2022 WATER SYSTEM IMPROVEMENTS

LEONI TOWNSHIP JACKSON COUNTY, MI



DRINKING WATER REVOLVING FUND (DWRF) DRAFT PROJECT PLAN DWRF 7702-01



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TABLE OF CONTENTS

Introduction	. 1
1.0 Project Background	. 1
1.1 Delineation of Service Area	. 1
1.2 Land Use	. 1
1.3 Population Projections	. 1
1.4 Water Demand and Existing Facilities	.2
1.5 Summary of Project Needs	. 3
2.0 Analysis of Alternatives	.5
2.1 No Action	.5
2.2 Optimum Performance of the Existing Facilities	.5
2.3 Regional Alternatives	.5
2.4 Water Main Construction Method Alternatives	.5
2.5 Water Service Line Replacement	.5
2.6 Water Treatment Improvement Alternatives	.6
2.7 Storage Tank Maintenance and Improvements	.6
2.8 Delivery Methods	.6
3.0 Principal Alternatives	. 8
3.1 Monetary Evaluation	. 8
3.2 Environmental Impacts	. 8
3.3 Implementability and Public Participation	. 8
3.4 Technical Considerations	. 8
4.0 Selected Alternatives	.9
4.1 Schedule	.9
4.2 Cost Estimates	.9
4.3 User Costs	10
4.4 Disadvantaged Community	10
4.5 Ability to Implement the Selected Alternative	10
5.0 Environmental Evaluation	10
5.1 Climate	10
5.2 Description of Project Impacts	10
6.0 Mitigation of Impacts	14
6.1 General	14
6.2 Short-Term Impact Mitigation	15
6.3 Long-Term Impact Mitigation	16
6.4 Indirect Impact Mitigation	16

7.0 Public Participation	16
7.1 Formal Public Hearing	16
7.2 Public Hearing Advertisement	16
7.3 Public Hearing Transcript	16
7.4 Public Hearing Contents	16
7.5 Public Hearing Comments and Answers	17
7.6 Adoption of the Project Plan	17

Appendix A: Water Reliability Study
Appendix B: Asset Management Plan
Appendix C: Leoni Township Master Plan
Appendix D: Leoni Township Floodplain and Wetland Maps
Appendix E: Farmland Classification Information
Appendix F: Project Cost Estimates and Bond Schedule
Appendix G: Preliminary Distribution System Materials Inventory
Appendix H: Affidavit of Publication
Appendix I: Public Hearing Transcript, Project Plan Resolution

INTRODUCTION

The purpose of the Leoni Township Drinking Water Revolving Fund Project Plan is to fulfill the project planning requirements under the States' Safe Drinking Water Act 399 and to provide the basis for ranking of the Township's proposed waterworks improvements under a Project Priority List for a low-interest Drinking Water Revolving Fund Loan.

The scope of the project plan includes a summary of the existing water quality and reliability issues within the Township's service area, projection of the population served within the next 20 years, identification of principal alternatives to meet the future water needs of the service area, and evaluation of environmental impacts resulting from completion of a selected alternative in both the long and the short term.

The project plan also presents projected user costs for financing the selected alternative and a review of the public participation and public comments solicited by the Township on the selected alternative.

The format of the report follows the May 2016 project planning guidelines for Drinking Water Revolving Fund Projects issued by the Michigan Department of Environmental Quality (MDEQ), now referred to as the Michigan Department of Environment, Great Lakes, and Energy (EGLE).

1.0 PROJECT BACKGROUND

1.1 DELINEATION OF SERVICE AREA

The service area is shown in Figure 1 of the Township's February 2020 Water Reliability Study (WRS), included in Appendix A to this report. The service area consists of water system components installed from 1960 to 2018. The Leoni Township water distribution system serves customers in the southwest corner of the Township. The western boundary of the system is North Dettman Rd (just west of US-127). The northern boundary of the system is Seymour Rd (just north of I-94), which becomes Brills Lake Rd in the eastern portion of the system. The eastern boundary includes (from north to south) Whipple Rd, Gilletts Lake Rd, Ballard Rd, and 8th St. The southern boundary includes (from west to east) East South St, Flansburg Rd, and East Grove Ave.

1.2 LAND USE

The Zoning Map of the Township's 2030 Master Plan (included in Appendix C) shows existing land uses in the Township. Map 1 (Leoni Township Future Land Use Plan) of the Master Plan shows expected future uses. As shown in these maps, the Township water distribution system service area primarily includes residential land but also includes commercial, industrial, and open space/agricultural land. The service area also includes large surface water bodies, including Center Lake, Gilletts Lake, and Brill Lake.

1.3 POPULATION PROJECTIONS

As of the 2020 U.S. Census, Leoni Township has a population of 13,487. However, the Township water distribution system only serves a portion of this population, and the exact number of people it serves is unknown. In the WRS for the Township, the 2019 population served by the system was estimated at 2,922, based on 2019 Township water usage records and per-capita water usage estimates by the United States Geological Survey (USGS) for the greater region.

The Township population increased at an average rate of 0.26% between 2000 and 2010. However, annual estimates from the Census Bureau indicate that the population has been decreasing in recent years. In the WRS, for planning purposes, the population increase rate for the water system service area was given a conservate estimate of 0.30%. Based on this rate, the 2024 service area population was projected at 2,966, and its 2039 population was projected at 3,102.



In the future, the Township would like to expand the service area of its water distribution system. In the 2020 WRS, estimates were made for the total population that would be served by the expanded water system. First, the then-current (2019) population that would have been served by the expanded system was estimated at 5,979, based on estimating the population in new service areas (3,057) and adding it to the estimated population of the existing service area (2,922). Expanded service area population projections for 2024 and 2039 were then made by applying the estimated annual population growth rate of 0.30% to the estimated 2019 expanded service area population of 5,979. Based on these calculations, the 2024 expanded service area population was projected at 6,070, and the 2039 population was projected at 6,349.

1.4 WATER DEMAND AND EXISTING FACILITIES

The existing water distribution system was originally constructed in 1960 and consists of 18,203 feet of 6inch watermain, 35,106 feet of 8-inch watermain, 1,406 feet of 10-inch of watermain, and 74,147 feet of 12-inch watermain, for a total of 128,862 linear feet of water main. By length, the system is approximately 62% polyvinyl chloride (PVC), 35% cast iron, and 3% ductile iron. The system has 178 fire hydrants, 230 watermain valves, and 699 known water service connections. The Township submitted a Preliminary Distribution System Materials Inventory (DSMI) on December 20, 2019. A copy of the DSMI is included in Appendix G.

Four wells supply water for the entire Township water distribution system. The wells operate in pairs at two locations in the system. One pair (Wells 1 and 1A) is in the southeast corner of the system, and the other pair (Wells 2A and 2B) is in the northeast corner of the system. The current firm capacity of the system is 1,319 gallons per minute (gpm). The table below provides information for all four wells. Figure 1 of the WRS shows their locations.

	Well Summary								
Well No.	Year Drilled	Diameter (in.)	Depth (ft.)	Design Flow (gpm)	TDH at Design Flow (gpm)				
1	1963	12	250	540	133				
1A	1976	12	250	769	184				
2A	1960	12	348	303	229				
2B	1960	10	340	476	351				

The Township's water is treated with sodium hypochlorite, a disinfectant. Separate chemical feed pumps inject sodium hypochlorite into the Well 1 and Well 1A water lines. In contrast, one chemical feed pump injects sodium hypochlorite into the Well 2A and 2B water lines jointly.

The existing system has one, 940,000-gallon storage tank. The tank is a ground-level cylindrical steel tank located and the end of Andrew Park Drive, which is near the geographic center of the system. The location of the tank is shown in Figure 1 of the WRS. The tank has a total head range of 65 feet. As is typical of water distribution system design, the storage tank is in a higher-elevation portion of the system to maintain adequate pressures during various flow conditions.

Additional information about the system can be found in the WRS and Water Asset Management Plan reports, which can be found in Appendices A and B, respectively.



To meet projected demands, flows must be predicted for the future. For both the existing and the expanded water system service areas, 2019, 2024, and 2039 average-day, maximum-day, and peak-hour water system demands were estimated. These estimates are presented in the table below.

	Existing and Projected Water Demands for Leoni Township Water System							
Existing Service Area					Expanded S	ervice Area		
Year	Population Estimate	Average- Day Demand (gpm)	Maximum- Day Demand (gpm)	Peak- Hour Demand (gpm)	Population Estimate	Average- Day Demand (gpm)	Maximum- Day Demand (gpm)	Peak- Hour Demand (gpm)
2019	2,922	256	703	895	5,979	523	1,439	1,831
2024	2,966	260	714	908	6,070	531	1,461	1,859
2039	3,102	271	746	950	6,349	556	1,528	1,944

Blue text = values corresponding to existing conditions (2019 population with existing service area). Green text = values corresponding to proposed conditions (2039 population with expanded service area).

Average-day demands were estimated based on an average water usage of 126 gallons per capita per day (gpcd). Maximum-day demands were estimated by multiplying average-day demands by a peaking factor of 2.75. Likewise, peak-hour demands were estimated by multiplying average-day demands by a peaking factor of 3.5. Further details about these calculations can be found in the WRS.

1.5 SUMMARY OF PROJECT NEEDS

1.5.1 Water Distribution System Looping

The Township has several different improvements that it would like to complete for the water distribution system, as part of the proposed project. Some improvements pertain to system operation, while others pertain to various regulations for water distribution systems in general.

Currently, the water system is laid out as three dead-end branches that join at a common point (which is near the intersection of Ann Arbor Rd and North Sutton Rd). In the WRS, one portion of the system, near Michigan Center High School (the 5th St and South State St region), was found to have inadequate capacity to provide recommended target fire flows, based on standard water system evaluation and design practices¹. Watermain breaks frequently occur in the northern portion of the system, near Ridgewood Vista Dr, which is at the dead end at one of the branches and likely does not have enough ground cover to protect it from seasonal freeze-thaw phenomena.

The multiple dead-end water mains result in a reduction of water reliably and water quality. When the water main needs to be shut down for service, the entire line needs to be closed and a boil water notice issued. Water is also not continually flowing through the system resulting in taste and order complaints to the Village.

Clark Industrial Equipment is located on Falahee Road just south of the railroad tracks. This large industrial site currently has its own private water system. Currently the system is experiencing multiple failures and is under the State requirements to replace the system or connect to the Township system.

¹ Specifically, an EPANET simulation (or similar) is run with maximum-day water demands, firm well pumping capacity, and pressure set to 20 pounds per square inch (psi) throughout the entire system. In each portion of the system, simulated flows are compared to recommended target fire flows, which, in turn, depend on facilities located in that portion.



1.5.2 Water Line Replacement

Most of the water service lines were constructed using copper or cross-linked polyethylene (PEX). Approximately 600 water services are constructed with galvanized steel pipe. These service where constructed in the late 1960s or early 1970s and may contain lead goosenecks.

1.5.3 Water Well and Water Treatment Improvements

The pump for Well 1 is currently performing 40% below its design head-discharge curve, and the pump for Well 2A is performing 14% below its design curve. The proposed project includes overhauling these two pumps, to help ensure the system always has reliable water supply.

At Wells 2A and 2B, one chemical feed pump injects sodium hypochlorite into the water lines for these wells jointly. In general, to provide adequate disinfection, sodium hypochlorite must be injected into the water supply to a high enough concentration. To maintain a high enough concentration, the chemical feed pump injects the sodium hypochlorite at a rate controlled by the well pump rate.

At Wells 2A and 2B, the joint chemical feed configuration may be hindering the feed system's ability to maintain adequate sodium hypochlorite levels in both water supply lines. During periods when the well pumping rates differ significantly, the chemical feed system may have difficulty maintaining adequate sodium hypochlorite levels in the water line with the higher flow rate.

The proposed project includes disconnecting the existing chemical feed pump from one of the two wells and adding a separate chemical feed system for that well. In other words, the proposed project seeks to equip Wells 2A and 2B with their own sodium hypochlorite feed systems. This improvement will help ensure the entire water supply to the system receives adequate disinfection.

1.5.4 Storage Tank Maintenance and Improvements

During its last inspection (in August 2018), the storage tank was found to be full of sediment. The proposed project includes removal of this sediment, to help ensure that the tank functions properly and that the water supply has high enough quality.

During that same August 2018 inspection, the storage tank was found to fall short of full compliance with Occupational Safety and Health Administration (OSHA) and American Water Works Association (AWWA) safety standards. The tank was also found to be in need of several other maintenance-related items.

The proposed project seeks to complete the following improvements to the storage tank to bring it into full OSHA and AWWA compliance:

- Add signage for private property and confined space entry.
- Electrically ground the tank for lightning protection.
- Clear vegetation growth around the tank foundation.
- Install a flapper valve and new screen on the existing overflow pipe elbow.
- Raise and extend the handrails around the circumference of the tank roof.
- Replace the existing roof vent with a vacuum-pressure, frost-proof vent and screen.
- Modify the overflow configuration and overflow vent to meet *Ten States' Standards* specifications for these items.

The proposed project seeks to complete the following maintenance-related items for the storage tank:

- Repair cracks in the concrete foundation (if any are present), then seal the foundation.
- Install a frost-proof drain valve.
- Install a cable-type ladder safety device.
- Install a liquid indicator with target board and float.
- Install interior access ladders.



- Install a mixing system to prevent thermal stratification and short-circuiting.
- Thoroughly clean and perform spot maintenance of the interior and exterior to prevent grime and rust spots.
- Resurface the interior and exterior.

2.0 ANALYSIS OF ALTERNATIVES

2.1 NO ACTION

Taking no action will reduce the upfront capital costs but will not address the system needs over the next 30 years. The system will continue to deteriorate until it fails and no longer provides safe, reliable water. No further analysis is presented for this alternative.

2.2 OPTIMUM PERFORMANCE OF THE EXISTING FACILITIES

Optimization alternative would not address the proposed looping to the system. Since this alternative would not address this objective, it will not be analyzed further.

2.3 REGIONAL ALTERNATIVES

The nearest community with a water distribution system is the City of Jackson. The eastern-most reaches of the Jackson's water system are less than 5 miles away from the Leoni Township water system. However, connecting Jackson's water system to Leoni Township's could have negative consequences for both municipalities. First, the connection could burden the City of Jackson system and lead to inadequate flows and pressures at customer connections in Jackson. Second, the connection could lead to legal, political, and financial complications for one or both municipalities. For example, Jackson could charge Leoni Township large fees or implement strict regulations on that connection. Even if a connection were completed, it would not necessarily address the low-pressure portions of the Township system or allow connection of more customers within the Township. Due to these complicating factors, this alternative will not be analyzed further.

2.4 WATER MAIN CONSTRUCTION METHOD ALTERNATIVES

The Township has two water main construction method alternatives to evaluate for water main and service line replacements.

2.4.1 Alternative #1: Open Cut

The open-cut trench method involves excavating a trench down to the appropriate line and grade and placing the pipe. The trench is then backfilled with appropriate material, and a paving course is placed on the surface.

2.4.2 Alternative #2: Directional Drilling

Directional drilling (commonly referred to simply as *drilling*) is the process of using a small, steer-able steel pipe that is guided under the soil to create a pilot hole. The pipe is guided by above-grade monitoring equipment that tracks the depth and location. Once the guided head reaches its location, the host pipe is attached and pulled back through the pilot hole.

2.5 WATER SERVICE LINE REPLACEMENT

There are no alternatives to replacing lead service lines. State law does not allow the rehabilitation or partial replacement of lead service lines, so they must be replaced.

2.6 WATER TREATMENT IMPROVEMENT ALTERNATIVES

Overall, sodium hypochlorite is working as intended as a disinfectant, and the Township is meeting all its water quality standards with its current treatment method. The only identified inadequacy of the treatment system can be addressed with little more than the addition of a new chemical feed pump, which is a minor improvement. No other treatment alternatives have been identified or will be analyzed.

2.7 STORAGE TANK MAINTENANCE AND IMPROVEMENTS

The storage tank is in need of a large number of minor maintenance and improvement items. The sum of these items is far less than the cost of demolishing the existing tank and constructing a new one. Since the tank maintenance and improvement items are minor, no alternatives to them have been identified or will be analyzed.

2.8 DELIVERY METHODS

The Township has reviewed various methods for delivering the construction of their project. EGLE has published the State Revolving Fund and Drinking Water Revolving Fund Project Delivery Methods Guidance Document in March 2015. The various delivery methods allowed include Design Bid Build (DBB), Construction Management at Risk (CMAR), Fixed-Price Design-Build (FPDB), and Progressive Design-Build (PDB).

The Township has reviewed all four methods. Summarized comparisons of these methods are outlined below.

2.8.1 Design-Bid-Build (DBB)

Many public infrastructure projects are delivered using the DBB method. In the DBB method, an engineer works closely with the Township and prepares the project bidding documents, including the construction drawings and specifications.

General contractors submit bids based on the plans and specifications, and the lowest, responsible bidder is awarded the project. The general contractor pricing includes their subcontractors, or trade contractors, to perform specialized work such as electrical/controls, mechanical work, concrete work, etc. Typically, the engineering firm that developed the design provides construction observation and construction administration services during the construction phase. In this alternative, there are three parties: the Owner, the engineer, and the general contractor.

The DBB method offers the following advantages:

- Well understood and accepted.
- Independent oversight of Builder.
- Open to Owner involvement during design.

On the other hand, the DBB method has the following disadvantages:

- Pricing is not known until the design process is complete.
- Contractor selected based on low bid not on value, knowledge, and experience brought to the team.

2.8.2 Construction Management At-Risk (CMAR)

CMAR is similar to DBB in that the engineering/design contract is separate from the construction contract. However, in the CMAR method, a construction management firm (CM) is hired independently by the Township before or early on in the design process. An engineer works closely with the Township and the CM during the entire design process. The CM provides input to the engineer and Owner through the entire design process. The engineer prepares the construction drawings and specifications while the CM prepares the bidding documents and obtains pricing from their subcontractors and suppliers. The CM develops a Guaranteed Maximum Price (GMP). In this alternative, there are three parties: the Owner, the engineer, and the independently contracted CM firm.

The CMAR method offers the following advantages:

- Open to Owner involvement during design.
- Early integration of Builder.
- Provides early and continuous constructability review.
- Provides early certainty of costs.
- Pricing and design may be conducted in parallel.
- Reduced likelihood of claims compared to the DBB alternative.
- Project can be ready for construction quickly.

On the other hand, the CMAR method has the following disadvantages:

- Not a single source of responsibility.
- No legal obligation linking Designer to Builder.
- Potential for disputes, claims and change orders.

2.8.3 Fixed Price Design Build (FPDB)

FPDB is a delivery method where the Owner designates one firm, a design-builder (DB), under one contract for the design and construction of the project. The DB provides a fixed price based on a defined scope, requirements, and schedule but before complete preparation of detailed design documents.

Owner involvement during the design process is typically very limited after the fixed price is accepted. The "book is closed" on pricing around the 30% mark of the design process.

This Township is increasing rates dramatically for this project and has indicated they want to be heavily involved in the design process to provide direction on design options to reduce overall cost. They will be involved throughout the entire design and construction process. Therefore, FPDB was not considered further for this project.

2.8.4 Progressive Design Build (PDB)

The PDB delivery method is similar to the CMAR method but with one major distinction – the designbuilder (DB) is under one contract for design and construction of the project. Therefore, the Township has one single firm responsible for the design, schedule, construction, and warrantee of the project. If issues arise during or after construction, the Township only has one entity it would need to address them with.

During the latter part of the design phase, the DB prepares the bidding documents and obtains pricing from its subcontractors and suppliers on an open-book basis.

If an agreement is reached on the pricing, the Township will move forward collaboratively to construction. With such flexibility, the PDB method allows the Owner to improve the project outcome by participating directly in design decisions. In this alternative, there are two parties: the Owner and the DB firm.

The PBD delivery method offers the following advantages:

- The Owner can transfer more risk to the DB, since there is a single point of responsibility for the design, permitting, construction, and performance warrantee of the project.
- Owner is involved during the entire design and construction.
- Early integration of Builder.
- Provides early and continuous constructability review.
- Provides early certainty of costs.
- Pricing and design may be conducted in parallel.



Project can be ready for construction quickly.

3.0 PRINCIPAL ALTERNATIVES

The no-action, optimized performance, and regional alternatives are not considered viable alternatives the principal alternative is the selected alternative

3.1.2 Construction Delivery Methods

The <<selected>>> method(s) provide(s) the best monetary value for the Township.

3.2 ENVIRONMENTAL IMPACTS

The primary potential environmental impacts identified for this project (regardless of the selected construction method alternative) include temporary decreased air quality due to dust from construction sites, temporary noise from construction activities, temporary traffic flow restrictions, and close proximity to designated wetlands and floodplains (but without any anticipated impacts on them).

The open cut construction method alternative would likely have much more of an environmental impact than the drilling method would. The open cut method would involve digging trenches over the entire new watermain length, while the drilling method would involve excavating holes in the ground at long intervals from each other, then drilling new watermain between each hole. Since the proposed project includes 22.9 miles of new watermain, the difference in extensiveness of required excavation between the two methods is substantial.

The significantly larger amount of excavation required for the open cut method than excavation required for the drilling method is the primary reason for the open cut method's larger potential environmental impact. The open cut method would produce larger amounts of dust, as excavation would occur over the entire new watermain length, rather than at comparatively small, isolated sites. Similarly, the open cut method would create more noise, as construction activities would occur over the entire new watermain length, rather than at individual work sites spaced far apart. The open cut method would require more disruption to traffic flow, as long lengths of road, possibly covering both traffic directions, would need to be closed, rather than short lengths of road with closures for only one side of the road. The open cut method has a higher potential to impact adjacent wetlands and floodplains, as it would produce larger amounts of excess dirt that, if not contained properly, could enter the wetlands or create obstructions to floodplains (e.g. by getting blown around by the wind).

The proposed water supply well, water treatment, and storage tank improvements are not anticipated to have any environmental impacts.

3.3 IMPLEMENTABILITY AND PUBLIC PARTICIPATION

The public was given a chance to review and comment on this project plan, including all the alternatives that were considered. A formal public hearing was held after the comment period to ensure further opportunity for public participation. << <s style="text-align: center;">Summary of public hearing to be inserted here</style="text-align: center;">>>.</u>

Concerns related to financial burden are expected to be remediated by funding the project through lowinterest loans from DWSRF. With this work needing to be completed to ensure proper upkeep of essential community water systems, the costs related to this project are unavoidable.

3.4 TECHNICAL CONSIDERATIONS

The primary technical considerations for this project include system reliability, especially for average-flow and fire-flow conditions, system expansion for new customers, safety of distributed water for drinking,





minimizing watermain breaks, project cost, project implementability, environmental impact, and maintaining compliance with worker safety regulations.

The two construction method alternatives differ only in project cost, project implementability, and environmental impact. Both alternatives are equal relative to the rest of the aforementioned considerations.

Of the two construction method alternatives, the drilling alternative has the smallest present-worth cost. The drilling method is deemed to be more implementable because it would require far less excavation and, therefore, would be completed much more efficiently. The drilling method is deemed to have the smallest environmental impact because, again, it would require far less excavation and, therefore, would produce less dust, create less noise, cause less disruption to traffic flow throughout the Township, and pose less of a hazard to designated wetlands and floodplains.

4.0 SELECTED ALTERNATIVES

4.0.1 Water Main Construction

The drilling alternative (Alternative #2) is the chosen alternative for new watermain construction and service line replacement because it is the best financial and most implementable option. This method is also anticipated to have the smallest impacts to the environment, traffic, facilities, and customers themselves.

Figure 5 of the WRS shows a map of the existing water system and proposed watermain extensions.

4.0.2 Water Treatment Improvement Alternatives

The project will include addition of a second sodium hypochlorite feed pump, with feed line modifications, at Well 2. On completion of these upgrades, Wells 2A and 2B will each have their own chemical feed pump. These upgrades will help ensure that intake water at these wells receives adequate disinfection.

4.0.3 Storage Tank Maintenance and Improvements

The storage tank maintenance and improvement items that will be completed as part of this project can be found in the two bullet-point lists in Section 1.5.4. Completion of these items will help ensure compliance with worker safety regulations and functional reliability of the water system.

4.0.4 Delivery Method

<<<mark>TBD</mark>>>.

4.1 SCHEDULE

The Township anticipates a Michigan Finance Authority (MFA) closing in <<<u>month and year</u>>>, which places the project on track for quarter <<<u>x</u>>> of <<<u>year</u>>>. The schedule in the table below shows the required milestone dates to reach the anticipated bond closing.

<<<mark>Table</mark>>>.

4.2 COST ESTIMATES

Cost estimates for the proposed improvements are provided in Appendix F. The project costs include construction costs, construction contingencies, and professional services for legal, administrative, and project engineering costs.



4.3 USER COSTS

The proposed user cost structure involves dividing the total project cost between existing and new customers, based on specific improvements that would be completed in existing and new portions of the system. In other words, existing customers would only pay for improvements to be completed in the existing system, while new customers would only pay for the new portions of the system. Project cost items that pertain to the project as a whole, not to any specific part of the system, would be apportioned between existing and new customers based on the relative portions of the whole project that existing-system and new-system improvements make up, by cost. Apportioned costs specifically include bonds, insurance, engineering, and contingency.

The proposed project has a total cost of \$5,356,000. The total bond payment of due each year is \$214,433.

Full breakdowns of the proposed project costs and the calculations for per-user costs can be found in Appendix F. The Detailed Bond Schedule is also provided in Appendix F.

4.4 DISADVANTAGED COMMUNITY

EGLE has determined the Leoni Township <<<mark>will/will not</mark>>> be a disadvantaged community based on a \$<<<mark>x</mark>>> loan.

4.5 ABILITY TO IMPLEMENT THE SELECTED ALTERNATIVE

The proposed water mains will be maintained and operated by contracted operations. The contracted operator has 3 licensed operator(s).

5.0 ENVIRONMENTAL EVALUATION

5.1 CLIMATE

The climate in the region is continental, with cold winters and warm summers. According to the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center's 1981-2010 Normals Dataset, the annual average daily temperature is 48.3 °F. The climate can be further described by the following:

- Temperature: January is typically the coldest month, with an average temperature of 23.6 °F. July is typically the warmest month, with an average temperature of 71.1 °F.
- Precipitation: the average total yearly precipitation is 31.5 inches. Of the non-winter months, July is typically the wettest, with an average total monthly precipitation of 3.58 inches. March is typically the driest, with an average total monthly precipitation of 1.9 inches, followed by April and November, with average total monthly precipitations of 2.6 inches.
- Snowfall: Leoni Township typically receives 37.4 inches of snowfall every year². January is typically the snowiest, with an average total monthly snowfall of 12.5 inches.

5.2 DESCRIPTION OF PROJECT IMPACTS

5.2.1 Historic and Natural Landmarks

No National or State Historic Places or National Landmarks are present within the project area, based on reviews of the National Register of Historic Places, Michigan State Historic Sites, National Historic Landmarks, and National Natural Landmarks lists. Therefore, the construction of the proposed project will have no impacts on historic places, sites, landmarks, or archaeological sites.

² In practice, 1 inch of snowfall converts to 0.1 inches of rainfall. Therefore, snowfall accounts for 3.74 inches of the Township's yearly total 31.5 inches of precipitation.

5.2.2 Air Quality

The air quality trends in Michigan can be defined by the measurement of certain air pollutants. These pollutants are identified as carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), ozone (O₃), particulate matter (PM), sulfur dioxide (SO₂), and air toxins or trace metals.

The Air Quality Index (AQI) was developed by the EPA to provide a simple uniform way to report daily air pollution concentration on a numerical scale. The scale is related to potential health effects. The scale ranges as follows: good (0-50), moderate (51-100), unhealthy for sensitive groups (101-150), and unhealthy (151+). The unhealthy group also includes "very unhealthy" and "hazardous" classifications.

According to the EPA's AirData Air Quality System, at the Ann Arbor, Michigan air monitoring station (the one closest to Leoni Township), the primary contributor to the index was ozone for 217 days in 2021 and PM2.5 for the remaining 148 days. The AQI was in the good to moderate (less than 100) range for every day in 2021 and never reached the unhealthy for sensitive groups (101-150) or unhealthy (151+) ranges. The 2021 AQI 90th percentile was 61 (moderate), meaning the AQI only exceeded 61 for 10% of the year.

The environmental impacts to air quality resulting from the proposed project are short-term, direct, negative impacts due to the construction of the facilities. These impacts can be minimized by properly maintaining construction equipment and using water to reduce dust problems.

5.2.3 Wetlands

The proposed watermain extensions cross several 100-300 foot stretches of land designed as wetland. Also, a large wetland area borders the proposed ~1,200-foot watermain extension on Falahee Rd (between Franklin Rd and Page Ave) to the west. Due to the small distances between the new watermain and wetland in these areas, the project may be subject to federal and state permitting requirements. However, all the proposed new watermains are within road right-of-ways, so the proposed construction project is not anticipated to have any long-term impacts on wetlands areas in Leoni Township.

One segment of the proposed watermain does cross underneath a portion of Center Lake. The crossing is between the east end of Grove Ave (on the west shore of Center Lake) and Duryea's Point Dr (on a peninsula in the middle of the lake). This segment will be constructed by drilling underneath the lake, and drilling is not known to cause negative impacts to surface water bodies, so the construction of this segment is not anticipated to have any long-term impacts on the lake. Only small wetland areas are present in the immediately surrounding area, and once again, since the project will be completed within road right-of-ways, the project is not anticipated to have any long-term impacts on those wetlands.

A map showing wetlands and wetland soils in Leoni Township can be found in Appendix D. This map is from the Michigan Wetland Map Viewer.

5.2.4 Floodplains and Major Surface Waters

<u>Floodplains</u>

Leoni Township has three major waterway systems that the Federal Emergency Management Agency (FEMA) has designated floodplains for. The first system is a small drain that originates just north of Michigan Ave between Sycamore St and Hackett St, traverses southward through forestland, turns eastward along the south edge of Page Ave, and turns southward through marshland, and discharges to the North Branch Grand River approximately one-quarter mile directly south of the intersection of Page Ave and Sutton Rd. FEMA has designated the floodplain for this drain as Zone A, which is subject to the 1% annual chance flood but does not have exact flood water surface elevations determined.



The second system consists of the Grand River and the North Branch Grand River. The Grand River enters Leoni Township just west of US-127 and south of East South St, crosses underneath US-127, turns northward, crosses underneath East South St, turns westward, and crosses underneath US-127 again just north of East South St. The North Branch Grand River originates east of Leoni Township, but its FEMA-designated floodplain begins at the northwest point of Center Lake (5th St south of Broad St). From Center Lake, the North Branch travels westward through marshland, crosses underneath Falahee Rd, and discharges to the Grand River at its second US-127 crossing. FEMA has designated the floodplains for these rivers as Zone AE, which is subject to the 1% annual chance flood and has exact flood elevations determined (based on a previous hydraulic study for these rivers).

The third system consists of Center Lake and Round Lake, which have one combined floodplain. Overall, this floodplain does not extend far from the lakeshores. However, the floodplain does cover the land between the two lakes. FEMA has designated this floodplain as Zone A.

FEMA Flood Insurance Rate Maps (FIRMs), which show the boundaries of designated floodplains in the Township, have been provided in Appendix D.

Major Surface Waters

The existing and proposed Leoni Township water system has several neighboring surface water bodies other than those with FEMA-designated floodplains. Brill Lake is located in the northeast corner of the system service area, just north of I-94 and east of Sargent Rd. Wildcat Creek originates a short distance to the southeast, passes through the lake, and then discharges to the northwest and, eventually, to the Portage River. Gilletts Lake is located approximately 2 miles south of Brill Lake, just south of I-94 and on the west side of Gilletts Lake Rd. An unnamed creek discharges out of Gilletts Lake to the southwest and, eventually, to the North Branch Grand River.

Leoni Township has several other surface water bodies outside the water system service area. The Portage River forms the north border of the Township and flows from east to west into the Grand River. The north portion of the Township has several small lakes surround by marsh and forest land. Welch Like is located on the Township's eastern border (Welch Lake Rd), just north of I-94. Goose Lake is also located on the Township's eastern border (approximately one mile east of North Portage Rd) but just south of I-94. Crittenden Creek originates near the Township's eastern border directly west of Grass Lake (near the intersection of East Michigan Ave and North Portage Rd), flows to the southwest, receives flows from several small tributary drains, and discharges into Center Lake.

Analysis of Project Impacts

Several portions of the proposed watermain extension project will intersect floodplains in the Township. One portion is along the east side of US-127, between East South St and the railway to the north. The other portions include the entire lakeshore of Round Lake, Grove Ave between 5th St and Round Lake, and the entire length of Duryea's Point Dr.

Since the proposed water system improvements are entirely underground, with no modifications to ground surface topography, the project is not anticipated to have any long-term impacts on floodplains in the Township. However, it should be noted that construction activity within the floodplain areas will have a small amount of vulnerability to flooding (specifically, a 1% chance of flooding over a 1-year period). Even though the project is not anticipated to impact floodplains in the Township, the project may be subject to state and federal permitting requirements.

The proposed project is not anticipated to have any impacts on surface water bodies farther away from the project area. Large underground projects could have impacts on surface water by altering





groundwater levels and flow patterns, but watermains with similar size to those in this project are not capable of impacting groundwater in that manner.

5.2.5 Coastal Zones

Leoni Township is not in a coastal zone, so the proposed project will have no impacts on coastal areas.

5.2.6 National Wild and Scenic Rivers

There are no designated Wild and Scenic rivers near or in Leoni Township.

5.2.7 Land Use

The proposed project is not anticipated to cause any long-term impacts on land use in the Township. The nature of the project, water distribution system improvements and extensions, does not involve altering existing uses of land.

5.2.8 Agricultural Resources

According to the United States Department of Agriculture's Web Soil Survey, most of the land in the Township (approximately 60%) is considered "farmland of local importance." Large portions of land are also considered "all areas prime farmland" and "prime farmland if drained" (approximately 10% each). The remaining land (approximately 20%) is considered "not prime farmland" and largely consists of surface water and wetland areas. A map showing the USDA's Farmland Classification for land throughout the Township can be found in Appendix E.

Since the proposed project is almost entirely within road right-of-ways (the exception being the crossing under Center Lake), it is not anticipated to have any impacts on agricultural resources in the Township.

5.2.9 Endangered Species

Seven species in Jackson County are listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS). Endangered or threatened designated species are protected under the Endangered Species Act. The Michigan Department of Agriculture & Rural Development (MDARD) also lists one of these species, Mitchell's Satyr, to be endangered. Below is a table summarizing the species.

The proposed project will take place within already developed areas and are not expected to impact any habitat, including those of the endangered species listed in the table. Where tree trimming or removal is necessary, this work should be scheduled to mitigate impacts on threatened or endangered species.

Common Name	ESA Listing Status	Group
Indiana Bat	Endangered	Mammals
Mitchell's Satyr Butterfly	Endangered	Insects
Poweshiek Skipperling	Endangered	Insects
Copperbelly Water Snake	Threatened	Reptiles
Eastern Prairie Fringed Orchid	Threatened	Flowering Plants
Northern Long-Eared Bat	Threatened	Mammals
Eastern Massasauga	Threatened	Reptiles

5.2.10 Social and Economic Impact

Overall, the proposed project is anticipated to have positive social and economic impacts on the Township. The project will address portions of the system that do not provide adequate flow for fire-flow



conditions, thereby making the system more reliable. The project will ensure that water from wells 2A and 2B is adequately disinfected, thereby ensuring water will consistently be safe for customer use.

The water system extensions will increase the number of customers connected to the system. New customers will likely be freed from hassles associated with maintaining their own water supply systems. Many of these new customers will also likely receive higher-quality water than what they receive with their own supply systems, as municipal water systems tend to provide higher-quality water than private supply systems do.

Pursuing this project will increase water rates for existing water customers, but the larger number of customers will also increase water bill revenues for the Township. The burden of the water rate increases on existing customers can be diminished if the Township receives a loan or grant for the proposed project. The larger the loan or grant, the less of a water rate increase that will be needed.

5.2.11 Contamination Sites

Eight open sites of contamination are present in the proposed project areas, based on review of EGLE's Remediation Information Data Exchange (RIDE). The table below summarizes these sites. These sites are all on private property, and the proposed project is not to take place on private property, so the proposed project is not anticipated to have any impacts on these contamination sites.

Facility ID	Facility Name	Full Address	Regulatory Program	Risk Condition
00033584	The New 145 Auto Truck Plaza Inc	6100 Ann Arbor Rd, Jackson, Ml, 49201	213	Risks Present and Immediate
38000436	4204 Ann Arbor Road	4204 Ann Arbor Road, Leoni Twp, MI, 49202	201	Risks Controlled-Interim
38000455	4100 Ann Arbor Road	4100 Ann Arbor Road, Leoni Twp, MI, 49202	201	Risks Present and Immediate
00008687	XPO Logistics Freight Inc - XJA	4545 Ann Arbor Rd, Jackson, MI, 49202	213	Risks Present and Require Action in Long-term
38000541	325 Watts Rd	325 Watts Rd, Jackson, MI, 49203	201	Risks Not Determined
38000544	3365 Page Avenue	3365 Page Avenue, Jackson, MI, 49203	201	Risks Not Determined
38000621	2701 North Dettman Road	2701 North Dettman, Leoni Twp, MI, 49201	201	Risks Not Determined
38000407	Amtrak Train Derailment-Leoni	S. Portage Rd, Leoni Twp, MI, 49201	201	Risks Present and Require Action in Short-term

6.0 MITIGATION OF IMPACTS

6.1 GENERAL

Structural and non-structural measures that avoid, eliminate, or mitigate adverse impacts on the environment need to be identified in the project plan. Structural measures involve the specific design and construction of the improvements, while non-structural measures involve regulatory, institutional, governmental, or private plans, policies, or regulations of the Township. Mitigation of short-term, long-term, and indirect impacts must be considered in the project plan.



6.2 SHORT-TERM IMPACT MITIGATION

6.2.1 Traffic and Safety Hazard Control

Construction of the proposed project will require restricting traffic at some locations in the Township. With water main drilling, above-ground construction activity only occurs at the sites where the main is inserted into the ground, where the main is extracted from the ground, and sometimes at intermediate locations along the drill length. Therefore, at work sites, the lengths of restricted traffic flow will be small, and the sites will be located at long intervals from each other, so the project's construction will only have small impacts on traffic flow throughout the Township.

Drill and extraction sites can be strategically planned in advance with the intent of minimizing each site's impact on traffic. The Contractor would hire flaggers to direct traffic, for example, to alternate traffic directions where only one lane is available. If entire road closures were needed, detour routes would be implemented. Residents would be notified when construction work is scheduled in their area. The Contractor would maintain access to homes and businesses.

Construction site safety is the responsibility of the contractor. The contractor will be required to have only trained persons performing all phases of the work. The contractor will also be required to comply with the Occupational Safety & Health Act (OSHA), including using back-up alarms on all equipment, having employees trained in hazard control, and maintaining materials safety data sheets (MSDS) for materials that may be used or handled by construction personnel.

6.2.2 Dust Control

Each watermain's construction site will have increased amounts of dust over the duration of that watermain's construction activities. Mitigation measures to minimize negative effects of dust on residents and construction workers will be defined in the project specifications. It is anticipated that dust control will be provided by the application of water and/or dust palliative during dry and dusty periods. The Contractor will be required to control dust in accordance with methods described in the project specifications.

6.2.3 Noise Control

Each watermain's construction site will have elevated noise levels over the duration of that watermain's construction activities. Construction activities will only be allowed during the hours approved by the Township and would be subject to all local noise control ordinances. Construction workers and site visitors may be required to wear earplugs to minimize the effects of long-term noise during the construction operations.

6.2.4 Soil Erosion/Sedimentation Control

The Contractor will be required to obtain a soil erosion and sedimentation control permit from the local agency prior to the start of the work. It is anticipated that utilized mitigation measures may include silt fence, straw bales, rip rap, geotextile fabric, and other such methods, as appropriate.

6.2.5 Restoration of Disturbed Areas

Construction will generally be confined to within road right-of-ways. Disturbed areas will be restored in a timely fashion and in accordance with the project specifications.

6.2.6 Water System Operational Impacts

While they are being constructed, new watermains will be disconnected from existing ones. However, when new watermains get connected to the existing system, small, localized areas of the existing system may need to be temporarily shut off as part of flushing out the new mains of sediment and other materials that should not be in domestic water supply.

Individual customer connections may need to be temporarily shut off as part of the water service line replacements. Efforts would be made to replace each service line as efficiently as possible without negatively impacting the functionality of the affected customer connection.

6.3 LONG-TERM IMPACT MITIGATION

Mitigation measures would be developed to ensure that sensitive environments do not suffer permanent damage. Every effort will be made to avoid potential long-term or irreversible adverse impacts during the construction of the water distribution system improvements. Watermain construction work will incorporate "best management practice" methods for installing pipelines and disturbing the earth.

Wetland, floodplain, and inland stream mitigation would be handled through the permit process. Although wetland, floodplain, inland stream, and other water resource impacts are not anticipated as part of this project, mitigation measures will be employed if these impacts cannot be avoided and/or the need for them arises.

The design and project specifications will include the proper use of physical measures to reduce soil erosion to a manageable level. Any disturbed slope areas will be immediately seeded, mulched, and/or sodded to prevent soil erosion and/or sedimentation.

6.4 INDIRECT IMPACT MITIGATION

The most effective way of mitigating unrestricted growth in any community is proactive creation of zoning districts and effective enforcement of that zoning. Unrestricted growth in the Township water distribution system service area is not anticipated, with or without the proposed project.

7.0 PUBLIC PARTICIPATION

7.1 FORMAL PUBLIC HEARING

A formal public hearing on project alternatives and user costs was held on <<<mark>date</mark>>> at <<<mark>time</mark>>> at the <<<mark>facility</mark>>>, <<<mark>address</mark>>>.

7.2 PUBLIC HEARING ADVERTISEMENT

The public hearing was advertised in a local newspaper (<<<u>name</u>>>) for the Jackson County area. A copy of the public hearing notice is included in Appendix H.

A copy of the Draft Project Plan was made available to the public for a 30-day period at the Township Hall and as stated in the public hearing notice.

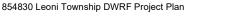
7.3 PUBLIC HEARING TRANSCRIPT

A verbatim transcript of the public hearing, recorded by a certified court reporter, can be found in Appendix I.

7.4 PUBLIC HEARING CONTENTS

The following items will be discussed at the public hearing:

- 1. A description of the drinking water quality needs and problems to be addressed by the proposed project and the principal alternatives that were considered.
- 2. A description of the recommended alternative, including its capital costs and a cost breakdown by project components.





- 3. A discussion of project financing and costs to users, including the proposed method of project financing and estimated monthly debt retirement; the proposed annual, quarterly, or monthly charge to the typical residential customer; and any special fees that will be assessed.
- 4. A description of the anticipated social and environmental impacts associated with the recommended alternative and the measures that will be taken to mitigate adverse impacts.

7.5 PUBLIC HEARING COMMENTS AND ANSWERS

No written comments from the public were received before, during, or subsequent to the Public Hearing. Questions and comments received during the Public Hearing were addressed as a part of the Questionand-Answer portion of the presentation.

7.6 ADOPTION OF THE PROJECT PLAN

On <<<mark>date</mark>>>, the Township Council members present voted <<<mark>x</mark>>> to <<<mark>approve/disapprove</mark>>> the resolution adopting the final DWRF Project Plan for the 2022 Water System Improvements and designated an authorized representative. A copy of the Resolution is included in Appendix I.



Appendix A

Water Reliability Study

LEONI TOWNSHIP JACKSON COUNTY, MI



WATER SYSTEM RELIABILITY STUDY



February 2020 Project No. 838290

Table of Contents

I.	Exe	ecutive Summary1
	Α.	Water Supply and Treatment1
	В.	Water Storage1
	C.	Water Distribution1
	D.	Recommended Improvements1
II.	Ba	ckground and Purpose1
III.	Exi	sting Water System2
	Α.	Water Supply2
	В.	Distribution System
	C.	Water Storage
	D.	Controls4
	Ε.	System Operations4
IV.	Wa	ter Use and Fire Protection5
	Α.	Water Use5
	В.	Population Projections
	C.	Projected Water Demands7
	D.	Fire Protection
V.	Eva	aluation of System Capacity9
	Α.	Hydraulic Model Analysis9
	В.	Water Supply10
	C.	Water Storage
VI.	Re	commended Improvements12
	Α.	Estimated Costs
	В.	Short-Term Improvements
	C.	Long-Term Improvements
VII.	Fu	nding Sources14

I. EXECUTIVE SUMMARY

This report is an evaluation of Leoni Township's water system facilities, capacities and needs through the year 2039. In addition, it provides a master plan for water system improvements to be implemented as feasible.

The system was evaluated in three categories: water supply, water distribution, and water storage. The system was found to meet supply and storage demands but has some distribution deficiencies.

A. WATER SUPPLY AND TREATMENT

Water supply is currently met with four wells that have capacities sufficient to meet 20-year projected demands. Wells 1 and 1A are located on the southeast side of the Township behind the Township Hall and Public Safety building on 5th St north of Grove Ave. Wells 2A and 2B are located on the northeast side of the Township between Viking Dr and Dogwood St. The water is treated by injection of disinfectant at each well pump. The treated water meets the state drinking water requirements.

B. WATER STORAGE

The 940,000-gallon storage tank is located on Andrew Park Dr. The tank was last inspected in 2018 by Pittsburg Tank & Tower Group Maintenance Division (PTTG). PTTG recommended sediment removal, thorough cleaning and spot maintenance of the exterior and interior to eliminate grime and rust spots, and the addition of several safety features to bring the tank into OSHA and AWWA compliance.

C. WATER DISTRIBUTION

The water distribution system is comprised of watermain ranging in diameter from 6 to 12 inches with cast iron and PVC pipes. The original system is estimated to have been constructed in 1950.

D. RECOMMENDED IMPROVEMENTS

Short-term water system improvements are recommended with an estimated cost of \$550K. Long-term improvements are recommended with an estimated cost of \$29M. Implementation of these projects should coincide with the Township's street improvements plan or master plan.

Each recommended improvement has an estimated cost associated with it. These costs are rough approximations to be used for budgeting purposes.

II. BACKGROUND AND PURPOSE

Leoni Township lies east of the City of Jackson along I-94 and US-127 in Jackson County, Michigan. Leoni has a Type I (public) water supply and distribution system with four water production wells and one storage tank.

The purpose of this report is to provide the Township with a comprehensive analysis of its water system in order to comply with the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and Act 399. The report evaluates the existing water supply, treatment, storage, and distribution, and provides recommendations for improvements to serve the existing and future needs of the Township. This report is intended to be the master plan for guiding the community on the overall future water system capital improvement needs to meet future daily water and fire flow demands.



III. EXISTING WATER SYSTEM

A. WATER SUPPLY

1. WELLS

Leoni Township's water supply system currently consists of four wells. These wells are designated as Well 1, Well 1A, Well 2A, and Well 2B and are shown in Figure 1. Wells 1 and 1A are located on the southeast side of the Township behind the Township Hall and Public Safety building on 5th St north of Grove Ave. Wells 2A and 2B are located on the northeast side of the Township between Viking Dr and Dogwood St. All wells have been in use since their original construction dates.

WELL SUMMARY								
Well No.	Year Drilled	Diameter	Depth	Current Capacity	Current TDH			
1	1963	12"	250 ft	540 gpm	133 ft			
1A	1976	12"	250 ft	769 gpm	184 ft			
2A	1960	12"	348 ft	303 gpm	229 ft			
2B	1960	10"	340 ft	476 gpm	351 ft			

TABLE 1

The current capacity and total dynamic head of each well pump was obtained from the January 2019 Well & Pump Service Inspection Report by Peerless Midwest Inc. These values were used to generate the pump curves in the hydraulic computer model. The current firm well capacity (largest capacity well pump out of service) is 1319 gpm.

The Well 1 pump was last overhauled in 2008 and is currently performing 40% below its design curve; overhauling is recommended. The Well 1A pump was replaced with a submersible pump in 2016, is performing above its rated design, and remains in great condition. The Well 2A pump was last overhauled in 2008 and is currently performing 14.4% below its design curve; overhauling is recommended. The Well 2B pump was upgraded to a new submersible pump in 2018 and is performing well.

Table 2 shows the total amount of water that was pumped from all wells from 2015 to 2019.

TABLE 2

HISTORIC WELL PRODUCTION LEVELS							
Month	2015 (MG)	2016 (MG)	2017 (MG)	2018 (MG)	2019 (MG)		
January	9.848	9.475	8.827	10.017	8.936		
February	9.028	8.115	8.394	8.290	8.905		
March	9.246	8.869	8.775	8.386	9.261		
April	9.677	9.185	7.781	7.737	8.670		
May	10.914	10.451	8.950	9.937	10.822		
June	10.445	15.415	11.948	10.556	10.408		
July	12.032	11.692	12.889	14.868	15.751		
August	12.855	9.958	11.343	11.892	13.751		
September	11.486	8.164	11.191	9.944	11.439		
October	10.413	7.292	9.266	8.553	11.039		
November	9.989	6.703	7.682	7.871	11.048		
December	9.635	9.740	8.402	8.228	14.343		
Total	125.568	115.059	115.448	116.279	134.368		



2. WATER TREATMENT & QUALITY

The Township's water is treated by injection of sodium hypochlorite at each well pump. Currently, there is one chemical pump that is connected to both Well 2A and Well 2B in the Viking Dr wellhouse, causing each well to produce a different chemical dose due to differing pump capacities. Each well should have its own chemical pump and an electrical outlet that is energized with the pump motor.

The Township regularly tests the water quality of its wells and throughout the system per EGLE requirements. Bacteriological testing is performed monthly; testing from recent months indicate that total coliforms are non-detectable.

The most recent chemical testing conducted in 2016 reports that the contaminant levels met the State drinking water standards. The next round of chemical testing is due by September 30, 2020.

Metals testing is performed every 3 years. The most recent metals analysis conducted in 2016 reports that lead and copper levels were below the EGLE action levels.

3. WELLHEAD PROTECTION

The Township does not have an approved Wellhead Protection Program.

4. AUXILIARY POWER

In the event of power loss, a permanent natural gas generator is available to operate Wells 1 and 1A. A permanent natural gas generator is available to operate Well 2A. The permanent generators are started monthly and load tested annually.

5. EMERGENCY RESPONSE PLAN

The Township's Emergency Response Plan was last updated in February 2013. It should be updated with any changes in contact information.

B. DISTRIBUTION SYSTEM

1. PIPE CONDITION

The construction date of the original water distribution system is estimated to be 1950. Pipe sizes range from 6 to 12 inches in diameter for primary distribution mains. Approximately 62% of the system is composed of PVC, 35% is cast iron, and 3% is ductile iron.

An inventory of the distribution system showing watermain sizes and the approximate lengths of each size are shown in Table 3.

Watermain Size (inches)	Length (feet)	Percentage of Total
6	18,203	14%
8	35,106	27%
10	1,406	1%
12	74,147	58%
Total	128,862	100%

TABLE 3 WATERMAIN INVENTORY

2. LOW FLOW AREAS

No recent areas of low flow have been noted.



3. WATERMAIN BREAKS

Watermain breaks have frequently occurred in the northern section of the system near Ridgewood Vista Dr. This area is a dead end and likely does not have enough bury on the pipe which makes it prone to freezing.

4. CROSS CONNECTIONS

The Township does not currently have a cross connection control ordinance or program. To comply with Act 399, the Township must enact a cross connection control ordinance and update the cross-connection control program. Additionally, the Township must propose a schedule for implementing the program, including residential accounts.

5. SERVICE LINES

Most of the water mains were constructed after 1970 and have copper/PEX service lines. One residential subdivision was constructed in the 1960s with galvanized services. The township is developing a program to investigate and replace the service if the goose neck is lead.

C. WATER STORAGE

1. SPECIFICATIONS

The Township has one ground-level cylindrical steel storage tank located at the end of Andrew Park Dr. The tank has a storage capacity of 940,000 gallons with a total head range of 65 ft.

2. TANK MAINTENANCE

The tank was constructed in 1987 and was last inspected in August 2018 by Pittsburg Tank & Tower Group Maintenance Division (PTTG). PTTG made several recommendations to bring the tank into OSHA and AWWA compliance, including adding signage for property and confined space entry; electrically grounding the tank for lightning protection; clearing vegetation growth around the tank foundation; installing a flapper valve and new screen on existing overflow pipe elbow; raising and extending the handrails around the circumference of the tank roof; replacing the existing roof vent with vacuum-pressure, frost-proof vent and screen; and removal of sediment in the tank.

Other maintenance recommendations include repairing any cracks in the concrete foundation, then sealing the foundation; installing a frost-proof drain valve; installing a cable type ladder safety device; installing a liquid level indicator with target board and float; installing interior access ladders; installing a mixing system to prevent thermal stratification and short-circuiting; thorough cleaning and spot maintenance of the interior and exterior to eliminate grime and rust spots; and resurfacing of the interior and exterior.

To return to compliance with Act 399, the overflow configuration and vent must be modified to meet 10 State Standards and sediment must be removed from the tank.

D. CONTROLS

1. TELEMETRY

The storage tank utilizes a SCADA system for water level readouts. The well pumps and storage tank are operated by radio controls.

E. SYSTEM OPERATIONS

1. OPERATORS

Leoni Township's water distribution classification is S-3 and the water treatment classification is D-3. The Township has six operators, two of which are fully certified with S-1/D-1 licenses. This meets the EGLE recommendation that public water systems have a minimum of two certified people on staff to operate the system.

2. METERS

There are 699 connections to the Township's water system. Residential customers are not metered and are billed a flat monthly rate regardless of usage. Commercial customers have Sensus SRII meters and 80% have remote reading devices. The average age of meters in the system is 10 years and the Township replaces meters when they are determined to be defective.

3. MAINTENANCE

The Township flushes all fire hydrants twice a year (spring and fall) and dead ends weekly for the purpose of inspection and iron (rust) control. The Township does not currently turn water valves regularly. It is recommended to create and implement a valve inspection and exercising program on an annual basis.

4. PARTS

The Township maintains spare parts for the system including extra sections of watermain for each size in service, as well as a full supply of repair clamps for all sizes of mains, tees, crosses, elbows, valves, hydrants, and services (Corp & Curb stops, clamps, and lines).

IV. WATER USE AND FIRE PROTECTION

- A. WATER USE
 - 1. CUSTOMERS

The Township's water system currently serves 699 customers: 548 residential and 151 commercial/industrial. Past water usage data is presented in Table 4 below. Peak hour demands were estimated based on a peaking factor of 3.5 times the average day demand.

ge Maximum	Average	Maximum	Maximum	Deek
nd Demand*	Day Demand (gpm)	Day Demand* (gpm)	Day Peaking Factor	Peak Hour Demand (gpm)
4 0.545	239	378	1.6	836
5 0.772	219	536	2.5	764
6 0.984	220	683	3.1	769
9 0.826	221	574	2.6	774
3 1.024	256	711	2.8	895
	ndDemand* (MGD)40.54550.77260.98490.82681.024	nd D)Demand* (MGD)Demand (gpm)40.54523950.77221960.98422090.82622181.024256	nd D)Demand* (MGD)Demand (gpm)Demand* (gpm)40.54523937850.77221953660.98422068390.82622157481.024256711	nd D)Demand* (MGD)Demand (gpm)Demand* (gpm)Peaking

TABLE 4 PAST WATER USAGE

*Maximum days include days with main breaks, hydrant flushing, etc.

2. HISTORICAL WATER LOSS

Since residential customer water use is not metered, the total metered usage of the system is unknown and cannot be compared to the total pumpage. Therefore, a complete analysis of unaccounted water is not possible.

3. LARGEST WATER USERS

Table 5 shows the total water use and average demand for the system's largest metered water users in 2019. These water users accounted for approximately 27% of the Township's total water use during that period.



Customer	Total Water Use (MGY)	Average Daily Use (gal)	Average Demand (gpm)
Royal Adhesives and Sealants	15.384	42,148	29.3
Christ Lutheran Church	9.974	27,325	19.0
Meijer	4.189	11,478	8.0
Legacy Assisted Living	3.211	8,796	6.1
Maurer's Sunshine Car Wash	3.027	8,294	5.8

TABLE 5 LARGEST WATER USERS IN 2019

B. POPULATION PROJECTIONS

The population of the area currently served by the water system is unknown. The U.S. Geological Survey estimated the average Jackson County public supply water use in 2015 to be 126 gpcd. Assuming this value has remained relatively constant since then, a current equivalent population served by the water system was estimated by dividing the 2019 Average Day Demand by this value.

According to the U.S. Census Bureau, the population of Leoni Township increased at an average rate of 0.26% annually between 2000 and 2010. However, annual estimates from the Census Bureau indicate that the population has been decreasing in recent years. As population in the long term may increase rather than decrease, a conservative estimate of 0.3% annual population growth was used for population projections.

The Township's 20-year Capital Improvement Plan proposes significant expansion of the water system – nearly doubling the total length of water main. Table 6 shows the current and projected equivalent populations for the existing and proposed service areas of the Township. The current population of the proposed service area was estimated by multiplying the number of occupied parcels (generally equivalent to the number of service connections) along roads of the proposed expansions by a factor of 3.09 persons per connection. This factor was determined as follows:

- 2019 Total Water Usage Top Users Total Usage = Non-Top Users Total Usage 134.368 MGY – 35.785 MGY = 98.583 MGY = 270,089 gpd
- Total Service Connections Top Users = Non-Top Users Service Connections
 699 Service Connections 5 Top Users = 694 Non-Top Users Service Connections
- 3) Non-Top Users Total Usage / Non-Top Users Connections = Ave. Usage per Connection 270,089 gpd / 694 connections = 389 gpd per connection
- Ave. Usage per Connection / 2015 Jackson Co. Water Use Per Capita = Persons per Connection

389 gpd per connection / 126 gpcd = 3.09 Persons per Connection

VICE AREA EQUIVALENT POPULATION PROJECTI									
	Year	Current Service Area	Proposed Service Area	Total					
	2019	2,922	3,058	5,979					
	2024	2,966	3,104	6,070					
	2039	3,102	3,246	6,349					

TABLE 6 SERVICE AREA EQUIVALENT POPULATION PROJECTIONS



C. PROJECTED WATER DEMANDS

The projected water demands were calculated using the projected population of the current service area and assuming the average usage per capita would remain at 126 gpcd. Since 2016, the maximum day peaking factor (maximum day demand divided by average day demand) has averaged 2.74 including flushing days and other high demand days. Based on this, a maximum day peaking factor of 2.75 is used in this report to estimate future maximum day demands. Peak hour demands are calculated based on a peaking factor of 3.5 times the average day demand. Table 7 shows the projected water demands.

Year	Total Water Usage (MGY)	Average Day Demand (MGD)	Maximum Day Demand (MGD)	Average Day Demand (gpm)	Maximum Day Demand (gpm)	Peak Hour Demand (gpm)			
2024	136.769	0.374	1.028	260	714	908			
2039	142.664	0.391	1.075	271	746	950			
2039*	291.969	0.800	2.200	555	1,528	1,944			
*Values in this row are based on the Townshin's proposed improvements									

TABLE 7					
PROJECTED WATER DEMANDS	,				

Values in this row are based on the Township's proposed improvements

D. FIRE PROTECTION

1. ISO RATING SYSTEM

The Insurance Services Office (ISO) establishes suggested fire flow protection standards based on various factors including building construction type, area, height, type of development and density. These factors and others such as firefighting capabilities, when combined, result in an ISO rating between 1 and 10, with 1 being the best and 10 being the worst. This rating is used by insurance companies to determine appropriate insurance rates for its customers that live within the water supply system.

Based on the most recent ISO report from November 2001, the Township is graded as a split 6/9 classification (now called 6/6X), which is a typical rating for a community of this size. The first number (6) refers to the classification of properties within 5 road miles of a fire station and within 1,000 feet of a fire hydrant. The second number (9 or 6X) applies to properties within 5 road miles of a fire station but beyond 1,000 feet of a fire hydrant.

2. RECOMMENDED FIRE FLOWS

The ISO establishes suggested fire flows at various locations throughout a community during a survey. It is not always cost-effective for a community to build a water system that meets all of the suggested ISO fire flows. In such a situation, the community can choose to adopt target fire flow values. Table 8 below presents the suggested ISO fire flows and recommended target fire flow values. The recommended target fire flows were obtained from tabular values presented in the "*Fire Protection Handbook*", and the AWWA's Manual of Water Supply Practices – "*Distribution System Requirements for Fire Protection*". It will be necessary for the Township to decide as to whether these recommended target fire flows provide the desired level of protection.



Classification	ISO Suggested Fire Flows at 20 psi (gpm)	Recommended Target Fire Flows at 20 psi (gpm)	Duration (hours)
Residential	1,000-1,500	1,000	2
Commercial	2,000-2,500	2,000	2
Industrial	3,000	3,000	3
Institutional	3,500	3,500	3

TABLE 8 ISO SUGGESTED AND RECOMMENDED TARGET FIRE FLOWS AND DURATIONS

3. HYDRANT FLOW TESTS

Fleis & VandenBrink staff performed fire hydrant flow tests at select locations throughout the system (see Figure 2) on July 24, 2019 in order to obtain information used in calibration of the WaterCAD hydraulic computer model. Table 9 provides the results of the fire hydrant tests. The available fire flow amount at the minimum residual pressure of 20 psi was calculated using the following formula:

Available Fire Flow at 20 psi = $\frac{Hydrant Flow \times (Static Pressure - 20)^{0.54}}{(Static Pressure - Residual Pressure)^{0.54}}$

Test #	Hydrant Test Location	Static Pressure Reading (psi)	Residual Pressure Reading (psi)	Hydrant Flow (gpm)	Calculated Flow at 20 psi (gpm)
1	Michigan Center High School (S State St)	82	20	948	948
2	Center St at Hall St & Long St	78	52	918	1,416
3	Commerce St	82	52	1,033	1,529
4	Watts Rd south of Michigan Ave	70	54	1,086	2,009
5	Hayes St at S Dettman Rd & Sheridan St	73	50	1,112	1,745
6	Fairyland Ave at Gypsy Ln	62	36	1,112	1,441
7	Sutton Rd at East Jackson High School	58	40	1,033	1,546
8	Jouette Ave & Douglas Ct	70	14	1,006	946
9	Ann Arbor Rd at Sargent Rd & Gilletts Lake Rd	60	32	871	1,056
10	Cash Dr at Dogwood Dr & Viking Dr	70	30	918	1,036
11	Seymour Rd at former East Jackson school	72	33	1,060	1,238

TABLE 9 JULY 2019 HYDRANT FLOW TEST RESULTS

The results of the fire hydrant flow tests indicate that the Township's system provides adequate static pressures, but the available fire flow does not meet the recommended target for certain areas. Figure 3 shows the static pressures for the Township's water system.



V. EVALUATION OF SYSTEM CAPACITY

A. <u>HYDRAULIC MODEL ANALYSIS</u>

1. MODEL DESCRIPTION

In order to evaluate the water distribution system, a computer model was developed to simulate the existing system. The software used was WaterCAD version 10.02 developed by Bentley. The watermain sizes, configuration, friction factors, well pump curves, topographic information, flow demands, and storage tank data were input into the model to simulate the existing and proposed water distribution system. Watermain friction factors were adjusted to achieve model calibration within $\pm 10\%$ of the calculated available fire flow at 20 psi residual for the valid test locations. Table 10 presents the comparison of the calculated available fire flow at 20 psi to the values obtained in the calibrated WaterCAD model for the test locations listed.

Test #	Hydrant Test Location	Available Fire Flow at 20 psi (calculated) (gpm)	Available Fire Flow at 20 psi (WaterCAD) (gpm)	Difference Between Calculated & WaterCAD
1	Michigan Center High School (S State St)	948	985	-3.9%
2	Center St at Hall St & Long St	1,416	1,475	-4.2%
3	Commerce St	1,529	1,478	3.3%
4	Watts Rd south of Michigan Ave	2,009	1,853	7.8%
5	Hayes St at S Dettman Rd & Sheridan St	1,745	1,575	9.8%
6	Fairyland Ave at Gypsy Ln	1,441	1,471	-2.1%
7	Sutton Rd at East Jackson High School	1,546	1,693	-9.5%
8	Jouette Ave & Douglas Ct	946	946	0.0%
9	Ann Arbor Rd at Sargent Rd & Gilletts Lake Rd	1,056	1,076	-1.9%
10	Cash Dr at Dogwood Dr & Viking Dr	1,036	1,094	-5.6%
11	Seymour Rd at former East Jackson school	1,238	1,178	4.9%

TABLE 10

2. TEST RESULTS

As the results of Table 10 show, the difference between the calculated available fire flows at 20 psi from the hydrant tests and those predicted by the calibrated WaterCAD model are within a $\pm 10\%$ tolerance. Therefore, the model is an accurate approximation of the system.

3. FIRE FLOW RESULTS

Fire flows were simulated throughout the existing system. The simulations were completed under existing firm capacity conditions. The storage tank water levels were set at average operating depth. EGLE recommends a minimum residual pressure of 20 psi in the system at all times. This is to ensure positive water pressure remains in the distribution system for customer use and to ensure safe water quality. All available fire flows reported are with a 20-psi residual pressure. Table 11 below presents available fire flow at 20 psi under maximum day conditions for the existing water distribution system. These values were obtained by running the WaterCAD model under firm capacity conditions and target fire flow demands. Figure 4.1 shows the existing available fire flow, expressed as contours, throughout the Township for the 2019 maximum day demand. Figures 4.2 and 4.3 show the available fire flow of the existing system under maximum day demands for 2024 and 2039, respectively.



Test #	Hydrant Test Location	Recommended Target Fire Flow at 20 psi (gpm)	Available Fire Flow at 20 psi (WaterCAD) (gpm)	Difference Between Target & Available
1	Michigan Center High School (S State St)	2,000	1,234	-38%
2	Center St at Hall St & Long St	1,000	2,242	124%
3	Commerce St	2,000	2,022	1%
4	Watts Rd south of Michigan Ave	2,000	2,843	42%
5	Hayes St at S Dettman Rd & Sheridan St	1,000	2,123	112%
6	Fairyland Ave at Gypsy Ln	1,000	1,840	84%
7	Sutton Rd at East Jackson High School	2,000	2,205	10%
8	Jouette Ave & Douglas Ct	1,000	1,040	4%
9	Ann Arbor Rd at Sargent Rd & Gilletts Lake Rd	1,000	1,782	78%
10	Cash Dr at Dogwood Dr & Viking Dr	1,000	1,519	52%
11	Seymour Rd at former East Jackson school	1,000	1,579	58%

 TABLE 11

 COMPARISON OF TARGET FIRE FLOWS TO MODEL FIRE FLOWS

The available fire flows shown in Table 11 vary slightly from the values shown in Table 10 for multiple reasons. In Table 10, the wells were turned off for calibration, and in Table 11, Wells 1, 2A and 2B were operating to model firm capacity conditions. Also, Table 11 shows the flows during the maximum day demands, while the calibration values in Table 10 portray average flow conditions.

The recommended target fire flow can currently be met at 10 out of the 11 test locations with 20 psi residual pressure.

B. WATER SUPPLY

EGLE recommends that the firm capacity of a community's water supply be greater than its maximum day demand. Currently, the firm capacity of the Township's water supply is 1319 gpm and the 2019 maximum day demand was 711 gpm. Therefore, the existing firm capacity is sufficient for the current demands of the system.

EGLE recommends that communities plan to increase supply when maximum day demand reaches 80% of firm capacity. The projected maximum day demand of 746 gpm for 2039 is approximately 57% of firm capacity. The projected maximum day demand for 2039 with the Township's proposed improvements is 1,528 gpm, which is approximately 116% of firm capacity, but only 73% of total capacity. If the Township's population continues its downward trend or if growth remains low, the water system is not likely to require any additional supply source in the next 20 years to cover daily water demands. Replacing or overhauling the existing pumps to perform at higher capacities would also reduce the likelihood of needing an additional water source.

C. WATER STORAGE

As an example, the recommended target fire flow for commercial areas is 2,000 gpm for two hours. To provide the required volume of water to combat a fire of this duration, 240,000 gallons of water would be used (2,000 gpm times 120 minutes). Table 12 compares the volume of available water using current firm well capacity and the existing storage volume for each of the classifications of recommended target fire flows and fire flow durations for the existing maximum day demand.



Classification	Desired Fire Flow at 20 psi (gpm)	Duration (hours)	Existing Maximum Day Demand (gpm)	Total Flow Required (system outflow) (gpm)	Firm Well Flow (system inflow) (gpm)	Net (system outflow) (gpm)	Total Storage Required (gal)	Existing Storage (gal)	Addt'l Storage Required (gal)
Residential	1,000	2	703	1,703	1,319	384	46,083	940,000	0
Commercial	2,000	2	703	2,703	1,319	1,384	166,083	940,000	0
Industrial	3,000	3	703	3,703	1,319	2,384	429,125	940,000	0
Institutional	3,500	3	703	4,203	1,319	2,884	519,125	940,000	0

 TABLE 12

 REQUIRED STORAGE CAPACITY FOR FIREFIGHTING (EXISTING MAXIMUM DAY DEMAND)

As the data in Table 12 shows, the Township has sufficient storage to meet the target fire flow requirements for all fire classifications. Additional storage is not needed at this time.

Table 13 shows the estimated storage needed for the 2039 maximum day demand with proposed improvements. Additional storage will not be needed in the next 20 years.

TABLE 13REQUIRED STORAGE CAPACITY FOR FIREFIGHTING(2039 PROJECTED MAX DAY DEMAND WITH EXPANSIONS)

Classification	Desired Fire Flow at 20 psi (gpm)	Duration (hours)	Maximum Day Demand (gpm)	Total Flow Required (system outflow) (gpm)	Firm Well Flow (system inflow) (gpm)	Net (system outflow) (gpm)	Total Storage Required (gal)	Existing Storage (gal)	Addt'l Storage Required (gal)
Residential	1,000	2	1,528	2,528	1,319	1,209	145,034	940,000	0
Commercial	2,000	2	1,528	3,528	1,319	2,209	265,034	940,000	0
Industrial	3,000	3	1,528	4,528	1,319	3,209	577,551	940,000	0
Institutional	3,500	3	1,528	5,028	1,319	3,709	667,551	940,000	0



VI. RECOMMENDED IMPROVEMENTS

Figure 5 shows the proposed system improvements from the Township's 20-year Capital Improvement Plan. Figure 6 shows the available fire flow contours under 2039 maximum day demands after completion of the proposed improvements.

Table 14 provides a comparison of the recommended target fire flows to the 2039 available fire flows after completion of the proposed improvements.

Test #	Hydrant Test Location	Recommended Target Fire Flow at 20 psi (gpm)	Available Fire Flow at 20 psi (WaterCAD) (gpm)	Difference Between Target & Available
1	Michigan Center High School (S State St)	2,000	2,382	19%
2	Center St at Hall St & Long St	1,000	2,996	200%
3	Commerce St	2,000	2,351	18%
4	Watts Rd south of Michigan Ave	2,000	2,999	50%
5	Hayes St at S Dettman Rd & Sheridan St	1,000	2,890	189%
6	Fairyland Ave at Gypsy Ln	1,000	2,296	130%
7	Sutton Rd at East Jackson High School	2,000	2,697	35%
8	Jouette Ave & Douglas Ct	1,000	1,697	70%
9	Ann Arbor Rd at Sargent Rd & Gilletts Lake Rd	1,000	2,350	135%
10	Cash Dr at Dogwood Dr & Viking Dr	1,000	1,420	42%
11	Seymour Rd at former East Jackson school	1,000	2,658	166%

TABLE 14 COMPARISON OF AVAILABLE FIRE FLOW TO TARGET FIRE FLOWS AFTER COMPLETION OF PROPOSED IMPROVEMENTS

As seen in Table 14, the proposed improvements would increase the available fire flow at each location, except for #10. All locations exceed the recommended target fire flows.

A. ESTIMATED COSTS

Distribution system improvements are recommended to improve available fire flows and overall system reliability. These improvements should be considered and implemented by Township officials as deemed necessary and as funding allows. The Township should plan on replacing 6-inch or smaller watermains as road improvements are conducted in the Township. These small pipes should be replaced with minimum 8-inch pipes.

Estimated costs are included with the recommended improvements. They are meant to be rough estimates for budgeting purposes only. They include appurtenances such as valves, hydrants, fittings, water services, restoration, engineering, and contingencies. A unit cost of \$1.3M per mile of watermain was assumed. It is assumed that the watermains can be placed outside of the paved roadway. The costs would increase if watermain must be constructed within the paved roadway, depending on the amount and type of road construction. An additional \$100,000 is estimated if a railroad or highway crossing is required.

B. SHORT-TERM IMPROVEMENTS

1.	Place 441 ft of 12-inch watermain on Falahee Rd from Commerce St south across the railroad to begin expansion of water system to the	
	industrial park	\$150,000
2.	Lead Service Line Replacement/Investigation Year 1	\$100,000
3.	Lead Service Line Replacement/Investigation Year 2	\$100,000

	4.	Lead Service Line Replacement/Investigation Year 3	\$100,000
	5.	Lead Service Line Replacement/Investigation Year 4	\$100,000
		Short-Term Improvements Total Cost:	\$550,000
C.	C. LONG-TERM IMPROVEMENTS		
	1.	Replace pumps at Wells 1 and 2A	\$20,000
	2.	Storage tank maintenance recommended by PTTG	\$350,000
	3.	Proposed 21.8 miles of system expansion	\$28,700,000
		Long-Term Improvements Total Cost:	\$29,070,000
		TOTAL COST OF ALL RECOMMENDED IMPROVEMENTS:	\$29,620,000



VII. FUNDING SOURCES

Five possible sources of funding have been identified for Leoni Township to complete the recommended improvement projects if desired. A brief description of each follows:

Drinking Water Revolving Fund

This is a preferred alternative. It is a low interest loan program sponsored by EGLE. The current interest rate is 2%, and some communities may be eligible for principle forgiveness under the Green Project Reserve funding if the project reduces system energy use or provides water conservation.

The program is competitive, and projects are scored on a point system that ranks them on a priority list. Not all projects submitted are funded so it is important to maximize points on the application. Requirements include a fairly extensive project plan, but most expenses, including the project plan, are eligible activities that can be rolled into the loan. In order for a community to be competitive, they should have a completed wellhead protection program. Applications are submitted by May 1st of every year.

Special Assessment Bonds

Special assessments levied under PA 188 of 1954 are one of the most common ways to finance infrastructure improvements. The Township may levy special assessments against properties that receive special benefits from a public improvement. Property owners have petition rights that must be satisfied before the special assessment can go forward.

Special assessments typically can be repaid in installments with interest. The bonds may not exceed the amount of the special assessment roll and may be secured secondarily by a pledge of the Township's full faith and credit.

Revenue Bonds

Revenue bonds are authorized by PA 94 of 1933. They authorize the Township to borrow money and issue bonds. They are paid from user fees generated by the operation of the improvements.

Revenue bonds are subject to the right of referendum. Petitions for a public vote can be filed by registered Township voters during a 45-day referendum period. Voter approval is not required if the referendum period expires without petitions being filed.

Contract Bonds

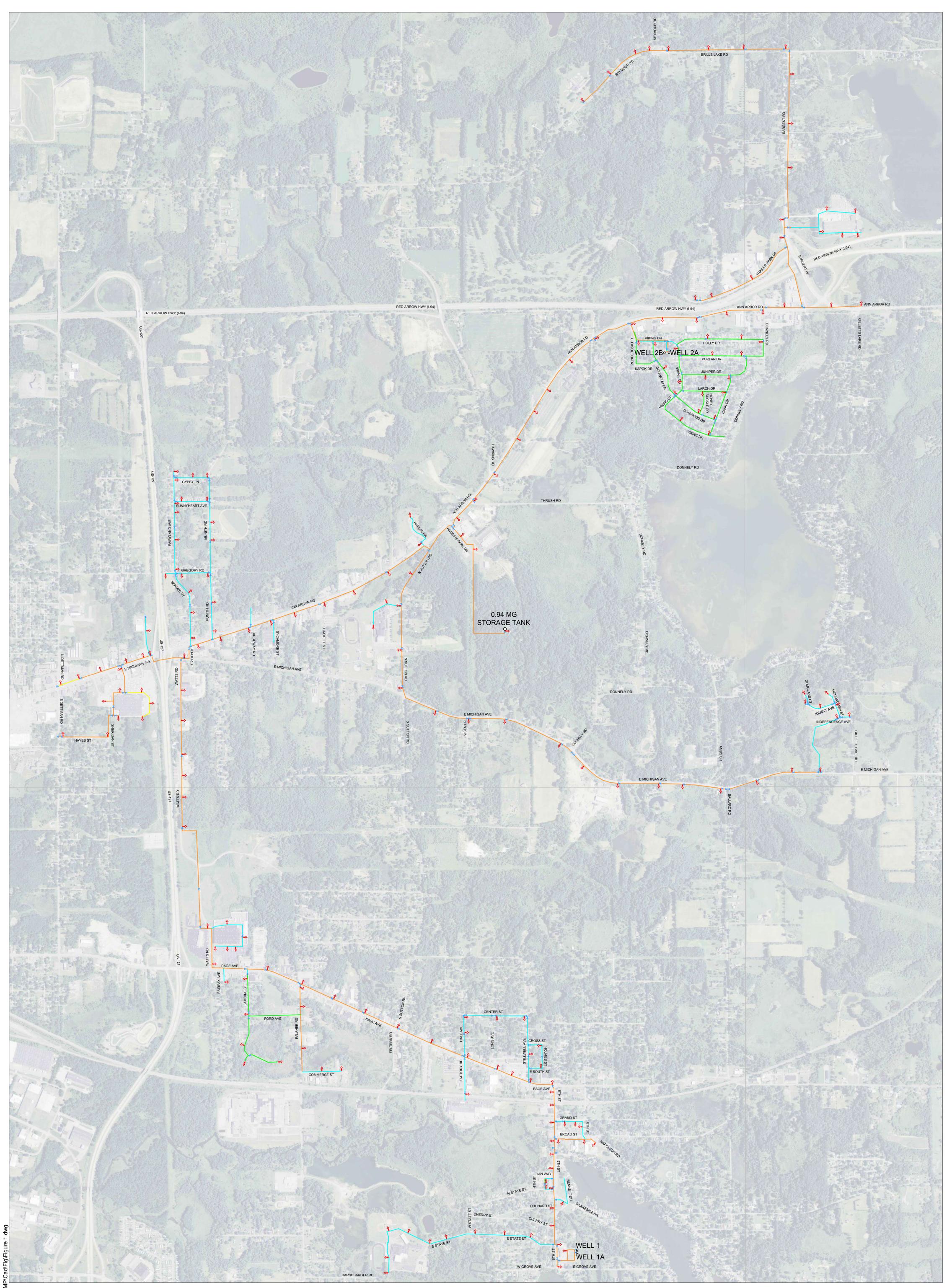
Contract bonds are authorized by several state laws. They authorize the Township to enter into an agreement with the County or a public authority in order to have the County or authority issue bonds on behalf of the Township.

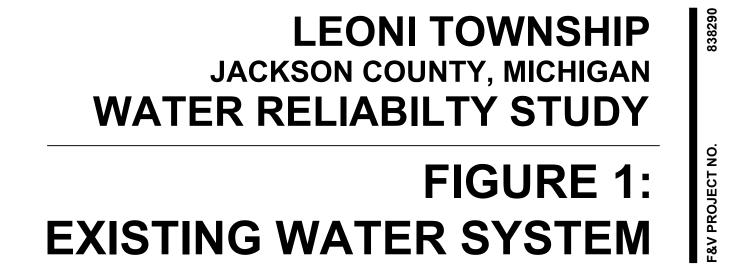
The Township may want to consider a contract bond as the County may be able to borrow at a more favorable rate than the Township if they are willing to pledge its taxing power as secondary security for repayment of the bonds. Also contract bonds may be paid back by a number of sources including specials assessments, connection fees, and user fees.

Economic Development Administration (EDA) and Michigan Economic Development Commission (MEDC)

EDA and MEDC fund infrastructure improvements when a business or industry is interested in locating in a community that will need to provide infrastructure improvements to support the incoming industry.

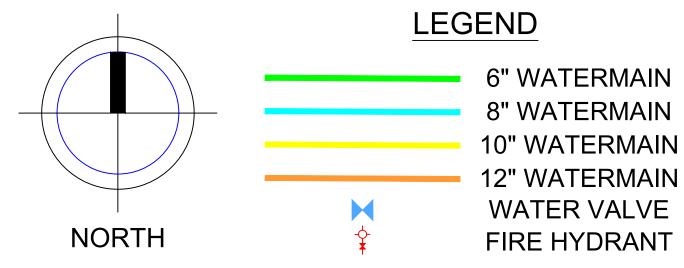
As an example, if an industry wanted to locate in the Township where there is not currently watermain, or the watermain is undersized to serve the business, these organizations could assist in funding the improvements. Also, water supply and/or storage improvements could be funded with grant dollars if the improvements are necessary to support the new business.



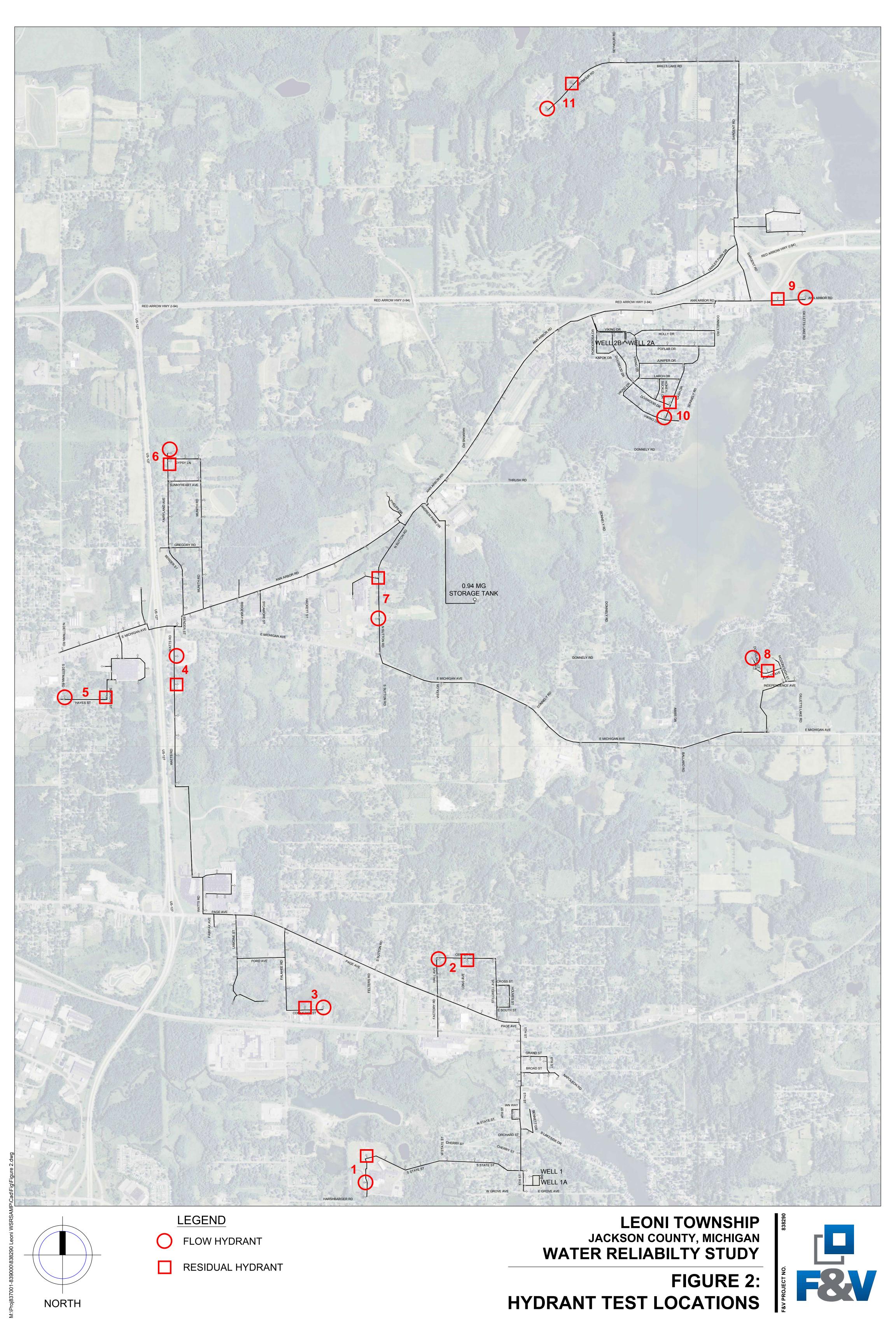


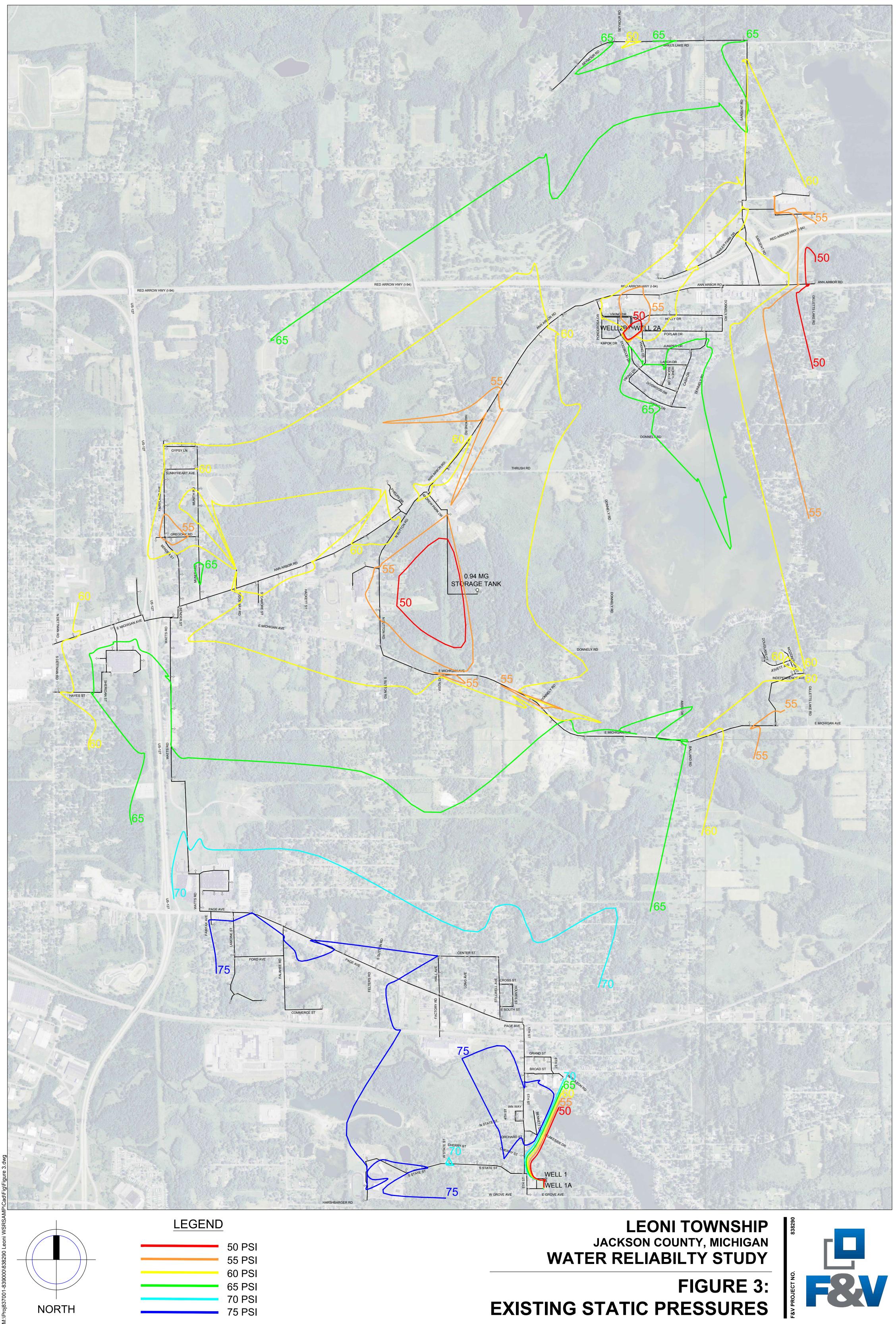
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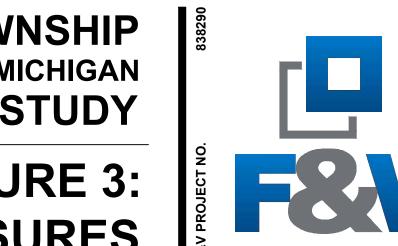
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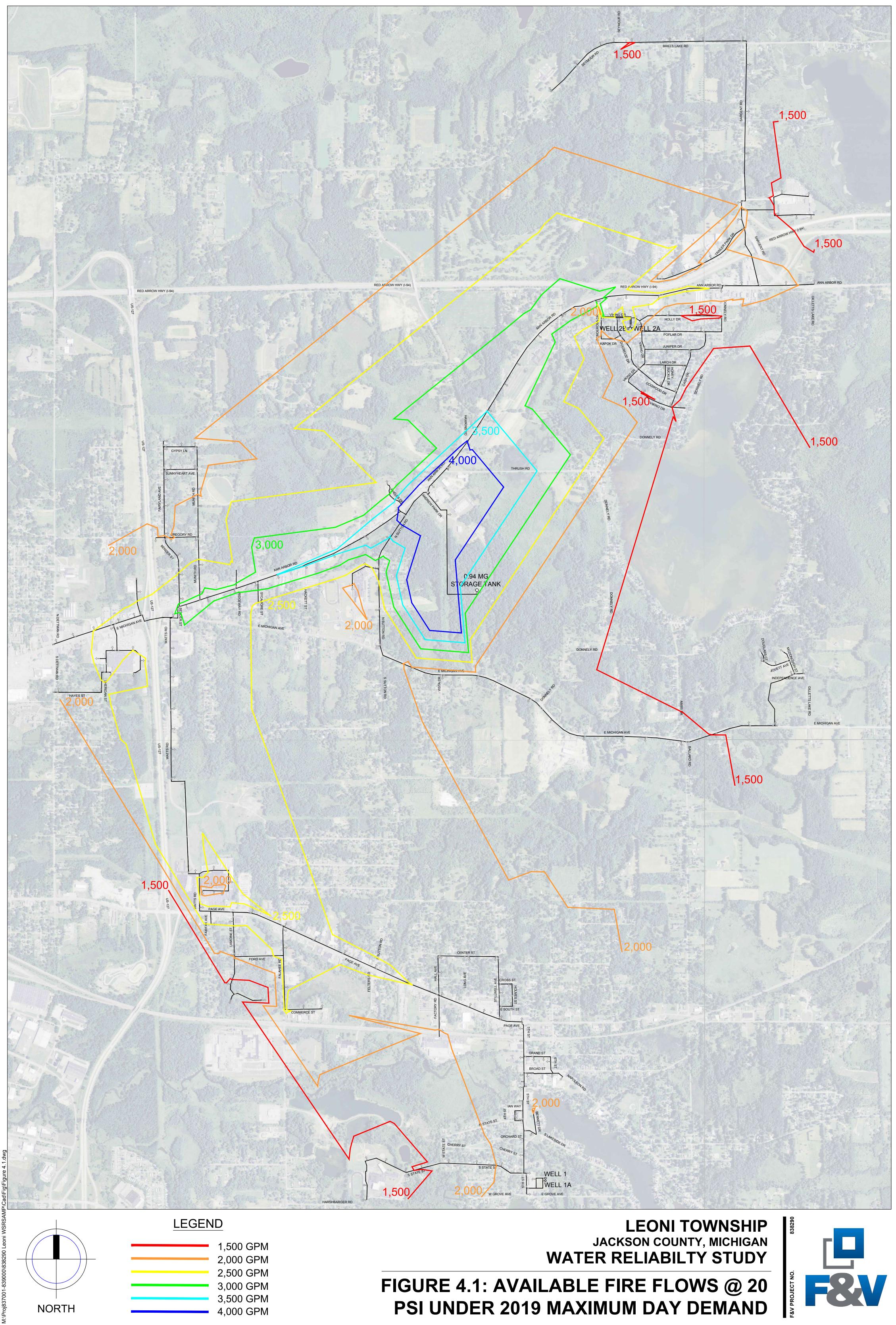


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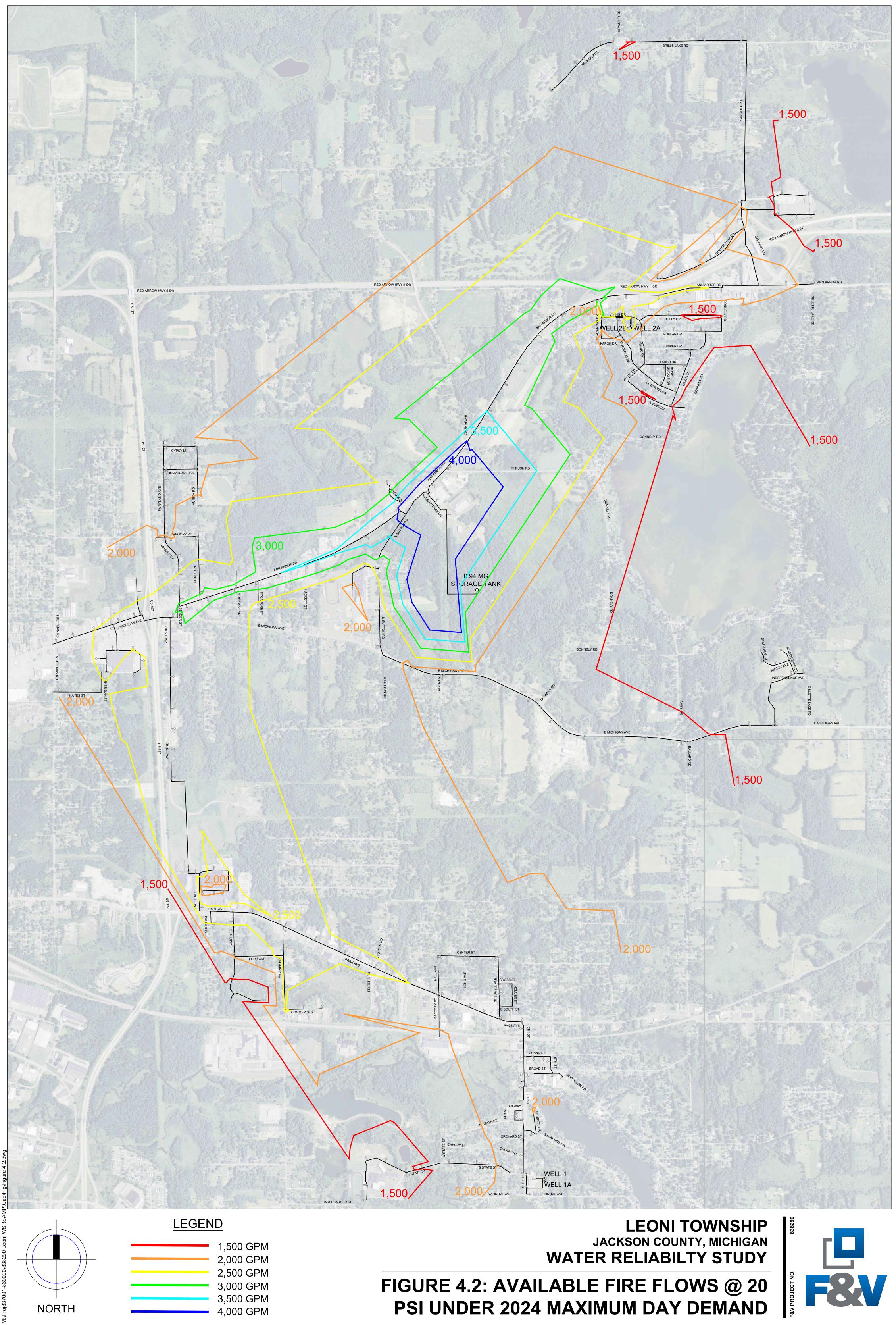




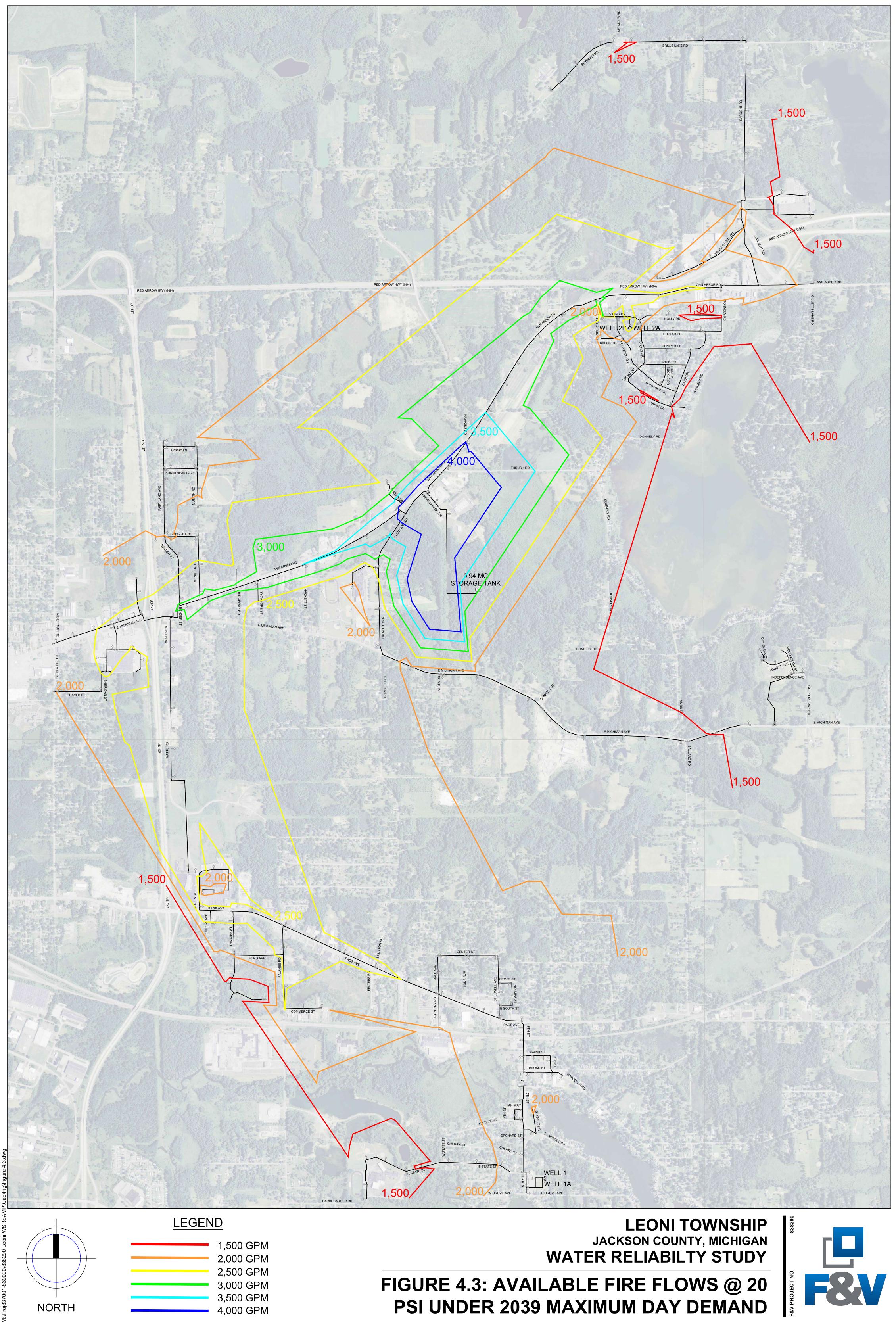




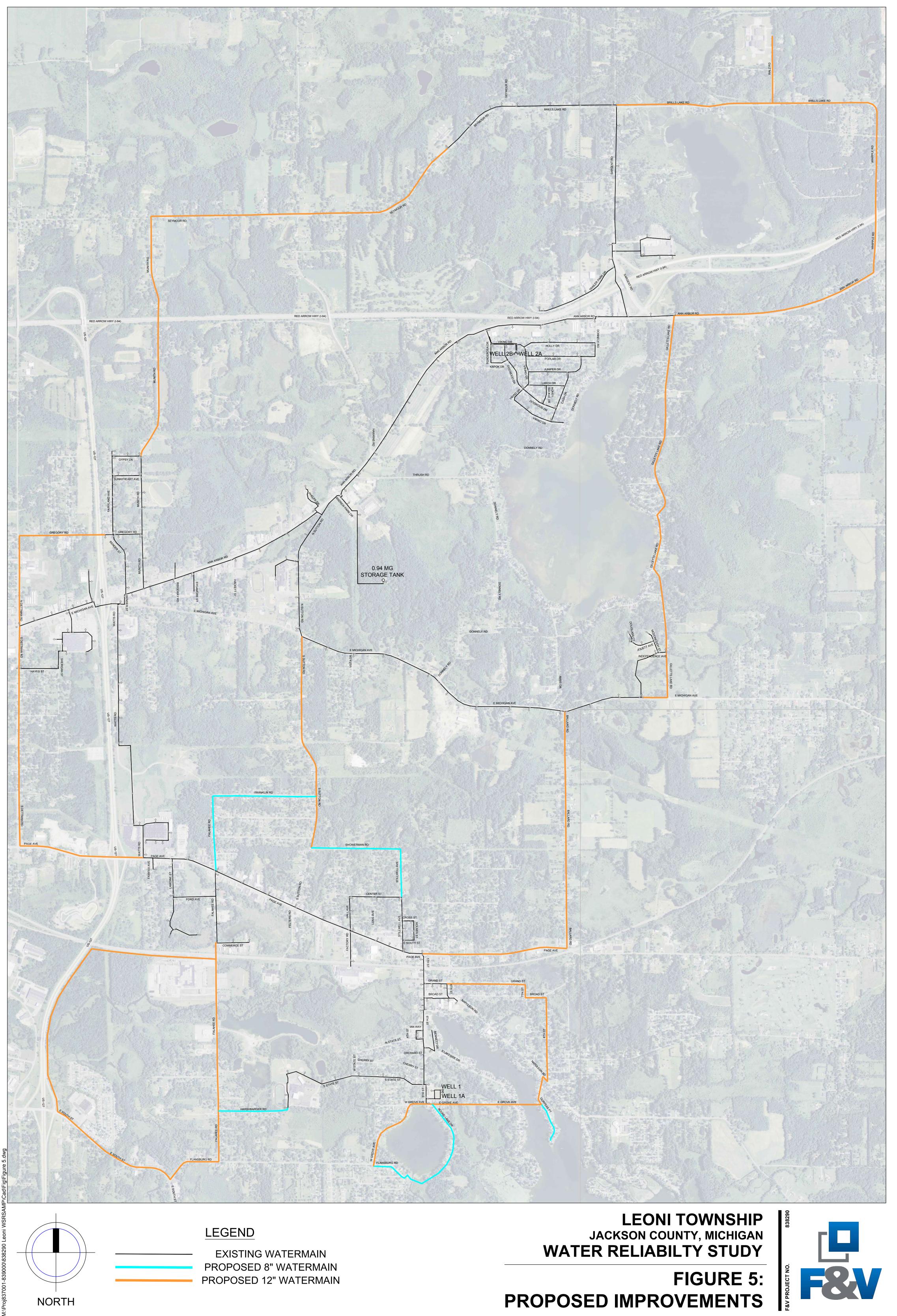






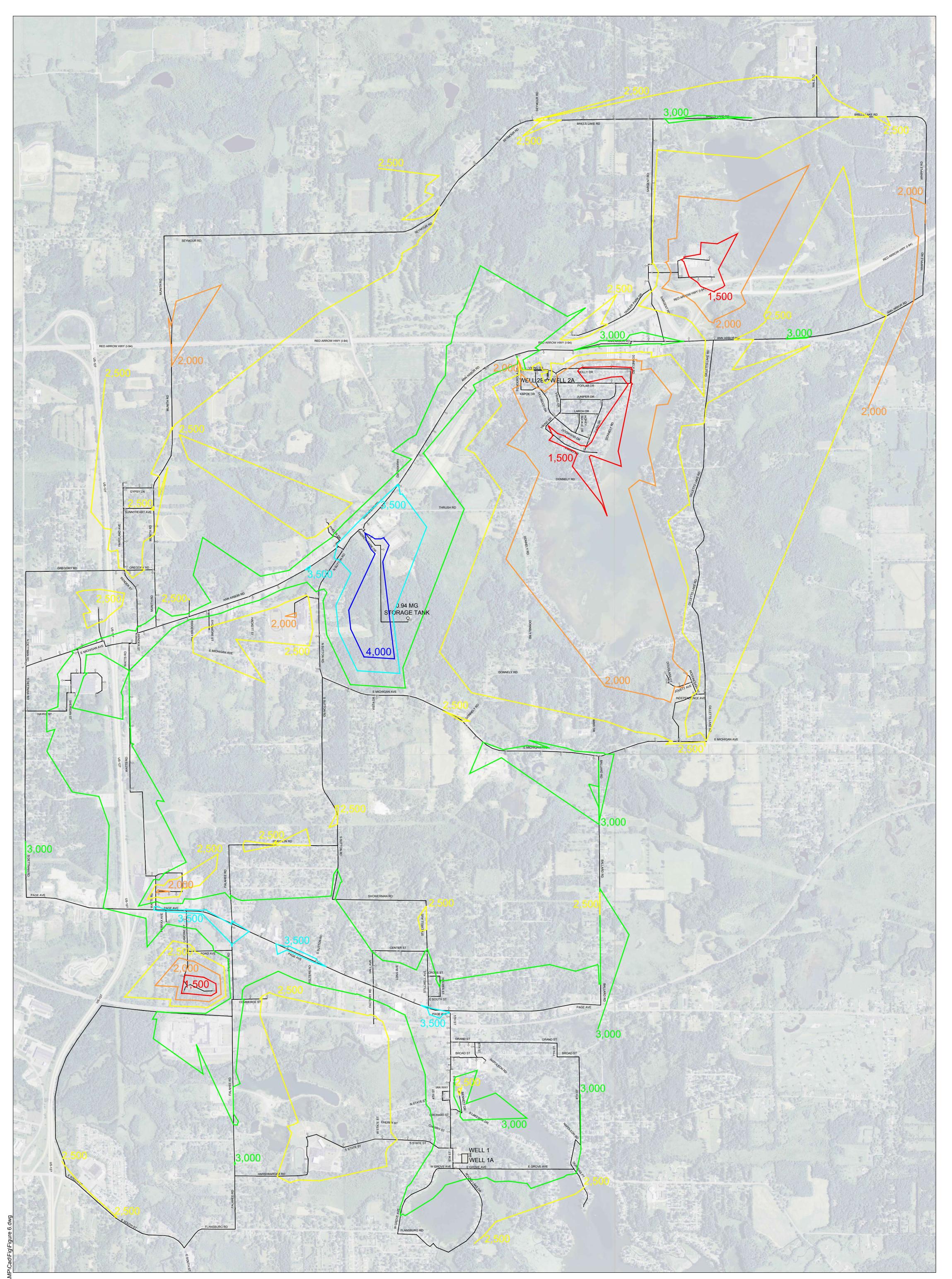








PROPOSED IMPROVEMENTS



LEONI TOWNSHIP JACKSON COUNTY, MICHIGAN WATER RELIABILTY STUDY

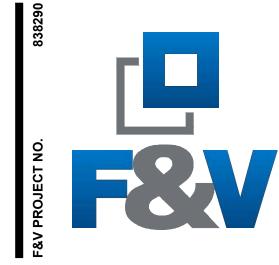
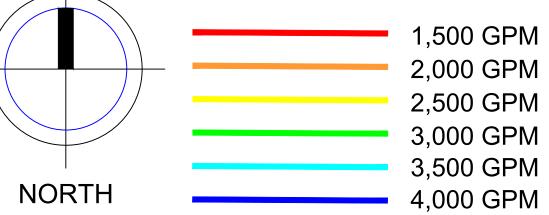


FIGURE 6: AVAILABLE FIRE FLOWS @ 20 PSI UNDER 2039 MAXIMUM DAY DEMAND w/ PROPOSED IMPROVEMENTS

LEGEND





2960 Lucerne Drive SE Grand Rapids, MI 49546 P: 616.977.1000 F: 616.977.1005 www.fveng.com

Appendix B

Asset Management Plan

ASSET MANAGEMENT PROGRAM for Water Utility Systems



Prepared for: Leoni Township



March 2020

CONTENTS

Executive Summary	. 1
Asset Management Team	. 2

List of Tables

- Table 2
- Table 3
- Water Asset Inventory Level of Service Goals Capital Improvement Project Plan Table 4

Attachment 1 Current Rate Structure

EXECUTIVE SUMMARY

OVERVIEW

This report summarizes the Asset Management Program (AMP) for Leoni Township water utility system. It is submitted to comply with Rule 1606 of Act 399 in which a community water supply that serves more than 1,000 people shall implement an asset management program as defined in R 325.10102 beginning January 1, 2018.

Leoni Township lies east of the City of Jackson at I-94 and US-127 in Jackson County, Michigan. The Township's current population is approximately 13,695 people. Leoni has a Type I (public) water supply and distribution system with four water production wells and one storage tank.

ASSET INVENTORY

The assets of the publicly owned water supply system consist of four wells producing an average of 314,000 gallons per day (gpd), with water treatment at the wells consisting of injection of sodium hypochlorite at each well pump. The system has one water tower with a total storage capacity of 940,000 gallons, two permanent generators for the wells and towers, over 125,000 feet of watermain ranging from 6-inches to 12-inches in diameter, 178 fire hydrants with valves, and 230 watermain valves.

The water asset inventory is included in Table 2 and provides source asset description, estimated year installed, location, manufacturer (where applicable), replacement cost, useful life and condition rating on a scale of

1-5.

CRITICALITY ASSESSMENT

The criticality of the assets of the Township's water utility system are based on a numerical (1-5) rating system of performance for Probability of Failure and Consequence of Failure. To determine criticality the following formula is used:

Criticality Factor = Probably of Failure x Consequence of Failure

Details of the asset rating system are included in Table 1. The water asset inventory in Table 2 contains the Criticality Factor for each asset in Leoni Township water supply system.

LEVEL OF SERVICE GOALS

Level of Service (LOS) goals were developed with Township operations staff. These goals were presented to the Township Council at a publicly noticed meeting and for inclusion with the final water asset management program. The LOS goals are detailed in Table 3.

CAPITAL IMPROVEMENT PLAN

A five (5) year and twenty (20) year Capital Improvement Plan (CIP) was developed for Leoni Township based on the criticality assessment within this report and the recently completed Water Reliability Study dated March 2020. As a part of the AMP process, the CIP was reviewed with the Leoni Township Council at a publicly noticed meeting. The water supply system CIP is included in Table 4.

FUNDING STRUCTURE AND RATE METHODOLOGY

EGLE requires a summary detailing the funding structure and rate methodology that provides sufficient resources to implement the AMP. Leoni Township contract with Utility Financial Solutions to provide funding structure and rate methodology recommendation. Utility Financial Solutions discovered a gap in the rates and submitted a rate recommendation to the Board for action. The financial report is being submitted separate for this report.

ASSET MANAGEMENT TEAM

Utility Information

Utility Name:	Leoni Water Utility System
Street Address:	913 Fifth Street
City:	Michigan Center
Zip Code:	49254
Phone Number:	517-522-8445
Email:	hlinnabary@leonitownship.com

Number of Connections: 688 Number of Customers:

Personnel

Contact Person:	Howard Linnabary
Title:	Township Supervisor
Role:	Administrative/Financial Contact
Email:	hlinnabary@leonitownship.com

688

Team Member: Title: Role: Email:

Ken Baker **Project Manager DPW Supervisor** kbaker@fv-operations.com

Team Member: Title: Role: Email:

Fleis & VandenBrink Engineering – Matt Johnson Project Manager Township Engineer mjohnson@fveng.com

Team Member: **Robert Jones Operations Specialist** Title: **DPW Operator** Role: Email: rjones@fv-operations.com



Column J	
Condition	Assessment
Condition Rating	Description
5	Asset Unserviceable - Over 50% of asset requires replacement
4	Significant deterioration - significant renewal/upgrade required (20 -40%)
3	Moderate deterioration - Significant maintenance required (10 -20%)
2	Minor Deterioration - Minor maintenance required (5%)
1	New of Excellent Condition - Only normal maintenance required

Column K	
Probability of	Failure
Performance Rating	Description
5	Imminent - Likely to occur in the life of the item
4	Probable - Will occur several times in the life of an item
3	Occasional - Likely to occur some- time in the life of an item
2	Remote - Unlikely but possible to occur in the life of an item
1	Improbable - So unlikely, it can be assumed occurrence may not be experienced

Column L	
Consequence of	Failure *
Performance Rating	Description
5	Catastrophic disruption
4	Major disruption
3	Moderate disruption
2	Minor disruption
1	Insignificant disruption

* consider safety/social, economic/financial, environmental



Table 2

Water Asset Inventory

Current Year:

2020

Directions

A. List assets

B. Enter asset information

C. To add more assets use insert function and add rows then copy first asset row to new rows to transfer formulas

D. Enter information in highlighed cells

E. Remaining cells will calculate automatically.

				5	ource Assets						
Source Assets	Year Installed	Location	Latitude	Longitude	Manufacturer	Replacement Cost	Remaining Useful Life in Years	Condition	Probability of Failure	Consequence of Failure	Criticality Factor
Well #1 (12" in diameter @ 250 ft depth)	1963	5th St	N42.223728	W84.325409		\$ 120,000.00	34	3	3	3	9
Well #1A (12" in diameter @ 250 ft depth)	1976	5th St	N42.223576	W84.325400		\$ 120,000.00	47	2	2	3	6
Well #2A (12" in diameter @ 348 ft depth)	1960	Viking Dr	N42.274959	W84.318673		\$ 140,000.00	31	3	3	3	9
Well #2B (10" in diameter @ 340 ft depth)	1960	Viking Dr	N42.274956	W84.318646		\$ 140,000.00	31	3	3	3	9
Wellhouse #1	1963	5th St				\$ 150,000.00	34	3	2	3	6
Wellhouse #2	1960	Viking Dr				\$ 175,000.00	31	3	2	3	6
Well Pump #1 (540 GPM @ 133 ft)	2008	5th St	N42.223728	W84.325409		\$ 10,000.00	1	4	4	2	8
Well Pump #1A (769 GPM @ 184 ft)	2016	5th St	N42.223576	W84.325400		\$ 10,000.00	17	1	1	3	3
Well Pump #2A (303 GPM @ 229 ft)	2008	Viking Dr	N42.274959	W84.318673		\$ 10,000.00	1	4	4	2	8
Well Pump #2B (376 GPM)	2018	Viking Dr	N42.274956	W84.318646	National	\$ 10,000.00	19	1	1	2	2
Natural gas generator @ 750 gpm						\$ 55,000.00	10	3	3	2	6
Natural gas generator @ 400 gpm						\$ 40,000.00	10	3	3	2	6
			•		·		•	If Criticality Fact	or is greater than 1	6 cell will turn RE	D
								If Outstanding Fact	an la susantas than 4	^	add to CID table

	Treatment Assets										
Treatment Assets	Year Installed	Location	Latitude	Longitude	Manufacturer	Replacement Cost	Remaining Useful Life in Years	Condition	Probability of Failure	Consequence of Failure	Criticality Factor
Water Treatment Equipment - Useful life 15 years											
Sodium Hypochlorite	1963	Well #1	N42.223728	W84.325409		\$ 2,000.00		3	3	3	9
Sodium Hypochlorite	1976	Well #1A	N42.223576	W84.325400		\$ 2,000.00		2	2	3	6
Sodium Hypochlorite	1960	Well #2A	N42.274959	W84.318673		\$ 2,000.00		3	3	3	9
Sodium Hypochlorite	1960	Well #2B	N42.274956	W84.318646		\$ 2,000.00		3	3	3	9
		•						If Criticality Facto	or is greater than 1	6 cell will turn RE)

Storage Assets											
Storage Assets	Year Installed	Material	Location / Label	Capacity	Manufacturer	Replacement Cost	Remaining Useful Life in Years	Condition	Probability of Failure	Consequence of Failure	Criticality Factor
Water Storage - Useful life: 90 years											
Ground storage tank	1987	Structural Steel	Ann Arbor Rd	0.94 MG	Tenemec	\$ 2,000,000.00	57	2	2	4	8

If Criticality Factor is greater than 16 add to CIP table

If Criticality Factor is greater than 16 cell will turn RED If Criticality Factor is greater than 16 add to CIP table



				Distrib	ution Assets							
Distribution Assets	Year Installed	Material	Diameter (in)	Total Length (ft)/Quantity	Manufacturer	Replacem	ent Cost	Remaining Useful Life in Years	Condition	Probability of Failure	Consequence of Failure	Criticality Factor
Watermain - Useful Life Based on Material												
Replacement cost*:	1960	CI	6	23,615		\$ 2,83	3,800.00	65	3	2	2	4
8" @ \$120 per foot	1960	CI	8	10,420		\$ 1,25	0,400.00	65	3	2	3	6
10" @ \$130 per foot	1960	CI	12	15,500			5,000.00	65	3	2	4	8
12" @ \$130 per foot	1980	PVC	8	12505			0,600.00	15	3	3	3	9
16" @ \$160 per foot	1980	PVC	12	29,298		\$ 3,80	8,740.00	15	3	2	4	8
	1990	PVC	10	1035		\$ 13	4,550.00	25	2	3	3	9
	2000	PVC	8	3127		\$ 37	5,240.00	35	1	3	3	9
	2000	PVC	12	31582		\$ 4,10	5,660.00	35	1	2	4	8
Hydrants - Useful Life: 90 Years	1960			24		\$ 7	2,000.00	30	4	3	2	6
Replacement cost @ \$3,000 each	1960			24		\$ 7	2,000.00	30	4	3	2	6
	1960			23		\$ 6	9,000.00	30	4	3	2	6
	1980			21		\$ 6	3,000.00	50	3	2	2	4
	1980			21		\$ 6	3,000.00	50	3	2	2	4
	1990			21		\$ 6	3,000.00	60	2	2	2	4
	2000			22		\$ 6	6,000.00	70	1	1	2	2
	2000			22		\$ 6	6,000.00	70	1	1	2	2
Valves - Useful Life: 70 Years												
Replacement cost:	1960		6	31		\$ 5	5,800.00	10	4	4	2	8
6" @ \$1,800	1960		8	31		\$ 6	2,000.00	10	4	4	2	8
8" @ \$2,000	1960		12	30		\$ 9	0,000.00	10	4	4	2	8
10" @ \$2,500	1980		8	28			6,000.00	30	3	3	2	6
12" @ \$3,000	1980		12	28			4,000.00	30	3	3	2	6
16" @ \$4,000	1990		10	28		\$ 7	0,000.00	40	2	2	2	4
	2000		8	27			4,000.00	50	2	1	2	2
	2000		12	27		\$ 8	1,000.00	50	1	2	2	4
*Assume all watermain less than 8" in diameter will b	e replaced with 8" watermai	n	-			•			If Criticality Fact	or is greater than 1	6 cell will turn REI	۵
	-									or is greater than 1		add to CIP table



We commit to maintaining and improving our water system to provide clean, safe drinking water and fire protection to the community while minimizing the long-term costs for their operation. The most cost effective means of the maintanence and improvements will be sought without sacrificing quality. We are committed to providing excellent customer service to our constituants.

LOS Determinants	Define the goal	How often do you measure it
		Monitor water quality: monthly for bacteria,
	Meet federal and state water quality	annually for partial chemical, and triannually
EPA/EGLE Requirements	standards.	for metals.
Safety	Safe work environment.	Safety meetings, no MIOSHA violations.
	Secure water installations from	Maintain fenced, locked, and lit well houses
Security	tampering.	and water towers.
		Maintain a minimum of two certified operators
	Certified operators to operate and	on staff at all times, one will have D3/S3
Operator certification	maintain system.	certification.
		Respond to and investigate customer
		complaints within 1 business days of report,
Customer complaints	Provide excellent customer service.	then provide results to the customer.
		Attend conferences and training to keep
	Keep up with regulatory changes and	regulatory compliance current. Meet annually
Upcoming regulatory changes	comply in a timely fashion.	with EGLE to ensure compliance.
		Respond to customer emergencies within 4
		hours of receiving report. Give 24 hour
		advance notice of planned service
Response time	Provide excellent customer service.	interruptions.
	Funds to address unexpected	
Operating Reserves	breakdowns and major expenses.	Maintain an operating reserve of 5% of budget.
	Balance internal vs external funding	Seek external funding for major projects as
Internal versus external funding	for projects.	they present themselves.
		Annual inspections of wells and pumps, then
		complete recommended improvements to
Water Supply	Sustain water supplies.	keep functioning as designed.
		Maintain water treatment equipment and flush
Water Quality	Provide quality, good tasting water.	watermains once annually.
		Professional inspection every 5 years and
Water Storage	Maintain for longer lifespan.	complete recommended improvements.
		Flush watermains once annually and maintain
	Maintain pipes, hydrants, and valves	normal condition pressure between 30 and 90
Distribution	to ensure good working order.	psi.

Table 3

Level of Service Goals



Directions

- A. List projects to be completed
- B. Determine how long before the project must begin
- C. Enter the total projected cost of the project
- D. To add more CIP's use insert function and add rows then copy first CIP row to new rows to transfer formulas
- E. Enter information in highlighed cells
- F. Remaining cells will calculate automatically.

Α	В		С
Projects	Years Until Project Begins	Proje	cted Cost
Lead Service Line Replacement Year 1	1	\$	100,000
Lead Service Line Replacement Year 2	2	\$	100,000
Lead Service Line Replacement Year 3	3	\$	100,000
Lead Service Line Replacement Year 4	4	\$	100,000
Fahalaee Road Extension	1	\$	150,000
Total Capital Improvement		\$	550,000

*No capital improvements were identified based upon a criticality score identified in Table 2. Capital improvements were identified based upon expansion of the system as indicated in the water reliability study and starting to remove lead service lines. These capital improvements do not include routine maintenance such as filter replacements, regular inspections, and annual cleanings as they are not considered capital improvement projects.

*The above projects listed are proposed projects, therefore there is not secured funding at this time. Funding for the CIP projects is anticipated to come from reserve utility funds.

*The list of Capital improvements was recommended by Planning Commission in December 2019 and reviewed by the Township in January 2020.

Rate Name: Details:	40-RESIDENTIAL WATER MONT	Effective Date: 10/01/2003	
	Turner Plat Data	Data mable marce	
Rate Calculation Flat Rate Amount	\$11.000	Rate Table Type:	
Minimum Fee:	\$0.00	Additional Units: \$0.00	
Minimum Fee. Maximum Fee	\$0.00	Additional Units: \$0.00	
Service Fee:	\$0.00	Additional Units: \$0.00	
Rate Multiplier:	100.00 Rate Mul	tipier Option: Multiply Usage Rate by % after calculation	
Allow Multi-Rate	Prorating: Yes		
Use Highest Fitti	ing Step Rate Only:	N Multiply Initial Step Low by REU's:	N
-	v Amt from Usage Before Calc:	N Prorate Initial Step Low on First and Fina	l: N
If Usage is Negat	tive, Don't Add Flat Step Amt:	N Multiply All Step Low and High Amts by REU	's: N
Charge Flat Step	Amt if Usage Equals Step Low:	N	
Minimum Usage Sub	otraction Amount: 0.0000	Daily Usage Fee Amount: .0000	
Allow Negative Us	sage Credits: Y	Negative Usage Override Amount: .0000	
Step	Low Amount Step High Amount	Rate Amount Flat Amount	
Rate Name:	45-APRT BLDG -RATE WATER	Effective Date: 09/09/2003	
Details:			
Rate Calculation	Type: Flat Rate	Rate Table Type:	
Flat Rate Amount	\$33.000		
Minimum Fee:	\$0.00	Additional Units: \$0.00	
Maximum Fee	\$0.00	Additional Units: \$0.00	
Service Fee:	\$0.00	Additional Units: \$0.00	
Rate Multiplier:	100.00 Rate Mul	tipier Option: Multiply Usage Rate by % after calculation	

Allow Multi-Rate Prorating: Yes

Use Highest Fitting Step Rate Only: Ν Multiply Initial Step Low by REU's: Ν Subtract Step Low Amt from Usage Before Calc: Ν Prorate Initial Step Low on First and Final: Ν If Usage is Negative, Don't Add Flat Step Amt: Multiply All Step Low and High Amts by REU's: N Ν Charge Flat Step Amt if Usage Equals Step Low: Ν Minimum Usage Subtraction Amount: 0.0000 Daily Usage Fee Amount: .0000 Allow Negative Usage Credits: Y Negative Usage Override Amount: .0000 Step Low Amount Step High Amount Rate Amount Flat Amount

Rate Name: Details:	48-P/3 BDR APT WATE	R RATE Effective Date: 02/10/2009	
Rate Calculation Flat Rate Amount	21	Rate Table Type:	
Minimum Fee:	\$0.00	Additional Units: \$0.00	
Maximum Fee	\$0.00	Additional Units: \$0.00	
Service Fee:	\$0.00	Additional Units: \$0.00	
Rate Multiplier:	100.00	Rate Multipier Option: Multiply Usage Rate by % after calculation	
Allow Multi-Rate	Prorating: Yes		
2	ing Step Rate Only: w Amt from Usage Befo:	N Multiply Initial Step Low by REU's: N re Calc: N Prorate Initial Step Low on First and Final: N	

N

0 0000

If Usage is Negative, Don't Add Flat Step Amt: Charge Flat Step Amt if Usage Equals Step Low:	N N	Multiply All Step Low a	nd High Amts	by REU's: N	1
Minimum Usage Subtraction Amount: 0.0000		Daily Usage Fee Amount:		.0000	
Allow Negative Usage Credits: Y		Negative Usage Override	Amount:	.0000	
Step Low Amount Step High Amount		Rate Amount FI	lat Amount		

Rate Name: 91-WATER LATE CHG-RATE Details:	Effective Date: 09/09/2003
Rate Calculation Type: Flat Rate Flat Rate Amount \$0.000	Rate Table Type:
Minimum Fee: \$0.00	Additional Units: \$0.00
Maximum Fee \$0.00	Additional Units: \$0.00
Service Fee: \$0.00	Additional Units: \$0.00
Rate Multiplier: 100.00 Rate Mul	ultipier Option: Multiply Usage Rate by % after calculation
Allow Multi-Rate Prorating: Yes	
Use Highest Fitting Step Rate Only:	N Multiply Initial Step Low by REU's: N
Subtract Step Low Amt from Usage Before Calc:	N Prorate Initial Step Low on First and Final: N
If Usage is Negative, Don't Add Flat Step Amt:	: N Multiply All Step Low and High Amts by REU's: N
Charge Flat Step Amt if Usage Equals Step Low:	: N
Minimum Usage Subtraction Amount: 0.0000	Daily Usage Fee Amount: .0000
Allow Negative Usage Credits: Y	Negative Usage Override Amount: .0000
Step Low Amount Step High Amount	t Rate Amount Flat Amount

Appendix C

Leoni Township Master Plan

Leoni Township

2030 Master Plan



Leoni Township Park

LEONI TOWNSHIP PLANNING COMMISSION

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Leoni Township

2030 Master Plan

Created by the Leoni Township Planning Commission

With assistance from:



Region 2 Planning Commission 120 W. Michigan Avenue Jackson, Michigan 49201

Adopted by Leoni Township Planning Commission: 11/28/12 Adopted by the Leoni Township Board of Trustees: 12/11/12 The <u>2030 Leoni Township Master Plan</u> was adopted by the Leoni Township Planning Commission on November 28, 2011

aus

Leoni Township Planning Commission Chair

The <u>2030 Leoni Township Master Plan</u> was approved by the Leoni Township Board on December 11, 2012

____ Janke

Leoni Township Clerk

Participants

Leoni Township Planning Commissioners

Douglas Sink, Chair Kathy Bellew Jeff Kruse Paul Overeiner Matt Shannon Judy Southworth, Township Board Liaison John Spencer

Leoni Township Board of Trustees

Todd Brittain, Supervisor Michele Manke, Clerk Lori Stack, Treasurer Jerry Ambs, Trustee Todd Pickett, Trustee Judy Southworth, Trustee Robert Sutherby, Trustee

Additional Contributors

Kevin Lawrence, Water Operator John Zang, General Mgr., WWTP Paul Rentschler, ASTI Environmental Page intentionally left blank

TABLE OF CONTENTS

SECTION PAG	GE
Chapter I Introduction	. 1
What is a Master Plan?	. 1
The Master Plan and the Zoning Ordinance	
Planning Process and Plan Organization	
Planning and Zoning Responsibilities	
Chapter II Background Information	. 6
Location	. 6
Geology and History	. 8
Demographic Overview	10
Chapter III Goals, Objectives, and Strategies	11
Natural Features Goals, Objectives, and Strategies	13
Agriculture Goals, Objectives, and Strategies	15
Residential Goals, Objectives, and Strategies	16
Commercial Goals, Objectives, and Strategies	18
Office Goals, Objectives, and Strategies	19
Industrial Goals, Objectives, and Strategies	20
Transportation Goals, Objectives, and Strategies	21
Chapter IV Land Use Plan	22
Land Use Plan Overview	22
Future Land Use Map Description	23
Chapter V Plan Implementation	28
Zoning Plan	
Capital Improvements Program (CIP)	28

APPENDICES

APPENDIX		PAGE
A.	Community Profile	A-1
	A1. Population	A-2
	A2. Housing	
	A3. Natural Features	A-10
	A4. Current Land Use	A-14
	A5. Transportation and Circulation	A-18
	A6. Community Facilities	A-20
B.	Public Participation	B-1
C.	Comments Received from Plan Distribution	

D. Required Plan Documents

I. INTRODUCTION

What is a Master Plan?

This community planning effort provided the Leoni Township Planning Commission with an opportunity to consider the future course of development in the community, and to avoid random and inefficient land development patterns. Other purposes for planning included the following:

- Improvements to infrastructure, emergency services, utilities, and other community facilities and services can be done in a more efficient manner when a recent up-to-date community plan is available for guidance.
- The plan provides a guide for zoning decisions.
- A land use plan directs future growth toward areas of the township more capable of handling the specific nature and intensity of land uses.
- Planning and zoning help to identify and conserve areas of significant natural features.
- Planning is a continuous process that allows for the adjustment of goals and objectives according to changing growth and demographic patterns.
- Adherence to the community land use plan reduces the potential for conflicting land uses.
- Plans are required to be kept up-to-date by Michigan planning and zoning enabling legislation.

The Master Plan and the Zoning Ordinance

The Master Plan is intended to guide the future growth and development of the Township. It is not an ordinance and does not have the force of law. The Plan takes a long-term view of the Township and provides a vision 20 years or more in the future. As such, the Plan represents a vision for the Township for the year 2031. As with all plans, contained within are goals, objectives, and policies, plan implementation measures, and a land use plan map. The land use plan map indicates appropriate areas for future land uses according to a vision for a desired future development pattern.

The Zoning Ordinance is the primary instrument used to implement this plan. The zoning ordinance creates zoning districts in which permitted land uses are listed, prohibited land uses are omitted, and lot requirements including density, building setbacks, maximum height, and maximum lot coverage percentages are provided. The zoning ordinance includes a zoning map indicating where zoning districts are located in the community.

The Zoning Plan that is included as part of Chapter V provides information on the relationship of the Master Plan to the Zoning Ordinance. The Zoning Plan "translates" future land use plan designations to existing and proposed zoning district designations.

In the State of Michigan, enabling authority for community planning is provided by the Michigan Planning Enabling Act, or P.A. 33 of 2008. The Michigan Zoning Enabling Act, or P.A. 110 of 2006 also requires that zoning be based on a plan that promotes health, safety, and general welfare.

Planning Process and Plan Organization

Work was begun on the Leoni Township Master Plan in November, 2008 with an inventory of existing conditions. In the months that followed, information was reviewed regarding population and housing trends, economy, natural features, infrastructure, land use trends, and transportation. The results of this research are summarized in Appendix A, Community Profile.

In order to ensure a degree of public participation on the planning process, a survey of Township residents and businesses was conducted in the summer of 2011. The results of the survey helped the Planning Commission in the identification of strengths and weaknesses to be addressed as part of the Master Plan. Survey information is available for other uses by the Board of trustees and other groups. The results of the public participation effort are found in Appendix B, Public Participation.

The identification of planning issues was an important step in the development of goals, objectives, and strategies. These community goals, objectives, and strategies comprise the heart of the Plan and can be found in Chapter III.

Chapter IV of the Land Use Plan reflects the Township's guide for future land development. The land use plan contains a land use plan map which serves as a tool for the Planning Commission to use in making decisions regarding changes to the zoning map.

Finally, Chapter V identifies measures that will be taken to implement the master plan. Because the plan is not of value as a guide unless it is implemented, this chapter is an important element. Implementation measures include action steps that are needed if the goals of the plan are to be realized.

As required by the Michigan Planning Enabling Act, the final task in the planning process was to reach out to the citizens of Leoni Township for additional public input through the public hearing process. The plan was distributed to surrounding communities, the Region 2 Planning Commission, and the County Affairs subcommittee of the Jackson County Board of Commissioners for their input.

By working with residents, business owners, township officials, planners, surrounding communities, and other stakeholders, Leoni Township has prepared a plan that balances competing interests that affect land use decisions. These decisions include, for example, jobs and tax base on one side and protection of quality of life and natural resources on the other. Through careful implementation of the Master Plan, the Township is preparing to build its tax base and provide for high quality new growth, while preserving existing natural assets and protecting the overall health, safety, and welfare of its residents.

Planning and Zoning Responsibilities

Several committees, agencies, and individuals are involved in planning, zoning, and other aspects of township development. These entities are listed below with a brief description of their roles.

Township Board of Trustees

The Leoni Township Board of Trustees is the legislative body elected to serve the residents of Leoni Township. As the legislative body, the township board has the authority to formally adopt the zoning ordinance and amendments to the text and zoning map. The board also sets the budget (including capital improvement projects), and appoints members to committees.



Leoni Township Hall

Planning Commission

The Planning Commission consists of a chairperson, vice chairperson, secretary, and township board liaison. Their main duties include the following:

- Take action on requests for amendments to the zoning ordinance.
- Create and maintain the township Master Plan.
- Review development proposals including site plan review, conditional uses, land division and subdivision, and site condominium proposals.

Though the Planning Commission is primarily a recommending body, it has the primary responsibility in development of the community master plan.

Zoning Board of Appeals (ZBA)

The Zoning Board of Appeals is the only body at the township level that hears appeals on zoning matters. When administrative decisions are made in connection with enforcing the ordinance, they can be appealed. When this occurs, the ZBA hears appeals and judges the merit of the request based on criteria listed in the Zoning Ordinance.

The ZBA also has the responsibility of interpreting the zoning ordinance when it is alleged that the zoning administrator or other township official or agency is in error. The ZBA has the authority to provide the official interpretation of the Zoning Ordinance with appeals to their interpretation taken to Circuit Court.

Zoning Administrator

The township zoning administrator is the primary official responsible for the enforcement of the zoning ordinance and other ordinances. The zoning administrator has several responsibilities being the primary contact person for developers seeking project approval, site plan review, issuance of zoning compliance permits, scheduling and arrangement of committee meetings, issuance of citations and court appearances, and public hearing notification.

Downtown Development Authority (DDA)

The purpose of the Leoni Township Downtown Development Authority (DDA) is to plan, propose, and implement the construction, repair, remodeling, restoration, preservation or reconstruction of public facilities, existing buildings, or new buildings within the boundaries of the DDA. The DDA also develops long-range plans to halt the deterioration of property values in the downtown district and to promote the long-term economic growth of the downtown district. The DDA, includes properties fronting the north and south sides of Michigan Avenue and Ann Arbor Road from US-127 to Gilletts Lake Road and along both sides of Sargent Road north of I-94 approximately one mile. The DDA has taxing authority under a tax increment financing authority (TIFA) plan.

Local Development Finance Authority (LDFA)

The purpose of the Local Development Finance Authority (LDFA) is to encourage local development to prevent conditions of unemployment and promote economic growth. The LDFA pro-

vides for the creation and implementation of development plans. The LDFA can buy and sell interests in real and personal property. It can also incur debt to further the goals and purposes of the LDFA. Leoni Township at this time does not use a LDFA.

Parks and Recreation Committee

The Parks and Recreation Committee is comprised of three members with the primary responsibilities:

- To expand recreation opportunities in the township.
- To explore, oversee, review and recommend improvements or expansions of current recreation facilities.
- To secure volunteers for Parks and Recreation maintenance.

Region 2 Planning Commission Staff

Staff of the Region 2 Planning Commission routinely advises the Planning Commission with rezoning recommendations and assists the Planning Commission in development of this Master Plan.

Jackson Area Comprehensive Transportation Study (JACTS)

The JACTS Policy and Advisory committees administer the Jackson Area Long-Range Transportation Plan and the Transportation Improvement Program.

Jackson County Zoning Coordinating Committee (JCZCC)

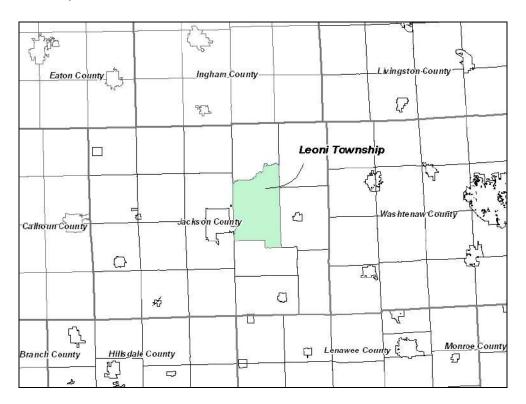
A committee of the Jackson County Board of Commissioners, the Zoning Coordinating Committee reviews and recommends on zoning ordinance amendments and community plans from Jackson County communities.

II. BACKGROUND INFORMATION

Location

Leoni Township is located in east-central Jackson County in south central lower Michigan. The township abuts Henrietta Township which is located to the north, Napoleon Township to the south, Grass Lake and Waterloo townships to the east, and the City of Jackson, Summit and Blackman townships to the west.

Several cities are located within an hour of Leoni Township. Ann Arbor is 35 miles to the east, Lansing is 45 miles to the north, Battle Creek is 50 miles to the west, and the City of Jackson abuts the township to the west.



Several important freeways and state trunklines are in the vicinity of the township providing access to other parts of Jackson County as well as other regions and states. Jackson County Airport is located within neighboring Blackman Township. Major airports in Detroit, Lansing and Toledo are located within one hour.

At 49.1 square miles, or approximately 31,400 acres, Leoni Township is the largest local unit of government in Jackson County. The population density of the township was 281 persons per square mile in 2010 which is somewhat higher than the overall Jackson County population density of 227 persons per square mile.

The population of Leoni Township was 13,807 in 2010 which represents a 3% increase above the 2000 population figure of 13,459. The population increase is primarily due to low- and moderate-density residential development as several dozen new homes were constructed during the 2000's. Growth slowed considerably in the latter half of the 2000's but, as population projections in Appendix A indicate, growth is expected to resume when economic conditions improve.

Leoni Township features a variety of land uses from suburban to rural. The area of the Township near the City of Jackson is built-up and includes general commercial, moderate- and highdensity residential, and industrial uses. Land uses to the north of I-94 and in east portion of the township tend to be more rural, including farms, farmsteads, low-density residential, environmentally-sensitive areas, and vacant land.

Leoni Township features several lakes and streams. Center Lake, at the south end of the township, is the largest lake in the township and is shared with Napoleon Township. Other large lakes are Gilletts Lake, Goose Lake, and Brills Lake. A small portion of the Grand River flows in and out of the township at its southwest corner. The Portage River drain traverses the north end of the township which feeds into the Grand River farther west in Blackman Township. Ballard Creek drains a portion of the central portion of the township and is a tributary to the Grand River. Crittenden drain runs from the east end of the township and feeds into Center Lake.

Until the recent slowdown in the state and national economy, an increase in the development of residential land uses of all kinds was an important land use trend in Leoni Township. More recently, development has slowed considerably. A few residential, commercial and industrial developments have occurred but the township plans for future development.



Brills Lake

The existing settlement pattern was largely the result of decisions made by residents, entrepreneurs, utilities, transportation officials and governments. Some of these decisions were made many years ago. It is worthwhile to review the history of settlement of the Township in order to better understand the current landscape.

Geology and History

Roughly 15,000 years ago Leoni Township was being molded by the effects of giant lobes of ice on the retreat as Michigan's last glacial period melted northward.

Geologically speaking, the township is located within the Jackson Interlobate Region, an area characterized by high gravel hills, large, flat outwash plains, lowlands, depressions and other glacial features.

Within the confines of its borders it's a township of vast contrasts easily seen by those with a whim to look: Leoni is host to the seven bodies of water that make up the Chain of Lakes; it has natural areas undisturbed by human development. There are factories and farmland, super highways and sub divisions, lakes, forests and natural wetlands.



Gilletts Lake

Leoni Township was established by an act of Michigan's Territorial Legislature in 1836 and was formed using a northern portion of Napoleon and the southeastern portion of what was called "West Portage," now Henrietta Township. The first election was held in that same year and one Josiah Mills became the first township supervisor.

At 49 square miles, Leoni Township has easy claim to the largest chunk of real estate in Jackson County. It's also the second largest township in the state of Michigan.

Over the past 180 years the township has been host to God-fearing pioneers, scoundrels, builders and crooks. The township can boast of raucous confrontations with railroad barons after the turn of the 19th Century and a reference, in name at least, to a legendary battle between the Greeks and Persians in the Fourth.

Native Americans were the first to inhabit the area during the Paleo period, 9,000 to 14,000 years ago. Artifacts that attest to their presence can still be turned up in Jackson County at a

host of scattered though not infrequent locations, from farm fields and lake shores to stream banks along the Grand and Portage rivers.

Although the evidence seems more anecdotal than factual, the name Leoni is apparently a reference to Leonidas, the heroic leader of the Spartans who for three days thwarted Persian King Xerxes invasion of the Greek city states at the Battle of Thermopylae in 480 B.C.

The first settler, by contrast, was never afforded much honor when he arrived on the scene in 1829, two years after Horace Blackman and company founded Jacksonburg, later to become Jackson. It's generally agreed David Sterling was Leoni's first resident but his name quickly passed into obscurity because he was considered a squatter on land he never purchased.

The first significant development was known as Leoni Village, these days mainly a cluster of homes, near E. Michigan Avenue and Portage Road. Joseph Otis and his two step sons from Vermont were among the first to settle in the village in 1830. Another Vermonter, Joab Page moved in with the Otis clan in 1831 and soon after built a saw mill southwest of the village. Ira Kellogg opened a flour mill in 1834, saving farmers a trip to Ann Arbor or Monroe.

The village was platted in 1834, about the same time a bank was founded in a swampy area north of the village. The location was referred to as "Bogus Island," which offered more than a little insight into the legality of the operation. The bank soon failed because of "mysterious circumstances," according to one account, or, according to another, it was shut down by authorities tasked with closing wildcat banking operators.

By 1842, the Detroit to Kalamazoo rail line had reached Jackson, carrying freight, passengers and boom times for fledgling Michigan Center. Hotels and taverns sprang up along with a mill and stores. But the railroad also brought a more unwelcomed development, the result of farmers' cows being run down and killed by locomotives.

By 1850 the infamous rail "war" broke out as locals, fortified some said by products sold in the taverns began their bovine retribution. Travel by rail was downright dangerous for a time with gunfire or other missiles directed at the cars. Some trains were reportedly derailed.

Railroad owners tolerated only so much. Several dozen township residents were identified as the perpetrators, arrested and sentenced to prison. Few apparently served lengthy terms but the troubles helped temper commercial development in Michigan Center, which became known more as a boating and fishing resort. More than 100 years later Center Lake is still a primary recreation venue in Jackson County.

In the late 1950s and 1970s voters plowed under proposals to incorporate Michigan Center as a city; Leaders in the city of Jackson, which was literally landlocked by corporate boundaries, also cast envious eyes in Leoni's direction but numerous annexation plans were also beaten back.

Ironically, government consolidation, the current darling of urban planners, also consumed township leaders for a time. But a plan to become part of a metropolitan government also fell to defeat in 1959.

The township has not rebuffed all cooperative alliances, however. In 2010 Leoni contracted with Blackman Township to provide police and fire protection through the Blackman-Leoni Department of Public Safety. And the township's state-of-the-art wastewater treatment plant began treating effluent from thirteen surrounding municipalities when it officially opened in 2011.

Demographic Overview

The population of Leoni Township grew nearly tripled from 1930-2010 and stands at 13,807 according to the 2010 Census. A high rate of growth occurred during the period from 1930-1970 but growth slowed in the 1970's. Township population decreased during the 1980's but has been increasing since that time. All three townships that surround the City of Jackson have seen similar patterns of growth while the City population has continuously declined since 1950.

With the aging of the baby boom generation, the median age of population continues to increase in Leoni Township. As an illustration, from 1990 to 2010 the median age of Leoni Township increased from 34 to 41. It is expected that the percentage of elderly population will continue to increase in the next two decades, but will decline from there. This demographic pattern has significant implications for services (e.g. schools, senior citizen services) that will be needed in the future by the residents of the township.

Population projection show differences in the future population of the township. Projections for year 2030 range from a low of approximately 13,000 to a high of 14,900. Population should be monitored when data become available in order to ensure that the plan remains current.

III. GOALS, OBJECTIVES, AND STRATEGIES

The goals, objectives, and strategies section is the heart of a community plan. It brings together other plan sections regarding trends, alternative analysis, and visioning. It is important in creating the township land use plan map, which is a reflection of adopted goals and objectives.

A goal is a general statement that is used to describe a desired end point.

An *objective* is an effort directed toward achieving a goal.

Strategies are methods employed to achieve objectives and goals.

The Leoni Township Master Plan lists goals, objectives, and strategies under six headings - Natural Features, Agricultural, Residential, Commercial, Office, and Industrial.

For the most part, the goals, objectives, and strategies section of this plan represents a detailed overhaul of the previous plan. As a result of its review process, the Planning Commission made the following observations:

- Preserving the small town feeling, rural atmosphere, natural beauty, and open spaces of the township is an important part of the plan.
- Making provision for the needs of the elderly, and handicapped will become increasingly important.
- A citizen survey indicated a strong desire for beautification and physical improvements on main thoroughfares of downtown Michigan Center.
- Respondents also indicated that single family housing should be encouraged.
- Growth should be encouraged in the DDA area.
- Consideration should be given to surrounding communities and their master plans.
- Light industrial uses should be encouraged on US-127 consistent with surrounding townships.
- Areas suitable for high-density residential development should be designated.
- The Township needs to conform with the county ordinance and state statute to preserve farmland.

- Provide for Park facilities such as the Leoni Mill pond, and other recreational areas.
- Encourage "looping" of existing, and future water lines to promote system reliability.



Leoni Wastewater Treatment Plan

The land use goals, objectives, and strategies are presented in the following pages.

NATURAL FEATURES

GOAL: Promote the townships natural features, and public lands, while preserving the natural beauty, and protecting environmentally sensitive areas.

Objective: Preserve existing wetlands

- Proper permits will be required as part of the site plan review process before permission will be granted for buildings, structures or other alterations in wetlands, floodplains or other environmentally sensitive areas.
- Objective: Require development site plans to conform to the topography, instead of the topography conforming to the site plan.
- Objective: Development shall be discouraged or prohibited in areas where soil drainage is poor or impaired because of natural or manmade features.
 - Areas identified as environmentally sensitive on the soils, wetlands, and floodplain maps should be preserved from incompatible and unnecessary urban development.



Leoni Township Park

- GOAL: Promote the use and development of public lands, for recreation, tourism, and fitness.
- Objective: Explore the creation of walking trails
- Objective: Explore ways to improve navigability between the Chain of Lakes.
- Objective: Promote Waterloo Recreational area as a community resource for outdoor activ-

ity and out-of-county tourism.

Objective: Enhance and develop the use of Leoni Mill pond.

GOAL: Encourage the preservation of wetlands.

- Objective: Inform the Township residents about the value of wetlands and the need to obtain a Department of Environmental Quality permit prior to dredging or filling any protected wetland.
- Objective: Require that proper permits be obtained prior to issuing a building permit for construction in a wetland in the site plan review of the zoning ordinances.
 - Utilize the MDEQ Permit and Licensing Guide checklist to ensure compliance with State and Federal environmental regulations.

Objective: Explore other methods for the zoning ordinance to regulate the use of wetlands.

GOAL: Encourage the protection of the Township's groundwater resources.

- Objective: Support development, and implementation of well head protection plan.
- Objective: Encourage that proper permits be obtained prior to groundwater and surface water extraction for commercial and industrial purposes.

GOAL: Promote and protect the Township lakes, streams and surface waters.

- Objective: Maintain and/or improve water quality, a healthy fishery, and biodiversity.
 - Limit and/or control agricultural and storm water runoff, pesticides, septic fields through the use of such tools as filter strips, retention and detention systems, etc.
 - Use the zoning approval processes to ensure that development occurs in an appropriate manner.
 - Encourage the extension of sanitary sewer systems where appropriate, or to improve environmental quality.

AGRICULTURE

GOAL: Encourage the preservation of farms and farmland.

Objective: Support county and state agricultural preservation programs.

Objective: Encourage family, and small scale farming

GOAL: Encourage the preservation of agricultural lands having a high potential for farming related industries, based upon soils and topography and location.

- Objective: Identify areas of high quality for farming and designate these areas for agricultural use.
 - Through zoning and land use controls, protect areas of unique agricultural capacity.
 - In agricultural areas, promote low population densities through less intensive zoning district designations.
 - Promote the protection of agricultural land by adopting practices that encourage its utilization for agricultural purposes.
 - Discourage extensive residential strip development along rural roads.

GOAL: Encourage the preservation of farms and farmland that have value for farming through a range of techniques that promote, protect, and preserve agriculture and agricultural activities.

- Objective: Use maps created as part of the Jackson County Community Comprehensive Plan, as well as other maps provided in this plan, to identify areas that meet agricultural preservation criteria.
- Objective: Support county and state agricultural preservation programs.

RESIDENTIAL

GOAL: Protect existing residential neighborhoods.

- Objective: Require landscaping or physical buffers where residential uses are adjacent to commercial or industrial uses, and review zoning regulations to ensure the effectiveness of existing buffering techniques.
- Objective: Promote practices which encourage commercial development in properly zoned areas and limit expansion into residentially zoned areas.

GOAL: Encourage the development of residential areas to meet population increases, while conserving agricultural and environmentally sensitive lands.

- Objective: Promote quality housing, regardless of type, in proper densities.
 - Low density residential developments should be located on sites having good physical characteristics including those conductive to on site sewage disposal, appropriate soils, slopes, and water table.
 - Single-family and two-family subdivision developments should be encouraged in areas where adequate services exist or are expected to be provided in the near future.
 - High-density residential land uses and multiple-family developments should be in areas having or expecting to have necessary services and facilities particularly major roads for access to sewer facilities.
 - Promote the redevelopment of existing residential areas.
- Objective: New residential development should occur in appropriate areas that are compatible with adjacent land uses in a safe manner.
 - Promote new subdivision developments in areas where adequate utilities and services exist or can feasibly be expanded.
 - Encourage residential development which reduces the number of driveways and street access points along major roads.
 - Encourage the preservation of natural features (e.g. wetlands, woodlots, floodplains) to enhance the aesthetics of the development.

- New residential development should be clustered in subdivisions and neighborhood areas located near appropriate shopping facilities, community services, utilities, or where these supportive services may be feasibly provided to promote efficient utilization of land.
- Residential developments should be encouraged in areas adjacent to existing residential developments having sewer services.
- Support continuous and coordinated zoning of land rather than piecemeal development.

GOAL: Ensure that the needs of senior citizens are met.

- Objective: To the greatest extent possible, ensure that the needs of the elderly are taken into consideration as part of development projects.
 - Encourage existing and proposed land uses that serve the elderly to provide for accessibility needs.
 - Review zoning regulations to ensure that they do not discriminate against senior citizens.

COMMERCIAL

GOAL: Encourage commercial investment, and related services while maintaining compatibility with adjacent areas.

- Objective: Discourage sprawl by driving commercial investors into appropriate areas already served with proper infrastructure.
- Objective: Provide for the retention of existing commercial uses and allow for expansion in appropriate locations.
 - Utilize existing infrastructure such as roads, sewers, water and utilities.
 - Promote the Sargent Road /I-94 as a gateway to the Leoni DDA, and the Jackson Community.
 - Advocate the possibility of angle parking on the east side of Fifth Street, and other areas, if appropriate.
 - Promote I-94/US 127 corridors.
 - Utilize empty buildings.
 - Locate commercial uses so as to avoid incompatible adjacent uses.
- Objective: Encourage a diverse business mix to meet the needs of the citizens.
 - Limit commercial activities to areas easily accessible to area residents.
 - Require green space and landscaping around commercial areas.
- Objective: Support commercial expansion and / or redevelopment in appropriate locations.
 - Encourage development in the DDA district, and existing commercial areas

OFFICE

GOAL: Encourage development of office uses as transitional areas between commercial and residential uses.

Objective: Encourage office use as mixed development in predetermined areas.

• Identify areas conducive for mixed uses.

INDUSTRIAL

GOAL: Encourage industrial uses at locations that will allow the quality of the local environment to be maintained and to minimize land use conflicts and impact on residential areas.

- OBJECTIVE: Industrial areas should be developed where a high degree of compatibility with surrounding land uses may be maintained.
 - Encourage the use of existing industrial buildings/properties.
 - Industrial development should be encouraged in areas where major thoroughfares, utilities, and sewer are available.
 - Industrial development should be located in areas where soils are suitable, drainage is good, and the potential for ground water contamination is minimized.
 - The use of industrial parks should be encouraged. Such parks should be located where there is ample room to expand and conflict with residential areas is minimized.
 - Buffer industrial uses from residential areas and require appropriate landscaping and screening of each industrial park.
 - Industrial uses should be encouraged consistent with adjacent townships.

TRANSPORTATION

GOAL: Promote closer commercial and cultural connections between north and south Leoni Township.

Objective: Develop more energy efficient traffic flow; provide better access for emergency vehicles; improve access for citizens.

GOAL: Promote safe street conditions.

Objective: Whenever possible, adhere to the "complete streets" concept.

- Monitor new growth and interface with other government agencies including MDOT, Region 2 Planning Commission, and the Jackson County Road Commission.
- Determine availability of project funding.
- Work with state and county transportation experts to improve "thru-put" via lane changes, signage and signals.
- Develop new connector streets where possible.

Objective: Create a downtown identity, and a more vibrant business district.

- Utilize angle parking
- Streetscape
- Better utilization of existing public space.
- Improve pedestrian/ bicycle infrastructure.
- Improve parking infrastructure in the Michigan Center commercial/retail district

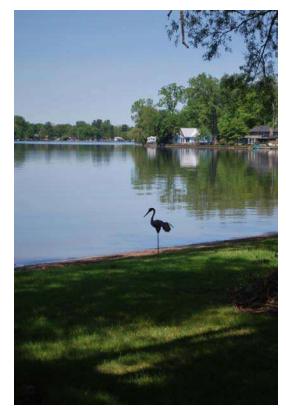
GOAL: Improve parking infrastructure at the township park/boat launch.

- Improve boat/trailer parking
- Pave boat launch parking area

IV. LAND USE PLAN

The Land Use Plan consists of descriptive text and an accompanying map that describe where land uses are encouraged to develop in the future. The land use plan map is not intended to reflect current zoning. Instead, the land use plan is intended to serve as a vision for the future development of the Township 20 years or more in the future.

The development of the land use plan map is based on many factors including the type and distribution of existing land uses, presence of natural features, and access to major transportation routes, convenience, and availability of public utilities. Community preferences and future needs must be considered, including the desire for a mixture of land uses and a balanced tax base. Often the plan goals, objectives, and strategies are the basis for decisions on location of future land uses. At other times, the goals were used in conjunction with other factors. Map 1 on the following page is the Leoni Township 2030 Land Use Plan map. The map indicates locations where several types of land use are to be encouraged. The general types of land uses are agriculture, residential, commercial, industrial, public/quasi-public, parks and recreation, and open space. Within each type of land use there may be sub-groups such as low-density residential and regional commercial.



Gilletts Lake

Land Use Plan Overview

Leoni Township has developed more intensely south of I-94. Areas of concentrated development include Michigan Center, W. Michigan Avenue, portions of Ann Arbor Road, and Page Avenue corridors. Much of the intensive development that has taken place is concentrated within small areas in the west central portion of the Township.

There remain several active farms in the township. It is a goal of this plan to encourage continued agricultural production on these farms. In addition, the land use plan features an "agricultural preservation areas" category that identifies active farming areas where soils are highly productive for crop production.

Protection and promotion of environmentally sensitive areas are goals of the plan. The importance of sensitive areas such as floodplains and wetlands to the community is recognized and protection of these resources is a benefit to the entire township. However, within areas

that have been identified as environmentally-sensitive there may be locations where lessintensive uses may be appropriate provided precautions are taken to minimize disruption of those features. It is not necessarily a goal of the plan to prohibit all use in these areas, rather to encourage uses which will have a minimum impact. There may be small areas within a mapped wetland unit where some type of use could coexist and benefit from the presence of a wetland. However, where site plans are required for certain uses, the site plan should show the wetland or floodplain boundaries and preservation of those sensitive systems will be required whenever possible.



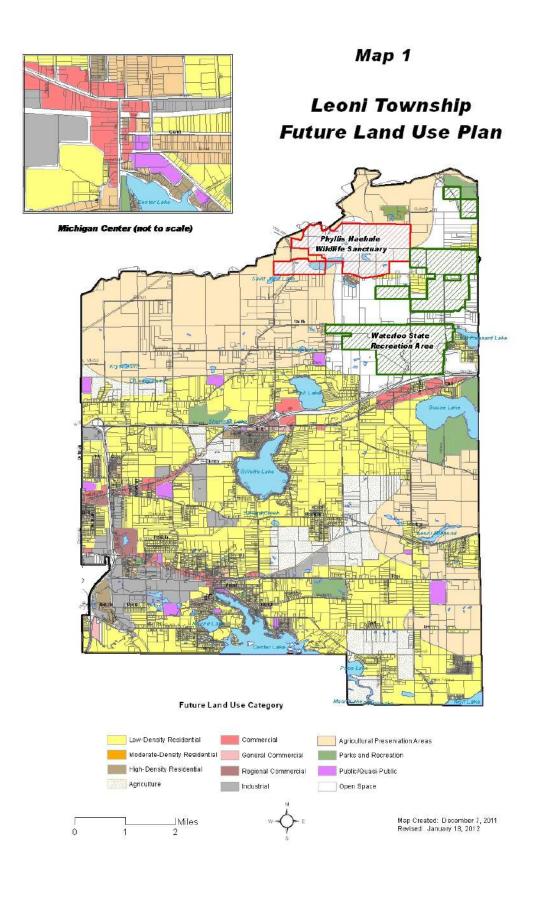
Leoni Township Park

Future Land Use Map Description

The township land use plan map identifies the following categories of future land use:

Residential	
 Low-density residential 	Agricultural preservation
 Moderate-density residential 	
 High-density residential 	
Commercial	
General commercial	Public and Quasi-Public
Commercial	
Regional commercial	
Industrial	Parks and recreation
Agriculture	Open space

Further information regarding the purpose and location of these categories is included in the following pages.



Residential

In Appendix A, the population of Leoni Township was projected to the year 2030. A growth range between negative 808 and 1,097 was projected for that year based on three methods with a mid-range growth projection of 723. Using the mid-range projection and the 2010 persons per household ratio of 2.52, a minimum of approximately 286 new housing units will be needed by 2030. The land use plan map has set aside more than enough land for residential purposes to accommodate this demand.

Residential Densities

Low-density residential development is proposed for much of the vacant land that remains in the Township. Based on the densities required in the Zoning Ordinance, low-density residential developments are considered single-family dwellings that are developed at no greater than 2.2 dwellings per acre where central sewers are available and no greater than 1 dwelling per acres where on-site septic systems are used^a. Moderate-density residential development is defined as those single-family and two-family developments that will not exceed 5.8^b dwellings per acre. High-density residential development is defined as those residential developments that may exceed 17.2^c dwellings per acre. High-density residential developments must be connected to a central water and sewage system.

Low-density residential development is encouraged throughout much of the south and west portions of the township in areas where a low-density residential development pattern has already been established. The low-density residential designation allows for expansion of these areas where appropriate due to such factors as adequacy of infrastructure, convenience, and a lack of conflicting land uses. Moderate-density residential densities are recommended in several areas to accommodate existing residential densities that are 3-4 dwellings units per acre. They are primarily found in the Michigan Center area including Michigan Center Lake, in several areas in proximity to US-127 on the west portion of the township, and a few small areas on Gilletts Lake, Brills Lake, and on Seymour Road south of the Phyllis Haehnle Wildlife Sanctuary. The high-density residential designation is provided for areas with residential densities of greater than 4 units per acre where infrastructure can accommodate higher intensities of residential land use. High-density residential areas are found on Michigan Center and Gilletts lakes, three manufactured housing facilities, and in several locations near Michigan Center.

^a Based on RS-1 (Suburban Residential) land density requirements from Section 42-271 of the Leoni Township Zoning Ordinance.

^b Based on R-1 (Single-Family Residential) land density requirements.

^c Based on R-4 (High-Density Residential and Office) density requirements.

Commercial

Much of the commercial development in Leoni Township has occurred along major transportation routes such as Page Avenue, E. Michigan Avenue, and Ann Arbor Road. Higher intensities of development have occurred in proximity to interchanges along I-94 and US-127. To accommodate future commercial growth, the plan has provided for future development along Ann Arbor Road and E. Michigan Avenue. An attempt has been made to cluster commercial development where businesses already exist and to limit strip commercial development by providing breaks where residential areas, natural features, and agricultural areas have been established.

Three types of commercial uses are found on the Land Use Plan map. Commercial areas are those types of commercial uses that provide commercial services to the surrounding area along major roads intended to serve the needs of Leoni Township and Jackson County. General commercial areas are found near highway interchanges near South Street and Sargent Road.

The regional commercial designation accommodates large-scale commercial developments located near highway interchanges along Page Avenue and near Sargent Road. Commercial uses in these areas are intended to draw customers from a large area including a vicinity outside of Leoni Township and Jackson County.

Industrial

Industry is important to Leoni Township. Industrial uses provide jobs for local residents and contribute significantly to the Township tax base. The Land Use Plan has combined both light and heavy industrial areas into a single industrial classification. It is conceivable that either type of industrial use could be appropriate in areas suggested for industrial development on the Map. However, where existing industry has already been developed, future development of surrounding property should be consistent with the existing type of industry in the area. If no industrial uses are currently located in the immediate area, the Township will consider the most appropriate industrial use for a site based on other factors such as surrounding uses, the availability of water and sewer, the road network and surrounding zoning.

Industrial areas have been reserved either to accommodate existing industrial uses or provide areas for future development. These areas are located along US-127 in proximity to interchanges at Page Avenue, South Street and E. Michigan Avenue; along Ann Arbor Road; and further east on Page Avenue.

Public and Quasi-Public

Several small areas are designated public or quasi-public. These areas include public uses such as township office and fire hall in Michigan Center, several cemeteries, schools, DPW structures, waste water treatment plants, and similar uses. The public/quasi-public designation also includes private uses such as churches and private schools. All of these areas are encouraged to continue on the Land Use Plan map.

Parks and Recreation

The parks and recreation designation accommodates various campgrounds and golf courses in Leoni Township. These facilities are all privately owned and are encouraged to continue to provide the residents of Leoni Township with recreation opportunities.

Open Space

The open space areas consist of very-low density residential uses and wetlands in the vicinity of the Waterloo Recreation Area in the northeast corner of the township.

V. PLAN IMPLEMENTATION

The successful pursuit of plan goals requires aggressive implementation strategies. The purpose of this Chapter is to identify the means by which the plan is to be implemented and follows upon the previous section of the plan regarding goals, objectives and strategies. Some of the major planning topics are described in the following paragraphs.

Preserving Natural Resources

One of the goals of the plan is to preserve the natural features of the township. Development standards should be created to encourage that natural features and open space be set aside and protect sensitive environmental features such as wetlands, floodplains, woodlands, areas of steep slopes, and groundwater recharge areas. These standards should be adopted as part of site plan review, planned unit development regulations, and subdivision and site condominium approval process.

Plan Publicity

The plan should be brought to the forefront. Development proposals (e.g. site plans, subdivisions, site condominiums) were created and presented to the Planning Commission without taking the preferences of the Planning Commission into consideration. Several means have been identified to publicize this Plan including placement on the Township web site, distribution of an electronic version of the Plan to developers, pre-application meetings, brochures, development of an executive summary, and creation of checklists to guarantee adherence to Plan objectives.

Keeping the Plan Current

The Michigan Planning Enabling Act requires that the Plan be reviewed and evaluated a minimum of once every five years. It is recommended that the plan be reviewed at a minimum of once per year and evaluated for consistency with existing land use development trends. The Planning Commission should keep up with current trends with periodic reviews of building permit activity, variance requests, conditional use requests, rezoning requests, population estimates in relation to population projections, and other available information. With the American Community Survey from the U.S. Census Bureau, some demographic and housing data will be made available on a more frequent basis than in the past.

Compliance with the Planning and Zoning Enabling Statutes

The Michigan statutes related to planning and zoning - P.A. 33 of 2008 and P.A. 110 of 2006, respectively, list a number of planning, zoning, and administrative duties for township planning commissions. Become familiar with the requirements of these statutes and incorporate these into a standard operating procedure.

Maintenance of the Zoning Ordinance

The Zoning Ordinance is the most important and commonly-used tool to implement the Plan. The Zoning Ordinance should be reviewed initially for consistency with the Plan and reviewed periodically in relation to the goals. Among the Zoning Ordinance measures that should be considered to implement the plan are overlay zoning districts for such purposes as natural features preservation, corridor development, mixed use zoning, commercial corridor enhancement, and historic preservation.

Subdivision and Condominium Regulations

Subdivision and condominium ordinances are helpful in achieving residential development as desired by the township. These ordinances should be developed in order to provide effective standards that will result in high quality, attractive developments with adequate buffer zones.

Capital Improvements Plan/Program

A capital improvements programs, together with an annual capital improvements program, is important in linking capital expenditures to the furtherance of the Master Plan.

ZONING PLAN

What is a Zoning Plan?

One of the purposes of the Leoni Township Master Plan is to serve as a basis for the Zoning Ordinance. To that end, the Plan contains a special element known as a "Zoning Plan". According to the Michigan planning and zoning enabling acts, zoning plans are intended to describe the various zoning districts controlling area, bulk, location, and use of buildings and property. The zoning plan includes an explanation of how the land use categories on a land use plan map relate to the zoning districts provided on the zoning map.

While the zoning plan is intended to promote zoning that is consistent with the land use plan, it should be kept in mind that the zoning ordinance has a short-term focus of up to five years and the master plan has a long-range focus of 20 or more years in the future. Accordingly, not all areas on the land use plan map should be rezoned until growth indicates the need for zoning changes and/or infrastructure is in place to service new development.

Zoning Districts

The Leoni Township Zoning Ordinance currently divides the Township into the following zoning districts (see Zoning Map on the following page). The districts fall into the general categories of open districts, residential districts, commercial districts, and industrial districts.

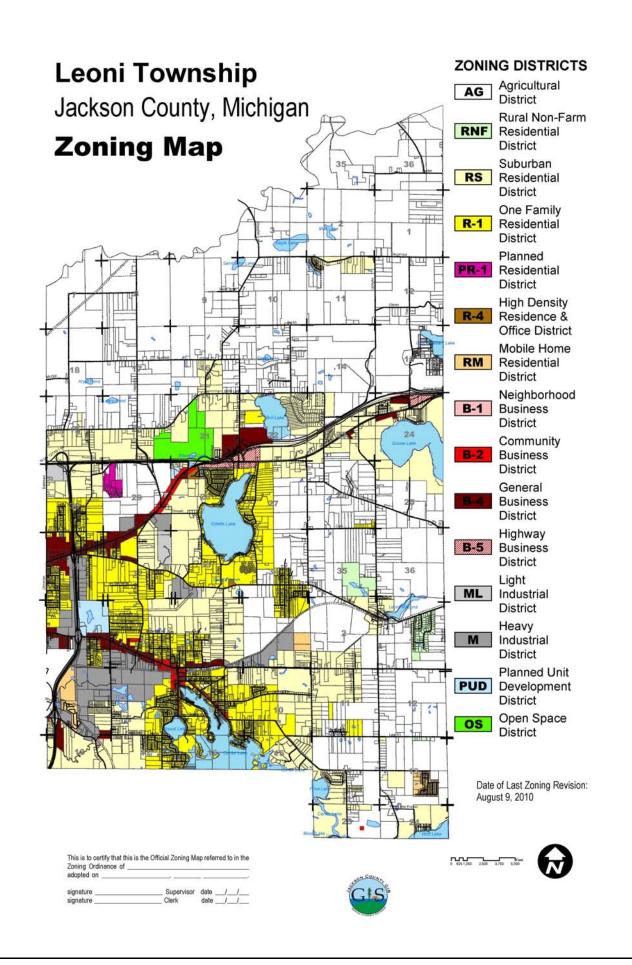
Open Districts

Open Space District (OS). This district is composed of areas of the township well suited to open space and recreational land use. The regulations governing this district are designed to retain lands which are environmentally sensitive or provide for the recreational pursuits of township residents. Permitted land uses are generally those in support of public interests of open space and recreation.

Agricultural District (AG). This district is composed of areas of the township suited to agricultural land use. The regulations governing this district are designed to retain and preserve farmland and farm dwellings, while providing transition from open space areas and rural non-farm residences.

Residential Districts

Rural Non-Farm Residential District (RNF). This district is established to provide suitable areas for single-family dwellings at low densities to preserve a predominately rural character in these areas fit for concentrated residential use because of the ability of the soil to absorb sewage wastes from individual septic tanks.



Suburban Residential District (RS). The RS district is intended to accommodate single-family dwelling units and compatible land uses at densities that are slightly higher than the RNF district. The availability of central sewer supplies is not a pre-requisite of the RS district.

One Family Residential District (R-1). The R-1 district is composed of low density, single-family residential development and other uses which are compatible with the intent to stabilize, protect and encourage the residential character of the district.

Planned Residential District. The Planned Residential District (PR-1) is intended to provide flexibility within the design and development of (primarily) single family housing consistent with the density established for the One-Family Residential District (R-1).

While standard zoning and subdivision practices are appropriate for the regulation of residential land use in areas or neighborhoods that are already substantially developed, these controls can hinder the creation of attractive, safe, and affordable housing in developing areas of the township. Therefore, this district is intended to permit enough flexibility in development design so as to allow the development of housing which benefits from modern design techniques while adhering to general standards of character and density.

High Density Residence and Office District (R-4). The R-4 district is composed of the older and higher density residential areas plus some open areas where the intermingling of one, two and multiple family dwellings with professional offices, clubs and specified home occupations may be developed for apartments, offices, clubs and headquarters for group organizations. All of these types of use will be encouraged provided adequate parking space and the essential residential character of the district is maintained.

Mobile Home Residential District (RM). This district is composed of residential development within mobile home parks or plats where three (3) or more mobile homes are located on contiguous lots within a planned development regulated by the State of Michigan Mobile Home Commission Act (Act 96 of 1987) and the rules established by the Mobile Home Commission, as amended. Such development shall be connected to a central water supply system and a central sanitary sewerage system as approved by the Jackson County Health Department.

Commercial Districts

Neighborhood Business District (B-1). The B-1 district is composed of certain land and structures used primarily to provide for the selling at retail of "convenience goods" in the grocery, hardware and drug store, and to furnish "services" such as beauty shops, barber shops, selfservice laundromats, eating places and others of a similar nature. This district is small, usually located at the intersection of two highways or streets and serves the immediate neighborhood. The regulations are designed to encourage uses and services needed from day to day and to protect surrounding residential districts against the encroachment or infiltration of business enterprises. Community Business District (B-2). This district is composed of certain land and structures used not only to provide all of the types of "convenience goods and services" found in the B-1 District, but in addition provide a greater number of business enterprises as to type, variety or service offered. These would include supermarkets, discount stores, household furnishings, major appliance stores, junior department stores, variety stores, garden supply centers, and banks. This district is encouraged to provide the types of goods and services that will attract customers from the entire com-munity. Regulations are designed to permit growth of the enumerated uses and services and limited only by standards which will give protection to adjacent businesses and industrial or residential districts.

General Business District (B-4). The B-4 district is composed of certain land and structures used to provide for the retailing and wholesaling of goods, warehousing facilities, trucking facilities and limited fabrication of goods. When any of these types of enterprises are permitted, they are to be regulated in a manner that will protect the abutting residential districts, provide reasonable compatibility with each other and prevent further "strip" zoning along major thoroughfares.

Highway Business District (B-5). The B-5 district is intended to provide for various commercial establishments offering accommodations, supplies, and services to local as well as through automobile and truck traffic. These districts should be prepared at locations along major thoroughfares or adjacent to the interchange ramps of a limited access highway facility and should encourage grouping of various facilities into centers and discourage dispersion of these activities.

Industrial Districts

Light Industrial District (ML). This district is composed of those areas of the Township whose principal use is and ought to be light manufacturing and other limited industrial uses. These uses generate a minimum of noise, glare, odor, dust, vibration, air and water pollutants, fire, explosive and radioactive hazards, and other harmful or obnoxious matter. This district has been located within the Township to permit the development of these industrial uses, to protect adjacent agricultural, residential, and commercial areas against the encroachment of incompatible uses, and to lessen congestion of public streets and highways. To these ends, certain uses which would function more effectively in other districts and would interfere with the operation of these industrial activities and the purpose of this district, have been excluded.

Heavy Industrial District (M). The M district is designed to provide suitable space for industrial operations of all types that can comply with all provisions of this Ordinance and can assure protection of the public interest and surrounding property and persons.

Dimensional Standards

Bulk, height, and setbacks for each district are included in the zoning ordinance. The following table summarizes the current bulk, height, and setback requirements.

Zoning District	Zoning Symbol	LOT REQUIREMENTS		MAXIMUM ALLOWED DENSITY	MINIMUM YARD REQUIREMENTS		MAXIMUM BUILDING HEIGHT REQUIREMENT (See 2.2.10)		REMARKS		
		Minimum Lot Areas	Minimum Lot Width	Maximum Lot Coverage	(Dwelling Units per Gross Acre)***	Front	Side	Rear	Principal	Accessory	REIVIARIS
Agricultural	AG	<u>2 acres</u> 5 acres	200'	10%	<u>0.5</u> 	60'	30' 60'*	50'	2. story or 35'	80'	Single-Family detached dwelling. All other uses.
Rural Non-Farm Residential	RNF	<u>1 acre</u> 2 acres	150'	20%	<u>1.0</u> 	60'	20' 60'*	35'	2. story or 30'	12'	Single-family detached dwelling. All other uses.
Suburban Residential	RS	<u>20,000 sq. '</u> 1 acre	<u>75'</u> 120'	25%	4.3	35'	10' 25' tot. 35'	20'	2. story or 30'	12'	Single-family detached dwelling with <u>central sewage.</u> All other uses.
Single Family Residential District	R1	<u>7,500 sq.'</u> 20,000 sq. '	<u>60'</u> 100'	25%	<u>5.8</u> 	25'	10' 25' tot. 35'*	25'	2. story or 30'	12'	Single-family detached dwelling with <u>public sewer.</u> All other uses.
High Density Residential and Office District	R-4	<u>10,000 sq. '</u> <u>15,000 sq. '</u> 1/2 acre	200'		<u>4.3</u> 17.2	25'	25' tot. 35'*	25'	35'	12'	Two-family detached dwelling 15,000 sq. ft. first three (3) dwellings plus. <u>3,000 sq. ft. for ea. add'l. dwelling</u> All other dwellings.
Planned Residential Development	PR-1	(See PR-1 Dis- trict)							None		
Mobile Home Residential***	RM	For Mobile Home Parks:	 8.7	20' 8' tot.	25' 10' tot.	20' 8' tot.	1 story or 15'	12'	See MH-1 District	Minimum Site size of a Mobile Home <u>Park.</u> Mobile home site within a Mobile Home Pk.	
Neighborhood Business	B-1	<u>10,000 sq. '</u> <u>15,000 sq. '</u>	<u>80'</u> 100'	25%		35'	20' 35'*	35'	25'	25'	With central sewage and water <u>systems.</u> Without central sewage and water system.
Community Business	B-2	<u>10,000 sq. '</u> <u>15,000 sq. '</u>	<u>80'</u> 100'	25%		35'	20' 35'*	20'	35'**	35'**	With central sewer and water <u>systems.</u> Without central sewage and water systems.
General Business	B-4	<u>10,000 sq. '</u> <u>15,000 sq. '</u>	<u>80'</u> 100'	25%		35'	20' 35'*	20'	35'**	35'**	With central sewer and water <u>systems.</u> Without central sewage and water systems.
Highway Business	B-5	25,000 sq. '	100'	25%		35'	20' 35'*	20'	35'	35'****	
Light Industrial	ML	20,000 sq. '	100'	25%		35'	20' 35'*	35'	35'	35'	
Heavy Industrial	М	3 acres	300'	25%		50'	60'	60'	35'	35'	

SECTION 42-271 - DISTRICT AREA, YARD, HEIGHT, AND BULK REGULATIONS

Corner Lot.

*

** (See 4.6.4B) One additional foot of side, rear, and front yard setback required for every one foot of building height over 25 feet if any part of the lot abuts a residential district.

*** Maximum allowed density (dwelling units per gross acre) represents density per acre (43,560 sq. ft.), inclusive of streets, parks, all other land uses.

**** 17.2 units for the first acre, plus 21.7 units per acre for each additional acre.

***** Does not include signs.

Rezoning Criteria

The most common application of the land use plan is during the rezoning process. Accordingly, a rezoning should be required to meet set criteria in order to be considered consistent with the land use plan. The following standards satisfy this requirement:

Is the proposed rezoning consistent with the policies and uses proposed for that area in the Master Plan?

Will all of the uses allowed under the proposed rezoning be compatible with other zones and uses in the surrounding area?

Will public services and facilities be significantly adversely impacted by a development or use allowed under the requested rezoning?

Will the uses allowed under the proposed rezoning be equally or better suited to the area than uses allowed under the current zoning district?

Relationship to the Land Use Plan Map

The remainder of this section equates the various zoning districts included on the zoning map with the various categories included on the land use plan map.

Agriculture and Agricultural Preservation Land Use Plan Designations

The agricultural and agricultural preservation plan designations take in active farms including areas identified as agricultural preservation areas in the Jackson Community Comprehensive Plan. For the most part these map designations will be implemented with the AG zoning district.

Residential Land Use Plan Designations

The following residential designations are included on the Land Use Plan Map:

Low-Density Residential. Low-density residential development is encouraged throughout much of the south and west portions of the township in areas where a low-density residential development pattern has already been established. The following zoning districts can be used to implement the low-density residential land use plan designations:

- RNF Rural Non-Farm Residential
- RS Suburban Residential

Moderate-Density Residential. Moderate-density residential densities are recommended in several areas to accommodate existing residential densities that are 3-4 dwellings units per acre. The following zoning districts are intended to implement the moderate-density land use plan designation:

- RS, Suburban Residential District
- R-1, Single-Family Residential District
- PR-1, Planned Residential District

High-Density Residential. The high-density residential designation is provided for areas with residential densities of greater than four units per acre where infrastructure can accommodate higher intensities of residential land use. This plan designation is primarily intended to be implemented using the following two zoning districts:

- R-4, High-Density Residential and Office District
- RM, Mobile Home Residential District

Commercial Land Use Plan Designations

The following commercial plan designations are included on the land use plan map.

Commercial. Commercial areas are those types of commercial uses that service the Surrounding area along major roads intended to serve the needs of Leoni Township and Jackson County. It is anticipated that the following zoning districts will be used to implement the commercial land use plan designation:

- B-1, Neighborhood Business District
- B-2, Community Business District

General Commercial. The general commercial planning areas indicated on the future land use map are to be implemented using the following zoning districts:

• B-4, General Business District

Regional Commercial. Commercial uses in these areas are intended to draw customers from a large area including the area outside of Leoni Township and Jackson County. The following zoning district is to be used to implement the regional commercial land use plan designation:

- B-4, General Business District
- B-5, Highway Business District

Industrial Land Use Plan Designations

The industrial land use plan designation is to be implemented with the use of the following zoning districts:

- ML, Light Industrial District
- M, Heavy Industrial District

Public and Quasi-Public Plan Designation

No zoning district has been designated to implement this plan designation. Instead, uses that fall under this category are allowed in most zoning districts either as a permitted or conditional use.

Parks and Recreation Plan Designation

The parks and recreation designation is to be carried out with the use of the following zoning district:

• OS, Open Space

Open Space Plan Designation

The open space areas consist of very-low density residential uses and wetlands in the vicinity of the Waterloo Recreation Area in the northeast corner of the township. The open space designation is to be carried out with the use of the following zoning district:

• OS, Open Space

CAPITAL IMPROVEMENTS PROGRAM (CIP)

What is a Capital Improvements Program?

Capital improvements are investments in those physical facilities which involve a substantial investment and are of a more lasting nature, as opposed to the operating expenses which occur during the same year they are budgeted. Examples of capital improvements include: municipal buildings (e.g., township Hall, fire stations), parks and recreation facilities, streets and alleys, and utilities (e.g., water and sewer lines). A capital improvements program (CIP) is a six-year prioritized listing of those projects which often includes the following information: project location, date of construction, project cost, means of financing, sponsor, and relationship to other facilities. The CIP is updated annually with the first year being the current year capital budget.

Why Prepare a Capital Improvements Program?

The Michigan Planning Enabling Act (MPEA) requires planning commissions to annually prepare a capital improvements program upon the adoption of the master plan unless exempted by the township board. If the planning commission is exempted, the township board is required to prepare and adopt a capital improvements program separate from or as a part of the annual budget, or delegate the preparation of the capital improvements program to the township supervisor or a designee subject to final approval by the township board.

The CIP indicates those public structures and improvements, in the general order of their priority that, in the judgment of the Planning Commission, will be needed or desirable and can be undertaken within the ensuing six-year period. The improvements are to be based upon the requirements of Leoni Township for all types of public structures and improvements. Upon the request of the planning commission, each township department with authority for public structures or improvements is required to furnish with lists, plans, and estimates of time and cost of those public structures and improvements.

Among the benefits of creating a CIP is the coordination of seemingly disparate projects. For example, water and sewer projects can be coordinated with street paving projects eliminating the potential for streets to be repaved, only to be torn up to for a water or sewer project two or three years later. New public works projects that are identified in the master plan can come to fruition through the CIP process which is intended to ensure that new public facilities are built in locations and consistent with the public policy for development in particular areas or neighborhoods as spelled out in the master plan.

Developing a Capital Improvements Program

The following information should be used to develop the (CIP) upon the completion of the master plan:

Establishing Objective Criteria

Without objective criteria for rating proposed projects, the capital improvements review process can quickly break down. Simply ranking proposed projects with subjective labels such as "urgent", "important", or "desirable" can leave room for disagreement in determining priority. Rather, it is recommended that a set of objective criteria, such as the list that follows, be considered for examining the merit of each proposed capital improvements project:

- Does the project advance the goals of the Master Plan?
- Does the proposed facility address a risk to public safety or health?
- Is the current facility deteriorated or unsafe?
- Is the proposed facility part of a systematic replacement program?
- Will the proposed facility result in improvement of operating efficiency?
- Is the proposed facility necessary to:
 - Ensure the success of another capital improvement?
 - Meet a state or federal statutory or administrative requirement?
 - A court order?
 - A major public goal of the legislative body?

- Will the proposed facility result in the equitable provision of services or facilities to a part of the population with special needs?

- Will the proposed facility protect or conserve sensitive natural features or natural resources or the air or water quality of Leoni Township?

- Will the proposed facility protect the investment in existing infrastructure from becoming over capacity?

- Will the proposed facility result in a new or substantially expanded facility to provide a new service or new level of service in Leoni Township?

Those answers can then be used to place proposed facilities into groups based upon the following criteria:

- The proposed facility is urgent and fills a high priority need that should be met.
- The proposed facility is a high priority that should be done as funding becomes available.
- The proposed facility is worthwhile if funding is available (but may be deferred).
- The proposed facility is a low priority that is desirable but not essential.

Establishing a Process

Once the criteria are put in place, the Township could consider using the Planning Commission as-a-whole or establish an advisory committee to provide recommendations regarding capital improvement projects. Though the committee itself or the composition of the committee is not mandated by the MPEA, it might consist of members of the Planning Commission, township supervisor, other township board members, and representatives from the pertinent township departments. The role of the committee is to advise the Planning Commission which in turn advises the Township Board during the budget development process.

APPENDICES

- A. Community Profile
 - A1. Population and housing
 - A2. Natural features
 - A3. Transportation and circulation
 - A4. Utility coverage
 - A5. Public facilities
 - A6. Land use trends
- B. Public Participation
 - B1. Citizen survey summary
 - B2. Public hearing
- C. Michigan Planning Enabling Act Requirements
 - C1. Notice of intent to plan
 - C2. Resolutions of approval

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APPENDIX A COMMUNITY PROFILE

The purpose of the community profile is to provide information about the community for which the Plan is being created. This examination of township demographics, housing trends, land use, natural features, transportation, and community services provided the Planning Commission with an opportunity to chart a course that encourages desirable aspects of Township facilities and quality of life, but also promotes change when necessary.

There are many influences on population growth and decline - both internal (e.g. fertility, migration, mortality) and external (e.g. regional population trends). In many cases, it is well to review regional trends and compare Leoni Township with others communities in the County and State. Included with the demographic information to be considered are population trends, group quarters population, age, education, occupation, income, commuting, race, and disability status. To provide an estimate of expected growth, the population of the Township is projected to the year 2030. Population data are reviewed in Appendix A1.

Housing is highly influenced by the people who live in a community. The type of jobs people have, their income, marital status, and age are among the important factors that play into the type of housing that is desired. Among the housing data provided is the number of housing units, renter vs. owner units, housing type, age of housing stock, and housing costs. The Township housing stock is examined in Appendix A2.

The natural features of a community play a vital role in determining current and future land use patterns. Physical features including topography, geology, soils, and floodplains are examined to determine how they shape future development patterns. The natural features of Leoni Township are described and mapped in Appendix A3.

Similarly, the current land use pattern and land use trends have resulted from a variety of influences including the location of natural features as well as such factors as transportation routes, location of the community relative to other centers of population, history of settlement, location of sewer, water, and electric utilities, availability of suitable soils for septic systems, and availability of groundwater supplies. The result of these factors in shaping the development pattern is examined in Appendix A4.

The transportation and circulation systems of a community play an important role in community development. Information regarding road functional classification, traffic volumes, airports, and rail availability are presented in Appendix A5.

Finally, a community needs to provide services of all kinds for the welfare of its residents. Community services include utilities, emergency services, schools, and parks are described in Appendix A6.

A1. Population

Appendix A1 examines the demographics of Leoni Township. Information is presented on population trends, group quarters population, migration, household population, household size, age structure, education, income, employment, and population projections. Unless otherwise stated, the U.S. Census Bureau is the source of all population statistics in this Chapter.

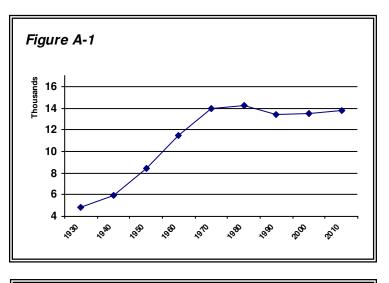
Population Trend

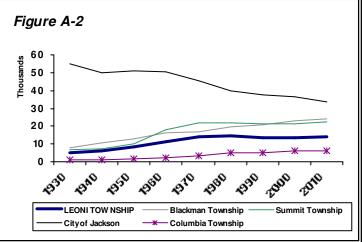
The population of Leoni Township was 13,807 in 2010. This was a 2.6% increase from the population in 2000, and greater than the 0.2% growth rate during the 1990's. Though modest, the growth occurred in spite of a sluggish state and national economy.

While growth rates have varied from decade to decade, Leoni Township population has risen since 1930 at which time it stood at 4,794. As shown in Figure A-1, growth was continual from 1930 through 1980 when the peak population was reached. After1980, the population declined slightly in 1990 and has increased slightly to the most recent population level.

Comparative Population Growth

Table A-1 and Figure A-2 illustrate the comparative growth rate among selected Jackson County townships and the City of Jackson. The three townships that surround the City of Jackson - Blackman, Leoni, and Summit - have shown similar patterns of growth over the decades. That is, all three had a close range of populations in 1930 and had proportionately similar populations in 2010. Meanwhile the City of Jackson began with a stable population from 1930-1960 but has steadily lost population since that time.





Community	1930	1940	1950	1960	1970	1980	1990	2000	2010
Leoni Township	4,794	5,918	8,468	11,430	13,953	14,259	13,435	13,459	13,807
Summit Township	6,754	7,177	10,215	18,101	21,754	22,113	21,230	21,534	22,508
Columbia Township	1,097	1,159	1,744	2,360	3,369	4,871	5,253	6,058	6,214
City of Jackson	55,187	49,656	51,088	50,720	45,484	39,739	37,425	36,316	33,534
Blackman Township	7,583	10,401	12,903	16,060	16,997	19,741	20,492	22,800	24,051

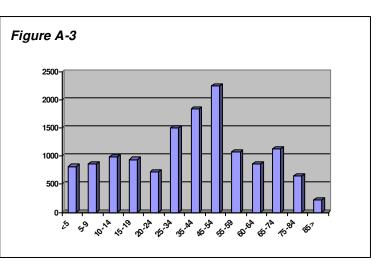
Table A1 - COMPARATIVE POPULATION GROWTH, 1930-2010

Source: U.S. Census Bureau

By contrast, Columbia Township (and other rural townships in Jackson County) has experienced significant growth in recent decades. While rural townships saw little or no growth through the 1950's, the 1960's began a period of increasing growth, greater than other types of communities. Some of this growth in rural townships is attributed to losses in urban areas. In Jackson County, rural communities in the eastern portion of the County have tended to experience greater growth than other areas. In the past, growth communities tended to have the characteristics of proximity to population centers, transportation routes, cultural activities, public facilities, schools, and place of work. While these factors remain important, recent trends have shown that there are new factors in play in determining place of residence such as rural atmosphere, low rural residential density, and the increased availability of community services in rural areas.

Age Structure

Age is an important factor in determining the needs of residents now, and in the future. The age of the population determines such demographic factors as the number of retirees, school-age children, employees, and fertility ratios. The study of age patterns can be useful in planning for recreation, education, services for the elderly, and other services. Figure A-3 provides the age pattern in Leoni Township for the year 2010. The table indicates that the age brackets associated with the baby boom are now reaching retirement age.



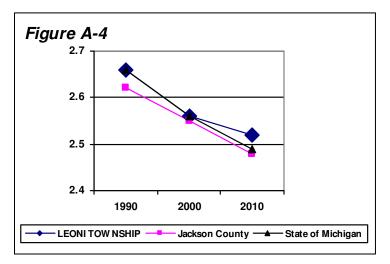
Another indicator of the age of a community is the trend in the median age. The median age the age at which half of the residents are older and half younger - increased in Leoni Township from 34 in 1990 to 41 in 2010. The increasing median age is a phenomenon that will continue as senior citizens make up a larger percentage of the population. Due to a decreased birth rate and relatively few women of child-bearing age, the number of school age children has not increased in proportion to population gains.

Household Population

According to the Census Bureau definition, households are categorized into families and nonfamilies. A family is a group of individuals that are related and live in the same home. A family can consist of a two-parent home or a one- parent home. A non-family consists of a person living alone or with a group of unrelated individuals in the same welling. The total number of households in Leoni Township was 5,487 in 2010 with 3,859, or 70% of households being families and 1,628, or 30% being non-families. Of the non-family households, 1,310 contained persons living alone of which 545 were senior citizens. The number of people living alone has the potential to increase in future years with an influx in the number of senior citizens as a result of the baby boom.

Household Size

For decades the average household size in most areas in the United States has been declining. The rate of decline in Leoni Township is similar to those of Jackson County and the State of Michigan. In 1990, the average number of people per household in Leoni Township was 2.66. By 2000, the number had declined to 2.56 and 2.52 in 2010. Figure A-4 shows how the trend for average household size in Leoni Township compares to the County and State.



Among the reasons for smaller household size are the large number of households with residents that live alone, a large number of rental units, and a large number of residents who remain single or choose to delay having children. The result of the relatively low persons per household ratio is that more dwellings are needed to house an equivalent number of people.

Education

The residents of Leoni Township have followed a national trend toward achievement of higher levels of education. In 1990, for example, the percentage of residents, 25 years of age and older, who achieved at least a high school education was 76%. By 2010, this percentage had increased to 84%.

The largest recent increases in educational attainment are those residents who have a college education. Of the 9,136 people in Leoni Township age 25 years and above from 2006-2010, 4,242, or 46%, attended college at some point. Of the number who attended some level of college, 2,033 did not yet receive a degree while the remaining 2,209 possessed an associate's degree, bachelor's degree, or a graduate or professional degree.

From 2006-2010, there was an average of 3,974 pupils 3 years and over enrolled in school in Leoni Township. Nearly 2,755 of these students were attending elementary or high school. Portions of three school districts are contained within Leoni Township – the Michigan Center School District, the East Jackson Community School District, and the Grass Lake Community School District.

Income

In spite of a sluggish economy in this decade, income in Leoni Township has increased. Reasons for the increase include higher levels of education, cost-of-living rises, and an increased standard of living. Table A2 provides an income comparison among Leoni Township, surrounding communities, Jackson County and the State of Michigan in the period from 2000 through 2010.

During the 2000's, the per capita income level rose in Leoni Township by 6.5%. While the increase would be considered modest in most decades, the rate surpassed several townships and the City of Jackson. Income levels in Leoni Township remain below the county and state and lost ground on those entities during the decade. Meanwhile, household income levels increased at a higher rate in the Township.

Community	Per Capita Income		% Change	Median HH Income		% Change
Community	2000	2010	2000-2010	2000	2010	2000-2010
LEONI TOWNSHIP	\$19,329	\$20,584	6.5%	\$43,551	\$48,088	10.4%
Blackman Township	\$18,708	\$16,904	(9.6%)	\$40,286	\$38,571	(4.3%)
Summit Township	\$25,738	\$27,459	6.7%	\$50,492	\$52,559	4.1%
City of Jackson	\$15,230	\$16,697	9.6%	\$31,294	\$30,641	(2.1%)
Rives Township	\$22,942	\$21,610	(5.8%)	\$53,819	\$53,488	(0.1%)
Sandstone Township	\$22,622	\$27,936	23.5%	\$50,396	\$63,105	25.2%
Tompkins Township	\$17,094	\$21,277	24.5%	\$43,203	\$43,079	(0.3%)
Henrietta Township	\$19,904	\$25,986	30.6%	\$48,517	\$59,570	22.8%

Table A2 - INCOME GROWTH FOR SELECTED POPULATIONS, 2000-2010

(continued)

Community	Per Capita Income		% Change Median H		IH Income	% Change
Community	2000	2010	2000-2010	2000	2010	2000-2010
Spring Arbor Twp.	\$19,622	\$22,858	16.5%	\$51,770	\$60,291	16.5%
Jackson County	\$20,171	\$21,947	8.8%	\$43,171	\$46,117	6.8%
State of Michigan	\$22,168	\$25,135	13.4%	\$44,667	\$48,432	8.4%

Source: U.S. Census Bureau

Employment

Two aspects of employment in Leoni Township are considered here - employment by occupation and employment by industry. Occupation is a description of the type of work that an employee performs while employment by industry describes the sector that an employer falls into. Table A3 provides employment and occupation data for Leoni Township and compares the Township to Jackson County.

As the table shows, the employment pattern in Leoni Township is similar to Jackson County with occupational and industry figures within ten percent of one another. The largest difference is in the 'other services' category where Leoni Township had an 8% advantage over Jackson County. Occupational sectors in which Leoni Township has a large advantage over Jackson County include 'sales and office' while the County has a significantly larger percentage of employees in the 'management and professional' category.

Occupation/Industry	Leoni	% of Twp.	Jackson	%. of Cty.
OCCUPATION	Township	Total	County	Total
Management, professional and related	1,311	21.6%	19,587	28.8%
Services	1,018	16.8%	12,855	18.9%
Sales and office	1,832	30.2%	17,312	25.5%
Natural resources, construction, and maintenance	646	10.7%	6,048	8.9%
Production, transportation, and material moving	1,250	20.6%	12,144	17.9%
Total	6,057	100.0%	67,946	100.0%
INDUSTRY				
Agricultural, forestry, fishing and hunting, and mining	31	0.5%	645	1.0%
Construction	465	7.7%	3,752	5.5%
Manufacturing	1,180	19.5%	12,774	18.8%
Wholesale trade	240	4.0%	2,056	3.0%
Retail trade	947	15.6%	8,048	11.8%
Transportation and warehousing, and utilities	278	4.6%	3,455	5.1%
Information	159	2.6%	1,174	1.7%
Finance, insurance, real estate, and rental and leasing	182	3.0%	3,216	4.7%
Professional, scientific, management, administrative, and waste management services	377	6.2%	5,050	7.4%
Educational, health and social services	1,138	18.8%	15,703	23.1%

Table A3 - EMPLOYMENT BY OCCUPATION/INDUSTRY, 2010

(continued)

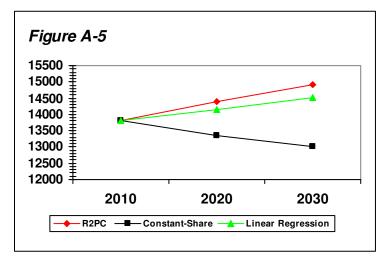
Occupation/Industry	Leoni Township	% of Twp. Total	Jackson County	%. of Cty. Total
Arts, entertainment, recreation, accommodation and food services	477	7.9%	5,052	7.4%
Other services (except public administration)	315	13.1%	3,281	4.8%
Public administration	268	4.4%	3,740	5.5%
Total	6,057	100.0%	67,946	100.0%

Source: U.S. Census Bureau

Workers in a so-called "bedroom community" in which many people reside but in which few jobs are available are likely to have long trips to work because few jobs are available locally. As of 2010, 1,022 workers, or 17% of the Leoni Township workforce, worked within the Township and the remaining 4,907 worked elsewhere. Though there are a significant number of jobs available in the Township, the recent trend has been for workers to travel longer distances to get to their place of employment. The average travel time to work in Leoni Township in 2010 was 21 minutes which was slightly less than the county average commute of 23 minutes. While most workers spend less than 30 minutes traveling to work, there is an increasing number that spend over a half-hour both to and from work. However, increasing fuel costs could reverse this trend in the future.

2030 Population Projection

Based on current trends, the population of Leoni Township was projected to 2030 using three separate forecasting methods. Based on this analysis, the population of the Township is projected to increase to lie somewhere between 12,999 and 14,904 by that year. The actual population figure is more likely to fall somewhere in the middle of these extremes. The three population projection methods are presented in Figure A5 and Table A4 and described in the following paragraphs:



- 1. Region 2 Planning Commission (R2PC) and the Michigan Department of Transportation have combined to provide population projections for the Township for the future transportation planning model. This model projects a future year population of 14,903 for year 2030.
- 2. The *constant-share* method assumes that Leoni Township will maintain a constant proportion of the Jackson County population in 2010, or 8.6%. This method takes ad-

vantage of the fact that population projections are more accurate for larger populations such as on the county or state level. Caution is advised when using this method because Leoni Township has been growing at a faster rate than Jackson County over the last few decades. Based on this method, the 2030 projection for Leoni Township is predicted to be 12,999.

3. *Linear regression* assumes that the Township will continue to grow at the same rate as it did between 2000 and 2010. The annual rate of increase for that period was about 0.26%. Based on this method, the 2030 population projection for Leoni Township is 14,530.

The R2PC projection predicts that the population of the Township will rise at the highest rate through 2030, the linear regression method produces a lower rate of increase, and the constant-share method predicts a population loss. A number of factors will influence future population growth in the Township including infrastructure improvements and economic conditions in the State and County. Population growth should be monitored with the use of available data including building permits for new residential construction, infrastructure improvements, census bureau population estimates, and the knowledge of the Planning Commissioners regarding growth in the area.

Method	2010	2020	2030	Change, 2010-2030
R2PC projection	13,807	14,404	14,904	1,097
Constant-Share	13,807	13,341	12,999	(808)
Linear regression	13,807	14,164	14,530	723

Table A4 - POPULATION PROJECTIONS, 2010-2030

Sources: US Census Bureau and Region 2 Planning Commission projections

A2. Housing

Appendix A2 examines the Leoni Township housing stock and trends in housing development. Trends in the number of housing units, types of housing, occupancy and tenure, age of housing stock, and housing affordability are considered.

Housing Trends

In 2010, there were 6,073 housing units in Leoni Township which was an increase of 9% from the 2000 total of 5,568. Table A5 provides the housing trends in Leoni Township during the 1990's and 2000's in comparison with other area communities. As the table indicates, housing development in Leoni Township has taken place at a relatively rapid rate in the last few decades.

Community	1990 housing units	2000 housing units	% change 1990-2000	2010 housing units	% change 2000-2010
LEONI TOWNSHIP	5,291	5,568	5.2%	6,073	9.1%
Blackman Township	6,202	6,921	11.6%	8,746	26.4%
Summit Township	8,288	9,109	9.9%	9,934	9.1%
City of Jackson	15,689	15,241	(2.9%)	15,457	1.4%
Rives Township	1,454	1,745	20.0%	1,894	8.5%
Sandstone Township	1,168	1,358	16.3%	1,586	16.8%
Tompkins Township	814	1,032	26.8%	1,111	7.7%
Henrietta Township	1,489	1,753	17.7%	2,047	26.8%
Spring Arbor Twp.	2,504	2,694	7.6%	3,022	12.2%
Jackson County	57,979	62,906	8.5%	69,458	10.4%

Table A5 - COMPARATIVE HOUSING GROWTH -1990-2010

Source: U.S. Census Bureau

Housing development has been uneven in the 2000's. While the decade began with significant growth but development slowed by mid-decade and slowed further toward 2010.

In 2010, 5,487 housing units were occupied in Leoni Township for an occupancy rate of 90%. Owner units made up 83% of the total occupied dwellings and renter units made up 17% of the occupied dwellings. The percentage of owner-occupied units is higher than the county and similar to several rural townships. The past two decades have seen a slight percentage increase in rental units in the Township.

The housing stock in Leoni Township consists primarily of single-family detached dwellings with 4,961. Other types of housing units include 87 single-family attached dwellings, 22 duplexes, 307 multiple-family units, and 331 manufactured homes. Table A6 compares housing by type in Leoni Township with Jackson County. The table shows that while Leoni Township has a much lower percentage of 1-unit structures, it provides much higher than average multiple-family structures and manufactured homes.

Table A6 - HOUSING T	(PE, 2010
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Community	1-Unit Struc- tures	2-Unit Struc- tures	3-4 Unit Structures	5-9 Unit Structures	10 + Unit Structures	Manufac- tured Homes
Leoni Township	5,048 (88)	22 (0.4)	133 (2)	130 (2)	44 (0.8)	331 (6)
Jackson County	53,237 (77)	2,425 (4)	1,980 (3)	2,233 (3)	4,644 (7)	4,567 (7)

Source: US Census, 2010

Housing Affordability

An important aspect of the housing stock is affordability. Housing supply is not adequate if the workers who reside in the community cannot afford to reside where they work. Housing costs in Leoni Township have been increasing until recently. However, the Township has an abundant supply of affordable housing.

The median value of housing units in the Township was \$134,000 in 2010. This is slightly higher than the County median value of \$130,000. The median monthly rent in Leoni Township in 2010 was \$649 compared to \$678 for Jackson County.

A common index of housing affordability is the ratio of income to housing costs. When housing costs exceed 30% of household income housing is considered unaffordable. Table A7 compares housing affordability in Leoni Township with other Jackson County communities for home owners and renters.

Community	Median Month- ly Owner Cost (\$)	Pct. of Households over 30% Owner Costs	Median Rent (\$)	Pct. of Households over 30% Renter Costs
LEONI TOWNSHIP	1,313	33.2	649	53.1
Blackman Township	1,157	33.6	674	43.0
Summit Township	1,222	28.7	841	52.7
City of Jackson	1,029	35.7	604	60.3
Rives Township	1,432	40.4	926	29.8
Sandstone Township	1,354	34.3	755	16.1
Tompkins Township	1,336	39.7	643	52.8
Henrietta Township	1,424	32.3	823	25.3
Spring Arbor Township	1,356	21.8	643	48.3
Jackson County	1,244	33.0	678	51.9

Table A7 - HOUSING COSTS AND AFFORDABILITY -2010

Source: U.S. Census Bureau

The table indicates that housing costs for owner units in Leoni Township are slightly higher than the County and somewhat higher than the other townships that abut the City of Jackson. Renter costs are slightly lower than the County as well as the other metropolitan townships.

A3. Natural Features

The natural features of Leoni Township are an asset of great value. The identification of these features is important in developing means to preserve them for the purposes that they serve for future residents.

<u>Topography</u>

Leoni Township is relatively flat (see Map A2). Elevations range from several high points in the eastern portion of the Township to low points near lakes in the northern and southwestern portion of the Township. Elevations range from low points of 918 feet above sea level to peaks of 1,049 feet above sea level.

Surface Geology

The landscape of Leoni Township is made up of glacially developed landforms on top of sedimentary bedrock. These landforms have been modified by streams over the last several thousand years and, with the coming of settlement, change has continued at an accelerated pace. Jackson County has been covered by glacial ice a number of times with the last ice sheet receding approximately 12,000 years ago. This latest glacial withdrawal ended the Wisconsin Ice Age which lasted approximately 70,000 years.

A detailed analysis of the surface geology of the area is beyond the scope of the Plan. However, a detailed geological study was conducted by ASTI Environmental in 2011. The study includes information regarding pre-settlement vegetation, natural areas, land use, and landforms.

<u>Soils</u>

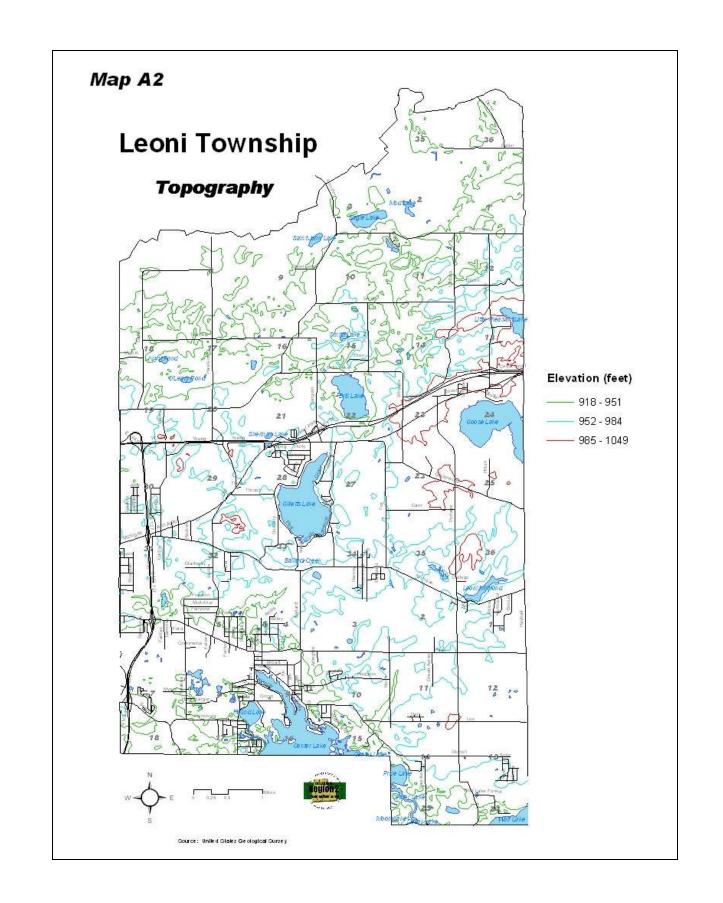
Based on information provided by the Jackson County Soil Survey, Leoni Township soils were examined based on agriculture productivity and hydric soils. These analyses are summarized in the following paragraphs.

Agricultural Productivity

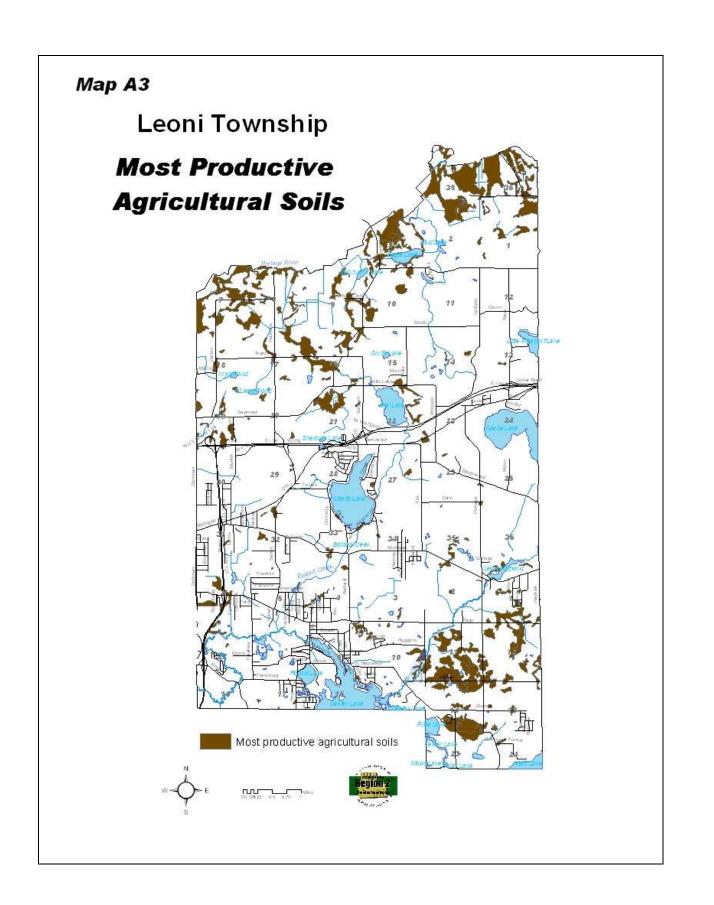
Agricultural productivity is based upon a number of factors and certain soils are deemed to be the most productive in a particular region. While management practices will allow practically any soil to be productive, some soils allow greater productivity with less input. These competitive soils are the ones that are best for crop production.

What is the basis for selection of a particular soil for classification as a productive soil within a region? The most obvious criteria are the production of general field crops -information which is available from a soil survey. Certain crops may need special soils such as mint or blueberries but these are specialty situations, not generally produced crops. To maintain the agricultural economy of the county the most productive soils need to be preserved in the agricultural districts.

Map A3 reflects agricultural productivity in Leoni Township. The map is based on a ranking system which was developed from the Jackson County Soil Survey using production figures for all the crops generally grown in Jackson County. Yields of corn, corn silage, winter wheat, oats, soybeans, and alfalfa hay were used. The map shows that there is not a clear pattern of agriculturally productive lands in the Township. There are several small areas in the north portion and in the Township's southeast corner but no sizeable concentrations emerge.



A-12



The source of Map A4 is the Jackson Comprehensive Land Use Plan. This map identifies areas in Leoni Township that are eligible for funding under the Michigan Farmland and Open Space Preservation Act purchase of development rights program.

Hydric soils

Hydric soils are poorly drained and subject to occasional flooding. Along with other sources such as the National Wetlands Inventory and aerial photographs, they can be used to identify wetlands and other sensitive lands. Hydric soils are also associated with lakes and streams. Map A5 shows that hydric soils are primarily located along rivers and drains in the Township.

A4. Current Land Use

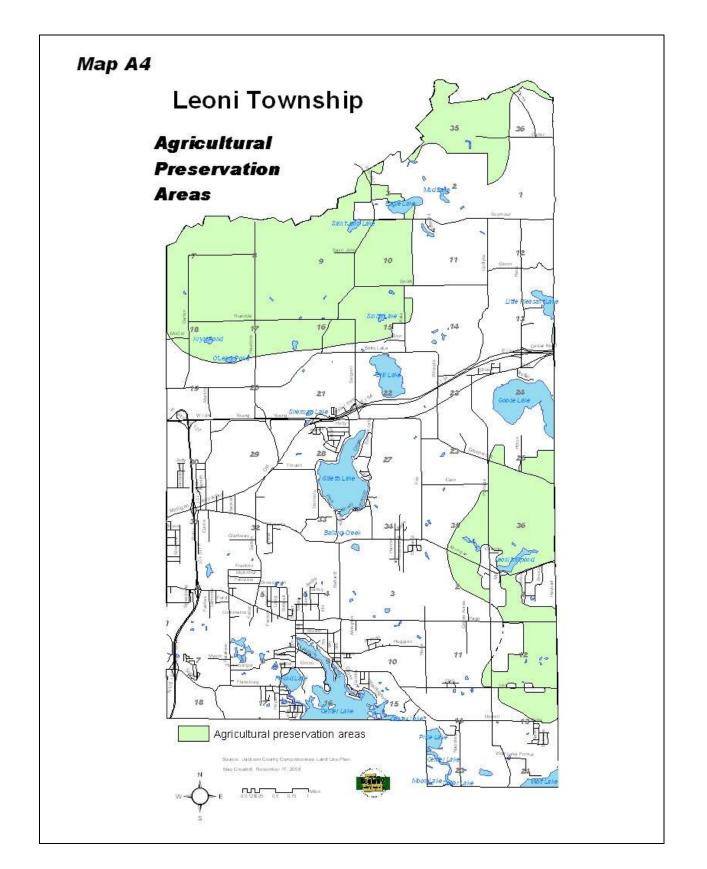
Many factors have influenced the development of land in Leoni Township. Over its history, the Township has become a mix of agricultural, residential, commercial, institutional, industrial, recreational, and other land uses. Among the factors creating this mix are the location of the Township near the City of Jackson, the mixture of soil types creating the capability to sustain both urban and rural land uses, the presence of an excellent transportation system including I-94, adequate infrastructure, and bodies of water such as Michigan Center Lake.

The County Equalization Department maintains a record of current land use for property assessment. Equalization data provide the basis for the examination of current land use. Results are displayed on Map A6.

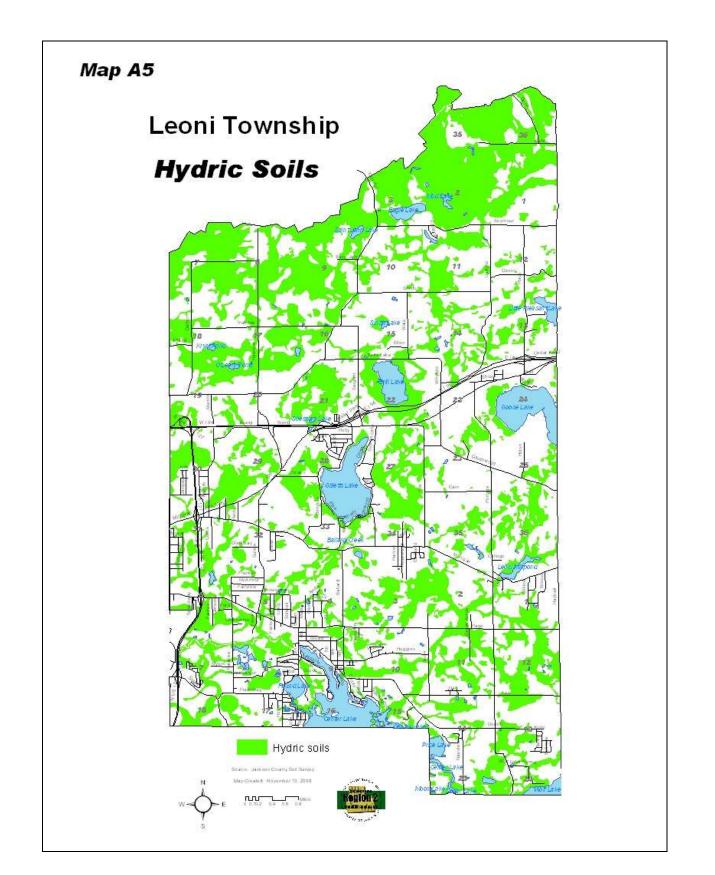
Map A6 shows seven general categories of land use – agricultural, residential, commercial, industrial, publicly-owned land, schools, churches, and cemeteries, and tax exempt. These categories are described in the following paragraphs.

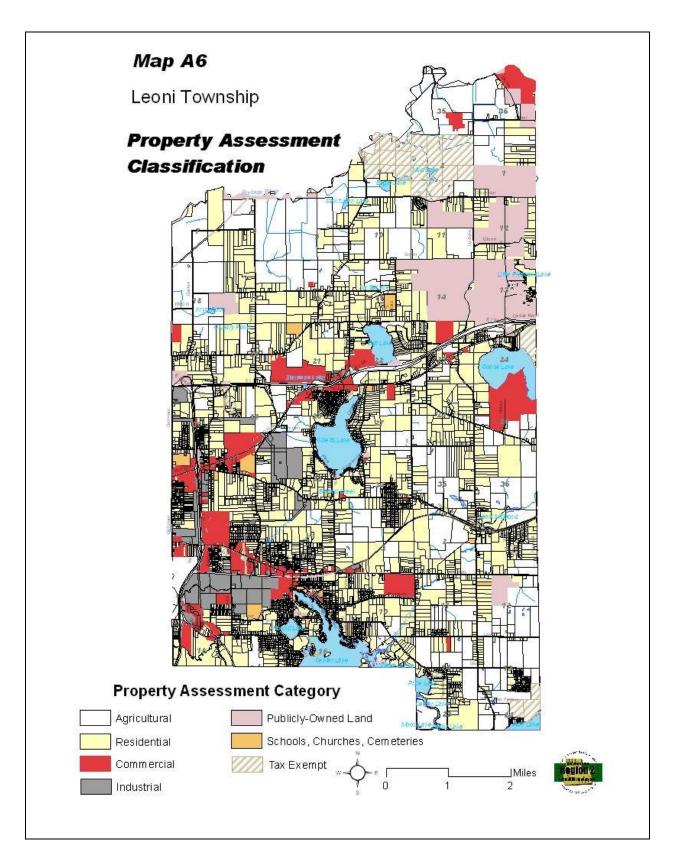
Agricultural Land Use – Agricultural land uses exist in the northwest and southeast corners of the township. These are areas at some distance from central sewer lines and are remote from built-up areas and major transportation routes. Several farms remain in operation in Leoni Township and this plan intends to preserve the farms that remain in Leoni Township if possible. Agricultural land uses consume approximately 8,800 acres in Leoni Township.

Residential Land Use – The residential land use category includes single-family dwellings, duplexes, multiple-family, and manufactured housing. Residential land use is the top category with over 14,000 acres devoted to that land use. Residential areas are found in varying densities throughout the township with highest concentrations found in Michigan Center, Page Avenue between Michigan Center and Jackson, near US-127 interchanges, and within manufacturing housing communities.



A-15





Commercial Land Use - Commercial uses are concentrated along Page Avenue from US-127 to Michigan Center, within Michigan Center, along Michigan Avenue/Ann Arbor Road, near freeway interchanges along US-127, and near the Sargent Road interchange with I-94. Commercial uses take up approximately 1,950 acres.

Industrial Land Use – Industrial lands are found exclusively in the southwest quarter of the township. Industry generally has several locational requirements including access to major roads, sewer and water infrastructure, and separation from less intensive uses. Industrial uses use up approximately 1,040 acres in Leoni Township.

Publicly-Owned Land – Publicly-owned land consists of parcels owned by state, county, or township government. Though there is a large concentration of acreage in this category in the northeast quarter of the township, public lands are found scattered throughout. Land area in this category amounted to about 2,400 acres.

Schools, Churches, and Cemeteries – Found in small areas throughout the township, the category amounts to about 265 acres.

Tax Exempt – Tax exempt properties totaled around 1,200 acres. The largest tax exempt area is the Phyllis Haehnle Wildlife Sanctuary in the northeast quarter of the township.

A5. Transportation and Circulation

Leoni Township is tied to its region by transportation connections. Roads are a prime factor in area development and local economy. The principal forms of transportation are associated with automobiles, trucks, trains, and airplanes.

Road Functional Classification

Roads serve a variety of functions depending on whether they are intended to provide access to property or to deliver traffic from one area to another. Accordingly, the Michigan Department of Transportation classifies roads as *interstates/freeways, arterials, collectors* and *locals* (see Map A6).

Interstates and freeways carry traffic at high speeds between counties, regions, and states. They are principal arterial roads that carry long distance, through-travel movements. They also provide access to important traffic generators, such as major airports or regional shopping centers.

Arterial roads are intended for relatively high speed through traffic providing as little access to individual properties as possible to ensure safe and efficient travel.

Collector roads generally carry lower volumes of traffic at lower speeds than arterials. The purpose of collector roads is to funnel traffic from local streets to arterials.

Local roads take in the remainder of streets and roads. Their primary purpose is to provide a link from arterials and collectors to individual properties. Local roads generally have little or no through purpose and have low traffic volumes.

Two interstates and freeways are located within Leoni Township. I-94 connects the Detroit area and Canada to points west and is the northernmost east-west interstate in the nation. I-94 runs between Port Huron in the east to Billings, Montana to the west. Because of the international connections that it provides between Canada and the United States, I-94 is an important international trade route.

US-127 runs north-south in the southwest quarter of the Township. US-127 provides access between Jackson and Lansing. Farther north, it merges with I-75 south of Grayling. To the east, US-127 runs south and becomes a two-lane highway south of Jackson.

Other arterial routes include W. Michigan Avenue and Ann Arbor Road which combine to deliver traffic from the City of Jackson to US-127 points east. Ann Arbor Road acts as an I-94 service drive while Michigan Avenue heads to Grass Lake, Chelsea and points east to Detroit. Page Avenue begins at E. Michigan Avenue in the City of Jackson providing a direct route to Michigan Center and points east. South Street provides a connection between US-127 and M-50 further south in Napoleon Township.

According to MDOT's Act 51 classification system, there are 188 miles of road in the Township. Of this total, approximately 31 miles are state trunkline routes, 49 miles are county primary roads, and 89 miles are county local roads.

<u>Air Travel</u>

Jackson County Airport-Reynolds Field is both a sport/recreation and a corporate/ business general aviation facility. The airport is considered critical to the competitive position of a number of local firms and plants, some of which might choose to locate elsewhere if the facility were not present. These organizations use the air taxi and general aviation services made possible by the Airport. Much of the airport activity is business-oriented and many businesses have aircraft based at the airport. Consumers Energy, Allegiance Health, and the Michigan International Speedway are just a few of the area businesses that rely on the services provided by the Jackson County Airport. In addition to the firms with general aviation aircraft based at the Airport, there are many other companies that depend on the airport for various services such as air taxi/charter service, air freight, etc. These services are important for sales, management and production activities by many firms based in the community.

Rail Transportation

The Jackson metropolitan area is located along the Detroit/Chicago intercity rail passenger corridor. Amtrak operates three daily passenger trains between downtown Detroit and Chicago over the Norfolk-Southern tracks paralleling I-94. The partnership of Amtrak, Norfolk-Southern, and MDOT has made significant operational and marketing improvements to the Detroit-Jackson-Chicago passenger rail service and this route now ranks as the fifth busiest among passenger rail lines in the nation. Projects are proceeding for incremental improvements to raise top line speeds from 79 mph to high speed operation of 125 mph and beyond. Passenger use of the Detroit – Chicago rail corridor has increased steadily since 2001 with more than 888,638 passengers in 2006. At the Jackson Amtrak Station, ridership has also continued to increase from 23,038 passengers in 2004 to 26,708 in 2006, an increase of 15.9%.

Regarding freight service, the Detroit/Chicago mainline is located parallel to I-94 in Jackson County. Norfolk-Southern operates daily through and local freight service. A secondary mainline in Jackson County runs between Jackson and Lansing with daily freight only service. This rail line runs in a north-south direction out of the City of Jackson. Some of the industrial uses in the Township are located in areas convenient to both rail lines.

A6. Community Facilities

Township Office

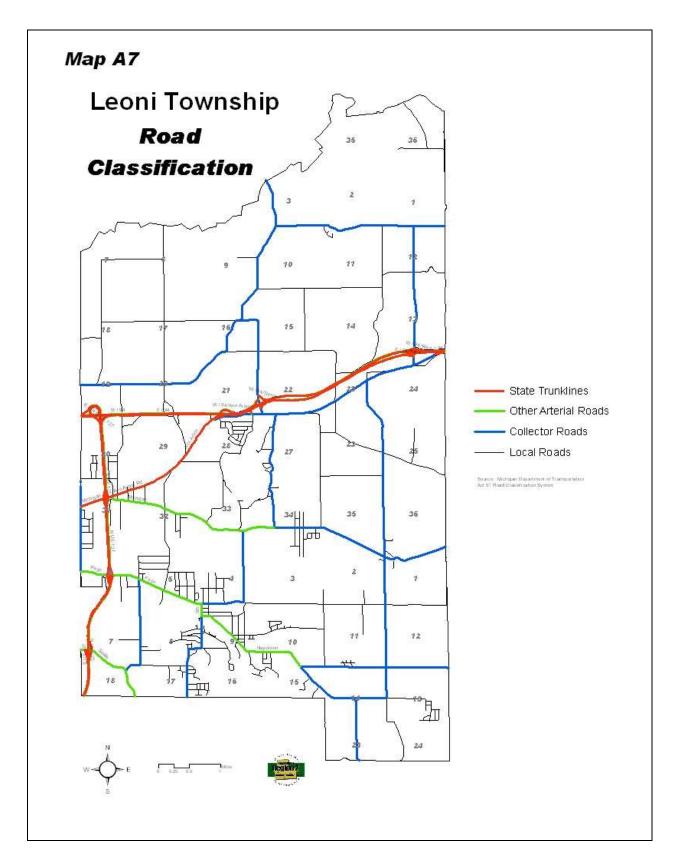
The Leoni Township administrative office is located at 913 Fifth St., Michigan Center, MI 49254. The Township Office houses the township supervisor, treasurer, and clerk, along with the zoning, building, assessing and utility departments. It is also the meeting location of township boards and commissions.

Public Safety

On August 10, 2010, the Leoni Township Board of Trustees voted to merge police and fire services with Blackman Township, creating the Blackman-Leoni Public Safety Department. The Department of Public Safety (DPS) office is located at 1996 Parnall Road in Blackman Township, and is responsible for both police and fire protection for the residents of Leoni Township. The DPS has a staff of 33 full-time equivalent employees including a director and deputy director, detective sergeant, two detectives, four shift sergeants, 24 public safety officers, and a full-time and a part-time secretary. In 2011, the DPS responded to 7,918 police calls, 174 fire calls, and 665 rescue calls, for a total of 8,757 calls for service within Leoni Township.

Fire and Rescue Services

Within Leoni Township fire calls increased 19% from the previous year. Rescue calls increased 35% in 2011 over 2010.



A-21

DPS fire apparatus consists of two ladder trucks, three engines, three grass trucks and one rescue vehicle. In addition, the department operates one ice-rescue craft and routinely conducts rescue exercises on Center Lake. Department personnel routinely conduct rescue training drills on Center Lake.

In addition to fire prevention programs, the department provides fire safety training to elementary and preschool children, senior citizen complexes and businesses and commercial enterprises. DPS personnel conduct fire inspections at businesses and commercial occupancies and the department also participates at the Leoni Township Halloween Party.

Police Services

There were 5,903 calls for police service in 2011, a 38-percent increase over 2010. The Blackman-Leoni DPS handled 4,919 – or 84 percent – of those calls. The Jackson County Sheriff's Office responded to 680 calls – 13 percent – and the Michigan State Police handled 304 requests for service, or 3 percent. Activities in 2011 included the execution of five search warrants, 67 OWI arrests and 47 drug cases. Police calls in 2011 increased 38% over 2010. In 2011, the department reported it investigated 47 drug cases with 67 OWI arrests, and executed five search warrants. The department participated in the Major Crimes Task Force and the Jackson Narcotics Enforcement Team (JNET).

The department's law enforcement division operates 12 marked and five unmarked vehicles and fields two K-9 units. Selected officers serve with an Emergency Services Unit trained to respond to a variety of special or extreme incidents including "active shooter" calls.

<u>Schools</u>

Leoni Township takes in two public school districts within its boundaries – Michigan Center School District and East Jackson School District.

The Michigan Center School District is comprised of three schools:

- Arnold Elementary (Grades KG-2) 4064 Page Ave. Michigan Center, MI 49254
- Keicher Elementary (Grades 3-6, Child Care & Preschool) 137 Broad St. Michigan Center, MI 49254
- Michigan Center Junior/Senior High School (Grades 7-12) 400 S. State St. Michigan Center, MI 49254

In the 2010-2011 school year the Michigan Center School District had a graduation rate of 71.2%, a dropout rate of 4.7%, and per-pupil spending of \$8,210. There were 1,433 students, 77 (FTE) teachers, for a student per teacher ratio of 18.7.

The East Jackson School District is comprised of three schools:

- Bertha Robinson School (Grades 4-6) 5400 Seymour Rd. Jackson, MI 49202
- Memorial School (Grades KG-3) 345 N. Dettman Rd. Jackson, MI 49202
- East Jackson High School (Grades 7-12) 1566 N. Sutton Rd. Jackson, MI 49202

In the 2010-2011 school year the East Jackson School District had a graduation rate of 79.9%, a dropout rate of 6.0%, and per pupil spending of \$8,436. There were 1,335 students, 74 (FTE) teachers, for a student per teacher ratio of 18.1.

Health Services

Two health providers are located within Leoni Township. Allegiance Health has a family medicine, diagnostic center and physical rehabilitation facility located at 4304 Page Ave. The Department of Veterans Affairs has a Community Based Outpatient Clinic located at 4328 Page Ave.

Two hospitals, Allegiance Health, 205 N. East Ave., Jackson, MI 49201, and Chelsea Community Hospital, 775 S. Main St., Chelsea, MI 48118, are minutes away from township residents and offer an array of health services. Regional medical facilities are also available within one hour in Ann Arbor and Lansing hospitals.

Emergency Dispatch System and Ambulance Service

In Jackson County, emergencies of all types; fire, medical and police, are dispatched through a 911 Central Dispatching Service offered by the Jackson County Sheriff's Department. For fire emergencies, Central Dispatch dispatches fire companies based upon a protocol established by each unit of government.

For medical emergencies, each of the four metropolitan units of government provides first responder service based upon protocols approved by the local unit and the medical control board. An initial screening by 911 Dispatch is conducted to determine whether a rescue vehicle should be dispatched. The call is then forwarded to the Jackson Community Ambulance (JCA), a private firm, which provides ambulance services in Jackson County. JCA further services the call and provides emergency medical services. JCA responds with an ambulance and transports persons requiring emergency medical services to Allegiance. Fire teams do not transport. This means that a minimum of two vehicles respond to medical emergencies dispatched through the 911 system, one responding from the fire service and one from JCA. JCA's headquarters is located at 429 Ingham St. in the City of Jackson. JCA handles approximately 16,000 calls each year in Jackson and operates 10 paramedic units in Jackson County.

Parks and Recreation

Leoni Township owns and maintains five parks. In back of the township hall is a small park which is used for the youth football and youth tee ball programs. The Leoni Community Park just down the road on Fifth Street is a twelve-acre park that features three pavilions,

playground equipment, restrooms, dock and boat launch, parking area, wetlands and a walking trail. This park is also host to the Carp Carnival held every year.

Bender Park, located at the corner of Bender and Gregory roads is a seven-acre park. It features playground equipment, a pavilion, benches, and a paved walking path. Peter Alex Ball Park, on Huggins Road, features a baseball field. Mill Pond Park on Michigan Avenue east of Portage Road is a wetlands area/wildlife sanctuary and includes limited vehicle parking.

The State of Michigan owns and manages four facilities within the township. They manage two boat launch sites, one on Center Lake (off Washington Drive) and one on Gilletts Lake (off Shady Lane). The Haehnle Bird Sanctuary on Seymour Road and the Waterloo Recreation Area are the other sites owned by the state. Waterloo Recreation Area is in the Northeast corner of the township and consists of 20,500 acres. This area features cross country skiing, hiking, metal detecting, snowmobiling, wildlife watching, fishing, a boat launch, hunting, mountain biking, and swimming.

Jackson County also owns and maintains a park in Leoni Township at Gilletts Lake. This park, located on Gilletts Lake Road, features a swimming area, shelter and picnic area, playground, softball diamond, and toilet facilities.

The township is also host to two golf courses and four private campgrounds. Campgrounds include Hideaway Campground (3500 Updyke Road), The Oaks Campground (7800 Cutler Road), Sherwood Forest Campground (off Dunn Road), and Greenwood Acres Campground (2401 Hilton). The two golf courses are Pine Hollow Golf Course, located at 5400 Trailer Park Dr., and Lakeland Hills Golf Course, located at 5125 Page Ave.

Cemeteries

The township maintains four cemeteries. These are Leoni Cemetery on Portage Road, Maxson Cemetery on Seymour Road, McArthur Cemetery on the corner of Michigan Avenue and Sutton Road and Craddit Cemetery on the corner of Michigan Avenue and Munith Road.

<u>Library</u>

A branch of the Jackson County Library is located at 3125 E. Michigan Ave.

Township Water System

The following information regarding the township water supply was provided by the Leoni Township Department of Public Works:

- As of 2012 the Leoni Township Water Department was providing service to nearly 700 customers, including approximately 170 metered commercial accounts.
- Residential customers are not metered and pay a flat rate of \$30.75 per quarter.
- Quarterly rates for commercial customers range from \$101.49 for a 1 ¹/₄- to 1 ¹/₂- inch meter to \$507.39 for a 4-inch meter based on monthly usage of 9,000 gallons.
- Commercial customers are charged \$2 for each additional 1,000 gallons consumed.
- The system is served by four different wells in two separate locations and a storage tower in the western side of the township. The combined pumping capacity is 3 million gallons per day. Current average use is 271,000 gallons per day, or 20 percent of the service capacity of 1.36 million gallons per day.
- Township water has been chlorinated since 2010 when the department began adding sodium hypochlorite to the system. No other form of treatment is provided. Water hardness ranges from 225 to 230 ppm and iron of 0.3mg/l.
- Water pressure ranges from 74 psi in the southern portion of the system to 60 psi in the north.

Wellhead Protection

Leoni Township relies exclusively on groundwater for its drinking water source. In response to the concern over safety of public water supplies, the Township has instituted a Wellhead Protection Program (WHPP). WHPP's develop long-term strategies aimed at protecting community drinking water supplies. The purpose of developing a SHPP is to identify the Wellhead Protection Area (WHPA) and develop long-term strategies aimed at safeguarding the area from contamination. A WHPA is defined as the surface and subsurface areas surrounding a water well or well field, which supplies a public water system, and through which contaminants are reasonably likely to move toward and reach the water well or well field within a 10-year time- of travel. The State of Michigan requires communities to identify seven elements to be included in the WHPP. These elements along with a brief description are below.

- <u>Roles and Responsibilities -</u> Identify individuals responsible for the development, implementation, and long-term maintenance of the local WHPP.
- <u>WHPA Delineation</u> Determine that area which contributes groundwater to the public water supply wells.
- <u>Contaminant Source Inventory</u> Identify known and potential sites of contamination within the WHPA and include in a contaminant source inventory list and map.

- <u>Management Strategies</u> Provide Mechanisms which will reduce the risk of existing and potential sources of contamination from reaching the public water supply wells or well field.
- <u>Contingency Planning</u> Develop an effective contingency plan in case of a water supply emergency.
- <u>Siting of New Wells</u> Provide information on existing groundwater availability, the ability of the PWSS to meet present and future demands and the vulnerability of the existing wells to contamination.
- <u>Public Education and Outreach</u> Generate community awareness in the WHPP by focusing on public education and dissemination of WHPP information.

It is the intent of the Master Plan to encourage protection of the Township's public water supply wells through the use of the Department of Environmental Quality permit information checklist incorporated within the existing site plan process. The permit checklist identifies issues which requiring additional permits and approvals from the DEQ prior to site plan approval both within and outside the Wellhead Protection Area (WHPA)

The most significant sources of water supply contamination are landfills, surface impoundment areas, subsurface percolation from septic tanks and cesspools, open dumps, uncapped or improperly capped abandoned wells, injection wells and underground storage tanks. These uses represent both *point* and *non-point* contamination sources. Point source is the term used to describe contaminants, which originate in the immediate area of the well or tap. All of the above, if located in close proximity to the water supply source, are examples of potential point source polluters. Contaminants from these uses may seep directly down through the soil to the water source.

Non-point source contamination is much more difficult to control because the cause of the problem may actually be located in a considerable distance from the well. This type of contamination is caused by pollutants that filter into an underground aquifer and then migrate slowly through the groundwater aquifer to off-site wells and water sources. Prevention of this type of contamination must involve a collective effort on the part of property owners and local officials from a large geographical area. It is the recommendation of this Plan that all existing and future wells be protected from both point and non-point source contamination to the greatest degree possible. It is also the intent of the Plan to recognize the importance of groundwater protection within Leoni Township.

Leoni Regional Waste Water System

The Leoni Waste Water Treatment Plant (WWTP) provides sewage disposal services to thirteen communities, which comprise the Leoni Regional Utility Authority (LRUA). Members of the LRUA are the Townships of Leoni, Napoleon, Columbia, Norvell, Hanover and Liberty, the Charter Townships of Blackman and Grass Lake and the Villages of Grass Lake and Brooklyn which

are all located in Jackson County, as well as the Township of Cambridge, located in Lenawee County and the Townships of Sylvan and Lyndon, located in Washtenaw County. In addition to sewage collection and disposal service to the LRUA, the Leoni WWTP accepts septage, from septic tank pumping, from Jackson County, and an area within a radius of 25 miles of the treat-

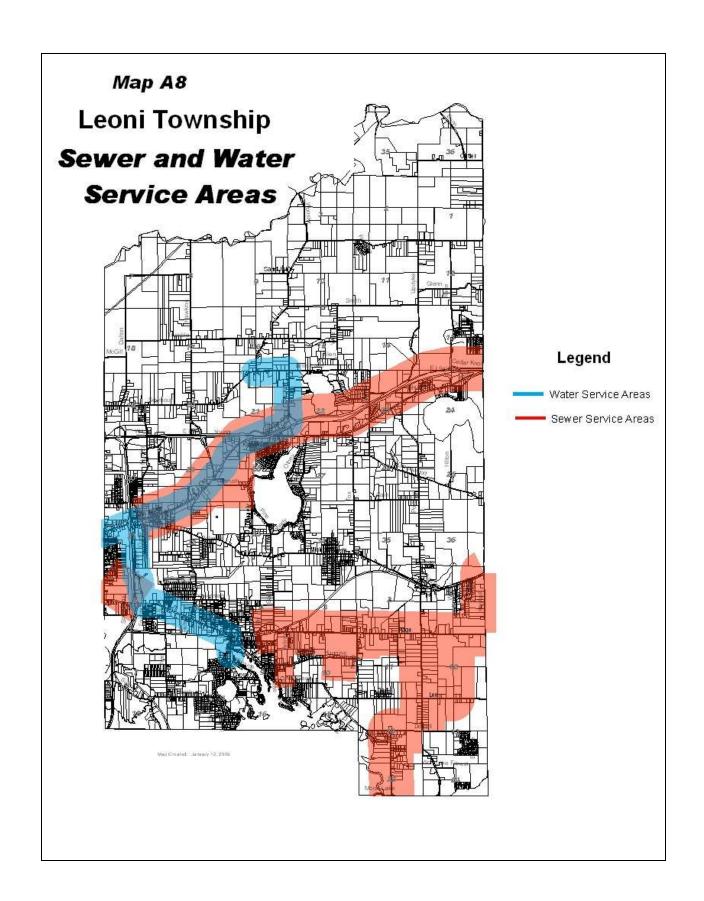
ment plant located at 8401 Page Avenue, Leoni Township, Michigan. The new Leoni WWTP replaces a lagoon treatment system, capable of treating 2.6 million gallons per day (mgd), which was nearing design capacity and was unable to meet new and stricter discharge limits imposed by state regulatory agencies. The new plant will initially be able to treat sewage at an average daily rate of 3.0 mgd and may, in the future, be expanded to treat a total of 4.0 mgd.



Sewage is pumped to the Leoni WWTP, from sewer lift stations in the various LRUA communities, through a series of force mains where it enters the headworks of the WWTP. At the headworks, grit is removed from the waste stream and the wastewater is screened to remove inorganic material and reduce the solids to a diameter of 2 millimeters or less. The waste stream moves to the anaerobic basins where anaerobic (without oxygen) bacterial action takes place to begin to treat the wastewater. The next step in the process is the pre-anoxic basins where the wastewater is continuously mixed and some oxygen is added to the sewage and aerobic (with oxygen) bacterial activity begins to occur. To this point, all the movement of the waste stream has been by gravity.

The wastewater is now pumped from the pre-anoxic basins to the pre-aeration basins where large quantities of air and oxygen are added to the waste stream resulting in a completely aerobic condition for continued treatment. The waste water, again moving by gravity, travels to the membrane reactor basins (MBR) where state-of-the-art membrane filters remove the solids and particles, as small as a polio virus, from the waste water. Additional air and oxygen is also added in these basins.

The filtered wastewater, now called final effluent, travels through a series of pipes to the final effluent pumping station. Final effluent water is disinfected by ultra-violet (UV) light, aerated to add additional oxygen to the water as the effluent cascades down a series of steps and is then pumped to the Grand River, by three vertical turbine pumps. The final, treated, disinfected and oxygen rich water is pumped through approximately 4.5 miles of newly constructed sewer main, where it outfalls into the Grand River just west of the Fifth Street Bridge in Michigan Center.



APPENDIX B

PUBLIC PARTICIPATION IN THE PLANNING PROCESS

The Planning Commission solicited public input throughout the re-drafting of the township's Master Plan. A survey was developed and posted on the Leoni Township home page on the internet. Hundreds of print copies were distributed to township residents and business owners and other were placed in the Township Hall. In addition, surveys were distributed by hand at a local carnival, personally delivered by Planning Commission members upon citizen request, and placed in area businesses frequented by the public.

Although not statistically significant the information collected did reveal strong public opinion on a number of issues. For example, when asked if farmland in the township should be preserved those expressing an opinion strongly agreed. Respondents were also undivided in their belief that downtown Michigan Center should be a focus of future improvements and that single-family housing is the desired path for residential growth throughout the township.

Eighty-six percent felt that sidewalks should be mandatory in new developments and 61 percent favored the expansion of water and sewer utilities. Additionally, a number of respondents mentioned natural settings and access to nature as Township assets. Township parks and the Leoni Mill Pond also generated positive comments. Page intentionally left blank

APPENDIX C

ADOPTION RESOLUTIONS AND COMMENTS

Planning Commission adoption resolution	. C-2
Township Board adoption resolution	. C-3
Waterloo Township Planning Commission comments	. C-4

Leoni Township Planning Commission

2030 Master Plan Resolution of Adoption

WHEREAS, Leoni Township is responsible for creating a master plan to guide future development within its jurisdiction as required by the Michigan Planning Enabling Act (PA 33 of 2008); and

WHEREAS, the Leoni Township Board created a planning commission for the purposes stated in the Michigan Planning Enabling Act; and

WHEREAS, the planning commission undertook a thorough study of the natural and cultural features, population, and existing land use and public infrastructure of the Township; and

WHEREAS, the planning commission drafted development policies and a future land use map and zoning plan element designed to implement those policies; and

WHEREAS, the 2030 Master Plan contains maps and descriptive and other matter intended by the planning commission to form the document; and

WHEREAS, the planning commission held a public hearing on the 2030 Master Plan on November 28, 2012; and

WHEREAS, the planning commission find that the 2030 Master Plan is necessary for the continued development of Leoni Township.

NOW, THEREFORE BE IT RESOLVED the Leoni Township Planning Commission herby adopts the <u>2030 Master Plan</u> and recommends its adoption by the Leoni Township Board.

I, <u>Dode has Sink</u>, Chair of the Planning Commission, do hereby certify that the foregoing is a true and original copy of a resolution adopted by a majority of the members of the Leoni Township's Planning Commission at a Regular Meeting thereof held on the <u>28</u>th day of <u>Modemnees</u> <u>2012</u>

2/1

Planning Commission Chair Leoni Township, Michigan

12-3-2012

Date

Leoni Township Board of Trustees

2030 Master Plan Resolution of Adoption

WHEREAS, Leoni Township is responsible for creating a master plan to guide future development within its jurisdictions as required by the Michigan Planning Enabling Act (PA 33 of 2008); and

WHEREAS, the Leoni Township Board created a planning commission for the purposes stated in the Michigan Planning Enabling Act; and

WHEREAS, the planning commission undertook a thorough study of the natural and cultural features, population, and existing land use and public infrastructure of the Township; and

WHEREAS, the planning commissions drafted development policies and a future land use map and zoning plan element designed to implement those policies; and

WHEREAS, the 2030 Master Plan contains maps and descriptive and other matter intended by the planning commission to form the document; and

WHEREAS, the planning commissions held a public hearing on the 2030 Master Plan on December 11, 2012; and

WHEREAS, the planning commission find that the 2030 Master Plan is necessary for the continued development of Leoni Township; and

WHEREAS, the Leoni Township Board reserved the right to adopt the 2030 Master Plan as allowed by the Michigan Planning Enabling Act.

NOW, THEREFORE BE IT RESOLVED the Leoni Township Board herby adopts the 2030 Master Plan.

I, <u>Michele Manke</u>, Supervisor of Leoni Township, do hereby certify that the foregoing is a true and original copy of a resolution adopted by the Township Board at a Regular Meeting thereof held on the 11^{+h} day of December, 2012.

under Mark.

Supervisor Clerk Leoni Township, Michigan

19-19-12

Date



Located at: 11120 Musbach Rd. Munith, MI 49259 Mail to: P.O. Box 130 Munith, MI 49259 Office: 517.596.8200 Fax: 517.596.8600 Office Hours: 9 am - 1 pm Monday - Friday www.waterlootwpmi.com

Discher Steeler and Steeler and

Timothy G. Anderson, ACP Principle Planner Region 2 Planning Commission 120 W. Michigan Ave. Jackson, MI 49201 September 17, 2012

Region 2 Planning Commission

Waterloo Township has received a copy of the Leoni Township 2030 Master Plan for comment in compliance with the Michigan Planning Enabling Act of 2008, section MCL 125.3839. It was referred to the Waterloo Planning Commission. The Planning Commission has reviewed the plan.

The Waterloo Planning Commission does not see any conflicts with the township's current Zoning Ordinance or the Future Land Use section of the current Master Plan. We are currently reviewing and adjusting the Waterloo Township Master Plan to bring it up to date. We have not completed a draft of that plan, but the Commission does not foresee any conflicts with the thinking of the Commission's future land uses for the portion of the township that is adjacent to your township. We do want to say that Waterloo Township has a policy of not enabling any extension of public water or sanitary sewer systems into our township.

The Planning Commission appreciates the work you have done in preparing this plan, and particularly appreciates seeing the document as we prepare our new Master Plan. The intended uses as well as the layout and material in your plan are a valuable model for us.

Ted Beals Chair, Waterloo Township Planning Commission

Cc: Leoni Township Planning Commission

Appendix D

Leoni Township Floodplain and Wetland Maps



* PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS

		ISTING OF COMMUNITIE	<u>S</u>		
COMMUNITY NAME	COMMUNITY NUMBER	LOCATED ON PANEL(S)	INITIAL NFIP MAP DATE	INITIAL FIRM DATE	MOST RECENT FIRM PANEL DATE
BLACKMAN, TOWNSHIP OF	260714	0180, 0185, 0190, 0193, 0194, 0195, 0205, 0215, 0301, 0302, 0306, 0326	February 9, 1979	December 18, 1984	May 3, 2010
BROOKLYN, VILLAGE OF	260335	0457, 0476	October 8, 1976	June 1, 1982	May 3, 2010
COLUMBIA, TOWNSHIP OF	261061	0350, 0365, 0457, 0460, 0475, 0476, 0480	May 3, 2010	May 3, 2010	May 3, 2010
CONCORD, TOWNSHIP OF	260946	<u>0265, 0266, 0267, 0275, 0300²</u>	May 3, 2010	May 3, 2010	May 3, 2010
CONCORD, VILLAGE OF	260423	0266, 0267	July 11, 1975	March 1, 1982	May 3, 2010
GRASS LAKE, TOWNSHIP OF	261062	0225, 0250, 0350, 0355, 0360	May 3, 2010	May 3, 2010	May 3, 2010
GRASS LAKE, VILLAGE OF ¹	261075	0250, 0355	NA	NA	NA
HANOVER, TOWNSHIP OF ¹	261063	0300 ² , 0311 ² , 0315 ² , 0425 ² , 0450 ²	NA	NA	NA
HANOVER, VILLAGE OF ¹	261058	0425 ²	NA	NA	NA
HENRIETTA, TOWNSHIP OF	261064	0100, 0205, 0225	May 3, 2010	May 3, 2010	May 3, 2010
JACKSON, CITY OF	260273	0193, 0194, 0215, 0306, 0307, 0308, 0309, 0326	June 7, 1974	December 15, 1977	May 3, 2010
LEONI, TOWNSHIP OF	260930	0205, 0215, 0225, 0250, 0326, 0328, 0330, 0350, 0355	May 3, 2010	May 3, 2010	May 3, 2010
LIBERTY, TOWNSHIP OF	261065	0311 ² , 0312, 0315 ² , 0316, 0317, 0320 ² , 0350, 0450 ² , 0475	May 3, 2010	May 3, 2010	May 3, 2010
NAPOLEON, TOWNSHIP OF	261066	0328, 0330, 0350, 0355, 0365	May 3, 2010	May 3, 2010	May 3, 2010
NORVELL, TOWNSHIP OF	260424	0355, 0360, 0365, 0370, 0480, 0500	November 5, 1976	September 30, 1988	May 3, 2010
PARMA, TOWNSHIP OF	261076	0150, 0175, 0275, 0300 ^{2,}	May 3, 2010	May 3, 2010	May 3, 2010
PARMA, VILLAGE OF ¹	260425	0175	NA		NA
PULASKI, TOWNSHIP OF	261067	0265, 0266, 0267, 0270 ² , 0300 ² , 0400, 0425 ²	May 3, 2010	May 3, 2010	May 3, 2010
RIVES, TOWNSHIP OF	261068	0075, 0100, 0180, 0185, 0205	May 3, 2010	May 3, 2010	May 3, 2010
SANDSTONE, TOWNSHIP OF	261069	0175, 0180, 0190, 0300 ² , 0301	May 3, 2010	May 3, 2010	May 3, 2010
SPRING ARBOR, TOWNSHIP OF ¹	261070	0300 ² , 0301, 0303, 0311 ²	NA		NA
SPRINGPORT, TOWNSHIP OF	261459	0025 ² , 0050, 0150, 0175	May 3, 2010	May 3, 2010	May 3, 2010
SPRINGPORT, VILLAGE OF ¹	261077		NA	- — — — — — — — — — — — — — — — — — — —	NA
		0301, 0302, 0303, 0304, 0306, 0307, 0308,			
SUMMIT, TOWNSHIP OF	260575	0309, 0311 ² , 0312, 0316, 0317, 0326, 0328, 0350	September 19, 1975	October 15, 1982	May 3, 2010
TOMPKINS, TOWNSHIP OF	261073	0050, 0075, 0175, 0180	May 3, 2010	May 3, 2010	May 3, 2010
WATERLOO, TOWNSHIP OF	261074	0100, 0125, 0225, 0250	May 3, 2010	May 3, 2010	May 3, 2010

¹ No Special Flood Hazard Areas Identified ² Panel Not Printed

- BLACKMAN, TOWNSHIP OF: 1990 West Parnall Road Jackson, MI 49201
- BROOKLYN, VILLAGE OF: 121 North Main Street Brooklyn, MI 49230
- COLUMBIA, TOWNSHIP OF: 8500 Jefferson Road Brooklyn, MI 49230
- CONCORD, TOWNSHIP OF: 110 Hanover Street Concord, MI 49237
- CONCORD, VILLAGE OF: 110 Hanover Street Concord, MI 49237
- GRASS LAKE, TOWNSHIP OF: 373 Lakeside Drive Grass Lake, MI 49240
- GRASS LAKE, VILLAGE OF: 119 North Lake Street Grass Lake, MI 49240

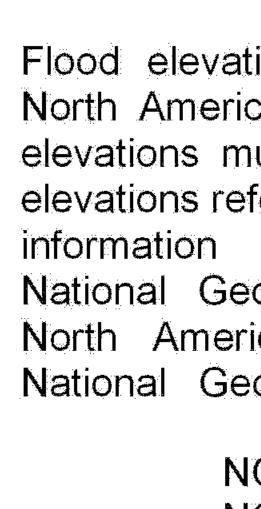
- HANOVER, TOWNSHIP OF: 237 Farview Street Horton, MI 49246
- HANOVER, VILLAGE OF: 118 West Main Street Hanover, MI 49241
- HENRIETTA, TOWNSHIP OF: 11120 Musbach Road Munith, MI 49259
- JACKSON, CITY OF: 161 West Michigan Avenue Jackson, MI 49201
- LEONI, TOWNSHIP OF: 913 5th Street Michigan Center, MI 49254
- LIBERTY, TOWNSHIP OF: 101 West Liberty Road Clarklake, MI 49234
- NAPOLEON, TOWNSHIP OF: 6755 Brooklyn Road Napoleon, MI 49261

MAP DATES

This FIRM Index displays the map date for each FIRM panel at the time that this Index was (may not be Because this Index unaffected communities subsequent revisions, users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website at http://msc.fema.gov or by calling the Map Service Center at 1-800-358-9616.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

Base Map information shown on this FIRM was derived from the Michigan Center for Geographic Information from photography dated 2005 or later.



MAP REPOSITORIES

(Maps available for reference only, not for distribution.)

106 East Commercial Street Norvell, MI 49263 PARMA, TOWNSHIP OF: 2388 Eaton Rapids Road Albion, MI 49224

NORVELL, TOWNSHIP OF:

PARMA, VILLAGE OF: 117 West Main Street Parma, MI 49269

PULASKI, TOWNSHIP OF: 12363 Folks Road Hanover, MI 49241

RIVES, TOWNSHIP OF: 4858 Maple Lane Road Jackson, MI 49201

SANDSTONE, TOWNSHIP OF: 7940 County Farm Road Parma, MI 49269

SPRING ARBOR, TOWNSHIP OF: 107 Teft Road Spring Arbor, MI 49283

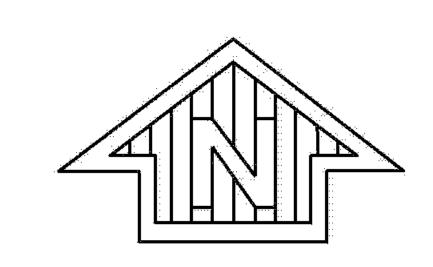
SPRINGPORT, TOWNSHIP OF: 101 East Main Street Springport, MI 49284

SPRINGPORT, VILLAGE OF: 137 Main Street Springport, MI 49284

SUMMIT, TOWNSHIP OF: 2121 Ferguson Road Jackson, MI 49203

TOMPKINS, TOWNSHIP OF: 9999 Tompkins Road Rives Junction, MI 49277

WATERLOO, TOWNSHIP OF: 11120 Musbach Road Munith, MI 49259



ELEVATION DATUM

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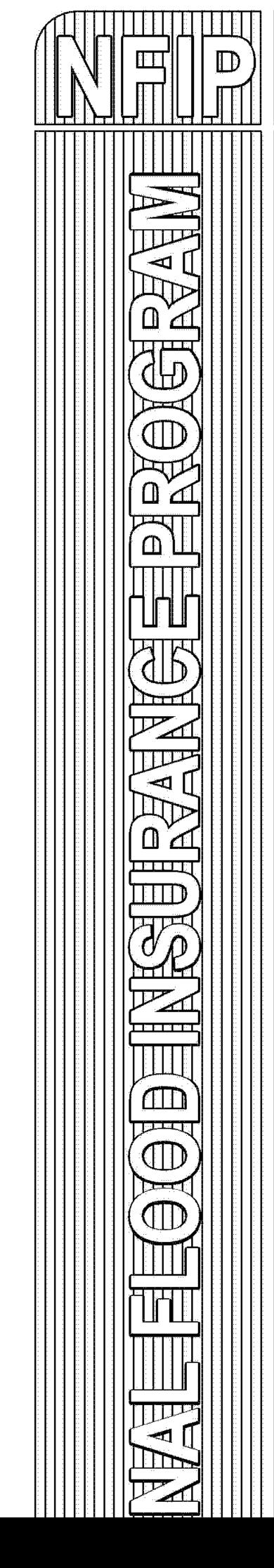
NGS Information Services

NOAA, N/NGS12 National Geodetic Survey SSMC-3, #9202 1315 East-West Highway

Silver Spring, Maryland 20910 (301) 713-3191

NOTE TO USER

Future revisions to this FIRM Index will only be issued to communities that are located on FIRM panels being revised. This FIRM Index therefore remains valid for FIRM panels dated May 3, 2010 or earlier. Please refer to the "MOST RECENT FIRM PANEL DATE" column in the Listing of Communities table to determine the most recent FIRM index date for each community.



MAP INDEX

FIRM

FLOOD INSURANCE RATE MAP

JACKSON COUNTY, MICHIGAN (ALL JURISDICTIONS) (SEE LISTING OF COMMUNITIES TABLE)

MAP INDEX

PANELS PRINTED: 50, 75, 100, 125, 150, 175, 180, 185, 190, 193, 194, 195, 205, 215, 225, 250, 265, 266, 267, 275, 301, 302, 303, 304, 306, 307, 308, 309, 312, 316, 317, 326, 328, 330, 350, 355, 360, 365, 370, 400, 457, 460, 475, 476, 480, 500

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The **projection** used in the preparation of this map was Michigan State Plane South zone 6401 (FIPSZONE 2113). The **horizontal datum** was NAD83. Differences in datum, spheroid, projection or state plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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NGS Information Services NOAA, N/NGS12

National Geodetic Survey

SSMC-3, #9202 1315 East-West Highway Silver Spring, Maryland 20910-3282

(301) 713-3242

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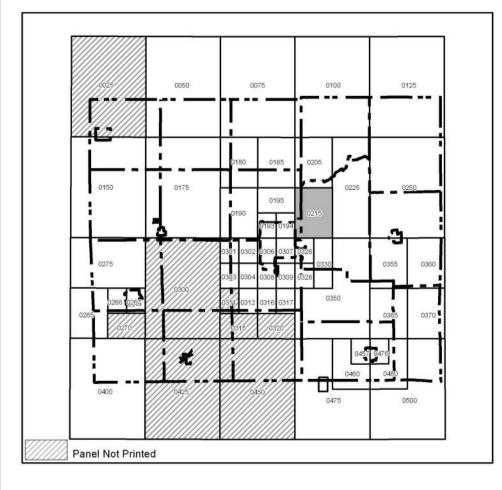
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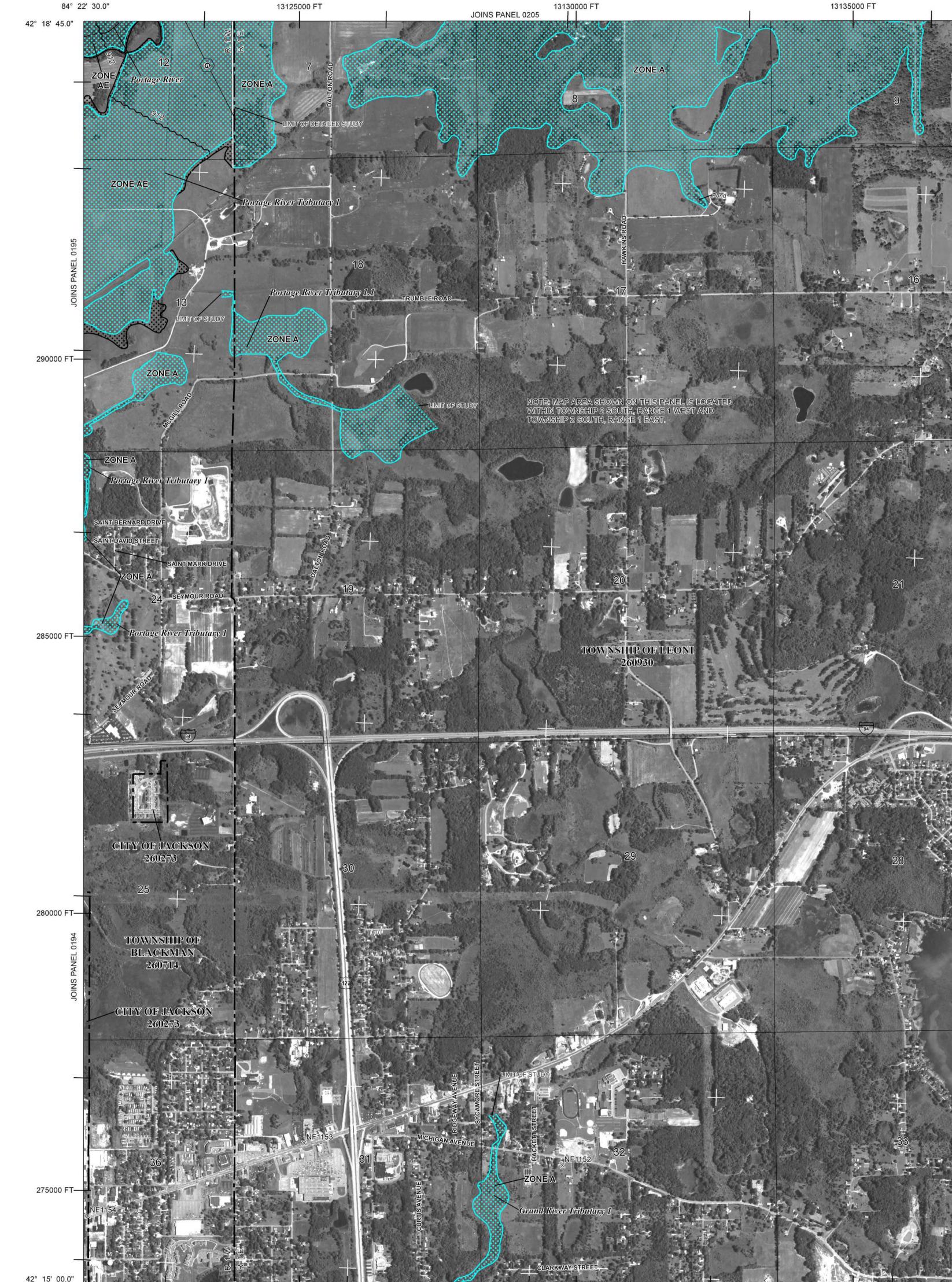
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PANEL INDEX





13 00.0

84° 22' 30.0"

⁷18^{000 M}F

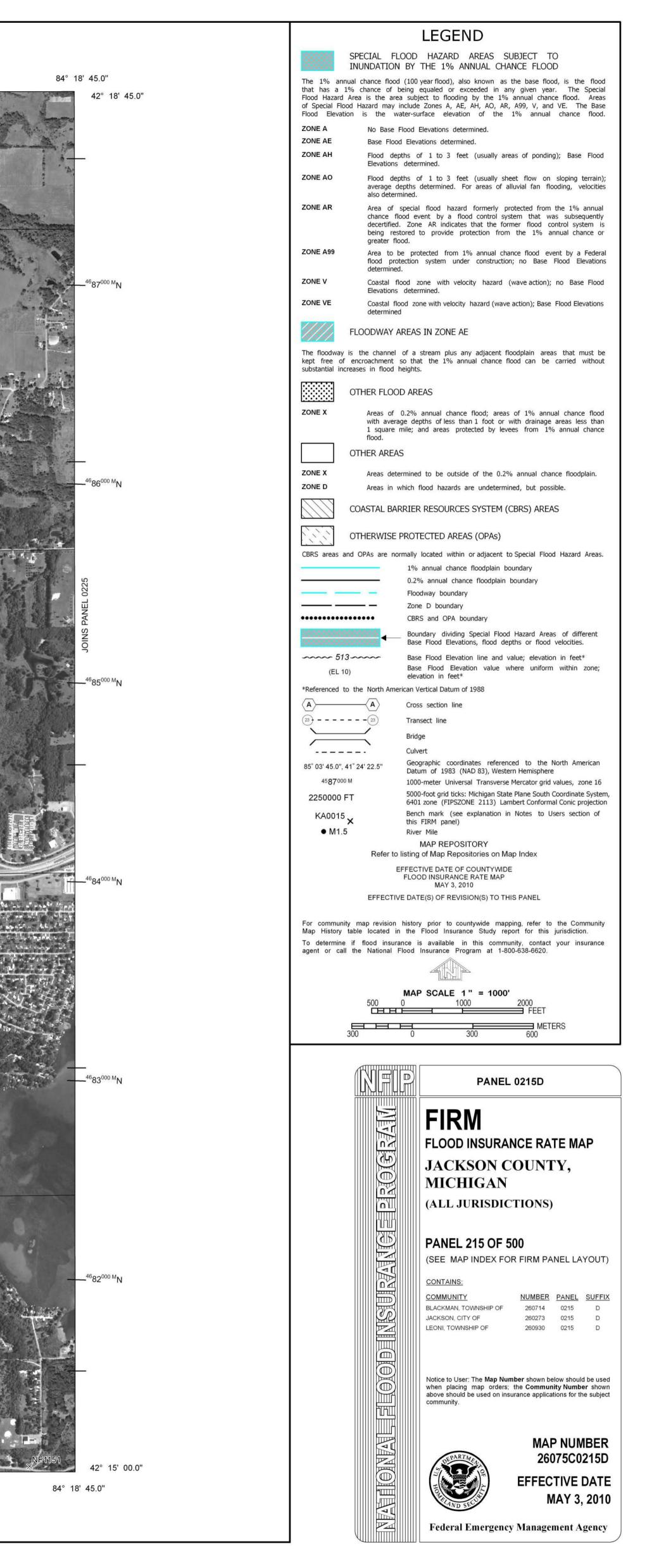
JOINS PANEL 0326

⁷17^{000 M}F

710000 Mm

JOINS PANEL 0330

⁷21^{000 M}E



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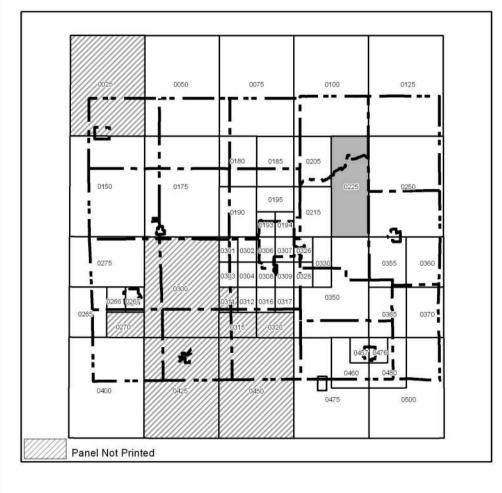
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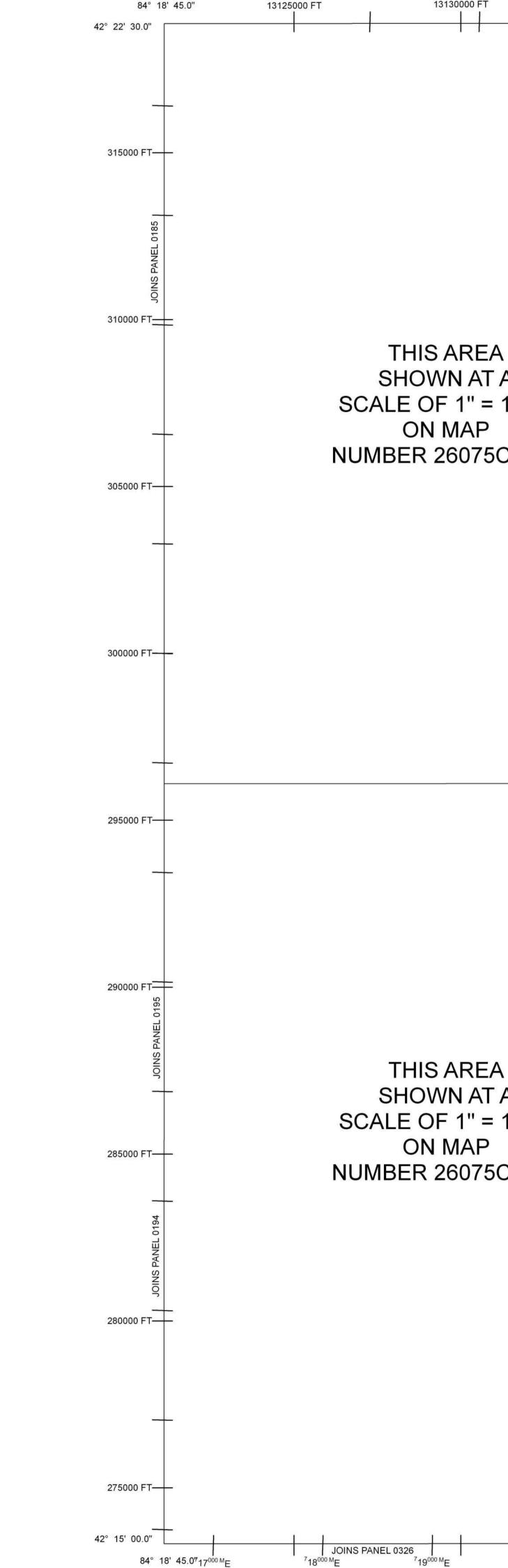
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THIS AREA SHOWN AT A SCALE OF 1" = 1000' ON MAP NUMBER 26075C0215

SHOWN AT A SCALE OF 1" = 1000' ON MAP NUMBER 26075C0205

13130000 FT

13135000 FT



13145000 FT

FOWNSHIP OF

HENRIETTA

13140000 FT

Batteese Cr.

JOINS PANEL 0100

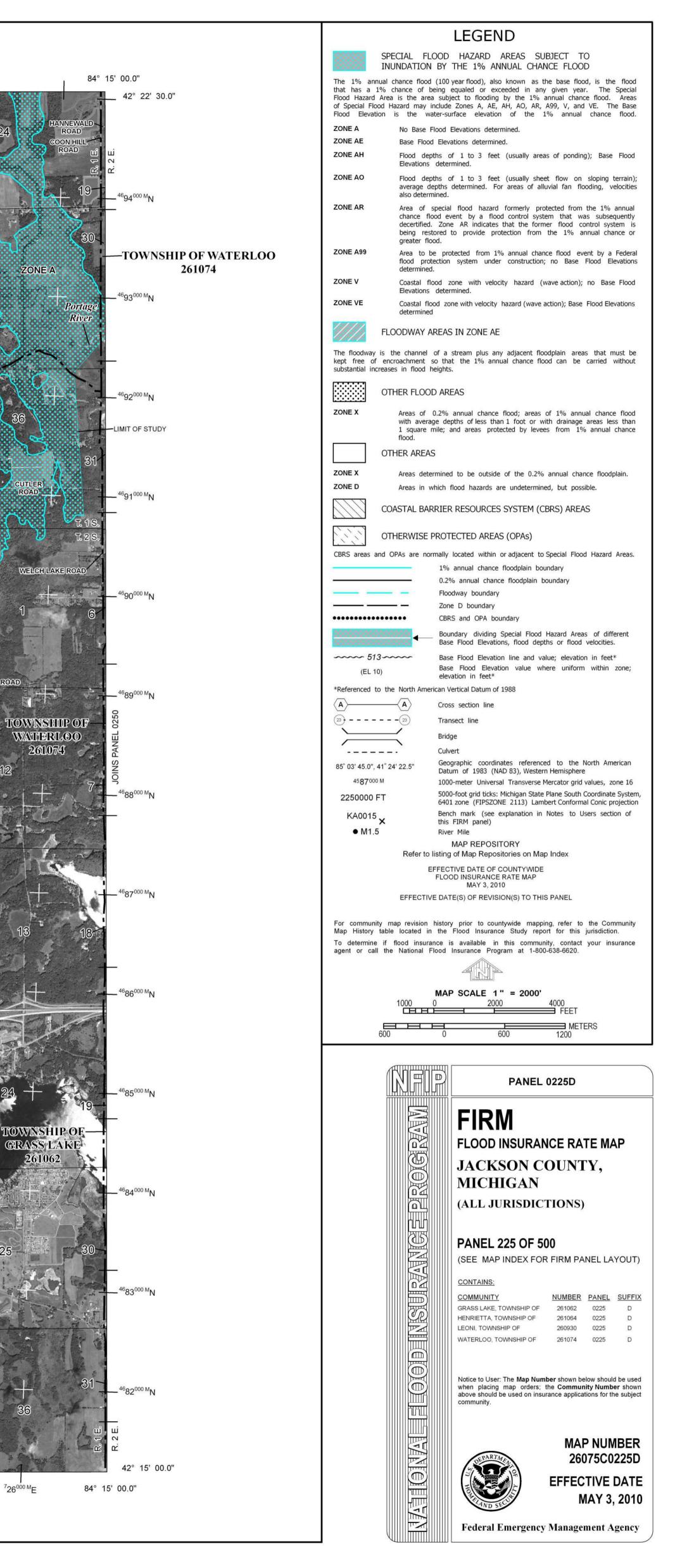
13150000 FT

JOINS PANEL 0330

22000 ME

JOINS PANEL 0350 25000

 26^{00}



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1315 East-West Highway Silver Spring, Maryland 20910-3282 (301) 713-3242

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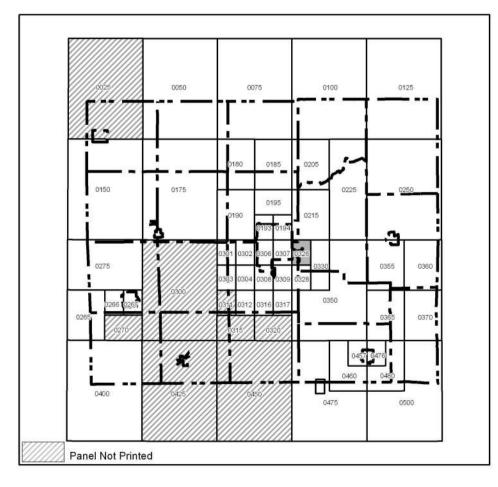
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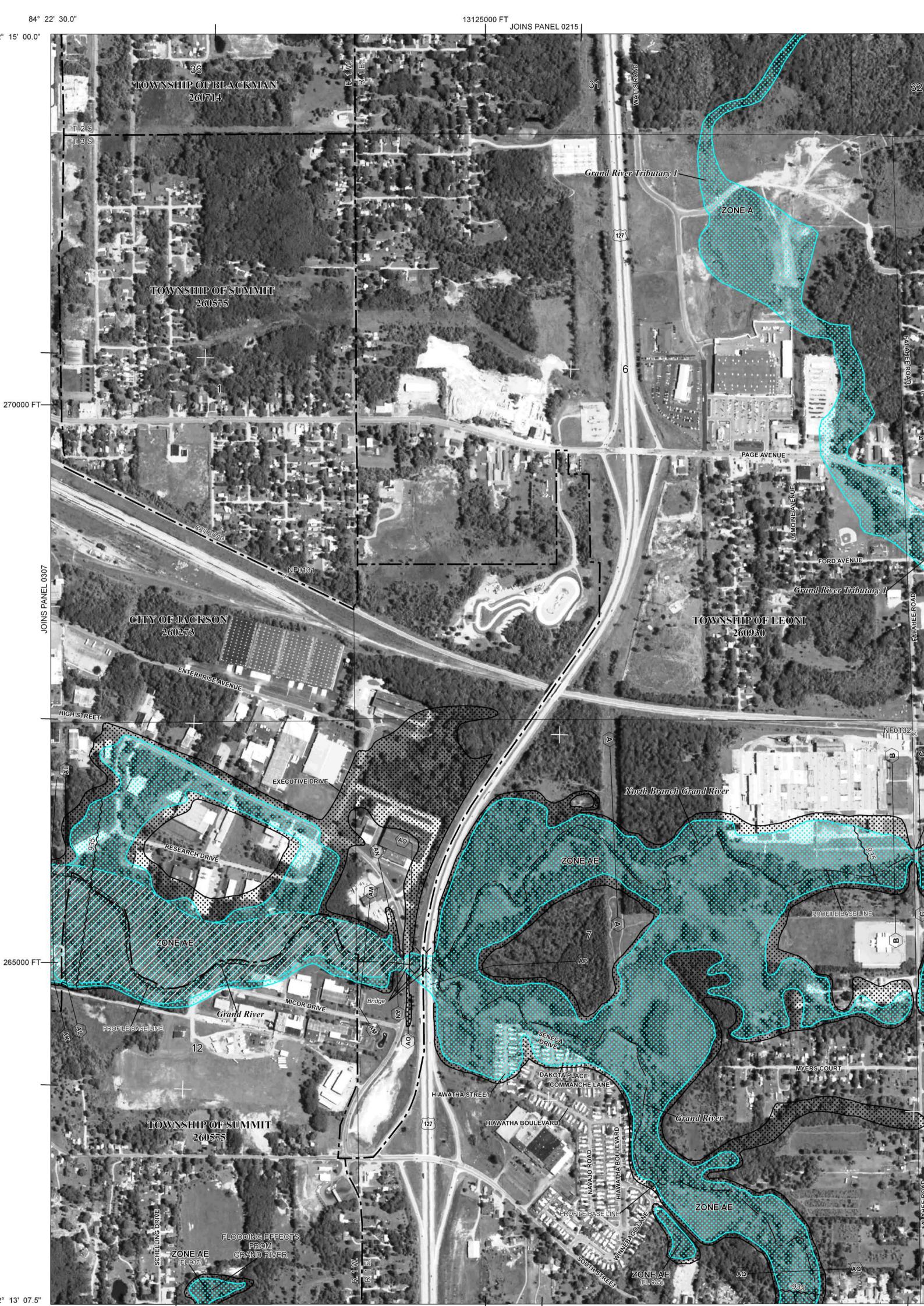
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PANEL INDEX



42° 15' 00.0"



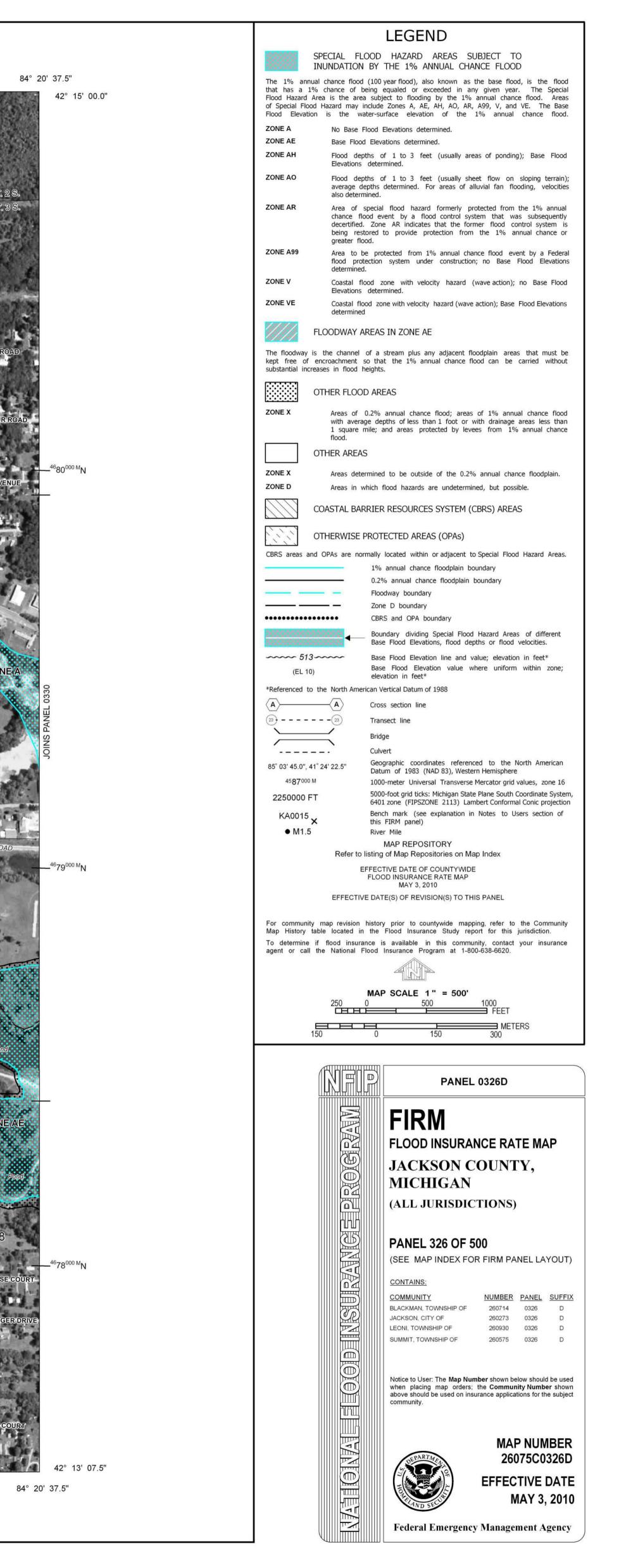
42° 13'

84° 22' 30.0"

⁷17^{000 M}E

JOINS PANEL 0328

⁷18^{000 M}F



This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Michigan State Plane South zone 6401 (FIPSZONE 2113). The horizontal datum was NAD83. Differences in datum, spheroid, projection or state plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services

NOAA, N/NGS12 National Geodetic Survey

SSMC-3, #9202 1315 East-West Highway

Silver Spring, Maryland 20910-3282 (301) 713-3242

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was derived from the Michigan Center for Geographic Information produced at a scale of 1:12,000 from photography dated 2005 or later.

This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

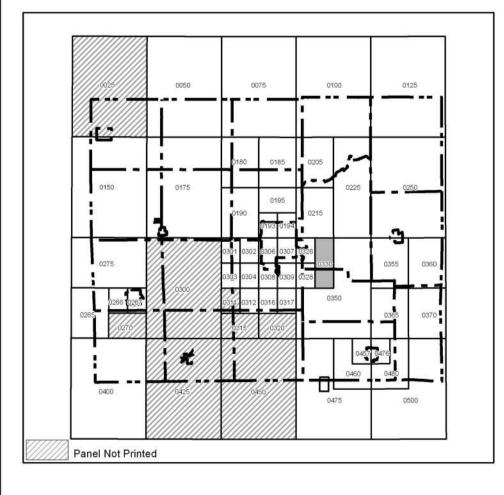
Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

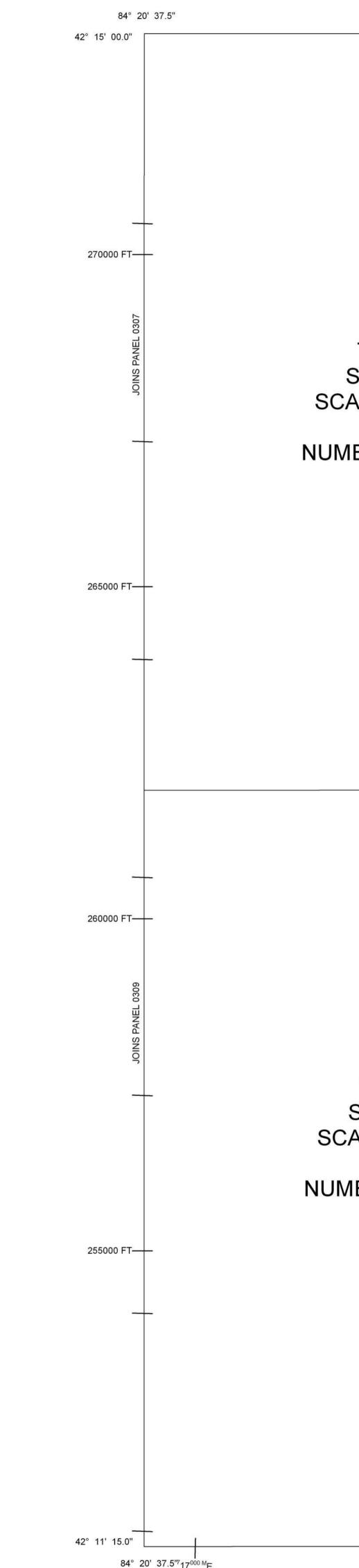
Contact the FEMA Map Service Center at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov/.

If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.

The profile base lines depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the profile base line, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

PANEL INDEX





13125000 FT

JOINS PANEL 0215

13135000 FT

THIS AREA SHOWN AT A SCALE OF 1" = 500' ON MAP NUMBER 26075C0326

THIS AREA SHOWN AT A SCALE OF 1" = 500' ON MAP NUMBER 26075C0328

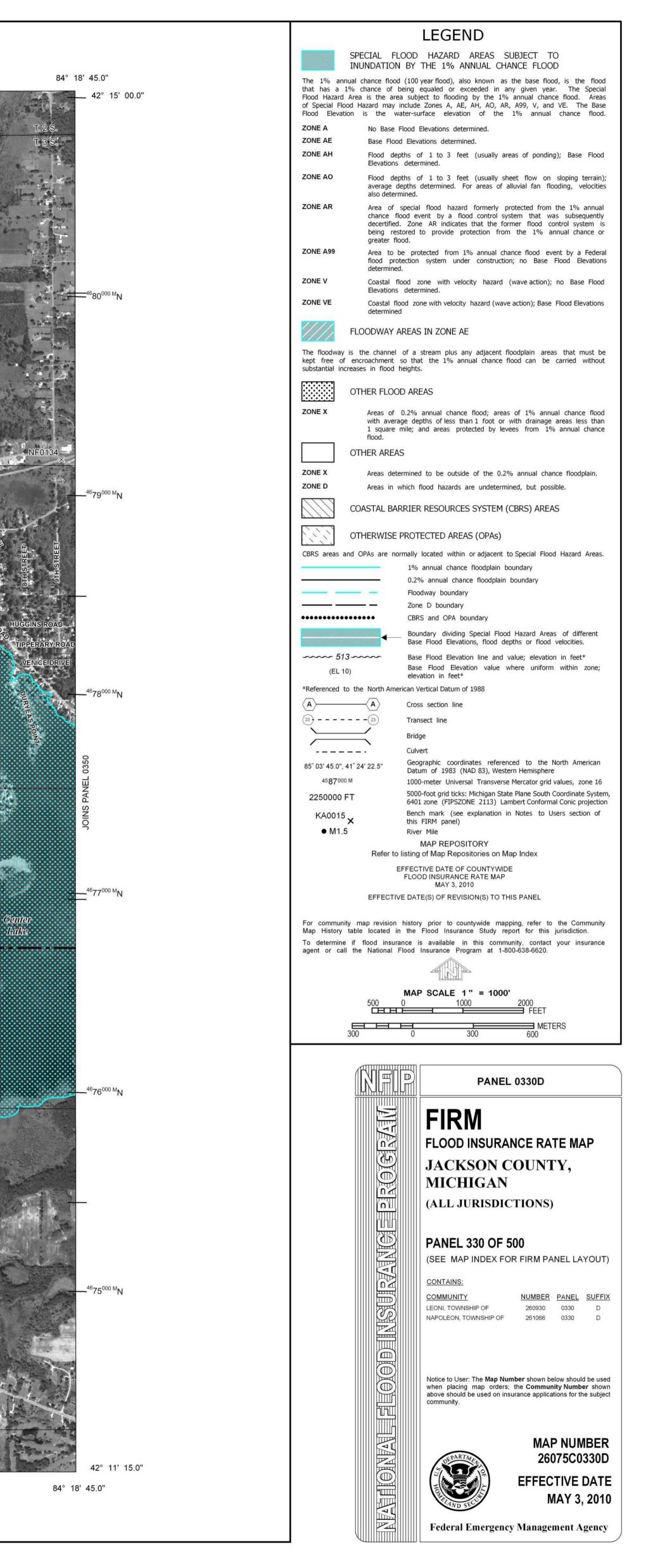
718^{000 N}



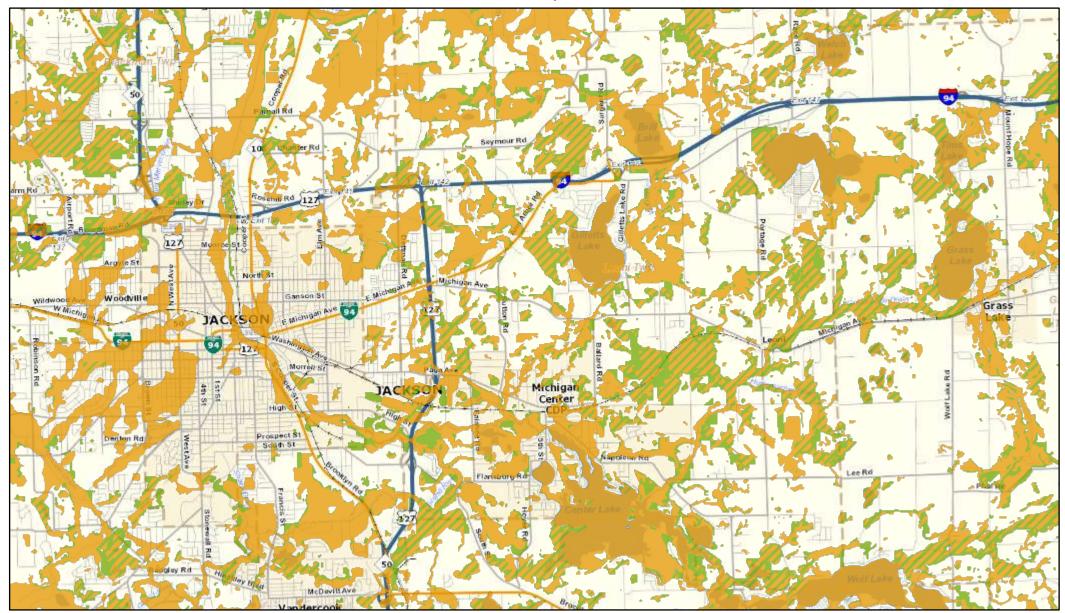
JOINS PANEL 0350 ⁷19^{000 M}E

⁷20^{000 M}E

⁷21^{000 M}E



Wetlands Map Viewer



May 2, 2022

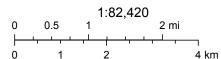
Part 303 Final Wetlands Inventory



Wetlands as identified on NWI and MIRIS maps

Soil areas which include wetland soils

Wetlands as identified on NWI and MIRIS maps and soil areas which include wetland soils

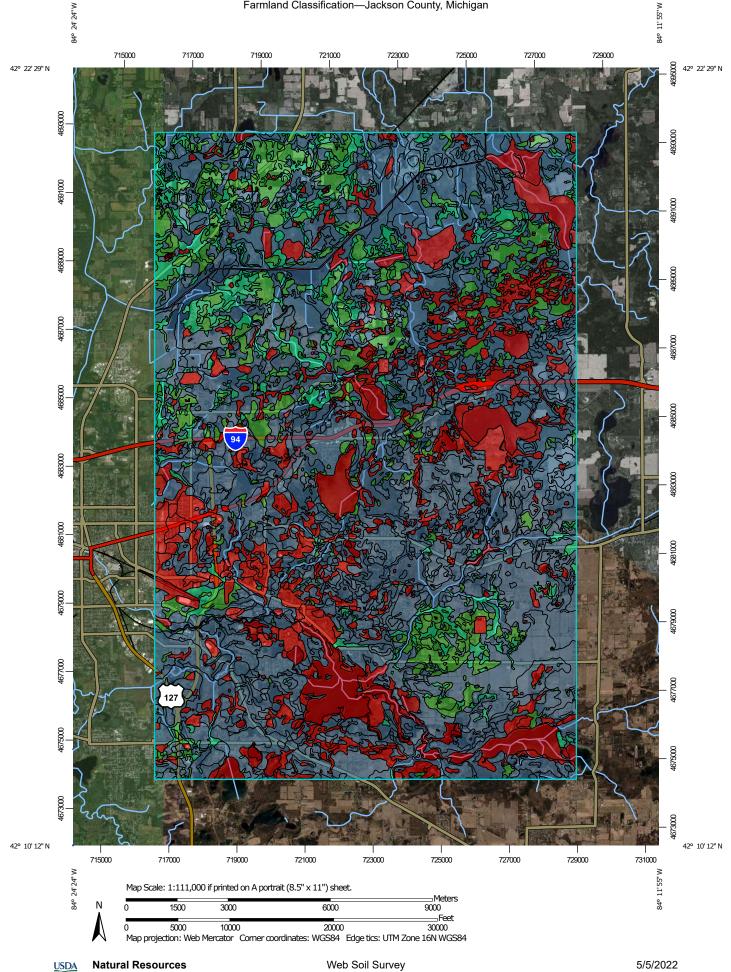


Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Appendix E

Farmland Classification Information

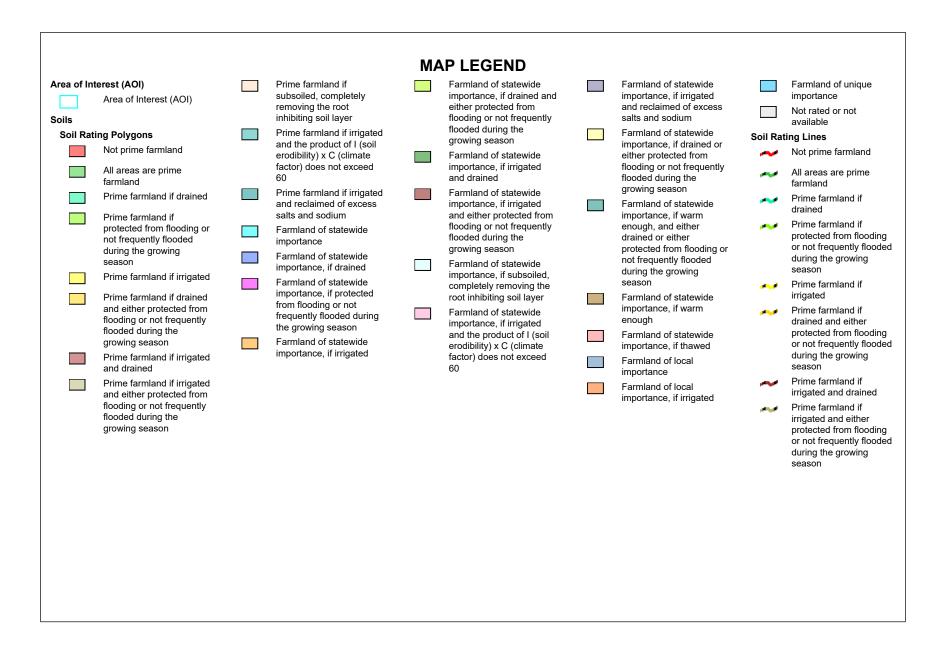
Farmland Classification—Jackson County, Michigan



National Cooperative Soil Survey

Conservation Service

Page 1 of 7



- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of statewide importance, if drained
- Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated

- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the
- growing season Farmland of statewide importance, if irrigated and drained

100

- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
 Farmland of statewide importance, if subsoiled.
- completely removing the root inhibiting soil layer Farmland of statewide importance, if irrigated

and the product of I (soil erodibility) x C (climate factor) does not exceed 60

- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated

Farmland of unique importance
 Not rated or not available

Soil Rating Points

- Not prime farmland
 All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of statewide importance, if drained
- Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated



flood flood grow Farm impo and c	er protected from ding or not frequently ded during the wing season nland of statewide ortance, if irrigated		and reclaimed of excess salts and sodium		importance	1:15,800.	
grow Farm impo and c	ving season mland of statewide				Not rated or not available	Please rely on the bar scale on each map sheet for map measurements.	
impo and o			Farmland of statewide importance, if drained or	Water Fea	Streams and Canals		
and o			either protected from flooding or not frequently	Transport		Source of Map: Natural Resources Conservation Service Web Soil Survey URL:	
	drained		flooded during the	++++	Rails	Coordinate System: Web Mercator (EPSG:3857)	
impo	mland of statewide ortance, if irrigated		growing season Farmland of statewide	~	Interstate Highways	Maps from the Web Soil Survey are based on the Web Mercatol projection, which preserves direction and shape but distorts	
	either protected from ding or not frequently	_	importance, if warm enough, and either	~	US Routes	distance and area. A projection that preserves area, such as the	
flood	ded during the wing season		drained or either protected from flooding or	~	Major Roads	Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.	
	mland of statewide ortance, if subsoiled,		not frequently flooded during the growing	\approx	Local Roads	This product is generated from the USDA-NRCS certified data	
comp	pletely removing the		season	Backgrou		as of the version date(s) listed below.	
Farm	inhibiting soil layer mland of statewide		Farmland of statewide importance, if warm enough	all a	Aerial Photography	Soil Survey Area: Jackson County, Michigan Survey Area Data: Version 18, Sep 1, 2021	
and t	importance, if irrigated and the product of I (soil	nd the product of I (soil	id the product of I (soil	Farmland of statewide importance, if thawed			Soil map units are labeled (as space allows) for map scales
	dibility) x C (climate or) does not exceed		Farmland of local			1:50,000 or larger.	
60		_		importance Farmland of local			Date(s) aerial images were photographed: May 27, 2010—Ma 25, 2019
	-	importance, if irrigated			The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.		



Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
11B	Boyer-Oshtemo sandy loams, 1 to 6 percent slopes	Farmland of local importance	3,149.2	5.4%
11C	Boyer-Oshtemo sandy loams, 6 to 12 percent slopes	Farmland of local importance	1,119.3	1.9%
11D	Boyer-Oshtemo sandy loams, 12 to 18 percent slopes	Not prime farmland	410.5	0.7%
11E	Boyer-Leoni complex, 18 to 40 percent slopes	Not prime farmland	963.3	1.7%
13B	Ormas-Spinks complex, 0 to 6 percent slopes	Farmland of local importance	5,711.1	9.9%
13C	Ormas-Spinks complex, 6 to 12 percent slopes	Farmland of local importance	3,751.9	6.5%
13D	D Ormas-Spinks complex, Not prime farml 12 to 25 percent slopes		826.1	1.4%
14B	Spinks sand, 0 to 6 percent slopes	Farmland of local importance	2,482.4	4.3%
14C	Spinks sand, 6 to 12 percent slopes	Farmland of local importance	1,445.5	2.5%
14D	Spinks sand, 12 to 25 percent slopes	Not prime farmland	281.0	0.5%
15A	Teasdale fine sandy loam, 0 to 3 percent slopes	All areas are prime farmland	593.1	1.0%
16A	Brady sandy loam, 0 to 3 percent slopes	All areas are prime farmland	944.0	1.6%
17	Barry loam, 0 to 2 percent slopes	Prime farmland if drained	195.5	0.3%
18	Gilford-Colwood complex	Prime farmland if drained	2,383.5	4.1%
20	Houghton muck, 0 to 1 percent slopes	Farmland of local importance	7,008.4	12.1%
22	Cohoctah fine sandy loam	Not prime farmland	74.5	0.1%
29A	Kibbie fine sandy loam, 0 to 3 percent slopes	Prime farmland if drained	96.6	0.2%
30	Edwards muck, 0 to 1 percent slopes	Farmland of local importance	964.7	1.7%
35B	Arkport-Okee loamy fine sands, 2 to 6 percent slopes	All areas are prime farmland	2,628.2	4.5%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
35C	Arkport-Okee loamy fine sands, 6 to 12 percent slopes	Farmland of local importance	2,391.0	4.1%
35D	Arkport-Okee loamy fine sands, 12 to 25 percent slopes	Not prime farmland	409.5	0.7%
37	Palms muck, 0 to 1 percent slopes	Farmland of local importance	3,764.9	6.5%
39A	Ypsi-Wauseon complex, 0 to 3 percent slopes	Prime farmland if drained	1.5	0.0%
40	Lenawee silt loam	Prime farmland if drained	29.3	0.1%
42A	Riddles sandy loam, 0 to 2 percent slopes	All areas are prime farmland	40.0	0.1%
42B	Riddles sandy loam, 1 to 6 percent slopes	All areas are prime farmland	598.5	1.0%
42C	Riddles sandy loam, 6 to 12 percent slopes	Farmland of local importance	341.7	0.6%
42D	Riddles sandy loam, 12 to 18 percent slopes	Farmland of local importance	23.8	0.0%
43A	Dixboro very fine sandy loam, 0 to 3 percent slopes	Prime farmland if drained	1,333.1	2.3%
44B	Leoni gravelly sandy loam, 2 to 6 percent slopes	Farmland of local importance	214.8	0.4%
44C	Leoni gravelly sandy loam, 6 to 12 percent slopes	Farmland of local importance	287.4	0.5%
45	Martisco muck	Not prime farmland	573.5	1.0%
46	Sebewa loam, 0 to 2 percent slopes	Prime farmland if drained	147.2	0.3%
47	Histosols and Aquents, ponded	Not prime farmland	1,362.1	2.4%
48	Napoleon muck	Not prime farmland	797.1	1.4%
49B	Hillsdale-Riddles sandy loams, 1 to 6 percent slopes	All areas are prime farmland	1,173.4	2.0%
49C	Hillsdale-Riddles sandy loams, 6 to 12 percent slopes	Farmland of local importance	803.7	1.4%
49D	Hillsdale-Riddles sandy loams, 12 to 18 percent slopes	Farmland of local importance	393.2	0.7%
49E	Hillsdale-Riddles sandy loams, 18 to 30 percent slopes	Not prime farmland	746.1	1.3%
51	Udorthents and Udipsamments, nearly level	Not prime farmland	767.6	1.3%

USDA

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
52	Pits, gravel	Not prime farmland	269.2	0.5%
53	Pits, quarries	Not prime farmland	7.3	0.0%
55B	Eleva sandy loam, 1 to 6 percent slopes	All areas are prime farmland	115.9	0.2%
56D	Riddles-Leoni complex, 10 to 20 percent slopes	Not prime farmland	12.1	0.0%
57A	Urban land-Barry-Brady complex, 0 to 3 percent slopes	Not prime farmland	232.9	0.4%
58B	Urban land-Oshtemo complex, 0 to 6 percent slopes	Not prime farmland	688.1	1.2%
58C	Urban land-Oshtemo complex, 6 to 15 percent slopes	Not prime farmland	351.6	0.6%
59C	Urban land-Riddles complex, 6 to 15 percent slopes	Not prime farmland	6.4	0.0%
60	Urban land-Udorthents complex	Not prime farmland	144.6	0.2%
62A	Del Rey silt loam, 0 to 3 percent slopes	Prime farmland if drained	3.9	0.0%
63	Henrietta muck	Farmland of local importance	1,266.5	2.2%
64B	Marlette-Owosso complex, 2 to 6 percent slopes	All areas are prime farmland	2.5	0.0%
67B	Whalan loam, 1 to 6 percent slopes	All areas are prime farmland	5.0	0.0%
W	Water	Not prime farmland	3,615.6	6.2%
Totals for Area of Inter	rest	r	57,955.4	100.0%

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Appendix F

Project Cost Estimates and Bond Schedule

Leoni Twp Water System Improvement Project Cost Estimates -	Open Cut (Alternative 1)
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Item Description	Units	Quantity	Unit Price	Cost
General Conditions, Bonds, and Insurance, Max 5%	Lump Sum	1	\$185,635	\$185,600
Traffic Control	Lump Sum	1	\$43,506	\$43,500
Gate Valve and Box, 8-inch	Ea	20	\$2,000	\$40,000
Fire Hydrants	Ea	24	\$6,000	\$144,000
Fire Hydrants: Tee: 12" x 12" x 6"	Each	24	\$1,400	\$33,600
Roadway Grading	Sta	120	\$2,265	\$271,800
Subgrade Undercutting, Type II	Cyd	1,000	\$20	\$19,600
Trench Undercut and Backfill	Cyd	500	\$28	\$14,000
Subbase, CIP	Cyd	6,550	\$12	\$80,200
HMA, 13A	TON	4,400	\$120	\$528,000
Aggregate Base, 8 inch	Syd	19,650	\$20	\$393,000
Surface Restoration	Syd	16,000	\$10	\$160,000
Watermain, 12-inch	Lft	12,000	\$125	\$1,500,000
Total Trench and New WM Construction Costs	Total			\$3,227,700
Replace Pumps at Wells 1 and 2A	Each	2	\$60,000	\$120,000
Storage Tank Maintenance	Lump Sum	1	\$350,000	\$350,000
Chemical Feed Upgrades at Wells 2A and 2B	Lump Sum	1	\$15,000	\$15,000
Total Well and Storage Tank Upgrade Costs	Total			\$485,000

Total	\$5,067,800
Contingency	\$389,800
Engineering	\$779,700
Subtotal	\$3,898,300

Leoni Twp Water System Improvement Project Cost Estimates - Directional Drilling (Alternative 2)

Item Description	Units	Quantity	Unit Price	Cost
General Conditions, Bonds, and Insurance, Max 5%	Lump Sum	1	\$172,910	\$172,900
Traffic Control	Lump Sum	1	\$10,000	\$10,000
Gate Valve and Box, 8-inch	Ea	20	\$2,000	\$40,000
Fire Hydrants	Ea	24	\$6,000	\$144,000
Fire Hydrants: Tee: 12" x 12" x 6"	Each	24	\$160	\$3,800
Subbase, CIP	Cyd	500	\$20	\$9,800
HMA, 13A	TON	400	\$28	\$11,200
Aggregate Base, 8 inch	Syd	1,500	\$12	\$18,400
Surface Restoration	Syd	1,200	\$30	\$36,000
Watermain, 12-inch, Directionally Drilled	Lft	12,000	\$225	\$2,700,000
Total Directional Drilling Construction Costs	Total			\$2,973,200
Replace Pumps at Wells 1 and 2A	Each	2	\$60,000	\$120,000
Storage Tank Maintenance	Lump Sum	1	\$350,000	\$350,000
Chemical Feed Upgrades at Wells 2A and 2B	Lump Sum	1	\$15,000	\$15,000
Total Well and Storage Tank Upgrade Costs	Total			\$485,000

Subtotal	\$3,631,100
Engineering	\$726,200
Contingency	\$363,100
Total	\$4,720,400

Bond Schedule	2022 Water Sys	tem Improvements		Date:	05/24/22
Borrower Name: Interest Rate: Yrs Deferred Principle Principal:		o (round to nearest \$1000)	Ţ	ype of Bond:	
Ammort. Factor Ammortized Payment:	0.0561 \$214,433				
Ammorazea r ayment.	φ214,400				
	1st	2nd	Principal	Total Year	Loan
Yea	r Interest	Interest	Paid	Payment	Balance
					4,721,000
	1 50,161	50,161	114,000	214,321	4,607,000
	2 48,949	48,949	117,000	214,899	4,490,000
	3 47,706	47,706	119,000	214,413	4,371,000
	4 46,442	46,442	122,000	214,884	4,249,000
	5 45,146	45,146	124,000	214,291	4,125,000
	6 43,828	43,828	127,000	214,656	3,998,000
	7 42,479	42,479	129,000	213,958	3,869,000
	8 41,108	41,108	132,000	214,216	3,737,000
	9 39,706	39,706	135,000	214,411	3,602,000
1	0 38,271	38,271	138,000	214,543	3,464,000
1	1 36,805	36,805	141,000	214,610	3,323,000
1	2 35,307	35,307	144,000	214,614	3,179,000
1	3 33,777	33,777	147,000	214,554	3,032,000
	4 32,215	32,215	150,000	214,430	2,882,000
1		30,621	153,000	214,243	2,729,000
	6 28,996	28,996	156,000	213,991	2,573,000
	7 27,338	27,338	160,000	214,676	2,413,000
	7 27,338	27,338	160,000	214,676	2,413,000
	8 25,638	25,638	163,000	214,276	2,250,000
	9 23,906	23,906	167,000	214,813	2,083,000
2	,	22,132	170,000	214,264	1,913,000
2		20,326	170,000	214,204	1,739,000
2	- 1	18,477	174,000	214,051 213,954	
2		16,596	181,000	213,954	1,562,000 1,381,000
2			185,000		
		14,673		214,346	1,196,000
2		12,708	189,000	214,415	1,007,000
2	,	10,699	193,000	214,399	814,000
2		8,649	197,000	214,298	617,000
2		6,556	201,000	214,111	416,000
2		4,420	206,000	214,840	210,000
3	0 2,231	2,231	210,000	214,463	0

Appendix G

Preliminary Distribution System Materials Inventory



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY DRINKING WATER AND MUNICIPAL ASSISTANCE DIVISION

PRELIMINARY DISTRIBUTION SYSTEM MATERIALS INVENTORY

Issued under authority of the Safe Drinking Act, 1976 PA 399, and Administrative Rules, as amended. Administrative Rule R 325.10604(c)(i) requires a water supply to complete and submit a preliminary distribution system materials inventory to the Michigan Department of Environmental Quality (MDEQ) by January 1, 2020.

Leoni Township		03837	
Supply Name		WSSN	
2408	688	Jackson	
Population Served	Number of Service Connections	County	

The primary focus of the Preliminary Distribution System Materials Inventory (DSMI) is to identify lead service lines, galvanized steel previously connected to lead, or service lines of unknown material. This inventory will estimate the number of high-risk service lines and describe the reliability of existing records, thereby providing important information for planning service line verification and replacement efforts. The Complete DSMI, which is due in 2025, will require characterization of all service line materials (lead, galvanized, copper, and plastic). Instructions for completing this form are provided at the end of the document.

1. Does this water supply have service lines meeting the following definition?

"Service line" means the pipe from the discharge of the corporation fitting to customer site piping or to the building plumbing at the first shut-off valve inside the building, or 18 inches inside the building, whichever is shorter.

Note: For the purposes of this inventory, Manufactured Housing Community (MHC) connections to units (risers) are considered service lines, so MHCs should fill out this entire form.

X YES. If yes, complete this form in its entirety.

NO. If no, skip to Questions 7 and 8 and the Certification.

2. Complete the table below.

	buil	ding, or 18 inche	es inside the buildi	ng, whichever is	shorter.	
Any Portion Contains Lead	Contains Galvanized Previously Connected to Lead*	Unknown			Contains neither Lead, nor Galvanized	
		Likely Contains Lead	Likely Does <u>Not</u> Contain Lead	Material(s) Unknown	Previously Connected to Lead	Total**
			688			688

*If a galvanized line is still connected to lead, it is a lead service line and must be counted in the first column. **The total number should equal the total number of potable water service lines in your water supply (residential, commercial, industrial, other).

Describe the sources of information used to summarize or estimate the data above (see instructions for a list of potential sources of information).

Existing Water quality data Interviews with Senior Staff Distribution maps and drawings

4.	Describe your level of confidence in the sources of information discussed in Question 3.						
	Very confident Somewhat confident Not very confident Not confident						
	Describe:						
5.	How common is it to find discrepancies in your service line data (for example, services you expected to be lead turned out to be copper)?						
	Frequently Occasionally Seldom Never Not Enough Information						
	Describe, including any common patterns:						
6.	In general, describe the composition of lead services lines identified in the column titled "Any Portion Contains Lead." For example, are services primarily full lead lines, partial lead lines (main to curb stop, curb stop to water meter), or lead goosenecks?						
	N/A						
7.	What other information can you share about your preliminary DSMI?						
	No Evidence of lead services in the system.						
8.	Beyond your service lines, do other documents previously submitted to MDEQ, including the General Plan, Reliability Study, issued permits, and/or Asset Management Plan, in combination, properly characterize the remainder of your current distribution system?						
	YES, my general plan, reliability study, issued permits, and/or asset management plan characterize the rest of my current distribution system.						
	NO. If no, please contact your district engineer to update your documentation.						
Ce	rtification of Preliminary Distribution System Materials Inventory						

I certify that I have reviewed available documentation related to the materials in this water supply's distribution system and the information herein is accurate and complete to the best of my knowledge and information.

Signature

20 a Date

Robe one

Print Name

0) Title

When complete, submit this signed form to your MDEQ district office no later than January 1, 2020.

PRELIMINARY DISTRIBUTION SYSTEM MATERIALS INVENTORY (DSMI) REPORTING FORM INSTRUCTIONS

Water supplies should review all records documenting the materials used to construct and repair service lines and use that information to complete this reporting form.

Potential sources of service line information may include, but are not limited to, the following:

- Plumbing codes
- Plumbing permits
- Distribution maps and drawings
- Tap records
- Inspection and maintenance records
- Meter installation records
- Billing records
- Water asset databases
- Geographic Information System
- Standard operating procedures

- Operation and maintenance manuals
- Permit files
- As-Built drawings
- Existing water quality data
- Property tax records
- Interviews with senior personnel, building inspectors, and retirees
- Community survey
- Other

Complete the Service Line Materials Table

The service line materials table summarizes potable water service connections by broad material categories, focusing on service lines containing lead, galvanized steel previously connected to lead, or service lines of unknown material. A service line includes any section of pipe from the water main to the first shut-off valve inside the building, or up to 18 inches inside the building, whichever is shorter. The number of service lines in each of the following categories need to be reported:

- Any Portion Contains Lead: Any portion of a service line that is made of lead or any lead pigtail, lead
 gooseneck, or other lead fitting that is connected to the service line, or both. In short, any service line that
 contains any lead.
- Galvanized Previously Connected to Lead: A galvanized service line that WAS previously connected to a lead service line, gooseneck, or pigtail. If a galvanized line is still connected to lead, it is considered a lead service line and must be counted in the category above.
- Unknown: While a water supply may not be certain of the materials content of some service lines, they
 may have information that indicates the likelihood of a service line containing lead. For planning
 purposes, it is helpful to record this information. Therefore, three categories of unknown service lines are
 provided.
 - Unknown Likely Contains Lead: While not known for certain, service lines the water supply believes are likely to contain lead.
 - Unknown Likely Does NOT Contain Lead: While not known for certain, service lines the water supply believes are NOT likely to contain lead.
 - Unknown Material(s) Unknown: Service line materials are fully unknown. Supply has no information regarding the likelihood of lead being present in the service line.
- Contains neither Lead, nor Galvanized Previously Connected to Lead: Service lines that are known to contain NO lead in any portion. These typically include: copper, plastic, cast iron, ductile iron, or galvanized that was NEVER connected to lead. If a galvanized service line was previously connected to lead, it should not be included in this category but rather included with the second bullet above.

All physically connected potable water services must be included in this table, even if there is no current active account. Complete the table to the best of your ability based on your available records and/or knowledge of the system. If you do not know the answer, use the unknown category. You will not be penalized for acknowledging you do not know. The purpose of this preliminary inventory is to understand current service line materials documentation and knowledge. The total number of service lines in the lower right-hand box should equal the total number of service lines in your system.

Answer Supporting Questions

Provide answers to the questions asked. Because water supplies differ significantly in terms of service line materials and records, many questions require a narrative response to allow flexibility. Please provide thorough answers that provide meaningful information about the status of your water supply's service line inventory. DEQ Environmental Assistance Center Page 3 1-800-662-9278
www.michigan.gov/deq EQP6786 (04/2019)

Submit Form to the Michigan Department of Environmental Quality (MDEQ)

Submit the completed and signed reporting form to the appropriate MDEQ district office no later than January 1, 2020. See below for district office mailing and email addresses.

MDEQ District office locations and email addresses:

CADILLAC DISTRICT OFFICE 120 West Chapin Street Cadillac, MI 49601-2158 Fax: 231-775-4050 EMAIL: DEQ-DWMA-Cadillac@michigan.gov

GRAND RAPIDS DISTRICT OFFICE State Office Building 5th Floor 350 Ottawa Avenue NW, Unit 10 Grand Rapids, MI 49503-2341 Fax: 616-356-0202 EMAIL: DEQ-DWMA-Grand-Rapids@michigan.gov

JACKSON DISTRICT OFFICE 301 East Louis Glick Hwy Jackson, MI 49201-1556 Fax: 517-780-7855 EMAIL: DEQ-DWMA-Jackson@michigan.gov

KALAMAZOO DISTRICT OFFICE 7953 Adobe Road Kalamazoo, MI 49009-5025 Fax: 269-567-3555 EMAIL: DEQ-DWMA-Kalamazoo@michigan.gov LANSING DISTRICT OFFICE 525 West Allegan (Constitution Hall, 1st Floor, South) P.O. Box 30242 Lansing, MI 48909-7742 Fax: 517-241-3571 EMAIL: DEQ-DWMA-Lansing@michigan.gov

SAGINAW BAY DISTRICT OFFICE 401 Ketchum Street, Suite B Bay City, MI 48708 Fax: 989-891-9237 EMAIL: DEQ-DWMA-Saginaw-Bay@michigan.gov

SOUTHEAST MICHIGAN DISTRICT OFFICE 27700 Donald Court Warren, MI 48092-2793 Fax: 586-751-4690 EMAIL: DEQ-DWMA-SEMI@michigan.gov

UPPER PENINSULA DISTRICT OFFICE 1504 West Washington Street Marquette, MI 49855 Fax: 906-228-4940 EMAIL: DEQ-DWMA-UP@michigan.gov

Appendix H

Affidavit of Publication

<< This Appendix intentionally left blank for draft report>>

Appendix I

Public Hearing Transcript Project Plan Resolution

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