# UPDATED NOSE CREEK WATERSHED WATER MANAGEMENT PLAN

# **Summary Document**



"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."



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# **INTRODUCTION**

The Nose Creek watershed is impacted by the cumulative effects of increasing residential and commercial development, industrial growth, stormwater discharge, agricultural activity, and stream channelization. The Nose Creek Watershed Partnership (NCWP) formed in 1998 to undertake joint watershed planning to address concerns regarding the future condition of Nose Creek and West Nose Creek. In 2008, the NCWP completed the Nose Creek Watershed Water Management Plan (Nose Creek Plan, Plan) as a means to protect riparian areas and improve water quality.

Currently, the NCWP is represented by the Calgary Airport Authority, City of Airdrie, The City of Calgary, and Rocky View County. The Partnership continues to promote stewardship of Nose Creek watershed resources through the implementation of the Nose Creek Plan. In 2016, the Partnership set out to update the Plan to:

- Reflect advancements in knowledge
- Reflect changes in provincial and municipal policies
- Address challenges with Plan implementation
- Address new issues in watershed management

This document summarizes key content from the final draft of the Nose Creek Watershed Water Management Plan (April 2018). The comprehensive Nose Creek Plan includes background information, the full suite of recommendations, targets and thresholds, priorities, and additional tables and maps.



## THE WATERSHED

Nose Creek originates near the northern boundary of Rocky View County and the Town of Crossfield (Figure 1). It flows south through the City of Airdrie, to join the Bow River in Calgary near the Calgary Zoo. Nose Creek is fed by numerous intermittent watercourses; the most notable is McPherson Coulee. The main permanent tributary to Nose Creek is West Nose Creek. The watershed drains a gross area of 989 km<sup>2</sup> including West Nose Creek. The mainstem of West Nose Creek originates in Rocky View County, northwest of Calgary. The creek flows about 65 km before joining Nose Creek near Deerfoot Trail (Hwy 2), directly west of the Calgary International Airport. This sub-watershed drains a gross area of 325 km<sup>2</sup>.



Figure 1. Nose Creek watershed.

#### **CURRENT WATERSHED CONDITIONS**

#### Water Quantity

The natural hydrology of the Nose Creek watershed has been altered by changing land use. Urban growth and country-residential developments have increased impervious cover, compacted subsoils, drained or filledin depressions or wetlands, and eliminated natural vegetation. These practices generate higher rates and volumes of stormwater compared to pre-development conditions.

More than 137 stormwater outfalls currently direct water from urban developments to Nose and West Nose creeks. The addition of stormwater to the creeks alters peak flow characteristics and increases streamflow. Higher streamflow increases streambank erosion, alters channel morphology, increases sediment transport, and degrades water quality and aquatic habitat (Figure 2).



Rural

Urban



Figure 2. Impacts of typical urbanization on Nose and West Nose creeks (adapted from Vietz et al. 2016).

Reduced bedload sediments

Increased channel capacity

Prolonged, elevated streamflow threatens infrastructure (e.g., pathways, bridges, culverts) and public safety in the watershed at a substantial cost to municipalities and residents. Poor water quality is also observed, particularly in older developments where stormwater infrastructure (e.g., ponds, wetlands, oil/grit separators) is minimal or absent.

#### Water Quality

Water quality in the Nose Creek watershed remains a concern, particularly for the indicators total phosphorus, total nitrogen, salts, total suspended solids, and fecal coliform bacteria. Nutrients contribute to the production of algae and aquatic macrophytes in surface water that can degrade water quality (deplete oxygen concentrations) for aquatic life and aesthetics (odour) in urban areas. Suspended sediment can transport other contaminants in the water, decrease water treatment ability, and reduce the longevity of irrigation equipment. Sediment also impacts aquatic life by filling in fish habitat (e.g., spawning areas and pools).

#### **Riparian Health**

Riparian areas and wetlands are important natural features in the watershed. Riparian areas mitigate impacts of flood and drought, maintain streambank stability, filter contaminants from overland runoff, and provide fish and wildlife habitat. Fifty-three percent of the riparian sites assessed at Nose Creek and 13% of sites at West Nose Creek rated "unhealthy" (Figure 3).

Limited mobile bedload sediments

No regular floodplain engagement



Figure 3. Riparian health at Nose and West Nose creeks.

Unhealthy ratings indicate that riparian functions are impaired. It has been estimated that 80-90% of wetlands have been lost in Calgary.

# NOSE CREEK WATERSHED WATER MANAGEMENT PLAN

#### 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, INTENT AND AUTHORITY**

The 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. It is expected that the updated Plan 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 standalone policies. While recommendations in the Plan apply only to those areas of the municipality in the Nose Creek watershed, the relevance of the Plan may extend beyond the watershed boundary.

The updated Nose Creek Plan aligns with current provincial planning initiatives, and municipal plans and policies. The Nose Creek Plan may inform future planning initiatives, such as municipal development plans and growth strategies.

#### **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.

Refer to the Nose Creek Plan for a full discussion of issues.

## **PLAN OBJECTIVES**

THEME	OBJECTIVES
Water Quantity and Stormwater Management	Recommend actions to manage streamflow and water quantity through the practice of integrated stormwater management.

THEME	OBJECTIVES	
	Identify appropriate surface water and	
Surface	stormwater quality guidelines.	
Water Quality	Recommend management actions to	
	improve water quality.	
	Identify health targets, riparian setbacks,	
Riparian	and other management actions that	
Protection	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.	

#### **PLANNING PROCESS**

The updated plan was prepared under the direction of the NCWP and in collaboration with AEP and other watershed stakeholders.

2016	2017	2018
<ul> <li>Completed Terms of Reference for Plan update</li> <li>Hosted first stakeholder engagement session on issues</li> <li>Data collection, synthesis &amp; analysis</li> <li>Hosted second</li> </ul>	<ul> <li>Continued to synthesize input</li> <li>Engaged with municipal staff</li> <li>draft updated Nose Creek Plan available for NCWP and Technical Team review</li> </ul>	<ul> <li>Discussed implementation</li> <li>Identified NCWP priorities</li> <li>Hosted third stakeholder engagement session on final draft Nose Creek Plan</li> <li>To do: Finalize Plan</li> </ul>
stakeholder engagement		•To do: Renew municipal

# direction

The updated Nose Creek Plan builds on community engagement and scientific studies conducted in the watershed. Relevant plans, policies and technical reports for the watershed were compiled. Provincial spatial data was also accessed and a series of maps developed. This information was used to inform the recommendations in the Plan.

#### **Stakeholder Engagement**

**Information Assembled** 

session on key

The NCWP engaged with municipal governments, the provincial government, industry, and non-government organizations at key junctures in the planning process. Stakeholder engagement sessions were hosted to obtain input into issues and draft recommendations, and to collect comments on the final draft of the updated Nose Creek Plan. Engagement discussions are summarized in PESL (2016; 2017) (see <u>NCWP</u> website). In the following section, recommendations that reflect key stakeholder input are identified by an arrow bullet (▶).

support for the

Plan

## **KEY RECOMMENDATIONS<sup>1</sup>**

Recommendations in the updated Plan reflect the ongoing need to protect riparian areas and improve water quality in the Nose Creek watershed. Adaptive management will be applied as new information becomes available through recommended technical studies, and as policy advances.

#### Administration

Adoption

- Adopt the goal, objectives and desired outcomes in the Nose Creek Plan
- Consider recommendations in the development and update of municipal and provincial policies, procedures, and planning and development standards and guidelines

#### Governance

- Form an Inter-municipal Team to work together to aid with implementation (i.e., Technical Team plus additional staff as needed)
- Continue to work internally with colleagues (internal working groups) to implement the Plan

#### **Communication with Stakeholders**

- Host focus group sessions with stakeholders to discuss Plan implementation (e.g., successes, challenges, strategies to achieve objectives)
- Monitor and report on indicators of watershed condition to support Plan implementation

#### 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.

#### Hydrologic/Hydraulic and Water Quality Model

- Collaborate with partners to develop a watershedscale predictive, hydrologic, hydraulic and water quality model
- Implement a water monitoring program to populate the model with current, comprehensive data
- Initiate erosion monitoring to establish baseline conditions, better understand erosion processes and channel migration

#### Water Conservation Objectives

- Refine the low-flow water conservation objective as determined through detailed analysis (model assessment)
- Apply Maximum Allowable Release Rates
- Manage high flows to minimize changes to the morphological characteristics of the creek channels in the upper reaches

#### **Integrated Stormwater Management**

Delay the implementation of the 2017 runoff volume control target until January 2021; continue to implement the 2013 target



#### **Redevelopment Areas**

- Develop strategies to retain open space/green space in redevelopment areas
- Establish a redevelopment runoff volume control target and water quality objectives. Runoff volume control targets in redevelopment areas should be a function of land use and parcel size
- Use absorptive landscaping, green roofs, soil cells and cisterns to manage runoff volumes in redevelopment areas that are constrained by space

#### **Internal Drainage Areas**

- Continue to integrate internal drainage areas into existing and future policies to minimize discharges and protect properties
- Amend the Alberta Wetland Policy to consider wetland integration in stormwater management for urbanizing areas

<sup>&</sup>lt;sup>1</sup> A summary of key recommendations are provided for each theme represented in the Nose Creek Plan. Refer to the comprehensive Plan for the complete suite of recommendations.

#### Low Impact Development

- Incorporate LID practices wherever feasible
- Improve the timeliness and uncertainty of the approval process for LID projects
- Monitor and evaluate the performance of LID pilot studies

#### 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.

#### Water Quality Guidelines and Objectives

- Surface water quality should meet objectives and guidelines summarized in the Plan
- Explore Total Maximum Daily Loads for phosphorus and sediment (and other parameters as identified) as a mechanism to improve water quality

#### **Stormwater Quality**

- Explore opportunities to advance the development of stormwater quality guidelines and objectives, beyond the current requirement to reduce total suspended solids
- Encourage more extensive and targeted use of LID practices to improve stormwater quality

#### **Discharge of Treated Effluent**

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

#### Monitoring

- Develop and implement a comprehensive, standardized surface water monitoring program
- Continue to monitor stormwater quality to better understand trends in quality and volume

#### **Stream Channel Morphology**

- Prevent the further loss of channel length and associated ecological functions in Nose and West Nose creeks through principles of "no net loss" and redesign
- Restore actively eroding streambanks using bioengineering techniques, where possible

#### Sediment, Erosion and Soils

- Implement, monitor and maintain sediment and erosion control measures at construction sites
- Maintain existing vegetation where possible
- Adhere to the Procedure for Topsoil Statutory Declaration and Development Permit process for soil quality disposal (Rocky View County)

#### Escarpments

 Escarpments equal to 15% slope up to 30% slope should be assessed to determine suitability for development, or maintained as natural area; slopes >30% should be designated as Environmental Reserve

#### Restoration

- Partner with conservation groups and others to restore ecological function of Nose and West Nose creeks, and their tributaries
- Assign priority to areas that pose a safety hazard, can restore hydraulic connectivity, or are impacted by improper management of grazing lands

#### **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.

#### **Riparian Health Targets and Thresholds**

- Improve riparian condition when scores fall below the threshold rating of 70, where practical, using a priority approach for restoration
- Apply a systematic approach to monitoring riparian lands

#### Mitigation

 Prescribe BMPs during detailed design, and use routinely when working in and around riparian areas

#### **Riparian Setbacks**

• Determine riparian setbacks for permanent watercourses on a site specific basis as the greater of the minimum setback (e.g., 30 m or 60 m) and

the 1:100 year floodplain width (see Figure 4). Additional steep slope setbacks may apply



**Figure 4**. Schematic showing application of riparian setbacks for permanent watercourses.

• Except for permitted activities, no further development or site alteration should be permitted in the riparian setback, thus maintaining riparian lands in their natural state

#### **Ephemeral and Intermittent Watercourses**

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

#### Wetlands

- Update the wetland inventory and assign values to wetlands
- Apply setbacks to wetlands
- 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.

#### **Agricultural Areas**

• Apply manure and fertilizer according to standards in the *Agricultural Operations Practices Act* 

- Convert marginally productive cropland into longterm forage production or retain in its natural state (e.g., ephemeral wetlands)
- Implement BMPs for livestock grazing permitted in riparian areas (e.g., avoid spring grazing, stocking rates, offstream watering)

#### Groundwater



#### **Desired Outcomes**

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

#### General

- Develop a comprehensive source water protection plan focused on the groundwater resource
- Identify and properly decommission abandoned water wells
- Apply appropriate BMPs to protect groundwater (e.g., proper use of pesticides and fertilizers)
- 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.

#### Fish

- 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

#### Wildlife

• Consider wildlife habitat sensitivities in future land use plans

#### **Invasive Species and Plants**

- 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 species with due care to native plants and water resources.

# **IMPLEMENTATION**

#### **Shared responsibility**

Watershed management is a shared responsibility. Federal, provincial and municipal governments, nongovernment organizations, and industries represented in the Nose Creek watershed all have varying levels of responsibility for land and water resource management.

The NCWP encourages the implementation of the Nose Creek Plan by all partners and stakeholders to achieve desired watershed outcomes. In support of implementation, the Partnership will strive to:

- Develop and provide common watershed-scale resources (e.g., tools, maps, information)
- Identify and address data gaps
- Report on watershed condition as a way to measure progress toward achieving goals
- Support collaboration, education and stewardship in watershed management

#### **NCWP Priorities and Timelines**

The Nose Creek Plan Implementation Guide provides further direction on Nose Creek Plan implementation. The guide suggests who has a role or regulatory responsibility for implementing the recommendation, and identifies a preliminary priority timeline.

For the NCWP, the following key project priorities were established to implement during the next three years:

- 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

Implementation priorities and timelines may change in the future depending on provincial and municipal direction, emerging issues (e.g., new science, catastrophic events), resource availability, and staff changes. However, achieving the desired outcomes for the Nose Creek watershed should remain the overall focus of the Plan implementation.

# **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 (Figure 5).

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

- 1. Renew support for the updated Nose Creek Plan
- 2. Define the governance of the NCWP and Technical Team moving forward in implementation
- **3.** Identify needs and leverage resources, as possible, to initiate key watershed-scale projects



Figure 5. Watershed management continuum.

# ACKNOWLEDGEMENTS

The NCWP would like to thank the Technical Team and all stakeholders who participated in the review and update of the Nose Creek Plan.

# FOR MORE INFORMATION



Nose Creek Watershed Partnership

#### www.nosecreekpartnershp.com

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