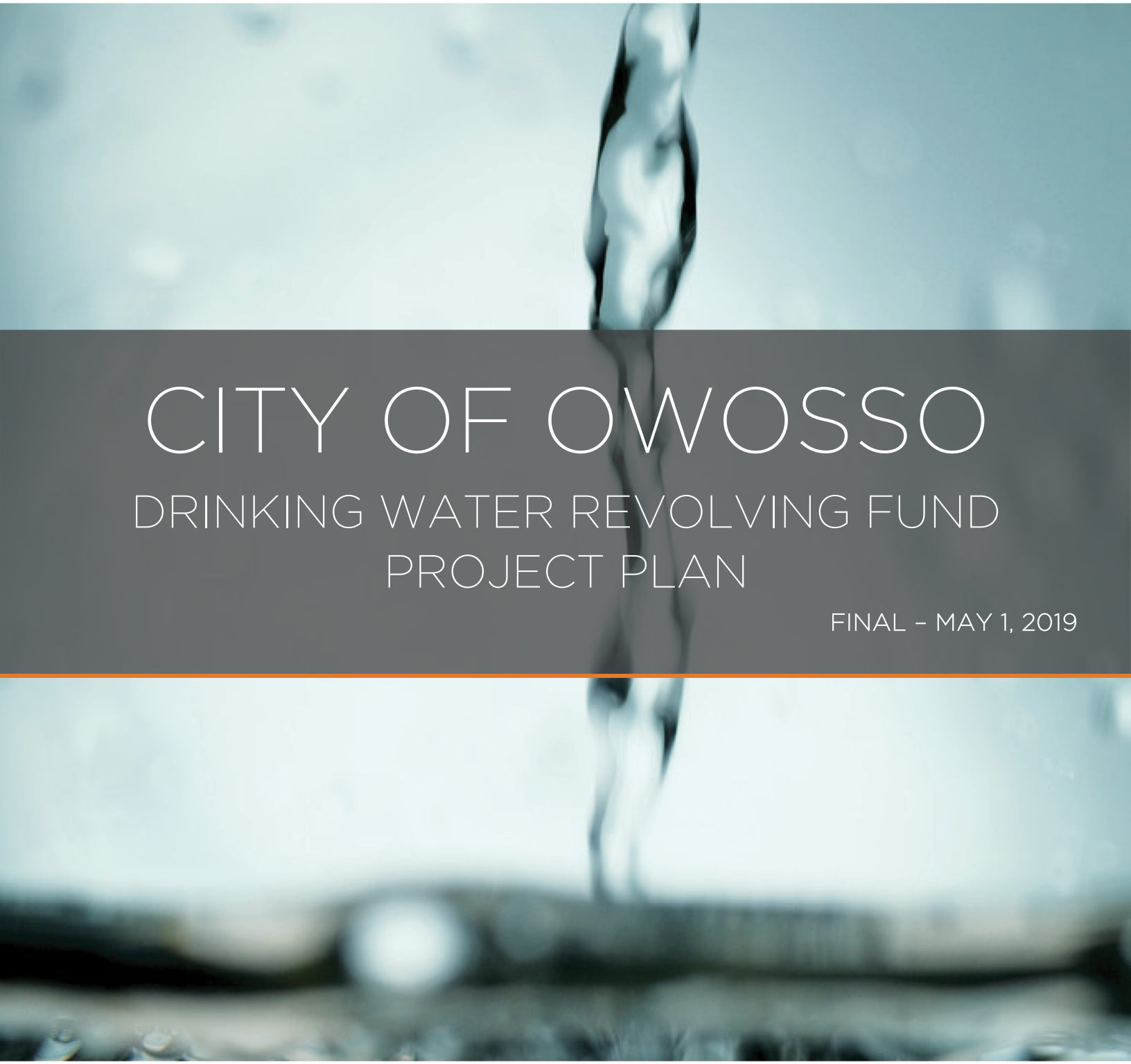

CITY OF OWOSSO

DRINKING WATER REVOLVING FUND PROJECT PLAN

FINAL – MAY 1, 2019

Michigan Department of Environmental Quality
Rick Snyder, Governor
Dan Wyant, Director

http://www.michigan.gov/deq

Drinking Water Revolving Fund Project Plan Submittal

Name of the Project City of Owosso Water System Improvements	**Applicant's Federal Employer Identification Number (EIN)** **38-6004723**
Legal Name of Applicant City of Owosso	**Areas Served by this Project** Counties Shiawassee
Address of Applicant (Street, PO Box, City, State & Zip) 301 W. Main Street Owosso, MI 48867	Congressional Districts Michigan US District 4 State Senate Districts 24 State House Districts 85

Population Served by the Water Supplier 14,539

If you are interested in an interim planning loan for the immediate reimbursement of project planning costs, check here ☐
(An interim planning loan is available only to a municipality serving a population of less than 10,000.)

Brief Description of the Project
Replace High Priority Water Mains with PVC / Repair Water Storage Facilities / Water Treatment Plant Upgrades / Supply Well Construction

Disadvantaged Community Determination
☒ The applicant is requesting a disadvantaged community determination, and a completed *Disadvantaged Community Status Determination Worksheet* is attached.

Estimated Total Cost of the Project $15,479,900.00	**Construction Start Target Date** May, 31 2020	
Name and Title of Applicant's Authorized Representative Glenn Chinavare, Director of Public Services	**Telephone** (989) 725-0555	**E-mail Address** glenn.chinavare@ci.owosso.mi.us

Address of Authorized Representative
if same as address above, check here ☒

Signature of Authorized Representative	**Date** 4-29-2019

State approval of the water supplier's Surface Water Intake Protection Program is attached (if applicable) check here ☐
State approval of the water supplier's Wellhead Protection Program is attached (if applicable) check here ☒
Joint Resolution of Project Plan Adoption/Authorized Representative Designation is attached check here ☒

A final project plan, prepared and adopted in accordance with the Department's *Drinking Water Revolving Fund Program Project Plan Preparation Guidance*, must be submitted by May 1st in order for a proposed project to be considered for placement on Michigan's Project Priority List for the next fiscal year. Please send your final project plan with this form to:

REVOLVING LOAN SECTION
OFFICE OF DRINKING WATER AND MUNICIPAL ASSISTANCE
MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
PO BOX 30241
LANSING MI 48909-7741

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Project Background

Delineation of Study Area

The City of Owosso is located directly west of the City of Flint in Shiawassee County. The City of Owosso is bordered by the Owosso Charter Township and the Township of Caledonia. The City of Corunna is the nearest city to the City of Owosso, located roughly three miles to the southeast of the City of Owosso.

The City of Owosso owns and operates its own water system. There are six community wells where potable water is drawn from a well for public water supply. Water is supplied directly to some residents in Owosso Township and Caledonia Township. The City of Corunna is a wholesale customer of the City of Owosso.

Land Use

Greater than 62% of the City of Owosso consists of improved residential parcels, 11.6% are improved commercial parcels, 10.4% are improved industrial parcels, 6.7% are city used parcels (mainly parks), and about 5% are vacant parcels.

Figures 1 and 2 are the zoning district map and legend for the City as of November 2018. A complete description of each zoning type and the regulations for each district are provided in the City of Owosso's Zoning Ordinance, which is available on the City's website (http://www.ci.owosso.mi.us/).

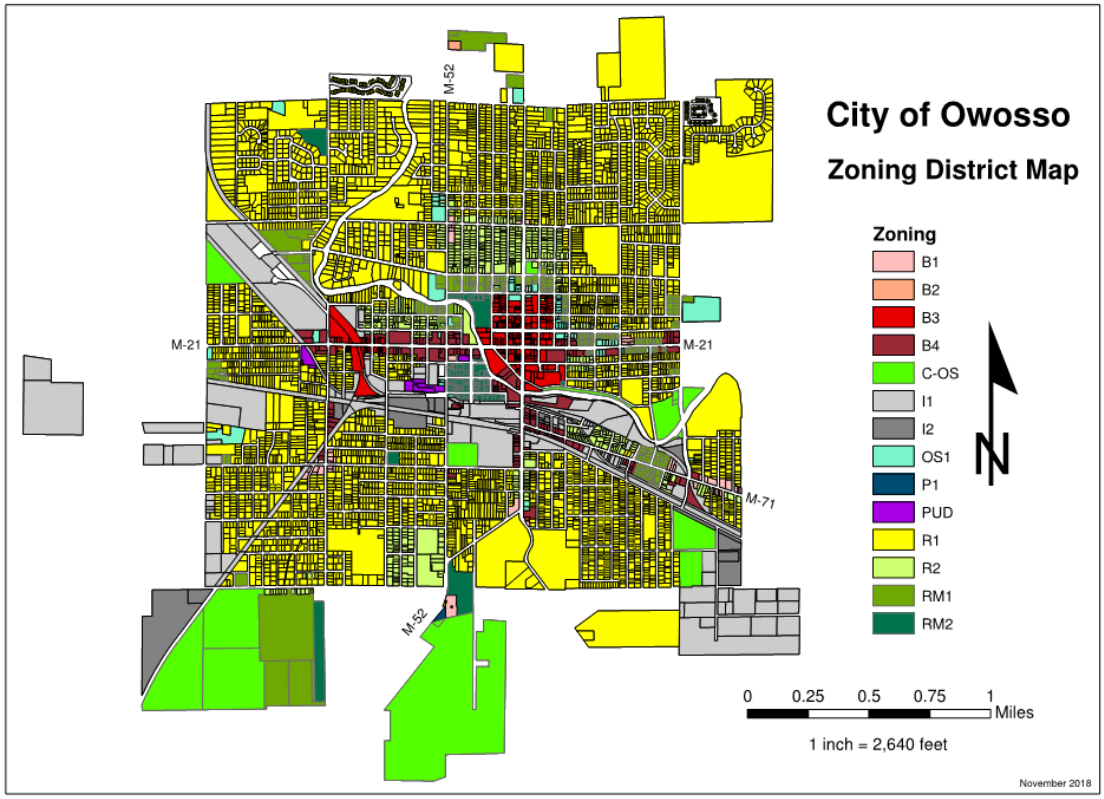

Figure 1. Existing Land Use – Zoning Map
Source: City of Owosso

B1	Local Business District
B2	Planned Shopping Center District
B3	Central Business District
B4	General Business District
C-OS	Conservation/Open Space District
I1	Light Industrial District
I2	General Industrial District
OS1	Office Service District
P1	Vehicular Parking District
PUD	Planned Unit Development District
R1	One-family Residential District
R2	Two-family Residential District
RM1	Multiple-family Residential Districts
RM2	Multiple-family Residential Districts – High Rise

Figure 2. Zoning Map - Legend

Population Projections

The 2017 population of the City of Owosso was 14,539 per the United States Census Bureau (USCB). Since 2010, the population of the City of Owosso has been steadily declining (4.1%). To be conservative, the future planning periods were completed based on the existing population (reference *Table 1. Population Data*). The USCB also possesses population data for Shiawassee County. The population at the County level is observed to have declined at a similar rate from 2010 to 2017 (3.1%). There is no seasonal variance in the population within the City of Owosso as the population remains constant throughout the year.

Table 1. Population Data

	2017	2019	2030
Service Area Year-Round	14,539	14,539	14,539
Service Area Seasonal	N/A	N/A	N/A

The City of Owosso has 6,386 operational service connections, with 95% of those being single-family residential locations. Currently, the City of Owosso has approximately 7,964 Residential Equivalency Units (REUs). See Table 2. *REU Calculation Based on Meter Size* for REU calculations.

Table 2. REU Calculation Based on Meter Size

Size (in)	Number in Operation	Equivalent Factor*	REU
5/8	6,039	1.0	6039
3/4	53	1.5	79.5
1	112	2.5	280
1.5	91	5.0	455
2	55	8.0	440
3	28	15.0	420
4	6	25.0	150
6	2	50.0	100
Total	6,386		7,964

* Based on AWWA Manual M6, Water Meters--Selection, Installation, Testing and Maintenance

Water Demand

The City of Owosso's average water demand is 1.68 MGD per the 2018 MDEQ Sanitary Survey Five Year Average Day. The Maximum Day for capacity requirements is 2.62 MGD and the calculated Peak Hour demand is 4.36 MGD (reference the 2017 City of Owosso Water Reliability Study)

Table 3 shows the current demands which are equivalent to the projected 5-year and 20-year demands due to declining population.

Table 3. Current and Future Projects System Demands

Demand	GPM	MGD	Peaking Factor
Average Day	1,167	1.68	--
Maximum Day	1,819	2.62	1.55
Peak Hour	3,029	4.36	2.60

Existing Facilities

Condition of Source Facilities

The total permitted capacity based on the production wells is 4,451 gallons per minute (GPM), as detailed in Table 4. *Summary of Raw Water Wells*. The permitted firm capacity with the largest producing well out of service is 3,659 GPM. However, based on the actual performance of the wells, the actual firm capacity is approximately 2,247 GPM. An updated Well Head Protection Program was approved by MDEQ in 2016. The approval letter is included in Appendix I.

Table 4. Summary of Raw Water Wells

Well ID	**Long-Term Plan**	**Year Installed**	**Permitted Capacity (GPM)**	**Actual Capacity (GPM)**
LW-1 (WL001)		Pre 1960	700	704
LW-13 (WL013)	Decommission	1955	750	482
Hintz (WL022)		2018	730	Under Construction
OSBORN (WL005)		1968	722	543
PS-2 (WL002)	Decommission	1963	757	853
PS-3 (WL003)	Decommission	1964	792	528
Hintz 2	Future install	2021		
Vandekarr-1	Future install	2021		
		Total Capacity	**4,451 (6.41 MGD)**	**3,110 (4.48 MGD)**
		Firm Capacity	**3,659 (5.27 MGD)**	**2,257 (3.25 MGD)**

The Ten States Standards require that the firm capacity of the system be equal to or greater than the design maximum day demand of the system. The maximum day demands for the system are 1,819 GPM for the present and future conditions. The permitted capacity of the wells is currently sufficient to meet the demands of the system; however, the city would like to eventually decommission wells LW-13, PS-2, and PS-3. To address this issue and issues with well protection, the City is in the planning stages to develop an additional well at the Hintz Wellfield to replace LW-13 and to develop a new wellfield at Vandekarr Road to replace PS-2 and PS-3. This alternative is discussed further in the Analysis of Alternatives Section.

Figure 3. *Wellhead Protection Area* identifies the City's six (6) public water supply wells and the wellhead protection area as of June 2015. A new well at this site is planned for completion in 2019.

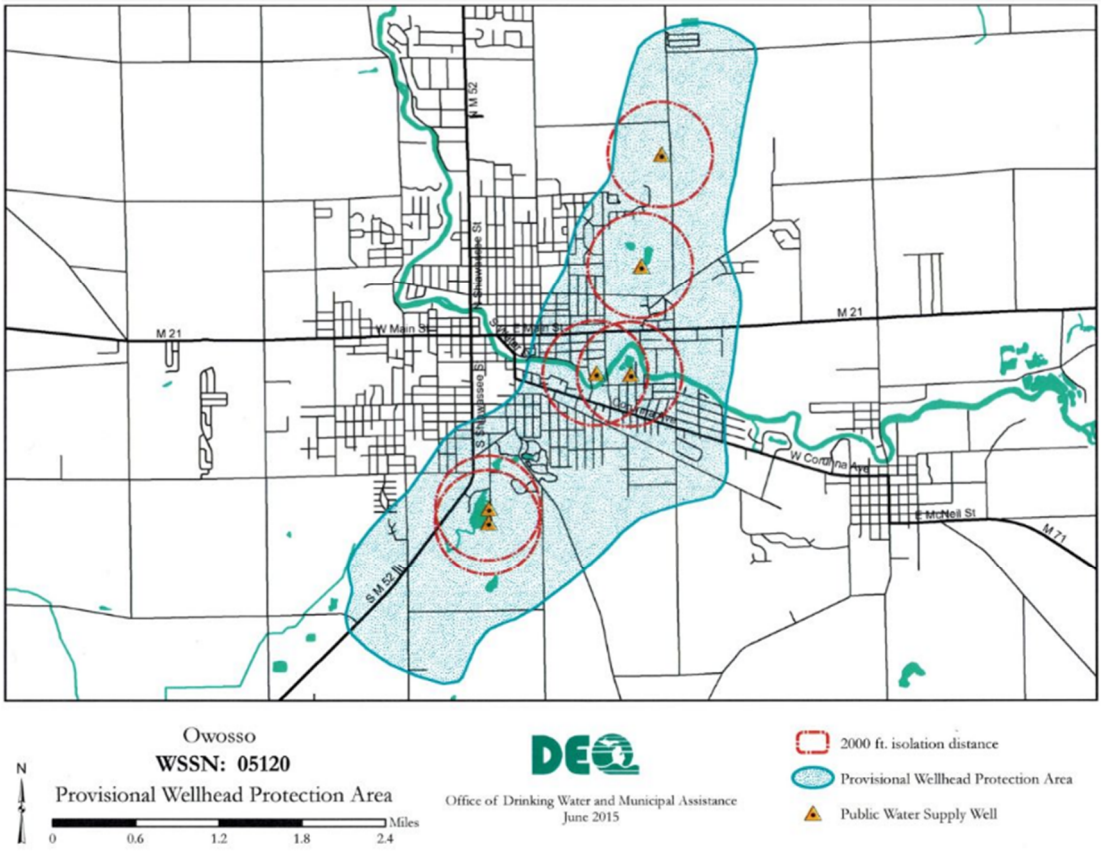

Figure 3. Wellhead Protection Area

Water Treatment

The City of Owosso owns and operates its own water treatment plant at 1111 Allendale Avenue on the banks of the Shiawassee River. This plant has a total capacity of 5.4 MGD as per the 2018 MDEQ Sanitary Survey. The Water Treatment Plant (WTP) was built in the 1930's and 1940's and treats water received from the six public wells. The process includes an induced draft aerator for iron oxidation, two solids contact clarifiers for lime softening, a CO2 contact chamber for recarbonation, 4 sand filters for additional solids removal, and sodium hypochlorite feeds for disinfection. The WTP capacity is limited by the filtration rate of the filters which was found to have a rate of 5.4 MGD (3,780 GPM). The WTP has a pumping capacity of 8.0 MGD from four high service pumps. However, the ultimate limiter of the entire City of Owosso water system was found to be the firm capacity of the public wells which is at 4.22 MGD (2,929 GPM).

Condition of Storage Tank and Pump Station Facilities

The City of Owosso has a total of 3.65 million gallons (MG) of storage between their west elevated storage tank, standpipe, clear well, and underground storage tank. Given that the City's average water demand is 1.68 MGD, there is enough available storage for 2.2 average days. The Ten States Standards recommends that a system have at a minimum, storage capacity equal to one average day's volume. The City of Owosso is in compliance with this recommendation.

The elevated storage tank and the standpipe are in need of major repair including, but not limited to, abrasive blast cleaning and recoating of interior and exterior surfaces due to corrosion. Further analysis of the storage facilities are presented in the Analysis of Alternatives section of this report.

Condition of Service Lines

Water meters in the City range from 5/8-inch to 6-inch as detailed in *Table 2. REU Calculation Based on Meter Size*. In general, the service lines are the same age as the water main they are connected into. Estimated pipe ages can be found in the 2017 City of Owosso Water Reliability Study. The majority of documented service lines in the City are copper, while approximately 10% of service lines are galvanized, lead, or unknown. The City is currently performing a survey to document lead and galvanized service lines for replacement.

Condition of Transmission/Distribution System

The existing water distribution system is constructed with local transmission and distribution mains ranging in size from 1.5 to 24 inches in diameter. Documented pipe materials include cast iron (CI), ductile iron (DI), asbestos-concrete (AC), copper, polyethylene (PE), plastic, and galvanized steel. Cast iron and ductile iron are documented as the majority material that accounts for roughly 60% of the entire system. The majority of the system mains are 50 to 65 years old while there are some parts

of the main that are 80 to 100 years old. Table 5. *Summary of Water Main* shows the water main types and sizes as found during the 2017 City of Owosso Water Reliability Study.

Table 5. Summary of Water Main

Size (inch)	Cast Iron	Copper	Ductile Iron	P.E.	Plastic	Galv. Steel	A.C.	Unknown	Total
≤ 4	33,050	1,801	2,818	--	65	2,711	4,153	42,770	87,368
6	97,727	280	42,093	--	1,350	--	13,563	81,794	236,806
8	25,706	--	40,734	--	7,317	--	972	28,415	103,145
10	2,850	--	1,018	--	--	--	--	142	4,009
12	38,088	--	21,464	--	6,963	--	4,185	27,728	98,429
14	--	--	17	402	--	--	--	--	419
16	5,857	--	14,765	--	--	--	--	12,797	33,418
20	--	--	2,996	--	--	--	--	1,960	4,956
24	--	--	--	--	--	--	--	878	878
Total	203,278	2,081	125,904	402	15,695	2,711	22,873	196,482	569,424

Method of Residuals Handling and Disposal

At the Water Filtration Plant, solid residuals generated as a result of the lime softening process and filter backwash are stored in lagoons north of the Plant. Each lagoon is emptied of lime sludge and hauled off-site by a contractor every three (3) years. The lime sludge is processed and ultimately used for farm application. Approximately 8,000 cubic yards of lime sludge is processed every year.

Condition of Water Meters

The City of Owosso began replacing all water meters with smart meters in its water distribution system in 2017. Approximately 6,100 of 6,386 meters have been replaced. The City expects to install the remaining meters in 2019-2020.

Operation and Maintenance

The City has full time staff for both the water treatment plant and for the distribution system. This section focuses on the operation and maintenance activities relevant to this project plan. Additional information can be found in the 2018 MDEQ Sanitary Survey.

Water Mains: The City is currently performing a survey to document lead and galvanized service lines for replacement. The City is also exploring implementation of a valve exercising and water main flushing program. Hydrant flushing is currently performed on an as-needed basis for dead-end water mains to remedy low pressures or water quality issues.

Water Storage: The water storage facilities (standpipe and spheroid tank) and their controls are inspected on a weekly basis. A third-party inspection is performed approximately every five (5) years.

Water Treatment Plant: The backwash pump on the filter system was installed in 1942 and operates daily. Major updates for the pump were performed in 1960 and 1988. Following a recent seal repair the pump was deemed no longer serviceable. The SCADA system is constantly monitored by staff and is essential to all operations at the WTP.

Well Systems: Plant operating staff verify the functionality of the remote-controls of the well pumps and booster pumps on a monthly basis. Each well is inspected on a weekly basis; controls are tested locally and remotely on a monthly basis. Drawdown tests occur monthly due to historically observed issues of wells running dry. Additionally, wells are given an annual inspection by a third-party licensed well driller (Northern Pump & Well Company). The annual budget includes monies for potential major repairs for one well per year; which may include chemical treatment or equipment replacement.

Design Capacity of Waterworks System

The City of Owosso has an average daily water demand of 1.68 MGD. The maximum day peaking factor is 1.55 and the peak hour factor is 2.60. The City of Owosso's supply wells are permitted for a firm capacity of 5.27MGD, while the water treatment plant can supply up to 4.8 MGD. The current system has the capacity to handle the peak hour demand.

Evaluation of System's Climate Resiliency

The system is sufficiently protected from changes in climate that results in extreme weather events such as drought, flooding, and loss of power systems.

In the event of drought that results in a lowered capacity from the individual water supply wells, the City can utilize the Osburn well or Palmer Street Well #2 (PS-2) to supplement flow to the WTP. Currently, these wells are only used when other wells are out of service or during very high demand times (e.g. fire flow).

In the event of extreme wet weather, the water storage tanks are located away from areas designated as floodplains by the Federal Emergency Management Agency (FEMA). At the water treatment plant, the storage lagoons rely on water infiltration; however, this can be hampered by a high water table resulting in high water levels. When this occurs, the lagoons can be emptied manually with temporary pumps to allow sludge and backwash transfer pumps to discharge into the lagoons properly. Portions of the water treatment plant sub basements are below the 100-year flood level; however, the plant foundations extend above the 100-year flood level and are well sealed.

If a 500-Year Flood event were to occur, the water treatment plant would need to be bypassed since it would be in the area affected. However, during this time the municipal water supply wells would be able to provide untreated water directly to the city's distribution system.

If loss of power occurs at the remote well sites, portable generators are available and would be brought to the well sites to supply water to the population. Permanent standby power is available at the water plant to maintain treatment.

Summary of Project Need

Owosso is planning the following projects to improve its water distribution and treatment system:

- Water main replacements.
- Repairs to water storage facilities.
- Water Filtration Plant improvements and repairs.
- Development of a new well field.

The City is interested in replacing and upgrading sections of water main, including valves, service leads, and hydrants, that are old and undersized, or that experience frequently breaks. These water mains were recommended to be replaced in the 2018 DEQ Sanitary Survey, as well as in the 2017 Water Reliability Study, and 2017 Water Asset Management Plan. Additionally, critical dead-end sections will be looped to increase reliability of service, reduce head loss, and improve water quality within the system. Over the previous 10 years (2009-2019), 297 main breaks that have occurred in Owosso with 131 main breaks on the 53,000 feet of pipe planned for replacement in this project. These water mains are less than 10% of the linear feet of water main in Owosso, but account for 44% of the breaks across 10 years. These breaks are associated with as much as 50 million gallons of water loss per year. Additionally, most water mains are severely undersized at 2-inch, 3-inch, and 4-inch. The pressure losses in the old, small diameter pipes result in poor levels of service for customers, and increased energy costs associated with pumping. Replacing these mains can save up to 68,000 kilowatt-hours per year.

Water Storage inspections performed by Nelson Tank Engineering and Consulting (NTEC) in 2016 included repair recommendations for the 0.6 million gallon elevated tank and a 1.25 million gallon standpipe. These primarily consist of abrasive blasting and recoating of the structures' interior and exterior surfaces and replacing minor miscellaneous equipment (e.g., ladder, valve, vent, mixing equipment). The tasks listed in the NTEC report are essential for the long-term operation and maintenance of the storage tanks. The 2018 DEQ Sanitary Survey recommends following the conclusions of the 2016 NTEC inspection. The summaries of the maintenance inspection reports written by NTEC for each structure are included in Appendix D.

Water Filtration Plant improvements include replacement of the failing, single rapid filter backwash pump with two backwash pumps. New variable frequency drives will be installed along with new emergency stops or local disconnects. The piping at this location will be altered accordingly to accommodate the two new pumps. Additionally, portions of the high service pump discharge header piping that are severely corroded will be replacement along with replacement of the SCADA, communications, and controls equipment which has exceeded its useful life. The existing backwash pump is over 70 years old and has exceeded its expected useful life and lacks redundancy. Consequently the existing pump will be replaced with a duplex pumping system.

The proposed high service pump discharge piping to be replaced is approximately 70 feet in length and is highly-corroded. It is the original 16-inch and 8-inch cast iron pipes, fittings, and valving installed in the 1940's. A redundant line was recently installed; however, the corroded 16-inch main is the main feed from the WTP and due to its criticality needs to be replaced in order to maintain system reliability.

The current SCADA system has exceeded its useful life. Improving automation of the Owosso Water Filtration Plant by upgrading existing SCADA equipment will assist operators in improving plant operations and implement a number of recommendations from the 2018 DEQ Sanitation Survey. These recommendations include improved process documentation, security at the well houses, and real time disinfectant monitoring.

The development of the Vandekarr wellfield is needed to allow the City to replace some of the existing wells that are at a higher risk for contamination or have elevated hardness making them more difficult to treat. All wells in operation by the City of Owosso are permitted by MDEQ and meet all applicable drinking water standards, however, some wells are at greater risk of potential contamination than others. Due to these risks, the city plans to discontinue use of Palmer Street Well No.2 (PS2) Palmer Street Well No. 3 (PS3), and Local Well 13 (LW13) and replace them with wells in lower risk locations in the future. Additionally, Palmer Street Well No. 2 contains high hardness (600-700 ppm) and causes a burden on the Water Filtration Plant as more lime addition is required for softening.

Compliance with the drinking water standards defined in the Administrative Rules for Act 399.

There are no acute or non-acute violations of Act 399; however, there are a number of recommendations from the 2018 DEQ Sanitary Survey included in this project plan that are required for the City to remain in compliance.

The basis for the proposed projects in this Project Plan is to increase reliability of service to residents and customers. Specific examples of improved reliability are as follows:

- Old, cast iron water mains will be replaced.
- Very small diameter cast iron and galvanized water mains will be upsized to a minimum 6-inch diameter pipes.
- Some dead end water mains will be looped.
- Storage facility upgrades and repairs will prevent unscheduled down time.
- Duplex backwash pump system to replace simplex system and increase backwashing reliability and improve operational functionality.
- SCADA upgrades to improve controls and data collection
- New wellfield options to optimize treatment and reduce risk of contamination.

The following documents substantiate the water system improvements and have been previously submitted to MDEQ.

- 2018 Water System Sanitary Survey.
- 2017 Water Reliability Study.
- City of Owosso Maintenance Inspection 1.25 Million Gallon Standpipe (2016).
- City of Owosso Maintenance Inspection 600,000 Gallon Elevated Tank (2016).

Orders or Enforcement Actions

The City of Owosso has no orders or enforcements actions targeted at correcting deficiencies in order to achieve compliance with Act 399.

Drinking Water Quality Problems

The City of Owosso's drinking water is safe for consumption and meets or exceeds federal and state requirements.

Projected Needs for the Next 20 Years

The 2017 Water Reliability Study and the 2017 Water Asset Management Plans identified areas where water main improvements were recommended, along with treatment plant and source water upgrades. Approximately 1,500 to 5,000 feet of water main are planned for replacement each year through 2041. The majority of these improvements will upgrade mains from 4-inch to at least 6-inch diameter. At the source wells, WTP, and storage facilities, approximately $7,000,000 worth of improvements, replacements, and rehabilitations are planned over the next 20 years. These include potential replacement of the standpipe and the underground storage reservoir, replacement of aging process piping and valves, and rehabilitation of source wells, rapid sand filters, and lime softening equipment.

Exploratory Well/Investigations/Well Site Selection/Test Well Drilling Procedures

The City currently owns property east of Vandekarr Road and south of Oak Hill Cemetery. They would like to develop the property for use as a well field.

The densely forested, 34.7 acre property is directly adjacent to a freshwater forest and shrub wetland. About 400 feet north of the site is a residential neighborhood. Roughly 1,500 feet west of the site is Hillcrest Cemetery.

This property is next to an existing raw water transmission main that provides water to the Water Treatment Plant. It was originally identified as a potential well field by Layne Christensen, a licensed well driller. The transmission main length from the proposed well site to the Water Treatment Plant would be approximately one (1) mile. This location is mapped in the Area of Potential Effects (Figure 4 found in Appendix A - Maps) and the existing raw water transmission main is shown the Existing Facilities Map (Figure 5 found in Appendix A - Maps).

There are known contamination sites approximately 1,300 to 2,000 feet east of the site which are shown on Figure 4. *Sites of Contamination*.

Analysis of Alternatives

The analysis of alternatives section has been separated by project type for ease of discussion.

Improve Distribution System Pressures and Reliability

No Action

If no action is taken to replace the undersized, galvanized and cast iron mains, water quality, pressure loss, and increased rate of pipe breakage will continue to be a concern for residents throughout the water system. Dead-end water mains are associated with higher collection of debris, higher water age and lower residual disinfectant concentration. To forego replacing dead-end water mains results in poor water quality and requires frequent maintenance and flushing. Lastly, many of the water mains scheduled for replacement are shallow, cast iron pipes that experience frequent shear breaks during freeze and thaw cycles in winter months. Shallow water mains are located within 4 feet of the surface. No action is not a principal alternative.

Optimum Performance of Existing Facilities

Optimizing the performance of the existing water system involves changing operational procedures to simultaneously improve pressures and reduce the number of water main breaks. Since the material for many of the existing water mains is primarily aged cast iron increasing the pressures is likely to create additional water main breaks. Conversely, operating at lower pressures to avoid breaks is not a viable option as pressure variability is necessary for adequate turnover for the water storage facilities and areas with existing low pressures will see poorer service. Optimum performance of existing facilities is not a principal alternative.

Regional

A regional alternative will not address the deficiencies of the existing water distribution system owned by the City; current concerns pertaining to excessive water main breaks and local system reliability cannot be solved by a regional approach. A regional alternative is not a principal alternative.

Water Main Replacements and Upgrades

The City of Owosso owns an aging water distribution system (primarily cast iron, galvanized pipe and asbestos concrete) in which excessive water main breaks have been observed. The existing system also contains 1.5-, 2-, 3-, and 4-inch water mains, which are smaller than the recommended minimum size per Ten States Standards. Upgrades to the system to address the above issues would consist of the following:

- Replacing shallow water mains susceptible to heaving or freezing (mains less than 4 feet from the surface).
- Replacing water mains with a history of breaking.
- Aged or undersized (1.5 to 4-inch) pipes made from galvanized steel or cast iron will be upsized to six to eight inch pipe made from PVC or ductile iron.
- Looping dead-end water mains where feasible

Water Main Rehabilitation

Water main rehabilitation such as cleaning and lining is not a principal alternative because the majority of water mains in this project plan require upsizing and lining costs in this situation dramatically exceed replacement costs. There are three (3) of forty-five (45) streets where water mains will be replaced with the same diameter pipe - North, Chipman, and Huntington Streets. On these streets, the cost to install a liner would be much higher than the cost to outright replace the pipe because street replacement costs are specifically excluded in this DWRF Project Plan. For example, cost to clean and line an 8" pipe is approximately $200/LF whereas the costs to install an 8" PVC main is approximately $150/LF. Therefore, rehabilitation is not a principal alternative.

Failing Water Storage Facilities

No Action

The standpipe and spheroid tank are critical components that are required to meet the peak hour and peak instantaneous system demand. No action would mean that the major, unplanned repairs to the coating systems could result in disruption of service to residents. The last major work performed on the storage tank and standpipe were in 1996 and 1998 respectively. No action will result in increased corrosion problems leading to decreased structural integrity, increased water loss, and deterioration of water quality.

Optimum Performance of Existing Facilities

Measures such as addition of new equipment, operational changes, or the addition and training of operating personnel will not prevent corrosion of the structures. The water storage tanks are both necessary for system operation and therefore cannot be permanently removed from service. Optimizing performance of the existing facilities is not a principle option to solve the issue.

Regional Alternative

Connecting to a regional water supply will not serve the immediate, existing needs for adequate water storage. A regional alternative is not a principle alternative.

Repair of Existing Storage Facilities

Nelson Tank Engineering & Consulting, Inc. (NTEC) has provided repair recommendations for both facilities based on the inspections performed in 2016. These consist of abrasive blasting and recoating of the structures' interior and exterior and replacing minor miscellaneous equipment (e.g., ladder, valve, vent, and mixing equipment). Performing the repairs is a principal alternative.

Replacement of Storage Facilities

In lieu of repairing the existing standpipe and elevated tower, the City may consider replacing them in kind. The elevated tower was constructed in 1996 and is well within its expected lifetime of 30-60 years. The standpipe was constructed in 1953, and has exceeded the calculated expected lifetime; however, it is in good structural condition and NTEC does not recommend replacement at this time. Replacing the elevated tank is not a principal alternative; however, replacing the standpipe is considered a principal alternative and the life cycle costs have been evaluated in a present worth analysis (appendix B).

WTP Failing Backwash Pump, Failing Process Piping, Obsolete Controls and Communications Equipment

No Action

The existing backwash pump and high-service process piping are expected to fail in the near future. When the pump fails, the filter system will need to utilize an un-tested backwash method involving use of the high service pump discharge. Due to the basic controls of the backwash system, this high pressure method could potentially wash out the filter media instead of fluidizing the media bed. The existing backwash pump was installed in 1942 and has outlived the useful service life of 20 to 30 years. In the event of failure of the existing backwash pump, if the redundant backwash method cannot be adequately controlled, operation of the plant filter system will cease after 3-4 days.

The 16-inch high service line is the primary feed to the city from the WTP. A newer, redundant main does exist in the event of a failure, however, two lines are necessary to maintain an acceptable level of reliability. In the event this parallel pipe were to rupture, it could damage equipment in the subterranean levels of the WTP and the City would be dependent upon the single process pipe from the WTP.

The existing SCADA systems are out of date and the communications equipment is obsolete and no longer supported by the developers. No action will result in loss of ability to control treatment equipment and water supply.

No action is not a principal option.

Optimal Performance of Existing Facilities

There are no optimizing performance measures that will completely address the immediate needs of the existing system. The backwash system could be optimized to better utilize the high service discharge for backwashing the filters; however, this would likely require additional controls improvements and would not address the failing backwash pump necessary for a backup system. The high-service discharge piping is necessary to maintain reliable operation of the WTP. There are no measures for optimal performance of the existing SCADA facilities given that the large portions of the existing telemetric equipment are obsolete.

Optimal performance of the existing facility is not a principal option.

Regional Alternative

Connecting to a regional water supply such as the Genesee County Water System will not serve the immediate needs of the existing facility, which include replacing the existing backwash pump that has well exceeded its useful remaining life.

There is no regional alternative that addresses the immediate needs of the existing SCADA system. The existing telemetric equipment is limited in its ability to treat and supply water in the system efficiently.

A regional alternative is not a principal option.

Replacement Alternatives for Backwash Pump

1. *Replace Existing Pump in Kind*

   This alternative consists of obtaining a spare, in-kind backwash pump and storing it on-site. In the event of failure of the main pump, the downtime required to replace it may cause temporary disruption of operations and cause the plant to be unable to meet the system water demand.

   The existing system currently lacks the necessary controls to efficiently backwash the system; a constant pump speed results in a higher risk of removing media from the filter bed. Replacement of the existing backwash pump is not a principal alternative as it will not provide the alternative means of backwashing the filter system as required by Ten States Standards.

2. *Upgrade to Duplex System on Main Level*

   Installing a duplex pump system on the main level will allow for adequate redundancy in the event that the current pump in operation fails and will protect the pump equipment in the event of a catastrophic flood. This alternative would require installation of new piping for the additional pump to another location in the building and may also require construction of additional storage vessel at grade.

Due to the substantial cost associated with this work, it is not a principal alternative.

3. *Upgrade to Duplex System in Existing Location*

Installing a duplex pump system with variable frequency drives allows for adequate redundancy in the event that one of the pumps fails and allows for precise control of backwash operations. This alternative would require installation of new piping for the additional pump along with new controls and all new electrical equipment. The design process will investigate the use of dry pit submersible pumps or immersible pumps in order to protect against basement flooding. VFDs and other electrical equipment will be provided for a complete working system. As much electrical equipment as feasible will be located above the 100-yr flood level or waterproofed if below.

Replace High Service Process Piping and Upgrade and Combine SCADA System

For the SCADA system and the High Service Process Piping, replacement is the only principal alternative. The alternatives for the backwash pumps are discussed below.

The existing SCADA hardware and software versions are outdated and having controls on two different platforms is inefficient and unreliable. The ScaData system used on the distribution equipment is proprietary and replacement parts are not readily available nor interchangeable with other systems. The Wonderware system at the WTP was installed in 2004 and requires extensive controls and software updates. Combining, updating, and expanding the two SCADA platforms allows staff to better control systems, analyze and troubleshoot operational problems, and provide comprehensive documentation of operations. This is the only viable alternative for this issue.

Additional work would occur concurrently to replace the corroded high-service process piping, valves, and appurtenances located in the lowest basement level. This option will provide reliable, primary discharge for the high service pumps.

Water Supply Wells

No Action

No action will require Palmer Street Well No. 2, No. 3, and the Local Well No. 13, to stay in service indefinitely. Palmer Street Well No. 2 contains high hardness (600-700 ppm) and causes a burden on the Water Filtration Plant as more lime addition is required for softening. Additionally, the plant is unable to achieve the desired hardness level while treating water from this well.

As part of the City's wellhead protection plan, Palmer Street Well No.2 (PS2) Palmer Street Well No. 3 (PS3), and Local Well 13 (LW13) are at greater risk of contamination as well as at the end of their useful life. The proposed Vandekarr Wellfield will be necessary to maintain the system capacity once PS2 and PS3 are closed at the Palmer Street Wellfield. Therefore, no action is not a principal alternative.

Optimal Performance of Existing Facilities

This alternative would involve using other, existing wells in a different manner in order to meet the system water demand. Currently, the source water wells are as optimized as much as possible to provide acceptable water quality while minimizing resources. This is not a principal alternative.

Regional Alternative

There is no feasible regional alternative that would meet the immediate demands of the existing system.

Construction of Well Field

Historically, the City has experienced issues with municipal wells loosing significant capacity over time – often very quickly and unexpectedly. Aquifer recharge in the area is generally lower than in other areas of Michigan with 6 to 7 inches of recharge per year. If drought conditions occur, having an additional well field would allow the city to spread out the groundwater draw across a larger area of the aquifer and therefore reduce the burden of any single well or well field. Additional source options improve source water reliability in the event of drought, contamination, loss of capacity, or raw water transmission break. Constructing a new wellfield is a principal alternative.

Improve Distribution System Pressures and Reliability

The two principal alternatives to improve the distribution system pressures and reliability are to replace the existing lines with either ductile iron or PVC piping. The valves, hydrants, and appurtenances would be ductile iron. Additionally, ductile iron would be used at all locations where known contamination is present.

Monetary Evaluation

Present worth calculations were performed considering replacing and upgrading water mains with either ductile iron pipe or PVC pipe with ductile iron hydrants, valves and appurtenances. These cost opinions are organized by proposed construction year and are provided in Appendix B of this report. The present worth analysis indicated that PVC has the lower Total Present Worth and is therefore the Selected Alternative for this project.

The basis for the replacements are substantiated by the 2017 City of Owosso Reliability Study.

Table 6 Water Main Material Cost Comparison

	Alt 1 PVC	Alt 2 Ductile Iron
2020 Water Main	$ 2,262,700	$ 2,526,000
2021 Water Main	$ 2,301,600	$ 2,569,000
2022 Water Main	$ 1,997,600	$ 2,230,000
2023 Water Main	$ 2,471,200	$ 2,759,000
2024 Water Main	$ 3,436,500	$ 3,836,000
Total Cost	$ 12,469,600	$ 13,920,000

Environmental Evaluation

Construction impacts as a result of this alternative include dust, noise, and traffic disruption. City, County, and State regulations associated with these impacts will be addressed during design as well as in the construction contracts associated with the work.

Note that some water main replacements will be located in historical sites or districts known to exist in the city of Owosso. Discussion of these sites and the mitigation of impact to these sites is discussed at the end of this project plan.

Water main replacements are scheduled to begin in year 2020. All construction activities will conclude in year 2024.

Mitigation

Construction sites will be restored to their original condition following all construction activities.

Implementability and Public Participation

User fees associated with the replacement of the water main include capital costs. These may be of concern to the public. The proposed projects and user costs will be reviewed with residents during the public hearing on April 15, 2019. The costs were also published in the Owosso Press and Guide on March 13th, 2019.

Adoption of this alternative would maintain compliance with applicable water quality standards as well as increase reliability of service to residents and customers.

Technical Considerations

Replacing water mains that have a history of breakage as well as replacing dead-end water mains will increase reliability of service to residents and customers as noted in the 2017 Water Reliability Study. Both PVC and Ductile Iron meet MDEQ requirements for water main. Water main in areas of contamination is discussed below. Water mains included in this project plan that are 1.5-inch, 2-inch, 3-inch or 4-inch will be upsized to 6-inches or larger. Any dead end pipes that cannot be looped, will have necessary flushing equipment installed to maintain water quality. Details of each water main are listed Appendix E.

Residuals

No new residuals at the City's Water Treatment Plant will be generated as a result of the water main replacements and upgrades.

Contamination

There are at least 7 proposed water mains that pass close to or through locations that are included on the state's list of contaminated sites (https://secure1.state.mi.us/ facilitiesinventoryqueries). The sites are either open or closed Part 213 leaking underground storage tanks (LUST) sites or Part 201 hazardous substance releases. The locations have been mapped depicting their proximity to the project areas on Figure 12 Sites of Contamination found in Appendix A- Maps. Specifics on the exact pollutants are not always available; however, precautionary measures will be taken at each

location to ensure that the new water main does not become contaminated, create further spread of contamination, or needlessly expose residents or workers to contamination.

Any new water main in the presence of potential contaminants will be installed via directional drilling with ductile iron pipe. This method of installation and material will eliminate any exposure to potential contaminants as well as reduce pipe failure due to a reaction with the pipe material. Specialized gaskets designed to withstand ground water contamination at water main joints will be proposed in this area to help prevent contaminants from entering the system. Due to the uncertainty of contaminants in these locations, PVC will be eliminated from consideration in these locations.

Applicable MDEQ procedures, Ten States Standards, as well as local ordinances shall be strictly adhered to during design and construction.

New/Increased Water Withdrawals

No new water withdrawals will result from this alternative.

Failing Water Storage Facilities

The primary alternatives for the aging standpipe is to repair the structure or replace it. For the elevated tower, the only alternative is to repair it since it is well within the useable lifetime.

Monetary Evaluation

A present worth analysis was performed to compare the repairs against the option to replace the standpipe. The present worth analysis located in Appendix B indicates that repairing both structures has the lowest Total r and is therefore the Selected Alternative for this project. These values are substantiated by the maintenance inspection reports prepared by NTEC included in Appendix D.

Table 7: Cost Opinion for Water Storage Maintenance

	Alternative 1	Alternative 2
Elevated Tank Repair	**$414,000**	$414,000
Standpipe Repair	**$565,800**	
Standpipe Replacement		2,208,000
Total	**$979,800**	2,622,000

Environmental Evaluation

All activities will take place within the existing water storage facilities. Surface preparation will result in paint dust and recoating the tanks may result in minimal overspray.

If Alternative 2 were chosen, demolition and construction impacts as a result of this alternative would include dust, noise, traffic disruption, and soil erosion at the existing standpipe site.

There would be no effect on cultural resources for either of these alternatives.

Mitigation

Any dust or coatings overspray will be managed appropriately as to limit airborne particles outside the construction area. City, County, and State regulations associated with these impacts will be addressed during design as well as in the construction contracts associated with the work.

Construction areas will be restored to original conditions.

Implementability and Public Participation

User fees associated with these alternatives include repair costs which may be of concern to the public. The proposed projects and user costs will be reviewed with residents during the public hearing on April 15, 2019. The costs were also published in the Owosso Press and Guide on March 13th, 2019.

Adoption of either alternative would maintain compliance with applicable water quality standards, increase reliability of service to residents and customers, and improve water quality in the storage vessels.

Technical Considerations

Repair of the two water storage tanks will increase reliability of service to residents and customers and extend the useful life and serviceability of the structures. Additional details are documented in the maintenance inspection reports performed by NTEC which are located in Appendix D. Additionally, mixing equipment will be installed in both storage facilities to reduce stratification and improve quality of water within the storage tanks.

Residuals

No new residuals at the City's Water Treatment Plant will be generated as a result of the tank storage rehabilitation.

Contamination

No issues pertaining to contamination are associated with this alternative as the extent of the project areas are the existing water storage facilities.

New/Increased Water Withdrawals

No new water withdrawals will result from this alternative.

WTP Failing Backwash Pump, Failing Process Piping, Obsolete Controls and Communications Equipment

There are single alternatives for each of the three issues at the WTP:

- Upgrade to duplex backwash pumping system in existing location – this duplex skid can use traditional centrifugal pumps or dry-pit submersible pumps that would be protected in the event of a flood.
- Replace the highly corroded cast iron process piping, valves, fittings, and equipment with ductile iron piping, valves, and appurtenances.
- Combine the out of date SCADA systems in to a single, updated system for the WTP, supply wells, and water storage facilities.

Monetary Evaluation

The budget table below breaks down the estimated costs for critical work at the water treatment plant

Table 8. Cost Opinion for Water Treatment Upgrades

	Alternative 1
Backwash Pumps	$406,300
High-Service Piping Replacement	$414,400
Water System Controls (SCADA)	487,500
Total	**$1,259,400**

Environmental Evaluation

There are no environmental impacts anticipated as a result of this alternative. All activities will take place within the existing Water Treatment Plant facilities.

Mitigation

There are no mitigation efforts that are required to be addressed for this alternative as all construction activities are contained within the existing facilities.

Implementability and Public Participation

User fees associated with this alternative include capital costs. These may be of concern to the public. The proposed projects and user costs were reviewed with residents during the public hearing on April 15, 2019. The costs were also published in the Owosso Press and Guide on March 13th, 2019.

Adoption of this alternative would maintain compliance with applicable water quality standards as well as increase reliability of service to residents and customers.

Technical Considerations

The filtration backwash system requires a duplex pumping system to provide adequate redundancy per the Ten States Standards. Currently, the City has only one existing backwash pump at the WTP and plans on installing a duplex pumping system with variable frequency drives for improved control for backwashing the filter system.

The City investigated moving the backwash pump(s) to an elevation above the 100-year flood level as recommended in the 2018 Sanitary Survey and determined this work was not justifiable economically. In order to satisfy the requirements for protection against the 100-year flood, the City will consider installing dry-pit submersible pumps or end suction centrifugal pumps with immersible bearing frames and motors in the lower level. All other electrical equipment and controls would be installed above the flood level.

The original high service process piping and appurtenances in the basement of the WTP is badly corroded and located behind multiple other process pipes. A secondary discharge pipe has been installed at the plant and can be used during the difficult replacement of this line. Both discharge lines are necessary to maintain a level of system reliability.

Residuals

No new residuals at the City's Water Treatment Plant will be generated as a result of this alternative.

Contamination

No issues pertaining to groundwater contamination are associated with this alternative as the extent of the project areas are the existing Plant facilities.

New/Increased Water Withdrawals

No new water withdrawals will result from this alternative.

Supply Wells

At this time, there is only a single alternative for a new wellfield at the Vandekarr site. During the 2015 update to the Owosso Wellhead Protection Plan (WHPP), the city began investigating sites for wells to replace the Palmer Street wells #2 and #3. Layne Christensen, a well drilling company, began investigating various sites along to the south of the Shiawassee River. The Vandekarr property shown in Appendix A – Maps was identified as the preferred location. The benefits of the site are as follows:

1. When the Palmer wells #2 and #3 are abandoned, the remaining municipal wells will all be located north of the Shiawassee River. Locating a well south of the river away from the other municipal wells will distribute risk and increase reliability.
2. Once the Palmer wells #2 and #3 and Local Well 13 are abandoned in the future, all remaining municipal wells will be connected to the water treatment plant via a single raw water main. Using a separate raw water main from the municipal wells north of the Shiawassee River distributes risk and increases reliability.
3. Locating the new well field adjacent to an existing raw water main allows to City to take advantage of an existing asset and save significant costs a new 16-inch water main can cost $200-$250 per linear foot depending on the accessibility and land acquisition costs.
4. The city owns the 34.7 acre Vandekarr site adjacent to the existing raw water main. This allows the city to provide adequate isolation distances now and in the future without purchasing additional property or creating additional legal agreements.

Monetary Evaluation

The basis for development of a new supply well is increased water reliability and the ability to idle or abandon existing wells with less-desirable characteristics. The Vandekarr site it the only alternative evaluated at this time because the property is adjacent to an existing raw water main and is already owned by the City.

Table 9. Cost Opinion for New Water Supply Well

Raw Water Main to WTP (already exists)	$0.00
Property Cost (already owned by city)	$0.00
Site Investigation/Test Wells	$103,500
Production Well/Pump Testing/Permitting	$103,500
Well house	$414,000
Total	**$621,000**

Environmental Evaluation

The construction of the new well field will take place on an undeveloped, heavily forested area. One (1) to two (2) acres of tree clearing is anticipated to construct access roads and drilling sites. Construction impacts as a result of this alternative include soil erosion, drilling water runoff, and noise. Wetlands exist directly east of the anticipated well location. These will be protected during all construction activities. Additional studies and monitoring will be performed as necessary to determine if and how groundwater withdrawal will affect the wetlands. Additional environmental impacts are discussed below.

Applicable MDEQ procedures, Ten States Standards, as well as local ordinances shall be strictly adhered to during design and drilling.

Mitigation

The City's Wellhead Protection Program will be updated to ensure the protection of the water table in the area and the surrounding environment.

City, County, and State regulations associated with these impacts will be addressed during design as well as in the construction contracts associated with the work.

Implementability and Public Participation

User fees associated with this alternative include capital costs. These may be of concern to the public. The proposed projects and user costs were reviewed with residents during the public hearing on April 15, 2019. The costs were also published in the Owosso Press and Guide on March 13th, 2019.

Adoption of this alternative would maintain compliance with applicable water quality standards as well as increase reliability of service to residents and customers.

Technical Considerations

Construction of a new public supply well will increase the reliability of delivering water to residents and customers and allow more versatility to protect against drought and contamination in the future. The Vandekarr site is adjacent to an existing raw water main and will require minimal cost to connect to the existing system.

Residuals

No new residuals at the City's Water Treatment Plant will be generated as a result of the construction of the new well field.

It is anticipated that sludge residuals will be reduced from the Plant's lime softening process as a result of this alternative due to the lower hardness associated with the groundwater at this site.

Contamination

Approximately 1,300 feet from the eastern border of the 34.7 acre site is a Part 201 contamination site at 1370 E. South Street (facility site ID 78000061). Additionally, Hillcrest Memorial Gardens cemetery is located directly to the north of the site. The future potable water wells will be located on the new property and all required isolation distances as described in Act 399, PA 1976 will be considered.

New/Increased Water Withdrawals

The proposed Vandekarr site will be used to replace the Palmer Street well field for a withdrawal rate between 1600 and 2000 gpm. As soon as this DWRF Project Plan is submitted, the Adverse Resource Impact (ARI) assessment and registration will be formerly submitted. Additionally, the City will apply for a water withdrawal permit under Part 327 Great Lakes Preservation Act at approximately the same time this DWRF project plan is submitted.

Selected Alternative

Improve Distribution System Pressures and Reliability
Replace Water Mains with PVC

A list of all water mains to be replaced with the proposed diameter, along with details of the existing material, size, and condition, and break history is found in Appendix E.

The selected material for water main replacement will be C-900 PVC with ductile iron valves, hydrants, fittings, and other appurtenances. The water main replacements are being coordinated with the City's Street Replacement projects to minimize disruptions for residents, as well as eliminate costs from redundant excavations and asphalt replacement. Road restoration costs will be borne by the Street Replacement project and are not included in these project costs.

The following types of problems will be addressed during replacement.

- Service leads will be replaced to stop box. If undocumented lead or galvanized are encountered during the water main replacement, the service feed will be replaced according to the guidelines set forth under the MDEQ Lead and Copper rule.
- Shallow water mains susceptible to heaving or freezing (noted in condition chart in Appendix E) will be installed below the frost depth when replaced.
- Water mains with a history of breaking (noted in condition chart) will be replaced per the schedule in the condition chart.
- Aged or undersized (1.5, 2, 3, and 4-inch) pipes will be replaced with six or eight inch pipe according to demands at that location.
- Galvanized steel, cast iron, and Transite water mains will be replaced with PVC.
- Dead-end water mains will be replaced with looped water mains on Clyde and Lynn Streets.

There are at least 7 proposed water mains that pass close to or through locations that are included on the state's list of contaminated sites (https://secure1.state.mi.us/ facilitiesinventoryqueries).

- Center/W. King to W. North, planned replacement: 2021
- Milwaukee/ S. Lyon to S. Cedar, planned replacement: 2021
- Cedar/Hampton to Main, planned replacement: 2023
- Ball/Exchange to Mason, planned replacement: 2023
- Ball/Oliver to 450' north, planned replacement: 2023
- Monroe/Washington to Broadway, planned replacement: 2024
- Gould/Oliver to North, planned replacement:2024

The sites are either open or closed Part 213 leaking underground storage tanks (LUST) sites or Part 201 hazardous substance releases. The locations have been mapped depicting their proximity to the

project areas on Figure 12 Sites of Contamination found in Appendix A- Maps. Specifics on the exact pollutants are not always available; however, precautionary measures will be taken at each location to ensure that the new water main does not become contaminated, create further spread of contamination, or expose residents or workers to contamination.

Any new water main in the presence of potential contaminants will be installed via directional drilling with ductile iron pipe. This method of installation and material will eliminate any exposure to potential contaminants as well as reduce pipe failure due to a reaction with the pipe material. Specialized gaskets designed to withstand ground water contamination at water main joints will be proposed in this area to help prevent contaminants from entering the system. Due to the uncertainty of contaminants in these locations, PVC will be eliminated from consideration in these locations.

Applicable MDEQ procedures, Ten States Standards, as well as local ordinances shall be strictly adhered to during design and construction.

Repair Water Storage Facilities

The details for the water storage facility repairs are located in Appendix D. The work includes:

West Elevated Water Storage

- Replace inoperable mud valve with a frost free mud valve in the inverted cone
- Replace roof vent with a new frost free vent
- Abrasive blast clean and paint wet interior
- Abrasive blast clean and paint dry interior
- Power wash exterior, spot power tool clean and apply a three coat polyurethane system
- Remove existing cathodic protection system
- GridBee GS-12 mixers or similar mixing equipment to be added

Standpipe

- Install ladder to exterior roof
- Remove obsolete conduit from exterior roof
- Weld permanent plates over cathodic caps and holes left from conduit removal
- Replace roof vent with frost free design
- Power wash, power tool clean and recoat exterior
- Abrasive blast clean and paint wet interior
- Abrasive blast clean and paint piping in pump house
- Remove cathodic protection
- Remove overgrown sod from tank foundation
- GridBee GS-12 mixers or similar mixing equipment to be added

WTP Failing Backwash Pump, Failing Process Piping, Obsolete Controls and Communications Equipment

Replace Filter Backwash pumps

The existing, single pump will be replaced with a duplex pump system with variable frequency drives. The existing suction and discharge piping and fittings will be replaced and reconfigured as necessary to connect the new pumps. Existing suction and discharge isolation valves will be inspected and then replaced as necessary. All electrical equipment associated with the pump upgrade will be installed above the 100-year flood level as space and budget allow. A remote control panel for the pumps will be installed in the filter gallery and integrated with existing filter backwash controls. Motor control centers (MCCs), conductors, conduits, equipment disconnects, local/remote pump controls, and all associated appurtenances will be upgraded or replaced as necessary.

The design process will evaluate the feasibility of installing dry-pit submersible pumps in order to protect equipment in the event of basement flooding.

Replace Failing Process Piping

The proposed process piping to be replaced at the water treatment plant is approximately 70 feet of highly-corroded, original 16-inch and 8-inch cast iron pipes, fittings, and valves on the treatment plant high-service discharge located along the west wall of the lowest basement. Pipe supports and restraints will need to be replaced. Concrete coring and structural restoration work may be necessary where the corroded 16" pipe penetrates the SE corner of the building foundations if the existing 16" flange cannot be salvaged. Due to the difficult location and circumstances of this pipe replacement, construction will require special rigging to demolish the existing pipe, move the new pipe into place, and install the new pipe supports, valves, and fittings.

SCADA Replacement and Controls Update

The SCADA system upgrades listed below may be included in the scope of the replacements. Electrical connections, backup power supplies, surge protectors, may be considered as well as, PLC and SCADA programming, screen development, and integration. Integrator to review processes at the WTP with staff and update controls programming as necessary. Connections and controls to measurement equipment to be verified and repaired as necessary.

Water Treatment Plant

- Replace or upgrade radio hardware at plant and/or add backup cellular modems
- Replace SCADA computers

- Upgrade SCADA software and integrate the distribution system SCADA with the treatment process SCADA into a single, compatible platform. Data logging capabilities will be considered, as well as an alarm system with call-out capabilities, and limited remote accessibility to SCADA interfaces by authorized operators. VPN security will be included as necessary. Software licenses to be provided.
- Additional PLCs for high service pump controls, WTP water storage level measurement and controls, and other water treatment plant systems as economically feasible.
- Provide pressure transducers and associated electrical equipment to connect control equipment to new level transducers and VFDs.

West Elevated Storage Tank

- Replace or upgrade the existing communications equipment and PLCs/RTUs.
- Review existing controls and edit/upgrade PLC programming as economically feasible.
- Install security measures connected to SCADA system.

Standpipe

- Replace or upgrade the existing communications and PLCs/RTUs.
- Review existing controls and edit/upgrade PLC programming as economically feasible.
- Install security measures connected to SCADA system.

Hintz Well, Palmer Well No. 3, Local Well No. 13, Future Vandekarr Well

- Replace or upgrade the existing communications and PLCs/RTUs (4 separate sites)
- Install new hardware and controls at Vandekarr Wellfield
- Review existing controls and edit/upgrade PLC programming as economically feasible.
- Install security measures at all well houses and connect to SCADA system

Corunna Elevated Water Storage and Corunna Booster Station

- Coordinate with City of Corunna to connect to tie their current SCADA system into the City of Owosso's proposed system.

Supply Well Construction

The selected alternative is to develop the Vandekarr well field. This initial phase of this work will include hydrogeologic study, updated contamination inventory, Adverse Resource Impact (ARI) assessment, water withdrawal permit application, land survey, installation of test wells and coordination with MDEQ. If necessary, tree clearing and construction of an access drive will take place.

Once all necessary testing has been performed and the well field has been approved by the MDEQ district engineer, the exact location for the production well will be identified within the 34.7 acre site. One (1) production well will be drilled and developed and the pump house design will be finalized. Additional tree clearing and access drive construction may be necessary.

The well house will be constructed and may include the following items and equipment:

- Connection to the existing water main on the south side of the property including all valves, pipes, fittings structures, hydrants, well pump, and other necessary appurtenances. Pipes size and material to be determined during design once the final location of the production well is determined. Additional piping connections to be included for future wells.
- Construction of site improvements including permanent access drive, grading, landscaping, security fencing, outdoor lighting.
- Electrical service connection, backup generator, VFD and/or motor controls, control panel. flow meter, pressure transducer(s), level transducer(s)
- SCADA communications equipment to connect to the WTP SCADA system for data logging and system control.

Map Descriptions

The following figures are included in Appendix A - Maps:

- Area of Potential Effects (Figure 4) – the proposed project areas and the locations of national and state historic properties
- Existing Facilities (Figure 5) – the extent of the existing water distribution and treatment system as they pertain to the proposed projects
- Natural Features (Figure 6) – the existing water bodies and wetlands present in the City
- Floodplains (Figure 7) – the 100-year and 500-year Shiawassee River flood zones
- Water Main Replacements (Figure 8 through 11) – four (4) section maps detailing the locations of water main replacements organized by construction year
- Sites of Contamination (Figure 12) – known sites of contamination within 150 feet of a project area or within 2000 feet of the Vandekarr supply well site

Schedule for Design and Construction

Construction Year 2020

Design Water Main & Road Replacement for construction years 2020; WTP Designs, Well Field Investigation, Storage Repair Design	8/19-12/19
Draft Documents Submittal to MDEQ	9/19
Rate Methodology Approved	11/1/19
Environmental Assessments Published No Later Than	11/7/19
Part I and Part II Application	11/15/19
Final Documents Submittal to MDEQ	11/19
Finding of No Significant Impacts Clearance; Plans & Specs Approved	12/7/19
Bid Ad Published No Later Than	12/7/19
Part III of Application; Bid Data Submittal (With Tentative Contract Award)	1/15/20
DEQ Order of Approval Issued	2/15/20
Borrower's Pre-Closing with the MFA	3/1/20
MFA CLOSING	3/20/20
Notice to Proceed Issued	5/1/20
Water Main Construction 2020	5/20-10/20
Water Storage Repairs	5/20-10/20
Water Treatment Plant Improvements	5/20-12/20

Construction Year 2021

Supply Well Site Investigation and testing	8/19 – 8/20
Design Water Main & Road Replacement for construction years 2021; Supply Well Design	8/20-12/20
Draft Documents Submittal to MDEQ	9/20
Rate Methodology Approved	11/1/20
Environmental Assessments Published No Later Than	11/7/20
Part I and Part II Application	11/15/20
Final Documents Submittal to MDEQ	11/20
Finding of No Significant Impacts Clearance; Plans & Specs Approved	12/7/20
Bid Ad Published No Later Than	12/7/20
Part III of Application; Bid Data Submittal (With Tentative Contract Award)	1/15/21
DEQ Order of Approval Issued	2/15/21
Borrower's Pre-Closing with the MFA	3/1/21
MFA CLOSING	3/20/21
Notice to Proceed Issued	5/1/21
Water Main Construction 2021	5/20-10/20
Supply Well Field Construction	5/20-8/21

Construction Year 2022

Design Water Main & Road Replacement for construction years 2022;	8/21-12/21
Draft Documents Submittal to MDEQ	9/21
Rate Methodology Approved	11/1/21
Environmental Assessments Published No Later Than	11/7/21
Part I and Part II Application	11/15/21
Final Documents Submittal to MDEQ	11/21
Finding of No Significant Impacts Clearance; Plans & Specs Approved	12/7/21
Bid Ad Published No Later Than	12/7/21
Part III of Application; Bid Data Submittal (With Tentative Contract Award)	1/15/22
DEQ Order of Approval Issued	2/15/22
Borrower's Pre-Closing with the MFA	3/1/22
MFA CLOSING	3/20/22
Notice to Proceed Issued	5/1/22
Water Main Construction 2022	5/22-10/22

Construction Year 2023

Design Water Main & Road Replacement for construction years 2023;	8/22-12/22
Draft Documents Submittal to MDEQ	9/22
Rate Methodology Approved	11/1/22
Environmental Assessments Published No Later Than	11/7/22
Part I and Part II Application	11/15/22
Final Documents Submittal to MDEQ	11/22
Finding of No Significant Impacts Clearance; Plans & Specs Approved	12/7/22
Bid Ad Published No Later Than	12/7/22
Part III of Application; Bid Data Submittal (With Tentative Contract Award)	1/15/23
DEQ Order of Approval Issued	2/15/23
Borrower's Pre-Closing with the MFA	3/1/23
MFA CLOSING	3/20/23
Notice to Proceed Issued	5/1/23
Water Main Construction 2023	5/23-10/23

Construction Year 2024

Design Water Main & Road Replacement for construction years 2024;	8/23-12/23
Draft Documents Submittal to MDEQ	9/23
Rate Methodology Approved	11/1/23
Environmental Assessments Published No Later Than	11/7/23
Part I and Part II Application	11/15/23
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Bid Ad Published No Later Than	12/7/23
Part III of Application; Bid Data Submittal (With Tentative Contract Award)	1/15/24
DEQ Order of Approval Issued	2/15/24
Borrower's Pre-Closing with the MFA	3/1/24
MFA CLOSING	3/20/24
Notice to Proceed Issued	5/1/24
Water Main Construction 2024	5/24-10/24

Cost Estimate

Detailed Cost estimates are included in Appendix B. Additional cost breakdown for the Water Storage Repairs can be found in the NTEC reports in Appendix D.

Loan Amount by Year

Year	Activity	Loan Amount
2020	Water Main Replacements 2020 WTP Upgrades and Repairs Storage Repair	$ 4,382,300.00
2021	Water Main Replacements 2021 Supply Well Construction	$ 2,471,700.00
2022	Water Main Replacements 2022	$ 1,997,600.00
2023	Water Main Replacements 2023	$ 3,185,800.00
2024	Water Main Replacements 2024	$ 3,436,500.00
	TOTAL	$ 15,473,900.00

User Costs Estimate

Description	DWRF Loan Amount	Quarterly Resident Payment Increase
Water Storage Repairs	$ 979,800.00	$1.47
Water Treatment Plant Improvements	$ 1,259,400.00	$1.89
Well Field Investigation and Construction	$ 621,000.00	$0.93
2020 Water Main Replacements	$ 2,251,700.00	$3.38
2021 Water Main Replacements	$ 2,301,600.00	$3.45
2022 Water Main Replacements	$ 1,997,600.00	$3.00
2023 Water Main Replacements	$ 2,471,200.00	$3.71
2024 Water Main Replacements	$ 3,436,500.00	$5.15
Total Loan Amount	$ 15,318,800.00	
Total Quarterly increases over 5 years per REU		$22.98

Disadvantaged Community

The City of Owosso qualifies as a disadvantaged community based on its population. A completed Disadvantaged Community Status Determination Worksheet is included in Appendix H.

Ability to Implement the Selected Alternative

The selected alternative will be implemented by the City of Owosso. All work is under the jurisdiction of the City and requires no inter-municipal agreements. All work will be performed in road rights-of-way, utility easements, or on property owned by the City of Owosso.

Environmental Evaluation

Historic/Archaeological/Tribal Resources

Of the five (5) historic districts listed in the National Park Service's National Register of Historic Places, all five (5) of them are observed to be within areas of potential effects as a result of the water main replacements. Impacts as a result of the water main replacements, however, are expected to be minimal since construction is limited to the road right-of-way. The only exception to this is a potential impact on the brick road intersection observed on the intersection of Genesee Street and Michigan Avenue. No other interferences are observed between historical properties and areas of potential effects. Construction sites will be restored to their original condition following all construction activities.

The SHPO and Tribal Historical Preservation Officers within Shiawassee County have been contacted for an opportunity to comment on the proposed project prior to the completion of this report. Clearances will need to be obtained from these offices during the design process.

Water Quality

There are no anticipated impacts on the quality of the ground water and surface water within the proposed construction limits. Soil erosion and sedimentation control measures will be utilized to contain soils within construction areas.

The project will improve the reliability of drinking water quality for residents and costumers. Aged water mains have a higher probability of breaking and subsequent contamination. Dead-end water mains are a potential source of undesirable biological activity.

An impact after the construction completion of the new well field will be the groundwater withdrawal from the aquifer. Measures will be taken to protect the water table and surrounding environment. Additionally, the City's Wellhead Protection Program would be updated to reflect the improvements.

Land/Water Interface

The natural features (i.e., wetlands, water bodies) present in the City of Owosso are shown in Figure 6 found in Appendix A - Maps. The water main replacements, water storage rehabilitation and improvements to the Water Treatment Plant will have no effect on natural land and water features as construction will be contained within the existing facilities. Water main replacements within the flood plains will not change any ground elevations.

The construction of the new well field will require tree clearing and well drilling. Tree clearing will need to be coordinated with endangered species limitations. Additionally, the 34.7 acre Vandekarr property contains wetlands to the east of the area where the well(s) will be drilled. Care will be taken to protect the wetlands during drilling and construction against soil erosion and sediment. Additional studies and monitoring will be performed as necessary to determine if and how groundwater withdrawal will affect the wetlands.

Endangered Species

According to the U.S. Fish and Wildlife (https://www.fws.gov/endangered) and the Michigan Natural Features Inventory (https://mnfi.anr.msu.edu/resources/county-element-data), the following endangered and threatened species summarized in the table below are present in Shiawassee County. The Eastern Massasauga, Indiana Bat, and possibly the Northern Long-Eared Bat could be present in the Rouge River corridor which runs through the City of Owosso. No construction activity will take place in the corridor for this project.

The water main replacements, water storage maintenances and improvements to the Water Treatment Plant are not anticipated to have any effects on endangered or threatened species as construction will be contained within the existing facilities.

The construction of the new well field will require tree clearing. While there is uncertainty as to whether these threatened or endangered species may exist in the new well site area, the U.S. Fish and Wildlife and the Michigan Natural Features Inventory have been contacted for an opportunity to comment prior to the completion of this report.

If any threatened or endangered species are found during the course of the project, protective measures would be taken to ensure that they are not affected by the proposed construction.

Table 10. Currently Listed Endangered and Threatened Species

Species	Status	Description
Eastern Massasauga	Threatened	Wet prairies, marshes, low areas along rivers and lakes.
Indiana Bat	Endangered	Mature trees in floodplain forests, savannas and caves.
Northern Long-Eared Bat	Threatened	Live and dead trees, caves and mines.

Source: U.S. Fish & Wildlife, Michigan Natural Features Inventory

Agricultural Land

The focus of this project plan are improvements to the City of Owosso water system, which is an urban area. No agricultural land will therefore be impacted as a result of this project.

Social/Economic Impact

Impacts on materials, land, and energy will be minimized by selection of qualified contractors. The existing road materials will be recycled during the water main replacements when possible. The asphalt surface once removed is crushed and sized, and then added to new paving mixes or used as an aggregate base. Sustainable recycling of existing materials not only helps the environment, but can provide cost savings for the community.

Construction activities start as early as year 2020. All construction activities will conclude in year 2024.

All construction activities for the water main replacements, water storage maintenance, and improvements to the Water Treatment Plan will take place within existing facilities. No additional land will be acquired for this project; the new well field site is located on a property that is already owned by the City.

Resources, energy consumption, and inconveniences to residents will be minimized by completing the water main replacement at the same time as the street replacements project. Once the water main is constructed and backfilled, the surface will be paved completely.

Replacement of the City's water mains will have a positive, direct impact on the value of residential and commercial properties due to increased reliability of service.

Construction/Operational Impact

Traffic will be disrupted along the roads where the water main projects are proposed. This impact will primarily affect the residents in the project area. No major arterial streets will be closed. Tree removal may be required for the water main installation. Also, any tree that is not healthy would be removed. All trees that are removed for water main replacements replaced.

All construction activities for the water storage repairs and improvements to the Water Treatment Plan will take place within existing facilities.

The construction of the new well field will require tree clearing and well drilling.

Water main construction activities will run spring through fall each year from 2020 through 2024. Other construction activities at the water storage facilities, water treatment plant, and Vandekarr well field investigation will occur in 2020 and construction will occur in 2021.

Indirect Impacts

- Development – There are no anticipated impacts to the rate, density, or type of development as a result of this project.
- Land Use – A previously undeveloped, primarily forested site will be used as the location for the new well field. All other projects will take place within existing facilities.
- Air and Water Quality - There are no expected changes in air quality as a result of this project. Impacts related to air quality (i.e., dust, debris, airborne particles) are limited to direct impacts during construction. Reliability of drinking water quality to residents and customers will improve as a result of this project.
- Natural Areas - Anticipated changes to the natural setting or ecosystem will be limited to the direct impacts as a result of tree clearing for the new well field.
- Aesthetic Changes - Impacts on cultural, human, social, and economic sources are expected to be minimal and short-term during the construction phase as a result of the traffic routing around the construction areas.
- The new well field will have minimal aesthetic impacts on residents, i.e., the neighborhood north of the site, since it will primarily be surrounded by forestry.
- Resource Consumption - The replacement of aging water main reduces the number of water main breaks and water loss for the community. Water loss is also reduced with looping dead-end water mains as dead-end water mains require routine flushing to prevent contamination as a result of biological activity.

Cumulative impacts

No cumulative impacts, for example population growth, are anticipated as a result of the improvement projects.

Mitigation Measures

Mitigation of Short-Term Impacts

Typical construction mitigation is expected for the selected alternative. Traffic control will be required during the water main replacement along all the roads. Access to some roads may be temporarily restricted to provide a safe working environment. Soil erosion and sedimentation control measures will be required during the water main installation to ensure nearby sewers or storm drains are not impacted by the construction process. A water truck may be used if dust becomes an issue on dry, windy days. Any vegetation or road way disrupted by the construction process will be rehabilitated to its original condition. Service will be maintained for residents during construction and will only be shut off during the short period of time while the connection of their house lead is changed from the old water main to the new.

There will be tree clearing involved with the construction of the new well field. Protection measures will be taken to ensure that no endangered or threatened species will be affected during the tree clearing phase.

Construction activities start as early as year 2020. All Construction activities will conclude in year 2024.

Mitigation of Long-Term Impacts

Construction of the water main will not occur in any sensitive environments. There is no long-term impact anticipated for the existing wetlands

There will be drawdown of groundwater as a result of operating the new well field. The City's Wellhead Protection Plan will be updated to ensure protection of the water table.

Mitigation of Indirect Impacts

The proposed project is intended to improve the reliability and functionality of the existing system and is not intended to induce growth within the City of Owosso.

Public Participation

The Formal Public Hearing

The formal public hearing was held on Monday, April 15th, 2019 from 7:30 P.M. to 9:30 P.M. in the City Hall Council Chambers, 301 West Main Street, Owosso, Michigan, 48667.

Public Hearing Advertisement

The public hearing advertisement ran in the Owosso Press and Guide on Wednesday, March 13th, 2019. A copy of the advertisement and an affidavit confirming its publication is included in Appendix F.

Public Hearing Transcript

A transcript of the public hearing is located in Appendix F. The names and addresses of the people who attended the public hearing are included.

Comments Received and Answered

One written comment was received during the Public Comment Period that from March 13, 2019 through April 17, 2019. During the hearing, there was a comment of support for the project plan and a number of requests for clarification. Glenn Chinavare, Director of Public Services in Owosso, responded directly to verbal questions that were raised during the public hearing. No changes have been made to the project as a result of the public participation process. The questions and comments are listed in the hearing transcript located in Appendix F.

Adoption of the Project Plan

The City of Owosso unanimously passed Resolution Number 62-2019: Adopting a Final Project Plan for Water System Improvements and Designating an Authorized Project Representative. This resolution is included in Appendix G and names Glenn Chinavare as the Authorized Representative for all activities associated with this project plan.

Appendix A. Maps

Figure 4. Area of Potential Effects

Historical Markers

- State
- National

Historic Districts

- Mason Street Historic Residential District
- Michigan Avenue-Genessee Street Historic Residential District
- Oliver Street Historic District
- Owosso Downtown Historic District
- West Town Historic Commercial and Industrial District

Project Areas

- Supply Well Vandecarr
- Treatment Plant Upgrade
- Storage Rehabilitation
- Water Main Replacement

N

0 1,350 2,700

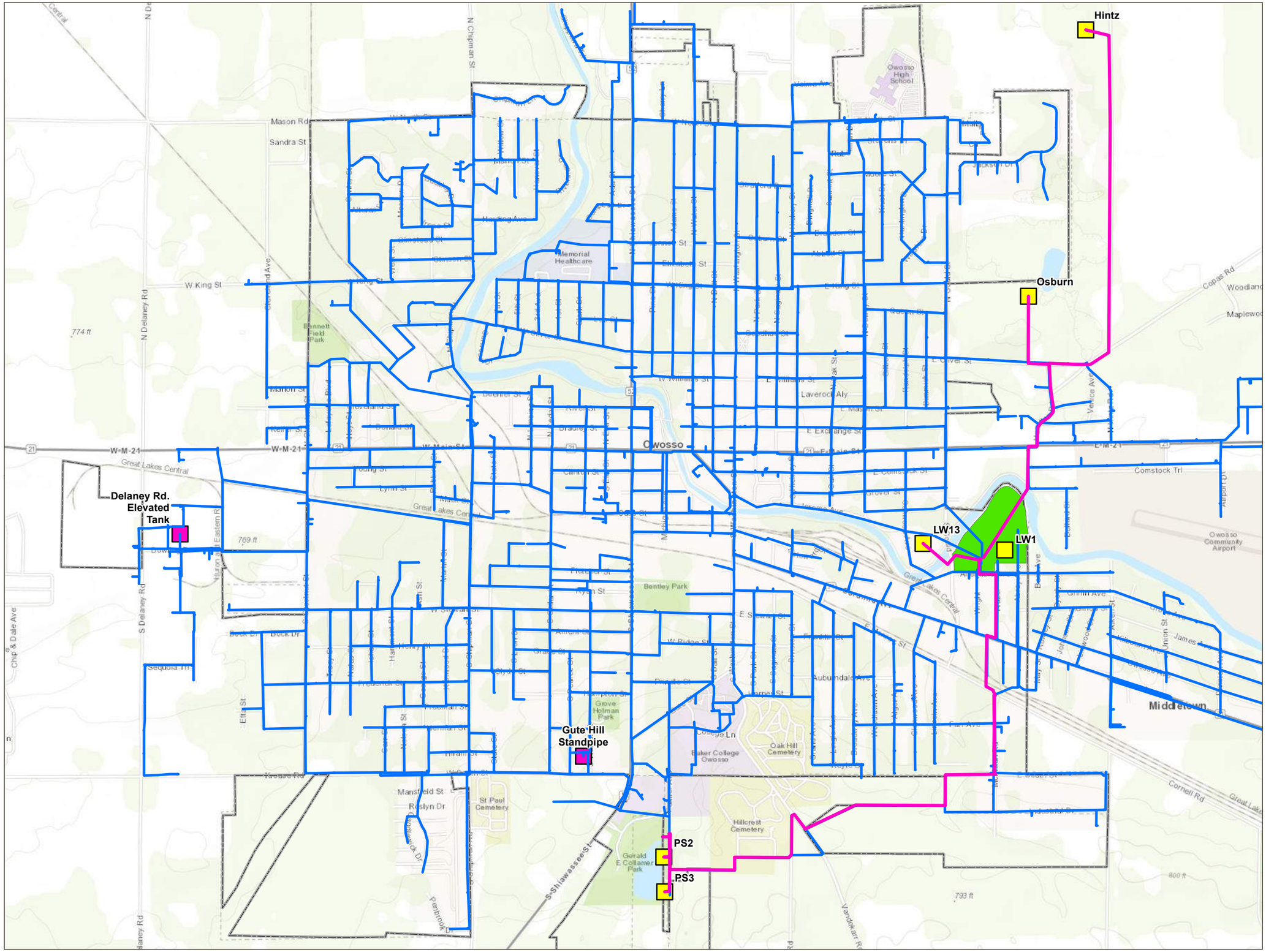
Feet

1" = 1,350'

Source: Data provided by City of Owosso, USGS, The National Park Service, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: March 13, 2019



Existing Facilities
Figure 5

- Raw Water Main
- Water Main
- Well
- Storage Tank
- Treatment Plant
- City Limits

N

0 1,500 3,000

Feet

1" = 1,500'

Source: Data provided by City of Owosso, USGS, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: April 29, 2019

Natural Features
Figure 6

Water Main Replacement
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Lake or River
Well
Storage Tank
Treatment Plant
Supply Well Vandecarr
City Limits

N

0 1,500 3,000
Feet

1" = 1,500'

Source: Data provided by City of Owosso, USGS, US Fish and Wildlife Service, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: April 29, 2019

Floodplain Areas
Figure 7

- Floodway
- 100 Year Flood Zone
- 500 Year Flood Zone
- Storage Tank
- Water Main Replacement
- Treatment Plant
- Supply Well Vandecarr
- City Limits

N

0 1,500 3,000

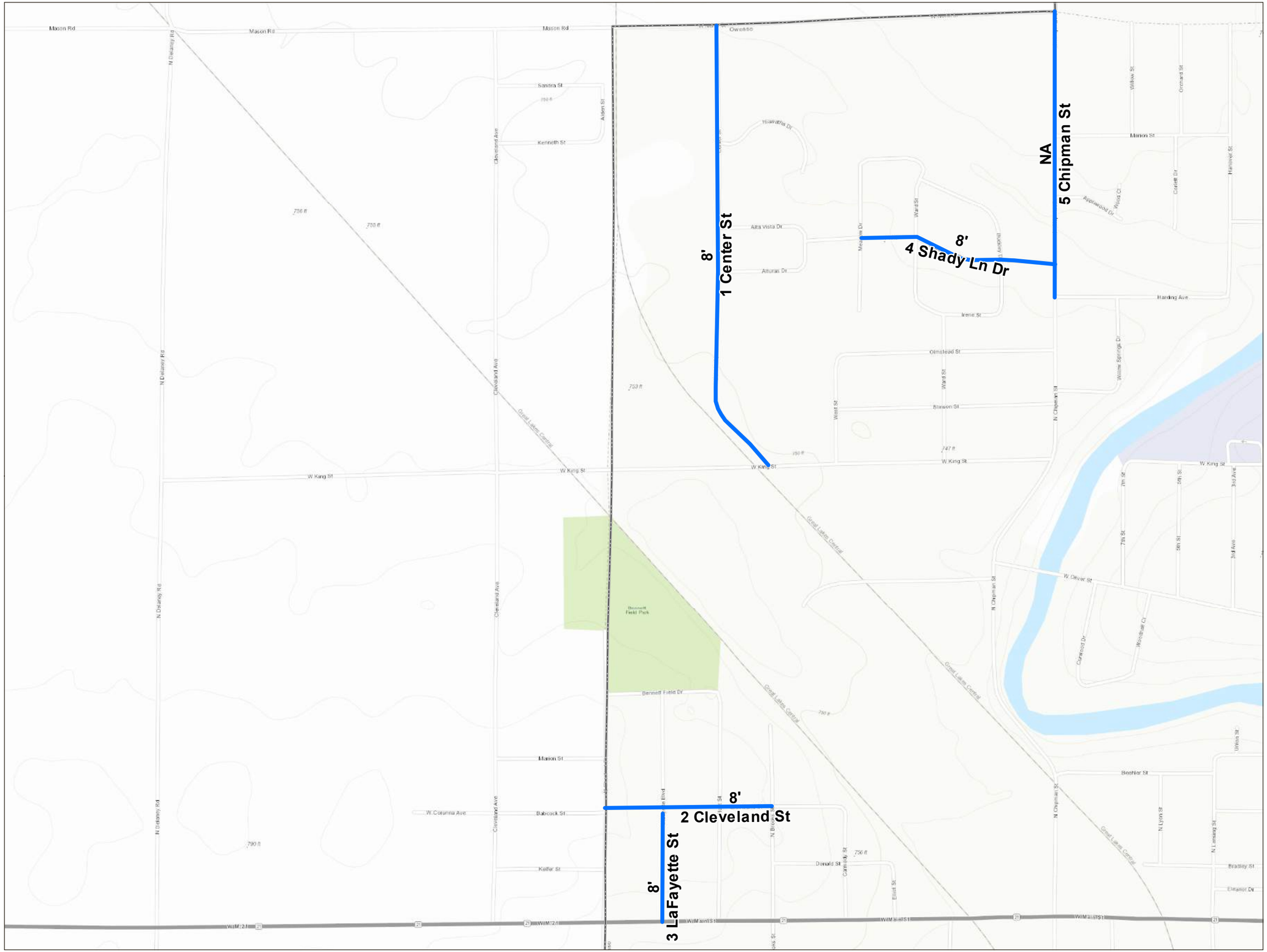
Feet

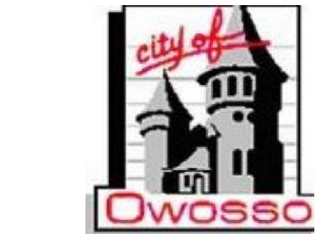
1" = 1,500'

Source: Data provided by City of Owosso, USGS, FEMA, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: April 29, 2019





Water Main Replacements Figure 8

(T 07 N R 02 E Section 14)

Water Main Replacement

City Limits

Figure ID	Location	Size (Feet)	Length (Feet)
1	Center	8	2863
2	Cleveland	8	1000
3	Lafayette	8	600
4	Shady Lane	8	1184
5	Chipman	N/A	1695

N

0 550 1,100

Feet

1" = 550'

Source: Data provided by City of Owosso, USGS, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

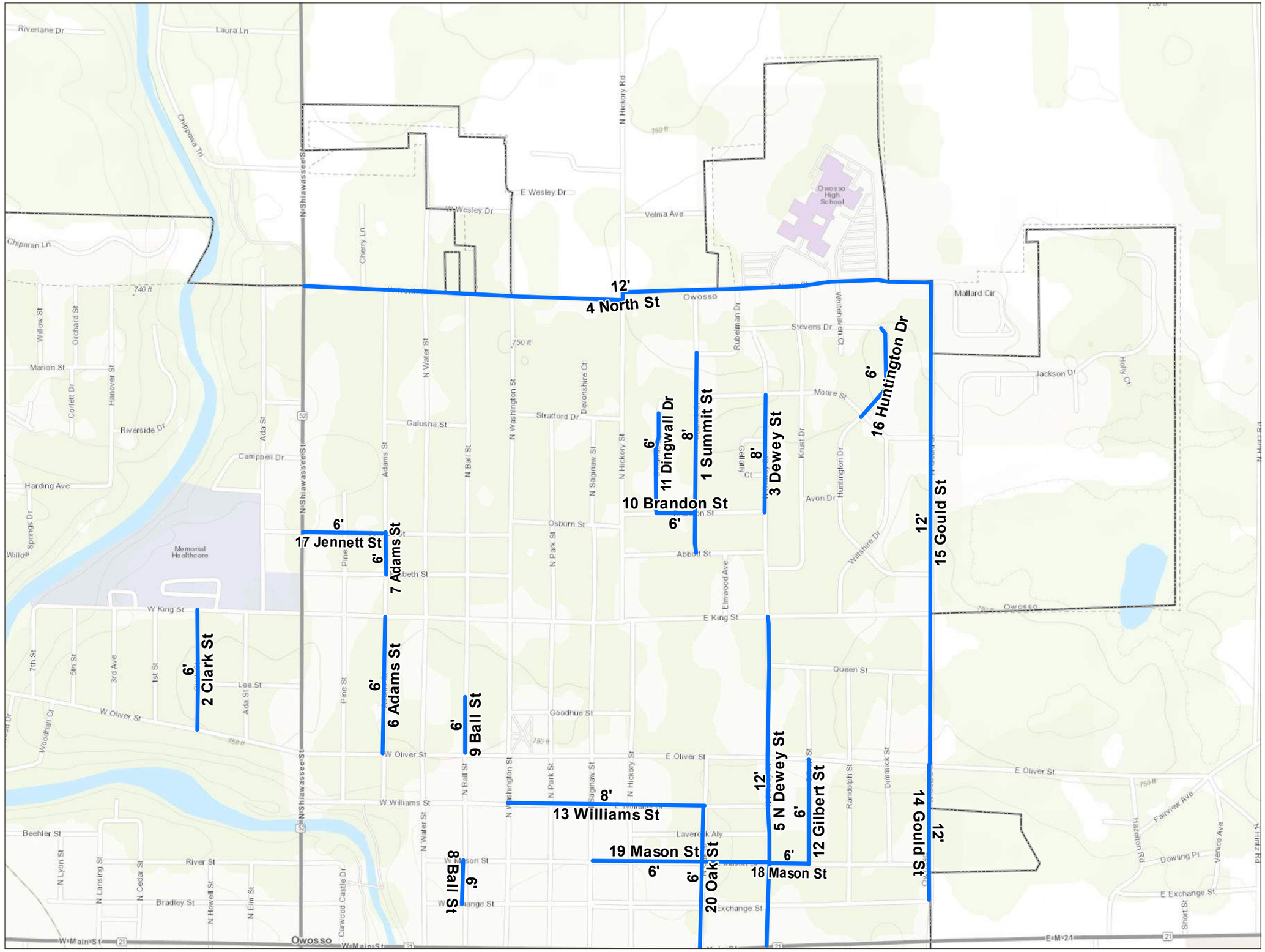
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: April 29, 2019

OHM

Water Main Replacements Figure 9

(T 07 N R 02 E Section 13, T 07 N R 03 E Section 18)



Water Main Replacement

City Limits

Figure ID	Location	Size (Feet)	Length (Feet)
1	Summit	8	1650
2	Clark	6	970
3	Dewey	8	1000
4	North	12	5963
5	Dewey	12	2659
6	Adams	6	1000
7	Adams	6	600
8	Ball	6	250
9	Ball	6	450
10	Brandon	6	450
11	Dingwall	6	900
12	Gilbert	6	800
13	Williams	8	1601
14	Gould	12	1100
15	Gould	12	2700
16	Huntington	6	1000
17	Jennett	6	700
18	Mason	6	300
19	Mason	6	1350
20	Oak	6	1150

N

0 750 1,500

Feet

1" = 750'

Source: Data provided by City of Owosso, USGS, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: April 29, 2019

Water Main Replacements Figure 10

(T 07 N R 02 E Section 24,
T 07 N R 03 E Section 19)

14 Clinton St
6'

6'
3 Lynn St

12 Genesee St
6'

6' 7 Genesee St

4 Milwaukee St
6'

13 Cedar St
12'

8'
5 Huron St

8'
15 Monroe St

10 Grace St
6'

8 Grace St
6'

6'
2 Clyde St

6'
9 Grand Ave

6'
6 Woodlawn

6'
11 Nafus St

12'
1 S. Cedar St

Water Main Replacement

City Limits

Figure ID	Location	Size (Feet)	Length (Feet)
1	Cedar	12	1319
2	Clyde	6	600
3	Lynn	6	312
4	Milwaukee	6	670
5	Huron	8	360
6	Woodlawn	6	847
7	Genesee	6	400
8	Grace	6	1300
9	Grand Avenue	6	700
10	Grace	6	600
11	Nafus	6	500
12	Genesee	6	422
13	Cedar	12	3972
14	Clinton	6	1289
15	Monroe	8	2073

N

0 800 1,600

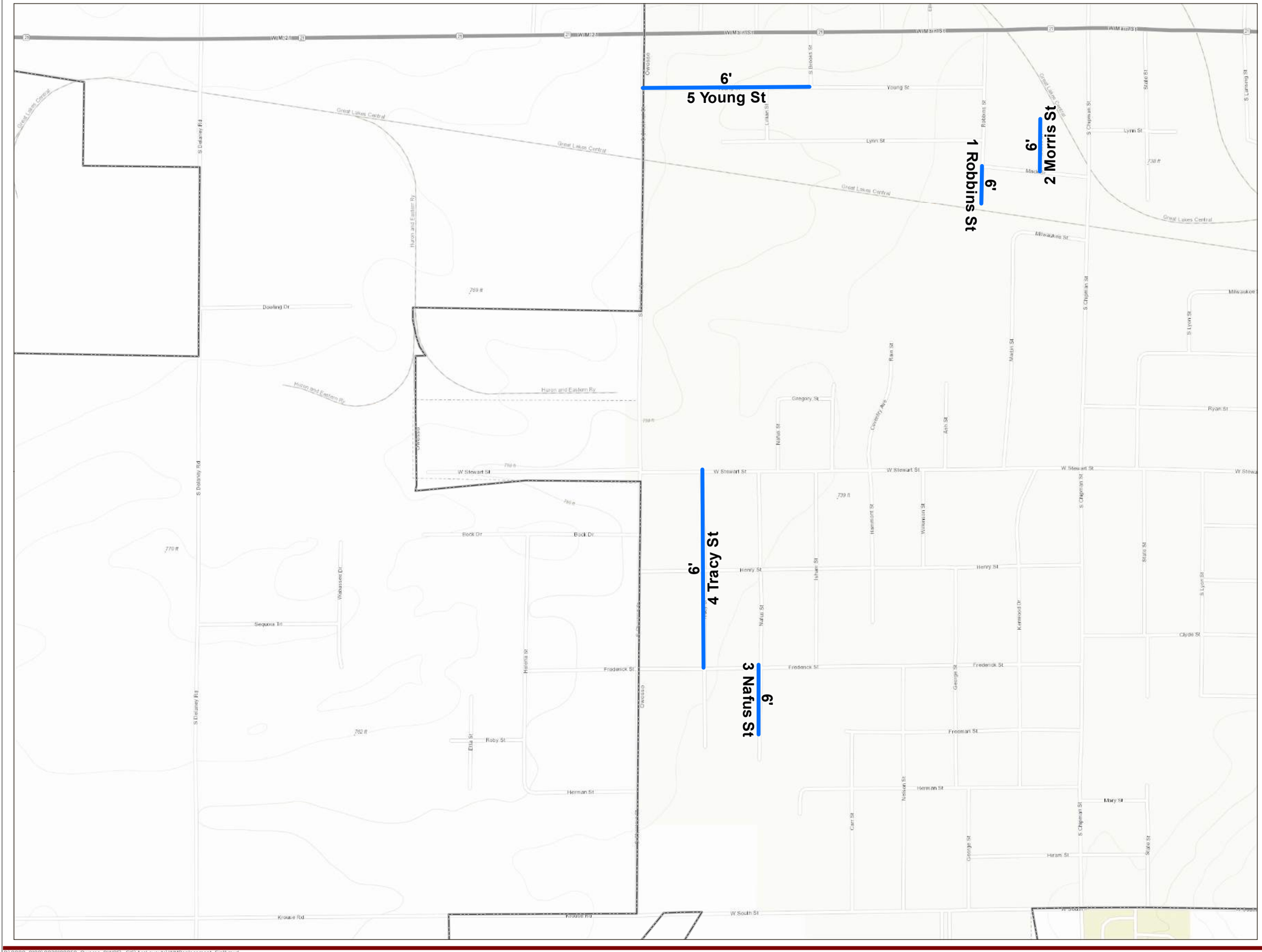
Feet

1" = 800'

Source: Data provided by City of Owosso, USGS, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: April 29, 2019



Water Main Replacements Figure 11

(T 07 N R 02 E Section 23)

Water Main Replacement

City Limits

Figure ID	Location	Size (Feet)	Length (Feet)
1	Robbins	6	230
2	Morris	6	328
3	Nafus	6	650
4	Tracy	6	1200
5	Young	6	950

N

0 550 1,100

Feet

1" = 550'

Source: Data provided by City of Owosso, USGS, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: April 29, 2019

Contamination Sites in Owosso Figure 12

Proposed Water Main Replacements

Contamination Sites

Water Treatment Plant

Existing Wells

Existing Storage Tanks

Supply Well Vandecarr

N

0 1,500 3,000

Feet

1" = 1,500'

Source: Data provided by City of Owosso, USGS, Michigan DEQ, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: April 29, 2019

Owosso DWRF 2020 Projects Figure 13

North St
Summit St
Clark St
Cleveland St
LaFayette St
Robbins St
Morris St
S. Cedar St

Water Main Replacement
Treatment Plant Upgrade
Storage Rehabilitation

N

0 1,350 2,700
Feet

1" = 1,350'

Source: Data provided by City of Owosso, USGS, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: April 30, 2019

Owosso DWRF 2021 Projects Figure 14

Center St

Dewey St

N Dewey St

Lynn St

Milwaukee St

Huron St

Clyde St

Water Main Replacement

Supply Well Vandecarr

Storage Rehabilitation

N

0 1,350 2,700

Feet

1" = 1,350'

Source: Data provided by City of Owosso, USGS, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: April 30, 2019

Owosso DWRF 2022 Projects Figure 15

Shady Ln Dr

Young St

Tracy St

Nafus St

Grace St

Genesee St

Grand Ave

Woodlawn

Water Main Replacement

N

0 1,350 2,700

Feet

1" = 1,350'

Source: Data provided by City of Owosso, USGS, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: April 30, 2019

Owosso DWRF 2023 Projects Figure 16

North St

Chipman St

Dingwall Dr

Brandon St

Adams St

Ball St

Gilbert St

Cedar St

Water Main Replacement

N

0 1,350 2,700

Feet

1" = 1,350'

Source: Data provided by City of Owosso, USGS, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: April 30, 2019

Owosso DWRF 2024 Projects Figure 17

Jennett St

Gould St

Huntington Dr

Williams St

Mason St

Oak St

Clinton St

Monroe St

Water Main Replacement

N

0 1,350 2,700

Feet

1" = 1,350'

Source: Data provided by City of Owosso, USGS, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: April 30, 2019

Appendix B. Cost Analysis

a. Present Worth Analysis – Water Main Material
b. Present Worth Analysis – Water Storage
c. Budget by Year

PRESENT WORTH ANALYSIS
WATER MAIN MATERIAL

28-Apr-19

City of Owosso DWRF

Owosso, Michigan

INPUTS	PVC w/Ductile Iron Fittings	All Ductile Iron
Design and Construction Costs	$12,565,000	$14,023,300
EPA Discount Rate (i)	0.200%	0.200%
Life Expectancy (lexp)	50	50
Cost Recovery Period - Years (n):	30	30

SALVAGE VALUE (Straight Line Depreciation)		
Constant Yearly Depreciation (Dx) (Design & Const Costs/lexp):	$251,300.00	$280,466.00
Value Remaining After 20 years (Vn = Dx*(lexp-n))	$5,026,000.00	$5,609,320.00
Present Worth Factor of Remaining Value: PWf = (1+i)^-n	0.9418	0.9418
Present Worth of Salvage Value (PWsalv=PWf * Vn):	***$4,733,592.17***	***$5,282,975.18***

OPERATION, MAINTENANCE and REPLACEMENT (OM&R)		
Present Worth Factor for uniform series of payments PWf = ((1+i)^n*-1) / (i * (1+i)^n)	29.09	29.09
Projected Annual OM&R Costs (Aomr) - Total Equivalent B/T materials	**$0.00**	**$0.00**
Present Worth for OM&R: Pwomr = Aomr * PWf	***$7,831,407.83***	***$8,740,324.82***

TOTAL PRESENT WORTH		
Total Present Worth (Pwtot) = Design & Construction Cost + Pwomr - Pwsalv	***$7,831,408***	***$8,740,325***

PRESENT WORTH ANALYSIS
WATER STORAGE

OHM

929 Bridgeview South
28-Apr-19
City of Owosso DWRF
Owosso, Michigan

INPUTS	Standpipe Repair	Standpipe Replacement	Elevated Tank Repair	Elevated Tank Replacement
Design and Construction Costs	$565,800	$2,208,000	$414,000	$2,346,000
EPA Discount Rate (i)	0.200%	0.200%	0.200%	0.200%
Life Expectancy (lexp)	20	50	40	50
Cost Recovery Period - Years (n):	30	30	30	30

SALVAGE VALUE (Straight Line Depreciation)				
Constant Yearly Depreciation (Dx) (Design & Const Costs/lexp):	$28,290.00	$44,160.00	$10,350.00	$46,920.00
Value Remaining After 20 years (Vn = Dx*(lexp-n))	$0.00	$883,200.00	$103,500.00	$938,400.00
Present Worth Factor of Remaining Value: PWf = (1+i)^-n	0.9418	0.9418	0.9418	0.9418
Present Worth of Salvage Value (PWsalv=PWf * Vn):	***$0.00***	***$831,816.28***	***$97,478.47***	***$883,804.79***

OPERATION, MAINTENANCE and REPLACEMENT (OM&R)				
Present Worth Factor for uniform series of payments PWf = ((1+i)^n*-1) / (i * (1+i)^n)	29.09	29.09	29.09	29.09
Projected Annual OM&R Costs (Aomr) - Total EQUAL in both cases				
Present Worth for OM&R: Pwomr = Aomr * PWf	***$565,800.00***	***$1,376,183.72***	***$316,521.53***	***$1,462,195.21***

TOTAL PRESENT WORTH				
Total Present Worth (Pwtot) = Design & Construction Cost + Pwomr - Pwsalv	***$565,800***	***$1,376,184***	***$316,522***	***$1,462,195***

USER RATE CHARGES

29-Apr-19

City of Owosso DWRF

Owosso, Michigan

Interest:	2.50%
Time Period: [(a)]	30
Number of REUs:[(b)]	7964

Description	DWRF Loan Amount	Quarterly Resident Payment
2020 Water Storage Repairs	$979,800.00	$1.47
2020 Water Treatment Plant Improvements	$1,308,100.00	$1.96
2020 Water Main Replacements	$2,094,400.00	$3.14
2021 Well Field Construction	$621,000.00	$0.93
2021 Water Main Replacements	$1,850,700.00	$2.78
2022 Water Main Replacements	$1,997,600.00	$3.00
2023 Water Main Replacements	$3,185,800.00	$4.78
2024 Water Main Replacements	$3,436,500.00	$5.15
TOTAL INCREASE OVER 5 YEARS	**$15,473,900.00**	**$23.21**

Notes:

(a) 30 year loan period used based on City's status as disadvantaged community.

(b) A Residential Equivalent Unit is equivalent to a single family residence.

OPINION OF PROBABLE PROJECT COST 2020
WATER MAIN REPLACEMENTS
STORAGE REHABILITATION
WATER TREATMENT PLANT UPGRADES

30-Apr-19

City of Owosso DWRF

Owosso, Michigan

Description: Proposed work includes water main replacements for year 2020, Storage rehabilitation, and water treatment plant upgrades

DESCRIPTION	UNIT	TOTAL	UNIT PRICE	ALL COSTS
DISTRIBUTION (2020 CIP)*				
S.Cedar/South to Hampton	FT	1319	$150.00	$ 197,850.00
Summit/Abbott to Rubelman	FT	1650	$231.00	$ 381,150.00
Clark/W. Oliver to W. King	FT	970	$150.00	$ 145,500.00
Cleveland/ Chestnut to Brooks	FT	1000	$150.00	$ 150,000.00
LaFayette/ Main to Cleveland	FT	600	$150.00	$ 90,000.00
Robbins/ Mack to South End	FT	230	$150.00	$ 34,500.00
Morris/ Mack to South End	FT	328	$150.00	$ 49,200.00
W. North/Hickory to N. Gould	FT	2981	$157.50	$ 469,507.50
				$ 1,517,707.50
STORAGE				
Elevated Tank Rehabilitation	LS	1	$ 300,000.00	$ 300,000.00
Standpipe Rehabilitation	LS	1	$ 410,000.00	$ 410,000.00
SUBTOTAL STORAGE				**$ 710,000.00**
TREATMENT				
Backwash Pumps	LS	1	$ 250,000.00	$ 250,000.00
SCADA and other Controls	LS	1	$ 300,000.00	$ 300,000.00
16" Water Main Replacement	LS	1	$ 255,000.00	$ 255,000.00
SUBTOTAL TREATMENT				**$ 805,000.00**
SUBTOTAL CONSTRUCTION				**$ 3,032,707.50**
CONTINGENCY				**$ 535,406.13**
TOTAL CONSTRUCTION COST				**$ 3,568,113.63**
DESIGN/CONSTRUCTION ENGINEERING				**$ 635,842.04**
LEGAL/FINANCIAL (5% TCC)				**$ 178,413.18**
TOTAL PROJECT COST				**$ 4,382,300.00**

**Cost based on City of Owosso CIP*

OPINION OF PROBABLE PROJECT COST 2021
WATER MAIN REPLACEMENTS
WELL FIELD CONSTRUCTION

30-Apr-19

City of Owosso DWRF

Owosso, Michigan

Description: Proposed work includes water main replacements for year 2021 and Vandecarr Wellfield Construction

DESCRIPTION	UNIT	TOTAL	UNIT PRICE	COST
DISTRIBUTION (2021 CIP)*				
Center/W. King to W. North	FT	2863	$157.50	$ 454,922.50
Dewey/ Brandon to Moore	FT	1000	$157.50	$ 157,500.00
Clyde/ Walnut to Shiawassee	FT	600	$157.50	$ 94,500.00
Lynn/ W. End to Howell	FT	312	$157.50	$ 49,140.00
Milwaukee/ S. Lyon to S. Cedar	FT	670	$157.50	$ 109,525.00
Huron/ Huggins to West End	FT	360	$157.50	$ 56,700.00
N. Dewey/ M-21 to King	FT	2659	$157.50	$ 418,792.50
SUBTOTAL DISTRIBUTION 2021				**$ 1,341,080.00**
SUPPLY (Vandercarr Well Site)				
Site Investigation/Test Wells	LS	1	$ 75,000.00	$ 75,000.00
Production Well/Pump Testing/Permitting	LS	1	$ 75,000.00	$ 75,000.00
Well house	LS	1	$ 300,000.00	$ 300,000.00
SUBTOTAL SUPPLY				**$ 450,000.00**
SUBTOTAL CONSTRUCTION				**$ 1,791,080.00**
CONTINGENCY (15%)				**$ 268,662.00**
TOTAL CONSTRUCTION COST				**$ 2,059,742.00**
DESIGN/CONSTRUCTION ENGINEERING (15% TCC)				**$ 308,961.30**
LEGAL/FINANCIAL (5% TCC)				**$ 102,987.10**
TOTAL PROJECT COST				**$ 2,471,700.00**

**Cost based on City of Owosso CIP*

OPINION OF PROBABLE PROJECT COST 2022
WATER MAIN REPLACEMENTS

30-Apr-19

City of Owosso DWRF

Owosso, Michigan

Description: Proposed work includes water main replacements for year 2022.

DESCRIPTION	UNIT	TOTAL	UNIT PRICE	COST
DISTRIBUTION (2022 CIP)*				
Shady Lane/Meadow to Chipman	FT	1184	$165.38	$ 195,804.00
Woodlawn/Farr to Auburndale	FT	847	$165.38	$ 140,072.63
Genesee/Michigan to Green	FT	400	$165.38	$ 66,150.00
Grace/Shiawassee to Cedar	FT	1300	$165.38	$ 214,987.50
Nafus/Frederick to Freeman	FT	650	$165.38	$ 107,493.75
Tracy/Frederick to Stewart	FT	1200	$165.38	$ 198,450.00
Young/Chestnut to Brooks	FT	950	$165.38	$ 157,106.25
Grand/Auburndale to Franklin	FT	700	$165.38	$ 115,762.50
Grace/Cedar to Lyons	FT	600	$165.38	$ 99,225.00
Nafus/Frederick to South End	FT	500	$165.38	$ 82,687.50
Genesee/Michigan Avenue to West End	FT	422	$165.38	$ 69,788.25
SUBTOTAL CONSTRUCTION				**$ 1,447,527.38**
CONTINGENCY (15%)				**$ 217,129.11**
TOTAL CONSTRUCTION COST				**$ 1,664,656.48**
DESIGN/CONSTRUCTION ENGINEERING (15% TCC)				**$ 249,698.47**
LEGAL/FINANCIAL (5% TCC)				**$ 83,232.82**
TOTAL PROJECT COST				**$ 1,997,600.00**

**Cost based on City of Owosso CIP*

OPINION OF PROBABLE PROJECT COST 2023
WATER MAIN REPLACEMENTS

30-Apr-19

City of Owosso DWRF

Owosso, Michigan

Description: Proposed work includes water main replacements for year 2023.

DESCRIPTION	UNIT	TOTAL	UNIT PRICE	COST
DISTRIBUTION (2023 CIP)*				
W. North/ N. Shiawassee to Hickory	FT	2982	$173.64	$ 517,805.66
Cedar/Hampton to Main	FT	3972	$173.64	$ 709,712.98
Chipman/Harding to North	FT	1695	$173.64	$ 294,326.16
Adams/Oliver to King	FT	1000	$173.64	$ 173,643.75
Adams/Elizabeth to N. of Jennett	FT	600	$173.64	$ 104,186.25
Ball/Exchange to Mason	FT	250	$173.64	$ 48,410.94
Ball/Oliver to 450' north	FT	450	$173.64	$ 87,139.69
Brandon/Summit to Dingwall	FT	450	$173.64	$ 78,139.69
Dingwall/Brandon to North End	FT	900	$173.64	$ 156,279.38
Gilbert/Mason to Oliver	FT	800	$173.64	$ 138,915.00
SUBTOTAL DISTRIBUTION 2023		13099		**$ 2,308,559.48**
CONTINGENCY (15%)				**$ 346,283.92**
TOTAL CONSTRUCTION COST				**$ 2,654,843.40**
DESIGN/CONSTRUCTION ENGINEERING (15% TCC)				**$ 398,226.51**
LEGAL/FINANCIAL (5% TCC)				**$ 132,742.17**
TOTAL PROJECT COST				**$ 3,185,800.00**

**Cost based on City of Owosso CIP*

OPINION OF PROBABLE PROJECT COST 2024
WATER MAIN REPLACEMENTS

30-Apr-19

City of Owosso DWRF

Owosso, Michigan

Description: Proposed work includes water main replacements for year 2024.

DESCRIPTION	UNIT	TOTAL	UNIT PRICE	COST
DISTRIBUTION (2024 CIP)*				
Clinton/Cedar to Shiawassee	FT	1289	$182.33	$ 235,018.13
Monroe/Washington to Broadway	FT	2073	$182.33	$ 395,961.67
Williams/Washington to Oak	FT	1601	$182.33	$ 291,903.83
Gould/Exchange to Oliver	FT	1100	$182.33	$ 200,558.53
Gould/Oliver to North	FT	2700	$182.33	$ 546,280.03
Huntington/Moore to Stevens	FT	1000	$182.33	$ 182,325.94
Jennett/Shiawassee to Adams	FT	700	$182.33	$ 127,628.16
Mason/Dewey to Gilbert	FT	300	$182.33	$ 54,697.78
Mason/Saginaw to Dewey	FT	1350	$182.33	$ 246,140.02
N. Oak/Main to Williams	FT	1150	$182.33	$ 209,674.83
SUBTOTAL CONSTRUCTION				**$ 2,490,188.91**
CONTINGENCY (15%)				**$ 373,528.34**
TOTAL CONSTRUCTION COST				**$ 2,863,717.25**
DESIGN/CONSTRUCTION ENGINEERING (15% TCC)				**$ 429,557.59**
LEGAL/FINANCIAL (5% TCC)				**$ 143,185.86**
TOTAL PROJECT COST				**$ 3,436,500.00**

**Cost based on City of Owosso CIP*

Appendix C. Correspondence

a. Tribal Historic Preservation Office Letters
    i. Bay Mills Indian Community
    ii. Hannahville Potawatomi Indian Community
    iii. Keweenaw Bay Indian Community
    iv. Lac Vieux Desert Band of Lake Superior Chippewa Indians
    v. Little River Band of Ottawa Indians
    vi. Little Traverse Bay Band of Odawa
    vii. Match-e-be-nash-shee-wish Gun Lake Band of Potawatomi Indians
    viii. Nottawaseppi Band of Huron Potawatomi
    ix. Pokagon Band of Potawatomi
    x. Saginaw Chippewa Indian Tribe of Michigan & Response
    xi. Sault Ste. Marie Tribe of Chippewa
b. MDEQ – Water Resources Division - Lansing District Office
c. Genesee County Metropolitan Planning Commission
d. Michigan Natural Features Inventory
e. Letter to US Fish & Wildlife Service
f. State Historic Preservation Office

ARCHITECTS. ENGINEERS. PLANNERS.

OHM Advancing Communities℠

March 5, 2019

MDEQ Water Resources Division
Lansing District Office
525 Allegan (Constitution Hall, 1S)
P.O Box 30242
Lansing, Michigan 48909

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

The City of Owosso is in the process of submitting a DWRF project plan for improvements to their water distribution system (water main replacements), storage tanks and treatment facilities. The project also includes the construction of a new well field. We have been notified by the Michigan Department of Environmental Quality (MDEQ) that information regarding DWRF Project Plans are required to be sent to the attention of the corresponding MDEQ Water Resources Division district office for comments regarding the proposed project. The Floodplain Areas map shows the various proposed project areas within the City with respect to the floodway, 100 – Year Flood Zone and 500 – Year Flood Zone. The enclosed Description of Project Work document details the proposed construction and the possible impacts of the proposed action.

The various project components and their expected construction impacts are summarized as follows:

- Water mains are located within the road right-of-way. Placement is expected to be under existing pavement
- Improvements to the storage facilities are expected to have minimal impacts since construction will be contained within the existing structures and are not located in flood plains
- Improvements to the water treatment plant is located in the 100-year flood plain, but will have minimal impacts since construction will be contained inside the existing building.
- Project work for the proposed well field, which is located on a development site east of Vandecarr Road, is not located in the existing flood plain

The locations of two (2) water main replacements and the water treatment plant are observed to be located within the 100 – Year Flood Zone. Reliability of service to residents and customers necessitates the water main replacements be located in the floodplains as no practicable alternative exists. Additionally, an insurmountable cost would be associated with relocating the City's water treatment plant outside of the 100 – Year Flood Zone. In order to satisfy the requirements for protection against the 100-Year Flood for federally-assisted projects, the City will consider during the design phase to install immersible pumps in the lower level and all electrical controls above the flood elevation as space and budget will allow.

OHM Advisors
34000 PLYMOUTH ROAD
LIVONIA, MICHIGAN 48150
T 734.522.6711
F 734.522.6427
OHM-Advisors.com

No floodplains will be adversely impacted by the proposed project and therefore conforms to all state and local floodplain protection standards.

Please review and verify the enclosed information regarding the City of Owosso DWRF Project Plan. Please return any comments within 60 days. You may also send comments to my attention via email at Franky.Hang@ohm-advisors.com.

Sincerely,
OHM Advisors

_____
Franky Hang, Engineer

Encl: Floodplain Areas
Description of Project Work
Project Schedule

cc: Office File
Mr. Lou Fleury, OHM Saginaw

Figure 6. Natural Features

- Lake or River
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Treatment Plant
- Well
- Storage Tank
- City Limits
- Supply Well Vandecarr
- Water Main Replacement

N

0 1,500 3,000

Feet

1" = 1,500'

Source: Data provided by City of Owosso, USGS, US Fish and Wildlife Service, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: February 8, 2019

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OHM Advancing Communities℠

February 26, 2019

Genesee County Metropolitan Planning Commission
1101 Beach Street, Room 223
Flint, MI 48502

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

The City of Owosso is in the process of submitting a DWRF project plan for improvements to their water distribution system (water main replacements), storage tanks and treatment facilities. The project also includes the construction of a new well field.

The attached Area of Potential Effects map shows the proposed project areas within the City in which potential construction impacts may occur. The Description of Project Work document enclosed details the proposed construction and the possible impacts of the proposed action.

Enclosed is the population data and projections for the City of Owosso to be included in the DWRF Project Plan. Data population was obtained from the United States Census Bureau (USCB).

Please review and verify the enclosed information and return any comments within 60 days. You may also send comments to my attention via email at Franky.Hang@ohm-advisors.com.

Sincerely,
OHM Advisors

_____
Franky Hang, Engineer

Encl: Area of Potential Effects
Description of Project Work
Project Schedule
Population Data

cc: Office File
Mr. Lou Fleury, OHM Saginaw

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Population Data

The population data obtained from the United States Census Bureau for the City of Owosso in the year 2017 was used to determine a twenty-year (20) population projection. This information will be included in the City of Owosso – DWRF Project Plan.

According to the United States Census Bureau (USCB), the 2017 population of the City of Owosso was 14,539. Since 2010, the population of the City of Owosso has been steadily declining (4.1%). To be conservative, the future planning periods were completed based on the existing population (see Table 1). The USCB also possesses population data for Shiawassee County. The population at the County level is observed to have declined at a similar rate from 2010 to 2017 (3.1%). There is no seasonal variance in the population within the City of Owosso as the population remains constant throughout the year.

Table 1: Population Data

	2017	2019	2030
Service Area Year-Round	14,539	14,539	14,539
Service Area Seasonal	N/A	N/A	N/A

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February 26, 2019

Bay Mills Indian Community
Paula Carrick, THPO
12140 W. Lakeshore Drive
Brimley, MI 49715

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

Dear Paula Carrick:

We have been notified by the Michigan Department of Environmental Quality (MDEQ) that information regarding DWRF Project Plans should be sent to your attention for comments regarding the proposed project.

The City of Owosso is in the process of submitting a DWRF project plan for improvements to their water distribution system (water main replacements), storage tanks and treatment facilities. The project also includes the construction of a new well field. The attached Area of Potential Effects map shows the various proposed project areas within the City in which potential construction impacts may occur. The enclosed Description of Project Work document details the proposed construction and the possible impacts of the proposed action.

The various project components and their expected construction impacts are summarized as follows:

- Water mains are located within the road right-of-way. Placement is expected to be under existing pavement and no trees are proposed to be removed. If trees become an issue, the water main will be bored under the tree(s) where feasible
- Improvements to the storage and treatment facilities are expected to have minimal impacts since construction will be contained within the existing structures
- Project work for the proposed well field, which is located on a development site east of Vandecarr Road, includes tree clearing (between one to three acres)

Typical construction disturbances such as noise, dust, and traffic disruptions along existing roads are expected, which will be addressed by the City, County, and State regulations as well as in the construction contracts associated with the work. A positive impact as a result of this proposed project work will be increased reliability of service to residents and customers.

There are 29 properties and five (5) districts in the City of Owosso listed in the National Park Service's National Register of Historic Places. There are also five (5) properties designated as state historic sites according to the Michigan History Center. All five (5) historical districts are observed to be located within areas of potential effects for water main replacements, however, impacts are expected to be minimal since construction is limited to the road right-of-way. No other interferences are observed between historical properties and areas of potential effects. Construction sites will be restored to their original condition following all construction activities.

City of Owosso has confirmed that there are no additional cultural resources to the best of their knowledge that would be affected as a result of this project work.

Please review and verify the enclosed information regarding the City of Owosso DWRF Project Plan. Please return any comments within 60 days. You may also send comments to my attention via email at Franky.Hang@ohm-advisors.com.

Sincerely,
OHM Advisors

Franky Hang

Franky Hang, Engineer

Encl: Area of Potential Effects
Description of Project Work
Project Schedule

cc: Office File
Mr. Lou Fleury, OHM Saginaw

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February 26, 2019

Grand Traverse Band of Ottawa and Chippewa Indians
Cindy Winslow
2605 NW Bayshore Drive
Peshawbetown, MI 49682

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

Dear Cindy Winslow:

We have been notified by the Michigan Department of Environmental Quality (MDEQ) that information regarding DWRF Project Plans should be sent to your attention for comments regarding the proposed project.

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Please review and verify the enclosed information regarding the City of Owosso DWRF Project Plan. Please return any comments within 60 days. You may also send comments to my attention via email at Franky.Hang@ohm-advisors.com.

Sincerely,
OHM Advisors

Franky Hang, Engineer

Encl: Area of Potential Effects
Description of Project Work
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February 26, 2019

Hannahville Potawatomi Indian Community
Earl Meshigaud
N-14911 Hannahville B-1 Road
Wilson, MI 49896

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

Dear Earl Meshigaud:

We have been notified by the Michigan Department of Environmental Quality (MDEQ) that information regarding DWRF Project Plans should be sent to your attention for comments regarding the proposed project.

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Please review and verify the enclosed information regarding the City of Owosso DWRF Project Plan. Please return any comments within 60 days. You may also send comments to my attention via email at Franky.Hang@ohm-advisors.com.

Sincerely,
OHM Advisors

Franky Hang

Franky Hang, Engineer

Encl: Area of Potential Effects
Description of Project Work
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cc: Office File
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February 26, 2019

Keweenaw Bay Indian Community
Gary Loonsfoot, Jr., THPO
16429 Bear Town Road
Baraga, MI 49908

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

Dear Gary Loonsfoot, Jr.:

We have been notified by the Michigan Department of Environmental Quality (MDEQ) that information regarding DWRF Project Plans should be sent to your attention for comments regarding the proposed project.

The City of Owosso is in the process of submitting a DWRF project plan for improvements to their water distribution system (water main replacements), storage tanks and treatment facilities. The project also includes the construction of a new well field. The attached Area of Potential Effects map shows the various proposed project areas within the City in which potential construction impacts may occur. The enclosed Description of Project Work document details the proposed construction and the possible impacts of the proposed action.

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City of Owosso has confirmed that there are no additional cultural resources to the best of their knowledge that would be affected as a result of this project work.

Please review and verify the enclosed information regarding the City of Owosso DWRF Project Plan. Please return any comments within 60 days. You may also send comments to my attention via email at Franky.Hang@ohm-advisors.com.

Sincerely,
OHM Advisors

Franky Hang, Engineer

Encl: Area of Potential Effects
Description of Project Work
Project Schedule

cc: Office File
Mr. Lou Fleury, OHM Saginaw

OHM Advisors
34000 PLYMOUTH ROAD
LIVONIA, MICHIGAN 48150
T 734.522.6711
F 734.522.6427
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February 26, 2019

Lac Vieux Desert Band of Lake Superior Chippewa Indians
Giiwegiizhigookway Martin, THPO
P.O. Box 249
Watersmeet, MI 49969

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

Dear Giiwegiizhigookway Martin:

We have been notified by the Michigan Department of Environmental Quality (MDEQ) that information regarding DWRF Project Plans should be sent to your attention for comments regarding the proposed project.

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Franky Hang

Franky Hang, Engineer

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February 26, 2019

Little River Band of Ottawa Indians
Jay Sam, Director
2608 Government Center Drive
Manistee, MI 49660

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

Dear Jay Sam:

We have been notified by the Michigan Department of Environmental Quality (MDEQ) that information regarding DWRF Project Plans should be sent to your attention for comments regarding the proposed project.

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Franky Hang

Franky Hang, Engineer

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February 26, 2019

Little Traverse Bay Band of Odawa
Wes Andrews
7500 Odawa Circle
Harbor Springs, MI 49740

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

Dear Wes Andrews:

We have been notified by the Michigan Department of Environmental Quality (MDEQ) that information regarding DWRF Project Plans should be sent to your attention for comments regarding the proposed project.

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Franky Hang

Franky Hang, Engineer

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February 26, 2019

Match-e-be-nash-shee-wish Gun Lake Band of Potawatomi Indians
Heather Bush
2872 Mission Drive
Shelbyville, MI 49344

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

Dear Heather Bush:

We have been notified by the Michigan Department of Environmental Quality (MDEQ) that information regarding DWRF Project Plans should be sent to your attention for comments regarding the proposed project.

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February 26, 2019

Nottawaseppi Band of Huron Potawatomi
Mon-ee Zapata, Cultural Specialist
1485 Mno-Bmadzewen Way
Fulton, MI 49052

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

Dear Mon-ee Zapata:

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February 26, 2019

Pokagon Band of Potawatomi
Matthew J.N. Bussler, THPO/GIS Specialist
57824 East Potawatomi Road.
P.O. Box 180 Dowagiac, MI 49047

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

Dear Matthew Bussler:

We have been notified by the Michigan Department of Environmental Quality (MDEQ) that information regarding DWRF Project Plans should be sent to your attention for comments regarding the proposed project.

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February 26, 2019

Saginaw Chippewa Indian Tribe of Michigan
William Johnson, Interim THPO
6650 E. Broadway
Mt. Pleasant, MI 48858

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

Dear William Johnson:

We have been notified by the Michigan Department of Environmental Quality (MDEQ) that information regarding DWRF Project Plans should be sent to your attention for comments regarding the proposed project.

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February 26, 2019

Sault Ste. Marie Tribe of Chippewa
Colleen Medicine
523 Ashmun
Sault Ste. Marie, MI 49783

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

Dear Colleen Medicine:

We have been notified by the Michigan Department of Environmental Quality (MDEQ) that information regarding DWRF Project Plans should be sent to your attention for comments regarding the proposed project.

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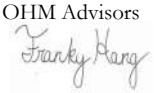

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February 26, 2019

Michigan Natural Features Inventory
P.O. Box 30444
Lansing, MI 48909

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

The City of Owosso is in the process of submitting a DWRF project plan for improvements to Owosso's water distribution system (water main replacements), storage tanks and treatment facilities. The project also includes the construction of a new well field. The proposed project areas are located at T 07 N R 02 E sections 13, 14, 23, 24 and T 07 N R 03 E sections 18, 19, 30. The attached Area of Potential Effects map shows the various proposed project areas within the City in which potential construction impacts may occur. The enclosed Description of Project Work document details the proposed construction and the possible impacts of the proposed action.

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OHM has reviewed state and federal listings for threatened and endangered species according to the U.S. Fish and Wildlife and the Michigan Natural Features Inventory. According to these sources, Shiawassee County is home to three (3) threatened species (Northern Long-Eared Bat, Rufa Red Knot, Eastern Massasauga) and two (2) endangered species (Indiana Bat, Rusty-Patched Bumble Bee). While there is uncertainty as to whether these species may exist in the proposed project areas, we request a review of this information be performed.

If threatened or endangered species were to be found during the course of the project, protective measures would be taken to ensure that they are not affected by the proposed construction.

Please review and verify the enclosed information regarding the City of Owosso DWRF Project Plan. Please return any comments within 60 days. You may also send comments to my attention via email at Franky.Hang@ohm-advisors.com.

Sincerely,
OHM Advisors

_____
Franky Hang, Engineer

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February 26, 2019

U.S. Fish and Wildlife Service
East Lansing Field Office
2651 Coolidge Road
Lansing, MI 48823

RE: Section 7 Endangered Species Act Consultation
City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

OHM is requesting concurrence from the U.S. Fish and Wildlife Service that activities in the proposed project areas for the City of Owosso DWRF Project Plan may affect but are not likely to adversely affect the Northern Long-Eared Bat, Rufa Red Knot, Eastern Massasauga and Indiana Bat. The proposed DWRF project plan includes improvements to the City's water distribution system (water main replacements), storage tanks and treatment facilities. The project also includes the construction of a new well field. The proposed project areas are located at T 07 N R 02 E sections 13, 14, 23, 24 and T 07 N R 03 E sections 18, 19, 30. The attached Area of Potential Effects map shows the various project areas within the City in which potential construction impacts may occur. The enclosed Description of Project Work document details the proposed construction and the possible impacts of the proposed action.

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OHM has reviewed current State and Federal listings for threatened and endangered species according to the U.S. Fish and Wildlife and the Michigan Natural Features Inventory. According to these sources, Shiawassee County is home to three (3) threatened species (Northern Long-Eared Bat, Rufa Red Knot, Eastern Massasauga Rattlesnake) and one (1) endangered species (Indiana Bat). No work is anticipated to occur within wetlands for the proposed project areas, therefore the Rufa Red Knot is not anticipated to be affected.

In regards to the Eastern Massasauga Rattlesnake (EMR), no Tier 1 or Tier 2 habitat is present within the project areas. Rather than conduct surveys, we plan to utilize the following best management practices assuming that that the EMR may be present within the project areas:

- Use of wildlife-safe materials for erosion control and site restoration (i.e. net-less erosion control blankets (for example, made of excelsior), loose mulch, hydraulic mulch, soil binders, unreinforced silt fences, and straw bales. Other options are made from natural fibers (such as jute) and loosely woven together in a manner that allows wildlife to wiggle free.).

- To increase human safety and awareness of EMR, the contractor, engineer, and all others that will be on site for the project will be required to watch MDNR's "60- Second Snakes: The Eastern Massasauga Rattlesnake" video (available at: https://www.youtube.com/watch?v=-PFnXe_e02w), and review the EMR factsheet (available at: https://www.fws.gov/midwest/endangered/reptiles/eam a/pdf/EMRfactsheetSept2016.pdf).

- The reporting of any EMR observation, or observation of any other listed threatened or endangered species (T&E), during the project construction is required within 24 hours of said observation. EMR or T&E Species siting will be reported to the Lansing, MI USFWS Office at: 517-351-2555.

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In regards to the Indiana Bat and the Northern Long Eared Bat, we plan to utilize the following best management practices:

- All tree removals and tree trimming required for this project will be completed during the non-active season for both species. Specifically, tree removal will only occur between the months of October to March.

- Any Indiana Bat or Northern Long Eared Bat observation, or observation of any other listed threatened or endangered species, will be reported within 24 hours of said observation. The USFWS office in Lansing Michigan (517-351-2555) will be contacted to report species sighting.

Based on the best management practices identified above, we conclude that activities in the proposed project areas for the City of Owosso DWRF Project Plan may affect but are not likely to adversely affect the listed threatened and endangered species. The management practices will be identified in future bidding documents for the project(s) and would be considered requirements of the contract.

Please review and verify the enclosed information regarding the City of Owosso DWRF Project Plan. Please return any comments within sixty (60) days. You may also send comments to my attention via email at Franky.Hang@ohm-advisors.com.

Sincerely,
OHM Advisors

Franky Hang, Engineer

Encl: Area of Potential Effects
Description of Project Work
Project Schedule

cc: Office File
Mr. Lou Fleury, OHM Saginaw

ARCHITECTS. ENGINEERS. PLANNERS.

OHM Advancing Communities

March 11, 2019

State Historic Preservation Office
Cultural Resources Management and Planning Section
735 East Michigan Avenue
P.O. Box 30044
Lansing, MI 48909

RE: City of Owosso - Drinking Water Revolving Fund (DWRF) Project Plan

Dear Cultural Resource Management and Planning Specialist:

The City of Owosso is in the process of submitting a DWRF project plan for improvements to their water distribution system (water main replacements), storage tanks and treatment facilities. The project also includes the construction of a new well field. The attached Area of Potential Effects map shows the various proposed project areas within the City in which potential construction impacts may occur. The enclosed Description of Project Work document details the proposed construction and the possible impacts of the proposed action.

The various project components and their expected construction impacts are summarized as follows:

- Water mains are located within the road right-of-way. Placement is expected to be under existing pavement and no trees are proposed to be removed. If trees become an issue, the water main will be bored under the tree(s) where feasible
- Improvements to the storage and treatment facilities are expected to have minimal impacts since construction will be contained within the existing structures
- Project work for the proposed well field, which is located on a development site east of Vandecarr Road, includes tree clearing (between one to three acres)

Typical construction disturbances such as noise, dust, and traffic disruptions along existing roads are expected, which will be addressed by the City, County, and State regulations as well as in the construction contracts associated with the work. A positive impact as a result of this proposed project work will be increased reliability of service to residents and customers.

There are 29 properties and five (5) districts in the City of Owosso listed in the National Park Service's National Register of Historic Places. There are also five (5) properties designated as state historic sites according to the Michigan History Center. All five (5) historical districts are observed to be located within areas of potential effects for water main replacements, however, impacts are expected to be minimal since construction is limited to the road right-of-way; the only exception to this is a potential impact on the brick road intersection observed on the intersection of Genesee Street and Michigan Avenue (see Historic Properties in the Areas of Potential Effects document enclosed). No other interferences are observed between historical properties and areas of potential effects. Construction sites will be restored to their original condition following all construction activities. The Historic Properties in the Areas of Potential Effects enclosed contains Google Earth Pro street view imagery as photo documentation.

City of Owosso has confirmed that there are no additional cultural resources to the best of their knowledge that would be affected as a result of this project work.

Please review and verify the enclosed information regarding the City of Owosso DWRF Project Plan. Please return any comments within 60 days. You may also send comments to my attention via email at Franky.Hang@ohm-advisors.com.

Sincerely,
OHM Advisors

_____
Franky Hang, Engineer

Encl: Area of Potential Effects
Description of Project Work
Project Schedule
Historic Properties in the Areas of Potential Effects

cc: Office File
Mr. Lou Fleury, OHM Saginaw

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STATE HISTORIC PRESERVATION OFFICE
Application for Section 106 Review

SHPO Use Only
☐ IN Received Date ____ / ____ / ____ Log In Date ____ / ____ / ____
☐ OUT Response Date ____ / ____ / ____ Log Out Date ____ / ____ / ____
Sent Date ____ / ____ / ____

Submit one copy for each project for which review is requested. This application is required. Please type. Applications must be complete for review to begin. Incomplete applications will be sent back to the applicant without comment. Send only the information and attachments requested on this application. Materials submitted for review cannot be returned. ***Due to limited resources we are unable to accept this application electronically.***

I. GENERAL INFORMATION

☒ THIS IS A NEW SUBMITTAL ☐ THIS IS MORE INFORMATION RELATING TO ER#

a. Project Name: City of Owosso Drinking Water Revolving Fund (DWRF) Project Plan
b. Project Address (if available): N/A
c. Municipal Unit: City of Owosso County: Shiawassee
d. Federal Agency, Contact Name and Mailing Address (*If you do not know the federal agency involved in your project please contact the party requiring you to apply for Section 106 review, not the SHPO, for this information*.): N/A
e. State Agency (if applicable), Contact Name and Mailing Address: Jonathan M. Berman, Senior Project Manager, Revolving Loan Section, 517-284-6664, bermanj@michigan.gov, MDEQ Drinking Water & Municipal Assistance Division, Constitution Hall, 4th Floor South, 525 West Allegan, P.O. Box 30817, Lansing, Michigan 48909
f. Consultant or Applicant Contact Information (if applicable) *including mailing address*: Lou Fleury, 929 Bridgeview South, Saginaw, MI 48604, lou.fleury@ohm-advisors.com

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II. GROUND DISTURBING ACTIVITY (INCLUDING EXCAVATION, GRADING, TREE REMOVALS, UTILITY INSTALLATION, ETC.)

DOES THIS PROJECT INVOLVE GROUND-DISTURBING ACTIVITY? ☒ YES ☐ NO (If no, proceed to section III.)

Exact project location must be submitted on a USGS Quad map (portions, photocopies of portions, and electronic USGS maps are acceptable as long as the location is clearly marked).

a. USGS Quad Map Name: Owosso North, Owosso South
b. Township: Range: Section: T 07 N R 02 E Section 13, 14, 23, 24 T 07 N R 03 E Section 18, 19, 30
c. Description of width, length and depth of proposed ground disturbing activity: See map attached.
d. Previous land use and disturbances: Residential, commercial, industrial, parks, vacant parcels.
e. Current land use and conditions: Residential, commercial, industrial, parks, vacant parcels.
f. Does the landowner know of any archaeological resources found on the property? ☐ YES ☒ NO
Please describe:

III. PROJECT WORK DESCRIPTION AND AREA OF POTENTIAL EFFECTS (APE)
Note: Every project has an APE.

a. Provide a detailed written description of the project (plans, specifications, Environmental Impact Statements (EIS), Environmental Assessments (EA), etc. **cannot** be substituted for the written description): See letter attached.
b. Provide a localized map indicating the location of the project; road names must be included and legible.
c. On the above-mentioned map, identify the APE.
d. Provide a written description of the APE (physical, visual, auditory, and sociocultural), the steps taken to identify the APE, and the justification for the boundaries chosen. See letter attached.

IV. IDENTIFICATION OF HISTORIC PROPERTIES

a. List and date **all** properties 50 years of age or older located in the APE. If the property is located within a National Register eligible, listed or local district it is only necessary to identify the district: Michigan Avenue-Genessee Street Historic Residential District, West Town Historic Commercial and Industrial District, Mason Street Historic Residential District, Owosso Downtown Historic District, Oliver Street Historic District
b. Describe the steps taken to identify whether or not any **historic** properties exist in the APE and include the level of effort made to carry out such steps: See figure attached. All registered historic property locations are shown and have been reviewed for conflicts.
c. Based on the information contained in "b", please choose one:
   - ☒ Historic Properties Present in the APE
   - ☐ No Historic Properties Present in the APE
d. Describe the condition, previous disturbance to, and history of any historic properties located in the APE: See letter attached.

V. PHOTOGRAPHS

Note: All photographs must be keyed to a localized map.

a. Provide photographs of the site itself.
b. Provide photographs of all properties 50 years of age or older located in the APE (faxed or photocopied photographs are not acceptable).

VI. DETERMINATION OF EFFECT

☐ No historic properties affected based on [36 CFR § 800.4(d)(1)], please provide the basis for this determination.

☒ No Adverse Effect [36 CFR § 800.5(b)] on historic properties, explain why the criteria of adverse effect, 36 CFR Part 800.5(a)(1), were found not applicable.

☐ Adverse Effect [36 CFR § 800.5(d)(2)] on historic properties, explain why the criteria of adverse effect, [36 CFR Part 800.5(a)(1)], were found applicable.

Please print and mail completed form and required information to:

State Historic Preservation Office, Cultural Resources Management and Planning Section, 735 East Michigan Avenue, P.O. Box 30044, Lansing, MI 48909

Historic Properties in the Areas of Potential Effects

The table below contains the 29 existing properties and five (5) districts in the City of Owosso listed in the National Park Service's National Register of Historic Places. The exact delineation of the historical district areas contained in the National Archives were used to analyze which districts are present in the areas of potential effects.

National Register of Historic Places in the City of Owosso

Property Name	Address	Reference Number
Ayres, Nathan, House	604 North Water Street	80001891
Christian, Leigh, House	622 North Ball Street	80001892
Christian-Ellis House	600 North Water Street	80001893
Comstock, Elias, Cabin	408 Curwood Castle Drive	80001894
Curwood Castle	224 Curwood Castle Drive	71000420
Duff Building	118 West Exchange Street	85000168
Frieseke, Frederick, Birthplace and Boyhood Home	654 North Water Street	80001895
Frieseke, Julius, House	529 Corunna Avenue	90000574
Gould, Amos, House	115 West King Street	80001896
Gould, Daniel, House	509 East Main Street	80001897
Gould, Ebenezer, House	603 West Main Street	80001898
Grow Block	120-122 West Exchange Street	85000169
House at 314 W. King St.	314 West King Street	80001899
Jacobs, Eugene, House	220 West King Street	80004553
Lincoln School	645 Alger Street	16000510
Mason Street Historic Residential District		8000190
McCormick, Colin, House	222 East Exchange Street	80001901
Michigan Avenue-Genessee Street Historic Residential District		80001902
Miner, Selden, House	418 West King Street	80001903
Old Miller Hospital	121 Michigan Avenue	80001904
Oliver Street Historic District		80001905
Opdyke, Sylvester, House	655 North Pine Street	80001906
Owosso Downtown Historic District		14000126
Palmer, Albert, House	528-530 River Street	80001907
Pardee, George, House	603 North Ball Street	80001908
Pere Marquette Railway Steam Locomotive No. 1225	405 South Washington Street	94000744
Perrigo, George, House	213 North Cedar Street	80001909
Todd, Edwin, House	520 North Adams Street	80001910
West Town Historic Commercial and Industrial District		80001911
Williams, Alfred, House	611 North Ball Street	80001912
Williams, Benjamin, House	628 North Ball Street	80001913
Woodard, Lee, and Sons Building	306 Elm Street	80001914
Woodard, Lyman, Company Workers' Housing	601 Clinton Street	80001916
Woodard, Lyman, Furniture and Casket Company Building	216-222 Elm Street	80001915

The table below contains the five (5) state historic sites according to the Michigan History Center.

State Historic Sites

Property Name	Address
Curwood Castle	Curwood Castle Drive
Comstock Cabin	Curwood Castle Drive
Herman C. Frieseke / Frederick Carl Frieseke	654 North Water Street
First Congregational Church and Society	327 North Washington Street
Birthplace of Thomas Edmund Dewey	313 West Main Street

The table below summarizes the existing historic properties that are present in the areas of potential effects (APE). After reviewing the locations of the national and state historical properties in the City of Owosso, all (5) historical districts are observed to be located within areas of potential effects for water main replacements. No other interferences are observed between historical properties and areas of potential effects.

Historic Districts Located in Areas of Potential Effects

Proposed Project	Historical Districts
Genesee St. from Michigan Ave. to Green St.	Michigan Ave. - Genesee St. Historic Residential District
Genesee St. from Michigan Ave. to west end	Michigan Ave. – Genesee St. Historic Residential District
Cedar St. from Hampton St. to Main St.	West Town Historic Commercial and Industrial District
Mason St. from Saginaw St. to Dewey St.	Mason St. Historic Residential District
Dewey St. from to King St. to Main St.	Mason St. Historic Residential District
Oak St. between Main St. and Williams St.	Mason St. Historic Residential District
Ball St. from Exchange St. to Mason St.	Owosso Downtown Historic District
Ball St. from Oliver St. to 450' north	Oliver Street Historic District
Adams St. from Oliver St. to King St.	Oliver Street Historic District
Clark St. from Oliver St. to King St.	Oliver Street Historic District

The construction impacts as a result of the water main replacements are expected to be minimal since construction is limited to the road right-of-way. The only exception to this is a potential impact on the brick road intersection observed on the intersection of Genesee Street and Michigan Avenue. Construction sites will be restored to their original condition following all construction activities.

Photo documentation has been provided for each historic district located in areas of potential effects. These photos were obtained from Google Earth Pro street view imagery. All photos were either taken in 2018 or 2019.

Project: Genesee Street from Michigan Avenue to west end (Water Main Replacement)
Historical Property: Michigan Avenue-Genesee Street Historic Residential District

Intersection of Genesee Street and Michigan Avenue facing west:

Intersection of Genesee Street and Shiawassee Street facing east:

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Intersection of Genesee Street and Shiawassee Street facing west:

Intersection of Genesee Street and west end facing east:

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Intersection of Genesee Street and west end facing north:

Project: Genesee Street from Michigan Avenue to Green Street (Water Main Replacement)
Historical Property: Michigan Avenue-Genesee Street Historic Residential District

Intersection of Genesee Street and Michigan Avenue facing west:

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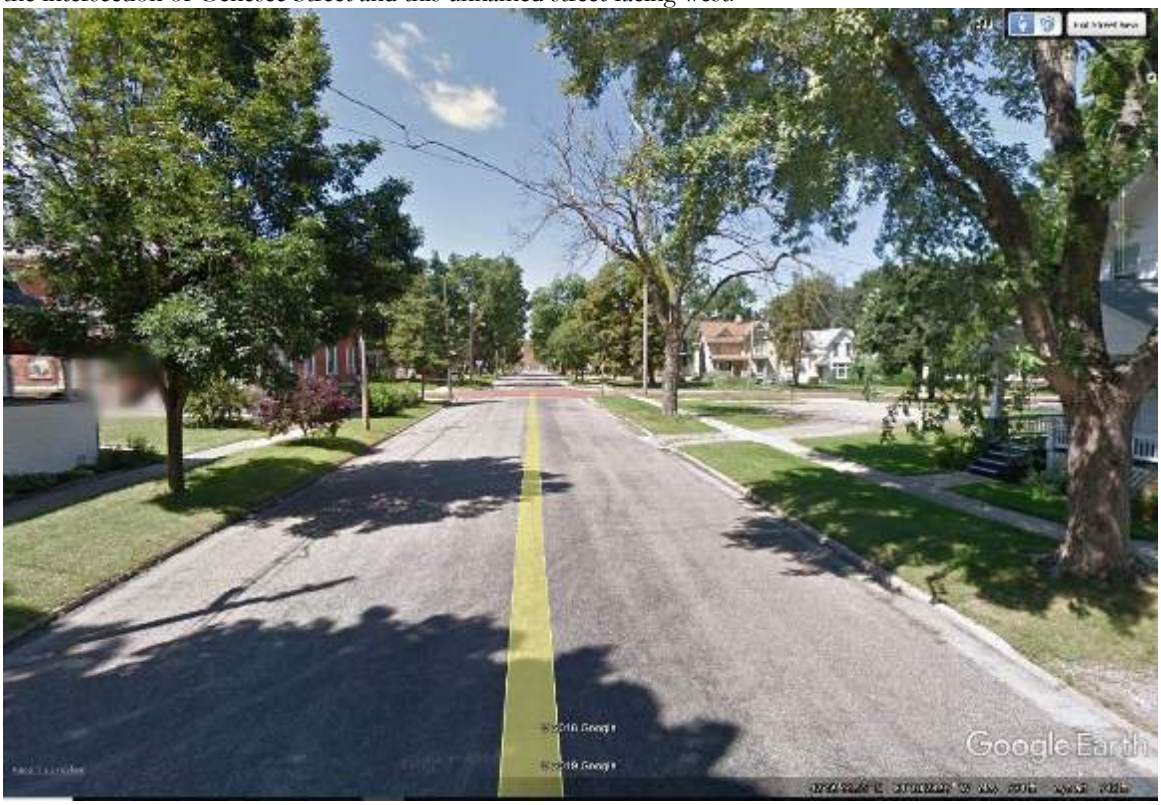
Intersection of Genesee Street and Green Street facing east:

There is an unnamed street 360 feet west of the intersection of Genesee Street and Michigan Avenue. Shown below is the intersection of Genesee Street and this unnamed street facing west:



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Intersection of Genesee Street and unnamed street facing east:

Project: Cedar Street from Hampton Street to Main Street (Water Main Replacement)
Historical Property: West Town Historic Commercial and Industrial District

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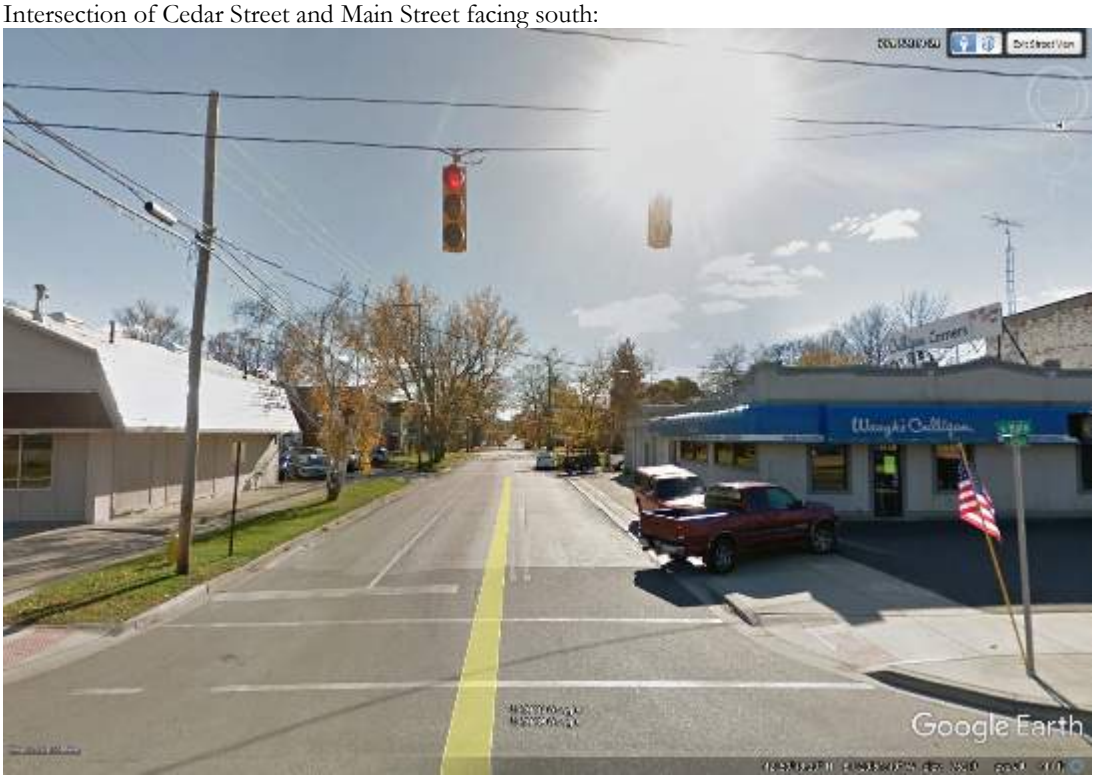
Intersection of Cedar Street and Main Street facing south:



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Intersection of Cedar Street and Clinton Street facing north:

Project: Mason Street from Saginaw to Dewey (Water Main Replacement)
Historical Property: Mason Street Historic Residential District

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Intersection of Mason Street and Hickory facing east:

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Intersection of Mason Street and Dewey Street facing west:

Intersection of Mason Street and Oak Street facing east:

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Intersection of Mason Street and Oak Street facing west:

Project: Dewey Street from to King Street to Main Street (Water Main Replacement)
Historic Property: Mason Street Historic Residential District

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Intersection of Dewey Street and Laverock Alley facing south:

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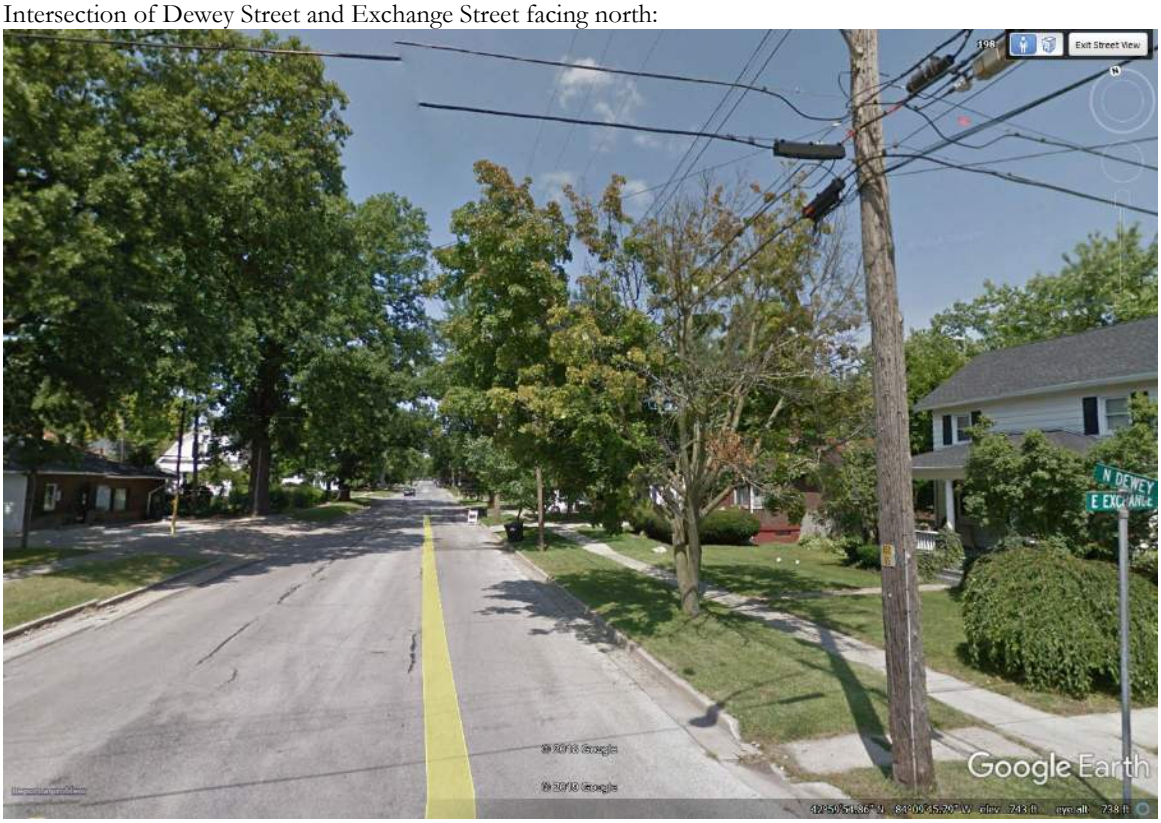
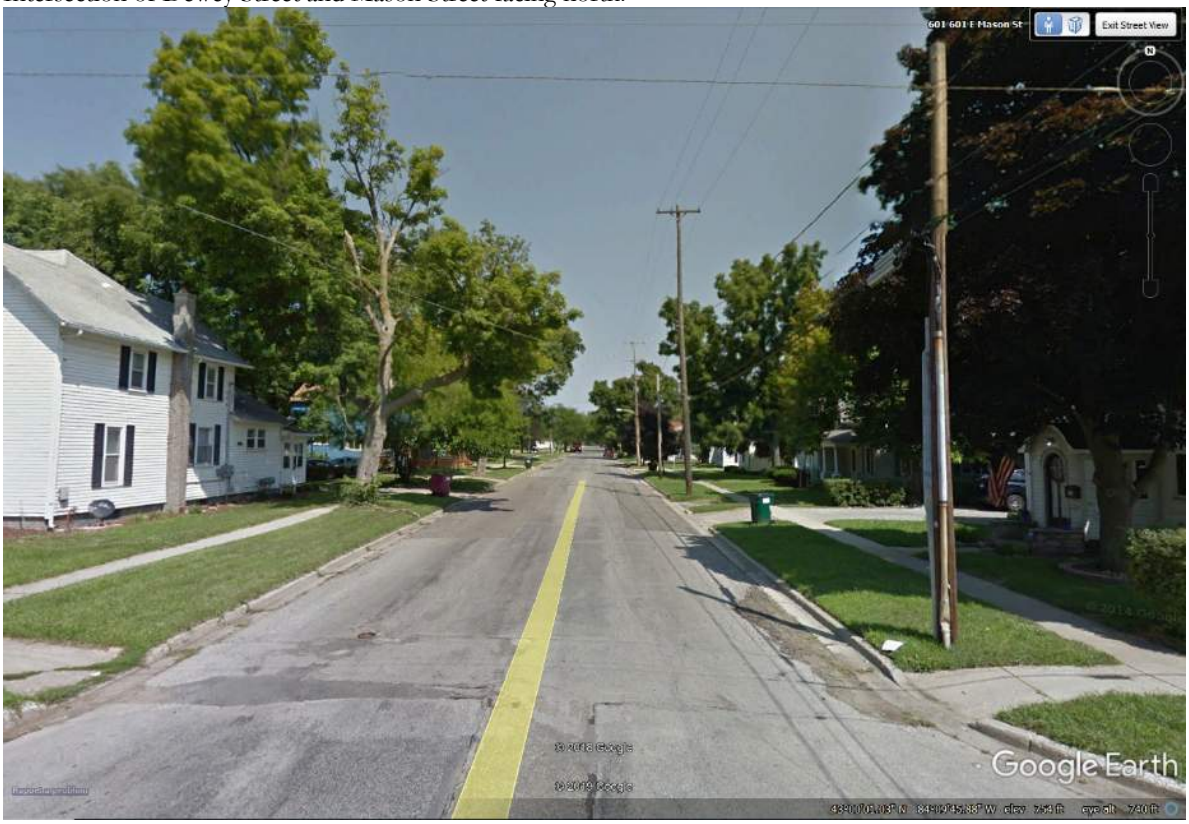
Intersection of Dewey Street and Exchange Street facing north:



Intersection of Dewey Street and Mason Street facing north:



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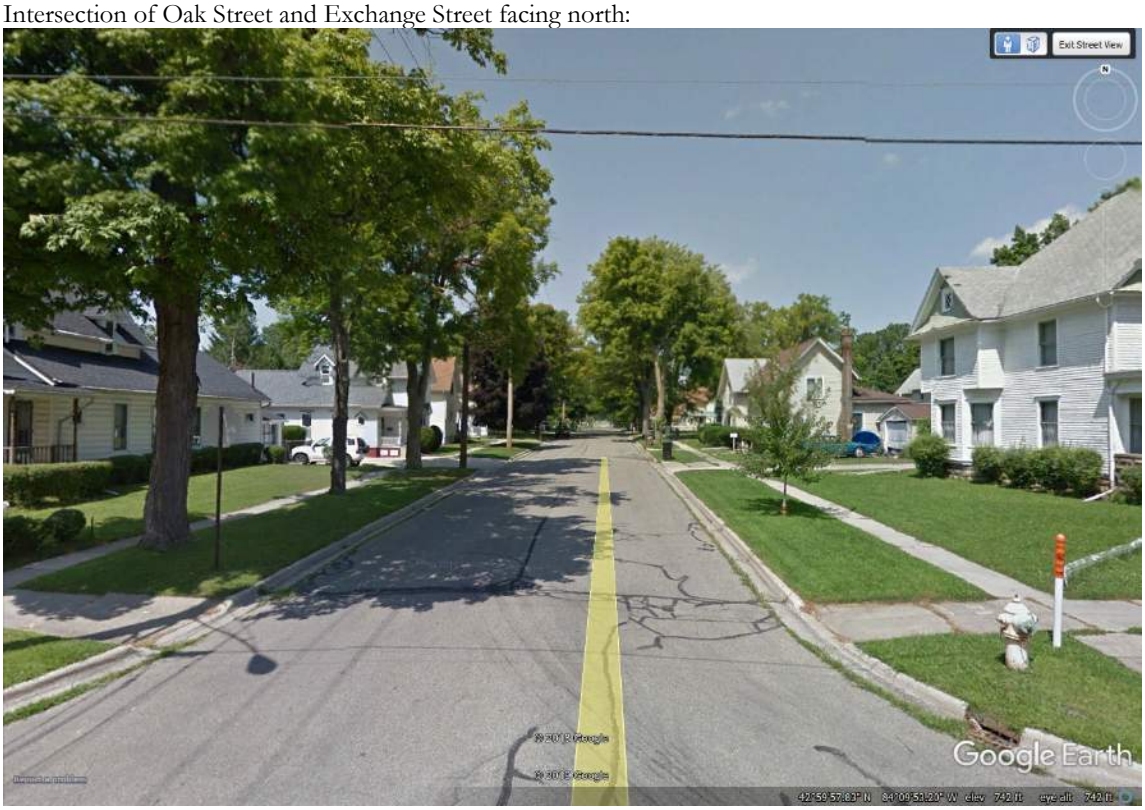
Intersection of Dewey Street and Mason Street facing south:

Project: Oak Street between Main Street and Williams Street (Water Main Replacement)
Historic Property: Mason Street Historic Residential District

---

Intersection of Oak Street and Exchange Street facing north:



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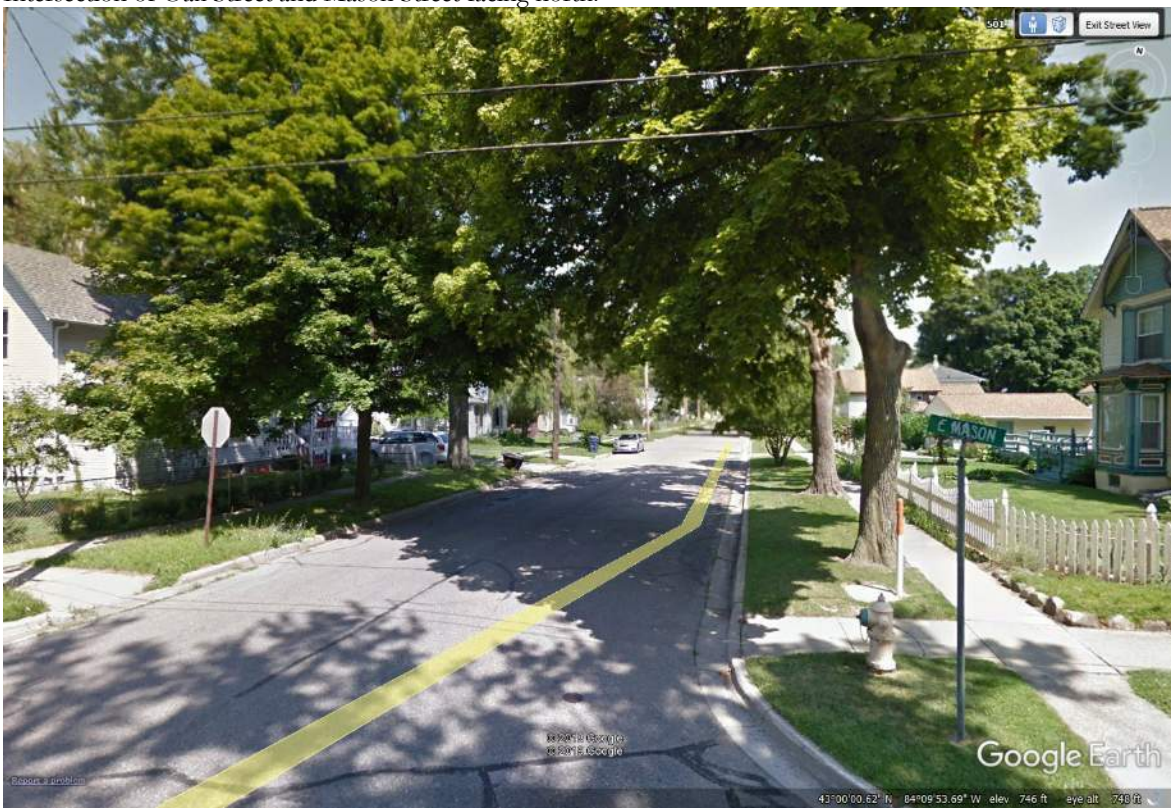
Intersection of Oak Street and Laverock Alley facing south:

Intersection of Oak Street and Mason Street facing north:



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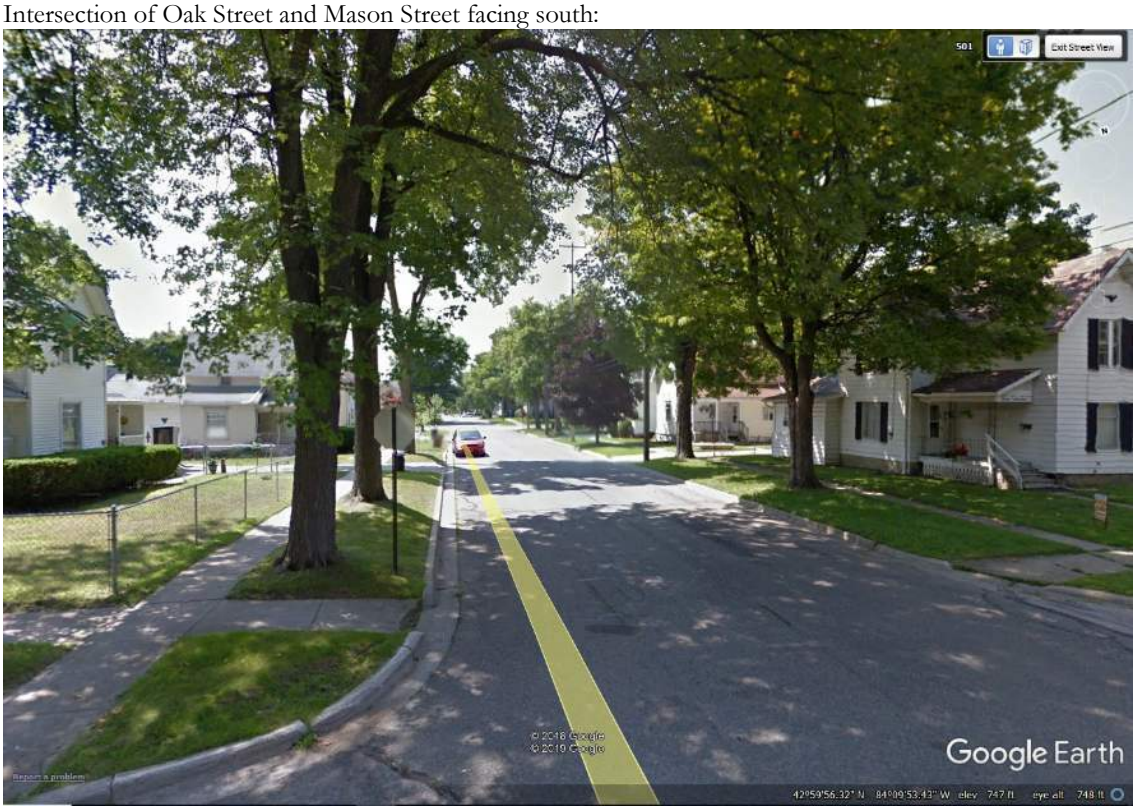
Intersection of Oak Street and Mason Street facing south:



Project: Ball Street from Exchange Street to Mason Street (Water Main Replacement)
Historic Property: Owosso Downtown Historic District

Intersection of Ball Street and Exchange Street facing north:

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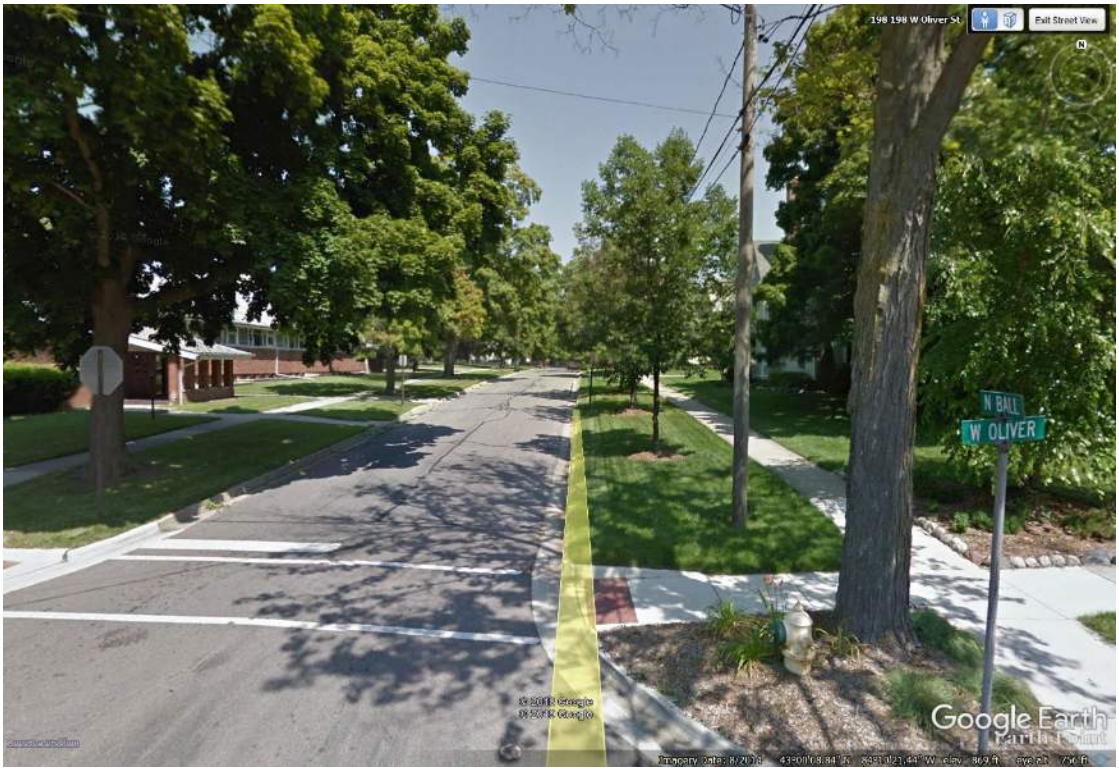
Intersection of Ball Street and Mason Street facing south:

Project: Ball Street from Oliver Street to 450 feet north (Water Main Replacement)
Historic Property: Oliver Street Historic District

Intersection of Ball Street and Oliver Street facing north:



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Project: Adams Street from Oliver Street to King Street (Water Main Replacement)
Historic Property: Oliver Street Historic District

Intersection of Adams Street and Oliver Street facing north:

Project: Clark Street from Oliver Street to King Street (Water Main Replacement)
Historic Property: Oliver Street Historic District

Intersection of Clark Street and Oliver Street facing north:

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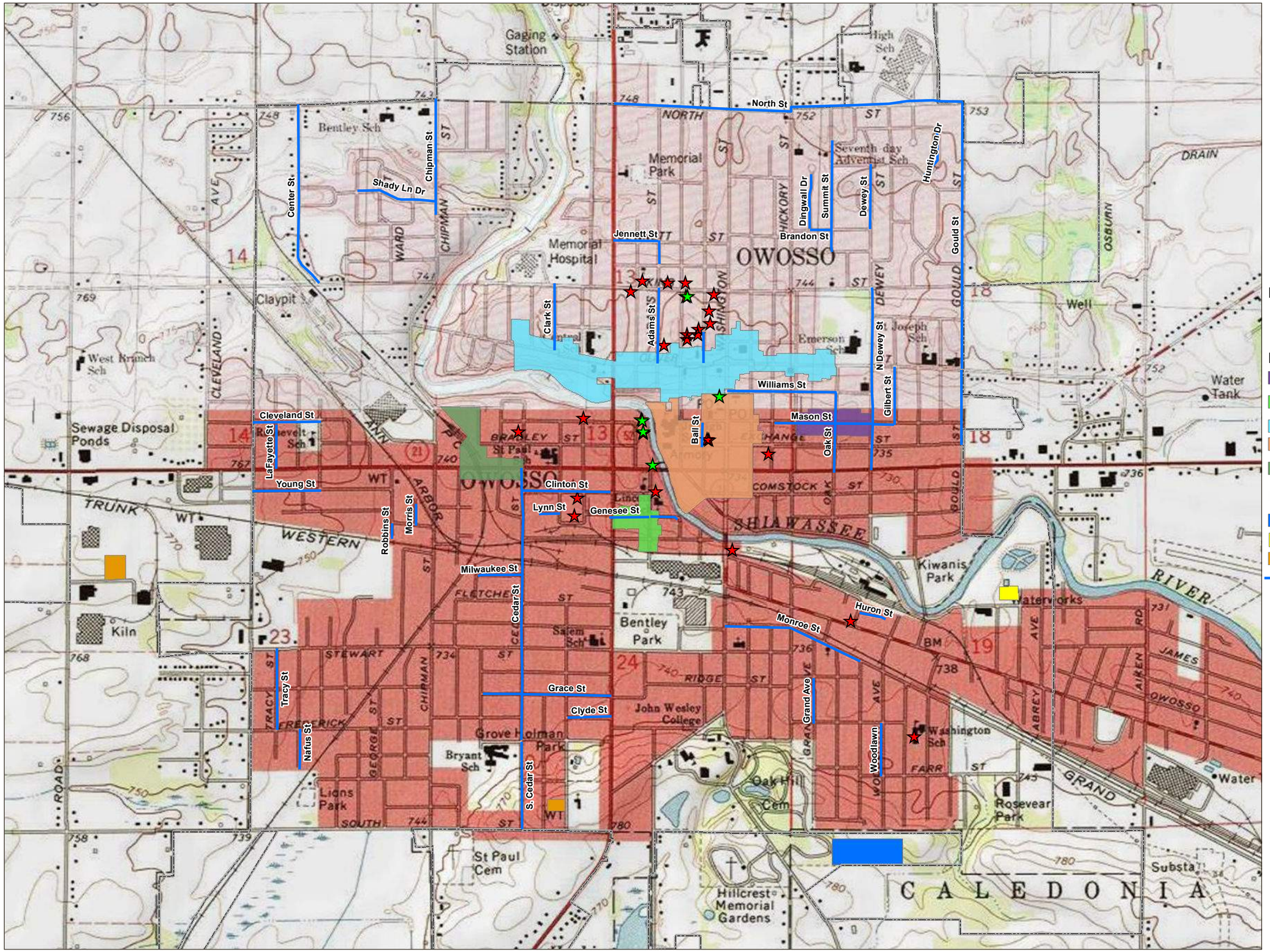


Area of Potential Effects

Historical Markers

- State
- National

Historic Districts

- Mason Street Historic Residential District
- Michigan Avenue-Genessee Street Historic Residential District
- Oliver Street Historic District
- Owosso Downtown Historic District
- West Town Historic Commercial and Industrial District

Project Areas

- Supply Well Vandecarr
- Treatment Plant Upgrade
- Storage Rehabilitation
- Water Main Replacement

N

0 1,350 2,700

Feet

1" = 1,350'

Source: Data provided by City of Owosso, USGS, The National Park Service, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 IntlFeet

Map Published: February 4, 2019

Description of Project Work

The DWRF Project Plan for City of Owosso consists of 45 water main replacements throughout the City's distribution system, maintenance of two (2) water storage tanks, improvements within the existing Water Treatment Plant (WTP) and construction of a new well field.

The proposed work more specifically consists of the following:

- Loop dead-end water mains
- Replace smaller size water mains to meet regulatory requirements
- Replace older, less reliable water mains
- Clean and recoat interior and exterior of water storage facilities (Walnut Street, Dowling Drive)
- Equipment and electrical upgrades at the WTP (Allendale Avenue)
- Construct a new well field on a development site east of Vandecarr Road

The earliest that any project component is schedule to begin is year 2020. All project work will conclude in year 2024. The year in which construction for each project component is summarized as follows:

- Water main replacements are scheduled to begin in year 2020 and conclude in year 2024
- Improvements to the storage and treatment facilities are scheduled to begin and conclude in year 2020
- Construction for the proposed well field is scheduled to begin in year 2020 and conclude at the end of year 2021

This proposed project plan is prepared for submittal to the MDEQ for DWRF funding through the EPA.

The various project components and their expected construction impacts are summarized as follows:

- Water mains are located within the road right-of-way. Placement is expected to be under existing pavement and no trees are proposed to be removed. If trees become an issue, the water main will be bored under the tree(s) where feasible
- Improvements to the storage and treatment facilities are expected to have minimal impacts since construction will be contained within the existing structures
- Project work for the proposed well field, which is located on a development site east of Vandecarr Road, includes tree clearing (between 1 to 3 acres)

Typical construction disturbances such as noise, dust, and traffic disruptions along existing roads are expected, which will be addressed by the City, County, and State regulations as well as in the construction contracts associated with the work. A positive impact as a result of this proposed project work will be increased reliability of service to residents and customers.

Project Schedule

The water treatment and storage tank improvements are scheduled to begin and conclude in the year 2020. Improvements to the water treatment facilities and storage tanks are expected to have minimal impacts as construction activities will be contained within the facilities themselves. Construction for the new well field is scheduled to begin in the year 2020 and conclude at the end of year 2021. The project work for the well field will require tree clearing.

The table below contains the year in which construction is proposed to begin for each water main replacement. There is a total of 45 replacements proposed for the City of Owosso's DWRF Project Plan. All water main replacements will conclude at the end of year 2024.

Water Main Replacement Schedule

	Location	From	To	Construction Year
1	Cedar	South (Krouse)	Hampton	2020
2	Summit	Abbott	Rubelman	2020
3	Center	King	North (Mason)	2020
4	Clark	Oliver	W.King	2020
5	Dewey	Brandon	Moore	2020
6	Cleveland	Chestnut	Brooks	2020
7	Lafayette	Main	Cleveland	2020
8	Robbins	Mack	South End	2020
9	Morris	Mack	North End	2020
10	North	Shiawassee	Gould	2020
11	Clyde	Walnut	Shiawassee	2020
12	Lynn	West End	Howell	2020
13	Milwaukee	Lyon	Cedar	2020
14	Huron	Huggins	West End	2020
15	Dewey	M-21	King	2020
16	Shady Lane	Meadow	Chipman	2022
17	Woodlawn	Farr	Auburndale	2022
18	Genesee	Michigan	Green	2022
19	Grace	Shiawassee	Cedar	2022
20	Nafus	Frederick	Freeman	2022
21	Tracy	Frederick	Stewart	2022
22	Young	Chestnut	Brooks	2022
23	Grand Avenue	Auburndale	Franklin	2022
24	Grace	Cedar	Lyons	2022
25	Nafus	Frederick	South End	2022
26	Genesee	Michigan Avenue	West End	2022
27	Cedar	Hampton	Main	2023
28	Chipman	Harding	North	2023
29	Adams	Oliver	King	2023
30	Adams	Elizabeth	North of Jennett	2023
31	Ball	Exchange	Mason	2023
32	Ball	Oliver	450' north	2023
33	Brandon	Summit	Dingwall	2023
34	Dingwall	Brandon	North End	2023
35	Gilbert	Mason	Oliver	2023
36	Clinton	Cedar	Shiawassee	2024
37	Monroe	Washington	Broadway	2024

	Location	From	To	Construction Year
38	Williams	Washington	Oak	2024
39	Gould	Exchange	Oliver	2024
40	Gould	Oliver	North	2024
41	Huntington	Moore	Stevens	2024
42	Jennett	Shiawassee	Adams	2024
43	Mason	Dewey	Gilbert	2024
44	Mason	Saginaw	Dewey	2024
45	Oak	Main	Williams	2024

OHM Advisors
34000 PLYMOUTH ROAD
LIVONIA, MICHIGAN 48150
T 734.522.6711
F 734.522.6427
OHM-Advisors.com

Saginaw Chippewa Indian Tribe of Michigan
Tribal Historic Preservation Office

6650 EAST BROADWAY, MT. PLEASANT, MI 48858
PHONE (989) 775-4751 • FAX (989) 775-4767

THPO

February 19, 2019

Franky Hang
Engineer
OHM

Re: City of Owosso – Drinking Water Revolving Fund Project Plan

Dear Sir/Madam,

This letter is in regards to the above referenced project.

The proposed area of concern is close to an area in which we have information indicating the presence of an Indian traditional cultural property.

This office will be available to assist you in the future or during the course of the project if there is discovery of Native American human remains or burial objects. I am attaching a Site Reference Form for your use if such an instance occurs.

Feel free to call my office if you have any questions or requests at 989-775-4730.
We thank you for including this Tribe in your plans.

Sincerely,

Sarah Jones

Tribal Historic Preservation Officer
Ziibiwing Center of Anishinabe Culture & Lifeways
Saginaw Chippewa Indian Tribe of Michigan

6650 E. Broadway • Mt. Pleasant, MI 48858•Phone (989) 775-4751 or (800) 225-8172
Fax (989) 775-4770•www.sagchip.org/ziibiwing•www.nativedirect.com

SITE REFERENCE FORM

Date_____/_____/_____ (the date this form is being filled out)

Owner/Site Representative_____

Address _____

City _____ State _____ Zip _____

Phone_____ Fax _____

Site Reference (fill out if the site is different than owner or site representative's address)

Address_____

City_____County_____

Location and Circumstance of Discovery _____

_____

_____

_____

Discovery Date_____/_____/_____ Time _____ AM/PM

Official Contacts

Law Enforcement_____

Phone_____ Fax_____

Investigation Officer_____

Phone_____ Fax_____

Date Report received_____/_____/_____

Medical Examiner_____

Phone_____ Fax_____

Date Report received_____/_____/_____

Native American Burial yes_____ no_____

Confirmed by_____

Phone_____ Fax_____

Release Status_____

_____

_____

Schedule Considerations _____

_____

_____

Saginaw Chippewa Indian Tribal Contact:

Sarah Jones
6650 E. Broadway Mt. Pleasant, MI 48858
Phone 989/ 775-4751 Fax 989/ 775-4770

Franky Hang

From: Dandridge, Tameka <tameka_dandridge@fws.gov>
Sent: Thursday, March 14, 2019 1:41 PM
To: Franky Hang
Subject: ESA Section 7 Consultation for City of Owosso DWRF Project

Dear Mr. Hang:

Thank you for your letter of February 26, 2019 requesting consultation pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act). Your project is regulated by the U.S. Environmental Protection Agency (USEPA) and you are acting as the non-federal applicant on behalf of your client, City of Owosso.

The City of Owosso proposes to replacement water mains, construct a well field, and make improvements to its storage tanks and treatment facilities. You advised tree removal is not proposed, as water mains will be bored underneath trees where feasible.

You have determined that this project is not likely to adversely affect Indiana bat, northern long-eared bat, eastern massasauga rattlesnake, and rufa red knot and request our concurrence with your determination.

Because tree removal is not a proposed activity and your project area does not provide habitat to support federally listed species. It is appropriate to conclude with a no effect determination.

This precludes the need for further action on this project as required by the Act. If the project is modified or new information becomes available that indicates listed species or critical habitat may be affected in a manner or to an extent not previously considered, you should reinitiate consultation with this office.

We appreciate the opportunity to cooperate with you in conserving endangered species.

Thank you.

Tameka N. Dandridge
U.S. Fish and Wildlife Service
Michigan Field Office
2651 Coolidge Road
Suite 101
East Lansing, Michigan 48823
517-351-8315
tameka_dandridge@fws.gov
*****My schedule: Mon-Thur: 8am-4:30 and Fri (telework): 7:30-4pm*****

Franky Hang

From: Sanders, Michael <sander75@msu.edu>
Sent: Monday, April 1, 2019 12:19 PM
To: Franky Hang
Subject: Rare Species Review #2316 - City of Owosso DWRF Project Plan
Attachments: RSR_2316_Section 7 Comments -Shiawassee County.pdf; RSR #2316 Response Letter.pdf

Hi Franky,

Please find our response letter for Rare Species Review #2316 in Shiawassee County, Michigan. Also included are comments for projects involving federal funding or a federal agency authorization.

Please let me know if you have questions or comments.

Thank you,

Mike Sanders

Michael A. Sanders
Environmental Review Specialist/Zoologist
Michigan Natural Features Inventory
MSU Extension Service
PO Box 13036
Lansing, MI 48901
Office: 517-284-6215
Cell: 517-980-5632
Sander75@msu.edu

MICHIGAN STATE UNIVERSITY | Extension

Franky Hang
Engineer
OHM Advisors
34000 Plymouth Road
Livonia, MI 48150
Franky.Hang@ohm-advisors.com

April 1, 2019

Re: Rare Species Review #2316 – City of Owosso – DWRF Project Plan, Shiawassee County, MI.

Mr. Hang,

The location for the proposed project was checked against known localities for rare species and unique natural features, which are recorded in the Michigan Natural Features Inventory (MNFI) natural heritage database. This continuously updated database is a comprehensive source of existing data on Michigan's endangered, threatened, or otherwise significant plant and animal species, natural plant communities, and other natural features. Records in the database indicate that a qualified observer has documented the presence of special natural features. The absence of records in the database for a particular site may mean that the site has not been surveyed. The only way to obtain a definitive statement on the status of natural features is to have a competent biologist perform a complete field survey.

Under Act 451 of 1994, the Natural Resources and Environmental Protection Act, Part 365, Endangered Species Protection, "a person shall not take, possess, transport, …fish, plants, and wildlife indigenous to the state and determined to be endangered or threatened," unless first receiving an Endangered Species Permit from the Michigan Department of Natural Resources (MDNR), Wildlife Division. Responsibility to protect endangered and threatened species is not limited to the lists below. Other species may be present that have not been recorded in the database.

Several protected and/or rare natural features have been documented in the project area. However, all of the records are **Historic,** and **it is not likely** that negative impacts will occur. Keep in mind that MNFI cannot fully evaluate this project without visiting the project site. MNFI offers several levels of Rare Species Reviews, including field surveys which I would be happy to discuss with you.

Sincerely,

Michael A. Sanders

Michael A. Sanders
Environmental Review Specialist/Zoologist
Michigan Natural Features Inventory

MSU EXTENSION

Michigan Natural Features Inventory

PO Box 13036
Lansing MI 48901

(517) 284-6200
Fax (517) 373-9566

mnfi.anr.msu.edu

Comments for Rare Species Review #2316: It is important to note that it is the applicant's responsibility to comply with both state and federal threatened and endangered species legislation. Therefore, if a state listed species occurs at a project site, and you think you need an endangered species permit please contact: Casey Reitz, Wildlife Division, Michigan Department of Natural Resources, 517-284-6210, or ReitzC@michigan.gov. If a federally listed species is involved and, you think a permit is needed, please contact Carrie Tansy, Endangered Species Program, U.S. Fish and Wildlife Service, East Lansing office, 517-351-8375, or Carrie_Tansy@fws.gov.

Special concern species and natural communities are not protected under endangered species legislation, but efforts should be taken to minimize any or all impacts. Species classified as special concern are species whose numbers are getting smaller in the state. If these species continue to decline they would be recommended for reclassification to threatened or endangered status.

Please consult MNFI's Rare Species Explorer for additional information regarding the listed species: http://mnfi.anr.msu.edu/explorer/search.cfm.

Table 1: Occurrences of threatened & endangered species within 1.5 miles of #2316

ELCAT	SNAME	SCOMNAME	USESA	SPROT	G_RANK	S_RANK	FIRSTOBS	LASTOBS
Animal	*Alasmidonta viridis*	Slippershell		T	G4G5	S2S3	1934	1934
Plant	*Galearis spectabilis*	Showy orchis		T	G5	S2	1889	1890-05
Plant	*Plantago cordata*	Heart-leaved plantain		E	G4	S1	1885	1889-05-18
Plant	*Dennstaedtia punctilobula*	Hay-scented fern		T	G5	S1	1889-06-17	1889-06-17

Of concern: No concerns

Table 2: Occurrences of special concern species & rare natural features within 1.5 miles of #2316

ELCAT	SNAME	SCOMNAME	USESA	SPROT	G_RANK	S_RANK	FIRSTOBS	LASTOBS
Animal	*Venustaconcha ellipsiformis*	Ellipse		SC	G4	S3	1934	1934
Animal	*Ptychobranchus fasciolaris*	Kidney shell		SC	G4G5	S2	1932	1934
Animal	*Alasmidonta marginata*	Elktoe		SC	G4	S3?	1926	1926
Animal	*Pleurobema sintoxia*	Round pigtoe		SC	G4G5	S3	1926	1934
Animal	*Villosa iris*	Rainbow		SC	G5Q	S3	1934-09	1934-09
Animal	*Pupilla muscorum*	Widespread column		SC	G5	S2	1947-07-10	1947-07-10
Animal	*Lasmigona costata*	Flutedshell		SC	G5	SNR	1926	1926
Animal	*Bombus auricomus*	Black and gold bumble bee		SC	G4G5	SNR	1948-07-01	1948-07-01

Of concern: No concerns

Codes to accompany Tables 1 and 2:

State Protection Status Code Definitions (SPROT)
E: Endangered
T: Threatened
SC: Special concern

Federal Protection Status Code Definitions (USESA)
LE = listed endangered
LT = listed threatened
LELT = partly listed endangered and partly listed threatened
PDL = proposed delist
E(S/A) = endangered based on similarities/appearance
PS = partial status (federally listed in only part of its range)
C = species being considered for federal status

Global Heritage Status Rank Definitions (GRANK)
The priority assigned by NatureServe's national office for data collection and protection based upon the element's status throughout its entire world-wide range. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.
G1 = critically imperiled globally because of extreme rarity (5 or fewer occurrences range-wide or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
G2 = imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
G3: Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g. a single western state, a physiographic region in the East) or because of other factor(s) making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.
G4: Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.
G5: Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
Q: Taxonomy uncertain

State Heritage Status Rank Definitions (SRANK)
The priority assigned by the Michigan Natural Features Inventory for data collection and protection based upon the element's status within the state. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.
S1: Critically imperiled in the state because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation in the state.
S2: Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.
S3: Rare or uncommon in state (on the order of 21 to 100 occurrences).
S4 = apparently secure in state, with many occurrences.
S5 = demonstrably secure in state and essentially ineradicable under present conditions.
SX = apparently extirpated from state.

Rare Species Review #2316
OHM Advisors
DWRF Project Plan
City of Owosso
Shiawassee County, MI
April 1, 2019

For projects involving Federal funding or a Federal agency authorization

The following information is provided to assist you with Section 7 compliance of the Federal Endangered Species Act (ESA). The ESA directs all Federal agencies "to work to conserve endangered and threatened species. Section 7 of the ESA, called "Interagency Cooperation," is the means by which Federal agencies ensure their actions, including those they authorize or fund, do not jeopardize the existence of any listed species."

The project falls within the range of four (4) federally listed/proposed species which have been identified by the U.S. Fish and Wildlife Service (USFWS) to occur in Shiawassee County, Michigan.

Federally Endangered

Indiana bat - there appears to be suitable habitat in our standard 1.5-mile search buffer. Indiana bats (*Myotis sodalis*) are found only in the eastern United States and are typically confined to the southern three tiers of counties in Michigan. Indiana bats that summer in Michigan winter in caves in Indiana and Kentucky. This species forms colonies and forages in riparian and mature floodplain habitats. Nursery roost sites are usually located under loose bark or in hollows of trees near riparian habitat. Indiana bats typically avoid houses or other artificial structures and typically roost underneath loose bark of dead elm, maple and ash trees. Other dead trees used include oak, hickory and cottonwood.

Foraging typically occurs over slow-moving, wooded streams and rivers as well as in the canopy of mature trees. Movements may also extend into the outer edge of the floodplain and to nearby solitary trees. A summer colony's foraging area usually encompasses a stretch of stream over a half-mile in length. Upland areas isolated from floodplains and non-wooded streams are generally avoided.

Management and Conservation: the suggested seasonal tree cutting range for Indiana bat is between October 1 and March 31 (i.e., no cutting April 1-September 30). This applies throughout the Indiana bat range in Michigan.

Federally Threatened

Northern long-eared bat - Northern long-eared bat (*M. septentrionalis*) numbers in the northeast US have declined up to 99 percent. Loss or degradation of summer habitat, wind turbines, disturbance to hibernacula, predation, and pesticides have contributed to declines in Northern long-eared bat populations. However, no other threat has been as severe to the decline as White-nose Syndrome (WNS). WNS is a fungus that thrives in the cold, damp conditions in caves and mines where bats hibernate. The disease is believed to disrupt the hibernation cycle by causing bats to repeatedly awake thereby depleting vital energy reserves. This species was federally listed in May 2015 primarily due to the threat from WNS.

Although no known hibernacula or roost trees have been documented within 1.5 miles of the project area, this activity occurs within the designated WNS zone (i.e., within 150 miles of positive counties/districts impacted by WNS. In addition, there appears to be suitable habitat within the 1.5-mile buffer. The USFWS has prepared

a dichotomous key to help determine if this action may cause prohibited take of this bat. Please consult the USFWS Endangered Species Page for more information. In addition, there appears to be suitable habitat within the 1.5-mile search buffer.

Also called northern bat or northern myotis, this bat is distinguished from other *Myotis* species by its long ears. In Michigan, northern long-eared bats hibernate in abandoned mines and caves in the Upper Peninsula; they also commonly hibernate in the Tippy Dam spillway in Manistee County. This species is a regional migrant with migratory distance largely determined by locations of suitable hibernacula sites.

Northern long-eared bats typically roost and forage in forested areas. During the summer, these bats roost singly or in colonies underneath bark, in cavities or in crevices of both living and dead trees. Roost trees are selected based on the suitability to retain bark or provide cavities or crevices. Common roost trees in southern Lower Michigan include species of ash, elm and maple. Foraging occurs primarily in areas along woodland edges, woodland clearings and over small woodland ponds. Moths, beetles and small flies are common food items. Like all temperate bats this species typically produces only 1-2 young per year.

Management and Conservation: when there are no known roost trees or hibernacula in the project area, we encourage you to conduct tree-cutting activities and prescribed burns in forested areas during October 1 through March 31 when possible, but you are not required by the ESA to do so. When that is not possible, we encourage you to remove trees prior to June 1 or after July 31, as that will help to protect young bats that may be in forested areas but are not yet able to fly.

Rufa red knot - there does not appear to be suitable habitat within our standard 1.5-mile search buffer. The rufa red knot (*Calidris canutus rufa*) is one of the longest-distance migrants in the animal kingdom, flying some 18,000 miles annually between its breeding grounds in the Canadian Arctic to the wintering grounds at the southern-most tip of South America. Primarily occurring along the Atlantic and Gulf coasts, small groups of this shorebird regularly use the interior of the United States such as the Great Lakes during the annual migration. The Great Lakes shorelines provide vital stopover habitat for resting and refueling during their long annual journey.

The largest concentration of rufa red knots is found in May in Delaware Bay, where the birds stop to gorge on the eggs of spawning horseshoe crabs; a spectacle attracting thousands of birdwatchers to the area. In just a few days, the birds nearly double their weight to prepare for the final leg of their long journey to the Arctic. This species may be especially vulnerable to climate change which affects coastal habitats due to rising sea levels.

Management and Conservation: applies to actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30.

Eastern massasauga rattlesnake – the project occurs outside of Tier 1 (occupied/high potential habitat) and Tier 2 (potential habitat) eastern massasauga habitat as designated by the US Fish and Wildlife Service. The federal and state threatened eastern massasauga rattlesnake *(Sistrurus catenatus)* is found in a variety of wetland habitats including bogs, fens, shrub swamps, wet meadows, marshes, moist grasslands, wet prairies, and floodplain forests. Eastern massasaugas occur throughout the Lower Peninsula but are not found in the Upper Peninsula. Populations in southern Michigan are typically associated with open wetlands, particularly prairie fens, while those in northern Michigan are better known from lowland coniferous forests, such as cedar swamps. These snakes normally overwinter in crayfish or small mammal burrows often close to the groundwater level and emerge in spring as water levels rise. During late spring, these snakes move into

adjacent uplands they spend the warmer months foraging in shrubby fields and grasslands in search of mice and voles, their favorite food.

Often described as “shy and sluggish”, these snakes avoid human confrontation and are not prone to strike, preferring to leave the area when they are threatened. However, like any wild animal, they will protect themselves from anything they see as a potential predator. Their short fangs can easily puncture skin and they do possess potent venom. Like many snakes, the first human reaction may be to kill the snake, but it is important to remember that all snakes play vital roles in the ecosystem. Some may eat harmful insects. Others like the massasauga consider rodents a delicacy and help control their population. Snakes are also a part of a larger food web and can provide food to eagles, herons, and several mammals.

Management and Conservation: any sightings of these snakes should be reported to the Michigan Department of Natural Resources, Wildlife Division. If possible, a photo of the live snake is also recommended.

USFWS Section 7 Consultation Technical Assistance can be found at:

https://www.fws.gov/midwest/endangered/section7/s7process/index.html

The website offers step-by-step instructions to guide you through the Section 7 consultation process with prepared templates for documenting “no effect.” as well as requesting concurrence on "may affect, but not likely to adversely affect" determinations.

Please let us know if you have questions.

Mike Sanders
Environmental Review Specialist/Zoologist
Sander75@msu.edu
517-284-6215

Appendix D. NTEC Reports

a. Standpipe
b. Tower

NTEC

Nelson Tank Engineering
& Consulting, Inc.

CITY OF OWOSSO
MAINTENANCE INSPECTION
1.25 MILLON GALLON
STANDPIPE

DATE: May 17, 2016

Phone: 517-321-1692 • Fax: 517-321-4405 • E-Mail: keith@nelsontank.com

TABLE OF CONTENTS

SUMMARY

Chicago Bridge & Iron, constructed the tank in 1953. The tank is a standpipe design constructed with a height to high water line of 75 feet. The tank has a dome roof that is supported by 28 beams and is of welded construction. The internal water-containing structure is equipped with a cathodic protection system. The Owner has indicated that maintenance painting was performed in 1986 on the interior and 1998 on the exterior.

The standpipe is in good structural condition. The tank has not been significantly damaged by active internal or external corrosion. Surface corrosion has developed along the interior intermittently, mostly above the waterline. The interior sidewall and floor, however, have suffered from previous pitting. The exterior tank has intermittent surface corrosion. Neither the interior nor exterior corrosion has had significant impact. The foundation is in good condition. Some erosion of fines of the foundation is noted along with intermittent vertical cracking. The grout is cracked and spalled in a few locations. Sod has overgrown many areas of the foundation.

The interior coating is an epoxy system that is in fair condition. Intermittent blistering has developed along with some cracking of the blisters. The exterior coating is faded and chalked.

The following maintenance is recommended. Associated probable cost for construction are provided for preparing a budget. These estimates do not include normal engineering costs:

Maintenance costs:

Item	Recommended Repair	Estimated Cost
1	Power wash, spot power tool clean and recoat exterior	$87,500
2	Abrasive blast clean and repaint interior	$167,600
3	Abrasive blast clean and paint pump house piping	$15,000
4	Install roof ladder	$7,300
5	Remove obsolete conduit from exterior roof	Incidental
6	Weld plates over cathodic caps and conduit holes and remove cathodic protection	$3,400
7	Replace roof vent with frost free design	$4,400
8	Remove overgrown sod from foundation and repair grout	$3,500
	TOTAL	$288,700

INTRODUCTION

Nelson Tank Engineering & Consulting, Inc. (NTEC) conducted a maintenance inspection on the 1,250,000-gallon standpipe owned by the City of Owosso. The inspection consisted of an evaluation of the structural condition of the tank and appurtenances, a review of the coatings' condition and an evaluation of potential environmental, health and safety concerns. Ray Otberg, lead technician, and Jim Gardner and Matt Otberg, field technicians, completed the inspection on April 26, 2016. David Haut, Water Filtration Supervisor, scheduled the inspection. The City provided personnel for assistance to expedite the inspection.

The tank was drained prior to the inspector's arrival. NTEC provided the pump and sprayer to perform the cleaning of interior surfaces and removal of sediments. Upon completion of the inspection, the tank was chlorinated per AWWA C652-92 method # 2 using calcium hypochlorite. Bacteriological sampling and testing were performed by the Owner.

The inspection consists primarily of a visual observation of the condition of the tank, appurtenances, coatings and exposed foundations. The inspection was conducted in accordance with a combination of AWWA D101 methods and procedures developed by NTEC. Coatings are reviewed for percent intact based upon Steel Structures Painting Council (SSPC) visual standards. Coatings are reviewed for signs of failure that include, but are not limited to: lifting, delaminating, cracking and blistering. Defects, such as overspray, runs and sags, are discussed when they are determined remarkable.

The tank and appurtenances are reviewed for visual signs of corrosion or structural damage. Corrosion damage is evaluated by visual observations and by using depth gauges or calipers wherever possible. Ultrasonic testing is only used in instances where the original plate thickness cannot be established. Estimates of internal pitting are prepared for each of the individual locations (i.e. roof, sidewall, bowl and riser) by selecting a representative area within each location. The estimate for total pitting within each location is then extrapolated from the representative area.

Environmental testing is performed on coatings only when uncertainty exists. Testing, therefore, is not performed on epoxy or polyurethane coating systems. Samples are analyzed to determine the presence of metals (lead, chromium and cadmium) in the coating system. Samples are collected by removing coating from the steel substrate. The reliability of the results is highly dependent upon sampling techniques. Variations in accuracy may be caused by difficulties in removing all the primer, multiple coating systems and variations in dry film thickness.

Estimates of probable costs are provided within the recommendations and summary of this report for the construction year reported. Probable costs are based upon the competitive bidding prices for construction costs only and do not include engineering

costs. Construction costs are evaluated for prices received in the past year for similar work plus inflation for one year.

Estimates consider the method of surface preparation, applied coatings, surface area, complexity and location of the structure and environmental compliance requirements. Estimates do not consider variations imposed by market factors, revisions in the scope of work, work performed with restricted schedules or projects scheduled in low temperature seasons.

EVALUATION

INTERIOR

The tank is lined with a three-coat epoxy system applied in 1986 by Richard Brothers Painting. The epoxy coating is in fair condition with blistering developing along the floor. The coating has been stained from the mineral and iron content of the water. The staining does not affect the performance of the coating system. Several defects were observed in varying locations. The following is a description of the classifications of the remaining intact coating along with notable defects or the presence of corrosion.

The epoxy coating remains 99.9 percent intact along the roof. Coating deterioration is occurring on the lap seams, however, adjacent plate surfaces have fully intact coating. Coating deterioration is, also, occurring along the roof beams and cathodic lift holes.

The epoxy coating remains over 99.99 percent intact along the sidewall and bowl. The coating has blistered throughout the surfaces below the water line, however, the majority of blisters noted were along the floor. This coating failure may be attributed to inadequate or improper cure. Solvent becomes entrapped within the coating film when the cure process is not complete. Solvent entrapment may be caused from inadequate cure times, excessive dry film thickness or defective materials. Several of the blisters have popped, exposing the steel substrate.

The tank's interior steel plating is in good condition. Active corrosion was evident above the water line in the form of surface corrosion along the roof beams, lap seams and the sidewall/roof seam. Evidence of corrosion below the water line is in the form of holidays where blisters have broken. Evidence of prior corrosion is apparent in the form of pitting along the lower sidewalls and floor, however, the existing coating appears to be protecting these areas.

The tank is equipped with a cathodic protection system. The cathodic protection system is apparently functioning properly, as there is no evidence of active galvanic cell corrosion. The system is a horizontal design consisting of titanium oxide anodes connected to the floor. The anode remains in its original design position with no obvious damage.

EXTERIOR

The tank's exterior is coated with a polyurethane system applied in 1998 by Richard Brothers. Several minor defects were observed in varying locations. The following is a description of the classifications of the remaining intact coating along with notable defects or the presence of corrosion.

The polyurethane coating is in fair condition with no signs of premature failure. The coating has good adhesion with no signs of lifting or delamination. The coating system remains 99.99 percent intact along the sidewall. Coating breaks, likely due to rock chips, were observed along the lower sections of the sidewall. Light surface corrosion was noted at the coating breaks. There are no significant misses or skips apparent in the finish coat. The coating is faded and chalked.

The polyurethane coating remains over 98 percent intact along the roof. The coating has faded and chalked. Intermediate coat bleed-through is apparent, however, the underlying coats are holding and remain 100 percent intact.

The coating remains 60 percent intact on piping in the pump house adjacent to the tank. The coating is lifting, especially in the lower level of the pump house. Heavy scale and surface corrosion was noted throughout.

The coating's adhesion was tested using a crosshatch adhesion method. This is a modified version of the ASTM D3359 and as a result does not replicate the same results as the ASTM. This modified test method is used by NTEC to determine the coating's overall adhesion and cohesion. NTEC uses this method for evaluation of coating systems for repair. When results indicate good adhesion, coatings may be top coated with compatible coating systems. Similarly, results indicating poor adhesion should not be top coated. The test, although important, is only one of the variables used to assess the coating's ability to be top coated. Other variables include, but are not limited to: the generic type of coating, the age of the coating, number of coats, percent intact, presence of defects or failure and dry film thickness.

The method consists of cutting a lattice pattern in the painted surface using a guide. Pressure sensitive tape is applied to the scribed area and then removed. The remaining pattern is evaluated by comparison with descriptions and illustrations. The illustrations are classified ranging from 0B to 5B. 0B represents greater than 65% removal of the coating and 5B represents fully intact coating.

Tests were performed on the roof and sidewalls. The following represents the classifications observed:

1. Roof 5B
2. Sidewalls 5B

A coating sample was collected from the piping in the pump house and analyzed for total lead, chromium and cadmium (EPA 600/R-93/200M). The test determined below detectable levels of lead, chromium and cadmium.

The appurtenances include sidewall staircase, overflow pipe, vent, balcony and hatches. The sidewall staircase is located along the eastern and southern sidewall. The staircase is in good condition with no significant corrosion damage observed. The staircase has a 42-inch handrail and an upper platform that are both in good condition with no significant corrosion noted.

The overflow pipe and support bracing are in good condition. There was no evidence of significant external corrosion. The base of the overflow pipe has a screen to prevent contamination. The screen remains intact and in good condition.

The vent is an umbrella dome design located at the center of the roof. The vent appears to be in good condition. The roof is not equipped with a ladder to reach the roof peak, therefore, a close observation of the vent and screen could not be made, as there was no area to tie off to. As viewed from the upper staircase platform, it appeared that there was no significant external corrosion and that the screen is in good condition.

The tank contains three hatches: two on the sidewall and one on the roof. The sidewall hatches are in good condition. The roof hatches are in good condition, however, the ring has surface corrosion present.

Cathodic lift holes have been cut in the roof plates. The openings are used for replacement of the damaged or spent cathodic protection anodes. The openings are capped with aluminum covers that have gaskets and can be tightened from the exterior.

The exposed concrete foundation was visually inspected for deterioration, undermining and root encroachment. Small surface cracks have developed intermittently. The sod is encroaching on the foundation in several areas. The root network has the potential to penetrate cracks and cause structural damage. The grout is in fair to poor condition with some spalling and delamination occurring along the outer perimeter.

RECOMMENDATIONS

INTERIOR

NTEC recommends removal of the existing coating by abrasive blast cleaning to a near white grade and application of a three coat epoxy system. The epoxy paint system has been used extensively for interior lining of potable water storage tanks. The coating offers a combination of good adhesion, abrasion resistance and relatively low cost. Not all epoxy systems may be used in potable water storage tanks. Epoxy coating systems require certification from the National Sanitation Foundation (NSF) prior to their use in potable service applications. Epoxy coatings, normally, require a minimum substrate surface temperature of fifty degrees unless accelerated. Accelerated versions will allow application at surface temperatures down to thirty-five degrees or less. The abrasive blast cleaning will create a spent material waste that requires testing prior to disposal. TCLP tests are performed to determine whether the spent abrasive is hazardous or non-hazardous. The landfill determines the number and type of contaminants to be tested (normally eight metals). In most cases, the test determines the waste nonhazardous. The estimated cost for painting is $167,600.

NTEC recommends removal of the obsolete cathodic protection paraphernalia from the roof. This would include all old wires, conduit, insulators and cathodic caps. Permanent caps would be welded over the existing lift holes to eliminate contamination points of entry. The estimated cost is $3,400.

EXTERIOR

NTEC recommends maintenance painting for the tank's exterior. The existing coating has good adhesion and, therefore, provides a suitable substrate. We recommend power washing, spot power tool cleaning and application of a three coat polyurethane system. The polyurethane system would incorporate a binder coat that would be compatible with the existing coating. Painting will eliminate corrosion and extend the remaining life of the existing coating. The estimated cost would be $87,500.

We recommend installation of a ladder to the roof. Currently, there is no way to reach the center roof safely, as there are no tie-off points. We would, also, recommend installation of a fall prevention device to the roof ladder. OSHA requires fall prevention devices on all fixed ladders greater than 20 feet in length and all caged ladders greater than 30 feet in length. The device consists of either a cable or rail attached to the ladder with a braking mechanism that glides along the cable or rail. We recommend installing the cable style device due to its unencumbered ease of operation. The system comes with cable, brackets, belts and cable glide. The estimated cost is $7,300.

We recommend installation of a new vent in the center of the roof. The new vent would be a frost free design with screened openings. The estimated cost to furnish and install the vent is $4,400.

We recommend removal of overgrown sod from around the tank footing and repair of loose and missing grout. After removal of the the sod from the tank foundation a further evaluation of damage to the grout can be made. A contingency estimate for sod removal and grout repair would be $3,500.

PUMP HOUSE PIPING

NTEC recommends removal of the existing coating by abrasive blast cleaning to a commercial grade and application of a three-coat epoxy system. The existing coating, generally, has poor adhesion and provides an unsuitable substrate for painting. Therefore, painting over the existing paint is not recommended due to imminent adhesion failure. Some nuts and bolts may need to be replaced, as well. The estimated cost would be $15,000.

ANALYTICAL LABORATORY REPORT

Tuesday, May 10, 2016

CUSTOMER: Nelson Tank Engineering & Consultants
16240 Nation Parkway
Lansing, MI 48906

DATE RECEIVED: Friday, May 6, 2016
PO/PROJECT #:
SUBMITTAL #: 2016-05-06-015

LAB NUMBER: AC12379

Sampled By: Ray Otberg
Job Location: Owosso, MI
Sample Identification: 1: Owosso stand pipe, valve vault pipe

Date Sampled: Tuesday, April 26, 2016
Sample Description: Paint Chips

Preparation Method: EPA 3050B-P-M (Acid Digestion for Paints)
Analysis Method: EPA 6010C (ICP-AES Method for Determination of Metals)
Date Analyzed: Tuesday, May 10, 2016

ELEMENT	RESULT (by dry weight)	REPORTING LIMIT (RL)
Cadmium	**< RL**	0.00075 %
Chromium	**1.8 %**	0.0013 %
Lead	**0.0037 %**	0.0025 %

ANALYTICAL LABORATORY REPORT

CUSTOMER: Nelson Tank Engineering & Consultants
16240 Nation Parkway
Lansing, MI 48906

DATE RECEIVED: Friday, May 6, 2016
PO/PROJECT #:
SUBMITTAL #: 2016-05-06-015

Unless otherwise noted, the condition of each sample was acceptable upon receipt, all laboratory quality control requirements were met, and sample results have not been adjusted based on field blank or other analytical blank results. Individual sample results relate only to the sample as received by the laboratory.

Tests Reviewed By: Jason Kraai, Senior Analyst Jason Kraai 2016.05.10 15:38:35 -04'00'

CCC&L has obtained accreditation under the following programs:

- **National Lead Laboratory Accreditation Program (NLLAP)**
  ELLAP: AIHA-LAP Laboratory ELLAP Accreditation Program Laboratory, ID#101030 (www.aihaaccreditedlabs.org)
  OH: Ohio Department of Health Lead Poisoning Prevention Program, Approval #E10013 (www.odh.ohio.gov)
- **AIHA-LAP Laboratory IHLAP Accreditation Program** (www.aihaaccreditedlabs.org)
  IHLAP: Laboratory ID#101030
- **National Environmental Laboratory Accreditation Program (NELAP)**
  NY: State of New York Department of Health, Laboratory ID#11609 (Serial # 54336 - 54340) (518-485-5570)
  LA: State of Louisiana Department of Environmental Quality, Laboratory ID#180321 (Certificate 05036) (www.deq.louisiana.gov)
  OK: Oklahoma Department of Environmental Quality, Laboratory ID#9993 (Certificate 2015-059) (www.deq.state.ok.us)

Testing which is performed by CCC&L according to test methods, or for elements which are not included in the table below fall outside of the current scope of laboratory accreditation. Customers are encouraged to verify the current accreditation status with the individual accreditation programs by calling or visiting the appropriate website for the applicable program.

SCOPE OF ACCREDITATION

Air and Emissions

Element/Test	Method	Accreditation(s)
Suspended Particulates: PM10 / TSP	40 CFR 50 Appendix J / 40 CFR 50 Appendix B	NY, LA
Lead in Airborne Dust	NIOSH 7300	ELLAP, OH, NY, LA
Lead in Airborne Dust	EPA 600/R-93/200/ EPA 6010C	ELLAP, OH
Metals in Airborne Dust	EPA 600/R-93/200/ NIOSH 7300/ EPA 6010C	IHLAP
Surface Coating: Density	ASTM D1475	NY
Surface Coating: Percent Solids	ASTM D2697	NY
Surface Coating: Percent Water	EPA 24	NY
Surface Coating: Volatile Content	EPA 24 / ASTM D2369	NY

Solid Chemical Materials

Element/Test	Method	Accreditation(s)
TCLP	EPA 1311(Sample Preparation Method)	NY, LA, OK
Lead in Soil	EPA 3050B/ EPA 6010C	ELLAP, OH, NY, LA, OK
Lead in Paint	EPA 3050B/ EPA 6010C	ELLAP, OH, NY, LA
Lead in Paint	ASTM D 3335-85A/ EPA 6010C	NY
Lead in Dust Wipes	EPA 3050B/ EPA 6010C	NY, LA
Lead in Dust Wipes	EPA 600/R-93/200/ EPA 6010C	ELLAP, OH
Ignitability	EPA 1010A	NY

Non-Potable Water / Analysis by ICP			Solid Chemical Materials	
Element/Test	Method	Accreditation(s)	Method	Accreditation(s)
Arsenic	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA
Barium	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA
Cadmium	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA
Chromium	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA
Copper	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA
Lead	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA, OK
Mercury	EPA 245.1 Rev.3/ EPA 7470A	NY, LA, OK	EPA 7471B	NY, LA
Nickel	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA
Selenium	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA
Silver	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA
Zinc	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA
Cobalt	----	----	EPA 6010C	NY, LA
Manganese	----	----	EPA 6010C	NY, LA
Acid Digestion	EPA 3010A	NY, LA	EPA 3050B	NY, LA

FIELD REPORT FORM

I. GENERAL

OWNER:	City of Owosso	DATE:	April 26, 2016
ADDRESS:	Pearce Street	HEIGHT:	75' HWL
TANK SIZE:	1,250,000 gallons	CONSTRUCTION:	Welded
TANK DESIGN:	Standpipe	LETTERING:	Owosso (x2)
MANUFACTURE:	CBI	LOGO:	Roof tops and water (x2)
ERECTION DATE:	1953	COLOR:	Blue
LEAD INSP:	Ray Otberg	ASST INSP:	Jim Gardner, Matt Otberg

II. CONTROLS

CONTROL LOCATION:	Pump House	BRAND:	--
TELEMETERED:	Yes	RADIO TRANS:	No
HEATED:	No	INSULATED:	Brick Building
CATHODIC PROTECTION:	Yes	MANUFACTURE:	Corrpro
RECTIFIER (MAN, AUTO):	Auto	OPERATIONAL:	Yes
ANODE DESIGN:	Titanium oxide anodes	CONFIGURATION:	Horizontal
ANY DAMAGE:	No	DESCRIBE:	--

III. VALVE VAULT

VAULT CONDITION:	Good	HEATED:	No
INSULATED:	No	WATER SEEPAGE:	Floor was wet
PIPING CONDITION:	Fair	COATING INTACT:	60%
EXPANSION JOINT TYPE:	N/A	CONDITION	--
ALTITUDE VALVE:	No	CONDITION:	--

IV. FOUNDATION

CONDITION OF CONCRETE:	Good/Fair
ANY APPARENT SETTLEMENT:	Some
SOIL EROSION OR LACK OF COVER:	No
CRACKS:	Yes
DELAMINATION:	No
SPALLING:	Minor
AGGREGATE EXPOSED:	Yes
CONDITION OF GROUT:	N/A
CONDITION OF BASE PLATES:	Good
CONDITION OF ANCHOR BOLTS:	N/A

SHRUBS ENCROACHING:	Grass has grown over many areas.

V. EXISTING COATING HISTORY

SURFACE	DATE	PAINT SYSTEM	MANUFACTURE	CONTRACTOR
INTERIOR:	1986	Epoxy	Tnemec	Richard Brothers
EXTERIOR:	1998	Polyurethane	Tnemec	Richard Brothers

VI. EXTERIOR CONDITIONS

A. SIDEWALLS

NUMBER OF SHELL SECTIONS:	11
GENERAL CONDITION OF COATING:	Fair
PERCENT TOPCOAT INTACT:	99.99
PERCENT INTERMEDIATE/PRIMER INTACT:	99.99
COMMENTS:	5B adhesion. Coating is faded and chalked. Several areas exist along the lower plates where coating breaks are apparent, most likely do to rock chips.

B. SIDEWALL STAIRCASE

CONDITION OF CONNECTIONS:	Good
GENERAL CONDITION OF COATING:	Fair
PERCENT TOPCOAT INTACT:	99.99
PERCENT INTERMEDIATE/PRIMER INTACT:	99.99
CORROSION PRESENT:	Surface
DEGEE OF CORROSION:	Minor
ACCUMULATED DEBRIS:	No
HEIGHT:	42"

C. ROOF

DESIGN:	Dome
GENERAL CONDITION OF COATING:	Fair
PERCENT TOPCOAT INTACT:	98
PERCENT INTERMEDIATE/PRIMER INTACT:	100
COMMENTS:	Coating has faded and is chalked. Top coat bleed-through in varying locations. 5B adhesion.

D. ACCESSORIES

LADDER CONDITION:	No	FALL PREVENTION:	--
CAGED:	--	IF YES, WHERE:	--
SHELL LADDER FIXED:	--	ROOF LADDER FIXED:	N/A
OVERFLOW PIPE SIZE:	6"	CONDITION:	Good
SCREENED:	Yes	CONDITION:	Good
STUB:	No	GROUND LEVEL:	Yes
MANWAY SIZE	24" (2)	GASKET CONDITION:	Good
RISER MANWAY SIZE:	N/A	GASKET CONDITION:	--
MUD VALVE:	No	SIZE:	--
CONDITION OF VENT:	Appears good	DESIGN:	Dome
SCREENED:	Perforated holes	CONDITION:	Appears good
CATHODIC CAPS:	Yes – 12	MISSING OR SLIPPED:	No
ROOF HATCH SIZE:	24"	CONDITION:	Fair, some scale corrosion
AVIATION LIGHTS:	No	CONDITION:	--
OBSTRUCTIONS:	No	ANTENNAE:	No

VII. INTERIOR CONDITIONS

A. FLOOR

GENERAL CONDITION OF COATING:		Good	
PERCENT TOPCOAT INTACT:		99.99	
PERCENT INTERMEDIATE/PRIMER INTACT:		99.99	
ACTIVE CORROSION:	Yes	TYPE:	Starter pits
CONCENTRATION:	Blistered areas	INACTIVE CORROSION:	Yes
DEEPEST PIT:	1/16"	AVG PIT DEPTH:	1/32"
PIT ESTIMATE:	10,000	WELDING ESTIMATE:	0
PRIOR PIT WELDS:	No	# TO GRIND:	--
STRAY WELDS:	No	LINEAL ESTIMATE:	--
FILL PIPE DIAMETER:	16"	DRAIN DIAMETER:	--
ADDTNL PIPING:	No	CONDITION:	--
COMMENTS:	Tank is equipped with cathodic protection that is currently protecting the exposed steel. Approximately 1 to 2 inches of sediment was removed from the tank floor.		

B. SIDEWALL

GENERAL CONDITION OF COATING:	Good/Fair
PERCENT TOPCOAT INTACT:	99.99

PERCENT INTERMEDIATE/PRIMER INTACT:		99.99	
ACTIVE CORROSION:	Yes	TYPE:	Surface
CONCENTRATION:	Upper sidewall	INACTIVE CORROSION:	Yes
DEEPEST PIT:	1/16"	AVG PIT DEPTH:	1/32"
PIT ESTIMATE:	50,000	WELDING ESTIMATE:	0
PRIOR PIT WELDS:	Yes	# TO GRIND:	≈5
STRAY WELDS:	No	LINEAL ESTIMATE:	--
PAINTER'S RAIL:	No	STIFFENER:	No
ANY LADDER:	No	CONDITION:	--
COMMENTS:	Most coating failure and corrosion is above the high water line where the cathodic protection cannot protect it.		

C. ROOF

GENERAL CONDITION OF COATING:		Fair	
PERCENT TOPCOAT INTACT:		99.9	
PERCENT INTERMEDIATE/PRIMER INTACT:		99.9	
ACTIVE CORROSION:	Yes	TYPE:	Surface
CONCENTRATION:	Couplings and cathodic caps	INACTIVE CORROSION:	No
DEEPEST PIT:	--	AVG PIT DEPTH:	--
PIT ESTIMATE:	0	WELDING ESTIMATE:	--
ROOF BEAMS:	Yes	DESIGN:	
NUMBER:	28	CONDITION:	Good
CORROSION TYPE:	Surface	EST. PERCENT LOSS:	<1%
BOLTS:	No	CONDITION:	--
COMMENTS:	Coating failure and corrosion is occurring along the lap seams, beams, couplings, cathodic caps and the roof/sidewall connection.		

Note: Percentage of intact coating is based upon visual observation of actual paint remaining in comparison to SSPC-Guide Visual Standard No. 2, Figure 1. It does not indicate the coating has good adhesion, is free from defects or is failing. Any surface preparation estimates should consider these variables.

VIII. RECOMMENDATIONS

REPAIRS:	Install ladder to exterior roof. Remove obsolete conduit from exterior roof. Weld permanent plates over cathodic caps and holes left from conduit removal. Replace roof vent with frost free design.
PAINTING:	Power wash, power tool clean and recoat exterior. Abrasive blast clean and paint wet interior. Abrasive blast clean and paint piping in pump house.
MISC:	Remove cathodic protection. Remove overgrown sod from tank foundation.

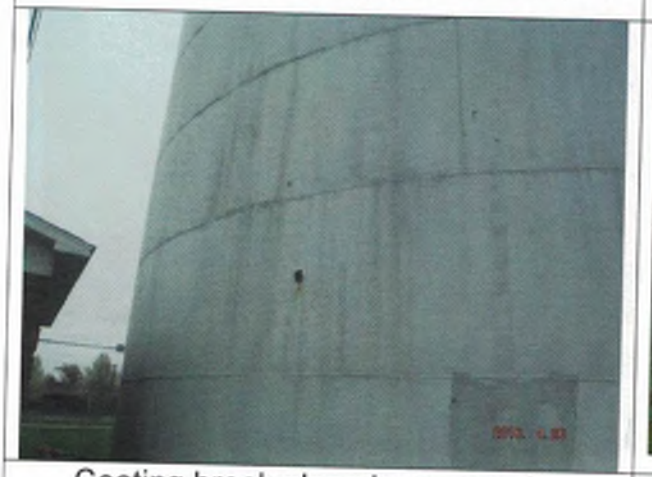
ASTM D 3359 METHOD B - VISUAL CLASSIFICATIONS

Classification	Surface of Cross-Cut Area From Which Flaking Has Occurred		
5B	None		
4B		(1% To 5%) 	
3B		(6% To 15%) 	
2B		(16% To 35%) 	
1B		(36% To 65%) 	
0B	Greater Than 65%		

5B The edges of the cuts are completely smooth; none of the squares of the lattice is detached.
4B Small flakes of the coating are detached at intersections; less than 5% of the area is affected.
3B Small flakes of the coating are detached along edges and at intersection of cuts. The area affected is 5 to 15% of the lattice.
2B The coating has flaked along the edges and on parts of the squares. The area affected is 15 to 35% of the lattice.
1B The coating has flaked along the edges of cuts in large ribbons and whole squares have detached. The area affected is 35 to 65% of the lattice.
0B Flaking and detachment worse than Grade 1B.

1,250,000 gallon standpipe, Owosso, MI

Lower exterior sidewall

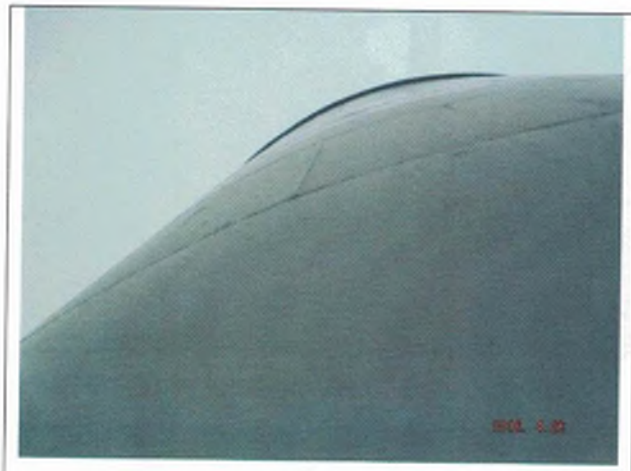


Coating break along lower exterior sidewall

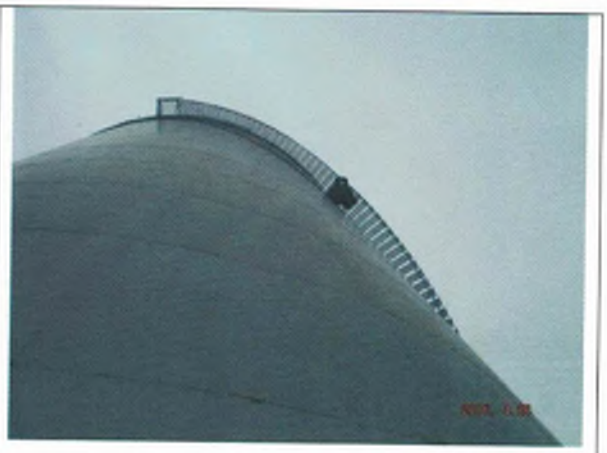
Lower sidewall and foundation

Lower sidewall and foundation

Spalling of foundation



Exterior sidewall



Exterior sidewall and staircase

North manway hatch

Conduit for cathodic protection entering the north sidewall

Controls in pump house

Piping on main floor of pump house

Piping in lower level of pump house

Fill line in lower pump house

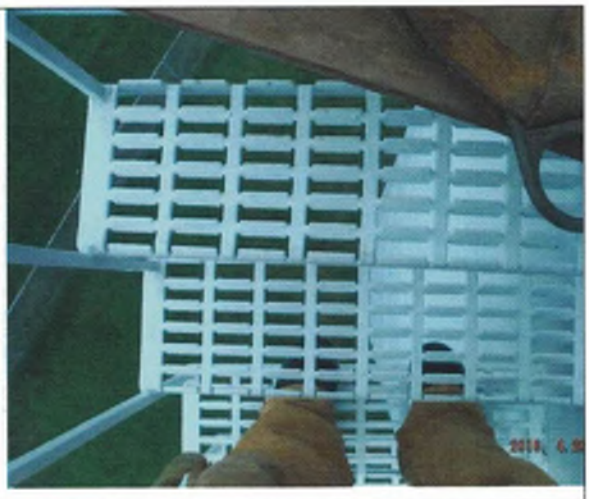
Overflow pipe screen

Lower exterior staircase

Lower sidewall staircase

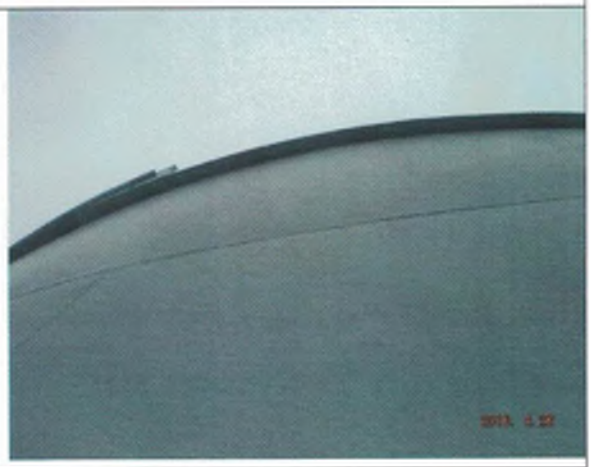
Typical view of bottom side of staircase handrail

Mid sidewall staircase



Typical view of steps on staircase

Upper sidewall staircase



Upper exterior sidewall

Exterior roof

Exterior roof and roof vent

View of staircase from roof

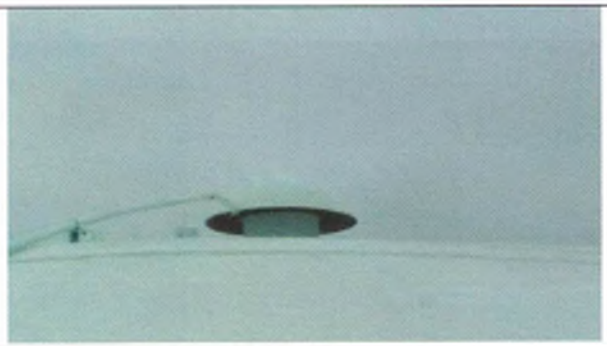
Adhesion test on exterior roof

Exterior roof and obsolete conduit

Roof handrail is 42" in height

Cut off obsolete conduit on exterior roof

Obsolete conduit entering tank roof is loose



Roof vent

Interior roof

Interior floor and and sidewalls after cleaning

Outer interior roof and upper sidewall

Outer interior roof and upper sidewall

Outer interior roof and upper sidewall

Upper interior sidewall

Upper interior sidewall

Close up of outer roof sidewall seam

Apparent pit repair on interior sidewall seam

Interior roof

Interior sidewall. Repair of above photo can be seen near center of photo

Interior sidewall

Interior sidewall and floor

West hatch and floor

Blistering of coating on floor

More blistering of coating on floor

Holidays along floor

Blistering and holiday from popped blister on floor

Interior floor

NTEC
Nelson Tank Engineering
& Consulting, Inc.
16240 National Parkway
Lansing, MI 48906

CITY OF OWOSSO
MAINTENANCE INSPECTION
600,000 GALLON
ELEVATED TANK

DATE: May 19, 2016

Phone: 517-321-1692 • Fax: 517-321-4405 • E-Mail: keith@nelsontank.com

TABLE OF CONTENTS

SUMMARY

Chicago Bridge & Iron, constructed the tank in 1996. The tank is a spheroid design constructed with a height to low water line of 78 feet. It is supported by a single pedestal of welded construction. The internal water-containing structure is equipped with a cathodic protection system. Maintenance has not been performed since 1996 when the interior and exterior were originally painted.

The elevated water storage tank and appurtenances are in good structural condition. The tank has not been significantly damaged by internal or external corrosion. The tank's foundation is in good condition with little evidence of deterioration. The wet interior coating is an epoxy system that is in poor condition, 99 percent intact. Areas of lifting and poor adhesion were observed. The dry interior coating is an epoxy system that is in poor condition with only 50 percent intact in some areas. The exterior coating is a polyurethane system that is in fair condition, 99.99 percent intact.

The following maintenance is recommended. Associated probable costs for construction are provided for preparing a budget. These estimates do not include normal engineering costs:

Maintenance costs (2016):

Item	Recommended Repair	Estimated Cost
1	Pressure wash exterior followed by power tool cleaning and overcoat.	$95,000
2	Abrasive blast clean and paint wet interior.	$90,000
3	Abrasive blast clean and paint dry interior.	$40,000
4	Replace mud valve.	$4,600
5	Install new frost free roof vent.	$4,400

INTRODUCTION

Nelson Tank Engineering & Consulting, Inc. (NTEC) conducted a maintenance inspection on the 600,000-gallon elevated storage tank owned by the City of Owosso. The inspection consisted of an evaluation of the structural condition of the tank and appurtenances, a review of the coatings' condition and an evaluation of potential environmental, health and safety concerns. Steve Kwart, Jim Gardner, and Matt Otberg, field technicians, completed the inspection on April 18, 2016. David Haut, Water Filtration Supervisor, scheduled the inspection. The City provided personnel for assistance to expedite the inspection.

The tank was drained prior to the inspector's arrival. NTEC provided the pump and sprayer to perform the cleaning of interior surfaces and removal of sediments. Upon completion of the inspection, the tank was chlorinated per AWWA C652-92 method # 2 using calcium hypochlorite. Bacteriological sampling and testing were performed by the Owner.

The inspection consists primarily of a visual observation of the condition of the tank, appurtenances, coatings and exposed foundations. The inspection was conducted in accordance with a combination of AWWA D101 methods and procedures developed by NTEC. Coatings are reviewed for percent intact based upon Steel Structures Painting Council (SSPC) visual standards. Coatings are reviewed for signs of failure that include but are not limited to: lifting, delaminating, cracking and blistering. Defects, such as overspray, runs and sags, are discussed when they are determined remarkable.

The tank and appurtenances are reviewed for visual signs of corrosion or structural damage. Corrosion damage is evaluated by visual observations and by using depth gauges or calipers wherever possible. Ultrasonic testing is only used in instances where the original plate thickness cannot be established. Estimates of internal pitting are prepared for each of the individual locations (i.e. roof, sidewall, bowl and riser) by selecting a representative area within each location. The estimate for total pitting within each location is then extrapolated from the representative area.

Environmental testing is performed on coatings only when uncertainty exists. Testing, therefore, is not performed on epoxy or polyurethane coating systems. Samples are analyzed to determine the presence of metals (lead, chromium and cadmium) in the coating system. Samples are collected by removing coating from the steel substrate. The reliability of the results is highly dependent upon sampling techniques. Variations in accuracy may be caused by difficulties in removing all the primer, multiple coating systems and variations in dry film thickness.

Estimates of probable costs are provided within the recommendations and summary of this report for the construction year reported. Probable costs are based upon the competitive bidding prices for construction costs only and do not include engineering costs. Construction costs are evaluated for prices received in the past year for similar

work plus inflation for one year. Estimates consider the method of surface preparation, applied coatings, surface area, complexity and location of the structure and environmental compliance requirements. Estimates do not consider variations imposed by market factors, revisions in the scope of work, work performed with restricted schedules or projects scheduled in low temperature seasons.

EVALUATION

WET INTERIOR

The tank is lined with a three-coat epoxy system applied in 1996. The epoxy coating is in poor condition with several areas of deterioration. The coating appears to have poor adhesion with several signs of lifting. The following is a description of the classifications of the remaining intact coating along with notable defects or the presence of corrosion.

The epoxy coating remains 99.7 percent intact along the roof. Coating deterioration is occurring on the lap seams and adjacent plate surfaces. Coating deterioration is, also, occurring along the access tube, vent opening and couplings through the roof shell. Surface rust exists in these locations.

The epoxy coating remains 99 percent intact along the access tube and equator. The coating appears to have poor adhesion with significant areas of coating failure. Mill scale and surface rust exists, intermittently, along the surface. The epoxy coating remains 99.9 percent intact along the bowl.

The tank's interior steel plating is in good condition. Corrosion has resulted where the coating system deteriorated. Damage to the interior tank has been minimal. Corrosion has, generally, been more aggressive below the water line. Corrosion is a surface rust and light scale occurring where the coating has deteriorated or the film thickness is minimal. Steel losses due to corrosion have been relatively insignificant.

Scale corrosion has developed along the exposed surface above the water line. The scale corrosion has manifested itself along areas of the vent opening, access tube and hatches. The scale is relatively minor and has had no significant impact.

The tank is equipped with a cathodic protection system. The cathodic protection system is, apparently, functioning properly as there is no evidence of active galvanic cell corrosion. The system is a horizontal design consisting of a titanium oxide anode connected to the access tube. The anode remains in its original design position with no obvious damage.

The ladder in the tank proper is in good condition. The ladder is connected to the access tube and descends down it to the bowl. The rungs and rails remain intact with no obvious damage due to icing.

DRY INTERIOR

The dry interior is lined with an epoxy system which is the original applied in 1996. The tank is painted with epoxy throughout the dry interior. The lower basebell has been insulted with a spray on insulation, possibly a cellulose. The insulation remains intact and in good condition.

The epoxy coating is in fair to poor condition with several areas of deterioration. The coating appears to have poor adhesion, small cracks and signs of pinhole corrosion. The following is a description of the classifications of the remaining intact coating along with notable defects or the presence of corrosion.

The epoxy coating remains 99.9 percent intact along the pedestal. Minor deterioration of the coating was observed along the platforms and stiffeners. The coating is lifting in these locations with surface corrosion forming.

The epoxy coating remains 50 percent intact along the inverted cone. Surface corrosion, caused by small cracks developing in the coating, has speckled the entire surface. Surface corrosion has also formed along the exterior mud valve and drain piping. The epoxy coating remains 70 percent intact along the access tube with similar coating defects. Minor surface corrosion and scale has formed along the overflow pipe weir box, compression manway and its retaining clamps.

The appurtenances include piping, valves and ladders. Ladders are located in the basebell, pedestal and access tube. The ladders are in good condition with minor corrosion damage observed. The ladders have a rail-type fall prevention system. The fall prevention system is in good condition. The rail appears in proper alignment with the hardware secured in place. Cables are improperly attached along the ladder rails instead of the brackets.

The tank includes the following piping: fill pipe, overflow pipe and mud valve drain pipe. All piping and support bracing are in good condition. There was no evidence of significant external corrosion. The fill pipe is covered with a urethane insulation and aluminum frost jacket. The insulation is secured to the pipe in sections. The insulation and frost jacket are in good condition and all sections remain intact.

The condensate drain is a 4-inch hose that is connected to the overflow pipe. A 4-inch mud valve is located in the lower inverted cone. It is connected to a pipe that extends down to the basebell and out the wall. The valve is designed for removal of sediments during routine cleaning. The valve was opened but was not working properly during the tank cleaning.

The basebell contains the inlet/outlet piping, gate valves, expansion joint and altitude valve. The coating is in fair condition on the piping with the expansion joint covered by insulation.

EXTERIOR

The tank's exterior is coated with a polyurethane system applied in 1996. Several minor defects were observed in varying locations. The following is a description of the classifications of the remaining intact coating along with notable defects or the presence of corrosion.

The polyurethane coating is in good condition with few signs of failure. The coating has good adhesion with only a few signs of lifting. The coating system remains 99.99 percent intact. While no significant corrosion was observed, mill scale is anticipated. Mill scale was observed on the interior plates and therefore, it is highly likely that it will be encountered throughout. The coating has lost most of its gloss. There are minor misses and skips apparent in the finish coat. Roller marks are apparent, however, they are a normal consequence of the application.

The polyurethane coating remains over 99.99 percent intact along the pedestal, bowl, equator and roof. Black mildew has covered much of the bowl up to the equator. The coating has faded and chalked which is to be anticipated due to its age. A small coating break (crack) was observed on the basebell. This indicates an adhesion issue to the substrate.

The coating's adhesion was tested using a crosshatch adhesion method. This is a modified version of the ASTM D3359 and as a result does not replicate the same results as the ASTM. This modified test method is used by NTEC to determine the coating's overall adhesion and cohesion. NTEC uses this method for evaluation of coating systems for repair. When results indicate good adhesion, coatings may be top coated with compatible coating systems. Similarly, results indicating poor adhesion should not be top coated. The test, although important, is only one of the variables used to assess the coating's ability to be top coated. Other variables include, but are not limited to: the generic type of coating, the age of the coating, number of coats, percent intact, presence of defects or failure and dry film thickness.

The method consists of cutting a lattice pattern in the painted surface using a guide. Pressure sensitive tape is applied to the scribed area and then removed. The remaining pattern is evaluated by comparison with descriptions and illustrations. The illustrations are classified ranging from 0B to 5B. 0B represents greater than 65% removal of the coating and 5B represents fully intact coating.

A test was performed on the roof. The following represents the classifications observed:

1. Roof 4B

The appurtenances include overflow pipe, mud valve pipe, vent and hatches. The overflow and mud valve pipes are located within the dry interior. The base of the pipes extends through the basebell. There was minor evidence of external corrosion. The base of the overflow pipe has a screen to prevent contamination. The screen remains intact and in good condition. The base of the mud valve pipe also has a screen to prevent contamination but is in poor condition.

The vent is an umbrella design located near the center of the roof. The vent design does not provide adequate protection from contaminants entering the tank. It does not

have a two-inch drip ring extending below the screened area. Rain water could enter the tank. There was no evidence of significant internal or external corrosion. The screen is constructed from expanded metal. It remains intact and in good condition.

The tank contains three hatches: one at the top of the pedestal and two on the roof. The pedestal hatch is in good condition. The roof hatches and covers are in good condition with only minor surface corrosion.

The exposed concrete foundation was visually inspected for deterioration, undermining and root encroachment. The foundation is in good condition with only minor signs of deterioration. Small surface cracks have developed on the foundation. The grout is in good condition with little evidence of deterioration.

RECOMMENDATIONS

WET INTERIOR

NTEC recommends removal of the existing coating by abrasive blast cleaning to a near white grade and application of a three coat epoxy system. The epoxy paint system has been used extensively for interior lining of potable water storage tanks. The coating offers a combination of good adhesion, abrasion resistance and relatively low cost. Not all epoxy systems may be used in potable water storage tanks. Epoxy coating systems require certification from the National Sanitation Foundation (NSF) prior to their use in potable service applications. Epoxy coatings, normally, require a minimum substrate surface temperature of fifty degrees unless accelerated. Accelerated versions will allow application at surface temperatures down to thirty-five degrees or less. The abrasive blast cleaning will create a spent material waste that requires testing prior to disposal. TCLP tests are performed to determine whether the spent abrasive is hazardous or non hazardous. The landfill determines the number and type of contaminants to be tested (normally eight metals). In most cases, the test determines the waste nonhazardous. The estimated cost for painting is $90,000. The cathodic protection system would require removal to complete the painting.

DRY INTERIOR

NTEC recommends removal of the existing coating by abrasive blast cleaning to a commercial grade and application of a two coat epoxy system. The existing coating, generally, has poor adhesion and provides an unsuitable substrate for painting. The spent abrasive generated by the surface preparation will require testing subsequent to disposal. The estimated cost for painting is $40,000.

NTEC recommends replacement of the inoperable mud valve located beneath the inverted cone. The valve allows for the periodic removal of sediments from the settlement zone, which is the area below the top of the fill pipe. The valve is threaded into a coupling that is welded to the inverted cone. The estimated cost is $4,500.

EXTERIOR

NTEC recommends maintenance painting for the tank's exterior. The existing coating has fair to good adhesion and, therefore, provides a suitable substrate. We recommend power washing, spot power tool cleaning and application of a three coat polyurethane system. The polyurethane system would incorporate a binder coat that would be compatible with the existing coating. Painting will eliminate corrosion and extend the remaining life of the existing coating.

We recommend vent replacement near the center of the roof. The existing umbrella style does not adequately prevent contaminants from entering the tank. The new vent would be a frost free design that prevents rainwater from entering the tank. The estimated cost to furnish and install the vent is $4,400.

FIELD REPORT FORM

I. GENERAL

OWNER:	City of Owosso	DATE:	April 18, 2016
ADDRESS:	Dowling Drive	HEIGHT:	78' HWL
TANK SIZE:	600,000 gallons	CONSTRUCTION:	Welded
TANK DESIGN:	Spheroid	LETTERING:	"Owosso" inside logo
MANUFACTURE:	C.B.I.	LOGO:	Castle and river
ERECTION DATE:	1996	COLOR:	White
ENGINEER INSP:	Steve Kwart	ASST INSP:	Jim Gardner, Matt Otberg

II. CONTROLS

CONTROL LOCATION:	Basebell	BRAND:	Motorola
TELEMETERED:	No	RADIO TRANS:	Yes
HEATED:	No	INSULATED:	Yes
CATHODIC PROTECTION:	Yes	MANUFACTURE:	Aggressive
RECTIFIER (MAN, AUTO):	Auto	OPERATIONAL:	Yes
ANODE DESIGN:	Titanium oxide anodes	CONFIGURATION:	Horizontal
ANY DAMAGE:	No	DESCRIBE:	--

III. FOUNDATION

CONDITION OF CONCRETE:	Good
ANY APPARENT SETTLEMENT:	No
SOIL EROSION OR LACK OF COVER:	No
CRACKS:	Minor
DELAMINATION:	No
SPALLING:	No
AGGREGATE EXPOSED:	No
CONDITION OF GROUT:	Good
CONDITION OF BASE PLATES:	Good
CONDITION OF ANCHOR BOLTS:	Good
SHRUBS ENCROACHING:	1 small bush near the overflow pipe.

IV. EXISTING COATING HISTORY

SURFACE	DATE	PAINT SYSTEM	MANUFACTURE	CONTRACTOR
WET INTERIOR:	1996	Epoxy	Unknown	Unknown
DRY INTERIOR:	1996	Epoxy	Unknown	Unknown
EXTERIOR:	1996	Polyurethane	Unknown	Unknown

V. EXTERIOR CONDITIONS

A. PEDESTAL

NUMBER OF SECTIONS:	5
GENERAL CONDITION OF COATING:	Good
PERCENT TOPCOAT INTACT:	99.99
PERCENT INTERMEDIATE/ PRIMER INTACT:	99.99
CONDITION OF INSULATION/FROST JACKET:	N/A
RISER TIE BANDS:	N/A
COMMENTS:	--

B. BOWL

DESIGN:	Conical
NUMBER OF SECTIONS:	2
GENERAL CONDITION OF COATING:	Good
PERCENT TOPCOAT INTACT:	99.99
PERCENT INTERMEDIATE/PRIMER INTACT:	99.99
COMMENTS:	Heavy mildew has coated much of the bowl making evaluation difficult.

C. EQUATOR

NUMBER OF SHELL SECTIONS:	2
GENERAL CONDITION OF COATING:	Good
PERCENT TOPCOAT INTACT:	99.99
PERCENT INTERMEDIATE/PRIMER INTACT:	99.99
COMMENTS:	Some mildew. Logo is in good condition.

D. ROOF

DESIGN:	Sphere
GENERAL CONDITION OF COATING:	Good
PERCENT TOPCOAT INTACT:	99.99
PERCENT INTERMEDIATE/PRIMER INTACT:	99.99

COMMENTS:	Antennae cables run flat along the roof. Brackets should be holding cables in place.

E. ACCESSORIES

LADDER CONDITION:	N/A	FALL PREVENTION:	N/A
CAGED:	N/A	IF YES, WHERE:	N/A
SHELL LADDER FIXED:	N/A	ROOF LADDER FIXED:	N/A
OVERFLOW PIPE SIZE:	10"	CONDITION:	Good
SCREENED:	Yes	CONDITION:	Good
STUB:	No	GROUND LEVEL:	N/A
SHELL MANWAY SIZE	N/A	GASKET CONDITION:	N/A
RISER MANWAY SIZE:	N/A	GASKET CONDITION:	N/A
MUD VALVE:	Yes	SIZE:	4"
CONDITION OF VENT:	Inadequate	DESIGN:	Umbrella
SCREENED:	Yes	CONDITION:	Good
CATHODIC CAPS:	No	MISSING OR SLIPPED:	No
ROOF HATCH SIZE:	24"	CONDITION:	Good
AVIATION LIGHTS:	None	CONDITION:	N/A
OBSTRUCTIONS:	No	ANTENNAE:	Yes, 7

VI. INTERIOR CONDITIONS

A. DRY INTERIOR

1. BASEBELL

GENERAL CONDITION OF COATING:	Bottom section insulated, top section above platform painted.
PERCENT TOPCOAT INTACT:	99.99
PERCENT INTERMEDIATE/PRIMER INTACT:	99.99
COMMENTS:	Heavy staining on one side.
FILL PIPE DIAMETER:	12"
INSULATION TYPE:	Urethane
CONDITION:	Good
FROST JACKET:	Aluminum
EXPANSION JOINT:	Yes
DESIGN AND CONDITION:	Covered in insulation
LADDER CONDITION:	Good

CAGED:	No
FALL PREVENTION DEVICE:	No
CONDENSATE DRAIN CONDITION:	Good
PIPE SUPPORTS CONDITION:	Good
LIGHTING CONDITION:	Good

2. PEDESTAL

GENERAL CONDITION OF COATING:	Fair
PERCENT TOPCOAT INTACT:	99.9
PERCENT INTERMEDIATE/PRIMER INTACT:	99.9
COMMENTS:	Top of stiffener rings are lifting. Staining streaks.
FILL PIPE INSULATION CONDITION:	Good
FROST JACKET:	Aluminum
EXPANSION JOINT:	No
DESIGN AND CONDITION:	N/A
LADDER CONDITION:	Fair
CAGED:	No
FALL PREVENTION DEVICE:	Rail
PIPE SUPPORTS CONDITION:	Good
LIGHTING CONDITION:	Good

3. INVERTED CONE

GENERAL CONDITION OF COATING:	Poor
PERCENT TOPCOAT INTACT:	50
PERCENT INTERMEDIATE/PRIMER INTACT:	50
COMMENTS:	Pinhole corrosion throughout entire surface.
MUD VALVE:	Yes
SIZE:	4"
COMPRESSION MANWAY:	No
SIZE:	N/A
GASKET CONDITION:	N/A

4. ACCESS TUBE

GENERAL CONDITION OF COATING:	Poor
PERCENT TOPCOAT INTACT:	70
PERCENT INTERMEDIATE/PRIMER INTACT:	70
COMMENTS:	Pinhole corrosion throughout entire surface.

LADDER CONDITION:	Fair
FALL PREVENTION DEVICE:	Rail
PIPE SUPPORTS CONDITION:	Fair
COMPRESSION MANWAY SIZE:	18" x 24"
GASKET CONDITION:	Fair
LIGHTING CONDITION:	Poor; burned out bulbs.

B. WET INTERIOR

1. BOWL

GENERAL CONDITION OF COATING:		Fair	
PERCENT TOPCOAT INTACT:		99.9	
PERCENT INTERMEDIATE/PRIMER INTACT:		99.9	
ACTIVE CORROSION:	Yes	TYPE:	Cracking
CONCENTRATION:	Intermittent	INACTIVE CORROSION:	No
DEEPEST PIT:	N/A	AVG PIT DEPTH:	--
PIT ESTIMATE:	0	WELDING ESTIMATE:	0
PRIOR PIT WELDS:	0	# TO GRIND:	0
STRAY WELDS:	0	LINEAL ESTIMATE:	--
FILL PIPE DIAMETER:	12"	DRAIN DIAMETER:	
ADDTNL PIPING:	No	CONDITION:	--
COMMENTS:	Heavy staining.		

2. EQUATOR

GENERAL CONDITION OF COATING:		Poor	
PERCENT TOPCOAT INTACT:		99	
PERCENT INTERMEDIATE/PRIMER INTACT:		99	
ACTIVE CORROSION:	Yes	TYPE:	Surface rust
CONCENTRATION:	Intermittent	INACTIVE CORROSION:	No
DEEPEST PIT:	N/A	AVG PIT DEPTH:	--
PIT ESTIMATE:	0	WELDING ESTIMATE:	0
PRIOR PIT WELDS:	None	# TO GRIND:	0
STRAY WELDS:	0	LINEAL ESTIMATE:	N/A
PAINTER'S RAIL:	No	STIFFENER:	No
ANY LADDER:	No	CONDITION:	N/A
COMMENTS:	Signs of mill scale on substrate.		

3. ACCESS TUBE

GENERAL CONDITION OF COATING:		Poor	
PERCENT TOPCOAT INTACT:		99	
PERCENT INTERMEDIATE/PRIMER INTACT:		99	
ACTIVE CORROSION:	Yes	TYPE:	Scale, surface
CONCENTRATION:	Spot rust	INACTIVE CORROSION:	No
DEEPEST PIT:	N/A	AVG PIT DEPTH:	N/A
PIT ESTIMATE:	0	WELDING ESTIMATE:	0
PRIOR PIT WELDS:	0	# TO GRIND:	0
STRAY WELDS:	0	LINEAL ESTIMATE:	N/A
PAINTER'S RAIL:	No	STIFFENER:	Yes
ANY LADDER:	Yes	CONDITION:	Good
WEIR DESIGN:	Box	CONDITION:	Poor
COMMENTS:	Signs of mill scale on substrate.		

4. ROOF

GENERAL CONDITION OF COATING:		Fair	
PERCENT TOPCOAT INTACT:		99.7	
PERCENT INTERMEDIATE/PRIMER INTACT:		99.7	
ACTIVE CORROSION:	Yes	TYPE:	Pinhole
CONCENTRATION:	Intermittent	INACTIVE CORROSION:	No
DEEPEST PIT:	N/A	AVG PIT DEPTH:	N/A
PIT ESTIMATE:	0	WELDING ESTIMATE:	0
ROOF BEAMS:	No	DESIGN:	N/A
NUMBER:	0	CONDITION:	N/A
CORROSION TYPE:	N/A	EST. PERCENT LOSS:	N/A
BOLTS:	N/A	CONDITION:	N/A
COMMENTS:	--		

Note: Percentage of intact coating is based upon visual observation of actual paint remaining in comparison to SSPC-Guide Visual Standard No. 2, Figure 1. It does not indicate the coating has good adhesion, is free from defects or is failing. Any surface preparation estimates should consider these variables.

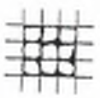
VII. RECOMMENDATIONS

REPAIRS:	Replace inoperable mud valve with a frost free mud valve in the inverted cone. Replace roof vent with a new frost free vent.

PAINTING:	Abrasive blast clean and paint wet interior. Abrasive blast clean and paint dry interior. Power wash exterior, spot power tool clean and apply a three coat polyurethane system.

MISC:	Remove existing cathodic protection system.

ASTM D 3359 METHOD B - VISUAL CLASSIFICATIONS

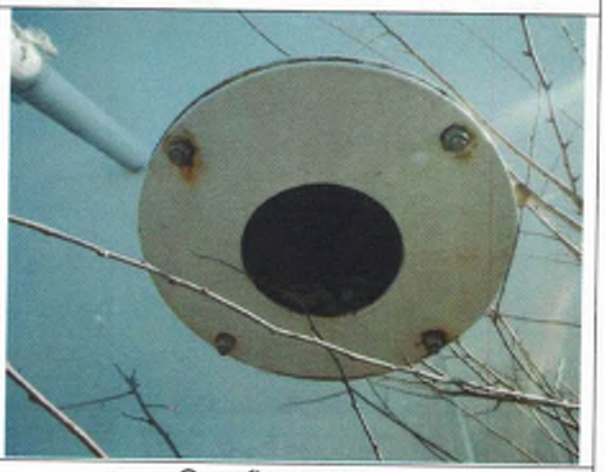
Classification	Surface of Cross-Cut Area From Which Flaking Has Occurred		
5B	None		
4B		(1% To 5%) 	
3B		(6% To 15%) 	
2B		(16% To 35%) 	
1B		(36% To 65%) 	
0B	Greater Than 65%		

5B The edges of the cuts are completely smooth; none of the squares of the lattice is detached.
4B Small flakes of the coating are detached at intersections; less than 5% of the area is affected.
3B Small flakes of the coating are detached along edges and at intersection of cuts. The area affected is 5 to 15% of the lattice.
2B The coating has flaked along the edges and on parts of the squares. The area affected is 15 to 35% of the lattice.
1B The coating has flaked along the edges of cuts in large ribbons and whole squares have detached. The area affected is 35 to 65% of the lattice.
0B Flaking and detachment worse than Grade 1B.

600,000 gallon elevated tank
Owned by the City of Owosso

Logo at equator

Basebell door and pipes



Overflow screen

Condensate screen

Baseplates and anchor bolts at foundation

Heavy mildew on exterior bowl

Pipes in basebell

Condensate into the overflow

Basebell ladder

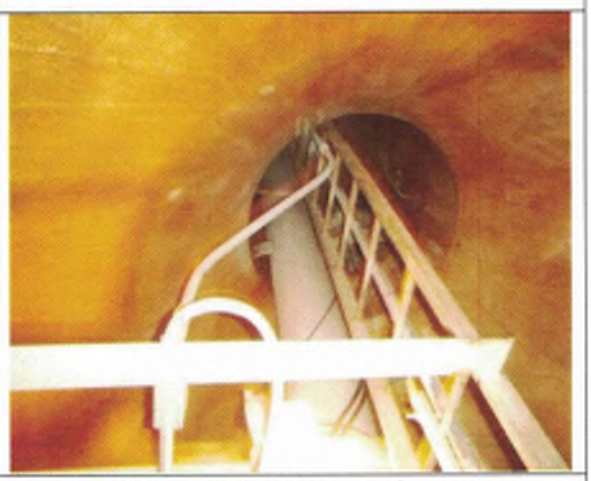
Fill pipe; staining on upper basebell wall

Overflow pipe in condensate platform

Looking up the interior pedestal

Mud valve under the inverted cone

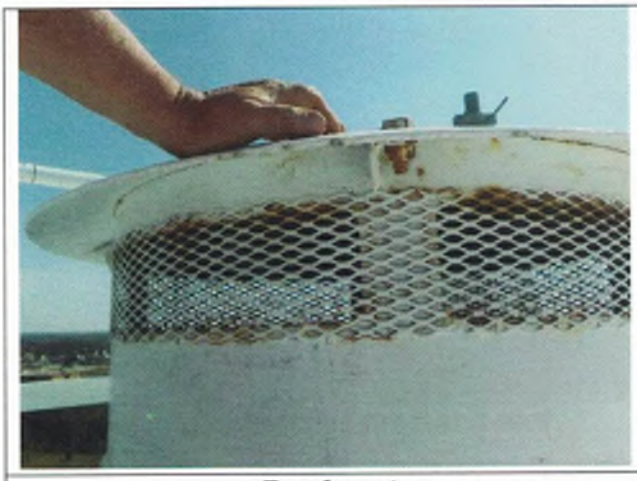
Upper platform floor



Looking up the inverted cone

Dry interior access tube manway hatch

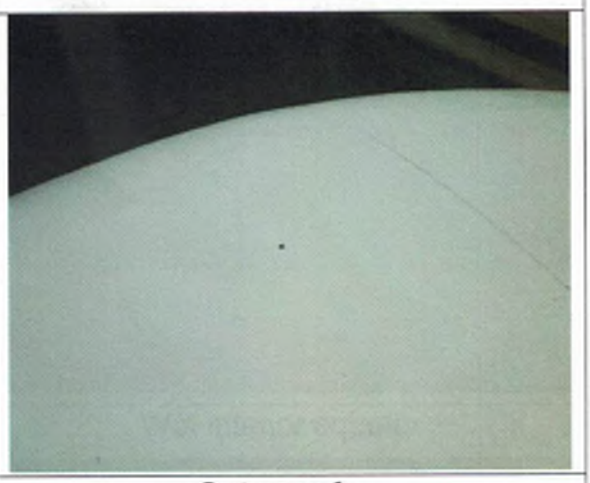
Ladder going up the interior access tube



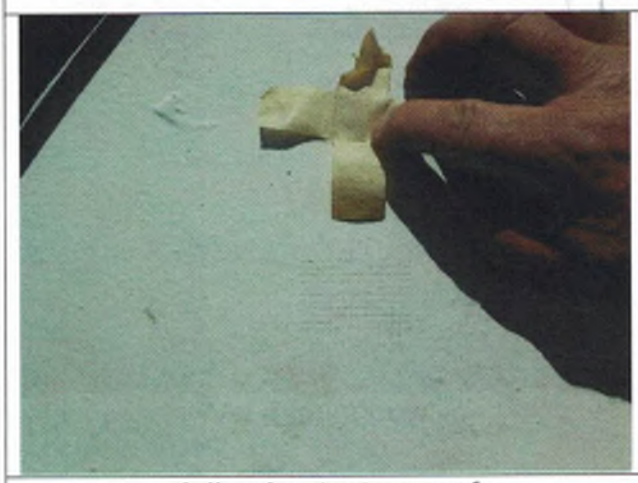
Roof vent

Secondary roof hatch cover

Access tube at exterior roof



Outer roof



Adhesion test on roof

Stiffener on wet interior access tube

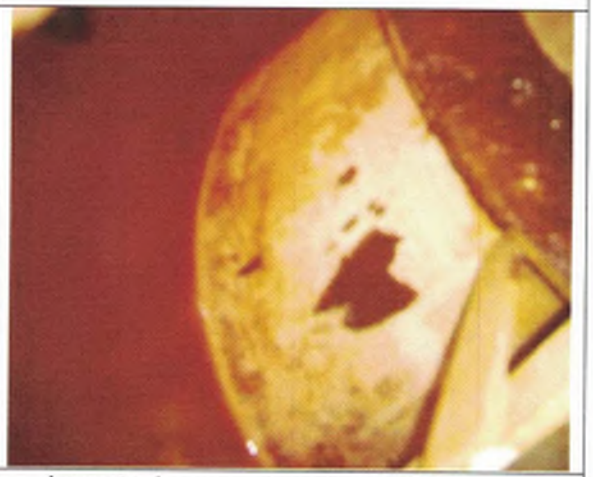
Wet interior access tube and roof

Wet interior roof

Wet interior access tube

Wet interior equator

Wet interior bowl



Inverted cone at bottom of the wet interior

	
Looking down to bowl from roof	Cathodic protection and equator

Appendix E. Water Main Replacement Summary

Water Main Replacement Condition Summary

City of Owosso DWRF

ID	Planned Replacement Date	Location	From	To	Length (Feet)	Installation Date	Condition	Material	Existing Size (Inch)	New Size (Inch)	5 yr Break History	Reason for Work						
												Existing Pipe Age	Existing Pipe Material	Minimum Pipe Size Requirement	Existing pipe condition	Looping needed	Potential Shallow WM	Upsize to Improve Pressure/ Flow
1	2020	Cedar	South	Hampton	1319	1950s	Fair	Asbestos Concrete	6 & 12	12	1	x	x		x			x
2	2020	Summit	Abbott	Rubelman	1650	1950s		Cast Iron	6	8	0	x	x	x				x
4	2020	Clark	Oliver	King	970	1950s		Cast Iron	4 & 6	8	0	x	x	x				
6	2020	Cleveland	Chestnut	Brooks	1000	1950s & 1960s	Poor	Cast Iron	4	6	5	x	x	x	x		x	
7	2020	Lafayette	Main	Cleveland	600	1950s	Poor	Cast Iron	4	6	5	x	x	x	x			
8	2020	Robbins	Mack	South End	230	1950s	Poor	Galvanized Steel	2	6	0	x	x	x	x			
9	2020	Morris	Mack	North End	328	1950s	Poor	Galvanized Steel	2	6	0	x	x	x	x			
10	2020	North	Hickory	Gould	2981	1960s	Fair	Cast Iron	12"	12	5		x		x			
3	2021	Center	King	North	2863		Poor	Cast Iron	6	8	4	x	x		x			
5	2021	Dewey	Brandon	Moore	1000	1950s	Fair	Cast Iron	4&6	8	5	x	x	x	x			
11	2021	Clyde	Walnut	Shiawassee	600	1970s	Fair	Cast Iron	4	6	1		x	x	x	x	x	
12	2021	Lynn	West End	Howell	312	1970s		Cast Iron	4	6	0		x	x				
13	2021	Milwaukee	Lyon	Cedar	670	1960s	Poor	Galvanized Steel	3/4 & 3	6	1		x	x	x	x		
14	2021	Huron	Huggins	West End	360		Poor	Galvanized Steel	2	6	1	x	x	x	x			
15	2021	Dewey	M-21	King	2659	1950s & 1960s	Poor		4,6 & 12	*See Below	2	x	x		x		x	
16	2022	Shady Lane	Meadow	Chipman	1184			Asbestos Concrete	6	8	2	x	x					
17	2022	Woodlawn	Farr	Auburndale	847	1950s	Fair	Cast Iron	4	6 or 8	1	x	x	x	x		x	
18	2022	Genesee	Michigan	Green	400	1950s	Poor	Steel	2	6	0	x	x	x	x			
19	2022	Grace	Shiawassee	Cedar	1300	1960s	Poor	Cast Iron	4	6	5		x	x	x			
20	2022	Nafus	Frederick	Freeman	650		Poor	Steel	2	6	1	x	x	x	x			
21	2022	Tracy	Frederick	Stewart	1200	1950s	Poor	Cast Iron	4	8	5	x	x	x	x		x	x
22	2022	Young	Chestnut	Brooks	950	1950s	Poor	Cast Iron	6	8	5	x	x	x	x		x	x
23	2022	Grand Avenue	Auburndale	Franklin	700		Fair	Cast Iron	4 & 6	8	2	x	x	x	x			x
24	2022	Grace	Cedar	Lyons	600		Poor	Cast Iron	6	8	5	x	x	x	x			
25	2022	Nafus	Frederick	South End	500	1950s	Poor	Steel	2	6	2	x	x	x	x			
26	2022	Genesee	Howell	West End	422		Poor	Steel	4	6	1	x	x	x	x			
10	2023	North	Shiawassee	Hickory	2982	1960s	Fair	Cast Iron	8 & 12	12	5		x		x			
27	2023	Cedar	Hampton	Main	3972	1950s		Asbestos Concrete	6 & 12	12	3	x	x					
28	2023	Chipman	Harding	North	1695	1970s	Fair	Cast Iron	12"	12"	2		x		x			
29	2023	Adams	Oliver	King	1000	1950s	Fair	Cast Iron	4	6	1	x	x	x	x			
30	2023	Adams	Elizabeth	North of Jennett	600	1950s		Cast Iron	4	6 or 8	0	x	x	x				
31	2023	Ball	Exchange	Mason	250	1950s	Fair	Cast Iron	4	6	1	x	x	x	x			
32	2023	Ball	Oliver	450 Feet North	450	1950s		Cast Iron	4	6	0	x	x	x				
33	2023	Brandon	Summit	Dingwall	450		Fair	Cast Iron	4	6	3	x	x	x	x			
34	2023	Dingwall	Brandon	North End	900	1950s	Poor	Cast Iron	4	6 or 8	4	x	x	x	x		x	
35	2023	Gilbert	Mason	Oliver	800	1950s		Cast Iron	4	6	0	x	x	x				
36	2024	Clinton	Cedar	Shiawassee	1289	1950s		Cast Iron	4	6	1	x	x	x				
37	2024	Monroe	Washington	Broadway Avenue	2073	1960s	Poor		6	8	5		x		x		x	
38	2024	Williams	Washington	Oak	1601	1950s	Poor	Cast Iron	4	8	3	x	x	x	x		x	x
39	2024	Gould	Exchange	Oliver	1100	1950s	Fair	Cast Iron	8	12	1	x	x		x			x
40	2024	Gould	Oliver	North	2700		Poor	Cast Iron	8	12	5	x	x		x		x	x
41	2024	Huntington	Moore	Stevens	1000	1960s	Fair	Cast Iron	6	6	5		x		x			
42	2024	Jennett	Shiawassee	Adams	700	1950s	Fair	Cast Iron	4	6 or 8	1	x	x	x	x			
43	2024	Mason	Dewey	Gilbert	300	1950s		Cast Iron	4	6	0	x	x	x				
44	2024	Mason	Saginaw	Dewey	1350	1950s		Cast Iron	4	6	0	x	x	x				
45	2024	Oak	Main	Williams	1150	Before 1930			4	6	0	x	x	x				

* 4", 6" and 12" water mains currently exist in this section of Dewey Street. The 4" and 6" mains will be abandonded and the affected services will be moved to the newer 12" WM.

Appendix F. Public Hearing

a. Notice of Public Hearing
b. Attendance List
c. Verbatim Transcript

NOTICE OF PUBLIC HEARING

The City of Owosso will hold a public hearing on proposed improvements to the City's water distribution, storage, and treatment facilities for the purpose of receiving comments from interested persons.

The hearing will be held during the Owosso City Council meeting on Monday, April 15th 2019 from 7:30 P.M. to 9:30 P.M. in the City Hall Council Chambers, 301 West Main Street, Owosso, Michigan 48867.

The purpose of the proposed project is to address improvements at the facilities to comply with regulatory requirements and increase reliability of service to residents and customers.

Proposed project construction will involve water main replacements, repairs to two outdoor water storage tanks, repairs, improvements within existing facilities at the Water Treatment Plant and the construction of a new well field. The water main replacements will take place over 5 years from 2020 through 2024 while the remaining projects will likely occur in 2020-2021 calendar years.

Construction-related impacts during water main replacements include temporary soil erosion impacts, utility excavation, noise, and dust generation.

The City is proposing to fund the project with money collected from user charges. The estimated cost to users for the proposed projects result in a total increase of up to $23 per quarter over the next 5 years. Total cost of the project is estimated at $15,300,000.

Copies of the plan detailing the proposed projects are available for review beginning on Wednesday, March 13th 2019 at the City of Owosso Clerk's Office located at 301 West Main Street, Owosso, Michigan 48867.

Written comments received before the hearing record is closed on April 15th, 2019 at 7:30 P.M. will receive responses in the final project plan. Written comments should be sent to:

Amy K. Kirkland, City Clerk
301 West Main Street
Owosso, Michigan 48867

City of Owosso Public Hearing Attendance – April 15th 2019

Christopher T. Eveleth: Mayor, 715 W. King St., Owosso, MI 48867

Council Members

Lori Bailey: 530 N. Chipman St., Owosso, MI 48867
Janae L. Fear: 1212 Riverside Dr., Owosso, MI 48867
Jerry C. Haber: 1624 W. Lynn St., Owosso, MI 48867
Daniel A. Law: 1007 W. Main St. Apt C, Owosso, MI 48867
Nicholas L. Pidek: 308 E. Oliver St., Owosso, MI 48867
Scott Gould: City Attorney, 1000 Beehler St., Owosso, MI 48867
Kevin Lenkart: Public Safety Director, 301 W. Main St, Owosso, MI 48867
Nathan Henne: City Manager, 301 W. Main St, Owosso, MI 48867
Amy Kirkland: City Clerk, 540 N. Chipman St., Owosso, MI 48867

Citizens

June Cudney: Owosso Charter Twp. Treasurer, 2622 W. Wilkinson, Owosso, MI 48867
Joy Archer: Trustee Owosso Charter Township, 621 S. Ruess Rd., Owosso, MI 48867
Pastor Gary Beal: Church of Jubilee, 3910 S. Ruess Rd., Owosso, MI 48867
Lee Sowle: 321 West William , Owosso, MI 48867,
Diane Krajcovic: 690 Hollywood Dr, Owosso Twp., MI 48867
David and Catherine Loxen: 1118 Palmer Ave., Owosso, MI 48867
Roxane Cramer: 701 W. South St., Owosso, MI 48867
Rob Twina: 1265 Mill Creek Rd, Flint, MI 48532
Glen Chinavare: 301 W. Main , Owosso, MI 48867
Brian and Lynette Suggs: 1012 Ryan St., Owosso, MI 48867
Brandie Cords: 994 Ryan St., Owosso, MI 48867
Ellen Rodman: 635 7th St.
Glenn White: 2031 Vandekarr Rd., Owosso, MI 48867
Roger Durfee: 1299 S. Shiawassee, Owosso, MI 48867
Tom Manke: 2910 W. M21 , Owosso, MI 48867
Karen Mead-Elford: 1330 W. King St., Owosso, MI 48867
Mersadeez Mendham: 924 Kenwood Dr., Owosso, MI 48867
Kory Costello: 924 Kenwood Dr., Owosso, MI 48867
Gary Burk: 770 Riverbend Dr., Owosso, MI 48867
Rick Finley: 1103 Hintz Rd., Owosso, MI 48867
Lori Frantz: 804 Ryan St., Owosso, MI 48867
Steven Goff: 1370 E. South St., Owosso, MI 48867
Brian Chouinard: 1370 E. South St., Owosso, MI 48867
Steven Teich: 1508 Alta Vista Dr., Owosso, MI 48867
Caroline Wilson: 405 N. Ball St., Owosso, MI 48867

VERBATIM TRANSCRIPT FROM CITY OF OWOSSO PUBLIC HEARING

APRIL 15, 2019 AT CITY HALL DURING CITY COUNCIL MEETING

Mayor Chris Eveleth: Conduct a public hearing to receive citizen comment regarding the project plan proposed for submission to the MDEQ Drinking Water Revolving Fund for improvements to City's water distribution, storage & treatment facilities. Nathan or Glenn want to kick us off?

Glenn Chinavare: Evening, what council will be looking at to adopt by resolution tonight is simply to approve of a project plan to be submitted to the state of Michigan as identified priority projects for a five year period of time for funding. You are not adopting a budget, you are not approving of any of the projects, and you are just endorsing this project application to submit to the State of Michigan for them to review and then they will determine if these projects are appropriate or if they have other comments. And also review the funding requirements for this. Some of the things that we are required by the state of Michigan, which we cover here in the power point, is to identify the drinking quality needs and recommend alternatives to the projects. We have alternative one and alternative two. Alternative one is the least costly. Alternative two picks on those and recommends replacement versus repair, we don't recommend that. The other alternative two talks about using ductile iron pipe as opposed to plastic, we don't recommend that either, plastic is pretty much the standard now at this time. We also discussed project financing with that the cost to the users for these projects and also talking about the social and environmental impacts of this as well. Matt Kennedy from OHM will do the power point and go through this for you briefly. There will be a comment period at the end. This is a little bit different then the normal public hearings. These have to be submitted to the state. They have to be submitted in writing and I think anyone here probably had a sign in sheet which is also required by the state of Michigan who also attended here. My preferences is if you have comments you like to present that you allow me to respond to those in writing, I have to submit those to the State. If you have to have and answer tonight I'll do my best to answer your question and make sure we get it right so we submit it to the state. We will also provide you until Wednesday to submit some written comments to us that we can also answer get back to you they will also go to the State of Michigan. Matt, it's all yours.

Mayor Eveleth: Welcome

Matt Kennedy: Hi, I'm Matt Kennedy with OHM, we're a municipal engineering firm. We're going to talk to you about the drinking water revolving fund. So, the drinking water revolving fund is a jointly administered loan program between MEDQ and then the municipal bond authority. It is for funding specifically for water and structure projects that are current needs project. So the loan is usually a twenty year loan, in this case

with Owosso being a disadvantaged community, you're eligible for a thirty year loan at up to a 2 ½% high interest rate. The need for the DWRF Project, the aging infrastructure issue that everybody is always talking about in the news results in water main breaks, undersized and dead end water mains that were installed at the turn of the last century, failing water storage facilities, antiquated equipment at the water filtration plant and then there is the existing ground supply water wells supply some of those wells were installed in the 1950's and 60's. So, previous planning efforts that went into this, we basically dug through all these documents and built this plan. There is the 2018 DEQ sanitary survey, the 2017 Water Reliability study, and Water Asset Management Plan; there is the standpipe and elevated tank maintenance inspections that occurred in 2016 and then there is the 20 year capital improvement plan that is constantly being updated. So, for the proposed projects there is a number of different goals that we have, looping the dead end water mains where we can, increasing reliability, replacing undersized water mains a minimum size is usually 6 to 8 inches there is a lot of 2 ¼ inch, 2 inch, 3 inch and 4 inch water mains that are getting replaced under this program, replacing those aged, less reliable water mains that tend to break more often, cleaning and recoating the interior and exterior of the water storage facilities, that is both the stand pipe and the elevated tank. And then upgrading the pump and electrical equipment at the water filtration plant, this is a backwash pump that is used for the filters, and then constructing a new well field that's going to be east of Vandecarr (aka Vandekarr) Road, south of the city. So the factors that served as a basis again talking about that water main breakage frequency, there are good records from the city on those that goes into which ones are getting replaced. Requirements for the minimum water same size as I mentioned, overall condition water storage facilities, assessments that have gone long over the last probably 4 years. Then equipment reliability and operating efficiency the water plant, quality of ground water supply and sites of potential ground water contamination around the city and coordination with street replacements projects. That last one is a big one where there is a good amount of savings that occur when you can do the water main the same time as you're doing the street. That way you are not ripping up the street after you just replaced it. So the first set of projects, again are the improving the distribution system pressures, and the liability, this is those water main replacements. We looked at regional alternatives, optimal performance of existing facilities, and then water main replacements and upgrades, and then we eliminated those first two so we are going to replace those shallow water mains that are susceptible to heating and freezing. We're going to replace those aged water mains with PVC or ductile iron and then loop those dead end water mains. Glenn did mention that the majority of this is going to be PVC. Any location where there might be contamination we need to put in ductile iron just because it's better resistance to hydrocarbon contamination. So for the failing water storage facilities we looked at again the regional alternative or optimal performance and then repair versus replacement of

those storage facilities. We went with repair after a present worth analysis looking at principal stuff, the older stand pipe that's there is still worth your time to repair that rather than replace it. Water filtration plant, here again, regional alternative, optimal performance of the existing facility, upgrade that failing equipment. We are going to get a new SCADA system. That is the Supervisory Control and Data Acquisition System that basically controls everything that's in your water system, that is very much aged and just like an old laptop needs to be replaced from time to time; replacing the high service process piping that's in the basement of the plant, that is old and corroded and then installing a duplex backwash pump system, which is just two pumps, and removable ones that if one fails you will always have a backup. The water supply wells, again, regional versus optimal performance in construction of any well field we went with construction of that well field and then it will likely lead to the retirement of some of the other well fields over the course of time. This is the overview of the city. You can see highlighted on there some blue lines and then some orange spots and then a yellow spot and a green spot. So we will zoom in on those. The northwest corner these are the streets that are going to get new water mains. In the northeast corner there is a lot more streets going on up there and they are going to get new water mains. Here in the southwest you have the elevated tank that is off to the very west side there and that is going to get the rehab project. Then here in the southeast, which is really the central south area, you have the stand pipe which is on the very far south there and then you have the water treatment plant off to the far east and then obviously all the water mains. That green area is going to the potential new Vandecarr (aka Vandekarr) well site as well. So overall cost opinions, I want to qualify this, these are not bid numbers these are potential costs that will be there and so this is the number that is going to the state in order to ask for that loan, this isn't again the final number. Once this comes in with all the engineering that goes into it and bidding out there will be a different number associated with this but this is just the initial numbers that are going to the city and they are not guaranteed. So the water storage repairs, the treatment plant improvements, the well field construction and the water main replacements, all of those equate to about a total loan value of $15,400,000 which equates to about a $23 increase per quarter per resident. So environmental impacts and mitigation, the impacts during construction are the same as with any other construction project, there is temporary noise, dust and traffic disruption, there is a short period of water service disruption, they switch your service line over to the new water main and then there will be tree and or branch removals that go on during that. The mitigation of those obviously will be traffic control, soil, erosion and sedimentation control protection against impacts on environmentally sensitive, culturally significant resources such as historic properties and then associated surface restoration, so trees will be replaced when possible. The benefits of the DWRF project, again, reliability of service, there is going to be a huge improvement to fire protection on many streets, improve reliability and operation at the water filtration plant

and then increase the reliability of supply water, with the new well fields south of the city and with that we'll take public comments.

Mayor Eveleth: Thank you very much Matt. Okay, so that will get us to the public comment portion of the hearing and Glenn could you just reiterate if you will at some point need these questions in writing so you can show the state, is that correct?

Glenn Chinavare: Yes, this is a project for the State so if you do have a comment please come up state your name and address so we can get that and then record it and then I would like to respond to that in writing to you as well as submit them to the State as well.

Mayor Eveleth: Do we have any citizen's comments on this public hearing? Yes Commissioner McMaster.

Dan McMaster: Dan McMaster, 522 North Saginaw Street, I just have a question for Glenn or whoever. You said per resident. Is that per resident or per customer household? So am I paying twenty-three dollars or one hundred dollars for my house every, quarter?

Glenn Chinavare: Twenty-three.

Dan McMaster: Okay, thank you.

Glenn Chinavare: Thank-you.

Mayor Eveleth: Thank-you. Yes, Tom.

Tom Manke: I'll just speak real loud so it picks up. The, will this then after this is done; will all the lead be removed out of the system? Is this going to remove the lead out of our water system?

Glenn Chinavare: No, Tom.

Mayor Eveleth: Thank-you, Tom. Yes, Diane.

Diane Krajovic: Diane Krajovic, Owosso Township, is the twenty-three dollars is it going to be forty-six then for we our residents in the township per quarter an increase?

Joy Archer: We pay double.

Mayor Eveleth: Thank you, Diane. Let's see if we can get verbal answers as well on top of the written. Yes, Gary.

Gary Burke: My name is Gary Burke, I'm the currently reside in Rush Township, not in the city but previously was the City utilities director, still a property owner in the City of

Owosso. With regard to that last question, a portion of that cost would be ascribed to every retail customer, and some of the water supply cost would be ascribed also to the City of Corunna, but the water main replacement in the City of Owosso is the responsibility and would be ascribed to the city customers, not the township. Township with our revenue sharing agreement is responsible for replacing water mains in the township and that's a big portion of the cost that are being directed here but anyway, I would like to lend my support to this application for revolving fund loan financing. It's a lot of money but we need it in terms of the investment in our water infrastructure. So I'm speaking in favor of proceeding with the project plan with recognition that some of the elements can be adjusted as we go along. With respect to water supply and treatment, I'm not sure how much you have actually read into the plan but everything that's in there is something that we have long term identified as being necessary and is now becoming even more critical that we proceed with and that we don't have reserve funds in the water utility fund to be able to pay as we go. We need to get it done and we can't afford to do it out of current revenues so it requires debt service and going with the drinking water revolving fund is really it's our best deal to get 2 or 3% interest financing over 30 years for some of these improvements. So what has been discussed in terms of replacing a backwash water pump at the water plant like with the duplex pump arrangement that's something, we are dealing with stuff that was I've been there quite a few years and it's predated me by quite a few decades in terms of the current backwash pump. It must be replaced we can't continue to service it and some of the sixteen inch transmission main it definitely; it needs to be replaced and upgraded. It's something I had hoped to have accomplished before I retired but it's now more critical that it gets done. The SCADA improvements will improve our efficiency and it's necessary in terms of control of our remote facilities, the elevated tanks and our remote well sites. In terms of the water storage facilities, if you look at the tanks and the scaling they're in decent condition. The stand pipe its 1950's vintage but it can be extended probably another fifty years if we continue to properly treat and recoat it but it definitely needs it now. It's probably a couple or three years overdue but it's something that needs to get done. We don't have current reserves but if we do the debt financing we can get it done. The only thing I would say there is that I would support having a standby generator to our booster pump facility there for improved system reliability. The water distribution system that's the bulk of the improvements you are looking at. It's difficult for me because I look at things like replacing water mains on East Oliver, Stewart and Chipman depleted our reserves that we had set aside for those sorts of replacements. But the cost that we're looking at currently are almost double what I was budgeting for ten years ago. The cost for water main replacement it's what we had ascribed our rates for just don't go as far now. Where we looked at replacing a half a mile of water main a year at a current rate we can't do but half of that.

Mayor Eveleth: Thank you.

Gary Burke: We really need to be replacing one to two percent.

Mayor Eveleth: Thank you, Gary. I think we are at the three minutes. I do appreciate that and the hand out here. Obviously we always value your expertise and may have a question or two for you and Glenn at the end of this. So, thank you. Do we have further comments regarding this or questions? Okay, seeing none I will close the public hearing. (8:19 p.m.)

The above is a verbatim transcript of the public hearing to receive citizen comment regarding the project plan proposed for submission to the MDEQ Drinking Water Revolving Fund for improvements to City's water distribution, storage & treatment facilities. The public hearing was held at Owosso City Hall on April 15, 2019 beginning at 8:01 p.m. and ending at 8:19 p.m.

_____

Roxane K. Cramer
Deputy City Clerk
City of Owosso

April 15, 2019

To: Owosso City Council

From: Gary Burk, Retired City Utilities Director
770 Riverbend Dr., Rush Township

RE: Public Hearing Comments on Project Plan
Drinking Water Revolving Fund

Though I am no longer a City Resident, I still own property in the City and wish to see the City prosper. Reliable, high quality municipal water supply is critical for a sustainable community.

Tonight I am speaking in favor of the proposed Project Plan, which addresses significant capital investments in 3 major asset areas: 1) Water supply and treatment; 2) Water storage facilities, and 3) water distribution.

1) Water supply and treatment
All the proposed projects have long been identified as necessary. The backwash pump and 16 inch transmission line are now critically necessary. SCADA improvements are critical to assure proper control of remote facilities and improve plant operating efficiency.

I support investigation of the Vandecarr property for future well supply. However, development and timing of a new well field will depend on the preliminary investigation. In the interim I favor continuing investment in Palmer Well No 3 (rehab, well house, and standby generator) to assure reliability of well water supply.

2) Water Storage Facilities (Standpipe/booster pump station and West Side Elevated Tank)
Major and complete repainting of these steel structures is necessary to extend their useful life. I particularly support the addition of the new generation of mixing devices to prevent water stagnation and to prevent ice formation and resultant damage to the steel coatings. I would also recommend consideration of a fixed, natural gas fired stand-by generator at the water standpipe booster pump station.

3) Water Distribution
I generally favor pay as you go, as opposed to debt financing, for street water main replacements. However, given the accelerated street program financed by the $10 million local bond issue and markedly higher water main replacement costs, debt financing for water mains is required to keep pace with the road program. The first 3 years of water main replacement on E. Oliver, S. Chipman and W. Stewart has depleted the Water Fund balance reserved for such replacements. We should not be reconstructing streets over water mains that are near the end of their useful life.

Appendix G. City of Owosso Council Resolution

MDEQ Drinking Water Revolving Fund Project Submittal

Public Services Director Chinavare indicated that tonight he would be looking for approval of the project plan that will be submitted to the State of Michigan DEQ to try to secure assistance with funding for the projects. The action tonight does not represent approval of the project itself or any actual expenditures, it is simply approval to seek options for low cost funding.

Mr. Chinavare went on to note that a sign-in sheet will be circulated per State regulations and he asked that all those present sign the sheet. Any questions brought forward this evening, and any written questions received by Wednesday, will be answered in writing within a few days.

OHM Engineer Matt Kennedy gave a presentation detailing the funding that could be received, the project plan and how it was derived. The proposed plan is estimated to cost $15 million and would increase bills approximately $23 per quarter.

A public hearing was conducted to receive citizen comment regarding the project plan proposed for submission to the MDEQ Drinking Water Revolving Fund for improvements to City's water distribution, storage, & treatment facilities. The following people commented in regard to the proposed project:

Dan McMaster, 522 N. Saginaw Street, sought clarification on the amount by which utility bills would increase.

Tom Manke, editor- Facebook.com/friendsandneighborsowosso, asked if all of the lead in the water system would be removed after the project is completed.

Diane Krajcovic, Owosso Charter Township Trustee, inquired whether the $23 increase in utility bills would result in a $46 increase for those in the township.

Gary Burk, retired City Utilities Director, responded to Ms. Krajcovic's question saying that the replacement of watermains within the City is the responsibility of the City. He went on to say that he lent his support for the application, the work is needed and he wants to see the project plan proceed. Many of the needs addressed by the proposed project plan were identified a long time ago but the City does not have the revenues to support a project of this size and scope, making the Drinking Water Revolving Fund a very attractive option for funding.

No other members of the public expressed an interest in commenting and the public hearing was closed.

Public Services Director Chinavare addressed Mr. Manke's question noting that the project would deal with some of the lead in the system but that the work would not be targeting lead specifically.

There was discussion among Councilmembers and staff regarding: the pressure residents will feel with a significant increase in water/sewer rates; the possibility of deferring the cost; making sure the City accomplishes as many watermain replacements as possible in a pay-as-you-go fashion to avoid rate increases; strategically picking and choosing certain parts of the plan to implement; and providing as many options to Council as possible.

There was further discussion regarding: the number of watermain breaks each year; the average cost of a watermain break; making the choice to repave a street without replacing the watermain; the life expectancy of different water system materials; trying to determine how this piece meshes with last years' plans; and securing another funding option to consider when determining how to accomplish these projects.

Motion by Councilmember Bailey to approve the proposed project plan and designate an authorized signer as detailed below:

RESOLUTION NO. 62-2019

**ADOPTING A FINAL PROJECT PLAN
FOR WATER SYSTEM IMPROVEMENTS AND
DESIGNATING AN AUTHORIZED PROJECT REPRESENTATIVE**

WHEREAS, the City of Owosso recognizes the need to make improvements to its existing water treatment and distribution system; and

WHEREAS, the City of Owosso authorized OHM Advisors to prepare a Project Plan, which recommends the construction of distribution, treatment, and storage upgrades as well as development of a new well field; and

WHEREAS, said Project Plan was presented at a Public Hearing held on April 15, 2019 and all public comments have been considered and addressed;

NOW THEREFORE BE IT RESOLVED, that the City of Owosso formally adopts said Project Plan and agrees to implement the selected alternative #1.

BE IT FURTHER RESOLVED, that the Director of Public Services, a position currently held by Glenn Chinavare, is designated as the authorized representative for all activities associated with the project referenced above, including the submittal of said Project Plan as the first step in applying to the State of Michigan for a Drinking Water Revolving Fund Loan to assist in the implementation of the selected alternative.

Motion supported by Councilmember Pidek.

Roll Call Vote.

AYES: Councilmembers Haber, Fear, Law, Pidek, Bailey, and Mayor Eveleth.

NAYS: None.

ABSENT: Mayor Pro-Tem Osika.

I hereby certify that the foregoing document is a true and correct copy of a resolution adopted by the Owosso City Council at the regular meeting of April 15, 2019 and which has not been rescinded or modified in any way whatsoever and is at present in full force and effect.

Amy K. Kirkland, City Clerk

Appendix H. Disadvantaged Community Documentation

Disadvantaged Community Status Determination Worksheet

The following data is required from each municipality in order to assess the disadvantaged community status. Please provide the necessary information and return to:

Robert Schneider
Revolving Loan Section
Office of Drinking Water and Municipal Assistance
P.O. Box 30241
Lansing, MI 48909-7741
Schneiderr@michigan.gov

If you have any questions please contact Robert Schneider at 517-388-6466

Please check the box this determination is for:

☒ DWRF ☐ SRF

1. Total amount of anticipated debt for the proposed project, if applicable.

   $15,318,300 anticipated debt

2. Annual payments on the existing debt for the system.

   $598,007

3. Total operation, maintenance and replacement expenses for the system on an annual basis.

   $2,545,010

4. Number of "residential equivalent users" in the system.

   7964 REUs

For determinations made using anticipated debt, a final determination will be made based upon the awarded loan amount.

Appendix I. Well Head Protection Plan State Approval

RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

KEITH CREAGH
DIRECTOR

February 5, 2016

Mr. David Haut
Water Filtration Plant Supervisor
City of Owosso
1111 Allendale Avenue
Owosso, Michigan 48867

WSSN: 05120
Shiawassee County

Dear Mr. Haut:

Congratulations! The City of Owosso Wellhead Protection Plan update is approved. We commend you on your efforts and encourage you to keep the program viable by updating it every six years or as changes occur within the wellhead protection program.

If you have any questions or need assistance implementing the program, please contact me at 517-284-6517; kukukw@michigan.gov; or at Department of Environmental Quality (DEQ), P.O. Box 30241, Lansing, Michigan 48909-7741.

Again, congratulations.

Sincerely,

Wayne Kukuk

Wayne Kukuk, Geologist
Community Drinking Water Unit
Field Operations Section
Office of Drinking Water and Municipal Assistance

cc: Ms. Kristen Philip, DEQ
Mr. Jason Berndt, DEQ
Mr. Kurt Swendsen, DEQ

Appendix J. Green Reserve Qualification

Drinking Water Revolving Fund
Green Project Reserve Qualification Template

Applicant: City of Owosso Project No: 0020-18-0050
Project Name: 2018 City of Owosso DWRF Project Plan

Identify by page number from the project plan, or attach excerpts, where water efficiency or energy efficiency improvement justification is provided or discussed to support the need for the recommended green project reserve component: Pages 9.

Please ensure all requested information is provided to enable an assessment by the Michigan Department of Environmental Quality (DEQ) of whether the project or project component can qualify for funding from the green project reserve.

~~**Meter Replacements with Conventional Meters**~~

~~1. Over the last five years, water lost or unaccounted for in the system has averaged _____ gallons per year and is _____ percent of the water produced each year.~~

~~2. Identify the source of this information (i.e. water audit, water conservation study, production and billing records):_____~~

~~3. Identify the portion of the water loss that is likely due to inaccurate meters:_____~~

~~4. The expected reduction in water loss by installing replacement traditional water meters in all or a portion of the system is _____gallons per year, reducing the water loss percentage to _____.~~

~~5. It takes _____kilowatt hours (kWh) of electricity to produce and distribute 1,000 gallons of water. At a cost of $_____per kWh, the estimated annual electrical cost for the water loss due to inaccurate meters based on the five-year average is $_____.~~

~~6. Based on the average cost per year for the loss and the estimated cost of_____ for replacing the meters, the project will pay for itself in _____months/years.~~

~~7. Attached all relevant data and calculations that were used to provide answers to these questions.~~

Water Main Replacement

1. Over the last ten years, 131 water main breaks have occurred on the water mains that are proposed for replacement, an average of 1.31 breaks/mile/year.

2. Identify the length, diameter, age and type of pipe to be replaced:

   The proposed water main replacements (46) total a length of 52,657 feet. Each segment is detailed in Appendix E in the Project Plan. Water mains were installed as early as before 1930 and as late as 2010. The material of the existing water mains include asbestos concrete, cast iron, galvanized steel and steel. See Appendix E of the 2020 DWRF Project Plan for a complete summary of lengths, diameters, ages, types, and conditions of pipes

3. Each break is estimated to result in the average loss of 3.9 million gallons of water, calculated to total 51.09 million gallons/year of water lost for those water mains.

4. Present the data indicating how this is a significant source of water loss in the system and how the pipes proposed for replacement are likely to generate the greatest return in leak reduction.

   The City's water system has approximately 569,424 linear feet of water main, or approximately 108 miles. Of that water main, 52,657 linear feet is 1.5-inch, 2-inch, 3-inch, 4-inch, 6-inch, 8-inch, 10-inch, and 12-inch cast iron, galvanized, or Transite water main that is proposed for replacement.

   Within the 52,657 linear feet of water main, the City experiences approximately 13.1 water main breaks/year (1.31 breaks/mile/year) (between the years of 2009 and 2018). Within the remaining 493,124 linear feet, the City experiences about 0.18 breaks/mile/year. By replacing this water main, it is estimated that the City will experience a reduction of 44% in the number of water main breaks that they experience.

5. The energy savings from pumping/delivering water through the new water mains versus the old ones is estimated at 67,918 KwH/year.

6. Describe the condition of the replaced mains with respect to friction/head loss etc from tuberculation or other deterioration issues. As appropriate, identify if the soils are corrosive and contributing to the deterioration/breaks or leaks in the mains, and how the replacement mains are designed to address future corrosion:
   The majority of the piping being replaced is cast iron installed prior to 1955 which has shown severe tuberculation. Additionally, hard water in Owosso has resulted in calcium deposits in piping. Based on hydrant flow testing, the existing C is estimated at 30 to 50. New 6-inch, 8-inch, and 12-inch C-900 PVC will have a C factor of 120 to 130. A new water softening process was installed at the WTP in 2005 to improve treatment so that new piping will not be affected in the same manner.
   Many existing water mains are shallow and subject to breaks due to freezing and frost heaving. Replacement mains will be installed at depths well below frost levels.

7. Total projects cost for the water main replacement component of the project: $12,565,000

8. Identify the source of data used for these calculations: Water Reliability Study (2017), City of Owosso Water Main Capital Improvement Plan.

Submitted by:

Matthew Kennedy, PE 4/30/2019
Name Date

Project Engineer
Title