ICELANDIC RIVER AND WASHOW BAY CREEK

INTEGRATED WATERSHED MANAGEMENT PLAN

EXECUTIVE SUMMARY

The Icelandic River and Washow Bay Creek watershed management plan was developed as a partnership between the East Interlake Conservation District, the Province of Manitoba and a vibrant group of community stakeholders. The plan is intended to outline tasks for residents, government agencies and other stakeholders, that work towards protecting, conserving or restoring land, water, aquatic ecosystems and drinking water sources in the watershed.

In short, the plan is intended to act as a roadmap for anyone who wants to see this watershed support a thriving community in the future.

The planning process extended over two and a half year timeframe, starting in April of 2006 and moved through to completion in late 2008. Although key decision makers on the project management team changed midway through the planning process, resulting in a few setbacks, the plan remained focused on four goals or 'challenges' for the watershed:

1. ensuring safe drinking water;
2. protecting the agricultural community from flood events;
3. protecting and restoring natural areas like wetlands and riparian areas; and
4. improving watershed health awareness.

These challenges were derived mainly from talking with watershed residents during a public consultation event held in Arborg in April of 2007. The project management team sought technical guidance from a team of experts on how to address these challenges, but relied on their familiarity of the area to know what actions would most likely succeed in this area of Manitoba. Each challenge was given a vision of success so everyone knew what we were working towards, as well as actions to achieve success, which include:

ACTIONS TO PROTECT OUR WATERSHED
- AT A GLANCE

1. ENSURE SAFE DRINKING WATER FOR THE HEALTH AND PROSPERITY OF THE COMMUNITY WITHIN THE ICELANDIC RIVER AND WASHOW BAY CREEK WATERSHED.

Success means:	Actions to Achieve Success:
Preventing bacterial contamination in private water wells	• Ensure drillers understand how and where to best place private wells • Ensure landowners know how to maintain private wells • Seal abandoned wells (see map on page iii indicating where to focus the program) • Provide well water analysis yearly
Reducing nitrate contamination from point and non-point sources	• Develop a sewage management committee with the mandate to develop a long-term sewage management plan for Arborg, Riverton and region • Offer a septic system awareness program • Offer programming to reduce agricultural inputs of nitrates to the groundwater aquifer, such as: swath or bale grazing, windbreaks to livestock owners, subsidize offsite watering equipment, move manure piles, subsidize fencing and other riparian restoration techniques (see map on page 4 - 5) • Enforce existing regulations aimed at managing nutrient inputs and update soil classification maps to reflect actual conditions
Source water protection areas are created for the watershed	• Work with the planning district to implement development restrictions to prevent future at risk development in source water protection areas • Improve understanding of groundwater recharge areas in watershed through proposed wetland inventory suggested under Challenge Four • Adopt policy to prevent removal of snow from ditches in winter

2. PROTECT THE AGRICULTURAL COMMUNITY BY REDUCING THE IMPACT OF FLOOD EVENTS THAT OCCUR DURING THE SUMMER GROWING SEASON (BETWEEN JUNE AND AUGUST).

The capability and limits of the agricultural drainage system are recognized	• Offer programming aimed at increasing the understanding of the limits of the drainage system • Create an open maintenance schedule • Access federal funding to aid with drain improvement projects • Ensure that the standard of drainage provided by the province or municipality is considers current land use, topography and soil capability
The existing drainage network is improved using a surface water management based approach for prioritizing works	• Consider water conservation/retention options first to build climate change resilience and protect existing wetlands • Fix existing problems with the drainage network - use the proposed surface water management planning process to prioritize current and future projects in the Icelandic River and Washow Bay Creek watershed • When conducting a drain improvement project that coincides with an identified rehabilitation site, proponents of the drainage project should work with the EICD to remediate the site

3. PROTECT AND RESTORE THE QUALITY AND INTEGRITY OF WETLANDS AND NATURAL WATERWAYS TO MAINTAIN A HEALTHY AQUATIC ECOSYSTEM.

Success means:	Actions to Achieve Success:
There is a net gain of wetlands and retention areas and people are more aware of the role wetlands play in watershed health	• Conduct a wetland inventory of the watershed • Offer programming to provide incentives to landowners who protect or create wetlands (see map on page three indicating where to focus program)
There is a net gain of riparian area vegetation quantity and quality and people are more aware of the role riparian areas play in watershed health	• Improve awareness of the benefits of riparian area management, maintaining intact shoreline along Lake Winnipeg and access to existing EICD riparian area programs. Expand riparian programming to include portable shelters to reduce manure build up along riparian areas and encourage healthy shoreline riparian management practices and shoreline sensitive developments • Enforce set-backs for new developments and inspect septic systems along waterways • Offer grants to aid landowners to improve shoreline health along the Lake
There is a net gain of productive fish habitat in the watershed and people are more aware of landscape components that make a health aquatic ecosystem	• Conduct targeted improvements to migratory fish corridors, with a focus on the priority one rehabilitation sites identified in the Icelandic River and Washow Bay Creek Watershed Habitat Assessment (see map) • Educate stakeholders and residents about the importance of maintaining natural stream meanders and floodplains

4. BUILD WATERSHED HEALTH AWARENESS THROUGHOUT THE COMMUNITY, GOVERNMENT AND OTHER STAKEHOLDER GROUPS.

All watershed stakeholders are more aware of the baseline health of the watershed and there are more watershed successes shared within the community	• Understand more about mining activities within the watershed • Develop an annual report card which evaluates watershed health • Improve the EICD web site to include a data warehouse of information • Initiate a public education outreach program about activities that help or harm watershed health to raise awareness of the conservation district • Celebrate successes in the watershed • Increase groundwater monitoring program in watershed

THE PLANNING PROCESS IDENTIFIED AREAS OF THE WATERSHED TO FOCUS LIMITED RESOURCES. INFORMATION ABOUT THE SOILS, LAND USE, DEPTH OF SOIL ABOVE BEDROCK, AND WELL LOCATIONS WERE CONSIDERED WHEN ESTABLISHING THESE PRIORITY AREAS.

LEGEND

Source Water Protection Focus Area include areas with less than 6 metres of overburden. Focus area for groundwater management and nutrient programming (abandoned well sealing, free private well analysis, off site watering, swath and bale grazing, windbreaks, soil testing, changing manure storage areas, fencing, portable shelters, riparian and wetland protection, and development recommendations)

Source Water Protection Focus Area also includes areas within 5 kilometers of a public drinking water well. Focus area for groundwater management and nutrient programming (abandoned well sealing, free private well analysis, off site watering, swath and bale grazing, windbreaks, soil testing, changing manure storage areas, fencing, portable shelters, riparian and wetland protection, and development recommendations)

Agricultural Improvement Focus Area includes Canada Land Inventory Agricultural Capability Class 1-3 Lands

Water Retention Focus Area includes wetland incentive and water retention programming

Drain improvement project location and priority (see below for description of works)

Canada Land Inventory Class 1-3 lands are found in region indicated in yellow, a factor used to prioritize drainage improvement projects in the watershed. Other factors include fisheries habitat quality, distance to downstream, number of sections benefiting from the improvement, project cost, and land use. Project descriptions are provided below, and reference the number indicated in orange circles on the map.

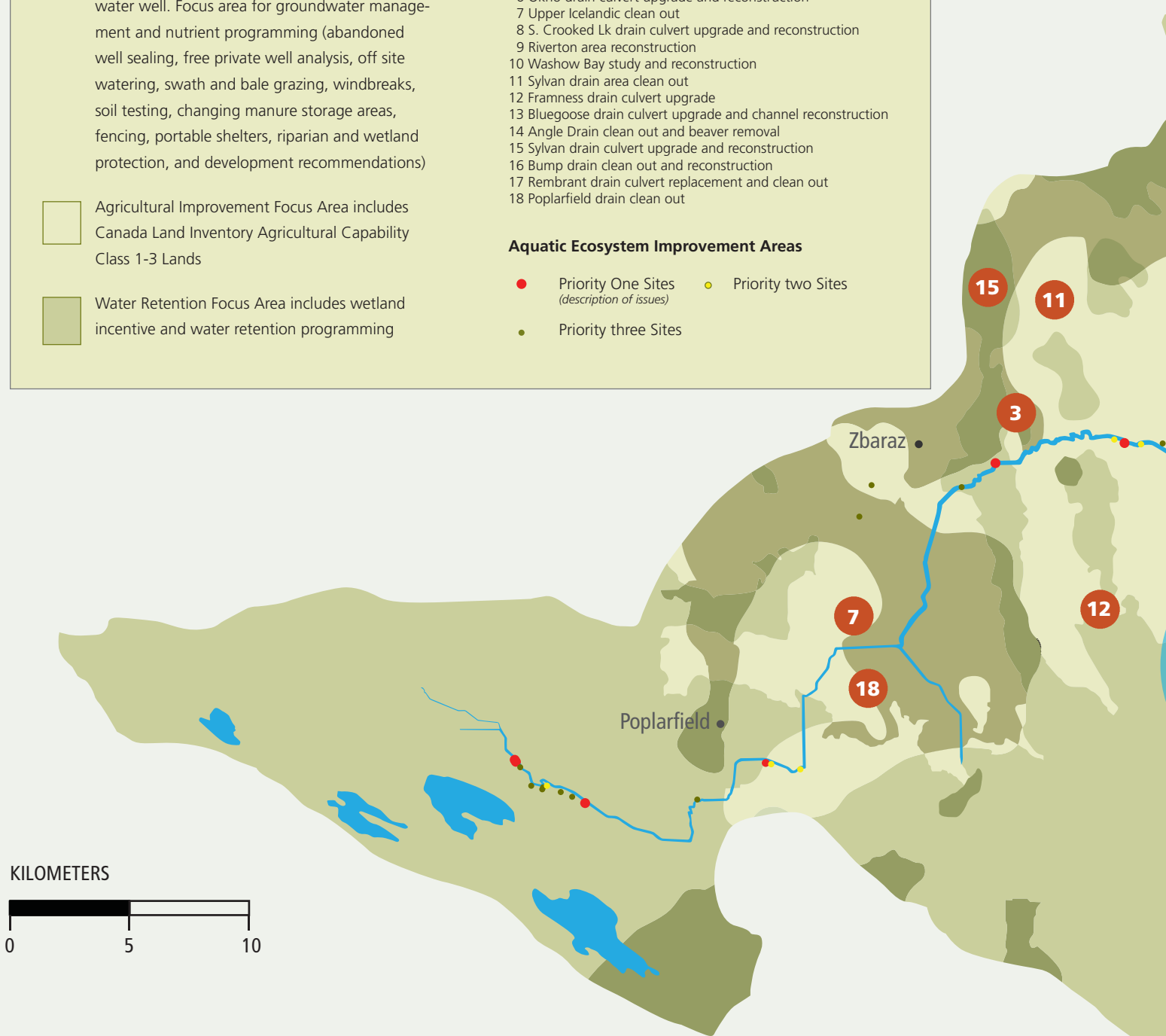
1 S. Crooked Lk area clean out
2 Shorncliffe drain clean out
3 Sylvan drain area clean out
4 N. Crooked Lk Drain culvert upgrade and reconstruction
5 PTH#8 study, culvert replacement and channel reconstruction
6 Okno drain culvert upgrade and reconstruction
7 Upper Icelandic clean out
8 S. Crooked Lk drain culvert upgrade and reconstruction
9 Riverton area reconstruction
10 Washow Bay study and reconstruction
11 Sylvan drain area clean out
12 Framness drain culvert upgrade
13 Bluegoose drain culvert upgrade and channel reconstruction
14 Angle Drain clean out and beaver removal
15 Sylvan drain culvert upgrade and reconstruction
16 Bump drain clean out and reconstruction
17 Rembrant drain culvert replacement and clean out
18 Poplarfield drain clean out

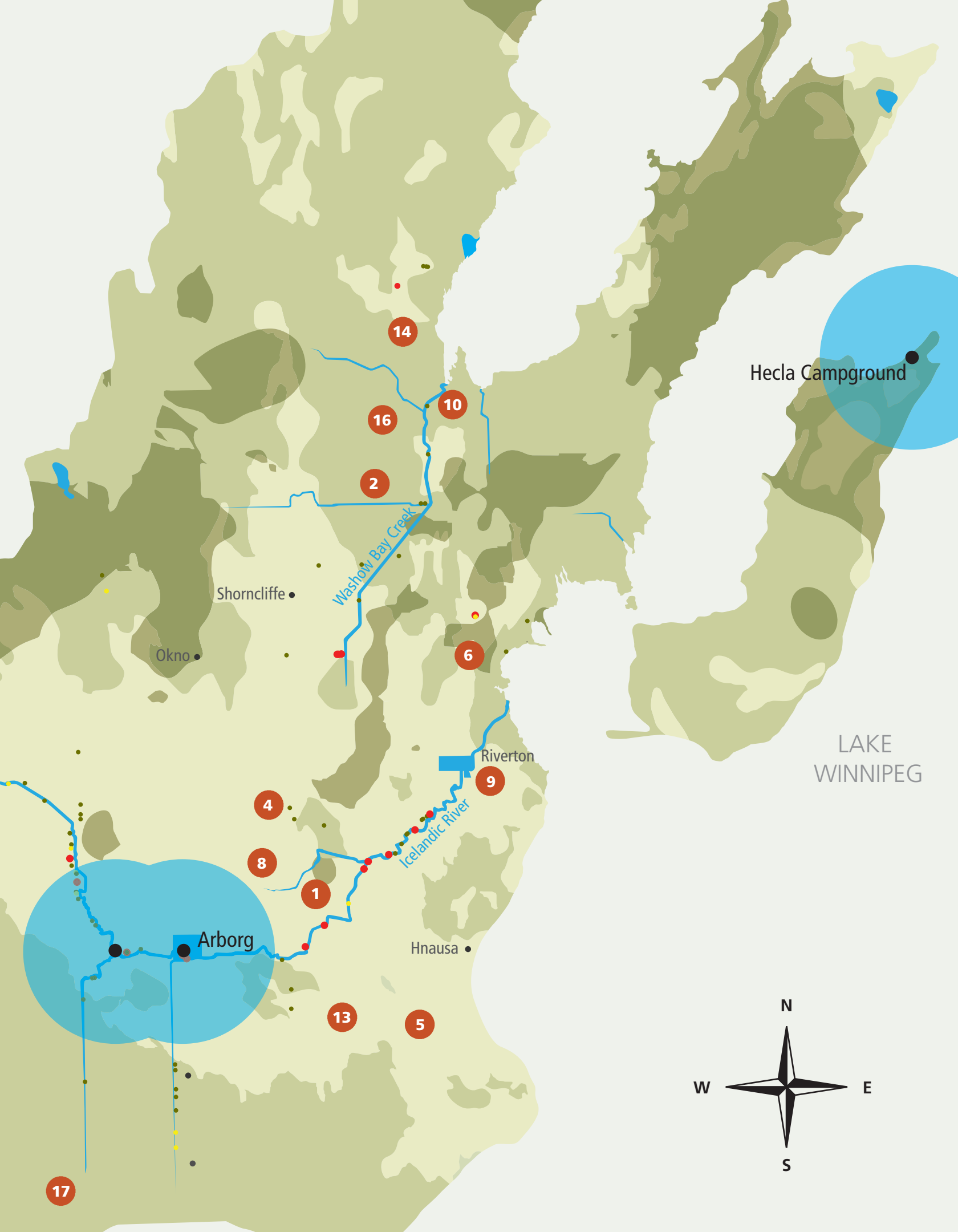
Aquatic Ecosystem Improvement Areas

Priority One Sites *(description of issues)*

Priority two Sites

Priority three Sites




Hecla Campground
LAKE
WINNIPEG
Washow Bay Creek
Shorncliffe
Okno
Riverton
Icelandic River
Arborg
Hnausa
14
10
16
2
6
9
4
8
1
13
5
17
N
W
E
S

MELVYN EYOLFSON, CHAIR
Project Management Team

I became involved with the East Interlake Conservation District to help improve the management of water within the watershed. As a farmer, I have seen first hand the damage that excess water can cause to field crops. When the opportunity arose I was happy to work within the EICD to help develop the integrated watershed management plan. It is a long term project which will be very beneficial to the entire area for generations.

LEN LOWEN
Project Management Team

My wife and I farm near Riverton. Water stewardship and environmental awareness have become priorities today. I want my kids and grandkids to be able to farm, drink safe water, and go fishing in our rivers and streams. Conservation districts, programs and education need to grow in the future.

STEPHEN CARLYLE
Project Management Team

As the newest member of the Project Management Team I was fortunate to enter this planning process with the pre-existing knowledge and passions of Melvyn, Len and Sarah. Contained in this document are the instructions on how to preserve the health of our watershed. As the Manager of the EICD it is my job, and privilege, to be a steward of the land but everyone that lives, works or plays in this watershed is also a land manager. I look forward to working with all of you as we bring this plan to life over the coming years.

SARAH COUGHLIN
Project Management Team

When I started working with the EICD, the Chair told me "the only thing you need to know about the Interlake is that water doesn't flow uphill." I thought that was simple enough. After working on this plan for almost three years, and seeing how flood events and water management have shaped the community and the landscape, I understand how central this issue is to living in the watershed. Now in a different role, I hope to continue working with the community to see this plan turned into action.

ACKNOWLEDGEMENTS

I'd like to acknowledge the support provided by Garry Wasylowski , David Smolinski, and Peter Blahut, early members of the project management team. Garry ensured that the voice of cattleman was heard and had the forethought to understand the importance of valuing ecological services provided by forage lands. I'd like to extend thanks to Bob Betcher and his team, who provided support above and beyond what is expected. Mapping support was provided by Jason Hancheruk, who always found solutions to our often challenging requests. And finally, I'd like to thank the residents of the watershed who came out to share their concerns and solutions with our team. The concern expressed by many local people gave me confidence that the words on these pages will be turned into action in on the landscape.

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FIGURES

01 INTRODUCTION

Residents and businesses of Arborg, Riverton and surrounding townships are fortunate to have bountiful supplies of clean and accessible fresh water. Water has defined the industry, society and culture of Manitoba's Interlake region. It is the responsibility of those residents, and the government representatives charged with water protection, to ensure our water remains clean, and in bountiful supply for the health and prosperity of future generations.

The marshy banks of Washow Bay Creek, at the Highway 8 crossing | *Figure 2.*

BUT WHERE DO WE START?

In Manitoba, resource managers are moving towards a watershed-based management philosophy. A watershed is an area of land that drains to a common point. Water moves downstream through a watershed, and any activity that affects water quality, quantity, or rate of flow at one location will affect locations downstream. What happens upstream affects what happens downstream. Given that impacts are felt at the watershed level, watersheds are considered the most ecologically and administratively appropriate units for managing water. Working within watersheds gives people the opportunity to address water quality, quantity, community and habitat issues beyond the scope of single jurisdictions like towns or municipalities, as well as consider cumulative impacts of land use practices.

Watershed management plans are tools to be used by residents, government agents and other stakeholders, to assist in making responsible choices about the way we live and work. Watershed management planning draws upon the concept that the health of our water is fundamentally influenced by how we manage our land. Understanding the linkages between land practices and the quality and quantity of water is critical to the long-term health and prosperity of residents in this region.

The Icelandic River and Washow Bay Creek integrated watershed management plan was initiated in April of 2006 and identifies important actions for individuals, municipal, provincial and federal agencies and other interested stakeholders.

The most important part of this plan is implementing its action items. These action items are identified in four 'Challenges,' and summarized at the end of each chapter.

02 PURPOSE

The purpose of this plan is to outline tasks for residents, government agencies and other stakeholders, for the protection, conservation or restoration of land and water, aquatic ecosystems and drinking water sources in the watershed.

KEY CONTRIBUTORS
TO THE PLANNING PROCESS

03

RESIDENTS OF THE WATERSHED

Residents of the watershed have a central role to play in the development of the plan and in its implementation. Success of the plan will depend on the support and participation of plan action items from all watershed residents. To date, over 80 residents of this watershed have contributed ideas and opinions to this watershed plan, and we hope that number continues to grow.

THE WATER PLANNING AUTHORITY

One of the initial steps in conducting an Integrated Watershed Management Plan (IWMP) is the designation of a water planning authority. The East Interlake Conservation District (EICD) was designated as the water planning authority for the Icelandic River and Washow Bay Creek watershed in April of 2006 through a memorandum of understanding signed by Manitoba Water Stewardship.

The EICD is an organization of local people working together to manage and conserve natural resources for the benefit and enjoyment of area residents. EICD membership includes all or parts of the rural municipalities of Armstrong, Bifrost, Fisher, Gimli, Rockwood, Rosser, St. Andrews, West St. Paul, and Woodlands; the city of Selkirk, the towns of Arborg, Stonewall, Teulon and Winnipeg Beach; and the villages of Dunnottar and Riverton.

The EICD operates on watershed boundaries and partners with the Province and other agencies to conduct programming in five priority areas: water quality, surface water management, watershed planning, soil and riparian health and education.

THE WATERSHED PLANNING ADVISORY TEAM

This is a group of key watershed representatives and technical support staff established to help the water planning authority collect key information throughout the planning process, and to identify management issues within the Icelandic River and Washow Bay Creek watershed. The project management team, met more frequently and made key decisions for the group including: developed the Know Your Watershed document, mailed in April of 2007; designed public consultation methods to engage participation from area residents; and, helped create the plan in its current format.

The East Interlake Conservation District and Icelandic River and Washow Bay Creek watershed boundary. | *Figure 3.*

04 THE PLANNING PROCESS

Watershed management planning is a cooperative effort by stakeholders, municipalities and government agencies to create a long term plan for the protection, conservation and/or restoration of water, aquatic ecosystem and drinking water sources within a watershed. It is an integrated process that involves groups of people interested in or affected by watershed issues, and aims to address and resolve priority issues and improve watershed health and sustainability.

Watershed management planning is like building a roadmap for your watershed—what do you want this area to look like for the future?

In January of 2006 the Province of Manitoba proclaimed *The Water Protection Act*. Part three of this *Act* provides the foundation for developing and financing watershed management plans. As part of the requirements of the *Act*, a water planning authority is assigned the responsibility for preparing and implementing the plan for a specific watershed. The below timeline illustrates watershed planning activities between January of 2006 and August of 2008.

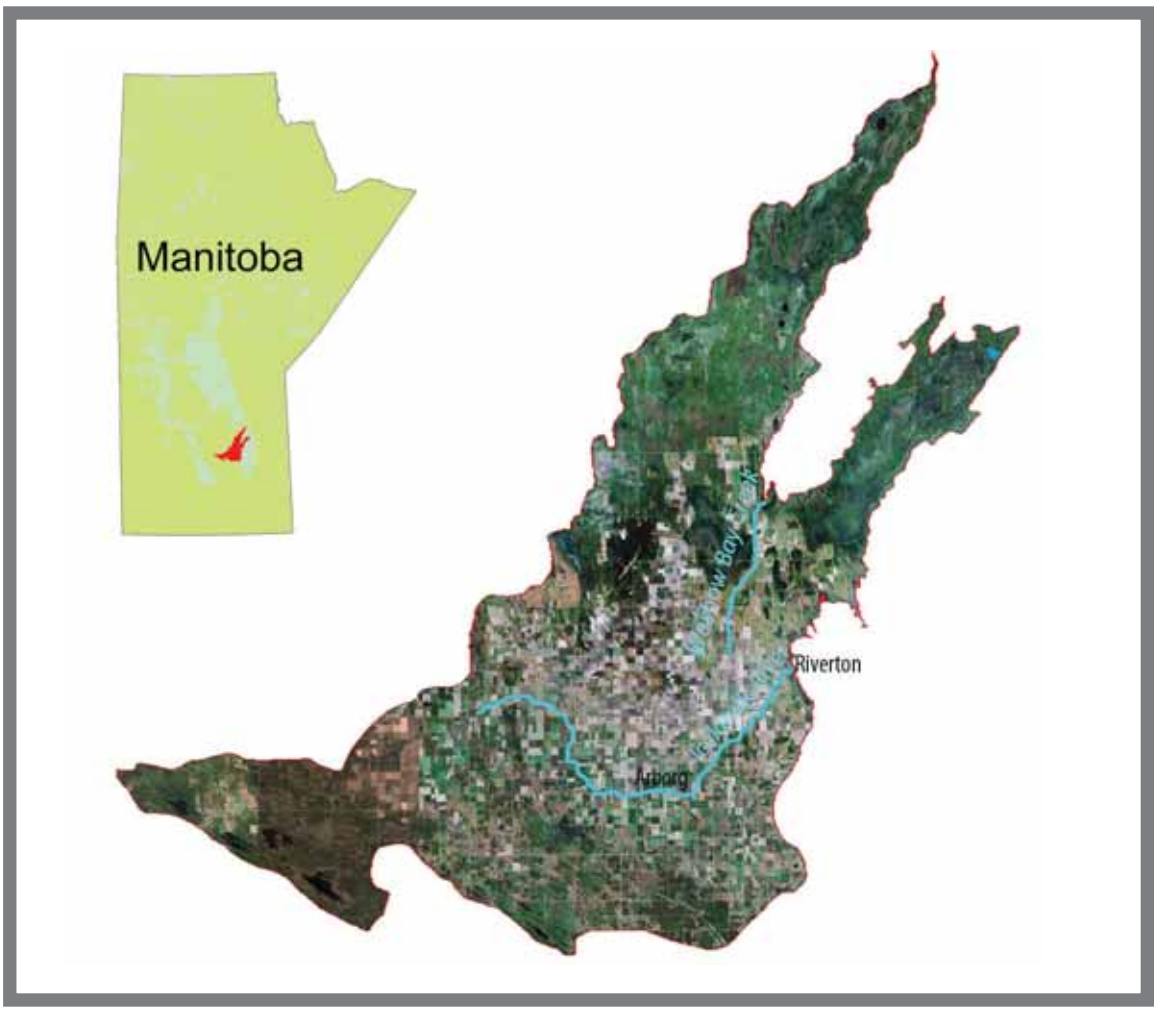
TIMELINE OF WATERSHED PLANNING ACTIVITIES

January 2006	Memorandum of understanding signed by the Province and the EICD to be designated the water planning authority for the Icelandic River and Washow Bay Creek watershed.
May 2006	Technical team meeting in Arborg.
May 2006 - February 2007	Technical team presents and summarizes information between May, 31st, 2006 and February, 2007. Some requested information is never received.
April 2007	Technical submissions and habitat assessments are summarized into the 'Know Your Watershed' report and distributed to all watershed residents.
April 19 2007	Public consultation held to establish and prioritize issues and options of watershed residents.
November 2007	The project management team discussed ways of grouping related issues into challenge areas. Measurable objectives were set for each challenge area. A draft report was created.
August - December 2008	Draft management plan reviewed by local representatives. Plan is revised. Plan is sent to technical staff for revisions. Plan is revised further.
April 2009	Second public consultation held to review draft management plan, set timelines for action items and develop performance measures.
May 2009–May 2016	EICD adopts new programs and targets others to meet plan objectives. The EICD asks other stakeholders to help implement plan action items and reach watershed goals.

Timeline of watershed planning activities. | *Figure 4.*

STUDY AREA 05

The Icelandic River and Washow Bay Creek watershed is located on the west side of the south basin of Lake Winnipeg. The watershed covers an area of approximately 2,640 km^2 and drains in an easterly direction towards Lake Winnipeg. Municipal land area within the watershed includes the rural municipalities of Armstrong, Bifrost, Eriksdale, Fisher and Gimli. Rural communities include the Town of Arborg and the Village of Riverton. The main industries and land use within the watershed include agriculture, light industry, tourism and mining of aggregate and peat.



The Icelandic River and Washow Bay Creek watershed study area. | *Figure 5.*

06 SUMMARY OF CURRENT CONDITIONS

Technical submissions and background reports were reviewed and summarized in a report entitled "Know Your Watershed," completed in April of 2007. This document was intended to provide a basic understanding of the baseline conditions of the watershed.

The 'Know Your Watershed' report was provided to all residents, and used to help shape the direction of planning action items.

All technical information received from throughout the watershed planning process is housed at the EICD office. Much of the information is also available electronically at www.eicd.ca.

The following summarizes key characteristics of the watershed in the areas of land, water and aquatic ecosystems and drinking water.

SOILS

Much of the watershed contains soil that drains imperfectly to poorly.

This is a wet watershed. This watershed is part of the Interlake Plain ecoregion of the Boreal Plains ecozone. This ecozone is relatively humid, has a mean annual temperature of 1.1 °C, and precipitation levels of about 500 millimeters per year.

There is valuable farmland in this watershed. The Canada Land Inventory soil capability classification for agriculture, used as an indicator for agriculture potential, indicates that this watershed contains over 230,000 acres (93,000 ha) of Class 2 and 3 lands. Soil Class 1-3 represents the prime agricultural land capable of sustained production of cultivated crops.

There is an extensive network of agricultural drains designed to remove excess rainfall from cropland during the growing season. The agricultural drainage network does not meet the needs of many agricultural producers in the region.

WILDLIFE AND PLANTS

Wildlife is thriving in this watershed. Areas within the watershed with a special designation for wildlife include: the Hecla Grindstone Provincial Park, the Moose Creek, Lee Lake, Washow Bay and Rembrandt Wildlife Areas. There is also important elk wintering area at the extreme west portion of the watershed and sensitive habitat along the Riverton Sandy Bar area for a nationally endangered bird, the piping plover.

The piping plover, a nationally endangered bird, can be found in the Icelandic River and Washow Bay Creek watershed. *Figure 6.*

There are also rare and very rare plant species found in this watershed, including the Engelmann's Spike-rush (Eleocharis engelmannii) and Richardson Needle Grass (Stipa richardsonii).

HISTORY

The Icelandic River has always been an important part of the region. In the early days of settlement it was the main road, by boat in summer and by ice in winter. Hardwoods such as elm and maple grew along its banks. In spring and early summer it provided pickerel, jackfish, mullets, catfish and goldeye. It was also prone to flooding, which caused frequent hardship for those living along the river.

East Interlake Conservation District sampling programs in the Icelandic River and Washow Bay Creek watershed, including (starting from the top) water quality sampling, benthic invertebrate sampling, well water inventory and fisheries habitat assessments.

Figure 7.

WATER AND THE AQUATIC ECOSYSTEM

Water in this watershed is accessible, plentiful and of good quality.

Regular water quality sampling was initiated in 2006 and shows a water quality index score of 81 out of 100 (or 'good') for the Icelandic River, and the Washow Bay Creek.

There are five recreational beach areas in the watershed which generally have excellent recreational water quality. Occasionally, beach advisories are posted due to high bacteria levels that usually coincide with high wind speed and direction .

Many wetlands have been drained, and significant reaches of the Icelandic River have been channelized and removed of vegetation to improve overall capacity of the drainage network.

Habitat assessments were conducted in 2006 and 2007 to review the quality of aquatic habitat, water quality, depth and velocity, channel morphology, bank vegetation, and fish migration barriers. This study revealed 108 potential rehabilitation sites in the watershed, and noted channelization, migration barriers and constructed drains as sources impairing habitat quality.

There have been four attempts to reduce the Icelandic Rivers' tendency to overtop its banks. These attempts were made in 1936, 1946, 1962, and once again with the Federal Rural Economic Development project in 1971-1973, in which large portions of the Icelandic River watershed were engineered. Each of the projects deepened and straightened the channel, diked its banks, and increased the volume capacity of the river.

DRINKING WATER AND GEOLOGY

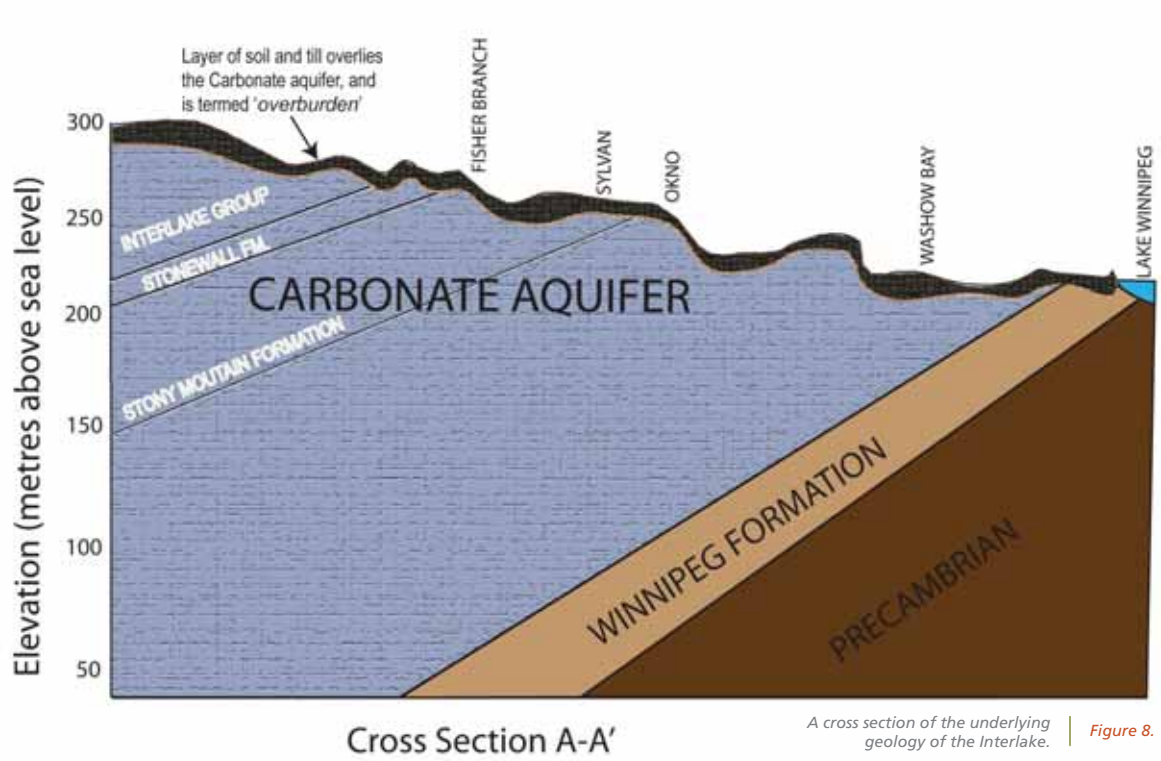
There are two public water supply systems within the watershed, supplying the Town of Arborg and the seasonal guests at the Hecla Island Provincial Park campground. Both treatment systems use groundwater as a source and both maintain Class 1 treatment and distribution facilities.

Groundwater is clean and plentiful in this watershed. The expansive Carbonate aquifer underlying the Interlake region provides high yields for households and has characteristically high total dissolved solids. A second aquifer, the Winnipeg Formation, is accessed on the far eastern side of the watershed and contains harder water with higher sulphate concentrations occurring naturally.

The water table is close to the surface in parts of this watershed and, in some areas, water levels in the Carbonate aquifer are above ground surface. Natural springs occur locally in these areas and wells may be artesian. If not properly constructed and capped, these wells will flow uncontrollably and may create local flooding issues. In areas where the aquifers occur close to ground surface they may be vulnerable to contamination.

A well water inventory of 549 homes conducted in 2006 and 2007 by the EICD revealed that 6.9% and 1.5% of samples tested exceed drinking water guidelines for total coliform bacteria and E. coli, respectively. Of the 387 homes sampled for nitrate, 3.9% exceed drinking water guidelines for nitrate, and those that exceeded guidelines were closely associated with those parts of the watershed with less than 6 metres of overburden cover above the bedrock.

There are 119 known abandoned wells in the watershed, 54 have been sealed properly by the EICD in the Icelandic River and Washow Bay watershed to date.



A cross section of the underlying geology of the Interlake. | *Figure 8.*

WATERSHED CHALLENGES 07

Photographs taken at the April 19, 2007 public consultation in Arborg, MB. A detailed summary of the public consultation and issue selection process as well as a summary of all technical team issue statements are available online at www.eicd.ca.

Figure 9.

In the following chapters, an action plan has been developed for each challenge area. Each chapter includes background information on the issue of concern, and a proposed set of action items. Implementing the action items will be the responsibility of watershed residents, the East Interlake Conservation District, the East Interlake Planning District, municipal, provincial and federal governments, stakeholders, developers and businesses in the watershed.

To identify local issues and concerns, stakeholders were asked to provide their point of view on problems and concerns in the Icelandic River and Washow Bay Creek watershed. Issue statements were requested from two types of watershed stakeholders: 1) the general public within the watershed, and 2) a technical subgroup of the watershed planning advisory team.

The project management team endeavored to balance science-based information with issues of concern to watershed residents. The project management team found most comments, from both the technical team and the public consultation, were organized into four areas of concern. These areas were then considered our watershed 'Challenges' and form the framework for the remainder of the plan.

WATERSHED CHALLENGES:

1. Ensure safe drinking water for the health and prosperity of the community within the Icelandic River and Washow Bay watershed.
2. Protect the agricultural community by reducing the impact of flood events that occur during the summer growing season.
3. Protect and restore the quality and integrity of wetlands, natural waterways and Lake Winnipeg to maintain a healthy aquatic ecosystem.
4. Build watershed health awareness throughout the community, government and other stakeholder groups.

CHALLENGE 1

"some spring runoff water should be held back to ease flooding and would supply water for groundwater"

"MAINTAINING EXCELLENT DRINKING WATER FROM FARM WELL"

"MUST AVOID WELL WATER ISSUES LIKE LUNDAR, AS WE DON'T KNOW WHERE THE BACTERIA IS COMING FROM OR HOW! AQUIFER WATER QUALITY"

"Pollution to abandoned wells beside river. (flooding waters cover wells at certain times)"

"WATER QUALITY, LONG TERM GROUNDWATER PROTECTION"

"Our water quality, both surface and ground are extremely important. Agriculture, municipalities and industry must treat this resource with great respect."

"Preservation/restoration of the natural environment/where possible/That helps preserve the quality of the water e.g. wetlands act as sponges and can be important elements in regulating "natural" river/creek flows."

Ensure safe drinking water for the health and prosperity of the community within the Icelandic River and Washow Bay watershed

"GROUNDWATER QUALITY"

"WATER NOT LEAVING FIELDS QUICK ENOUGH AT SPRING RUNOFF"

CHALLENGE 1 08

Ensure safe drinking water for the health and prosperity of the community within the Icelandic River and Washow Bay Creek watershed.

BACKGROUND

Ensuring safe and bountiful supplies of clean drinking water is a priority for the Icelandic River and Washow Bay Creek watershed residents. A third (42 of 154) of all comments received during public consultations referenced concern over water quality, and/or referenced protection of groundwater quality specifically.[1] Groundwater is the primary source of drinking water for the Town of Arborg municipal system and almost all other residents within the watershed, including cottages along Lake Winnipeg, campgrounds within the Hecla Grindstone Provincial Park and producers located throughout the watershed. Watershed residents rely on clean, abundant groundwater to sustain industry, livestock facilities, aquatic ecosystems and healthy communities. Protecting our groundwater means ensuring the activities we conduct on the landscape do not contaminate or deplete our vulnerable aquifers.

"Top priority issue: Long term protection of high quality groundwater (drinking water supply)"

Comment received during April 2007 public consultation

The quality of groundwater is dependant on watershed geology, topography, soils, vegetation and 'what we do' on the landscape. As a drop of rain or snow melt hits the ground, its chemistry may change as it interacts with soil particles and any chemicals that may be associated with that soil. The quantity of that water in the aquifer may change based on how easily that drop or water can infiltrate the soil. Understanding these interactions is important for agencies, watershed residents and other stakeholders in offering the most effective protective measures possible. Ensuring private landowners are aware of proper maintenance procedures at a well head is just as important as suggesting broad protective measures for sensitive recharge areas.

Protecting this resource is complex and requires a multi-barrier approach, beginning with the individual and broadening to landscape-level policy recommendations. To ensure safe drinking water in the Icelandic River and Washow Bay Creek watershed means:

1. prevent bacterial contamination in private water wells;
2. prevent and reduce nitrate contamination from point and non-point sources;
3. put in place a source water protection areas; and,
4. provide special protections to groundwater recharge areas.

The sections to follow provide background information for each of the above areas of protection, as well as a 'Taking Action' section, outlining recommended protective measures.

08 CHALLENGE 1

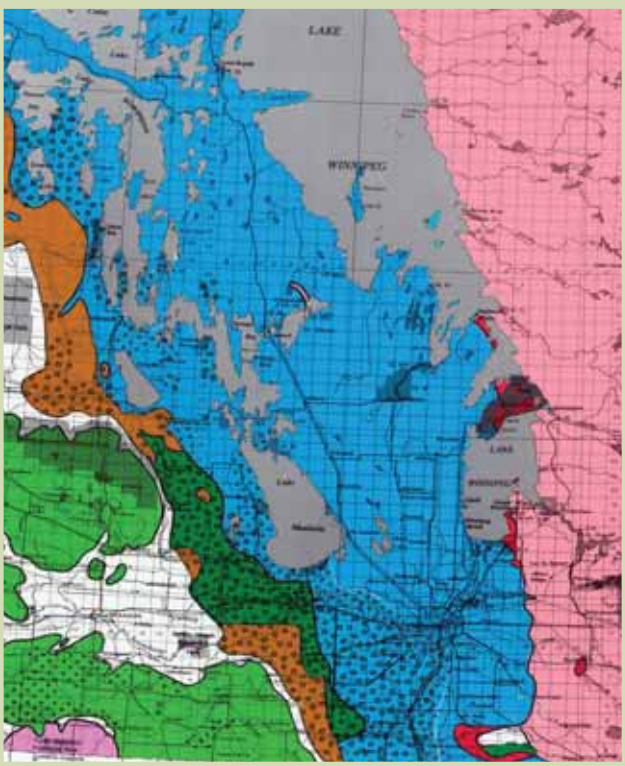
1.1 PREVENT BACTERIA IN PRIVATE WATER WELLS

In the summer of 2006 and 2007 the East Interlake Conservation District conducted extensive sampling of private wells located within the Icelandic River and Washow Bay Creek watershed.[2] This report noted that of the 549 homes inventoried in 2006 and 2007, 6.9% and 1.5% exceed drinking water guidelines for total coliform bacteria and E. coli, respectively. The following action items focus on eliminating bacterial contamination in wells to maintain healthy and prosperous communities.

Did You Know?

Groundwater is water that occurs in the pore spaces of soil and rocks. It originates as precipitation that moves down through the soil. An aquifer is an underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, or silt) from which groundwater is extracted using a water well. Unconfined aquifers, or water table aquifers, are close to the ground surface, while confined aquifers are overlain by geologic deposits of low permeability, such as clay or shale. Most wells in the Icelandic River and Washow Bay Creek watershed, greater than 95%, are supplied by a deep, confined aquifer called the Carbonate aquifer.[2]

The blue area indicates the area of Manitoba underlain by the Carbonate aquifer.



TAKING ACTION

1.1a Conduct an education program to increase awareness on proper locating, drilling, and maintaining private water wells:

- When drilling wells, locate them up-slope and away from sources of contaminants, such as fertilizer preparation and storage sites, septic systems, manure storage areas and feedlots. Maximizing the distance between your well and contaminant source minimizes the risk of contamination.
- Discuss with your driller the amount of casing which should be installed in your well to ensure you obtain groundwater which is uncontaminated by surface influences. Have the driller 'tremmie grout' the casing annulus with cement or bentonite to prevent the movement of contaminants down to the aquifer along the outside of the well casing.
- Check your well each spring for cracks or damage in the well cap and casing. Check that the well vent opening is properly screened and clear of debris. Ensure the submersible pump electrical conduit is securely attached to the well cap. Eliminate well pits or older wells. Surface water can pool in well pits, contaminating shallow groundwater
- Slope land surface away from well casing, and grow grass on immediate area around well to reduce surface water run-off inputs
- Conduct well water sampling annually

1.1b Seal abandoned wells.

1.1c Offer accessible private well water analysis to keep land owners informed on the condition of their well.

1.2 PREVENT AND REDUCE NITRATE CONTAMINATION FROM POINT AND NON-POINT SOURCES;

The East Interlake Conservation District's well water inventory also revealed elevated nitrate levels in groundwater wells throughout the watershed. Of the 549 water wells sampled, 387 were tested for nitrate levels. Of the 387 samples collected, 3.9% exceeded the Canadian Drinking Water Quality Guideline of 10 mg/L nitrate-nitrogen. Elevated nitrate concentrations were noted in the vicinity of Zbaraz and Sylvan (north and west of Arborg), and the Washow Bay area (see Figure 10).[2]

Sources of nitrogen in the watershed include nitrogen fertilizers, livestock manures, septic fields and tanks, lagoon discharges, and soils high in organic matter. Nitrate is also highly mobile in the soil because it is soluble in water. As a result, loss of nitrate to groundwater can be significant in soils with coarse textures, shallow bedrock and coarse textured soils with shallow water tables, especially when large amounts of nitrates are present in the soil prior to major precipitation events or in spring during initial snow melt. To reduce nitrate infiltration to groundwater, a strategy should be developed to manage nutrient inputs from septic fields, lagoon sources, and confined livestock areas. A series of beneficial management practices should be targeted to areas with thin overburden (less than 6 metres in depth), see Figure 11. These areas of thin overburden correlate with areas showing elevated nitrate levels in the watershed.

Additionally, Manitoba has existing nutrient-related regulations that need clear enforcement (see Nutrient Management Regulations under The Water Protection Act and amendments to Manitoba Conservation's Livestock Manure and Mortalities Management Regulation at http://web2.gov.mb.ca/laws/).

ADDITIONAL BENEFITS TO REDUCING NITRATES IN GROUNDWATER

Studies conducted by the Province of Manitoba have determined that over the past three decades, phosphorus loading to Lake Winnipeg has increased by about 10 per cent, and nitrogen loading by about 13 per cent[3, 4]. Nitrogen and phosphorus are the two major nutrients that appear to be contributing to eutrophication of Lake Winnipeg. By reducing nitrogen inputs to our groundwater systems we will also be participating in the basin-wide effort to reduce nutrients to Lake Winnipeg, a valuable economic, intrinsic and aesthetic resource for residents of this watershed.

Did You Know?

Three major nutrients essential for plant growth are nitrogen, phosphorus and potassium. These elements are found in our soils and atmosphere.

Healthy plants require varying amounts of these elements on an annual basis. During the growing season, a plant will convert large amounts of carbon dioxide from the air into oxygen. A healthy crop can better withstand insect and disease pressure, and reduce our need for pesticides. Healthy plant and root growth also reduces soil erosion.

Over-application of nitrogen fertilizer and leaching of nitrogen due to excess rainfall and flooding can contribute to nitrates in drinking water. Manitoba has set drinking water safe maximum limits at 10 milligrams per litre for nitrates measured as nitrogen.

The second nutrient of concern to water quality is phosphorus. Excess phosphorus in our rivers and streams is a major source of water quality impairment to Lake Winnipeg.

It is important to match crop growth needs to soil health. Nutrients applied to a growing crop should match the amount of nutrients used in any particular season. The balance of nutrients in our soils needs to be maintained but not mined to ensure healthy plant growth.

Timing, method of application and amount of fertilizers are critical to maintaining plant health and water quality.

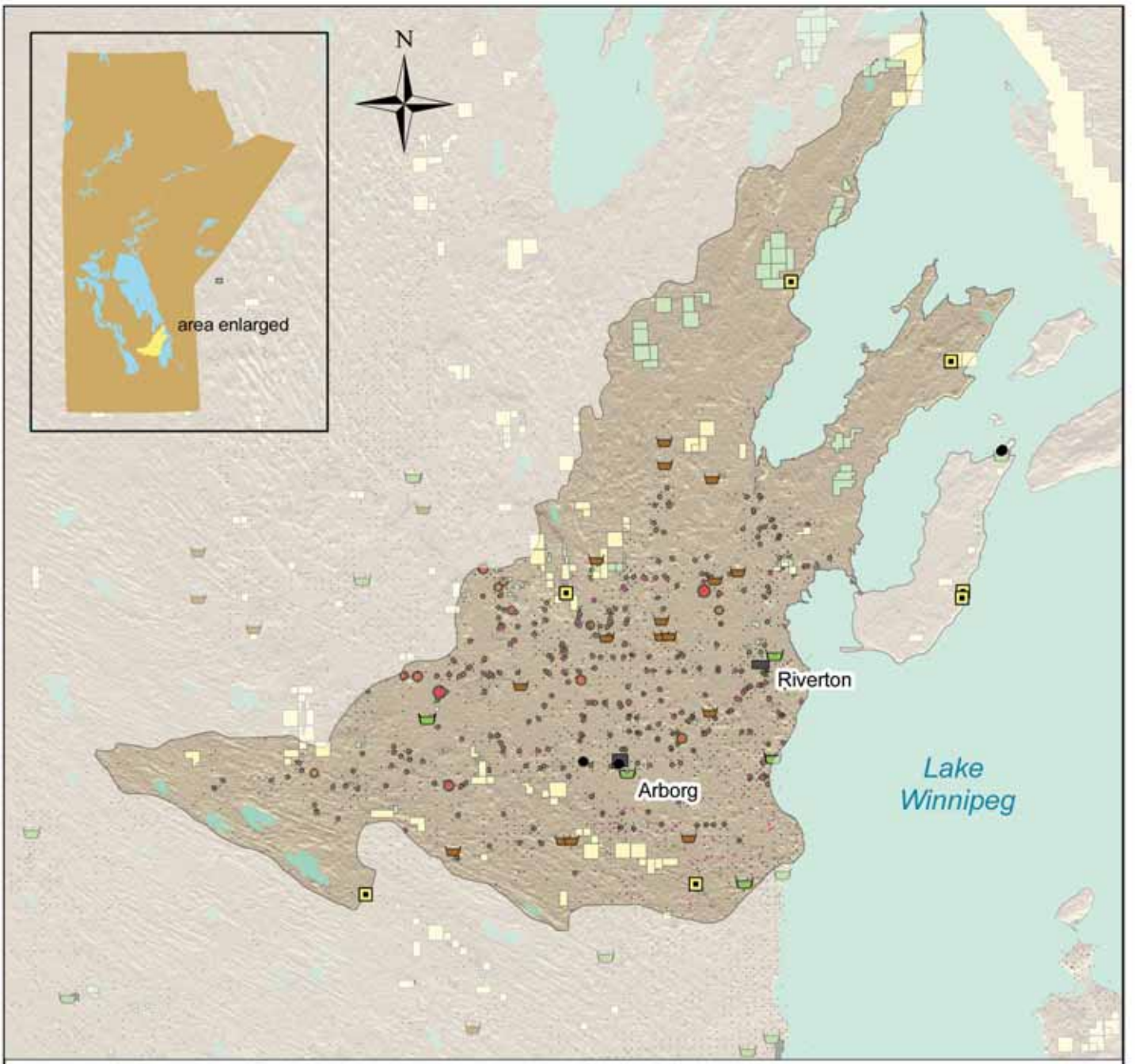


Figure 10. Nitrate Concentration of Groundwater in the Icelandic River and Washow Bay Creek watershed

Legend

- Municipal Water Well Location
- Wastewater Treatment Facilities
- Manure Storage Facilities
- Known private operational wells
- Known abandoned, unsealed wells
- Landfills
- 05SC watershed boundaries
- Lake
- Urban Areas
- Quarry Withdrawals
- Quarry Leases

Concentrations Under Canadian Drinking Water Guideline of 10 mg/L nitrate-nitrite*

- 0 - 5 mg/L nitrate-nitrite
- 5 - 9.9 mg/L nitrate-nitrite

Concentrations Over Canadian Drinking Water Guideline of 10 mg/L nitrate-nitrite*

- 10 - 20 mg/L nitrate-nitrite
- 20 - 30 mg/L nitrate-nitrite
- 30 - 44 mg/L nitrate-nitrite

Kilometers
0 2.5 5 10 15 20

North American Datum 1983
Universal Transverse Mercator Zone 14U
Completed March 26, 2008 by S. Coughlin,
Manitoba Water Stewardship

1:600,000

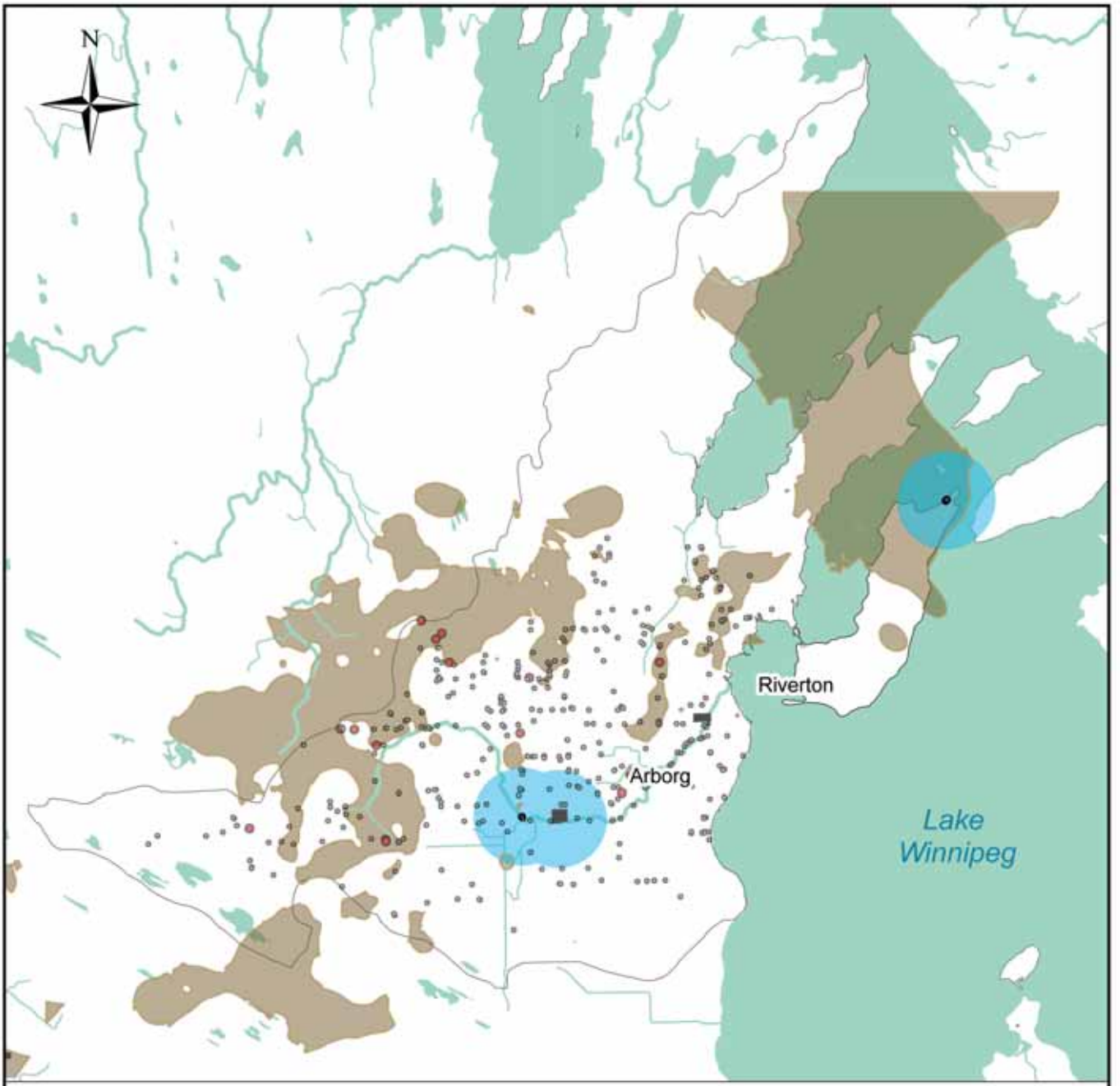


Figure 11. Source Water Protection Areas in the Icelandic River and Washow Bay Creek Watershed

Legend

05SC watershed boundaries

Lake

Nitrate concentration in well water between 0.005 - 9.99 mg/l

Nitrate concentration in well water over 10.0 mg/L

Source Water Protection Areas

Overburden is less than 6 metres deep

Area is within 5 kilometres of a public well

Kilometers
0 3 6 12

1:600,000

North American Datum 1983
Universal Transverse Mercator Zone 14U
Completed December 4, 2008
by S. Coughlin, Manitoba Water Stewardship

TAKING ACTION

1.2a Establish a sewage management committee with the mandate to develop a long term sewage management plan for the Town of Arborg and the region. Work with the Town of Arborg and Village of Riverton to develop enhanced treatment alternatives to reduce nutrient inputs to the Icelandic River.

1.2b Offer targeted nutrient reduction programming to areas of thin overburden (less than 6m depth), see Figure 11. Nutrient reduction programming includes:

- Swath or bale grazing: Swath or bale grazing is a management practice that can be used to extend the grazing season and prevent build up of manure in yard sites. This practice also has added benefits of reducing feed, labour and manure handling costs for cattle producers and may eliminate or reduce the costs for corral cleaning, manure spreading and feed handling.
- Installing windbreaks: windbreaks offer shelter for cattle and encourage grazing over a wider area, preventing concentrations of manure in yard sites.
- Offering offsite watering systems: Watering systems reduce the amount cattle enter waterways, directly reducing manure inputs to streams and riparian impacts due to bank trampling.
- Fencing and riparian area restoration: Fencing areas reduces impacts to waterways from livestock use
- Soil testing: Soil testing is a method of determining an appropriate amount of nutrients to add as fertilizer. Besides the potential for increased profits, soil testing may prevent risk of environmental impacts due to nutrient run-off.

1.2c Septic systems can contribute excess nutrients to our soils, and can pollute wells if they are placed too close to a well, are not properly maintained, or have not been properly installed. Septic systems should not be used in areas with thin overburden and/or sandy soils. Initiate a focused educational campaign to provide guidance to homeowners on how to properly maintain septic fields, and how to recognize when they are failing.

1.2d Conduct detailed soil characterization in the Icelandic River and Washow Bay watershed. Many new Provincial regulations are based on reconnaissance level soils data for this watershed. Updating this information will aid in planning and more accurate management of the land.

1.2e Adhere to existing regulations aimed at reducing nutrient inputs to waterways. Two new sets of regulations have been developed by the Province of Manitoba to regulate the application of nutrients onto land. One series of regulations is meant to restrict the application of manure phosphorus from livestock operations in Manitoba, through amendments to the Manitoba's Live stock Manure and Mortalities Management Regulation. The other set of regulations, established under The Manitoba *Water Protection Act*, are designed to prevent over application of nitrogen and phosphorus from all sources of nutrients (livestock manure, commercial fertilizers, and municipal biosolids) on all land in Manitoba, through the establishment of Water Quality Management Zones.

CHALLENGE 1 08

1.3 ADOPT SOURCE WATER PROTECTION AREAS

BACKGROUND

Protecting the sources of our drinking water is an important step toward ensuring there is enough safe, clean drinking water for all. The most cost-effective way to ensure a safe source water supply is to prevent drinking water problems from developing in the first place. This is best achieved with an effective source water protection plan. Drinking water source protection will allow for the identification of risks to public water supply systems in the Icelandic River and Washow Bay Creek watershed, and the creation of a plan to reduce those risks

SOURCE WATER ASSESSMENT

A standardized methodology to complete a source water assessment has been adopted by the Province of Manitoba[5]. The approach focused on "the potential for the raw water supply at the intake location to affect human health, due to either poor water quality or spills or general land use practices." A susceptibility measure is calculated based on a number of different indicators including: wastewater treatment facilities, transport of dangerous goods routes, mines and quarries, large livestock operations, landfills, contaminated sites, petroleum storage facilities, and landscape disturbance based on land use. This method will allow for relative comparison of susceptibility of drinking water sources across the province. It is important to note that this is only a measurement of susceptibility - not of risk, this is an important consideration as the susceptibility measurement only checks for the presence of potential pollutants but does not include any measure of probability or impact. Also, as stated previously, a key indicator of groundwater susceptibility is depth of overburden. The depth of overburden in the region of both municipal wells for the Town of Arborg is between 5 and 10 metres . The standardized methodology mentioned above classifies any aquifers with less than 15 metres of overburden as a shallow aquifer, and therefore more at risk.

The results of this coarse land use analysis indicate that both the Town of Arborg main well and the emergency well are rated as highly susceptible to contamination from land use activities (see Figure 12). The Hecla Grindstone Provincial Park well is rated as low susceptibility to contamination from land use activities.

Did You Know?

Drinking water systems can be sorted into 3 categories: public systems which contain 15 or more service connections, semi-public systems which contain less than 15 service connections but are not private systems (e.g. a school or hospital with its own well), and private systems that supply water to only one private residence. The Icelandic River and Washow Bay Creek watershed contains 5 wells that supply public systems[6]. Two wells supply the Town of Arborg (well 1 is located approximately four kilometers west of the treatment plant in Arborg, well 2 is located inside the plant,but is primarily used for fire-fighting and construction purposes). Once treated, the water from the Arborg treatment plant meets all objectives set out in "Guidelines for Canadian Drinking Water Quality."[7] The Hecla Island Provincial Park campground is serviced by three wells (wells 1-3 are located 6, 8 and 300 metres from the plant, respectively). Although this facility needs updating, the Hecla Island Provincial Park campground plant meets all guidelines with the exception of iron, an aesthetic objective. No semi-public sources were identified in this assessment and there is an unknown number of private wells servicing watershed residents.

The East Interlake Conservation District's well water inventory revealed a positive correlation between depth of over-burden and well water contamination. Additionally, technical comments received from groundwater management experts[8] noted that wells located in areas with less overburden, or a shallow depth to bedrock, were more likely to contain elevated nitrate concentrations. Areas around each public well (shown in Figure 12), as well as all areas with less than 6 metres depth to bedrock (shown in Figure 11), should be considered sensitive and provided targeted groundwater protection programming and offered special protections from development.

TAKING ACTION

1.3a Consider both a 5 kilometer protective area around each municipal well and areas with less than 6 metres of depth to bedrock as "source water protection areas" and provide landowners in these regions priority for targeted programming including: well sealing, managing sink holes, incentives to protect wetlands, all nutrient management programming.

1.3b Restrict future "at risk" developments in source water protection areas. At risk development will be defined by the sewage management committee.

Did You Know?

Justice Dennis O'Connor of the Supreme Court of Ontario, the appointed investigator of the Walkterton tragedy, recommended a multi-barrier approach to source water protection after his investigation. Each barrier deals with one or more of the flaws that came to light in Walkerton. "The best way to achieve a healthy public water supply is to put in place multiple barriers that keep water contaminants from reaching people," wrote O'Connor. He identified five parts to the multi-barrier system:

1. source water protection
2. adequate treatment
3. a secure distribution system
4. proper monitoring and warning systems, and
5. well-thought out responses to adverse conditions

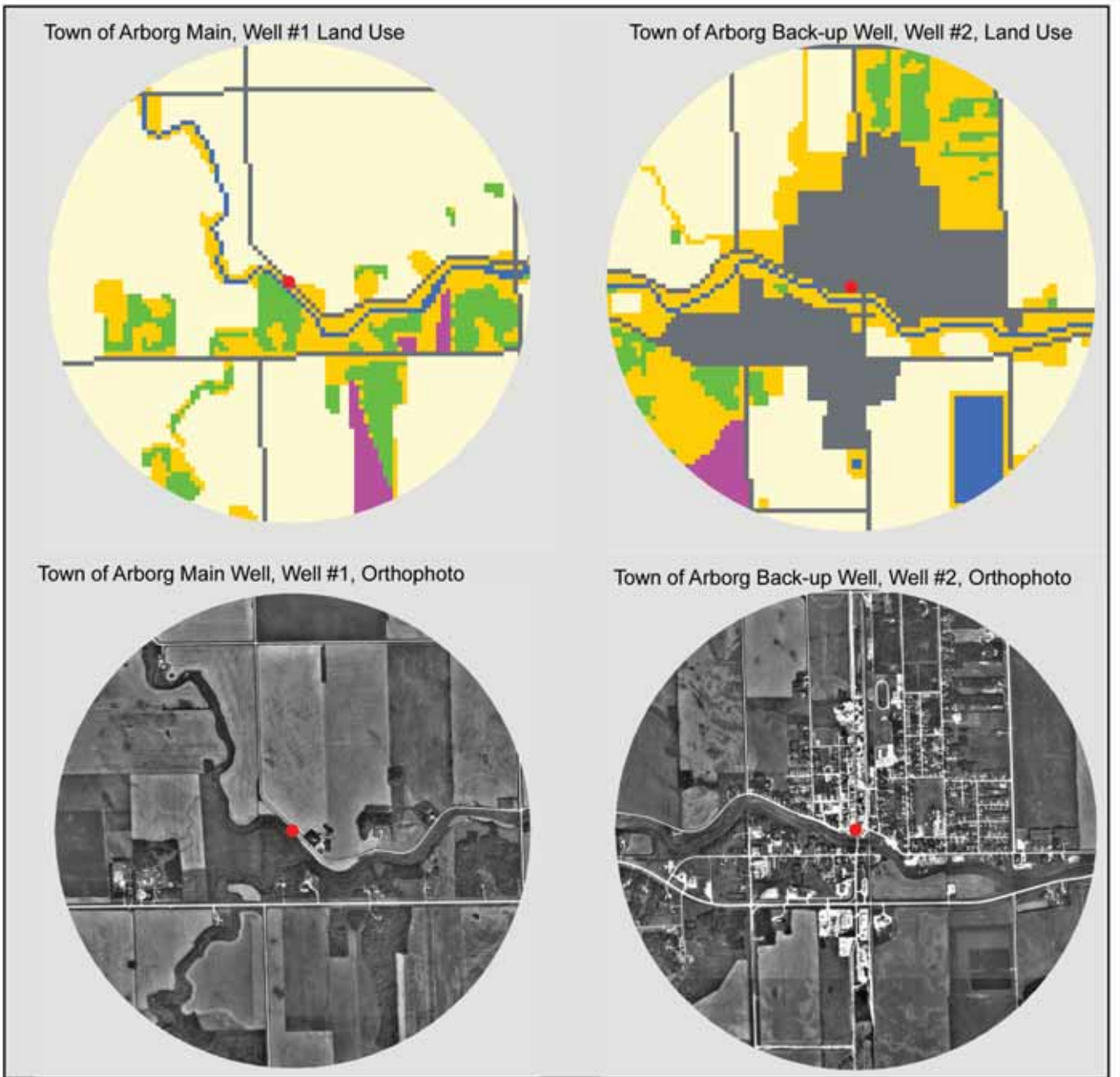


Figure 12. Town of Arborg Public Water Supply System Source Water Management Zone Assessment

Legend

Location of well

Kilometers
0 0.25 0.5 1

North American Datum 1983

Universal Transverse Mercator Zone 14U

Completed March 17, 2008 by S. Coughlin, Manitoba Water Stewardship

Source Water Protection Areas

Canada Land Inventory Class		Disturbance Indicator	Management Zone (1.5 km radius around well)			
			Well #1 (main well)		Well #2 (in town)	
			Land Class Area	Result	Land Class Area	Result
	Crop Land	30%	73%	22%	41%	12%
	Forest	0%	8%	0%	5%	0%
	Water	0%	2%	0%	4%	0%
	Grassland	0%	11%	0%	21%	0%
	Wetlands	0%	0%	0%	0%	0%
	Forage	15%	2%	0%	2%	0%
	Urban	100%	4%	4%	28%	28%
	TOTAL			26%		40%

08 CHALLENGE 1

1.4 PROVIDE SPECIAL PROTECTIONS TO WETLAND AREAS.

BACKGROUND

Understanding how our groundwater aquifers are recharged is important when planning to protect water quality and quantity. The significant expanse of wetlands found in this watershed may play a major role in aquifer recharge.

A flowing well in an area SW of Arborg. | *Figure 13.*

Wetlands are the lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water. Wetlands may be hydraulically connected to the water table, and because of this, play an important role in recharging shallow depth aquifers. Conversely, wetlands may also form as a result of a high groundwater table, directing flow upward and inhibiting downward drainage to the aquifer. Either way, healthy aquifers and healthy wetlands benefit all, including practical benefits like increased soil moisture for crop production.

The water levels in the Carbonate aquifer are high in this watershed, sometimes forcing water as much as 6 metres above ground level. These elevated water levels are expressed through flowing artesian wells, located in greater density along the eastern shores of Lake Winnipeg, but found throughout the watershed. Uncontrolled flowing wells cause irritation for landowners and road maintenance crews, but do not typically affect water quality.

Policy and economic incentives have encouraged the drainage of wetlands in this watershed and much of Canada's Prairie region. Drainage networks constructed and maintained by provincial governments, municipalities, and producers themselves, are designed to accelerate the movement of runoff water from fields, without allowing water to infiltrate into the ground to recharge shallow and deep water aquifers.

In addition to functioning as an aquifer recharge area, wetlands provide other benefits to watershed residents, such as improving the watersheds ability to rebound from stresses, reduce flood peaks, reduce soil erosion, increase soil moisture, pollutant removal, waste treatment, influence local weather effects, and provides wildlife habitat in addition to recreational and aesthetic benefits.

TAKING ACTION

1.4a Improve understanding of groundwater recharge areas in watershed through proposed wetland inventory suggested under Challenge 4.

1.4b Adopt policy to prevent removal of snow from ditches in winter. Holding water back will help to retain water on the land and prevent a major flush through the watershed and into Lake Winnipeg all at one time.

CHALLENGE #1 ENSURE SAFE DRINKING WATER FOR THE HEALTH AND PROSPERITY OF THE COMMUNITY WITHIN THE ICELANDIC RIVER AND WASHOW BAY WATERSHED.

Success Means: Preventing bacterial contamination in private water wells

Who Has Expertise?	Recommended Action	Recommended Action
Individuals	• Slope land away from your well head; • Plant grasses around wellhead • Inspect your wellhead yearly, in the spring • Participate in annual water testing days	• Conduct well inventory in 2011 and compared to 2006-07 inventory results to gage improvements
Well Drillers	• Install sufficient casing and ensure proper well construction techniques are utilized in all areas. • Ensure the annulus is grouted with either neat-cement or a bentonite slurry • Ensure minimum distances are respected between bacteria sources (livestock, septic tank, field or ejector) and the well head	• All new wells are installed at a maximum distance from bacteria sources
EICD	• Distribute well maintenance pamphlets • Provide free native grass seed for well head protection areas • Offer a focused well decommissioning program • Rehabilitate poorly constructed wells • Manage annual well testing days	• Each house receives one pamphlet 2010 • 100 Lbs of seed distributed by 2012 • Seal all abandoned wells by 2012 • Well testing days hosted each year
Province	• Ensure regulatory compliance with new wells • Further subsidize well testing (1 free test/year/well)	• Well testing days are funded annually

Success Means: Reducing nitrate contamination from point and non-point sources

Who Has Expertise?	Recommended Action	Recommended Action
Individuals	• Take part in available programming offered to reduce nutrient inputs to the watershed	• Take part in available programming offered to reduce nutrient inputs to the watershed.
EICD	• Prioritize work with landowners in targeted nutrient reduction areas and fund nutrient reduction projects including: swath/bale grazing, move manure storage locations regularly, wind-breaks, offsite cattle watering, fencing and riparian restoration and soil testing. • Initiate a focused educational campaign to provide guidance to homeowners on how to properly maintain septic fields, and how to recognize when they are failing.	• All landowners in targeted nutrient reduction areas have been approached to partner on all nutrient management programming
Province	• Enforce existing regulations related to nutrients and manure management • Update soil capability classification for agriculture, as reference in Manitoba Nutrient Management Regulations, in this watershed.	• Soil maps are based on detailed soil samples and mapping is updated for this watershed
Town of Arborg	• Appoint a sewage management committee (SMC) with representatives from RM of Bifrost, EICD, Town of Arborg, Village of Riverton, EICD and Planning District with the mandate to develop a long term sewage management plan for town and region aimed at reducing regional nutrient loads.	• The SMC develops a plan to reduce nutrients to the watershed

CHALLENGE #1 ENSURE SAFE DRINKING WATER FOR THE HEALTH AND PROSPERITY OF THE COMMUNITY WITHIN THE ICELANDIC RIVER AND WASHOW BAY WATERSHED.

Success Means: Source water protection areas are created.

Who Has Expertise?	Recommended Action	Recommended Action
Individuals	• Take part in available programming offered to protect sensitive areas in the watershed • Be aware of sensitive groundwater recharge areas. Conduct activities on the land that are respective of these vulnerable areas	• Greater awareness of sensitive watershed areas
EICD	• Target groundwater protection programming to source water protection areas including: well sealing, managing sink holes, incentives to protect wetlands, all nutrient management programming.	• Source water protection areas are created in the watershed
Rural Municipalities	• Restrict activities in sensitive areas through amendment to zoning by-laws	• Source water protection areas are created in the watershed through zoning restrictions by 2012
Planning District	• Provide incentives to protect remaining or historic wetlands throughout watershed. Participate in a team aimed at providing market-based incentives to landowners for providing ecological goods and services	• Landowners are compensated for maintaining or creating wetland areas on lands appropriate for holding water.

Success Means: Reducing nitrate contamination from point and non-point sources

Who Has Expertise?	Recommended Action	Recommended Action
Individuals	• Be aware of sensitive groundwater recharge areas. Conduct activities on the land that are respective of these vulnerable areas	• Greater awareness of sensitive watershed areas
EICD	• Improve understanding of groundwater recharge areas in watershed through proposed wetland inventory suggested under Challenge 4.	• A wetland inventory is completed for the watershed by 2012 • More landowners are compensated for maintaining or creating wetland areas on lands appropriate for holding water.
Province	• Provide incentives to protect remaining or historic wetlands throughout watershed. Participate in a team aimed at providing market-based incentives to landowners for providing ecological goods and services.	• Landowners are compensated for maintaining or creating wetland areas on lands appropriate for holding water.
Town of Arborg	• Provide incentives to protect remaining or historic wetlands throughout watershed. Participate in a team aimed at providing market-based incentives to landowners for providing ecological goods and services.	• Landowners are compensated for maintaining or creating wetland areas on lands appropriate for holding water.

CHALLENGE 2

"I live in an area that drains directly to the lake. Municipal ditches provided as part of road construction hasten flows off of non agricultural areas and create downstream flooding of housing sites and agricultural lands"

"IMPROVED SURFACE WATER MANAGEMENT"

"drainage structures where municipal boundaries adjoin and where Provincial and municipal drainage systems/authorities converge need to be studies and remedied for more effective management"

"ADEQUATE AND VASTLY IMPROVED DRAINAGE FOR AGRICULTURAL LAND"

Protect the agricultural community by reducing the impact of flood events that occur during the summer growing season.

"A properly planned drainage system that provides farmers to have sound economic and agronomic practices"

"TAKES TOO LONG FOR PERMITS FOR DRAINAGE"

"Getting the water off crop land in a timely fashion after a 2" June rain"

"MAINTAIN EXISTING DRAINAGE SYSTEMS, KEEP THEM CLEAN"

"A common problem of all Conservation Districts is huge underfunding by the Province to carry out their valuable objectives."

"HAVE A DRAINAGE RISK MAP FOR PRIORITY DRAIN AREAS"

"There are several areas in our watershed area that could be designated set aside land, class 4 or 5 soils, that should not be drained, except to control drainage on neighbouring farm land"

09 CHALLENGE 2

Protect the agricultural community by reducing the impact from flood events that occur during the summer growing season.

BACKGROUND

The current agricultural drainage networks (the Icelandic River network and the Washow Bay Creek network) do not meet community expectations. It is unrealistic to expect no crop damages from heavy rainfall in this watershed in the growing season, however; by taking action in two key areas, we can address concerns related to crop damages due to flood events in the watershed, and include:

"Top priority issue: a planned drainage system that works"

comment received during April 2007 public consultation

2.1 Promote realistic expectations of the agricultural drainage network; and

2.2 Adopt a watershed-based approach to drainage when improving and maintaining existing infrastructure.

THE PURPOSE OF AGRICULTURAL DRAINAGE

The primary purpose of agricultural drainage is to reduce the damage to agricultural crops caused by excess rainfall during the growing season. Excess rainfall is that portion of rainfall that is in excess of what the agricultural plant can use for growth, and will ultimately damage or destroy the crop if it remains on the ground for too long a period of time. Drainage has secondary benefits which occur when the water table is lowered by some amount, which include:

- increasing the depth of the root zone, making more of the soil nutrients available to the plant and producing a more drought-resistant plant
- enabling better growth of beneficial soil bacteria
- increasing the soil temperature
- the drainage network also provides some degree of flood protection to residences and to the road network. Both in the summer and in the spring, the drainage network carries away rainfall and/or snowmelt runoff that would otherwise flood residences and overtop municipal or provincial roads

JURISDICTION OVER WATERWAYS

All drains and natural waterways in the Icelandic River and Washow Bay Creek watershed, and all of Manitoba, are under the authority of the Crown. Some drains are under the jurisdiction of the Province, and termed 'provincial waterways.' These drains are formally designated as being under Provincial jurisdiction through Orders-in-Council. Other drains, usually smaller, and natural waterways are the responsibility of rural municipalities. In some areas of Manitoba, Conservation Districts have assumed responsibility over all of the waterways contained within their district.

WHO MAINTAINS WHAT?

In the Icelandic River and Washow Bay watershed there are over 178 miles of provincial waterways (7% of all provincial waterways in Manitoba). These waterways are maintained by the Province, depending on available budgets. The rural municipalities (RMs) of Armstrong,

G. Wasylowski, H. Foster, and R. Sigurdson discussing cross boundary drainage issues in the East Interlake Conservation District. *Figure 14.*

Bifrost, Fisher and Gimli maintain 75, 464, 55 and 43 miles of municipal drains, respectively. The maintenance schedules of these RMs are also dependant on annual budgets, and may also fluctuate annually. The East Interlake Conservation District does not include drain maintenance or construction in its current mandate.

CHALLENGE 2

09

2.1 PROMOTE REALISTIC EXPECTATIONS OF THE AGRICULTURAL DRAINAGE NETWORKS

First and foremost, the Interlake is a wet place. Poor natural drainage occurs here because of the ridge and swale topography, the lack of any significant elevation change, and the heavy clay soils with poor internal percolation that characterize this watershed. Because of these natural land characteristics, excess rainfall runoff naturally occurs very slowly. These natural characteristics of the land limit the agricultural capability of the soil due to excessive wetness.

All drains, natural streams and rivers ultimately flow into Lake Winnipeg. Lake levels are affected by inflows, wind, precipitation and an outlet control structure operated by Manitoba Hydro. Water will not flow downstream to the lake until surface water levels downstream are low enough for gravity to draw down the upstream surface water levels. In some cases, high lake levels may back up water in upstream drains, stressing an already overtaxed system.

TAKING ACTION

2.1a Increase the understanding of the limits and the purpose of the existing agricultural drainage network through an awareness and educational program.

2.1b Encourage all watershed partners to create an open and accessible maintenance schedule for watershed residents. The portion of funds dedicated to maintenance in the watershed should, over the long term, be equal to the amount of infrastructure present in this watershed. Ensure the budget allocated to the drains under provincial jurisdiction is commensurate with other regions of the province with similar levels of service, and a reflection of the types of crops grown in the region (i.e. where specialty crops are grown, value added services are provided).

2.1c Watershed partners may be eligible for federal grants or federal capital expenditure funding. Further attempts should be made to garner funds from the federal level of government.

2.1d Ensure that the standard of drainage provided by the Province or Municipality is compatible with current land uses and cropping practices

Aerial view of a drain in Washow Bay area | *Figure 15.*

09 CHALLENGES 2

2.2 DEVELOP A WATERSHED-BASED APPROACH TO MANAGING SURFACE WATER WHEN IMPROVING AND MAINTAINING EXISTING INFRASTRUCTURE

Maintenance by both the municipal and provincial level of government responsible for maintaining the drainage network has been less than required for the network to function as intended. Provincial and municipal budget shortfalls, a withdrawal of all federal drain infrastructure funds, and an incomplete dike and pumping system in the Washow Bay area, have resulted in a substandard drainage network in some areas of the watershed, causing economic hardship for these landowners.

The agricultural drainage and flood control system in this watershed simply needs work.

Local councilors, public works foremen, provincial staff and representatives from the East Interlake Conservation District were asked to create a list of proposed drainage and flood control improvement projects. A list of 18 projects were identified throughout the watershed (Figure 16).

An overgrown drain in the Icelandic River and Washow Bay Creek watershed. | *Figure 16.*

THE SURFACE WATER MANAGEMENT PLAN

The project management team came to the understanding that a process for making decisions about how to prioritize the 18 identified projects and future projects in this watershed was necessary. The process should recognize that a watershed-based approach to managing surface waters is necessary and take into account the fact that there is connectivity between upstream and downstream portions of the watershed and changes to one part of the watershed can affect downstream reaches in that watershed. The process should recognize that portions of the drainage network in the watershed have been constructed in areas that contain marginal or poor quality soils, only marginally suitable for agriculture. The process should recognize that drain improvements that may benefit more sections of land (and likely more people), should be prioritized over projects that only service a small area. The process should also recognize the value that fisheries provide to the watershed by prioritizing works in areas with low impact to fisheries habitat.

The process for making decisions about these 18 projects, is provided in the follow pages. It is also important to recognize that improving the existing drainage infrastructure is not the only solution to reducing crops losses following heavy summer rainfalls. Before any projects are considered, water managers should determine if it is feasible and practicable to reduce flow volumes and potentially the frequency of flood events by retaining water in areas suitable for holding back water, protecting and utilizing existing wetlands for further water storage, and by restricting further drainage development in areas of the watershed unsuitable or marginal for farming.

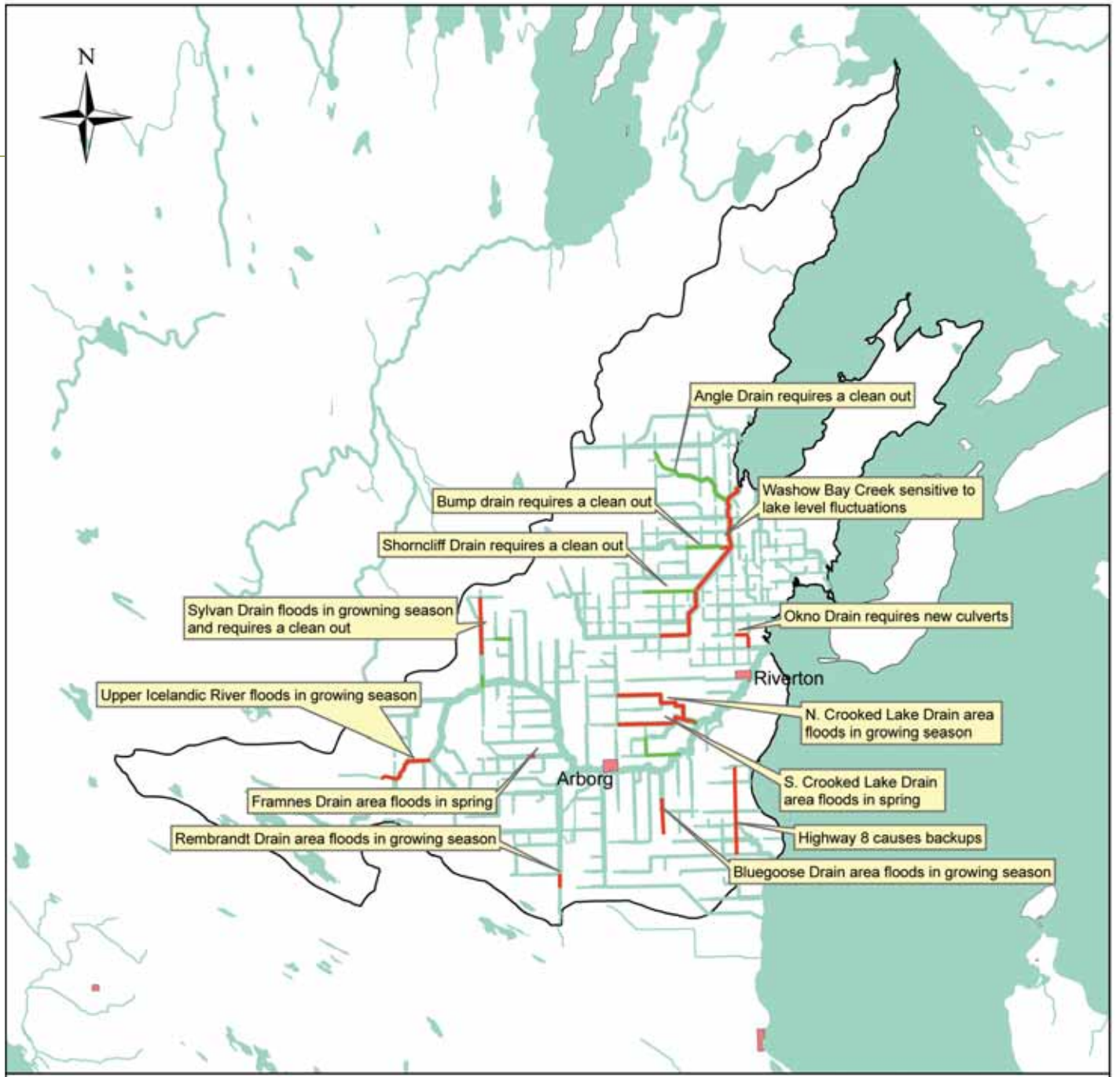


Figure 17. Key Agricultural Drainage and Flooding Problems Identified by Stakeholders in the Icelandic River and Washow Bay Creek watershed.

Legend

- watershed boundary
- Lake
- Stream or River
- Town or Village

Problem Types

- Clean out required
- Drainage problems
- Description

1:600,000

Kilometers

0 2.5 5 10 15 20

North American Datum 1983
Universal Transverse Mercator Zone 14U
Completed October 3, 2008 by S. Coughlin
Manitoba Water Stewardship

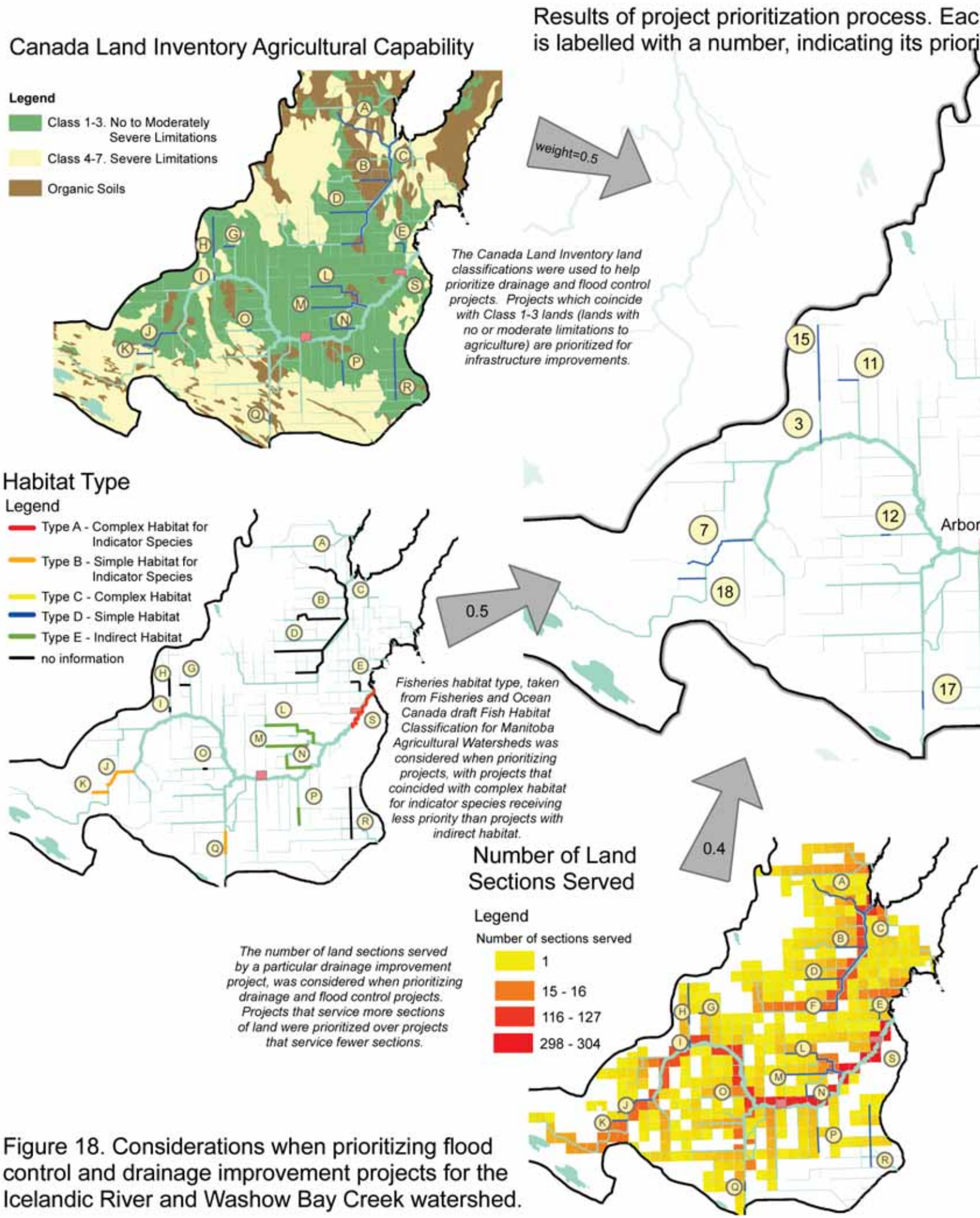
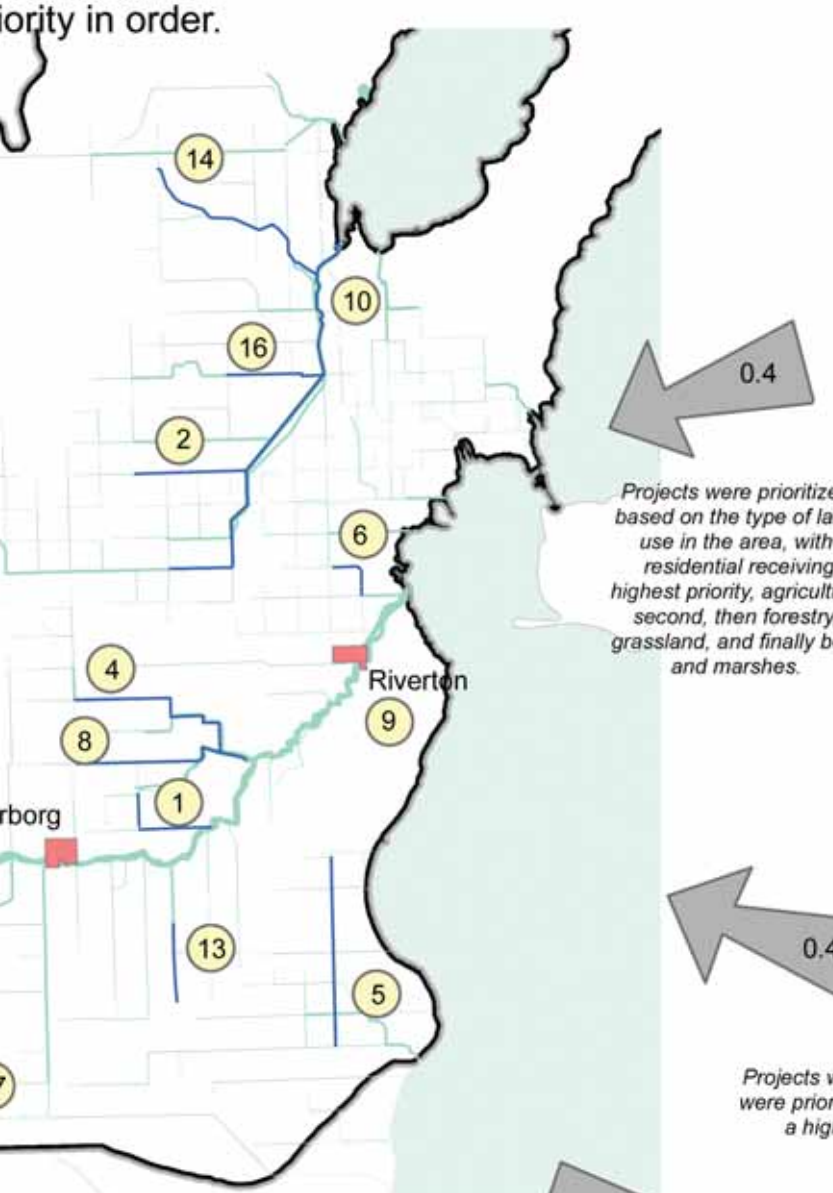


Figure 18. Considerations when prioritizing flood control and drainage improvement projects for the Icelandic River and Washow Bay Creek watershed.

Each project
priority in order.



0.4

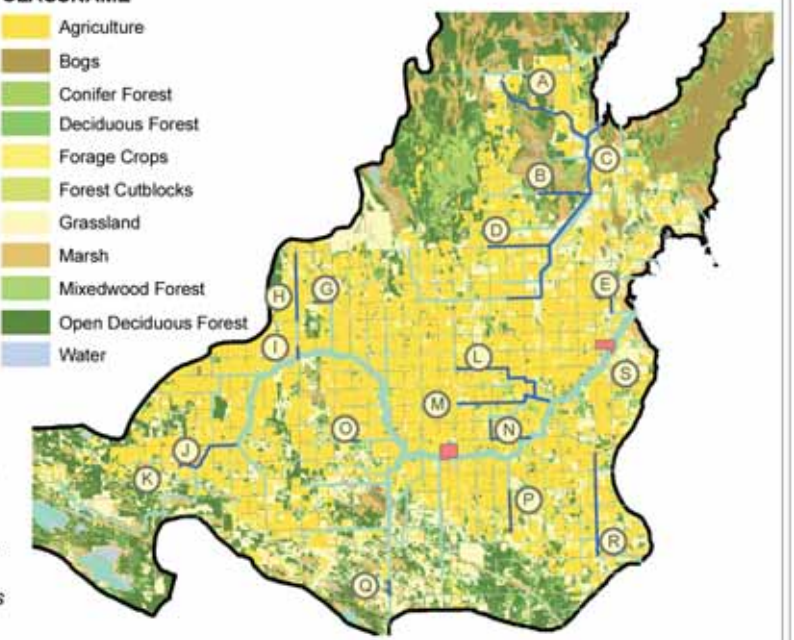
Projects were prioritized based on the type of land use in the area, with residential receiving highest priority, agriculture second, then forestry, grassland, and finally bogs and marshes.

Land Use

Legend

CLASSNAME

- Agriculture
- Bogs
- Conifer Forest
- Deciduous Forest
- Forage Crops
- Forest Cutblocks
- Grassland
- Marsh
- Mixedwood Forest
- Open Deciduous Forest
- Water



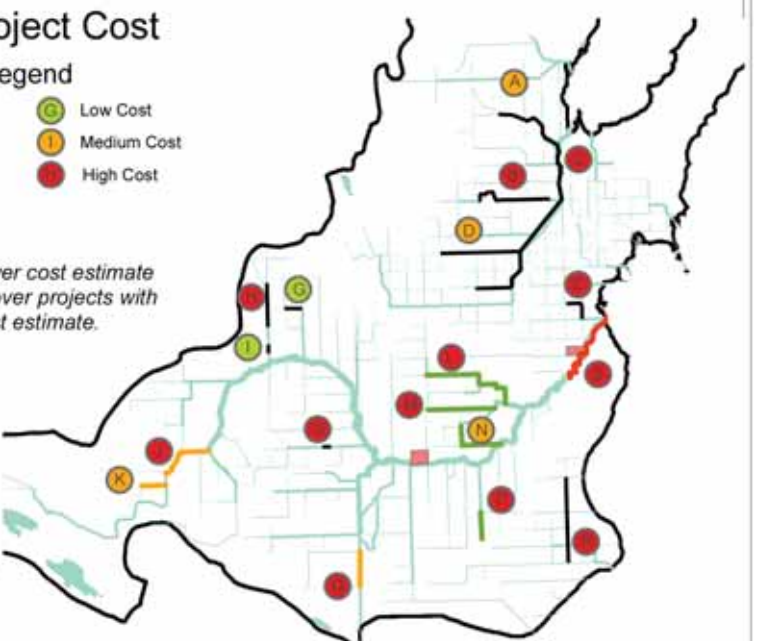
0.4

Project Cost

Legend

- G Low Cost
- I Medium Cost
- High Cost

Projects with lower cost estimate were prioritized over projects with a higher cost estimate.

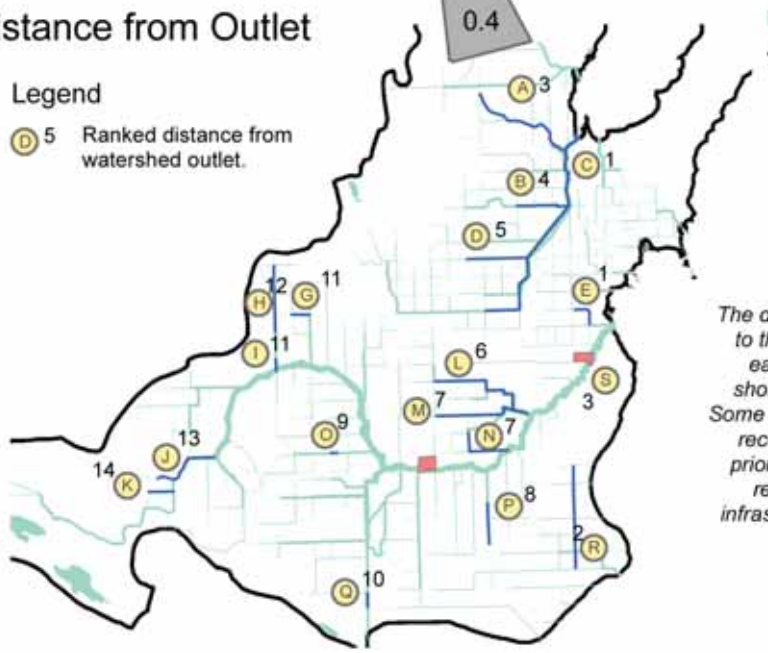


0.4

Distance from Outlet

Legend

D 5 Ranked distance from watershed outlet.



The distance from project (most downstream point), to the outlet of the watershed was measured for each project. The projects were ranked from shortest (1) to longest (14) distance from outlet. Some projects were similar in distance, and therefore received the same ranking. This measurement prioritized downstream projects above upstream, recognizing the need to ensure downstream infrastructure is functional prior to making upstream improvements.

N

2.2 THE SURFACE WATER MANAGEMENT PLAN

The following outlines the components or factors that were considered when prioritizing the 18 proposed drain improvement and flood control projects in the Icelandic River and Washow Bay Creek watershed.

1. A PROJECT RECEIVES HIGHER PRIORITY IF IT IS LOCATED WITHIN AN AREA OF HIGH QUALITY SOIL, SUITABLE FOR AGRICULTURE.

Lands that normally yield the greatest economic return from a high level of drainage are the flat, and depressional lands characterized by fine-textured, fertile, clay soils. These lands have a high potential to grow high value crops but, without drainage, their productivity is limited due to the soil's susceptibility to ponding and water logging. The Canada Land Inventory map indicates the varying potential of a specific area for agricultural production. Land is divided into classes, which are based on characteristics of the soil as determined by soil surveys. Maintaining a functional drainage network in lands containing Class 1-3 lands is a priority for the water planning authority (see Land Capability map provided in Figure 17).

2. A PROJECT RECEIVES LOW PRIORITY IF IT IS LOCATED WITHIN AN AREA CONSIDERED BETTER OR COMPLEX FISH HABITAT FOR SPECIES LIKE PIKE, WALLEYE OR SUCKERS, THAN AN AREA WITH LOWER QUALITY HABITAT.

Fisheries and Oceans Canada has conducted an assessment indicating potential habitat for fish throughout the watershed and have developed DRAFT maps. Any project that coincides with Habitat Type defined as D, E or unclassified, will received priority over projects that coincide with Habitat Type A or B (see Habitat Type map in Figure 17)

3. A PROJECT RECEIVES HIGHER PRIORITY IF IT SERVES MORE SECTIONS OF LAND.

Projects that may benefit more sections of land (and likely more people), were prioritized over projects that only service a small area. The number of sections serviced by each section of land was estimated, mile by mile throughout the watershed (see map illustrating the Number of Land Sections Served in Figure 17).

4. A PROJECT RECEIVES HIGHER PRIORITY IF IT IS LOCATED DOWNSTREAM, OR CLOSER TO THE WATERSHED OUTLET.

Drainage projects must be planned and developed with the watershed concept in mind. There is connectivity between surface water flows at the downstream and upstream portions of a watershed. Failure to adequately develop or maintain down- stream components of the system reduces the effectiveness of the entire system. Prioritizing projects that are closer to the outlet of the watershed will work to ensure the system is capable of handling upstream improvements (see Distance From Outlet map in Figure 17).

5. A PROJECT RECEIVES PRIORITY IF IT COSTS LESS.

In this time of budget shortfalls and a struggling agricultural community, it is important to focus our limited funds. Councillors and provincial engineers were asked to estimate project costs for all 18 projects. These costs were ranked from highest to lowest, and low cost projects were prioritized over high cost projects (see Project Cost map in Figure 17)

6. A PROJECT RECEIVES PRIORITY IF IT PROTECTS RESIDENTIAL OR AGRICULTURAL PROPERTY.

Projects were also prioritized based on the type of land use in the area, with residential receiving the highest priority, then agriculture, forage, forestry, grassland, and finally marshes and bogs (see Land Use map in Figure 17)

Table 1. The six factors considered when prioritizing projects in the watershed.

Name	Factor Name and Weight	Cost Estimate (W=0.4)[1]	Is the project in Class 1-3 lands? (W=0.5)	Habitat Type (W=0.5)	Position within the watershed (W=0.4)	Land Use (W=0.4)	Number of Beneficiaries (W=0.4)	Total Value	RANK
	Score	High=10 Medium=5 Low=1[2]	Yes=1 No=10[3]	A=10 B=8 C=6 D=4 E=1[4]	Ranked closest to furthest point from outlet, out of 14	Residential=1 Agriculture=2 Forestry=6 Grassland=7 Bog/Marsh=10	Ranked lowest to highest, out of a total of 10		
A Angle Drain		5	10	1	3	6	7	13.77	**14**
B Bump Drain		10	10	1	4	10	9	18.53	**16**
C Washow Bay		10	10	1	1	2	2	11.46	**9**
D Shorncliffe Drain		5	1	1	5	2	10	9.59	**2**
E Okno Drain		10	1	1	1	2	10	10.16	**6**
G In Sylvan Drain area		1	1	4	11	2	10	11.63	**11**
H Sylvan Drain		10	1	1	12	2	10	14.09	**15**
I Sylvan Drain Cleanout		1	1	1	11	2	9	9.73	**3**
J Upper Icelandic		1	1	8	13	2	3	11.14	**10**
K Poperfield Drain		5	10	8	14	6	10	22.40	**18**
L N. Crooked Lake Drain		10	1	2	6	2	4	10.04	**4**
M S. Crooked Lake Drain		10	1	2	7	2	6	11.20	**7**
N S.Crooked Lake Area		5	1	2	7	2	6	9.20	**1**
O Framness Drain		10	1	1	9	2	8	12.21	**12**
P Bluegoose Drain		10	1	2	8	2	9	12.76	**13**
Q Rembrant Drain		10	10	8	10	7	5	21.37	**17**
R PTH # 8		10	1	1	2	2	9	10.11	**5**
S In the Riverton Area		10	1	10	3	1	1	11.37	**8**

1 W = weight

2 Low cost <$15,000, medium $15-100,000 and High >$100,000

3 Information obtained from the Canada Land Inventory

4 From Fisheries and Oceans Canada Fish Habitat Classification for Manitoba Agricultural Watersheds DRAFT map

Each of the six factors considered in Table 1 were given a weighting. This weighting was used as a multiplier to provide higher weight to factors that were considered more important when making decisions about drainage or flood improvement projects, such as land capability and fisheries habitat. Table 1 provides the calculations used to score and weight each factor. To add to the above table, watershed partners may also want to include criteria such as:

- Whether downstream waterways have the capacity to handle the increased flow?
- Does the waterway meet the hydraulic design standard for the land use, soil type and topography of the watershed?
- What is the cost/benefit of the project?
- How extensive, frequent and for how long have the flood events been occurring?
- What is the useful life of the crossing structures (bridges and culverts) on the waterway?
- Are there environmental benefits to the upgrade (is the project fixing a slumping bank, removing a fish barrier, reducing sediment loading in some fashion)?

A watershed-based approach takes into account the fact that there is connectivity between upstream and downstream portions of the watershed and changes to one part of the watershed affects the entire watershed. Wetlands and retention areas provide a useful flow attenuation function, reducing stream flashiness (reducing peak flows during rain events) and sedimentation of drains. By reducing flow volumes to drains and maintaining water on the land in suitable areas, further drain construction projects may be avoided and maintenance needs could be reduced.

Portions of the drainage network in the Icelandic River and Washow Bay Creek watershed have been constructed in areas that contain marginal or poor quality soils, only marginally suitable for agriculture. Drainage and land use planning authorities should recognize that there is often an environmental cost to improved drainage, and encourage non-drainage methods of flood reduction in lands prior to undertaking engineered solutions, such as digging deeper drains, or installing larger culverts.

Did You Know?

Climate change caused by excess greenhouse gas emissions is predicted to raise temperatures and alter precipitation patterns in Manitoba. Most experts agree that in Manitoba, average temperatures could increase by four to six degrees Celsius over the next 50 to 100 years. Manitobans are particularly vulnerable to climate change because of the important role that renewable resources, like agriculture, play in our economy. Climate change may have negative consequences that impact the ecological balance and overall health of this watershed. More frequent droughts, more intense rainstorms, and unpredictable water levels in rivers and lakes are predicted. It is also expected that grasslands areas will move further north and replace areas of boreal forest. These impacts are expected to result in increased uncertainty in agro-Manitoba, as major weather fluctuations make planning decisions for businesses, farmers and local governments more difficult. Water conservation and retention will become increasing important in coming years, to combat the negative impacts of climate change during periods of drought.

TAKING ACTION

2.2a When reviewing options for managing flood-related crop damages, investigate retention and water holdback strategies prior to undertaking projects which move water into the agricultural drainage network. Consider water conservation options to build climate change resilience and increase climate change awareness in the watershed.

2.2b Use the proposed surface water management planning process to prioritize current and future projects in the Icelandic River and Washow Bay watershed.

2.2c Ensure protection of the aquatic ecosystem by providing adequate habitat, fish passage and sufficient stream flows. In this watershed 108 sites require rehabilitation[8]. When conducting a drain improvement project that coincide with an identified rehabilitation site, proponents of the drainage project should work with the East Interlake Conservation District to remediate the site. The location of all 108 sites are illustrated in Figure 18.

2.2d Adopt environmentally sensitive drain maintenance/ construction strategies when available.

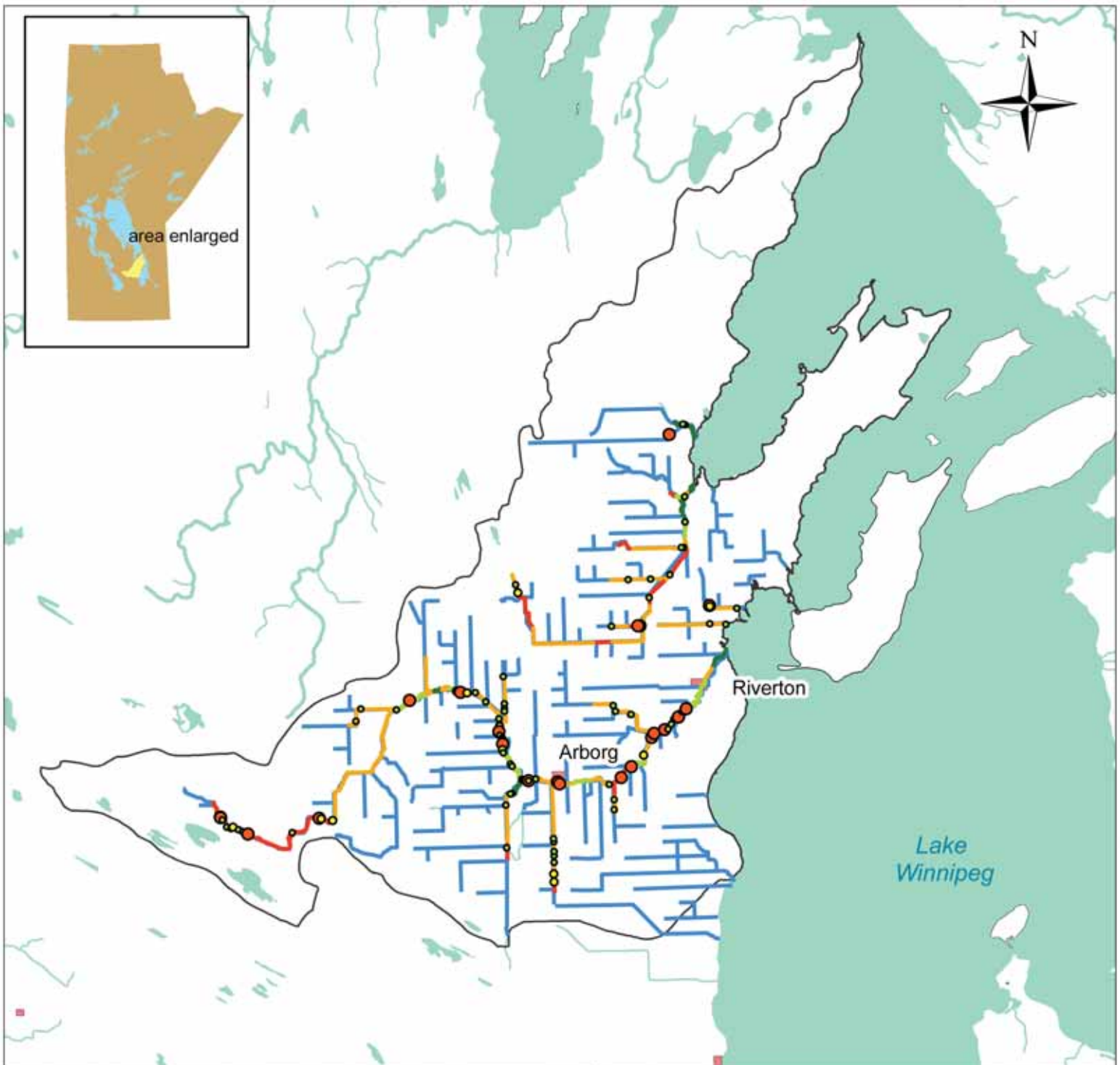


Figure 19. A habitat assessment conducted in 2006-07 revealed 108 potential rehabilitation sites, illustrated above. Stream reaches were designated as severely, highly, moderately or minimally impacted.

Legend

- Unassessed Drain or Stream
- Assessment of Aquatic Impact
  - Severely Impacted
  - Highly Impacted
  - Moderately Impacted
  - Minimally Impacted
- lake
- wateshed boundary
- Rehabilitation Sites
  - Priority
    - 1
    - 2
    - 3

1:600,000

Kilometers

0 2.5 5 10 15 20

North American Datum 1983

Universal Transverse Mercator Zone 14U

Completed September 17, 2008 by S. Coughlin, Manitoba Water Stewardship

CHALLENGE #2 PROTECT THE AGRICULTURAL COMMUNITY BY REDUCING THE IMPACT OF FLOOD EVENTS THAT OCCUR DURING THE SUMMER GROWING SEASON.

Success Means: The capability and limits of the agricultural drainage system are recognized.

Who Has Expertise?	Recommended Action	Recommended Action
Individuals	• Recognize the limits of the drainage system, and that it was constructed to remove water from fields during the summer growing season. The system was not designed to manage spring flood conditions	• Decrease in drainage and flooding related complaints to local municipalities
EICD	• Increase the understanding of the limits and the purpose of the existing agricultural drainage network through an awareness and educational program	• Decrease in drainage and flooding related complaints to local municipalities
Province and Rural Municipalities	• Ensure the budget allocated to the drains under provincial jurisdiction is commensurate with other regions of the province with similar levels of service and land use • Encourage all watershed partners to create an open and accessible maintenance schedule for watershed residents • Investigate opportunities to partner with the federal government to fund infrastructure improvement projects • Ensure that the standard of drainage provided by the province or municipality is compatible with current land uses and cropping practices	• Drains are built to be reflective of surrounding land uses, topography, and soil capability • Maintenance schedule is made available by 2010 • Partnership possibilities are discussed with federal representatives
Federal	• Partner with water managers in the watershed to fund infrastructure improvement projects.	• Federal funding has been provided

Success Means: The existing drainage network is improved using surface water management based approach to prioritizing works.

Who Has Expertise?	Recommended Action	Recommended Action
EICD	• Build awareness of the importance of including water conservation measures into a surface water management plan and consider modeled climate change precipitation fluctuations for the long term • Use the proposed surface water management planning process to prioritize current and future projects in the Icelandic River and Washow Bay Creek watershed	• Projects are prioritized using the proposed surface water management plan • Actively working with watershed partners to facilitate the completion of fisheries mitigation projects
Rural Municipalities	• Use the proposed surface water management planning process to prioritize current and future projects in the Icelandic River and Washow Bay Creek watershed • When conducting a drain improvement project that coincides with an identified rehabilitation site, work with the EICD to remediate the site (see Figure 18) • Increase communications to public about future projects and drain maintenance plans	• Projects are prioritized using the proposed surface water management plan • Fisheries mitigation projects are completed when drainage projects coincide with their location • Increased understanding of project schedules and priorities
Province	• Use the proposed surface water management planning process to prioritize current and future projects in the watershed. Increase communications about multi-year plans to the public • When conducting a drain improvement project that coincides with an identified rehabilitation site, work with the EICD to remediate the site (see Figure 18) • Adopt environmentally friendly drainage strategies	• Projects are prioritized using the proposed surface water management plan • Fisheries mitigation projects are completed when drainage projects coincide with their location • Increased understanding of project schedules and priorities

CHALLENGE 3

"Before our municipal drainage system became so efficient, there was nutrients running into this lake. The more natural wetlands provided filters for the runoff and slowed the runoff. Maybe we need to think about a retake of some of these wetlands."

"RETAIN VIABLE COMMERCIAL AND SPORT FISHERY"

"some spring runoff water should be held back to ease flooding and would supply water for groundwater"

"SHORELINE EROSION, IMPACT ON LAKE AND LOCAL ENVIRONMENT"

Protect and restore the quality and integrity of wetlands and natural waterways to maintain a healthy aquatic ecosystem.

"the dikes that do not allow water exchange in marshes which inhibits birds and muskrats"

"TAX INCENTIVE FOR TREES AROUND FARM LAND LIKE NORTH DAKOTA"

"STOP DRAINING TOO MUCH WETLAND"

"use of water retention areas, especially on non-agricultural land and lower potential land (with compensation to property owners)"

"Agriculture and conservation need to communicate with each other more effectively so that common sense regulations that farmers can implement to protect our environment and ensure continued profitability."

"PRESERVE OUR BEES AND FOREST"

"RESTRICT COTTAGE DEVELOPMENT"

10 CHALLENGES 3

Protect and restore the quality and integrity of wetlands and natural waterways to maintain a healthy aquatic ecosystem.

BACKGROUND

The quality and integrity of water in this watershed, as in all watersheds, is dependant on complex inter-relationships that occur between the natural physical, chemical and biological characteristics of the watershed, and changes that have been made through human activities. Much of the farmland in the Icelandic River and Washow Bay Creek watershed was once marshland, or land that was frequently flooded. This land was drained by natural rivers and streams. Over the years, many of these natural streams, including large portions of the Icelandic River, have been altered for drainage through a network of ditches, dikes and diversion channels that have created some of the best and most productive farmland in Manitoba. Much of the economic prosperity in this region is due to the resultant agricultural industry. However, the cumulative effect of these human-induced changes has resulted in changes to stream and lake conditions in this watershed.

"Our water quality, both surface and ground, are extremely important. Agriculture, municipalities and industry must treat this resource with great respect."

comment received during April 2007 public consultation

The mouth of Washow Bay Creek and associated wetland areas. *Figure 20.*

Did You Know?

When wetlands, riparian areas and natural stream meanders are removed from a watershed, the watershed responds. Changes may include: an increase in stream flashiness (higher peak flows during rain events) causing more frequent and more severe flood events, increase in sedimentation of streams, degraded fisheries habitat through a loss of stream sinuosity (natural meanders) and riparian vegetation removal, increase barriers to fish passage, loss of wetland areas, and changes to the landlake interface. The watershed philosophy holds that these observed changes have not arisen independently from one another, but are linked and with time these changes will extend to economic and social impacts. For example, downstream landowners have experienced economic impacts associated with increased flood flashiness through crop damage, and municipal residents experience higher tax rates due to increased cost of maintaining municipal ditches.

CHALLENGE 3

10

3.1 THE PROTECTION OR REHABILITATION OF WETLAND, WATER RETENTION AREAS

To deal effectively with a loss of surface water integrity in a watershed, a watershed-based approach is required. To protect and restore the quality and integrity of wetlands, natural waterways and Lake Winnipeg, and to maintain a healthy aquatic ecosystem, action is recommended in two areas: the protection or rehabilitation of wetland or water holding areas, and riparian area management.

TAKING ACTION

3.1a Conduct a wetland inventory for the purposes of providing baseline information suitable for:

- Better understanding the location of sensitive ground water recharge areas in the watershed to focus protection measures;
- Working with partner agencies to construct/ preserve water retention areas; and,
- Administering a wetland incentive program (described below).

3.1b Protect existing and historic wetlands from future drainage or development. It is recommended that private rural landowners who provide ecological goods and services to society through the protection of wetland areas or good stewardship practices on their land should be compensated. To accomplish this, the Conservation District, rural municipalities and the Province of Manitoba would need to work out an agreement to provide direct or indirect incentives to farmers to set-aside portions of their land that would otherwise be in production. Market incentives can be provided through a variety of means, such as stewardship incentives, market-based instruments, tax rebates, conservation easements or the purchase of land.

Did You Know?

Apart from their valuable role as habitat for hundreds of species of wildlife, wetlands also:

- Help to purify surface water by breaking down, removing, using or trapping nutrients, pollutants, organic waste and sediment that is carried to them by runoff water
- Reduce the severity of floods by retaining water and releasing it slowly during drier periods
- Protect shorelines from erosion by slowing the flow of water and lowering the crest of streams or ditches during spring and storm runoff peaks
- Recharge groundwater supplies by soaking up surface water and letting some of it seep back into the ground where it's filtered even further

10 CHALLENGE 3

3.2 RIPARIAN AREA AND STREAM MANAGEMENT

Riparian areas are moist areas of water-loving vegetation that border a stream, river, lake or wetland. Riparian areas are highly valuable ecosystems because their position in the landscape connects aquatic areas with terrestrial areas and allows them to act as natural filters of both surface water and groundwater and buffer against flooding and erosion. Natural riparian areas have been altered through the construction and maintenance of ditches and by cottage development, which can have serious consequences for the long term quality and availability of freshwater. Maintaining a well vegetated buffer area alongside waterways will minimize the impacts from cultivated fields, wintering sites and other intensively used areas, and mitigate flooding impacts.

The shoreline along Lake Winnipeg is also considered a riparian area. Vegetation cover on a slope is the primary defense against soil erosion and is very important to long term erosion protection. Vegetation protects by holding or binding the soil with the root system of plants, by removing water from the soil by uptake and transpiration, by reducing runoff velocity, by reducing frost penetration and by the buttressing or reinforcing action of large tree roots.

In the Icelandic River and Washow Bay Creek watershed the shoreline along Lake Winnipeg is generally intact, with the exception of a 10 mile stretch along the southeastern extent of the watershed.

Ensuring a healthy riparian area is just one component of aquatic ecosystem health. Other components of a functioning watershed include protecting natural stream meanders, access to floodplains and maintaining intact upland recharge zones.

Stream channels develop naturally stable meandering patterns that fit the slope, width, bed and bank materials local to the area. When this natural sinuosity is altered, the river will always try to recreate a stable system. This increases the erosive energy of the flowing water, and often results in increased bank erosion.

When stream flow exceeds its banks, water moves out of the channel onto a floodplain area. When floodplains are protected by dikes or roadways, the energy that would have been dissipated on the floodplain is kept within the channel, further increasing the energy of the flowing water. This leads to bank blowouts, and an accumulation of impacts to downstream landowners.

Landscape alterations such as: a loss of riparian areas, natural meanders, and access to flood plains may have implications in this watershed where many channels have been straightened, floodplains protected and riparian areas removed. Much of the upland recharge zones are still intact, providing valuable water holding capacity for vulnerable downstream landowners.

TAKING ACTION

3.2a Improve awareness of the benefits of riparian areas and other components of a healthy aquatic ecosystem. Consider expanding existing EICD riparian programming to include portable shelters, to reduce manure build up along riparian areas.

3.2b Initiate a targeted riparian area improvement program with a focus on the prioritized rehabilitation sites identified in a recent habitat assessment (Figure 18).

3.2c Raise awareness of the value of existing intact shoreline vegetation along Lake Winnipeg. Encourage healthy riparian management practices and shoreline sensitive developments.

3.2d Educate stakeholders and adopt environmentally sensitive drain maintenance/construction strategies when available.

CHALLENGE #3 PROTECT AND RESTORE THE QUALITY AND INTEGRITY OF WETLANDS AND NATURAL WATERWAYS TO MAINTAIN A HEALTHY AQUATIC ECOSYSTEM.

Success Means: There is a net gain of wetlands and retention areas in the watershed and people are more aware of the role wetlands play in watershed health.

Who Has Expertise?	Recommended Action	Recommended Action
Individuals	• Become familiar with available incentive programs to protect or create wetlands on your property • Take part in programming to keep livestock out of wetlands	• A net increase in wetlands has been measured
EICD	• Conduct a wetland inventory aimed at: a) better understanding groundwater recharge areas b) constructing/preserving water retention areas c) administering a wetland incentive program	• A net increase in wetlands has been measured • A wetland inventory is completed for the watershed by 2012 • More landowners are compensated for maintaining or creating wetland areas on lands appropriate for holding water
Province	• Protect existing wetlands from future drainage or development. Provide incentives to private rural landowners who provide ecological goods and services to society through the protection of wetland areas or good stewardship practices on their land	• A wetland incentive program is successfully offered to landowners in the watershed

Success Means: There is a net gain of riparian area vegetation quantity and quality and people are more aware of the role riparian areas play in watershed health.

Who Has Expertise?	Recommended Action	Recommended Action
Individuals	• Become familiar with available incentive programs to protect or create riparian areas on your property • Take part in programming to keep livestock out of riparian areas	• A net increase in riparian areas has been measured
EICD	• Improve awareness of the benefits of riparian area management and existing EICD riparian area programs. Expand riparian programming to include portable shelters, to reduce manure build up along riparian areas • Raise awareness of the value of existing intact shoreline vegetation along Lake Winnipeg in the watershed. Encourage healthy shoreline riparian management practices and shore line sensitive developments	• General awareness is improved on the importance of riparian areas • New programming is introduced to include portable livestock shelters by 2010 • General awareness is improved on the importance of shoreline vegetation and lake-sensitive practices • There is a net gain of vegetated riparian areas in the watershed.
Province	• Improve and/or maintain shoreline health along Lake Winnipeg. Enforce set-backs for new developments and inspect septic systems along waterways	• All septic systems within 1.5 miles of major waterways (order 3 or higher) and Lake Winnipeg has been inspected by 2014
Federal	• Offer grants to aid landowners in improving shoreline health along Lake Winnipeg	• Funding has been provided to aid in improving the Lake Winnipeg shoreline

CHALLENGE #3 PROTECT AND RESTORE THE QUALITY AND INTEGRITY OF WETLANDS AND NATURAL WATERWAYS TO MAINTAIN A HEALTHY AQUATIC ECOSYSTEM.

Success Means: There is a net gain of productive fish habitat in the watershed, and people are more aware of the landscape components that make a healthy aquatic ecosystem.

Who Has Expertise?	Recommended Action	Recommended Action
Individuals	• Understand landscape features that make up a healthy aquatic ecosystem, and the importance of maintaining natural stream meanders and floodplains	• A net increase in wetlands has been measured
EICD	• Conduct improvements to migratory fish corridors including: reduce blockages to fish passage, fish spawning areas, fish rearing areas, cover for fish and fish feeding areas (see Figure 18 for project locations). A prioritized list is provided in report commissioned by the East Interlake Conservation District in 2006-07 entitled "Habitat Assessment of the Icelandic River and Washow Bay Creek watershed." (see EICD website for report) • Educate stakeholders and residents about the importance of maintaining natural stream meanders and floodplains.	• A net increase in habitat area can be used as a surrogate to measure a net gain in productive fish habitat. • More landowners are compensated for all natural waterway improvements and are more aware of the importance of maintaining natural meanders and floodplains • All first priority rehabilitation sites are remediated by 2012 • A habitat assessment or audit is completed in 2016 to assess improvements to aquatic ecosystem health.
Fisheries and Oceans Canada	• Provide guidance to the EICD when conducting improvement projects and measuring habitat improvements	• Increased communications and partnerships.

CHALLENGE 4

"do trials and research showing importance of plant life around waterways and drains i.e. erosion and nutrient movement"

"BENCHMARK CURRENT WATER QUALITY"

"RESEARCH AND INVENTORY OF WATER RESOURCES. MANAGE WATER FLOW AND RETAIN WATER FOR LATER USE."

"Monitor and identify polluters - everyone has a sense of responsibility. "Accountability" by everyone"

"FUNDING FOR RESEARCH ON THE WATERSHED BOTH PAST AND PRESENT."

"Evidence based regulations with accountability (information and education re: use and impact)"

"Public education (information booklets, CD) school presentations etc."

Build watershed health awareness throughout the community, government and other stakeholder groups.

11 CHALLENGE 4

Build watershed health awareness throughout the community, government and other stakeholder groups.

"Funding for research on the watershed both past and present."

Comment received during April 2007 public consultation

BACKGROUND

A variety of comments received through the public consultation process centered on research needs, a desire for specific water-related information and improvement in general watershed health awareness. The comments were focused in three areas:

1. Improve the baseline understanding the physical and biological characteristics of this watershed
2. Improve communication of lake, river and groundwater quality information to the general public
3. Improve general watershed health awareness with watershed stakeholders, agencies and individuals within the watershed

Understanding the general characteristics, overall health and areas which are currently at risk or degraded, will help local people and authorities to make more informed land and water management decisions. When compiling information for the watershed management plan, a literature search revealed a few short term studies, but overall little technical information is available for this watershed. Many people listed concerns about the quality of municipal and livestock lagoon effluent. Lagoon effluent information is currently difficult to obtain and generally, not easily interpreted. Surface water quality has just recently been monitored on a continual basis with the installation of a long term water quality monitoring station located on the Icelandic River in 2006. Groundwater levels have been monitored more extensively. Water levels have been monitored on a continual basis from nine monitoring stations since the 1960's (with a few exceptions)[5]. However, groundwater quality monitoring, exclusive of municipal systems reliant on groundwater, is undertaken in only a single monitoring well in the watershed. This well was installed in 2000 and is sampled once a year, with analysis typically limited to coliform bacteria/E. coli, nitrate and fluid conductivity.

The East Interlake Conservation District initiated a broad well water inventory in 2006 and 2007 (described in Challenge #1). However, this program was also limited to bacteria, conductivity and nitrate analysis and does not compare to the valuable information received from established, long term monitoring wells. The East Interlake Conservation District has also initiated short term studies with water quality, benthic invertebrates and habitat quality. This information has not been well communicated to watershed residents or other watershed stakeholders. Additionally, information from other watershed stakeholder groups, such as: Ducks Unlimited Canada, the Lake Winnipeg Research Consortium and both the provincial and federal governments, exists in separate databases or files and is not centrally located or compiled to establish a comprehensive understanding of watershed health.

A knowledgeable watershed community is simply better for ecological, social and economic health over the long term. Watershed residents and businesses need to understand the costs and benefits of their actions in the watershed, and celebrate their successes. Although there are many grassroots initiatives currently underway throughout the Icelandic River and Washow Bay Creek watershed (the EICD, cottage associations, and fish and wildlife groups), there is a need to coordinate these efforts and to build watershed health awareness with all watershed stakeholders. Watershed health information should be compiled and communicated to watershed residents in a non-technical language in an accessible format and on a regular basis.

TAKING ACTION

4a Recommend continued long term surface water quality monitoring and additional groundwater monitoring stations to be located in the Icelandic River and Washow Bay Creek watershed to better understand baseline conditions and watershed health.

4b Understand more about peat mining in the northeast part of the watershed. Tour facilities and include mining in future planning publications.

4c Develop an annual report card which evaluates watershed health (i.e., water quality, quantity, riparian health, etc.) and communicates this information to the public in an easy to understand and accessible manner.

4d Improve the East Interlake Conservation District web site to include a data warehouse of watershed information which tracks projects, provides water quality information and other watershed characteristics of the watershed.

4e Initiate a public education outreach program about the activities that help or harm watershed health in the watershed and to raise awareness of the conservation district. Include schools, businesses, homeowners and other watershed stakeholders. The purpose of the outreach program would be to inspire community members to protect and enhance their watershed and to increase uptake in conservation district programming.

4f Celebrate successes in the watershed! For example, when water quality reaches a predefined goal (i.e. a water quality index score of 90 out of a 100), host a water-themed party in the area. When a riparian project is completed in partnership with a landowner, provide a certificate of watershed improvement acknowledgement or a plaque in the name of the watershed resident. Celebrating small and big successes will encourage further participation, generate excitement and enthusiasm about watershed protection and is important for recognition of a job well done.

CHALLENGE #4 BUILD WATERSHED HEALTH AWARENESS THROUGHOUT THE COMMUNITY, GOVERNMENT AND OTHER STAKEHOLDER GROUPS.

Success Means: Watershed residents, stakeholders and government agents are more aware of the baseline health of the Icelandic River and Washow Bay Creek watershed and there are more watershed successes shared within the community.

Who Has Expertise?	Recommended Action	Recommended Action
Individuals	• Take part in conservation district programming and become aware of activities that help or harm your watershed. Make comments and programming suggestions to the EICD Board to improve awareness of ongoing issues and concerns	• Greater awareness of watershed health and EICD programming and a greater Board awareness of watershed issues
EICD	• Understand more about mining activities within the watershed • Develop an annual report card which evaluates watershed health and communicates this information to the public in an easy to understand and accessible manner • Improve the EICD web site to include a data warehouse of watershed information which tracks projects, provides water quality information and other watershed characteristics of the watershed. Post all watershed report cards at this site • Initiate a public education outreach program about the activities that help or harm watershed health in the watershed and to raise awareness of the conservation district • Celebrate successes in the watershed! Celebrating small and big successes will encourage further participation, generate excitement and enthusiasm about watershed protection and is important for recognition of a job well done	• A tour and meeting have been held to review peat mining activities by 2010 • A report card is published annually, and communicated to all watershed residents • Web page improvements are made and relevant water data is added to the website on a regular basis • A new program is launched to inform watershed residents of available programming, watershed health principles and there is an increase in uptake of conservation district programming • Celebrations are held in the watershed and watershed residents are proud of their accomplishments
Province	• Continue monitoring long term surface water quality stations and locate additional groundwater monitoring stations within the watershed. Share results of analysis with EICD with the intent to better understand baseline conditions and watershed health	• Water quality data is shared with EICD, and used in annual watershed report card communications • A suite of relevant and measurable indicators are provided to the EICD to aid in reporting on watershed health by 2010

IMPLEMENTING ACTIONS 12

The EICD is the water planning authority for the Icelandic River and Washow Bay Creek Watershed. As the water planning authority, the EICD is responsible for carrying out actions in the plan that fall within their mandate, and for reporting on plan progress. The EICD is not the only organization responsible for carrying out the actions provided in this plan. Plan implementation also falls to all watershed residents and stakeholders, as well as the organizations assigned actions in this plan, including:

- the RM of Bifrost;
- the RM of Armstrong;
- the RM of Fisher;
- the Town of Arborg;
- the Village of Riverton;
- the Provincial government;
- the Federal government;
- well drillers;
- the East Interlake Planning District;
- potential developers; and
- watershed residents.

Plan actions proposed for the EICD may be funded through Manitoba Water Stewardships' Conservation Districts Program. The EICD currently receives an annual grant of $285,000 (2008-09) in order to assist with the delivery of land and water management programs and to implement the actions identified in the plan. In addition, the EICD receives financial support of over $100,000 from its municipal partners, and because of its non-profit charitable status, is able to acquire additional money from other available funding programs.

Funding for actions proposed for organizations, other than the EICD, such as RMs, towns, villages and government organizations which have a stake in the watershed, will need to come from their current budgets. It is expected all watershed partners will support the EICD in annual reporting and plan updates.

DEVELOPMENT PLAN LINKAGES 13

Some of the actions in this plan recommend changes to the development plan in the region. Further steps are required to:

- Adopt the proposed 'source water protection areas' as defined in Figure 11 into the local develop plan; and,
- Establish a sewage management committee with the mandate to develop a long term sewage management plan for the Town of Arborg, the Village of Riverton and the surrounding watershed.

In addition to these specific actions, developers and the people in charge of approving developments in this watershed, should consider the critical linkage between overburden depth and aquifer susceptibility which is illustrated in this plan to ensure future developments are located in a manner respective of watershed and community health.

EVALUATION AND REPORTING 14

This plan is a living document and will be updated as plan milestones are reached, or if actions require adjusting as recommended by annual evaluations. Reporting milestones will be drawn from the 'Success Means' comments established for all challenges and report on program effectiveness, watershed health and planning support. Reports will be made available on the EICD website for all residents, the watershed planning advisory team and as a supplement to the EICD annual budget presentation package.

In addition to annual updates, this integrated watershed management plan should undergo a full review in 2016.

15 REFERENCES

1. "Icelandic River and Washow Bay Creek Watershed Issues" provides a detailed summary of the public consultation and issue selection process as well as a summary of all technical team issue statements. This report is available online at www.eicd.ca or a hard copy is available at the EICD office.

2. East Interlake Conservation District. 2007. Well water inventory of the Icelandic River and Washow Bay Creek watershed.

3. Jones, G. and N. Armstrong. 2001. Long term trends in total nitrogen and total phosphorus concentrations in Manitoba streams. Manitoba Conservation Report No. 2001-07. Winnipeg, MB, Canada.

4. Lake Winnipeg Stewardship Board report December 2006 "Reducing Nutrient Loading to Lake Winnipeg and its Watersheds – Our Collective Responsibility and Commitment to Action."

5. Golder Associates Ltd. June 2007. Manitoba Source Water Assessment Recommended Method For Pubic Water Supply Systems." File No. 07-1345-0012. Completed for Manitoba Water Stewardship.

6. Technical report submitted by the Office of Drinking Water, Manitoba Water Stewardship for the Icelandic River and Washow Bay Creek watershed management plan. 2006.

7. Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment. May 2008. "Guidelines for Canadian Drinking Water Quality Summary Table."

8. Technical report submitted by the Groundwater Management Section of Manitoba Water Stewardship for the Icelandic River and Washow Bay Creek watershed management plan. 2006

9. North/South Consultants. 2006-07 Habitat Assessment of the Icelandic River and Washow Bay watershed.