographic mapping, and current and historical aerial photography.

During site inspections, one (1) wetland (Wetland 1) was observed (*Vegetation and Wetlands Map,* **Appendix A**). A small tributary (Stream 1) was also observed. Site Photographs depicting conditions at the time of the site investigation are provided in **Appendix B** and Wetland Data Forms are provided in **Appendix C**.

Concurrently, descriptive vegetation types were identified and noted. These areas were determined based on a general assessment of quality, overstory composition, and characterization of understory plants which suggest likely regeneration.

Wetland Characteristics

Wetlands are defined by P.A. 451 of 1994, as:

"...land characterized by the presence of water at a frequency and duration sufficient to support and that under normal circumstances does support wetland vegetation or aquatic life and is commonly referred to as a bog, swamp, or marsh..."

ECT confirmed the existence of a wetland on the project site and has mapped the approximate wetland boundaries (see attached *Vegetation and Wetlands Map*).

Wetland 1 was an emergent/scrub shrub wetland. Vegetation generally included riverbank grape (*Vitis riparia*), side-flowering aster (*Aster lateriflorus*), cursed crowfoot (*Ranunculus sceleratus*), tussock sedge (*Carex stricta*), sensitive fern (*Onoclea sensibilis*), Curly dock *(Rumex crispus),* rice-cut grass (*Leersia oryzoides*), purple loosestrife (*Lythrum salicaria*), boneset (*Eupatorium perfoliatum*), creeping charlie *(Glehoma hederacea*), and silky dogwood (*Cornus amomum*). Soils were hydric; from 0-16 inches muck was observed (10YR 2/1). Wetland hydrology was indicated by standing water at 1-4 inches, inundation on aerial, high-water table at 6 inches, and passing of the FAC neutral test.

Stream 1 was a small tributary in the southeast corner of the AOI which is likely formed by stormwater draining from the adjacent residential area. The small channel formed at the toe of two forested slopes and ran laterally into Johnson Creek. Leaf pack and detritus was dense, and little vegetation was present except for lake sedge (*Carex lacustris*).

Upland Characteristics

Upland conditions were found throughout a majority of the AOI, including areas directly adjacent to the creek channel (*Vegetation and Wetlands Map*, Appendix A). Upland areas were higher in elevation than the mapped wetlands and demonstrated upland vegetation and non-hydric soils.

Primarily, the upland characteristics are consistent with a disturbed southern forest. Vegetation found includes: eastern lined aster (*Aster lanceolatus*), tall goldenrod (*Solidago altissima*), Canada Goldenrod *(Solidago canadensis),* oriental bittersweet (*Celastrus orbiculata*), parasol whitetop (*Aster umbellata*), ninebark (*Physocarpus opulifolius*), amur honeysuckle (*Lonicera maackii*), honeysuckle (*Lonicera spp.*), common buckthorn (*Rhamnus cathartica*), glossy buckthorn (*Rhamnus frangula*), European privet (*Ligustrum vulgare*), box-elder (*Acer negundo*), hawthorn (*Crataegus spp.*), black willow (*Salix nigra*), Norway maple (*Acer platanoides*), American elm (*Ulmus americana*), and cottonwood (*Populus deltoides*). This vegetation type tended to form a shelf immediately adjacent to Johnson Creek, such that streambanks were well-defined and somewhat steep.

Another portion of the upland was more characteristic of an undisturbed mature southern forest (*Vegetation and Wetlands Map*, Appendix A). Vegetation in this upland area included: white oak (*Quercus alba*), northern red oak (*Quercus rubra*), ironwood (*Ostrya virginiana*), black cherry (*Prunus serotina*), and

Norway maple (*Acer platanoides*). This forested area was located on the hillside of the south part of the AOI.

Invasive Species

Invasive shrubs such as honeysuckle (*Lonicera spp.*), common buckthorn (*Rhamnus cathartica*), glossy buckthorn (*Rhamnus frangula*), and European privet (*Ligustrum vulgare*) were common throughout the disturbed forest (see *Vegetation and Wetlands Map*). Purple loosestrife was found within Wetland 1. BMP's to avoid spreading these invasive species during project implementation is recommended.

APPENDIX A

Mapping

Vegetation and Wetlands Map

Johnson Creek Fish Hatchery Park
Alliance of Rouge Communities

12/20/2018 ECT, Inc Project: 18-0611

- Area of Investigation
- Disturbed Southern Forest
- Disturbed Southern Forest Shelf
- Maintained Park/Upland
- Mature Forest
- Scrub Shrub Wetland
- Small Tributary
- Waterbodies

ECT Environmental Consulting & Technology, Inc.

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APPENDIX B

Site Photographs

Photograph 1. View of Wetland 1 facing east

Photograph 2. View of Wetland 1 with dense herbaceous stand

Photograph 3. Constructed pond with vegetation at edge

Photograph 4. Constructed pond with erosion control

Photograph 5. View of disturbed southern forest shelf vegetation

Photograph 6. View of retaining wall, showing no wetland edge

Photograph 7. Small tributary of flowing water, likely from stormwater

Photograph 8. View of small tributary

Photograph 9. Disturbed southern forest shelf with upland vegetation

Photograph 10. View of disturbed southern forest shelf with backwater

APPENDIX C

Wetland Data Form

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Johnson Creek Fish Hatchery Park City/County: Wayne Sampling Date: 11/28/2018

Applicant/Owner: Alliance of Rouge Communities State: MI Sampling Point: DP-1

Investigator(s): Lauren Edson, Matt Carmer Section, Township, Range: Sections 03, 04, 09, 10 (01S, 08E)

Landform (hillside, terrace, etc.): Local relief (concave, convex, none):

Slope (%): Lat: 42.423576 Long: -83.492210 Datum: WGS 1984

Soil Map Unit Name: Cohoctah fine sandy loam, frequently flooded NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No

Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area within a Wetland?** Yes No X
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size:)			
1. *Cornus amomum*	30	Yes	FACW
2.			
3.			
4.			
5.			
	30 =Total Cover		
Herb Stratum (Plot size:)			
1. *Aster lateriflorus*	20	Yes	FACW
2. *Carex stricta*	20	Yes	OBL
3. *Onoclea sensibilis*	20	Yes	FACW
4. *Rumex crispus*	10	No	FAC
5. *Leersia oryzoides*	10	No	OBL
6. *Lythrum salicaria*	10	No	OBL
7. *Eupatorium perfoliatum*	20	Yes	OBL
8.			
9.			
10.			
	110 =Total Cover		
Woody Vine Stratum (Plot size:)			
1. *Vitis riparia*	5	Yes	FACW
2.			
	5 =Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	60	x 1 =	60
FACW species	75	x 2 =	150
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	145 (A)		240 (B)

Prevalence Index = B/A = 1.66

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-13	10YR 3/1						Mucky Loam/Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- X Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Iron-Manganese Masses (F12)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Midwest Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ___

Water Table Present? Yes ___ No ___ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ___

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: