



Parks and Public Works Committee Meeting September 26, 2023 – 10:00 am

*This is an in-person meeting at Saugatuck City Hall, 102 Butler St, Saugatuck, MI 49453.
The meeting will also be available live, virtually on Zoom.*

1. CALL TO ORDER

2. ROLL CALL

3. APPROVAL OF AGENDA

4. APPROVAL OF MINUTES:

- A. Regular Meeting Minutes from 08/22/23

5. GUEST SPEAKER

6. PUBLIC COMMENTS/TODAY'S AGENDA TOPICS ONLY

(LIMIT 3 MINUTES) Use the “raise hand” button in the participant’s screen found in the Zoom interface or enter *9 if calling in by phone to raise hand.

7. REVIEW/DISCUSSION:

- A. Department of Public Works and Administrative Updates
- B. Study Group Updates
 - 1. Invasive Species
 - 2. Airport Property
 - 3. Blue Star Multimodal Path
 - 4. Village Square & Playground
 - 5. Park Street & Mt. Baldhead Improvements
- C. Tri-Community Parks & Recreation Master Plan Update

8. REVIEW NEXT STEPS

9. PUBLIC COMMENTS (LIMIT 3 MINUTES) Use the “raise hand” button in the participant’s screen found in the Zoom interface or enter *9 if calling in by phone to raise hand.

10. MEMBER CLOSING COMMENTS

11. ADJOURN

NOTICE:

Join online by visiting:

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Join by phone by dialing:
(312) 626-6799 -or-
(646) 518-9805

Then enter “Meeting ID”:
2698572603

Please send questions or comments regarding meeting agenda items prior to meeting to:
ryan@saugatuckcity.com

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PARKS AND PUBLIC WORKS COMMITTEE MEETING MINUTES

August 22, 2023

The Parks and Public Works Committee met for Regular Committee Meeting at 9:30 a.m.
City Hall
102 Butler St., Saugatuck, MI 49453.

Call to Order:

The meeting was called to order by Chair Baldwin at 9:30 a.m.

Attendance:

Present: Chair Baldwin, Committee members Charak, DeJong, Kimble (arrived @ 9:40 am) & Roche.

Absent: Committee member Johnson.

Others Present: Superintendent Herbert, Deputy Clerk & DPW Asst. Williams

Approval of Agenda:

Motion by Charak, second by DeJong, to table item 6B7 on the agenda for July 25, 2023. Via voice vote, motion carried 3-0.

Approval of Minutes from 7/25/23:

Motion by DeJong, second by Roche, to approve the minutes from the July 25, 2023, meeting. Via voice vote, motion carried 3-0.

Public Speaker:

Ruth Thornton from the Land Conservancy of WM, Land Protection Director, was in person to speak to the Committee about who they are and the kind of work that they do. They work in an eight-county area in Western Michigan where they have prioritized and have completed a strategic plan. They have three focal areas that they prioritize for their work which are Big Forests & Wild Rivers, the Lake Michigan Shoreline, and the Eastern Glacial Corridor. They also have Strategic Plan focus areas where there is very high conservation potential for the West Michigan Shoreline. Thornton went over how they partner with Local and State Governments on projects such as the Saugatuck Harbor Natural Area, Tallmadge Woods, Lost Lake, Meinert Park, North Ottawa Dunes, and the Upper Macatawa Natural Area. She also discussed the criteria for land projects and explained how a landowner is able to donate a conservation easement.

Public Comments (agenda items only):

Chris Clark (Saugatuck Township) – John Vanderbeek asked him to come and be a resource, particularly with the presentation. He is active in the Riverwood Council and the hiking clubs, so he has hiked all of the trails and he is quite familiar with most of the properties. He has been looking into easements and everything and has learned that you have to make sure that the real estate attorneys understand that you're looking at an easement in perpetuity. Most of them are not usually doing that, like farmers can do temporary easements. He has seen the airport property several times and he has walked with Helen a couple of times and says that if there is any way he can be helpful, let him know. He is particularly interested in the Mount Baldhead area and believes one thing that might help them as they look into who owns what is to speak with the Land Conservancy of Western Michigan. He is sure they hold the easements for Tallmadge Woods, and they are the ones who work so they probably have a lot of research somewhere in a file. He said that they may be able to answer some of their questions. There are probably some sort of handshake agreements and some misunderstandings about who owns what over there. He doesn't think it will be terribly hard to clear that up. He is willing to help if needed.

John Kerr (Douglas) – Mount Baldhead Park is arguably Saugatuck's most popular, most historic, and most iconic landmark and he thinks that is evidenced by the two historic photos in the room of Mount Baldhead and the view from Mount Baldhead. Every summer, thousands of people from around the country and around the world face the challenge of climbing to the top of the big sand dune with the dome on top of it. It's a real gem in the community. For the last five years, he has worked as a volunteer for the pump house museum, and he gets to meet these people. They have a map where they ask people to put a pin in the map to show where they have come from. Every year they have hundreds and hundreds of people from around the world coming to visit that site. Compared to other city parks in Saugatuck, Mount Baldhead Park is in sad shape. It has been neglected over the years with minimal maintenance and needs attention. The lovely old picnic pavilion is dirty. The roof is covered with years of debris and rafters are filled with birds and the messes that they make. The electricity doesn't work at all, and the light bulbs are dangling from the wires from the ceiling. A couple of the picnic tables are simply rotting. It is not a place that families want to enjoy a picnic with a view over the river. The restrooms are primitive and haven't been updated in decades. They never seem clean, and the doors don't close on either one. The fixtures are ancient. They are definitely not family friendly. People don't want to send their children into them. On the plus side, they do have running water. At the top of the stairs, the wooden joint platform is sliding down the dune. If you walk around, there are rotten timbers in numerous places. There are a lot of hazards up there. Because of its popularity with all the tourists and the locals as well, the facilities at Mount Baldhead get a lot of wear and tear. It is this popularity that we feel makes it incumbent upon the City to step up. With the help of volunteers like himself, they can make it a place that they can be proud of once again.

Renee Zita (985 Park St) – Her family has had a home on Park Street since 1932. Says it is painful to see the way Mount Baldhead looks and she pleads with the Committee to address that.

Review/Discussion:

A. Department of Public Works and Administrative Updates:

DPW Superintendent Herbert thanked Ruth Thornton for the presentation she delivered. She did an excellent job and there was quite a bit of thought-provoking data there. He said that he was thinking during the presentation that it may be a good idea to bring Jon Moxey from Fleis & VandenBrink in to help with the data collection that would be needed. As they go through different parcels, that may be helpful.

We are roughly 2 weeks away from Labor Day, and Herbert wanted to take a quick look backwards and then talk about a little bit of what they have got going on this fall. He thinks that DPW overall had a very successful summer. One of the main challenges that Public Works faces is the Oval Beach Management position as it has been a difficult position to fulfill. They had a longtime beach manager for over a decade and then she resigned in May of 2021. Since that time, they have gone through seven managers. They really need to fill that position with somebody who is going to be consistent and be here for the long-term. He said that he has taken some steps and had some conversations with people after posting the job, but you never really know until you get somebody hired in and see how they work out and make sure they like the position and they want to stay awhile. The downside of going through that much turnover is there is so much training involved. It is a critical operation for the city. There are public safety elements to it, food handling elements to it so it has been a key role for them at Public Works. He just wanted to bring to light some of the challenges that they face.

When asked why the beach had such a high turnover in the management position, Herbert explained that there are different reasons for each of the seven. The main reason is that the job is very demanding. They pay a certain amount of money for the position, but really what they are giving up is their summer, by working holidays and weekends. You are dealing with seasonal staff that work for only 99 days per summer and those employees have varying degrees of work ethic, and for some employees, this is their very first job. So, for these reasons, it has just been difficult. He thinks that they are making good progress. Herbert said that he is hopeful going into the 2024 season, Public Works will have a few positions available, and one of them is a hybrid position between an Equipment Operator slash Oval Beach Manager position. It is a very unique position. He has had conversations with someone, and he plans to offer the job to him as he has interviewed and did quite well. He hopes to gain good traction in 2024 and then get to a level of training with this individual to where they can go beyond that and start getting a little more innovative with their operation out there. There are a lot of ideas out there. Herbert is trying to keep his nose to the ground and say that that this is where they are currently, and then building off of that, there is so much potential out there that they can go in any number of directions and there are lots of good ideas. He said that they need to take one step at a time and make sure that they have consistent leadership at the beach, that are going to be there and make sure that everyone is safe, and the organization is being run well. So that was a look back at the 2023 season.

The biggest challenge for DPW this fall is that they are pretty project heavy this fall. He said that they are going to get pretty aggressive this year with road construction projects. In a matter of weeks, they are tearing into Taylor, Takken, East, and West Streets. There is also a section of road that they will be redoing on North Maple Street. Herbert said that he just signed a proposal with

TNT Roofing who will be doing the roof replacement on the restroom facility, as well as the pavilion at Mount Baldhead this fall.

This City Hall exterior still has some work to be completed. The large projects are done, but there are a couple of details like the shutters need to get reattached to the building. He is told that would be completed by last week. Another issue that has come up is the rain gutters on the building. They discharge off to the side of the building, mulch gets covered on the sidewalk, it has been a problem for a really long time. They plan to do the exterior work before the project is fully complete where they will be refurbishing the landscaping, but also some cracked sidewalks out front in the driveway apron. While they have the concrete torn up, they plan on connecting the rain gutters to the catch basin that is in front of the building, which is the proper fix.

After Labor Day, they will be moving forward with refurbishing the Rose Garden fence as well as the iron gate on the restroom building. He has spoken to Douglas DPW Director Rick Zoet, regarding having the same company refurbish the streetlamps on the Saugatuck Blue Star Highway Bridge, as they are kind of rusted out particularly where the snow hits the post consistently with salt.

Ace Parking Lot Striping still has some work to do. They came in hot and heavy downtown earlier this summer. There are still some crosswalks, stop bars, and then the whole west side of the river that still needs to get painted. Herbert said that crack sealing will take place this fall. Crack sealing is a treatment that they apply to roads that are in fairly good condition and help preserve the life of the road before it deteriorates more. The next thing on the list will be to get the irrigation replaced at Willow Park. He said that this is stuff that will be going on with the DPW team during the fall season and he is looking forward to seeing everything completed.

B. Study Group Updates:

a. Invasive Species:

Committee member Charak said that the Allegan County Conservation District is working to treat 4000 Hemlock trees on City property. Contracts and qualifications that they have to have along with insurance, license, and a couple of years of experience. They have picked out a contractor from Allendale and they are going to start working on that soon.

City Manager Heise added that the Allegan Conservation District has also been treating, working with private landowners in the same area. There are dual efforts going on at the same time. The City did budget the amount as far as a little bit from GEI, and it will be on the Council agenda, Monday for action. This has been a long-standing issue and the City Council has been supportive.

b. Airport Property:

Chair Baldwin gave all PPW members a copy of the ecological and sustainability evaluations that were provided by the ODC. The update is there for you. The thing that she was most interested in and what she is happiest about is it looks like there is nothing to stop them from grooming the already established trails and giving more legitimacy to those trails. She was disappointed to see that there is not really an opportunity to do solar, but she is okay

with it because it opens up for other things that they can possibly do in those areas. They have an optional planning session that they have already paid for with the ODC so she would like to set that up and contact them. Hopefully they can get something squared away where she would like to talk about next steps then on their trails and what that looks like. Baldwin said that it makes sense to have transparency and have it during a normally scheduled meeting. She says the next steps would be to contact them and get the meeting set up and then start making the next move to get the trails legitimized. She thinks that could be really exciting stuff, something to put a feather in their cap.

c. Blue Star Multimodal Path:

Committee member Kimble said they had their project kickoff Zoom meeting on August 8th and that it went really well. That included everyone that is on the tribe, community, committee so they have representatives from Saugatuck Township, Douglas, Saugatuck City, and the Friends of the Blue Star Trail. The timeline is so long that they are not scheduled to start construction until probably Spring of 2025. That gives them six months or more to prepare, and there is still quite a bit of work that needs to be done. They will be working on all of the fine tuning the design of the path so they can start the bids in January. They will have a meeting with Saugatuck City so that they can start talking about some of the anticipated controversial aspects of the project. The Friends of The Blue Star Trail had their gala and done very well. They are putting money aside for adding the next portion to the trail. Kimble said that they are also in need of new board members.

d. Village Square:

Committee members DeJong and Roche teamed up for a presentation regarding the progress at Village Square. They went over the ODC Inspection regarding the playground equipment. There are many Priority 1 and 2 safety concerns and it is currently non-compliant and should be corrected ASAP. They have advised that the equipment be demolished, and that the City move forward with replacement. They went over the playground location and goals for the playground which are:

1. Keeping at current location
2. Maximize existing footprint
3. Broaden age range to 2-12 years
4. Include unique & modern features
5. Use long-lasting materials
6. Keep the existing trees
7. Pursue themes – nature, art/music, maritime
8. Add solar, flashing crosswalk sign

They spoke about the Vendors/Designers Meetings with the ODC, Adventure World, Sinclair using GameTime/Playcore, and Penchura using Landscape Structures. They visited 12 playgrounds, looked through several catalogues & online components, and received multiple

renderings with feedback. They presented to the Committee several options from each vendor/designer and explained the differences between all of them. They also went over the timeline which involves the following:

- August 22, 2023 – Present work to PPW & get feedback.
- August 25, 2023 – Receive updated renderings/quotes.
- September 2023 – PPW Special Meeting to make decision to send to CC.
- October 2023 – CC approval & playground demolition.
- October 27, 2023 – GameTime grant is due.
- April 2024 – Community build.

d. Park Street & Mount Baldhead:

City Manager Heise said that AT&T are hanging tough with them, dealing with multiple stakeholders as it stands now. They are working with the Historical Society to try to make accommodations inside the radar dome, to leave their giant antenna intact inside the radar. AT&T has been very patient with them, and they have been working with their engineers. Heise says they feel like there is a way to work with the Historical Society to allow the antenna to stay in place in the radar. They are moving forward to a couple more steps with that. They have had to go through the Zoning Board of Appeals for some setback issues following their city ordinances. Other than that, they've already made investments in getting fiber installed out there. They are ready to go with that and are hoping to have this installed in time for summer events next year. He doesn't believe that AT&T have any interest in upgrading the bathrooms at this point. Heise suggested working as a group to renovate them and that they want to try to stay inside that existing footprint given the Archaeological Survey. Heise had a meeting with Consumers Energy, and they let him know about a project which is pretty significant. He said that they stated they would bury all of the utilities on Park Street. They have so many issues with the trees and the sand to stabilize the poles. A lot of the poles and trees are leaning, and he thinks that it is just too difficult for them to get their footings in there. He is unsure of the timeline for that project at this time but will have more details at a later date.

One the agenda for Council is the donation box that Ms. Eda and Mr. Curb placed at the steps at Mount Baldhead. What City Manager Heise has asked of them is to have a clear understanding of questions such as who is collecting money and where does the money go? He thinks that the donation box is a great idea. They have informed him that the Historical Society will collect the funds and then everything goes to the City for Mount Baldhead infrastructure steps, and some of the other issues that were pointed out earlier in the meeting. They just need to get that in writing and in front of City Council so that they know where the money is going. If the money is being collected by the Historical Society, are the funds distributed half and half? Heise said that there are a lot of nonprofits that would love to put out donation boxes in different areas. He just wants to make sure that they have a good handle on the management of the funds. They probably make \$100 per week if he had to guess and said that

they have already collected over \$100, and it has only been out there a couple of weeks. He has requested new signage as they want to put up a QR code for larger donors because not a lot of people like cash.

e. Recycling Bins:

Committee Member Roche said that at the last meeting she spoke to the Committee about recycling bins and trying to integrate them in commercial spaces or public spaces. She did some research on that and got some quotes after speaking with Scott Herbert and receiving some feedback. Scott operates with a small crew so they have to make sure that this will work for his team. He suggested 55-gallon bins, so they don't have to empty them every hour and they also want them to match. Roche did some research into what the best behavior or habit creator is and said that it is the restrictive opening cans, because they will be starting with only bottles and cans that hopefully have less contamination. They can label the downside of the can and do the same thing for waste. They also like the hinges on the garbage because they have a lot of dogs and food and things get put in there on hot days, they really want to keep the smell down. They are made from 100% recyclable materials. They are looking to purchase three sets, three of each is around \$6600 to do six cans which is not cheap, but they are durable. She proposed to the group that they would like to do a pilot of putting these in three locations. Scott suggested the Saugatuck Drug Store corner, at Village Square, and at Mount Baldhead, which are all high traffic locations. They will do a test and then get feedback from DPW. They will also need to get a new dumpster because they will be collecting materials that they haven't collected before. They are hoping that this keeps the levels of garbage down because they will be putting the materials where it belongs.

C. Tri-Community Parks & Recreation Master Plan Update:

John McCann and Lindsey Gadbois from Veritas Design Group were in person to speak to the Committee regarding the Tri-Community Parks & Recreation Master Plan. John said that they were spearheading the updates to the rec plan in collaboration with Douglas, Saugatuck Township, and the local school district to create a joint five-year plan for the area. They have focus groups set up with each individual community as part of their outreach and their process so they can hear specifically what their ideas are, and if there are any thoughts or concerns. They are also working with a steering committee to help guide the project in general. They would like to hear what each community wants to do, so that they can gather all of the input and try to reconcile together with that and what they hear from the public piece to that. They have already met with the Township, and then later in the day they plan to meet with Douglas and the school district. To be eligible for grants through the DNR, you have to have a current Parks and Recreation Master Plan on file, which it is required to update every five years. That is the main purpose that communities do these plans. However, there are other benefits to doing that as it gives you a chance to look at your facilities and evaluate what you have, what you need, and what you are missing, gives you an idea of the public perception through your public outreach. It gives you an idea of how the community perceives the facilities versus what council or others in the community see so you can help reconcile that. It provides you an opportunity to set

big goals and objectives for future improvements and developments, and lets you look at the big picture stuff in addition to the little picture stuff. You can think about things like sustainability and conservation, all of the great things the Committee has been talking about here. It will let you set a timetable through an action plan. The DNR would like to see if you apply for a grant that the project is inside your plan. They always encourage them to include as much as you think you might do in the plan. It may include some really high in the sky type projects that maybe there is no way you can do it. You never know when an opportunity might come along, or a donor. They encourage you to include those types of projects. You also include specific projects that you think you can do like the Playground at Village Square Park. It kind of covers you for all bases. They do a pretty robust public input process, and they are working on an online survey. They have put it out there as a draft and they are getting feedback now. They will make the changes and then they will send it out for a final review. This gives the community an opportunity in the comfort of their own home to get on the computer and provide feedback where they don't have to come to a meeting and interact, which is a little bit safer for them. They generally get a lot of good feedback through those surveys because they will be multiple choice or checkboxes, but then there are also common boxes where they can tell you all the things and you will hear all the things. They will also have a public input open house where they solicit input from the community regarding Parks and Recreation. It is a good opportunity for folks to come in and provide feedback. Usually, they have handouts and other materials that can make it interactive and fun for everybody. A community event has been discussed or piggybacking off another community event that is already happening in the community. They can come and set up a table and just kind of be there in the background and talk to people as they come through. The intention is to try to get diverse coverage and feedback. They aren't targeting just a certain group, they are getting families, seniors and everyone included. There is also a 30-day public review period. Once they have a draft of the plan put together, they are required to have a 30-day review period, so anyone can complete it and provide feedback. When they take it to council, they will also have a public review period. There are lots of opportunities.

McCann then gave the Committee a quick rundown of the sections of the plan and what all goes into the plan. Generally, the DNR kind of mandates certain sections that are required in the plan, and they can always add more if necessary. This may be the case in this community because you have the waterfront piece, so they may need to expand that section a little bit. Usually, there is a community description section that provides the description of the existing community in terms of topography, vegetation, demographics, transportation, and other things of the sort. He said that they will probably regurgitate a lot of that information from the previous plan since it doesn't change very often. There is an administrative structure piece where they describe a breakdown of how the hierarchy of the communities and how the leadership is set up the different committees and boards, what their roles are, how decisions are made, and things like the budgets for parks and the overall community. This gives them a good understanding of how things work. There is the recreational inventory piece where they go out to each park and do an inventory, look at accessibility, what types of facilities that they have, make a big matrix and list everything out. They have already been to a bunch of parks and started that process. They get a whole list of all of the facilities that are available to the community members to get an idea of what is there. They can describe the public input process and

then they can give you the results and let you know all of the things that they've done for public input. Then they will do a recreational needs and deficiencies analysis. They look at the National Park standards and then they will benchmark this community based on population in the area and see how it compares with the National Park. Those things vary from community to community. They use a lot of information from the previous plans and carry that forward. The last two sections, the goals, objectives, and the action plan are where they are looking for your feedback and input as well as input from the community. They would like to get an idea from your point of view of the goals, objectives in the previous plan are still valid or if they need to tweak them, change them, delete them, whatever they see fit. John said that the action plan is where you describe your timetable for projects and what projects you would like to do. In this project, since it is a joint Community Plan where they are still working out how they are going to get all of everyone's projects listed in there and have a cohesive overall joint type of plan. They still want to hear what your thoughts are on those types of things.

Review Next Steps: None.

Public Comments: Lisa Mize, Executive Director of the CVB – She appreciates what the committee is doing. She is very interested in the Tri-Community Master Plan update. Everything that she has heard about the “pie in the sky” projects is in line with what the CVB is currently looking at. They have a subcommittee put together right now to look at potential grant opportunities. What they have described in the Master Plan fits perfectly. She would love to have input into the Master Plan and loves what the committee is doing.

Member Closing Comments:

Committee Member Charak – loved the session regarding the five-year plan.

Committee Member Kimble – Agrees that the five-year plan session was good to emphasize this area and the idea of preserving their natural areas, but also encouraging education opportunities for people to create them.

Committee Member DeJong – Feels like they are really making progress. They've recommended something to City Council, and they have something that they will come back with in just a couple of weeks and recommend to City Council as well.

Committee Member Roche – She would like to take a deep dive into this at the next meeting and for the Committee members to do a deep dive and come back to this. She thinks this is great for analytical but says that this is their working order for the next several years. She says that they need to get really great as far as what they are doing not just for grants but for this community, and get numbers tied to it so that they don't feel so disorganized wondering what they can and can't do.

Chair Baldwin – She echoes that they probably need another working session on this. There is a lot to digest in the five-year plan. She agrees that she liked the five-year plan and talked about long term but is excited about in the short-term getting the playground before Council. They have \$175K earmarked, they can come up with the rest of it and think that they need to go big and propose it. She thanked everyone for their hard work and their three hours in the chair.

Adjournment:

Motion by Roche, second by Charak, to approve adjournment of the meeting. Via voice vote, motion carried 4-0. Chairwoman Baldwin adjourned at 12:30 p.m.

Respectfully Submitted,

Sara Williams, City Deputy Clerk & DPW Administrative Assistant

Ecological Evaluation of “Former Airport Property”

This report was created for:

City of Saugatuck
102 Butler St, Saugatuck, MI 49453



Project Background:

The ODC Conservation Services team conducted an ecological evaluation of the City of Saugatuck-owned “Former Airport” property (parcel #'s: 20-002-027-00 and 20-260-002-00). Survey work for the ecological evaluation began on **June 2, 2023** and continued through **July 31, 2023**. The purpose of the ecological evaluation was to assess the current state of ecological health of the existing natural communities and to provide direction for future land-use decisions on the property. The ecological evaluation process involved the identification of distinct natural communities on the site, along with outlining the following criteria for each unit:

- General ecological site description and inventory of natural features
- Description of each natural community including:
 - Landscape context and natural processes
 - General inventory of native plant communities including canopy, understory, and forb/graminoid layer
 - Documentation of high-quality native plant species (coefficient of conservatism rankings between 7-10)
 - Documentation of observed (and potential) wildlife including: state threatened (T), endangered (E), and species of special concern (SC)
 - Documentation of invasive species, pests, and ecological threats
 - Identification of potential ecological restoration and outdoor education opportunities

Executive Summary

The reviewed property consists of 169.1 total acres located along a significant mosaic of greenspace within the Kalamazoo River corridor. The site offers a diverse range of habitats including mature expanses of Mesic Southern Forest, Floodplain Forest, a biodiverse river corridor, several vernal pools, and multiple non-natural communities facing substantial anthropogenic disturbance. Based on our findings detailed below in this report, we recommend any future development and/or recreational amenities should remain on the western half of the property which is of lower ecological quality. The eastern half of the property consists almost entirely of high quality habitat that should be preserved if possible. Pockets of invasive species should be prioritized for management throughout the entire property in order to prevent the eventual displacement of these high quality plant communities.

Site Description

The property under review is situated directly east the intersection of 63rd St and 134th Ave in Saugatuck. The property has a long history of anthropogenic disturbance including a brief stint as an airport, a snowmobile club and trail system, as well as a current storage area for DPW lawn waste and other materials. The extensive history of anthropogenic disturbance is most obvious on the western half of the property. A plethora of invasive and noxious, disturbance-prone species can be found throughout this area. Despite this concern, the property also harbors several high-quality natural areas as we move east throughout the property including a rich creek corridor, hemlock dominated slopes leading to the creek, large tracts of mature forest with old growth oaks, multiple vernal pools, and several pockets of high-quality wet woods. Although invasive species are dense on the western half of the property, the presence of this wide range of habitats warrants a concerted management effort to discourage the spread of invasive species and preserve the integrity of the high-quality natural areas of the property.

Site Information:

Property Size:

169.1 acres

Topography:

Substantial elevation changes from upland (680') to lower-lying areas of Silver Creek (600') on the east side of the property

Watershed:

Kalamazoo

Corridor Component:

One of a number of connected recreational areas along Silver Creek

Historical Land Use:

Previously owned and operated as a small airport in the 1920's

Former snowmobile/UTV recreation club for a period of time (trails throughout)

Active storage area for DPW on SW corner of the property

Disturbance Comments:

Frequent anthropogenic disturbance has led to an increase in invasive and noxious species in the DPW storage area, the old airport runway, and in general on the western half of the property

Ecological Community Information:

Pre-settlement Communities:

Hemlock-Beech-Sugar Maple Forest, Mixed Hardwood Swamp

Present Communities:

Mesic Southern Forest, Floodplain Forest, Ruderal Pine Forest, Disturbed Wet Prairie

Maturity:

Mature canopy on eastern half of the property with pockets of middle-aged and early successional on the western half

Total Species Recorded:

102 in less disturbed areas

88 in heavily disturbed areas

***NOTE:** FQI recorded in two separate units due to the high prevalence of non-native species in the disturbed areas on the western half of the property

Floristic Quality Index (FQI):

41.4 in less disturbed areas

12.2 in heavily disturbed areas

***General scale:** 1-19 = low quality, 20-35 high quality, 35+ = exceptional

Notable Elements:

16 plants with a coefficient of conservatism (CC) of 7 or higher

Ecological Site Description and Natural Features:

1. Topography

The property has notable changes in elevation as we move east through the property. The peak elevation is 680' on the NW portion of the unit, with 600' being the low point of Silver Creek. The creek corridor is prone to frequent flooding events due to the presence of the creek, a high-water table, and notable elevation changes.

2. Hydrology

Silver Creek flows south through the eastern transect of the property meandering through the pockets of floodplain forest. Several ravines and seepage areas dot the slopes leading down to Silver Creek.

3. Present Natural Communities (see Appendix A)

- Mesic Southern Forest
- Floodplain Forest/Hemlock Transitional Zone
- Disturbed & Non-natural Communities:
 - Disturbed Wet Prairie
 - Ruderal Pine Forest
 - Disturbed Storage Lot

4. High Quality Plant Species (*CC = Coefficient of Conservatism)

- Fox grape (*Vitis labrusca*) *CC of 7
- Red trillium (*Trillium erectum*) *CC of 7
- Blackhaw (*Viburnum prunifolium*) *CC of 7
- Spicebush (*Lindera benzoin*) *CC of 7
- Yellow birch (*Betula alleghaniensis*) *CC of 7
- Red baneberry (*Actaea rubra*) *CC of 7
- Spotted wintergreen (*Chimaphila maculata*) *CC of 8
- Plaintain-leaf sedge (*Carex plantaginea*) *CC of 8
- Rue anemone (*Thalictrum thalictroides*) *CC of 8
- American cancer root (*Orobanche uniflora*) *CC of 8
- Flowering dogwood (*Cornus florida*) *CC of 8
- Joe-pye weed (*Eutrochium fistulosum*) *CC of 8
- Lizard's tail (*Saururus cernuus*) *CC of 9
- Tulip tree (*Liriodendron tulipifera*) *CC of 9
- Paw Paw (*Asimina triloba*) *CC of 9
- Toadshade (*Trillium sessile*) *CC of 9
- American chestnut (*Castanea dentata*) *CC of 9

5. Non-native/Invasive Species

- Black locust (*Robinia pseudoacacia*)
- Tree-of-Heaven (*Ailanthus altissima*)
- Multiflora rose (*Rosa multiflora*)
- European privet (*Ligustrum vulgare*)
- Japanese barberry (*Berberis vulgaris*)
- Purple loosestrife (*Lythrum salicaria*)
- Garlic mustard (*Alliaria petiolata*)
- Canada thistle (*Cirsium arvense*)
- Autumn olive (*Elaeagnus umbellata*)
- Spotted knapweed (*Centaurea stoebe*)
- Asian bittersweet (*Celastrus orbiculatus*)
- Japanese knotweed (*Fallopia japonica*)
- Creeping myrtle (*Vinca minor*)
- Honeysuckle (*Lonicera tatarica*)
- Phragmites (*Phragmites australis*)
- Glossy buckthorn (*Frangula alnus*)
- Reed canary grass (*Phalaris arundinacea*)
- Sweet clover (*Melilotus spp.*)
- Dame's rocket (*Hesperis matronalis*)

Description of Natural Communities (see Appendix A for map):

1. Mesic Southern Forest

- **Landscape Context/Natural Features:**

Mesic Southern Forest is a beech-maple dominated community that typically occurs on moraine and glacial outwash areas in close proximity to the Great Lakes. Gap phase dynamics from periodic severe weather events is the main process that promotes canopy regeneration in this system. The mosaic of old growth oaks in conjunction with recent recruitment of primarily younger beech and maple saplings supports this history of small-scale weather related disturbance. A matrix of long-lived, middle-aged, and early successional forest is found throughout this system.

- **Native Plant Community:** Mesic-Southern Forest occupies the majority of the property until the terrace/Hemlock transitional zone of the floodplain forest is reached on the eastern portion. It is situated along on the upland portions of the slopes west of the creek following the areas of more well-drained soil. The canopy layer is quite diverse here with the dominant species observed being American beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*). Abundant canopy associates include: yellow poplar (*Liriodendron tulipifera*), bitternut hickory (*Carya cordiformis*), white oak (*Quercus alba*), red oak (*Quercus rubra*), blue beech (*Carpinus caroliniana*), and ironwood (*Ostrya virginiana*). Young saplings of beech, maple, elm, and ironwood trees are common. Parasitic species American-cancer root (*Conopholis americana*), beech-drops (*Epifagus virginiana*) are also quite common. The soil is dense with leaf litter and organic matter which harbors a rich network of fungi as well. The shrub layer consists mainly of witch hazel (*Hamamelis virginiana*), spicebush (*Lindera benzoin*), prickly gooseberry (*Ribes cynosbati*), with a few scatterings of both pawpaw (*Asimina triloba*) and flowering dogwood (*Cornus florida*) on the east side. Virginia creeper (*Parthenocissus quinquefolia*), green briar (*Smilax spp.*), and poison ivy (*Toxicodendron radicans*) make up the majority of woody vine species. The ground/forb layer offers several high value native species and a variety of spring ephemerals including: squirrel corn (*Dicentra canadensis*), Dutchman's breeches (*D. cucullaria*), spring beauty (*Claytonia virginica*), wild geranium (*Geranium maculatum*), yellow trout lily (*E. americanum*), sharp-lobed hepatica (*Hepatica acutiloba*), May apple (*Podophyllum peltatum*), common trillium (*Trillium grandiflorum*), sessile trillium (*Trillium sessile*), bloodroot (*Sanguinaria canadensis*), and Canada mayflower (*Maianthemum canadense*). Several sedge species (*Carex albursina*, *C. arctata*, *C. blanda*) and fescue/bluegrasses fill in pockets of the understory during summer months. Baneberries (*Actaea pachypoda* and *A. rubra*), wreath goldenrod (*Solidago caesia*), and several fern species are also common later in the growing season. The problematic invasive species that have infiltrated this community are autumn olive (*Elaeagnus umbellata*), Japanese barberry (*Berberis thunbergii*), multiflora rose (*Rosa multiflora*), garlic mustard (*Alliaria petiolata*), Asian bittersweet (*Celastrus orbiculatus*), and autumn olive (*Elaeagnus umbellata*).

- **High Quality Plant Species:**

- Blackhaw (*Viburnum prunifolium*) *CC of 7 (state special concern)
- Spicebush (*Lindera benzoin*) *CC of 7
- Red baneberry (*Actaea rubra*) *CC of 7
- Spotted wintergreen (*Chimaphila maculata*) *CC of 8
- Plaintain-leaf sedge (*Carex plantaginea*) *CC of 8
- Rue anemone (*Thalictrum thalictroides*) *CC of 8
- American cancer root (*Orobanche uniflora*) *CC of 8
- Flowering dogwood (*Cornus florida*) *CC of 8
- Tulip tree (*Liriodendron tulipifera*) *CC of 9
- Toadshade (*Trillium sessile*) *CC of 9 (state threatened)
- American chestnut (*Castanea dentata*) *CC of 9 (state endangered)

- **Observed and Potential Wildlife Habitat:**

- This high-quality plant community provides habitat for wood thrush, warblers, tanagers, barred owl, pileated woodpecker, hawks, squirrels, chipmunks, rabbits, white-tailed deer, fox, raccoon, opossum, turkey, as well as diverse array of songbirds. Salamanders, frogs, aquatic invertebrates, and other amphibians seek refuge in the scattered vernal pools.
- Habitat is suitable for a variety of potential rare wildlife including:
 - *Accipiter cooperii* (Cooper's hawk, state special concern)
 - *Accipiter gentilis* (northern goshawk, state special concern)
 - *Ambystoma opacum* (marbled salamander, state threatened)
 - *Ambystoma texanum* (small-mouthed salamander, state endangered)
 - *Buteo lineatus* (red-shouldered hawk, state threatened)
 - *Dendroica cerulea* (cerulean warbler, state special concern)

- *Elaphe o. obsoleta* (black rat snake, state special concern)
- *Emydoidea blandingii* (Blanding's turtle, state special concern)
- *Microtus pinetorum* (woodland vole, state special concern)
- *Nicrophorus americanus* (American burying beetle, federal/state endangered)
- *Protonotaria citrea* (prothonotary warbler, state special concern)
- *Seiurus motacilla* (Louisiana waterthrush, state special concern)
- *Terrapene c. carolina* (eastern box turtle, state special concern)
- *Wilsonia citrina* (hooded warbler, state special concern)
- **Potential Invasive Species, Pests, Ecological Threats:**
 - Small pockets of invasive species pose the largest threat that could reduce biodiversity if left unchecked.
 - Management of Japanese knotweed and Asian bittersweet.
 - Hemlock Woolly Adelgid (HWA) is imminent and should be prepared for treatment.
- **Outdoor Education Opportunities:**
 - Hiking/biking trails – existing infrastructure footprint could be utilized.
 - Pole barn could be retrofit into welcome area/parking/restrooms/etc. and would be separate from DPW storage area.
 - Bird watching opportunities.
 - Plant identification/interpretive signage throughout.
 - Connection to other nearby trails.
- **Ecological Restoration Opportunities:**
 - Removal of non-native/invasive plant species to help protect the high quality Mesic Southern Forest and Floodplain Forest on the east side of the property.
 - Especially Asian bittersweet considering its ability to spread rapidly and to girdle trees causing eventual mortality.



Figure 1: Photo of Mesic Southern Forest community with high-quality ephemeral forb layer consisting of May apple (*Podophyllum peltatum*) and wild geranium (*Geranium maculatum*).

2. Floodplain Forest / Hemlock Transitional Zone

- **Landscape Context/Natural Features:** Floodplain forests are a dynamic interface community that bridge the gap between terrestrial and aquatic systems. The lower zone of the floodplain experiences dynamic interactions of over-the-bank flooding, sediment deposition, streambank erosion, and ice scour in the winter months. As expected with moving water and dynamic fluctuations in water level, the plant communities are quite diverse with variable species composition throughout different levels of inundation. Multi-stemmed trees are common due to this process of bank-scouring, deposition, and erosion. Shade from nearby trees and shrubs helps shade the creek from excessive sun exposure during the summer months which creates pockets of water with unique plant and wildlife components.
- **Plant Community:** The dominant canopy species of the low-lying, creek adjacent zone of this unit are silver maple (*Acer saccharinum*), basswood (*Tilia americana*), box elder (*Acer negundo*), slippery elm (*Ulmus rubra*), and a few standing-dead green ash (*Fraxinus pennsylvanica*). As we continue the transition away from fluvial landforms and reach soil above the influence of seasonal inundation, the species composition begins to shift. Eastern hemlock (*Tsuga canadensis*) trees dominate a majority of the slope/terrace region. Hemlock trees should be closely monitored for the presence of the invasive tree pest Hemlock Woolly Adelgid (HWA). American beech (*Fagus grandifolia*), ironwood (*Carpinus caroliniana*), and sugar maple (*Acer saccharum*) trees become more common as we continue to increase in elevation up the terrace/slope back into Mesic Southern Forest. The shrub layer is scattered and consists mainly of dogwoods (*Cornus spp.*) and spicebush (*Lindera benzoin*). Several high quality species including: royal fern (*Osmunda regalis*), wood fern (*Dryopteris spp.*), cut grass (*Leersia oryzoides*), wood reedgrass (*Cinna arundinacea*), jewelweed (*Impatiens capensis*), jumpseed (*Persicaria virginiana*), Virginia waterleaf (*Hydrophyllum virginianum*), and white avens (*Geum canadense*) are all common in the forb layer. Moonseed (*Menispermum canadense*), Virginia creeper (*Parthenocissus quinquefolia*), and poison-ivy (*Toxicodendron radicans*) are the most abundant woody vines in this community.
- **High Quality Plant Species:**
 - Blackhaw (*Viburnum prunifolium*) *CC of 7 (state special concern)
 - Spicebush (*Lindera benzoin*) *CC of 7
 - Yellow birch (*Betula alleghaniensis*) *CC of 7
 - Joe-pye weed (*Eutrochium fistulosum*) ***CC of 8**
 - Lizard's tail (*Saururus cernuus*) ***CC of 9**
 - Toadshade (*Trillium sessile*) ***CC of 9** (state threatened)
 - Paw Paw (*Asimina triloba*) ***CC of 9**
- **Observed and Potential Wildlife:**
 - This community provides important habitat for cavity-nesting birds, canopy-dwelling birds, woodpeckers, and migratory birds. Ducks, owls, herons, egrets, songbirds, wawks, bats, squirrels, chipmunks, rabbits, white-tailed deer, and raccoon are also common. Turtles, invertebrates, frogs, snakes, and other reptiles/amphibians are scattered throughout differing levels of inundation. Various species of creek-dwelling fish occupy pools of deeper water throughout the creek.
 - Habitat is suitable for a variety of potential rare wildlife including:
 - *Accipiter cooperii* (Cooper's hawk, state special concern)
 - *Ambystoma opacum* (marbled salamander, state threatened)
 - *Ambystoma texanum* (small-mouthed salamander, state endangered)
 - *Buteo lineatus* (red-shouldered hawk, state threatened)
 - *Clonophis kirtlandii* (Kirtland's snake, state endangered)
 - *Dendroica cerulea* (cerulean warbler, state special concern)
 - *Dendroica dominica* (yellow-throated warbler, state threatened)
 - *Elaphe o. obsoleta* (black rat snake, state special concern)
 - *Emydoidea blandingii* (Blanding's turtle, state special concern)
 - *Glyptemys insculpta* (wood turtle, state special concern)

- *Myotis sodalis* (Indiana bat, federal/state endangered)
- *Nerodia erythrogaster neglecta* (copperbelly watersnake, federal threatened and state endangered)
- *Protonotaria citrea* (prothonotary warbler, state special concern)
- *Seiurus motacilla* (Louisiana waterthrush, state special concern)
- *Sistrurus c. catenatus* (eastern massasauga, federal candidate species and state special concern)
- *Tachopteryx thoreyi* (grey petaltail, state special concern)
- *Terrapene c. carolina* (eastern box turtle, state special concern)
- *Wilsonia citrina* (hooded warbler, state special concern)
- **Potential Invasive Species, Pests, Ecological Threats:**
 - Creek has potential to carry in unwanted aquatic invasive species including reed canary grass, purple loosestrife, and phragmites.
 - Hemlock Woolly Adelgid (HWA) will cause eventual mortality to Eastern Hemlock trees if left untreated.
- **Outdoor Education and Recreational Opportunities:**
 - Hiking trails to observe creek corridor plant community and topography.
 - Plant identification signage.
 - Bird watching opportunities.
 - Recommend minimalist trails in this area and avoiding bike paths here to limit disturbance and protect high quality plant communities.
- **Ecological Restoration Opportunities:**
 - HWA control to prevent eventual loss of slope stabilizing Eastern Hemlocks.
 - Prioritization of Asian bittersweet control to prevent mortality of mature trees through girdling and displacement of native plant communities.



Figure 2: Photo of Floodplain Forest community documenting the shift of the understory plant community at the beginning of the Hemlock transition zone.

3. Disturbed Wet Prairie

- **Landscape Context/Natural Features:** The disturbed wet prairie section is a highly disturbed and neglected area that appears to be the remnants of the old runway or possibly the remnants of the large White Spruce (*Picea glauca*) and Scotch Pine (*Pinus sylvestris*) planting that occurred following the abandoning of the airport. A clay topsoil is covering the area that creates unconventional plant communities; with ruts in the clay being most similar to a wet prairie. The intense microtopography as a result of the rutted clay topsoil has formed a wetland matrix throughout the unit with the majority of the wetland pockets along the treeline to the northeast. Tree species exhibit stunted growth due to the seasonal inundation from the hard clay topsoil.
- **Plant Community:** The plant community throughout the disturbed wet prairie is highly disturbed and impacted by dense populations of invasive species. Native tree species throughout the area are primarily early successional trees including; boxelder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), and cottonwood (*Populus deltoids*). Encroaching populations of Autumn Olive (*Elaeagnus umbellata*), Red Pine (*Pinus resinosa*), and Scotch Pine (*Pinus sylvestris*) are a non-natural liability on the surrounding landscape and should be controlled if a native, high-quality habitat is the primary goal. Woody vegetation is much more abundant at higher elevations along the southwest edge of the wet prairie plant community. As you go to the northeast and elevation starts to drop the hardpacked clay soil holds onto more water which has prevented a lot of the woody invasive plants from encroaching too much. The forbs throughout this area mirror the same pattern as the woody vegetation with dryer species like black-eyed susan (*Rudbeckia hirta*), blackberry (*Rubus spp.*), and meadow garlic (*Allium canadense*) being along the southwest line and wetter species like bulrush (*Scirpoidea holoschoenus*), phragmites (*Phragmites australis*), and meadowsweet (*Filipendula ulmaria*) at the lower elevations. This wetland spectrum is further complicated by the microtopography throughout the area; which allows wetland species to be located at the higher elevations where pockets of clay allow for water retention.
- **High Quality Plant Species:**
 - Fox grape (*Vitis labrusca*) *CC of 7
 - Joe-pye weed (*Eutrochium fistulosum*) ***CC of 8**
- **Observed and Potential Wildlife:**
 - Suitable habitat for woodpeckers, hawks, squirrels, chipmunks, rabbits, white-tailed deer, raccoon, opossum, turkey, and songbirds. Turtles, snakes and other amphibians are found throughout the scattered wet pockets.
 - Habitat is suitable for a variety of potential rare wildlife including:
 - *Acris crepitans blanchardi* (Blanchard's cricket frog, state special concern)
 - *Ambystoma texanum* (smallmouth salamander, state endangered)
 - *Ammodramus savannarum* (grasshopper sparrow, state special concern)
 - *Asio flammeus* (short-eared owl, state endangered)
 - *Botaurus lentiginosus* (American bittern, state special concern)
 - *Circus cyaneus* (northern harrier, state special concern)
 - *Clemmys guttata* (spotted turtle, state threatened)
 - *Clonophis kirtlandii* (Kirtland's snake, state endangered)
 - *Dorydiella kansana* (leafhopper, state special concern)
 - *Emydoidea blandingii* (Blanding's turtle, state special concern)
 - *Flexamia reflexus* (leafhopper, state special concern)
 - *Meropleon ambifusca* (Newman's brocade, state special concern)
 - *Neoconocephalus lyristes* (bog conehead, state special concern)
 - *Neoconocephalus retusus* (conehead grasshopper, state special concern)
 - *Neonympha m. mitchellii* (Mitchell's satyr, federal/state endangered)
 - *Orchelimum concinnum* (red-faced meadow katydid, state special concern)
 - *Orphulella pelidna* (green desert grasshopper, state special concern)

- *Papaipema cerina* (golden borer, state special concern)
- *Papaipema maritima* (maritime sunflower borer, state special concern)
- *Papaipema speciosissima* (regal fern borer, state special concern)
- *Paroxya hoosieri* (Hoosier locust, state special concern)
- *Phalaropus tricolor* (Wilson's phalarope, state special concern)
- *Sistrurus c. catenatus* (eastern massasauga, federal candidate species and state special concern)
- *Spartiniphaga inops* (spartina moth, state special concern)
- *Spiza americana* (dickcissel, state special concern)
- *Tyto alba* (barn owl, state endangered)
- **Potential Invasive Species, Pests, Ecological Threats:**
 - Proximity to large populations of Autumn Olive (*Elaeagnus umbellata*) will continue to encroach into the community over time.
 - Absence of fire has allowed other non-native species like Phragmites (*Phragmites australis*), Sweet Clover (*Melilotus officinalis*), Purple Loosestrife (*Lythrum salicaria*), and Bull Thistle (*Cirsium vulgare*) to outcompete native vegetation in pockets.
- **Outdoor Education Opportunities**
 - Wet prairies are incredibly educational because the dynamic water relationships that exist seasonally within the plant community.
 - A trail should be planned on the outskirts of the community to avoid waterlogged clay soil.
- **Ecological Restoration Opportunities:**
 - Invasive species management should be the top priority in this plant community. Removal of early successional trees and invasive shrubs will allow for better light penetration and will drastically improve the biodiversity throughout the unit.
 - Reintroduction of fire would also have a massive impact on plant community diversity by removing species that are not adapted to fire like blackberry (*Rubus spp.*), bentgrass (*Agrostis spp.*), phragmites (*Phragmites australis*), and clovers (*Trifolium spp.*)



Figure 3: Invasive phragmites (*Phragmites Australis*) pictured invading pockets of disturbed wet prairie.

4. Ruderal Pine Forest

- **Landscape Context/Natural Features:** Monoculture stands of purposefully planted pine trees are scattered throughout the property and appear to coincide with historic deforestation and replanting in the 1940's. The logging companies usually would plant a monoculture of a fast growing timber species. In this case, red pines were the majority planted. While a naturally spaced stand of red pines can survive for ~400 years, a reforestation with spacing maximized for commercial lumber production will generally fail after ~80 years. Due to the age of the stand the red pines are starting to fail. Topographically the areas are uniformly flat with a sandy soil. Water retention in these areas is non-existent.
- **Plant Community:** The canopy is dominated by red pines that were obviously planted as part of a large scale reforestation project. The size of the trees would suggest the trees were planted ~80 years ago. This was a common practice in the mid 20th century following large scaled logging projects. A major issue with tightly spaced red pine stands is the lack of sun into the understory which leads to poor replacement of trees. The understory is non-existent within the center of these red pine stands. Pre-deforestation this community would have mimicked the surrounding Mesic Southern plant community. This is evident by the forbs observed within pockets of dappled sunlight. Virginia Creeper, Wild Geranium, Canada Mayflower, Spicebush and Wood Fern are found sporadically throughout this unit. There are large populations of Asian Bittersweet along areas with historic disturbance (remnant snowmobile trails.) This bittersweet is quickly colonizing the area, girdling red pines, and eventually pulling them down.
- **Observed and Potential Wildlife:**
 - Suitable habitat for spillover of typical inhabitants of the surrounding Mesic Southern Forest including: songbirds, owls, woodpeckers, hawks, squirrels, chipmunks, rabbits, white-tailed deer, raccoon, opossum, turkey, and snakes.
 - Habitat is suitable for a variety of potential rare wildlife including:
 - *Accipiter gentilis* (northern goshawk, state special concern)
 - *Falco columbarius* (merlin, state threatened)
 - *Haliaeetus leucocephalus* (bald eagle, state threatened)
 - *Pandion haliaetus* (osprey, state threatened)
 - *Picoides arcticus* (black-backed woodpecker, state special concern)
- **Potential Invasive Species, Pests, Ecological Threats:**
 - Asian bittersweet is a problem as it continues to shade out and smother the small pockets of native species.
 - As Asian bittersweet continues to pull down the dying red pines and exposes the forest floor to sunlight, there is potential for invasive shrub species like honeysuckle, Japanese barberry, autumn olive, and common buckthorn to establish quickly in the vacant space.
 - There is minimal hardwood replacement occurring within the community which will create an ecological void as the red pines continue to die off.
- **Outdoor Education Opportunities**
 - In its current state, there is minimal educational opportunities through this community.
 - There could be potential connecting trails run through these areas to connect higher quality areas to public access points.
 - Special care should be taken along these trails to prevent invasive species spread (mainly bittersweet) via the trail system.
- **Ecological Restoration Opportunities:**
 - Focus on invasive species along the trail system to prevent spread. Containment should be the first priority.
 - Strategic thinning of the red pines would allow for large scale reforestation to occur in this unit to return it to its pre-settlement community type.
 - Broadscale invasive species management.



Figure 4: Photo of Ruderal Pine Forest documenting red pine monoculture with minimal understory.

5. Disturbed Storage Lot

- **Landscape Context/Natural Features:** The storage lot area is a highly disturbed community that experiences consistent disturbance and non-native plant material inputs. Decades of municipal yard waste and fill dirt have been placed into an area that likely mirrored the surrounding mesic southern forest. This has created an inhospitable soil structure littered with gravel, large rocks, and partially decayed woody plant material. The soil appears to be consisting of heavy clay which is not consistent with the surrounding landscape or soil maps (which show a much sandier parent material.) The area also appears to be growing outwards towards pockets of wetlands to the east; likely a result of clearing the yard to accommodate more waste material at the end of the growing season.
- **Plant Community:** The plant community found within the storage lot is highly disturbed; consisting of 95% non-native and invasive plants. This is likely the result of dumping yard waste from throughout the city in one common place in conjunction with a high disturbance regime. The usual invasives are found throughout the unit including thistles (*Cirsium spp.*), reed canary grass (*Phalaris arundinacea*), phragmites (*Phragmites australis*), dame's rocket (*Hesperis matronalis*) and yellow rocket (*Barberaea spp.*). There also a few exotic escaped landscaping plants including a mature mimosa tree (*Albizia julibrissin*), chamomile (*Anthemis arvensis*), and bermuda-grass (*Cynodon dactylon*); which are typically found in much warmer climates to the south. Several large colonies of Japanese knotweed (*Fallopia japonica*) are scattered throughout as well which have the potential to spread even further with soil disturbance and/or mowing. The presence of these species is more concerning and would require a faster response than the more common invasive plants to keep with the state strategy of early detection and rapid response. *No high quality plants are found within this unit.*
- **Observed and Potential Wildlife:**

- Minimal opportunities for wildlife habitat with the exception of the wetland along the eastern edge of the lot as a potential nesting habitat for Wood Ducks if disturbance and human impact slows drastically.
- **Potential Invasive Species, Pests, Ecological Threats:**
 - Absentium (*Artemisia absinthium*)
 - Japanese Knotweed (*Fallopia japonica*)
 - Common Mullien (*Verbascum Thapsus*)
 - Moth Mullien (*Verbascum blattaria*)
 - Reed Canary Grass (*Phalaris arundinacea*)
 - Horse Nettle (*Solanum carolinense*)
 - Bermudagrass (*Cynodon dactylon*)
 - Birds Foot Trefoil (*Lotus corniculatus*)
 - Yellow Nutsedge (*Cyperus esculentus*)
 - Canada Thistle (*Cirsium arvense*)
 - Sow Thistle (*Sonchus arvensis*)
 - Bull Thistle (*Cirsium vulgare*)
 - Canada Goldenrod (*Solidago Canadensis*)
 - Velvetleaf (*Abutilon theophrasti*)
 - Phragmites (*Phragmites australis*)
 - Sweet Clover (Yellow) (*Melilotus officinalis*)
 - Sweet Clover (White) (*Melilotus albus*)
 - Micanthus Grass (*Micanthus sinensis*)
 - White Mulberry (*Morus alba*)
 - Johnsongrass (*Sorghum halepense*)
 - Bindweed (*Convolvulus arvensis*)
 - Yellow Foxtail (*Setaria pumila*)
 - Jimsomweed (*Datura stramonium*)
 - Yellow Rocket (*Barbarea vulgaris*)
 - Mimosa (*Albizia julibrissin*)
 - Black Locust (*Robinia pseudoacacia*)
 - Dames Rocket (*Hesperis matronalis*)
 - Myrtle (*Vinca minor*)
 - Poison Hemlock (*Conium maculatum*)
 - Asian Bittersweet (*Celastrus orbiculatus*)
- **Outdoor Education Opportunities**
 - Outdoor education is not recommended in this area in its current state due to the presence of several extremely noxious and poisonous plants. These plants include Poison Hemlock, Jimsomweed, Poison Ivy, and Absentium.
- **Ecological Restoration Opportunities**
 - The most obvious path forward for this unit is to get control of the invasive species by focusing on poisonous and exotic plants first through intensive chemical application.
 - The secondary focus would be on perennial invasive plants including Canada Thistle, Phragmites, Canada Goldenrod, and Asian Bittersweet.
 - If disturbance and further plant inputs are minimized there should be a reduction in the annual and biennial non-native plants.
 - Yard waste could be hot composted in a concentrated area to reduce seed spread into surrounding natural communities. This would require a more formal “pad” for yard waste to be deposited and turned to insure sufficient temperatures to kill seed.
 - Effort should be made to prevent further spread of the yard towards the east to reduce the likelihood of wetland destruction.

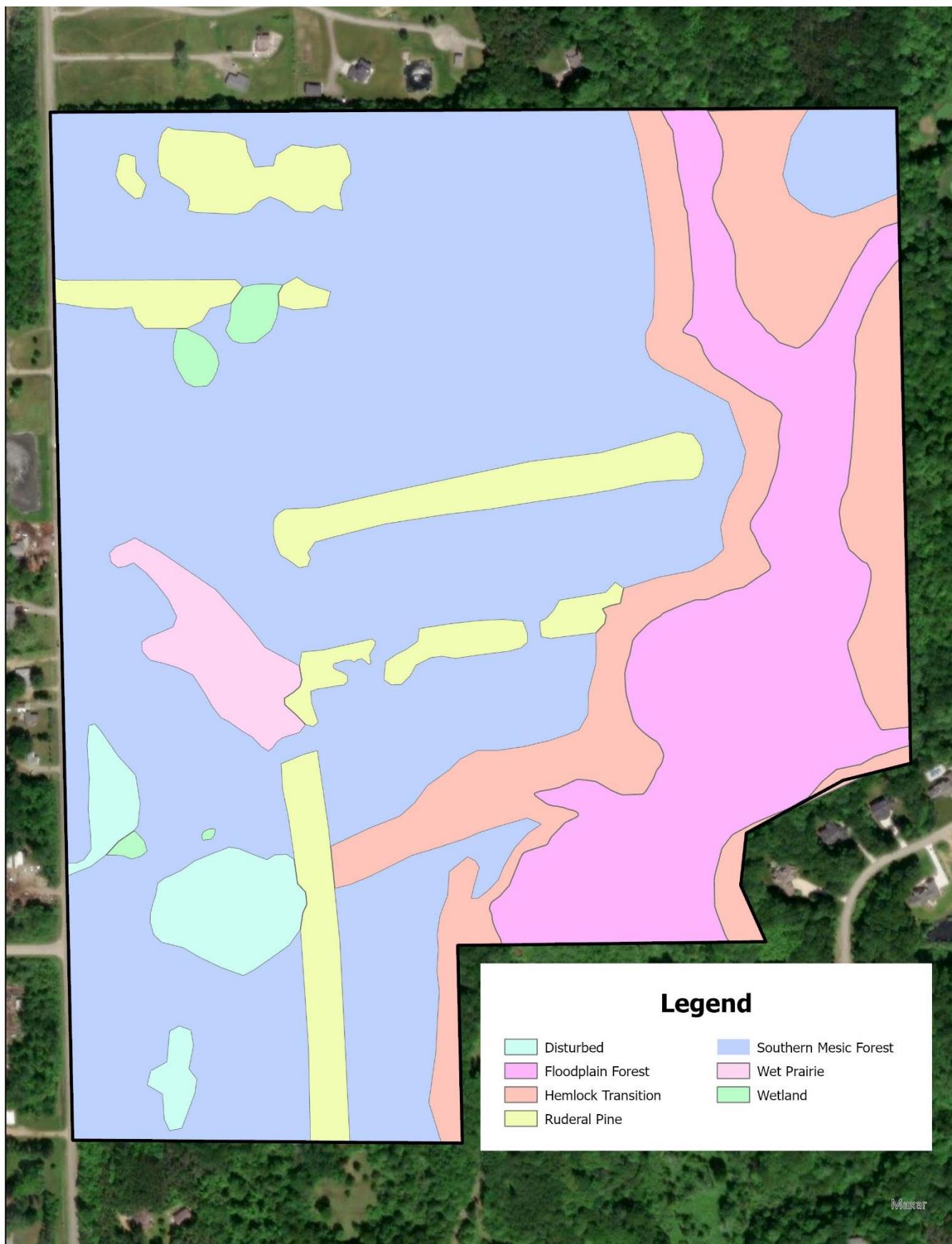


Figure 5: Photo of disturbed storage yard showing frequent soil disturbance and predominantly invasive and noxious plant species.

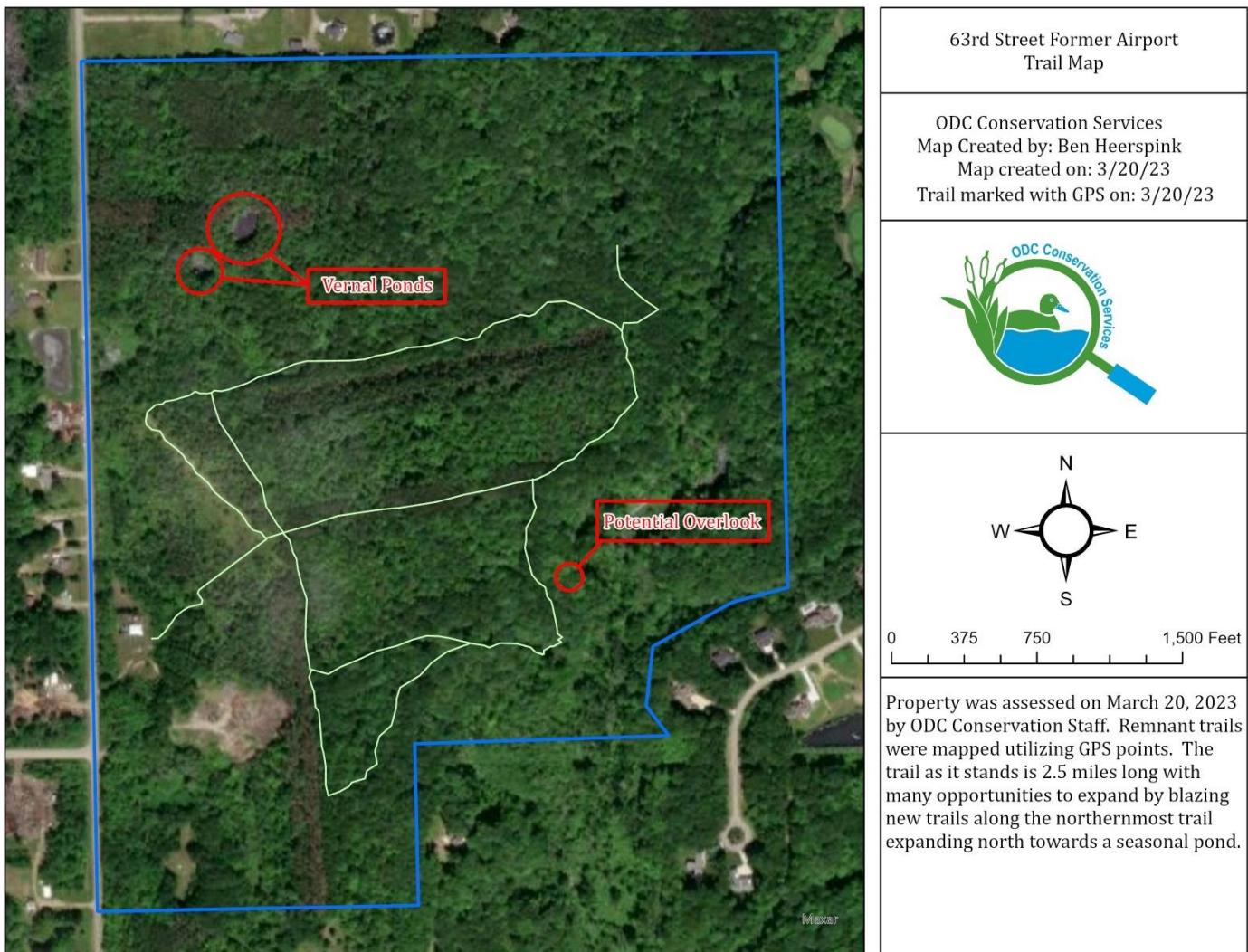


Figure 6: Photo of large invasive Japanese Knotweed (*Fallopia japonica*) colony. Japanese knotweed has already gained a massive foothold in this area and should be prioritized for management in the near future due to its aggressive nature of growth and ability to quickly outcompete native plant communities.

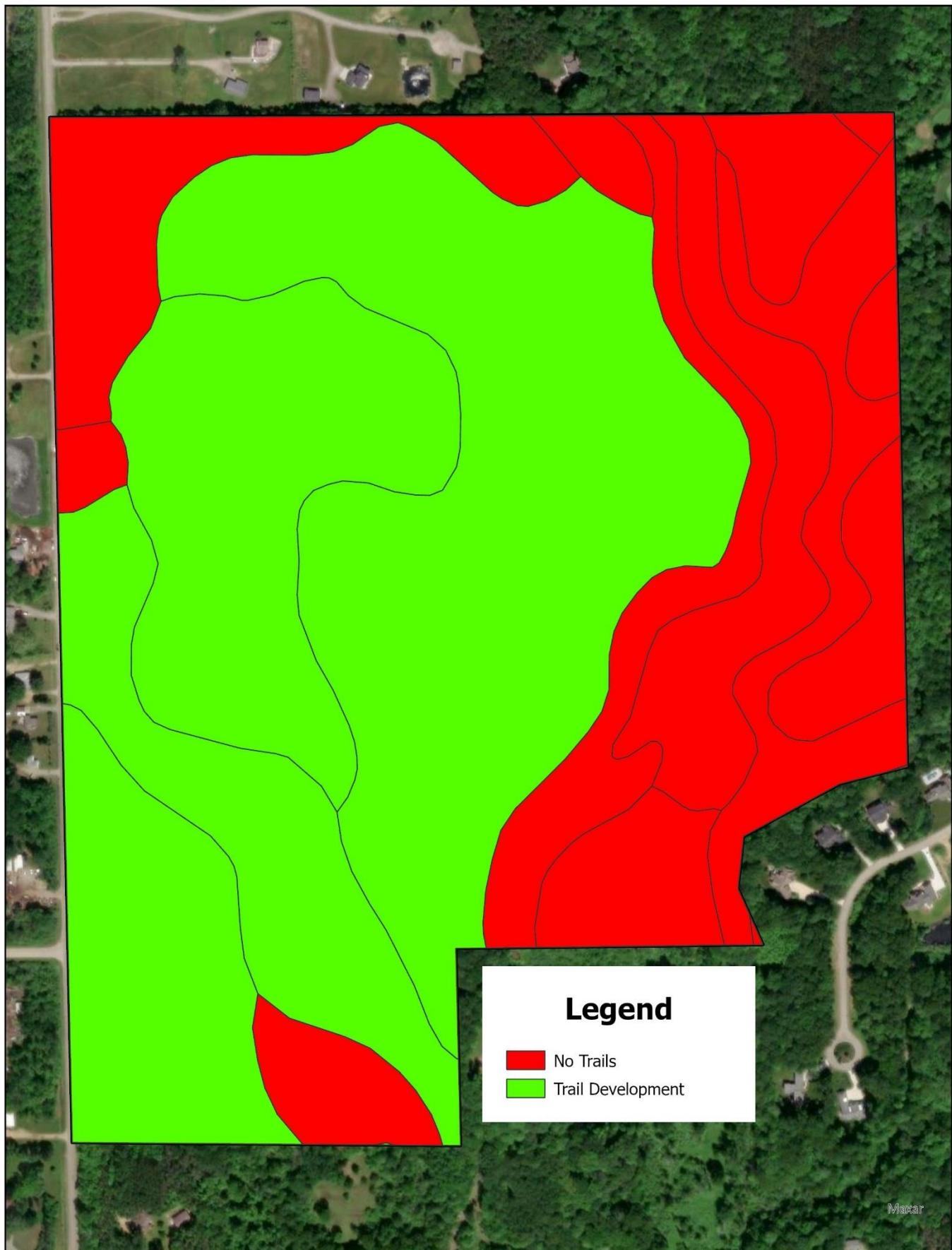
Appendix A: Map of Natural Communities



Appendix B: Existing Trail Footprint



Appendix C: Recommended Trail Development Areas



Appendix D: Plant Inventory & Floristic Quality Index Results – Natural Communities (Eastern half):

Former Airport Natural Area									
Practitioner:	O'DC Network								
Conservatism-Based Metrics:		Species Richness:							
Total Mean C:	4.1	Total Species:	102						
Native Mean C:	4.7	Native Species:	89	87.30%					
Total FQI:	41.4	Non-native Species:	13	12.70%					
Native FQI:	44.3								
Adjusted FQI:	43.9	Species Wetness:							
% C value 0:	13.7	Mean Wetness:	1.4						
% C value 1-3:	24.5	Native Mean Wetness:	1.2						
% C value 4-6:	45.1								
% C value 7-10:	16.7								
Native Tree Mean C:	4.9								
Native Shrub Mean C:	5.7								
Native Herbaceous Mean C:	4.5								
Physiognomy Metrics:		Duration Metrics:							
Tree:	25	24.50%	Annual:	3	2.90%				
Shrub:	10	9.80%	Perennial:	94	92.20%				
Vine:	9	8.80%	Biennial:	5	4.90%				
Forb:	46	45.10%	Native Annual:	3	2.90%				
Grass:	4	3.90%	Native Perennial:	85	83.30%				
Sedge:	4	3.90%	Native Biennial:	1	1%				
Rush:	0	0%							
Fern:	4	3.90%							
Bryophyte:	0	0%							
Species:									
Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name	
Acer platanoides	Sapindaceae	ACEPLA	non-native	0	5	tree	perennial	norway maple	
Acer rubrum	Sapindaceae	ACERUB	native	1	0	tree	perennial	red maple	
Acer saccharinum	Sapindaceae	ACESAI	native	2	3	tree	perennial	silver maple	
Acer saccharum	Sapindaceae	ACESAU	native	5	3	tree	perennial	sugar maple	
Actaea rubra	Ranunculaceae	ACTRUB	native	7	3	forb	perennial	red baneberry	
Adlumia fungosa	Papaveraceae	ADLFUN	native	4	5	vine	biennial	climbing fumitory	
Agrimonia parviflora	Rosaceae	AGRPAR	native	4	0	forb	perennial	swamp agrimony	
Alisma subcordatum; a. plantago-aquatica	Alismataceae	ALISUB	native	1	5	forb	perennial	southern water-plantain	
Alliaria petiolata	Brassicaceae	ALLPET	non-native	0	3	forb	biennial	garlic mustard	
Amphicarpaea bracteata	Fabaceae	AMPBRA	native	5	0	vine	annual	hog-peanut	
Anemone virginiana	Ranunculaceae	ANEVIR	native	3	3	forb	perennial	thimbleweed	
Apocynum androsaemifolium	Apocynaceae	APOAND	native	3	5	forb	perennial	spreading dogbane	
Arctium minus	Asteraceae	ARCMIN	non-native	0	3	forb	biennial	common burdock	
Arisaema triphyllum	Araceae	ARITRI	native	5	0	forb	perennial	jack-in-the-pulpit	
Asimina triloba	Annonaceae	ASITRI	native	9	0	tree	perennial	pawpaw	
Atropa belladonna	Solanaceae	ATRBEL	non-native	0	5	forb	perennial	deadly nightshade	
Berberis thunbergii	Berberidaceae	BERTHJU	non-native	0	3	shrub	perennial	japanese barberry	
Betula alleghaniensis	Betulaceae	BETALL	native	7	0	tree	perennial	yellow birch	
Betula papyrifera	Betulaceae	BETPAP	native	2	3	tree	perennial	paper birch	
Carex intumescens	Cyperaceae	CXINTU	native	3	3	sedge	perennial	sedge	
Carex palescens	Cyperaceae	CXPALL	native	5	0	sedge	perennial	pale sedge	
Carex plantaginea	Cyperaceae	CXPLAN	native	8	5	sedge	perennial	sedge	
Carex radiata; c. rosea	Cyperaceae	CXRADI	native	2	0	sedge	perennial	straight-style wood sedge	
Carya glabra	Juglandaceae	CARGLA	native	5	3	tree	perennial	pignut hickory	
Carya ovata	Juglandaceae	CAROVA	native	5	3	tree	perennial	shagbark hickory	
Castanea dentata	Fagaceae	CASDEN	native	9	5	tree	perennial	american chestnut	
Celastrus orbiculatus	Celastraceae	CELOBR	non-native	0	5	vine	perennial	oriental bittersweet	
Centaurea stoebe; c. maculosa	Asteraceae	CENSTO	non-native	0	5	forb	biennial	spotted knapweed	
Chimaphila maculata	Ericaceae	CHIMAC	native	8	5	shrub	perennial	spotted wintergreen	
Circaea canadensis; c. lutetiana	Oenotheraceae	CIRCAN	native	2	3	forb	perennial	enchancers-nightshade	
Conium maculatum	Araliaceae	CONMAC	non-native	0	3	forb	biennial	poison-hemlock	
Cornus florida	Cornaceae	CORFLO	native	8	3	tree	perennial	flowering dogwood	
Dichanthelium clandestinum; panicum c.	Poaceae	DICCLA	native	3	3	grass	perennial	panic grass	
Diphastiastrum complanatum; lycopodium c.	Lycopodiaceae	DIPCOM	native	5	3	fern	perennial	ground-cedar	
Dryopteris intermedia	Dryopteridaceae	DRYINT	native	5	0	fern	perennial	evergreen woodfern	
Elaeagnus umbellata	Elaeagnaceae	ELAUMB	non-native	0	3	shrub	perennial	autumn-olive	
Elymus hystrichus; hystrix patula	Poaceae	ELYHYS	native	5	3	grass	perennial	bottlebrush grass	
Eurybia macrophylla; aster m.	Asteraceae	EURMAC	native	4	5	forb	perennial	big-leaved aster	
Eutrochium fistulosum; eupatorium f.	Asteraceae	EUTFIS	native	8	3	forb	perennial	hollow-stemmed joe-pye-weed	
Eutrochium maculatum; eupatorium m.	Asteraceae	EUTMAC	native	4	5	forb	perennial	joe-pye-weed	
Fagus grandifolia	Fagaceae	FAGGRA	native	6	3	tree	perennial	american beech	
Fraxinus americana	Oleaceae	FRAAME	native	5	3	tree	perennial	white ash	
Fraxinus pennsylvanica	Oleaceae	FRAPEN	native	2	3	tree	perennial	red ash	
Gaultheria shallon	Ericaceae	GALSHO	native	4	3	shrub	perennial	salal	
Rubus hispida	Rubiaceae	GALCIR	native	4	3	forb	perennial	white wild licorice	
Geranium maculatum	Geraniaceae	GERMAC	native	4	3	forb	perennial	wild geranium	
Geum canadense	Rosaceae	GEUCAN	native	1	0	forb	perennial	white avens	
Geum virginianum	Rosaceae	GEUVIR	native	6	3	forb	perennial	pale avens	
Hamamelis virginiana	Hamamelidaceae	HAMVIR	native	5	3	shrub	perennial	witch-hazel	
Laportea canadensis	Urticaceae	LAPCAN	native	4	3	forb	perennial	wood nettle	
Leersia oryzoides	Poaceae	LEORY	native	3	5	grass	perennial	cut grass	
Ligustrum vulgare	Oleaceae	LIGVUL	non-native	0	3	shrub	perennial	common privet	
Lindera benzoin	Lauraceae	LINBEN	native	7	3	shrub	perennial	spicebush	
Uridodendron tulipifera	Magnoliaceae	LURTUL	native	9	3	tree	perennial	tulip tree	
Malanthemum canadense	Convallariaceae	MAICAN	native	4	3	forb	perennial	canada mayflower	
Malanthemum racemosum; smilacina r.	Convallariaceae	MAIRAC	native	5	3	forb	perennial	false spikenard	
Menispernum canadense	Menispermaceae	MENCAE	native	5	0	vine	perennial	moonseed	
Mimulus ringens	Phrymaceae	MIMRIN	native	5	5	forb	perennial	monkey-flower	
Mitchella repens	Rubiaceae	MITREP	native	5	3	forb	perennial	partridge-berry	
Monotropa uniflora	Ericaceae	MONOUN	native	5	3	forb	perennial	indian-pipe	
Onoclea sensibilis	Onocleaceae	ONOSEN	native	2	3	fern	perennial	sensitive fern	
Orobanchus uniflora	Orobanchaceae	OROUNI	native	8	5	forb	perennial	cancer root	
Osmorhiza berteroi; o. chilensis	Araliaceae	OSMBER	native	5	3	forb	perennial	sweet-cicely	
Parthenocissus quinquefolia	Vitaceae	PARQUI	native	5	3	vine	perennial	virginia creeper	
Persicaria punctata; polygonum p.	Polygonaceae	PERPUN	native	5	5	forb	annual	smartweed	
Persicaria virginiana; polygonum v.	Polygonaceae	PERVIR	native	4	0	forb	perennial	jmpseed	
Phalaris arundinacea	Poaceae	PHAARU	native	0	3	grass	perennial	reed canary grass	

<i>Phryma leptostachya</i>	Phrymaceae	PHRLEP	native	4	3	forb	perennial	looseseed
<i>Phytolacca americana</i>	Phytolaccaceae	PHYAME	native	2	3	forb	perennial	pokeweed
<i>Pilea pumila</i>	Urticaceae	PILPLUM	native	5	-3	forb	annual	clearweed
<i>Pinus resinosa</i>	Pinaceae	PINRES	native	6	3	tree	perennial	red pine
<i>Pinus strobus</i>	Pinaceae	PINSTR	native	3	3	tree	perennial	white pine
<i>Podophyllum peltatum</i>	Berberidaceae	PODPEL	native	3	3	forb	perennial	may-apple
<i>Polystichum acrostichoides</i>	Dryopteridaceae	POLACR	native	6	3	fern	perennial	christmas fern
<i>Prunus serotina</i>	Rosaceae	PRUSER	native	2	3	tree	perennial	wild black cherry
<i>Quercus alba</i>	Fagaceae	QUEALB	native	5	3	tree	perennial	white oak
<i>Quercus rubra</i>	Fagaceae	QUERUB	native	5	3	tree	perennial	red oak
<i>Quercus velutina</i>	Fagaceae	QUEVEL	native	6	5	tree	perennial	black oak
<i>Rosa multiflora</i>	Rosaceae	ROSMUL	non-native	0	3	shrub	perennial	multiflora rose
<i>Rubus allegheniensis</i>	Rosaceae	RUBALL	native	1	3	shrub	perennial	common blackberry
<i>Saponaria officinalis</i>	Caryophyllaceae	SAPOFF	non-native	0	3	forb	perennial	bouncing bet
<i>Sassafras albidum</i>	Lauraceae	SASALB	native	5	3	tree	perennial	sassafras
<i>Saururus cernuus</i>	Saururaceae	SAUCER	native	9	-5	forb	perennial	lizards-tail
<i>Smilax rotundifolia</i>	Smilacaceae	SMIROD	native	6	0	vine	perennial	common greenbrier
<i>Solanum dulcamara</i>	Solanaceae	SOLDUL	non-native	0	0	vine	perennial	bittersweet nightshade
<i>Solidago canadensis</i>	Asteraceae	SOLCAN	native	1	3	forb	perennial	canada goldenrod
<i>Solidago flexicaulis</i>	Asteraceae	SOLFLE	native	6	3	forb	perennial	zigzag goldenrod
<i>Solidago gigantea</i>	Asteraceae	SOLGIG	native	3	-3	forb	perennial	late goldenrod
<i>Solidago rugosa</i>	Asteraceae	SOLRUG	native	3	0	forb	perennial	rough-leaved goldenrod
<i>Symplocarpus foetidus</i>	Araceae	SYMFOE	native	6	-5	forb	perennial	skunk-cabbage
<i>Thalictrum thalictroides; amonemella t.</i>	Ranunculaceae	THATHA	native	8	3	forb	perennial	rue-anemone
<i>Tilia americana</i>	Malvaceae	TILAME	native	5	3	tree	perennial	basswood
<i>Toxicodendron radicans</i>	Anacardiaceae	TOXRAD	native	2	0	vine	perennial	poison-ivy
<i>Trentalis borealis</i>	Myrsinaceae	TRIBOR	native	5	0	forb	perennial	star-flower
<i>Trillium erectum</i>	Trilliaceae	TRIERE	native	7	3	forb	perennial	stinking benjamin; red trillium
<i>Trillium grandiflorum</i>	Trilliaceae	TRIGRA	native	5	3	forb	perennial	common trillium
<i>Trillium sessile</i>	Trilliaceae	TRISES	native	9	3	forb	perennial	toadshade
<i>Tsuga canadensis</i>	Pinaceae	TSUCAN	native	5	3	tree	perennial	hemlock
<i>Ulmus americana</i>	Ulmaceae	ULMAME	native	1	-3	tree	perennial	american elm
<i>Viburnum acerifolium</i>	Adoxaceae	VIBACE	native	6	5	shrub	perennial	maple-leaved viburnum
<i>Viburnum prunifolium</i>	Adoxaceae	VIBPRU	native	7	3	shrub	perennial	black-haw
<i>Viola sororia</i>	Violaceae	VIOSOR	native	1	0	forb	perennial	common blue violet
<i>Vitis labrusca</i>	Vitaceae	VITLAB	native	7	3	vine	perennial	fox grape

Disturbed Communities (Western half of the property):

Disturbed Former Airport								
Practitioner:	ODC Network							
Conservatism-Based Metrics:								
Total Mean C:	1.3	Species Richness:						
Native Mean C:	2.8	Total Species:	88					
Total FQI:	12.2	Native Species:	39	44.30%				
Native FQI:	17.5	Non-native Species:	49	55.70%				
Adjusted FQI:	18.6	Species Wetness:						
% C value 0:	60.2	Mean Wetness:	2.2					
% C value 1-3:	23.9	Native Mean Wetness:	1					
% C value 4-6:	15.9							
% C value 7-10:	0							
Native Tree Mean C:	3.7							
Native Shrub Mean C:	3							
Native Herbaceous Mean C:	2.4							
Physiognomy Metrics:								
Tree:	18	20.50%	Annual:	9	10.20%			
Shrub:	8	9.10%	Perennial:	71	80.70%			
Vine:	6	6.80%	Biennial:	8	9.10%			
Forb:	49	55.70%	Native Annual:	3	3.40%			
Grass:	3	3.40%	Native Perennial:	36	40.90%			
Sedge:	3	3.40%	Native Biennial:	0	0%			
Rush:	1	1.10%						
Fern:	0	0%						
Bryophyte:	0	0%						
Species:								
Scientific Name	Family	Acronym	Native?	C	W	Physiognomy	Duration	Common Name
Abutilon theophrasti	Malvaceae	ABUTHE	non-native	0	3	forb	annual	velvet leaf
Acer negundo	Sapindaceae	ACENEG	native	0	0	tree	perennial	boxelder
Acer nigrum; a. saccharum	Sapindaceae	ACENIG	native	4	3	tree	perennial	black maple
Acer platanoides	Sapindaceae	ACEPLA	non-native	0	5	tree	perennial	norway maple
Acer saccharum	Sapindaceae	ACESAU	native	5	3	tree	perennial	sugar maple
Achillea millefolium	Asteraceae	ACHMIL	native	1	3	forb	perennial	yarrow
Alliaria petiolata	Brassicaceae	ALLPET	non-native	0	3	forb	biennial	garlic mustard
Allium canadense	Alliaceae	ALLCAN	native	4	3	forb	perennial	wild garlic
Ambrosia artemisiifolia	Asteraceae	AMBART	native	0	3	forb	annual	common ragweed
Ambrosia trifida	Asteraceae	AMBTRI	native	0	0	forb	annual	giant ragweed
Apis americana	Fabaceae	APIAME	native	3	-3	vine	perennial	groundnut
Artemisia absinthium	Asteraceae	ARTABS	non-native	0	5	forb	perennial	absinth wormwood
Asclepias syriaca	Apocynaceae	ASCSYR	native	1	5	forb	perennial	common milkweed
Atropa belladonna	Solanaceae	ATRBEL	non-native	0	5	forb	perennial	deadly nightshade
Barbarea vulgaris	Brassicaceae	BARVUL	non-native	0	0	forb	biennial	yellow rocket
Campsis radicans	Bignoniaceae	CAMRAD	non-native	0	0	vine	perennial	trumpet-vine
Carex pallescens	Cyperaceae	CXPALL	native	5	0	sedge	perennial	pale sedge
Carex vulpinoidea	Cyperaceae	CXVULP	native	1	-5	sedge	perennial	sedge
Celastrus orbiculatus	Celastraceae	CELOBR	non-native	0	5	vine	perennial	oriental bittersweet
Centaurea stoebe; c. maculosa	Asteraceae	CENSTO	non-native	0	5	forb	biennial	spotted knapweed
Chenopodium album	Amaranthaceae	CHEALB	non-native	0	3	forb	annual	lamb's-quarters
Cichorium intybus	Asteraceae	CICINT	non-native	0	3	forb	perennial	chicory
Cirsium arvense	Asteraceae	CIRARV	non-native	0	3	forb	perennial	canada thistle
Cirsium vulgare	Asteraceae	CIRVUL	non-native	0	3	forb	biennial	bull thistle
Convolvulus arvensis	Convolvulaceae	CONARV	non-native	0	5	vine	perennial	field bindweed
Crataegus phoenopyrum	Rosaceae	CRAPHA	non-native	0	0	tree	perennial	washington thorn
Cynodon dactylon	Poaceae	CYNDAC	non-native	0	3	grass	perennial	bermuda grass
Cyperus esculentus	Cyperaceae	CYPESC	native	1	-3	sedge	perennial	yellow nutsedge
Datura stramonium	Solanaceae	DATSTR	non-native	0	5	forb	annual	jimson-weed
Daucus carota	Araliaceae	DAUCAR	non-native	0	5	forb	biennial	queen-anne's-lace
Dianthus barbatus	Caryophyllaceae	DIAARM	non-native	0	5	forb	annual	deptford pink
Elaeagnus umbellata	Elaeagnaceae	ELAUMB	non-native	0	3	shrub	perennial	autumn olive
Erechtites hieracifolius	Asteraceae	EREHIE	native	2	3	forb	annual	fireweed
Eupatorium perfoliatum	Asteraceae	EUPPER	native	4	3	forb	perennial	boneset
Euthamia graminifolia	Asteraceae	EUTGRA	native	3	0	forb	perennial	grass-leaved goldenrod
Filipendula ulmaria	Rosaceae	FILLUM	non-native	0	0	forb	perennial	queen-of-the-meadow
Fragaria virginiana	Rosaceae	FRAVIR	native	2	3	forb	perennial	wild strawberry
Fraxinus pennsylvanica	Oleaceae	FRAPEN	native	2	-3	tree	perennial	red ash
Geum urbanum	Rosaceae	GEUURB	non-native	0	5	forb	perennial	avens
Glechoma hederacea	Lamiaceae	GLEHED	non-native	0	3	forb	perennial	ground-ivy
Hesperis matronalis	Brassicaceae	HESMAT	non-native	0	3	forb	perennial	dames rocket
Hypericum perforatum	Hypericaceae	HYPER	non-native	0	5	forb	perennial	common st. johns-wort
Juncus articulatus	Juncaceae	JUNART	native	3	-5	rush	perennial	jointed rush
Juniperus virginiana	Cupressaceae	JUNVIR	native	3	3	tree	perennial	red cedar
Leucanthemum vulgare; chrysanthemum leucanthemum	Asteraceae	LEUVUL	non-native	0	5	forb	perennial	ox-eye daisy
Ligustrum vulgare	Oleaceae	LIGVUL	non-native	0	3	shrub	perennial	common privet
Lonicera maackii	Caprifoliaceae	LONMAA	non-native	0	5	shrub	perennial	amur honeysuckle
Lotus corniculatus	Fabaceae	LOTCOR	non-native	0	3	forb	perennial	birdfoot trefoil
Lythrum salicaria	Lythraceae	LYTSAL	non-native	0	-5	forb	perennial	purple loosestrife
Malanthemum frutescens; smilacina r.	Convallariaceae	MAIRAC	native	5	3	forb	perennial	false spikenard
Marrubium vulgare	Lamiaceae	MARVUL	non-native	0	3	forb	perennial	horehound
Matricaria chamomilla; m. recutita	Asteraceae	MATCHA	non-native	0	5	forb	annual	false chamomile
Melilotus albus	Fabaceae	MELALB	non-native	0	3	forb	biennial	white sweet-clover
Melilotus officinalis	Fabaceae	MELLOF	non-native	0	3	forb	biennial	yellow sweet-clover
Morus alba	Moraceae	MORALB	non-native	0	3	tree	perennial	white mulberry
Parthenocissus quinquefolia	Vitaceae	PARCUI	native	5	3	vine	perennial	virginia creeper
Phragmites australis var. americanus	Poaceae	PHRAUM	native	5	-3	grass	perennial	reed
Phytolacca americana	Phytolaccaceae	PHYAME	native	2	3	forb	perennial	pokeweed
Pinus resinosa	Pinaceae	PINRES	native	6	3	tree	perennial	red pine
Pinus sylvestris	Pinaceae	PINSYL	non-native	0	3	tree	perennial	scotch pine
Plantago lanceolata	Plantaginaceae	PLALAN	non-native	0	3	forb	perennial	english plantain
Populus deltoides	Salicaceae	POPDEL	native	1	0	tree	perennial	cottonwood
Prunella vulgaris	Lamiaceae	PRUVUL	native	0	0	forb	perennial	self-heal
Prunus serotina	Rosaceae	PRUSER	native	2	3	tree	perennial	wild black cherry
Quercus rubra	Fagaceae	QUERUB	native	5	3	tree	perennial	red oak
Quercus velutina	Fagaceae	QUEVEL	native	6	5	tree	perennial	black oak

Rhamnus cathartica	Rhamnaceae	RHACAT	non-native	0	0 tree	perennial	common buckthorn
Rhus typhina	Anacardiaceae	RHUTYP	native	2	3 shrub	perennial	staghorn sumac
Robinia pseudoacacia	Fabaceae	ROBPSE	non-native	0	3 tree	perennial	black locust
Rosa multiflora	Rosaceae	ROSMUL	non-native	0	3 shrub	perennial	multiflora rose
Rudbeckia hirta	Asteraceae	RUDHIR	native	1	3 forb	perennial	black-eyed susan
Rumex crispus	Polygonaceae	RUMCRI	non-native	0	0 forb	perennial	curly dock
Salix discolor	Salicaceae	SALDIS	native	1	3 shrub	perennial	pussy willow
Salix nigra	Salicaceae	SALNIG	native	5	5 tree	perennial	black willow
Sassafras albidum	Lauraceae	SASALB	native	5	3 tree	perennial	sassafras
Solanum carolinense	Solanaceae	SOLCAR	non-native	0	3 forb	perennial	horse-nettle
Solidago canadensis	Asteraceae	SOLCAN	native	1	3 forb	perennial	canada goldenrod
Solidago gigantea	Asteraceae	SOLGIG	native	3	3 forb	perennial	late goldenrod
Solidago juncea	Asteraceae	SOLJUN	native	3	5 forb	perennial	early goldenrod
Sonchus oleraceus	Asteraceae	SONOLE	non-native	0	3 forb	annual	common sow-thistle
Sorghum halepense	Poaceae	SORHAL	non-native	0	3 grass	perennial	johnson grass
Taraxacum officinale	Asteraceae	TAROFF	non-native	0	3 forb	perennial	common dandelion
Toxicodendron radicans	Anacardiaceae	TOXRAD	native	2	0 vine	perennial	poison-ivy
Trifolium pratense	Fabaceae	TRIPRA	non-native	0	3 forb	perennial	red clover
Trifolium repens	Fabaceae	TRIREP	non-native	0	3 forb	perennial	white clover
Verbascum thapsus	Scrophulariaceae	VERTHA	non-native	0	5 forb	biennial	common mullein
Viburnum acerifolium	Araliaceae	VIBACE	native	6	5 shrub	perennial	maple-leaved viburnum
Vinca minor	Apocynaceae	VINMIN	non-native	0	5 shrub	perennial	periwinkle

Sustainability Evaluation of “Former Airport Property”

This report was created for:

City of Saugatuck
102 Butler St, Saugatuck, MI 49453

Sustainability Evaluation

ODC Network sustainability staff evaluated the sustainability performance of the City of Saugatuck-owned “Former Airport” property (parcel #'s: 20-002-027-00 and 20-260-002-00), both in its current state and potential future uses. This assessment involved an examination of carbon sequestration and mitigation potential, air pollution, hydrological benefits, EV charging feasibility, and solar development opportunity. The primary purpose of this work was to identify opportunities for improving sustainability performance and strategies to balance and support social, environmental, and economic needs of the community.

Executive Summary:

The forest cover of this site represents the bulk of its value as a sustainability asset to the community. The ecological services provided by the large areas of mature, biodiverse, and healthy forests should be preserved and emphasized in any future use plans for the property. In addition to its intrinsic value as high-quality habitat and natural area, the property has a measurable impact on factors directly associated with human health, wellness, and prosperity. Unless significant redevelopment of the parcel and surrounding area were to occur, opportunities to leverage the property for electric vehicle charging and/or solar development are non-existent.

Valuation of Existing Canopy

The data presented here provided a quantitative assessment of the properties role in combatting climate change, enhancing air quality, and sustaining the water balance within the region.

Sequestration Value of Existing Canopy

Healthy forests capture and store large quantities of CO₂, the primary greenhouse gas associated with human-caused emissions and climate change. This relatively large tract of forest acts as significant carbon sink in the community. At the time of this report, the tree cover alone stores over 5,000 metric tonnes of carbon or the equivalent to approximately 20,000 metric tonnes of CO₂. US Forest Service estimates the social cost of this quantity of carbon to be upwards of \$900,000. Each year, the property is projected to sequester an additional 200+ metric tons of carbon, the equivalent to 100 homes' energy use for one year (*Appendix B*)

Description	Carbon (T)	±SE	CO ₂ Equiv. (T)	±SE	Value (USD)	±SE
Sequestered Annually in Canopy	217.94	±3.98	799.11	±14.58	\$37,169	±678
Stored in Trees (Not Annual)	5,473.24	±99.85	20,068.55	±366.13	\$933,465	±17,030

Soil-based carbon sequestration values were not included in this report (Standard measurement practices and tools are still in development), however, it is highly likely that this represents an additional carbon sink and ecosystem service provided by the property in its current state.

Air Pollution Value of Existing Canopy

In addition to carbon sequestration, healthy forests also play a critical role in the moderation of air quality and air pollution. At the time of this report, the existing canopy of this property has the potential to remove over 12,000 lbs. of air pollution each year. Notably, this includes particulate matter (PM2.5 and PM10), one of the primary concerns associated with the increased presence of wildfire smoke in West Michigan.

Abbr.	Description	Annual Removal (lbs.)	±SE	Value (USD)	±SE
CO	Carbon Monoxide	142.56	±2.60	\$2	±0
NO2	Nitrogen Dioxide	776.85	±14.75	\$3	±0
O3	Ozone	7,822.81	±142.72	\$185	±3
SO2	Sulfur Dioxide	494.87	±9.03	\$1	±0
PM2.5	Particulate Matter <2.5 Microns	379.38	±6.92	\$373	±7
PM10	Particulate Matter <10 Microns	2,635.50	±48.08	\$150	±3
Total		12,251.98	±223.52	\$714	±13

Hydrological Value of Existing Canopy

Forests are also a key component of the water cycle and healthy watersheds. The trees alone on this property help to filter and manage over 20,000 gallons of water (the size of an average swimming pool in the United States) each year.

Abbr.	Benefit	Amount (gal)	±SE
AVRO	Avoided Runoff	34.83	±0.64
E	Evaporation	5,935.62	±108.29
I	Interception	5,967.80	±108.88
T	Transpiration	8,496.19	±155.00
Total		20,434.44	±372.81

Data calculated using I-Tree software, A product produced through the collaboration of the US Forest Service, Davey, Arbor Day Foundation, Society of Municipal Arborists, Casey Trees, International Society of Arboriculture. See Appendix A for more information.

EV Charging Evaluation:

Public entities including parks, beaches, and nature preserves represent are increasing popular locations for EV chargers as demand rises for charging options that provide entertainment and recreation opportunities while drivers and passengers refuel (Appendix C). At the time of this report, the charging infrastructure of the Saugatuck is considered underdeveloped and ripe with opportunity for additional public charging facilities. The portion of Interstate 196 passing through the Saugatuck area does not yet meet the US Department of Energy's minimum distance or fuel-specific station requirements to qualify as an electric-vehicle ready corridor.

Although demand at this property could increase depending on future-use plans and public accessibility, investment in publicly available EV charging facilities should be prioritized elsewhere in the community before focusing on this area. The property is ineligible for the Department of Environment Great Lakes and Energy's Charge Up Michigan program and will likely be ineligible for other funding sources due to its distance from local thoroughfares and population centers. (The current driveway is 1.59 miles from exit 41, 4.58 miles from exit 36)

Solar Evaluation

As it stands, the property does not lend itself to solar development satisfying only one of four priorities typically considered in site selection:

- **Three-phase power:** Close proximity (less than 1 mile) to 3-phase power is a minimum requirement for solar development and is conveniently present along 63rd street.
- **Substation:** Close proximity (less than 3 miles) to an electrical substation is commonly preferred for solar development. The nearest substations are located 6.89 miles and 8.15 miles away.
- **Ecological loss:** Current solar developments prioritize land that has already been cleared and leveled. In addition to the logistical issue of clearing the land, the social and environmental cost of

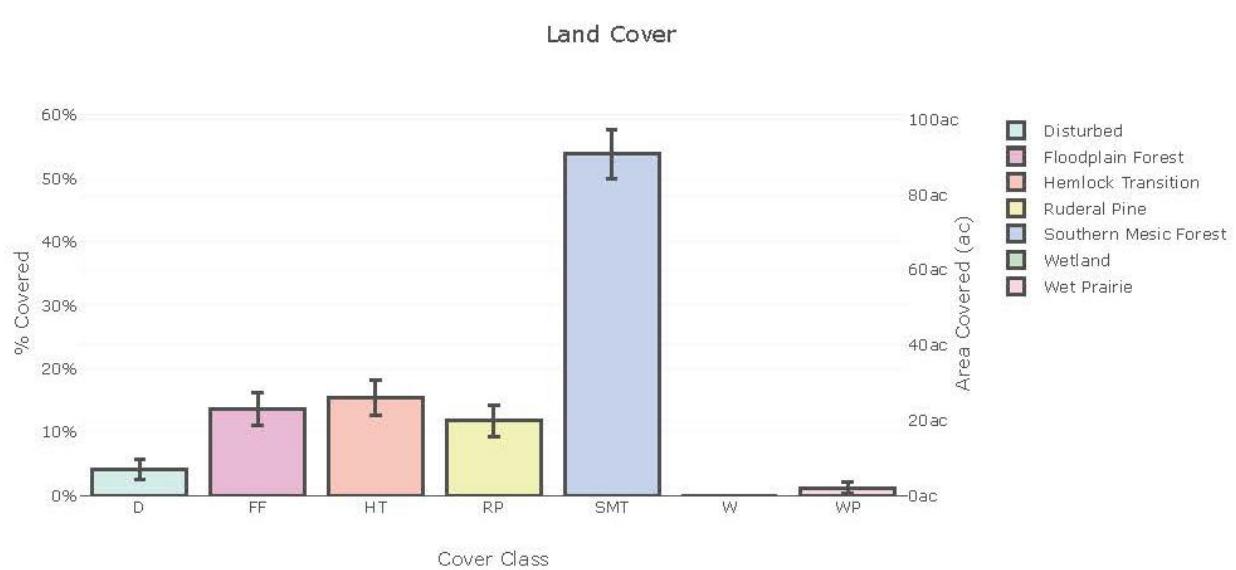
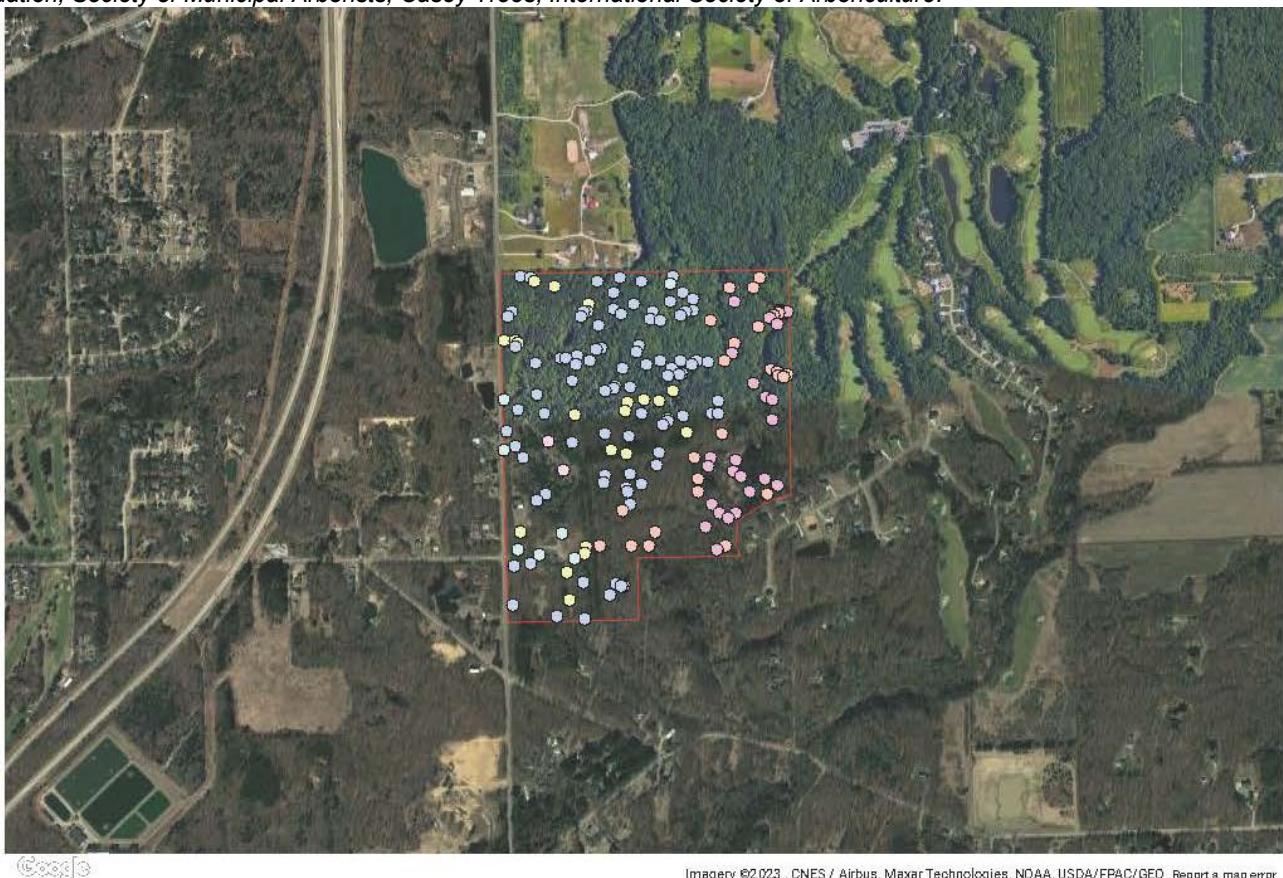
- site preparations for a ground-mount solar array (minimum of 20 acres) would likely outweigh the potential returns (Annual lease rates currently hover between \$600 - \$1,500 per acre).
- **Competitive Alternatives:** The presence of numerous alternative sites in the region with a lower opportunity cost for solar development (parking lots, rooftops, vacant property, agricultural land) pose significant competition making this property an unlikely candidate.

Composting/Yard Waste Material Management:

The disturbed area of property currently used to manage DPW lawn waste appears compliant with Section 11521(4)(b)(i) and (ii), of Part 115, Solid Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451 requirement for use as a Commercial Composting facility. If demand for a larger local composting facility to serve residential needs exists, many aspects of this location make it a good candidate for consideration. The western half of the property is well-buffered from require setbacks and is visually isolated from major residential and commercial areas. The eastern half of the property could serve as an olfactory buffer to any neighbors downwind of the operation. If this opportunity were pursued, caution should be taken to avoid the introduction of invasive species to the surrounding natural areas through the translocation of yard and lawn waste. If codeveloped with a trail system and other recreational opportunities, careful planning would be necessary to isolate operations from public-use areas.

Appendix A: Canopy Valuation Results:

Data calculated using I-Tree software, A product produced through the collaboration of the US Forest Service, Davey, Arbor Day Foundation, Society of Municipal Arborists, Casey Trees, International Society of Arboriculture.



Appendix B: Canopy Sequestration Equivalencies: Calculated using EPA Greenhouse Gas Equivalencies Calculator

799 Metric Tons ▾ of Carbon Dioxide (CO₂) equivalent

This is equivalent to greenhouse gas emissions from:

178

gasoline-powered passenger vehicles driven for one year ⓘ



2,048,557

miles driven by an average gasoline-powered passenger vehicle ⓘ



This is equivalent to CO₂ emissions from:

89,919

gallons of gasoline consumed ⓘ



78,498

gallons of diesel consumed ⓘ



895,126

pounds of coal burned ⓘ



10.6

tanker trucks' worth of gasoline ⓘ



101

homes' energy use for one year ⓘ



155

homes' electricity use for one year ⓘ



4.4

railcars' worth of coal burned ⓘ



1,848

barrels of oil consumed ⓘ



36,710

propane cylinders used for home barbeques ⓘ



0.0002

coal-fired power plants in one year ⓘ



0.002

natural gas-fired power plants in one year ⓘ



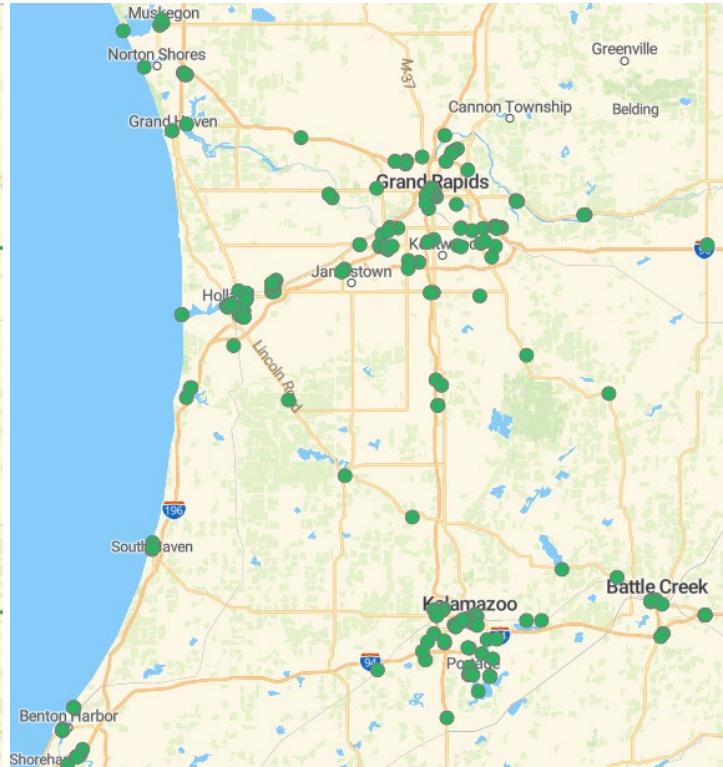
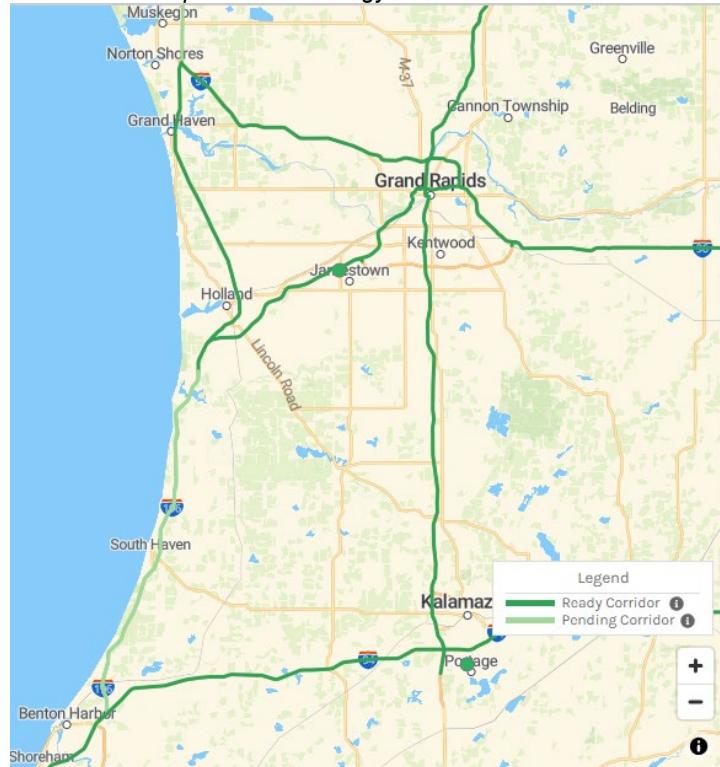
97,205,855

number of smartphones charged ⓘ



Appendix C: EV Charging Supporting Data

Source: U.S. Department of Energy Alternative Fuels Data Center



Appendix D: Commercial Composting Regulatory Requirements

Department of Environment, Great Lakes, and Energy Commercial Composting

Yard Waste Composting Isolation Distances (feet)

According to Section 11521(4)(b)(i) and (ii), of Part 115, Solid Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, registered composting sites must maintain certain isolation distances to property lines, residences, surface water, wells, and sensitive receptors. The following table contains these requirements.

	Facility in operation before December 1, 2007	Facility in operation after December 1, 2007
Property line	50	50
Residence	200	200
Surface water	100	100
Type I or IIA water supply well	NA	2,000
Type IIB or III water supply well	NA	800
Sensitive receptor	NA	500
Groundwater	NA	4