

# Wastewater Master Plan

---

Robinson Township

**Wastewater Plan for the Township and  
Service to the Intersection of M-231 and M-45**

March, 2014

2130643

# Table of Contents

- I. INTRODUCTION..... 1
- II. MASTER PLAN ..... 1
  - A. Soils..... 1
  - B. Zoning ..... 2
  - C. Existing Wastewater Collection & Treatment Systems ..... 2
  - D. Service Areas/Watersheds for Robinson Township..... 3
- III. SERVICE TO M-231 & M-45 INTERCHANGE ..... 4
  - A. Projected Flow Rates ..... 4
  - B. West Central Ottawa County Wastewater Treatment Plant..... 4
  - C. Grand Haven – Spring Lake ..... 5
  - D. Allendale Township ..... 5
  - E. On-Site Disposal of Wastewater ..... 6
  - F. Mechanical Treatment Plant ..... 7
  - G. Recommendations..... 8
- IV. SERVICE TO M-231 & LINCOLN STREET ..... 9
  - A. Projected Flow ..... 9
  - B. Recommendations..... 10

## Tables

- Table 1 .....Capacity Analysis
- Table 2 .....Projected Flow Rates
- Table 3 .....Cost Estimate Connect to Ottawa County System at Fillmore Street & 120<sup>th</sup> Avenue
- Table 4 .....Cost Estimate Service from West Central Ottawa Treatment Plant
- Table 5 .....Cost Estimate Forcemain from M-45 & M-231 to Grand Haven Charter Township Pump Station
- Table 6 .....Cost Estimate Service from Allendale Township
- Table 7 .....Cost Estimate On-Site Septic Tank and Drainfield System
- Table 8 .....Cost Estimate Wastewater Collection & Treatment System/On-site Lagoon System

## Figures

- Figure 1 .....Zoning Map
- Figure 2 .....Wastewater Master Plan
- Figure 3 .....Ottawa County Complex, Flow Schematic

## **I. INTRODUCTION**

The purpose of this report is to prepare a master wastewater plan for Robinson Township and to evaluate the feasibility of providing public wastewater collection and treatment at the intersection of M-231 and M-45 in Robinson Township.

This report presents the results of a review of capacities of the existing wastewater collection systems and the wastewater treatment plants in the vicinity of Robinson Township. This report also contains an evaluation of the feasibility of on-site wastewater treatment systems as development begins to take place. With this information, a master plan for a public wastewater collection system and treatment facilities has been developed for Robinson Township.

## **II. MASTER PLAN**

### **A. Soils**

Soils in the Township have been classified by the US Department of Agriculture Soil Conservation Service. The western two-thirds of the southern one-third of the township and the western one-half of the central region of the township are classified as nearly level and gently sloping, very poorly drained to somewhat poorly drained, sandy soils of the lake plains.

The remainder of the Township is classified as level and gently sloping, very poorly drained, sandy soils of the lake plains and out-wash plains.

The high water table impacts a corridor along Lake Michigan Drive and an area bordering the Grand River at the northern Township limit. The fact that the soils are poorly drained indicates that site specific data must be collected before designing an on-site system. High ground water should be expected.

## B. Zoning

A zoning map of Robinson Township can be found in Figure 1. Zoning near the intersection of M-231 and M-45 identifies an area that is in transition. There is industrial and commercial zoning at this intersection already.

## C. Existing Wastewater Collection & Treatment Systems

### 1. Allendale Township

Allendale Township is located immediately east of Robinson Township. Its wastewater collection system extends west of the developed area on M-45. A capacity analysis is necessary before additional area is served by the system. The wastewater treatment plant is located northeast of the community close to the Grand River. The capacity of the plant is 1.6 mgd and the present average day flow is 1.3 mgd. See Table 1. Buy-in cost for the wastewater collection and treatment system must be determined.

### 2. Grand Haven – Spring Lake

The Grand Haven – Spring Lake system has a wastewater treatment plant located on Beechtree Street in the City of Grand Haven. It has a capacity of 6.67 mgd and a present average day flow of 3.33 mgd, see Table 1. A potential connection point for the wastewater collection system is located in Grand Haven Charter Township at US-31 and M-45. Capacity analysis and buy-in costs must be determined.

### 3. West Central Ottawa County

Ottawa County owns and operates a wastewater treatment plant located in Section 7 of Olive Township at the intersection of 142<sup>nd</sup> Avenue and Crosswell Street. The plant has a capacity of 0.3 mgd and a present average day flow of 0.128 mgd over the last 11-years. See Table 1. The headworks of the plant requires an equalization basin to

stabilize flows. The current collection system consists of force mains manifolded together creating significant flow variations at the plant. This makes treatment operations difficult to maintain.

The trunkage charge for connecting to the treatment plant is \$1,850 per residential equivalent.

An 8-inch forcemain extends west from the Ottawa County Complex to Stanton Street and then south to the treatment plant. At the County Complex a submersible pump station with a capacity of 240 gpm at 57 feet of total dynamic head is located. This pump station is equipped with a grinder to reduce the size of solid material in the wastewater. At this time, the wastewater system serves the County Complex and the Pine Meadows development as well as the West Olive Estates Mobile Home Park at 142<sup>nd</sup> Avenue and Stanton Street.

The existing wastewater collection system along the US-31 corridor consists of a dry pit pump station known as Pump Station No. 3 at 136<sup>th</sup> Avenue and Port Sheldon Street. It pumps wastewater through an 8-inch diameter and 12-inch diameter force main in Port Sheldon and along US-31 to the West Central Ottawa Wastewater Treatment Plant. Another dry pit pump pump station known as Pump Station No. 2 at 2<sup>nd</sup> Street south of Crosswell Street pumps wastewater through an 8-inch diameter force main to the 12-inch force main from Pump Station No. 3. The design capacities of these stations are 350 gpm and 310 gpm respectively.

#### D. Service Areas/Watersheds for Robinson Township

Figure 2 identifies the watersheds in Robinson Township. It is likely that, in general, most wastewater collection system extensions will follow the watersheds. In the northwest

corner of the Township a future wastewater collection system will most likely tie into a proposed system on Green Street in Grand Haven Charter Township.

In the eastern area of the Township, a future wastewater collection system will follow the Bass River in the Grand River Drainage Basin. A pump station or wastewater treatment plant will be necessary where the Bass River joins the Grand River.

The area around and south of M-45 could utilize the existing West Central Ottawa County wastewater treatment plant in Olive Township at the intersection of Crosswell Street and 142<sup>nd</sup> Avenue. The existing pump station at the Ottawa County Complex could be utilized however; there is insufficient capacity in the pump station at this time.

### **III. SERVICE TO M-231 & M-45 INTERCHANGE**

#### **A. Projected Flow Rates**

A big box store has been proposed for the intersection of the proposed M-231 and M-45. The initial projected flow rate is 9,500 gallons per day (gpd). Figure 2 shows potential location and routes for forcemains serving the proposed development. Table 2 projects flows at this location for the next 20 years.

#### **B. West Central Ottawa County Wastewater Treatment Plant**

This plant and the associated 8-inch forcemain and pump station in the Ottawa County Complex are closest to the interchange at M-45 and M-231. Table 3 identifies Option 1 and the cost estimate for extending the system. Figure 2 identifies the location of Option 1. Negotiations with Ottawa County will be necessary to determine the cost to utilize the connection to the wastewater plant and the pump station and force main systems.

When flows increase, an equalization basin may be required in order to connect to this system. The equalization basin may be located at the Ottawa County Complex with their permission. The capacity of the basin is assumed to be approximately 100,000 gallons. Figure 3 is a schematic diagram of this facility. Location, size, capacity and equipment details will be determined by a preliminary design prior to construction.

The existing pump station on the Ottawa County Complex has a capacity of 240 gpm. Connection to this pump station may require increasing the capacity of the existing pumps or alternatively increasing the size of the pump chambers as demand for wastewater service increases. At the present time the wet well is a 6.0 foot concrete manhole with a working storage volume of 5feet.

Another alternative could be constructing a force main directly from the intersection of M-231 and M-45 to the West Central Ottawa wastewater treatment plant. This option, requires no capacity purchase for the wastewater collection system but developers will be required to pay the trunkage charges of \$1,850 per residential equivalent. See Table 4 for an estimated cost of Option 2 and see Figure 2 for the location of this option.

### C. Grand Haven – Spring Lake

The potential connection to the Grand Haven – Spring Lake system is located at M-45 and US-31, approximately five miles west of the M-231 and M-45 intersection. This is Option 3 on Figure 2. Connection to this system will require negotiations with the Grand Haven – Spring Lake Sewer Authority for wastewater treatment and Grand Haven Charter Township for the purchase of capacity in its wastewater collection system. Table 5 is a cost estimate for Option 3.

The capacity of the wastewater plant is 6.67 mgd and present average day flow is 3.33 mgd. See Table 1.

#### D. Allendale Township

Allendale Township is located east of Robinson Township. The M-231 and M-45 intersection is located six miles west of the existing wastewater collection system on M-45. Service could be provided from this location. Table 6 is a cost estimate for Option 4. A capacity analysis of the Allendale Township wastewater collection system and negotiation for capacity purchase will be required prior to connecting to this system. The capacity of the Allendale wastewater treatment plant is 1.6 mgd and the average day flow is 1.3 mgd. See Table 1.

#### E. On-Site Disposal of Wastewater

There are several on-site methods which could be utilized for the treatment of wastewater at the intersection of M-231 and M-45. The two most common are a septic tank and drainfield system or a lagoon system with seasonal discharges to Bass Creek or, alternatively, an on-site irrigation system. These two methods of wastewater treatment will each require a discharge permit from Ottawa County Environmental Health Department (less than 10,000 gpd flow) or from the Michigan Department of Environmental Quality (MDEQ).

The estimated cost for a septic tank and drainfield system serving a 10,000 gpd development is \$400,000 (see Table 7). This alternate will require a site with the water table at least four feet below the drainfield.

The other option for on-site treatment is a lagoon system with seasonal discharge to the Bass River. Initially, the lagoon could be very small with a capacity of 25,000 gpd and the



seasonal discharges to the Bass River would also be quite small. However, discharge to this surface water would require a NPDES permit from the MDEQ. As the area grows, the lagoon system can be expanded to accommodate the larger wastewater flow rates.

The lagoon will require a composite (double) liner because the nature of the existing sandy, on-site soils is not suitable as a liner for a lagoon system. The estimated cost for a lagoon system with capacity to treat 25,000 gpd and with a seasonal discharge is \$1,900,000 (see Table 8). Alternatively, the lagoon effluent might be used to irrigate cropland. This discharge will require suitable soils and crops. Also, this discharge will require a permit from MDEQ. Cost estimates do not include the cost of a wastewater collection system if the lagoons are located at a remote location from the development sites.

## F. Mechanical Treatment Plant

When wastewater flow exceeds 10,000 gpd and a septic system with a drainfield discharge is no longer adequate, a mechanical plant could be considered for treatment of a continuous discharge to Bass Creek or one of its tributaries.

The National Pollutant Discharge Elimination System (NPDES) discharge permit issued by the MDEQ will determine the quality of treatment that will be required. There are various types of mechanical treatment plants employing one of several different processes that are available for consideration. Some of those are:

- Sequencing Batch Reactor (SBR)
- Moving Bed Bioreactor (MBBR)
- Membrane Bioreactor (MBR)

At the time a mechanical treatment plant is being considered, a preliminary engineering design should be prepared that would consider the various treatment processes that are available and the quality of the effluent that will be required by the NPDES permit.

Construction cost for a mechanical plant with capacity of 75,000 gpd to 200,000 gpd is estimated to range from \$2 million dollars to \$4 million dollars depending on the capacity and the type of treatment that is provided.

Operating costs for the mechanical plant will include a part-time operator, power, chemicals and miscellaneous expenses. This cost should be estimated when the capacity and type of treatment are known.

## G. Recommendations

The least expensive cost option for a low wastewater volume is constructing a septic tank and drainfield. See Table 9. There are limitations on this type of wastewater treatment. The soils in the area are not well suited to this type of treatment. They are generally described as poorly drained with a high groundwater table. A typical drainfield in soils of this nature will have a shorter life expectancy than in sandy well drained soils. There is a concern over contamination of the ground water from the drainfield effluent which would have a negative impact on the entire area.

If a drainfield is considered, it will probably be a temporary solution. In that case, a regional public system operated by the Ottawa County Road Commission is the best alternative. As additional businesses locate in the area, the system could be modified to accept the additional growth.

The most cost effective long-term public method of disposing of the wastewater generated at M-231 and M-45 is through the Ottawa County Complex and the West Central Ottawa County Wastewater Treatment Plant. This alternative will require negotiating an agreement with Ottawa County for the use of the existing infrastructure to determine the total township cost. The existing 8-inch forcemain has a capacity of 240 gpm (0.34 million gallons per day (mgd)). It can be increased to over 400 gpm (0.57 mgd) by changing the pumps and motors at the pump station. An equalization basin could also be installed to reduce peak flows and the corresponding pumping energy. In addition, depending on the amount and type of development, the wastewater plant may need to be expanded.

#### **IV. SERVICE TO M-231 & LINCOLN STREET**

##### **A. Projected Flow**

Eventually, there could be demand for municipal water and sewer at the proposed interchange of M-231 and Lincoln Street. Projected flow rates are similar to the intersection of M-231 and M-45. Initially the flow is expected to be approximately 10,000 gpd. After 10-years of growth, the flow rates may increase to 25,000 gpd and after 20-years to 100,000 gpd.

The likely source of wastewater treatment is the West Central Ottawa wastewater Treatment Plant. The closest wastewater collection location will be M-231 and M-45 which is two miles south of this location assuming that area develops first.

The Grand Haven – Spring Lake systems could also provide this intersection with wastewater service. The existing collection system in Grand Haven Charter Township is located west of 144<sup>th</sup> Avenue, one quarter mile north of Lincoln Street in the center of Section 12, three miles west of the intersection.

## B. Recommendation

It is recommended that Robinson Township consider the West Central Ottawa County Wastewater Treatment Plant and the Ottawa County Complex for wastewater service to M-231 and Lincoln Street because it is one mile closer than the Grand Haven system. At the time development occurs at this location, more consideration should be given to the cost of capacity in the West Central Ottawa system and the Grand Haven-Spring Lake system.



Table 1  
Capacity Analysis for Robinson Township

Wastewater Plant	<u>Average Day Flow (mgd)</u>	<u>Current Capacity (mgd)</u>
Allendale Township	1.3	1.6
Grand Haven-Spring Lake	3.33	6.67
West Central Ottawa County	0.128	0.3

Table 2  
Projected Flow Rates from Robinson Township at M-231 and M-45

	<u>Average Day (mgd)</u>	<u>Maximum Day (mgd)</u>
5-Year	0.0095	0.038
10-Year	0.025	0.10
20-Year	0.10	0.40

## Estimate of Probable Cost - Table 3

Owner:

Robinson Township Option 1

Project Title:

Connect to the Ottawa County System at Fillmore Street and 120th Avenue

Project #:  
2130643

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	8" Forcemain Directionally Drilled	11500	LF	\$41.00	\$471,500.00
2	Air Release Structures	2	Ea	\$5,000.00	\$10,000.00
3	Submersible Pump Station	1	Ea	\$200,000.00	\$200,000.00
4	100,000 Gallon Equalization Basin - Double Pumping	1	Ea	\$200,000.00	\$200,000.00
	Allowance for Construction Contingencies, Legal, Administration, Engineering	1	Ea	\$253,500.00	\$253,500.00
<b>Total Project Cost:</b>					<b>\$1,135,000.00</b>

**Additional Consideration**

Purchase capacity from the County for use of the existing pump station and force main upgrade the headworks and purchase capacity for treatment from the West Central Ottawa County Wastewater Treatment Plant.

Collection system will be required in the development area.

## Estimate of Probable Cost - Table 4

Owner:

Robinson Township Option 2

Project Title:

Service from the West Central Ottawa Treatment Plant

Project #:  
2130643

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	8" Forcemain Directionally Drilled	33000	LF	\$41.00	\$1,353,000.00
2	Air Release Structures	7	Ea	\$5,000.00	\$35,000.00
3	Submersible Pump Station	1	Ea	\$200,000.00	\$200,000.00
4	Allowance for Construction Contingencies, Legal, Administration, Engineering	1	Ea	\$487,000.00	\$487,000.00

**Total Project Cost: \$2,075,000.00**

**Additional Consideration**

Purchase Capacity in the West Central Wastewater Treatment Plant

Headworks will require upgrade with a significant increase in wastewater flow rates.

Collection system will be required in the development area.



## Estimate of Probable Cost - Table 5

Owner:

Robinson Township Option 3

Project Title:

Force Main from M-45 and M-231 west along M-45 to US-31 to the Grand Haven Charter Township Pump Station

Project #:  
2130643

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	8" Forcemain Directionally Drilled	26500	LF	\$41.00	\$1,086,500.00
2	Air Release Structures	5	Ea	\$5,000.00	\$25,000.00
3	Submersible Pump Station	1	Ea	\$200,000.00	\$200,000.00
	Allowance for Construction Contingencies, Legal, Administration, Engineering	1	Ea		\$388,500.00
<b>Total Project Cost:</b>					<b>\$1,700,000.00</b>

**Additional Considerations**

Purchase Capacity in Grand Haven Charter Township Wastewater Collection System and the Grand Haven/ Spring Lake Wastewater Treatment System  
 Collection system will be required in the development area.

## Estimate of Probable Cost - Table 6

Owner:

Robinson Township Option 4

Project Title:

Service from Allendale Township

Project #:  
2130643

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	8" Forcemain Directionally Drilled	35000	LF	\$41.00	\$1,435,000.00
2	Air Release Structures	7	Ea	\$5,000.00	\$35,000.00
3	Submersible Pump Station	1	Ea	\$200,000.00	\$200,000.00
4	Wastewater Collection System Capacity Study	1	Ea	\$6,000.00	\$6,000.00
5	Allowance for Construction Contingencies, Legal, Administration, Engineering				\$499,000.00
<b>Total Project Cost:</b>					<b>\$2,175,000.00</b>

**Additional Consideration**

Negotiate capacity in Allendale Township's Wastewater Collection and Treatment System

May require collection system buy-in and costs for upgrading the systems.

Collection system will be required in the development area.

## Estimate of Probable Cost - Table 7

Owner:

Robinson Township Option 5

Project Title:

On-site Septic Tank and Drainfield System

Project #:  
2130643

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	Surge Tank	1	Each	\$20,000.00	\$20,000.00
2	Septic Tanks	10	Each	\$10,000.00	\$100,000.00
3	Dosing Tank w/ Pump & Control Valves	1	Each	\$25,000.00	\$25,000.00
4	Drainfield	20,000	SqFt	\$6.00	\$120,000.00
5	Site Improvements, Fence, Drive	1	Each	\$25,000.00	\$25,000.00
6	Electric Service	1	Each	\$10,000.00	\$10,000.00
<b>Total Construction Cost:</b>					<b>\$300,000.00</b>
Allowance for Construction Contingency, Engineering, Legal & Administration					\$100,000.00
<b>Total Project Cost</b>					<b>\$400,000.00</b>

**Additional Consideration**

Collection system will be required in the development area and to the treatment site.

## Estimate of Probable Cost - Table 8

Owner:

Robinson Township Option 6

Project Title:

Onsite Lagoon System

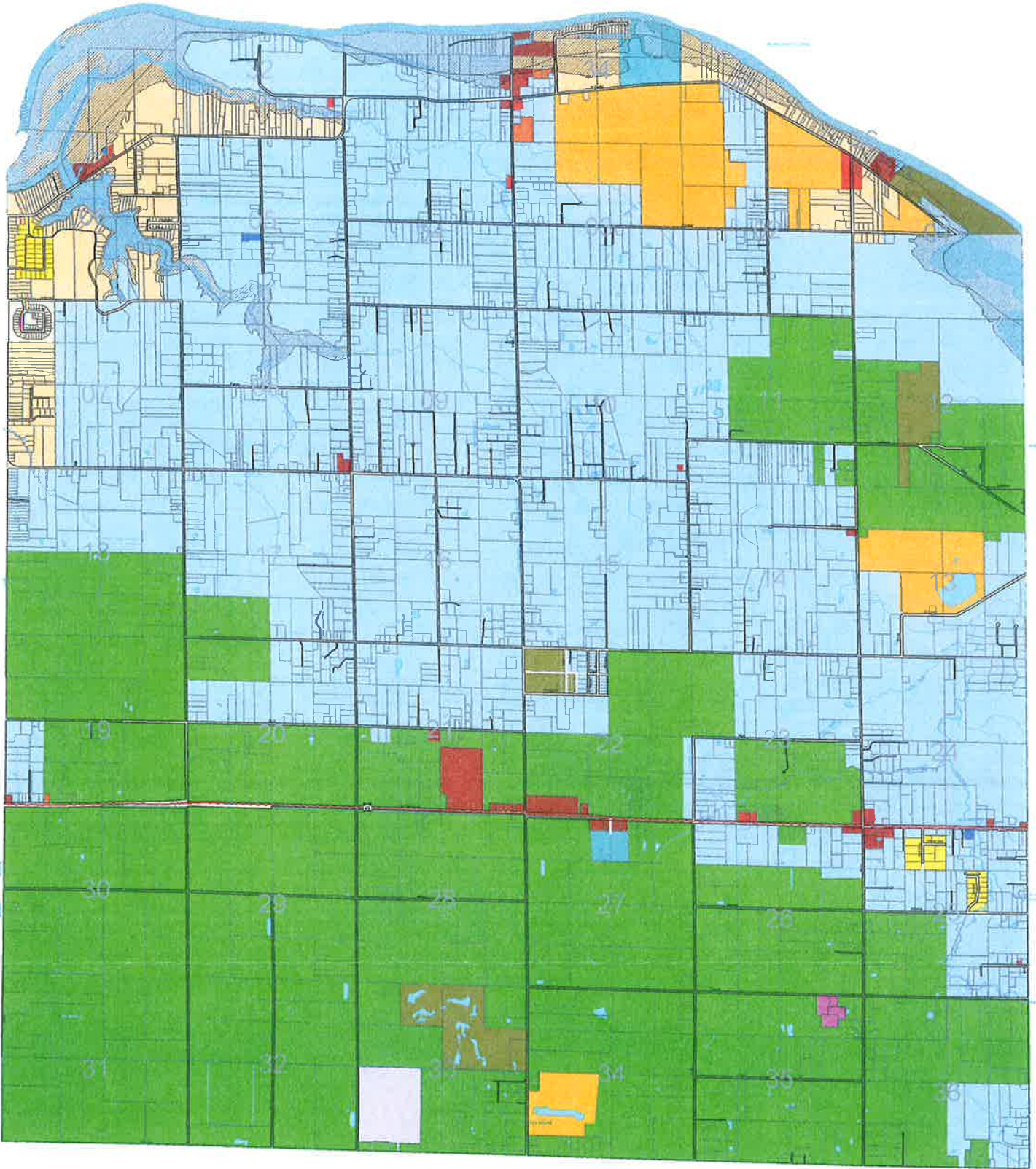
Project #:  
2130643

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
<b>20 Acre Lagoon Treatment System</b>					
1	Land	40	Ac	\$10,000.00	\$400,000.00
2	Topsoil Stripping	3,000	Cyd	\$2.00	\$6,000.00
3	Pond Dikes	30,000	Cyd	\$4.50	\$135,000.00
4	Composite Liner	90,000	SqFt	\$1.20	\$108,000.00
5	Sand Cushion	3,500	Cyd	\$9.00	\$31,500.00
6	Inlet Structure	1	Each	\$30,000.00	\$30,000.00
7	Outlet Structure	1	Each	\$25,000.00	\$25,000.00
8	Transfer Structure	2	Each	\$15,000.00	\$30,000.00
9	Rip Rap	6,600	Syd	\$40.00	\$264,000.00
10	Topsoil, Seed	12,500	Syd	\$3.00	\$37,500.00
11	Gravel Access Roadway	1,700	Syd	\$5.00	\$8,500.00
11	Fence	1,200	LF	\$7.00	\$8,400.00
12	Force Main to Plant (8")	5,000	LF	\$41.00	\$205,000.00
13	Coagulant Storage & Feeding Facility	1	Lsum	\$200,000.00	\$200,000.00
15	Underdrain	12,000	LF	\$3.00	\$36,000.00
<b>Total Construction Cost:</b>					<b>\$1,524,900.00</b>
Allowance for Construction Contingency, Engineering, Legal & Administration					\$375,100.00
<b>Total Project Cost</b>					<b>\$1,900,000.00</b>

**Additional Consideration**

Collection system will be required in the development area and to the treatment site.





# Robinson Township Zoning Map



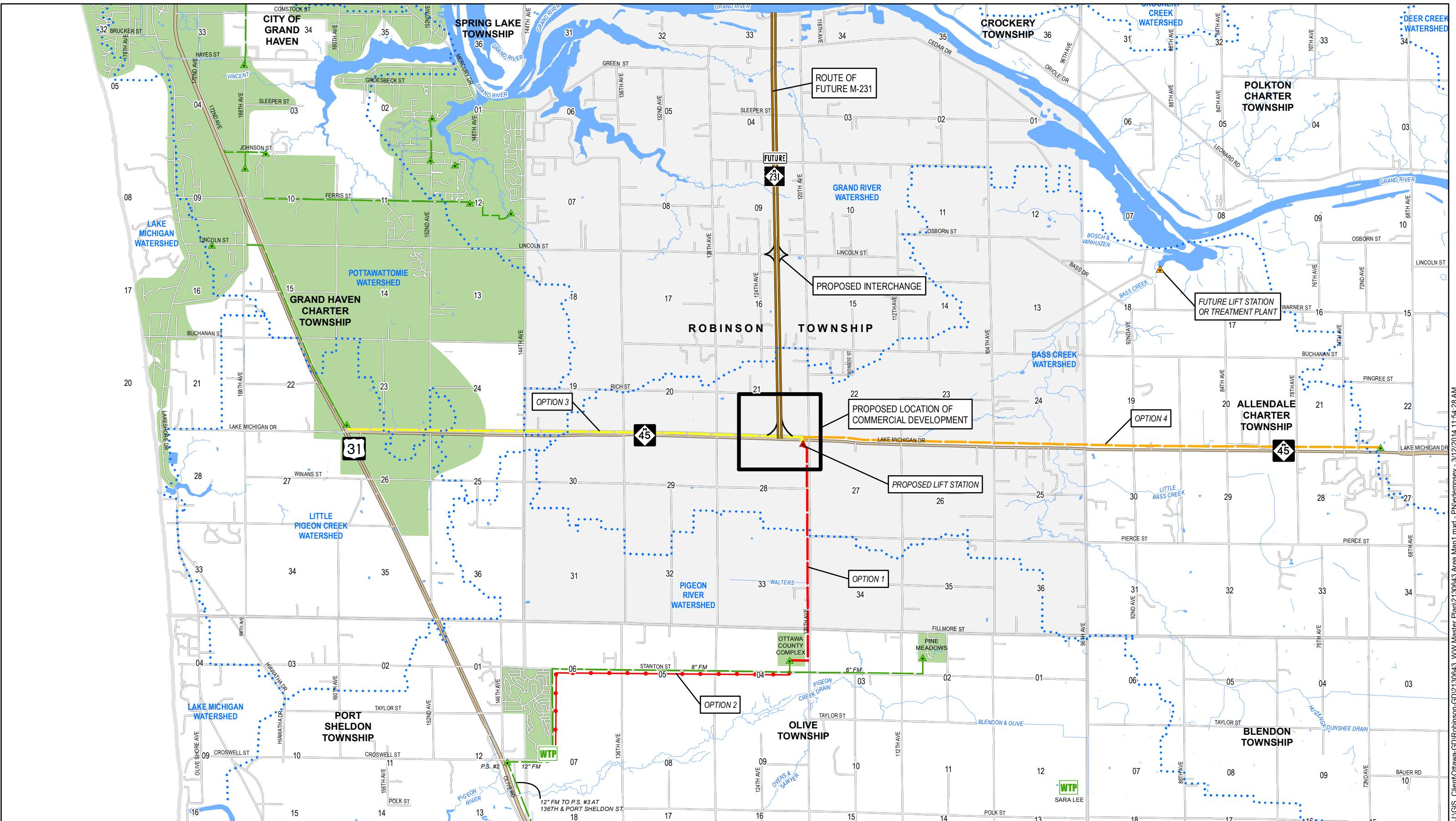
Robinson Township  
 3000 Robinson Road  
 Robinson, NJ 07068  
 Phone: 908.398.1234  
 Fax: 908.398.1235  
 www.robinstownshipnj.com

1 inch = 1,000 feet



Legend	
Zoning Class and Code	
<span style="display:inline-block; width:15px; height:15px; background-color:yellow;"></span>	Clustered Residential (PUD C)
<span style="display:inline-block; width:15px; height:15px; background-color:orange;"></span>	Non-Clustered Residential (PUD NC)
<span style="display:inline-block; width:15px; height:15px; background-color:lightgreen;"></span>	Recreational Park (PUD RP)
<span style="display:inline-block; width:15px; height:15px; background-color:lightblue;"></span>	One-Family Residential (R-1)
<span style="display:inline-block; width:15px; height:15px; background-color:lightyellow;"></span>	Multiple-Family Residential (R-2)
<span style="display:inline-block; width:15px; height:15px; background-color:lightpurple;"></span>	Rural Residential (RR)
<span style="display:inline-block; width:15px; height:15px; background-color:lightpink;"></span>	Mobile Home Park (PUD MHP)
<span style="display:inline-block; width:15px; height:15px; background-color:lightblue;"></span>	General Business (B-2)
<span style="display:inline-block; width:15px; height:15px; background-color:lightblue;"></span>	Industrial (I-1)
<span style="display:inline-block; width:15px; height:15px; background-color:lightblue;"></span>	Industrial (I-2)
<span style="display:inline-block; width:15px; height:15px; background-color:lightblue;"></span>	Mining (M-1)
<span style="display:inline-block; width:15px; height:15px; background-color:lightblue;"></span>	Lowland Resource Conservation (E-1)
<span style="display:inline-block; width:15px; height:15px; background-color:lightblue;"></span>	Contract Zoned





SCALE: 1" = 5,000'

- LEGEND**
- ▲ Ex. Pump Station
  - WTP Ex. WWTP
  - ▲ Proposed Pump Station
  - Existing Sanitary Sewer Service Areas
  - Existing Forcemain
  - Watersheds
  - Treatment Options
  - Option 1 - West Central Ottawa / County Complex
  - Option 2 - West Central Ottawa / Direct
  - Option 3 - Grand Haven - Spring Lake
  - Option 4 - Allendale

ROBINSON TOWNSHIP  
 OTTAWA COUNTY, MICHIGAN  
**WASTEWATER MASTER PLAN  
 TREATMENT OPTIONS**  
 FIGURE 2  
 Prein&Newhof  
 2130643

J:\GIS\_Client\Ottawa-GD\Robinson-GD\2130643\_WW Master Plan\2130643 Area Map1.mxd - P:\Niedempsey - 3/12/2014 11:54:28 AM