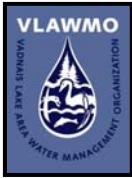




TABLE OF CONTENTS

EXECUTIVE SUMMARY ..... IX
1.0 INTRODUCTION..... 1
2.0 LAND AND WATER RESOURCE INVENTORY ..... 5
2.1 PRECIPITATION ..... 5
2.2 WATERSHED CHARACTERISTICS ..... 7
2.2.1 General Geology ..... 7
2.2.2 Soil Data ..... 8
2.2.3 Drainage Patterns ..... 9
2.3 SURFACE WATER RESOURCES ..... 14
2.3.1 Public/Protected Waters and Wetlands ..... 14
2.3.2 Public Ditches ..... 16
2.3.3 National Wetlands Inventory Map ..... 16
2.3.4 Metropolitan Mosquito Control District Wetland Map ..... 18
2.3.5 VLAWMO Comprehensive Wetland Management Plan ..... 18
2.3.6 Physical Characteristics of Public Waters ..... 23
2.3.7 Board of Water Commissioners St. Paul Regional Water System ..... 23
2.3.8 Floodplains ..... 24
2.3.9 Hydrologic Information ..... 26
2.3.10 Water Quality Data ..... 26
2.3.11 Assessment of Monitoring Data ..... 33
2.3.12 MPCA Impaired Waters ..... 39
2.3.13 Exotic Species ..... 39
2.3.14 Fisheries and Habitats ..... 41
2.3.15 Unique Features ..... 42
2.4 HUMAN ENVIRONMENT ..... 45
2.4.1 Current Land Use ..... 45
2.4.2 Future Land Use ..... 48
2.4.3 Surface Water Appropriations ..... 51
2.4.4 Pollutant Sources ..... 52
2.5 GROUNDWATER RESOURCE DATA ..... 55
3.0 ISSUES IDENTIFICATION/ASSESSMENT OF PROBLEMS ..... 57
3.1 ISSUES AND PROBLEM IDENTIFICATION ..... 57
3.2 ASSESSMENT OF PROBLEMS ..... 61
3.2.1 Issue: Potable Water Supply from Groundwater ..... 61
3.2.2 Issue: Groundwater Quality: Threatened and Impaired ..... 61
3.2.3 Issue: Potable Water Supply from Surface Water ..... 61
3.2.4 Issue: Urban Development BMP Occurred Before Implementations ..... 61
3.2.5 Issue: Additional Development is Expected ..... 62
3.2.6 Issue: Data Needs/Limitation ..... 63
3.2.7 Issue: Public Awareness ..... 63
3.2.8 Issue: Sensitive Resources ..... 64
3.2.9 Issue: Lake Water Quality: Threatened or Impaired ..... 64
3.2.10 Issue: Exotic Species Infestation ..... 64



3.2.11 Issue: Localized Flooding..... 65

3.3 ISSUE PRIORITIZATION..... 65

3.4 ADEQUACY OF EXISTING CONTROLS ..... 69

3.5 SUMMARY ..... 70

**4.0 GOALS, POLICIES AND MANAGEMENT STRATEGIES ..... 86**

4.1 GOAL 1: PREVENT FLOODING..... 87

    4.1.2 Policy 1.1: Ensure New/Re-Development Construction, Minimizing Flooding Risk and Loss of Floodplain Capacity ..... 88

    4.1.3 Policy 1.2: Manage New Development and Drainage Alterations ..... 88

    4.1.4 Policy 1.3: Maintenance of Public Ditches..... 89

    4.1.5 Policy 1.4: Study and Improve Areas along Lambert Creek..... 89

4.2 GOAL 2: PROTECT AND IMPROVE SURFACE WATER QUALITY ..... 90

    4.2.1 Policy 2.1: Prevent Further Degradation of Surface Water ..... 90

    4.2.2 Policy 2.2: Improve the Quality of Surface Waters..... 98

4.3 GOAL 3: PROTECT AND IMPROVE GROUNDWATER QUALITY AND QUANTITY ..... 102

    4.3.1 Policy 3.1: Promote Management Practices that Protect Recharge..... 102

    4.3.2 Policy 3.2: Promote Management Practices that Protect Groundwater Quality ..... 103

4.4 GOAL 4: PROTECT AND ENHANCE WETLAND RESOURCES ..... 103

    4.4.1 Policy 4.1: Continue Wetland Conservation Act Permitting ..... 104

    4.4.2 Policy 4.2: Implement The VLAWMO Wetlands Management Plan ..... 104

    4.4.3 Policy 4.2: Enhance or Restore Wetlands..... 112

4.5 GOAL 5: PROTECT AND IMPROVE WATERS FOR WILDLIFE HABITAT AND RECREATION..... 112

    4.5.1 Policy 5.1: Protect and Improve Aquatic Habitat ..... 112

    4.5.2 Policy 5.2: Protect and Improve Waters for Recreation..... 113

4.6 GOAL 6: ENHANCE PUBLIC PARTICIPATION AND STEWARDSHIP..... 113

    4.6.1 Policy 6.1: Assist and Enable MS4s..... 113

    4.6.2 Policy 6.2: Encourage Public Participation ..... 113

    4.6.3 Policy 6.3: Inform The Public ..... 114

    4.6.4 Policy 6.4: Promote Education and Marketing to Foster Stewardship ..... 114

4.7 GOAL 7: OPTIMIZE PUBLIC RESOURCES..... 115

    4.7.1 Policy 7.1: Minimize Public Expenditures..... 115

    4.7.2 Policy 7.2: Avoid Duplications of Management Efforts ..... 115

    4.7.3 Policy 7.3: Utilize Volunteers ..... 116

    4.7.4 Policy 7.4: Promote Cost Sharing..... 116

    4.7.5 Policy 7.5: Coordinate Data Collection and Management Efforts ..... 116

4.8 GOAL 8: ANALYZE AND USE ALTERNATIVE FUNDING SOURCES ..... 117

    4.8.1 Strategy 8.1: Continue to Analyze and Use Alternative Funding Sources ..... 117

4.9 GOAL 9: MAKE AND ENABLE INFORMED DECISIONS..... 117

    4.9.1 Policy 9.1: Develop Environmental Data Collection Programs ..... 117

    4.9.2 Policy 9.2: Water Quality Modeling..... 118

4.10 GOAL 10: IMPROVE COMMUNICATIONS ..... 118



4.10.1 Policy 10.1: Involve the Public in Decisions ..... 119

4.11 SUMMARY ..... 119

**5.0 ADMINISTRATION .....120**

5.1 AUTHORITY..... 120

5.2 REGULATORY CONTROLS ..... 120

5.3 FINANCIAL MECHANISMS ..... 122

5.4 JOINT POWERS AGREEMENT..... 123

5.5 PLAN REVISIONS/AMENDMENTS ..... 123

    5.5.1 General Amendment Procedures ..... 124

    5.5.2 Minor Amendments..... 125

    5.5.3 Form and Distribution of Plan Amendments..... 125

5.6 LOCAL WATER MANAGEMENT PLANS..... 125

    5.6.1 LWP Review ..... 126

    5.6.2 Administration and Enforcement of LWPs..... 126

**6.0 IMPLEMENTATION PROGRAM .....127**

6.1 ADMINISTRATIVE EFFORTS ..... 127

6.2 LWP DEVELOPMENT AND IMPLEMENTATION ..... 127

6.3 STUDIES AND PROGRAMS..... 130

    6.3.1 Lambert Creek Studies and Management..... 131

    6.3.2 County Road E and Highway 61 Area Storm Water Study ..... 131

    6.3.3 Development of SLMPs..... 131

    6.3.4 Financial Incentives and Cost Sharing ..... 131

    6.3.5 Public Education and Information..... 132

    6.3.6 Facilities Operation..... 132

    6.3.7 Data Collection and Monitoring ..... 132

    6.3.8 Data Analysis and Monitoring..... 133

    6.3.9 WCA and Small Waters Appropriation Permitting..... 133

6.4 CAPITAL IMPROVEMENTS PROGRAM ..... 133

6.5 IMPACT OF IMPLEMENTATION PROGRAM ..... 134

6.6 MEASURABLE OUTCOMES..... 137

6.7 FUTURE PLAN AMENDMENTS ..... 137

**7.0 BIBLIOGRAPHY .....140**



**LIST OF TABLES**

Table 1-1 Governmental Units in VLAWMO .....2

Table 2-1 Rainfall in Minneapolis/St. Paul Area.....5

Table 2-2 Ramsey County Soil Name, Symbol, and Hydrologic Group .....11

Table 2-3 Anoka County Soil Name, Symbol, and Hydrologic Group .....12

Table 2-4 Wetland Size Distribution.....18

Table 2-5 Inventoried Wetland Types .....19

Table 2-6 Wetland Functions and Values .....20

Table 2-7 Functional Assessment of VLAWMO Inventoried Wetlands .....20

Table 2-8 Wetland Management Classifications for VLAWMO Wetlands .....21

Table 2-9 Summary of Wetland Management Classifications by Subwatershed.....21

Table 2-10 Physical Characteristics of VLAWMO Lakes.....23

Table 2-11 Available Flood Insurance Study.....24

Table 2-12 Lambert Creek Watershed Hydrologic Modeling Results .....25

Table 2-13 Average Total Phosphorus Concentrations for VLAWMO CLMP Lakes (June – September) .....29

Table 2-14 Average Secchi Disk Transparency (SDT) Values for VLAWMO CLMP Lakes (June – September) .....29

Table 2-15 Average Chlorophyll-a Concentrations for VLAWMO CLMP Lakes (June – September) .....30

Table 2-16 TP Concentrations for BWCSP Monitored Lakes (May – September) .....33

Table 2-17 Trophic Status Thresholds for NCHF Ecoregion.....34

Table 2-18 VLAWMO CLMP Lake Grades, 1997-2005 .....35

Table 2-19 TSI Values for VLAWMO CLMP Lakes (June – September).....37

Table 2-20 TSI Values for BWCSP Monitored Lake Sites and Lake Outlets (May – September) .....38

Table 2-21 Lake Conditions and Carlson’s TSI .....38

Table 2-22 MnDNR Classification of VLAWMO Lakes .....41

Table 2-23 Rare, Endangered, and Sensitive Species and Natural Communities.....44

Table 2-24 Current Land Use by Subwatershed.....47

Table 2-25 Estimated Developable Land Based on Future 2020 Land Use.....48

Table 2-26 Water Appropriations Permits .....51

Table 2-27 Pollutant Sources: Dumps and Landfills .....52

Table 2-28 Water-based Recreation Facilities.....55

Table 3-1 Prioritization of Issues by Subwatershed.....59

Table 3-2 Ordinal Ranking .....67

Table 3-3 Citizen Priorities.....68



Table 3-4 Existing Controls and Potential Management Gaps by Issue .....70

Table 3-5 The Applicability of Shoreland and Flood Plain Ordinances.....75

Table 3-6 Comparison of Local Ordinances Affecting Storm Water Quality .....76

Table 3-7 VLAWMO Public Groundwater Supplies and Wellhead Protection Status.....85

Table 4-1 Hydrologic Soil Type, Infiltration Rate, and Soil Texture .....97

Table 4-2 SLMP Implementation Plan..... 100

Table 4-3 Hydroperiod Guidelines for Water Level Fluctuations in Wetlands..... 105

Table 4-4 Buffer Widths ..... 107

Table 4-5 Alternative Wetland Buffer Width Standards ..... 109

Table 6-1 Implementation Program - VLAWMO ..... 128

Table 6-2 Approximate Financial Impacts on VLAWMO Residents for Various Budget Amounts  
..... 136

Table 6-3 Annual Outcomes/ACTIVITIES - VLAWMO ..... 139

**LIST OF GRAPHS**

Graph ES 1 VLAWMO Implementation Efforts.....xiv

**LIST OF FIGURES**

Figure 1-1 Vicinity Map – North Metro VLAWMO.....3

Figure 1-2 Governmental Units in VLAWMO.....4

Figure 2-1 Subwatersheds.....6

Figure 2-2 Soil Data.....13

Figure 2-3 Protected Waters and Public Ditch System.....15

Figure 2-4 NWI Wetlands and VLAWMO Inventoried Wetlands .....17

Figure 2-5 Wetland Value Management Classification Decision Matrix .....22

Figure 2-6 Current Monitoring Sites.....28

Figure 2-7 Lambert Creek Monitoring Results, 2000-2005 BWCSP Data.....32

Figure 2-8 Unique Features .....43

Figure 2-9 Current Land Use .....46

Figure 2-10 Future 2020 Land Use .....49

Figure 2-11 Future 2030 Land Use .....50

Figure 2-12 Potential Pollutant Sources .....54

Figure 2-13 Groundwater Sensitivity .....56



## LIST OF APPENDICES

- Appendix A ANNUAL REPORT CARD
- Appendix B WETLAND INVENTORY MAP
- Appendix C VLAWMO CLMP Lake Data Summaries
- Appendix D Metropolitan Council LWP Requirements
- Appendix E VLAWMO General Water Appropriations Permit Information
- Appendix F Current VLAWMO JPA

## LIST OF ACRONYMS

ac	Acre(s)
AC-FT	Acre-feet
BMP	Best management practice
BWCSP	Board of Water Commissioners of the City of Saint Paul
BWSR	Minnesota Board of Water and Soil Resources
CAC	Citizen Advisory Committee
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFS	Cubic feet per second
Chl-a	Chlorophyll-a
CIP	Capital Improvement Project
CLMP	Citizen Lake Monitoring Program
CMP-A	Corrograted metal pipe arch
COE	United States Army Corps of Engineers
CSAH	County State Aid Highway
CWA	Clean Water Act
EAW	Environmental Assessment Worksheet
EIS	Environmental Impact Statement
Fe	Iron
FEMA	Federal Emergency Managemnet Agency
FT	Feet
GIS	Geographic Information System
HP	High Priority Protection Wetlands
ISTS	Individual Sewage Treatment System
JPA	Joint Powers Agreement
LGU	Local Government Unit
LWP	Local Water Plan
LWPA	Local Water Planning Authority
M.S.	Minnesota Statutes
MCES	Metropolitan Council Environmental Services
MDH	Minnesota Department of Health
mg/L	Milligram per liter
MGY	Million gallons per year
MM	Moderate Management Wetlands
MMCD	Metropolitan Mosquito Control District
MNDOT	Minnesota Department of Transportation
MnDNR	Minnesota Department of Natural Resources
MNRAM	Minnesota Routine Assessment Methodology
MOU	Memoradum of Understanding



MPCA	Minnesota Pollution Control Agency
MS4	Municipal Separate Storm Sewer System
MSL	Mean Sea Level
MUSA	Metropolitan Urban Service Area
NCHF	North Central Hardwoods Forest
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Units
NWI	National Wetland Inventory
NWL	Normal Water Level
OHWL	Ordinary High Water Level
P	Phosphorus
PC	Policy Committee
PLS	Pounds pure live seed
QA/QC	Quality assurance/ quality control
RCP	Reinforced concrete pipe
RCRA	Resource Conservation and Recovery Act
RSWCD	Ramsey Soil and Water Conservation District
SCWM WMC	Shingle Creek and West Mississippi Watershed Management Commissions
SDT	Secchi disk transparency
SDWA	Safe Drinking Water Act
SEPA	State Environmental Policy Act
Si	Silica
SLMP	Sustainable Lake Management Program
SWCD	Soil and Water Conservation District
SWPPP	Storm Water Pollution Prevention Plan
TAC	Technical Advisory Committee
TMDL	Total maximum daily load
TN	Total nitrogen
TP	Total phosphorus
TP 40	Technical papers 40
TSI	Carson's trophic state index
U	Utilize wetlands
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VLAWMO	Vadnais Lake Area Management Organization
WCA	Wetland Conservation Act
WRAM	Wisconsin rapid assessment methodology
µg/L	Microgram per liter



## LIST OF DEFINITIONS

- “Board” – The Board of Commissioners of the Organization, consisting of one commissioner from each of the governmental units which is a party to this Agreement and which shall be the governing body of the Commission.
- “Capital Improvement Program” or “capital improvement program” or “Works of Improvement” – An itemized program for at least a multi-year prospective period, and any amendments to it, subject to at least biennial review, setting forth the schedule, timing, and details of specific contemplated capital improvements by year, together with their estimated cost, the need for each improvement, financial sources, and the financial effect that the improvements will have on the governmental unit or watershed management organization.
- “Commissioner” – That person appointed to the Board by each governmental unit which enters into this Agreement.
- “Comprehensive Plan” or “comprehensive plan” – The meaning given it in Section 473.852, Subdivision 5.
- “Council” – The governing body of a governmental unit which is a member of this Commission.
- “Flood Prone” - Areas within the floodplain or the floodway.
- “Governmental Unit” – Any city, town, county, school district, or other political subdivision as cited in M.S. 471.59, Subdivision 1.
- “Local Government Unit” or “local government unit” – The meaning given it in Section 473.853.
- “Non-degradation” - No significant increase in storm water runoff or pollutant loads from 2005/2006 numerical standards.
- “Organization” – The organization created by the Agreement, the full name of which is the “Vadnais Lake Area Water Management Organization” and is abbreviated VLAWMO. It shall be a public agency of its members.
- “Redevelopment” – Alterations of a property that change the “footprint” of a site or building in such a way that results in the disturbance of equal to or greater than 1 acre of land.
- “St. Paul Water Utility” “St. Paul Regional Water Service”- Board of Water Commissioners of the City of Saint Paul.
- “Vadnais Lake Area Watershed” – The area contained within a line drawn around the extremities of all terrain whose surface drainage is tributary to Vadnais Lake.