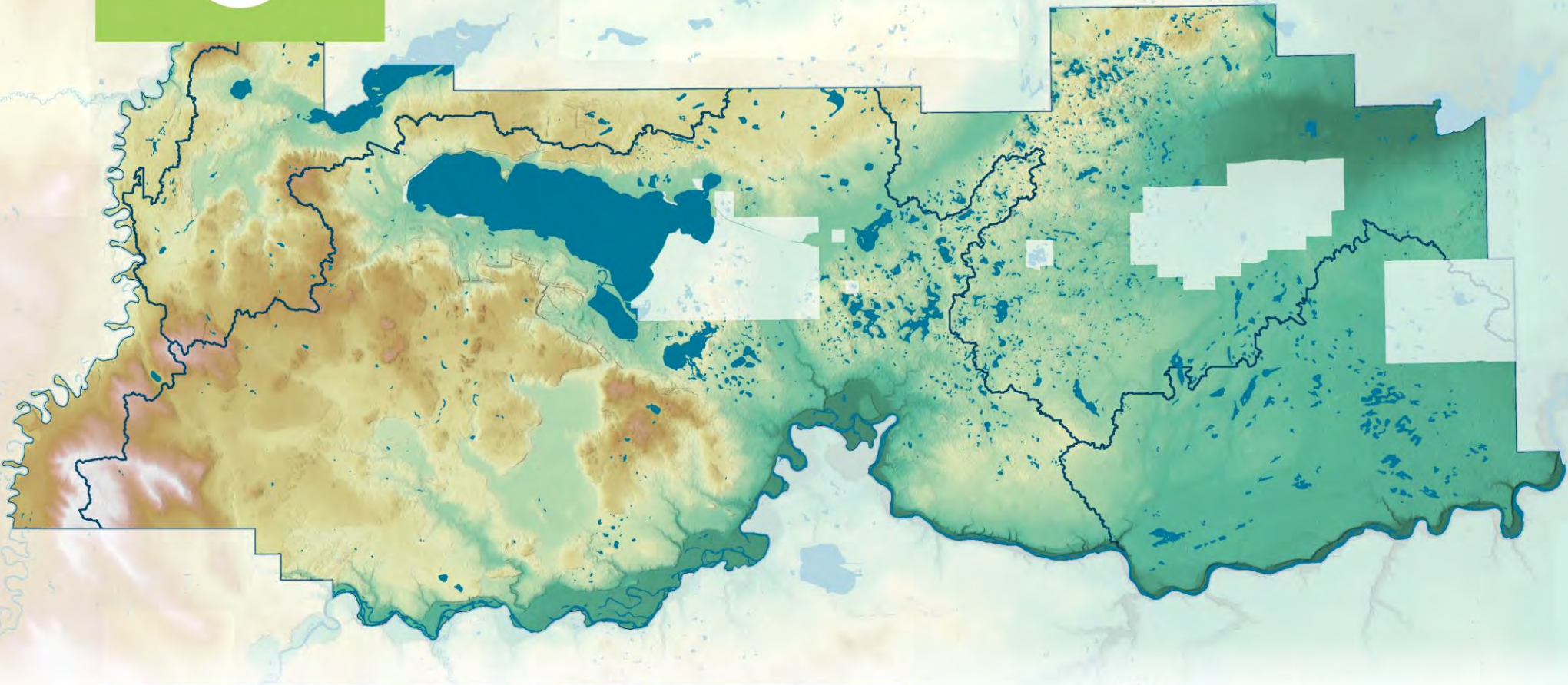


Parkland County

Stormwater Master Plan



One Parkland: Powerfully Connected.





Parkland County STORMWATER MASTER PLAN

June 2023

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1.0 INTRODUCTION

1.1. Background

This Stormwater Master Plan project is a Council directed strategic planning document that will advance corporate direction while providing vision and strategic direction for managing stormwater across Parkland County. The plan was driven by continued drainage related concerns raised by residents and other County stakeholders. Parkland County wants to have a better understanding of its stormwater management role relating to regulatory and approval authority, operation and maintenance, infraction enforcement, and oversight.

The study charter was approved by Parkland County Council in late 2021. The Stormwater Master Plan project was initiated in March 2022 when Parkland County retained ISL Engineering and Land Services.

1.2. Study Objectives and Scope of Work

Most stormwater master plans focus on existing and proposed development areas and include detailed technical analyses to determine the stormwater infrastructure requirements for these development areas. They typically assess the capacity of existing infrastructure to convey and store stormwater for a range of design storm events and determine the infrastructure upgrading needed to protect properties from flood damage.



For this stormwater master plan, the County is looking for a high-level strategic planning document that addresses the following questions:

1. What is the county-wide current stormwater drainage system comprised of, including both natural and constructed drainage systems?
2. How does the County's stormwater drainage system interact with its neighbours and/or land uses, considering both natural systems and constructed drainage infrastructure?
3. What are the applicable regulatory stormwater roles for the County and other levels of government?
4. What are the County's roles and responsibilities for the stormwater management system in granting development approvals, maintaining compliance and addressing system deficiencies (natural and constructed systems)?
5. How well is the County doing at fulfilling its role and meeting its responsibilities for all aspects of stormwater management (e.g., policy, planning, approvals, construction, operation and maintenance, monitoring, enforcement) throughout all levels of the organization?
6. What are the County's internal processes for dealing with the various aspects of stormwater? Are there any gaps, and how could the processes be improved?
7. Would it make sense for the County to proactively work with adjacent municipalities (e.g., First Nations, residents, businesses and/or industry groups) to improve how stormwater is managed?
8. What are the current extreme weather trends for stormwater and how would it impact stormwater system planning?
9. What types of changes are needed to address how the County manages its natural and constructed stormwater systems, and how would these changes impact the County's organizational structure?
10. How can the County improve its communications with residents, businesses, and external groups, as well as internally between departments, levels of administration and Council?



To achieve the overall goal, the Stormwater Master Plan scope of work focused on three strategic areas:

- **Basin Identification** documents the existing natural and constructed stormwater drainage systems across the entire County. This will help the County understand how natural and constructed systems direct stormwater runoff/snowmelt to downstream water bodies, including wetlands, lakes and rivers. It will also identify the existing constructed drainage systems within hamlets, rural roadways, industrial areas and country residential areas. Finally, it will help with understanding intricacies, implications and/or challenges resulting from where drainage systems that cross lot or jurisdictional boundaries.
- **Regulatory Review** focuses on the County's role and responsibilities for managing stormwater, how well it currently performs regarding its federal, provincial and municipal related regulatory responsibilities, and where it falls short from the perspective of both the County administration and external stakeholders.
- **System Management** includes a detailed review of the current County stormwater system management processes and identifying potential ways that the management system can be improved to meet the County's responsibilities for stormwater and the County's policy objectives as directed by Council. It will include detailed recommendations for modifying approval processes, managing stormwater complaints (including incidents of non-compliance), implementing operation and maintenance strategies, enhancing communications to elevate public awareness about stormwater system and monitoring programs.

1.3. Overview of County Drainage System

The County's drainage system is largely a natural system made up of watercourses, wetlands, creeks, lakes and rivers. The surface water and groundwater interact and cannot be separated; surface water supplies groundwater in numerous recharge areas. Groundwater is one of the primary drivers of natural runoff on an annual basis with numerous springs.

The County's stormwater "infrastructure" interacts with this natural system in multiple ways:

- Township and range roads intercept the natural system, occasionally providing a short cut for natural drainage to follow road ditches; however, in general, roadway drainage system has minimal impact on the rural natural drainage system.
- Country Residential developments typically minimize the amount of grading and thus have minimal impact on the natural drainage paths. What was originally forest and grasslands was converted to farming and later to Country Residential development; drainage paths to wetlands and natural drainage courses were largely unchanged. As additional development occurs, the downstream system may not be able to accommodate increased runoff volumes and longer run off duration periods. Also, in flat/low lying areas, the Country Residential stormwater infrastructure (ditches and culverts) may not have considered the natural seasonal and year to year variations in surface and groundwater levels, thereby impacting the performance of the new stormwater infrastructure.



- The hamlets and industrial areas represent more intense development with a significant increase in the percent of impervious area and the peak flows/annual runoff volume — especially the larger hamlets and Acheson. These areas generally use more complex drainage system and discharge to larger water bodies, such as the Acheson and Big Lake Area Basin 1, which has a major stormwater trunk to Big Lake. The smaller hamlets and local commercial/industrial areas are a hybrid of the above.

Development in the County dates to the early 20th century with highways, local roads, and small residential areas. During the first half of the 20th century the township and range roads were developed, and agriculture became the focus for the County. Communities like Entwistle were established during this time. By the 1960s, Country Residential development grew rapidly west of Edmonton, as well as recreational properties around Wabamun Lake and the smaller hamlets (Tomahawk, Duffield Country Residential developments continued in the 1970s, with industrial development beginning in the Acheson Area. Although at a slower pace, Country Residential development has continued from the 1980s to the 2020's. Industrial development in Acheson has grown since the 1980s based on market demands (peaks and valleys in development activity). Agriculture expanded throughout the 20th century and there was interest by the province in the 1970s and 1980s to expand agricultural production through draining wetlands and constructing agricultural drainage ditches, hereafter referred to as licensed drainage courses.

Design standards for roadways and drainage systems have evolved over the years. In the early 20th century, township and range roads were often “field fit” and did not consider long-term drainage operation and maintenance. This was presumably partly due to the equipment used and the cost of excavating deeper cuts. By the mid-20th century design standards were developed and land use planning processes had been put in place to guide the land development industry. However, several of the design standards used in the mid-20th century were lacking by today's standards (e.g., no specific stormwater requirements for Area Structure Plans). By the 1970s the design standards had evolved and generally represented sound engineering principles. Stormwater management became standard practice by the 1970s and 1980s; however, the specific requirements are considered lacking by today's standards. Most urban and industrial developments utilized stormwater management facilities by the 1980s. In the 1990s and 2000s, the focus expanded to include stormwater quality, which coincided with an increased focus on environmental protection, as well as wetland protection and restoration, etc.

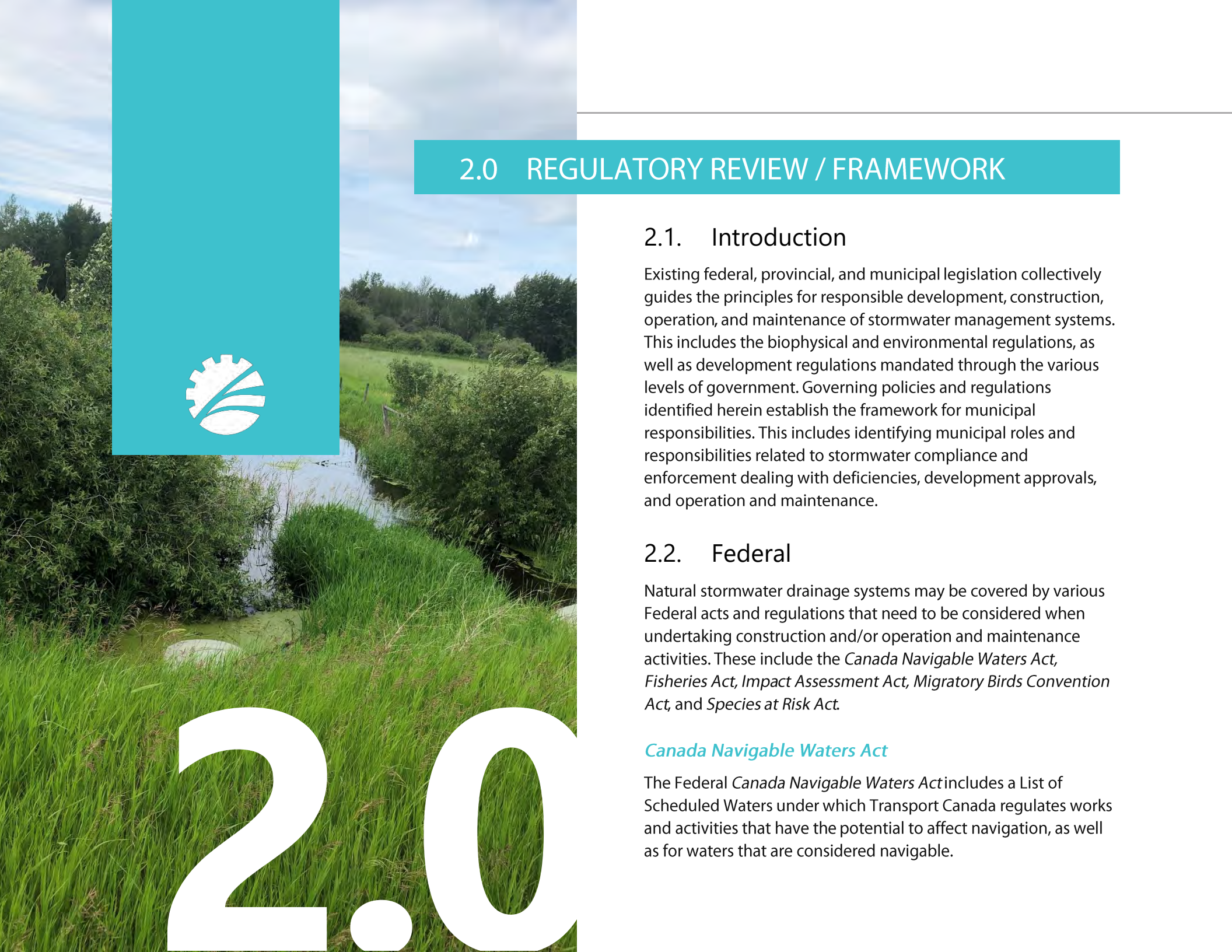
Overall flooding risk, extent, and frequency within Parkland County is relatively minor. Extreme rainfall events and quick spring thaws rarely cause flooding that impact buildings or displace people. Rather, it causes minor to significant inconvenience to residents through high water overtopping roads or driveways for short periods of time or flooding private and agricultural lands for several days or weeks. The duration of flooding on private and agricultural lands is generally related to topography. In the flat areas of Parkland County, it takes longer for the flood water to subside. The average annual fiscal impact of flooding is relatively minor.



The result of largely rural areas with extensive watercourses, wetlands and creeks, combined with a drainage system developed with a range of design standards, is a system that has numerous challenges. These challenges were instrumental drivers in the County initiating this Stormwater Master Plan, seeking direction towards feasible solutions and strategies.

1.4. Terminology

In this report, the terms “stormwater master plan” and “stormwater management plan” are frequently used. In general, the term “stormwater master plan” is intended to refer to a larger scale study of the existing stormwater drainage systems. The term “stormwater management plan” is typically used to refer to smaller scale studies that focus on how stormwater runoff is proposed to be managed within a new development area. It is acknowledged that these terms are often used interchangeably within the industry.



2.0 REGULATORY REVIEW / FRAMEWORK

2.1. Introduction

Existing federal, provincial, and municipal legislation collectively guides the principles for responsible development, construction, operation, and maintenance of stormwater management systems. This includes the biophysical and environmental regulations, as well as development regulations mandated through the various levels of government. Governing policies and regulations identified herein establish the framework for municipal responsibilities. This includes identifying municipal roles and responsibilities related to stormwater compliance and enforcement dealing with deficiencies, development approvals, and operation and maintenance.

2.2. Federal

Natural stormwater drainage systems may be covered by various Federal acts and regulations that need to be considered when undertaking construction and/or operation and maintenance activities. These include the *Canada Navigable Waters Act*, *Fisheries Act*, *Impact Assessment Act*, *Migratory Birds Convention Act*, and *Species at Risk Act*.

Canada Navigable Waters Act

The Federal *Canada Navigable Waters Act* includes a List of Scheduled Waters under which Transport Canada regulates works and activities that have the potential to affect navigation, as well as for waters that are considered navigable.



Transport Canada is finding most waterbodies to be considered navigable, and therefore typically require some level of approval or notification. Numerous activities, such as outfalls and erosion protection work may fall under the classification of Minor Works under the *Canada Navigable Waters Act* and therefore simple notifications are required. For Major Works, such as bridges, an Approval is typically required.

Fisheries Act

The provisions of the new *Fisheries Act* came into force at the end of August 2019 under Fisheries and Oceans Canada. While guidance documents are still being developed, important changes include the new prohibitions:

- 34.4 (1) No person shall carry on any work, undertaking or activity, other than fishing, that results in the death of fish.
- 35 (1) No person shall carry on any work, undertaking or activity that results in the harmful alteration, disruption, or destruction of fish habitat.
- Harmful Alteration: any change to fish habitat that reduces its long-term capacity to support one or more life processes of fish but does not permanently eliminate the habitat.
- Disruption: any change to fish habitat occurring for a limited period of time that reduces its capacity to support one or more life processes of fish.
- Destruction: any permanent change of fish habitat, which completely eliminates its capacity to support one or more life processes of fish.

Typically, any work in water that may impact fish or fish habitat requires a Request for Review to be submitted to Fisheries and Oceans Canada, such that they can determine if there is potential Harmful Alteration, Death or Destruction of fish and fish habitat implications. A Request for Review typically takes 3 months for a response. If after the Request for Review is complete and Fisheries and Oceans Canada has determined that an Authorization will be required, it then takes another 6 months for the Review of the Authorization application.

Impact Assessment Act

The *Impact Assessment Act*, administered by the Impact Assessment Agency of Canada, requires environmental assessments of proposed projects that are likely to have significant adverse environmental effects, including impacts on water, air, and soil quality. The *Impact Assessment Act* aims to promote sustainable development by ensuring that the potential environmental effects of proposed projects are considered and addressed in the decision-making process.

The typical triggers for an environmental assessment under the *Impact Assessment Act* include projects that are designated by the federal government, or that fall within the jurisdiction of the federal government, such as interprovincial pipelines, railways, or shipping lanes or mega-projects. While stormwater management may not be explicitly addressed in the *Impact Assessment Act*, it could be considered as part of the broader environmental effects of a proposed project, particularly if the project involves construction or land use changes that could impact water quality or quantity.



Migratory Birds Convention Act

The *Migratory Birds Convention Act* is administered by Environment and Climate Change Canada to ensure protection of migratory birds, their nest, and their eggs. Birds protected by the *Migratory Birds Convention Act* include waterfowl (such as ducks, geese and swans), insectivorous birds (such as wrens, robins, shrikes and woodpeckers), and some nongame birds (such as herons and gulls).

To protect migratory birds, Environment and Climate Change Canada provides general nesting periods based on geographic location. The general nesting period covers the majority of species covered under the *Migratory Birds Convention Act*; however, it may not be accurate for species that can breed at any time during optimal conditions (e.g., Crossbill species), or species that may nest earlier or later (such as Great Blue Heron). It is important to note that this period may not include those nesting periods for species not covered under the *Migratory Birds Convention Act* but are covered under *Alberta's Wildlife Act*.

The general migratory bird nesting period for the Calgary/Edmonton area is April 1 to August 31, however the nests of species listed in the *Migratory Bird Conservation Act's* Schedule 1 are protected year-round (Great Blue Heron and Pileated Woodpecker in Edmonton Area). For species not listed in Schedule 1, during the identified nesting period, construction activities require a pre-construction nest-sweep to avoid disturbance and nest sweeps every 2- 6 days where habitat occurs. If there is no habitat on the project footprint, but adjacent to the footprint, nest sweeps are also required as some species have large setbacks.

If nesting migratory birds are identified during the nest sweep, a setback may be identified through consultation with Environment and Climate Change Canada where feasible, or a permit would be required to remove the nest. To avoid nest sweeps, clearing activities are recommended to occur in winter thereby removing habitat and potential spring nesting.

Species at Risk Act

The *Species at Risk Act* is also administered by Environment and Climate Change Canada. The Act identifies measures to protect listed wildlife (this includes vegetation) species through recovery strategies, protection of critical habitat, management of species of concern, agreements and permits, as well as Project reviews (Government of Canada 2018b).

Typically, the *Species at Risk Act* implications only occur within Federal Lands, or for aquatic species (e.g., Bull Trout), and rarely have implications to municipal projects. Where the *Species at Risk Act* listed species occur within aquatic areas, Fisheries and Oceans Canada typically determines implications as part of the Request for Review process.

Other Federal Acts

There are several other federal acts that may indirectly apply to stormwater drainage systems, including: Explosives Act, Firearms Act, Canada Wildlife Act, and Canadian Aviation Regulations (e.g., drone flights).



2.3. Provincial

Natural stormwater drainage systems may be covered by various Provincial acts and regulations that need to be considered when undertaking construction and/or operation and maintenance activities. These include the *Water Act*, *Public Lands Act*, *Wildlife Act*, *Historical Resources Act*, *Environmental Protection and Enhancement Act* and *Municipal Government Act*.

Water Act

The *Water Act* manages Alberta's water resources and applies to numerous Parkland County's stormwater related activities. Through Alberta Environment and Protected Areas, the *Water Act* governs activities affecting waterbodies in Alberta, including construction, water diversions and infilling of wetlands. *Water Act* Approval is required to alter flow or level of water; change the location of water; change the direction of water flow, cause the siltation of water; cause erosion of bed or shore of any waterbody; or any effect on the aquatic environment.

Any activity that will disturb a wetland or other type of waterbody requires *Water Act* Approval, other than those activities that are regulated under the *Codes of Practice*. Code of Practices may occur for:

- Temporary diversion of water for hydrostatic testing
- Pipelines and telecommunication lines crossing a water body
- Watercourse crossings
- Outfall structures on waterbodies

For activities that are not regulated under a Code of Practices, a *Water Act* approval is required. The *Water Act* application submission must include:

- A letter of consent from the landowner.
- A review by the Water Boundary Group from the *Public Lands Act* for Class III and above wetlands.
- Where impacts occur to either the aquatic or wetland environment, a Qualified Aquatic Environmental Specialist or Authenticating Wetland Professional Assessment and report is required.
- A compensation agreement.

Typically, *Water Act* approval applications take between 4-12 months to process. Code of Practice Notifications are required to be submitted a minimum of 14-days prior to the commencement of the activity.

The *Water Act* Regulations state that the following activities are exempt (i.e., do not require a formal approval or notification) from the requirement for an approval (reader is referred to Schedule 1 of the Regulations for full listing):

- Placing, constructing, installing, maintaining, replacing or removing a crossing in a water body where (i) the water body is not frequented by fish, (ii) the hydraulic, hydrologic or hydrogeological characteristics of the water body are not altered at flood events below the one in 25 year flood event, (iii) the size of the culvert used in constructing the crossing, if applicable, is 1.5 metres or less in diameter, (iv) there is no diversion of water from the water body, and (v) the installation of the crossing is not part of a causeway through a lake, slough, wetland or other similar water body.



- Landscaping except where (i) it is in or adjacent to a watercourse frequented by fish or in a lake or a wetland, or (ii) it changes the flow or volume of water on an adjacent parcel of land or adversely affects an aquatic environment.
- Removal of debris from a water body that is not frequented by fish if the person removing the debris owns or occupies the land adjacent to the water body where the debris is located.
- Removal of a beaver dam from a water body if the person removing the beaver dam owns or occupies the land adjacent to the water body where the beaver dam is located, or has been authorized to remove the beaver dam under section 95 of the Act.

INDIGENOUS ENGAGEMENT

Alberta Environment and Protected Areas integrates its approval process with Indigenous engagement through the Alberta Aboriginal Consultation Office. This involvement has become a proponent responsibility under the *Water Act*. Aboriginal Consultation Office advises on whether consultation is required.

Projects addressed under a Code of Practice would not need indigenous engagement. Larger projects (e.g., rip rap, channel realignment) that do not fall under the Code of Practice and thus require a *Water Act* approval need to do a pre-consultation assessment with the Aboriginal Consultation Office. Most pre-consultation assessments do not require formal indigenous consultation.

ALBERTA WETLAND POLICY

Where impacts to wetlands occur, under the authority of the *Water Act*, wetlands must be identified and delineated according to the Wetland Identification and Delineation Directive; classified using the Alberta Wetland Classification System; and assigned an ecological wetland value using the Alberta Wetland Rapid Evaluation Tool - Actual.

Impacts to wetlands will trigger a *Water Act* application, and typically require a Wetland Assessment and Impact Report, or Wetland Assessment and Impact Form. In addition to the above information, a Wetland Assessment and Impact Report will include the required in-lieu fee replacement value; based on the Alberta Wetland Rapid Evaluation Tool – Actual results (i.e., wetland value) as well as Relative Wetland Assessment Unit value pursuant to the Alberta Wetland Mitigation Directive. Where less impacts are typical (e.g., Code of Practice activities), a Wetland Assessment and Impact Form is allowable to lessen the field assessment requirements.

Public Lands Act

The *Public Lands Act*, administered by Alberta Forestry, Parks and Tourism, is responsible for administering lands owned by the Crown. The *Public Lands Act* requires that a surface disposition be issued for the use of all public lands in Alberta. Under Section 3 of the *Public Lands Act*, public lands include the bed and shore of all permanent and naturally occurring waterbodies (i.e., watercourses and wetlands) unless the title has been granted to a private landowner.



Bed and shore of watercourses are all owned by the Crown. For work on the bed and/or shore of a watercourse, a Department License of Occupation or Temporary Field Authorization is required. A Temporary Field Authorization is a short-term deposition issued for a year or less. These are issued quickly to authorize access, occupation, or work on public land for a temporary period (Alberta Environment Sustainable Resource Development 2014). A Temporary Field Authorization is issued for one-off projects where there is no long-term or permanent occupation of public land. A Department License of Occupation is a long-term disposition for multi-year projects or long-term/permanent occupation of public land. A Department License of Occupation application must include a letter from the applicant describing the need, an application form, a detailed sketch plan, and application fees. These take 6+ months to issue so in some cases, it is allowable to have a Temporary Field Authorization before a Department License of Occupation is issued to allow for early entry onto public land.

All Class III and above wetlands may be claimed by the Crown. The Water Boundary Group for Alberta Environment and Protected Areas makes a determination of Crown claimed wetlands under the Public Lands Act. Currently, the review process for determination of Crown ownership will take up to 9 months to a year. It is optimal for all Class III and above wetlands traversed by a Project be submitted to the Public Lands for review by the Water Boundary Group immediately after field assessments to avoid delays in construction. This is a critical stage in the regulatory process and should be the first regulatory submission to occur. Additionally, Department License of Occupation or Temporary Field Authorization and/or compensation may be required for the alteration of a Crown claimed wetland.

Wildlife Act

In addition to the federal *Migratory Birds Convention Act*, birds may be protected provincially under the *Wildlife Act*. Alberta Environment and Protected Areas administers the *Wildlife Act*, which influences and controls human activities that may have adverse effects on wildlife or wildlife habitat on both Crown and privately owned land. Section 36(1) of the *Wildlife Act* states that a person shall not willfully molest, disturb, or destroy a house, nest, or den of prescribed wildlife or beaver dam in prescribed areas and times. This applies to nests and dens of endangered wildlife, migratory birds, snakes (except prairie rattlesnakes hibernacula). Additionally, Section 36(1) also applies to beaver dens and houses on land that is not privately owned as well as houses, nests, and dens of all wildlife in a wildlife sanctuary and nests of game birds in game bird sanctuaries. As a result of the *Wildlife Act*, setbacks and Restricted Activity Dates have been defined for important species.

Restricted Activity Dates are based on existing knowledge of species-specific seasonal life history traits, such as breeding, nesting, and rearing activities. Generally, interannual climate variation is captured within the dates, however, there may be occurrences where the Restricted Activity Dates does not cover the entire trait (i.e., young still in the nest) (Government of Alberta 2011). As a result, the Restricted Activity Dates should be extended to avoid disturbance. Setback distances are based on thresholds where human disturbance will adversely affect key wildlife areas or sites (Government of Alberta 2011).



If wildlife is encountered on a Project during construction a Permit for Damage Control from Alberta Environment and Protected Areas is likely required to remove the individual and/or the nest, den, burrow, etc. A local wildlife control company will remove the individual and/or nest, den, burrow, etc. with the necessary permits and reporting.

Historical Resources Act

The *Historical Resource Act* is administered by Minister of Culture to preserve and study Alberta's historical resources. *Historical Resource Act* clearance must be obtained by the minister before development.

Typically, any work that occurs with ground disturbance should consider impacts to Historical Resources, by completing a Historic Resource Clearance that provides clearance to Projects through the Ministry of Culture. Areas with higher Historic Resource Value such as next to watercourses may incur requirements for Historic Resource Impact Assessments.

Environmental Protection and Enhancement Act

The *Environmental Protection and Enhancement Act* is administered either through Alberta Environment and Protected Areas for projects such as land development, or through the Alberta Energy Regulator for oil and gas related activities. The *Environmental Protection and Enhancement Act* supports the protection, enhancement, and wise use of the environment within a development framework. The *Environmental Protection and Enhancement Act* manages air, land, and water, and its accompanying regulations set out in detail the activities that require approvals and the requirements for obtaining them. An approval may be required for activities related to stormwater management, waste management, substance release, potable water, pesticides, designated materials, as well as for conservation and reclamation.



Table 2.1 Regulatory Approval Timelines

Regulation	Approval Type	Timeline	Comment
Federal			
<i>Fisheries Act</i>	Fisheries and Oceans Canada Authorizations	3 months for Review, 6+ months for Authorization	Typically, can avoid Authorization for activities that fall under a Code of Practice.
<i>Canada Navigable Waters Act</i>	Notification: Minor works in Navigable Waters	Requires public notice before construction. No minimum timeline is provided by the Act, however best practice is at least 2 weeks.	Minor works include: - Erosion-protection works - Aerial cables - Submarine cables - Buried pipelines - Outfall and water intakes - Dredging - Watercourse crossings
	Major works in any Navigable Water	45-day notice period, then typically 4 weeks for Approval	The classes of works currently established in the Major Works Order that are likely to pose a substantial interference to navigation including: - Aquaculture sites - Bridges - Causeways - Works – Water control structures - Ferry cables
	Works that may impact navigation but not a Minor or Major work	45-day notice period, then typically 4 weeks for Approval	Must submit an application for an approval to the Minister and allow for public notice.
	No interference with navigation notification.	Requires public notice before construction. No minimum timeline is provided by the Act, however best practice is at least 2 weeks.	For works that occur within a navigable waterbody but will not interfere with navigation.
<i>Impact Assessment Act</i>	<i>Impact Assessment Act</i> Approval	12-24+ months	Typically for Major Projects and for interprovincial works and would be unlikely to be triggered by most County projects.



Regulation	Approval Type	Timeline	Comment
<i>Migratory Birds Convention Act</i>	No approval required (due diligence only) (Note special consideration for species listed in Schedule 1 of the Act for their nests are protected year-round)	Pre-construction survey	- No approval required per se, but all migratory birds, their eggs, and their nests are protected and may have a setback or require a Permit to remove from a construction site. - It is best to remove habitat where feasible before nesting season. - Continuous monitoring during construction if habitat is available may be required (nest sweeps every 2-6 days). - Fines if due diligence is not illustrated.
<i>Species at Risk Act</i>	Approval	6 months	As the <i>Species at Risk Act</i> is only in place in federal lands or for aquatic species, it would be rare for the Act to be triggered unless interacting with aquatic species at risk, which are typically on the east slopes of the Rocky Mountains.
Provincial			
<i>Water Act</i>	<i>Water Act</i> Code of Practice Notification (watercourse and wetland)	14 days	- Wetland assessments must occur from late May-September. Where a Wetland Assessment and Impact Form is permitted, work can be completed via desktop. - Stream crossing assessments should be completed under ice free flowing conditions.
	<i>Water Act</i> Approval (watercourse)	4-12 months	Assessments should be completed under ice-free, flowing conditions.
	<i>Water Act</i> Approval (Class I or Class II wetland)	4-12 months	- Assessments must occur from late May-September. - Compensation is required.
	<i>Water Act</i> Approval (Class III, IV, V, or VI wetland)	4-12 months	- Assessments must occur from late May-September. - Compensation is required.



Regulation	Approval Type	Timeline	Comment
	<i>Indigenous Engagement – Pre-consultation</i>	1-2 weeks	Applies to projects that require <i>Water Act</i> approval. Alberta Aboriginal Consultation Office determines if Indigenous consultation is required.
<i>Public Lands Act</i>	Temporary Field Authorization and/or Department License of Occupation (Department License of Occupation) (Watercourses)	6+ months	Department License of Occupation and/or Temporary Field Authorization is typically required for any structure or construction activity on the bed and shore.
	<i>Public Lands Act</i> Review (Class III, IV, V, or VI wetland)	6+ months	All Class III, IV, V and VI wetlands may be claimed by the Crown and require a review from the Water Boundary Group of Public Lands.
<i>Wildlife Act</i>	Due diligence only	Pre-construction survey	- No approval required per se, but all wildlife and their dens, nests, hollows, etc., are protected and may have a setback or require a Permit for Damage Control to remove from a construction site. - Continuous monitoring during construction if habitat is available may be required. - Fines if due diligence is not illustrated.
<i>Historical Resources Act</i>	<i>Historical Resources Act</i> Clearance required for ground disturbance	6 weeks from submittal	Areas with high historic values may trigger Historical Resource Impact Assessment by a qualified archaeologist/paleontologist.
<i>Environmental Protection and Enhancement Act</i>	Required for stormwater systems	~1 year	<i>Environmental Protection and Enhancement Act</i> approvals for stormwater drainage plans may take upwards of 1 year to process.



Municipal Government Act Chapter M-26 RSA 2000

The *Municipal Government Act* establishes how local municipalities operate and is one of the most significant and far-reaching statutes in Alberta. The *Municipal Government Act* affects everyone in Alberta, the private sector, and every ministry in the Government of Alberta.

The authority for municipal planning, subdivision and development control is established in Part 17 of the *Municipal Government Act*. The purpose of this Part is set out in s.617 of the *Municipal Government Act*. It enables municipalities to adopt plans and land use bylaws and to make planning decisions to achieve the beneficial use of land without infringing on the rights of individuals except to the extent necessary for the greater public interest. In addition, the Matters Related to Subdivision and Development Regulation (AR 84/2022), authorized by s.694(1) of the *Municipal Government Act* provides for the administration of subdivision applications, referrals, subdivision and development conditions, registration and endorsements of subdivision, and Land and Property Rights Tribunal setbacks for provincial appeals.

In 2020 changes were made to the *Municipal Government Act* through *Bill 48, the Red Tape Reduction Implementation Act* to update Part 17. The changes were to create more efficient and streamlined municipal land development application and approval processes.

The legislated planning framework is depicted in Exhibit 2.1.

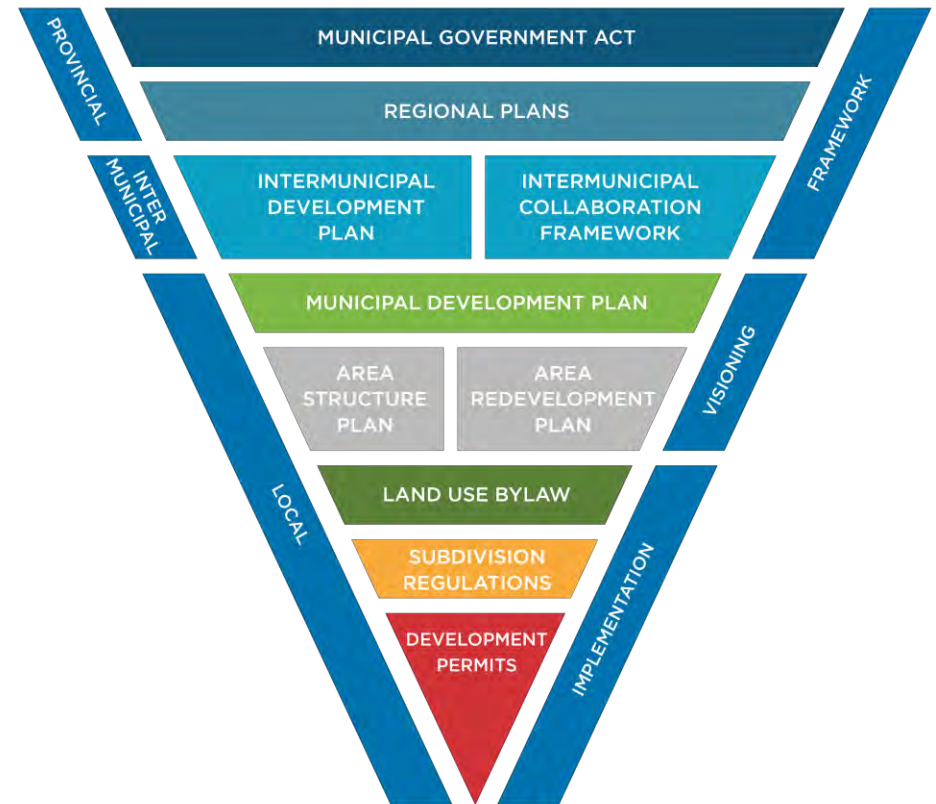


Exhibit 2.1 Alberta Legislated Planning Framework



Municipal Government Act Sections relevant to stormwater are outlined below:

- Enforcement of Municipal Law – gives municipalities’ authority to inspect and issue orders to remedy stormwater construction contraventions of the *Municipal Government Act* or a municipal bylaw and to establish the powers and duties of bylaw enforcement officers in a bylaw.
- Offences and Penalties – describes offences, that no obstructions of public utility construction, maintenance, operation, or repair allowed, and provides municipalities the ability to issue fines for offences and obstructions.
- Planning Authorities – requires municipalities to establish a subdivision and development authority and appeal board to hear appeals on development decisions (the basis of which may be offsite drainage concerns from affected adjacent landowners).
- Statutory Plans – identifies Municipal Development Plan, Inter-Municipal Development Plan, Area Structure Plan, and Area Redevelopment Plan as plans that set policies to guide development in municipalities. An Inter-Municipal Development Plan must include infrastructure policies for development around the boundaries of two municipalities. A Municipal Development Plan must coordinate infrastructure (could apply to stormwater) with adjacent municipalities if no Inter-Municipal Development Plan and set policies for municipal services and facilities. An Area Structure Plan must establish servicing frameworks for new development in specific areas of a municipality. Area Redevelopment Plan policies must address establishing, improving, or relocating public utilities and may set development levies.
- Land Use Bylaws – requires all municipalities to adopt a Land Use Bylaws. The Land Use Bylaws must establish the way municipal decisions on development permit applications will be made, prescribe permitted and discretionary uses for each land use district, and include stop order and enforcement provisions to stop non-compliant development or illegal development (i.e., lot grading without permit approval for a grading plan).
- Levy Bylaws and Conditions – describes municipal authority to enact bylaws for a redevelopment levy or off-site levy for stormwater public utility purposes.
- Subdivision of Land – requires that a parcel to be subdivided must be suitable for the intended use, conform to the municipality’s planning framework and the *Municipal Government Act*, and sets out that a development agreement may be a condition of approval. Establishes that a Conceptual Scheme is to relate a proposed application to future subdivision and development of adjacent land and have the same referral rules as subdivision applications.
- Reserve Land and Land for Roads and Utilities – allows municipalities to take land for public utilities, and/or environmental reserve under subdivision without paying compensation. Describes environmental reserve as land consisting of a natural drainage course; subject to flooding or is unstable; a 6 + metre buffer strip along the bed and shore of any body of water; that would help prevent pollution of an adjacent water body, provide public access to an adjacent water body – not an exhaustive listing.



- Development Permits – sets out that a Land Use Bylaw require a Development Permit for most types of development, establish an approval process, and what content required for a development permit application. Allows municipalities to request a development agreement to install or pay for the installation of a public utility as a condition of Development Permit approval. The *Municipal Government Act* defines public utility “as a system or works used to provide one or more things for public consumption, benefit, convenience or use: (i) water or steam; (ii) sewage disposal; (iii) public transportation operated by or on behalf of the municipality; (iv) irrigation; (v) drainage; (vi) fuel; (vii) electric power; (viii) heat; (ix) waste management; (x) residential and commercial street lighting, and includes the thing that is provided for public consumption, benefit, convenience or use.
- Development in Floodways – establishes that the Lieutenant Governor in Council can make regulations to control development in a floodway, exempt a municipality from the regulations, override other *Municipal Government Act* provisions, and define floodway. Regulations made take precedence over any municipal statutory plans or bylaw enacted under the *Municipal Government Act*. If not exempted, it requires that County municipal statutory plans, any bylaw, or Land Use Bylaw be amended to comply with the regulations. If a master drainage bylaw were enacted by the County, or Land Use Bylaw content included development regulations regarding floodways, these bylaws must comply with any regulations made under this section of the *Municipal Government Act*.
- Regulations – sets out regulations for applications for Subdivision and Development of land including the subdivision or development authority’s review for completeness, decisions respecting subdivision/development standards and requirements, and information to be included in a notice of decision, with or without conditions. Requires a development application for land, providing complete information to the County including site characteristics such as wetlands, drainage courses to be deemed complete, and where present that the County must consider the suitability of the site for the proposed development prior to issuing a decision, with or without conditions.
- Establishment and Operation of Growth Management Boards – Conformity with growth plan. Requires that every municipal statutory plan, bylaw, resolution or municipal agreement made by the County must conform with growth plan. Edmonton Metropolitan Regional Growth Plan policies for Natural Living Systems, Land Use and Infrastructure are particularly relevant to stormwater and require consideration in municipal statutory plans (Municipal Development Plans, Inter-Municipal Development Plans, Area Structure Plans, Area Redevelopment Plans).



Effective June 1, 2022, new Alberta Regulation 84/2022, enacted through Ministerial Order No. MSD: 002/22 replaced AR 43/2002. This provincial regulation is authorized by the *Municipal Government Act* and used by Alberta municipalities in considering subdivision and development applications that the municipality has authority to approve under the *Municipal Government Act*. It provides more detail on subdivision application processes, itemizes what subdivision applications must contain, identifies agency referrals for subdivision applications and timelines for a decision on subdivision applications, and what must be considered when making a decision on subdivision applications. The regulation also includes conditions and setback requirements for subdivision and development permit applications.

The below outlines regulations related to stormwater:

- Subdivision Applications and Relevant Considerations – Requires multi parcel subdivision applications of more than 4 lots include any Environmental Reserve agreement, a proposed subdivision plan showing the location, dimensions and boundaries of existing rights of way of each public utility, any other rights of way, the boundaries of the bed and shore of any body of water contained within the parcel, if the land is located in a potential flood plain (a map showing the 1:100 flood plain when available), a conceptual scheme that relates the application to future subdivision and development of adjacent areas. Requires Subdivision Authority to consider topography, stormwater collection and disposal, and any potential for flooding. These items are specific to subdivisions of land into more than 4 lots.

- Subdivision Application Referrals – Requires referral of complete subdivision applications to the Deputy Minister or Minister responsible for the *Public Lands Act* if the parcel is adjacent to the bed and shore of a water body or contains the bed and shore; Deputy Minister of Environment and Protected Areas (previously Environment and Parks) if adjacent to works defined under the *Water Act*; municipalities with land adjacent and any other persons and local authorities deemed necessary.
- Subdivision and Development Conditions – The Development Authority cannot require as a condition of a completed development permit application, that the applicant submit a technical report regarding it to Council for their approval.
- Registration, Deferral and Endorsement – Proposed plan of subdivision must comply with the *Municipal Government Act* and the endorsement must contain information about the area covered by an Environmental Reserve easement if any.
- Provincial Appeals – Sets out required Land and Property Rights Tribunal distances from a body of water for land subject of a subdivision application. Identifies the Land and Property Rights Tribunal as the appeal body where the land is subject of a licence, permit, approval, or other authorization granted by the Minister of Environment and Protected Areas under any act the Minister is responsible for.

See Appendix A Planning Legislative Framework, A-1: Provincial – Stormwater Related Excerpts for a more detailed description of what is addressed in each section.



Lastly, the *Municipal Government Act* governs the development of utilities within the province. It provides municipalities the right to establish a utility, provided the utility charges customers in relative proportion to their use of the service. For example, a water utility can charge in proportion to metered water consumption (closely in proportion to use), and a wastewater utility can also charge in proportion to metered water consumption (considered in relative proportion to use, but not in exact proportion, as some water used is not returned to sewer). All utility charges collected from users must be used to provide the service in which they are intended and all utilities must provide an annual return on investment payment to the municipality.

A number of Alberta municipalities have developed Stormwater Utilities as a better way to fund stormwater services, based on the provisions of the *Municipal Government Act*. While there are various billing methods taken, it is possible to charge customers in relative proportion to use of the services and meet the requirements of the Act.

2.4. Regional Governance

At the regional level, Parkland County is a member municipality within the Edmonton Metropolitan Region and the Edmonton Metropolitan Region Board. The Edmonton Metropolitan Region Growth Plan establishes the overall regional structure and policy framework to guide and manage future growth and development and is implemented through member municipal statutory plans. The Growth Plan requires that municipal statutory plans align with the Growth Plan. Parkland County's Municipal Development Plan was referred to the Edmonton Metropolitan Region Board for evaluation through the Regional Evaluation Framework and approved. Edmonton Metropolitan Region Board requires that new or amendments to Municipal Development Plans, Inter-Municipal Development Plans, Area Structure Plans, and Area Redevelopment Plans be evaluated against the criteria set out in Ministerial Order No. MSD:088/20 and the policies and mapping of the Growth Plan to ensure conformance with it.

The Edmonton Metropolitan Region Board's Metropolitan Regional Servicing Plan addresses stormwater management in the Region. Two recent Edmonton Metropolitan Region Board Charter initiatives may impact the Metropolitan Regional Servicing Plan and affect member municipal servicing approaches and planning and engineering standards pertaining to stormwater.



1. The Flood Risk Assessment Project Charter, March 2022. The purported imperatives for this project are increased growth pressures, climate change, aging infrastructure, outdated stormwater networks, and the need for the Edmonton Metropolitan Region Board Stormwater Collaborative (initiated in February 2021 and comprising all 13 member municipalities) to assess flood risk at the regional level. A common theme is that the change in rainfall patterns which impacts the rainfall IDF (intensity duration frequency) relationship is leading to increased flood damage to municipal infrastructure, businesses and homes and negatively impacting creeks, streams and other natural water bodies. The basic premise is the total rainfall over 24 hours with a 1:100 year chance of occurring is going up. The Edmonton Metropolitan Region Flood Risk Assessment project was conducted concurrent to this master plan. Early outcomes from this Edmonton Metropolitan Region initiative may inform implementation of Parkland's Stormwater Master Plan strategies.

2. The Regional Climate Risk and Vulnerability Assessment. At the June 9, 2022 Edmonton Metropolitan Region Board meeting, Board administration presented the Business Case for a Regional Climate Risk and Vulnerability Assessment and sought Board approval to proceed to the next step of preparing the Project Charter for this work. At the regional level, the Climate Risk and Vulnerability Assessment will identify risks and vulnerabilities the Region will face due to a changing climate. Extreme events including flooding have become more common. The Climate Risk and Vulnerability Assessment will impact the Metropolitan Regional Servicing Plan regarding stormwater management by establishing adaption actions around climate resilient neighbourhoods and the planning, design, and construction of stormwater infrastructure to adapt to a changing climate.

It should be mentioned that Parkland County is part of the Tri-Municipal sub-regional working group with Spruce Grove and Stony Plain. While not a recognized governing body, the Tri-Municipal working group have successfully worked on local initiatives together including the Tri-Municipal Regional Plan in 2021. Some of the key stormwater recommendations are listed below:

- Consider developing a joint Tri-Municipal stormwater master plan.
- Consider developing shared stormwater management infrastructure where storm basin boundaries do not align with municipal boundaries.
- Develop a joint "Low Impact Development" Strategy.



2.5. Municipal Governance

At the municipal planning level, the legislative framework includes statutory bylaws and appeal components. Municipalities establish planning policy to guide future growth and development by adopting statutory plans and land use bylaws to implement policy and make amendments thereto. Policies are put into operation by municipally appointed subdivision and development authorities which are responsible for receiving and deciding on subdivision and development permit applications. These administrative decisions may be appealed to the subdivision and development appeal board or, in certain instances, to the Land and Property Rights Tribunal.

Exhibit 2.2 is Parkland County's *Proposed Plan Framework and Hierarchy* as depicted in Appendix I of the Parkland County Municipal Development Plan.

Highlights related to stormwater policy and regulations contained in Parkland County's Statutory Plans (Municipal Development Plan and Area Structure Plans) and the Land Use Bylaw are presented in Section 3.

2.6. Discussion

The regulatory roles and responsibilities for stormwater can be complex given the different levels of government and the many applicable Acts and Regulations. Table 2.2 below provides a simplified illustration of the role and responsibilities for Parkland County.

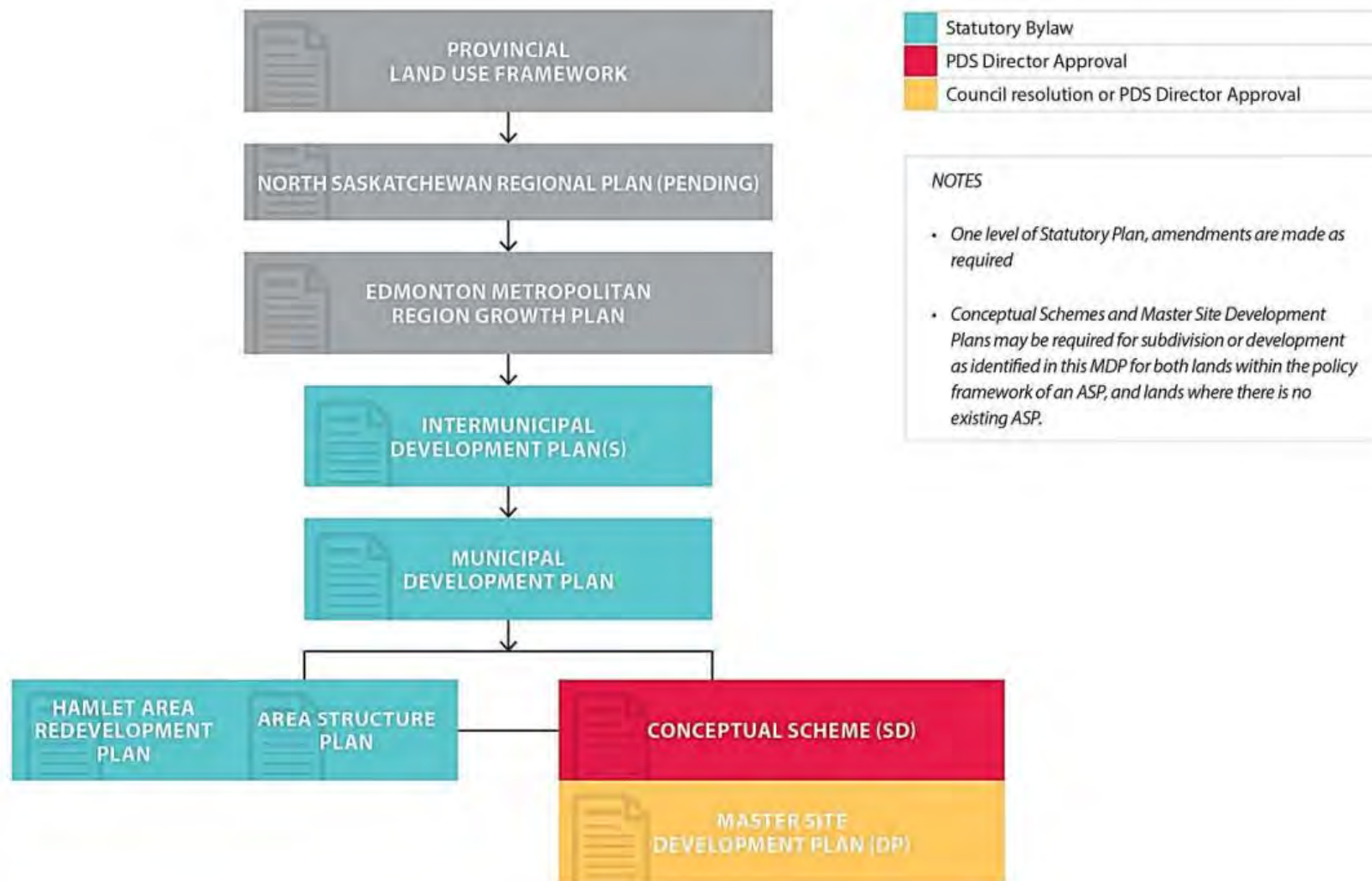


Exhibit 2.2 Parkland County Proposed Plan Framework and Hierarchy



Table 2.2 Regulatory Roles and Responsibilities

Parkland County Stormwater Related Activities	Federal Government				Government of Alberta						
	Fisheries Act	Canada Navigable Waters Act	Impact Assessment Act	Migratory Birds Convention Act	Water Act	Public Lands Act	Wildlife Act	Historic Resource Act	Environmental Protection and Enhancement Act	Alberta Wetland Policy	Municipal Government Act
Long-range Land Use Planning											
Short-term Land Use Planning											
Subdivision Application Review and Approval											
Development Permit and Building Permit Approval											
Subdivision Acceptance (CCC, FAC)											
Roadway and bridge projects - design and construction											
Design and construction of stormwater infrastructure											
Operation and maintenance of stormwater infrastructure (including road ditches)											
Operation and maintenance of natural and constructed ditches											
Enforcement of County's Land Use Bylaw											
Enforcement of Other County Bylaws											
Wetland and Riparian Area Enhancements											

LEGEND

Indirectly or rarely applies, staff should have general awareness

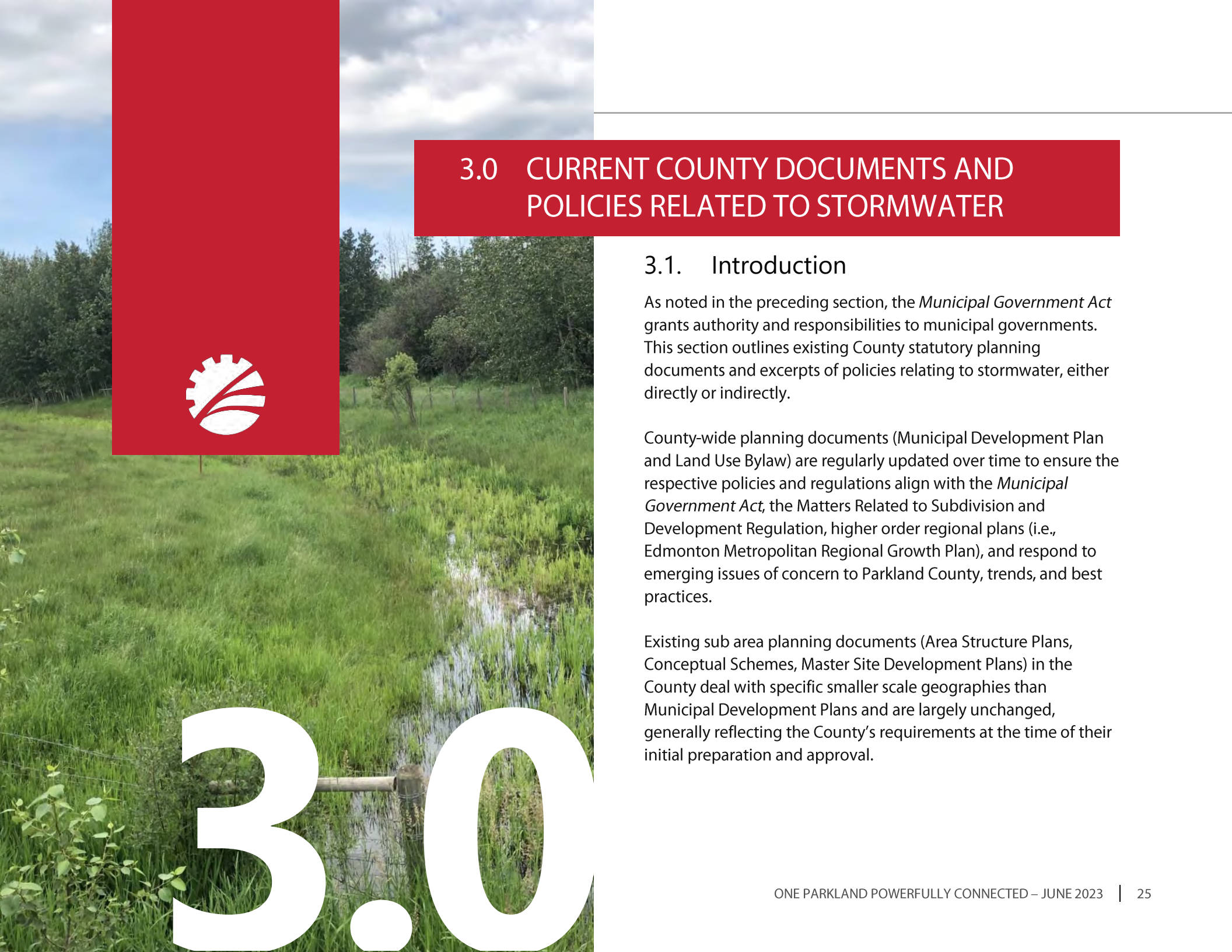


Applies in some situations, staff should be aware



Directly applies, staff should have direct knowledge and apply it





3.0 CURRENT COUNTY DOCUMENTS AND POLICIES RELATED TO STORMWATER

3.1. Introduction

As noted in the preceding section, the *Municipal Government Act* grants authority and responsibilities to municipal governments. This section outlines existing County statutory planning documents and excerpts of policies relating to stormwater, either directly or indirectly.

County-wide planning documents (Municipal Development Plan and Land Use Bylaw) are regularly updated over time to ensure the respective policies and regulations align with the *Municipal Government Act*, the Matters Related to Subdivision and Development Regulation, higher order regional plans (i.e., Edmonton Metropolitan Regional Growth Plan), and respond to emerging issues of concern to Parkland County, trends, and best practices.

Existing sub area planning documents (Area Structure Plans, Conceptual Schemes, Master Site Development Plans) in the County deal with specific smaller scale geographies than Municipal Development Plans and are largely unchanged, generally reflecting the County's requirements at the time of their initial preparation and approval.

3.0



This section will also provide an overview of the County's current Terms of Reference and identify the approving body for Area Structure Plans, Conceptual Schemes and Master Site Development Plans that guide more detailed sub-area planning.

Finally, this section provides a brief overview of existing stormwater planning studies and related documents such as Parkland County Engineering Design Standards, Conceptual Schemes and Master Site Development Plans, Acheson / Big Lake Area Drainage Reports and *Water Act* Stormwater Fenceline Agreement and the Draft Surface Drainage and Lot Grading Bylaw.

3.2. Municipal Development Plan – Bylaw 2017-14 – One Parkland: Powerfully Connected

The 2017 Parkland County Municipal Development Plan, amended on October 12, 2019, is the overarching municipal statutory plan guiding future land use and development decisions in the County. It contains a vision, objectives, policies and figures. Policies are organized by policy area and provide direction addressing land use and development, the environment, and servicing to support future population and employment growth. They also direct intermunicipal collaboration policies describing matters on which the County intends to collaborate, cooperate, and coordinate with its municipal neighbours, and implementation policies for monitoring the performance of the plan over the plan's horizon. Municipal Development Plan Policies guide more detailed planning in Area Structure Plans, Conceptual Schemes, subdivision, and development.

We note, at this time, the former Village of Wabamun's Municipal Development Plan has not yet been rescinded by County Council, so it continues to guide development in the now Hamlet of Wabamun.

Specific Parkland County Municipal Development Plan Sections with policies related to stormwater are outlined below:



- Section 9 Transportation and Utility Infrastructure
 - o Recovering Costs – Maintain current off-site levies bylaws to recover capital costs of stormwater systems in new developments. Require developers to pay levy fees as a condition of subdivision/ development and to front end the cost of on-site and off-site infrastructure.
 - o Stormwater Planning – Consider impacts onsite and in surrounding drainage catchment areas, naturalize constructed Stormwater Management Facilities, and incorporate Low Impact Development to maintain quality and manage quantity of surface water.
 - o Subdivision and Development Requirements for Stormwater Management – Incorporate wetlands/ low areas in new subdivision planning and development. Make adherence to County Policy C-ES04- Stormwater Management Facility Naturalization a condition of subdivision approval.
- Section 10 Natural Environment.
 - o High Priority Landscapes – Preserve surface and groundwater interactions and connectivity and address cumulative effects at the watershed and broader landscape scale (such as upper Sturgeon River reach, Devon Dunes, Wabamun Creek, North Saskatchewan River, central wetlands, aquifers, class 1 and 2 soils).
 - o Surface Water, Groundwater and Wetlands - Conserve wetlands, prepare sub-watershed lake land use plans, protect highest value wetlands through Environmental Reserve and Environmental Reserve easement dedication, conservation reserves or easements, encourage net gain of wetlands through stormwater management facility naturalization, protect quality and quantity of surface water resources, require technical studies of surface water to minimize impacts, and support naturalization, retention and enhancement of natural drainage patterns during the subdivision and development process.
 - o Renewable Energy and Sustainable Development - Make a Community Climate Adaptation Plan. The Plan is to provide adaptation actions for increased rainfall and flood risk actions.
- Section 12 Intermunicipal Collaboration and Local Governance.
 - o Collaborative approach – Resolve intermunicipal issues such that both parties' benefit.
 - o Communication and engagement – Support open and transparent governance, informing residents and stakeholders about major planning initiatives, and decisions, and seek feedback.

3.0 Current County Documents and Policies Related to Stormwater



- Section 13 Implementation.
 - o Completing and updating plans and studies – Update County wetland inventory, complete Stormwater and Drainage Master Plan for Acheson Special Study Area and prepare/maintain sub-watershed lake land use plans.
- Appendix 1 Proposed planning framework and hierarchy (see Figure 2.2 in Section 2.5 above) and Sections 1.1 and 1.2 for Terms of References for Area Structure Plans, Area Redevelopment Plans, Conceptual Schemes, and Master Site Development Plans.
- Appendix 2 Technical reports and studies – Terms of References for fourteen (14) technical studies informing what must be identified and addressed in each study. The following are technical studies particularly addressing surface water and stormwater related matters:
 - o Biophysical Assessment (Desktop + Comprehensive)
 - o Floodplain (1:100 year) Analysis
 - o Hydrologic Assessment
 - o Risk Assessment
 - o Stormwater Management Report

Appendix 1 of the Parkland County Municipal Development Plan lists the items that need to be addressed in Area Structure Plans and Conceptual Schemes. The stormwater related items are listed in Tables 3.1 and 3.2 below.



Table 3.1 Stormwater Issues to be Addressed in ASPs

What must be addressed:	What may need to be addressed:
• Compatibility with <i>Municipal Government Act</i>, Edmonton Metropolitan Region (formerly Capital Region) Growth Plan (as required), Parkland County Municipal Development Plan, other Parkland County plans and policies • Site context and development considerations; existing site conditions, topography, constraints, and adjacent development • Engineering Design Brief including servicing infrastructure and capacities • Phasing of Land Development and Infrastructure • Environmental and biophysical impact • Reserve land	• Recreation and open space

Source: MDP Appendix 1

Table 3.2 Stormwater Issues to be Addressed in Conceptual Schemes and Master Site Development Plans

What must be addressed:	What may need to be addressed:
• Compatibility with Municipal Development Plan, Area Structure Plan, and other County policies • Engineering Design Brief including: ○ On-site servicing scheme and connectivity/impacts off-site ○ Drainage ○ Impact on adjacent development ○ Phasing	• Parks and Open spaces • Environmental and/or biophysical impact

Source: MDP Appendix 1

See Appendix A: Planning Legislative Framework, A-2: Municipal - Stormwater Related Excerpts for a more detailed description of what is addressed in each Municipal Development Plan Section (excluding Municipal Development Plan Appendices).



3.3. Parkland County Land Use Bylaw – Bylaw 2017-18 – Regulations

Parkland County's Land Use Bylaw No. 2017 – 18 (Consolidated June 19, 2020) is the primary document regulating the use and development of land and buildings in the County excluding lands in Wabamun. The Wabamun Land Use Bylaw 07 – 2010 continues to remain in effect until repealed and transitioned to become part of Parkland County's Land Use Bylaw.

Relevant County Land Use Bylaw provisions related to stormwater are outlined below:

- Land Use Districts
 - o Districts and overlays – Provide general subdivision and development standards for each District. Overlays outline area specific regulations.
 - o Osprey Bay Direct Control District development regulations – Requires biophysical assessment for subdivisions since the Osprey Bay Direct Control District is within an area defined as environmentally significant in the Environmental Conservation Plan.
 - o Atim Creek/Big Lake Floodplain Overlay – Sets out specific grading and landscaping requirements for the golf course clubhouse access and parking area to manage drainage.
 - o Legend Estates Overlay - Sets out that a Site Drainage and Grading Plan, and Stormwater Management Study may be required for subdivision and development permit applications, and that drainage requirements may be imposed as a condition of approval.
- Development Regulations
 - o Development on or adjacent to hazard lands – Do not allow development within 1:100 yr. floodplain of North Saskatchewan River, Pembina River, Wabamun Lake, Atim Creek, Big Lake, or other waterbody unless compiles with Sections 10.2 and 10.3 of Land Use Bylaw. Requires top-of-bank be determined by survey of a geotechnical engineer, or any other method determined to be satisfactory to the Development Authority for development permit and Land Use Bylaw amendment applications. Referrals may be made to federal or provincial departments prior to the County issuing notice of decision.
 - o Stripping, filling, excavation, and grading – Regulations for construction of artificial water bodies and dugouts; information required for a development permit application including grading proposed, effect on existing drainage patterns, grading and re-contouring plans, pre- and post-development elevations, and cross-sections. Enables the County, as condition of development permit approval, to require a lot grading and drainage plan be submitted for County approval. Requires the County to consider the effect of the proposed lot grading plan on water courses and drainage patterns; conservation of water courses, and maintenance of positive drainage and potential drainage effects on adjacent or nearby properties before approving. Requires proposed building grade to retain to the extent practical, the natural contour of land, minimize the need for retaining walls, and ensure positive drainage to receiving water courses. Establishes that a person who alters an approved lot drainage on a site so that it drains onto adjacent parcels, is responsible for corrective drainage structures.



- o Landscaping – Allows County discretion to require a Landscape Plan for a development permit application. If required, the landscape plan must include a detailed grading plan showing side slope grades, drainage swale grades, existing grades on adjacent lands and all proposed site elevations, and locations of all existing and proposed utilities and easements; including storm sewers, and catch basins for site drainage. Requires a Letter of Credit for landscaping.
- o Parking and loading – Regulations require that grades and drainage dispose of surface water and prohibit surface drainage to cross sidewalks or site boundaries without County approval.
- Administration
 - o Enforcement – Describes what is an offence under the County's Land Use Bylaw. Enables the County to cancel, suspend, or modify the development for non-compliance with notice to a permit holder; to issue warnings or orders, and take actions or measures to enforce the Land Use Bylaw. Enables a Community Peace Officer or Bylaw Enforcement Officer to issue a violation ticket where there are reasonable grounds that a person has committed an offence. Establishes penalties for offences.

- o Land Use Bylaw Amendment – Land Use Bylaw amendment applications may be required to include how statutory and non statutory plans (i.e., this Stormwater Master Plan when approved by the County) have been considered, and technical studies such as a flood plain analysis if the County deems this information is required to inform their review of an application.

See Appendix A: Planning Legislative Framework, A-2: Municipal Stormwater Related Excerpts for further details.

3.4. Parkland County Planning and Development Processes

The County's planning and development process includes the following steps: a development permit, subdivision application, development agreement, and building permit. The stormwater submission requirements for the different types of development activity are summarized in Table 3.3 below. It is noted that in March 2023 County administration introduced a draft Surface Drainage and Lot Grading Bylaw to County council and that the draft bylaw has not been accepted or implemented at the time of writing (April 2023).

3.0 Current County Documents and Policies Related to Stormwater



Table 3.3 Development Stormwater Submission Requirements

Development Activity	Type of Development	Description	Stormwater Submission Requirements
Development Permit	Residential	Residential dwelling, accessory buildings, demolition	Site plan must show distance to water sources (floodplain, top of bank, water bodies), existing drainage easements, and offset distance between proposed structure and easement
	Commercial/Industrial	Industrial, Natural resources extraction	Site drainage and grading plan (stamped engineering plans); Erosion and Sediment Control Plan
	Land Development – Stripping, grading, filling and excavation	All	Site drainage and grading plan (stamped engineering plans); Erosion and Sediment Control Plan; site plan must show distance to water sources
Subdivision Application	Max. 4 Parcels per quarter section (3 Parcels plus the remnant)	Residential and Agriculture General District (AGG) zoning only	Tentative Plan – must include river, stream, lake
	Multiparcel/ Industrial/Bareland Recreational Resort	Includes all industrial and any subdivisions with 5 or more parcels per quarter section	Tentative Plan – must include river, stream, lake; Conceptual Scheme – includes stormwater management plan, overall Surface Drainage Plan, Erosion and Sedimentation Control Plans, etc.
Development Agreement	Where local improvements asset classes are to be the responsibility of Parkland County.	All	Stamped design drawings (with drainage info); securities, Construction Completion Certificate, Final Acceptance Certificate
Building Permit	Commercial/ Industrial	All	n/a stormwater not mentioned; site plan must include existing and finished ground elevations
	Residential	Single family dwelling / accessory buildings / detached garages	n/a stormwater / grading not mentioned



3.5. County Engineering Design Standards – Storm Drainage Systems

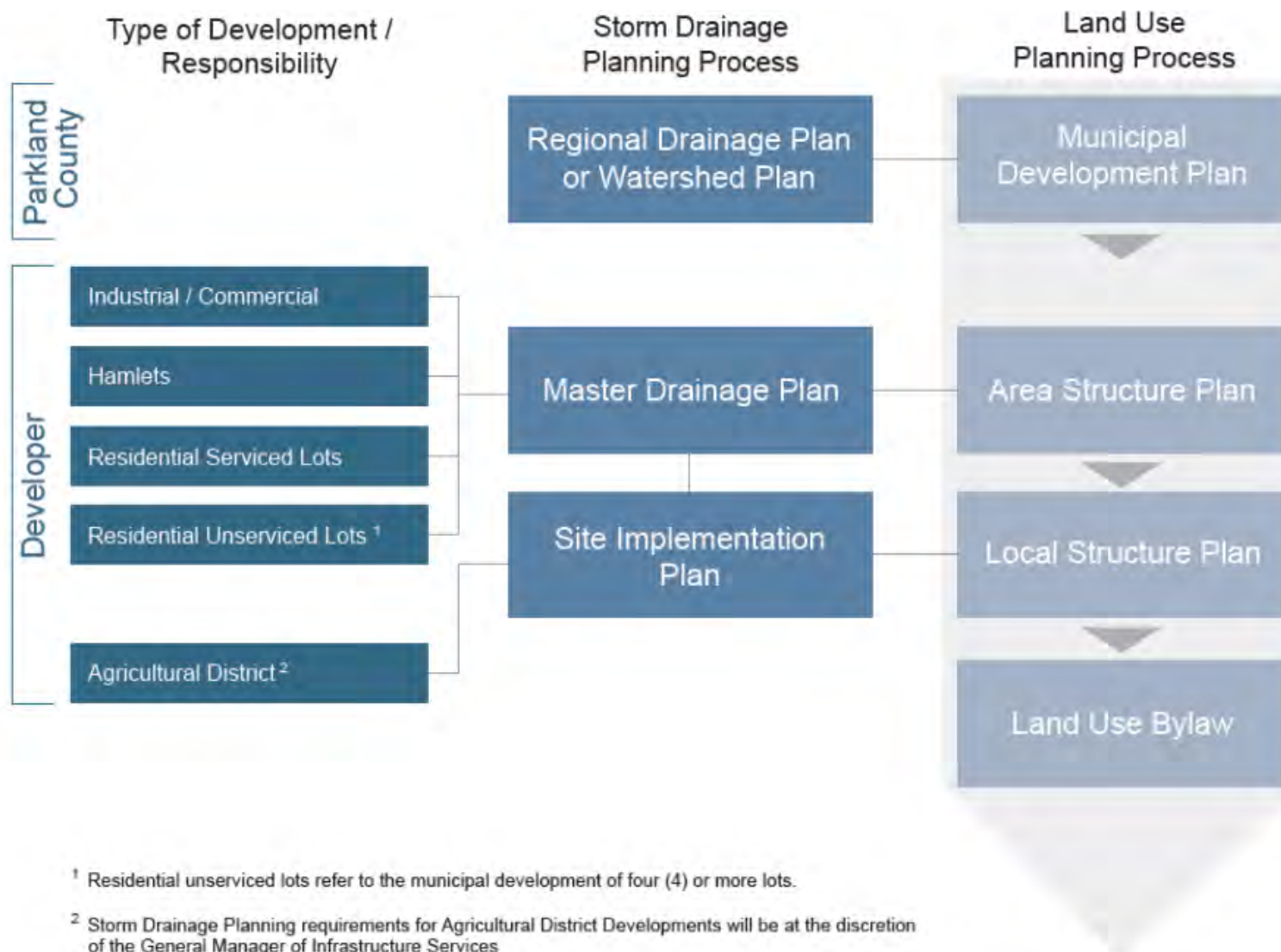
The Parkland County Engineering Design Standards for storm drainage systems are summarized below. Part A focuses on the scope of the planning studies required by the County and developers at different stages of the land use planning and land development process. It also describes the different design submission requirements for different types of developments. Part B lists the stormwater design standards.

The following summary is based on the June 2014 Engineering Design Standards (amended March 2015) accessed on the County's website in July 2022. It is noted that the County is currently (April 2023) revising these standards and an updated version is expected to be released soon.

3.5.1. PART A: PLANNING STUDIES

The Parkland County Engineering Design Standards Section 6 Stormwater include the following graphic to illustrate the storm drainage planning process within the County's land use planning process. It is noted that this graphic is not consistent with the County's current Planning and Land Development Engineering practices (County does not have Local Structure Plans and this graphic excludes Conceptual Schemes).

3.0 Current County Documents and Policies Related to Stormwater



Source: Parkland County Engineering Design Standards Section 6 Stormwater

Exhibit 3.1 Parkland County Storm Drainage Planning Process



The highest level of stormwater planning is the Regional Drainage Plan / Watershed Plan. It proposed local and regional cooperation that recognizes watershed boundaries and focuses on water resources management as the central planning objective. The plan would then outline specific requirements of the subsequent Master Drainage Plan. The County has not yet completed a Regional Drainage Plan/ Watershed Plan but has completed sub-watershed planning studies which focused on land use planning (refer to Wabamun Lake Sub-watershed studies below).

The next level of stormwater planning is the Master Drainage Plan. It is intended to be a comprehensive document that addresses both short and long-term stormwater drainage servicing requirements and must consider a number of design alternatives. The servicing standards include a checklist of over 30 submission requirements.

This list includes:

- Watercourse and development areas
- Existing topography and watercourses
- Existing and proposed land use
- Pre-development and post-development runoff flows and rates
- Grading plans and sub-catchment boundaries
- Interim and ultimate servicing plans
- Storage requirements, including volume and locations
- Proposed minor and major drainage systems
- Stormwater management facility description
- Water quality control and Erosion/Sedimentation Control Plan
- Hydraulic analysis for a range of storm events
- Staging and implementation plan

The County has completed one master drainage plan, refer to Acheson/Big Lake Area Master Drainage Plan, refer to Section 3.8 below.

The third level of stormwater planning document listed in the County's Engineering Design Standards is the Site Implementation Plan. The requirements for these documents vary based on the size and type of development, which are summarized in Table 3.4 below.

3.0 Current County Documents and Policies Related to Stormwater



Table 3.4 Site Implementation Plan Submission Requirements for Various Development Types

Type of Development	Overview of Plan Submission Requirements
Multi-lot Country Residential (For Multi-Parcel Residential Subdivision the Parcel density requirement is determined by the Subdivision Authority.)	• Outfall locations and overland flow routes, ponding depths • Minor drainage system details • 5, 25 and 100 year storm hydraulic analysis • Public Utility Lot requirements • Proposed stormwater management facility design and maintenance information • Water quality control and Erosion/Sedimentation Control Plan • Grading extents and earthworks balance • Staging/implementation plan • Oversizing details for adjacent lands • Financing considerations for cost shareable facilities
Commercial (BI) and Rural Industrial/ Commercial Districts and Industrial (MI) Districts (Parcel Density and Minimum and Maximum Parcel Area requirements determined by Subdivision Authority.)	• Outfall locations and overland flow routes, ponding depths • Minor drainage system details • 5, 25 and 100 year storm hydraulic analysis • Public Utility Lot requirements • Proposed stormwater management facility design and maintenance information • Water quality control and Erosion/Sedimentation Control Plan • Grading extents and earthworks balance • Staging/implementation plan • Oversizing details for adjacent lands • Financing considerations for cost shareable facilities



Type of Development	Overview of Plan Submission Requirements
Regional Business Industrial District (no maximum number of lots/quarter section)	• Outfall locations and overland flow routes, ponding depths • Minor drainage system details • 5, 25 and 100 year storm hydraulic analysis • Public Utility Lot requirements • Proposed stormwater management facility design and maintenance information • Water quality control and Erosion/Sedimentation Control Plan • Grading extents and earthworks balance • Staging/implementation plan • Oversizing details for adjacent lands • Financing considerations for cost shareable facilities
Single Lot Industrial	• Site grading drawing with existing and proposed surface elevations, swale locations, direction of drainage, provision for overland flows from adjacent undeveloped lands
Country Residential District (1 to 3 residential Parcels in addition to Remnant/unsubdivided quarter section, or maximum 1 single residential Parcel from 32 ha. Parcel) & Agricultural District	• Storage calculations, with orifice sizing and allowable outflow • Depth, velocity, and flow calculations for 1:25 year event • Lot grading plan



The Engineering Design Standards then list the steps needed for the County to accept the lot grading plans as part of the Implementation Stage. It includes a detailed checklist for the Lot Grading Plans (over 20 bullets).

The final section of the Part A lists the various federal and provincial approvals and authorizations that the developer/consultant must obtain. These include brief summaries for the *Canada Navigable Waters Act*, *Fisheries Act*, *Impact Assessment Act*, the *provincial Environmental Protection and Enhancement Act*, *Water Act*, and *Public Lands Act*.

3.5.2. PART B: STORMWATER DESIGN STANDARDS

The stormwater design standards include information that the developer's consultants will need to address as part of the engineering designs.

The major headings in the standards are listed below.

- Level of Service
- Design Requirements
- Stormwater Outfalls
- Receiving Water Bodies
- Analysis of Minor Storm Drainage Systems
- Analysis of Major Storm Drainage Systems
- Design of Stormwater Management Facilities
- Constructed Wetlands (also called naturalized stormwater management facilities)
- Wet Ponds
- Rural Service Area Drainage System (highway and road ditches, culverts)
- Surface Runoff Drainage Swales
- Design Standards for Bio-Swales
- Operation and Maintenance
- Piped Drainage System
- Major Drainage Systems
- Manhole and Storm Sewer Locations and Installation
- Force mains
- Inspection and Testing

It is noted that naturalized stormwater management facilities (also referred to as constructed wetlands) is the preferred type of storage within the County (as dictated by the Municipal Development Plan), and the standards include extensive information on the design requirements.



Acheson Basin 1 Storm Trunk Installation

3.5.3. STORMWATER PUMP STATION GUIDELINES FOR ACHESON BASIN 1

The County Engineering Design Standards has a separate section dealing with the specific stormwater pump station requirements within Acheson Basin 1. Most of the stormwater management facilities in this drainage basin require pumping to the outfall trunk.

3.6. Area Structure Plans

The County's Municipal Development Plan Appendix 1 – Proposed Plan Framework and Hierarchy sets out what Area Structure Plans and Hamlet Area Redevelopment Plans are, when they are required, what each must address, what each may need to address, and who approves them. See details in the Municipal Development Plan Appendix 1, Section 1.1.

Area Structure Plans and Hamlet Area Redevelopment Plans are statutory plans and must be approved by Council by bylaw in accordance with the *Municipal Government Act*. Area Structure Plans and Hamlet Area Redevelopment Plans provide a framework for land use patterns and servicing provisions for a large land base, typically a quarter section or greater, and more detailed policy direction consistent with the overarching Municipal Development Plan policies to guide long term development of an area. These applications require information on servicing constraints, impacts associated with the proposed development, and an Engineering Design brief identifying infrastructure to be provided.



There are a total of eleven (11) approved Area Structure Plans in the County. The below is a list of approved Area Structure Plans:

- Big Lake ASP I(1991, latest update 2013)
- Acheson ASP (2020)
- Atim Creek ASP (2002, latest update 2009)
- Fifth Meridian ASP (2001, latest update 2009)
- Entwistle ASP, (2012, latest update 2017)
- Glory Hills ASP, (1979, latest update 2013)
- Jackfish Lake ASP, (1997, latest update 2013)
- Jackfish Mayatan ASP (1981, latest update 2013)
- Woodbend Graminia ASP, (1984, latest update 2013)
- Highvale End Land Use ASP, (2016)
- Wabamun Waterfront ASP (2010, Approved by the Village of Wabamun)

The below summarizes our overall observations of the approved statutory and non-statutory plans:

- Older Area Structure Plans generally had limited requirements for stormwater and were often silent on stormwater management provisions. In some cases, management of natural drainage courses are addressed as part of the Open Space section of the Area Structure Plan.
- Based on a review of the approved Area Structure Plans, it is evident that the County Terms of Reference for stormwater within Area Structure Plans has evolved over the years. This is consistent with many rural municipalities in Alberta.
- It is interesting to note that the approved Area Structure Plans are dated 1979 to 2020 but a very large portion of Country Residential developments happened in the 1960s and 1970s. This may be because the County only required an outline or shadow plan for large scale (quarter sections or greater) multi-parcel Country Residential subdivisions.

- The recent Area Structure Plans dated 2000 or later address stormwater much more thoroughly than the older Area Structure Plans, reflecting more detailed stormwater requirements.

3.7. Conceptual Schemes and Master Site Development Plans

The County's Municipal Development Plan (Appendix 1 – Proposed Plan Framework and Hierarchy) sets out what Conceptual Schemes (formerly Outline Plans) and Master Site Development Plans are, when they are required, what each must address, what each may need to address, and who approves them. For further details, refer to Municipal Development Plan Appendix 1, Section 1.2.

Conceptual Schemes are non-statutory plans for large scale rural multi-parcel subdivisions (more than 4 lots, but not more than a quarter section) and urban industrial multi-parcel subdivisions typically a section of land in size (i.e., Acheson Area Structure Plan area) that are required to show how what is being proposed will relate to existing and future parcels, future subdivision and development of adjacent areas, access, servicing (on-site servicing schemes, impacts off-site, drainage), and reserves. An Engineering Design Brief including an on-site servicing scheme and connectivity/impacts off-site and drainage is listed among other items that a Conceptual Scheme document must address.



Conceptual Schemes may be required in areas with an Area Structure Plan or for lands without an approved Area Structure Plans in place. Urban industrial multi-parcel subdivision Conceptual Schemes require approval by Council resolution. Rural Conceptual Schemes can be approved by the Director of Planning and Development Services.

A Master Site Development Plan is a design proposal that may be required by Administration to show how a large property development will look when construction is completed, or how a resource/aggregate extraction business will operate. As with the Conceptual Scheme, an Engineering Design Brief including an on-site servicing scheme and connectivity/impacts off-site and drainage is listed among other items that a Master Site Development Plan document must address. These plans can be approved by the Director of Planning and Development Services.

There is a total of six (6) approved Outline Plans/Conceptual Schemes in the County.

3.0 Current County Documents and Policies Related to Stormwater



The table below lists those Outline Plans/Conceptual Schemes between 2017 and 2021:

Table 3.5 County Approved Outline Plans / Conceptual Schemes

Outline Plan	Location	Approval Date
Acheson Zone 7	Section 28-52-26-W4M	2021-09-14
Acheson Zone 6	Section 34-52-26-W4M	2021-04-27
Acheson Zone 2	Section 11-53-26-W4M	2019-04-23
Whitewood	Sections of Range 4-53-including 15,16,17,19,20,21,22,27,28, 29, and 30, W5M	2018-03-27
West Point Estates (North)	N1/2 of Section 9-52-2-W5M	2018-03-13
Morgan Creek Business Park	N1/2 and S1/2 of Section 5-53-26-W4M	2017-05-23

The below summarizes our overall observations of the approved Conceptual Schemes and Outline Plans:

- These most recent Conceptual Schemes/Outline Plans appear to address stormwater servicing in detail. They typically demonstrate the drainage areas to each stormwater management facility, identify stormwater management facility locations, and the direction of on-site drainage. They also establish the land dedication for stormwater Public Utility Lots, Environmental Reserve and Municipal Reserves.
- The level of detail provided in the Conceptual Schemes is significantly higher than that provided in the recent Area Structure Plans.



3.8. Acheson / Big Lake Drainage Reports and Fenceline Agreement

The following documents are the key stormwater drainage studies and agreements within the Acheson / Big Lake Area.

Big Lake Stormwater Management Plan, 2004

The Big Lake drainage basin is comprised of over 3500 km² encompassing eight municipalities. The main objective of this study was to address the drainage and flooding issues that had been occurring within the Big Lake Basin. As a result, guidelines were developed for developments discharging to the Big Lake Basin, with appropriate methods on how to deal with the overland runoff generated. Recommendations included the implementation of floodplain overlays, requirements for stormwater management facilities for all development types, and a maximum allowable release rate of 2.5 L/s/ha for the Big Lake basin.

Acheson / Big Lake Area Master Drainage Plan and Amendment, 2011

The 2011 Acheson / Big Lake Area Master Drainage Plan provided Parkland County with the appropriate documentation to apply under the *Water Act* for approval to manage cumulative effects of multiple developments' stormwater systems in the Acheson and Big Lake Area. The Acheson / Big Lake Area Master Drainage Plan and Amendment delineated 10 drainage basins in the Area. For Basins 2 through 10, a system of existing and proposed stormwater management facilities that drained overland to separate outfalls into the Big Lake system were proposed. Multiple alternatives were investigated for servicing the stormwater management facilities located in the Basin 1 area.

Acheson / Big Lake Area Master Drainage Plan Amendment Application Document, 2011

This application document was prepared for the purpose of obtaining *Water Act* approval to facilitate land development in the entire Acheson / Big Lake Area, therefore eliminating the need for each developer to apply for separate approvals under the *Water Act*.



Water Act Approval #00287756-00-00

The *Water Act* application from Parkland County was approved by Alberta Environment and Sustainable Resource Development on December 21, 2011. The approval allows for placement, construction, operation and maintenance of stormwater infrastructure within the area as defined in the document. The approval also indicates that no additional applications are required from the County provided that the activity complies with the application document or master drainage plan.

This agreement was amended in 2020 (Legacy Amendment No. 00287756-00-04 and 00287756-00-05) which has an expiry date of December 20, 2026. The agreement grants Parkland County specific rights and responsibilities within the Fenceline area in the Acheson / Big Lake area. These responsibilities include:

- Ensuring that Best Management Practices for managing stormwater are implemented for all Basins 1 through 10.
- Performing operation and maintenance of the Storm Drainage System and downstream receiving water bodies.
- Prior to construction of Storm Drainage Systems at the sub-basin level, the Approval Holder shall develop a Stormwater Management Plan.
- In 2020, the any reference to wetland mitigation and compensation was removed from the Fenceline Approval. Any work involving wetlands is no longer covered under the Fenceline Approval. Separate Alberta Environment approval would be required by the proponent.
- Annual reporting relating to water quality and construction was also removed.

Acheson / Big Lake Basin 1 Storm Design Preliminary Design Report, 2013

This preliminary design report was prepared to refine the Acheson Basin 1 concepts presented in the Acheson / Big Lake Area Master Drainage Plan Amendment Document, 2011 and to complete a preliminary design of the recommended servicing for Basin 1. This preliminary design report included the following:

- Providing background relating to Parkland County's Alberta Environment *Water Act* "Fenceline" Approval for managing stormwater generated in the Acheson / Big Lake Area.
- Assessing the Basin 1 release rate permitted in the *Water Act* "Fenceline" Approval that was issued to Parkland County by Alberta Environment in December of 2011. This assessment led to questioning if it was necessary to "release after the storm event" as required by the "Fenceline" approval, and if the "Fenceline" approved release rate was the optimal release rate.
- Recommending preferred preliminary design Outfall Trunk, Collector Trunk, and Outlet Trunk alignments, as well as optimum locations for the Basin 1 stormwater management facilities located south of the CN rail line.



Acheson / Big Lake Basin 1 Stormwater Summary Report, 2018

This summary report was prepared to consolidate previous master drainage plans, preliminary designs, detailed designs, approvals, and record drawings for Basin 1. As the Basin 1 Highway 60 gravity stormwater outfall line was now (2018) in operation from south of Highway 16A to Big Lake, the report also provides a concise record of the latest planned and constructed stormwater infrastructure for Basin 1.

As Water Act Approval Legacy Amendment No. 00287756-00-04 and 00287756-00-05 refers to this summary report, the Acheson / Big Lake Basin 1 Stormwater Summary Report 2018 must be used by Parkland County administration, developers, and engineering consultants in the preparation and review of future stormwater drainage designs within Basin 1.



Acheson Basin 1 Storm Trunk Installation



3.9. Draft Surface Drainage and Lot Grading Bylaw

In March 2023, the Parkland County administration introduced a draft Surface Drainage and Lot Grading Bylaw to County council. The draft bylaw would require owners of commercial, industrial, or residential lots seeking to develop, build, or construct to submit a Site Grading Plan to the County for approval. The draft bylaw outlines what must be included in the Site Grading Plan and describes requirements for lot owners who do not have a Site Grading Plan. The bylaw also includes restrictions on surface drainage and alterations to surface elevations on a lot. The reader is referred to the latest version of the draft bylaw for more information.

3.10. Other Documents

The following background documents were reviewed as part of this study.

Intermunicipal Development Plans

An Intermunicipal Development Plan is “a statutory document prepared with two (or more) municipalities that share a common border, and where at least one member is not a part of a growth management region.” The process to prepare an Intermunicipal Development Plan provides an opportunity and framework for the municipalities involved to collaborate and coordinate on matters related to the future growth and development on the shared boundaries of both municipalities. The following Parkland County Intermunicipal Development Plans focus on coordinated land use policies and briefly address stormwater issues:

- Summer Village of Betula Beach IDP
- Summer Village of Seba Beach IDP
- Village of Spring Lake IDP
- Parkland County / Lac Ste. Anne County IDP
- Parkland County / Brazeau County IDP
- Parkland County / Yellowhead County IDP

These documents mention watershed and wetland protection, as well as riparian set back areas from natural areas. They typically do not address stormwater servicing.



Environmental Conservation Master Plan, 2014

This Environmental Conservation Master Plan integrated a wide variety of County-wide spatial data sets to prepare a series of maps including landscape ecology, wetlands, landforms, groundwater/surface water resources, and environmental significance scoring. The study developed an inventory and description of the 61 most important Environmental Significant Areas at the County-wide scale. The study noted that the County includes many small “micro-site” Environmental Significant Areas such as small wetlands, intermittent streams, and forest patches that were not described in detail in the report.

Wabamun Lake Sub-Watershed Land Use Plan, 2016

The Wabamun Lake Sub-watershed Land Use Plan comprised of four phases: Technical Report, Wabamun Lake Sub-watershed Land Use Plan, Implementation Plan, and Watershed Land Use Planning Toolbox (Draft). The plan provides land use direction to the watershed, addressing surface water quality, groundwater quality and quantity, upland/riparian health, and environmental impacts of development.

Developer Stormwater Reports

ISL reviewed several stormwater reports prepared by developer consultants to support local country residential and industrial development. These reports represent a wide range of locations, site conditions, development sizes and types, and different stormwater drainage concepts. In some cases, the report was used to justify developing without stormwater management facilities, and in other cases, the reports provided detailed information on locations and sizes of stormwater management facilities. Some reports were located within the Acheson / Big Lake area and thus covered by the Acheson / Big Lake Area Master Drainage Plan Amendment. However, there were several developer stormwater reports that are stand-alone, and thus are not part of a larger stormwater master drainage plan. These latter reports typically do not include assessments of the larger drainage basin, with little to no analysis of the impact on the downstream drainage system. Some of these reports include information on licensed drainage ditches that were subsequently registered with Alberta Environment and Protected Areas.

Other Stormwater Reports

Parkland County has undertaken several other stormwater drainage studies over the past 40 years dealing with localized drainage issues. Where studies led to the construction of drainage ditches, licenses were obtained from Alberta Environment and Protected Areas. These reports are archived in a hard copy format and are not readily available.



4.0 EXISTING AND PLANNED STORMWATER DRAINAGE SYSTEM



4.1. Existing Watersheds

Parkland County naturally drains to two major river basins, the Athabasca and North Saskatchewan Rivers, refer to Figure 4.1. The far west edge of the County drains to the Pembina River, which is part of the Athabasca River watershed, with the rest of the County draining to the North Saskatchewan River and its tributaries. The northwest part of the County drains to the upper Sturgeon River which drains through Lac St. Anne County and Sturgeon County before discharging to Big Lake and the downstream Sturgeon River, and eventually into the North Saskatchewan River, northeast of Edmonton. The northeast part of the County generally drains to Atim Creek which also discharges to Big Lake. The remainder of the County drains to the North Saskatchewan River, either directly through numerous creeks or through Wabamun Lake and Wabamun Creek to the river.

4.0



The major watersheds and sub-watersheds in Parkland County are shown in Figure 4.2. It is noted that the North Saskatchewan River is divided into sub-watersheds, including the Modeste, Strawberry and Sturgeon (River). The Modeste and Strawberry sub-watersheds include the drainage area on both north and south sides of the main stem of the North Saskatchewan River. Figure 4.2 shows the Modeste and Strawberry sub-watersheds within Parkland County. The Modeste sub-watershed includes most of the west and central parts of the County and includes the Wabamun Lake watershed. The Strawberry sub-watershed includes the southeast part of the County.

The drainage basins for several of the creeks and major watercourses in Parkland County are shown in Figure 4.3. The largest creek drainage basins include Wabamun Creek (includes Wabamun Lake), Atim Creek, Tomahawk Creek, Wedgewood Creek (drains to Edmonton) and Kilini Creek. There are numerous unnamed creeks draining to the North Saskatchewan River, with the drainage basins for the larger ones identified in Figure 4.3.

Detailed drainage basin maps are shown in Appendix B with a series of 124 maps ("mapbook") at a 1:20,000 scale (when printed to 11x17). These detailed maps include basin boundaries, watercourses, water bodies, and topography. The maps also include the anticipated flow direction (modeled drainage paths) based on the detailed 3-D surface with the culverts "burnt" into the 3-D surface.

4.2. Lakes, Creeks and Wetlands

The existing lakes and creeks within Parkland County are also shown on Figure 4.3. Wabamun Lake is the largest lake, followed by Lake Isle and Big Lake. There are numerous smaller lakes, most of which are in the north-central part of the County; Jackfish Lake, Johnny's Lake, Spring Lake, Mayatan Lake, Hasse Lake and Hubbles Lake.

Parkland County has an extensive network of creeks and natural watercourses. The slopes of these watercourses vary significantly across the County depending on the local topography. Atim Creek and its tributaries have very gentle slopes, especially as it approaches Big Lake. Kilini Creek drains a low area in the north-central part of the County to the north into Lac St. Anne County with numerous connecting wetlands. Wabamun Creek is relatively flat within Paul First Nation (Wabamun No. 133A) but becomes steep as it approaches the North Saskatchewan River. The upper reaches of Wedgewood Creek in Parkland County are relatively flat and become steeper within the City of Edmonton as it drops to the river. The other creeks draining to the North Saskatchewan River also become much steeper as they approach the river.

There are numerous wetlands located throughout the County, as shown in Figure 4.4. This figure also shows the distribution of the various types of wetlands, including bog, fen, marsh, swamp, and open water.



4.3. Existing Storm Drainage Infrastructure

While most of the stormwater in Parkland County is drained through natural creeks and watercourses, there is constructed stormwater drainage infrastructure within the developed parts of the County. These are shown in Figure 4.5 and include:

- Roadway drainage with ditches and local culverts
- Bridges and bridge sized culverts
- Storm sewers
- Stormwater management facilities
- Stormwater lift stations
- Licensed drainage courses
- Constructed drainage courses
- Special structures

The roadway ditch system is extensive, with over 2200 km of roadway in the County. The roadway ditches typically direct stormwater runoff to adjacent watercourses and creeks. The ditch cross-sections vary significantly across the County, depending on the roadway type and year of construction. There are over 16,000 documented culverts across the County that cross driveways, local roads, and highways.

There are approximately 34 bridges and 87 bridge-sized culverts (1500 mm and larger) at major creek and watercourse crossings. These large culverts are treated differently from culverts less than 1500 mm as they must meet provincial standards (Alberta Transportation Engineering Consultant Guidelines).

Most of the storm sewers in Parkland County are in the Acheson Industrial Area, but there are a few within the Hamlets of Wabamun and Entwistle. There are total of 24 km of storm sewers in the County.

Stormwater management facilities are primarily located in the Acheson Industrial Area and Country Residential developments. In general, developments completed since the 1990s have stormwater management facilities. Several stormwater management facilities within Acheson south of Highway 16A require lift stations due to local topography.

There are approximately 285 km of licensed and constructed drainage courses in the County's GIS database, refer to Figure 4.5. Licensed drainage courses were constructed in the 1970s, 1980s, and 1990s to improve local drainage in agricultural and Country Residential areas. It is noted that Alberta Environment and Protected Areas now use the term *Approval* when referring to its drainage agreements, but *License* is the term used when these drainage courses were approved and constructed. Also, there are constructed drainage courses shown in Figure 4.5 that were constructed to facilitate peat extraction (northwest of Tomahawk) or to drain agricultural lands (southeast quadrant of Parkland County and east of Tomahawk). The County is endeavoring to verify this GIS layer to confirm the extent of the licensed drainage courses.



The special structures include:

- Fleming syphon – conveys stormwater north along Range Road 261 to a branch of Wedgewood Creek south of Highway 627.
- Atim Creek weir structure – located about 3 km south of Stony Plain – controls rate of discharge in Atim Creek immediately upstream of Highway 779.
- Wabamun Lake weir structure – located at the east end of Wabamun Lake where the lake discharges into Wabamun Creek.
- Walker Lake weir structure – located in the NW or 16-53-26-W4M, at the east end of the outlet of Walker Lake, where Walker Lake discharges into Big Lake.

The above storm drainage infrastructure is also shown in the 124 mapbook in Appendix B (1:20,000).

The following sub-sections present the constructed drainage systems for the Acheson Industrial area and adjacent Big Lake residential area (Acheson and Big Lake Area Water Act Fenceline Approval area) as well as for the larger hamlets (Entwistle, Wabamun, Tomahawk and Duffield).

4.3.1. ACHESON AND BIG LAKE AREA WATER ACT FENCELINE APPROVAL AREA

The Acheson and Big Lake Area Water Act Fenceline Approval area is shown in Figure 4.6. This area is the focal point for industrial and residential development in the east part of the County, which resulted in the preparation of the Acheson / Big Lake Area Master Drainage Plan and Amendment 2011 and the Acheson / Big Lake Area Master Drainage Plan Amendment Application Document 2011. The 2011 Application Document was used to obtain *Water Act* Approval #00287756-00-00 (Fenceline Approval). These reports and the subsequent 2018 Acheson / Big Lake Basin 1 Stormwater Summary Report provide detailed information on the existing and planned stormwater infrastructure in the area.

The Acheson and Big Lake Area Water Act Fenceline Approval area has the highest concentration of stormwater infrastructure within Parkland County, including storm sewers, stormwater management facilities, lift stations, forcemains, and culverts as shown in Figure 4.6. The area is divided into ten (10) separate stormwater basins, all draining to Big Lake, also shown in Figure 4.6.



Basin 1 is drained by a 5 km stormwater Basin 1 outfall trunk with diameters ranging from 900 mm to 1200 mm that discharges to Big Lake north of the Highway 60 / 16 interchange via a constructed wetland. Some of the connecting stormwater management facilities of Basin 1 can drain by gravity to the outfall trunk, but most existing stormwater management facilities require lift stations. A force main servicing Zone 5 has been constructed along 96th Avenue from Highway 60 to just west of 283rd Street. A force main servicing Zone 7 has been constructed along 279th Street to 92nd Avenue and discharges into a gravity trunk near 266th Street. This gravity trunk connects to the outfall trunk. Stormwater management facilities in Basin 1 have a design discharge rate of 0.6 L/s/ha. The low discharge rate was selected to minimize the size of the downstream outfall trunk to Big Lake.

Basins 2 through 10 are drained through a series of ditches and culverts to Big Lake. The upstream sections of the basins south of Highway 16 have steeper sections, with the downstream sections becoming very flat as they approach Big Lake. Stormwater management facilities in Basins 2 and 4 to 10 have a design discharge rate of 2.5 L/s/ha. This discharge rate was based on findings in the 2004 Big Lake Stormwater Management Plan. As Basin 3 is within the Wagner Natural Area recharge area, it has a design discharge rate of 1.2 L/s/ha.

The Wagner Natural Area is a 130 ha provincially protected area immediately southwest of the Highway 16 / 44 interchange. It has unique biodiversity due to its groundwater discharge area (springs). The Wagner Natural area is specifically excluded from the planned Acheson and Big Lake Area *Water Act* Fenceline Approval area drainage system. While the Wagner Natural Area is the most significant groundwater discharge location in the area, the lands between the natural area and Big Lake are also prone to groundwater discharge.

4.3.2. HAMLETS

Most of the hamlets use a rural drainage system consisting of ditches and culverts, with the larger hamlets having limited storm sewers and stormwater management facilities.

Wabamun

The existing stormwater infrastructure within the Hamlet of Wabamun is shown in Figure 4.7. Wabamun relinquished its village status on January 1, 2021, to become a Hamlet under the jurisdiction of Parkland County. The former Village of Wabamun GIS has been integrated into the County's GIS database and is currently (2023) being verified and refined. The stormwater infrastructure shown in Figure 4.7 is therefore subject to change.



Wabamun drains from north to south towards Lake Wabamun via a combination of roadway gutters/ditches and storm sewers. There is one stormwater management facility at approximately 56 Avenue and 53 Street that services the subdivision to the northwest, as well as intercepting the subdivision to the south (54 to 56 Avenue east of 53 Street). There are four (4) major culverts beneath the CNR tracks that service the hamlet (not shown in Figure 4.7, which is based on March 2022 GIS data).

It is noted that the shoreline of Lake Wabamun includes natural vegetation that acts as a buffer to help treat stormwater runoff prior to it reaching the lake.

There are two locations with known drainage concerns:

- Urban drainage flows west across 53 Street into private lot.
- The marina and RV development has a history of flooding complaints (note: County documentations indicate that the marina did not comply with conditions and have in fact disturbed the drainage).

Entwistle

The existing stormwater infrastructure within the Hamlet of Entwistle is shown in Figure 4.8. Entwistle was disincorporated on January 1, 2001 and became a hamlet in Parkland County.

Entwistle generally drains from east to west and northwest towards the Pembina River via a combination of roadway gutters/ditches and storm sewers. There is one stormwater management facility southwest of 44 Street and 44 Avenue. There is a long storm sewer immediately north of the highway (south of CN Rail) that drains the pedestrian walkway beneath the CN Rail and highway, as well as the ditch to the east.

One noted drainage concern is the overland discharge to the high banks of the Pembina River, which has been noted in previous bank stability analysis reports.

Tomahawk

The existing stormwater infrastructure within the Hamlet of Tomahawk is comprised of a series of ditches and culverts draining to one of the main tributaries to Tomahawk Creek which runs west to east through the hamlet. There is one storm sewer draining the 50 Street (Highway 769) / 51 Avenue intersection to a watercourse to the east. The existing stormwater infrastructure in Tomahawk is shown in Map Book page 26 of 124 in Appendix B.

Duffield

The Hamlet of Duffield's existing stormwater infrastructure includes a series of ditches and culverts draining overland to Mink Creek to the southwest. The existing stormwater infrastructure in Duffield is shown in Map Book page 77 of 124 in Appendix B.



Other Hamlets

The stormwater infrastructure for the remaining hamlets consist of a series of ditches and culverts. These are shown in the following Map Book pages in Appendix B:

- Carvel – page 79 of 124 in Appendix B
- Fallis – page 89 of 124 in Appendix B
- Gainford – page 87 of 124 in Appendix B
- Keephills – page 47 of 124 in Appendix B

4.3.3. COUNTRY RESIDENTIAL

The County has over 300 Country Residential subdivisions, most of which are located in the eastern half of the County and around Wabamun Lake. To illustrate the typical stormwater drainage systems and stormwater infrastructure in Country Residential areas, Figure 4.9 shows several subdivisions in the southeast corner of the County. This map illustrates several things:

- There are typically no storm sewers in Country Residential developments (Figure 4.9 has one).
- Roadway ditches (orange dashed lines) and culverts (yellow lines) make up the vast majority of the constructed drainage system.
- Off-site storm drainage is via a combination of constructed ditches (orange dashed lines) or natural channels.
- There are few, if any, stormwater management facilities in Country Residential subdivisions (typically limited to developments completed after 1990). Existing wetlands are often used as stormwater management facilities as shown in Figure 4.9.

4.4. Planned Future Storm Drainage Infrastructure

4.4.1. ACHESON AND BIG LAKE AREA WATER ACT FENCELINE APPROVAL AREA

The Acheson / Big Lake Area Master Drainage Plan Amendment Application Document, the Acheson / Big Lake Area Master Drainage Plan – Amendment Document, Water Act Approval No. 00287756-00-00, and the 2018 Acheson / Big Lake Basin 1 Stormwater Summary Report present the ultimate stormwater drainage plans for the area. The latest servicing plans are shown in Figure 4.10 and include the ten basin boundaries, both existing and proposed stormwater management facilities, lift stations, connecting storm sewers, and forcemains.

It should be noted that the stormwater drainage plans at the sub basin levels may be refined as developers submit detailed Conceptual Schemes for individual developments. Acheson Zones 2, 6, and 7 have recent Conceptual Schemes with detailed plans for the sub basin, on-site drainage, stormwater management facilities, and connections to off-site outfalls. The Morgan Creek Business Park Outline Plan (now referred to as Conceptual Scheme) includes a more detailed concept than listed in Acheson / Big Lake Area Master Drainage Plan Amendment Application Document and related Acheson / Big Lake Area Master Drainage Plan – Amendment Document, including stormwater management facilities each side of Morgan creek with overland drainage (ditches) to the stormwater management facilities. These plans align with the previous Big Lake / Acheson drainage studies listed above.



4.4.2. OTHER PLANNED FUTURE STORMWATER INFRASTRUCTURE

There are no other large-scale, long-term stormwater plans within the County with specific plans for stormwater drainage infrastructure. There are, however, a few developer prepared stormwater drainage plans for individual developments. One example of this is the West Point Estates (North) Outline Plan, which has a detailed stormwater concept with overland drainage to several stormwater management facilities discharged to Jackfish Lake. A portion of the drainage system was constructed in 2022, with additional stages of development to be constructed in the future.

There are several Area Structure Plans that provide long term land use planning, but they do not include any detailed infrastructure plans (e.g., Glory Hills ASP, Atim Creek ASP, Jackfish Lake ASP). These documents describe stormwater issues, but there are no maps with proposed stormwater infrastructure. While these Area Structure Plans (including amendments) are considered to be current from a land use planning perspective, the stormwater drainage information is outdated.

4.5. Age, Condition and Level of Service for Existing Drainage System

4.5.1. AGE OF EXISTING DRAINAGE INFRASTRUCTURE

The age of the existing roadway drainage infrastructure (ditches, culverts) can generally be estimated based on the age of the subdivision or roadway within the County. Figure 4.11 shows the timing for each development in the County based on the date of subgrade construction in the County's GIS. This map shows the development of industrial and Country Residential subdivisions has generally occurred from the 1970s to the 2020s. It is noted that the construction timing data is not considered to be accurate prior to the 1980s, so the drainage infrastructure depicted in the 1960s and 1970s capital road program may have been constructed much earlier.

The County's culvert GIS data has very limited information on the year of installation and thus the age of most culverts can be roughly estimated based on the roadway construction year in Figure 4.11.

The County's stormwater main GIS data (storm sewers and forcemain) does include (relatively) comprehensive data for both the year of construction and pipe sizes. This stormwater main data is shown in Exhibit 4.1 below.

4.0 Existing and Planned Stormwater Drainage System

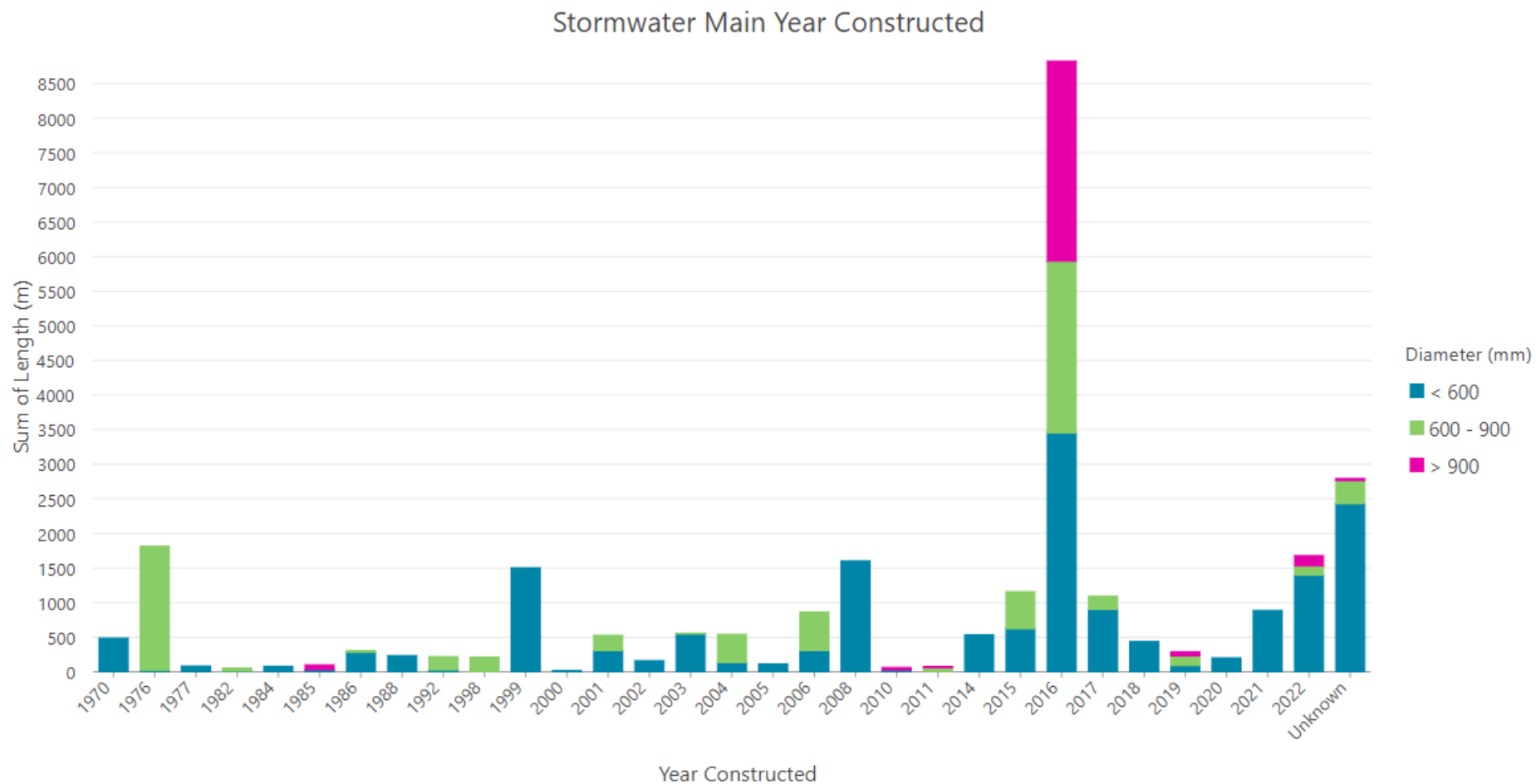


Exhibit 4.1 Stormwater Main Sizes and Year of Installation



It is noted that there will be locations where older stormwater infrastructure has been or is being upgraded due to its physical condition or level of service. The GIS data has limited information on the date of installation of storm sewers within the hamlets that have been incorporated by the County. It is known that the storm sewers in Entwistle would have been installed primarily in the 1960's when the hamlet was developed. A similar timeline would likely be the case in Wabamun.

Most of the storm sewers and stormwater management facilities in Acheson have been constructed since 2000. The Basin 1 outfall trunk, along with the stormwater lift stations and forcemains have been constructed in 2018 or later.

4.5.2. CONDITION OF EXISTING DRAINAGE INFRASTRUCTURE

Most of the County's drainage infrastructure is readily accessible (roadway ditches, stormwater management facilities) and can be inspected during day-to-day operations (subject to adequate resource allocation). Storm sewers and smaller diameter culverts can be inspected with closed circuit television (CCTV). The County has an ongoing CCTV program for long culverts and storm (and wastewater) sewers. As most the County's storm sewers are less than 20 years old, they are not yet scheduled for inspection.

The County currently has a very limited database of the condition of its existing stormwater infrastructure. This is generally limited to older storm sewers and select culverts. The County typically rehabilitates or replaces underground infrastructure on an as-needed basis. It is noted that a section of storm sewer in Acheson Zone 3 (northwest of Highway 16A / 60 interchange) is proposed for rehabilitation/replacement in 2024.

The County does have a comprehensive report on the condition and rehabilitation requirements for its bridges and bridge sized culverts. The 2021 report entitled Strategic Overview – Bridge Files provides a full inventory of the 87 bridge culverts and 34 bridges in the County, along with the age, condition, and rehabilitation requirements for each. The report indicated that 2% of the bridges require immediate action, with 18% being listed in poor condition, and the remaining 80% being in adequate, good, or very good condition. Based on the condition of the existing bridges, the report estimated the expected timing for bridge replacement and the associated costs.



4.5.3. DESIGN LEVEL OF SERVICE

The level of service of the existing storm drainage infrastructure is based on the design standards at the time of development. Section 6.3.2 of the current Parkland County Engineering Design Standards indicates “that all stormwater drainage systems shall meet the following minimum level of service objectives:

- 6.3.2.1 *Avoid all property damage and flooding and minimize any inconveniences to the general public due to runoff from 1:5 year and more frequent rainfall events.*
- 6.3.2.2 *Avoid property damage from 1:100 year rainfall events.*
- 6.3.2.3 *Avoid loss of life and injuries and minimize damage to property through the control of runoff during unusual or infrequent storm events with high intensity rainfall and large runoff volumes.*
- 6.3.2.4 *Avoid degradation of receiving water bodies.”*

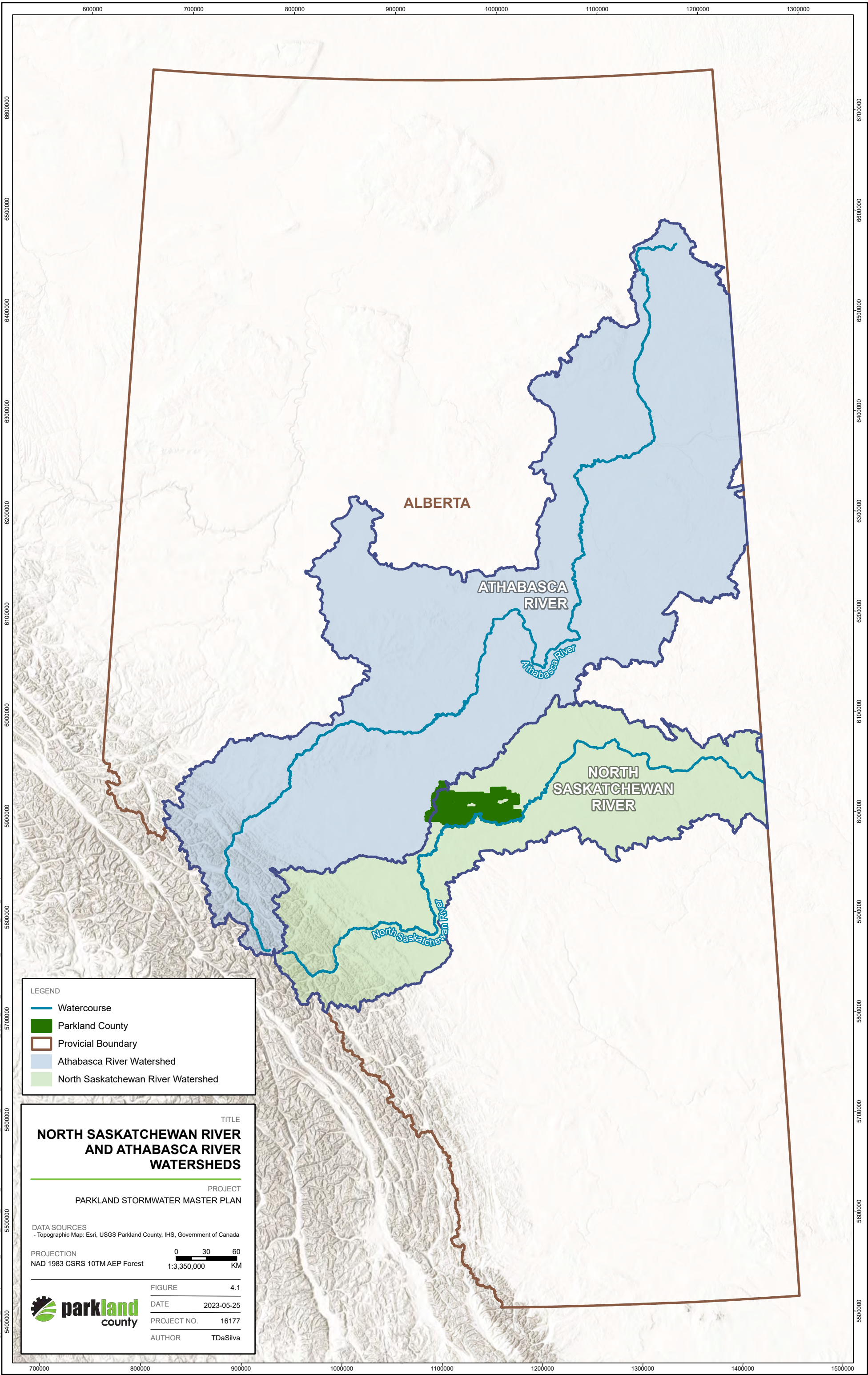
Bridges and bridge sized culverts are required to be designed based on Alberta Transportation’s Bridge Conceptual Design Guidelines for evaluating hydrology and hydraulics. This considers upstream and downstream channel capacity, as well as historic highwater observations.

There are some older developments with lower levels of service. For example, Acheson Zone 3 has stormwater management facilities designed for only a 1:25 year event, as it was the design standard at the time of development. Older developments also may not have been designed to manage overland drainage within the roadway ditches to current standards, which can result in flooding of private property during extreme storm events.

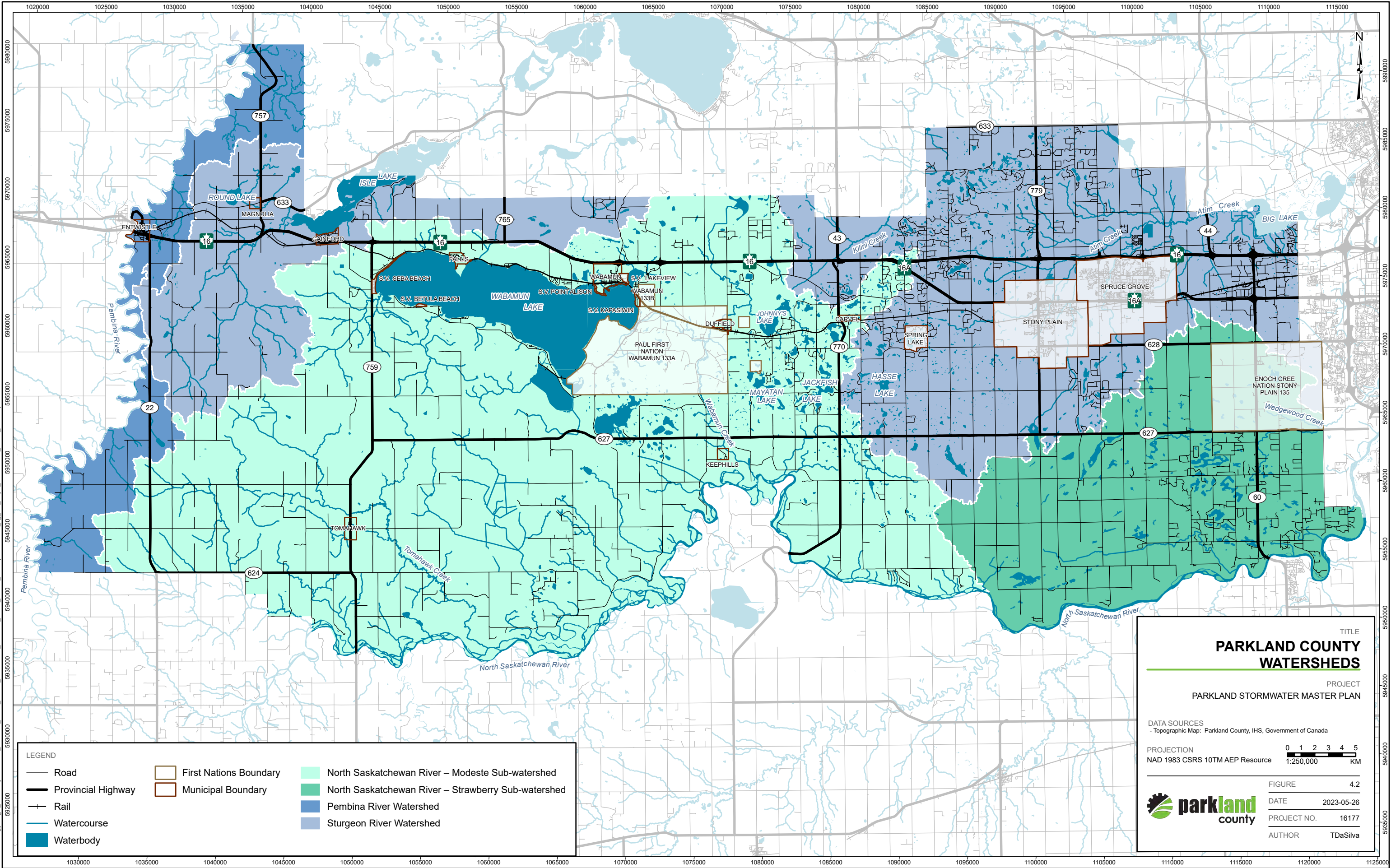


Runoff overtopping Township Road 514 in April 2013

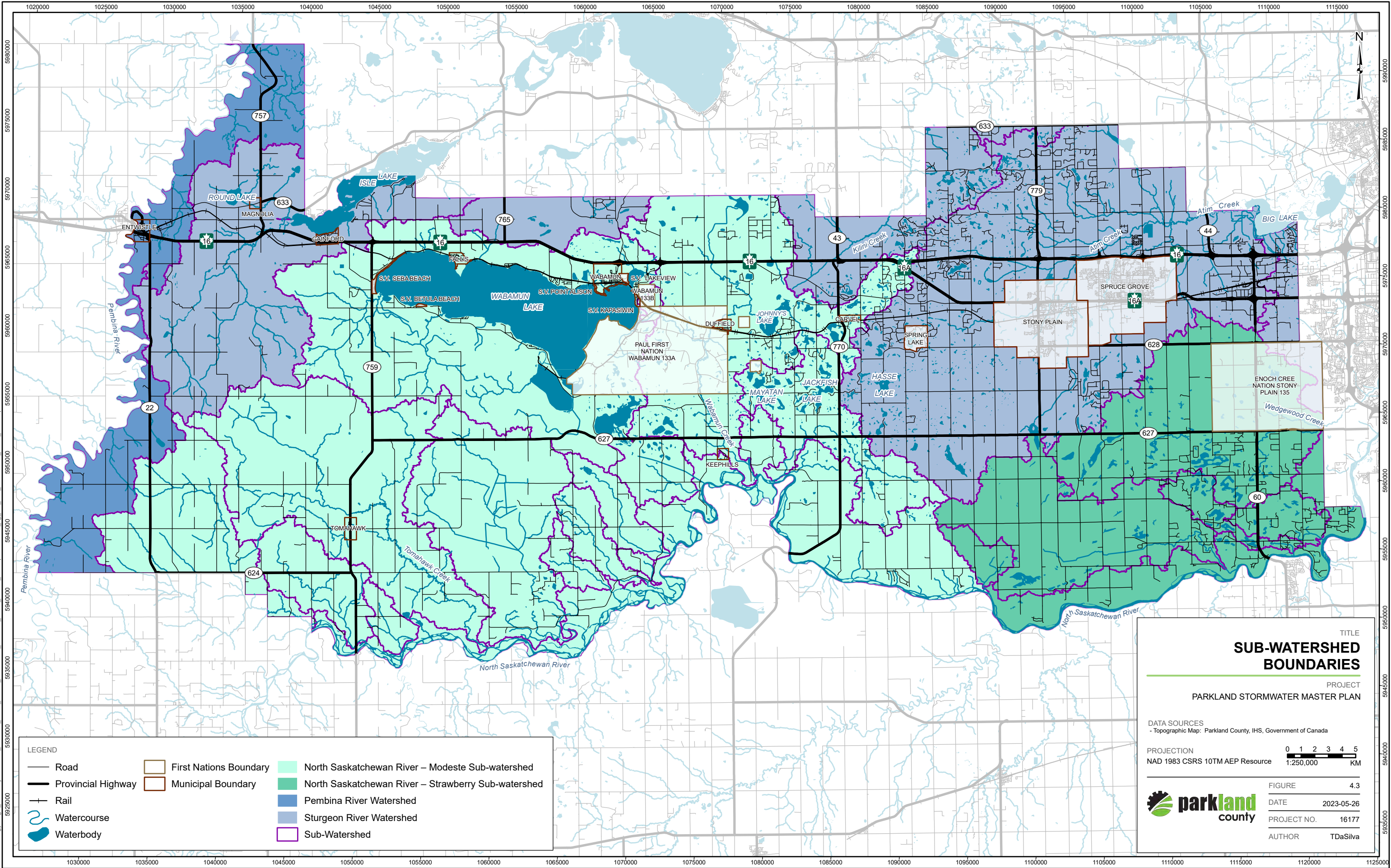
Document: \\gvs2\gis_data\Projects\16177_Parkland Storm Master Plan\16177_Parkland Storm Master Plan.aprx - 16177 fig 4.1 North Saskatchewan Watersheds 11x17 landscape



Document: \\gis2\gis_data\Projects\16177_Parkland_Storm_Master_Plan\16177_Parkland_Storm_Master_Plan.aprx - 16177_fig_4.2_Major_Watersheds_1x17_Landscape



Document: \\gis2\gis_data\Projects\16177_Parkland_Storm_Master_Plan\16177_Parkland_Storm_Master_Plan.aprx - 16177_fig_4.3_Sub_Watersheds_1x17_landscape



LEGEND

— Road	First Nations Boundary	North Saskatchewan River – Modeste Sub-watershed
— Provincial Highway	Municipal Boundary	North Saskatchewan River – Strawberry Sub-watershed
+ Rail		Pembina River Watershed
~ Watercourse		Sturgeon River Watershed
Waterbody		Sub-Watershed

TITLE
SUB-WATERSHED BOUNDARIES

PROJECT
PARKLAND STORMWATER MASTER PLAN

DATA SOURCES
- Topographic Map: Parkland County, IHS, Government of Canada

PROJECTION
NAD 1983 CSRS 10TM AEP Resource

FIGURE
4.3

DATE
2023-05-26

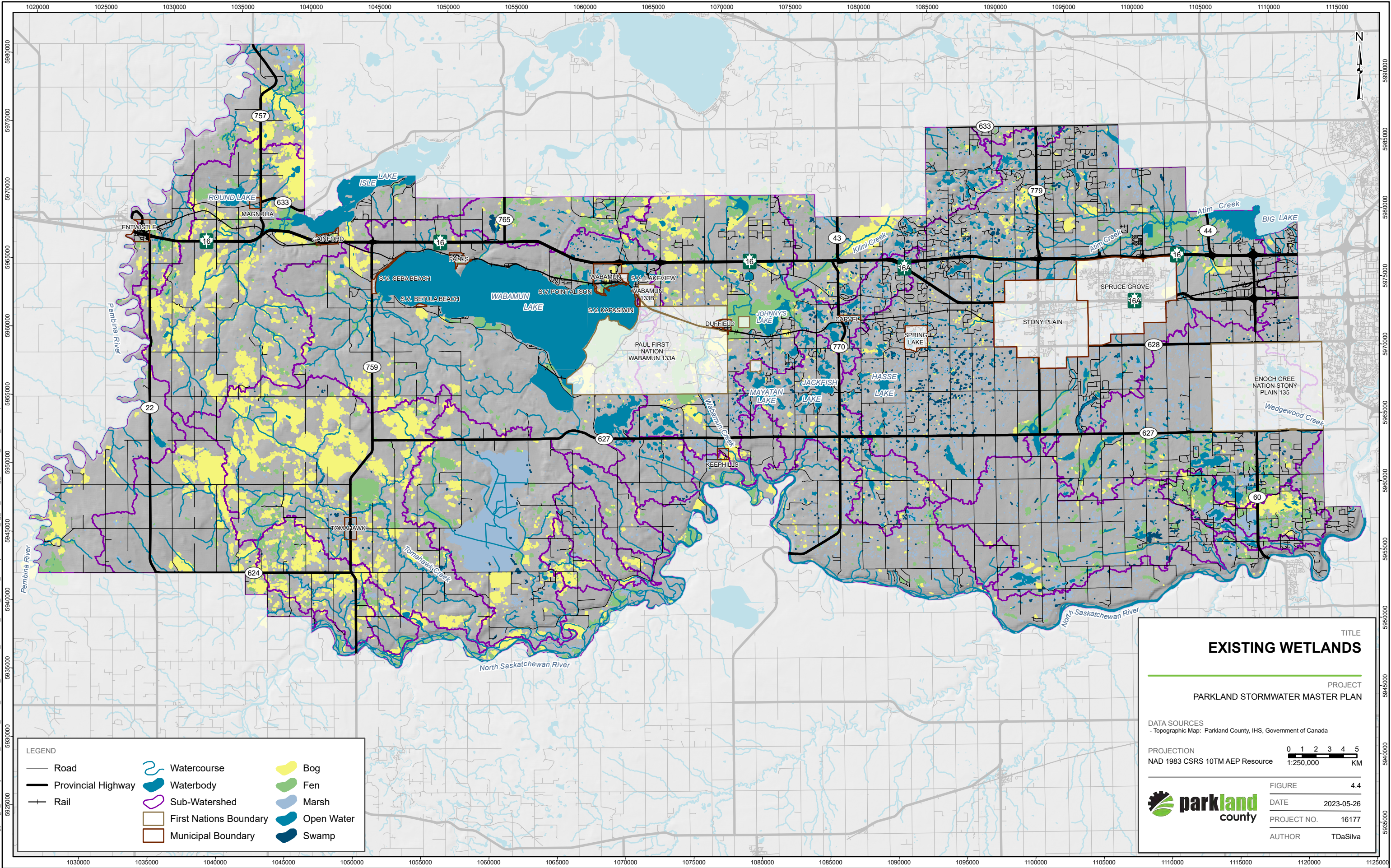
PROJECT NO.
16177

AUTHOR
TDaSilva

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parkland county

Document: U:\gis\2\gis_data\Projects\16177_Parkland_Storm_Master_Plan\16177_Parkland_Storm_Master_Plan.aprx - 16177_fig_4.4_Existing_Wetlands_11x17_Landscape



LEGEND

- | | | |
|------------------------|---------------|-------|
| — Road | Watercourse | Bog |
| — Provincial Highway | Waterbody | Fen |
| + Rail | Sub-Watershed | Marsh |
| First Nations Boundary | Open Water | |
| Municipal Boundary | Swamp | |

TITLE
EXISTING WETLANDS

PROJECT
PARKLAND STORMWATER MASTER PLAN

DATA SOURCES
- Topographic Map: Parkland County, IHS, Government of Canada

PROJECTION
NAD 1983 CSRS 10TM AEP Resource

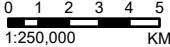
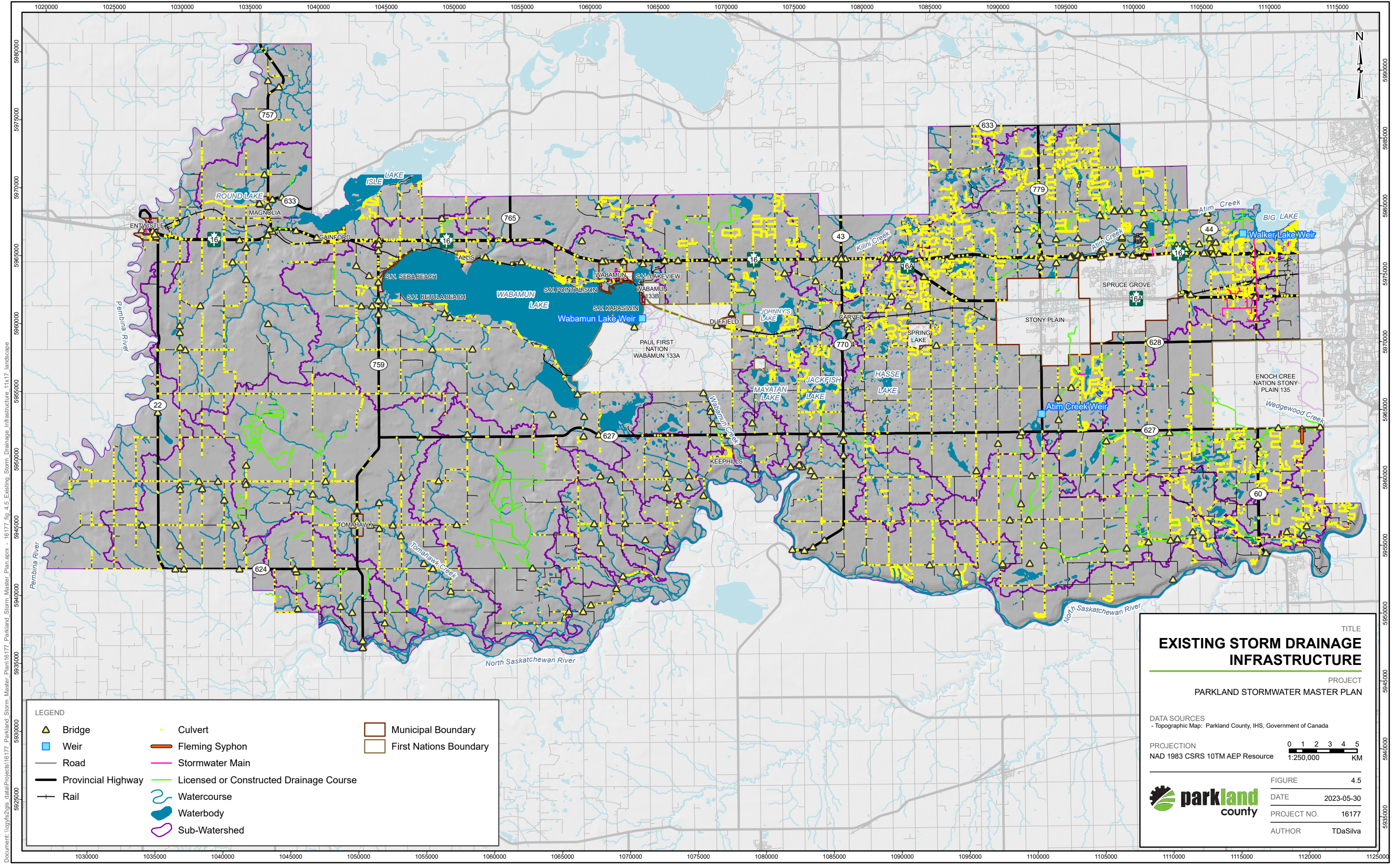


FIGURE	4.4
DATE	2023-05-26
PROJECT NO.	16177
AUTHOR	TDaSilva



LEGEND

Bridge

 Weir

Road

Provincial Highway

Rail

Culvert

Fluming Syphon

Stormwater Main

Licensed or Constructed Drainage Course

Watercourse

Waterbody

Sub-Watershed

Municipal Boundary

First Nations Boundary

TITLE

EXISTING STORM DRAINAGE INFRASTRUCTURE

PROJECT

PARKLAND STORMWATER MASTER PLAN

DATA SOURCES

- Topographic Map: Parkland County, IHS, Government of Canada

PROJECTION

NAD 1983 CSRS 10TM AEP Resource

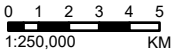
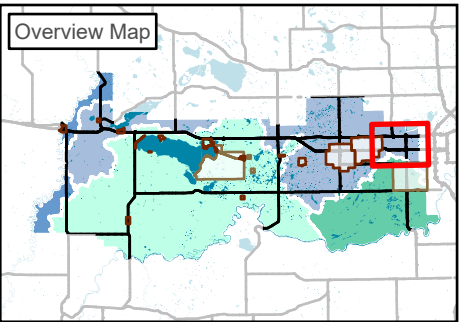
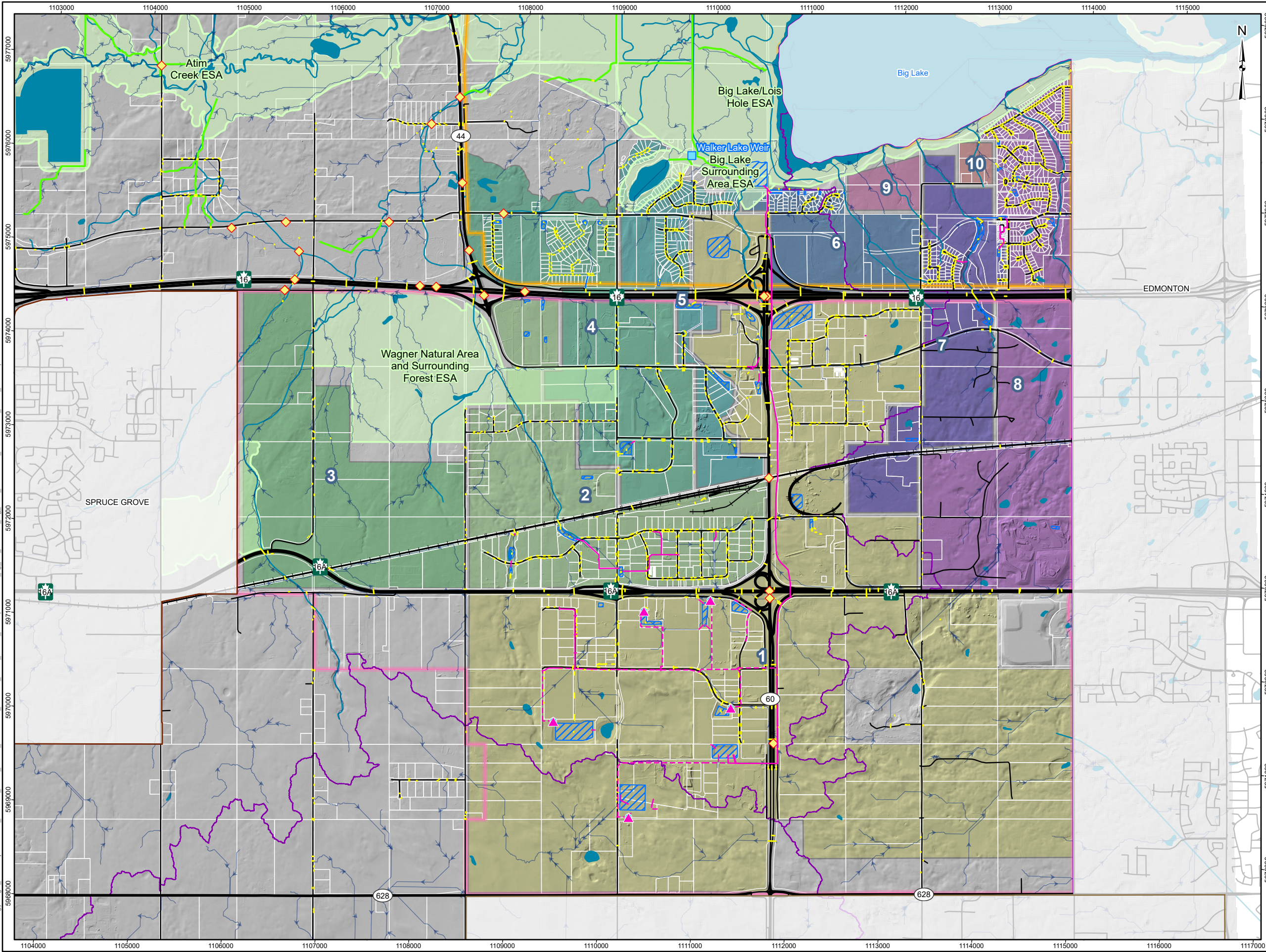


FIGURE	4.5
DATE	2023-05-30
PROJECT NO.	16177
AUTHOR	TDaSilva

Document: \\gis\2\gis_data\Projects\16177_Parkland_Storm_Master_Plan\16177_Parkland_Storm_Master_Plan.aprx - 16177 fig 4.6 Acheson Big Lake Stormwater Infrastructure, 11x17 Landscape



LEGEND

- Bridge
- Culvert
- Lift Station
- Stormwater Gravity Main
- Stormwater Force Main
- Licensed or Constructed Drainage Course
- Road
- Provincial Highway
- Rail
- Modelled Drainage Path
- Watercourse
- Waterbody
- Existing Stormwater Management Facility
- Sub-Watershed
- Parcels
- Municipal Boundary
- First Nations Boundary
- Acheson Area (Fenceline)
- Big Lake Area (Fenceline)
- Environmentally Significant Area (ESA)

Water Act Fenceline Basin (1-10)

1	2	3	4	5	6	7	8	9	10
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TITLE
**EXISTING ACHESON / BIG LAKE
STORMWATER INFRASTRUCTURE**

PROJECT
PARKLAND STORMWATER MASTER PLAN

NOTES
- Existing stormwater management facility GIS data is known to contain some future planned stormwater management facility data.

DATA SOURCES
- Topographic Map: Parkland County, IHS, Government of Canada

PROJECTION
NAD 1983 CSRS 10TM AEP Resource

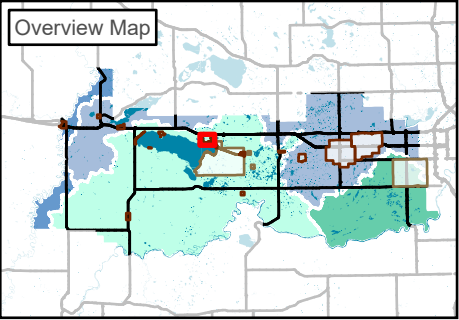
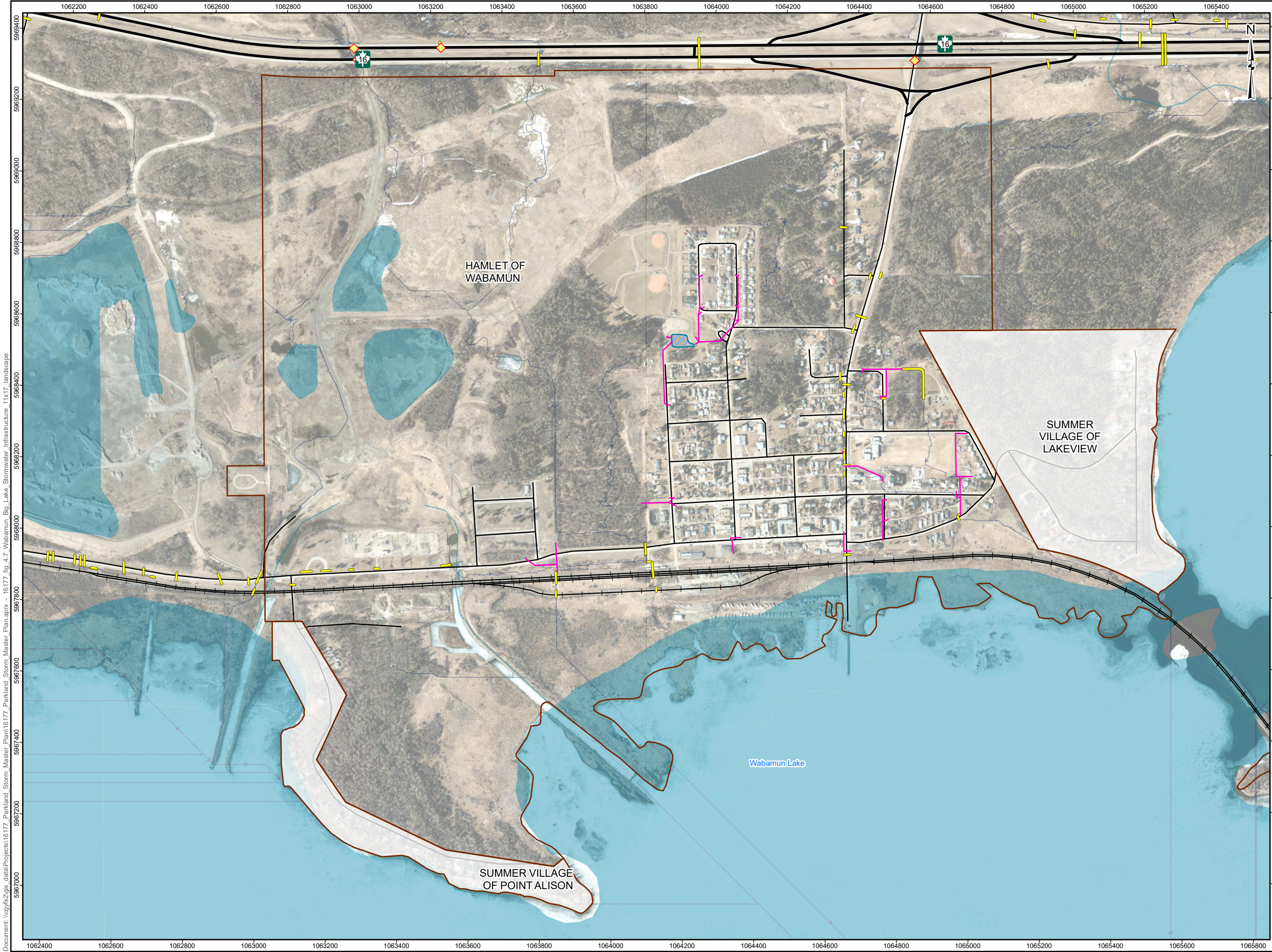
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**parkland
county**

FIGURE	4.6
DATE	2023-05-30
PROJECT NO.	16177
AUTHOR	TDaSilva

Document: \\gis2\gis_data\Projects\16177_Parkland_Storm_Master_Plan\16177_Parkland_Storm_Master_Plan.aprx - 16177 fig 4.7 Wabamun, Big Lake, Stormwater Infrastructure_1x17 landscape



- LEGEND
- Bridge
 - Culvert
 - Stormwater Gravity Main
 - Provincial Highway
 - Rail
 - Road
 - Modelled Drainage Path
 - Watercourse
 - Waterbody
 - Sub-Watershed
 - Existing Stormwater Management Facility
 - Municipal Boundary

TITLE
HAMLET OF WABAMUN EXISTING INFRASTRUCTURE

PROJECT
PARKLAND STORMWATER MASTER PLAN

NOTES
- Existing stormwater management facility GIS data is known to contain some future planned stormwater management facility data.

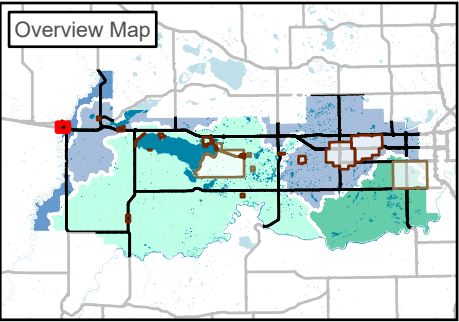
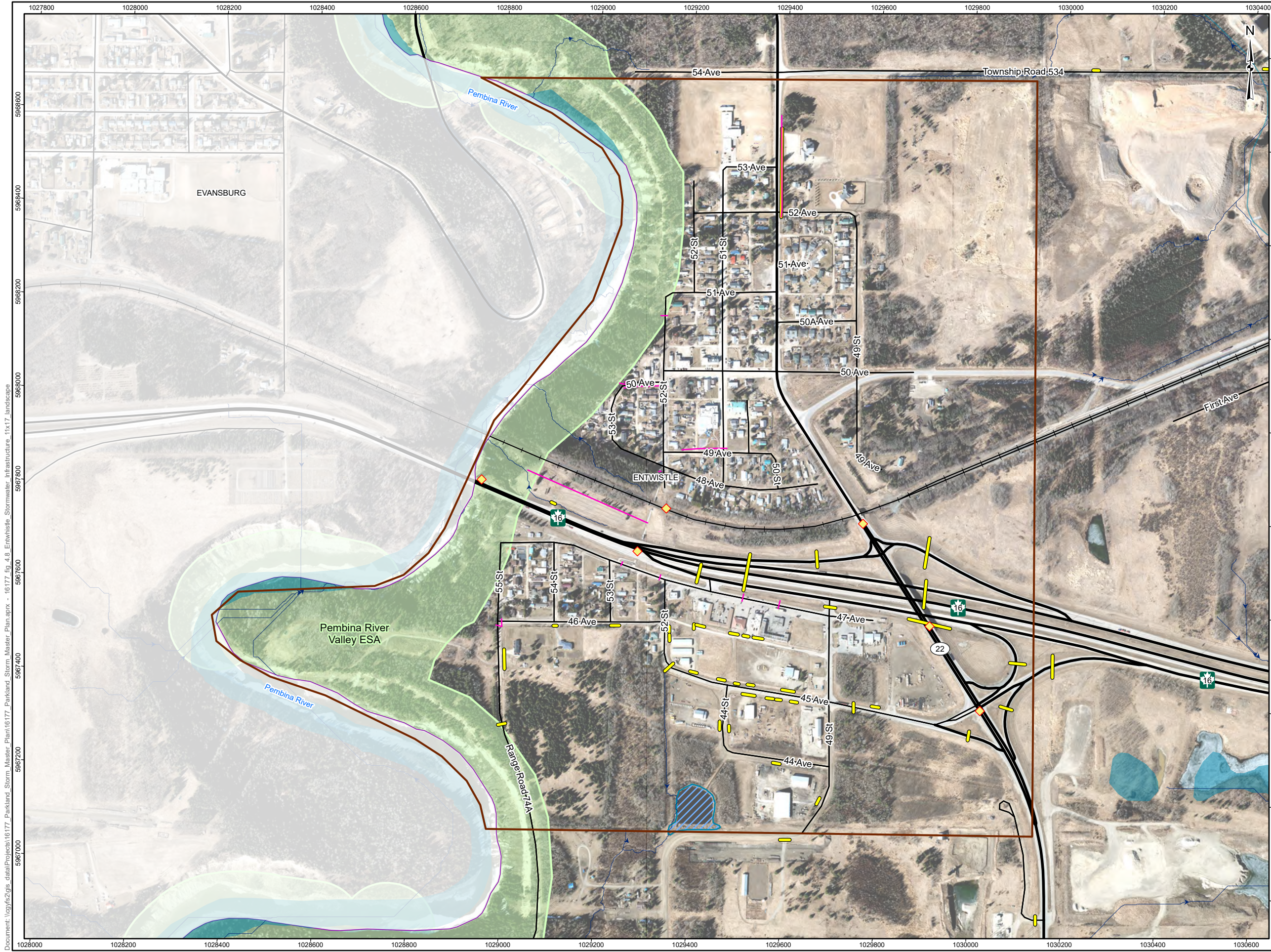
DATA SOURCES
- Topographic Map: Parkland County, IHS, Government of Canada

PROJECTION
NAD 1983 CSRS 10TM AEP Resource

0 100 200
1:10,500 Meters



FIGURE	4.7
DATE	2023-05-26
PROJECT NO.	16177
AUTHOR	TDaSilva



- LEGEND
- Bridge
 - Culvert
 - Stormwater Gravity Main
 - Road
 - Provincial Highway
 - Rail
 - Modelled Drainage Path
 - Watercourse
 - Waterbody
 - Existing Stormwater Management Facility
 - Environmentally Significant Area (ESA)
 - Municipal Boundary

TITLE

HAMLET OF ENTWISTLE EXISTING INFRASTRUCTURE

PROJECT

PARKLAND STORMWATER MASTER PLAN

NOTES

- Existing stormwater management facility GIS data is known to contain some future planned stormwater management facility data.

DATA SOURCES

- Topographic Map: Parkland County, IHS, Government of Canada

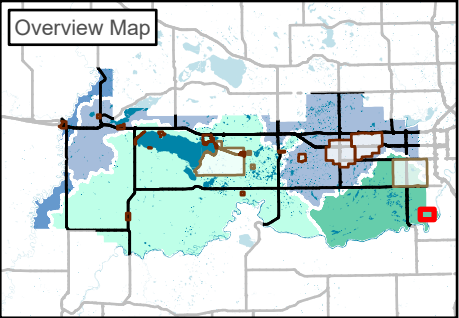
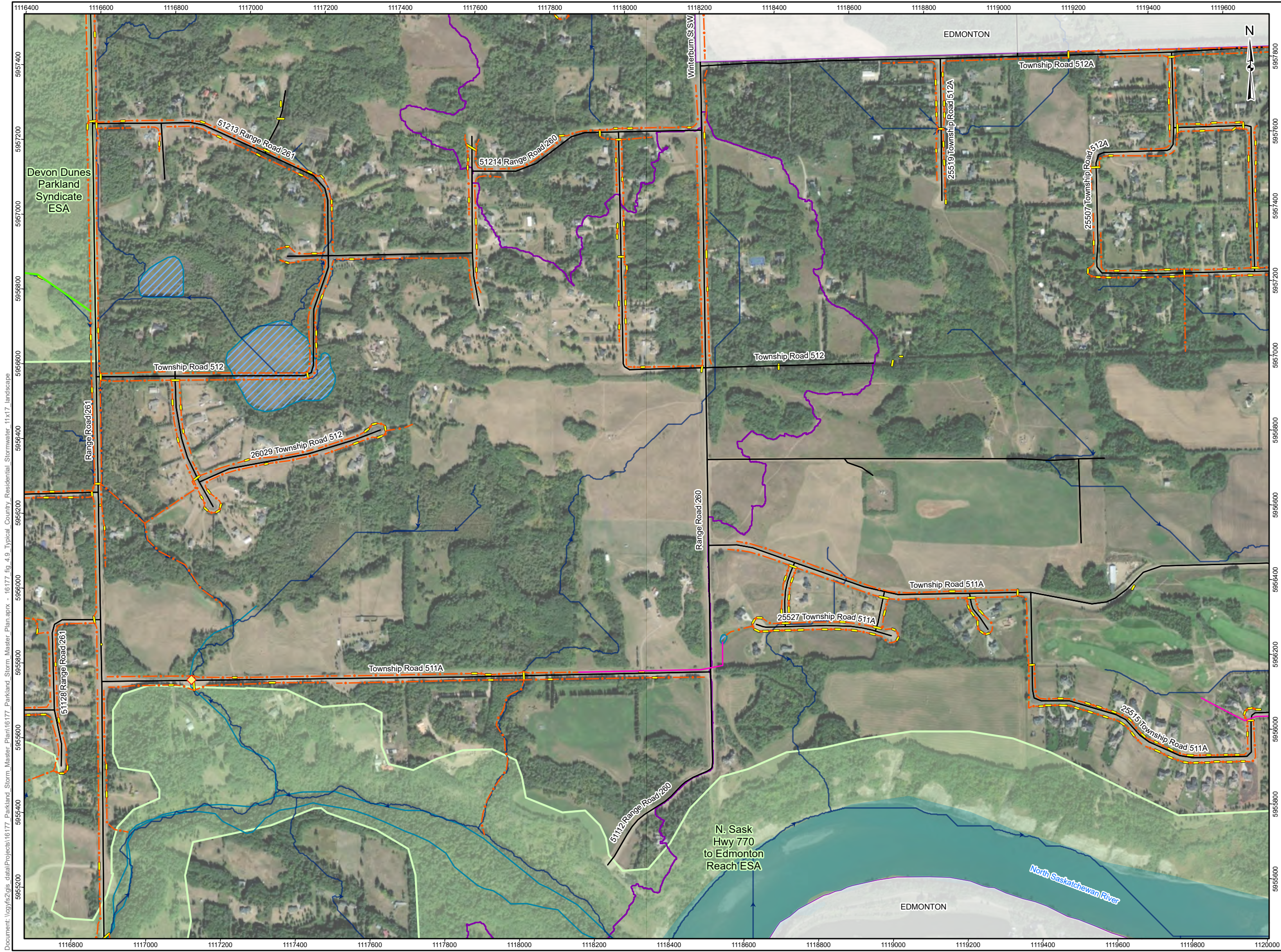
PROJECTION

NAD 1983 CSRS 10TM AEP Resource

0 75 150
1:8,000 Meters

FIGURE	4.8
DATE	2023-05-26
PROJECT NO.	16177
AUTHOR	TDaSilva





- LEGEND
- Bridge
 - Road
 - Culvert
 - Stormwater Gravity Main
 - Grass Swale / Drainage Ditch
 - Licensed or Constructed Drainage Course
 - Modelled Drainage Path
 - Watercourse
 - Waterbody
 - Existing Stormwater Management Facility
 - Sub-Watershed
 - Environmentally Significant Area (ESA)

TITLE

TYPICAL COUNTRY RESIDENTIAL STORMWATER INFRASTRUCTURE

PROJECT

PARKLAND STORMWATER MASTER PLAN

NOTES

- Existing stormwater management facility GIS data is known to contain some future planned stormwater management facility data.

DATA SOURCES

- Aerial Imagery obtained from Parkland County and Maxar.
- No information to the accuracy of the data was provided.

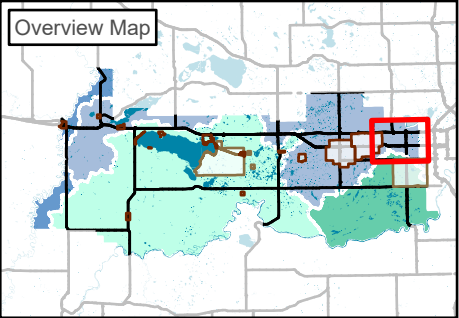
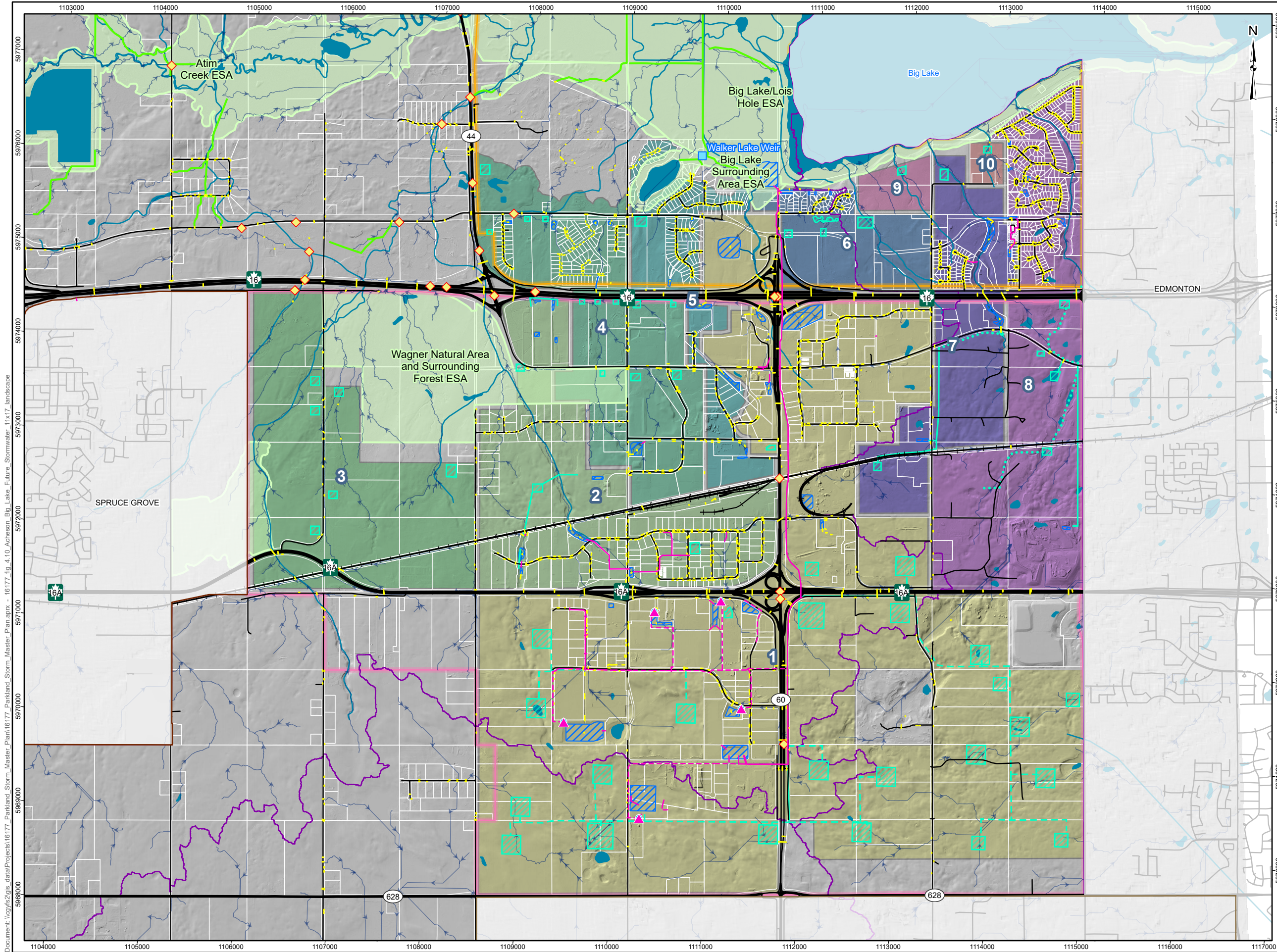
PROJECTION

NAD 1983 CSRS 10TM AEP Resource

0 100 200
1:10,000 Meters

FIGURE	4.9
DATE	2023-05-30
PROJECT NO.	16177
AUTHOR	TDaSilva





LEGEND

- Bridge
- Culvert
- Lift Station
- Stormwater Gravity Main
- Stormwater Force Main
- Licensed or Constructed Drainage Course
- Future Stormwater Main
- Future Stormwater Forcemain
- Future Ditches
- Future Stormwater Pond
- Road
- Provincial Highway
- Rail
- Modelled Drainage Path
- Watercourse
- Waterbody
- Existing Stormwater Management Facility
- Environmentally Significant Area (ESA)
- Sub-Watershed
- Parcels
- Municipal Boundary
- First Nations Boundary
- Acheson Area (Fenceline)
- Big Lake Area (Fenceline)

Water Act Fenceline Basin (1-10)

1	2	3	4	5	6	7	8	9	10
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TITLE
**ACHESON / BIG LAKE PROPOSED
STORMWATER INFRASTRUCTURE**

PROJECT
PARKLAND STORMWATER MASTER PLAN

NOTES
- Existing stormwater management facility GIS data is known to contain some future planned stormwater management facility data.

DATA SOURCES
- Topographic Map: Parkland Country, IHS, Government of Canada

PROJECTION
NAD 1983 CSRS 10TM AEP Resource 1:40,000

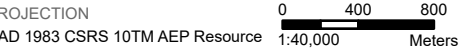
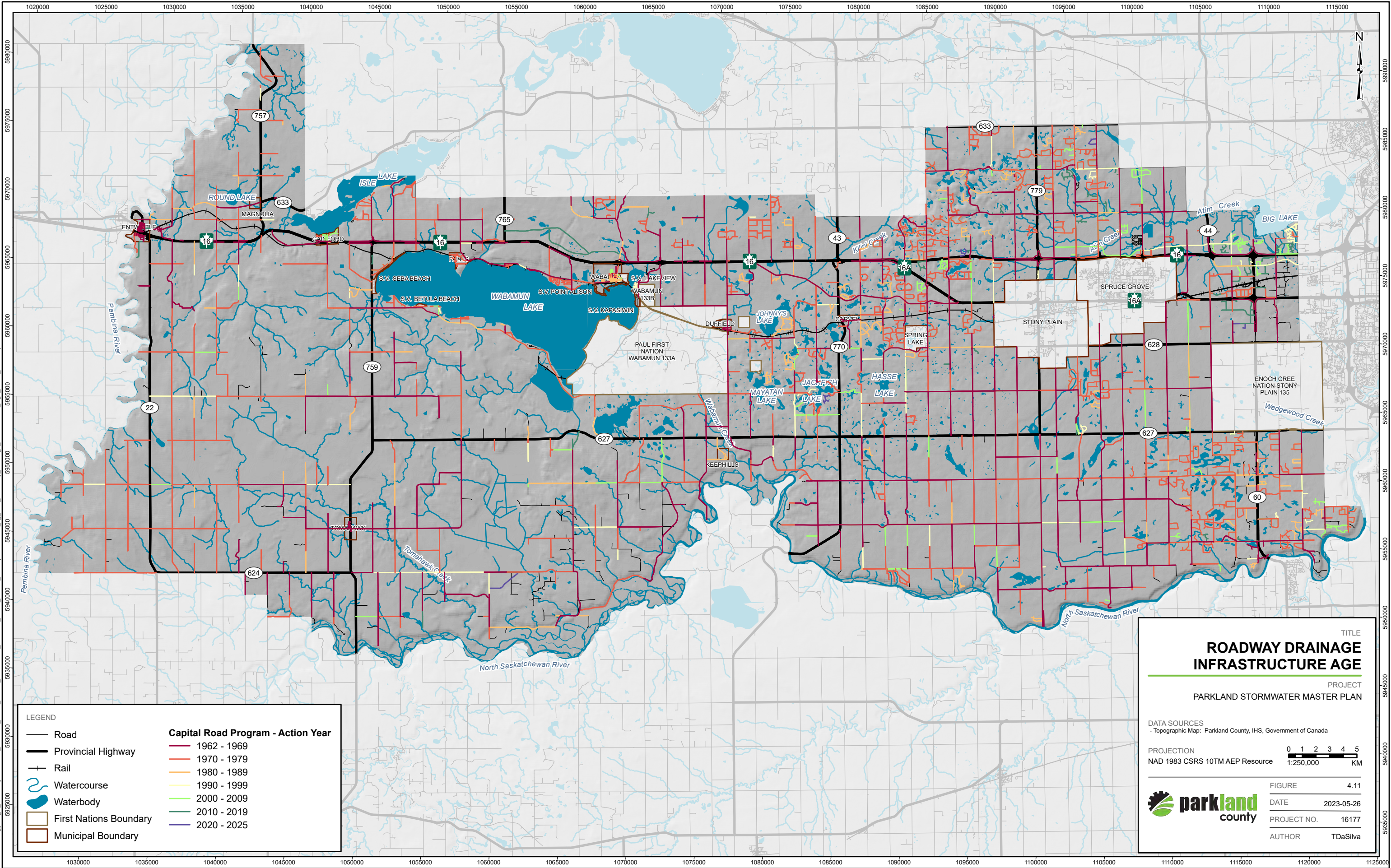


	FIGURE	4.10
	DATE	2023-05-30
	PROJECT NO.	16177
	AUTHOR	TDaSilva

Document: U:\gis\2\gis_data\Projects\16177_Parkland_Storm_Master_Plan\16177_Parkland_Storm_Master_Plan.aprx - 16177_fig_4.11_Roadway_Drainage_Infrastructure_Age_11x17_Landscape



5.0 EXISTING STORMWATER DRAINAGE ISSUES AND CHALLENGES



5.1. Introduction

The County reports numerous on-going drainage operation and maintenance issues. The issues tend to be complex and have numerous underlying causes. This section will focus on the reported drainage and stormwater related issues, as well as the reported underlying causes. A detailed assessment of the underlying causes and potential solutions is presented later in the report.

5.2. Reported Stormwater Drainage Issues

The reported drainage issues can be broken down to the following general categories:

- Flooding – generally land flooding, road or driveway overtopping with water, water occasionally causing minor property damage but rarely causing building damage or displacing people
- Excessive runoff velocity, erosion, and bank sloughing
- Sedimentation
- Beaver activity
- Culvert requiring repair or replacement

5.0



The vast majority of the complaints are for flooding and/or runoff draining too slowly. This is typically caused by the following factors:

- Frozen culvert
- Damaged culvert
- Plugged culvert
- Impeded flow – willows, trees, cat tails
- Inadequate downstream conveyance capacity (ditch, watercourse, culvert, etc)
- Natural topography
- Human changes to the upstream hydrology
- Residents/businesses dumping snow in ditches (interferes with spring runoff)
- Lot grading issues
- Cross lot drainage issues

The County's Road Maintenance and Drainage Department typically receives several hundred complaints per year that they are required to respond to (but not necessarily complete a field repair). The following tables provide a brief summary of the complaints received. Table 5.1 shows the 2017 to 2020 complaints tracked using the Work Request Register system and Table 5.2 shows the complaints from January 2021 to June 2022 tracked using the County's new Customer Resource Management system.

The variation in reported complaints is influenced by the rate of snowmelt, the amount of snowpack, significant rainfall events, and reporting systems. Comparing 2017-2019 with 2020, it is noted that the summer of 2019 had well above average rainfall followed by the spring of 2020 which had a large snowpack that melted very quickly over a more saturated watershed, resulting in very high spring runoff volumes and thus excessive drainage complaints.



Table 5.1 Summary of 2017 to 2020 Drainage Complaints – Work Request Register System

Issue	Total	Year				Season				Priority					
		2017	2018	2019	2020	Spring	Summer	Fall	Winter	Emergency	Urgent	High	Medium	Low	Other
Approaches	16	5	6	3	2	4	7	3	2	0	2	4	1	5	4
Beaver Control	154	11	15	48	80	39	66	49	0	0	7	52	25	3	66
Complaints	186	61	32	52	41	58	70	52	6	0	11	39	18	14	104
Culverts	1038	113	282	135	508	837	129	62	10	0	159	291	93	22	436
Ditch Drainage	530	26	52	118	334	298	166	46	20	0	73	136	92	37	144
Ditches	49	13	7	7	22	18	16	14	1	0	2	3	8	3	32
Roadway Hazard	15	2	1	7	5	11	3	1	0	0	2	0	0	0	11
Grand Total	1988	231	395	370	992	1265	457	227	39	0	256	525	237	84	797

Table 5.2 Summary of January 2021 to June 2022 Drainage Complaints – Customer Resource Management System

Concern	Priority				Total
	Urgent	High	Normal	Low	
Beavers	-	1	86	-	87
Bridges	-	-	4	-	4
Damaged Culvert	1	-	15	-	16
Frozen Culvert	-	8	86	4	98
Plugged Culvert	-	-	74	2	76
Other Culvert Concerns	1	1	33	1	36
Ditch Flooding	-	1	38	3	42
Road Washing Out	-	-	2	-	2
Other Ditch Concerns	-	-	10	-	10
General Drainage	-	-	38	1	39
Manholes and Gutters	-	-	2	-	2
Grand Total	2	11	388	11	412



5.3. Drainage Complaint Locations and Timing

Drainage complaints are reported throughout the County and tend to cluster in low lying areas with significant development. Figure 5.1 shows the location and type of drainage complaint as recorded by the County's Customer Resource Management system from January 2021 to June 2022. It is noted that; the location of these complaints is based on the location recorded by the Customer Resource Management system (location of caller), and not necessarily the location of the drainage issue, and the Customer Resource Management system does not identify if multiple calls are received for the same complaint. The concentration and number of complaints shown in Figure 5.1 can also be attributed to a high concentration of people living in low lying and flat areas.

The preponderance of County drainage issues are in the low lying areas in the north east which is known to have a high water table and is close to the Big Lake floodplain. Other low lying or flat areas with higher concentration of flooding complaints include the Acheson Industrial Area, Country Residential area southwest of Enoch Cree Nation, and areas around Wabamun Lake.

Most drainage complaints are related to flooding during the spring runoff period, typically due to frozen culverts. The distribution of drainage complaints by season are shown in Figure 5.2. Based on Table 5.1 above, about 2/3 of the annual drainage complaints occur during the spring months.



Frozen culvert following use of steaming equipment.

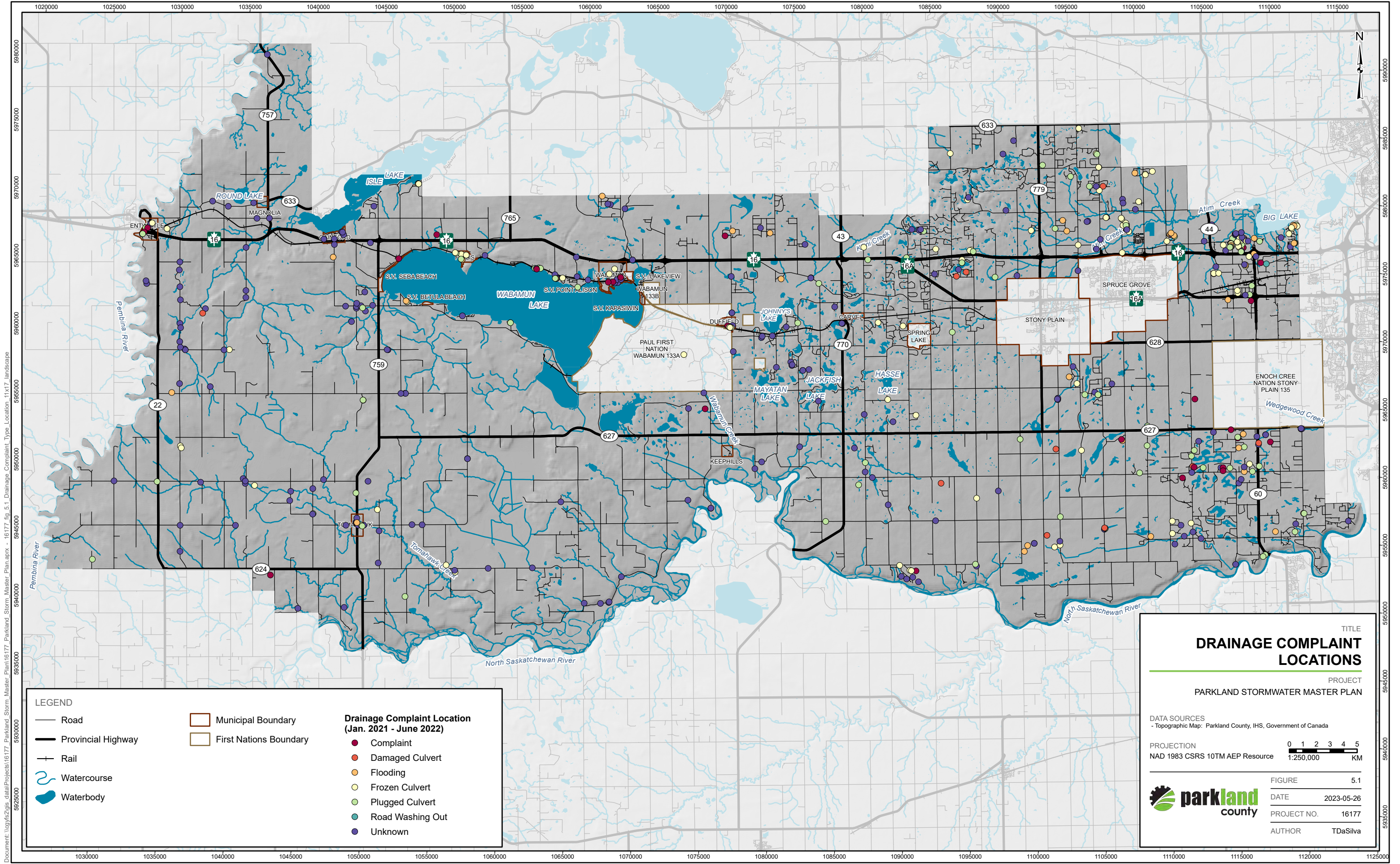


5.4. Discussion

Based on interviews with County staff and a review of historic flooding complaints, the following observations are made:

- There are numerous anecdotal reports of local property damage and minor structure damage due to flooding, as well as loss of use of private property from a few days to two weeks.
- Based on a review of the detailed complaint notes, the economic impact of the drainage/flooding complaint is not particularly severe when compared to a catastrophic flood event (e.g., residence is destroyed). However, they would be considered severe by the resident.
- There are hundreds of minor flooding problems in the County that significantly affect County residents, and to the residents, these impacts would be more than a nuisance or an inconvenience.
- It can be inferred from the drainage/flooding complaints that there are locations with minor flooding when events happen more often than once every 5 to 10 years.
- There is no estimate of the financial impact due to flooding, either from an individual rainfall or snowmelt event, or on an annual basis.
- The flooding records do not allow ISL to estimate the frequency of flooding.

The drainage issues described above are fairly typical for rural municipalities with similar topography and historic development patterns.



LEGEND

- Road
- Provincial Highway
- Rail
- Watercourse
- Waterbody

- Municipal Boundary
- First Nations Boundary

Drainage Complaint Location
(Jan. 2021 - June 2022)

- Complaint
- Damaged Culvert
- Flooding
- Frozen Culvert
- Plugged Culvert
- Road Washing Out
- Unknown

TITLE
**DRAINAGE COMPLAINT
LOCATIONS**

PROJECT
PARKLAND STORMWATER MASTER PLAN

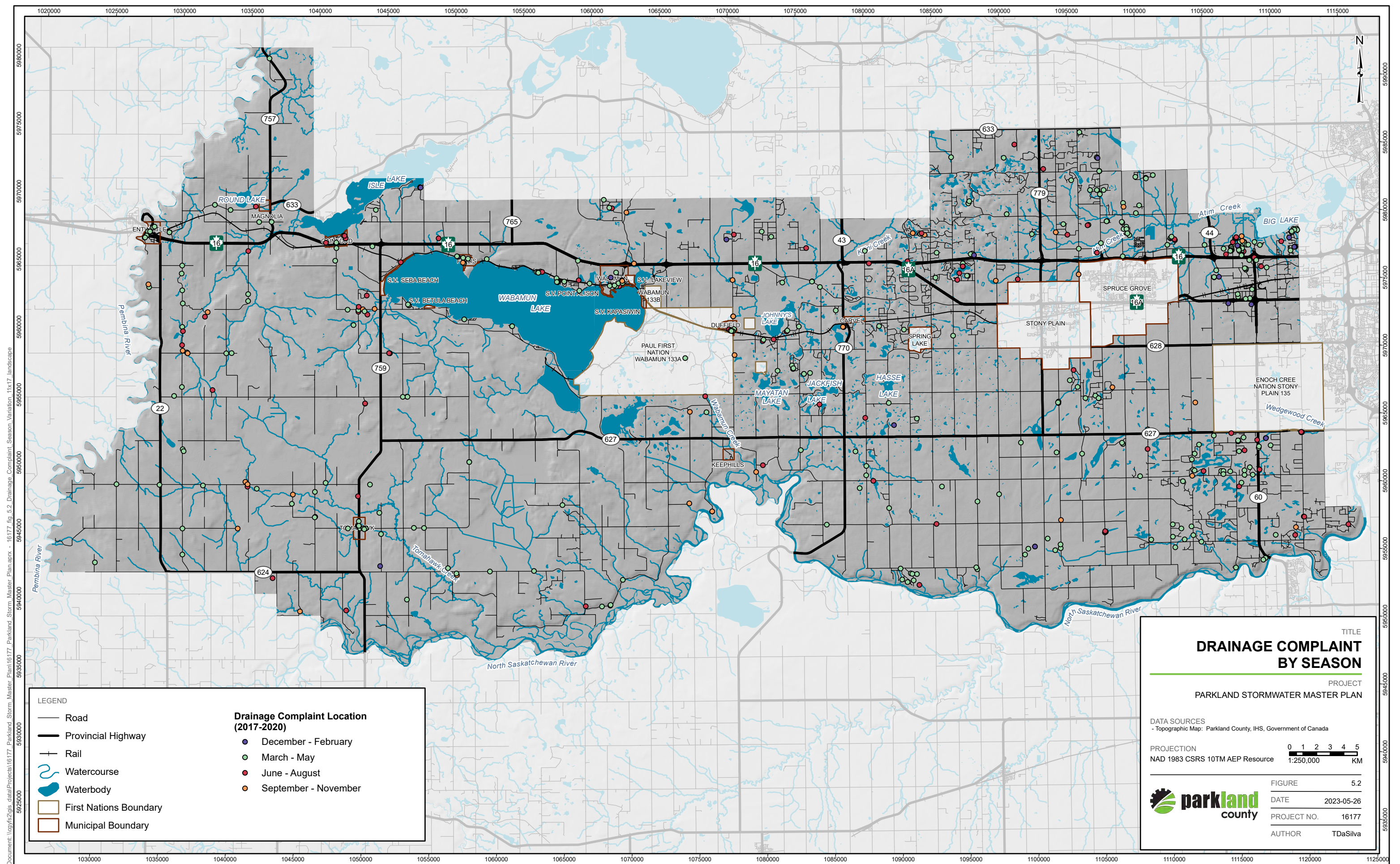
DATA SOURCES
- Topographic Map: Parkland County, IHS, Government of Canada

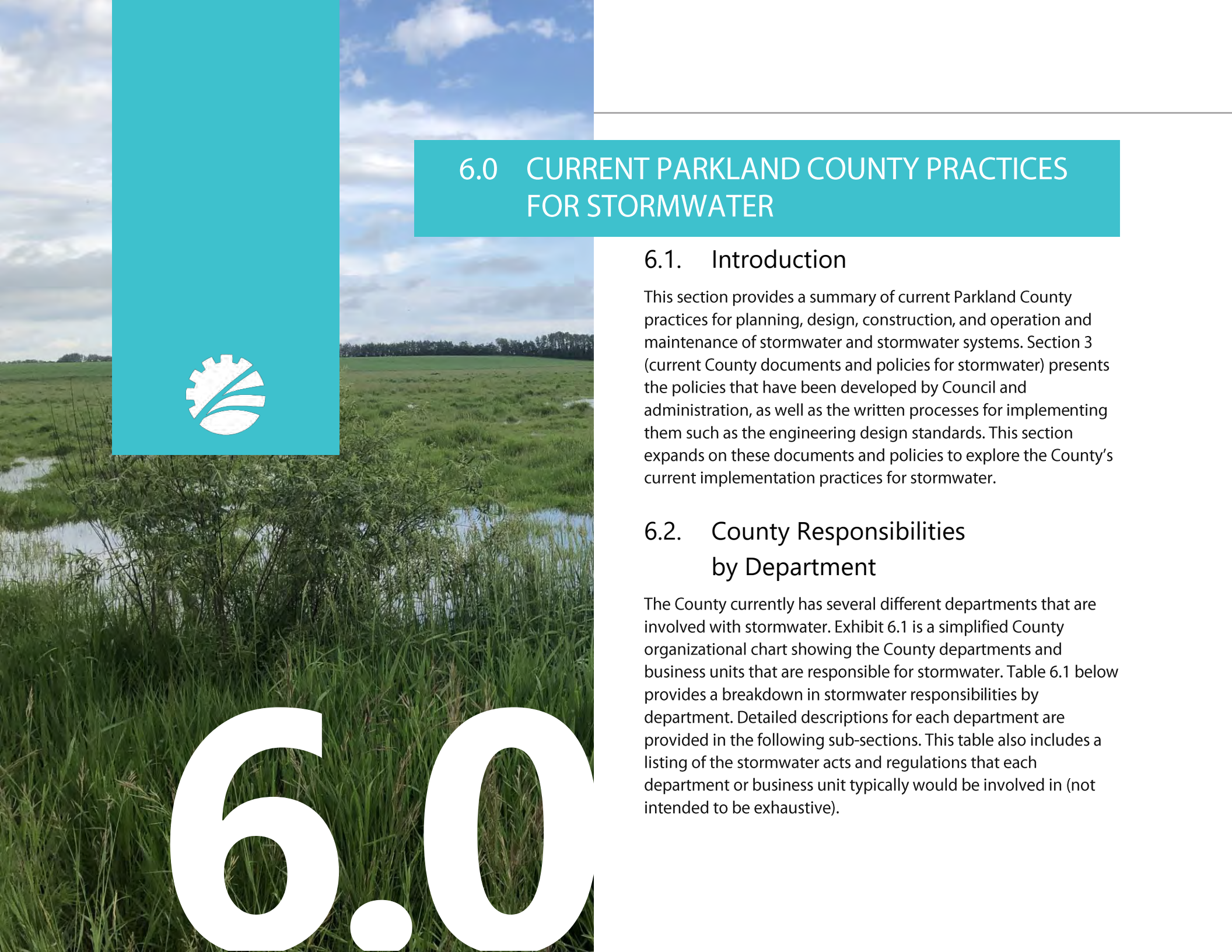
PROJECTION
NAD 1983 CSRS 10TM AEP Resource

0 1 2 3 4 5
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FIGURE 5.1
DATE 2023-05-26
PROJECT NO. 16177
AUTHOR TDaSilva





6.0 CURRENT PARKLAND COUNTY PRACTICES FOR STORMWATER

6.1. Introduction

This section provides a summary of current Parkland County practices for planning, design, construction, and operation and maintenance of stormwater and stormwater systems. Section 3 (current County documents and policies for stormwater) presents the policies that have been developed by Council and administration, as well as the written processes for implementing them such as the engineering design standards. This section expands on these documents and policies to explore the County's current implementation practices for stormwater.

6.2. County Responsibilities by Department

The County currently has several different departments that are involved with stormwater. Exhibit 6.1 is a simplified County organizational chart showing the County departments and business units that are responsible for stormwater. Table 6.1 below provides a breakdown in stormwater responsibilities by department. Detailed descriptions for each department are provided in the following sub-sections. This table also includes a listing of the stormwater acts and regulations that each department or business unit typically would be involved in (not intended to be exhaustive).

6.0

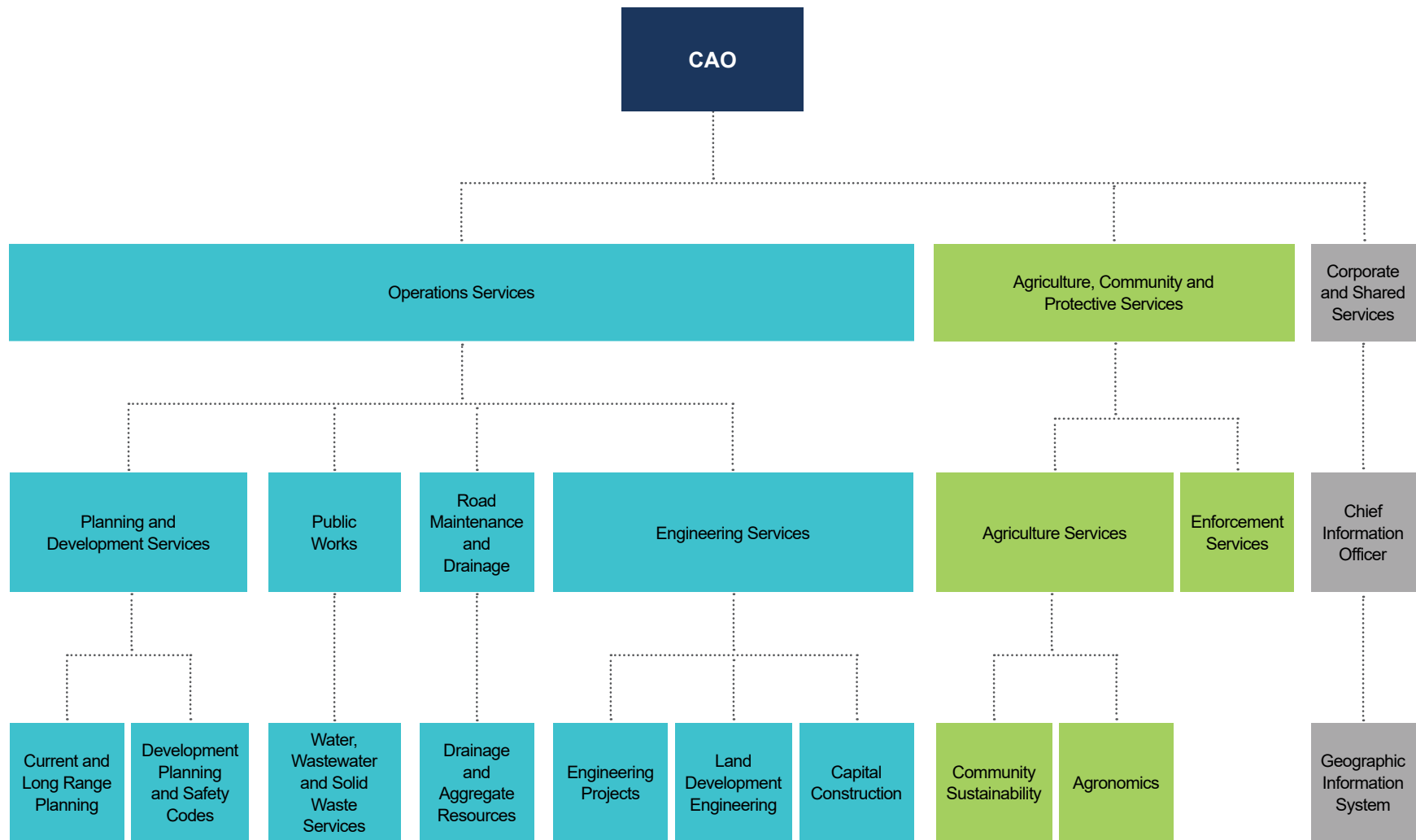


Exhibit 6.1: Parkland County Organizational Chart with Stormwater Responsibilities

6.0 Current Parkland County Practices for Stormwater



Table 6.1 Parkland County Stormwater Responsibilities by Department

General Manager	County Department	Business Unit	Current Stormwater Responsibilities	Stormwater Related Regulatory Involvement
Operations Services	Planning and Development Services	Current and Long-Range Planning, Development Planning and Safety Codes	Land use planning, development coordination and agreements, enforcement of Land Use Bylaws	<i>Water Act, Environmental Protection and Enhancement Act (EPEA), Alberta Wetland Policy, Public Lands Act, Historical Resources Act, Municipal Government Act (MGA)</i>
	Engineering Services	Land Development Engineering	Review and approval of developer submitted stormwater reports and drawings; Construction Completion Certificate / Final Acceptance Certificate inspections and approvals	<i>Water Act, EPEA, Alberta Wetland Policy, MGA</i>
		Capital Construction	Coordination of roadway and bridge design and construction projects	<i>Fisheries Act, Nav. Waters Act, Migratory Birds Conv. Act, Water Act, Public Lands Act, Wildlife Act, Historical Resources Act, EPEA, Alberta Wetland Policy, (MGA)</i>
		Engineering Projects	County initiated stormwater planning and capital projects	<i>Fisheries Act, Nav. Waters Act, , Migratory Birds Conv. Act, Water Act, Public Lands Act, Wildlife Act, Historical Res. Act, EPEA, Alberta Wetland Policy, MGA</i>
	Public Works	Water, Wastewater and Solid Waste Services	Operation and maintenance of storm sewers, lift stations and forcemains	<i>Water Act, Public Lands Act, EPEA</i>
	Road Maintenance and Drainage	Drainage and Aggregate Resources	Operation and maintenance of drainage system, including ditches, culverts and stormwater management facilities (excludes underground infrastructure)	<i>Fisheries Act, Nav. Waters Act, Migratory Birds Conv. Act, Water Act, Public Lands Act, Wildlife Act, Historical Resources Act, EPEA, Alberta Wetland Policy</i>



General Manager	County Department	Business Unit	Current Stormwater Responsibilities	Stormwater Related Regulatory Involvement
Agriculture, Community and Protective Services	Agriculture Services	Community Sustainability	Environmental support and restoration, wetlands, natural asset management	<i>Fisheries Act, Nav. Waters Act, Migratory Birds Conv. Act, Water Act, Public Lands Act, Wildlife Act, Historical Resources Act, EPEA, Alberta Wetland Policy</i>
		Agronomics	Mowing of County roadway ditches	<i>Migratory Birds Conv. Act, Water Act, Public Lands Act, Alberta Wetland Policy</i>
	Enforcement Services	Operations	Enforcement of County Bylaws (excludes Land Use Bylaw)	<i>Water Act, Public Lands Act, Wildlife Act, Historical Resources Act, EPEA, Alberta Wetland Policy</i>
Corporate and Shared Services	Information Services	Business Solutions	GIS Support – LiDAR, GIS for stormwater infrastructure	n/a
	Strategic Services	Customer Service	Customer Resource Management – complaint coordination	n/a



6.3. Planning and Development Process

6.3.1. INTRODUCTION

The processes that the County's Planning and Development, and Engineering Services, Land Development Engineering use for the planning, design, construction, and to take ownership of stormwater infrastructure is described in Section 3.4. The following is a summary of the current practices based on interviews with County Planning and Development and Land Development Engineering staff.

6.3.2. DEVELOPMENT PERMIT

As outlined in Table 3.3, the development permit application process and stormwater requirements vary depending on the type of development. Current practices for each are described below.

Development permit approval will normally include conditions that other federal and/or provincial approvals be obtained by the applicant as required (e.g., Safety Codes, *Water Act*). It's not often that subdivision approvals include such conditions.

Agricultural Development

A Development permit is not a requirement for agricultural development, such as an agriculture building (i.e., barn, dugout, feed shelter). If the landowner is excavating for agricultural purposes (leveling off a hill, building a dugout), then a development permit is required. If fill is needed to fill in low areas, the landowner will require a development permit and grading plan. If a landowner wants to fill a water body (permanent or season wetland or watercourse), the County refers the landowner to Alberta Environment and Protected Areas for specific requirements. County staff indicated that they are looking for clarity on who is responsible for reviewing the site works, the County or Alberta Environment and Protected Areas.

Industrial / Commercial Development

County Planning refers development applications for industrial and commercial uses (e.g., warehouses, gas stations) to Land Development Engineering to determine if a site engineering and grading plan is required. Currently the County does not require a Lot Grading Certificate to confirm if the works completed are in accordance with the plans submitted. County staff have identified this as one of the County's issues right now as this requirement is not in their Engineering Standards. It is noted that a draft Surface Drainage and Lot Grading Bylaw is being developed concurrent to this study (spring 2023).



Residential Development

County Planning does not require any type of stormwater management plan for a development permit application for residential development (e.g., house) in residential areas. However, a stormwater management plan may be required for specific situations (e.g., site grading with greater than 150 mm of fill, dugout).

Hamlets

Hamlets are predominantly older residential communities so County Planning does not ask for Stormwater Management plans for residential development permits, however, on a location-by-location basis, for larger scale developments in Hamlets (i.e., Pinnacle Pellet Plant that included rail sidings in Entwistle, or a large greenhouse) they may require Stormwater Management plans with development permit applications. The County does not have a Lot Grading Bylaw and has no requirement in County Engineering Standards, so no Lot Grading Certificate is required. As noted above, a draft Surface Drainage and Lot Grading Bylaw is being developed concurrent to this study.

6.3.3. SUBDIVISION APPLICATION

The Agricultural District only allows 3 subdivisions in addition to the remnant of the original quarter section/quarter. No stormwater management plan is typically required for these types of simple subdivision applications; however, the application would be referred to Land Development Engineering to determine drainage requirements.

A Country Residential (unserved) subdivision of up to 4 (16 ha). Parcels/quarter section (3 Parcels in addition to remnant) on lands districted Agricultural (AGG) or Country Residential (CR) in the rural area is viewed as a simple Country Residential subdivision by County Planning and no stormwater management plan is required. For Country Residential subdivisions for greater than four lots, County Planning does require a stormwater management plan and refers the application to Land Development Engineering for their review and comments on drainage requirements.

For Country Residential subdivisions on lands with previous approval of 10 Country Residential lots or more, County Planning will require a limited scope stormwater management plan to be provided for Country Residential re-subdivision (infill) at the time of application, if the original subdivision did not originally have a stormwater management plan. County Planning clarified that in the case of existing Country Residential subdivisions approved in the 1960's, 70's and 80's (i.e., Woodbend, Graminia) the Country Residential lots were oversized and unserved, so they allow for re-subdivision as they will still meet the Country Residential District's minimum lot size requirements to accommodate re-subdivision.

For Multi Parcel Country Residential subdivisions on lands districted Country Residential Estate or in the Big Lake Plan area, County Planning will require a Stormwater Management plan that aligns with the overall Stormwater Master Drainage Plan for the Plan area. Land Development Engineering reviews these Stormwater Management plans prior to approval to ensure there is alignment.



For Industrial subdivision applications in areas districted for Commercial or Industrial uses (i.e., Highway Commercial, Business Industrial, Medium Industrial), County Planning requires stormwater management plans to align with the overall Master Drainage Plan that applies to the subject area. County Planning refers these subdivisions and stormwater management plans to Land Development Engineering to review and comment on drainage matters.

County Planning currently receives few subdivision applications in hamlets. The stormwater management plan for a Hamlet subdivision should address what the current drainage is and compare that with the resulting change effect from the proposed development (i.e., pre- and post-design details).

County Planning exercises its judgement on the need or not to require a full stormwater management plan for development applications as they want to avoid causing ratepayers/developers undue hardship associated with the cost to prepare a full stormwater management plan. For this reason, County Planning considers the type and scale of the development proposed and may only require a lot grading plan to show drainage.

6.3.4. ADDITIONAL SITE SPECIFIC REQUIREMENTS

County Planning considers requirements in the *Municipal Government Act*, Provincial Subdivision Development Regulations (that identify stormwater as a relevant consideration, however, where is the line to avoid undue hardship), Provincial Wetland Inventory (that identifies the wetland type and value for compensation purposes), Provincial Wetland Policy which sets out the requirement for a wetland assessment (which could be a desktop study) for development applications where wetlands are present; and may require a wetland assessment and impact report be completed to apply for *Water Act* approval.

If a residential development is located directly adjacent to an environmentally significant or highly sensitive area, then County Planning may ask for a desktop Biophysical Assessment or a Comprehensive Biophysical Assessment. The County has noted that their current wetland inventory may not include all wetlands in the County and that they may require a biophysical assessment specific to the titled land proposed for multi parcel residential and industrial developments. These assessments provide more detailed wetland identification to help address gaps in the County's wetland inventory. Sometimes County Planning requires a desktop biophysical assessment if a wetland is noted in any lot or adjacent to the development. It may depend on the scale of the development. County Municipal Development Plan speaks broadly to Municipal Reserve and Environmental Reserve Policy and Procedures. For example, the County would take the wetland as Environmental Reserve and require that a riparian setback area be determined and applied to the wetland.



6.3.5. SECURITIES

The County takes securities at subdivision, through a Development Agreement for multi parcel residential or industrial subdivisions when a developer is required to build a stormwater management facility. When the Developer constructs assets that upon Construction Completion Certificate are to be dedicated to the County for ownership, operation, and maintenance, then securities are required. Some portions of securities are refunded at the end of construction when the Construction Completion Certificate is issued, with full release at end of warranty at the Final Acceptance Certificate stage when transfer to County management is complete. The development process typically takes between 2 to 5 years in the County.

6.3.6. OTHER STORMWATER PLANNING ISSUES

County Planning and Land Development Engineering staff reported the following issues:

- County Planning commented that having an overarching Stormwater Master Plan would help with their stormwater review process. Further, the County noted that a Stormwater Master Plan will help address surface flooding when snow melts and cross-lot drainage issues (Woodbend was provided as an example area).

- Stormwater master planning in general was not adequate for older subdivisions in the County, several of which were approved by the regional planning commission that was in place at that time (overriding Parkland County). In several of these developments, drainage crosses private lands with no easements or access agreements being put in place. Specific areas of concern include areas south and east of Spruce Grove, around Wabamun, Woodbend, Graminia, and Devonian Gardens area.
- Regional drainage plans don't exist outside of Acheson. Areas without regional drainage plans create engineering compliance issues at the local level.
- To understand the master drainage area for a subdivision outside of Acheson, County Engineering needs a regional idea of what is going on, specifically see pre and post development conditions but at a large scale. Without a Stormwater Master Plan, it's harder to see the larger dynamic.
- At an individual lot level, As-Builts and records are difficult to find or do not exist. This makes it difficult for the County to deal with drainage issues that arise after the fact and determine who is in the wrong. The lack of a lot grading plan to tie the subdivision plan to, creates difficulty. When As-Builts or lot grading plans do not exist, the County is often faced with having to take on the mitigating of the problem for they are unable to hold landowners responsible for the drainage issue.
- Not having a Lot Grading Bylaw to give grounds for the County to enforce compliance makes it difficult for County Enforcement to manage conversations between Council, staff, regulatory bodies, developers, and private landowners as to who is at fault and how to deal with a drainage issue.



- The County is looking at their filling and grading permits as a place for improvement, thus the drafting of the Lot Grading and Drainage Bylaw. The County does not have policies or bylaws in effect to follow up/enforce Filling and Grading Development Permits.
- County Development Planning staff reported that they cannot go back and ask for the Stormwater Report or Filling and Grading plan after the completeness review in the Referral Review period; however, Land Development Engineering can require as part of this their process. Also, if the Development Permit application is a permitted use, then based on the Land Use Bylaw, the County does not have the authority to request a Grading Plan.
- Master Drainage Plans are not organized or are missing for a lot of completed subdivisions (i.e., as-builts/record drawing sourcing) so cross-referencing during engineering compliance is challenging.
- The County is currently looking at implementing the following improvements to their processes:
 - o Revising Development Agreement for improvements needed.
 - o Drafting a drainage bylaw and introducing lot grading certificates.

When reviewing developers' stormwater management reports, the County's Land Development Engineering group is required to assess whether the unit pre-development discharge rates being used for new stormwater management facilities are reasonable. For the Acheson and Big Lake Areas, they follow the previously mentioned Water Act Fenceline Approval accepted discharge rates. There is no formal process that the County uses for establishing unit discharge rates for the remainder of the County.

The County is aware that Alberta Environment and Protected Areas has developed a 1:100-year, 24-hour pre-development stormwater runoff rate isochart in Litres per second per hectare. While the County currently allows developers to use this isochart, they are concerned that it is too coarse to accurately estimate predevelopment discharge rates for individual developments.

6.4. County Capital Projects

This section describes the current County practices related to stormwater when undertaking capital construction projects.

6.4.1. ROADWAYS AND BRIDGES

The County's Engineering Services, Capital Construction group is responsible for overseeing the design and construction of capital roadway projects, including ditches, local culverts, bridges-sized culverts, and bridges. The stormwater component is not separated from the roadway component in the capital planning and budgeting. The design and construction administration for most roadway projects are assigned to engineering consultants. Consultants then take professional responsibility for the design of the stormwater infrastructure (ditches, culverts, bridges) and obtaining permits where required. Construction is done by external contractors who are overseen by consultants.

Roadway projects are designed to follow existing drainage patterns and tie into existing watercourses. Where possible, the designs try not to reintroduce additional waters to water courses.



Designs are done to County's or Alberta Transportation and Economic Corridor's Engineering Consultant Guidelines, whichever is more applicable. During construction, erosion control measures are required (per *Water Act*).

The Capital Construction group is also responsible for long term planning for major bridge maintenance and replacement. Bridge structures require regular bridge inspections which feeds into Alberta Transportation and Economic Corridor's Transportation Infrastructure Management System database. Smaller maintenance items from bridge inspections are sent to Road Maintenance and Drainage group for operational maintenance planning operational activities.

The 2021 Strategic Overview – Bridge Files report documents funding, maintenance, and long term prioritization of bridges etc. It was noted that there has been a shortfall on funding over the years on the bridge files, and many that were built in the 60's and 70's are soon due for rehabilitation or replacement.

It was noted that routine bridge, culvert, and ditch maintenance was conducted by the County's Roadways Maintenance and Drainage – Drainage and Aggregate Resources group. The Capital Construction group supports capital maintenance activities typically with consultant oversight.

The Capital Construction group has indicated that there are stormwater aspects to their projects that can be challenging. These include:

- Roadway culverts can adversely impact upstream or downstream stormwater flows if culvert modifications are made. For example, replacing a blocked culvert can drain an upstream wetland that has been established by the blocked culvert.
- Notwithstanding a consultant led construction project, Capital Construction requests clarification on how to oversee consulting assignments in keeping with applicable Legislature Acts and Policies etc.

6.4.2. STORMWATER CAPITAL PROJECTS

The County's Engineering Services, Engineering Projects group occasionally construct stormwater capital projects. The largest project undertaken by this group was the Acheson / Big Lake Basin 1 Outfall Trunk to Big Lake that included the Zone 5 forcemain. The group is also responsible for upgrading existing stormwater infrastructure based on its physical condition or if additional capacity is required. An example of this is the current Acheson Zone 3 stormwater sewer upgrading. The design and construction administration for capital projects, including obtaining permits and approvals, is carried out by engineering consultants with construction by external contractors.



Tomahawk Creek Restoration

6.4.3. OTHER CAPITAL PROJECTS

The County routinely carries out capital projects that directly or indirectly involve stormwater. Building and site development projects initiated by the County do not require the development agreements or development permits based on current County policies and the *Municipal Government Act*. However, the County's Engineering Services is endeavoring to fulfil the County's applicable requirements when initiating new projects where feasible. The design and construction administration for capital projects, including obtaining permits and approvals, is carried out by engineering consultants with construction by external contractors.

6.5. Stormwater Operation and Maintenance

Stormwater operation and maintenance activities are required for all County drainage infrastructure and is handled through some scheduled maintenance activities, and by responding to community complaints and issues identified by County staff. Operation and maintenance activities address numerous issues, with responsibilities distributed to various County departments.



Township Road 514 Culvert Replacement



6.5.1. DEPARTMENT OPERATION AND MAINTENANCE RESPONSIBILITIES

County responsibilities are summarized in the following table and described below.

Table 6.2 County Stormwater Operation and Maintenance Responsibilities

County Department	Stormwater Operation and Maintenance Responsibilities
Road Maintenance and Drainage - Drainage and Aggregate Resources	• Ditch maintenance including brushing (includes licensed drainage ditches) • Culvert maintenance, including cleaning debris from blocked/partially blocked culverts, thawing frozen culverts • Pest management / beaver control • Stormwater management facility maintenance including mowing, fencing • Routine bridge and bridge sized culvert maintenance • Addressing surface flooding complaints • All other aspects of stormwater operation and maintenance that is not delegated to other departments
Public Works - Water, Wastewater and Solid Waste Services	• Stormwater lift stations, forcemains, manhole outlet structure gate valve and orifice, and storm sewers (i.e., all underground stormwater infrastructure other than culverts) • Lift Station SCADA alarms • Oil/grit separator inspection and maintenance • Facility locates • Close stormwater management facility/structures during emergencies (e.g., spills)
Agriculture, Community and Protective Services – Agriculture Services - Agronomics	• Mowing and weed control of roadside ditches • Management of County owned lands
Engineering Services	• Televising (CCTV) and condition assessment • Water quality monitoring • Reviewing and issuing approval for temporary discharge of stormwater into storm systems during construction



Roadway Maintenance and Drainage

As noted above, the County's Roadways Maintenance and Drainage - Drainage & Aggregate Resources group has overall responsibility for overland stormwater drainage system operation and maintenance activities. Roadway ditches and culvert maintenance is the primary focus for the group. They are also responsible for drainage related issues relating to manmade drainage channels on County land or a subdivision and Licensed Drainage Courses constructed through the Alberta Water Management and Erosion Control Program. They often get involved with other drainage issues such as:

- cross lot drainage,
- private property flooding, and
- overland flooding related to development impacts

The Roadways Maintenance and Drainage – Drainage and Aggregate Resources group takes an active role in tracking stormwater drainage issues to assist with tracking complaints and identifying problem areas. The County budget for Stormwater operation and maintenance is allocated to Roadways Maintenance and Drainage and is shared with other departments as required (e.g., funding of storm drainage operation and maintenance carried out by Public Works).

Public Works

The County's Public Works - Water, Wastewater & Solid Waste Services is responsible for operating and maintaining the stormwater lift stations, forcemains, manhole outlet structures gate valve and orifice, and storm sewers. Public Works operates these facilities based on their operational expertise and safety training relating to confined space entry requirements (manholes, chambers) related to operating the County's water and wastewater systems, which includes sewers, manholes, pressure pipes, pumps, valves, and electrical and SCADA systems. As the Acheson gravity sewer trunk, stormwater management facility lift stations, and forcemains are relatively new, Public Works is still developing a detailed operation and maintenance strategy (e.g., frequency for testing lift station operation, inspection cycle of infrastructure). Their key operation and maintenance responsibilities include:

- General system operations for SCADA, pumps, valves, etc. that have standard operating and maintenance procedures.
- Receiving, processing, and responding to Utility Safety Partner buried utility underground system locate requests.
- Inflow and Infiltration issues during spring runoff for wastewater manholes in ditches.
- Operation and inspection of stormwater management facility manhole type outlet structure gate valves and orifices.



Maintenance of stormwater infrastructure is typically allocated to groups based on the nature of the work. Overland drainage through ditches and culverts are managed by Road Maintenance and Drainage, and drainage managed by buried piped infrastructure, and appurtenances is managed by Public Works. The focus for Public Works is the Acheson area infrastructure with some Country Residential subdivisions that have buried stormwater infrastructure installed.

Agriculture Services

The County's Agriculture, Community & Protective Services – Agriculture Services - Agronomics group is responsible for weed control and mowing of County roadway ditches and land. They do not have specific responsibilities related to stormwater management, however the weed control and mowing of roadway ditches is indirectly a maintenance item for stormwater drainage infrastructure.

Other areas where Agriculture Services supports stormwater drainage is through the reporting of culvert conditions during the mowing of roadway ditches. Damaged culvert ends, blocked culverts, or missing culvert marking posts are identified and recorded using a handheld device for Roadways Maintenance and Drainage to address. Agriculture Services then emails photographs of damaged culverts to Roadway Maintenance and Drainage. It is noted that culverts are occasionally damaged by others, and it is not reported to Roadway Maintenance and Drainage.

Engineering Services

Engineering Services supports Roadway Maintenance and Drainage by conducting televising (CCTV) and condition assessment as part of the County's Asset Management program (discuss in detail below). They also oversee the water quality monitoring program in the County's stormwater management facilities and outfalls (also discussed below).

Engineering Services also provide LiDAR support, as well as Bridge File inspections, assessment, rehabilitation, and replacement.

6.5.2. ROAD MAINTENANCE AND DRAINAGE - FLOOD MANAGEMENT PLAN

Road Maintenance and Drainage has a working document called Parkland County Flood Management Plan that they developed in 2018 for planning out their response to flooding. This Flood Management Plan is an internal document in draft stage and has not been circulated within the County. The purpose of the Flood Management Plan is to ensure clear direction is in place for staff to effectively manage extreme weather events as it relates to flooding. Flooding events occur with the annual spring melt or with high volumes of precipitation over a brief period of time. The document establishes the following objectives for Road Maintenance and Drainage crews to:

- Prepare for events to reduce impact or severity.
- Prioritize events as they occur.
- Mitigate concerns in alignment with developed action plans.
- Communicate actions internally and externally.



The flood management plan is intended to help identify the appropriate level of resources to quickly manage weather events and get back to “normal” activities as soon as possible. The information provided and actions identified also ensure alignment with the Council approved Engineering Services Overland Drainage Policy as outlined in Council Policy C-EN14 Overland Drainage.

The document lists three melting conditions:

- Typical melting conditions with freeze-thaw cycle which can cause some culverts to freeze.
- Adverse melting conditions with very warm daytime temperatures and nighttime freezing; this can result in both localized flooding and culvert freezing.
- Extreme melting conditions with very warm daytime temperatures and above zero overnight temperatures; these events can lead to multiple flooding sites with roadway closures and potentially ice jam conditions in creeks.

Road Maintenance and Drainage has established prioritization based on the severity of the event (emergent, damaging, general, nuisance) and the risk levels (high, medium, low). Targeted response times are then based on the combination of severity and risk. For example, a high risk of an emergent severity (extreme impact to residences and businesses) requires same day attention, while a medium risk of a damaging event has a target response time of 24 to 48 hours. If target response times cannot be met, Road Maintenance and Drainage brings on additional resources and equipment from other departments.



Spring runoff encroaching roadway.

The County’s Flood Management Plan lists the following preventative maintenance activities to prepare for spring runoff event incidents:

- Remove snow blocking all flap gates.
- Remove snow from underground drainage.
- Remove snow from culvert inlets with historical flood issues.
- Open or close all gate valves used for flood protection.
- Open Fleming Park Syphon.
- Clear all catch basins.
- Servicing the equipment and tools (pumps, steamers), preparing signs/barricades, and stockpile sandbags.

The Flood Management Plan also includes some general drainage notes and some Frequently Asked Questions. Some of these are listed below to illustrate how the Roadway Maintenance and Drainage – Drainage and Aggregate Resources group currently communicates to the public on drainage issues:



- Parkland County will not enter private lands to construct or make drainage improvements unless it directly improves the County's ability to maintain its road allowances, licensed watercourses, or other County infrastructure unless in the event of a disaster or emergency. Parkland County will not enter private property to pump water from a natural collection area, and/or supply pumps to landowners, unless in the event of a disaster or emergency.
- During heavy rainfall, some ponding and higher water is normal. The stormwater system will catch up and drain the water where it needs to go if not impeded.
- Spring Snow Melt: As the snow melts, water will flow down to stormwater catch basins (can be natural low-lying depressions) via road ditches, drainage courses, culverts, tributaries, and bridges which all need to be free of snow and ice to ensure adequate flows.

6.5.3. TRIAGE PROCESS FOR DRAINAGE COMPLAINTS

Prior to 2021, drainage complaints were directed to the Road Maintenance and Drainage department and staff used an information sheet to collect detailed information on the location, nature, and severity of the situation. The collected information was entered into the Work Request Registry database (managed through Vemax Software) and automatically routed directly to the manager responsible (Manager, Drainage & Aggregate Resources) or the drainage foreman.

In 2021, the County introduced the Customer Resource Management system where a Customer Services Representatives collect all complaints for all County departments. This change resulted in less detailed data being available as well as all complaints being forwarded to the Roadway Maintenance and Drainage – Drainage and Aggregate Resources group who then assigns the complaint to the appropriate foreman. Refer to Tables 5.1 and 5.2 for examples of the drainage complaint data for the Work Request Registry and Customer Resource Management systems.

Based on the data received, the Roadway Maintenance and Drainage – Drainage and Aggregate Resources group evaluates and prioritizes emergent and urgent work requests. Tasks are then assigned to in-house drainage crews. Additional resources are brought in from within Roadway Maintenance and Drainage Services and external resources can be accessed with the necessary approvals.



Roadway Maintenance and Drainage staff reported that Council Action Requests, internal inquiries, or repetitive calls during the busy spring runoff period duplicate the information in the Customer Resource Management system and led to expectations of triage priority based on the source of the request. This adversely impacted Operations' priority rankings and impacted the response times for other complaints. Trying to accurately categorize drainage complaints in real time during the spring runoff period is not practical due to the workload of the foremen and crews.

Roadway Maintenance and Drainage have been trying to set up a database to document locations with frequent drainage complaints using the triage process. This was set up with Work Request Register prior to 2021 and the tracking sheet was detailed enough to clearly identify the exact location of the complaint (including both the cause – e.g., blocked culvert, and the impact – e.g., upstream flooding location). The current Customer Resource Management system does not provide the same problem area location details needed.



Washed out culvert on Range Road 63



6.5.4. ROADWAY MAINTENANCE AND DRAINAGE USE OF GIS

Road Maintenance and Drainage has increased its use of GIS software to increase the efficiency of operation and maintenance activities. Examples of this include:

- Identifying the upstream drainage area (elevation analysis and flow accumulation review) for culverts that need to be replaced.
- Documenting areas with frequent drainage complaints.

Roadway Maintenance and Drainage application of GIS is somewhat independent from that being used by the Engineering Projects and GIS groups. This was initiated by Roadway Maintenance and Drainage's manager responsible for operation and maintenance in an effort to maximize its understanding of the existing drainage system and undertake as much maintenance as possible within limited staffing levels.

6.5.5. FLOW AND WATER QUALITY MONITORING

Flow Monitoring

The County is not actively conducting a flow monitoring program within its storm sewers and watercourses/creeks.

It should be noted that Alberta Environment and Protected Areas operates a North Saskatchewan River and tributary flow and water quality monitoring network. This includes the following flow/lake level monitoring sites:

- Atim Creek at Century Road 05EA012
- Wabamun Creek near Duffield 05DE003
- Wabamun Lake at Wabamun 05DE002
- Tomahawk Creek near Tomahawk 05DE009
- Tomahawk Creek near mouth 05DE930 (photo on-line)
- Pembina River near Entwistle – 07BB002
- North Saskatchewan River at Hwy 759 – 05DE010



Water Quality Monitoring

As a requirement of the original *Water Act* Acheson / Big Lake Area Master Drainage Plan Fenceline Approval 00287756-00-00, in 2011, the County initiated an annual stormwater water quality sampling program for select stormwater management facilities and outfalls in the Acheson / Big Lake Area Master Drainage Plan Fenceline Approval area. The requirement to report annual stormwater water quality sampling within the Fenceline Area was removed when the *Water Act* Acheson / Big Lake Area Master Drainage Plan Fenceline Approval was amended by Legacy Amendment 00287756-00-04 in 2020. The County has continued an annual stormwater water quality sampling program. A total of nine stormwater management facilities were sampled in 2022. The sampling locations that were selected were based on a combination of:

- New stormwater management facilities.
- Stormwater management facilities that have several upstream stormwater management facilities flowing through.
- Locations seen to have high environmental importance.
- Stormwater management facilities that are located next to a development that could potentially be at a higher risk for contamination.

Samples are analyzed once per year at the selected location and submitted to a private laboratory for analysis. The laboratory analyzed the samples for the following water quality parameters:

- Physical Tests (conductivity, pH, total dissolved solids, total suspended solids)
- Anions and Nutrients (total Kjeldahl nitrogen, total ammonia, chloride, total phosphorus, total dissolved phosphorus, sulfate)

- Organic/Inorganic Carbon (dissolved organic carbon, total organic carbon)
- Microbiological Tests (fecal and total coliforms, E. coli)
- Metals (sodium adsorption ratio, total aluminum, total antimony, total arsenic, total barium, total boron, total cadmium, total calcium, total chromium, total copper, total iron, total lead, total magnesium, total manganese, total mercury, total nickel, total potassium, total selenium, total silver, total sodium, total uranium, total zinc, dissolved calcium, dissolved magnesium, dissolved potassium, dissolved sodium)
- Aggregate Organics (biochemical oxygen demand, chemical oxygen demand)
- Volatile Organic Compounds (benzene, carbon tetrachloride, chlorobenzene, chloroform, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4- dichlorobenzene, 1,1-dichloroethane, 1,2- dichloroethane, 1,1-dichloroethylene, trans-1,2- dichloroethylene, dichloromethane, 1,2- dichloropropane, cis-1,3- dichloropropylene, trans-1,3- dichloropropylene, ethylbenzene, styrene, 1,1,2,2- tetrachloroethane, tetrachloroethylene, thiophene, toluene, 1,1,1-trichloroethane, 1,1,2- trichloroethane, trichloroethylene, m+p-xylene, o-xylene, total xylenes, benzene, ethylbenzene, toluene, m+p-xylene, o-xylenes, total xylene, total BTEX)
- Volatile Organic Compounds Surrogates (4- bromofluorobenzene, 1,4- difluorobenzene)
- Hydrocarbons (F1 (C6-C10), F2 (C10-C16), F3 (C16-C34), F4 (C34-C50), F1-BTEX, TEH (C10-C50), TEH (C16-C50))
- Hydrocarbons Surrogates (2- bromobenzotrifluoride, 3,4- dichlorotoluene)
- Plant Pigments (chlorophyll a)



It is understood that the testing parameters were selected to fulfil the testing requirements for Alberta Environment and Protected Areas' Water Quality based Effluent Limits Procedure Manual (1995) and Environmental Quality Guidelines for Alberta Surface Waters (2014).

It is also noted that Alberta Environment and Protected Areas also does water quality monitoring at select locations, including Tomahawk Creek, North Saskatchewan River, Wabamun Lake, Isle Lake, Jackfish Lake and Mayatan Lake. Provincial data can be accessed at the following Alberta Environment and Protected Areas website: <https://www.alberta.ca/surface-water-quality-data.aspx>

6.6. GIS and Asset Management for Stormwater

6.6.1. GIS AND ASSET MANAGEMENT RESPONSIBILITIES

The County's Corporate & Shared Services - GIS group is responsible for the management of the County's corporate GIS System including the software access integration with other County systems, and maintaining the County's Spatial Database Engine (SDE) and GIS integrative web viewer platform for all County staff and the public to use. The accuracy and completeness of datasets are the responsibility of the asset owners. GIS works very closely with Engineering Services and Road Maintenance and Drainage to develop and maintain the spatial datasets for storm infrastructure.

This includes the following activities:

- Develop and maintain the GIS storm database structure.
- Update the GIS database with field collected and record drawing spatial information (e.g., storm sewers, culverts, stormwater management facilities).
- Annual Aerial Acquisition of LiDAR data and incorporating it into the GIS database.
- Using GIS to develop drainage pathways, including "burning in" culvert elevations into the drainage surface.
- Using GIS to determine catchment areas, contours, bare earth digital elevation models, for County staff to use.
- Develop and maintain how the storm infrastructure is displayed and accessed in the County's GIS integrative webviewer platform for staff and including open data available for public use.

Concurrently, the County's Engineering Projects group is responsible for management of the County's Asset Management system and works with other departments to collect the data to populate the records management system.

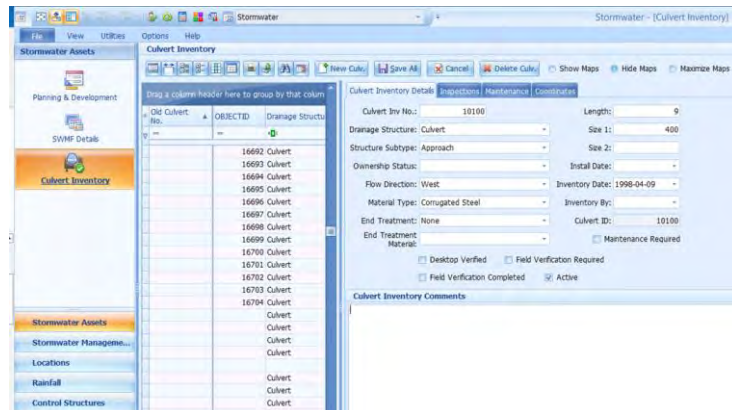
Multiple departments have access to the GIS and Asset Management systems in a "read only" capacity and some have the ability to directly update information. All County have access to select information in the County's GIS integrative webviewer platform.



6.6.2. EXISTING GIS AND ASSET MANAGEMENT DATA

Parkland County has its Geographic Information System (GIS) and its Asset Management System integrated for stormwater. The GIS database holds the geospatial locations of the infrastructure, while most other attribute data is in an Asset Management System. The Asset Management System includes the following stormwater infrastructure:

- Culverts – the County has an estimated 17,000 culverts listed in the AMS. Many are identified with material type, diameter, length, location, and/or estimated age. The confidence of the accuracy of the data is lower than other datasets as the information was collected inconsistently over the past 15 years by various staff, including by summer students. The data has been transferred from spreadsheets to a database to GIS as systems developed, resulting in data that has not been kept completely up to date when new culverts are installed, or existing culverts are replaced. A pilot and first version of the culvert dataset has been completed in the Asset Management System as well as GIS and the County is actively starting to verify existing and collect missing culvert data beginning in 2023.



Screen shot of culvert GIS data

- Roadway ditches – are not captured in the database, though culverts are. It is assumed there are functioning ditches along all county roadways. With the recent acquisition of Lidar across the county, Information Services, Engineering and Drainage have started to use Lidar to determine water flow directions. Through using Lidar, overland and roadside ditch flow direction can be ascertained to enter into the asset management system and spatial datasets.
- Overland drainage ditches – for some overland drainage ditches, location, year of construction, flow direction, and size associated appurtenances have been captured. Like the culvert data, the County questions the accuracy of the data.
- Storm sewers and forcemains – as most storm sewers and forcemains outside of the hamlets are relatively new infrastructure, and the number of these are relatively small, the accuracy of this data is fairly accurate. With the older infrastructure, the storm sewers and forcemains in the hamlets (Entwistle and Wabamun), the accuracy of the data is fairly accurate because the County has recently utilized CCTV's and confirmed as-built information.
- Stormwater management facilities – the data relating to stormwater management facilities is only accurate within the Acheson / Big Lake Area Fenceline Area. For most stormwater management facilities outside this area, in Country Residential subdivisions and hamlets, reports, designs and as-built information is non-existent or can no longer be located.
- Stormwater management lift stations or control structures – as most stormwater management lift stations or control structures are within the Acheson / Big Lake Area Fenceline Area, data relating to these facilities is fairly accurate; however, only basic information is captured in the AMS currently.

The available information in the GIS and Asset Management database is summarized in Table 6.3 below.



Table 6.3 Stormwater GIS and Asset management Data

Stormwater Infrastructure	Data Included (where available)	Estimated Amount of Infrastructure with GIS & Asset Management Data	Current (May 2023) Confidence in Data	In Tangible Capital Asset Registry?	Priority to Collect Data and Further Develop Asset Management System
LiDAR	- Three dimensional point data 4-10pts/m² classified data for vegetation, water, roads, towers, bridges, buildings, etc. - Bare earth digital elevation model - Flow paths and contours	- Collect 150-225 square km annually - At end of 2022, approx. 70% collected 100% of county collected by end of 2024 - Acheson Area collected every 5 years	- Very high confidence - Data goes through extensive quality control process by contractor and County GIS team - Data must meet County's accuracy and completeness specifications to be accepted	No, not a Capital Asset	- High priority and already as good as possible - Large datasets that need extra processing power - GIS Team has developed a LiDAR processing station so that it can work independently of the GIS Technicians
Culverts (~17,000)	- Identification number, upstream and downstream coordinates (tied to GIS database) - length, diameter, pipe material - upstream and downstream inverts, slope (very limited) - inspection date(s) and condition - maintenance activities	95%+ has spatial data in GIS 70% has some diameter, pipe material or length information - Very limited pipe invert data - Very limited inspection, condition or maintenance records - Much of the culvert data was collected many years ago by summer students and inconsistent staff. - Data has been inconsistently maintained.	- Low confidence in existing data quality until field verified - Low confidence that inventory is complete for smaller access culverts (best estimate is that there are another 3,000 to 5,000 culverts not in the existing 17,000 culvert inventory)	- Short standard access or centreline culverts, does not meet the minimum \$50,000 value to capture in Tangible Capital Assets - Captured in road subgrade but not as separate asset with 40 year life - Longer, high value culverts are inconsistently captured as storm mains in the TCA Registry with 75 year life	- High priority to start with known higher risk areas - Data collection App being developed and trialed in 2023 for field staff to collect in field to integrate with Asset Management System and GIS spatial datasets
Roadway ditches (~4,400 km)	Not directly captured in the database, with recent acquisition of Lidar across the County, water flow directions can be determined in and adjacent to road ditches	70% of the County has Lidar coverage. Expecting to have 100% Lidar coverage by end of 2024	Low confidence in data completeness and accuracy	- Captured with road subgrade with 40 year life and as part of Right-of-Way (land) - Approximately 30% of the road ditches have been mapped in GIS	- Low priority as road ditches are considered part of the road infrastructure - Piloted extracting from LiDAR to be able to map and quantify more accurately in the future
Overland drainage ditches (constructed and licensed drainage ditches) (286 km)	- Identification number, upstream and downstream coordinates (tied to GIS database) - upstream and downstream inverts, slope	- Limited geospatial data (less than 50%) - Very limited elevation data (less than ~5%)	- Low to medium confidence in data completeness and accuracy - Historic records for licensed drainage courses need complete review	- Inconsistently captured depending on historic information available and value 75 year life - When dataset complete and valued, needs to be reconciled with Tangible Capital Assets	- High priority to determine for jurisdictional purposes – what is county versus province versus landowner responsibility areas. - Medium priority for other overland drainage on County land to quantify amounts, types and conditions



6.0 Current Parkland County Practices for Stormwater

Stormwater Infrastructure	Data Included (where available)	Estimated Amount of Infrastructure with GIS & Asset Management Data	Current (May 2023) Confidence in Data	In Tangible Capital Asset Registry?	Priority to Collect Data and Further Develop Asset Management System
Storm sewers and forcemains (386 pipe sections with total length of 27.5 km)	• Identification number, upstream and downstream coordinates (tied to GIS database) • length, diameter, pipe material • upstream and downstream inverts, slope • inspection date(s) and condition (limited as most storm sewers are relatively new) • maintenance activities	• 95% have geospatial, pipe diameter, material, elevation information (updated annually) • Inspection information available where inspections scheduled (not required for newer infrastructure) • Maintenance info is available on some assets •	• High confidence in completeness and accuracy • Some detailed elevation data to be extracted from records and CCTV	• Captured as storm mains with 75 year life fairly consistently since 2008 • Historic records to be reconciled with Tangible Capital Assets in future	• High priority to continue extracting information as CCTV program continues and records are located
Stormwater Management Facilities (36 in Acheson Big Lake Area; of ~300 country residential subdivisions, ~110 have been roughed in)	• Geospatial – perimeter of stormwater management facility (water level or property boundary) (tied to GIS)	• Better data in the Acheson and Big Lake Water Act Fenceline Area • Sporadic data for country residential subdivisions and hamlets that are outside of the Acheson and Big Lake Water Act Fenceline Area • Geospatial data is in GIS and not considered reliable • No design information available in Vemax • No inspection, condition or maintenance information available in Asset Management system	• High confidence on spatial data for existing SWMFs in the Fenceline Area • Low confidence on completeness of attribute and design data in Fenceline Area • Low confidence on completeness and accuracy of stormwater management facilities outside the Fenceline area • Outside Fenceline Area, many SWMFs will be or become natural assets	• Captured as storm ponds with a 50 year life fairly consistently since 2008 in the Fenceline • Historic records to be reconciled with Tangible Capital Assets in future • When SWMFs (particularly outside Fenceline) dataset complete and valued, needs to be reconciled with Tangible Capital Assets	• High priority to complete data entry for Fenceline area • Med priority to complete inventory and attribute data on SWMFs outside Fenceline
Stormwater Management lift stations & control structures	• Location of lift station / control structure (tied to GIS)	• Location of lift station and control structures for 80% in the Acheson and Big Lake Water Act Fenceline Area • Sporadic data for country residential subdivisions and hamlets that are outside of the Acheson and Big Lake Water Act Fenceline Area (few lift stations and control structures outside of the Fenceline area) • Geospatial data is in GIS and not considered reliable • No design information available in Vemax • No inspection, condition, or maintenance information available in Asset Management system	• High confidence on small amount of data captured • Data captured currently is basic to show on maps and know what the County has	• Captured in Tangible Capital Assets as storm ponds (lift stations) with 50 year life • All have been constructed since 2008 when Tangible Capital Assets came into effect and are captured in the registry	• Medium priority to further develop the Asset Management System for more detailed inspections, maintenance records, etc • Will be developed with Public Works to suit their needs or to integrate with their maintenance records



The following are additional observations noted regarding the current GIS database relative to stormwater:

- There is some uncertainty in the accuracy of the data, especially data that was entered a long time ago. The County does not have a good record of the quality assurance program used for GIS data collection and entry for some of the older datasets.
- The geospatial information for stormwater management facilities outside the Acheson Fenceline is known to be incomplete.
- There are numerous instances of where the GIS data shows a natural wetland as a stormwater management facility in Country Residential areas. This is presumably due to the natural wetland being approved as a stormwater management facility for controlling stormwater quality and quantity. Thus, there is no differentiation in the GIS data between constructed stormwater management facilities and natural wetlands approved and acting as stormwater management facilities.
- Although the database does include licensed drainage ditch easements or right of ways that are registered with land titles; the user needs to “zoom in” to the property before the easement or right of way becomes visible and, many drainage ditch easements or right of ways have not been registered with land titles.
- The data base includes a layer entitled “licensed drainage course” refers to ditches constructed typically on agricultural land to improve farming operations. It is believed to have been completed prior to 2000 with cooperation between the County, landowners, and the province. The licensed drainage course dataset appears to be incomplete and may have been created by County staff from hard copy records as staff had time available. As well, gaps in the GIS map along the “licensed drainage course” routes may be a result of entering natural water bodies that are not licensed or landowner(s) not granting the County access to the lands to construct certain portions of the drainage course. This in turn leads to challenges relating to maintaining these constructed drainage courses.
- The database also includes a layer entitled “grass swale / drainage ditch” which predominately includes roadway ditches. This data is at the beginning of its development and considered incomplete as it only includes about one third of the roadway ditches in the County and information is assumed and yet to be verified through LiDAR data and field inspections. It is understood that this layer was also created by County staff as they had time available.



6.6.3. CURRENT GIS AND ASSET MANAGEMENT ACTIVITIES

The County's Engineering Services are currently working with Road Maintenance and Drainage to collect data on the stormwater drainage system. This includes the following:

- CCTV of storm sewers.
 - o Typically based on age, with initial inspection at 20 years after construction and then re-inspection, interval is determine by infrastructure condition where a poorer condition main gets inspected more frequently than a good condition main.
- CCTV of longer road center line culverts (30m and longer).
 - o Selected based on combination of diameter, depth, and length, based on impact of failure and difficulty of repair by Roadways Maintenance and Drainage crews.
- CCTV of smaller diameter culverts that cannot be visually inspected.
 - o Smaller diameter culverts, primarily in hamlets, can only be inspected with specialized CCTV cameras.
- Set up and incorporate the stormwater management facility design and attribute data in the Asset Management Database.
- Collecting culvert data (e.g., diameter, length, invert elevation) as opportunities arise (fairly limited).

Engineering Services and Road Maintenance and Drainage staff noted that they do not have the resources to collect data on the culverts and overland drainage ditches. Based on the 17,000 culverts listed in the County's Vemax system it would take in the order of 5 years of full-time work for an additional staff member to inspect all the culverts based on an average of a 30 minute inspection time per culvert.

County staff also mentioned that although they have an Asset Management system in place that predicts future asset rehabilitation and replacement costs, they do not have a good enough inventory of many of the stormwater asset classes to predict the rehabilitation and replacement costs. The total order of magnitude cost of the County 17,000 culverts is at least \$250 million. While most culverts would last longer than the projected lifespan of 50 years, the total potential future fiscal impact of large-scale culvert failure is very significant.

Though County has not undertaken a formal detailed risk assessment for all its stormwater asset categories, it does prioritize its data collection program based on asset category risk and value, and staff knowledge of higher risk assets. The exception is for the storm mains where condition information through the CCTV program allows the County to a develop risk-based capital plan. A formal risk assessment for all storm asset categories would determine which stormwater assets are critical to the County and thus need to be monitored and rehabilitated or replaced on a proactive basis. A thorough risk assessment requires a more complete dataset and confidence in the data.



Damaged culvert

6.6.4. OTHER DATA MANAGEMENT

Stormwater related documents are generally managed by the various departments responsible for stormwater as previously described. For example:

- Area Structure Plans and Conceptual Scheme reports are managed by Planning and Development and eventually uploaded to the County's website following approval.
- Land Development Engineering collects record drawings following development related stormwater infrastructure construction, including new roads and ditches; these are forwarded to Engineering Projects (or AM Coordinator) for entering into GIS, Asset Management, and Records Management Systems.

- Land Development Engineering is responsible for overseeing new and the replacement of approaches to private lands being done outside the capital road program or maintenance program. These approaches are being requested to be constructed by private landowners, or industries such as utility or oil and gas companies requiring access to lands. There is no process for updating the culvert data resulting from these activities.
- Capital Construction (roads and bridges) and Engineering Projects (other County projects) collects record drawings following completion of capital related stormwater infrastructure construction, including new road and ditches; these are forwarded to Engineering Projects (Asset Management Coordinator) for entering into GIS, Asset Management, and Records Management Systems.
- Roadway Maintenance and Drainage maintain a database of their drainage maintenance activities.
- When Capital Construction and Roadway Maintenance and Drainage install or replace culverts, drainage related data has not often updated in the Asset Management system, but the system is being developed to better enter maintenance data in the future.



6.7. Community Sustainability

The County's Community Sustainability department is not directly responsible for stormwater management; however they do have a supporting role. Their involvement includes the following:

- Watershed planning
- Naturalization policy
- Natural asset management including mapping and valuation
- Studies to determine impacts of natural asset loss or benefit of restoration
- Climate change vulnerability assessments and adaptation planning
- Wetland/riparian area maintenance, including incorporating wetland construction into drainage areas
- Contaminant release management
- Instream wetlands to improve water quality
- Supporting other County departments; reviewing reports, providing recommendations and guidance, and retaining consultants to conduct biophysical assessments

Community Sustainability deals with external complaints from residents, planning and development, and internal assignments. Sometimes, residents provide input regarding wetlands through the County's Customer Resource Management dispatch.

As Community Sustainability is responsible for naturalization, they often interact with the Road Maintenance and Drainage department on requests for brush control. It is noted that naturalization and brush control have potentially contradicting objectives. Brush control is to manage drainage through maintenance.

Community Sustainability does not have a dedicated budget for maintenance of wetlands, watercourses, or other natural stormwater management facilities. However, they do get involved on budgeted capital projects when grant funded such as building a wetland (wetland replacement program grants). In this case the Province of Alberta administers the money for wetland replacement through a Memorandum of Understanding. Community Sustainability provides information to the Province on the location of wetland replacement projects. They also work with Road Maintenance and Drainage department to identify areas applicable to the program and look at any surrounding impacts or limitations.

Community Sustainability coordinates projects within the County with ALUS Canada. The ALUS website (<https://alus.ca/who-we-are/>), states

ALUS

"originally an acronym for Alternative Land Use Services, is a charitable organization with an innovative community-developed and farmer-delivered program that produces, enhances and maintains ecosystem services on agricultural lands. Projects such as wetland restoration and enhancement, riparian buffers, shelterbelts, afforestation and native prairie grass restoration provide cleaner water and air, habitat, carbon sequestration and climate resiliency."



In 2022, the Community Sustainability group and ALUS worked with 42 participants (agricultural producers/landowners) on a total of 204 projects in Parkland County. Wetland related projects generally involve fencing off and/or excluding wetlands from livestock or within a crop field. Projects can also be related to restoration work like planting, seeding, and staking willows. Projects are usually completed by the producer.

Community Sustainability have also expressed an interest in developing a natural asset management system for the County. They have had discussions with Engineering Services (who are responsible for asset management for hard engineering assets) about this, but nothing has been developed to date.

6.8. Enforcement

6.8.1. COUNTY ENFORCEMENT RESPONSIBILITIES

Enforcement responsibilities within the County are divided into two departments:

- Planning and Development Services are responsible for “Land Use” complaints (note: Section 18 of the Land Use Bylaw only deals with land use violations and drainage is not land use). They have one person who deals with all land use complaints and is assisted by Enforcement Services.
- Agriculture, Community & Protective Services’ Enforcement Services are responsible for enforcement of County bylaws related to stormwater. Enforcement Services will allocate resources as required.

It is noted that County Enforcement Officers cannot enforce anything federal or provincial. They can enforce anything that is County (public) infrastructure and to do so, they need the supporting Bylaws (i.e., Lot Grading Bylaw) and information behind it. Sometimes, an affected resident is told to take up their drainage issue with another governing body, such as Alberta Environment and Protected Areas.

Within the Acheson and Big Lake Area *Water Act* Fenceline Approval area, the County has authorization from the Province for enforcement. The Fenceline agreement transfers authority from Alberta Environment and Protected Areas to Parkland County related to the *Water Act* within the specified Fenceline boundary.

6.8.2. HISTORIC ENFORCEMENT CHALLENGES

The following enforcement issues have been raised by County staff:

- Many stormwater drainage issues are not enforceable due to lack of drainage agreements, easements, etc. at the time of development.
- Record drawings are not readily accessible, i.e., drainage swale not registered on title against an individual landowner lot at the time of subdivision (thus County is forced to negotiate an easement document with landowner after the fact).
- The County has a 150mm (6 inch) fill limit for landscaping, but some areas are very flat and minimal amounts of fill (under 150 mm) can cause upstream issues.



- If the public infrastructure is not registered on a landowner title, dealing with drainage issues created by a landowner either not providing County ready access to their land, or changing natural drainage on their land is challenging. The *Municipal Government Act's* Section 562 would help the County address these issues as it says no person may interfere with the construction, maintenance, operation or repair of a public works or utility. It enables the County to take action regarding drainage infrastructure/ditch issues on private land. Further, Section 542 of Act sets out that if the Act or any other municipal bylaw authorizes or requires anything to be inspected, remedied, enforced, or done by a designated officer of the municipality after giving reasonable notice to the owner or occupier of land is enabled to do so. County approval of the draft Surface Drainage and Lot Grading Bylaw should further empower County Enforcement Officers and other County officials in Administration to respond to drainage issues, and where circumstances dictate exercise the County's authority under Section 542 of the Act. The County's designated Enforcement Officers' duties include enforcing the Land Use Bylaw which regulates development on private land such as enforcing permit approvals, addressing illegal development without permits, which may cause drainage issues. County Bylaws need to be coordinated to provide clarity in terms of duties and enforcement authority and lines of communication between County departments needs to be better coordinated.
- Parkland County cannot enforce stormwater flows crossing municipal and other boundaries.

- County administration and Council have historically been reluctant to issue fines and/or stop work orders, preferring education and warnings (with little or no follow up enforcement). The County generally does not issue violation tickets as set out in Section 18 of the County's Land Use Bylaw. Warnings are issued and compliance is somewhat effective. Few violation tickets or stop work orders are given.

6.8.3. ROLE OF PROVINCIAL AND FEDERAL GOVERNMENTS

The provincial and federal governments typically do not proactively enforce the respective acts and regulations. Alberta Environment and Protected Areas typically do not get involved in lot-to-lot drainage complaints. They get approximately 20,000 to 30,000 complaints per year, so it's difficult for them to respond to each. Alberta Environment and Protected Areas' Compliance staff must triage complaints, with contaminated sites and contaminated spills being the highest priority. Alberta Environment and Protected Areas will prioritize enforcement where there is clear evidence of wrongdoing (e.g., dumping fill, draining wetland). They typically do not follow up on complaints of an increase in flooding associated with actions by others. Alberta Environment and Protected Areas suggest that if the County or its residents observe non-compliant activity, they should send complaint to their compliance group with supporting documentation.



6.8.4. ACTIONS BY RESIDENTS / LANDOWNERS

County staff reported a number of landowner-initiated activities that are illegal, such as blocking an existing drainage path, or regrading to divert flows away from the natural drainage path without obtaining the relevant approvals from either the County and/or Alberta Environment and Protected Areas. Enforcement of these types of activities has been challenging for both the County and Alberta Environment and Protected Areas for the reasons noted above.



Wabamun Lake Shoreline Damage



7.0 ASSESSMENT



7.0

7.1. Introduction

This section presents an overview of the County's drainage system and stormwater infrastructure, and ISL's assessment of how the County is managing stormwater. It includes detailed assessments of the following:

- An overview of County's stormwater drainage system.
- The underlying causes of flooding issues and complaints.
- The County's practices for stormwater, including:
 - o Corporate structure and division of stormwater responsibilities
 - o Land use planning practices
 - o Stormwater planning processes
 - o Land development requirements
 - o Capital construction and environmental planning processes
 - o Drainage system operation and maintenance, including management of overland drainage on private property
 - o Stormwater flow, rainfall, and water quality monitoring practices
 - o Culvert design practices
 - o Enforcement, and
 - o GIS system management
- The County's work in fulfilling its regulatory obligations.



7.2. Overview of County Drainage System and Stormwater Infrastructure

Overall, the existing stormwater infrastructure in the County is fairly typical for a mixed rural municipality in Alberta. The drainage system works well during most of the year, and in most locations stormwater runoff flows properly even during rapid snowmelt and large rainfall events. However, there are numerous locations throughout the County where stormwater cannot flow freely during rapid snowmelt and/or large rainfall events. These flooding events are relatively localized and have a mild to moderate impact on County infrastructure (typically roadways) and private property (e.g., yards, fences), and can represent a concerning inconvenience to County residents. It is noted that there were no reported incidences of homes being destroyed by stormwater runoff.

The rural nature of the County and the local focus on drainage planning and design results in a lack of detailed integrated stormwater planning. This is exacerbated by the complex hydrology, hydrogeology, and size of the County. Also, in some areas, small changes in ground elevations (either natural or constructed) can significantly alter the hydrology. For example, a 0.1m change in ground elevation in flatter areas can divert multiple quarter sections of land to a different watercourse. This can adversely impact the downstream ditches, culverts, and bridges.

Drainage complaint information, combined with the experience of County operation and maintenance crews, represent a much more accurate assessment of the conveyance system than would be practical using hydrologic and hydraulic models if considering the County as a whole.

There are issues with drainage in the larger hamlets (Entwistle and Wabamun), in particular with the limited/undersized storm sewer network coupled with the minimal grade in the hamlets. Again, anecdotal information provides excellent insight into the capacity issues within these areas.

Country Residential subdivisions located in flat, low-lying areas, particularly in the north east, and south east areas of the County, as well as around Wabamun Lake, are a special concern. The Acheson area was (and is) developed with good engineering design standards with the exception of the pre-1980s infrastructure (Zone 3, etc.). The drainage complaints appear to be related to the older development areas.

The County has reasonable records of the age and condition of its stormwater infrastructure. Roadway ditches don't really require records as flooding and erosion can be easily observed. The GIS system shows the location of the 17,000 culverts. Many are identified with material type, diameter, length, location, and estimated age. The County questions the accuracy of the data as the information was collected many years ago. The County has reasonably good records of the storm sewer sizing and year of construction, but not of the physical condition. The County does have a good understanding of the condition of its bridges and bridge sized culverts through the Strategic Overview – Bridge Files 2021 report.



Overall, it is expected that the culverts more than 50 years old may be reaching their life expectancy, which could be more than half of all culverts. The 2021 bridge report documents the condition of the bridges/bridge culverts and the expected rehabilitation/replacement schedule. The storm sewers in the older parts of the Hamlets of Wabamun and Entwistle have likely reached the end of their service life and many likely require rehabilitation. For these hamlets, the County has a reasonable record of the material type and age of the stormwater infrastructure and are working on determining the condition and replacement schedule for the same.

As previously noted, based on a review of historic flooding complaints, the following observations are made:

- There are numerous anecdotal reports of local property damage and minor structure damage due to flooding, as well as loss of use of private property from a few days to two weeks.
- Based on a review of the detailed complaint notes, the economic impact of the drainage/flooding complaint is not particularly severe when compared to a catastrophic flood event (e.g., residence is destroyed). However, they would be considered severe by the resident.
- There are hundreds of minor flooding problems in the County that significantly affect County residents, and to the residents, these impacts would be more than a nuisance or an inconvenience.
- It can be inferred from the drainage/flooding complaints that there are locations with minor flooding when events happen more often than once every 5 to 10 years.
- There is no estimate of the financial impact due to flooding, either from an individual rainfall or snowmelt event, or on an annual basis.
- The flooding records do not allow for an accurate estimate of the frequency of flooding.

7.3. Assessment of Underlying Causes of Flooding Issues and Complaints

The following is a partial list of the underlying causes of drainage issues documented in Section 5, primarily the frequently reported flooding/lack of timely drainage. As previously mentioned, flooding in the County is generally land flooding, road or driveway overtopping with water and rarely building damage or displacing people.

- Inadequate design of drainage infrastructure
- Drainage infrastructure not constructed to design
- Drainage system not adequately maintained
- Changes made to the system following construction
- Changes to grading at the lot level impacting neighbouring properties
- Level of service expectations of residents
- Sump pumps discharging into ditch, freezing culverts
- Changes made by landowners to natural drainage patterns impacting downstream system
- Natural causes such as extreme rainfall or snowmelt events, poorly drained lands, very high water table, beaver activity

These underlying causes are described below and illustrated in Exhibit 7.1.

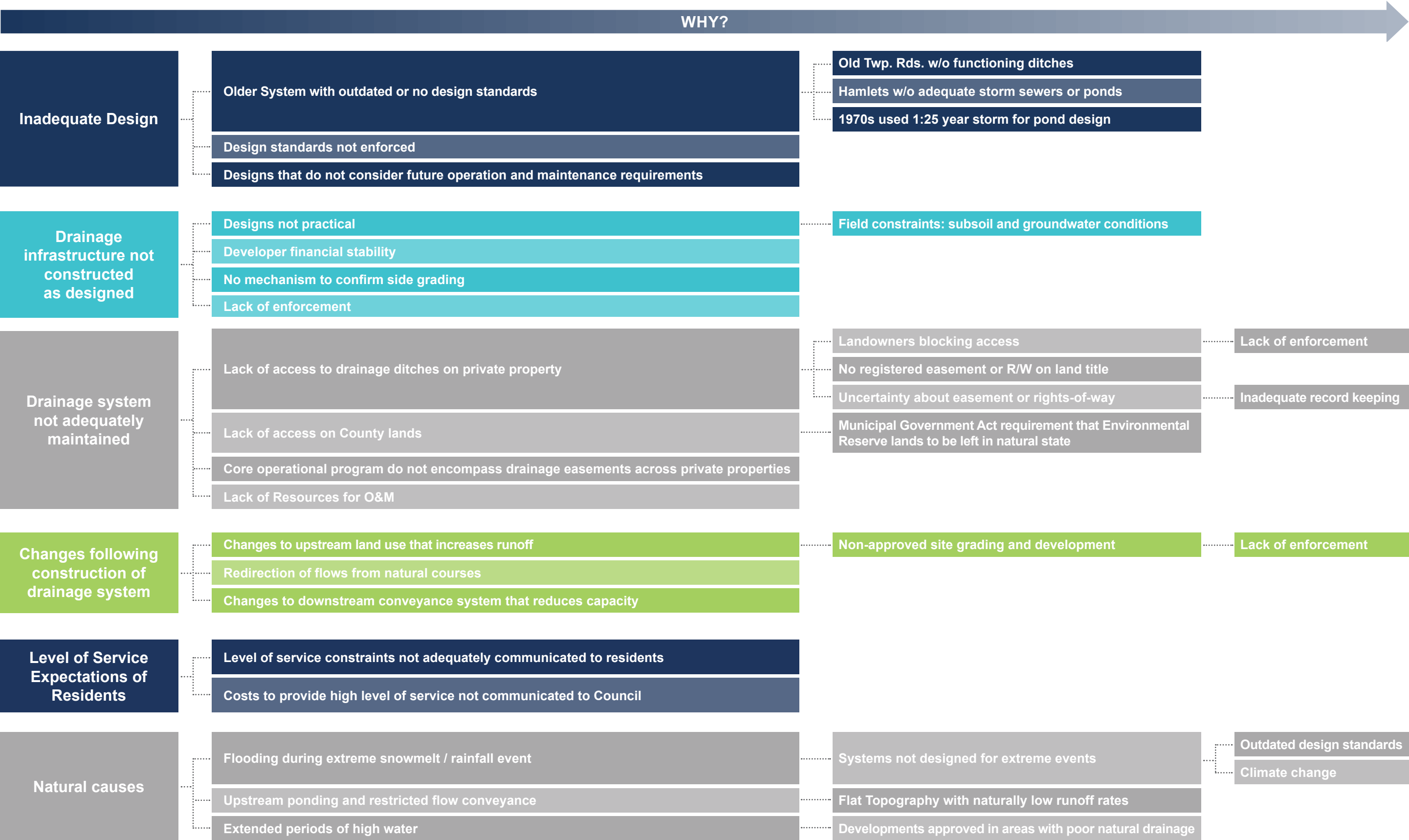


Exhibit 7.1: Underlying Causes of Drainage Operation and Maintenance Issues



Inadequate design of drainage infrastructure

There are numerous reasons that drainage infrastructure may not have been designed to prevent or minimize flooding:

- Older systems.
 - o The County has numerous township and range roads that date back to the first half of the 20th century that were not built to engineering standards. Several of these roads do not have functioning ditch systems and do not have adequate space for snow storage. Several of these road ditches lack available grade to reach a drainage outlet.
 - o The hamlets were primarily developed in the 1960s or earlier and frequently lack adequate storm sewers. This is exasperated where the lands are relatively flat.
 - o The east part of Acheson Zone 3 (northwest of Highway 16A & 60 interchange) dates back to the 1970s, and while they include stormwater ponds, the design standard at that time was a 1:25 year storm event.
 - o Country residential subdivisions that were developed without comprehensive overland drainage design standards, especially where lands are particularly flat.
- Design standards not enforced during the subdivision process.
- Designs that did not consider the future operation and maintenance requirements.

Drainage infrastructure not constructed to design

Based on discussions with County staff, it is understood that several storm drainage systems were not constructed to the approved construction drawings. There appears to be several causes of this including:

- Designs were not practical based on field constraints encountered during construction, such as subsoil and groundwater conditions.
- Financial stability of developers.
- No mechanism to confirm that sites were graded according to design due to no lot grading bylaw and no lot grading certificates required.
- Lack of enforcement by County staff, due in part, to lack of support and direction to enforce by County Administration.

Drainage system not adequately maintained

While the County's Roadways Maintenance and Drainage – Drainage and Aggregate Resources group is motivated to operating and maintaining the stormwater drainage system, there are numerous challenges preventing them from doing so. These include:

- Lack of physical access to drainage system, particularly the ditches within private property.
 - o In some cases, this is due to landowners (illegally) constructing landscaping and/or fencing that blocks access, combined with a lack of enforcement on the part of the County.
 - o In some cases, the County does not have authorization to enter private property as there is no registered drainage easement or right-of-way on title.
 - o In some cases, it is due to uncertainty in the County having authorization to enter private property due to inadequate record keeping. One example of this is the extensive licensed drainage ditches on private property, several of which have no easements or rights-of-way.



- The County does not have authorization to make alterations to the drainage system within County owned Environmental Reserve based on their interpretation of Division 9 of the *Municipal Government Act*. Clause 671(1) states that Environmental Reserve lands must be left in their natural state.
- The County's Roadways Maintenance and Drainage's core operational programs (culvert maintenance, ditch maintenance and pest control) traditionally do not encompass drainage easements across private properties.
- The County's Roadways Maintenance and Drainage – Drainage and Aggregate Resources group do not have the staffing resources to maintain the drainage system to the degree necessary to keep it functioning optimally. They are responsible for operation and maintenance activities for over 17,000 culverts and more than 5,000 km of ditches.

Changes made to the system following construction

County staff report several examples of changes made to the development area that impact stormwater management, particularly on private property, following the completion of the development. These changes can be broken down into the following:

- Changes to the upstream land use which increases the volume and rate of runoff as compared to what is planned for and approved. This includes site grading, removal of depressions, and increasing of site imperviousness.
- Grading/development that re-directs flows from their natural conveyance route.
- Changes to the downstream conveyance system on private property that restricts the hydraulic capacity of the drainage ditch.

Resident Expectations for Level of Service

Based on a review of the drainage complaints and discussions with County staff, it appears that residents generally have the following expectations for the level of service:

- Stormwater will rarely flow over local roadways, and if it does, it will only be for a short duration of time. Thus, residents will not be required to find alternate routes to their property.
- Stormwater will rarely flood private property, and if it does, it will drain away quickly.
- When residents register a stormwater drainage/flooding complaint, County staff will respond quickly to address the cause.

Other issues include:

- Residents assuming that the ditches are part of their property, and that water should be removed at all times.
- Residents are not always aware of the impact that groundwater (natural or sump pump discharge) has on the ditch and private property.

It is noted that Council Policy C-EN14 Overland Drainage does not specify the acceptable frequency that local roadways or private property are flooded. Instead, it focuses on maintenance activities. It does state that "Parkland County... will endeavor to rectify any drainage problems as scheduling and budget permit."



It is also noted that County administration has not tried to quantify the costs to modify the County's storm drainage system to achieve the high level of service expectations of (at least some) residents. As many of the historic flooding complaints are related to developments in low-lying areas or areas with limited downstream conveyance capacities, it would be very technically challenging and extremely expensive to address many of these local flooding issues.

Natural causes

Today's overland stormwater systems are typically designed to convey or store 1:100 year flows (either stream flows with a 100 year frequency or runoff from a rainfall event with a 100 year frequency). Urban systems with storm sewers are designed for the 1:5 year rainfall events. When larger stream flow/rainfall events occur, the constructed infrastructure cannot convey or store the stormwater and localize flooding can occur. Constructed stormwater systems are designed to flood in these instances to balance the cost of infrastructure and the protection of the public. This applies to both surface ponding in areas serviced by underground storm sewer systems, but also to rural areas where topography makes it impractical to eliminate some localized flooding on private property.

Several parts of the County are relatively flat with less than one metre of topographic relief over several kilometres. This can lead to localized flooding and extended draw down periods following major snowmelt and rainfall events. This can be exasperated by beaver activity, which can impact large upstream areas if not managed. It is noted that the County cannot presently do beaver management within the provincially owned Lois Hole Provincial Park, which has resulted in upstream flooding.

Inadequate Funding

Funding for stormwater servicing is currently provided through property taxes. The distribution of property taxes to the competing municipal services is influenced by Council priorities. This competitive process tends to result in underfunding of stormwater services. This situation is common amongst all municipalities that fund stormwater through property taxes.

Due largely to pressures from the public and provincial and federal regulators for improved stormwater servicing, many municipalities around North America have moved to a different funding model – a Stormwater Utility. The key benefits to the municipality of changing to a Stormwater Utility include:

- Provision of a dedicated, adequate and stable source of funding.
- An improved ability to borrow to meet peak needs.
- An improved ability to raise rates to meet growing stormwater servicing demands, including growing environmental performance requirements from regulators.
- Improved public relations through adoption of a billing approach that provides improved customer equity.
- Credits and incentives can be incorporated into the rate structure to encourage behavioral changes in property owners that reduce their impacts on municipal systems – the opportunity to save money is a strong incentive.



7.4. Assessment of County Practices for Stormwater Management

7.4.1. CORPORATE STRUCTURE AND DIVISION OF STORMWATER RESPONSIBILITIES

The County corporate structure divides stormwater responsibilities over several departments: Planning and Development Services, Public Works, Road Maintenance & Drainage, Engineering Services, Agricultural Services (includes Community Sustainability and Environment), Community Services (includes Parks), Enforcement Services, and Information Services. Generally, this division of responsibility is logical, given the primary function of each department.

The separation of stormwater operation and maintenance into primarily two departments (Public Works and Roadway Maintenance and Drainage) is logical. Roadway Maintenance and Drainage have overall responsibility for stormwater, and delegate the pumped facilities involving mechanical and electrical systems and urban piped systems (e.g., gravity sewers and manholes) like water and wastewater systems to Public Works. Thus, Roadway Maintenance and Drainage are primarily responsible for ditches and culverts, along with minor bridge maintenance. Agronomics are responsible for grass cutting along roadway ditches, which is a minor role and is logical as they have the equipment and expertise. Engineering Services assists with televising, condition assessment and water quality monitoring, which is also appropriate.

The following sub-sections assess how the County is currently addressing stormwater and what improvements should be considered.

7.4.2. LAND USE PLANNING PROCESSES

The role of County Planning and Development Services is to prepare, monitor, and amend the County's Municipal Development Plan and Land Use Bylaw. The Municipal Development Plan is the County's overarching statutory plan that applies County-wide and establishes a policy framework to guide the preparation of sub area planning documents such as Area Structure Plans, Conceptual Schemes, Master Site Development Plans, initiated by the County or private landowners/ developers.

When a new Area Structure Plan, Conceptual Scheme, or amendments to same are proposed, applications for subdivision and development are proposed. The applicant must prepare a formal application with supporting technical studies before Planning and Development deem it complete, evaluate it, and circulate it to internal and external key stakeholders, including the public, for comments. Following this, revisions are made as needed, prior to the proposed plan or amendment advancing to Council for first reading, public hearing and second and third reading, and it being adopted. In evaluating all development applications, Planning and Development Services' role is to ensure alignment with all applicable planning documents such as the County's Municipal Development Plan, non-statutory plans such as the Transportation Master Plan, County Engineering Design Standards and other higher order senior legislation including the Edmonton Metropolitan Region Growth Plan and applicable provincial legislation.



Existing surface drainage patterns and post development drainage impacts, on-site and offsite, are important considerations in the evaluation process, and requires that Planning and Development consult and coordinate with other County Departments, such as Land Development Engineering in developing recommendations to Council on statutory plans or amendments, and Land Use Bylaw amendments

Below we highlight key findings from our review of the County Municipal Development Plan that relates to stormwater matters.

Municipal Development Plan

The overall Municipal Development Plan findings are summarized below:

- The Municipal Development Plan adequately addresses stormwater from a high-level planning perspective.
- The specific Municipal Development Plan policy statement on naturalized stormwater management facilities is good. It requires naturalizing constructed stormwater management facilities and incorporating Low Impact Development to maintain quality and manage quantity of surface water and incorporating wetlands/low areas in new subdivision planning and development.
- The Municipal Development Plan's inclusion of Terms of References for Technical Studies related to stormwater is good – Biophysical Assessment, Floodplain (1:100 year) Analysis and Stormwater Management Report however, the County does not require Stormwater Management Reports for all development applications.
- County Engineering Design Standards' depiction of the Land Use Planning Process and terminology doesn't align with the Planning Framework and Hierarchy in the Municipal Development Plan. Suggest that aligning these and establishing a shared understanding of planning terminology amongst Planning and Land Development Engineering staff.
- It would benefit the County to review its Council Policies and update them to ensure alignment with current Municipal Development Plan Policies, the Land Use Bylaw, and proposed Surface Drainage and Lot Grading Bylaw. Or, rescind them if it's deemed that they be incorporated in the Municipal Development Plan, Land Use Bylaw, or the Surface Drainage and Lot Grading Bylaw through a formal amendment process. The specific Council Policies relating to stormwater are C-ES04 Stormwater Management Facility Naturalization, and C-EN14 Overland Drainage.
- The Municipal Development Plan's current top-of-bank policy does not prescribe a minimum setback requirement and there is no policy for a public upland setback nor the requirement that setbacks be applied to all development applications. Replacing the existing policy with a new policy through a formal amendment process for minimum top-of-bank and public upland setbacks will standardize the required setbacks and ensure that they be applied to all development applications County-wide.



Land Use Bylaw

The overall Land Use Bylaw findings are summarized below:

- For the most part, the Land Use Bylaw contains adequate regulations to address stormwater drainage, they just need to be applied consistently to all development applications.
 - Identified shortcomings are that the current Land Use Bylaw development regulations don't align with the County's proposed Surface Drainage and Lot Grading Bylaw and there is no explicit reference in current regulations requiring that all development be in accordance with the County's Engineering and Design Standards.
 - Current Land Use Bylaw Overlays address some but not all key areas in the County that have a history of flooding. Direct Control Development Regulations associated with Overlays apply to some but not all key areas. The County should consider adding floodplain overlays for key areas with a history of flooding.
 - The Land Use Bylaw contains adequate provisions for enforcement such as cancelling, suspending, or modifying development for non-compliance, issuing notices to a permit holder, warnings or stop orders, violation tickets, and penalties for offences. The will to execute enforcement actions and penalties has not always been supported by Council.
- Shortcomings are noted in current subdivision and development permit application requirements. Additional requirements for County consideration include that applicants:
 - a) Submit a lot grading plan and drainage plan with their development application. The Land Use Bylaw currently indicates these may be required as a condition of approval. The County's evaluation of applications would benefit from a lot grading plan and drainage plan being submitted at the time of development application.
 - b) For development on low lying lands and land adjacent to County watercourses and lakes with a history of flooding submit the geodetic elevation of the proposed building location; geodetic elevation of the lowest point of all openings to proposed buildings, a certificate prepared by a qualified, registered professional engineer or architect confirming that these items have been considered in the building design, floodproofing, basement drainage, and site drainage prior to the issuance of a development permit.
 - c) Submit a certificate, authenticated, and validated from a qualified, registered professional engineer or architect confirming the proposed development complies with:
 - i. Floodplain management policies of statutory plans (Municipal Development Plan, Area Structure Plan if one applies)
 - ii. Proposed Surface Drainage and Lot Grading Bylaw
 - iii. County Engineering Design Standards, or
 - iv. Provides recommendations on measures that will be taken to bring the development into compliance.



- Development permit approval conditions could be refined/standardized to require that development be undertaken in accordance with the County's proposed Surface Drainage and Lot Grading Bylaw and Engineering Design Standards.
- Some refinements to Land Use Bylaw Development Regulations on stormwater drainage for County consideration could include:
 - a) Requiring that development conditions set out in a certificate prepared by a qualified, registered professional engineer or architect on behalf of an applicant be applied prior to issuance of a permit so that development compliance with floodplain management policies of applicable statutory plans (Municipal Development Plan, Area Structure Plan) and any specific design concerns have been addressed.
 - b) Requiring that development impacts on overland drainage conditions, flood risks and mitigations be identified prior to the issuance of a permit prior to the issuance of a permit.

Area Structure Plans and Conceptual Schemes

The Terms of References for Area Structure Plans and Conceptual Schemes are adequate for addressing stormwater servicing requirements. The recently submitted and approved Area Structure Plans and Conceptual Schemes demonstrate that the necessary land use and infrastructure planning framework being established through the current planning process do consider stormwater drainage.

Other Land Use Planning Processes

While new Area Structure Plans and Conceptual Schemes meet the County's need for stormwater drainage requirements to be addressed, it is not clear that this need is being met through other land use planning processes, such as Area Structure Plan Amendments and local subdivision and development permit applications in rural parts of the County. Area Structure Plan Amendments have not included a comprehensive assessment of the stormwater drainage system for the entire Area Structure Plan area that would meet the County's requirements for a new Area Structure Plan. Planning documents supporting local developments typically only address stormwater servicing within the proposed development area.

It is noted that the County Planning and Development Department's requirements for planning documents are not consistent with the stormwater system planning required by Engineering Services as outlined in the County's Engineering Design Standards (refer to next sub-section). The County should try to integrate and refine the land use planning and stormwater planning processes.

Another issue noted is that technical studies are generally only required for new multi-parcel development when they are just as relevant to inform single large lot greenfield development, Hamlet intensification, redevelopment and/or intensification of existing Country Residential planned areas, and land development in sub watershed geographic areas.



These types of development due their scale and level of surface disturbance through construction of structures, on-site services, site grading, and landscaping, have the potential to increase imperviousness and alter natural drainage patterns to impact stormwater flows, runoff direction, volume, and velocity, that could have adverse effects on-site and off-site on adjacent lands. Requiring a stormwater management study/plan at the time of development application should help to mitigate potential drainage issues.

7.4.3. STORMWATER PLANNING PROCESSES

Municipal Development Plan / Watershed Planning

Part A of the County's Engineering Design Standards (Section 6.2.1 Planning Approval Overview) calls for a Regional Drainage Plan or Watershed Plan to be conducted in parallel to the Municipal Development Plan. However, to date, the County has never completed such a plan. The scope of work for a Regional Drainage Plan / Watershed Plan in the design standards appears to be suitable for sub-basin level of study (e.g., Atim Creek) and too detailed for a County-wide document. It is also noted that the County has not completed any regional drainage plans or watershed plans. The Acheson / Big Lake stormwater documents are a hybrid between a watershed plan and a master drainage plan. It is therefore suggested that the reference to a Regional Drainage Plan or Watershed Plan related to the Municipal Development Plan be removed.

The County should develop a formal process for establishing pre-development unit discharge rates for new development areas outside of the Acheson / Big Lake area. For "one-off" developments, the County can elect to delegate this to the developer's consultant. Where multiple developments are anticipated, the County can lead the assessment to determine an appropriate pre-development unit discharge rate.

Area Structure Plan Level / Master Drainage Plan

The County's Engineering Design Standards require developers to prepare Master Drainage Plans in parallel to Area Structure Plans. It is noted that the 2020 Acheson Industrial Area Structure Plan is the only Area Structure Plan prepared in Parkland County since 2002, with most of the County's Area Structure Plans developed in the 1970s, 1980s and 1990s (except office consolidations). It is also noted that the Acheson / Big Lake Area Master Drainage Plan (and Amendment) was developed by the County to help promote industrial development in Acheson.

The development potential in Parkland County is such that no single developer (or consortium of developers) would be willing to fund a Master Drainage Plan in support of an Area Structure Plan. It is therefore suggested that the County consider removing reference to developer responsibility for Master Drainage Plan in the Engineering Design Standards.



There was a strong business case for the County to prepare the Acheson / Big Lake Area Master Drainage Plan and Amendment, as it has helped facilitate industrial development in Acheson. It is not clear if there is a business case for preparing a similar Master Drainage Plan anywhere else in the County based on future development potential. It may be necessary to consider other factors, such as historic drainage challenges, to develop a business case to undertake future Master Drainage Plan level of studies.

It is therefore suggested that future Master Drainage Plan studies should be initiated by the County based on a combination of future development potential and the historic drainage challenges. The portion of the cost of the Master Drainage Plan attributed to facilitating new development could potentially be recovered through stormwater off-site levies.

Conceptual Schemes / Site Implementation Plan

As Conceptual Schemes / Site Implementation Plan are supporting private development, it is appropriate that they be initiated and funded by the benefiting development. Where the County specifically requires the scope of the study to include upstream and/or downstream areas, it may be appropriate for the County to facilitate cost sharing of the drainage study among benefiting parties.

Based on the issues encountered in the Country Residential in the northeast (Big Lake), southeast (Woodbend Graminia), around Wabamun Lake, in the Hamlets, and in other flat areas, the Engineering Design Standards need to put more onus on developers to incorporate upstream and downstream system analyses in the engineering studies, and the impact of their proposed designs. For example, developers should be required to determine if there is adequate grade from their development to outlet under extreme conditions (downstream flooding or beaver dam) as well as be able to handle any upstream stormwater impacts.

Other Stormwater Studies

Based on the discussions from County staff and Council, there are a number of locations within the County that have chronic flooding issues that cannot be addressed by operation and maintenance efforts alone. While flooding complaints exist across the entire County, flooding is often very localized and for short periods of time (road or driveway overtopping, undeveloped land being impacted, and very rarely impacting buildings or displacing people). There are areas such as the north east (Big Lake), south east (Woodbend Graminia), Wabamun Lake, Hamlets, that are flat with little topographical relief, where the flooding is more concentrated and/or occurs more frequently than other areas. As previously discussed, these historic flooding issues are typically due to inadequate design standards at the time of development and/or inadequate enforcement historically.



It is recommended that the County consider funding local stormwater studies to address historic drainage challenges. The rationale for the County funding these studies is to endeavor to provide a minimum level of stormwater servicing to all residents (but not necessarily the same level of service for new development areas). Another rationale for County funding these types of studies is to minimize the ongoing operation and maintenance costs within the Road Maintenance and Drainage department to address frequent flooding events at these locations.

It is also noted that the natural overland drainage system covers a majority of the County. High water levels that may lead to flooding can be due to natural causes such as poor drainage (flat topography), beaver activity and/or large snowmelt/rainfall events. Agricultural practices may also influence these types of events. Potential solutions to this type of flooding are limited with the introduction of the Provincial Wetland Policy. This policy improves biodiversity, downstream flooding and water quality and is supported by several County policies.

To address natural overland flooding issues, it is suggested that the County's Engineering Services and Community Sustainability work together to develop potential solutions. Community Sustainability routinely obtains grant funding to develop constructed wetlands which is a very cost-effective way for the County to address natural flooding issues.

It is suggested that Community Sustainability proactively engage Engineering Services (and possibly Roadway Maintenance and Drainage) support to consider more holistic solutions to these natural flooding issues. It is also suggested that the County look for ways to integrate suitable ALUS projects into larger overland flooding assessment jointly led by Community Sustainability and Engineering Services.

Engineering Design Standards for Stormwater

The Engineering Design Standards are generally good and do include information on naturalized stormwater management facilities/constructed wetlands, Low Impact Development methods such as bioswales, and other methods for managing stormwater.

The following issues were noted relative to the current standards:

- The County's Engineering Design Standards (Section 6.2.1) refers to the level of land use planning process following Area Structure Plans, as a Local Structure Plan. However, the County's Planning documents now refer to this as a Conceptual Scheme, so this reference in the Engineering Design Standards should be updated.



- The Engineering Design Standards are not consistent when describing the types of stormwater management facilities that are required. The first part of Section 6 mentions constructed stormwater management facilities, while the latter part refers to naturalized stormwater management facilities. Also, Council policy C-ES04 SWMF Naturalization passed October 31, 2014, states that all stormwater management facilities constructed after January 1, 2015 must be naturalized stormwater management facilities. The Engineering Design Standards needs to be updated to reflect this policy.
- The Engineering Design Standards do not specify the specific standards for rural areas. For example, they do not specify the design standards for approach culverts and centreline culverts.
- The Engineering Design Standards do not specify using existing natural features as the stormwater management facility. This needs to be clarified with specific direction for both industrial and country residential areas.
 - o For industrial areas where there is likely going to be a significant increase in runoff volume and the potential for higher stormwater contaminants, the onus should be on the developer to demonstrate that their use of natural features will not have a negative ecological impact. In general, industrial areas should avoid using existing natural features for stormwater management facilities.
 - o For Country Residential developments where the increase in runoff volumes is expected to be nominal and stormwater runoff is expected to have lower concentration of contaminants, natural features can be considered for use as stormwater management facilities. The developer should be asked to demonstrate that the increase in runoff volume to that feature is nominal. Also, the design should include grassed swales upstream of the natural feature to provide a degree of stormwater quality treatment.

7.4.4. LAND DEVELOPMENT PROCESSES

During ISL's review of the County's land development processes, several areas were identified that could be improved upon. The current requirements occasionally seem vague and/or subjective and may not be easily enforced, which may present issues for both developers and the County. Potential changes to the land development requirements are not expected to deter development. These changes would bring the County up to a standard that other municipalities are maintaining.

The County may want to consider implementing changes or additional land development requirements as outlined below:

- It seems that many of the stormwater drainage problems are being addressed through enforcement rather than proactive action through the planning and/or design stages of all developments, being multi parcel down to the single lot level. This is likely to minimize the burden on developers. However, this doesn't seem to be working and is causing issues for a lot of parties, and typically passing the burden along to the County.



- It is suspected that larger greenfield developments are not a significant cause of stormwater drainage issues, especially in Acheson, and to an even lesser extent elsewhere. It is easier for the County to enforce stormwater drainage requirements in greenfield areas as they can be captured in the development agreement. The primary focus for improvements to the development agreement should be on specific requirements for site development projects and not multi-lot (>4 lot) subdivisions.
- The County could consider a phased approach where they target problematic areas in the County that have reoccurring drainage issues.
- If the County doesn't already do so, they should outline the lot grading requirements for each project as a condition of the development permit (for site development projects). They could then retain security from the applicant and not release it until they have fulfilled the lot grading requirements. This would especially include single family and country residential parcels. The development of these individual sites can have a considerable drainage impact on neighbouring lands that are not easy to fix.
- The County should implement a requirement for lot grading plans on all site development projects (single family residential, country residential, commercial, industrial, multi-family) with follow-up as-built grading plans (lot grading certification). A site review by the County would be required to ensure the applicant has completed the works. It is noted that the County's Land Development Engineering has introduced the Surface Drainage and Lot Grading Bylaw to Council during the course of this study which will address this recommendation.
- The County does not require a development permit for agricultural uses. As result there is no notification to the County. The County may want to consider requiring notification of a development for agricultural uses that may cause impacts to watercourses or wetlands, however a Land Use Bylaw amendment to enact a requirement would be necessary for this to happen. If a development for agricultural uses may cause impacts to watercourses or wetlands the landowner must make application to the province to obtain *Water Act* Approval before commencing the development disturbance.
- The County should have staff allocated to reviewing grading plans, inspecting site grading activities, and ensuring all Erosion & Sedimentation Control requirements are in place.
- The County's land development requirements don't include references to areas of high water table and how they are to be considered in the land develop processes. It is noted that other mixed rural municipalities in the area have strict development requirements on parcels with a high water table.
- Critical ditches etc. that cross multiple parcels should have drainage right of ways and the right of ways should be surveyed and registered with land titles. It isn't always clear in the County's documents how the proponent is to address this.
- The County should have a drainage bylaw that includes clause(s) about not permitting cross lot drainage (servicing and/or surface drainage). It is noted that the County's Land Development Engineering has introduced the Surface Drainage and Lot Grading Bylaw to Council during the course of this study that addresses this.



Construction of Stormwater Control Structure

7.4.5. CAPITAL CONSTRUCTION PROCESSES

The County's Capital Construction group currently engage consultants to design and oversee construction of roadways, bridge projects, storm outfalls, storm mains, and other storm infrastructure. The Terms of Reference for consulting assignments includes delegating management of regulatory approvals to consultants. County staff have indicated consultants are meeting the regulatory requirements. Due to the number of and intricacies of the Federal and Provincial acts and regulations, the County should develop a process to ensure all regulations are being met.

It is noted that during construction works, the County as the Owner is ultimately responsible for the work of their consultants and needs a mechanism for confirming compliance. It is suggested that the County consider adding content to their Request for Proposals that requires consultants to review all regulatory requirements and provide documentation taking professional responsibility for it. Examples that the County may want to consider are noted below:

- City of Edmonton Integrated Infrastructure Services - Environmental Permit/Approval Checklist
- Alberta Transportation – Terms of Reference for Environmental Evaluation of Highway Infrastructure Projects

7.4.6. ENVIRONMENTAL PLANNING PROCESSES

The County's Community Sustainability group is typically involved with stormwater within natural overland drainage systems, including coordinating ALUS projects and constructed wetland projects. These initiatives are beneficial to the County and are supported by County Council.

One suggested improvement to the current process is to increase the coordination between Community Sustainability, Engineering Services and Road Maintenance and Drainage. As previously mentioned, it is suggested that Community Sustainability proactively engage Engineering Services support to consider more holistic solutions to these natural flooding issues, including looking for ways to integrate suitable ALUS projects into larger overland flooding assessment.



As previously noted, Community Sustainability have also expressed an interest in developing a Natural Asset Management system for the County but have not yet developed one. Some of the benefits of Natural Asset Management include:

- *Managing areas such as aquifers, forests, and wetlands reduces service delivery costs and improves engineered assets efficiency.*
- *Engineered assets must be replaced after their lifespan ends. Some natural assets, on the other hand, can provide services in perpetuity. They can become more valuable over time with effective monitoring, maintenance, and restoration.*
- *Some natural assets are resilient and can meet increased service delivery requirements under predicted climate change scenarios, meaning that their value can grow over time.*

Source: Municipal Natural Assets Initiative website <https://mnai.ca/>

It is recommended that Community Sustainability continue to work with Engineering Services to develop the scope, budget, and business case for developing a Natural Asset Management system for Parkland County.

7.4.7. OVERLAND DRAINAGE COURSES ON PRIVATE PROPERTY

Introduction

One of the most significant issues with the County's stormwater drainage system is the overland drainage courses on private land. This was raised as a main issue for the County's Road Maintenance and Drainage staff.

This section addresses the underlying challenges and provides some potential solutions.

Key Issues and Challenges

The key issues and challenges faced by County staff for overland drainage on private property are summarized below.

- Complex drainage systems
 - o The natural drainage system is very large and complex. Until the recent procurement of LiDAR data and subsequent incorporation into a surface drainage model, the County did not have accurate information for the natural drainage system. With numerous wetlands, the existing system hydrology is complex and small changes in ground elevation can result in significant changes to the downstream runoff.



- Licensed drainage ditches
 - o Ditches were constructed over the years to improve agricultural production and/or to reduce flooding. Design information on these licensed ditches is limited and hard to access. It is understood that some of these licensed ditches have *Water Act* licenses, but information on the licenses is hard to access (Alberta Environment and Protected Areas website includes legal address but no specific spatial data).
 - o Limited registered drainage rights-of-way on agricultural drainage ditches. A small percentage of licensed ditches have registered Drainage Right-of-Way on title, while the rest do not.



Licensed Drainage Ditch on Agricultural Land

- Limited grade and hydraulic capacity
 - o Several parts of the County have very flat grades (e.g., downstream Atim Creek, southeast part of the County) which severely impacts the hydraulic capacity of natural and constructed watercourses. There are numerous areas with frequent flooding that connect to shallow, flat natural watercourses on private land.
- Owners altering the drainage/grading on their property without knowledge or authorization from either the County or the Province of Alberta.
- Limited registered drainage rights-of-way in new development areas
 - o Drainage easements or rights-of-way should be registered on a Certificate of Title for a parcel of land containing or proposing to contain a stormwater drainage feature that is subject of a proposed Area Structure Plan, Area Redevelopment Plan, subdivision or development permit application. However, to date, the County has not consistently implemented the requirement that drainage easements be registered on Title as a condition imposed in subdivision or development decisions. This has resulted in gaps in the County's GIS inventory of stormwater infrastructure and impeded a county-wide comprehensive understanding of surface drainage network patterns and connections.
- Lack of access to private property for Road Maintenance and Drainage crews to conduct operation and maintenance
 - o Lack of access for routine maintenance such as brush removal to maintain flows in watercourses
 - o Lack of access for emergency repairs, clear blockages.



- Lack of easily accessible information on private property
 - o The County's GIS system is unreliable as the County staff are not certain what criteria was used to create the GIS layer entitled "licensed water courses."
 - o Lack of staffing resources to update the GIS system from hard copy files that date back to the 1970s, 1980s and 1990s.

To illustrate some of these challenges, Figure 7.1 shows the drainage rights-of-way in the southeast part of the County, along with the licensed drainage ditches, selected Environmental Reserve lands (where licensed drainage goes through Environmental Reserve land) and other County owned land. This exhibit shows that a very small percentage of the licensed drainage ditches is protected by a drainage right-of-way on title.

Water Act Considerations

In developing potential solutions, the following aspects of the *Water Act* are noted:

- A natural watercourse is governed by the *Water Act*, and it is illegal to alter its flows.
- Previously re-routed ditches can be designated by Alberta Environment and Protected Areas as natural. It is not known if they have made any such designations within Parkland County.

Landowner Considerations When Obtaining Drainage Rights-of-Way

The following landowner considerations are noted:

- There is uncertainty in whether landowners would be willing to grant drainage rights-of-way to the County at key locations, and what the costs would be (financial compensation; legal survey; registration costs).
- There is also uncertainty in the benefits/need for the County to obtain drainage rights-of-way, including where is it needed and the rationale for it. If there are no backwater issues causing flooding, it may not be necessary for the County to obtain rights-of-way. The *Water Act* requires landowners to allow natural flows, so it may not be necessary to protect the drainage course. However, if Alberta Environment and Protected Areas are not going to enforce the *Water Act*, then the County may need to obtain drainage rights-of-way.

Possible Solutions/Action Items

- One possible solution for addressing on-going flooding and operation and maintenance issues is for the County to obtain drainage rights-of-way in key areas. This could be done as part of a wider stormwater improvement initiative. Possible steps could include:
- Engineering studies for chronic problem areas.
 - o What is causing the problem? Landowner infill, downstream culvert elevation/capacity, downstream watercourse debris, etc.
 - o If downstream conveyance capacity due to brush/debris, etc., is the issue, then determine if it is in the public's interest for the County to obtain a Drainage Right-of-Way whether the owner is willing to provide it.



- o Negotiate with landowner; expropriate the Drainage Right-of-Way if necessary.
- o Prepare a list of desired parcels for Drainage Right-of-Way and wait for owner to apply for subdivision, etc.
- A public education campaign to highlight the issue with all County residents and businesses; then approach key landowners and ask for a Drainage Right-of-Way.

Another possible solution or partial solution is for the County to improve its record keeping/GIS system. Action items could include:

- Obtain all available records from the Province.
 - o May need a summer student to assist or a dedicated staff member.
- Search all County documents including GIS layers.
 - o What to do with GIS layer “licensed drainage ditches”? It may be necessary to re-create this GIS layer.
- Export all Drainage Right-of-Way from land titles to GIS layers so that they can be plotted (it was difficult to compare watercourses with Drainage Right-of-Way boundaries).

7.4.8. DRAINAGE SYSTEM OPERATION AND MAINTENANCE

Coordination of Operation and Maintenance Activities

While the County has delineated responsibility for operation and maintenance of stormwater systems, there are some minor areas of uncertainty that still exist:

- Responsibilities for “special structures”, typically weirs, syphons, and long pipes that are not considered to be storm sewers. Part of this uncertainty is the unique nature of these structures and their (often) remote locations.
- Mowing of landscaped areas around stormwater management facilities (Roadway Maintenance and Drainage is responsible but does not have the equipment or availability for this).
- General bridge maintenance such as approach signs, guardrail, bridge cleaning. Engineering is responsible for capital replacements; it is unclear if annual maintenance and inspections are completed by Roadway Maintenance and Drainage or others.

The one major gap with stormwater operation and maintenance is the maintenance of licensed drainage ditches under *Water Act* Approval from Alberta Environment and Protected Areas. Roadways Maintenance and Drainage only maintain the portion of these ditches within public lands (typically culvert and short sections of ditch) or where drainage easements/Rights-of-Way exist. The majority of the licensed drainage ditches are on private land with no easement or Right-of-Way, and thus are not currently being maintained by the County as required by Alberta Environment and Protected Areas.



Another issue is responsibility for culvert replacement, and whether this is a capital program or a maintenance activity. It is also understood that the County does not have a formal capital program run through Engineering Services to replace culverts, nor is there an annual capital budget for culvert replacement. Roadway Maintenance and Drainage routinely replaces culverts under its maintenance budget. They typically replace between 6 and 12 centre line culverts per year during summer months (May to October). It is understood that these replacements are done to optimize the crews time during the “off-peak” periods, and individual culverts are selected based on condition and/or maintenance history. The Roadway Maintenance and Drainage crews do not have equipment nor expertise to replace large diameter and/or deep culverts, and do not have the capacity to do more than 6 to 12 culverts per summer.

Another gap is the detailed operation and maintenance responsibilities for stormwater management facilities and related infrastructure, including:

- Mowing around stormwater management facilities.
- Operation and maintenance of stormwater management control structures in rural areas.

Drainage Complaint Triage System

Based on a cursory review of the Work Request Register and Customer Resource Management stormwater drainage complaint triage systems, there appears to be pros/cons for both systems. Advantages of the current Customer Resource Management system include:

- The Customer Resource Management collection location data is easy to manipulate in GIS.
- The Customer Resource Management system is integrated with the rest of the County and is therefore (presumably) more economical to operate.
- The Customer Resource Management system is a one point of connection for external stakeholder inquiries.

The advantages of the former Work Request Register system are:

- Work Request Register has more detailed fields, providing the Road Maintenance and Drainage Operations staff more detailed information on the complaint.
- The Work Request Register tracking helped staff identify locations with reoccurring drainage issues.
- Staff could separate the location of the complaint (e.g., flooding) with the cause (e.g., downstream blocked culvert).
- The additional fields helped staff track communications with stakeholders, to include or track steps taken by staff, etc.
- Roadway Maintenance and Drainage had an administrative staff member familiar with operations for data entry, phone calls, documentation control, etc., which was efficient.



It is recommended that the County investigate ways that the Customer Resource Management system can be expanded to provide the operation and maintenance staff the tools that were in the previous Work Request Register system. This should be explored as the Stormwater Master Plan strategies are implemented.



Spring runoff encroaching on rural roadway

Road Maintenance and Drainage Operations GIS/Triage for Future System Planning

As the County's stormwater drainage system is very complex, the long-term plan should be to collect Drainage Complaints records with as much info as possible for an extended period of time. The following key information should be collected if possible:

- Location (location of call, location of cause – e.g., culvert, location of impact – e.g., u/s flooding); geolocate at the time of field visit
- Cause of complaint – frozen culvert, etc.
- Site photos/video – geolocated
- Link to GIS data – e.g., culvert
- Way to link the issue (e.g., frozen culvert) for multiple occurrences and/or recent changes to infrastructure (culvert) in GIS
- Central storage of pertinent data – weather, etc.

Access to Drainage Ditches for Maintenance

During discussions with County staff, it was noted that drainage crews could not access drainage courses that had a registered easement or Right-of-Way on title due to landowner activity that blocked access. It was also noted that the County staff were reluctant to enforce their right to access the drainage courses for maintenance.

The only solution to this is for the County to enforce their right to access the drainage Rights-of-Way. If there are costs associated with enforcement, the County could consider passing costs to offending landowner(s).



It is also noted that there are numerous locations where the licensed drainage ditch does not have an easement or Right-of-Way, and therefore the County does not have the right to enter the land for maintenance purposes, even though the license requires the County to maintain it. This is addressed in Section 7.4.7 above.

Access to Drainage Ditches for Maintenance with Environmental Reserve Zoning

The County staff are careful to enter and carry out operation and maintenance activities within Environmental Reserve zoned parcels for maintenance because of their interpretation of Division 9 of the *Municipal Government Act* (Use and Disposal of Reserve Land) 671(1) "...environmental reserve must be left in its natural state or be used as a public park."

There are three options within the *Municipal Government Act* that the County can consider allowing crews to conduct maintenance on Environmental Reserve lands:

- *Municipal Government Act* Section 551 Emergencies - Despite Section 549 Municipality remedying contraventions and Section 550 Municipality remedying dangers to public safety caused by a structure..., in an Emergency a municipality may take whatever actions or measures are necessary to eliminate the emergency.

- *Municipal Government Act* Section 676 Changes to environmental reserve's use or boundaries, a Council may by bylaw, after giving notice, use an Environmental Reserve for a purpose not specified in Section 671 (1), change the boundaries of an Environmental Reserve or Environmental Reserve easement... to rectify an encroachment problem or other concern, may include terms and conditions in a bylaw... may amend an Environmental Reserve Easement affected by the bylaw and issue any new certificates of title required by the bylaw.
- *Municipal Government Act* Section 677 Road, etc., over reserve land. Despite Section 671, a municipality may authorize the construction, installation, and maintenance, or any of them, of a roadway, public utility in, over or under reserve land, or the maintenance and protection of reserve lands if the interests of the public will not be adversely affected.

Regulatory Approval Process

While County staff have an understanding of the *Water Act*, determining exactly which rules of the *Water Act* approvals related to specific operation and maintenance activities can be challenging. It is suggested that the County utilize the flowchart in Figure 7.3 below to assess the need for *Water Act* approval, Code of Practice submission, or if no *Water Act* authorization is required. It is also suggested that the County arrange a meeting with Alberta Environment and Protected Areas to review the County's interpretation of the *Water Act*, its regulations, and the Code of Practice.

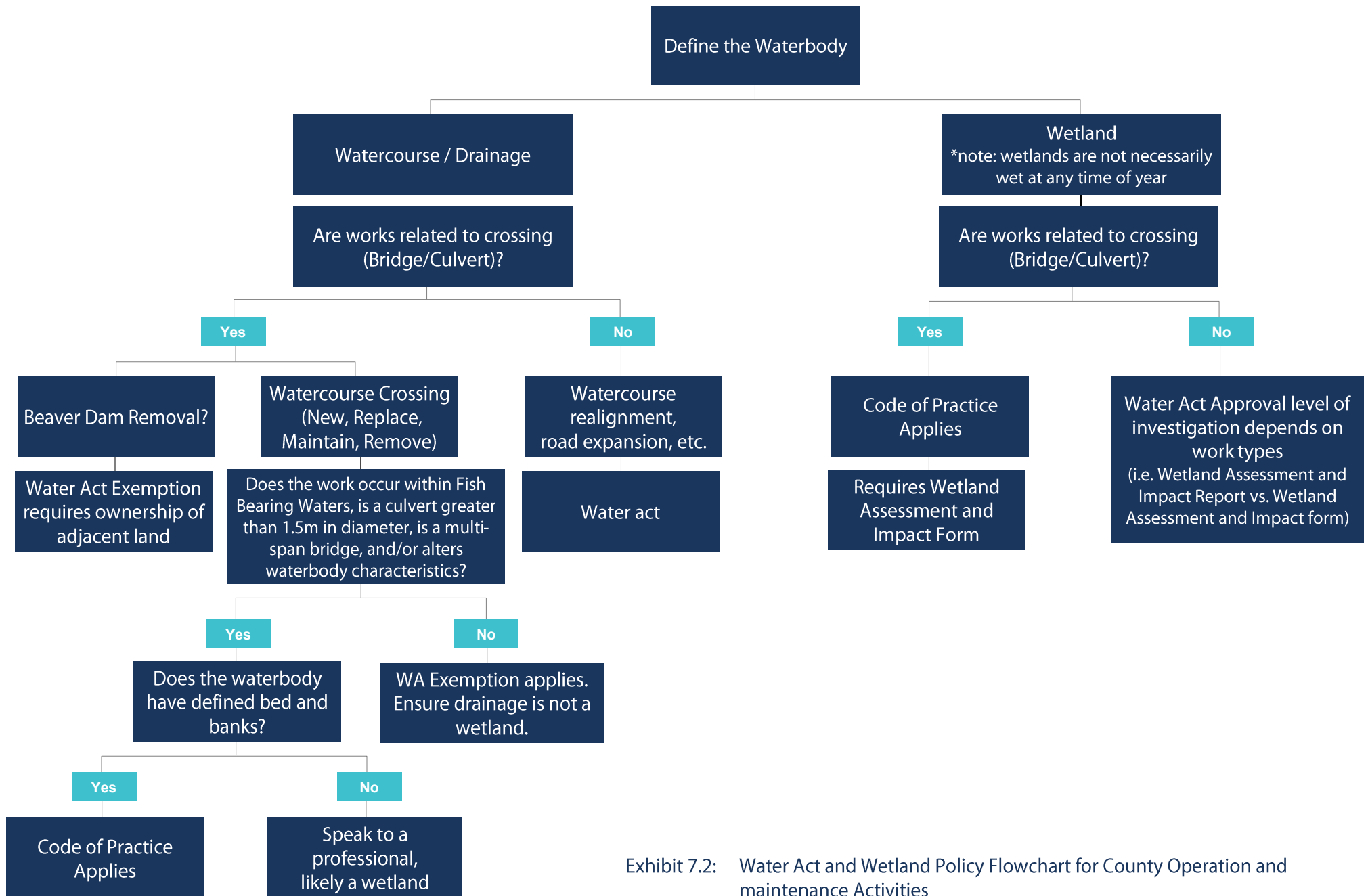


Exhibit 7.2: Water Act and Wetland Policy Flowchart for County Operation and maintenance Activities



Beaver Management

Pest (beaver) management is one of the key issues that the County's operation and maintenance staff need to deal with. They currently have one seasonal staff member who is primarily responsible for beaver management. The following issues are currently being addressed by County staff:

- Land ownership
 - o The *Water Act* allows the owner of the land upstream and downstream of the dam to remove the dam. The County can assist the landowner as a service.
 - o Fisheries and Oceans Canada has a simple Code of Practice for beaver dam removal (available at <https://www.dfo-mpo.gc.ca/pnw-ppe/codes/beaver-dam-barrage-castor-eng.html>) that provides information on when the Code prevails and how to safely remove beaver dams while not impacting fish. Provided the Code can be met, a simple notification to Fisheries and Oceans Canada is required a minimum of 10 days before the work commences.
- For beaver dams on provincial lands, the County needs to rely on Alberta Environment and Protected Areas to manage the beavers or obtain approval for the County to manage the beavers.
 - o In the past, Alberta Environment and Protected Areas has not supported removing a dam or beavers in Lois Hole Provincial Park even though it caused backwater flooding impacts to the County.

One possible solution to backwater impacts from beaver activity on provincial or private lands is to update stormwater management plans requirements to consider risk of beaver dam backwater effects in the design. This should include updating the Terms of Reference for developer prepared stormwater studies to address potential for backwater effects from beaver dams on private or provincially owned lands. For areas where lands are already developed, this should include determining the risk tolerance of backwater effects, what the upper tolerance limit is, and communicating this tolerance to landowners.

Operation and Maintenance Resource Availability and Management

During interviews with operation and maintenance staff, the issue of staffing levels was raised as a concern, especially with the increase in stormwater infrastructure within the County. The primary issue is with the Road Maintenance and Drainage team that is responsible for the County's ditches, culverts, and stormwater management facilities, but also applies to Public Works staff who are responsible for an increased number of stormwater sewers and lift stations.

ISL has reviewed this issue and provides the following comments:

- The amount of infrastructure that both the Road Maintenance and Drainage, and the Public Works teams are responsible for operating and maintaining has steadily increased over the years as shown in Figure 4.11.



- The stormwater management requirements for Country Residential developments completed in the past 20 to 30 years is much more stringent than Country Residential developments prior to the 1990s. Thus, even though the number of Country Residential developments in the County may have gone up by only about 20% to 30% since 2000, the number of stormwater management facilities that need to be maintained has increased by a factor of 5 or more. (Note: it is difficult to accurately quantify this as stormwater management facility GIS data is not yet reliable.)
- Several of the new developments have occurred in areas with high water table and/or near the Atim Creek / Big Lake floodplain. These developments have more challenging drainage issues than much of the rest of the County.
- Implementation of the new Customer Resource Management system resulted in generalization of the complaint related information (as Customer Service Representatives deal with all County complaints), which results in additional efforts requiring technical staff (manager, foreman) to spend time during the critical spring runoff period following up on Customer Resource Management complaints to fully understand the nature and location of the complaint.
- There are numerous requests such as undocumented requests from internal departments, Council Action Requests, and other sources such as insurance brokers that the operations staff find are time consuming, may replicate information in the Customer Resource Management system, and are not often recorded so their impact can be measured.

Road Maintenance and Drainage has been proactive in addressing the operation and maintenance challenges, including:

- Developing the Flood Management Plan documents.
- Developing staffing plans to draw in additional resources as needed during spring runoff peak periods, along with assigning proactive maintenance activities throughout the year.
- Accessing the County's GIS system and other technologies to improve its efficiency throughout the year, and especially during the critical spring runoff period. This includes:
 - o Using GIS to track frequent flood locations.
 - o Using drones to obtain video imagery of select drainage courses.
 - o Using GIS to estimate the drainage area to culverts to help size replacements.

Based on this assessment, the County needs to:

- Define the acceptable level of service for responding to resident complaints.
- Assess how and where resources are being utilized to meet the level of service.
- Determine if the resources are adequate.



Roadways Maintenance and Drainage crew repairing washed out culvert

Based on this assessment, if the County wants to meet its residents' level of service expectations, then it should increase the Road Maintenance and Drainage and Public Works staffing levels in response to the increase in operation and maintenance responsibilities. Specific changes can be addressed as part of the implementation of this stormwater master plan.

The initiatives developed by the Road Maintenance and Drainage team should carry on with the following conditions:

- The use of GIS, drones, etc., must be sustainable. There are examples of initiatives undertaken by individual staff that were either not completed (e.g., staff moved on) or without adequate oversight (e.g., drainage data entered into GIS not accurate). If the County is going to record photographic/video data of existing drainage infrastructure for future analysis, it must be supported by senior management with consistent staff levels.

- Roadway Maintenance and Drainage indicated may infrequently perform tasks such as determining contributing flow area, choosing rain event, percent imperviousness, flow duration and volumes for culvert replacement and resizing. These tasks require oversight by a professional engineer.

7.4.9. STORMWATER FLOW, RAINFALL AND WATER QUALITY MONITORING

Flow Monitoring

As previously noted, the County is not actively conducting a flow monitoring program within its storm sewers or watercourses/creeks. Given the limited degree of urban development within the County, and corresponding impact of County development on downstream creeks, there is not a strong rationale for the County to undertake flow monitoring of the creeks within its borders.

It is noted that Alberta Environment and Protected Areas operates flow monitoring sites along Atim Creek, Wabamun Creek, and Tomahawk Creek. The Atim Creek flow monitoring site (at Century Road #05EA012) may be relevant to the County as it would include post-development flows from Stony Plain and part of Spruce Grove. The County can also access the Alberta Environment and Protected Areas Wabamun Lake level monitoring site (#05DE002) during lake high water level periods to help assess local flooding issues.



The County may want to develop a flow monitoring program for storm sewers to understand existing trunk capacity utilization where there are concerns about pipe capacity to accommodate future development. The best illustration of this is the Acheson Basin 1 Outfall Trunk which is sized for approximately 10 sections of land utilizing a very low outlet rate (0.6 L/s/ha). This basin is currently less than 20% developed and thus there is no urgency to set up a flow monitoring program on the trunk. It is recommended that the County develop a flow monitoring system on the Acheson Basin 1 Outfall Trunk when its basin is more than 50% developed, which could take another 20 to 40 years based on the current development rates in Acheson.

As an alternative to a conventional flow monitoring site, the County could utilize the available data at the lift stations within Basin 1. Most of the stormwater management facilities in Acheson Basin 1 will be pumped, and it should be possible to use the lift station pump run times (multiplied by the pump capacity) to estimate the daily or weekly discharges to the Basin 1 Outfall Trunk. Alternately, the lift station SCADA system could be set up to collect the hourly or daily pumped flows to the trunk.

Rainfall Monitoring

It is noted that the County has a rain gauge installed at the Acheson Zone 3 Water Reservoir site. Data is downloaded regularly and compiled annually. This data will be useful when assessing stormwater flows in the Basin 1 Trunk in the future. Through the Alberta Capital Region Wastewater Commission's flowworks.com site, the County has access to area rain gauges located in the Town of Stony Plain, the City of Spruce Grove, and the City of St. Albert.

No additional rainfall monitoring is required for analyzing stormwater flows in Acheson or elsewhere in the County.

Water Quality Monitoring

As previously mentioned, in 2011, as required by the *Water Act* Acheson / Big Lake Area Master Drainage Plan Fenceline Approval 00287756-00-00, the County initiated a stormwater water quality sampling program for select stormwater management facilities. In 2020, the requirement to report annual stormwater water quality sampling within the Fenceline Area was removed, when the *Water Act* Acheson / Big Lake Area Master Drainage Plan Fenceline Approval was amended by Legacy Amendment 00287756-00-04. As all ten stormwater Basins in Acheson and the Big Lake Area outfall into the Atim Creek, Big Lake system, the County has an interest in protecting Lois Hole Provincial Park and the environment, having continued their annual stormwater water quality sampling program. The monitoring program currently (based on the 2022 program) includes one-time annual sampling at approximately nine stormwater management facilities, with over 80 water quality parameters analyzed in the laboratory.

It is understood that the testing parameters were selected to fulfil the testing requirements for Alberta Environment and Protected Areas' Water Quality based Effluent Limits Procedure Manual (1995) and Environmental Quality Guidelines for Alberta Surface Waters (2014).



It is not clear that there is a strong rationale for this level of laboratory analyses currently being conducted. It is noted that the City of Edmonton's stormwater quality monitoring program laboratory analyses initially included only six parameters (total phosphorus, biochemical oxygen demand, total suspended solids, Chlorophyll A, fecal coliform, and total coliform), plus four field parameters (PH, temperature, dissolved oxygen, and conductivity).

It is recommended that the County review the rationale for the water quality parameters being analyzed through discussions with Alberta Environment and Protected Areas and other municipalities. This should be carried out as part of the implementation strategy for this Stormwater Master Plan.

7.4.10. CULVERT DESIGN

Similar to most rural municipalities, the County has ongoing issues with culvert icing during the winter/spring runoff season. The County should investigate potential design solutions to minimize the frequency and magnitude of culvert icing. Possible solutions are identified below:

- Heat tape for problem culverts
 - o Heat tape is widely documented as a design solution to address culverts freezing up. Unfortunately, these have higher ongoing operating costs and require both a power source and a power meter.
 - o These should only be considered for locations with frequent icing problems where the reduced operation and maintenance costs would be offset by the capital on ongoing operating costs of the heat tape system or where access is challenging.

- Multiple level culverts
 - o Install multiple culverts at different elevations. This has been done historically and currently done based on specific design parameters.
 - o The lower culvert, which is the primary flow culvert for much of the year, would be allowed to ice up during winter/spring runoff, while the upper culvert would convey runoff when the lower culvert is blocked.
 - o The applicability of this solution is very dependant on the local topography, roadway elevation, and the frequency of freeze thaw cycles.

7.4.11. ENFORCEMENT

While Enforcement Officers strive to enforce the County's Land Use Bylaw, there has been times when the County Administration has been unwilling or reluctant to do so. This has had a negative impact on the design, condition, and operation and maintenance of the County's stormwater drainage system. To address this, the County needs to educate the public and enforce the County's Land Use Bylaw to address non-compliant development with authorized development permit Conditions of Approval, and illegal development activities without formal approval in accordance with the County Land Use Bylaw development permit application provisions.

7.4.12. GIS SYSTEM MANAGEMENT

The County's GIS data for buried stormwater systems such as the Acheson / Big Lake Area Fenceline area, Country Residential subdivisions, Entwistle, Wabamun and miscellaneous systems like the Fleming Syphon is 95% complete and is near ready to be released to staff.



The County's GIS data for overland drainage is not complete, especially for licensed drainage ditches, and could lead to confusion when trying to use the data to manage the stormwater drainage system. The following are preliminary recommendations for discussion purposes:

- The County should work with Alberta Environment and Protected Areas to obtain any available geospatial data for water licenses and approvals that deal with drainage (exclude licenses for diversion for irrigation, stock watering, industry, etc.). The Alberta Environment and Protected Areas Approval Viewer is not particularly user friendly and does not include geospatial information. It is important to understand the location and current status of drainage ditches installed several decades ago by the County in cooperation with Alberta Environment and Protected Areas.
- The "licensed drainage" layer in the County's GIS needs to be reviewed in detail. It is suspected that it was traced from hard copy maps and may not be complete, and/or include non-licensed drainage ditches. This task is expected to take significant effort and can be initiated as part of the implementation strategy for this Stormwater Master Plan.
- The County should incorporate the registered drainage Rights-of-Way into a separate GIS layer that can be easily accessed. It is understood that this information is currently on the Province's land titles with only the linework available in GIS as part of lot lines.

There should be consideration and assessment of the resource capacity within Engineering Services and Road Maintenance and Drainage.

7.5. Assessment of County Work in Fulfilling its Regulatory Obligations

Federal Regulatory Obligations

Based on interviews with County staff, Parkland County is meeting its federal regulatory obligations. Key staff are aware of the applicable federal acts and regulations as they apply to stormwater, including the *Fisheries Act*, *Canada Navigable Waters Act*, *Migratory Birds Convention Act*, *Species at Risk Act*, and *Impact Assessment Act*. Senior management direct their staff to follow these acts and their regulations, and through the course of this study there was no anecdotal evidence to the contrary.

Provincial Regulatory Obligations

Overall, the County is also meeting its provincial regulatory obligations. Key staff are generally aware of the applicable provincial acts, regulations, and policies as they apply to stormwater, including the *Water Act (including Indigenous Engagement)*, *Alberta Wetland Policy*, *Public Lands Act*, *Wildlife Act*, *Historical Resources Act*, and *Environmental Protection and Enhancement Act*. Again, senior management direct their staff to follow these acts and their regulations, and through the course of this study there was no anecdotal evidence to the contrary.



As previously mentioned, while County staff have an understanding of the *Water Act*, determining exactly which rules of the *Water Act* approvals related to specific operation and maintenance activities is often challenging. It is suggested that the County utilize the flowchart in Figure 7.3 to assess the need for *Water Act* approval, Code of Practice submission, or if no *Water Act* authorization is required.

It is noted that Parkland County has a “Fenceline agreement” with Alberta Environment and Protected Areas as Approval No. 00287756-00-00. This agreement was amended in 2020 (Amendment Nos. 00287756-00-04 and 00287756-00-05) which has an expiry date of December 20, 2026. The agreement grants Parkland County specific rights and responsibilities within the Fenceline area in the Acheson / Big Lake area. These responsibilities include:

- Ensuring that Best Management Practices for managing stormwater are implemented for all Basins 1 through 10.
- Performing operation and maintenance of the Storm Drainage System and downstream receiving water bodies.
- Prior to construction of Storm Drainage Systems at the sub-basin level, the Approval Holder shall develop a Stormwater Management Plan.

It appears that Parkland County is fulfilling its obligations to Alberta Environment and Protected Areas under this approval.

The one area that it appears that the County may not be fulfilling its provincial regulatory obligation is in relation to the County’s obligation to operate and maintain its licensed drainage ditches. Several of these approvals/licenses, which date back to the 1970s, 1980s, and 1990s, include terms and conditions such as “The licensee is responsible for the construction, operation, and maintenance of the works...”

During a November 15, 2022, meeting with Alberta Environment and Protected Areas, provincial representatives indicated that they expect the licensees to continue to maintain these licensed drainage ditches in perpetuity, and that agreements with expiry dates were being extended through Ministerial Orders.

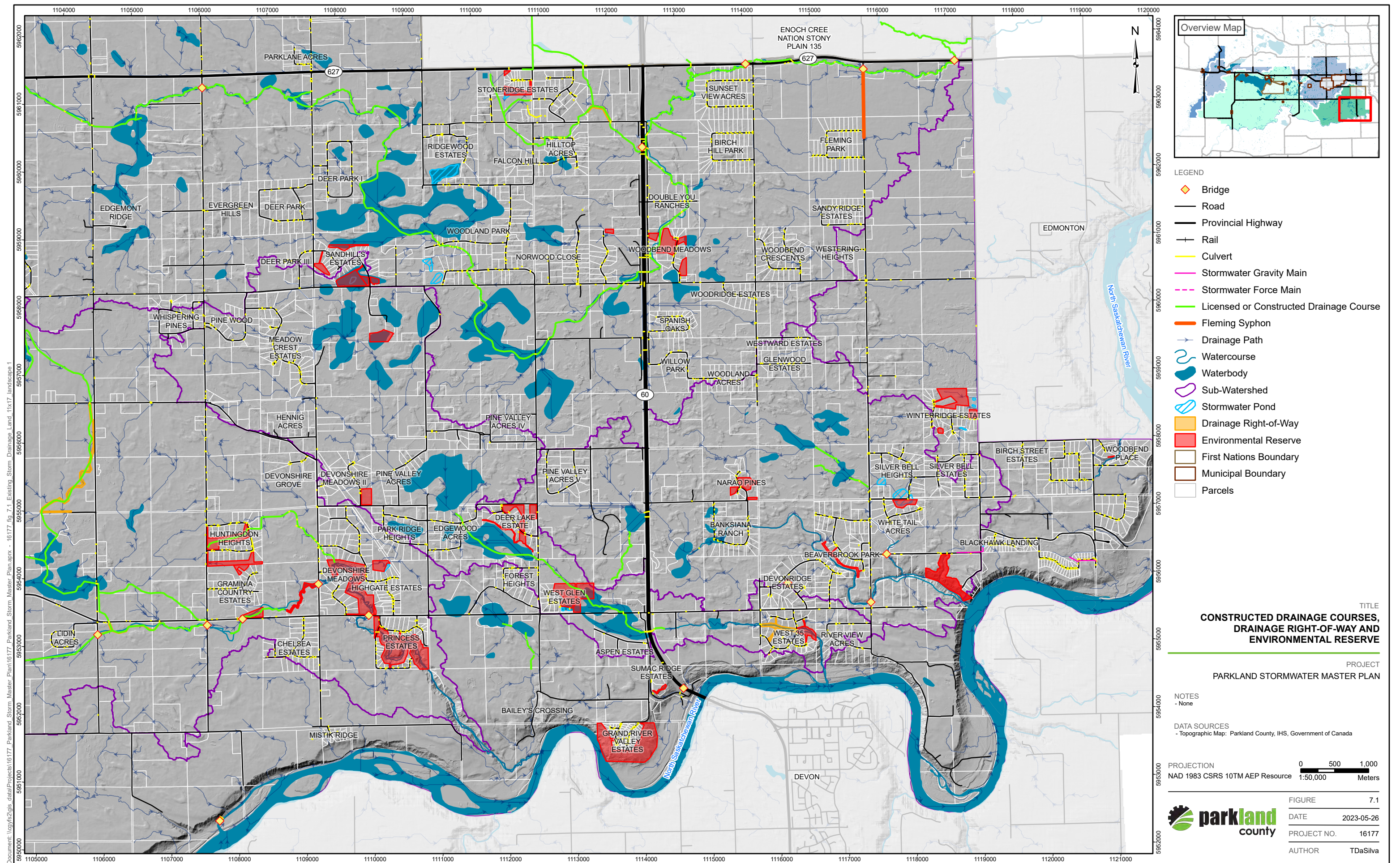
Based on discussions with Road Maintenance and Drainage staff, it is understood that County crews typically do not enter private property to inspect these licensed drainage ditches. Thus, is it difficult to ascertain whether these ditches require maintenance and if the County is fulfilling its obligation to Alberta Environment and Protected Areas to operate and maintain the licensed drainage ditches.



Municipal Obligations

While Parkland County is not necessarily obligated to meet its own municipal policies and procedures, it is preferable for it to do so. It is noted that the County's Engineering Services Department are making it a standard practice to fulfil the County's Land Development Engineering's requirements when initiating capital construction projects.

One area where the County may not be meeting its own policies is regarding County Council's Policy C-ES04 Stormwater Management Facility Naturalization. The County's current Engineering Design Standards appear to allow wet ponds in addition to constructing naturalized stormwater management facilities. It is not clear if the County has approved the construction of wet ponds following the introduction of this Council policy.





8.0 STORMWATER MASTER PLAN STRATEGY

8.1. Introduction

This section presents the overall stormwater master plan strategy for Parkland County. Specific strategic directions and actions were developed to address the County's regulatory responsibilities for stormwater and the key priorities identified through the technical review; including input from County staff.

8.2. Communication Strategy

The communication strategy includes communication to both internal and external stakeholders. Internal stakeholders include the general public, residents, businesses, administration, and Council. External stakeholders focus on adjacent municipalities where significant stormwater crosses municipal boundaries.

8.0



8.2.1. INTERNAL COMMUNICATION

STRATEGIC DIRECTION	County should develop a communications strategy to educate and inform all stakeholders about surface water drainage issues in Parkland County.
STRATEGIC ACTIONS	1. The County should develop a communication program (like Fire Smart Program) that targets the general public to educate them about surface water drainage challenges and their role in helping to manage them.
	2. The County should publicize its triage process for responding to stormwater complaints on its website to make it easier for the public to access.
	3. The County should clearly indicate the internal County responsibilities for stormwater that is readily available to all staff members. This should include a regulatory matrix and internal organizational chart for stormwater.
	4. The County should develop a specific communications strategy for owners/tenants of agricultural lands to address permitted and non-permitted development activities on agriculture lands.
	5. The County should develop a specific communications strategy for industrial and commercial landowners/tenants to address permitted and non-permitted activities. This should include allowable location for snow storage and surface contaminants being discharged to the drainage system.
	6. The County should develop a communications strategy for developers to explain proposed changes to County policies and practices related to stormwater and private development.
	7. The County should develop a communications initiative to introduce the new Surface Drainage and Lot Grading Bylaw to the general public.
	8. The County should develop a policy for communicating with landowners regarding chronic stormwater problem areas. Proposed engineering studies or planned capital works should be communicated if applicable. If there is no practical long-term solution to recurring stormwater issues, it should be clearly communicated to the landowner, along with potential next steps for the landowner to consider.
	9. County should develop a summary of the above with links to the documents that be included in the Council Orientation Package.



8.2.2. EXTERNAL COMMUNICATION

STRATEGIC DIRECTION	County should develop a communications strategy with external stakeholders regarding shared stormwater issues.
STRATEGIC ACTIONS	1. County should communicate with Spruce Grove and Stony Plain to jointly plan for future stormwater flows from Spruce Grove and Stony Plain through Parkland County to Big Lake. 2. The County should continue to liaise with similar rural municipalities to compare their stormwater design standards, operation and maintenance practices, and asset management initiatives as part of a “benchmarking” exercise. 3. The County should continue to meet with the EMRB committee as well as a regional Land Development Committee that discuss Engineering and Planning Policies and Standards.



8.3. Regulatory Compliance and Enforcement Strategy

This section addresses how the County fulfils its regulatory obligations to other levels of government. It also addresses ways that the County can improve its enforcement practices to meet its own policies and objectives.

8.3.1. LICENSED DRAINAGE COURSES

STRATEGIC DIRECTION	The County should proactively operate and maintain the licensed drainage courses as required by the licence agreements with Alberta Environment and Protected Areas.
STRATEGIC ACTIONS	1. The County should obtain legal advice on the County's on-going obligations to the Province to maintain licensed drainage ditches.
	2. The County should work with Alberta Environment and Protected Areas to update and refine its GIS database for the licensed drainage courses.
	3. The County should determine the benefits and cost to obtain easements/drainage Rights-of-Way along Alberta Environment and Protected Areas licenced drainage courses.



8.3.2. STORMWATER ENFORCEMENT AND REGULATORY POLICIES

STRATEGIC DIRECTION	County should refine its enforcement and regulatory policies related to stormwater.
STRATEGIC ACTIONS	1. The County should develop minimum environmental approval checklists that their consultants and contractors must follow when the County delegates environmental approvals to their consultants and/or contractors. 2. The County should provide detailed environmental approval checklists for developers and their consultants as part of the development agreement process. 3. The County should continue to work with Alberta Environment and Protected Areas compliance staff and County residents to address illegal stormwater related activities when they are reported and where the County has jurisdiction through supporting bylaws such as the Land Use Bylaw take enforcement action or refer them to Alberta Environment and Protected Areas. 4. The County should continue to enforce Development Agreements and ensure that the construction of drainage infrastructure, erosion and sediment control measure implementation, and lot grading aligns with approved construction drawings, project stormwater management plans, and any higher-level County stormwater documents. 5. The County should determine the benefits and cost to obtain easements/drainage Rights-of-Way along drainage channels and ditches within existing subdivided lots where there are no agreements existing.



8.4. Asset Management and GIS Strategy

STRATEGIC DIRECTION	County should continue to develop and refine its asset management and GIS strategy for stormwater infrastructure.
STRATEGIC ACTIONS	1. The County should continue to collect data on the condition of existing stormwater infrastructure and use the data to plan for future rehabilitation.
	2. The County should expand its GIS spatial data, asset inventory, and condition data management system for all classes of stormwater assets where practical and feasible.
	3. The County should continue developing an asset management system for rural culverts (including inventory, condition assessment, and capital planning).
	4. The County should use risk management to prioritize the GIS and asset management program, considering both the likelihood and impact of asset failure.
	5. The County should continue to prioritize funding for stormwater rehabilitation based on condition assessment and risk of failure, recognizing long term costs to County rate payers of deferring needed rehabilitation.
	6. The County should consider developing a natural asset management component as part of the County's asset management system.
	7. The County should investigate ways that natural assets and licensed drainage ditches could be incorporated into the County's GIS system and determine a business case to do so.



8.5. Stormwater System Planning Strategy

8.5.1. STORMWATER DRAINAGE STUDIES

STRATEGIC DIRECTION	County should develop business cases for proactively preparing detailed stormwater drainage studies.
STRATEGIC ACTIONS	1. The County should develop a business case for preparing Master Drainage Plans for select areas based on a combination of future development potential, potential future ALUS opportunities, and historic drainage challenges. Priority areas for the County to consider include the Atim Creek Area Structure Plan and Woodbend Gramina Area Structure Plan. 2. The County should seek out partnerships with private developers and landowners to carry out stormwater planning studies for larger development areas to avoid a multitude of local stand-alone drainage reports. 3. The County should develop a business case for conducting local stormwater studies to address historic drainage challenges. Integrate with natural asset management/ALUS studies where possible. The stormwater study results should be used to determine if there is a business case (considering both hard and soft costs) and/or external funding for upgrading existing stormwater drainage infrastructure / enhance natural drainage systems to minimize impacts to residents and businesses (e.g., depth and duration of surface flooding that does not result in significant property damage). 4. The County should mitigate climate change through integrating engineering stormwater system planning with natural assets system planning (e.g., ALUS). 5. The County, in collaboration with Spruce Grove and Stony Plain, should conduct a stormwater study to estimate the future stormwater flows from upstream urban areas to determine their impact on the County's stormwater drainage system. This should include the development of a cumulative effects model for Spruce Grove and Stony Plain stormwater flows at full build out to determine the impacts of the extended period of moderately high flows on County watercourses and ditches. Consider incorporating the provincial flood mapping into the analysis. Consider applying for grants through the support of the EMRB for this work. 6. The County should develop a formal process for establishing pre-development unit discharge rates for new development areas outside of the Acheson / Big Lake area.



STRATEGIC DIRECTION	County should develop business cases for proactively preparing detailed stormwater drainage studies.
	The County should carry out a study to investigate the potential of developing a Stormwater Utility as an alternate way to finance stormwater services. In addition to investigating the potential for a Stormwater Utility and development of a billing rate structure most appropriate for the County, the study should make recommendations on how the County administration may be best organized moving forward. The study should be developed in close collaboration with the County Administration to ensure County values are carefully considered.

8.5.2. ACHESON / BIG LAKE AREA FENCELINE APPROVAL

STRATEGIC DIRECTION	Continue to follow terms of Alberta Environment and Protected Areas “Fenceline” Approval No. 00287756-00-00 and subsequent amendments.
STRATEGIC ACTIONS	- The County should ensure that Best Management Practices for managing stormwater are implemented within the Fenceline area. - Continue to perform operation and maintenance of the storm drainage system and downstream receiving water bodies. These operation and maintenance activities should be clearly documented and be readily available to engineering staff. - Continue to develop stormwater management plans prior to construction of stormwater drainage systems within the Fenceline area. - The County should consolidate its Fenceline documentation (reports, maps, GIS) in preparation for the 2026 Fenceline Approval renewal. - The County should fulfil its obligation to enforce stormwater approvals within the Fenceline area. - The County should review the rationale for the water quality parameters being analyzed through discussions with Alberta Environment and Protected Areas and other municipalities.



8.5.3. EDMONTON METROPOLITAN REGIONAL BOARD STORMWATER CHARTER

STRATEGIC DIRECTION	The County should continue to work with the Edmonton Metropolitan Regional Board on its stormwater charter initiatives.
STRATEGIC ACTIONS	1. The County should work with the Edmonton Metropolitan Regional Board on the Flood Risk Project Charter to determine how it can be applied to a mixed rural/urban municipality like Parkland County. 2. The County should continue to work with the Edmonton Metropolitan Regional Board on the Regional Climate Risk and Vulnerability Assessment. The County should accept the pending changes to the Engineering Design Standards' IDF curve reference to the 2020 EPCOR IDF curves. 3. The County should ask the Edmonton Metropolitan Regional Board if they will be addressing inter-municipal stormwater flows in its stormwater charter.

8.6. Land Use Planning and Land Development Engineering Strategy

8.6.1. SURFACE DRAINAGE AND LOT GRADING BYLAW

STRATEGIC DIRECTION	The County should implement the new Surface Drainage and Lot Grading Bylaw.
STRATEGIC ACTIONS	1. The County should adopt and implement the Surface Drainage and Lot Grading Bylaw as soon as possible to align with its regional counterparts and better support its enforcement services. 2. The County should educate stakeholders (residents, landowners, developers, and staff) about the new bylaw and its potential impacts on them. 3. The County should begin enforcing the new bylaw as soon as it has been communicated to stakeholders. It should be applied consistently to all non-compliant activity. 4. The County should adopt the proposed Lot Grading Policy in support of the new Surface Drainage and Lot Grading Bylaw and Land Use Bylaw.



8.6.2. COORDINATION OF DEVELOPMENT PROCESSES

STRATEGIC DIRECTION	The County should refine current Planning Services and Engineering Services - Land Development Engineering development processes to improve coordination on stormwater related issues.
STRATEGIC ACTIONS	1. The County should refine current Planning and Land Development Engineering development review processes to improve coordination, establish a shared understanding of planning and engineering terminology, application submission requirements, clarify each County Department's role in the development review process, and standardize stormwater-related development conditions for all applicable development applications.
	2. Refine/Add to Development Permit Approval Conditions to address overland drainage issues and flood risk resulting from development disturbances.
	3. Review, Amend, or Rescind current County Council Policies as appropriate to ensure consistency and alignment of the different County Departments actions regarding stormwater requirements, and to the extent possible, embed the requirements in the Municipal Development Plan through a formal amendment process.
	4. The County should update and consolidate County Council policies as necessary to establish a County-wide approach for surface drainage and flood risk management.
	5. The County should consider developing snow dump sites to provide residents and businesses an alternate location to dispose of excess snow.



8.6.3. MUNICIPAL DEVELOPMENT PLAN AND LAND USE BYLAW UPDATES

STRATEGIC DIRECTION	The County should update the Municipal Development Plan and Land Use Bylaw to integrate new stormwater related directions through a formal amendment process.
STRATEGIC ACTIONS	1. The County should establish minimum top-of-bank and public upland setback requirements from County watercourses and embed them as new county-wide policies in the Municipal Development Plan through a formal Plan amendment. 2. The County should update/amend the Land Use Bylaw to align stormwater-related development regulations with the proposed Surface Drainage and Lot Grading Bylaw and new Lot Grading Policy following its approval by Council. 3. The County should update its current Subdivision and Development Application Requirements set out in the Land Use Bylaw through a formal amendment to add that development applications impacting existing stormwater drainage conditions must include an existing conditions plan, authenticated by an engineer, and lot grading plans pre- and post-development before an application can be deemed complete and ready for development review. 4. The County should consider expanding Floodplain Overlays in key areas based on flooding history and/or updated floodplain mapping information from the Province of Alberta. This would include a formal amendment to the Land Use Bylaw and identifying/creating overlays for other key areas where there has been a history and preponderance of seasonal flooding to pro-actively manage potential flood risk to development. 5. The County should review County Policy C-ES04 and whether County Departments are aligned and consistent in implementing the requirement for naturalized stormwater management facilities for all development applications, or if there are some exceptions being made due to site-specific circumstances, that necessitate amendments to Policy C-ES04 and MDP policy. 6. The County should develop a bylaw prohibiting snow disposal in County ditches and watercourses.



8.7. Stormwater Operation and Maintenance Strategy

8.7.1. OPERATION AND MAINTENANCE MANDATE

STRATEGIC DIRECTION	The County should review the mandate and resource allocation for the drainage operations and maintenance staff and coordinate it with other departments.
STRATEGIC ACTIONS	1. The County should define the mandate for level of service relating to legacy complaints through considering regulatory responsibilities, viability of reaching a physical solution, cost, and available funding.
	2. The County should define the mandate for the drainage operations team, including the expected level of service response to stormwater drainage complaints, while recognizing the ever-expanding stormwater drainage infrastructure in the County.
	3. The County should match the operation and maintenance staffing resources needed to meet its level of service expectations, especially during the spring runoff period.
	4. The County should clarify and document the roles of the drainage operations staff and other departments related to shared stormwater drainage operation and maintenance activities.
	5. Specific arrangements made between County departments for sharing drainage system operation and maintenance responsibilities needs to be in writing and clearly document maintenance expectations. This should include following operation and maintenance manuals, frequency of checking and operating/maintaining specific components.
	6. The need for mowing around each stormwater management facility should be confirmed. Where mowing is required, department responsibility needs to be established with associated staffing and equipment allocated.
	7. The County should review and follow applicable operation and maintenance manuals for stormwater infrastructure. Maintenance records should be readily available to the department with overall responsibility for stormwater and the department(s) responsible for day-to-day activities.
	8. The County should continue its rainfall and stormwater quality monitoring programs. The water quality parameters being analyzed should be reviewed to confirm that they meet the County's needs.
	9. The County should plan for future flow monitoring of the Basin 1 system when the basin is approaching 50% development. This could be either monitoring of the gravity outfall trunk or individual stormwater lift stations.



STRATEGIC DIRECTION

The County should review the mandate and resource allocation for the drainage operations and maintenance staff and coordinate it with other departments.

10. Should the County decide to move to a Stormwater Utility financing model, consideration should be given to how maintenance activities will be tracked. Keeping clear accounting of costs is an important element of a Stormwater Utility, as the *Municipal Government Act* requires that all charges collected from users must be spent only on the services for which the costs have been collected. Many municipalities combine staff that provide wastewater utility services in the same business unit as those that provide stormwater services due to the similarity of services and skill sets between the two utilities.

8.7.2. OPTIMIZE OPERATION AND MAINTENANCE PROCESS

STRATEGIC DIRECTION

The County should optimize its Customer Resource Management system for stormwater operation and maintenance.

STRATEGIC ACTIONS

1. The County should refine its Customer Resource Management system to manage, administer and prioritize incoming drainage complaints/concerns and maximize the incident information that reaches front-line staff, especially during the spring runoff period more effectively. This should include getting detailed descriptions of the complaint, the geo-location of complaint, details regarding what caused the issue (if known), and proposed or potential solutions.
2. The County should refine the Customer Resource Management data collection system to maximize its effectiveness as a post-event assessment tool to analyze on-going drainage issues. Again, this should include getting detailed descriptions of the complaint, geo-location of complaint, what caused the issue (if known), and proposed or potential solutions (where possible within constraints of the Customer Resource Management system). This data should then be used as a future asset management support tool/resource, for assessing priority stormwater projects.
3. The County should update its triage system for prioritizing drainage complaints based on the Customer Resource Management system and its level of service mandate.

9.0 PRIORITIZATION AND IMPLEMENTATION STRATEGY



The strategies presented in Section 8 were reviewed and prioritized to develop an overall implementation strategy. The following evaluation criteria were considered in prioritizing the individual strategies:

1. County's regulatory responsibilities
2. Council priorities, including environmental sustainability
3. Improving level of service to residents
4. Minimizing costs to rate payers
5. Improve operational efficiencies

Table 9.1 presents the prioritization matrix for implementing this stormwater master plan. It includes the anticipated timeframe for implementation, along with whether the strategy will be capital or operating budgets. It also lists the expected partners involved with implementing the strategy.

9.0



Table 9.1 Prioritization Matrix

Recommendations		Timeframe				Expenditure		External Partners	
		Short-term (1-2 years)	Medium-term (3-5 years)	Long-term (6+ years)	Ongoing	Capital	Operating	Alberta Environment and Protected Areas	Others
1	Communication Strategy - Internal Communication								
1	The County should develop a communication program (like Fire Smart Program) that targets the general public to educate them about surface water drainage challenges and their role in helping to manage them.	➤					✓		
2	The County should publicize its triage process for responding to stormwater complaints on its website to make it easier for the public to access.	➤					✓		
3	The County should clearly indicate the internal County responsibilities for stormwater that is readily available to all staff members. This should include a regulatory matrix and internal organizational chart for stormwater.	➤					✓		
4	The County should develop a specific communications strategy for owners/tenants of agricultural lands to address permitted and non-permitted development activities on agriculture lands.	➤					✓		
5	The County should develop a specific communications strategy for industrial and commercial landowners/tenants to address permitted and non-permitted activities. This should include allowable location for snow storage and surface contaminants being discharged to the drainage system.	➤					✓		
6	The County should develop a communications initiative to introduce the new Surface Drainage and Lot Grading Bylaw to the general public.	➤					✓		
7	The County should develop a policy for communicating with landowners regarding chronic stormwater problem areas. Proposed engineering studies or planned capital works should be communicated if applicable. If there is no practical long-term solution to recurring stormwater issues, it should be clearly communicated to the landowner, along with potential next steps for the landowner to consider.	➤					✓		
8	County should develop a summary of the above with links to the documents that be included in the Council Orientation Package.	➤					✓		
9	The County should publicize development application submission requirement changes and any council policy changes related to stormwater.	➤					✓		
2	Communication Strategy - External Communication								
1	County should communicate with Spruce Grove and Stony Plain to jointly plan for future stormwater flows from Spruce Grove and Stony Plain through Parkland County to Big Lake.	➤	➤	➤	➤		✓		✓
2	The County should continue to liaise with similar rural municipalities to compare their stormwater design standards, operation and maintenance practices, and asset management initiatives as part of a “benchmarking” exercise.	➤	➤	➤	➤		✓		✓
3	The County should continue to meet with the EMRB committee as well as a regional Land Development Committee that discuss Engineering and Planning Policies and Standards.	➤	➤	➤	➤		✓		✓
3	Regulatory Compliance and Enforcement Strategy - Licensed Drainage Courses								
1	The County should obtain legal advice on the County’s on-going obligations to the Province to maintain licensed drainage ditches.	➤					✓	✓	✓
2	The County should work with Alberta Environment and Protected Areas to update and refine its GIS database for the licenced drainage courses.	➤	➤				✓	✓	
3	The County should determine the benefits and cost to obtain easements/drainage rights-of-way along Alberta Environment and Protected Areas licenced drainage courses.	➤	➤				✓	✓	



Recommendations		Timeframe				Expenditure		External Partners	
		Short-term (1-2 years)	Medium-term (3-5 years)	Long-term (6+ years)	Ongoing	Capital	Operating	Alberta Environment and Protected Areas	Others
4	Regulatory Compliance and Enforcement Strategy - Enforcement and Regulatory Policies								
1	The County should develop minimum environmental approval checklists that their consultants and contractors must follow when the County delegates environmental approvals to their consultants and/or contractors.	➤					✓		
2	The County should provide detailed environmental approval checklists for developers and their consultants as part of the development agreement process.	➤					✓		
3	The County should continue to work with Alberta Environment and Protected Areas compliance staff and County residents to address illegal stormwater related activities when they are reported and where the County has jurisdiction through supporting bylaws such as the Land Use Bylaw take enforcement action or refer them to Alberta Environment and Protected Areas.	➤	➤	➤			✓	✓	
4	The County should continue to enforce Development Agreements and ensure that the construction of drainage infrastructure, erosion and sediment control measure implementation and lot grading aligns with approved construction drawings, project stormwater management plans, and any higher level County stormwater documents.	➤	➤	➤			✓		
5	The County should determine the benefits and cost to obtain easements/drainage rights-of-way along drainage channels and ditches within existing subdivided lots where there are no agreements existing.	➤	➤				✓		
5	Asset Management and GIS Strategy								
1	The County should continue to collect data on the condition of existing stormwater infrastructure and use the data to plan for future rehabilitation.	➤	➤	➤	➤		✓		
2	The County should expand its GIS spatial data, asset inventory and condition data management system for all classes of stormwater assets where practical and feasible.	➤	➤	➤			✓		
3	The County should continue developing an asset management system for rural culverts (including inventory, condition assessment, and capital planning).	➤	➤	➤			✓		
4	The County should use risk management to prioritize the GIS and asset management program, considering both the likelihood and impact of asset failure.	➤	➤	➤			✓		
5	The County should continue to prioritize funding for stormwater rehabilitation based on condition assessment and risk of failure, recognizing long term costs to County rate payers of deferring needed rehabilitation.	➤	➤	➤	➤	✓	✓		
6	The County should consider developing a natural asset management component as part of the County's asset management system.	➤	➤	➤		✓	✓		
7	The County should investigate ways that natural assets and licensed drainage ditches could be incorporated into the County's GIS system and determine a business case to do so.	➤	➤	➤		✓	✓		



Recommendations		Timeframe				Expenditure		External Partners	
		Short-term (1-2 years)	Medium-term (3-5 years)	Long-term (6+ years)	Ongoing	Capital	Operating	Alberta Environment and Protected Areas	Others
6	Stormwater System Planning Strategy - Stormwater Drainage Studies								
1	The County should develop a business case for preparing Master Drainage Plans for select areas based on a combination of future development potential, potential future ALUS opportunities, and historic drainage challenges. Priority areas for the County to consider include the Atim Creek Area Structure Plan and Woodbend Gramina Area Structure Plan.	>					✓	✓	✓
2	The County should seek out partnerships with private developers and landowners to carry out stormwater planning studies for larger development areas to avoid a multitude of local stand-alone drainage reports.	>					✓		✓
3	The County should develop a business case for conducting local stormwater studies to address historic drainage challenges. Integrate with natural asset management/ALUS studies where possible. The stormwater study results should be used to determine if there is a business case (considering both hard and soft costs) and/or external funding for upgrading existing stormwater drainage infrastructure/enhance natural drainage systems to minimize impacts to residents and businesses (e.g., depth and duration of surface flooding that does not result in significant property damage).	>					✓	✓	✓
4	The County should mitigate climate change through integrating engineering stormwater system planning with natural assets system planning (e.g., ALUS).	>					✓		✓
5	The County, in collaboration with Spruce Grove and Stony Plain, should conduct a stormwater study to estimate the future stormwater flows from upstream urban areas to determine their impact on the County's stormwater drainage system. This should include the development of a cumulative effects model for Spruce Grove and Stony Plain stormwater flows at full build out to determine the impacts of the extended period of moderately high flows on County watercourses and ditches. Consider incorporating the provincial flood mapping into the analysis. Consider applying for grants through the support of the EMRB for this work.	>					✓	✓	✓
6	The County should develop a formal process for establishing pre-development unit discharge rates for new development areas outside of the Acheson/Big Lake area.	>					✓	✓	
7	The County should carry out a study to investigate the potential of developing a Stormwater Utility as an alternate way to finance stormwater services. In addition to investigating the potential for a Stormwater Utility and development of a billing rate structure most appropriate for the County, the study should make recommendations on how the County administration may be best organized moving forward. The study should be developed in close collaboration with the County Administration to ensure County values are carefully considered.	>					✓		
7	Stormwater System Planning Strategy - Acheson/Big Lake Area Fenceline Approval								
1	The County should ensure that Best Management Practices for managing stormwater are implemented within the Fenceline area.	>					✓	✓	
2	Continue to perform operation and maintenance of the storm drainage system and downstream receiving water bodies. These operation and maintenance activities should be clearly documented and be readily available to Engineering staff.	>					✓	✓	
3	Continue to develop stormwater management plans prior to construction of stormwater drainage systems within the Fenceline area.	>					✓	✓	
4	The County should consolidate its Fenceline documentation (reports, maps, GIS) in preparation for the 2026 Fenceline Approval renewal.	>					✓	✓	
5	The County should fulfil its obligation to enforce stormwater approvals within the Fenceline area.	>					✓	✓	
6	The County should review the rationale for the water quality parameters being analyzed through discussions with Alberta Environment and Protected Areas and other municipalities.	>					✓	✓	✓



Recommendations		Timeframe				Expenditure		External Partners	
		Short-term (1-2 years)	Medium-term (3-5 years)	Long-term (6+ years)	Ongoing	Capital	Operating	Alberta Environment and Protected Areas	Others
8	Stormwater System Planning Strategy - Edmonton Metropolitan Regional Board Stormwater Charter								
1	The County should work with the Edmonton Metropolitan Regional Board on the Flood Risk Project Charter to determine how it can be applied to a mixed rural/urban municipality like Parkland County.		➤				✓		✓
2	The County should continue to work with the Edmonton Metropolitan Regional Board on the Regional Climate Risk and Vulnerability Assessment. The County should accept the pending changes to the Engineering Design Standards' IDF curve reference to the 2020 EPCOR IDF curves.	➤					✓		✓
3	The County should ask the Edmonton Metropolitan Regional Board if they will be addressing inter-municipal stormwater flows in its stormwater charter.		➤				✓		✓
9	Land Use Planning and Land Development Engineering Strategy - Surface Drainage and Lot Grading Bylaw								
1	The County should adopt and implement the Surface Drainage and Lot Grading Bylaw as soon as possible to align with its regional counterparts and better support its enforcement services.	➤					✓		
2	The County should educate stakeholders (residents, landowners, developers, and staff) about the new bylaw and its potential impacts on them.	➤					✓		
3	The County should begin enforcing the new bylaw as soon as it has been communicated to stakeholders. It should be applied consistently to all non-compliant activity.	➤					✓		
4	The County should adopt the proposed Lot Grading Policy in support of the new Surface Drainage and Lot Grading Bylaw and Land Use Bylaw.			➤			✓		
10	Land Use Planning and Land Development Engineering Strategy - Coordination of Development Processes								
1	The County should refine current Planning and Land Development Engineering development review processes to improve coordination, establish a shared understanding of planning and engineering terminology, understand application submission requirements, clarify each County Department's role in the development review process, and standardize stormwater-related development conditions for all applicable development applications.		➤				✓		
2	Refine/Add to Development Permit Approval Conditions to address overland drainage issues and flood risk resulting from development disturbances.		➤				✓		
3	Review, Amend or Rescind current County Council Policies as appropriate to ensure consistency and alignment of the different County Departments actions regarding stormwater requirements and to the extent possible embed the requirements in the Municipal Development Plan through a formal amendment process.		➤				✓		
4	The County should update and consolidate County Council policies as necessary to establish a County-wide approach for surface drainage and flood risk management.		➤				✓		
5	The County should consider developing snow dump sites to provide residents and businesses an alternate location to dispose of excess snow.		➤				✓		



Recommendations		Timeframe				Expenditure		External Partners	
		Short-term (1-2 years)	Medium-term (3-5 years)	Long-term (6+ years)	Ongoing	Capital	Operating	Alberta Environment and Protected Areas	Others
11	Land Use Planning and Land Development Engineering Strategy - Municipal Development Plan and Land Use Bylaw Updates								
1	The County should establish minimum top-of-bank and public upland setback requirements from County watercourses and embed them as new county-wide policies in the Municipal Development Plan through a formal Plan amendment.	>	>	>			✓	✓	✓
2	The County should update/amend the Land Use Bylaw to align stormwater-related development regulations with the proposed Surface Drainage and Lot Grading Bylaw and new Lot Grading Policy following its approval by Council.	>					✓		
3	The County should update its current Subdivision and Development Application Requirements set out in the Land Use Bylaw through a formal amendment to add that development applications impacting existing stormwater drainage conditions must include an existing conditions plan, authenticated by an engineer, and lot grading plans pre- and post-development before an application can be deemed complete and ready for development review.	>	>				✓		
4	The County should consider expanding Floodplain Overlays in key areas based on flooding history and/or updated floodplain mapping information from the Province of Alberta. This would include a formal amendment to the Land Use Bylaw and identifying/creating overlays for other key areas where there has been a history and preponderance of seasonal flooding to pro-actively manage potential flood risk to development.	>	>	>			✓		
5	The County should review County Policy C-ES04 and whether County Departments are aligned and consistent in implementing the requirement for naturalized stormwater management facilities for all development applications, or if there are some exceptions being made due to site-specific circumstances, that necessitate amendments to Policy C-ES04 and MDP policy.	>					✓		
6	The County should add a bylaw prohibiting snow disposal in County ditches and watercourses.	>	>	>			✓		
12	Stormwater Operation and Maintenance Strategy - Operation and Maintenance Mandate								
1	The County should define the mandate for level of service relating to legacy complaints, through considering regulatory responsibilities, viability of reaching a physical solution, cost, and available funding.	>					✓	✓	✓
2	The County should define the mandate for the drainage operations team, including the expected level of service response to stormwater drainage complaints, while recognizing the ever-expanding stormwater drainage infrastructure in the County.	>					✓		
3	The County should match the operation and maintenance staffing resources needed to meet its level of service expectations, especially during the spring runoff period.	>					✓		
4	The County should clarify and document the roles of the drainage operations staff and other departments related to shared stormwater drainage operation and maintenance activities.	>					✓		
5	Specific arrangements made between County departments for sharing drainage system operation and maintenance responsibilities needs to be in writing and clearly document maintenance expectations. This should include following operation and maintenance manuals, frequency of checking and operating/maintaining specific components.	>	>				✓		
6	The need for mowing around each stormwater management facility should be confirmed. Where mowing is required, department responsibility needs to be established with associated staffing and equipment allocated.	>					✓		
7	The County should review and follow applicable operation and maintenance manuals for stormwater infrastructure. Maintenance records should be readily available to the department with overall responsibility for stormwater and the department(s) responsible for day to day activities.	>					✓		
8	The County should continue its rainfall and stormwater quality monitoring programs. The water quality parameters being analyzed should be reviewed to confirm that they meet the County's needs.	>	>	>	>		✓		
9	The County should plan for future flow monitoring of the Basin 1 system when the basin is approaching 50% development. This could be either monitoring of the gravity outfall trunk or individual stormwater lift stations.	>	>	>			✓		
10	Should the County decide to move to a Stormwater Utility financing model, consideration should be given to how maintenance activities will be tracked. Keeping clear accounting of costs is an important element of a Stormwater Utility, as the <i>Municipal Government Act</i> requires that all charges collected from users must be spent only on the services for which the costs have been collected. Many municipalities combine staff that provide wastewater utility services in the same business unit as those that provide stormwater services due to the similarity of services and skill sets between the two utilities.	>	>	>			✓		



Recommendations		Timeframe				Expenditure		External Partners	
		Short-term (1-2 years)	Medium-term (3-5 years)	Long-term (6+ years)	Ongoing	Capital	Operating	Alberta Environment and Protected Areas	Others
13	Stormwater Operation and Maintenance Strategy - Optimize Operation and Maintenance Process								
1	The County should refine its Customer Resource Management system to more effectively manage, administer and prioritize incoming drainage complaints/ concerns and maximize the incident information that reaches front-line staff, especially during the spring runoff period. This should include getting detailed descriptions of the complaint, geo-location of complaint, what caused the issue (if known), and proposed or potential solutions.	➤					✓		
2	The County should refine the Customer Resource Management data collection system to maximize its effectiveness as a post-event assessment tool to analyze on-going drainage issues. Again, this should include getting detailed descriptions of the complaint, geo-location of complaint, what caused the issue (if known), and proposed or potential solution (where possible within constraints of the Customer Resource Management system). This data should then be used as a future asset management support tool/resource, for assessing priority stormwater projects.	➤					✓		
3	The County should update its triage system for prioritizing drainage complaints based on the Customer Resource Management system and its level of service mandate.	➤					✓		

APPENDIX A

PLANNING LEGISLATIVE FRAMEWORK

A-1: Provincial – Stormwater Related Excerpts

A-2: Municipal – Stormwater Related Excerpts



A



Appendix A-1: Provincial – Stormwater Related Excerpts

Municipal Government Act Chapter M-26 RSA 2000 – Excerpts

Relevant Section	Subsections	Topics	What's Addressed
Local Improvement Tax	s.408(1) Sewers	Improvement tax	Use of tax for stormwater infrastructure construction with Council approval and in public interest.
Enforcement of Municipal Law	s.542 – s.556	Inspections Orders to remedy Injunctions Bylaw Enforcement Officers	- Municipalities' authority to enter and inspect stormwater facilities, and issue orders to remedy or apply for an injunction if they find that a stormwater structure is being constructed in contravention to the Act or any bylaw that municipalities are authorized to enact. - Municipalities' responsibility to adopt a bylaw specifying the powers and duties of bylaw enforcement officers.
Offences and Penalties	s. 557 – s.567	Offences Obstruction Prosecution and penalties Order for compliance	- What constitutes and offence. - No obstruction of public utility construction, maintenance operation or repair. - Municipality's authority to charge fines and penalties for offences and obstructions.
Planning Authorities	s.623 – s.627	Subdivision and Development Authorities Other planning authorities Appeal Boards	- Municipalities are required to establish a subdivision and a development authority by bylaw - Municipalities can establish a municipal planning commission, or form an intermunicipal planning commission or an intermunicipal service agency - Municipalities are required to establish a subdivision and development appeal board (SDAB) or enter into an agreement with other municipalities to establish an intermunicipal SDAB, to hear appeals from the decision of the subdivision or development authority.



Relevant Section	Subsections	Topics	What's Addressed
Statutory Plans	s.631 – s.638	Municipal Planning Framework – MDP, IDP, ASP, ARP	- Statutory Plans include policies to guide development in municipalities. - IDP: policies for development, natural features, and infrastructure in and around the boundaries of two municipalities. - MDP: coordinates infrastructure with adjacent municipalities in the absence of an IDP; and has provisions for municipal services and facilities including financing, programming, environmental matters, and development. - ASP: provides servicing frameworks for specific areas undergoing new development. - ARP: has provisions for establishing, improving, or relocating public utilities; and imposition and collection of development levies.
Land Use Bylaws	s.640 – s.645	Scope and contents of a Land Use Bylaw (LUB)	- Adopting a LUB is mandatory. - Core content mandated by the MGA, beyond that the municipality can determine relevant content. - Establishes a method to make decisions on applications for development permits. - Divides the municipality into districts and prescribes permitted and/or discretionary uses for each district. - Contains stop orders and enforcement provisions for a municipality to stop development that does not comply with the LUB.
Levy Bylaws and Conditions	s.647 – s.648	Redevelopment levies Offsite levies Intermunicipal offsite levies	A bylaw that authorizes a redevelopment levy or an off-site levy must set out the purpose of the levy (e.g., stormwater public utility purposes) and indicate how the amount of the levy was determined
Subdivision Control	s. 652 – s.660	Subdivision applications Subdivision authority Parameters and conditions for subdivision approval Conceptual schemes	- To be subdivided, a parcel must be suitable for the intended purpose, conform to the municipal planning framework, comply with the Act, and not have a property taxes balance. - Conditions of approval can include entering a development agreement for the installation of public utilities and paying an off-site levy or redevelopment levy. - Conceptual schemes relate a subdivision application to the future subdivision and development of adjacent land, and has the same referral rules as the subdivision and development regulation establish for subdivision applications



Relevant Section	Subsections	Topics	What's Addressed
Reserve Land and Land for Roads and Utilities	s.661 – s.664	Land dedication Environmental Reserve	• Upon subdivision, municipalities can take land for roads and public utilities, and/or environmental reserve, without paying compensation • Roads and public utilities: up to 30% of the total area of the parcel less any environmental reserve dedication. • Environmental reserve: applies to land consisting of a swamp, gully, ravine, coulee or natural drainage course; land that is subject to flooding or is unstable; a 6+ m buffer along the bed and shore of any body of water; other natural features that the municipality wants to preserve; land that would help prevent the pollution of an adjacent water body; land to provide public access to an adjacent water body; land that would be unsafe to develop.
Development Permits	s. 640 – s.650 s. 683	Development Permit applications Parameters and Conditions for development approval Development Agreements	• LUB requires a Development Permit (DP) for most types of development and sets a general process for the approval of development applications and the content of DPs. • As a condition of approval of a DP, Municipalities can request a development agreement to install or pay for the installation of a public utility.
Development in floodways	s.693.1	Authority of the Lieutenant Governor in Council to regulate development in floodways	• The Lieutenant Governor in Council can make regulations to control development located in a floodway; exempt a municipality or group of municipalities from the regulations in this section; override other provisions of the Act to effect this section; and define or respect the meaning of “floodway”. • These regulations take precedence over any statutory plan or bylaw enacted under the Act, and are binding before any of the authorities defined and established by the Act. • Municipalities must amend any statutory plans and LUB to comply with regulations made under this section



Relevant Section	Subsections	Topics	What's Addressed
Regulations	s.694(1)	Subdivision and Development	The Minister may make regulations respecting applications for the subdivision and development of land; providing for an alternative period of time for the subdivision authority or the development authority to review the completeness of an application or make a decision on an application under this Part or under the regulations; respecting subdivision and development standards and requirements; respecting the information to be contained in a subdivision authority's and a development authority's notice of a decision; conferring or imposing, with or without conditions, any power or duty under the regulations on the Land and Property Rights Tribunal, a subdivision authority or a development authority; removing or modifying the circumstances where a notice of appeal may be filed with the LPRT, and setting out additional circumstances where a notice of appeal may be filed with the LPRT.
Establishment and Operation of Growth Management Boards	s.708.061	Conformity with growth plan	- A growth plan prevails in the event of a conflict or inconsistency between the growth plan and a statutory plan, bylaw, resolution or municipal agreement of a participating municipality. - The council of a participating municipality must amend every statutory plan and bylaw as necessary to conform with a growth plan no later than the date specified by the growth management board.



Matters Related to Subdivision and Development Regulation 84/2022 – Excerpts

Relevant Sections	Topics	What's Addressed
Part 2 Subdivision Applications		
s.6(2),(3),(4), and (7)	Subdivision application requirements	• A complete subdivision application consists of, among others, a copy of a current land title, any agreement made under section 664.1 of the Act (pertaining to Environmental Reserve) and at the discretion of the development authority, must include following: • sketches or plans of the proposed subdivision at a scale the subdivision authority requires, showing: - o the location, dimensions and boundaries of the subject land, any reserve land, existing rights of way of each public utility, and any other rights of way; and - o the approximate location and boundaries of the bed and shore of any body of water that is contained within or bounds the proposed parcel of land. • As required by the subdivision authority, the following: - o an assessment of subsurface characteristics of the land, including susceptibility to slumping or subsidence, depth to water table and suitability for any proposed on-site sewage disposal system, - o a description of the uses proposed for the subject land, - o if the land is located in a potential flood plain, a map showing the 1:100 flood when available; - o a conceptual scheme that relates the application to future subdivision and development of adjacent areas; and - o any additional information required to determine compliance with the requirements of s.654 of the MGA.
s.7 (5),(6),	Subdivision application referrals	• For purposes of subsection (6) (e)(ii), the Deputy Minister of the Minister responsible for administration of the Public Lands Act may, in an agreement with a municipality, further define the term “body of water” but the definition may not include dugouts, drainage ditches, man-made lakes or other similar man-made bodies of water. • The subdivision authority must send a copy of complete subdivision applications to: - o the Deputy Minister or the Minister responsible for administration of the Public Lands Act if the proposed parcel is adjacent to the bed and shore of a body of water, or contains either wholly or partially, the bed and shore of a body of water, - o the Deputy Minister of Environment and Parks, if any of the land subject of the application is adjacent to works, as defined in the Water Act, that are owned by the Crown in right of Alberta, - o if the land is situated within an irrigation district, the board of directors of the district, - o the municipality within which the land that is the subject of the application is located, if the council, municipal planning commission or a designated officer of that municipality is not the subdivision authority for that municipality, - o each municipality that has adjacent land within its boundaries, unless otherwise provided for in the applicable municipal or intermunicipal development plan; and - o any other persons and local authorities that the subdivision authority considers necessary.



Relevant Sections	Topics	What's Addressed
s.9	Relevant considerations	In making a decision on whether to approve an application for subdivision, the subdivision authority must consider the land's topography, its soil characteristics, storm water collection and disposal, any potential for flooding, subsidence or erosion, the use of land in the vicinity of the land that is the subject of the application, and any other matters that are necessary to determine the suitability of the subdivision for its intended purpose.
s.10	Reasons for decision	The written decision of a subdivision authority provided by s.656 of the MGA must include the reasons for the decision, including an indication of how the subdivision authority has considered any submissions made to it by the adjacent landowners and the matters listed in s.9 above.
Part 3 Subdivision and Development Conditions		
s.22	Approval by council not part of development permit application	A development authority may not require, as a condition of a completed development permit application, the submission to and approval by council of a report regarding the development.
Part 4 Registration, Deferral and Endorsement		
s.23, s.25	Registration	- Proposed plan of subdivision must comply with s.665(2) of the Act. - When a subdivision authority endorses an instrument pursuant to s.657 of the MGA, the endorsement must contain the following information: - the area covered by an environmental reserve easement if any.
Part 5 Provincial Appeals		
s.26(3)	LPRT distances	The following are the distances for the purposes of s.678(2)(a) of the MGA for land subject to an application for subdivision: the distance with respect to a body of water described in s.7(6)(e) as adjacent to the bed and shore of a water body, or contains either wholly or partially the bed and shore of a body of water;
s.27(1), (2), (3), (4)	Appeals removed from list	- The following is removed from the list of circumstances where a notice of appeal of a development authority decision may be filed with the LRPT: an appeal where the land that is subject of the application contains, is adjacent to or is within a prescribed distance of a ...body of water... - Appeals referred to above may be commenced by filing a notice of appeal with the subdivision and development appeal board. - If the land subject of an appeal referred to in (1) above is subject to a licence, permit, approval or other authorization referred to in s. 685(2.1)(a)(i)(C) or (D) of the MGA, then, the appeal may be commenced by filing an appeal with the LPRT.
s.29	Additional circumstances where appeal may be filed	In addition to the circumstances listed in sections 678(2)(a)(i) and 685(2.1)(a)(i) of the MGA, a notice of appeal may be filed with the LPRT where the land is subject of a licence, permit, approval or other authorization granted by the Minister of Environment and Parks under any Act the Minister is responsible for under s.16 of the Government Organization Act.



Appendix A-2: Municipal – Stormwater Related Excerpts

Parkland County Municipal Development Plan Bylaw 2017-14 – Excerpts

Relevant Policies/Figures	Topics	Direction
Section 9.0 – Transportation and Utility Infrastructure		
9.6.5	Recovering Costs	• Maintain current off-site levies bylaws to recover capital costs of stormwater systems in new developments • Direct developers to pay outstanding levy fees as a condition of subdivision/development where applicable, and to front-end the cost of on-site and off-site infrastructure systems. • Assist in cost recovery of oversizing and extension of municipal infrastructure for future development where applicable
9.6.9	Stormwater Planning	• Consider onsite development impacts and impacts within the larger surrounding drainage catchment area. • Naturalize Constructed SWMFs. • Require developments to incorporate LID to maintain surface water quality and manage surface water quantity.
9.6.10	Subdivision and Development Requirements for Stormwater Management	• Incorporate wetlands/low areas into new subdivision planning and development to the greatest extent possible. • Require future subdivisions to adhere to County Policy C-ES04 – Stormwater Management Facility Naturalization as a condition of subdivision approval.
Section 10.0 – Natural Environment		
Figure 14	High Priority Landscapes	• High Priority Landscapes encompass the areas of upper Sturgeon River, Devon Dunes, Wabamun Creek, NSR, central wetlands, and Atim Creek, among others. • These areas were identified as a result of overlaying ESAs, wetlands, class 1 and 2 soils, and aquifers.
10.1.2		• Require developments to address preservation of surface and ground water interactions and connectivity; and cumulative effects at the watershed and broader landscape scale



Relevant Policies/Figures	Topics	Direction
10.4	Surface water, groundwater, and wetlands	- Minimize soil erosion, enhance riparian zones, and conserve wetlands and riparian zones. - Prepare sub-watershed lake land use plans for Wabamun Lake, Mayatan Lake, Jackfish Lake, Isle Lake, and Hubbles Lake as determined necessary by the County”. - Protect highest value wetlands as identified in the County’s Wetland Inventory & Historical Loss Assessment report through the use of environmental reserve and environmental reserve easement dedication, conservation reserves or conservation easements. - Encourage a net gain of wetlands through stormwater management facility naturalization. - Maintain and protect the quality and quantity of surface and groundwater resources. - Require technical studies concerning surface water or groundwater quantity or quality to minimize impacts on surface water and groundwater resources, including recharge zones. - Support naturalization, retention and enhancement of natural drainage patterns during the subdivision and development approval process. - Support a no net increase of post development nutrient discharges in sensitive groundwater - Use the Parkland County Riparian Setback Matrix Model to define site specific setbacks.
10.5	Renewable energy and sustainable development	- Support LID and eco-industrial parks. - Reduce carbon emissions and collaborate with climate action organizations, such as Partners for Climate Protection (PCP) program, Mistakis Institute, and Municipal Climate Change Action Centre, among others. - Develop a Community Climate Adaptation Plan.
Section 12.0 – Intermunicipal Collaboration and Local Governance		
12.0.1	Collaborative approach	Seek to resolve any intermunicipal or intergovernmental issues or disputes in a way that benefits both parties
12.0.6	Communication and engagement	- Supports open, responsible and transparent governance. - Inform residents and stakeholders on major planning and development initiatives and decisions, and opportunities for feedback.
Section 13.0 – Implementation		
13.0.4	Completing and updating plans and studies	- Review the Environmental Conservation Master Plan and the Wetland Inventory every 5 years and update as needed. - Complete a Stormwater and Drainage Master Plan for the Acheson Special Study Area. - Prepare and maintain sub-watershed lake land use plans as necessary
MDP Figures		
Figure 3	Approved ASPs	Shows existing ASPs
Figure 5	Environmentally Significant Areas	
Figure 6	Wetlands	



Relevant Policies/Figures	Topics	Direction
Figure 7	Development Concept	Priority Growth Hamlet – Entwistle and Growth Hamlets – Duffield and Tomahawk, CR predominantly in SE, NE and central part of County
Figure 11	Prime Recreation and Tourism Areas	Devon Dunes, Wabamun/Pembina, Great Waters – watershed protection
Figure 12	Transportation Infrastructure	Shows roads and EIA protected area
Figure 14	High Priority Landscapes	Upper Sturgeon River, Devon Dunes, Wabamun Creek, NSR, central wetlands, Atim Creek – GIS integration of wildlife corridors, ESAs, wetlands, Class 1&2 soils, aquifers – mentions need for flood hazard studies along creeks
Appendices		
Appendix 1	Proposed planning framework and hierarchy	• The hierarchy of Provincial, Regional and County Planning documents • ASP and CS TORs • Technical Studies – when required and TORs.
Appendix 2	Technical reports and studies	Technical Studies TORs: • 2.1 Biophysical Assessment Process Requirements • 2.4 Floodplain (1:100 year) Analysis • 2.6 Geotechnical Evaluation requirements • 2.8 Hydrologic Assessment for significant development with medium to high groundwater susceptibility • 2.13 Stormwater Management Report



Parkland County Land Use Bylaw *Bylaw 2017 - 18* – Excerpts

Relevant Regulations	Topics	What's addressed /What rules apply
Part 2 Land Use Districts		
All	Districts and overlays	- General subdivision and development standards for each district. - Overlays outline regulations to address items that may apply to specific areas in the County in conjunction with the base district regulations. - Land Use District Maps identify the boundaries of land use districts and overlays.
9.4	Whitewood Direct Control District Regulations (DC Area 3)	- All land uses within the Whitewood Direct Control will only be allowed after if it is determined that the proposed use is suitable and meets the following guidelines for development: - intensive agricultural operations may be permitted subject to topography, drainage, etc., - highway commercial uses should be developed on relatively flat, well-drained lands with good stability characteristics in close proximity to through-traffic areas, - recreation – day use area designated in Section 10-53-4-W5M requires flat, well-drained surfaces able to withstand the foot traffic, - off-highway vehicle park area - Drainage in gully areas need not be perfect, and wet areas should be re-vegetated with species suitable for wildlife habitat.
9.7	Osprey Bay Direct Control District Regulations	A biophysical assessment is required for any proposed subdivision due to the location of the district within the Environmental Conservation Plan
10.2	Atim Creek/Big Lake Floodplain Overlay	- Applies to lands within Atim Creek Flood Plain Area, defined as 1:100 year Flood Plain plus 0.5 m consistent with the 'Big Lake Basin Task Force: Floodplain Delineation for Atim Creek from Campsite Road to Big Lake Study' (Sameng, March 2007) as shown on Schedule G. As the floodplain elevation along Atim Creek varies, reference to the 2007 Study should be undertaken in all cases. - Applies to lands within the Big Lake Flood Plain Area, defined as the 1:100 year Flood Plain (653.30 m ASL) plus 0.5 m (653.80 m ASL) consistent with the 'Big Lake Basin Task Force: Floodplain Delineation for Atim Creek from Campsite Road to Big Lake Study' (Sameng, March 2007) as partially shown on Schedule G. - Landowner of the golf course located at SE-20-53-26-W4M and NE-17-53-26-W4M may complete grading and landscaping within the 3.07 ha clubhouse, the parking area and access road area, subject to the impacts being negligible.
10.3	Lake Wabamun Floodplain Overlay	- Applies to lands identified within the Lake Wabamun Flood Plain Area, defined as 1:100 year Flood Plain (725.17 m ASL) elevation plus 1.0 m, which will be verified at the time of subdivision or development through a topographical survey... - Uses considered on a discretionary basis including; - environmental reserve or natural areas; - public utilities;



Relevant Regulations	Topics	What's addressed /What rules apply
		o dwelling, single detached and accessory buildings, provided such uses, buildings and structures are located 1.0 m above the 1:100 year Flood Plain and mitigating measures are taken to the satisfaction of the Development Authority....
10.5	Legend Estates Overlay	• Applies to lands identified within Schedule A – Land Use Maps and shown on Schedule I – Legend Estates Overlay Map • All uses located within this Overlay are discretionary. • Development Authority or Subdivision Authority may require an applicant for a development permit or subdivision application to submit a Site Drainage and Grading Plan, and a Stormwater Management Study, among others. • Development Authority or Subdivision Authority may, as a condition of any approval, impose requirements relating to drainage and fill or soil compaction.
Part 3 Development Regulations		
11.3	Development on or adjacent to hazard lands	• No development is permitted within the 1:100-year Flood Plain of the North Saskatchewan and Pembina Rivers, Wabamun Lake, Atim Creek, Big Lake or other water body or natural feature, unless it is in strict compliance with Section 10.2 and 10.3. • Development permit or LUB amendment applicants required to provide location of the top of bank as determined by a geotechnical engineer through a survey or any other method to the Development Authority's satisfaction. • When a development permit application involving land in or near an Environmentally Sensitive Area the Development Authority may refer the application to federal or provincial departments and other relevant environmental agencies for comments prior to reaching a decision.
11.8	Stripping, filling, excavation and grading	• These regulations apply to situations where site stripping, filling, excavation, grading and/or re-contouring (including construction of artificial water bodies and dugouts) is proposed independent of, or prior to, other development on the same site. • A development permit application is required to include information on: - o type of stripping or grading proposed, showing the dimensions of the operation or the area and depth to which the topsoil is to be removed, and the effect on existing drainage patterns; - o location on the parcel where the excavation, stripping or grading is to be made; - o condition in which the excavation, stripping or grading is to be left when the operation is complete (including submission of site grading or re-contouring plans if required by the Development Authority); and - o plans showing pre and post-elevations and cross sections. • All site grading applications considered a Discretionary Use within the designated land use district, unless lot grading is exempted from the requirement of a development permit.



Relevant Regulations	Topics	What's addressed /What rules apply
		• Development Authority may require, as a condition of a development permit, that a developer submit a lot grading and drainage plan for County approval. • Grading associated with an approved development required to conform to the lot grading and drainage plan approved by the County. • In considering whether to approve lot grading as a discretionary use, the Development Authority may have regard for the effect on water courses and drainage patterns; and conservation of water courses, maintenance of positive drainage, and potential drainage effects on adjacent or nearby properties. • Proposed building grade required, to the extent practical, retain the natural contour of the land, minimize the necessity to use retaining walls, and ensure positive drainage to appropriate receiving water courses. • A person who alters the approved lot drainage on a site so that water drains onto adjacent parcels shall be responsible for corrective drainage structures, including retaining walls, to divert water from neighbouring properties.
13.4 – 13.6	Landscaping	• A landscape plan may be required as part of a development permit submission, at DA's discretion • The landscape plan required to include information for the proposed site as well as all adjacent boulevards and existing property, drawn at a scale of 1:500 or larger, which clearly indicates and accurately identifies detailed grading plan showing side slope grades, drainage swale grades, existing grades on adjacent lands and all proposed site elevations; and the location of all existing and proposed utilities and easements, including storm sewers, catch basins for site drainage and overhead utilities. • Any undeveloped portion of a site may be required to be graded, contoured and seeded, or left to recover to its natural condition. • The County requires a Letter of Credit for landscaping.
14.1	Parking and loading	• Grades and drainage shall dispose of surface water. Grades that would permit surface drainage to cross any sidewalk or site boundary without the approval of the Development Authority are prohibited.
Part 4 Process		
16.1	Control of Development – Development Permits	• Subject to subsection 16.2 no development shall be commenced or continued unless a development permit has been issued, the permit has not expired and the development is in accordance with the terms and conditions of a development permit issued pursuant to this Bylaw. • A development permit is not valid unless it conforms to this Bylaw and the Act • The applicant is responsible for ensuring and obtaining other safety code approvals or licenses that may be required by other regulatory departments or agencies.
16.2	Development Not Requiring a Development Permit	• Subject to subsection 16.2 developments designated as "deemed approved" and not requiring a development permit include:



Relevant Regulations	Topics	What's addressed /What rules apply
		- o the construction, completion, alteration, maintenance or repair of a street, lane or utility undertaken upon a public thoroughfare or utility easement, or to connect the same with any lawful use of buildings or land • Deemed Approved developments that do not require minimum Setbacks and do not require development permits include the following: - o landscaping including; • retaining walls of 1.0 m in height or less, as measured from the base of the retaining wall, where the existing natural surface drainage pattern on or off site is not altered; • placement of topsoil not exceeding 16.0 cm in depth; • dugouts or ponds on Parcels of land exceeding 15.0 ha, where there is continued use of the land for agriculture; or • placing of clean topsoil for agricultural purposes on Parcels of land exceeding 15.0 ha, where there is continued use for agriculture - o ornamental water features two feet deep or less, retaining walls of 1.0 m in height or less, as measured from the base of the retaining wall, where the existing natural surface drainage pattern on or off site is not altered; - o minor structures not exceeding 1.8 m in height, which are ancillary to residential uses - o the erection/ placement of an earthen berm in any district shall be as required by the Development Authority. A development permit application for an earthen berm shall require a lot grading plan.
16.3	Application for Development Permit	• An application for development permit must include: - o A site plan at 1:2000 scale showing: - o all rights-of-way and easements within and abutting the subject property; - o all drainage courses and/or the proposed storm water drainage plan • In addition, the DA may request the following information: - o a Stormwater Management Study, prepared by a qualified professional, describing how storm water runoff will be managed, in terms of both runoff rates and volumes and water quality, its potential for flooding, subsidence and/or erosion; - o a Site Grading Plan or detailed Geotechnical Engineering study, prepared by a qualified professional, for development on lands that may be prone to flooding, erosion, slope stability or other hazard risk that confirms that the site is suitable for the proposed development and describing any mitigation measures to safeguard the development; - o a Biophysical Site Assessment; - o Floodplain information - Floodplain Delineation Analysis Study
16.3 (l)	Application to Subdivide	• Application must be in accordance with the relevant sections of the MGA.



Relevant Regulations	Topics	What's addressed /What rules apply
16.9	Decisions on Development Permit Application	- DA shall issue a Development Permit with or without conditions for a Permitted Use if the application conforms to this Bylaw. - DA may issue a Development Permit with or without conditions for Discretionary Use if the application conforms to this Bylaw.
16.12	Development Permit Conditions	- As a condition of development permit being issued, the DA may require the applicant enter into an agreement with the County to do the following: - install or pay for the installation of public utilities for the development; - pay an off site levy or redevelopment levy; and - provide a guaranteed security to ensure compliance with the requirements of the agreement; - provide an irrevocable letter of credit issued by a Canadian Chartered Bank or the Alberta Treasury Branch from the applicant to secure performance of any of the conditions of a development permit prior to development starting; - post cash or a letter of credit, as security for ensuring that any or all obligations under a Development Permit are fulfilled to the satisfaction of the DA; - The DA may, provided a security is required as a condition of the same Development Permit establish, as a condition of Development Permit, circumstances in which the County may call on such securities and in such amounts. This includes, but is not limited to - If the applicant/owner/developer failed to comply with any provisions and/or conditions of the Development Permit/Land Use Bylaw; - Work has been commenced under the Development Permit but has not been properly completed within a reasonable time, as determined by the County.
Part 5 Administration		
18.1-18.5	Enforcement	- It is an offence for any person to construct a building or structure, commence a use or change of intensity of use, and not comply with the directions of an Order for which a development permit is required but has not been issued or is not valid under the LUB. - If DA becomes aware that one or more condition(s) imposed to an approved development permit have not been complied with, the DA may cancel, suspend or modify the development as appropriate, and notify the permit holder. - DA and/or a Designated Officer may issue warnings or orders and take actions or measures, consistent with the authority granted by the Municipal Government Act, to enforce the LUB. - Where a Community Peace Officer or Bylaw Enforcement Officer believes, on reasonable and probable grounds, that a person has committed an offence with respect to this Bylaw, the officer may issue a summons by means of a violation ticket in accordance with the Provincial Offences Procedure Act, R.S.A. 2000, Chapter P-34, as amended from time to time.



Relevant Regulations	Topics	What's addressed /What rules apply
		• A Violation Ticket may be issued for a non-compliant development or development without approval. • LUB establishes the minimum and maximum penalties for different offences. • Where any person contravenes the same provision of the LUB twice within a twelve month period, the specified penalty payable for the second contravention is double the initial amount. • Where any person contravenes the same provision of LUB three or more times within a twelve month period, the specified penalty payable for this violation or subsequent ones is triple the initial amount. • Payment of any fine, or other penalty imposed by a Court shall not relieve any person from the requirement to remedy the conditions that constitute the original offence or to pay any fees, charges or costs associated to the enforcement of the LUB. • A person who violates any provisions of this Bylaw, or permits a contravention of this Bylaw, is guilty of an offence and is liable, upon summary conviction, to a fine in an amount not to exceed \$10,000.00.
19.2	LUB amendment	• County may require any information necessary to properly evaluate a LUB amendment application, including: - o a statement describing how relevant statutory and non-statutory plans affecting the application have been considered; and - o a Geotechnical Report prepared by an engineer registered with APEGA addressing, among others, flood plain analysis, land dedications, and any known concerns and opinions of affected area residents, landowners, and adjacent municipalities regarding the application.
Part 6 GLOSSARY		
N/A	Definitions of stormwater related terms s	EASEMENT means a right to use land, generally for access to other property or as a right-of-way for a public utility. FLOOD PLAIN means the area of land bordering a water body or watercourse that would be inundated by a 1:100 year flood as determined by Alberta Environment and Sustainable Resource Development. GRADE, DRAINAGE means the ground elevation established in a lot drainage plan attached to an approved development permit for the purpose of controlling the flow of surface water on the Parcel. HAZARD LANDS means land that consists of a swamp, gully, ravine, coulee or natural drainage course, or land that is subject to flooding or is, in the opinion of the Subdivision Authority and Development Authority, unstable.



Relevant Regulations	Topics	What's addressed /What rules apply
		LANDSCAPING means to preserve or change the natural features of a site by adding top soil of no more than six (6) inches in depth. MAJOR DEVELOPMENT means a new commercial, industrial, resource extraction, institutional, recreational, or multi-unit residential project that may create off-site impacts in terms of traffic generation, environmental, municipal infrastructure, or similar effects. MASTER SITE DEVELOPMENT PLAN means a non-statutory document providing a comprehensive plan for a large-scale Major Development that provides a framework for future development, offsite impacts, and provisions for public infrastructure. MULTI-PARCEL RESIDENTIAL SUBDIVISION means a subdivision of land, registered by plan of survey or descriptive plan, containing a cluster of four (4) or more residential Parcels where the residential Parcels are predominantly 4.1 ha (10.0 ac) in size or less, and have been created for, or are being principally used for, residential purposes. OUTLINE PLAN means a document encompassing an entire quarter section, more or less, unless unique physical site circumstances such as a naturally occurring water body, manmade right-of-way or similar physical impediment warrant a lesser area, and shall detail all of the following: the location, siting and plotting of natural and man-made physical features such as sloughs and/or other bodies of water, rivers, creeks and intermittent streams, muskeg or swamp, organic areas, subsidence information on valley banks, top of bank, wooded areas, manmade water bodies, major drainage ditches, gravel and/or clay deposits, and land under cultivation; proposed methods of handling surface drainage through preliminary storm water management; the location, dimensions and areas of all proposed municipal and environmental reserve Parcels and public utility lots. SITE PLAN means a plan submitted in support of a development permit application, the approval of which may require a development servicing agreement, including matters such as engineering drawings for storm drainage, etc. UTILITY means the components of a sewage, storm water or solid waste disposal system, or a telecommunication, electrical power, water, gas or oil distribution system.



APPENDIX B

Mapbook of Parkland County Drainage System (sample only)

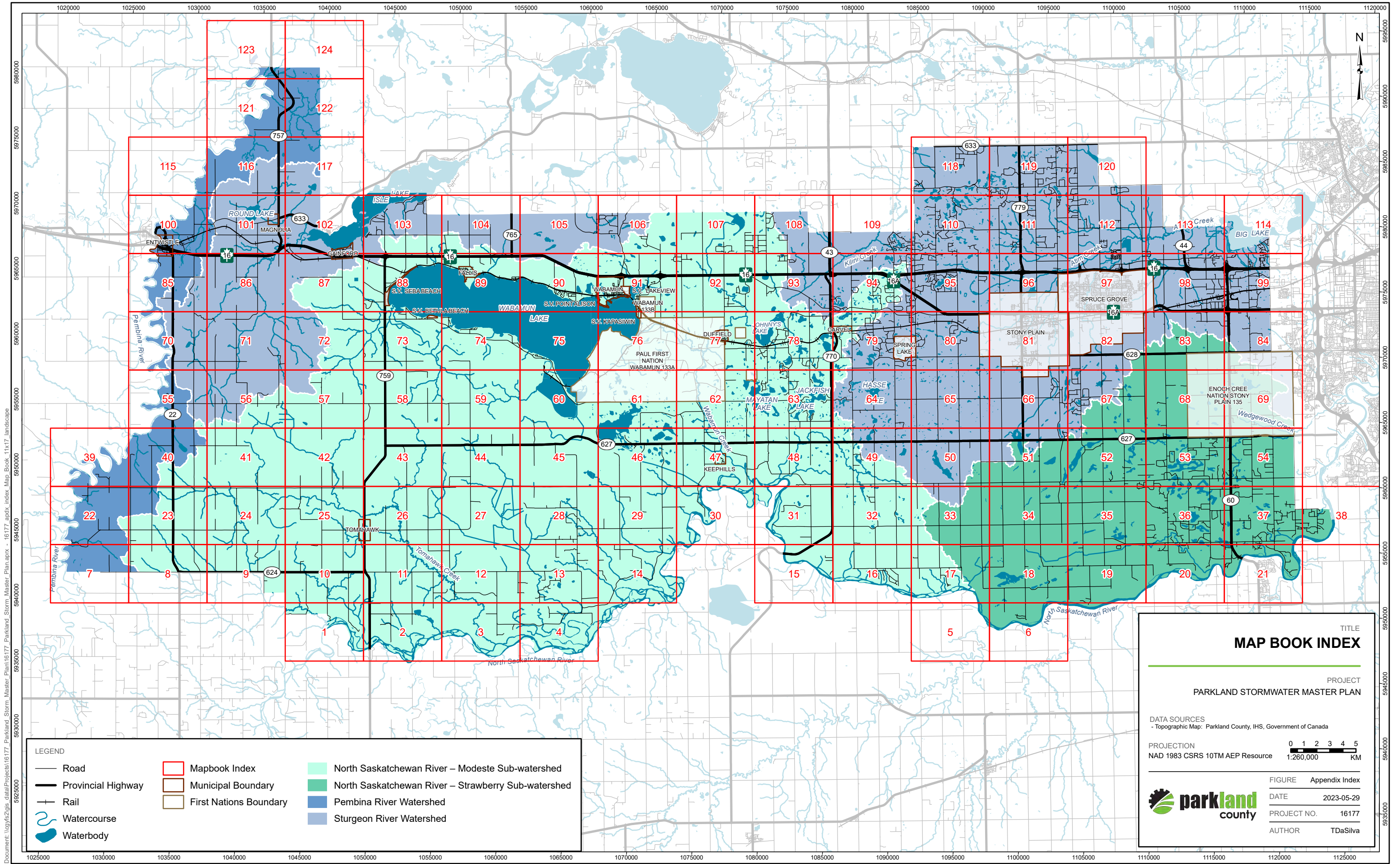
Parkland County's storm drainage system is shown in a series of 124 maps ("mapbook") at a 1:20,000 scale (when printed to 11x17). The detailed maps include the following information:

- Photobase
- Contour lines (5m)
- Rivers, lakes, creeks, and other waterbodies – from the provincial GIS database
- Storm sewers/gravity mains and stormwater forcemains
- Stormwater lift stations
- Culverts
- Bridges/bridge sized culverts
- Stormwater management facilities
- Licensed drainage ditches
- Special structures (e.g., weirs)
- Modeled drainage path – anticipated flow direction based on LiDAR data

These mapbooks were developed by ISL Engineering and Land Services using Parkland County GIS data obtained in 2022 and 2023. The GIS is set up to allow Parkland County to update the mapbooks as new GIS data becomes available, and/or to show different GIS attributes.

A key plan and a preview of one of the mapbook pages is attached below. The full 124 page mapbook is a separate PDF file.

Document: \\gis2\gis_data\Projects\16177_Parkland_Storm_Master_Plan\16177_Parkland_Storm_Master_Plan.aprx - 16177.aprx.index Map Book 11x17 Landscape



LEGEND

Road

Provincial Highway

Rail

Watercourse

Waterbody

Mapbook Index

Municipal Boundary

First Nations Boundary

North Saskatchewan River - Modeste Sub-watershed

North Saskatchewan River - Strawberry Sub-watershed

Pembina River Watershed

Sturgeon River Watershed

TITLE

MAP BOOK INDEX

PROJECT

PARKLAND STORMWATER MASTER PLAN

DATA SOURCES

- Topographic Map: Parkland County, IHS, Government of Canada

PROJECTION

NAD 1983 CSRS 10TM AEP Resource

0 1 2 3 4 5
1:260,000 KM

FIGURE

Appendix Index

DATE

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AUTHOR

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