WASTEWATER FEASIBILITY REPORT

Empire Village Council Wastewater Feasibility Committee

Committee:

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WWAT COMM 42618

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Empire Wastewater Feasibility Study
Table of Contents

		Page
i.	Executive Summary	3
ii.	Introduction	7
iii.	Empire Wastewater Practices and Regulations	9
iv.	Wastewater Engineering Feasibility Study	14
v.	Financial Analysis	20
vi.	Needs Analysis	23
vii.	Empire Moving Forward	34

WWATER COMM 42618

Appendices

Committee Work Attachments

A. Gosling Czubak Engineering Report – Village of Empire
Gosling Czubak Engineering Sciences, Traverse City MI

B. Wastewater Scenarios Financial Analysis
Michigan Rural Community Assistance Program (MI-RCAP)

C. Residential Septic System Regulations Summary
Committee work analysis of State and County Septic Regulations

D. Commercial Septic Systems Regulations Summary
Committee work analysis of State and County Septic Regulations

E. Commercial Business Septic Systems & Land Use – Empire Situation
Committee work analysis of State and County Septic Regulations

F. Empire Commercial/Residential (CR) Zoning – Business Type Listing
Committee work analysis of State and County Septic Regulations

G. Empire Commercial/Public Business List - Health Department Septic Records Reviewed
Committee work analysis of State and County Septic Regulations

H. Septic Age Profile
Committee work compilation from County and Village Septic Records

I. Wastewater System Study Area Scenario(s) Maps
Committee work with Leelanau County Equalization GIS Service

J. Village of Empire Groundwater Test Well Map
Committee work with Leelanau County Equalization GIS Service

Reference Attachments

1. How Septic Systems Work
https://www.epa.gov/septic/how-your-septic-system-works

2. Michigan Criteria Subsurface Discharge (septic systems)
DEQ - Onsite Wastewater
http://www.michigan.gov/documents/deq/deq-wb-dwehs-osw-mcssd_241120_7.pdf

3. Leelanau County Health Department Environmental Health Regulations
http://www.bldhd.org/local/upload/file/leelacode.pdf
http://www.bldhd.org/publications

4. Village of Empire Point of Sale Septic Ordinance
Village of Empire – Ordinance #137

5. Village of Empire Water Usage Detail
Village of Empire Water Department

6. Michigan Rural Community Assistance Program (MI-RCAP) Bio
MI-RCAP Website - http://michigan-rcap.org/

7. Village of Empire Groundwater Testing Detail
Village of Empire DPW

8. South Bar Lake Study, 2014
Great Lakes Environmental Center (GLEC), Traverse City

9. South Bar Lake Cooperative Lakes Monitoring Detail
South Bar Lake Association Volunteers for Michigan Clean Water Corps, Cooperative Lakes Monitoring Program

10. South Bar Lake & Lake Michigan Beach Testing
SOS Analytical, Traverse City; in conjunction with the Leelanau/Benzie District Health Department

11. Michigan State University Fecal Bacteria Study Across Michigan Watersheds
http://www.rose.canr.msu.edu/press-releases/2015/8/3/septic-tanks-arent-keeping-human-sewage-out-of-rivers-and-lakes

WWATER COMM 42618

I. Executive Summary

The Wastewater Feasibility Committee was formed by the Empire Village Council to obtain facts and compile information on the feasibility and need for Village wastewater options. The committee report addresses Empire Wastewater Practices and Existing Regulations, a Wastewater Engineering Feasibility Study, Financial Analysis, Needs Analysis and Empire Moving Forward.

Empire Wastewater Practices and Existing Regulations

Wastewater in the Village of Empire is managed in accordance with existing state, county and village regulations and ordinances.

Village wastewater permits were reviewed and a profile created for residential and commercial permits and practices. Over 350 septic systems exist in the village with 40% dating back earlier than 1990.

Residential wastewater is typically handled by individual septic tanks and discharge fields. The new neighborhood utilizes a community collection and discharge field. In the core village, there are hundreds of septic systems in a concentrated area. A relatively shallow water table and small lot sizes presents challenges and constraints.

Commercial businesses utilize wastewater solutions largely septic system based. Most existing businesses are "grandfathered" utilizing systems that do not meet current standards. Regulations and small lot sizes prevent these ever meeting the current on-site standards. A few businesses are forced to "pump and haul" waste to off-site treatment facilities. Development of vacant property requires site-specific wastewater solutions which can require additional land, costly treatment systems or limit potential uses.

The Village of Empire Point of Sale (POS) ordinance has resulted in corrective actions taken for deficient systems. The Empire ordinance differs from other more stringent community ordinances. There is no county POS ordinance.

Wastewater Engineering Feasibility Study:

An Engineering Feasibility study was conducted by Gosling Czubak Engineers (Appendix A). Three test case scenarios were developed for evaluation of costs and feasibility. The scenarios represented logical geographic service areas. Capital, and operations and

WWATER COMM 42618

maintenance costs for each scenario were estimated utilizing Empire water data (to project wastewater quantities), village street layouts and infrastructure.

Study findings are:
A village wastewater system is technically feasible and can be implemented for the entire Village of Empire or for a smaller geographic area.

There are alternatives for collection and treatment systems depending on the specific service populations. Modular wastewater treatment systems are available that provide advanced treatment and require relatively small discharge field areas of 1-2 acres.

Capital costs of the test case scenarios ranged from $2-6M, with annual operations and maintenance costs from $70-160K depending on the service area, collection and treatment system chosen.

Although the study was limited to three scenarios, there are numerous other potential scenarios which could be developed based on geography, user requirements, waste characteristics and economic need.

Financial Analysis

Capital and operating costs and wastewater quantities were converted to projected monthly user costs (Appendix B). The costs can be mitigated to an extent through the use of USDA loan financing commonly utilized for such projects.

For residential customers, the monthly bill would likely be much more than current Village water bills. For commercial customers, the costs would need to be incorporated into monthly operating budgets.

Needs Analysis

The need for a Village or partial wastewater system involves many factors and considerations. The community need for businesses, public services and employment opportunities are a few of the many considerations beyond this report. The committee did consider the environmental and economic need for a wastewater option.

Environmental Need:
There is no regulatory environmental need compelling a village wastewater system. Although many existing systems in the village do not meet current standards, they are "grandfathered" and operate in legal compliance.

WWATERCOMM 42618

The core village area concentration of aging septic systems on relatively small lots over a shallow water table is a minimally acceptable environmental and regulatory condition. It presents land use and environmental limitations going forward.

The Village and local volunteers have supported commendable ongoing environmental monitoring initiatives. There is an opportunity to better integrate these efforts, update past studies and improve the overall knowledge of the Village environmental interactions and impacts. This effort should continue to be supported by the Village and the community.

A wastewater system, although not required, would provide environmental benefits of enhanced treatment and discharge quality.

Economic Need:

Empire has a small number of year-round residents. However, it is host to the Sleeping Bear National Lakeshore Visitors Center and many of the 2 million annual park visitors. The commercial need is in the context of serving both Empire residents and visitors.

There is an economic need for a wastewater system to maintain and support existing businesses and commercial development.

Health Department records were examined on 35 parcels that make up Empire's current business and public building base in the commercial/residential zoned area.

The existing commercial district is restricted, in expanding services and accommodating growth requiring increased water use, due to wastewater limitations.

> 69% (24 parcels) are non-conforming with today's septic regulations. These are restricted in how they can change due to land area and wastewater discharge limitations.
>
> 31% (11 parcels) are conforming to the original building use, but are restricted in any expansion increasing wastewater discharge.

A wastewater system would eliminate barriers to development currently imposed, not by zoning, but by wastewater requirements. A wastewater system would support residential and commercial property use consistent with Village planning and zoning.

WWATER COMM 4618

For undeveloped residential lots, a wastewater system would support areas with difficult soils or proximity to groundwater. For existing residential lots with failing systems, mounded solutions would not be needed.

For commercial property, a wastewater system would facilitate new development. Small village commercial lots would be able to host more water intensive uses. For existing businesses, a wastewater system would eliminate the need for "grandfathered" exceptions and off site "pump and haul" practices. Existing businesses could expand services or change uses. Increased commercial use will increase the Village tax base.

Empire Moving Forward

Decisions about wastewater must take into consideration many factors in addition to those considered by this committee. For this reason, the committee was tasked to not provide a recommendation regarding implementing a wastewater system.

Empire has a unique and special urban and natural environment. Protecting and preserving this environment requires understanding the current conditions and managing change. Village government planning and zoning provides a blueprint for land use.

Village infrastructure for water, gas, electricity, communications, and roads are meeting needs and are, in many cases, excellent. There is no village infrastructure or services for wastewater. A village or partial wastewater system is feasible, offers benefits and presents financial challenges.

The study considered three test case scenarios and financing structures typical with municipal systems. There are other service area scenarios and financial structures that could be considered to meet wastewater demands. Any successful approach will require a match of user requirements, enhanced environmental treatment systems, and sustainable affordable financing.

Moving forward, the Village of Empire can take the following actions;

- Support continued planning and analysis of potential wastewater scenarios
- Understand and stay current on Village wastewater practices, impacts on the environment, and residential and commercial properties
- Support continued environmental monitoring, integration of efforts and analysis
- Be open to innovation and creative approaches

WATER COMM 42618

II. Introduction

Village of Empire

Incorporated in 1895, the Village of Empire is a small (pop 373) community on the shores of Lake Michigan in the southwest corner of Leelanau County. As the headquarters community of the Sleeping Bear Dunes National Lake Shore, the village is land locked on three sides by the Lake Michigan to the west and the national park bordering its north and south. The core village area is platted on a traditional grid containing a pedestrian accessible small downtown with a market, restaurant, post office, bank, library, Lake Michigan Beach Park and more. Like many northern Michigan villages, the economic health is heavily dependent upon seasonal tourism with national park attendance approaching 2 million annual visitors.

Wastewater Feasibility Committee

The Wastewater Feasibility Committee was formed by the Empire Village Council in May 2016. A Work and Report Plan was approved in September 2016 by the Village Council. This report presents the results of the committee work.

Committee Tasking

The Committee tasking:

- **i.** Review Empire wastewater practices and existing regulations
- **ii.** Develop and execute a Wastewater Engineering Feasibility Study of the scope and costs of wastewater system options for the Village of Empire.
- **iii.** Consider the "need" for wastewater options

Committee Members

1. Soni Aylsworth
2. John Collins (chair)
3. Chris Frey
4. Teresa Howes
5. Peter Schous
6. Paul Skinner

Process

The committee worked in an iterative and collaborative manner over 20 months. This included over a dozen committee meetings attended by members of the community and meetings with county health department and governmental administrators. An engineering consultant provided analysis on the feasibility and costs of different wastewater treatment scenarios. A not-for-profit consultant provided an analysis of

WATERCOMM 4618

available financing approaches and translated the system capital and operating costs into the projected monthly costs to system customers.

The Committee's initial meetings discussed the committee objectives and methods to accomplish the work. It was agreed to look at the entire village and smaller, more concentrated service areas. To ensure the committee was in alignment with the Village Council tasking, a document, titled "Wastewater Feasibility Study Committee, Work and Report Plan", was developed. This outlined the committee tasking and was presented and approved by the Empire Village Council on September 21, 2016. The report addresses Empire Wastewater Practices and Existing Regulations, the Wastewater Engineering Feasibility Study, Financial Analysis, Needs Analysis and Empire Moving Forward.

The committee report presents facts and information for use by the village and the community. It is intended to support further discussions and deliberations with up-to-date useful information. The report also contains findings and suggestions, for the benefit of the Village, on other issues uncovered during the study.

Contributors

The committee expresses appreciation for the support, advice and contributions of Empire village residents, members of the Empire community, the Village of Empire Council and staff, the Benzie-Leelanau District Health Department, Michigan Department of Environmental Quality, U.S. Department of Agriculture, Gosling Czubak Engineers and the Michigan Rural Community Assistance Program (MI-RCAP).

WWATERCOMM42618

III. Empire Wastewater Practices and Regulations

Empire Wastewater Disposal

Wastewater in the Village of Empire is managed in accordance with existing state, county and village regulations and ordinances (Appendix C, D, E).

Site-Specific Systems

For the treatment of residential and commercial wastewater and sewage, the village of Empire relies almost entirely on individual, property based "on-site" disposal. There are approximately 350 to 400 on-site disposal installations, primarily septic tanks and discharge fields, throughout the village on individual lots. The New Neighborhood (NN) subdivision, started in the 2000's, uses community drain fields for wastewater disposal. Each of the 60 parcels will have individual septic tanks from which effluent flows by gravity to one of four sets of tanks, and pumped to community drain fields permitted by the state DEQ. These installations are owned by four homeowner groups in the NN and are required by the village to be inspected annually.

Businesses and residences with septic systems that do not meet current standards are "grandfathered"; however, they must be brought up to current standards if they are replaced or if there is a change in use. Where on-site disposal is not possible, the "grandfathered" accommodation has in certain instances allowed holding tanks that are pumped out and wastewater transported to a municipal wastewater plant for treatment. This practice, commonly called "pump and haul", is no longer allowed by the state or county health department for a new use, or for expanding an existing use.

Current regulations for businesses require reserve drain fields, which limits new business and/or expansion of existing businesses on the smaller lots such as the 50 foot lots that comprise the core of Empire Village. In some instances, these requirements can be met through acquisition of additional adjoining property. In others, the only solution is to limit the size or kind of business so that it is not so water intensive (e.g., take-out instead of dine-in food service). Current Alternative Treatment System (ATS) guidelines are limited to residential use and are not expected, by the health department, to be expanded to commercial use.

System Age Profile

As part of its work, the committee conducted an "age profile" of the existing septic systems in village (Appendix H).

WATER COMM 4.26.18

This was done through a review of official records on file at both the Leelanau Benzie District Health Department (LBDHD) and the Empire Village Office. While records do not exist for septic systems installed prior to the mid 1960's, and are incomplete from the mid 1960's through the mid-1970's, relatively good information at the county level exists for systems installed and/or inspected from the mid-1970's onward.
The records were then compared to the Village tax parcels file. Out of 521 parcels of record in the village, 350 are noted as improved with structures. The result is an estimated septic system age profile with 40% dating back earlier than 1990.

Age Profile	
Decade	**Septic Installations**
1970s & Earlier	96
1980s	46
1990s	55
2000s	113
2010s	40
Total	**350**

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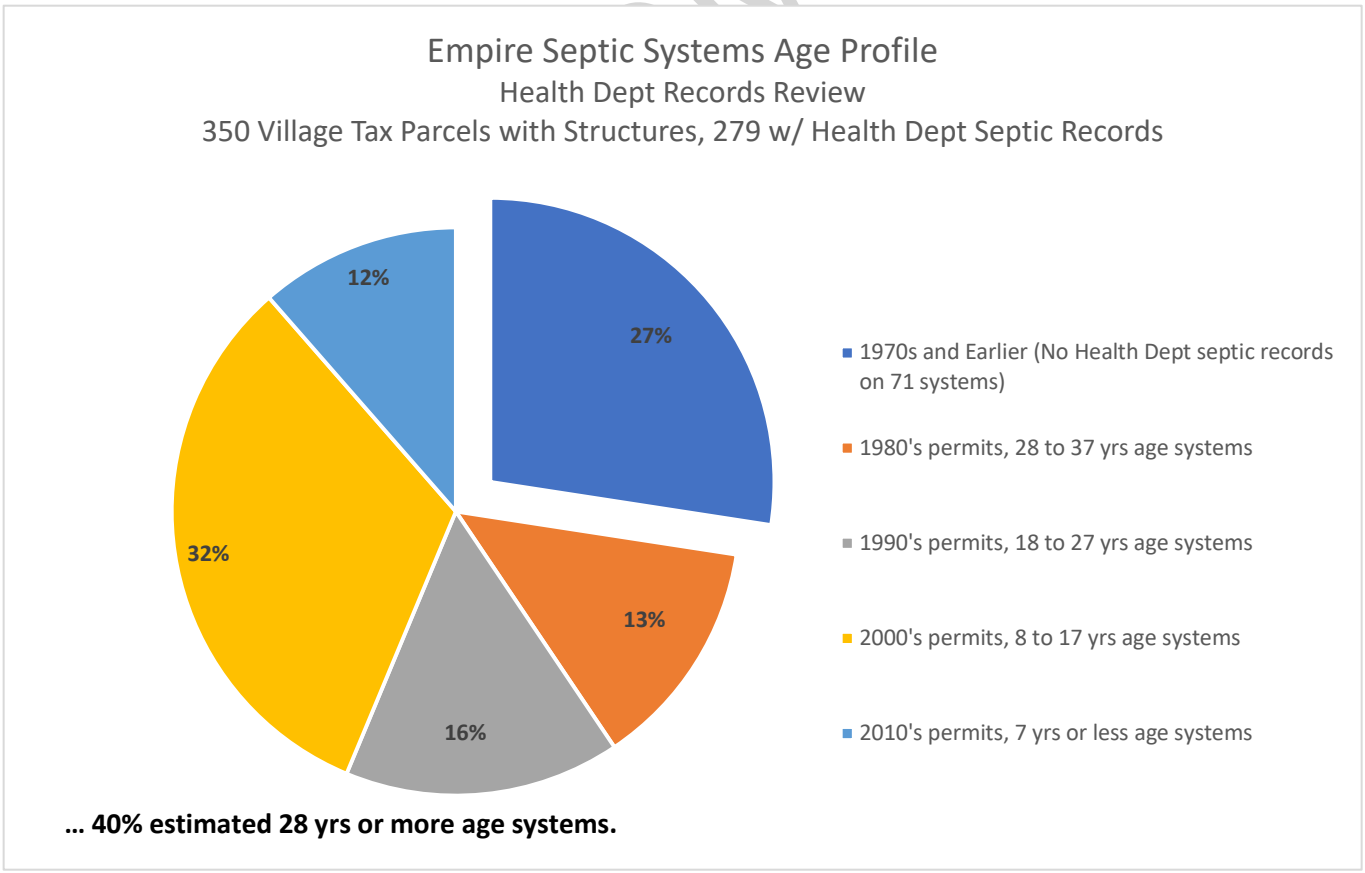


… 40% estimated 28 yrs or more age systems.

Wastewater Regulatory Situation

Standards, regulations and permitting of on-site wastewater disposal installations by the state and county health departments became more restrictive in the mid 70's. The most commonly used on-site disposal method, in the village, is a "septic system". This is comprised of a septic tank which collects wastewater, retains "solids" and discharges effluent into a drain field spread horizontally near the ground surface that "leeches" wastewater into the soil for biodegradation. Prior to this period, there was limited regulation and sewage disposal methods varied widely from early septic system designs to drywells to pipes in the ground or on the surface.

Wastewater disposal in Empire is currently governed by three regulations at the state, county, and local levels: 1) Michigan Criteria for Subsurface Sewage Disposal (Reference 2); 2) Environmental Health Regulations for Leelanau County Health Department (Reference 3); and 3) Village of Empire Ordinance 137, Point of Sale Ordinance (Reference 4). The State of Michigan criteria for regulating subsurface sewage disposal "provide minimum uniform standards of design and construction for such systems in Michigan. Nothing in these criteria shall prevent local health departments or other government agencies from adopting and enforcing requirements more stringent than these requirements." (Michigan Criteria for Subsurface Sewage Disposal, p. 1).

In Michigan, state law and county health department codes work in tandem. They jointly dictate the design, sizes and siting of permissible on-site installations. Per state law, permitting of new or replacement systems is for the most part the purview of the county health department.

In Empire, all on-site septic systems since permitting started, have been permitted by the LBDHD, or jointly by the LBDHD/State. The permitting process involves determining the adequacy of the property soil for drainage as well as the proximity of ground water to the surface. A key requirement is that there be four feet of undisturbed soil above indications of high sub-surface ground water. Permits specify the size and placement of tanks and drain fields, as well as any pumping required for a drain field. Drain field size varies by the use of the property and new commercial use permitting requires a reserve area, equivalent to the drain field size, set aside on which there can be no development.

At larger wastewater volumes and in any municipal systems, county health departments cease to be primarily involved and responsibility shifts to the Michigan Department of Environmental Quality (MDEQ). With MDEQ regulations, there is a

WATER COMM 4613

range of requirements governing both permitting, construction, operation monitoring, testing, and mandated reporting. For the vast majority of on-site sewage disposal installations in Empire, the county health department (and indirectly the state) is the permitting agency for new or replacement systems.

For Empire's typical residential and smaller commercial on-site wastewater volumes, the State of Michigan does not have requirements for periodic system monitoring, inspection, or maintenance after the initial permit and construction. The Leelanau County health code has no "post installation" requirements as well. The thinking behind this is that septic systems built to current standards are very passive in operation, self-regulatory and when failure occurs, it is very noticeable Reference 1 contains a brief description of how modern septic systems work.

There are key local factors that affect how septic systems work in Empire:

- Empire's soil is predominantly sand. This allows for excellent percolation flow, but can also flow too quickly relative to water table levels.

- The nutrient phosphorous in wastewater is removed chemically through soil bonding during percolation. Sand is a less than ideal soil type for phosphorus soil bonding.

- Parts of Empire have a high water table. Test wells placed around the core village indicate near surface static ground water at five to eleven feet of depth depending on year and season. The LBDHD has found high water indications at sometimes four feet or less.

Failure of septic systems involves failure of septic tank effluent percolation or failure of sufficient cleansing before reaching the groundwater (appendix Reference 1). Percolation failure can be noticed in the form of pooling sewage on the ground surface or backed up sewage in the septic tank or in the building. Failure of proper effluent cleansing can go unnoticed even as effluent still passes into the groundwater. The septic system may be old and not built to current standards. Older systems may use "dry wells" which concentrate the discharge and treatment area instead of drain fields dispersing effluent over a larger area. Soil conditions may have degraded in spite of drainage continuing. Drainage may be overly concentrated in an area instead of spreading out. Drainage may be too fast. The groundwater may be too close relative to drainage speed and conditions. In these cases, wastewater reaches groundwater before effective self-cleansing of bacteriological and chemical (nitrogen, phosphorus, etc.) contaminants.

WATER COMM 4/2/18

Empire POS Ordinance

On May 28, 2013, the Village of Empire enacted a point of sale ordinance (Ordinance #137) requiring all septic systems be inspected at the point of sale (POS). The inspection is required to be scheduled by the seller and to be performed by either the LBDHD or a licensed NSF sanitarian. For the inspection, the ordinance is specific on what constitutes a system failure:

Sewage backup in a structure
Ground surface sewage discharge
A storm drain connection
Backed up septic tank liquid
A structurally damaged septic tank
Sewage discharge into a body of water

If failure by the above criteria is determined, a new or conforming system is required through LBDHD permitting. Since the ordinance, approximately thirty POS inspections in Empire have taken place with corrective actions and findings.

Eight property septic system replacements took place associated with inspections or prior to a sale. In no instance did an inspection indicate actual failure.

- ***Two*** systems were deemed operational but inadequate and the owners acted to correct the issue.
- ***One*** system passed inspection but backed up later and was replaced.
- ***One*** commercial property sold involved an LBDHD inspection which found inadequacy for a proposed use.
- ***Three*** systems were replaced preemptively by sellers without inspections.
- ***One*** system was replaced under a previous, stricter village POS ordinance.

The failure definitions in the Empire ordinance would be deemed a public health issue by the county health department with or without the ordinance. Empire's sandy soils and relatively high-water table can allow for a deficient septic system to be hydraulically draining but not providing the soil contact time needed for sufficient biological treatment. A Glen Arbor Township ordinance and a Benzie County ordinance do not focus on noticeable failure but have a more stringent "code based" standard considering property septic system design, placement and adequacy for performance based on building size, use and critically, proximity to groundwater.

Currently there is no county POS ordinance, although discussions are continuing on this issue.

WATER COMM 42618

IV. Wastewater Engineering Feasibility Study

Scope of Work

Gosling Czubak Engineering was contracted by the Village of Empire to perform an engineering study of the costs and feasibility of a village wastewater system. The Gosling Czubak report is included as Appendix A. -Detailed information on the assumptions, data, and cost calculations can be found in the complete report.

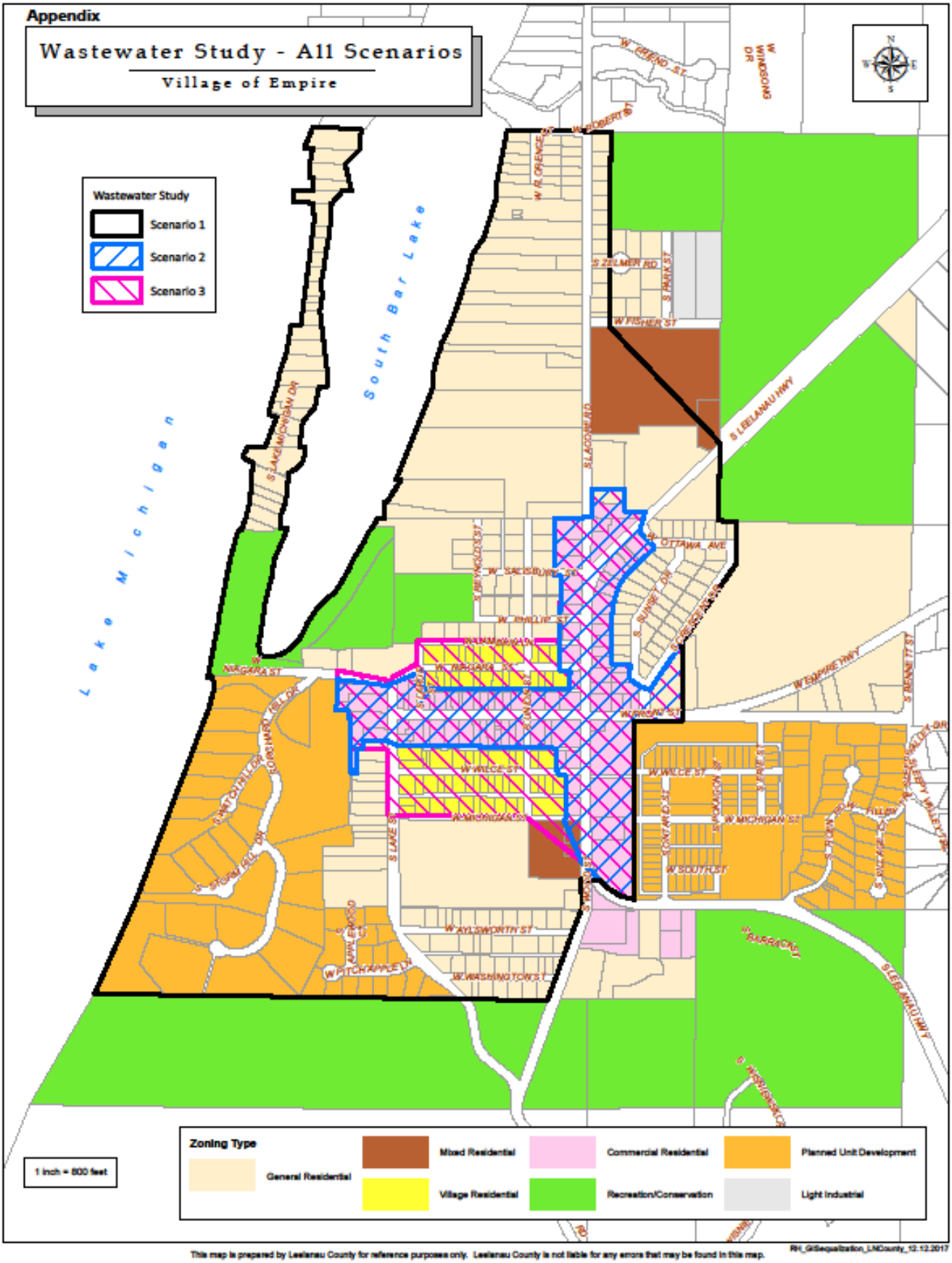
Study Scenarios

Three geographic scenarios were structured by the committee and Gosling Czubak. This case study provides examples of different size and geographic service areas. These scenarios were structured for study purposes to provide preliminary engineering approaches and cost estimates utilizing actual Empire street layouts, service populations and wastewater flows.

The three study scenarios are defined in the following description as well as separate maps in Appendix I.

WWATER COMM 42618

Appendix



This map is prepared by Leelanau County for reference purposes only. Leelanau County is not liable for any errors that may be found in this map.

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Scenario 1: Village Wide

- Does not include areas not served by the village water system.
- Does not include areas already served by industrial or community treatment system.

Scenario 2: Village Commercial Zone

- Includes areas designated by the zoning map as consisting of commercial residential district.
- Includes the National Park Station headquarters off of M-72
- Includes St. Phillip Neri to the North

Scenario 3: Commercial and Central Village

- Includes the areas designated by the zoning map as consisting of commercial residential district and the village residential.
- Includes the National Park Station headquarters off of M-72
- Includes St. Phillip Neri to the North

The following table summarizes the design flow and number of customers for each scenario.

Table 1: Village of Empire 2017 Wastewater Feasibility Study

	Scenario 1	Scenario 2	Scenario 3
Residential Units	289	46	149
Non-residential Units	28	25	25
Flow Summaries			
Average Day (gallons)	35,500	10,500	19,000
Max Day (gallons)	55,000	16,500	28,000

Note: The "units" in the above table are Empire Water Department customers with respective billing classification. More detailed of the water usage can be found in Reference 5.

WWTP COMM 42618

Collection, Treatment and Discharge
For the scenarios, collection and treatment alternatives were considered.

The treatment alternatives evaluated were aerated lagoons with spray irrigation or a modular decentralized treatment plant. Lagoon treatment was found not feasible for scenario 2 and 3 due to the smaller user base and higher capital cost. Lagoon treatment requires significant land area and associated collection transport costs. A Decentralized treatment plant was evaluated for all three scenarios.

A decentralized treatment plant provides a high degree of environmental treatment and protection of the environment. It is modular, can sited lo limited land and is scalable for changing demands and growth. It also requires a limited land area for final effluent groundwater discharge. The land area needed for these plants can often be the size of several "shipping containers", mostly buried and with little visual intrusion.

For collecting the wastewater (collection system) and transporting it to the treatment plant two approaches are considered: a traditional gravity system and a Septic Tank Effluent Pressure System (STEP).

The gravity system consists of gravity flow in the collector sewers with a pump station, pumping sewage through a force main to the treatment location.
The pump station location was assumed based on topography and Village owned property locations.

The STEP system consists of watertight septic tanks at each collection residence or business. The septic tank provides primary settling and septic tank effluent is pumped by a low power and low-pressure pump located in a separate pump chamber. The STEP system analysis assumes every collection point will require a new septic tank/pump chamber and includes this cost.

There are differences between gravity and STEP collection systems is their installation impact. Gravity collection, involving larger pipes, requires trenching and repair of the streets or other rights of way in its route. STEP collection, involving smaller pipes, is usually done with below ground, "trenchless" boring with minimal post installation repair/remediation. Gravity collection is typically done in municipal applications. Step collection requires tanks and pumps for each lot and associated legal access easements for maintenance and replacement. Either approach is feasible in Empire.

WWATERCOMM42618

The three scenarios considered are all serviced by the Village water system. The Village water and planning data was utilized to develop the projected number of residential and non residential commercial customers and the wastewater flows for each scenario. The waste characteristics were assumed to be typical residential waste and small business (non industrial) waste. For preliminary design of the treatment system, industry standard loading numbers for residential influent were utilized.

Wastewater treatment and collection systems require permiting for construction and operation by the MDEQ. Effluent is subject to groundwater discharge permit limits. The study assumed the discharge will be required to meet the effluent limits in Table 2.

Table 2: STEP Design Criteria*	
Influent Loading (mg/L)	
BOD_5	250
TKN	40
TP	4
TSS	200
Effluent Limits (mg/L)	
BOD_5	30
TKN	5
TP	1

The resulting treated effluent is significantly cleaner than the septic tank effluent being discharged into on-site drain fields or dry wells. A result is that the ground discharge area needed for this treated wastewater is significantly reduced.

Cost Estimates

Preliminary costs were developed for each of the three scenarios. For scenario 1 a treatment area for a lagoon was considered. This requires significant land and an assumption was made that this would be located outside the village limits requiring additional collection and pumping costs. The lagoon is the costliest approach and has disadvantages with respect to land acquisition, treatment system, and seasonal weather impacts on operations and maintenance. The capital costs ranged from approximately $2M for scenario 2 (M22 and Front Street), $4M for Scenario 3 (Scenario 2 + extended core area) to $6M for Scenario 1 (entire village).

WATER COMM 4218

Scenario 1				
Flow: 35,500 gpd Number of Connections: 317				
Collection Type	STEP	Gravity	STEP	Gravity
Treatment Method	Decentralized	Decentralized	Lagoon	Lagoon
Capital Cost	$7,317,000	$5,835,000	$8,563,000	$7,071,000
Annual O &M	$209,000	$155,000	$136,000	$110,000
Aprox. Land Required for Treatment (acres)	1.5	1.5	6	6

Scenario 2		
Flow: 10,500 gpd Number of Connections: 71		
Collection Type	STEP	Gravity
Treatment Method	Decentralized	Decentralized
Capital Cost	$1,971,000	$1,919,000
Annual O &M	$76,000	$73,000
Aprox. Land Required for Treatment (acres)	< 1	< 1

Note: Land requirements are approximate and do not include any setbacks or easements for sanitary lines or septic tanks

Scenario 3		
Flow: 19,000 gpd Number of Connections: 174		
Collection Type	STEP	Gravity
Treatment Method	Decentralized	Decentralized
Capital Cost	$4,045,000	$2,852,000
Annual O &M	$102,000	$83,000
Aprox. Land Required for Treatment (acres)	1	1

WWATER COMMISSION 4/2018

Gosling Czubak engineering sciences, inc.

Note: The "Land Required for Treatment" includes the land for the discharge area. The costs of land are not included in the above table but are included in the financial analysis section.

V. Financial Analysis

The Capital and Annual O&M (Operations and Maintenance) costs developed by Gosling Czubak were analyzed, by a consultant from the Michigan Rural Community Assistance Program (MI-RCAP, Reference 6). MI-RCAP is a not-for-profit organization experienced with the financing approaches and grant possibilities for municipal water projects, including wastewater. The objective of the financial analysis was to convert these costs into understandable costs at the user level. To accomplish this, MI-RCAP considered current and traditional wastewater financing programs and approaches. This financial analysis does not consider alternate funding approaches. The complete MRCAP report and detailed spreadsheets are included in Appendix B.

Financing, grants and analysis

The following spreadsheet summarizes the financial analysis for the three scenarios. The lagoon option was not analyzed due to the higher costs and engineering considerations. To include the cost of land acquisition, a $200,000 assumption was made. This accounts for the difference from the Gosling study capital costs and the MI-RCAP Total Project Costs.

The financial analysis translates the total project costs, potential grant possibilities and financing costs into the final potential “monthly user costs”. The spreadsheet assumes a 45% grant from the federal government and long term low interest financing through the US Department of Agriculture (USDA) loan program. The complete analysis report contains other assumptions including without grant funding.

WWATERCOMM4263

Village of Empire Scenario Comparison with USDA loan w/ 45% Grant

			FINANCING SCENARIOS					
Rural Community Assistance Program			Project:	Village of Empire - Sewer				
			Scenario 1 317 users	Scenario 1 317 Users	Scenario 2 71 Users	Scenario 2 71 Users	Scenario 3 174 Users	Scenario 3 174 Users
			STEP w/ decentralized	Gravity w/ decentralized	STEP w/ decentralized	Gravity w/ Decentralized	STEP w/ decentralized	Gravity w/ decentralized
CUSTOMERS (EDU)			345	345	99	99	202	202
ASSESSMENT UNITS				0	0	0	0	0
TOTAL PROJECT COST			$ 7,516,985	$ 6,035,780	$ 2,170,575	$ 2,118,994	$ 4,244,884	$ 3,051,914
TOTAL ANNUAL OM&R			$ 209,000	$ 155,000	$ 77,000	$ 83,000	$ 103,000	$ 83,000
FINANCING ALTERNATIVES								
			$ -	$ -	$ -	$ -	$ -	$ -
USDA Grant			$ 3,382,643	$ 2,716,101	$ 976,759	$ 953,547	$ 1,910,198	$ 1,373,361
Local Funds (Cash, Tap Fees, Etc.)			$ -	$ -	$ -	$ -	$ -	$ -
Property Tax Assessment					$ -	$ -	$ -	
Local Bank/Market Rate	20	3.25%	$ -	$ -	$ -	$ -	$ -	$ -
Clean Water Rev. Fund	20	2.50%		$ -	$ -	$ -	$ -	$ -
USDA Rural Development	40	2.63%	$ 4,134,342	$ 3,319,679	$ 1,193,816	$ 1,165,447	$ 2,334,686	$ 1,678,553
Total Financing			**$ 7,516,985**	**$ 6,035,780**	**$ 2,170,575**	**$ 2,118,994**	**$ 4,244,884**	**$ 3,051,914**
ANNUAL DEBT								
Annual Bonds/Notes/Bank Loans Payment			$ -	$ -	$ -	$ -	$ -	$ -
Clean Water Rev. Fund			$ -	$ -	$ -	$ -	$ -	$ -
Annual USDA Payment			$ 168,182	**$ 135,042**	$ 48,564	$ 47,410	$ 94,974	$ 68,282
Debt Reserve			$ 16,818	**$ 13,504**	$ 4,856	$ 4,741	$ 9,497	$ 6,828
ANNUAL DEBT			**$ 185,001**	**$ 148,547**	**$ 53,420**	**$ 52,151**	**$ 104,471**	**$ 75,111**
ANNUAL OM&R			**$ 209,000**	**$ 155,000**	**$ 77,000**	**$ 83,000**	**$ 103,000**	**$ 83,000**
TOTAL COST			**$ 394,001**	**$ 303,547**	**$ 130,420**	**$ 135,151**	**$ 207,471**	**$ 158,111**
Total Future Av. Mo. Cost Per EDU			**95.17**	**73.32**	**109.78**	**113.76**	**85.59**	**65.23**
Affordability Index	**MHI**	**49,875**	**2.29%**	**1.76%**	**2.64%**	**2.74%**	**2.06%**	**1.57%**
Assessment Amount per EDU			$ -	$ -	$ -	$ -	$ -	$ -
O&M Monthly Rate			$50.48	$37.44	$64.81	$69.87	$42.49	$34.24
Total Bonds/Notes/Bank Loans Payback			$ -	$ -	$ -	$ -	$ -	$ -
Total MDEQ Payback			$ -	$ -	$ -	$ -	$ -	$ -
Total USDA Payback			$ 6,727,297	$ 5,401,698	$ 1,942,548	$ 1,896,386	$ 3,798,943	$ 2,731,299

Projects with an affordability index above 2.0% present a significant finanical risk to the community and its citizens
Many funding agencies require community support of at least 1.5% for low interest loan and grant eligibility.
1.5% for $49,875 MHI = $62.35

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User cost projections

User costs are shown on the spreadsheet line labeled “Total Future Average Monthly Cost per EDU”. EDU (Equivalent Dwelling Unit) is a billing calculation term usually associated with the debt service cost portion of a wastewater bill. A single residence typically would be one EDU. A commercial business might be 1, 2, 5, 10 or more EDUs depending on the quantity and quality of the wastewater generated. The specific definition of an EDU varies and is determined by each local wastewater ordinance.

The financial analysis projects a range of monthly costs from $65-$114 per EDU depending on the scenario. This is an average number. In actual implementation, customer bills are not equal. Components of debt service are fixed and typically billed on an EDU basis with variable billing based on water usage covering system annual operations and maintenance. How customers are billed is determined by the local government and the system users.

The affordability index in the analysis represents the estimated wastewater customer expense as a percentage of, in this case, Empire's median household income (MHI). The USDA typically uses a 1.5% threshold for grant (vs debt) eligibility and views figures above 2% as a challenging household burden. USDA grants typically max out at 45% of a system's capital cost.

For Empire, even after 45% USDA grant funding, the affordability indexes remain high per residence EDU.

This wastewater study was limited in cost and the financial analysis in scope. As with almost all wastewater systems, all the cost is applied to the participation base with none to community overall. The analysis used a 100% participation assumption, municipally owned system approach in the geographies of the three scenarios.

There are many other service area and participation level scenarios that could be evaluated. There are, for instance, "private-public" system approaches that the DEQ recognizes, and permits. There are different financing options supported by user based participation. They are not municipally owned and potentially can be beneficial to the community. Such systems would involve local review and approval.

Wastewater is not a technical constraint or barrier but a financial and structural challenge which can be met with sufficient need, demand and community willingness.

WWATER COMM 4.26.18

VI. Needs Analysis

Background

2007 Wastewater Study

In 2007 the Village applied to the State of Michigan for debt funding for a municipal "opt in" system in the core village. An 87-equivalent dwelling unit (EDU) user base within an area of Front, Wilce and Niagara west of M22 was identified and opted in, including the old hardware store. The opted in users had an estimated average user cost of $90/month per EDU. The total project cost was estimated at $1.3 million without any land cost in the calculation. The application was turned down due to available loan funds.

The application focused on both environmental and economic characteristics. An excerpt of the application report reads:

> "The village is currently a small local economy that enjoys a summer influx of tourism dollars. The village would like to create a more diversified economy and promote reuse of existing buildings to maintain the village character that is a large part of its tourism charm. The village has struggled in the past in finding ways to work with local health department regulations to make businesses work on relatively small available lots. Once an area is established for a septic system, dispersal field and reserve field often there is not enough space left for a viable business."

This statement made ten years ago, remains true today.

Empire Master Plan

In addition to the 2007 wastewater study and loan application, the 2012 Village Master Plan references a wastewater system need inter-related with discussions on the village economy, development and small village character.

Empire's small village character is associated with its smaller lots, walkability and commercial/public uses mixed with residential proximity. The plan spells out the vision and goals developed and approved through a community wide visioning process.

The Community Goals and Land Use sections contain many references to preserving the small town, pedestrian character of the village and recognizing a tourist, recreation-based economy. The same sections also call for examining the feasibility of sanitary sewers and state that the current lack of a municipal sanitary sewer system is a significant factor limiting development.

WWATER COMM 42618

Needs for a wastewater system

Village government planning and zoning provides a blueprint for land use. Implementation requires availability of infrastructure, utilities and services.

Residential and commercial services and infrastructure for water, gas, electricity, communications, and roads meet village needs and are, in many cases, excellent. There is no village infrastructure or services for wastewater. The long-term health of some existing residential and commercial properties and the utilization of vacant and undeveloped property is impacted by wastewater requirements and the capability to meet these requirements.

Whether there is a "need" for a Village-wide or partial-coverage wastewater system involves many factors and considerations. The community need for businesses, public services and employment opportunities are a few of the many considerations beyond the tasking of this report.

The committee did consider the environmental and economic aspects of the need for a wastewater option.

Environmental Need

The "environmental need" for a community wastewater system was considered. The committee reviewed four areas of ongoing water quality monitoring in the village and provides some broad observations.

Village Water Quality Monitoring:

1. "Near surface" groundwater nutrient monitoring/measuring (details in Reference 7).

- This is not the deep aquifer groundwater associated with the village drinking water system which is separately and rigorously monitored by law through the MDEQ.
- This groundwater has been sampled quarterly since 2007 at five test wells (map in Appendix J) and measured for nutrients by Great Lakes Water Quality Lab in Lake Ann. The wells are positioned to sample groundwater both before and after its flow underneath the core village area.
- Visible on the well location map, well #4 is positioned downstream of the groundwater flow after it has passed under the "core" village with the highest septic system density.
- The static water depth varies between 5 and 12 feet (deducting for stanchion height).

WATER COMM 4618

- Phosphorous and nitrate levels are highest in Well #4. Its location at Lake and Niagara, is after the ground water has passed through the core village and is near a swale leading to an inlet into S. Bar Lake. This swale up until 2006 was the flow point for Front Street's storm runoff.
- The sampling does not include any bacteriological testing such as for E. Coli.

2. South Bar Lake water quality studies - Out of concern with weed growth and overall water quality, two studies (2009 and 2014) of S. Bar Lake have been done by the Great Lakes Environmental Center (GLEC). Highlights of the 2014 study (see Reference 8 for full report):

- Water quality was found to be generally good and the lake falls in the middle of the "trophic" range of lake conditions.
- Phosphorous in the lake was higher than 12 of 13 other lakes measured in the region. The level was stated as not unusual for such a small and shallow lake.
- Nitrogen and phosphorous concentrations were highest at the southern inlet to the lake.
- A shoreline buffer survey was classified mostly as excellent/very good. A filamentous alga, *chlaodophora*, which is an indicator of nutrient loading, was found only in concentrations at the south inlet area.
- Biological/Bacteriological testing was not part of the scope of this study.
- The study did not include the village near surface groundwater monitoring discussed in Point 1, above.
- A 5-year cycle of study was recommended.

3. South Bar Lake Association Monitoring and Cooperative Lakes Monitoring Program (CLMP, see Reference 9)

- Total Phosphorous, chlorophyll-a and Secchi disk clarity performed periodically and reported through CLMP monitoring
- Phosphorous levels appear to be consistent with the GLEC study and spring measurements show a very slight upward trend 2011-16.
- Average summer clarity shows a slight declining trend. Clarity was not measured in the GLEC study.
- Aquatic plant identification and mapping was done in 2014 and 2017.
- A 2016 CLMP report reports S. Bar Lake's "trophic" category consistent with the GLEC study, a short-term lake trend "that is stable" but there is too "little data to assesses long term trends".

4. Village beach testing - This is periodic year by year based on grants to local health departments for testing E. Coli in inland lakes for swimming safety.

WATER COMM 4.2018

Test data for both South Bar Lake and Lake Michigan over the past 4 years indicate very low E. Coli levels. Reference 10 ontains Health Department standards & Summer 2016 testing.

Summary:

- The village should be proud as a community of its size and resources to be doing this much water quality measuring and monitoring in both the groundwater and primary surface water within its jurisdiction.
- The work is done with different, but inter-related environmental concerns such as weed/algae growth (South Bar Lake monitoring), public safety (E. coli beach monitoring) and ground water health (village near surface test wells).
- Wastewater contains among other things high levels of phosphorous, nitrogen and bacteria. Well #4 groundwater nutrient levels might relate to the Village's reliance on individual on-site septic system wastewater disposal, or other sources, this requires further analysis.
- The Michigan DEQ has a mission and staff addressing Non-Point Source (NPS) pollution impacts on surface water quality. NPS sources are storm water and street surface runoff, yard fertilizing runoff, agriculture runoff, atmospheric deposition, groundwater affected by septic systems, and more. The South Bar Lake Association monitoring supports the DEQ NPS work.
- The groundwater that reaches the southern end of S. Bar Lake flows directly under the Village's highest concentration of septic systems. The groundwater well tests might be expanded to include *E. coli*, a human/warm blooded animal source indicator, as a way of potentially monitoring septic systems performance. Recent MSU study (Reference 11) examined septic system fecal bacteria watershed impact.
- Some NPS "remediation" efforts positively affecting S Bar Lake have been the replacement 10 years ago of the Front Street storm drains with infiltration catchments and the recent topography and vegetation work on the private land portion of the southern inlet swale area.
- Watershed studies and plans (WMP) are common throughout the state and have been done for other lakes and streams in Leelanau and Benzie counties to identify NPS sources and work. Done by a qualified body, a WMP can help further focus public resources, and actions. WMPs can be used for external funding and grants for NPS related efforts.

In conclusion, Empire water conditions in South Bar Lake and Lake Michigan meet required standards. There is inconclusive information on the environmental impact of individual septic systems. There is an opportunity and need to integrate the various monitoring efforts on-going within the village. The 5-year update of the 2013/2014

WATER COMM 12518

Great Lakes Environmental Center Study is recommended to be accomplished in 2018/2019. The scope of work should consider the integration of monitoring data from all village monitoring efforts and provide recommendations for an integrated monitoring program going forward.

The existing village condition of site-specific septic systems, a high water table and concentrated village core area has created environmental challenges and numerous "grandfathered" businesses. With accommodations for existing conditions, the village is in minimal regulatory compliance. A wastewater system would provide a higher degree of treatment and environmental performance. This provides an option to address environmental concerns but is not a requirement. Limitations and constraints on residential and commercial property have economic implications.

Economic Need

The economic need of a community or cooperative wastewater system is analyzed by the impact on land use of what is currently in place in Empire – individual property septic systems. Septic system regulations affect land use of individual properties in ways that community or cooperative wastewater systems do not. These regulations limit current uses and affect investment, expansion, new construction, re-development, re-use and changes in property use. They also limit initiatives to reutilize vacant village buildings.

There is less economic need when it comes to residential versus commercial land use. Current residential septic regulations allow replacement systems for older, existing homes. New homes are accommodated by either through their lot size or community drain field homeowner associations such as the New Neighborhood's. There are a few residential lots where lot size or soil conditions prevent development using conventional septic systems.

There is an economic case in Empire for a community or cooperative wastewater system for commercial activity in the Village. This is based on the effect that today's commercial septic regulations have on commercial land use within the village commercial area. These regulations limit commercial land uses and affect investment, expansion, new construction, re-development, re-use and changes of property use. They also limit new commercial efforts on vacant, residential or empty structure (schoolhouse) parcels in the same area.

Most of Empire's commercially used property in the Village's commercial area along Front St and M22 (zoning area "commercial residential" C/R, Appendix F) predate the current commercial septic regulations. They are non-conforming or "grandfathered"

WWATER COMM 4261

for use. Furthermore, even regulation-conforming newer commercial developments such as the M22 office center (State Savings) are constrained commercially by the regulations as well in conjunction with parcel size.

This section provides information on commercial properties in Empire obtained from county health department officials and records, state and local regulations. The review and assistance of the Benzie-Leelanau County Health Department is appreciated and was important to bring together this information

Residential Economic Need

A summary of the residential septic regulations can be found in Appendix C.

With few exceptions, these regulations accommodate residential property use in Empire:

- Current tank and drain field specifications usually work for new/replacement home systems on even smaller lots. In some cases, a "mound" system is required if there is sufficient groundwater separation. A few replacement residential systems are almost yearly occurrences in the village.
- Most Empire residential lots were platted before 1969 and 1997 and are therefore exempt when two state laws began requiring what are called septic reserve areas. This is a key contrast with commercial use.
- The worst-case scenario for an existing home with a failed septic system is the deployment of an "alternative treatment system" or the use of holding tanks with a "pump and haul". Alternative treatment systems are not allowed commercially.

The economic impact of septic system regulations on residences is basically threefold:

- A new septic system every 25+ years (lifespans vary widely). In today's dollars, this is a typically a $5,000 to $10,000 expense depending on multiple factors.
- The limitation on types of public businesses that residences in the Village commercial/residential area could convert to on their existing parcels.
- A limited number of vacant lots with soil and or water table conditions that make traditional septic systems impossible and residential land use possible only through more costly alternatives.

WWATER COMM 42618

Commercial Economic Need

Empire has a small number of year-round residents. However, it is host to the Sleeping Bear National Lakeshore Visitors Center and many of the nearly 2 million annual park visitors. The commercial need is in the context of serving both Empire residents and visitors.

Commercial need was analyzed by:

1. Understanding how commercial septic regulations work.
2. Reviewing Health Dept. records on the parcels in Empire's commercial area with existing commercial or public buildings in relation to the regulations.
3. Illustrating the current regulations' land requirements in relation to Empire's commercial area.

The table below shows that in 2017, commercially designated parcels (assessor classification) comprised 11% of the village parcels and 15% of the tax receipts.

Village	**# of Parcels**	**2017 Tax Contribution to Village**
Residential	458	$256,816
Commercial	58	$45,330
Total (Commercial & Residential)	516	$302,146
Commercial as a % of total	11.2%	15.0%

However, the commercial septic regulations have a disproportionate impact on this portion of the Village tax base.

Commercial Septic Regulations

Appendix D is a summary of commercial septic rules, put together by the committee from the state and local regulations. They affect land use in four key ways:

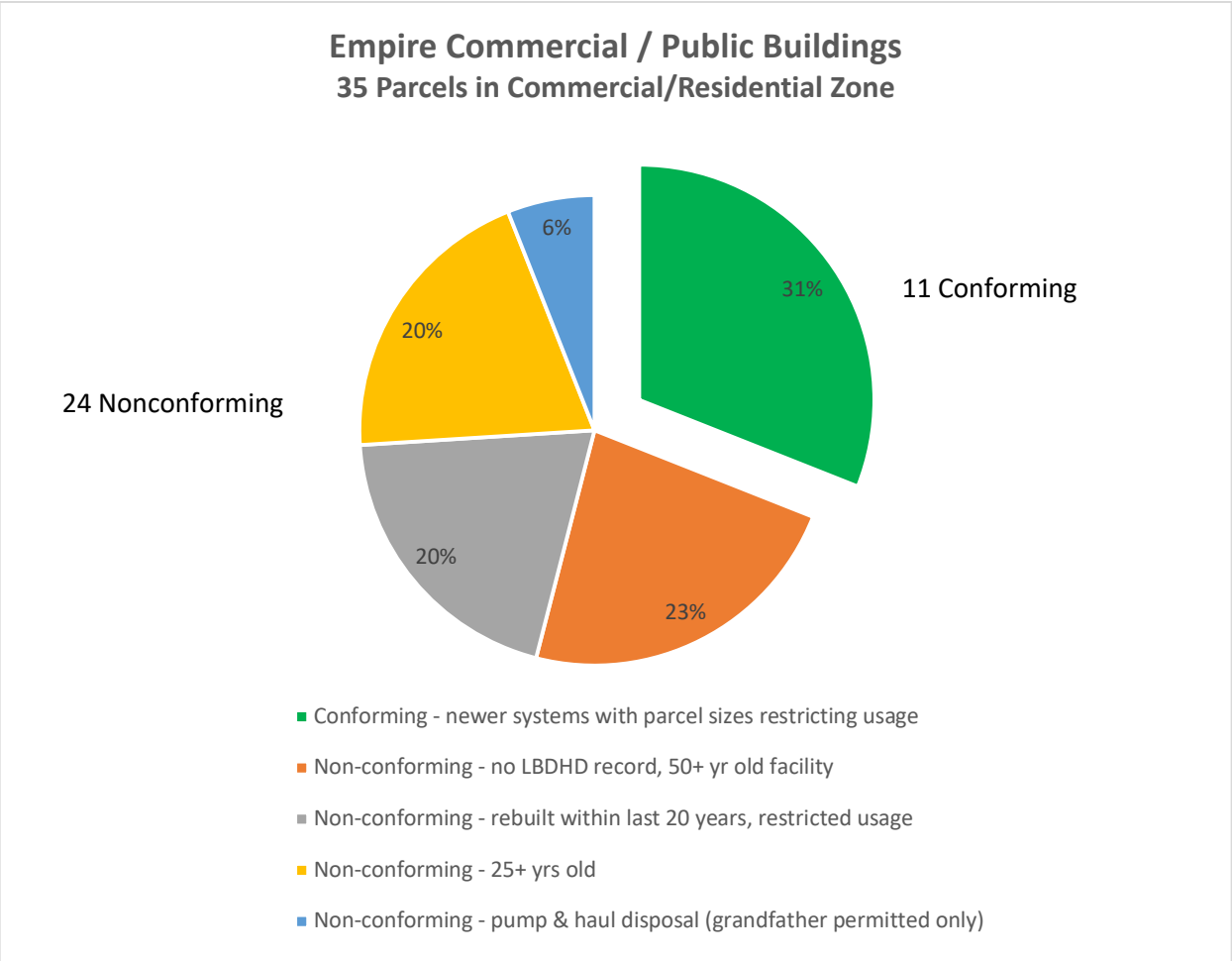
- Reserve field area requirements stricter than residential
- Business type water usage design specifications in gallons per day (gpd)
- Setbacks
- Changes in water use
- Interruptions of use

Health Dept. Septic Record Review

Health Department septic records were examined on 35 parcels that make up Empire's current business and public building base in the Village's commercial/residential zoned area; 31 active and 4 inactive buildings (Appendix G).

WATER COMM 4618

The records were reviewed for what the building and parcel has in the way of a septic system (in some cases dry wells and no drain field) in relationship to today's regulations. A chart of the findings is below.



The existing commercial district is restricted, in expanding services and accommodating growth requiring increased water use, due to wastewater limitations.

69% (24 parcels) of Empire's commercial area businesses and public facilities are non-conforming with today's septic regulations. These are restricted in how they can change due to land area and wastewater discharge limitations.

31% (11 parcels) are conforming to the original building use, but are restricted in any expansion increasing wastewater discharge.

Current Regulation Land Requirements

The land use impact of septic system regulations is illustrated in the following diagrams. These show the commercial septic system land area needed for different types of businesses. It is based on typical water usage design requirements of businesses in

three groups – Light, Medium and High. Typical Empire commercial area lot sizes are noted at the bottom. Appendix E has a larger rendering of this figure.

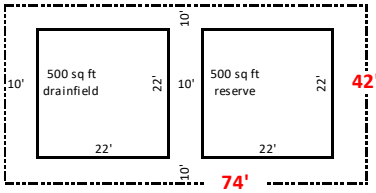
Commercial Business Examples & Drainfield Land Area Requirements*

Light Water Use Business

up to 500 gallons per day use specifications

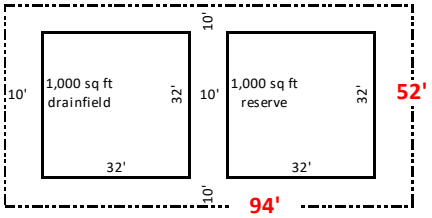
Retail stores using little water - gift shops, clothing stores, dollar stores, antique stores, galleries, etc.

***250* gpd specified business**



3,108 sq ft Land Requirement

***500* gpd specified business**



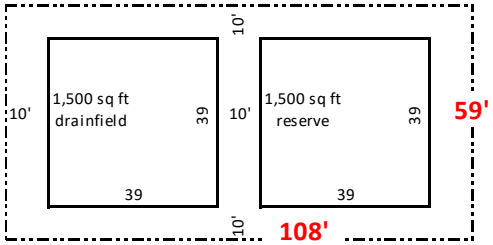
4,888 sq ft Land Requirement

Medium Water Use Business

500 to 1,500 gallons per day use specifications

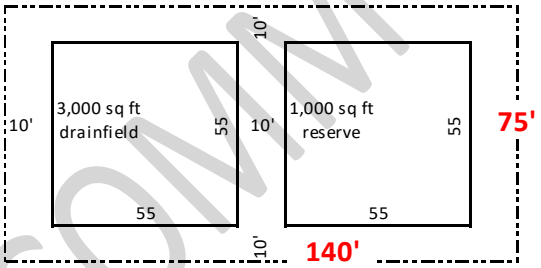
Medium water users - small takeout food service (disposable service), grocery store w/ food prep, bakery, coffee shop, 3 chair hair salon, public venue w/ public restrooms, B&B, etc.

***750* gpd specified business**



6,372 sq ft Land Requirement

***1,500* gpd specified business**



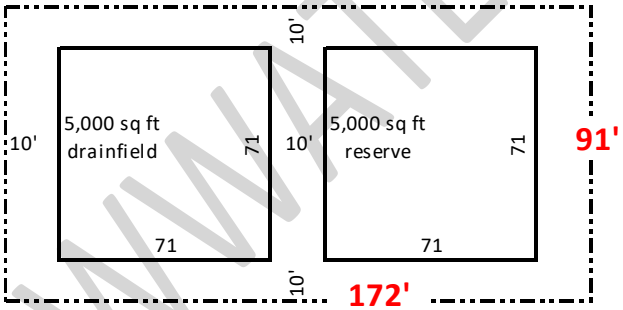
10,500 sq ft Land Requirement, .24 acre

High Water Use Business

1,500 gallons per day or more use specifications

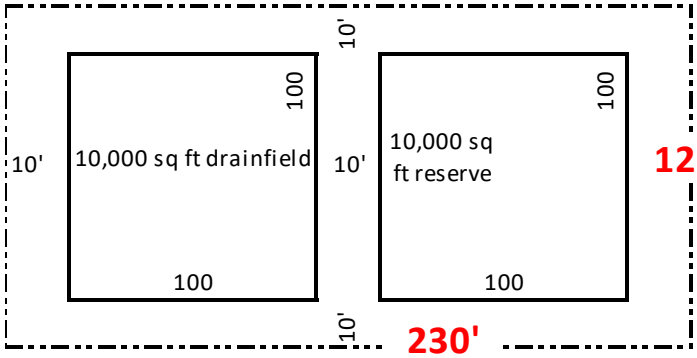
High water users - full service food service, hotel, assisted living, larger take out food service, brew pub/brewery larger bakery, larger coffee shop, laundromat, car wash, community/public restroom (running water), etc.

***2,500* gpd specified business**



15,652 sq ft Land Requirement, .36 acre

***5,000* gpd specified business**



27,600 sq ft Land Requirement, .63 acre

Typical Front Street small lot - 50' x 125' = 6,200 sq. ft.
Typical M22 lot - 75' x 150' = 11,250 sq. ft.

***Based on typical Empire sandy soil types, clay soil areas worse off**

WATER COMM 42618

Note: These septic system land area requirements in relation to lot size do not include the space needed for a building itself, parking, storm water runoff and their setbacks.

This figure above illustrates that: 1) today's commercial septic regulations require land areas for many types of business that are significantly challenged or impossible to fit within Empire's lot sizes in its commercial area and 2) the existing, non-conforming commercial activity reviewed previously would not be able to be replicated on their parcels if starting out new today. For example, a 100 seat restaurant would require over half an acre for drain field area.

In this same Village commercial area, there are 23 parcels with residences that are not currently utilized for commercial use. Based on their parcel size and the current regulations, a change to commercial use serving the public is impossible or very limited. Appendix F summarizes the types of businesses that are eligible by zoning right or special use permitting in this commercial area.

Finally, multiple lots clustered together can support larger septic systems. However, there are limited vacant parcel opportunities for this in the Village commercial area. Development using this approach is associated with larger projects and investment.

Summary

Front Street Historic Commercial District

- The area is mostly out of conformance with current standards. Long time businesses are severely restricted in expansion and changes in use.
- Residential, small lot parcels in CR zoning, are limited in terms of future commercial use.
- Older commercial buildings and their parcels can sit empty for decades, struggle to be re-used, become "frozen in time", and impact the ability for the village to retain its community character.
- A pedestrian friendly "walking downtown area", with a diversity of attractive shops is supported by Village planning, zoning, utilities and village service. It is not supported by affordable wastewater options.

M22 and out areas

- Face constraints inherent with site-specific, generally septic based wastewater management. Generally small parcels, some areas of poor soils, and the land required for wastewater management are barriers to use.
- Development is supported by Village planning, zoning, utilities, and village services. In many cases, it is not supported by available affordable wastewater options.

WATER COMM 4.26.18

Village wide considerations

- Wastewater systems can lead to additional economic growth, employment and commercial competition. Reliance on primarily septic systems restricts growth and land use flexibility.
  - Growth in the commercial property tax base is constrained by septic regulations, putting additional pressure on residential property taxes for municipal services.
  - Wastewater regulatory requirements and the availability of sufficient land area make site-specific solutions difficult or unaffordable and are barriers to development of untouched parcels and vacant older buildings.
  - Non-conforming "grandfathered" businesses have a competitive advantage over similar startups facing larger capital costs for land and septic wastewater treatment.
  - Non-conforming businesses have significant limitations on expansion, modernization, changes of use or future development.
  - Start-ups and small businesses that add character are at disadvantage due to septic system costs and land requirements.
  - Private site-specific wastewater systems are technically feasible but expensive and require sufficient user demand and investment. The DEQ has evaluated permitting groups of properties to own and operate what the DEQ refers to as non-government owned wastewater systems.

WWATER COMM 4613

VII. Empire Moving Forward

The Village Wastewater Committee tasking:

i. Review Empire wastewater practices and existing regulations
ii. Develop and execute a Wastewater Engineering Feasibility Study of the scope and costs of wastewater system options for the Village of Empire.
iii. Consider the "need" for wastewater options

The committee report fulfills this tasking and contains extensive data, analysis, observations, findings and references. This information is provided to assist the community and Village dialog and decisions moving forward. Decisions about wastewater must take into consideration many factors in addition to those considered by the committee. For this reason, it was not the tasking of the committee to provide a recommendation regarding implementing a wastewater system.

Empire has a unique and special urban and natural environment. Protecting and preserving this environment requires understanding the current conditions and managing change. Village government planning and zoning provides a blueprint for land use. Implementation requires availability of infrastructure, utilities and services.

Residential and commercial services and infrastructure for water, gas, electricity, communications, and roads meet village needs and are, in many cases, excellent. Empire wastewater management, through hundreds of septic based wastewater systems in a relatively concentrated area, is a minimally acceptable environmental and regulatory condition. There is no village infrastructure or services for wastewater. Integration of user water and wastewater needs with enhanced environmental treatment systems can meet needs, serve the village and protect and preserve the environment.

The wastewater study considered three test case scenarios and typical municipal financing approaches. There are numerous other potential scenarios and financing structures that could bring together users with documented needs and be supportable financially.

Moving forward, any successful approach will require a match of user requirements, excellent environmental treatment systems, and sustainable affordable financing. User requirements and excellent environmental treatment systems are easy to define. A sustainable affordable financing structure is a challenge that will require innovative, yet to be created, approaches.

WATER COMM 4618

Moving forward, the Village of Empire can take the following actions;

- Support continued planning and analysis of potential wastewater scenarios
- Understand and stay current on Village wastewater practices, impacts on the environment, and residential and commercial properties
- Support continued environmental monitoring, integration of efforts and analysis
- Be open to innovation and creative approaches

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