

Table of Contents

List of Acronyms.....	1
1. Chapter 1 - Introduction: Public Participation Process.....	4
1.1 Purpose of Plan.....	4
1.2 Identifying and Engaging Local Agencies and Citizens	7
1.3 Establishment the Steering Committee and Subcommittees	8
1.3.1 Public Outreach Subcommittee	8
1.3.2 Pathogen/Nutrient Management Subcommittee	9
1.3.3 Riparian Corridor Subcommittee	9
1.3.4 Watercourse Subcommittee	10
1.4. Public Input on the Watershed Management Plan and Process	11
2. Chapter 2 - State of the Kawkawlin River Watershed.....	12
2.1 Watershed Characteristics.....	12
2.1.1 Geographic Setting.....	12
2.1.2 Demographic Characteristic	12
2.1.3 Physical and Natural Features.....	14
2.1.4 Hydrology.....	14
2.1.5 Land Use and Land Cover.....	15
2.1.6 Geomorphology	16
2.1.7 Soils in the Watershed	17
2.1.8 Wetlands	19
2.1.9 Fisheries of the Kawkawlin River.....	21
2.1.10 Recreational Opportunities	22
2.1.11 Invasive and Non Native Species	23
2.1.12 Debris and Trash.....	27
2.1.13 Point Sources.....	28
3. Chapter 3 - Watershed Inventory: Prioritized Pollutants, Sources and Causes.....	31
3.1 Methodology and Findings of the Watershed Inventory.....	31
3.1.1 Introduction	31
3.1.2 Methods	31
3.1.3 Results.....	34
3.1.4 Geomorphic Assessment	34
3.2 Inventories.....	35
3.2.1 Livestock Inventory.....	35
3.2.2 Agricultural Inventory.....	36
3.2.3 On-Site Treatment Systems Inventory.....	38
3.2.4 Wetland Inventory.....	38
3.2.5 Road/Stream Crossing Survey	40
3.3 Ecological Assessment.....	41
3.3.1 General Aquatic and Riparian Habitat Assessments.....	49
3.4 Water Quality Monitoring	52
3.4.1 DNRE.....	52
3.4.2 Kawkawlin River Watershed Property Owners Association	56
3.4.3 Spicer Group Spot Sampling	57
3.4.4 Flow Rates	57
3.5 Pollutants, Sources and Causes	60
3.5.1 Point Sources.....	60

3.5.2	<i>Nonpoint Source Pollution</i>	60
3.5.3	<i>Total Maximum Daily Load (TMDL) for Dissolved Oxygen</i>	67
3.6	<i>Designated and Desired Uses, Met, Impaired or Threatened</i>	69
3.6.1	<i>Desired Uses in the Kawkawlin River Watershed</i>	75
3.7	<i>Critical Areas</i>	76
4.	Chapter 4 - Defining the Scope of the Kawkawlin Watershed Plan	82
4.1	<i>Goals for the Kawkawlin River Watershed</i>	82
4.2	<i>Objectives for the Kawkawlin River Watershed Goals</i>	82
4.3	<i>Pollutant Causes and Sources to be Restricted</i>	88
4.4	<i>Final Water Quality Summary</i>	88
4.5	<i>Impairments to Water Quality</i>	90
5.	Chapter 5 - Identifying Best Management Practices, Initiatives or Strategies for Implementation	114
5.1	<i>BMPs to Achieve Goals and Objectives of the Watershed</i>	115
5.1.1	<i>BMPs for Warmwater Fisheries</i>	115
5.1.2	<i>BMPs for Wetland Preservation</i>	116
5.1.3	<i>Preservation of Critical Areas</i>	116
5.1.4	<i>Managerial BMPs for Corridor Protection</i>	122
5.1.5	<i>Structural BMPs for Agriculture</i>	125
5.1.6	<i>Agencies Involved in Implementation of BMPs</i>	131
5.1.7	<i>Technical and Financial Assistance</i>	131
5.1.8	<i>Estimated Pollution Reductions from Proposed Actions, Strategies and BMPs</i>	131
6.	Chapter 6 - Identifying Key Reports, Initiatives or Strategies for Planning	137
6.1	<i>Vision of Green</i>	137
6.2	<i>Priority Conservation Lands Assessment – Tittabawassee River Watershed (2006)</i>	139
6.3	<i>MDEQ Studies</i>	139
6.4	<i>Bay County Build-Out Assessment (September 2000)</i>	139
6.5	<i>MS4-Watershed Management Plan for Kawkawlin River by BASWA</i>	141
6.6	<i>SBCI Phosphorus Committee Report</i>	142
6.7	<i>Saginaw Bay Remedial Action Plan</i>	160
7.	Chapter 7 - Information and Education Strategies	162
7.1	<i>Vision for Information and Education for the Kawkawlin Watershed</i>	162
7.2	<i>Current I&E Efforts in the Kawkawlin Watershed</i>	162
7.3	<i>Goals and Objectives of Information and Education Plan</i>	165
7.4	<i>Identification of Target Audiences</i>	175
7.5	<i>Developing the Right Message</i>	176
7.6	<i>Selecting Delivery Mechanisms and Activities</i>	177
7.7	<i>Implementation of Information and Education Strategy</i>	179
7.8	<i>Potential Watershed Partnerships</i>	184
7.9	<i>Evaluation Measures</i>	188
8.	Chapter 8 - Methods of Measuring and Evaluating Progress	189
8.1	<i>Specific Monitoring Components for Recommended Objectives and BMPs</i>	189
8.1.1	<i>Measurable Targets</i>	191
8.1.2	<i>Evaluation Criteria for the WMP</i>	192
8.2	<i>Indicators of Overall Water Quality</i>	196

8.3	<i>Watershed Monitoring Efforts</i>	199
9.	Chapter 9 – Project Sustainability: Sub-Watershed Action Plans	206
9.1	<i>Identifying and Analyzing Proposed Programs, Policies and Ordinances</i>	206
9.2	<i>Actions to be Implemented</i>	213
9.3	<i>Conclusions</i>	218

Appendix A – Exhibits (Watershed Maps)

Appendix B – MDEQ Wetland Study

Appendix C – DNR Fisheries Study

Appendix D – Agriculture Survey & Exhibits

Appendix E – BCHD On-Site Treatment System Database & Exhibits

Appendix F – MDEQ Biological Studies (1990-2006)

Appendix G – TMDL Information

Appendix H – Report on Problem Areas on the Kawkawlin River – Aerial 2010 & Watershed Assessment

Appendix I – KRWPOA Position Paper

Appendix J – Pipeline Crossing Information

Appendix K – Agricultural BMP Drafts

Appendix L – MDEQ Reports on Phosphorus in the Saginaw Bay Watershed

Appendix M – Build Out Assessment (September 2000)

Appendix N – Best Management Practices

Appendix O – BASWA MS4-Public Education Plan