Item 6G.
BCWMC 2-21-19

LOCAL WATER MANAGEMENT PLAN
2019 Update

For the

CITY OF MEDICINE LAKE

This plan was originally prepared by McCombs Frank Roos Associates, Inc., (now Sambatek) and originally adopted in 2010 by the City of Medicine Lake.

The plan was updated in fall of 2018 by Hoisington Koegler Group Inc. to incorporate updates as needed based on the updated Bassett Creek Watershed Management Commission 2015-2025 Watershed Management Plan.

The plan was reviewed by the BCWMC and approved on _____, _____.

The plan update was approved by the City of Medicine Lake by resolution xx.xx on _____, _____.

The full LSWMP is included as an appendix of the 2018 Comprehensive Plan Update for the City of Medicine Lake.

DRAFT 3 - February 12, 2019

CITY OF MEDICINE LAKE
DRAFT LOCAL WATER MANAGEMENT PLAN

TABLE OF CONTENTS

TABLES

MAPS

APPENDICES

ACRONYM IDENTIFICATION

AMLAC-Association of Medicine Lake Area Citizens

BCWMC-Bassett Creek Watershed Management Commission

BMP-Best Management Practice

BWSR-Minnesota Board of Water and Soil Resources

CIP-Capital Improvements Plan

CN-Curve Number

DWSMA-Drinking Water Supply Management Area

FEMA-Federal Emergency Management Agency

FIRM-Flood Insurance Rate Map

FIS-Flood Insurance Study

HSG-Hydrologic Soil Group

HWL-High Water Level

IDF-Intensity Duration Frequency

ISTS-Individual Sewage Treatment Systems

LGU-Local Government Unit

MDH-Minnesota Department of Health

MNDNR-Minnesota Department of Natural Resources

MFRA-McCombs Frank Roos and Associates

MNRRA-Mississippi National River and Recreation Area

MPCA-Minnesota Pollution Control Agency

NPDES-National Pollution Discharge Elimination System

NRCS-National Resource Conservation Services

NWI-National Wetland Inventory

NWL-Normal Water Level

OHWL-Ordinary High Water Level

PWI-Protected Waters Inventory

RD-River Development

SCS-Soil Conservation Service

LWMP-Local Water Management Plan

SWPPP-Storm Water Pollution Prevention Plan

TMDL-Total Maximum Daily Load

USACE-United States Army Corps of Engineers

USDA-United States Department of Agriculture

WCA-Wetland Conservation Act

WMO-Watershed Management Organization(s)

SECTION I – INTRODUCTION AND EXECUTIVE SUMMARY

A. Introduction

The City of Medicine Lake has updated this Local Water Management Plan (LWMP) from the previous version prepared in 2010 to provide the City and its residents with direction concerning the administration and implementation of surface water management activities within the community. The LWMP inventories City land and water resources and presents water management policies and goals, which address both known surface water-related problems and concerns about future development activities. The LWMP also presents the information needed to comply with the requirements of the federal, state and regional regulatory agencies involved in surface water management.

A.1 Policy Statement: The City of Medicine Lake is committed to a goal of no adverse impact or non-degradation for the area surface and ground waters. To accomplish this goal the City will demonstrate through the LWMP:

A.1.1 Performance measures for all proposed stormwater treatment devices.

A.1.2 Proposed plans and projects that will require water quality treatment, stormwater management rate control, volume control and erosion control. BMP protection measures will require City and Bassett Creek Watershed Management Commission (BCWMC) approval prior to construction. The City of Medicine Lake will have permitting authority.

A.1.3 Perform proper maintenance for Public Work's activities such as street sweeping, cleanup of City parkland and manhole sump cleaning.

A.1.4 Public education on water resource management.

A.1.5 Construction site inspection and enforcement of stormwater BMP's.

A.1.6 Providing necessary funds to implement the stormwater management plan.

A.2. Policy Statement: The City adopts by reference the Bassett Creek Watershed Management Commission's (BCWMC) "Watershed Management Plan", Rules and Regulations as part of Medicine Lake's "Local Water Management Plan" (LWMP) and will provide the localized information necessary to supplement the District's plan.

A.3 Policy Statement: The City will continue to collaborate with the BCWMC to continue to apply all of its rules and regulations in the City of Medicine Lake.

A.4 Policy Statement: The City will continue to authorize the BCWMC to be the "local unit of government" (LGU) responsible for implementing the Minnesota Wetlands Conservation Act within the City of Medicine Lake.

B. Purpose

The general purpose and objectives of the City of Medicine Lake LWMP are as follows:

B.1 Promote the infiltration of stormwater where feasible to improve water quality, reduce flow volumes and increase ground water recharge;

B.2 Promote activities that maintain, support, and enhance the quantity and ecological integrity of aquatic and upland resources;

B.3 Preserve, maintain and improve aesthetic, physical, chemical and biological composition of the Medicine Lake resource.

B.4 Minimize the risks of threats to public health through the development of programs, plans and policies that preserve the quality of surface and ground waters.

B.5 Preserve the natural appearance of shorelines and minimize degradation of shorelines and water quality resulting from dredging or land alteration operations;

B.6 Promote Best Management Practices (BMP's) to improve water quality;

B.7 Enhance public participation and knowledge by providing informational and educational material to the residents, businesses, developers and contractors;

B.8 Preserve, create and enhance wetland resources to maximize benefits and functionality to the City and Medicine Lake;

B.9 Promote aquifer protection;

B.10 Protect and preserve the Medicine Lake floodplain;

B.11 Control temporary sources of sediment resulting from land disturbance, minimize and correct the effects of sedimentation from erosion prone and sediment source areas;

B.12 Promote effective planning to minimize the impact of development and land use change on Medicine Lake's water resources;

B.13 Solicit public input with the intent that water resource policies, projects and programs will address the local values and goals. Strive to manage and make water resource decisions based on an educated public.

C. Regulatory Requirements

In 1982, the Minnesota Legislature adopted The Metropolitan Surface Water Management Act requiring all watersheds within the Twin Cities seven county metropolitan area to be incorporated into Watershed Districts and Watershed Management Organizations and the preparation and adoption of watershed management plans by each. The Act also requires that Local Governmental Units prepare Local Surface Water Management Plans which include the official controls and capital improvements necessary to bring each local surface water management into conformance with its respective Watershed District or WMO plan.

The City of Medicine Lake is entirely situated within the Bassett Creek Watershed Management Organization and located within the Medicine Lake watershed basin. The City of Medicine Lake LWMP is intended to meet the requirements of the following regulatory documents:

C.1 Bassett Creek Watershed Management Commission (BCWMC) 2015 "Watershed Management Plan".

C.2 Metropolitan Surface Water Management Act - Minnesota Statutes Chapter 103B;

C.3 Metropolitan Area Local Water Management - Minnesota Rules Chapter 8410;

C.4 Minnesota Wetland Conservation Act of 1991 and subsequent rules and amendments;

C.5 State and Federal laws pertaining to National Pollution Discharge Elimination System permitting for stormwater outfalls to designated drainage ways;

C.6 Erosion Control Guidelines and Best Management Practices prepared by the Minnesota Pollution Control Agency;

D. Water Resource Management Related Agreements

D.1 BCWMC Joint Powers Agreement: The City of Medicine Lake is one of nine member cities that comprise the Bassett Creek Watershed Management Commission. The Joint Powers agreement was last revised in 2014 and remains in effect until 2025, unless amended or terminated, and may be continued at the option of the member cities.

E. Executive Summary of Local Water Management Plan Content

The City of Medicine Lake's LWMP has been developed to meet the needs of the community and address the management planning requirements of the Metropolitan Surface Water Management Act and BCWMC Watershed Management Plan of 2015. The LWMP has been prepared in general accordance with Minnesota Rules Chapter 8410 and follows the plan outline identified in the rules.

The following summaries identify the major sections of the LWMP and where information can be located in the plan document:

E.1 Section I - Executive Summary:

This section presents an introduction for the local surface water management plan, and a summary of all the sections of this Local Water Management Plan. This section also summarizes strategic recommendations for consideration by the City in implementing the LWMP.

E.2 Section II - Land and Water Resource Inventory:

This section categorizes a wide range of information under the subsections entitled Physical Environment, Human Environment and Surface Water System. The subsections provide information and references regarding water resource and physical factors within the City of Medicine Lake including the following:

- Location
- Precipitation data for hydrologic/hydraulic review and design
- Geologic and topographic information
- Surface soils and groundwater information
- Land Erosion (Runoff) Susceptibility
- Unique features and scenic areas
- Land use and public utility services
- Water-based recreational areas and land ownership
- Potential pollutant sources
- Public waters and wetlands
- Flood Insurance Studies and surface water drainage information
- City subwatersheds ~~and Storm water modeling data, limitations and results~~

- Flood problem areas and surface water quality

E.3 Section III – Establishment of Policies and Goals:

This section outlines goals and policies addressing specific water resource management needs of the City and their relationship with the BCWMC, Regional, State, and Federal goals and programs. Goals and policies relating to the following issues are presented:

- Water quantity
- Water quality
- Erosion and sedimentation
- Wetlands
- Groundwater
- Recreation, fish and wildlife
- Enhancement of public participation

E.4 Section IV - Assessment of Problems and Corrective Actions

This section provides an assessment of existing or potential water resource related problems within the City. This section also describes potential structural, nonstructural and programmatic solutions on correction actions to the identified problems.

E.5 Section V – Implementation Program

This section identifies the regulatory controls, management programs, storm water design and performance standards, and capital improvements to be utilized by the City in implementing this LWMP.

E.6 Section VI – Implementation Priorities and Financial Considerations

This section presents improvement priorities and financial considerations that can be reasonably funded and implemented by the City in the near and longer-term future. This section also identifies the estimated costs and potential funding sources for implementing the proposed regulatory controls and programs.

E.7 Section VII – Stormwater Management and Erosion Control Standards

This section addresses stormwater management and erosion control standards the City has adopted and enforces when new development or redevelopment occurs. Implementation of these standards helps minimize the impact of stormwater runoff from the site and to receiving downstream areas.

E.8 Section VIII – Amendment Procedures

This section presents the expected longevity of the LWMP (to the year 2025) and the process for making amendments consistent with the future BCWMC plan.

F. Recommendation

The following recommendations are presented for the City's consideration based upon the information compiled for this LWMP:

F.1 The LWMP should be used to guide future water resource management decisions and stormwater related issues for future development and redevelopment within the City.

F.2 The LWMP should be used as part of the City's capital improvements planning process to address and prioritize necessary stormwater related infrastructure needs.

F.3 The City should examine existing and potential funding sources available for implementing stormwater regulatory controls and improvements.

F.4 The City should consider the additional staff time and financial resources required to implement this LWMP and develop additional revenue sources and budget accordingly.

F.5 The City should continue water resource educational programs and partner with the BCWMC, Association of Medicine Lake Area Citizens (AMLAC), Three Rivers Park District, other lakeside communities and other agencies to provide educational opportunities for the community.

F.6 The LWMP should be updated if there are changes to the City's projected land use.

F.7 The LWMP provides a general framework for addressing existing and future surface water management issues within the City. Additional studies may be required when specific development proposals are prepared or public improvements are considered. An example of studies that provide a greater level of detail into stormwater improvements is the Water Retention Pond in Jevne Park, a feasibility study currently being completed by BCWMC.

Water Retention Pond in Jevne Park: *This project will increase the capacity of an existing pond and wetlands located within the city's Jevne Park to collect and store stormwater runoff during heavy rainfall. This project also seeks to improve the quality of the outflowing water (from the Park pond into Medicine Lake) by diverting the water through a swale and a series of culverts before it reaches Medicine Lake. Lastly, this project will increase the holding capacity of wetlands located on private properties adjacent to the Park so as to minimize flooding from excess stormwater both in the Park, on Peninsula Road, and on homeowners' lawns and driveways. The study is to be completed in Spring of 2019 with construction to follow.*

SECTION II – LAND AND WATER RESOURCE INVENTORY

A. Introduction

This section provides a localized description and summary of land and water resource factors affecting the water resources within the City of Medicine Lake to supplement the BCWMC 2015 Watershed Management Plan. The subsections include Physical Environment, Human Environment, Surface Water Systems, and Groundwater Resource Data. The Physical Environment subsection presents local information on precipitation, geology, topography, soils, fish and wildlife habitat and unique features and scenic areas. The Human Environment subsection identifies local land use, public utility services, water based recreational areas and known pollutant sources. The Surface Water Systems subsection presents information on the City's drainage patterns, hydrologic systems, public waters and wetlands, floodplain areas, flood studies, shoreland management and water quality.

Much of the information contained within this section was compiled from available governmental sources, 2015 BCWMC Watershed Management Plan, and the City of Medicine Lake Comprehensive Plan. Whenever possible, the location of the information or additional resources have been identified or referenced.

B. Physical Environment

B.1 Location

The City of Medicine Lake occupies approximately 110 acres on Medicine Lake, in central Hennepin County as shown on the Regional Map at right. The City of Medicine Lake is entirely surrounded by the City of Plymouth. Medicine Lake borders Medicine Lake on the north. The City of Medicine Lake is located entirely within the BCWMC and the Medicine Lake watershed area. Refer to the Medicine Lake Subwatershed Location Map (see Exhibit 1 attached).

Source: Metropolitan Council

B.2 Precipitation

The climate of the Minneapolis/St. Paul metropolitan area is a humid continental climate with moderate precipitation, wide daily temperature variations, warm humid summers and cold winters. The total average annual precipitation is approximately 30 inches of which approximately 1/3 occurs in the months of June, July and August. The annual snowfall average is about 55 inches and is equivalent to approximately 5.3 inches of water. The average monthly temperatures, precipitations, and snowfalls are shown on Table 1.

TABLE 1 – AVERAGE CLIMATE DATA FOR MINNEAPOLIS

Month	Temperature (°F)	Precipitation (Inches)	Snowfall (Inches)
January	13.1	1.04	13.5
February	20.1	0.79	8.2
March	32.1	1.86	10.4
April	46.6	2.31	3.1
May	59.3	3.24	0.1
June	68.4	4.34	0
July	73.2	4.04	0
August	70.6	4.05	0
September	61.0	2.69	0
October	49.7	2.11	0.6
November	32.5	1.94	10.0
December	18.7	1.00	10.0
Annual Average	45.40	29.41	55.90

Source: Minnesota State Climatology 0ffice

For purposes of this LWMP and for enforcement of citywide and individual stormwater management plans, The City will rely on synthetic storms based on a 24-hour duration. The 24-hour design storms are the 2-year, 10 -year and the 100-year events. Table 2 identifies the specific design storm events, probability of occurrence and design rationale typically used for each design storm event.

TABLE – 2 STORM EVENT TABULATION

Storm Event (Return Period)	Rainfall Amount (24 hour period)	Storm Event Use Criteria (Typical)

2 - Year	2.87”	Stormwater Rate Control, Volume Control
10 - Year	4.29”	Storm Sewer Design, Stormwater Rate Control
100 - Year	7.42”	Design of Ponding/ Flooding Structures, High Water Levels, Stormwater Rate Control

The use of synthetic storms and the cumulative rainfall amounts are consistent with BCWMC standards. Further documentation regarding these storms can be found at National Oceanographic and Atmospheric Administration (NOAA) Atlas 14, Volume 8 (Midwest Region). The data itself can be found at: https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_printpage.html?st=mn&sta=21-3202&data=depth&units=english&series=pds
The NOAA Atlas 14 Precipitation Frequency Data Server (PFDS), the data’s source, can be found at: https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html

B.3 Geology

The general geology of Hennepin County and the City of Medicine Lake has been compiled by the Minnesota Geological Survey in a document titled Geologic Atlas of Hennepin County Minnesota (H. Hobbs and G. Meyer, Editors, 1989).

The surficial geology of the City consists of Glacial Till deposits that are mainly loam in texture. The approximately 20 foot top layer of loamy till is underlain by a layer of Superior lobe stratified sediment or till generally. Depth to bedrock is typically 50 to 100 feet.

The water table (soil consisting of saturated water located above the highest elevation of bedrock) in Medicine Lake varies with the lake level and local soil conditions. The clayey soils and granular lenses make for a variable water table condition. The water table elevation is estimated to be from 886.6 to 889.1. The water table elevation at a given location can vary from time to time depending on rainfall activity, soil water capacity, soil type, and lake level.

The sensitivity of ground water pollution to the water table, the upper most ground water resource, is greater near the shoreline of Medicine Lake. The sensitivity lessens in the upland areas where there is greater separation between the surface and the ground water. The ground water table is

connected directly to Medicine Lake which also makes the lake sensitive to pollution entering the ground water in upland areas.

B.4 Topography

Terrain within the city can be classified as gently rolling to level. The highest land elevations are adjacent to Peninsula Road. Peninsula Road runs north-south through the northern two-thirds of the city. The terrain gently slopes to the east and west and into Medicine Lake. Isolated areas contain steeper slopes. The majority of the steep slopes are adjacent to the lake in three locations on the peninsula.

B.5 Soils

The soils in areas of Medicine Lake that have not been developed and properties where re-development can be considered are to have moderate to questionable limitations in terms of building site suitability. The surface soils are made up primarily of loams and clay soil types intermixed with miscellaneous fill.

The general classification and hydrologic classification of the soils in Medicine Lake is found in the "Soil Survey for Hennepin County" prepared by the USDA Natural Resource Conservation Service (NRCS). All NRCS soil findings have now been placed online in a convenient easy to read format. The soil information can be found at: *http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx*

The information found online provides a good preliminary estimate of soil classification. If land disturbing activities are proposed, the City would require verification via soil borings and would not rely on information presented by the NRCS alone, given the information presented by the NRCS is general in nature and the degree of sampling is too large of a scale for land disturbing activities. The NRCS information however, is a tool suitable for runoff estimation and land use planning.

B.6 Land Erosion Susceptibility

Land that is located on high sloping land, or has previously been developed has a greater likelihood of generating more runoff than in areas that have not been developed or are located on gently sloping areas. The loams and clay soil types and gently sloping terrain in Medicine Lake represent a low to medium susceptibility to land erosion.

The close proximity to the shoreline of Medicine Lake makes land erosion an important issue from both an existing land use and new construction condition. The disturbed or exposed soils have a greater chance of flowing off site. Establishing or maintaining vegetation on exposed soil in these areas will keep silt and urban pollutants from washing into the receiving storm sewer lines and ultimately reaching the Medicine Lake.

B.7 Unique Features and Scenic Areas

According to Minnesota Department of National Resources (MNDNR) records, there are no occurrences of any rare plant or animal species within the city limits of Medicine Lake. The MNDNR does have regulatory jurisdiction with within their Medicine Lake shoreline setbacks. The City of Medicine Lake is located within these setback limits. Before any land alteration, dredging, or grading affecting the shoreline is scheduled to occur, the MNDNR office will need to be notified.

The City does not contain the following Federal, State, or County managed areas:

- Minnesota Historic Districts
- State, National or local forests
- Scientific or Natural Areas or areas designated for Wildlife Protection
- Three Rivers Park District Parks

The Medicine Lake region is known as a "Scenic Area" and a sport fishery with biodiversity significance and recreational features.

B.8 Biological Environment

B.8.1 Vegetation: The City of Medicine Lake is predominantly developed with a scattering of vacant properties and parkland. Natural vegetation consists of shoreline, aquatic and wetland varieties.

B.8.2 Medicine Lake: The city is bordered by Medicine Lake on the west, north and east sides of the city. The MNDNR regularly stocks and surveys the fish populations in the lake. The fishery is classified as a sport-northern pike lake populated with blue gill, walleye, northern pike, yellow perch, bass and black crappie. The MNDNR stocks the lake with walleye. Medicine Lake is considered a Priority 1 Deep Lake under the BCWMC Classification system.

Medicine Lake is under a Minnesota Pollution Control (MPCA) "Fish Consumption Advisory" due to elevated levels of mercury. Medicine Lake has been added to the MPCA's impaired waters list for nutrient/eutrophication biological indicators.

A TMDL report addressing nutrient impairment was completed for the MPCA and the BCWMC in 2010. The TMDL report can be found at: https://www.pca.state.mn.us/sites/default/files/wq-iw8-19e.pdf.

B.8.3 Wetlands: The City of Medicine Lake has no near-term plans to inventory the functional values of wetlands within the community with the exception of the Water Retention Pond in Jevne Park feasibility study. The City will review the functional values of impacted wetlands on a case-by-case basis in accordance with Minnesota Statue, Section 103B.3355 during City review of individual project proposals. BCWMC has accepted responsibility as the Local Government Unit under the Minnesota Wetlands Conservation Act and will review projects impacting wetlands in accordance with State wetland laws and rules. Section III of this SWMP further defines the Cities review process for projects affecting wetlands.

C. Human Environment

C.1 Land Use

The City's 2018 Comprehensive Plan Update contains descriptions of existing land use, current zoning, population and proposed land use projections. Maps of the Existing Land Use and 2040 Proposed Land Use Plan are provided on the following page of this report. The majority of the City is considered "built-out", or fully developed. Less than 5 acres of land remains undeveloped (2018), a significant amount of which is classified as wetlands. Most of the City consists of residential housing with single-family residential and commercial land uses. There is minor potential for commercial or multi-housing development and re-development. The 2016 population was estimated at 386 (Metropolitan Council) and is expected to grow to 400 by 2040.

C.2 Public Utilities Services

C.2.1 Sanitary Sewer:

The City of Medicine Lake is served by a municipal, city operated sanitary sewer system. All of the sewage flows are collected in the city system and pumped by a lift station to a Metropolitan Council sewer trunk line. The City is located entirely within the Metropolitan Urban Service Area (MUSA). The city recently completed a lining of its entire system to help reduce infiltration.

C.2.2 Storm Sewer:

The City of Medicine Lake routes stormwater via driveway culverts and ditches, or overland to either a receiving wetland or Medicine Lake. No treatment ponds or other structural stormwater pollution control devices are located within the City of Medicine Lake.

The current public storm sewer system in the City of Medicine Lake is comprised of city street culverts and drainage swales. The City of Medicine Lake has changed the direction of its water flow off Peninsula Road (near Jevne Park) so that the water first flows to the east and then subsequently flows back under Peninsula Road to the ditch / holding pond area before going into the creek / channel area leading into Medicine Lake. Due to the close proximity of Medicine Lake, the vast majority of stormwater runoff drains overland, directly into Medicine Lake. The Water Retention Pond in Jevne Park feasibility study will explore improvements that will provide improved stormwater treatment and control.

A map identifying existing street culverts and outfalls is attached in Exhibit 4.

C.2.3 Water System:

Each residential and commercial property within the City of Medicine Lake is served by its own private well. The City does not own or operate a water supply system.

C.3 Potential Pollutant Sources

Various land use practices have the potential to contaminate local surface waters and groundwater. There is significant contamination potential at open and closed landfills, dumps, hazardous waste sites, and underground and aboveground storage tanks. The city does not have operating private septic systems, operating landfills, superfund sites, permitted waste water discharges or animal feedlots.

There are no above ground or below ground storage tanks, nor any sites that are enrolled in the MPCA's Voluntary Investigation and Cleanup (VIC) program. As such, the City has not created a local spill containment plan.

D. Surface Water System

This section summarizes the available surface water data within the City. Additional information is included in the Appendices (as identified in this section) of the LWMP.

D.1 Public Waters and Wetlands

Medicine Lake is the second largest lake in Hennepin County and is the primary water resource in the City of Medicine Lake. The lake is defined as a Priority 1 Deep Lake under the BCWMC classification system. Medicine Lake is a recreational water that supports all recreational activities – boating, fishing and swimming – and reflects the current and expected future uses of the lake.

Medicine Lake is the only water body within the City identified as a public water. The MNDNR does not list any other water body within the City of Medicine Lake as a public water with a public water ID. Minnesota Chapter 103G provides specific criteria for protected status and the MNDNR Protected Waters and Wetlands (PWI) map identifies the protected water.

TABLE 3 – MNDNR PROTECTED WATERS

Water Body	DNR ID	Acreage
Medicine Lake	27-0104-00	886

Additional sources of wetland identification are "National Wetlands Inventory" (NWI) Maps, prepared by the U.S. Fish and Wildlife Service.

D.2 Ditches: There are no jurisdictional or public drainage ditches established under state statue in Medicine Lake.

D.3 Flood Insurance (Plain) Studies:

The City of Medicine Lake is nearly encircled by Medicine Lake flood plain. The basis for flood plain zoning and regulation is the Federal Insurance Rate Map (FIRM) developed by the Federal Emergency Management Agency (FEMA). The FIRM for the City of Medicine Lake identifies the areas that are subject to 100 year and 500 year flood plain elevations. The City of Medicine Lake administers the FEMA program and recognizes the Medicine Lake 100 year flood plain elevation as 890.4 based on the updated model and using the Atlas 14 precipitation amounts per BCWMC policy. This is equivalent to the BCWMC floodplain elevation for Medicine Lake. The BCWMC regulatory floodplain elevation of Bassett Creek, downstream of the Medicine Lake outlet is 889.4. See Exhibit 5 – FEMA Floodplain Map.

D.4 Surface Water Drainage Information and Modeling:

The City of Medicine Lake routes stormwater via driveway culverts and ditches or overland to either a receiving wetland or Medicine Lake. No treatment ponds or other structural stormwater pollution control devices are located within the City of Medicine Lake.

The City of Medicine Lake has changed the direction of its water flow off Peninsula Road (near Jevne Park) so that the water first flows to the east and then subsequently flows back under Peninsula Road to the ditch / holding pond area before going into the creek / channel area leading into Medicine Lake. Shoreline areas drain overland, mostly across residential yards directly into Medicine Lake.

When site specific stormwater management plans are required per city ordinance (Section 1700 of the zoning code attached as an appendix) the City will work with developers to use a HydroCAD or similar computer program to estimate stormwater flows. HydroCAD is a hydrologic/hydraulic program based on techniques and methods developed by the National Resource Conversation Service (NRCS). The results of the HydroCAD model can provide probability-statistical determinations of runoff rates, pond/basin storage volumes and water elevations.

Stormwater runoff generated in the City flows to Medicine Lake in a very short time period. The impact on the Medicine Lake water level is minimal. Runoff rates in the past were regulated based on water quality treatment criteria and storm sewer capacity.

With very limited land and resources for infiltration the volumes of runoff are expected to remain the same.

D.5 Flood Problem Areas:

There are few isolated areas that pond water and have flooding problems associated with stormwater runoff. These are considered "nuisance" in nature and are associated with low spots. There are no current landlocked areas experiencing flood problems. The City will continue to apply acceptable stormwater and surface water management practices for current properties and potential development areas. The City will adhere to a minimum building elevation of 2' above 100-year flood level elevations from adjacent ponds, basins, wetlands and the flood plain of Medicine Lake, as required in the BCWMC Watershed Management Plan. The City will also comply with the BCWMC Plan's goals and policies regarding flooding and rate control. In 2005, a detailed survey was completed in the areas of Kaiser Avenue and Colonial Circle as part of updating the FEMA floodplain map. The 2004 FEMA floodplain map indicated flooding in this area. The results of the survey indicated there is one home (potentially), five garages and two sheds that are located below the jurisdictional floodplain elevation. Revised flood areas are shown with the new FEMA maps (see appendix).

D.6 Surface Water Quality:

D.6.1 City Drainage: The quality of stormwater runoff generated in the city is typical for a mixed land use community consisting of residential, commercial and public right of way. The City will comply with the BCWMC's water quality performance standards for new or re-developed properties. All stormwater will be treated in accordance with the MPCA's Minimal Impact Design Standards (MIDS) performance goal for new development and redevelopment. If the MIDS performance goal is not feasible and/or is not allowed for a proposed project, then the project proposer must implement the BCWMC flexible treatment options, as shown in the BCWMC Design Sequence Flow Chart. The City will enforce water quality performance standards consistent with the BCWMC 2015 Watershed Management Plan and BCWMC Requirements for Improvements and Development Proposals. Based on comprehensive plan land use projections the pollutants in the stormwater runoff and the overall quality of the generated runoff will remain

unchanged. There are no illicit discharge outlets into Medicine Lake or MPCA permits for discharge in the City of Medicine Lake.

D.6.2 Medicine Lake: Medicine Lake borders the west, north and east sides of the City and receives the majority of storm water generated in Medicine Lake. The entire lake is under a Fish Consumption Advisory for mercury and was added to the "impaired waters" list in 1998. The Minnesota Department of Natural Resources (MNDNR), Minnesota Department of Health (MDH) and Minnesota Pollution Control Agency (MPCA) have collaborated to monitor mercury and PCB contamination in the Lake and continue to do so. More detailed fish consumption advisories have been prepared for Medicine Lake and are available from these agencies. Mercury contamination is being addressed by a region wide Total Maximum Daily Load (TMDL) process by the MPCA. In 2008 the MPCA added Medicine Lake to their "impaired waters list" for Nutrient/Eutrophication Biological Indicators. Therefore, the development of a TMDL is required. A TMDL was prepared in November 2010, and a TMDL Implementation Plan was prepared in February 2011. The BCWMC plan identifies phosphorous as the primary nutrient pollutant. A categorical wasteload allocation (WLA) of 8.44 lbs/day or 3,082 lbs/year total phosphorus (TP) has been assigned, in total, amongst all of the MS4s tributary to Medicine Lake, including the City of Medicine Lake MS4. The BCWMC serves as the convener of the categorical WLA and includes projects to address phosphorus loading to Medicine Lake in its capital improvement program (CIP).

D.6.3 Monitoring: Medicine Lake monitoring is currently performed annually at one site on the lake by Three Rivers Park District and the City of Plymouth. The BCWMC performs detailed monitoring of the lake every four years; the detailed monitoring program includes monitoring two locations on the lake (main basin and the southwest basin). In 2010, the BCWMC began participating in the Metropolitan Council's CAMP (Citizen Assisted Monitoring Program) on Medicine Lake. Local citizens have been monitoring the Southwest Bay and the Main Lake.

SECTION III – ESTABLISHMENT OF GOALS AND POLICIES

A. Introduction

The City of Medicine Lake has developed the goals and policies contained in this section to conform with the water resource purposes specified in Minnesota Statute Section 103B.201 and in the BCMC Watershed Management Plan. They have been developed to avoid conflict with existing State, Regional, and County goals and policies. The general purposes of the goals and policies are as follows:

A.1 Protect, preserve, and use natural surface and groundwater storage and retention systems;

A.2 Minimize public capital expenditures needed to correct flooding and water quality problems;

A.3 Identify and plan for means to effectively protect and improve surface and groundwater quality;

A.4 Establish uniform local policies and official controls for surface and groundwater management

A.5 Prevent erosion of soil into surface water systems;

A.6 Promote groundwater recharge;

A.7 Protect and enhance fish and wildlife habitat and water recreational facilities;

A.8 Secure the other benefits associated with the proper management of surface and groundwater.

The goals and policies developed by the City address water quality, water quantity, erosion and sediment control, wetlands, groundwater, recreation, fish and wildlife, and enhancement of public participation. Outlined below are the goals and policies developed for each of the above topics.

B. Water Quantity and Flooding

Goal: **To limit public capital expenditures necessary to control excessive volumes and rates of runoff.**

Policies:

1. The city will require that proposed stormwater discharges as a result of development be equal to or less than existing rates for the 2-year, 10- year, and 100-year events; in conformance with the BCWMC Flood Control Project system design and the BCWMC 2015 Watershed Management Plan.

2. Where practical and feasible, stormwater facilities will be developed on a regional basis, rather than on an individual site basis. For land development projects, the City will determine whether regional stormwater facilities are required and the level of City participation in planning and construction.

3. The City will review downstream stormwater-related impacts (within the community) of development proposals and proactively address water resource-related concerns.

4. The design of new stormwater storage facilities will accommodate the 100-year storm event. Lateral storm sewer will be designed for the 10-year storm event. Additional information on stormwater design standards is contained in Sections V and VII.

5. Require lowest floor elevations of all proposed structures be at least two feet above the 100 year flood level of Medicine Lake, and require surface elevations for new buildings to be a minimum of 2 feet above projected 100-year flood levels of basins. The city will prohibit the construction of basements in the floodplain.

6. The City will encourage the utilization of natural ponding areas for stormwater storage and treatment if not in conflict with the classifications and management strategies of this LWMP, and any Wetland Functional Assessments prepared on a project by project basis.

7. The City will encourage the minimization of the amount of direct impervious surface planned for any re-development. The city will also encourage the use of natural drainage ways for conveying stormwater, provided the drainage ways can properly channel the stormwater flows and volumes before ultimately reaching an existing or proposed storm sewer line.

8. Enhanced infiltration practices will be a top priority, where feasible.

9. Public stormwater facilities will be regularly inspected and maintained as necessary for adequate operations. For private stormwater facilities, the City will require a maintenance agreement, which identifies adequate inspection and maintenance methods for stormwater facilities as a part of the development documents.

10. Wetlands within the City will be protected to assure that the wetland's values for providing water quantity benefits will not be significantly impacted. Where practical and feasible,

wetland buffers will be encouraged and supported by the City consistent with BCWMC policies.

11. The City is the permitting authority for all projects. The City authorizes the BCWMC to continue to review development and redevelopment projects. The types of projects that must be submitted to BCWMC for review will comply with the requirements set forth in the BCWMC's document *Requirements for Improvements and Development Proposals* (BCWMC, August 2017, as revised).

12. The City will continue to enforce its floodplain ordinance. This ordinance shall apply to all BCWMC-designated floodplain and FEMA-delineated floodplain within the jurisdiction of the City of Medicine Lake. Flood plain areas within the City of Medicine Lake shall encompass all areas designated as Zone A, Zone AE, Zone AO, or Zone AH as shown on the FIRM adopted in the ordinance.

13. The city will make sure its ordinances conform to BCWMC floodplain standards, and submit any relevant ordinance revisions to the BCWMC for review.

14. The city will work with the BCWMC to determine responsibilities for major rehabilitation and replacement BCWMC Flood Control Project features and establish the associated funding mechanisms.

15. The city will do routine maintenance, repair, cleaning, including removal of debris, brushing, and tree removal of BCWMC Flood Control Project structures built in the City.

16. The city will retain on-site runoff from development and redevelopment projects consistent with the MPCA's Minimal Impact Design Standards (MIDS) performance goals.

    These include the retention of:

    - 1.1 inches of runoff from impervious areas for new development creating more than 1 acre of new impervious area
    - 1.1 inches of runoff from new or fully reconstructed impervious areas for redevelopment creating one or more acres of new or fully redeveloped impervious area
    - 1.1 inches of runoff from net new impervious areas for linear projects creating one or more acres of net new impervious area (revised May 2017).

- If an applicant is unable to achieve the performance goals due to site restrictions, the BCWMC flexible treatment options approach shall be used, following the BCWMC design sequence flow chart.

For all other projects, the BCWMC encourages the use of infiltration, filtration, or other abstraction of runoff from impervious areas for all development and redevelopment projects as a best practice to reduce stormwater runoff.

C. Water Quality

Goal: **To maintain or improve the stormwater runoff water quality to Medicine Lake and wetlands.**

Policies:

1. All stormwater will be treated in accordance with the MPCA's Minimal Impact Design Standards (MIDS) performance goal for new development and redevelopment. If the MIDS performance goal is not feasible and/or is not allowed for a proposed project, then the project proposer must implement the BCWMC flexible treatment options, as shown in the BCWMC Design Sequence Flow Chart.

2. In the design and construction of new stormwater conveyance systems or modification of existing systems, pretreatment of stormwater runoff will be required prior to discharge to Medicine Lake or a city wetland. Treatment methods shall include wet detention basins, proprietary structures and other Best Management Practices identified in the current Phase II MPCA Stormwater Construction Permit or equivalent performance standards. Additional information on design standards is contained in Sections V and VII.

3. Ponding areas constructed for water quality improvements shall include a skimmer, if feasible, at the pond outlet to remove oil and other floating materials in stormwater runoff.

4. The City will continue their maintenance program that regularly inspects and maintains public stormwater management facilities to assure their effectiveness per NPDES Phase II Municipal Separate Storm Sewer System (MS4) Requirements. The City will continue to require the owner of private stormwater facilities to execute a maintenance agreement with the City for regular inspection and maintenance of private ponding systems.

5. The City will continue to sweep paved public streets within the community twice per year. Vacuum-type sweepers are used to clean City streets and parking lots. Streets are swept in the spring when frost and snow is cleared, and in the fall season before the first frost. Since City roads do not contain storm sewer, only ditches and culverts, only surface generated sand and debris is contained on the roads.

6. The City will continue to inspect for illegal connections and discharges to the City's Storm Water System per the NPDES Phase II Municipal Separate Storm Sewer System (MS4) permit.

7. The City will require the implementation of erosion and sediment control plans and best management practices for construction and land development activities in accordance with the developer's Storm Water Pollution Prevention Plan (SWPPP) for construction activity requirements as required by the MPCA.

8. For proposed land development adjacent to Medicine Lake and wetlands, the City will follow city ordinance requirements for setbacks and buffers. (see wetlands policy E.11)

9. The City currently implements a public education program through the MS4 SWPPP permit to foster responsible water quality management practices by City residents and businesses. The public information includes information on proper lawn fertilizing and other lawn chemical use, disposal of lawn waste, and disposal of solid, liquid, and household hazardous waste products. The city will work to accomplish these tasks through partnerships with other organizations such as BCWMC, Three Rivers Park District, state and regional agencies, adjacent municipalities, City businesses, and private citizen groups.

10. The City will coordinate with BCWMC and Metropolitan Council on water quality monitoring programs proposed within the community and on Medicine Lake.

11. The goals and policies will be implemented and updated as necessary to meet BCWMC and MPCA's TMDL phosphorous reduction requirements.

12. The City authorizes the BCWMC to continue to review development and redevelopment projects according to the guidelines presented in the BCWMC Requirements for Improvements and Development Proposals document.

D. Erosion and Sedimentation Control

Goal: **To prevent erosion and sedimentation to the maximum reasonable extent.**

Policies:

1. The City will require the preparation and implementation of erosion and sediment control plans and best management practices for construction and land development activities in accordance with the developer's approved Stormwater Pollution Prevention Plan (SWPPP) for construction activity requirements as required by the MPCA. The City may obtain financial surety from the proposed project to assure compliance.

2. The City will enforce the erosion and sediment control plan and best management practices on construction sites to control erosion, soil loss, and sedimentation. Areas adjacent to water bodies and wetlands, and areas known to have high erosion potential will receive highest priority.

3. The City will cooperate with the BCWMC, State and Federal requirements for stormwater permits on land alteration activities.

4. The City may prohibit work in areas having steep slopes and/or high erosion potential when the impacts of significant erosion cannot be controlled or mitigated.

5. The city will perform regular erosion and sediment control inspections for projects triggering BCWMC review and subject to BCWMC erosion and sediment control standards. The city will annually report to the BCWMC regarding compliance with BCWMC standards as part of annual MS4 reporting or as requested by the BCWMC Commission.

6. The city will describe existing and proposed city ordinances, permits, and procedures addressing erosion and sediment control in this plan.

7. The city will work with the BCWMC to evaluate end-of-pipe sediment sources and controls. Following adequate source control, the BCWMC may fund removal of end-of-pipe sediment deltas downstream of intercommunity watersheds, or facilitate collaboration among responsible parties to remove these deltas.

E. Wetlands

Goal: **To protect wetlands in conformance with the requirements of the Minnesota Wetlands Conservation Act and rules, and other State and Federal regulations.**

Policies:

1. The City will maintain the BCWMC as the Local Governmental Unit (LGU) responsible for wetland management. The City and BCWMC will manage wetlands in conformance with the Minnesota Wetlands Conservation Act (WCA) of 1991, its amendments and rules (MN Rules Chapter 8420).

2. The City will notify parties proposing land disturbing activities (i.e.: altering, excavating, filling, and draining) in wetlands of permit requirements from the MNDNR, MPCA, US Army Corps of Engineers (USACE) and BCWMC.

3. The City will cooperate with the permitting programs of the MNDNR, MPCA, US Corp of Engineers and BCWMC for proposed activities within the jurisdictional wetlands.

4. The City will utilize available wetlands inventory information developed by the U.S. Fish and Wildlife Service, BCWMC, the MNDNR, and the Metropolitan Mosquito Control District to preliminarily identify the location of wetlands on properties where land alteration is proposed.

5. The City will require a wetlands report identifying jurisdictional wetlands as part of the City approval process for land development. If wetland encroachments are proposed with the development, wetland values and impacts will be evaluated on a case-by-case basis in accordance with the requirements of the WCA and rules.

6. The City will require pretreatment of stormwater runoff prior to discharge to a City waterbody or wetland. Pretreatment methods shall include wet detention basins or other approved Best Management Practices identified in the current Phase II MPCA Stormwater Construction Permit or equivalent performance standards.

7. The City will require wetland impact mitigation take place within the city limits.

8. The City will encourage placement of native, unmaintained buffer strips adjacent to wetlands to limit erosion and nutrient transportation to the wetlands.

9. The City authorizes the BCWMC to be the "local unit of government" responsible for implementing the Minnesota Wetlands Conservation Act within the City of Medicine Lake.
10. The City will develop and implement wetland protection ordinances that consider the results of wetland functions and values assessments, and are based on comprehensive wetland management plans, if available. For wetlands classified as Preserve or Manage 1, the city will implement standards for bounce, inundation, and runout control that are similar to BWSR guidance; member cities are encouraged to apply standards for other wetland classifications.
11. The City will maintain and enforce buffer requirements for projects containing more than one acre of new or redeveloped impervious area. Average minimum buffer widths are required according to the MnRAM classification (or similar classification system):
    - An average of 75 feet and minimum of 50 feet from the edge of wetlands classified as Preserve
    - An average of 50 feet and minimum of 30 feet from the edge of wetlands classified as Manage 1
    - An average of 25 feet and minimum of 15 feet from the edge of wetlands classified as Manage 2 or 3.

Allowable land uses and vegetative criteria for buffers are specified in the BCWMC's *Requirements for Development and Redevelopment* (BCWMC, 2015, as amended).
The City may allow exemptions for public recreational facilities parallel to the shoreline (e.g.trails) up to 20 feet in width, with that width being added to the required buffer width.

F. Groundwater

Goal: **To protect groundwater by prudent management of surface waters.**

Policies:

1. The City will cooperate with County and State agencies to inventory and seal abandoned wells and notify its residents of State standards on well abandonment. There are currently no known wells that need to be abandoned in the City.

2. The City will encourage the use of infiltration methods to promote groundwater recharge where groundwater will not be significantly impacted by the land use or stormwater runoff.

3. Because the City of Medicine Lake does not have a municipal well or water distribution system, a well head protection plan has not been prepared.

4. The City will continue MS4 inspections of the City's Storm Water System for illicit discharge connections.

5. The City will evaluate the impact new and re-development may have on the groundwater when permitting new construction.

6. The City will cooperate with the MPCA as they administer their pollution control programs.

7. The City will implement infiltration practices in accordance with the following guidance for determining the feasibility of infiltration:

   - Stormwater Permit (2013, as amended)
   - *Evaluating Proposed Stormwater Infiltration Projects in Vulnerable Wellhead Protection Areas* (MDH, 2007)
   - The BCWMC recommends that infiltration practices be designed with consideration for the following guidance: Requirements for Improvements and Development Proposals (BCWMC, 2017, as revised)
   - *Minnesota Stormwater Manual* (http://stormwater.pca.state.mn.us/index.php/Main_Page)

G. Recreation, Fish and Wildlife

Goal: **To protect and enhance recreational facilities, and fish and wildlife habitat.**
Policies:

1. The City will support the efforts of the BCWMC, Local, State, and Federal agencies promoting the public enjoyment, protection of fish and wildlife of the Medicine Lake resource.

2. The City will protect wetlands in accordance with the goals and policies of this plan.

3. The City will encourage native, unmaintained buffer zones around wetlands and ponding areas in new developments were feasible and practical and in conformance with BCWMC requirements with restrictive easements for these buffers.

4. The City will encourage its residents to retain vegetation buffers, and open spaces for the benefit of wildlife habitat and protection of the Medicine Lake shoreline.

5. The City will guide future land planning activities and encourage community development actions to include shoreline buffers.

H. Medicine Lake Shoreline

Goal: **To preserve the natural appearance of existing shoreline areas, promote native buffers along the shoreline and minimize degradation resulting from shoreline alterations and dredging.**

Policies:

1. To promote native shoreline buffer creation and shoreline restoration.

2. To enforce ordinance shoreline setbacks and buffer requirements on development projects.

I. Enhancement of Public Participation, Information and Education

Goal: **To educate and inform the public on water resources management issues and to increase public participation in water management activities.**

Policies:

1. The City will continue the MS4 permit public education program to foster public participation in responsible water quality management practices by residents and businesses. The public education topics will include: fertilizer use and the limited need for phosphorus in fertilizer; lawn care and lawn chemical use; solid, liquid and household hazardous waste disposal; and natural water resource systems and protection methods.

2. The City will coordinate public information and education programs with information and activities from the BCWMC, Local, State and Federal agencies.

3. The City will prepare and distribute water resource and water quality related information to residents at least once annually. The City will also have water resource protection information available at City Hall for review by its residents.

4. The City will develop a Water Resources Library available for public review at City Hall. The library will contain resources referenced in this LWMP, public information on water

quality practices and activities, the City of Medicine Lake's MS4 Storm Water Pollution Prevention Plan (SWPPP), and other water resource-related documents and information.

5. The City will utilize best management practices in the management of City lands, recreational areas, and open space areas and public works facilities.

6. The City will enforce its ordinance relating to lawn fertilizer application control for lawn applications and prohibit phosphorus to be used as fertilizer unless if allowed under Minnesota Statute 18C.60.

SECTION IV – ASSESSMENT OF PROBLEMS AND CORRECTIVE ACTIONS

This section contains an assessment of existing and potential water resource related problems presently known within the City and a description of structural, non-structural, or programmatic solutions that could be used to address or correct the problems. The problems and concerns have been identified by MFRA as part of the land and water resource data collected in the preparation of the 2010 LWMP. Since the 2010 LWMP, Medicine Lake has been considered impaired for excess phosphorus. A TMDL, along with a TMDL Implementation Plan has been created to address this issue. Many of the problems addressed in 2010 continue to be problems that need to be managed on a project by project or ongoing basis. Some of the topics discussed herein are repetitive because they are presented according to the State rules and outline for local management plan preparation.

A. Water Quantity and Flooding

A.1 Assessment:

A.1.1 There are no problem erosion areas created by excessive runoff rates or flood prone areas in Medicine Lake, except for "nuisance ponding" from high intensity rain events.

A.1.2 The City of Medicine Lake is completely developed except for a few acres of vacant land. New development and redevelopment projects are not expected to increase the runoff rates or volume of stormwater runoff to Medicine Lake. To meet phosphorous reductions the volumes of stormwater must be reduced and/or the stormwater treated to remove higher percentages of phosphorous.

A.2 Corrective Action:

A.2.1 Promote infiltration Best Management Practices (BMP's) for new development and redevelopment to maintain runoff rates and reduce volumes of stormwater runoff flowing to Medicine Lake.

B. Surface Water Quality

B.1 Assessment:

B.1.1 Medicine Lake is listed as "Impaired" based on Nutrient/Eutrophication Biological Indicators to MPCA's Total Maximum Daily Limit (TMDL) Reporting.

B.1.2 A TMDL for Nutrient/Eutrophication Biological Indicators was prepared in November 2010, and a TMDL Implementation Plan was prepared in February 2011. The BCWMC serves as the convener of the categorical wasteload allocation (WLA) of 8.44 lbs/day or 3,082 lbs/year total phosphorus (TP) assigned, in total, amongst all of the MS4s tributary to Medicine Lake, including the City of Medicine Lake MS4. The TMDL report can be found at:
https://www.pca.state.mn.us/sites/default/files/wq-iw8-19e.pdf
The TMDL Implementation Plan can be found at:
https://www.pca.state.mn.us/sites/default/files/wq-iw8-19c.pdf

B.2 Corrective Action:

B.2.1 Promote stormwater management design that utilizes BMP's, rain water gardens and open space site design that reduce runoff volumes by increasing infiltration.

B.2.2 The city will continue the MS4 stormwater facility inspection and maintenance program. Continue two times a year street sweeping and resident education program on measures to protect the water quality of Medicine Lake.

B.2.3 The City shall stringently uphold erosion control standards for land development and house building activities. Incorporate stormwater treatment in system upgrade projects that reduce phosphorous loadings where feasible; Regularly maintain and clean storm sewer ponding, water quality manhole structures and piping facilities. In 2018 the City has implemented a construction management process for new construction. This process is in part intended to improve construction monitoring to prevent erosion and runoff from entering Medicine Lake.

B.2.4 Continue to implement water quality performance standards consistent with BCWMC policies and requirements.

B.2.5 Develop a partnership of cooperation with the BCWMC to jointly work towards the goal of protecting and preserving the water quality of the Medicine Lake resource.

B.2.6 The City will continue to collaborate and cooperate with the BCWMC and its member cities to implement the projects identified in the BCWMC's CIP to address Medicine Lake water quality.

B.2.7 The City will continue to conduct a yearly goose round-up to reduce the goose population. Approximately 100 geese are removed annually.

C. Impacts of Soil Erosion on Water Quality and Quantity

C.1 Assessment:

C.1.1 Construction-related soil erosion can occur on small and large-scale construction projects. Sediment can be discharged off-site via surface waters and into Medicine Lake.

C.1.2 Erosion of existing slopes and shorelines due to natural causes or landscape activities can adversely impact Medicine Lake.

C.2 Corrective Actions:

C.2.1 Erosion and sediment control plans will be prepared, implemented, and enforced on construction projects to prevent erosion, sedimentation and adverse water quality impacts.

C.2.2 Existing eroded slopes and shoreline will be addressed and corrected, when feasible, or as part of permitted projects.

C.2.3 The City will promote native vegetated shoreline buffers.

D. General Impact of Land Use Practices and Land Development on Wetlands

D.1 Assessment:

D.1.1 Land use practices and land development can have a significant impact on water quality and water quantity entering wetlands. Impervious surfaces are often the receiving source of urban pollutants and contribute more runoff volume than natural land and vegetation. Increased development in the City has the potential to increase downstream flooding and degrade water quality.

D.2 Corrective Actions:

D.2.1 Implementation of the stormwater management practices within this LWMP will address potential negative impacts of land development. The City will work with new redevelopment proposals to remedy existing drainage problems, where feasible. Implementation and enforcement of erosion control best management practices will protect the quality of surface waters. In addition, the City will also continue to monitor lot coverage amounts for redeveloping areas.

D.2.2 Better communications and cooperation with adjacent communities and the BCWMC will reduce unanticipated impacts of land development impacting other communities and improve joint water resource planning and improvement efforts.

E. Adequacy of Existing Regulatory Controls to Manage or Mitigate Adverse Impacts on Public Waters and Wetlands

E.1 Assessment:

E.1.1 Public waters and wetlands are currently regulated by programs administered by the USACE, MNDNR and by Minnesota's Wetland Conservation Act (WCA). The City of Medicine Lake has authorized the BCWMC the responsibility of being the Local Government Unit (LGU) to administer the WCA requirements.

E.2 Corrective Action:

E.2.1 It is the City's position that the BCWMC's regulatory programs along with the City Ordinances, Codes and Guidelines will adequately manage or mitigate adverse impacts on public waters and wetlands.

F. Maintain groundwater quality and protect the public health

F.1 Assessment:

F.1.1 The city has not prepared a well head protection plan.

F.2 Corrective Action:

F.2.1 To prepare a well head protection plan in the future and coordinate stormwater management and regulate land use in the well protection area.

G. Impacts of Stormwater Quality on Recreation, Fish and Wildlife Resources

G.1 Assessment:

G.1.1 Sediment, nutrients and urban pollutants in untreated stormwater discharges adversely impacts water quality, recreation, fish and wildlife resources.

G.1.2 Existing land use activities and land development within the City may adversely impact recreational activities, fish and wildlife resources.

G.1.3 Manicured lawns immediately adjacent to lakes and wetlands allow lawn chemicals to runoff directly into waterbodies and also encourage habitation of lawns by Canada geese with the resulting deposition of waterfowl waste.

G.2 Corrective Action:

G.2.1 Water related recreational activities and impacts to the fish and wildlife resource will be considered in land use decisions and in reviewing land development proposals.

G.2.2 A native, unmaintained buffer zone will be encouraged around natural or constructed waterbodies as part of future development proposals and buffer zones will be encouraged around all waterbodies, wetlands and watercourses.

G.2.3 City stormwater management practices and implementation of erosion sediment control measures will maintain and improve the Medicine Lake water quality increasing the recreational, fishery and wildlife value.

H. Adequacy of Capital Improvements Program to Correct Problems Related to Water Quality, Water Quantity Management, Fish and Wildlife Habitat, Public Waters and Wetland Management, and Recreational Opportunities.

H.1 Assessment:

H.1.1 The City will be considering a stormwater utility fund, which generates revenues to fund stormwater management projects and programs deemed by the City to be in the public's best interest.

H.2 Corrective Action:

H.2.1 The City will need to identify and prioritize stormwater-related improvements in the CIP and additional methods of project financing. In addition, the City will need to address a variety of water quality and quantity issues in conjunction with land development proposals or City street improvement projects, when feasible. The City will acquire and maintain easements, right-of-way, or interest in land necessary to implement and maintain projects upon order of the BCWMC.

I. Future Potential Problems Anticipated to Occur Within Next 10 Years Based on Growth Projections and Planned Urbanization

I.1 Assessment:

The 2018 Comprehensive Plan identifies land use areas within the City to the year 2040. There are limited re-development possibilities in the City. The potential stormwater related problems and issues that might occur would do so through re-development. Through the re-development process, improved stormwater management facilities can be required or encouraged. An example of a recent improvement project was the Hutton House on South Shore Drive. The site was reconstructed to include stormwater treatment areas that also help manage flow of stormwater.

I.1.1 General – Development and re-development projects may add areas of impervious surfaces which have the potential to decrease water quality and increase the volume of runoff during construction and after development is complete. During construction, erosion and sedimentation can degrade water quality and in the longer-term, additional phosphorus and other pollutants may be discharged to waterbodies.

(See City Zoning Ordinance section 1700: Stormwater Pollution and Erosion control and BCWMC Requirements for Improvement's and Development Proposals.)

I.1.2 Roadways – New or reconstructed public or private roads in the City have the potential to degrade water quality by roadway erosion and runoff.

I.1.3 Pond and Stormwater Maintenance (Public and Private) - For the facilities to adequately and effectively function, routine inspection and maintenance will be required.

I.2. Corrective Action:

I.2.1 General – To maintain water quality and protect against erosion during development and after. Projects will need to follow an orderly process of site evaluation, design and project construction. Decreasing impervious surfaces and incorporating infiltration BMP's will be a site design requirement. Construction activities will need to include erosion control practices.

I.2.2 Roadways – Public or private road maintenance and improvement projects will need to address stormwater quantity and quality issues such as wetland protection, erosion and pretreatment of stormwater.

I.2.3 Pond and Storm Sewer Maintenance –For private stormwater treatment systems, maintenance agreements will be established identifying maintenance programs, responsible parties, and consequences for non-compliance.

SECTION V – IMPLEMENTATION PROGRAM

This section identifies the various methods, programs and official controls available to the City for the implementation of this LWMP. Many of these items are already in place, and currently utilized by the City. Some of them will require updating to be consistent with BCWMC requirements.

A. City Regulatory Controls

The City has various regulatory controls to manage and protect water resources and reduce stormwater-related impacts in the community. The following presents each of the official controls that will be implemented as regulatory controls:

A.1 General City Code of Ordinances. (See Appendix A)

The City has adopted a "Code of Ordinances." The City will utilize the Ordinances, Codes and Guidelines to regulate new development, re-development and public projects.

- Zoning Ordinance
- Floodplain Ordinance.
- Shoreland Ordinance.

The City has adopted a Zoning Ordinance controlling the land use and development of property within the community. In addition to other items, the ordinance addresses City project review and approvals, development of steep slopes, the necessity of erosion and sediment control plans, design standards for stormwater facilities and required flowage and drainage easements. The BCWMC may review proposed changes to city development regulations (e.g., zoning and subdivision ordinances) at its discretion or the request of the City of Medicine Lake. The city will inform the BCWMC regarding updates to city ordinances or comprehensive plans that will affect stormwater management. Stormwater management elements of the City of Medicine Lake comprehensive plans will conform to the BCWMC Plan. The BCWMC will assist the City in resolving watershed management disputes, as requested. The BCWMC will follow the dispute resolution procedure described in Section 5.1.1.5 of the BCWMC Watershed Management Plan.

A.2 Wetland Regulation

The City authorizes the BCWMC to act as the local Governmental Unit (LGU) under the Minnesota Wetlands Conservation Act to review wetland impacts in accordance with the State wetland law and

rules. The BCWMC will assist with wetland management when requested by the city. The MnDOT is the LGU within its right-of-ways.

A.3 Wetland Protection

The City will continue to enforce its rules as set forth in the Zoning Regulations pertaining to Wetland Systems Overlay District. The City will also encourage implementation of wetland buffers where practical and feasible. Encouragement of buffers is additional to the requirements for wetland buffers included in Policy E.11.

A.4 Dredging

The City will not assume responsibility for permitting this activity. The permitting responsibility will be retained by State and Federal agencies.

A.5 Shoreland Improvements

The City will continue to enforce its rules as set forth in the Zoning Regulations pertaining to Shoreland Overlay District. The city will be responsible for shoreland regulation. The city will adopt State shoreland management requirements for public water as needed and adopt MDNR approved shoreland ordinances, in accordance with the MDNR's priority phasing list. The City will update its shoreland ordinances in 2019.

A.6 MPCA MS4 Permit

The City will continue to implement and work within the framework of the MS4 Permit.

A.7 BCWMC Technical Advisory Committee (TAC)

The City will appoint a technical advisor to the TAC and encourage the advisor to attend BCWMC meetings.

B. Management Programs

The City will implement or encourage the following water resource-related management protection programs and ordinance updates.

B.1 Buffer and Setback Requirements

Update city ordinances with wetland and Medicine Lake buffers, easements and setbacks. Coordinate with BCWMC and MnDNR requirements. City will encourage the placement of native buffers around all City waterbodies where practical and feasible.

B.2 Public Best Management Practices

Continue maintenance and inspection programs established under the MS4 permit. Implement phosphorous reduction BMP's into Public projects.

B.3 Public Education

The City will continue the current MS4 permit public education program that provides water resource protection information to the community and to develop additional strategies necessary to protect the City's water related amenities.

C. Storm water Design and Performance Standards

The City adopts the BCWMC "Requirements for Improvements and Development Proposals." The City will perform initial development and redevelopment project review to determine consistency with local requirements before BCWMC review. The City is the permitting authority, but will only issue permits once the BCWMC has determined the project is consistent with BCWMC requirements. The BCWMC will review projects and developments to evaluate compliance with performance standards and the MPCA's Minimal Impact Design Standards (MIDS) performance goals, triggers, and flexible treatment options. See Section 3 of the BCWMC requirements document, for the types of improvements and development proposals that must be submitted to the BCWMC for review.

SECTION VI – IMPLEMENTATION PRIORITIES (CAPITAL IMPROVMENTS PROGRAM) AND FINANCIAL CONSIDERATIONS

A. Implementation Priorities and Capital Improvement Program

This LWMP has presented an implementation program identifying those various regulatory controls, management programs and potential capital improvements that are necessary to address City surface water resource related needs and funding capabilities. Table 4 below prioritizes the implementation program. Capital improvements will need to be implemented and funded by private parties or the City based upon City growth, demand and available resources.

TABLE 4. LWMP IMPLEMENTATION PROGRAM PRIORITIES AND CAPITAL IMPROVEMENTS

Ranking	Implementation Program Description and Capital Improvements	Proposed Year of Implementation	Estimated Capital Cost and Funding Source
1	Obtain BCWMC and Metropolitan Council approval of the Local Water Management Plan and City Comprehensive Plan	2019	NA
2	Update City Ordinance and Regulatory Agreements to be consistent with the BCWMC Plan, including updated shoreland regulations. Shoreland regulations for the city of Medicine Lake are planned to be updated in calendar year 2019. Update Zoning Ordinance to include water quality performance standards consistent with the BCWMC 2015 Watershed Management Plan and BCWMC Requirements for Improvements and Development Proposals.	2019/2020	NA
3	Consider preparation of a Phosphorous Reduction Strategy and Plan to address the reduction of phosphorous flowing to Medicine Lake. Coordinate with BCWMC in the future if the MPCA develops these TMDL requirements.	TBD	NA

Ranking	Implementation Program Description and Capital Improvements	Proposed Year of Implementation	Estimated Capital Cost and Funding Source
4	Evaluate developing a Stormwater Utility Fee to provide a funding source for stormwater management facilities that reduce phosphorous loadings to Medicine Lake and provide for general stormwater improvements.	2020	NA
5	Continue evaluation and updating of the City's MPCA MS4 permit to best provide measures that protect and preserve the Medicine Lake resource.	Ongoing	NA
6	Jevne Park Stormwater Improvement Project (BCWMC CIP Project ML-21) to provide water quality treatment and flood storage. Project slated for construction in 2020, pending BCWMC ordering of project.	2020	See Project Feasibility Study
7	Culvert and NERP pond inspection and maintenance.	Annual	2-3K per year – General Fund
8	Culvert replacement- Surface water culvert system replacement due to age and degradation on selected culverts on a bi-yearly basis to be completed by 2030.	By 2030	15-20K General Fund
9	NERP ponds and storm water holding areas. Enlarge the 2 current effluent points, one on Kaiser ave and one on Peninsula Road within city property.	Done in stages prior to major street redevelopment by 2030	300K General Fund, Grants, Watershed

B. Financial Considerations

Implementing this LWMP will have financial impacts on the City. The paragraphs below describe the implementation item and the anticipated cost of the associated regulatory control or management program. These are not necessarily new costs to be budgeted by the City since many of these costs are already being charged back to developments or included within the current City budget. The subsection to follow

identifies various methods available to the City for funding these programs and future capital improvements.

B.1 The City will review site plans and other proposed projects for conformance with this LWMP. These costs will generally be recouped from new developments through collection of escrow fees.

B.2 The City will inspect and enforce erosion control measures identified in this LWMP. Permit fees associated with building activities will recover portions of these costs.

B.3 The City will inspect municipal stormwater basins, ponds and outfalls every other year at a minimum. Insepection and maintenance of these facilities is budgeted at $2,000 to $3,000 annually. These costs are associated with the MS4 permit. Costs for needed maintenance of stormwater facilities may require additional financial resources based on specific needs.

B.4 Acquisition of easements around new ponding areas, stormwater facilities or for access to outlet control structures will be identified during the City project review process. Easements can potentially be obtained during the project review process, at no cost, as a requirement for City and BCWMC approvals. Acquiring easements on existing structures will incur acquisition costs. The additional cost for this item will vary greatly based on the value and use of property within the easement areas.

B.5 The City will develop and implement a public information and education plan. The plan is part of NPDES Phase II requirements. The City will work to share educational resources with other concerned parties such as the BCWMC, AMLAC, County and State Agencies. Costs for library and educational materials will vary with type of materials and sources.

B.6 Construction of capital improvement plan projects addressing known surface water resource problems or phosphorous reduction projects require engineering design, construction documents and property easements. Specific improvements will need to be determined based on need, cost and availability of funds. Funding for storm sewer projects can come from the City's General fund, or a stormwater utility fund (if established.)

There are currently no planned Capital Improvement Projects in the City of Medicine Lake. The City in collaboration with the BCWMC is currently conducting a feasibility study for Jevne Park exploring potential stormwater improvements. Depending on the outcomes of this study a new Capital Improvement may be planned in 2019. Construction will depend on the feasibility study.

Long term, the City recognizes that there will be a need to reconstruct or improve Peninsula Road. At that time, storm water improvements will be factored into the reconstruction project along with other utility provisions. This project will have a significant impact on the city.

C. Funding Sources

The City currently has two funding sources available to pay for the regulatory controls, management program and capital improvements identified in this LWMP. They include general tax revenues and special assessments. While general tax revenues can likely fund the regulatory and management programs, special assessments will generally be required to fund the larger capital improvements projects.

Several other revenue sources available to the City are the establishment of a stormwater utility fee, tax increment financing, and a stormwater area charge. Stormwater area charges are often assessed to development projects to fund necessary stormwater facilities on the property or necessary improvements downstream to facilitate the development. Additional funding sources include regional and local grant funding and support from BCWMC. The City will need to review each of these potential funding sources and determine the most appropriate and acceptable course of action for each program or project.

The Bassett Creek Watershed Management Commission (BCWMC) has developed a grant program to provide up to $1,000 to support the following activities:

- water-quality improvement projects;
- communication and education programs on reducing pollution from household activities; and,
- projects that raise citizen awareness of their role/ responsibility in improving and maintaining water quality in the watershed.

SECTION VII – STORMWATER MANAGEMENT PLAN AND EROSION CONTROL STANDARDS FOR PERMITTING

All new construction or re-development projects with land disruption will require review by the City and the BCWMC. The permitting requirements for projects vary depending on size, impacts to the environment and complexity. A determination for BCWMC approval will be made by the Commission's staff or by the Commission, depending on the complexity of the project. A determination for City permitting will made by City staff upon approval by BCWMC. All construction sites regardless of size will be required to provide and maintain minimum erosion control measures during construction. In 2018, the City began implementing a construction management plan (CMP) process for new construction within the Peninsula. The process insures that even small projects that do not trigger regulatory processes within the Peninsula have some degree of erosion control and site runoff controls on site. The process also strengthens the monitoring and management of erosion control installations. In 2018, the City also authorized the creation of a driveway permit process for reconstructed or expanded driveway installations. An ordinance will be considered for adoption in 2019. The permitting process will enhance erosion control and runoff management.

A. Stormwater Management Plan Standards for Permitting:

A.1 Bassett Creek Watershed Management Commission (BCWMC): The standards for permitting include:

- *Requirements for Improvements and Development Proposals* (August 2017, as revised).

Refer to BCWMC requirements which establish the procedure for review of improvements and development proposals.

A.2 City of Medicine Lake Standards: The Standards for permitting and guidelines to land use and site design include: Refer to the City of Medicine Lake Zoning Ordinance and Medicine Lake Comprehensive Plan.

B. Erosion Control Standards for Permitting

B.1 City of Medicine Lake Standards: The Standards for permitting and guidelines to land use and site design include: Refer to the City of Medicine Lake Zoning Ordinance and Medicine

Lake Comprehensive Plan. The City requires erosion and sediment control plans to conform to BCWMC requirements, and Section VII of the LWMP. (See Appendix A).

B.2 General Standards for Erosion Control during construction:

B.2.1 The plan shall show proposed methods of retaining waterborne sediments on-site during the construction period and proposed restoration, covering or re-vegetation after construction.

B.2.2 The plan shall show locations of any temporary sediment basin(s). Temporary Sedimentation Basins shall be designed in accordance with Part III.B of the MPCA "Storm Water Discharge associated with Construction Activity" (MN R100001) permit.

B.2.4 Sites with high erosion potential characterized by steep slopes or erodible soil will be required to provide site-specific construction recommendations by a Soils Engineer for City review. Steep slopes shall be defined as areas of 12% or more slope. In addition, a financial surety may be required to ensure performance.

B.2.5 If infiltration/filtration basins are proposed for the construction site, a note must appear on the plan stating; "The infiltration basin area(s) cannot be used to treat construction site runoff, and shall not be constructed to final grade until the contributing drainage area has been fully stabilized to the satisfaction of the engineer." In addition, the following statement shall also appear; "The proposed infiltration basins shall be roped off as not to allow heavy construction site traffic to enter any basin and the basins shall be staked off before any construction can begin".

B.2.6 If any disturbed soil is located within 200 lineal feet of Medicine Lake shoreline, wetland or stormwater management facility and the area has a continual positive slope to the water body, the exposed area must provide temporary erosion protection, or permanent cover according to Part IV.B.2 of the MPCA MN R100001 Permit. Those areas requiring temporary erosion protection or permanent cover shall be identified on the plans.

B.2.7 All sediment control practices shall be installed according to Part IV.C of the MPCA MN R100001 Permit.

B.2.8 The erosion control plan shall provide rock construction entrances for all entrances where heavy construction traffic will enter. Those entrances must be clearly identified on the plan.

B.2.9 Proposed design, suggested location and phased implementation of effective, practicable erosion control measures for plans shall be designed, engineered and implemented to achieve the following results:

a. Prevent gully and bank erosion: and,

b. Limit total off-site permissible annual aggregate soil loss for exposed areas resulting from sheet and rill erosion to an annual, cumulative soil loss rate not to exceed 0 tons per acre annually.

B.2.10 The City shall receive documentation that the NPDES General Storm Water Permit for Construction Activity application has been approved from the MPCA, as well as any other approved applications, as required, for the construction site, such as the Subdivision Registration form, Permit Transfer/Modification form, and the Notice of Termination form.

SECTION VIII – AMENDMENT PROCEDURES

It is the City's intention to have this LWMP reviewed and approved by the Bassett Creek Water Management Commission (BCWMC) and Met Council in accordance with Minnesota Statutes, Section 103B.235. After approval, it will be adopted by the City Council and incorporated into the City's Water Resource Library.

This LWMP has been prepared to extend through the year 2025. At that time the BCWMC "Watershed Management Plan" is scheduled for its ten year update. The LWMP may need to be updated with amendments in the interim to conform to the pending MPCA determined TMDL for Medicine Lake and any BCWMC issued updates to their comprehensive plan.

If the City proposes changes to this LWMP before year 2025, the changes and their impacts will be determined by the City. The general descriptions of the changes and the associated review and approval requirements are presented as follows:

Changes would include small adjustments to subwatershed district or subdistrict boundaries or other minor changes that would not significantly affect the rate or quality of stormwater runoff discharged across the municipal boundary or significantly affect high-water levels within the City. Minor changes also include revisions made to the stormwater related Capital Improvements Program to best meet the City's water resource needs and financial considerations. For proposed changes, the City will prepare a document, which defines the change and includes information on the scope and impacts of the change. The document will be forwarded to BCWMC for their records. The minor change will be implemented after the document is adopted by the City Council.

Major Changes are those that could have significant impacts on the rates, volumes, water qualities and water levels of stormwater runoff within the City or across its municipal boundaries. For proposed major changes, the City will prepare a document, which defines the change and includes information on the scope and impacts of the change. The document will be forwarded to BCWMC for their review and approval. BCWMC shall have 60 days to comment on the proposed revisions. Failure to respond within 60 days will constitute approval. After BCWMC approval, the City will adopt the amendment as part of the LWMP.