

NOSE CREEK WATERSHED PARTNERSHIP

BACKGROUND

Formed in 1998 to protect riparian areas and improve water quality in the Nose Creek watershed

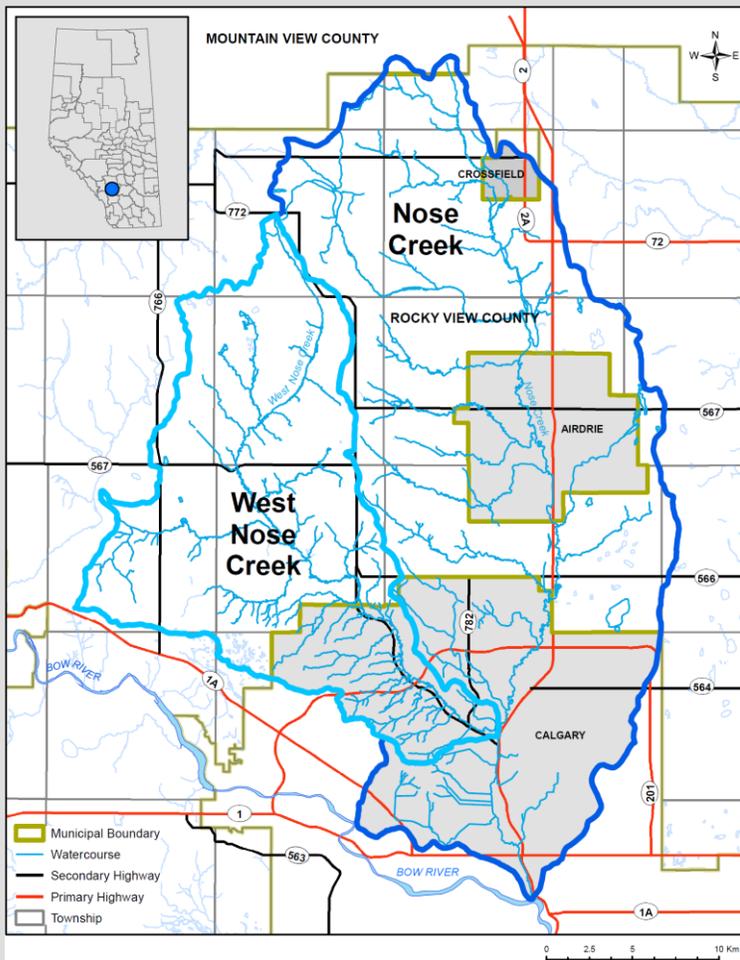
CURRENT PARTNERSHIP

- Calgary Airport Authority
- City of Airdrie
- Rocky View County
- The City of Calgary

Technical Team support provided by:

- Municipal Partners
- AEP
- Bow River Basin Council

Map of the Nose Creek watershed



SUMMARY OF PAST ACTIVITY

Historic Timeline	Activity
1997-2001	Surface water monitoring
2000	Riparian Health assessments
2002	West Nose Creek Stream Corridor Assessment (WER)
2004-2005	Instream Flow Needs Study
2005-2007	Nose Creek Watershed Water Management Plan
2008	Nose Creek Plan finalized and implementation <ul style="list-style-type: none"> • Stewardship projects • Education and outreach
2009-2013	Surface water monitoring program
2013	Internal Drainage Areas Study
2014-2016	Stormwater monitoring Microbial source tracking
2015	Internal Drainage Area Policy
2016+	Update Nose Creek Watershed Water Management Plan



IMPLEMENTATION HIGHLIGHTS (2008-2017)

Water Quantity and Stormwater Management

- Implementation of staged runoff volume control targets (2007 to 2013)
- Retrofits to existing infrastructure to include oiland grit separation, and/or stormwater retention ponds
- Increasing absorptive capacity in new developments
- Low impact development pilot projects



Water Quality

- Salt management planning and better salt storage facilities (indoors)
- Improved siting and infrastructure for snow storage locations - away from creeks
- Application of on-farm beneficial management practices in rural areas
- Examples of improved development planning and practices



Riparian Areas and Stream Channel Stability

- Advanced riparian policy development in all jurisdictions
- Riparian development setbacks applied



2007



2014

- Improved landscaping and mowing practices adjacent to watercourses



2008



2014



2006



2009



2015

- Use of bioengineering techniques to stabilize eroding streambanks



CURRENT WATERSHED CONDITION

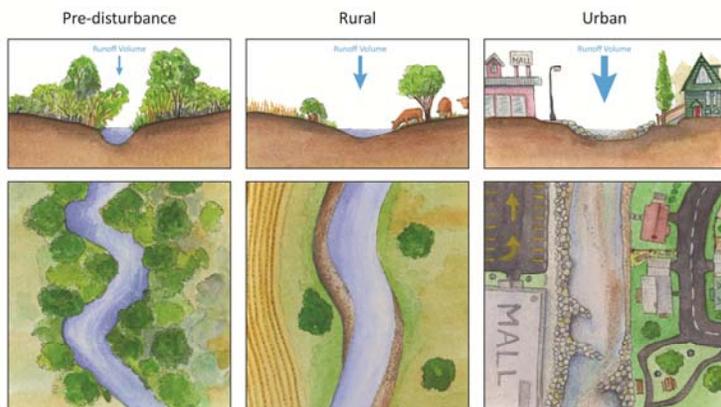
Water Quantity

Watershed hydrology has been altered by changing land use.

Urban growth and country residential developments, and other industrial and agricultural land uses have:

- Increased impervious surface area
- Compacted subsoils
- Drained or filled-in depressions or wetlands
- Eliminated natural vegetation
- Channelized (straightened) reaches of the creeks

Landscape evolution and associated impacts on watercourses



Urbanization results in higher rates and volumes of stormwater compared to pre-development conditions.

Higher streamflow and peak flow:

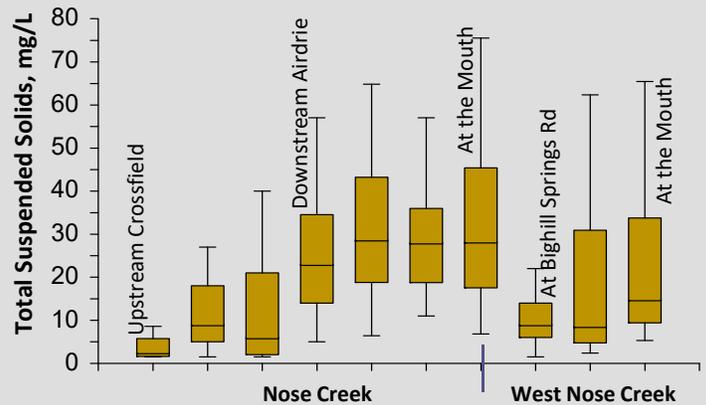
- Increases streambank erosion
- Alters channel morphology
- Increases sediment transport
- Degrades water quality
- Degrades aquatic habitat



Water Quality

Surface Water

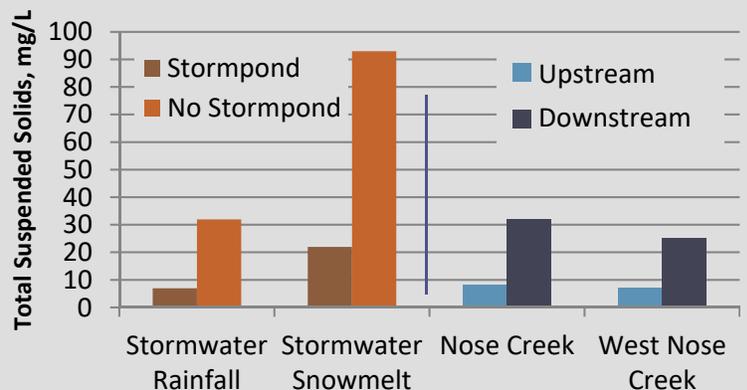
- Nutrients (namely phosphorus), salt and total suspended solid concentrations, and fecal coliform bacteria counts generally exceed desired guidelines and objectives
- Total suspended solids concentration increases from upstream to downstream (see figure)



Stormwater

- Contributes to poor quality water in Nose Creek and West Nose Creek
- Compared to surface water, stormwater contains higher concentrations of total phosphorus, salt, total suspended solids and fecal coliform bacteria
- Use of BMPs and low impact development practices can mitigate impacts of stormwater

Comparison of Median Total Suspended Solids Concentration in Stormwater and Surface Water



Riparian Areas

See panel titled 'Riparian Protection'

PLANNING PROCESS



PROCESS TIMELINE

2016

- Terms of Reference for Plan update
- First stakeholder engagement session held; focused on issues
- Data collection, synthesis & analysis
- Second stakeholder engagement session held; focused on direction and early draft recommendations

2017

- Continue to synthesize input
- Engaged with municipal staff
- Draft updated Nose Creek Plan available for NCWP and Technical Team review

2018

- Implementation and priority discussions
- Draft updated Nose Creek Plan available to stakeholders
- Third stakeholder engagement session held; focused on final draft updated Nose Creek Plan
- *To do: Finalize Nose Creek Plan*
- *To do: Renew municipal support for the Plan*

SCOPE OF ISSUES

Riparian function (health) and water quality have been compromised in the Nose Creek watershed due to:

- Elevated flows from addition of stormwater resulting in streambank erosion and changes to stream channel morphology;
- Encroachment by development and agricultural activity (i.e., infilling, channelization, grazing); and
- Alteration and/or elimination of the native plant community and natural features that protect water quality.

Main themes addressed in the updated Nose Creek Plan:

- Water quantity and stormwater management
- Surface water quality
- Riparian protection
- Groundwater Protection
- Biodiversity



PLANNING AND POLICY FRAMEWORK

Alberta's *Water for Life Strategy* established the framework for regional and local watershed partnerships.

The process for watershed management planning is outlined in the *Guide to Watershed Management Planning in Alberta*.

The updated Nose Creek Plan aligns with existing legislation and policies, and guidelines, including:

- *Alberta Land Stewardship Act*
- *Municipal Government Act*
- South Saskatchewan Regional Plan
- Intermunicipal Plans
- Municipal Development Plans
- Local Area Plans
- Land Use Bylaw

STAKEHOLDER ENGAGEMENT

PURPOSE

To create and maintain a constructive dialogue with watershed stakeholders, and thereby ensure the long-term viability of the Nose Creek Plan.

Recommendations in the updated Nose Creek Plan reflect stakeholder input collected during engagement, and in follow-up meetings or correspondence with stakeholder groups.

The NCWP engaged with

- Municipal governments
- Provincial government
- Industry (development, agriculture)
- Non-government organizations

Engagement Session I (May/June 2016)

- Discussed goals, implementation challenges and solutions

Engagement Session II (Nov/Dec 2016)

- Obtained input into issues, direction and preliminary recommendations



KEY CHALLENGES

Water Quantity and Stormwater Management

- Industry stakeholders expressed concern with the existing 2013 runoff volume control targets, and the ability to practically achieve the 2017 targets. Implementation challenges:
 - The lack of provincial policy and guidelines
 - Limited tools available to achieve targets
 - Stormwater management in redevelopment areas

Riparian Protection

- Relaxation of setbacks
- Process for wetland compensation and restoration (e.g., multiple levels of review, length of time to make decisions)
- Wetland retention
- Recognizing the value of ephemeral and intermittent watercourses to overall watershed hydrology and water quality

Monitoring and Evaluation Tools

- Lack of consistent monitoring to support and measure Plan implementation
- Lack of monitoring data to validate assumptions and the effectiveness of best management practices being implemented

COLLABORATION

- A need expressed to increase communication and networks among municipal staff within jurisdictions and between jurisdictions, and between the NCWP and stakeholders.

ENGAGEMENT SESSION I – WHAT WE HEARD

Stakeholders generally supported the NCWP goal. More discussion on how to achieve the goal was needed.



NOSE CREEK WATERSHED WATER MANAGEMENT PLAN – UPDATED 2018

GOAL

Protect riparian areas and manage streamflows in the Nose Creek watershed to mitigate impacts of flood and drought, and improve water quality for water users and aquatic life.

PURPOSE AND INTENT

- The updated Nose Creek Plan:
 - Provides broad guidance and strategic direction for water management that will result in consistent, specific actions to protect riparian function and improve water quality
 - Will continue to guide land and water management decisions in the watershed
- Provincial and municipal jurisdictions are encouraged to integrate recommendations into existing plans or develop stand-alone policies.



PLAN OBJECTIVES

THEME	OBJECTIVES
Water Quantity and Stormwater Management	Recommend actions to manage streamflow and water quantity through the practice of integrated stormwater management.
Surface Water Quality	Identify appropriate surface water and stormwater quality guidelines. Recommend management actions to improve water quality.
Riparian Protection	Identify health targets, riparian setbacks, and other management actions that maintain functioning riparian systems in the watershed.
Groundwater	Recommend actions to better understand, manage, and preserve groundwater.
Biodiversity	Identify measures needed to sustain biodiversity in the watershed.



WATER QUANTITY AND STORMWATER MANAGEMENT



DESIRED OUTCOMES

- Degradation of natural hydrology and stream channel morphology is minimized.
- Through mitigation, the cumulative impact of urban development on watershed resources is minimized.

The updated Nose Creek Plan recommendations reflect the need to balance watershed objectives and urban development.

KEY RECOMMENDATIONS THAT REFLECT STAKEHOLDER INPUT

Stakeholder Input

Nose Creek Plan Recommendations

Issue: Lack of tools and monitoring data to validate assumptions and the effectiveness of best management practices

Comment: A watershed-scale model is a useful tool for future forecasting, and for identifying water quality benefits



Hydrologic/Hydraulic/Water Quality Model

- Develop a watershed-scale hydrologic, hydraulic and water quality model
- Implement a surface water monitoring and streambank erosion monitoring program to support model
- Monitor and evaluate LID performance

Issue: Industry stakeholders expressed concern regarding the 2013 runoff volume control target and implementation of the 2017 target



Runoff Volume Control Targets

- Delayed implementation of the 2017 runoff volume control target until Jan 2021; continue to implement the 2013 target
- Advance provincial water re-use and stormwater use policy, guidelines, and performance criteria, and modelling tools to support implementation

Generally accepted that managing stormwater is critical to improving watershed condition.

Issue: Need for runoff volume control targets in redevelopment areas to improve watershed condition and to create a level playing field for all developments



Redevelopment Areas

- Establish a redevelopment runoff volume control target and water quality objectives. Consider land use and parcel size.
- Use absorptive landscaping, green roofs, soil cells and cisterns to manage runoff volumes in redevelopment areas constrained by space.

Issue: Delayed uptake of best management practices to achieve goals for water quantity, water quality and riparian health



Low Impact Development

- Incorporate LID practices where feasible
- Improve the timeliness and uncertainty of the approval process for LID projects

SURFACE WATER QUALITY



DESIRED OUTCOMES

- Surface water and stormwater quality improve.
- Water quality condition supports a variety of uses, and aquatic life.
- The cumulative impacts of land use on water quality is minimized.

KEY RECOMMENDATIONS THAT REFLECT STAKEHOLDER INPUT

Stakeholder Input

Issue: High nutrient concentrations in Nose and West Nose creeks that contribute to algal growth and poor water quality downstream



Water Quality Guidelines and Objectives

- Surface water quality should meet objectives and guidelines
- Explore Total Maximum Daily Loads as a mechanism to improve water quality



Stormwater Quality

- Explore opportunities to advance the development of stormwater quality guidelines and objectives
- Encourage more extensive and targeted use of LID practices to improve stormwater quality (See Low Impact Development)

Issue: Channelization (straightening) of Nose and West Nose creeks that reduces channel length, accelerates streamflow, increases erosion, and decreases sediment deposition in the floodplain



Stream Channel Morphology

- Prevent the further loss of channel length and associated ecological functions through principles of “no net loss” and redesign
- Restore actively eroding streambanks using bioengineering techniques, where possible

Issue: Discharge of treated effluent to Nose Creek from the Town of Crossfield, and the subsequent impacts to water quality and downstream users



Discharge of Treated Effluent

- Seek an alternative means for treating and disposing effluent from the Town of Crossfield

Issue: Limited monitoring to measure improvements in water quality, streamflow, and channel morphology



Monitoring

- Develop and implement a comprehensive, standardized surface water monitoring program
- Continue to monitor stormwater quality

RIPARIAN PROTECTION



DESIRED OUTCOMES

- Local and regional flood and drought mitigation efforts are supported.
- Contiguous and healthy riparian corridors maintain water quality and support biodiversity.
- Permanent watercourses naturally meander within floodplains.

ECOLOGICAL FUNCTIONS OF RIPARIAN AREAS CONTRIBUTE TO WATERSHED RESILIENCY

Healthy riparian areas:

- Mitigate impacts of flood and drought
- Maintain streambank stability
- Filter contaminants from overland runoff
- Provide fish and wildlife habitat

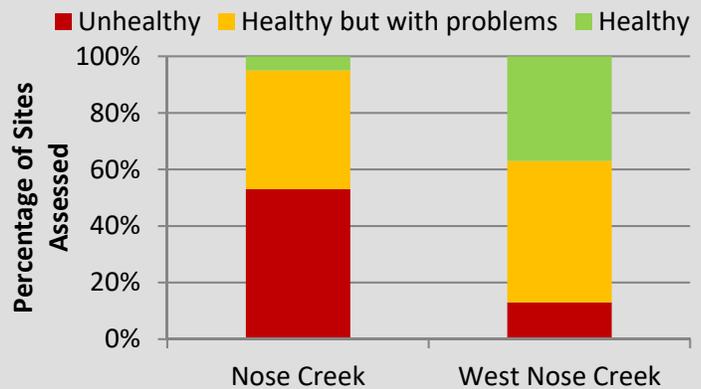
Stakeholder Input

Issue: Greater clarity needed to describe the desired outcome.

Nose Creek Plan Recommendations

- Improve riparian condition when scores fall below the threshold rating of 70 (healthy but with problems).

CURRENT RIPARIAN CONDITION



Riparian indicators scoring poor in assessments include:

- Invasive plant species cover and density distribution (e.g., yellow clematis, scentless chamomile, common tansy, caragana)
- River/streambank root mass protection

RIPARIAN CONDITION TARGETS

Healthy site: riparian area functioning with minor impairments

Healthy, but with problems: riparian area functioning, moderate impairment

Unhealthy: riparian area impaired, little ecosystem function



Unhealthy
Score < 60



Healthy, but with Problems
Score 60-79



Healthy
Score 80 -100



Threshold (Score 70)

Target (Score 80 or above)

RIPARIAN PROTECTION

KEY RECOMMENDATIONS THAT REFLECT STAKEHOLDER INPUT

Stakeholder Input

Comment: General need expressed for regionally standardized, minimum riparian setbacks.

Issue: Tendency for development to encroach into riparian areas resulting in the need for relaxations of setbacks

Issue: Concerns expressed by development industry regarding the implementation of riparian setbacks

Riparian Setbacks for Permanent Watercourses

*Minimum setbacks may increase according to site specific slope and floodplain factors.



Nose Creek Plan Recommendations

Riparian Setbacks

- Determine riparian setbacks for permanent watercourses according to the figure and table
- Except for permitted activities, no further development or site alteration should be permitted in the setback, thus maintaining riparian lands in their natural state

Relaxations of Setbacks

- Relaxations of the riparian setback should not occur. When encroachment on the setback cannot be avoided through alternative design or management, mitigation measures should be applied to minimize the impact, and compensation for impacts should be provided.

Mitigation

- Prescribe BMPs during detailed design, and use routinely when working in and around riparian areas
- Compensation may be explored when all other options have been considered.



Watercourse	Substrate	Minimum Setback
Nose Creek Upstream of the confluence with West Nose Creek; West Nose Creek; All other permanent creeks	Glacial till	30 m*
	Coarse textured sands and gravels, alluvial sediments	60 m*
Nose Creek Downstream of the confluence with West Nose Creek	All soil types	50 m*

Agricultural Areas

- Convert marginally productive cropland into long-term forage production or retain in its natural state (e.g., ephemeral wetlands)
- Apply manure and fertilizer according to AOPA
- Implement BMPs for livestock (e.g., avoid spring grazing, apply appropriate stocking rates, provide offstream watering)

RIPARIAN PROTECTION

(EPHEMERAL AND INTERMITTENT WATERCOURSES)

KEY RECOMMENDATIONS THAT REFLECT STAKEHOLDER INPUT

Stakeholder Input

Issue: Ephemeral and intermittent watercourses need to be properly defined and identified.
Comment: Challenges to maintaining these watercourses include site grading and road networks.

Issue: Recognizing the value of ephemeral and intermittent watercourses to overall watershed hydrology and water quality



Nose Creek Plan Recommendation

Ephemeral and Intermittent Watercourses

- Preserve ephemeral and intermittent watercourses in new developments, where possible.
- Locate buildings, roads and structures to preserve the natural hydrology of ephemeral and intermittent watercourses

Agricultural Areas

- Convert marginally productive cropland into long-term forage production or retain in its natural state (e.g., ephemeral wetlands)

Riparian Setback

- Apply a minimum 10 m setback to ephemeral and intermittent watercourses. Up to 4 m of the outer edge of the setback may be used for critical infrastructure or pathways



Riparian Setbacks for Ephemeral and Intermittent Watercourses

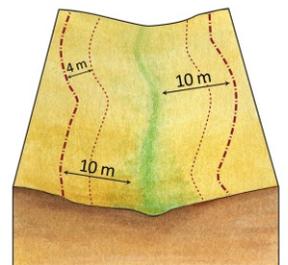
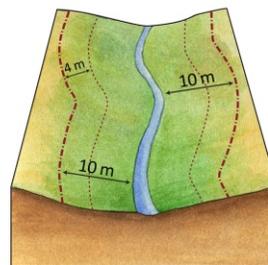
Waterbody	Minimum Setback	Notes
Ephemeral Watercourses	10 m*	A setback area of native vegetation adjacent to either side of the stream channel crest (or flow path), or the lowest elevation when the width of the flow path is not clear.
Intermittent Watercourses		Maintain continuous native vegetation cover along channels and slopes

*Minimum setbacks may increase according to site specific slope and floodplain factors.

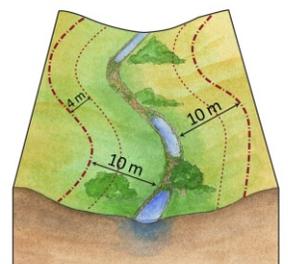
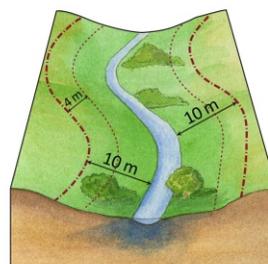
Spring

Summer

Ephemeral



Intermittent



RIPARIAN PROTECTION

(WETLANDS)

KEY RECOMMENDATIONS THAT REFLECT STAKEHOLDER INPUT

Stakeholder Input

Issue: Lack of guidance regarding wetland values

Issue: Loss of wetlands in urbanizing and rural areas

Issue: The Alberta Wetland Policy has had unintended consequences. It is simpler and more cost-effective for industry to compensate for wetland loss than to retain wetlands

Comment: Generally accepted that there are benefits to retaining wetlands in new developments, but only if they can be integrated into stormwater management plans.

Issue: Lack of guidance regarding wetland integration in developments

Nose Creek Plan Recommendation

Wetland Inventory and Valuation

- Update the wetland inventory for the Nose Creek watershed and assign value to wetlands

Wetland Setbacks

- Apply setbacks to wetlands according to the table below

Wetland Retention

- Integrate wetland management into urban planning
- Adopt strategies to prevent wetland loss. Where loss is unavoidable, mitigate impacts, or restore/create wetlands in urban areas as part of water management infrastructure, provided that future criteria for wetland integration are met.
- Amend the Alberta Wetland Policy to consider wetland integration in stormwater management for urbanizing areas

Guide to Wetland Integration in Urbanizing Areas

- Develop a guide to wetland integration in new developments and areas of redevelopment to support wetland retention

Wetland Setbacks

*Minimum setbacks may increase according to site specific slope and floodplain factors.



Waterbody	Substrate	Minimum Setback	Notes
Temporary Wetlands (Class I & II)	Not specified	10 m*	Maintain and conserve native wetland vegetation
Seasonal, semi-permanent, permanent, and alkali wetlands; stormwater wetlands (Class III – VI)	Glacial till	30 m*	Conserve native riparian vegetation and natural flood regimes
	Coarse textured sands and gravels, alluvial sediments	50 m*	

GROUNDWATER



DESIRED OUTCOMES

- Groundwater quality and quantity is protected for users and the aquatic environment.

KEY RECOMMENDATIONS CARRIED FORWARD FROM ORIGINAL PLAN

Groundwater is a critical water supply for many rural residents. Source water protection is needed to ensure future availability and quality.

Nose Creek Plan Recommendations

Source Water Protection Plan

- Develop a comprehensive source water protection plan focused on the groundwater resource

Abandoned Wells

- Identify and properly decommission abandoned water wells

Mitigation

- Apply appropriate BMPs to protect groundwater (e.g., proper use and disposal of pesticides and fertilizers)

Additional Research

- Increase understanding of springs and seeps, and the role of groundwater in the water balance

BIODIVERSITY



DESIRED OUTCOMES

- Native plants support stable streambanks.
- Conditions for fish and aquatic life improve.
- Invasive species are managed appropriately.

KEY RECOMMENDATIONS THAT REFLECT STAKEHOLDER INPUT

Stakeholder Input

Issue: Brown Trout spawning habitat needs protection in West Nose Creek

Issue: Presence of invasive species in stormponds, creeks, and tributaries

Issue: Prevention of new threats (e.g., zebra/quagga mussels, whirling disease, invasive plants)

Nose Creek Plan Recommendations

Fish: Restricted Activity Period

- Update the Restricted Activity Period for West Nose Creek, relevant to Brown Trout spawning
- Protect and maintain spawning and rearing areas for Brown Trout in West Nose Creek

Invasive Species

- Document the occurrence of invasive species in the watershed (e.g., Prussian carp, crayfish)
- Develop and disseminate educational resources for public users that highlight the threat of aquatic invasive species
- Continue annual effort to control and monitor invasive plant species with due care to native plants and water resources.

IMPLEMENTATION & NEXT STEPS

SHARED RESPONSIBILITY

Management of the Nose Creek watershed is a shared responsibility between:

- Municipal, provincial and federal governments
- Non-government organizations
- Industry
- Landowners and residents

The NCWP encourages the implementation of the Nose Creek Plan by all partners and stakeholders to achieve desired watershed outcomes. The Nose Creek Plan Implementation Guide provides a preliminary review of potential roles/responsibilities, actions, priorities, and timelines.

To support implementation, the Partnership will strive to:

- Develop and provide common watershed-scale resources
- Identify and address data gaps
- Report on watershed condition
- Support collaboration, education and stewardship in watershed management



NCWP PRIORITIES

The following NCWP project priorities are consistent with stakeholder input:

1. Develop a hydrologic/hydraulic and water quality watershed-scale model
2. Design and implement a comprehensive, standardized water monitoring program
3. Initiate streambank erosion monitoring program
4. Complete a wetland inventory and valuation.
5. Undertake watershed condition reporting



NEXT STEPS

The Nose Creek Plan is a living document.

The NCWP will periodically review implementation progress and continue the iterative process of watershed management.

In the short-term, the NCWP will strive to:

- Renew support for the updated Plan
- Identify needs and leverage resources, as possible, to initiate key watershed-scale projects



Watershed management continuum.