



Flood Policy Recommendations

PREPARED FOR:
Rural Municipality of Corman Park

PREPARED BY:
Stantec Consulting Ltd

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Table of Contents

1	INTRODUCTION.....	1
1.1	Purpose.....	1
1.2	Goals and Objectives.....	3
1.3	Summary of the Planning Process	4
1.4	Report Structure.....	4
2	BACKGROUND.....	5
2.1	Existing Land Uses and Development.....	5
2.2	Canadian Context	8
2.3	Saskatchewan Requirements	8
3	RECOMMENDATIONS.....	12
3.1	Flood Mapping	12
3.2	Floodplain Management and Encroachment Modelling	12
3.3	Land Use Regulations.....	16
3.3.1	Official Community Plan Policy Recommendations	16
3.3.2	Zoning Bylaw Amendments	18
3.4	Building Bylaw Amendments	21
3.5	Roadway Improvements	21
4	CONSIDERATION OF SPECIFIC EXAMPLES.....	23
4.1	Reviewing New Uses and Buildings	23
4.2	Considering Existing Uses and Buildings	23
4.3	Identifying Non-Conformance	24
4.3.1	Non-Conforming Uses.....	24
4.3.2	Non-Conforming Buildings	24
4.4	Dealing with Non-Conformance.....	25
4.4.1	Non-Conforming Uses.....	25
4.4.2	Non-Conforming Buildings	28
APPENDIX A	APPLICABLE LEGISLATION.....	36
A.1	Planning and Development Act (2007).....	A-1
A.2	The Statements of Provincial Interest Regulations (2012)	A-1
A.2.1	Overview	A-1
A.2.2	Direction	A-2
A.2.3	Definitions.....	A-3
A.2.4	Interpretation	A-3
A.3	Non-Conforming Uses, Buildings, and Sites.....	A-5
A.3.1	Overview	A-5
A.3.2	Legislation	A-5
A.3.3	Definitions.....	A-6
APPENDIX B	ENCROACHMENT ANALYSIS.....	44
APPENDIX C	REVIEW OF USES	125
APPENDIX D	BACKGROUND.....	128
D.1	History of Flooding	D-1
D.1.1	Probability.....	D-1
D.2	Roles and Responsibility.....	D-2



Section 1 Introduction

D.2.1	Government of Saskatchewan	D-2
D.2.2	Municipalities	D-3
D.2.3	Property Owners	D-4
D.3	Flooding Considerations	D-4
D.3.1	Negative Effects	D-4
D.3.2	Liability	D-4
APPENDIX E	MULTI-BARRIERED APPROACH.....	138
E.1	Prevention and Mitigation	E-1
E.2	Preparedness.....	E-2
E.3	Response	E-3
E.4	Recovery	E-3
APPENDIX F	LAND USE REGULATIONS.....	142
F.1	OFFICIAL COMMUNITY PLAN AMENDMENTS	F-1
F.2	Zoning Bylaw Amendments	F-5
F.3	Building Bylaw Amendments	16

LIST OF FIGURES

Figure 1	Study Area	2
Figure 2	South Saskatchewan Floodplain and Existing Land Use, Rural Municipality of Corman Park	7
Figure 3	Flooding area illustrated	11
Figure 4	Rural Municipality of Corman Park Flood Risk Area Map	15
Figure 5	Illustration of flood proofing for buildings	18
Figure 6	RM of Corman Park Zoning Bylaw - Floodplain Overlay District.....	20
Figure 7	Location of recommended roadway improvements.....	22
Figure 8	Developing in the Floodplain, modified from the SPI Handbook, 2022	F-3
Figure 9	Minimum Building Elevation Diagram, SPI Handbook, 2022.	F-15



Executive Summary

The *Flood Policy Recommendations* report reviews the context of flooding from the South Saskatchewan River in the Rural Municipality of Corman Park (the RM) to provide recommendations to the RM's *Official Community Plan* (OCP) and *Zoning Bylaw* (ZBL), with the objective of aligning both bylaws with the Government of Saskatchewan's *Statements of Provincial Interest Regulations* (SPI). In addition to recommending updates to the OCP and ZBL, the report, and associated community engagement undertaken as part of the project, aimed to increase community awareness about flooding in the Study Area and the legislated context in which policy decisions about flooding are made.

The Province of Saskatchewan has applied a 1:500 year regulatory flood standard since 1978. The 1:500 year represents a flow rate; it does not imply that flooding will only occur once every 500 years. The 1:500 flood event has a 1 in 500 chance (0.2%) of being reached each year. Over 50 years, the 1:500 flood event has a 9.5% chance of being reached.

Throughout the report, flooding is framed as an emergency management concern for both the Province and the RM with the importance of floodplain management emphasized as a valuable flood damage mitigation strategy. As part of that strategy, recommendations for managing development in the floodplain are made which include adopting a two-zone flood hazard map, introduction of new OCP policies that address the hazards of flooding, adopting new ZBL regulations that identify two overlay zones: Floodway and Flood Fringe, requiring floodproofing for structures in the Flood Fringe with details about floodproofing options added to the *Building Bylaw*, updating terminology used throughout the RM's bylaws, and completing roadway improvements to allow safe access and egress to properties during flood events.

To assist in the implementation of new floodplain management policies, guidance is provided regarding how the RM can review new and existing uses and buildings within the floodplain and guidelines for how to manage non-conformance in accordance with the *Planning and Development Act*.

There is a total of 6,760 ha (16,704 ac) of land within floodplain overlay, 4,394 ha (10,857 ac) of which are considered floodway (65% of floodplain overlay), and 2,091 ha (5,166 ac) are considered flood fringe (31% of floodplain overlay).

The study area has rural servicing and densities and a variety of existing land uses and development. Agricultural tourism uses in the study area include farm stands, corn mazes, restaurants, u-pick businesses, and a distillery. There are various types of intensive horticulture operations including commercial greenhouses, landscaping businesses, turf growers and tree farms. Non-intensive cultivation of crops and raising of livestock occurs throughout the study area.

Recreational uses include the Moon Lake Golf and Country Club and mini golf. Meewasin Valley Authority is a conservation organization with a mission to ensure a balance between human use and conservation of the South Saskatchewan River valley. Meewasin operates five conservation and day-use facilities in



Section 1 Introduction

the study area: Cranberry Flats Conservation Area, Beaver Creek Conservation Area and the Fred Heal Canoe Launch on the east side of the river, and Popular Bluffs and Paradise Beach on the west side of the river.

The updated OCP policy shall be directed by the SPI's, the two-zone map and guided by key planning themes as noted to: protect against vulnerability and risk, maximize development, protect the environment, and allow for fair and consistent application of the regulations.

Protection against vulnerability/risk: Use the floodplain two-zone map to make decisions. It is important that future development in the floodplain occurs in a manner that considers all flood risk impacts and vulnerability on and off site.

- Within a floodway, new development should be restricted to non-building uses (i.e., roads, utilities) and within the flood fringe, floodproofed buildings are permitted except for residential institutions (i.e., hospitals, care homes), municipal services (i.e., police, fire), schools, and storage of hazardous materials.
- Existing buildings within the floodway shall not be replaced.
- Existing residential, commercial, industrial, and institutional buildings within the floodplain are encouraged to undertake flood proof measures and expansion of existing buildings must consider risks to human safety and property and the possibility of exacerbating upstream and downstream flooding.

Maximize development: The RM values growth. Development potential may be maximized in keeping with the SPIs, and the applicable policies and bylaws in the OCP and Zoning Bylaw. New development is not encouraged in areas surrounded by floodway without proper access and/or evacuation plans.

Environmental considerations: Embrace practices of environmental stewardship, preserving and restoring the natural environment, waterways, and wetlands. Prohibit usage and storage of hazardous materials in the floodway.

Application: The planning policy for flood risk management needs to consider and apply the various measures and tools to allow for safe and responsible development and protecting investment. The policy and regulations need to be flexible, easy to understand, fairly implemented and enforced, and be applied consistently throughout the RM.

The Zoning Bylaw will be updated to enforce the OCP policy and provide regulations for development. In general, the regulations in the floodway will prohibit uses associated with risk to life, the environment, property, or the economy as well as new buildings and additions to existing buildings. Regulations in flood fringe will regulate and limit uses to reduce risk to life, the environment, property, or the economy. All development (including farm buildings) will require a development permit, floodproofing (dry or wet) and will need to be signed by an architect or engineer.



1 Introduction

The Rural Municipality of Corman Park (RM) hired Stantec Consulting in January 2021 to complete a policy review and update the RM's Official Community Plan (OCP) and Zoning Bylaw (ZBL) in keeping with *The Statements of Provincial Interest Regulations* (SPI) which form part of the *Planning and Development Act, 2007* (the Act) legislation. The SPI, included in **Appendix A Applicable Legislation** for reference, require that municipal planning documents and decisions reflect the province's regulations regarding flooding which includes incorporating flood mapping and adopt policies that prohibit and/ or limit development in hazardous areas. It was communicated to Stantec that the RM would like to undertake this project to not only bring their planning documents into compliance with the SPI but also because there was a desire to support safe, orderly development in the southeast portion of their jurisdiction, along Valley Road and the South Saskatchewan River –which is primarily low density, agricultural area of the floodplain.

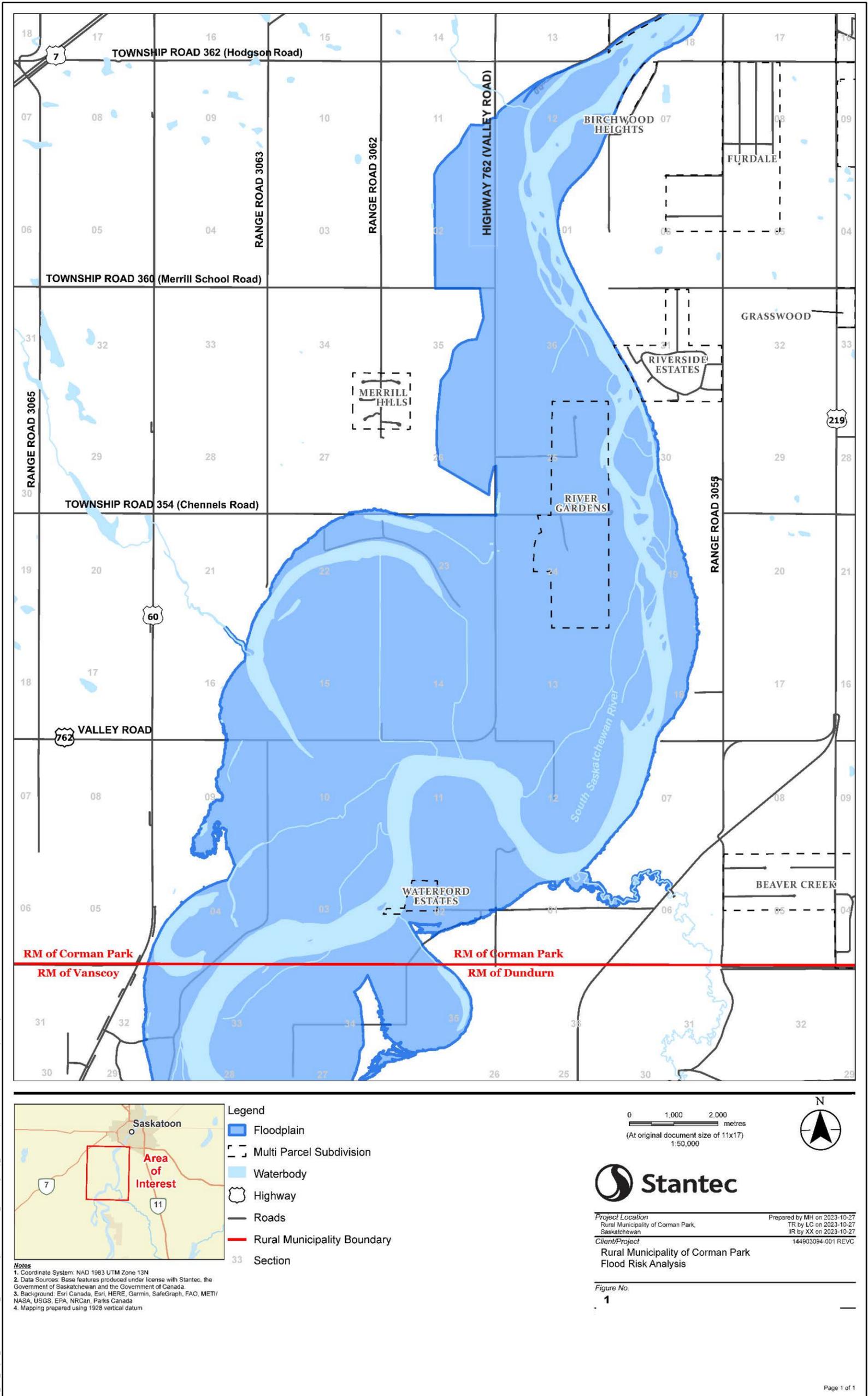
1.1 Purpose

This report is intended to inform the update of the RM's OCP and ZBL to bring them in alignment with the Act and SPI, aimed at mitigating the impacts of flooding by limiting and carefully managing development in the floodplain. The geographical boundary of this project is illustrated in **Figure 1 Study Area**, hereafter referred to as the Study Area.



Section 1 Introduction

Figure 1 Study Area



Section 1 Introduction

1.2 Goals and Objectives

When the project was initiated, the RM was facing pressure from landowners who had submitted applications for, or were exploring, development of parcels in the floodplain. As a reflection of the RM's desire to support growth and provide guidance, two key objectives were identified for this project: increase community awareness about development limitations in the floodplain and develop the necessary policies as required by the SPI.

Shortly after the project began, the RM was advised by Saskatchewan's Water Security Agency (WSA) that the flood modeling work (completed by Barr in 2019) which was going to be used to generate a two-zone flood policy map would not be supported by WSA due to issues related to the modeling methodology used. The RM increased Stantec's scope to complete modeling that could be used to generate a two-zone map by examining projected flood levels and completing an encroachment analysis for future development areas. Each of the objectives is further described below.

1. Increase community awareness and understanding about:

- flooding,
- risks of flooding,
- provincial priorities, and
- how the legal planning context applies to private properties.

2. Apply the SPI to the municipal policies:

Official Community Plan *provides the overall framework for organized, sustainable and planned development and outlines long-term vision of communities.*

- Align with SPI
- Explain the concern of flooding.
- Create policies for areas prone to flooding.

Zoning Bylaw *is the regulatory document containing regulations that facilitate the implementation of the OCP.*

- Includes SPI definitions.
- Introduces a two-zone flood hazard map for the floodplain: floodway, and flood fringe.
- Updates regulations for development.

3. Flood encroachment analysis.

- Determine development opportunities using iterative comparisons of existing conditions and proposed conditions during flood events, based on future development scenarios.
- Create a two-zone floodplain map clearly illustrating floodway and flood fringe areas.

The flood encroachment analysis and results are included in Appendix B of this Report.



Section 1 Introduction

1.3 Summary of the Planning Process

To inform the report, Stantec worked closely with the RM's administration, specifically planning and engineering staff; reviewed all of the RM's existing bylaws relating to land development, flooding, and emergency management; met with representatives from the Water Security Agency (WSA) and Ministry of Government Relations' Community Planning; developed encroachment-based two-zone flood hazard maps; and referenced both federal and provincial guidelines.

To increase community awareness about flooding, two rounds of public engagement were undertaken – one in July 2021 and one in November 2023. During these sessions, information was shared with ratepayers about the policy context surrounding floodplain management in Saskatchewan, the requirements of the SPI, how policies in the OCP and ZBL impact their properties, an overview of flood-related terminology, proposed recommendations included in this report and how they would impact their properties, as well as options about how they could interact with the RM to discuss their properties further in the future.

1.4 Report Structure

Section 1 Introduction

This section describes the overall project, summary of process, its objectives, and provides an outline of the report.

Section 2 Background

This section provides a description of the existing land uses, the Canadian and Saskatchewan planning and regulatory context, copy of the SPI, highlighting the specific legislative pieces the RM is required to adopt in their local planning policies; the content of these statements is the driver for this project.

Section 3 Recommendations

This section provides a set of recommendations for how the RM can adhere to the SPI and practice floodplain management, which relies on four specific tools:

- 3.1 Flood Mapping
- 3.2 Land Use Regulations
- 3.3 Building Bylaw Amendments
- 3.4 Roadway Improvements

Section 4 Consideration of Specific Examples

This section provides very detailed recommendations for how to apply the land use regulation recommendations outlined in **Section 3.2 Land Use Regulations**. In this section, recommendations are given for how the RM's administration should review and consider both new and existing uses, many of which will be considered Non-Conforming under the Act.



2 Background

Flooding is the costliest hazard for Canadian municipalities and in the last 10 years it became the largest source of property insurance claims. Properties in the RM of Corman Park experience overland flooding caused from the South Saskatchewan River. This flooding is the result of the River's channel elevation which is very flat and thus as additional water comes through the channel, it spreads out, filling the floodplain which is very large in this area. This section highlights the existing land use context, and the general context of flooding within the Study Area and how it is viewed in Canada and Saskatchewan. More detail is provided in **Appendix D Background**.

2.1 Existing Land Uses and Development

There is a total of 6,760 ha (16,704 ac) of land within Corman Park's floodplain located south of Saskatoon, primarily located on the west side of the river. The east side of the channel tends to flow along steep bluffs that rise above the floodplain. The Gardiner Dam is upstream of the study area and regulates flows in this reach of the South Saskatchewan River. The City of Saskatoon is directly downstream of the study area.

The study area has rural servicing and densities and a variety of existing land uses and development. Agricultural tourism uses in the study area include farm stands, corn mazes, restaurants, u-pick businesses, and a distillery. There are various types of intensive horticulture operations including commercial greenhouses, landscaping businesses, turf growers and tree farms. Non-intensive cultivation of crops and raising of livestock occurs throughout the study area.

Recreational uses include the Moon Lake Golf and Country Club and mini golf. Meewasin Valley Authority is a conservation organization with a mission to ensure a balance between human use and conservation of the South Saskatchewan River valley. Meewasin operates five conservation and day-use facilities in the study area: Cranberry Flats Conservation Area, Beaver Creek Conservation Area and the Fred Heal Canoe Launch on the east side of the river, and Popular Bluffs and Paradise Beach on the west side of the river.

As shown on **Figure 2 South Saskatchewan Floodplain and Existing Land Use, Rural Municipality of Corman Park**, there are approximately 50 residences that exist in the study area, some of which are located outside the floodplain overlay. In the past, elevating residential structures on mounds was seen as a practical method for allowing development in the floodplain, while minimizing the potential for property damage. Through visual inspection, there are approximately 20 mounds that are elevated above the 1:500 year flood elevations, and they are primarily located in the floodway.

Two multi-parcel country residential subdivisions exist in the study area: River Gardens and Waterford Estates. Waterford Estates consists of four lots, three of which are developed, and one is vacant. The subdivision was approved in 1995 and was identified as flood prone at the time of subdivision. A Safe Building Elevation of 482.0 m corresponding to a 1:500-year flood event was provided as part of the subdivision approval. The access road for the subdivision was constructed at an elevation of 481.4 m



Section 2 Background

which presents access concerns for residents as well as emergency services during flood events that would overtop the road. From a search of Corman Park's records a servicing agreement was executed for Waterford Estates that requires that development on each lot be constructed above the 1:500 year flood elevation and that a building mound of at least 0.5 metres be constructed.

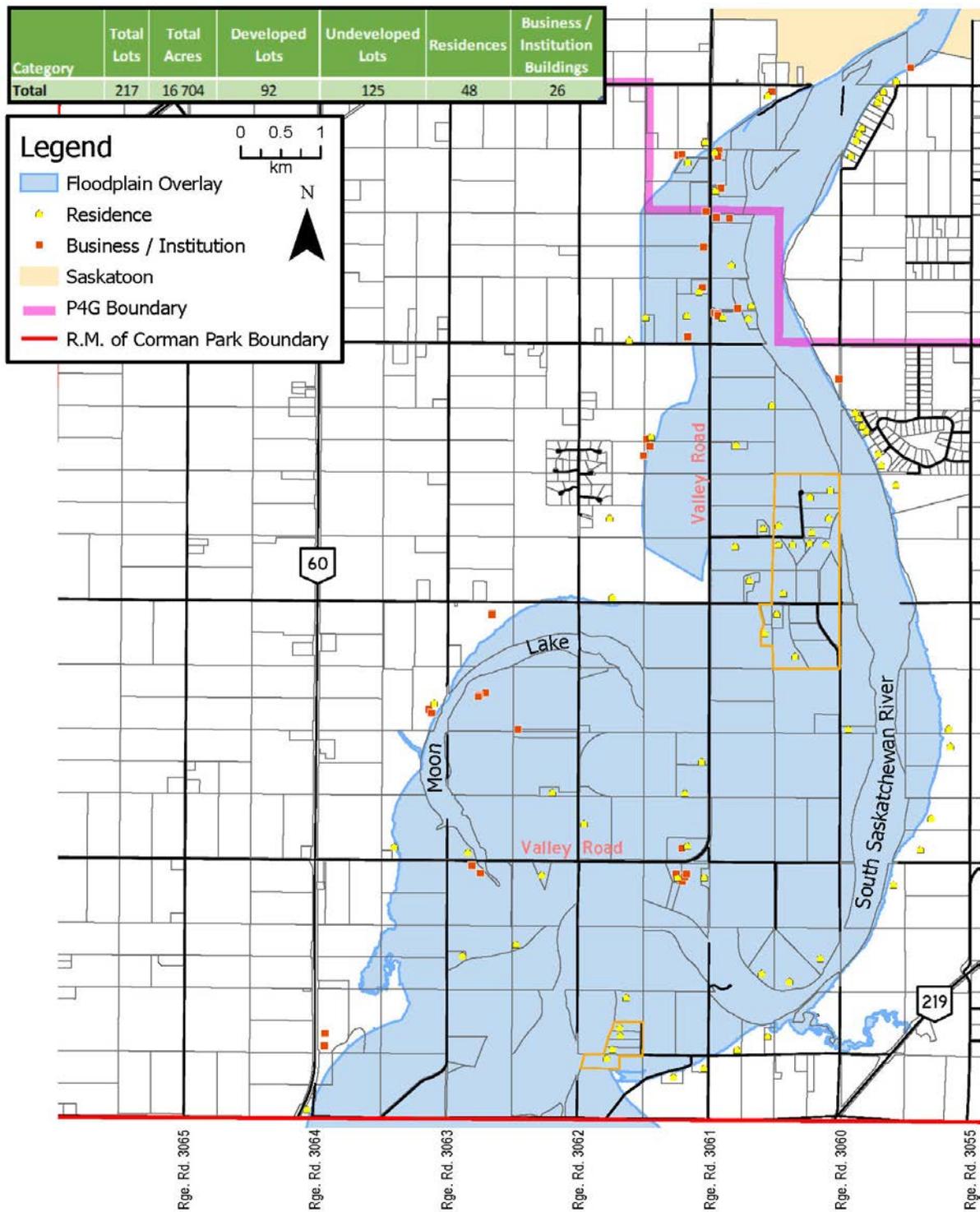
River Gardens was approved in four phases from 1984-1988. There are 16 lots in total with eleven having residential developments, one of which is being used as a monastery. There are several lots adjacent to River Gardens (but not part of the subdivision) that also have existing residential development.

The original subdivision approvals for River Gardens noted that the principal use of the land is for agricultural purposes, with residential development being permitted only if it is associated with the principal agricultural use and if the building site was elevated to a specified elevation in accordance with a servicing agreement. In correspondence between Corman Park and the Ministry of Rural Development it was noted that the E ½ of 25-35-6-W3 and NE 24-35-6-W3 are low lying areas that are susceptible to flooding at 1:50 and 1:75 year flood events. Some of the correspondence indicates that residences must be built above the estimated peak water level for a 1:100 year event while other correspondence states that construction above the peak water level for a 1:50 or 1:500 year flood event is required. There was also a corresponding flow rate with each flood event which differs from the flow rates used today. From a search of Corman Park's records, it appears that the residences in River Gardens were required to be built above the 1:100 year flood elevation, with a corresponding peak flow of 5,080 m³/s.



Section 2 Background

Figure 2 South Saskatchewan Floodplain and Existing Land Use, Rural Municipality of Corman Park



The Total Acres (16,704 ac) includes parcels directly adjacent to the floodplain overlay that contain development. Lands within the Floodplain Overlay total 6,760 ha (16,704 ac).



Section 2 Background

2.2 Canadian Context

Addressing flood prevention stems from the *Emergency Management Framework for Canada*. This framework aims to guide and strengthen the way governments and partners assess risks and work together to prevent/mitigate, prepare for, respond to, and recover from the threats and hazards that pose the greatest risk to Canadians. As stated in the framework,

“The ultimate purpose of emergency management is to **save lives, preserve the environment and protect property and the economy**. The protection of life is of paramount importance. In the broadest sense, emergency management raises the understanding of risks and contributes to a safer, prosperous, sustainable, disaster resilient society in Canada. Emergency management is comprised of four interdependent components as follows:

Prevention and Mitigation – to adapt to, eliminate, or reduce the risks of disasters in order to protect lives, property, the environment, and reduce economic disruption. Prevention/ mitigation includes structural mitigative measures (e.g., construction of floodways and dykes), and non-structural mitigative measures (e.g., building codes, **land-use planning**, and insurance incentives). Prevention and mitigation may be considered independently, or one may include the other.

Preparedness – to be ready to respond to a disaster and manage its consequences through measures taken prior to an event, for example emergency response plans, mutual assistance agreements, resource inventories and training, public awareness activities, equipment, and exercise programs.

Response – to act during, immediately before or after a disaster to manage its consequences through, for example, emergency public communication, search and rescue, emergency medical assistance and evacuation to minimize suffering and losses associated with disasters.

Recovery – to repair or restore conditions to an acceptable level through measures taken after a disaster, for example return of evacuees, trauma counseling, reconstruction, economic impact studies and financial assistance. There is a strong relationship between long-term sustainable recovery and prevention and mitigation of future disasters. Recovery programs provide a valuable opportunity to develop and implement measures to strengthen resilience, including by building back better. Recovery efforts should be conducted with a view towards disaster risk reduction.”

Flood management, like any emergency management, is best done using a multi-barrier approach that considers prevention, mitigation, preparedness, response, and recovery. None of these steps should be completed alone, they all must be used together to effectively reduce risks to the community. In alignment with the scope of this project, only specific components of prevention and mitigation will be discussed in this report; all other elements of emergency management for flooding have been placed in **Appendix E Multi-barriered approach** for further reference.

2.3 Saskatchewan Requirements

All recommendations included in this report have been developed in accordance with the SPI, as adopted under the Act, and applicable direction from the *Statements of Provincial Interest Handbook (August*



Section 2 Background

2021). Each of these requirements are listed below and included in **Appendix A Applicable Legislation** for reference.

Planning and Development Act: Outlines municipal powers that regulate planning.

Statements of Provincial Interest (SPI)

Regulations: Adopted as regulations under the Planning and Development Act

“6.5.3 Prohibit the development of new buildings and additions to buildings in the floodway of the 1:500 year flood elevation of any watercourse or water body;

6.5.4 Require flood proofing of new buildings and additions to buildings to an elevation 0.5 metres above the 1:500 year flood elevation of any watercourse or water body in the flood fringe;

6.5.5 Incorporate available flood mapping into land use planning documents, including zoning bylaws, and decisions;”

The Province of Saskatchewan has applied a **1:500 year regulatory flood** standard since 1978. The 1:500 year represents a flow rate; it does not imply that flooding will only occur once every 500 years. The 1:500 flood event has a 1 in 500 chance (0.2%) of being reached each year. Over 50 years, the 1:500 flood event has a 9.5% chance of being reached.

As stated in the SPI, there are three specific things the RM is required to do (highlighted in **orange** below).

“6.7 Public Safety

STATEMENT OF INTEREST

The province has an interest in ensuring the safety and security of individuals, communities and property from natural and human-induced threats.

Planning Documents and Decisions

To assist in meeting the province’s public safety interests, planning documents and decisions shall, insofar as is practical:

1 Identify potential hazard lands and address their management;



Section 2 Background

- 2 Limit development on hazard lands to minimize the risk to public or private infrastructure;
- 3 Prohibit the development of new buildings and additions to buildings in the floodway of the 1:500 year flood elevation of any watercourse or water body;**
- 4 Require flood proofing of new buildings and additions to buildings to an elevation 0.5 metres above the 1:500 year flood elevation of any watercourse or water body in the flood fringe;**
- 5 Incorporate available flood mapping into land use planning documents, including zoning bylaws, and decisions;**
- 6 Locate subdivisions, transportation infrastructure and public works to avoid, minimize or mitigate threats to the community from wildfire or other emergencies;
- 7 Consider community and regional fire protection measures, including escape routes and provision of emergency services, adjacent to forests or areas at risk of wildfire; and
- 8 Consider strategies that would avoid, minimize, or mitigate potential impacts a changing climate may have on the community.”

The *Statements of Provincial Interest Handbook (2021)* provides further guidance on how municipalities are to go about implementing the regulations included in the SPI. These include:

“For municipalities with floodplain mapping (which applies to the RM of Corman Park), municipalities must:

- Use this information when drafting planning documents and making planning decisions.
- Amend their zoning bylaw to include floodplain maps and use this information when making planning decisions.
- Floodway:
 - Prohibit new buildings or additions to buildings in the floodway in order to allow flood waters to flow freely.
 - Restrict development in the floodway to seasonal, temporary and passive uses only, such as recreation and open spaces, crop land, parking lots, campgrounds and golf courses.
 - Note: permanent buildings that may be associated with any of the above uses (e.g. campgrounds) are not permitted.



Section 2 Background

- Flood fringe:
 - Unless identified below, only permit development in the flood fringe that is adequately flood proofed and has a MINIMUM BUILDING ELEVATION of 0.5m above the 1:500 year flood elevation. This 0.5m “freeboard” minimizes the risk associated flood model variations.
 - No habitable space is permitted to locate below the MINIMUM BUILDING ELEVATION.
- Prohibit the following uses in the flood fringe:
 - Residential institutions, such as hospitals, senior citizen homes, homes for special care and similar facilities, where flooding could pose a significant threat to the safety of residents, if evacuation became necessary.
 - Agricultural operations where flooding could pose a significant threat to the safety of animals or contamination of water courses, if evacuation became necessary.
 - Any use associated with the warehousing or the production of hazardous materials.”

Each of the above-listed regulations or directions have directly shaped the recommendations of this report.

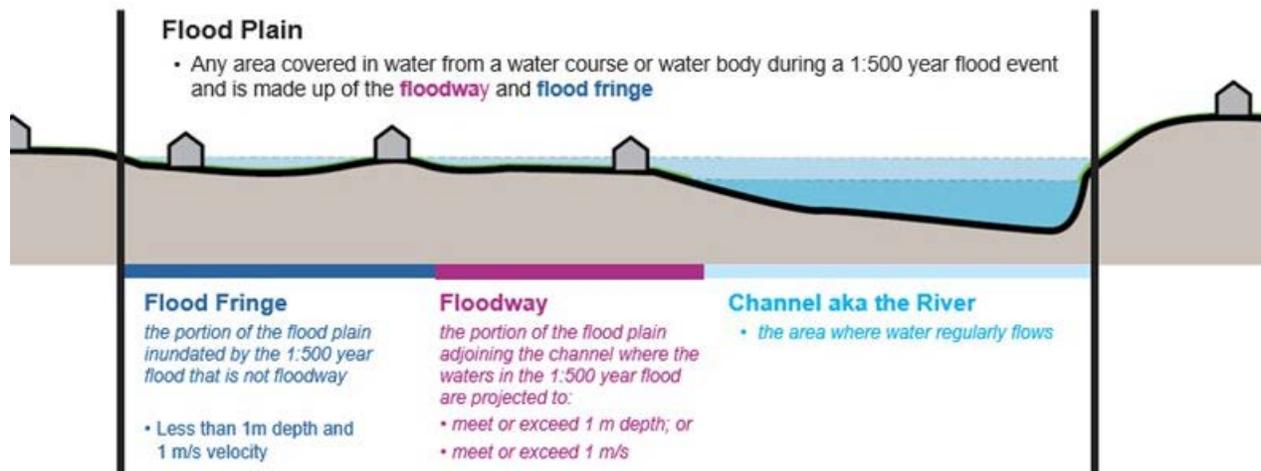


Figure 3 Flooding area illustrated



3 Recommendations

The most important tool a municipality has in mitigation damage from floods is floodplain management. As described by Environment and Climate Change Canada,

“Floodplain management typically involves the adoption of land use regulations for identified floodplains. Land use regulations are based on the premise that the specified hazard area will continue to be flooded on occasion. The intention of land regulation is to restrict or direct the use of the land to activities and structures amenable to such occurrences. This non-structural approach is accomplished by reserving or zoning the lands for such purposes and is the least costly method of flood damage reduction if implemented prior to major development of the floodplain. Land acquisition in the floodplain is another method of controlling land use. It has an advantage over legislative restrictions in that the agency involved has direct control over development within the area.”

3.1 Flood Mapping

Determining flood risk areas is key to informing floodplain land use regulations. A two-zone approach is commonly used, in which the floodway and flood fringe are both identified on the maps. These zones are defined by the SPI as follows:

“flood fringe

means the portion of the floodplain inundated by the 1:500 year flood that is not floodway.

floodplain

means the area inundated by water from a watercourse or water body during a 1:500 year flood and is made up of the floodway and the flood fringe.

floodway

means the portion of the floodplain adjoining the channel where the waters in the 1:500 year flood are projected to:

- (a) meet or exceed a depth of one metre: or
- (b) meet or exceed a velocity of one metre per second”

	Less than 1m depth	Greater than 1m depth
Less than 1m/s velocity	Flood fringe	Floodway
Greater than 1m/s velocity	Floodway	Floodway

3.2 Floodplain Management and Encroachment Modelling

To manage and regulate existing and new development in the floodplain WSA required flood encroachment modelling to adequately demonstrate that any new development and flood proofing actions (e.g., raising lands in the flood fringe) in the floodplain would not result in negative impacts to flood levels or conveyance. The WSA also indicated that the impacts to flood levels and conveyance must consider both changes to flood water surface elevations (WSEs) and flow velocity patterns and that the WSA evaluates those impacts at a reach scale (e.g., the extent of the South Saskatchewan River within



Section 3 Recommendations

Corman Park limits). This analysis would include iteratively modeling the proposed conditions development scenarios (i.e., candidate development areas {identified by the RM} raised above the 1:500 year flood level) and gradually removing development parcels from consideration until the hydraulic modeling for the proposed conditions did not result in a negative impact to flood levels or conveyance. WSA provided two general principles for the modelling; minimize potential loss of life and property by restricting development within the floodplain and plan for emergency access and egress during a 1:500 flood event.

The flood encroachment analysis was an iterative process. The first model iteration (Iteration #1) considered the full complement of candidate development areas provided by Corman Park in a proposed conditions scenario referred to as “Full Encroachment”. To inform which candidate development areas would be removed from consideration, Stantec evaluated the candidate development areas with respect to their relative impact to flood conveyance and in the context of Corman Park’s priority level of each candidate development area. Subsequent iterations removed candidate development areas from consideration until model results did not demonstrate negative impacts to flood conveyance compared to existing conditions.

Following a series of four iterations of candidate development areas the encroachment analysis concluded that:

- Construction within the Iteration #4 candidate development areas would have minimal impact on flooding or floodplains during the 1:500 year event provided that the proposed Valley Road opening design incorporates appropriate erosion control measures; and
- Construction within the Iteration #4 candidate development areas would have no impact on flooding or floodplains during events more frequent than the 1:100 year conditions.
- Other locations within the Study Area not included in the encroachment analysis (e.g., outside of the “candidate development areas”) also met the Provincial definition of flood fringe and can therefore be developed subject to satisfying flood proofing conditions.

A summary of the candidate development area sizes and composition are as follows.

Table 1 Candidate Development Area Summary

Candidate Development Area	Area (ha)	Area (ac)	% of Area
Area 1	249.82	617.31	100.0%
<i>Floodway</i>	<i>102.18</i>	<i>252.48</i>	<i>40.9%</i>
<i>Flood fringe</i>	<i>120.70</i>	<i>298.25</i>	<i>48.3%</i>
<i>Area outside of floodplain</i>	<i>26.95</i>	<i>66.59</i>	<i>10.8%</i>
Area 2	312.80	772.94	100.0%
<i>Floodway</i>	<i>52.40</i>	<i>129.49</i>	<i>16.8%</i>
<i>Flood fringe</i>	<i>238.93</i>	<i>590.41</i>	<i>76.4%</i>
<i>Area outside of floodplain</i>	<i>21.47</i>	<i>53.05</i>	<i>6.9%</i>



Section 3 Recommendations

Candidate Development Area	Area (ha)	Area (ac)	% of Area
Area 4	312.72	772.75	100.0%
<i>Floodway</i>	<i>53.30</i>	<i>131.70</i>	<i>17.0%</i>
<i>Flood fringe</i>	<i>221.68</i>	<i>547.78</i>	<i>70.9%</i>
<i>Area outside of floodplain</i>	<i>37.75</i>	<i>93.27</i>	<i>12.1%</i>
Total of all Candidate Development Areas	875.34	2,163.01	--

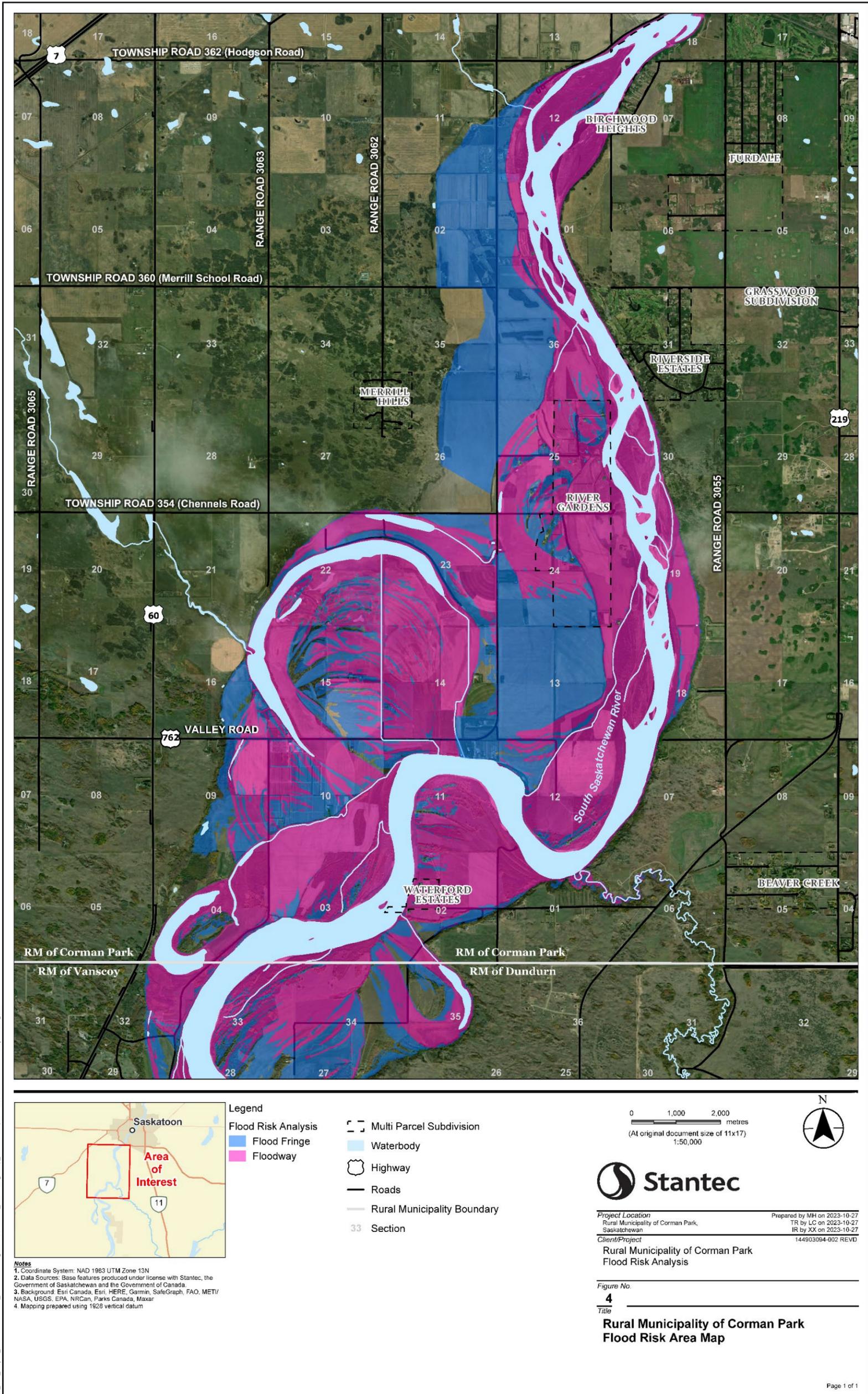
Floodway/ flood fringe/ area outside of floodplain descriptions are based on the original floodplain mapping; under this policy, all of Candidate Development Areas 1, 2, and 4 will be treated as flood fringe.

The results from the modelling informed **Figure 2 Rural Municipality of Corman Park Flood Risk Area Map** and is fully described in **Appendix B Modelling Results**. The model and the results involved significant cooperation and review from the WSA and should be incorporated in all RM planning bylaws as appropriate, including potentially updating the floodplain mapping that informs the P4G Zoning Bylaw.



Section 3 Recommendations

Figure 4 Rural Municipality of Corman Park Flood Risk Area Map



Section 3 Recommendations

3.3 Land Use Regulations

3.3.1 OFFICIAL COMMUNITY PLAN POLICY RECOMMENDATIONS

The RM's Official Community Plan is currently being updated. The RM has proposed planning goals to guide the implementation of the OCP. The goals include statements around supporting growth, diversity of land uses, sound planning, innovation, and responsible land use.

In keeping with these goals and implementation of the SPI's the RM supports responsible development in the floodplain respecting the environment, protecting investment, and ensuring public safety. OCP policy shall be directed by the SPI's, the two-zone map and guided by key planning themes to: protect against vulnerability and risk, maximize development, protect the environment, and allow for fair and consistent application of the regulations.

Protection against vulnerability/ risk: Use the floodplain two-zone map to make decisions. It is important that future development in the floodplain occurs in a manner that considers all flood risk impacts and vulnerability on and off site.

- Within a floodway, new development should be restricted to non-building uses (i.e., roads, utilities) and within the flood fringe, floodproofed buildings are permitted except for residential institutions (i.e., hospitals, care homes), municipal services (i.e., police, fire), schools, and storage of hazardous materials.
- Existing buildings within the floodway shall not be replaced.
- Existing residential, commercial, industrial, and institutional buildings within the floodplain are encouraged to undertake flood proof measures and expansion of existing buildings must consider risks to human safety and property and the possibility of exacerbating upstream and downstream flooding.

Maximize development: The RM values growth. Development potential may be maximized in keeping with the SPIs, and the applicable policies and bylaws in the OCP and Zoning Bylaw. New development is not encouraged in areas surrounded by floodway without proper access and/or evacuation plans.

Environmental considerations: Embrace practices of environmental stewardship, preserving and restoring the natural environment, waterways, and wetlands. Prohibit usage and storage of hazardous materials in the floodway.

Application: The planning policy for flood risk management needs to consider and apply the various measures and tools to allow for safe and responsible development and protecting investment. The policy and regulations need to be flexible, easy to understand, fairly implemented and enforced, and be applied consistently throughout the RM.



Section 3 Recommendations

The RM will need to determine how best to incorporate the policy amendments into their updated OCP and Zoning Bylaw. See **Appendix F Land Use Regulations** for proposed modifications to the existing OCP.

The recommendations include:

- Incorporate the regulations of the SPI's.
- Introduce the use of a two-zone flood risk map (FPO Floodplain Overlay District)
- Update flooding definitions
- Reference the Zoning Bylaw as the tool used to regulate development in the Floodplain
- Manage the non-conforming uses as per the Planning and Development Act
- Introduce policies that mitigate the negative impacts of flooding through.
 - land use regulations
 - building regulations
 - access/egress regulations
 - emergency planning
 - communication protocols
 - site specific application processes and requirements



Section 3 Recommendations

3.3.2 ZONING BYLAW AMENDMENTS

The following section provides recommended amendments to RM's ZBL. It is understood that the ZBL is currently being updated; as such, it is unclear what sections the following recommendations may fit into. It will be up to Corman Park's administration to determine how best to incorporate these recommendations into their updated ZBL. See **Appendix F Land Use Regulations** for proposed modifications to the existing Zoning Bylaw.

3.3.2.1 Floodplain Overlay

The Floodplain Overlay (FPO) District Map is an overlay map and will sit on top of all existing zones (e.g. Agriculture, Country Residential etc.) and will provide an additional level of regulation. The FPO Map is intended to regulate development on lands in the Floodplain to: preserve the capacity of the South Saskatchewan River channel during a 1:500 flood event, safely convey flood waters, and limit negative impacts of flooding on development.

3.3.2.2 General Regulations

In general, the regulations in the **floodway** will prohibit uses associated with risk to life, the environment, property, or the economy as well as new buildings and additions to existing buildings. Regulations in **flood fringe** will regulate and limit uses to reduce risk to life, the environment, property, or the economy. All development will require floodproofing (dry or wet) and will need to be signed by an architect or engineer.

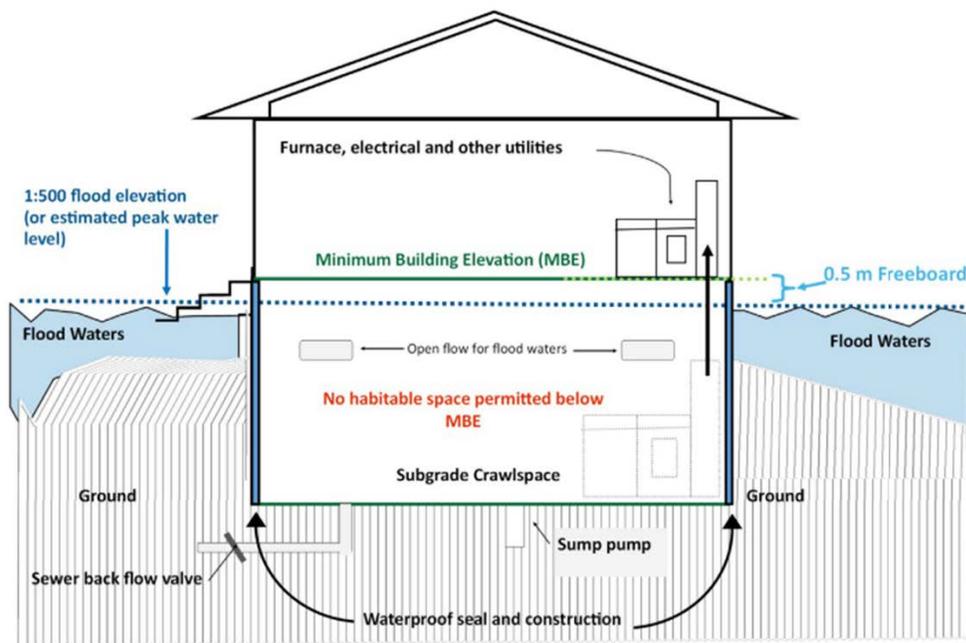


Figure 5 Illustration of flood proofing for buildings



Section 3 Recommendations

3.3.2.3 Safe Access

All uses in the FPO District must consider safe access/egress during a flood event. There are some “islands” of either floodway or flood fringe that are surrounded by areas covered in water during a flood event (floodway or flood fringe). These ‘islands’ (developments) are essentially floodproofed; however, they do not have safe evacuation during a flood event. Mitigation measures should be in place prior to any new development which could include emergency warning systems, evacuation and management plans, and improved flood proofed access routes.

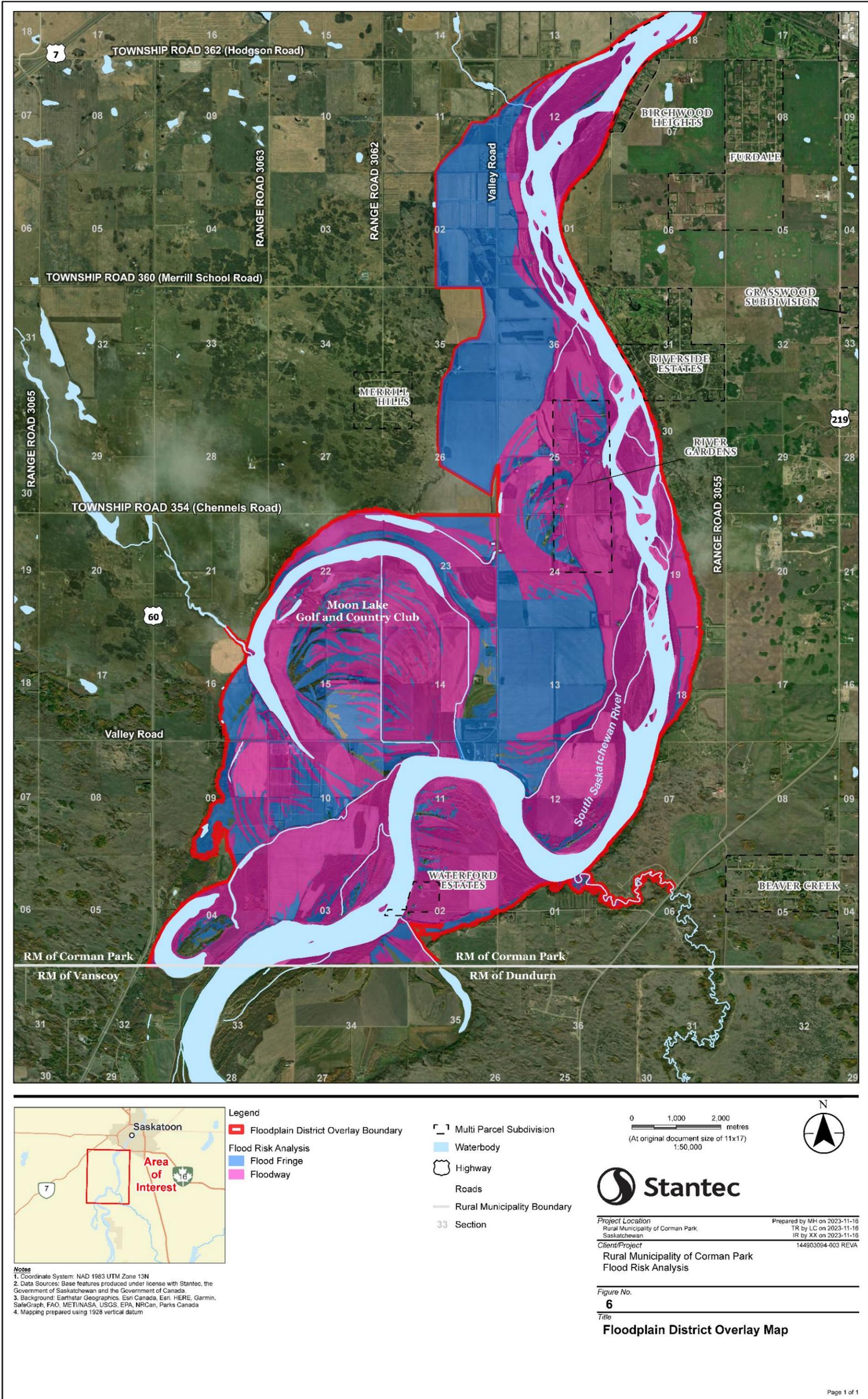
3.3.2.4 Farm Buildings

To ensure the safety of animals/livestock and the safe storage of hazardous materials all new farm buildings and additions to farm buildings in the FPO District will require flood proofing and will require a development permit.



Section 3 Recommendations

Figure 6 RM of Corman Park Zoning Bylaw - Floodplain Overlay District



Section 3 Recommendations

3.4 Building Bylaw Amendments

The following section provides recommended amendments to RM's Building Bylaw (BBL). The main purpose of amending the Building Bylaw is to update it for compliance with the *Construction Codes Act* of Saskatchewan which replaced the *Uniform Building and Accessibility Standards Act* on January 1, 2022.

In addition, the *Planning and Development Act* suggests that floodplain regulations apply to all types of buildings and the *Construction Codes Act* excludes Farm Buildings. As it is Stantec's understanding that the RM wishes to regulate FARM BUILDINGS within the municipality, that direction needs to reconcile in its bylaws which will include an amendment to the Building Bylaw. This authority is given through the following policy of *Construction Codes Act*:

"Application of construction standards ...

6 (2) The construction standards do not apply to: ...

(c) a farm building...

(3) Notwithstanding clause (2)(c), but subject to sections 17 and 47, if a local authority passes a bylaw declaring that the construction standards apply to farm buildings in the municipality, the construction standards apply to the farm buildings described in the bylaw."

Specific recommended amendments to the BBL are included in **Appendix F Land Use Regulations**.

3.5 Roadway Improvements

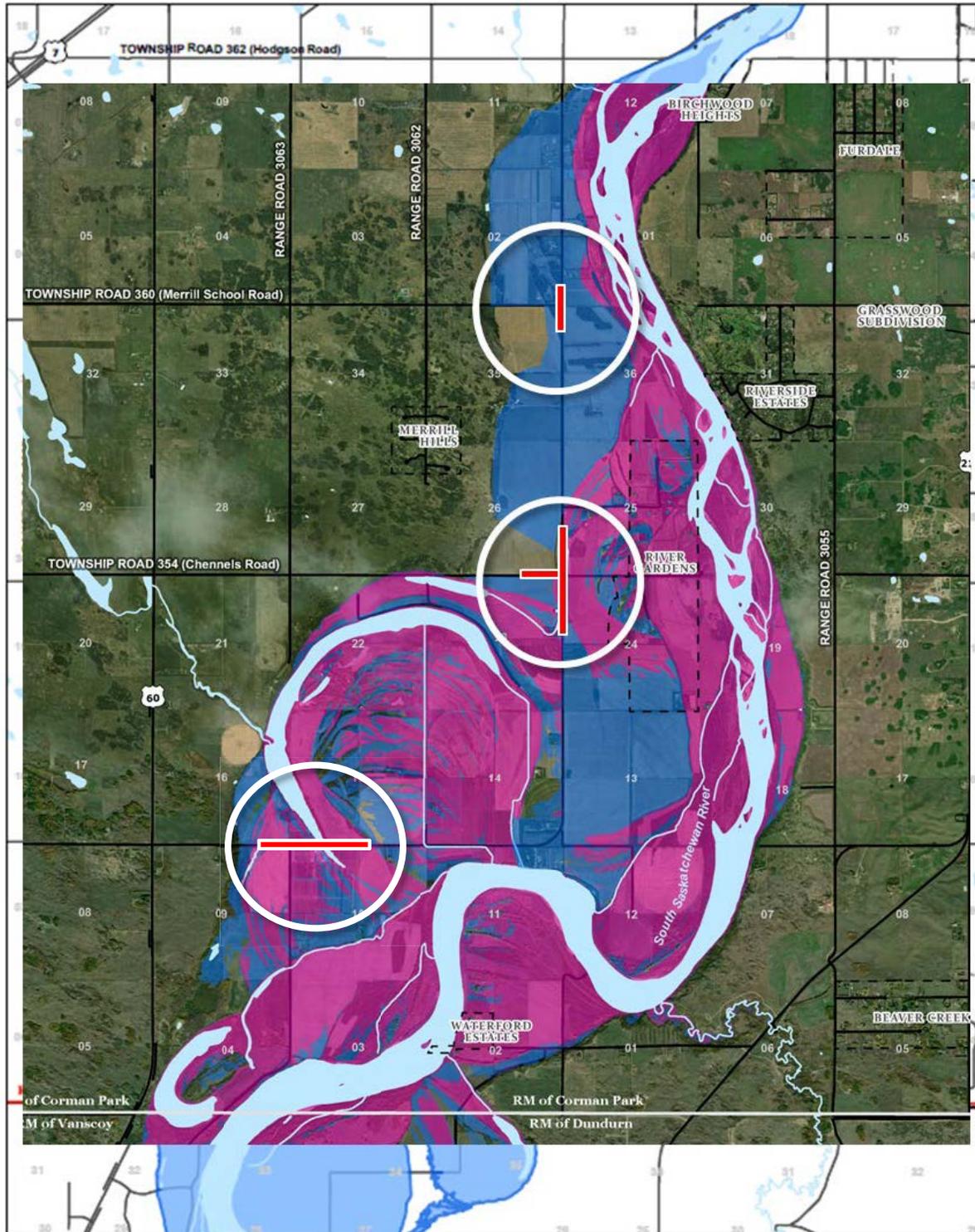
The following section provides recommendations for roadway improvements associated with the floodplain assessment work completed for the RM of Corman Park. In accordance with Provincial direction, safe access and egress should be provided for any new development within the floodplain (flood fringe) areas. Accordingly, to access new flood fringe development, Valley Road and Township Road 354 should be raised to elevations that exceed the 500-Year flood elevations. Mapping in **Figure 7 Location of recommended roadway improvements** illustrates the three locations where this is required. As outlined in the report included in Appendix B Encroachment Analysis, there is limited benefit of raising other portions of Valley Road further south and west of Area 4 towards Highway 60 because much of Valley Road is already higher than the 1:500 year flood elevation and additional concentrations of new development (i.e., candidate development areas) are not expected in these locations.

The RM of Corman Park should, in consultation with WSA and other approving authorities, undertake the planning, survey, design and construction of roadway improvements to provide safe access/ egress along Valley Road and Township Road 354 in accordance with the recommendations of Iteration #4, as outlined in **Appendix B Encroachment Analysis**.



Section 3 Recommendations

Figure 7 Location of recommended roadway improvements



4 Consideration of Specific Examples

4.1 Reviewing New Uses and Buildings

When reviewing new uses and buildings, it is recommended that each application is carefully reviewed for its adherence to the OCP policies and ZBL regulations, with professional judgement applied to consider the potentially negative impacts that may occur in both the short and long-term from flooding.

An example of such review and decision-making has been shown in **Appendix C Review of Uses**. This table, which should be considered only as a recommendation, lists all uses currently identified in the ZBL with decision-making notes and other considerations that flag potential concerns and help direct the reviewer to understand if the use should be permitted, permitted within regulations (i.e., flood proofing), permitted without buildings, or prohibited.

Decision-making notes provided includes identification of uses that should be considered critical infrastructure, have human or animal occupancy that would require evacuation during a flood event putting lives at risk, culturally sensitive uses that could cause emotional upset to the community should negative impacts from flooding occur, uses that could cause environmental contamination. It also anticipates whether the use proposed is associated with a building or not.

4.2 Considering Existing Uses and Buildings

The approval of an amendment to the ZBL introducing the FPO Floodplain Overlay District and its regulations will put many existing uses and buildings within the floodplain into non-compliance with the updated ZBL. This status is referred to in the Act as “non-conforming use”, “non-conforming site”, or “non-conforming building”, as defined below:

“(hh) “non-conforming **use**” means a lawful specific use:

(i) being made of land or a building or intended to be made of land or of a building lawfully under construction, or with respect to which all required permits have been issued, at the date a zoning bylaw or any amendment to a zoning bylaw affecting the land or building becomes effective; and

(ii) that on the date a zoning bylaw or any amendment to a zoning bylaw becomes effective does not, or in the case of a building under construction or with respect to which all required permits have been issued will not, comply with the zoning bylaw;

(gg) “non-conforming **site**” means a site, consisting of one or more contiguous parcels, that, on the date a zoning bylaw or any amendment to a zoning bylaw becomes effective, contains a use that conforms to the bylaw, but the site area or site dimensions do not conform to the standards of the bylaw for that use;

(ff) “non-conforming **building**” means a building:



Section 4 Consideration of Specific Examples

- (i) that is lawfully constructed or lawfully under construction, or with respect to which all required permits have been issued, at the date a zoning bylaw or any amendment to a zoning bylaw affecting the building or land on which the building is situated or will be situated becomes effective; and
- (ii) that on the date a zoning bylaw or any amendment to a zoning bylaw becomes effective does not, or when constructed will not, comply with the zoning bylaw;”

All non-conforming uses, sites, and buildings must be considered in accordance with the provisions of the Act. A copy of the non-conforming policies from the Act have been included in **Appendix A Applicable Legislation** for reference.

4.3 Identifying Non-Conformance

4.3.1 NON-CONFORMING USES

Non-conforming uses are those where the use present on site was approved in adherence to the ZBL at the time of its approval but is not in adherence to the ZBL as later amended. Uses are identified in the ZBL as either permitted or discretionary for each per land use district and apply to the entire parcel. After the ZBL amendment, any uses present on the parcel that are no longer listed as permitted or discretionary in the parcel’s applicable land use district will be considered non-conforming uses.

Floodway

All existing uses other than those listed as permitted in the Floodway portion of the FPO Floodplain Overlay District will be considered non-conforming uses.

Flood Fringe

All existing uses not included as Permitted or Discretionary in the underlying zones (i.e., AG Agriculture, AG1 Agricultural Residential 1, CR1 Country Residential 1, or REC Recreation), or those listed as Prohibited in the Flood Fringe portion of the FPO Floodplain Overlay, are now considered non-conforming uses.

4.3.1.2 Non-Conforming Sites

Non-conforming sites are those where the existing use is permitted in adherence to a ZBL, but the size or dimensions of the site do not conform to standards. As there are no specific size or dimension standards for parcels in the FPO Floodplain Overlay District, this term will not apply in this context of the new flooding policies.

4.3.2 NON-CONFORMING BUILDINGS

Non-conforming buildings are those that were approved in adherence to the ZBL at the time of its construction but is not in adherence to the ZBL as later amended.



Section 4 Consideration of Specific Examples

Floodway

In accordance with the proposed ZBL policies, “no development or buildings that alter the free flow of flood water are permitted in the Floodway”; as such, all existing BUILDINGS and ADDITIONS to BUILDINGS located in the Floodway are now considered non-conforming buildings.

The following are important notes about this policy interpretation:

- This does not apply to FARM BUILDINGS associated with a permitted use.
- The SPI does not apply to STRUCTURES which generally are described, through the *Construction Codes Act* and ZBL, as not attached to a BUILDING or sheltering persons, animals, or property (e.g., fences, gazebos, walls); as such, existing STRUCTURES are not impacted by this policy.

Flood Fringe

In accordance with the proposed ZBL regulations, the following BUILDINGS are now considered non-conforming:

- All BUILDINGS used to occupy a non-conforming use.
- All BUILDINGS not FLOOD PROOFED to the MINIMUM FLOOD ELEVATION.

The following are important notes about this policy interpretation:

- This does not apply to FARM BUILDINGS associated with a permitted use.
- The SPI does not apply to STRUCTURES which generally are described, through the *Construction Codes Act* and ZBL, as not attached to a BUILDING or sheltering persons, animals, or property (e.g., fences, gazebos, walls); as such, existing STRUCTURES are not impacted by this policy.

4.4 Dealing with Non-Conformance

4.4.1 NON-CONFORMING USES

The Act	“Continuation of non-conforming use or intensity of use	
	89 (1)	A non-conforming use or intensity of use may be continued if:
		(a) the use, either permitted or discretionary, conformed to the bylaw that was in effect at the time of development; and
		(b) the use has not been discontinued for a period of more than 12 consecutive months on that site.
	(2)	Any future use of the land or building must conform with any current zoning bylaw.”



Section 4 Consideration of Specific Examples

Interpretation	<p>Non-conforming uses may continue at their existing intensity. Regulations surrounding BUILDINGS used to occupy non-conforming uses are discussed in Section 3.2.2 Non-Conforming Buildings.</p> <p>If a non-conforming use be discontinued for more than one year, it will no longer be permitted; that parcel will need to adhere to the ZBL's list of permitted uses for that zone.</p>
Example	<ul style="list-style-type: none"> • A parcel in the Floodway is zoned AG and is used for an Equestrian Facility Type 2; which as a result of the new regulations, is considered a non-conforming use. In accordance with the legislation, that use can continue, and the owner can maintain their operation at the existing intensity (e.g., same number of horses) without issues; however, if this parcel is vacant for a more than one year, that use will no longer be permitted. • This legislation also applies to uses that do not have any associated BUILDINGS (e.g., outdoor storage facilities), golf courses, solar farms, etc.
The Act	<p>“Changes to a non-conforming use</p> <p>90 (1) A non-conforming use must not be increased in intensity, area or volume within a building, or on the parcel it occupies.”</p>
Interpretation	<p>Existing uses that do not comply with the ZBL cannot grow in intensity either within the BUILDING or on the parcel, they can only be maintained as-is. As there are no provincial guidelines for determining what the intensity of certain uses are, it would be logical to gauge this based on how the intended occupancy of a building or facility would increase based on any modification.</p>
Example	<ul style="list-style-type: none"> • For any use that includes a residential occupancy (e.g., single detached country residence, tourist home, secondary suite), the construction of additional bedroom would increase its intensity. • For any use that includes a patron component (e.g., agricultural tourism use, brewery, golf courses, campgrounds), the addition or expansion of parking lots, patio dining spaces, campsites, or creation of more golf holes would all be examples of how intensity could be increased.
The Act	<p>“(2) A non-conforming use must not be:</p> <p>(a) relocated within a building;</p> <p>(b) moved to any other location in a building; or</p> <p>(c) moved to another portion of the parcel on which the use is situated.”</p>



Section 4 Consideration of Specific Examples

Interpretation	<p>Existing uses that do not comply with the ZBL are considered non-conforming only at the location they are currently, at other locations on the parcel they are prohibited. Per policy 89(2), “Any future use of the land or building must conform with any current zoning bylaw.”; as such, it is not acceptable to consider the location of a non-conforming use or building as irrelevant, once it is moved, it has violated this legislation</p>
Example	<ul style="list-style-type: none"> • An Equestrian Facility Type 1 located in the Floodway is not permitted (i.e., non-conforming use); as such, it cannot be moved to another location on the same parcel where it is also not permitted. These two locations are not equal. The use at its existing location is considered a “non-conforming use” whereas at the alternative location it will be <u>not permitted</u>.
The Act	<p>“(3) Structural alterations or additions:</p> <p style="padding-left: 40px;">(a) may only be made to a building or that part of a building where the use is conforming; and</p> <p style="padding-left: 40px;">(b) must not be undertaken to any part of a building occupied by a non-conforming use.</p> <p>(4) For the purposes of this section, repairs, maintenance or installations that do not alter the size of the building or involve the rearrangement or replacement of structural supporting elements are not considered to be structural alterations.”</p>
Interpretation	<p>It is important to recognize this legislation is addressing additions or structural alterations, defined by the Act as,</p> <p>“ “structural alteration” means the construction or reconstruction of supporting elements of a building”</p> <p>No structural alterations or additions are permitted for BUILDINGS associated with a non-conforming use, only repairs and maintenance will be allowed.</p> <ul style="list-style-type: none"> • BUILDINGS in the Floodway are by definition not permitted; as such, no structural alteration or additions will be allowed. • BUILDINGS in the Flood Fringe can have structural alterations or additions only for portions of the BUILDING where the use is conforming to the ZBL, or if the structural alterations or addition do not alter the size of the building. <p>Additional regulations surrounding repairs and non-structural alterations to BUILDINGS used to occupy non-conforming uses are discussed further Section 3.2.2 Non-Conforming Buildings.</p>



Section 4 Consideration of Specific Examples

Example	<ul style="list-style-type: none"> • A single detached country residence is a permitted use in the Flood Fringe as long as the BUILDINGS are flood proofed; as such, if they are not flood proofed, it will be considered non-conforming. In this example, no structural alterations or additions are permitted for that BUILDING. However, because structural alterations may be required to bring the BUILDING into compliance with the LUB, it should be reasonably approved that any structural alteration that bring the BUILDING into compliance with the LUB would be permitted. • A single detached country residence exists in the Flood Fringe and is flood proofed through construction on a mound –structural alterations or additions are permitted for that BUILDING. However, if the parcel also has another BUILDING (e.g., guest suite/ garage suite/ garden suite/ guest house/ garage/ etc) on the parcel which is not flood proofed, those uses are non-conforming and must be treated the same as the above example.
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4.4.2 NON-CONFORMING BUILDINGS

The Act	<p>“Non-conformity of building or site</p> <p>91 (1) Any non-conforming building on a conforming or non-conforming site may continue to be used and any structural repairs, alterations and additions that conform to the requirements of the zoning bylaw may be made, but the element of non-conformity must not be increased by those repairs, alterations, or additions.</p> <p>(2) If an application for structural repairs, alterations or additions to a non-conforming building mentioned in subsection (1) is refused, an appeal may be made to the Development Appeals Board in accordance with section 219 and to the Saskatchewan Municipal Board in accordance with section 226.</p>
Interpretation	<p>All non-conforming BUILDINGS used to support a <u>conforming use</u>, may continue to be used as long as repairs, alterations, and additions conform to the requirements of the ZBL.</p>
Example	<ul style="list-style-type: none"> • No BUILDINGS are permitted in the Floodway; as such, this policy will not apply. BUILDINGS may continue to be used but structural repairs, alterations, and additions will not be permitted. • Repairs, alterations, and additions to BUILDINGS in the Flood Fringe that are used to occupy a permitted use will be allowed only if they are completed in accordance with the ZBL which requires FLOOD PROOFING.



Section 4 Consideration of Specific Examples

The Act	<p>“Damage to buildings</p> <p>92 If the extent of damage to a non-conforming building is such that the cost to repair is more than 75% of the construction cost to replace the building above its foundation, the building is not to be repaired or rebuilt except in accordance with the zoning bylaw.”</p>
Interpretation	<p>Should a major repair, as outlined above, be required for a non-conforming building, its repair must be undertaken in accordance with the regulations of the ZBL.</p>
Example	<ul style="list-style-type: none"> • For BUILDINGS in the Floodway, the buildings would not be permitted to be rebuilt. • For BUILDINGS in the Flood Fringe, the buildings would need to be constructed in a location where the use is permitted, using approved FLOOD PROOFING measures. This may require the building to be relocated on the parcel.
The Act	<p>“Change of occupancy</p> <p>93 The use of land or the use of a building is not affected by a change or intended change of ownership, tenancy or occupancy of the land or building.”</p>
Interpretation	<p>Parcels and buildings can be sold, leased, or rented without impact of new bylaw regulations. Although not mandated by this legislation, the limitations associated with their use should be disclosed to potential buyers.</p>
Example	<ul style="list-style-type: none"> • Parcels in the Floodway and Flood Fringe can be bought and sold; and BUILDINGS can be leased to new tenants; without any hinderance.



APPENDIX A



Appendix A Applicable Legislation

Municipalities are legally responsible for following provincial legislation in undertaking their decision-making processes; not doing so opens them up to legal vulnerabilities. In Saskatchewan, municipalities are given their authority through the *Municipalities Act* and, regarding development, must follow the regulations of the *Planning and Development Act* (“the Act”).

A.1 Planning and Development Act (2007)

Under the *Planning and Development Act, 2007* municipalities are authorized to set policies governing the development of their communities by preparing and adopting:

- official community plans and district plans containing policies to guide land use and community development;
- zoning bylaws establishing permitted, prohibited or discretionary land uses, development standards and permit requirements; and
- subdivision bylaws.

These planning documents express community priorities and goals and allow developers, business owners and homeowners to make informed decisions about purchasing and developing property in the community.

Through the Act, the Government of Saskatchewan has the authority to pass legislation that has directly resulted in the requirement for the introduction of municipal flooding policies.

A.2 The Statements of Provincial Interest Regulations (2012)

A.2.1 OVERVIEW

The *Planning and Development Act, 2007* (the Act) authorizes the Lieutenant Governor in Council to adopt Statements of Provincial Interest. The SPI were adopted as regulations under the *Planning and Development Act* to provide guidance for municipalities on a complex series of land use and development issues for municipalities, enabling them to facilitate the development of vibrant, safe, self-reliant, and sustainable municipalities. These link provincial and municipal objectives for land use planning and, as a result, directly affect the use of land and impact community development, economic growth, and environmental stewardship. The interests reflect the diversity of issues affecting Saskatchewan’s communities and regions, recognizing that wise management of development involves facilitating, promoting, and sustaining growth, based on planning principles.

Provincial oversight to ensure consistency with the SPI occurs through the approval of new official community plans, district plans, zoning bylaws and subdivision bylaws. Subdivision approving authorities,



Appendix A Applicable Legislation

including the province, are responsible for ensuring consistency with the SPI during the subdivision approval process.

A.2.2 DIRECTION

While there are several statements of provincial interest that municipalities are required to follow, the focal statement for the purpose of this report is that regarding public safety and flooding; however, in the application of these regulations in Corman Park, the statements regarding other interests must also be considered.

“6.7 Public Safety

STATEMENT OF INTEREST

The province has an interest in ensuring the safety and security of individuals, communities and property from natural and human-induced threats.

Planning Documents and Decisions

To assist in meeting the province’s public safety interests, planning documents and decisions shall, insofar as is practical:

- 1 Identify potential hazard lands and address their management;
- 2 Limit development on hazard lands to minimize the risk to public or private infrastructure;
- 3 Prohibit the development of new buildings and additions to buildings in the floodway of the 1:500 year flood elevation of any watercourse or water body;
- 4 Require flood proofing of new buildings and additions to buildings to an elevation 0.5 metres above the 1:500 year flood elevation of any watercourse or water body in the flood fringe;
- 5 Incorporate available flood mapping into land use planning documents, including zoning bylaws, and decisions;
- 6 Locate subdivisions, transportation infrastructure and public works to avoid, minimize or mitigate threats to the community from wildfire or other emergencies;
- 7 Consider community and regional fire protection measures, including escape routes and provision of emergency services, adjacent to forests or areas at risk of wildfire; and
- 8 Consider strategies that would avoid, minimize, or mitigate potential impacts a changing climate may have on the community.”



Appendix A Applicable Legislation

A.2.3 DEFINITIONS

“hazard land

means land that is contaminated, unstable, prone to flooding or otherwise unsuited for development or occupation because of its inherent danger to public health, safety or property.

floodplain

means the area inundated by water from a watercourse or water body during a 1:500 year flood and is made up of the floodway and the flood fringe.

flood fringe

means the portion of the floodplain inundated by the 1:500 year flood that is not floodway.

floodway

means the portion of the floodplain adjoining the channel where the waters in the 1:500 year flood are projected to:

- (a) meet or exceed a depth of one metre; or
- (b) meet or exceed a velocity of one metre per second;

flood proofed

means a measure, or combination of structural and non-structural measures, incorporated into the design of a structure that reduces or eliminates the risk of flood damage to a defined elevation.”

The following table helps to visualize the definitions for flood fringe and floodway, as per definitions within the glossary. The intent of the clarified definitions has not changed, and implementation by the Ministry of Government Relations will not change, either.

	Greater than 1m depth	Less than 1m depth
Greater than 1m/s velocity	Floodway	Floodway
Less than 1m/s velocity	Floodway	Flood fringe

A.2.4 INTERPRETATION

As outlined the *Statements of Provincial Interest Handbook*,

“For municipalities with floodplain mapping, municipalities must:

- Use this information when drafting planning documents and making planning decisions.
- Amend their zoning bylaw to include floodplain maps and use this information when making planning decisions.
- Floodway:
 - Prohibit new buildings or additions to buildings in the floodway in order to allow flood waters to flow freely.



Appendix A Applicable Legislation

- Restrict development in the floodway to seasonal, temporary and passive uses only, such as recreation and open spaces, crop land, parking lots, campgrounds and golf courses.
- Note: permanent buildings that may be associated with any of the above uses (e.g. campgrounds) are not permitted.
 - Flood fringe:
 - Unless identified below, only permit development in the flood fringe that is adequately flood proofed and has a minimum building elevation of 0.5m above the 1:500 year flood elevation. This 0.5m “freeboard” minimizes the risk associated flood model variations.
 - No habitable space is permitted to locate below the minimum building elevation.
 - Prohibit the following uses in the flood fringe:
 - Residential institutions, such as hospitals, senior citizen homes, homes for special care and similar facilities, where flooding could pose a significant threat to the safety of residents, if evacuation became necessary.
 - Agricultural operations where flooding could pose a significant threat to the safety of animals or contamination of water courses, if evacuation became necessary.
 - Any use associated with the warehousing or the production of hazardous materials.”



A.3 Non-Conforming Uses, Buildings, and Sites

A.3.1 OVERVIEW

Division 3 of the Act outlines regulations surrounding uses, buildings, and sites that were in existence prior to the adoption of the new municipal flood policies.

A.3.2 LEGISLATION

“DIVISION 3

NON-CONFORMING USES, BUILDINGS AND SITES

Existing non-conforming uses, buildings, and sites

- 88 Subject to the other provisions of this Act, the enactment of a zoning bylaw or any amendment to a zoning bylaw does not affect any non-conforming building, non-conforming use or non-conforming site.

2007, c.P-13.2, s.88.

Continuation of non-conforming use or intensity of use

- 89(1) A non-conforming use or intensity of use may be continued if:
- (a) the use, either permitted or discretionary, conformed to the bylaw that was in effect at the time of development; and
 - (b) the use has not been discontinued for a period of more than 12 consecutive months on that site.
- (2) Any future use of the land or building must conform with any current zoning bylaw.

2007, c.P-13.2, s.89.

Changes to a non-conforming use

- 90(1) A non-conforming use must not be increased in intensity, area or volume within a building, or on the parcel it occupies.
- (2) A non-conforming use must not be:
- (a) relocated within a building;
 - (b) moved to any other location in a building; or
 - (c) moved to another portion of the parcel on which the use is situated.
- (3) Structural alterations or additions:
- (a) may only be made to a building or that part of a building where the use is conforming; and



Appendix A Applicable Legislation

(b) must not be undertaken to any part of a building occupied by a non-conforming use.

- (4) For the purposes of this section, repairs, maintenance or installations that do not alter the size of the building or involve the rearrangement or replacement of structural supporting elements are not considered to be structural alterations.

2007, c.P-13.2, s.90.

Non-conformity of building or site

91(1) Any non-conforming building on a conforming or non-conforming site may continue to be used and any structural repairs, alterations and additions that conform to the requirements of the zoning bylaw may be made, but the element of non-conformity must not be increased by those repairs, alterations or additions.

- (2) If an application for structural repairs, alterations or additions to a non-conforming building mentioned in subsection (1) is refused, an appeal may be made to the Development Appeals Board in accordance with section 219 and to the Saskatchewan Municipal Board in accordance with section 226.

2007, c.P-13.2, s.91.

Damage to buildings

92 If the extent of damage to a non-conforming building is such that the cost to repair is more than 75% of the construction cost to replace the building above its foundation, the building is not to be repaired or rebuilt except in accordance with the zoning bylaw.

2007, c.P-13.2, s.92.

Change of occupancy

93 The use of land or the use of a building is not affected by a change or intended change of ownership, tenancy or occupancy of the land or building.

2007, c.P-13.2, s.93.”

A.3.3 DEFINITIONS

“(ff) “non-conforming **building**” means a building:

- (i) that is lawfully constructed or lawfully under construction, or with respect to which all required permits have been issued, at the date a zoning bylaw or any amendment to a zoning bylaw affecting the building or land on which the building is situated or will be situated becomes effective; and
- (ii) that on the date a zoning bylaw or any amendment to a zoning bylaw becomes effective does not, or when constructed will not, comply with the zoning bylaw;



Appendix A Applicable Legislation

(gg) “non-conforming **site**” means a site, consisting of one or more contiguous parcels, that, on the date a zoning bylaw or any amendment to a zoning bylaw becomes effective, contains a use that conforms to the bylaw, but the site area or site dimensions do not conform to the standards of the bylaw for that use;

(hh) “non-conforming **use**” means a lawful specific use:

(i) being made of land or a building or intended to be made of land or of a building lawfully under construction, or with respect to which all required permits have been issued, at the date a zoning bylaw or any amendment to a zoning bylaw affecting the land or building becomes effective; and

(ii) that on the date a zoning bylaw or any amendment to a zoning bylaw becomes effective does not, or in the case of a building under construction or with respect to which all required permits have been issued will not, comply with the zoning bylaw;”



APPENDIX B



Appendix B Encroachment Analysis





South Saskatchewan River Encroachment Analysis

April 3, 2024

Prepared for:

Rural Municipality of Corman Park

Prepared by:

Stantec Consulting Ltd.
100-300 Hagey Boulevard
Waterloo, ON N2L 0A4
Tel.: (519) 579-4410

144903094



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

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Digitally signed by Brown,
Steve (Waterloo)
Date: 2024.04.18
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Prepared by _____
(signature)

Steve Brown, MBA, P.Eng. (ON, MB, NWT/NU)
Surface Water Lead, Canada East



Digitally signed by
Heather Amirault
Date: 2024.04.18
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Approved by _____
(signature)

Heather Amirault, P.Eng.
Water Resources Engineer



2024-04-18



Table of Contents

EXECUTIVE SUMMARY	I
1.0 INTRODUCTION.....	1.1
1.1 BACKGROUND.....	1.3
2.0 METHODS/ASSUMPTIONS	2.1
3.0 RESULTS (ITERATIONS #1-4).....	3.2
3.1 ITERATION #1	3.2
3.2 ITERATION #2	3.4
3.3 ITERATION #3.....	3.7
3.4 ITERATION #4	3.10
4.0 CONCLUSIONS.....	4.1
5.0 REFERENCES.....	5.1

LIST OF FIGURES

Figure 1: Study Area	1.2
Figure 2: Iteration #1 Terrain Surfaces.....	3.2
Figure 3: Iteration #1 Water Surface Elevations and Velocities vs. Existing	3.3
Figure 4: Iteration #2 Terrain Surfaces.....	3.4
Figure 5: Iteration #2 Water Surface Elevations and Velocities vs. Existing	3.6
Figure 6: Iteration #3 Terrain Surfaces.....	3.7
Figure 7: Iteration #3 Water Surface Elevations and Velocities vs. Existing	3.9
Figure 8: Iteration #4 Terrain Surfaces.....	3.10
Figure 9: Iteration #4 Water Surface Elevations and Velocities vs. Existing	3.12
Figure 10: Iteration #4 Water Surface Elevations and Velocities vs. Existing (100-year flow).....	3.13

LIST OF APPENDICES

- Attachment A: WSA Correspondence
- Attachment B: Terrain and Water Surface Elevation Along Valley Road



Executive Summary

The Rural Municipality of Corman Park has been investigating the potential to support or allow for increased development within their jurisdictional boundary south of Saskatoon; however, this area is also prone to flooding by the South Saskatchewan River. Development in Saskatchewan is governed by the Statements of Provincial Interest Regulations (“SPIs”) (Saskatchewan 2012, Saskatchewan 2021); which, among other items:

- Prohibits the development of new buildings and additions to buildings in the floodway of the 1:500 year flood elevation of any watercourse or waterbody;
- Requires flood-proofing of new buildings and additions in the flood fringe to an elevation 0.5 m above the 1:500 year flood elevation of any watercourse or water body.

The SPIs also define the flooding terminology to be applied across the province. The two separate zones of the floodplain are defined as follows:

- Flood fringe occurs where depth is less than 1 m and flow velocity less than 1 m/s; and
- Floodway occurs where depth is greater than 1 m or flow velocity is greater than 1 m/s.

Encroachment analysis is a formal procedure whereby proposed conditions scenarios are iteratively modelled with the intent of identifying the extent of development which will not result in negative impacts to flood conveyance. This report documents the Encroachment Analysis performed for the South Saskatchewan River in the Rural Municipality of Corman Park (the Project).

Following a series of four iterations of candidate development areas, the encroachment analysis concluded that:

- Construction within the Iteration #4 candidate development areas would have minimal impact on flooding or floodplains during the 1:500-year event provided that the proposed Valley Road opening design incorporates appropriate erosion control measures; and
- Construction within the Iteration #4 candidate development areas would have no impact on flooding or floodplains during events more frequent than the 100-year conditions.

Other locations within the Study Area not included in the encroachment analysis (e.g., outside of the “candidate development areas”) also meet the Provincial definition of flood fringe and can therefore be developed subject to satisfying flood proofing conditions.

This conclusion will inform the development of the Flood Plain Overlay Map and the policies in the updated Rural Municipality of Corman Park’s Official Community Plan and Zoning Bylaw regulations.



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

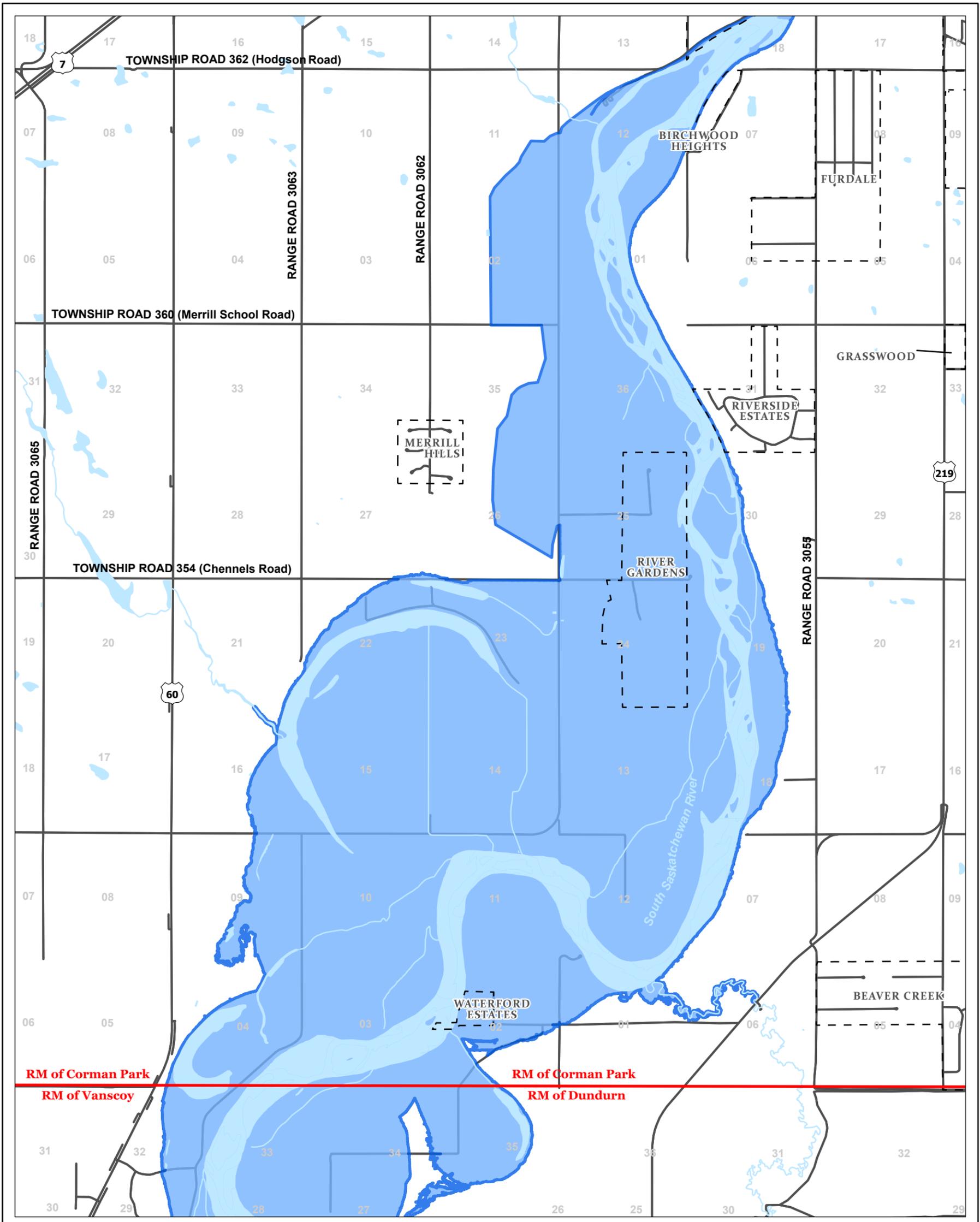
Introduction
April 3, 2024

1.0 INTRODUCTION

This report documents the Encroachment Analysis performed for the South Saskatchewan River in the Rural Municipality of Corman Park (the Project). For the purposes of this proposal, the portion of the South Saskatchewan River that flows north through Corman Park, south of Saskatoon, is referred to as the “Study Reach”, as shown in Figure 1.

The land use in this area of Corman Park is primarily low density and agricultural. The area has become a destination for visitors from Saskatoon and beyond. There is interest to grow and invest in various types of commercial development along Valley Road (agri-tourism, recreational, commercial greenhouses).

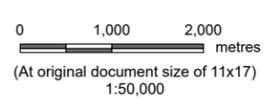




- Legend**
- Flood Plain
 - Multi Parcel Subdivision
 - Waterbody
 - Highway
 - Roads
 - Rural Municipality Boundary
 - 33 Section

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
2. Data Sources: Base features produced under license with Stantec, the Government of Saskatchewan and the Government of Canada.
3. Background: Esri Canada, Esri, HERE, Garmin, SafeGraph, FAO, METI/ NASA, USGS, EPA, NRCAN, Parks Canada
4. Mapping prepared using 1928 vertical datum



Project Location
 Rural Municipality of Corman Park,
 Saskatchewan

Client/Project
 Rural Municipality of Corman Park
 Flood Risk Analysis

Prepared by MH on 2023-10-27
 TR by LC on 2023-10-27
 IR by XX on 2023-10-27
 144903094-001 REVC

Figure No.
 1

Title
 Rural Municipality of Corman Park Flood
 Plain Overlay Map

G:\GIS\Project_Folder\144903094_FloodFringeMap_20231025.aprx Revised: 2023-10-27 By: mathughes

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SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Introduction
April 3, 2024

1.1 BACKGROUND

Over the past several years the Rural Municipality of Corman Park (Corman Park) has been investigating the potential to support or allow for increased development within their jurisdictional boundary south of the City of Saskatoon; however, this area is also prone to flooding by the South Saskatchewan River. Land Use Planning and Development in Saskatchewan is governed by the Planning and Development Act (Saskatchewan 2007) and regulations, one of which is the Statements of Provincial Interest Regulations (“SPIs”) (Saskatchewan 2012); which, among other items:

- Prohibits the development of new buildings and additions to buildings in the floodway of the 1:500 year flood elevation of any watercourse or waterbody;
- Requires flood-proofing of new buildings and additions to an elevation 0.5 m above the 1:500 year flood elevation of any watercourse or water body in the flood fringe.

The SPIs also define the flooding terminology to be applied across the province. Where the floodplain consists of two separate zones:

- Flood fringe occurs where depth is less than 1 m and flow velocity less than 1 m/s; and
- Floodway occurs where depth is greater than 1 m or flow velocity is greater than 1 m/s.

The Water Security Agency of Saskatchewan (WSA) is responsible for managing the province’s water supply, which includes matters related to flooding and floodplain mapping. As with other watercourses in the province, the WSA delineated the floodplain within the Study Area using a one-dimensional (1D) hydraulic model. To delineate flood fringe and floodway zones, and further inform Corman Park’s flood policies and development regulations in the Study Reach, Barr Engineering Co. (Barr) completed a two-dimensional (2D) hydraulic model of the Study Reach in 2019 (Barr, 2019).

Following the completion of the 2D model, Corman Park retained Stantec to complete municipal planning policy updates in 2021, under the assumption that the flood fringe and floodway delineations from the Barr (2019) hydraulic model were accepted by the WSA. Unfortunately, subsequent meetings between Stantec, the WSA, and Corman Park revealed that while the WSA accepted the flood fringe and floodway delineations for existing conditions from Barr (2019) (i.e., no new development), it did not accept the proposed conditions hydraulic modeling completed by Barr (2019) (i.e., any modifications or new development). This change in understanding regarding how the 2D modeling results could be applied to Corman Park policies and regulations became a roadblock for the planning project which required additional coordination to understand further.

During the September 27, 2021 meeting with the WSA, it was made clear that the WSA would require the proposed conditions model to adequately demonstrate that any flood proofing actions for new development (e.g., raising lands in the flood fringe to be developed or to be used for access) would not result in negative impacts to flood levels or conveyance. The WSA also indicated that the impacts to flood levels and conveyance must consider both changes to flood water surface elevations (WSEs) and flow



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Introduction

April 3, 2024

velocity patterns and that the WSA evaluates those impacts at a reach scale (e.g., the extent of the South Saskatchewan River within Corman Park limits).

On November 4, 2021, Stantec submitted a letter to Corman Park summarizing the outcomes of the various meetings held with Corman Park and the WSA to outline the options for moving the planning project forward (Stantec 2021). As outlined in the letter, Option 2B and Option 3 both consisted of completing an encroachment analysis. This analysis would include iteratively modeling the proposed conditions development scenarios (i.e., candidate development areas raised above the 1:500 year flood level) and gradually removing development parcels from consideration until the hydraulic modeling for the proposed conditions does not result in a negative impact to flood levels or conveyance. After meeting with Stantec to discuss the letter, Corman Park retained Stantec to perform a formal Encroachment Analysis for the candidate development areas as identified by Corman Park.

The relevant correspondence with WSA is included in Attachment A to this report.



2.0 METHODS/ASSUMPTIONS

Encroachment analysis involves the iterative comparison of existing conditions and proposed conditions hydraulic modelling results for various proposed conditions scenario(s), with the objective of determining the extent of development which is unlikely to result in negative impacts to flood elevations or flood conveyance according to the applicable regulatory requirements or flood authority. For this Project, the WSA is the ultimate decision agency as to what constitutes no negative impacts to flood conveyance. Encroachment analysis is a procedure whereby proposed conditions scenarios are iteratively modelled with the intent of identifying the extent of development which will not result in negative impacts to flood conveyance. In this project, the encroachment analysis iterations performed by Stantec were used to inform and facilitate discussions between Corman Park and the WSA with the goal of obtaining the WSA's approval of a proposed conditions model and development scenario.

In encroachment analysis, the existing conditions hydraulic model considers existing terrain and land cover; whereas, the proposed conditions hydraulic model incorporates any changes to the existing conditions including altered grades, modified land use, or changes in land cover. Modelled discharges and upstream/downstream boundary conditions are held constant between the two models, so that the hydraulic impacts of the proposed alterations are reflected in the comparative analysis.

The existing conditions hydraulic model completed by Barr (2019) was adopted as the existing conditions model for the encroachment analysis. This approach is based on the previously-confirmed WSA approval of the Barr (2019) model as an accurate representation of existing conditions and incorporated the 1:500 year flow (4,200 m³/s) as confirmed by WSA.

The proposed conditions model(s) considered the existing conditions terrain but with the candidate development areas and the external access routes to the parcels (i.e., roads) in the model terrain being raised to an elevation above the 1:500 year event. Proposed grading of the development areas being considered assumed that the parcels and their external access routes are filled to this standard to the full extent of their respective boundaries in the supplied cadastral layers. Grading modifications within the parcels were not included under this proposed scope.

The flood encroachment analysis was an iterative process. The first model iteration (Iteration #1) considered the full complement of candidate development areas provided by Corman Park in a proposed conditions scenario referred to as "Full Encroachment". If the Full Encroachment conditions demonstrate negative impacts to flood conveyance, this level of floodplain encroachment will be not permitted by WSA and additional iterations will be required.

To inform which candidate development areas would be removed from consideration, Stantec evaluated the candidate development areas with respect to their relative impact to flood conveyance and in the context of Corman Park's priority level of each candidate development area. Subsequent iterations would remove certain candidate development areas from consideration. This process was repeated until model results did not demonstrate negative impacts to flood conveyance compared to existing conditions.



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Results (Iterations #1-4)
April 3, 2024

Once model results reached this stage, the Province of Saskatchewan (WSA, Community Planning) was engaged in further review and discussion to check that the final recommendations would be acceptable. Both the model results and the agency discussions are described in the following sections.

3.0 RESULTS (ITERATIONS #1-4)

The results of each of four Encroachment Analysis iterations are presented in the following sections.

3.1 ITERATION #1

Figure 2 illustrates Iteration #1 existing terrain surfaces on the left and developed terrain surfaces on the right.

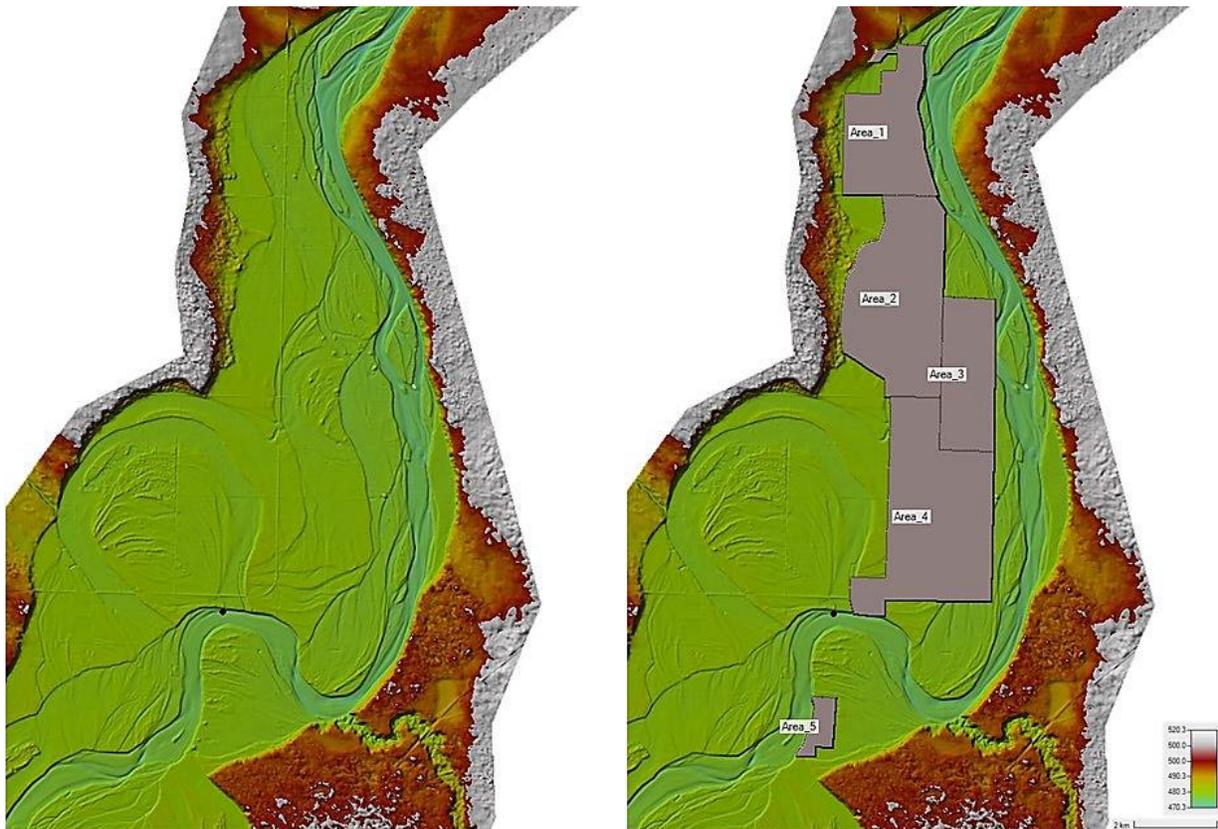


Figure 2: Iteration #1 Terrain Surfaces

The Iteration #1 scenario consisted of the following:

- All five candidate development areas are included in this iteration (Figure 2). To complete the encroachment analysis, the model terrain was modified to represent the post-development



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Results (Iterations #1-4)

April 3, 2024

topographic condition by elevating Areas 1 to 5 above the 1:500-year water surface elevation. The water surface elevation results from the previous Flood Hazard Study (Barr, 2019) were used for the purposes of this iteration, ranging from 479.9 m above mean sea level (amsl) downstream end of Area 1 to 481.8 m near Area 5.

- The model geometry was also modified according to the new topographic data for the accurate alignment of the computational cells along the edges of the candidate development areas. Figure 3 compares the original and modified digital terrain models within the study domain with the existing conditions results for both flood depth and velocity.
- Simulation of the 1:500-year design flood scenario (4,200 m³/s) using the modified geometry and terrain data.

Figure 3 illustrates Iteration #1 differences in water surface elevation (m) (left) and velocity (m/s) (right), due to construction within the candidate development areas in a 1:500-year flood scenario (4,200 m³/s).

Flow: 4200 m³/s- Round 1

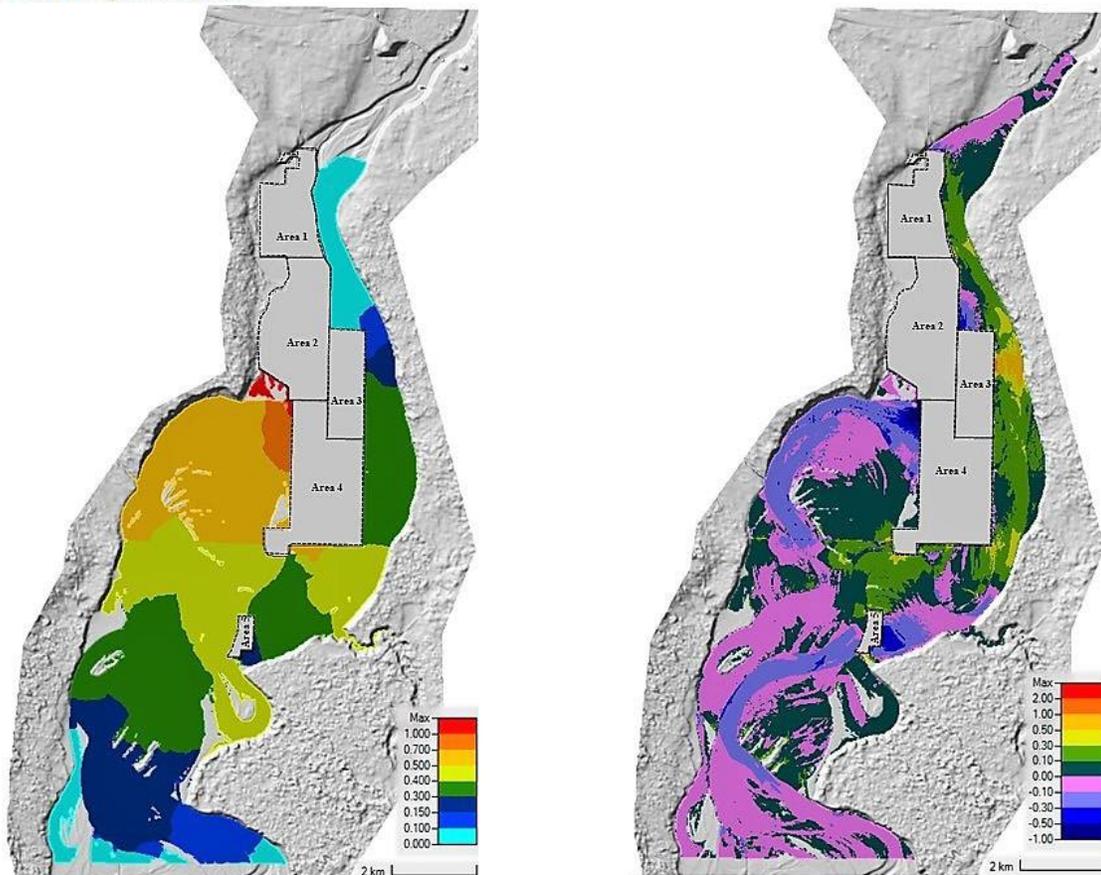


Figure 3: Iteration #1 Water Surface Elevations and Velocities vs. Existing



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Results (Iterations #1-4)

April 3, 2024

The Iteration #1 hydraulic modelling results were as follows:

- The encroachment analysis conducted for the design flood event, the 1:500-year flood, showed a maximum increase in water levels up to 1.4 m in the oxbow lake and the channel upstream of Area 2 and surrounding Area 4 under the proposed development scenario. The average WSE increase for this case was estimated to be around 0.4 m along the reach. The average velocities along the main river are estimated to be 0.1 m/s higher than existing velocities, with some local velocity increases as high as 2 m/s. These results are summarized and presented in Figure 3.

It was Stantec's professional opinion that the WSA would likely consider the above hydraulic model to demonstrate negative effects to flood conveyance under proposed conditions, given the change in water surface elevations and velocities.

3.2 ITERATION #2

Figure 4 illustrates Iteration #2 existing terrain surfaces on the left and developed terrain surfaces on the right.

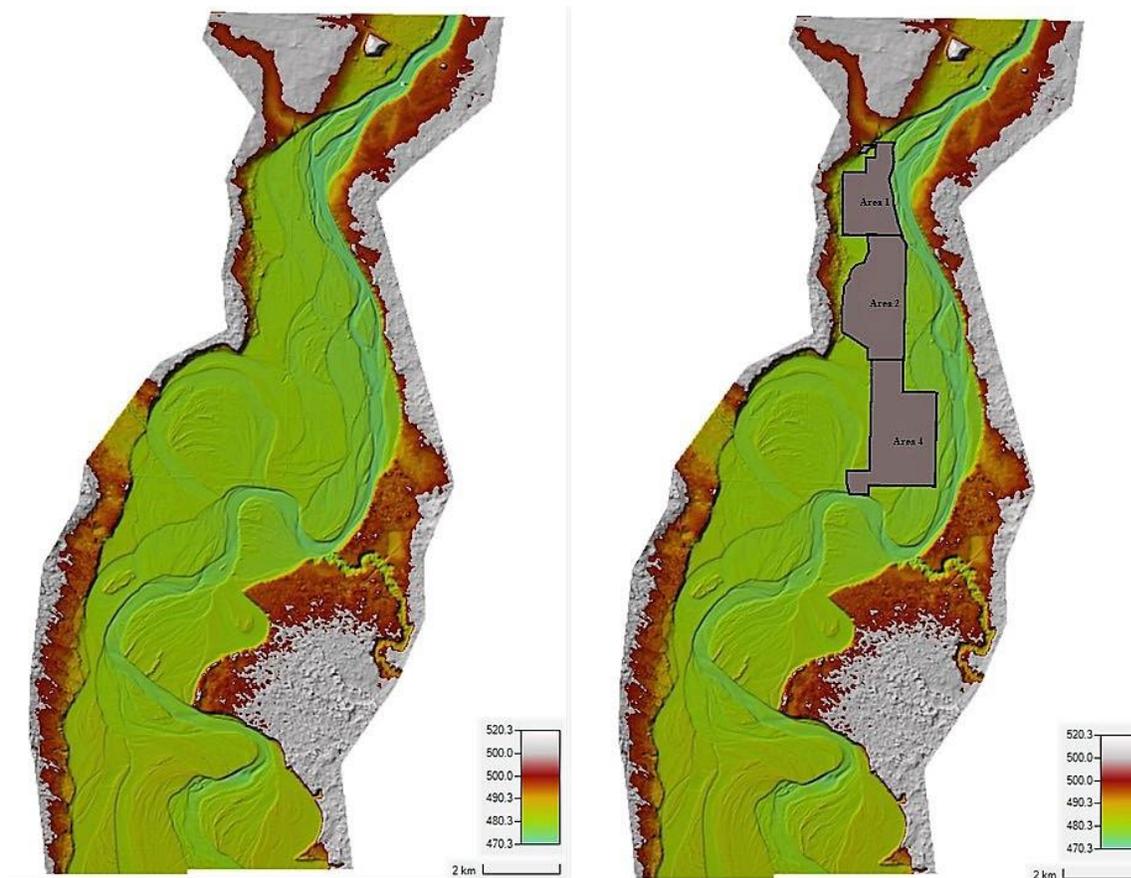


Figure 4: Iteration #2 Terrain Surfaces



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Results (Iterations #1-4)

April 3, 2024

The Iteration #2 scenario consisted of the following:

- Three (3) candidate development areas (out of five) are included in this iteration; Area 1, Area 2 and Area 4 as shown in Figure 4. To complete the encroachment analysis, the model terrain was modified to represent the post-development topographic condition by elevating Areas 1, 2 and 4 above the 1:500-year water surface elevation. The water surface elevation results from the previous Flood Hazard Study (Barr, 2019) were used for the purposes of this iteration, ranging from 479.9 m downstream end of Area 1 to 480.8 m near Area 4.
- The model geometry was also modified according to the new topographic data for the accurate alignment of the computational cells along the edges of the candidate development areas. Figure 5 compares the original and modified digital terrain models within the study domain with the existing conditions results for both flood depth and velocity.
- Simulation of the 1:500-year design flood scenario (4,200 m³/s) using the modified geometry and terrain data.



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Results (Iterations #1-4)

April 3, 2024

Figure 5 illustrates Iteration #2 differences in water surface elevation (m) (left) and velocity (m/s) (right), due to construction within the candidate development areas in a 1:500-year flood scenario (4,200 m³/s).

Flow: 4200 m³/s- Round 2

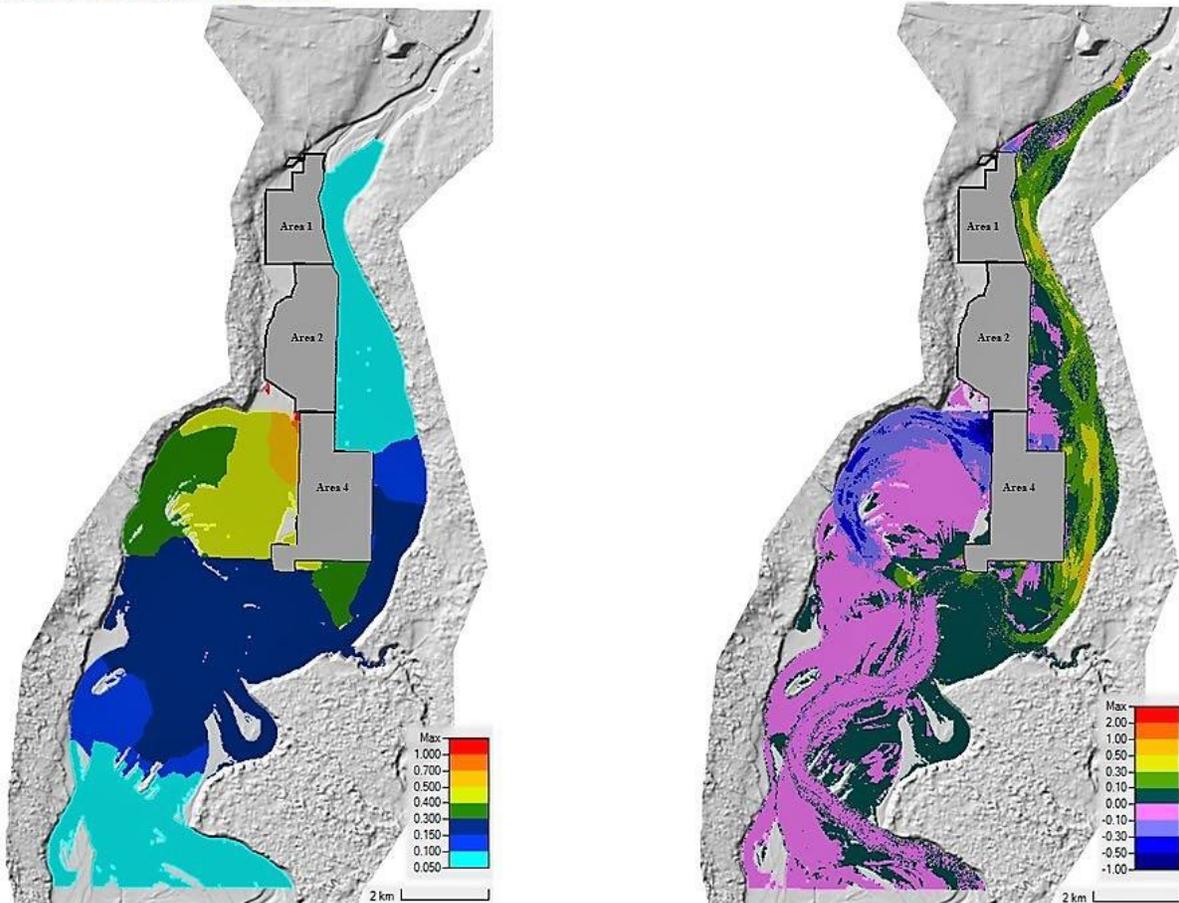


Figure 5: Iteration #2 Water Surface Elevations and Velocities vs. Existing

The Iteration #2 hydraulic modelling results were as follows:

- The encroachment analysis conducted for the design flood event, the 1:500-year flood, showed water level increases from existing of less than 0.3 m along the reach (~0.2 m on average), except for the area north of the oxbow lake and immediately south of Area 4. The model results show a maximum increase in water levels up to 1.0 m in the oxbow lake and the channel Upstream of Area 2 and surrounding Area 4. Model results showed the velocity increase from existing is generally less than 0.1 m/s (~0.05 m/s increase on average), except for the main channel areas east of Areas 1, 2, 4. Along this segment of the reach, some local velocity increases as high as 1.7 m/s were observed in the results. These results are summarized and presented in Figure 5.



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Results (Iterations #1-4)

April 3, 2024

It was Stantec's professional opinion that the WSA would likely consider the above hydraulic model to demonstrate negative effects to flood conveyance under proposed conditions, given the magnitude of the change in water surface elevations and velocities.

3.3 ITERATION #3

Figure 6 illustrates Iteration #3 existing terrain surfaces on the left and developed terrain surfaces on the right.

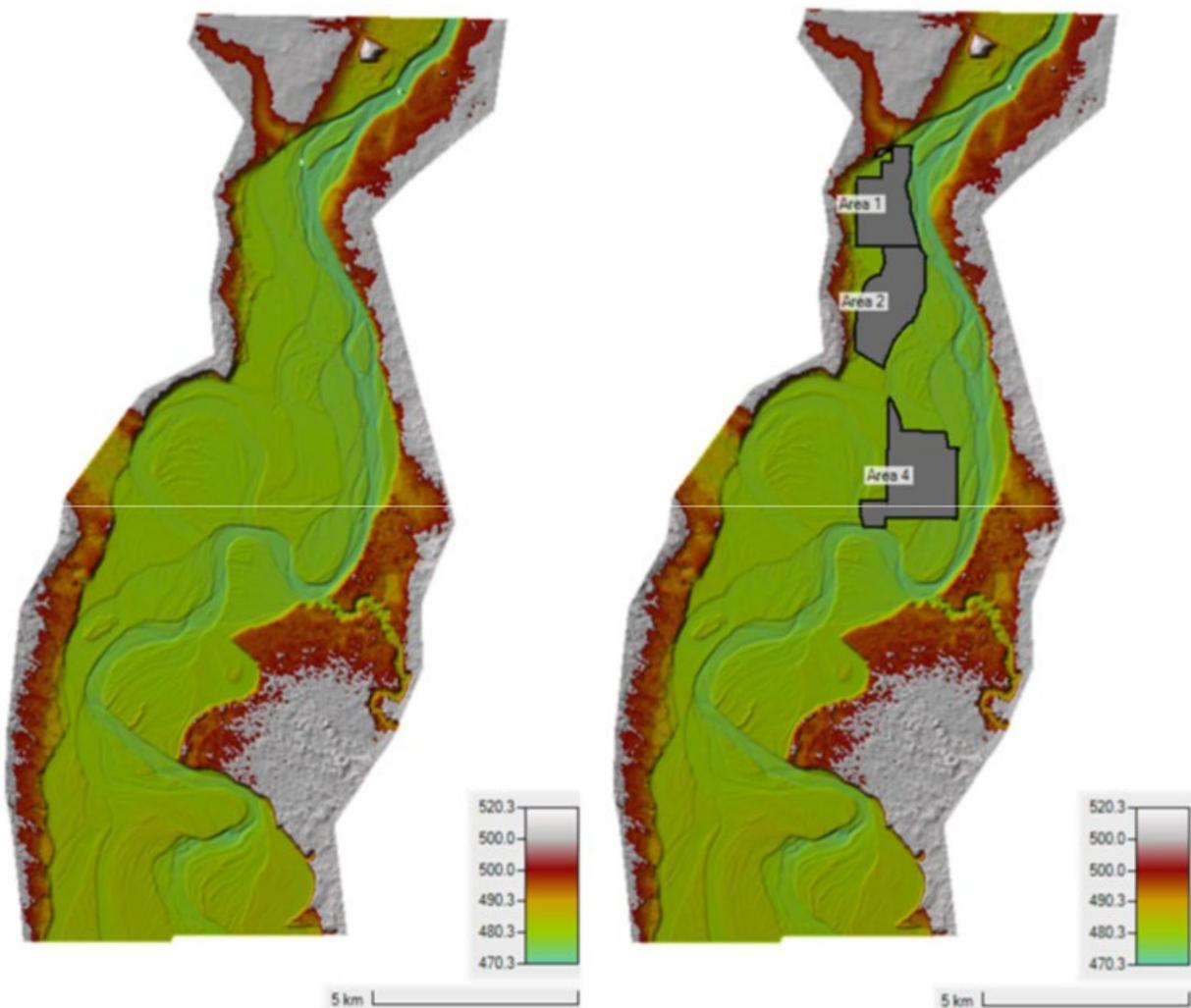


Figure 6: Iteration #3 Terrain Surfaces



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Results (Iterations #1-4)

April 3, 2024

The Iteration #3 scenario consisted of the following:

- Three (3) candidate development areas (out of five) are included in this iteration; Area 1, Area 2 and Area 4 as shown in Figure 6. These areas have been reduced in size compared to iteration #2. To complete the encroachment analysis, the model terrain was modified to represent the post-development topographic condition by elevating modified Areas 1, 2 and 4 above the 1:500-year water surface elevation. The water surface elevation results from the previous Flood Hazard Study (Barr, 2019) were used for the purposes of this iteration, ranging from 479.7 m downstream end of Area 1 to 480.9m near Area 4.
- The model geometry was also modified according to the new topographic data for the accurate alignment of the computational cells along the edges of the candidate development areas. Figure 7 compares the original and modified digital terrain models within the study domain with the existing conditions results for both flood depth and velocity.
- Simulation of the 1:500-year design flood scenario (4,200 m³/s) using the modified geometry and terrain data.



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Results (Iterations #1-4)
April 3, 2024

Figure 7 illustrates Iteration #3 differences in water surface elevation (m) (left) and velocity (m/s) (right), due to construction within the candidate development areas in a 1:500-year flood scenario (4,200 m³/s).

Flow: 4200 m³/s- Round 3

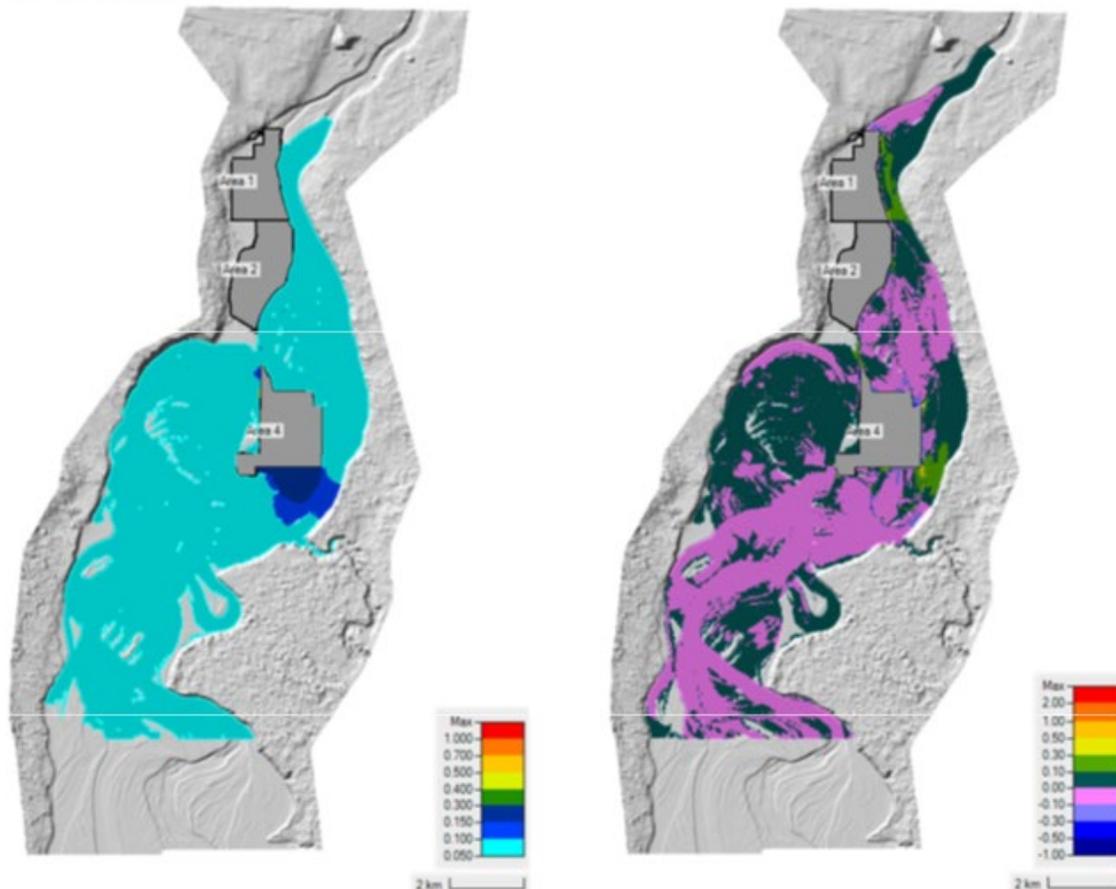


Figure 7: Iteration #3 Water Surface Elevations and Velocities vs. Existing

The Iteration #3 hydraulic modelling results were as follows:

- The encroachment analysis conducted for the design flood event, the 1:500-year flood, showed that water level increases less than 0.1 m higher than existing along the reach (~0.06 m in average), except for the area in the main channel, immediately upstream of Area 4. A maximum increase in water levels up to 0.25 m was observed in the main channel Upstream of Area 4,. Model results showed the velocity increase is generally less than 0.1 m/s (~0.05 m/s increase in average), except for the main channel areas east of Areas 1 and 4. Along this reach segment, velocities increased by 0.3 m/s on average. The highest velocity increase, up to 1.5 m/s above existing, is observed along Range Road 3061 (Valley Road), in the vicinity of Area 4. Considering that this road is overtopped during the 1:500-year flood, such high velocities may jeopardize the road integrity, causing access to Area 4 to be compromised during flooding. These results are summarized and presented in Figure 7.



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Results (Iterations #1-4)
April 3, 2024

The results of Iteration #3 clearly illustrated a reduced level of impact compared to the previous iterations and the regulators were engaged at this point to provide comments prior to the next iteration. A virtual meeting with WSA, Corman Park and Stantec was held on December 13, 2022 to review the modeling completed to date and provide an opportunity for review and feedback. Following this meeting, Stantec provided model files and a summary of results for review.

WSA reviewed iteration #3 in detail and provided comments (February 13, 2023 memo), which Stantec addressed in a response letter dated April 6, 2023. It was generally acknowledged that another iteration was required, but that the iteration #3 results represented conditions that – subject to minor modifications (including safe access to the candidate development areas) – could be supported by WSA.

This feedback led to a subsequent meeting with WSA, Community Planning, Corman Park and Stantec on April 12, 2023. Based on the outcome from this meeting, Stantec started Iteration #4.

3.4 ITERATION #4

Figure 8 illustrates Iteration #4 existing terrain surfaces on the left and developed terrain surfaces on the right.

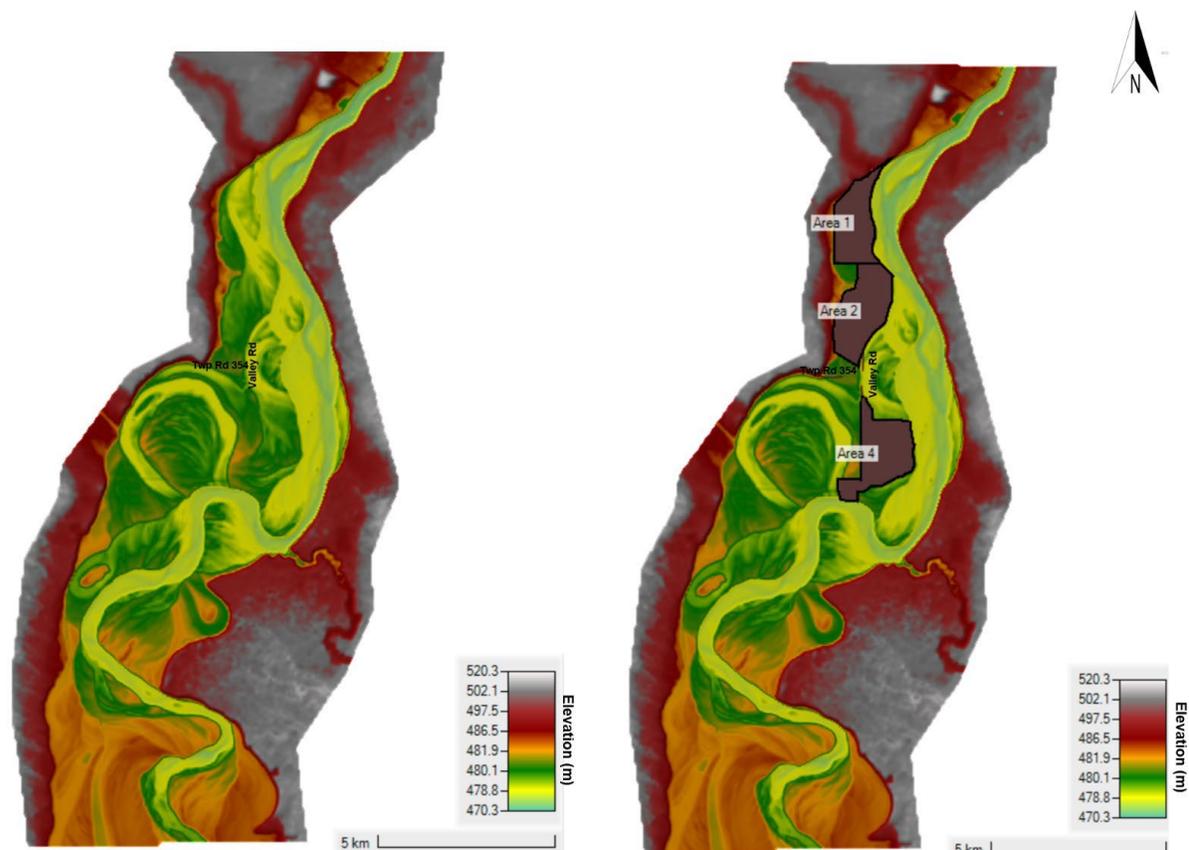


Figure 8: Iteration #4 Terrain Surfaces



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Results (Iterations #1-4)

April 3, 2024

Iteration #4 consisted of the following:

- Candidate development areas 1, 2 and 4 have been included in this iteration as shown in Figure 8. These candidate development areas have been reduced in size and modified in shape compared to iteration #3 to reduce the potential for floodplain impacts and increase future development land in area 1. Similar to previous iterations, the model terrain was modified to represent the post-development topographic condition by elevating modified Areas 1, 2 and 4 above the 1:500-year water surface elevation.
- As required by WSA, the portion of Valley Road, bounded by Areas 2 and 4 was raised above the 1:500-year flood elevation (consistent with the candidate development areas) so the road is not overtopped in the regulatory event scenario. Likewise, Township Road 354 was also raised above the 1:500-year flood elevation. To create conveyance between the east and west sides of Valley Road, an open passage in the form of a 100 m long by 2.5 m high opening was included close to Area 4 near the location of the existing culvert. This open passage is presented as part of a feasibility concept and has been modeled merely to simulate flow of water across Valley Road without overtopping the road. The exact proposed opening size, location and configuration (length and height) are not part of the scope of this modeling assignment and must be determined through detailed design. There is limited benefit of raising other portions of Valley Road further south and west of Area 4 towards Highway 60 because much of Valley Road is already higher than the 1:500 year flood elevation and additional concentrations of new development (i.e., candidate development areas) are not expected in these locations.
- The model geometry was also modified according to the new topographic data for the accurate alignment of the computational cells along the edges of the candidate development areas. Figure 9 compares the original and modified digital terrain models within the study domain with the existing conditions results for both flood depth and velocity.
- Simulation of the 1:500-year design flood (4,200 m³/s) and 100-year flood (2,500 m³/s) scenarios using the modified geometry and terrain data.

Figure 9 illustrates Iteration #4 differences in water surface elevation (m) (left) and velocity (m/s) (right), due to construction within the candidate development areas in a 1:500-year flood scenario (4,200 m³/s).



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Results (Iterations #1-4)
April 3, 2024

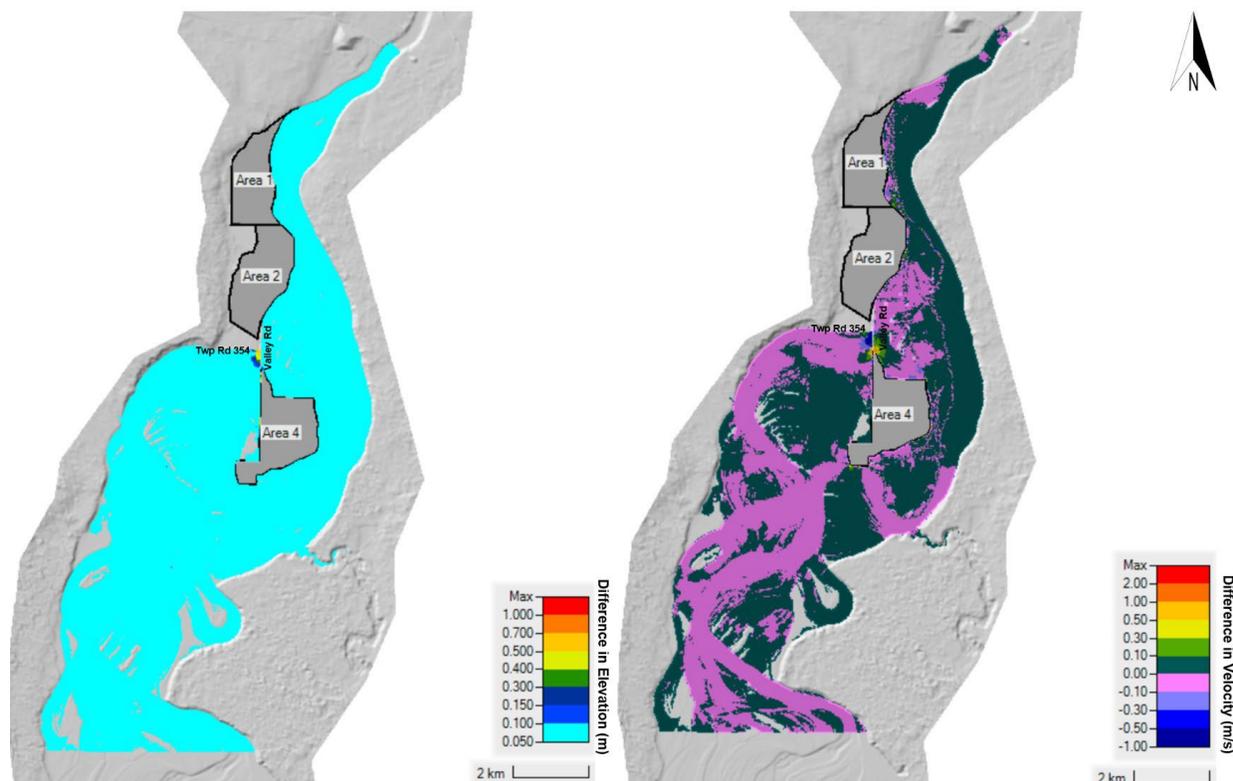


Figure 9: Iteration #4 Water Surface Elevations and Velocities vs. Existing

The iteration #4 results are summarized as follows:

The encroachment analysis conducted for the design flood event (1:500-year flood) showed that water levels and velocities are generally consistent with the existing conditions documented in the Barr report (2019) across the entire study area, with the exception of the area upstream and downstream of Valley Road. Model results include:

- Water surface elevations increases of less than 0.1 m were observed throughout the simulation domain, except for 1) the area at the intersection of Valley Road and Township Road 354 and 2) downstream of the opening (modeled culvert) under Valley Road. A maximum rise of 0.56 m is observed at the former location, and 0.24 m at the latter.
- The model results showed velocity increases less than 0.1 m/s, except through the Valley Road opening where an increase of up to 2 m/s was observed beyond existing conditions (the existing culvert was not modeled under existing conditions, which contributes to the observed change). This increase is localized and is typical of conditions at bridges and culverts. Velocities observed in the model near the Valley Rd. opening are up to 2.5 m/s, which can be addressed with appropriate erosion protection during the design and construction stages.

The size, location and configuration of the opening in the Valley Road can affect the location and magnitude of changes in depth and velocity and therefore should be refined during the detailed design



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Results (Iterations #1-4)

April 3, 2024

stage to limit changes and address residual impacts as needed (e.g., erosion protection). Attachment B contains a drawing illustrating the locations where Valley Road is currently overtopped in the vicinity of the candidate development areas.

A similar analysis was also completed for the 100-year flood scenario to examine if the simulated terrain changes would have any impact on conditions during comparatively more frequent events. This assessment showed WSE increases of less than 0.1 m and velocity changes of less than 0.1 m/s throughout the study area. In this scenario, the Township Road 354 and the Valley Road are not flooded, and water will not pass through the opening under Valley Road.

Figure 10 illustrates Iteration #4 differences in water surface elevation (m) (left) and velocity (m/s) (right), due to construction within the candidate development areas in a 1:100-year flood scenario (2,500 m³/s).

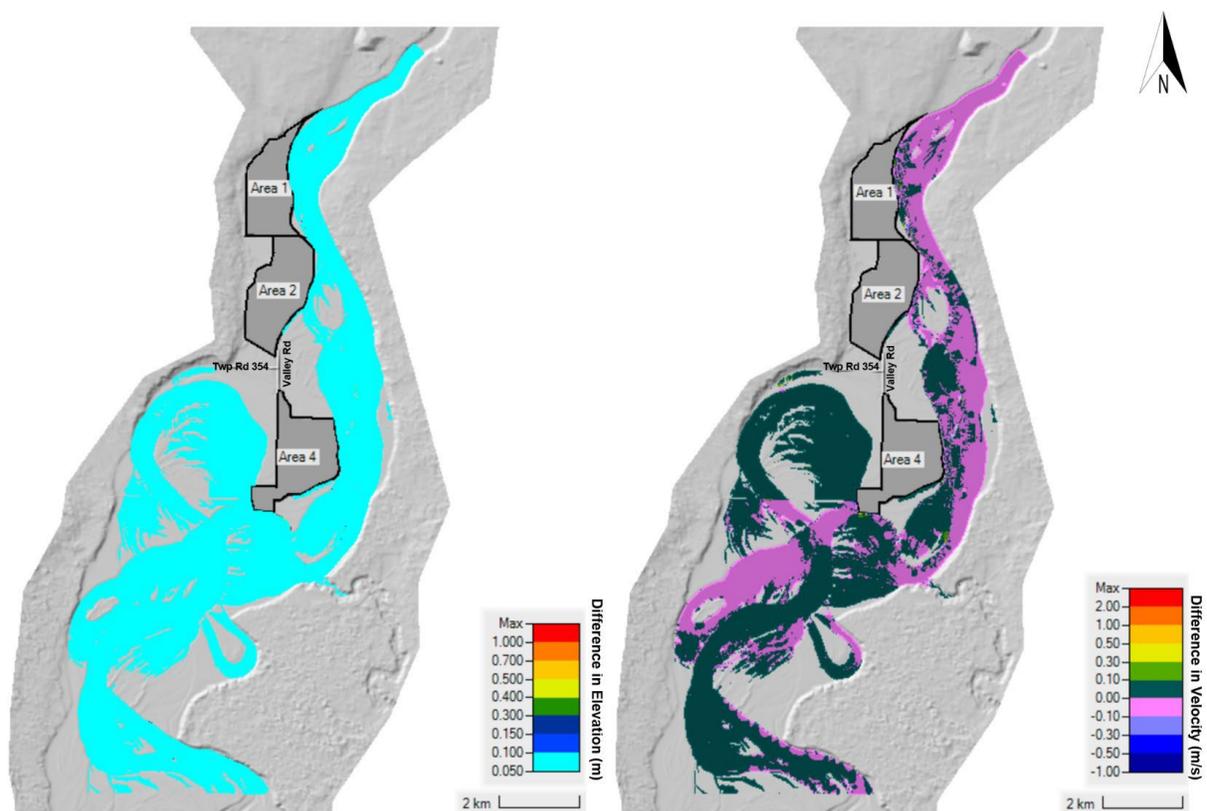


Figure 10: Iteration #4 Water Surface Elevations and Velocities vs. Existing (100-year flow)

These observations support the following conclusions:

- Construction within the iteration #4 candidate development areas would have minimal impact on flooding or floodplains during the 1:500-year event provided that the proposed Valley Road opening design incorporates appropriate erosion control measures; and



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Results (Iterations #1-4)

April 3, 2024

- Construction within the candidate development areas would have no impact on flood levels or flood velocities during events more frequent than the 100-year conditions.

WSA reviewed iteration #4 in detail and provided comments (September 18, 2023 letter), which Stantec addressed in a response letter dated October 17, 2023. It was acknowledged that the iteration #4 model appropriately simulated proposed development conditions.



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

Conclusions

April 3, 2024

4.0 CONCLUSIONS

This report summarizes the results an encroachment analysis for the South Saskatchewan River through Corman Park south of Saskatoon, including approval by WSA. After a series of scenarios were evaluated, the final iteration (#4) concluded that:

- Construction within the candidate development areas would have minimal impact on flood depths or velocities during the 1:500-year event provided that the proposed Valley Road opening design incorporates appropriate erosion control measures; and
- Construction within the candidate development areas would have no impact on flood depths or velocities during events more frequent than the 1:100-year conditions.

Other locations within the Study Area not included in the encroachment analysis (e.g., outside of the “candidate development areas”) also meet the Provincial definition of flood fringe and can therefore be developed subject to satisfying flood proofing conditions.

This conclusion will inform the development of the Flood Plain Overlay Map and the policies in the updated Rural Municipality of Corman Park’s Official Community Plan and Zoning Bylaw regulations.



SOUTH SASKATCHEWAN RIVER ENCROACHMENT ANALYSIS

References

April 3, 2024

5.0 REFERENCES

Barr Engineering, *Hydraulic Modelling and Mapping Study, South Saskatchewan River Flood Plain*, February 2019.

Government of Saskatchewan, Planning and Development Act, 2007

Government of Saskatchewan, *Statements of Provincial Interest Regulations*, 2012.

Government of Saskatchewan, *Statements of Provincial Interest Handbook*, August 2021

Stantec Consulting Ltd., *Summary of Recent Meetings and Options for Next Steps*, correspondence dated November 4, 2021.

Stantec Consulting Ltd., *Corman Park Encroachment Analysis: Summary of Iteration #1 Results*, Technical Memo dated September 6, 2022.

Stantec Consulting Ltd., *Corman Park Encroachment Analysis: Summary of Iteration #2 Results*, Technical Memo dated November 10, 2022.

Stantec Consulting Ltd., *Corman Park Encroachment Analysis: Summary of Iteration #3 Results*, Technical Memo dated September 6, 2022.

Stantec Consulting Ltd., *Corman Park Encroachment Analysis: Summary of Iteration #4 Results*, Technical Memo dated June 30, 2023.



**ATTACHMENT A:
WSA Correspondence**



Stantec Consulting Ltd.
100-75 24th Street East, Saskatoon SK S7K 0K3

November 4, 2021
File: 144903094

Attention: Rebecca Row, Director of Planning and Development
111 Pinehouse Drive
Saskatoon, SK S7K 5W1

Dear Rebecca Row,

Reference: Summary of Recent Meetings and Options for Next Steps

This letter has been prepared at the request of the Rural Municipality of Corman Park ("Corman Park") to support understanding and exploration of the next steps and options for the Corman Park Flood Policy project (the Project). To clearly explain these options, which are included at the end of the letter, we have provided a brief summary of the recent meetings between Corman Park, Stantec Consulting Ltd. ("Stantec"), and the Saskatchewan Water Security Agency ("WSA").

WSA/ CORMAN PARK/ STANTEC MEETING – SEPTEMBER 27, 2021

On September 27, 2021, Jeff Muirhead and Steve Brown, Stantec's water resources engineers, and Rebecca Row, Corman Park's Director of Planning and Development, met with Art Skibinsky, a representative from the WSA, to discuss some of the details of WSA's assessment methods and interpretations of the Statements of Provincial Interest ("SPIs") as they relate to Corman Park's proposed development scenarios.

The main take-away points from this meeting are provided below:

Design Flow

- The current 500-year flow estimate from Lake Diefenbaker into the South Saskatchewan River, which is adopted for design and planning considerations at Corman Park, is 4,200 m³/s.
- With various climate change projections and potential upcoming changes to the water management regime associated with major projects in the region, the 500-year flow rate may change (increase or decrease) in the coming years.
- In the same way that developments must be constructed 0.5 m above the 500-year flood elevation, access/ egress routes to all proposed development areas must also be constructed 0.5 m above the 500-year event.

Reference: **Summary of Recent Meetings and Options for Next Steps**

Development Areas in the Floodplain

- The WSA is generally not in favour of floodplain encroachment or development areas in the floodplain although that level of regulation or guideline is not necessarily explicitly stated in the SPIs.

Development in the Flood Fringe

- A proposed conditions hydraulic model accurately depicting the proposed conditions grading (e.g., proposed development areas raised to 0.5 m above the 500-year flood elevation) is required for the WSA to consider approval of development areas in the flood fringe. To date, the WSA has not received a proposed conditions model that they consider acceptable.

Development in the Floodway

- Approval of development areas in the floodway is not supported by WSA.
- The WSA representative acknowledged that many areas classified as floodway in Corman Park have low velocities, and depths greater than 1 m; it is the depth criterion that causes these areas to be designated as floodway. These low velocity/high depth areas are often not conveying significant volumes of floodwater. The WSA representative agreed it could be possible that in certain situations, infilling these areas for proposed development (as is required by the SPIs) may not negatively impact flooding.
 - To evaluate the impacts of proposed development areas in these specific situations, WSA would require robust proposed conditions hydraulic modelling accurately reflecting changes to topography and land use in the proposed conditions model.
 - Proposed conditions hydraulic modelling would need to be completed at the reach-scale (i.e., modelling the entire reach of the South Saskatchewan River within Corman Park boundaries). Individual properties or developments cannot perform modelling for their site only, because while site-scale impacts of proposed developments may be minimal, cumulative effects may be considerable.

Proposed Conditions Modelling

- WSA evaluates each proposed development plan (i.e., the total assemblage of development areas) and resulting hydraulic model on a reach-wide and river-specific basis, as they have many factors to consider in their decision making.
- Stantec proposed to WSA an iterative approach to performing the proposed conditions hydraulic modelling, whereby all proposed development areas would be raised to 0.5 m above the existing 500-year flood elevation, rather than just individual mounds as was completed by BARR in 2019.

The model would be run to determine if negative impacts to conveyance (i.e., increased flood elevations or changes to velocity patterns) would occur; if negative impacts were observed, development blocks would be removed on a reverse order of priority, as determined in consultation with Corman Park, until the impacts were no longer seen. The result of this process would determine areas where development constructed above the 500-year flood evaluation would not negatively impact the flood conveyance thereby identifying suitable development areas.

Reference: Summary of Recent Meetings and Options for Next Steps

The above approach is in accordance with standard practices for development planning purposes in other Canadian and North American jurisdictions.

- The WSA representative did not oppose Stantec's proposed approach as a viable method for undertaking proposed conditions hydraulic modelling and expressed a willingness to consider model results for specific candidate development areas which would be vetted in advance by WSA. This vetting step is recommended because there are certain areas of the floodplain which, for various reasons, would not be approved for development under any circumstance by the WSA, and it is most efficient for all parties to remove these from consideration.
- The WSA offered to have additional meetings with Corman Park and Stantec while the proposed development areas hydraulic modelling scenarios were being iterated.

Immediately following the meeting with WSA, Stantec and Corman Park debriefed to discuss the messaging from WSA. During this discussion, it was mutually understood that WSA was generally uncomfortable with approving development areas in Corman Park's floodplain however WSA was willing to consider development scenarios where proposed conditions hydraulic modelling:

- a) Only considered candidate development areas vetted in advance by WSA
- b) Accurately reflected and captured the proposed development scenario (topography, land use), and
- c) Demonstrated no negative impact on flooding or floodwater conveyance.

It was decided that Stantec would re-examine the "Floodplain Policy Study Scenarios" previously submitted to WSA by Corman Park, and provided to Stantec on June 18, 2021, in the context of WSA's feedback. In the examination, Stantec would identify development areas to be included in the iterative, proposed conditions hydraulic modelling which were most likely to be considered by WSA. Based on Stantec's understanding of WSA's requirements for consideration, the anticipated development blocks would likely be:

- a) located in the flood fringe, or
- b) a portion of the flood way that was likely low importance for reach-scale conveyance.

These candidate development areas would be confirmed with Corman Park, then be provided to WSA for vetting prior to initiation of proposed conditions iterative hydraulic modelling.

Reference: Summary of Recent Meetings and Options for Next Steps

CORMAN PARK/ STANTEC MEETING – OCTOBER 19, 2021

On October 19, 2021, Jeff Muirhead and Steve Brown, Stantec's water resources engineers, and Lesley Cabott and Amanda Haeusler, Stantec's planners; met with Rebecca Row, Corman Park's Director of Planning and Development, to review proposed next steps for the Project. As part of this meeting, Stantec's recommended candidate development areas were discussed. The main take-away points from this meeting are provided below.

Stantec presented two options for Corman Park (as illustrated in Attachment 1):

Option A – no additional hydraulic modelling

- WSA has indicated clearly to Corman Park that no development would be approved by them within the floodplain without completing additional hydraulic modelling; as such, Option A would not have any development areas within the floodplain extents.
 - Corman Park expressed concern regarding WSA's authority to prohibit development in the floodplain as expressed, given they are only involved in approving subdivision applications. For example, should no subdivision planning process occur (e.g., site plan applications), their review and approval are not required.
 - It is Stantec's understanding that WSA's comment is meant to limit Corman Park approval of an OCP/ Zoning Bylaw that relies on its existing flood fringe mapping, to be applied to the SPI regulations, rather than indicate how their future approval process for development applications would vary from the existing process.
 - Corman Park expressed concern regarding whether other municipalities across the province were being held to the same standard as it was speculated many had likely not completed the proposed conditions modelling required by WSA.
 - Stantec suggested that this be looked into further, as this precedent would be very pertinent to the Corman Park situation; however, during the September 27th meeting WSA made a point of avoiding "absolutes" in their evaluation approach, noting that since every river is different, their evaluation may also vary between situations. Corman Park was to follow up and report back to the team.
- Although there are small areas, "whisps", of land unimpacted by 500-year flood levels within the extent of the floodplain, these areas could also not likely be developed as they may lack safe access/ egress at a 500-year level and consideration for raising roads to the 500-year level would require additional hydraulic modelling.
 - Corman Park indicated that upgrading of the roadway network to allow access/ egress with a freeboard of 0.5 m above the 500-year elevation is unlikely given available resources.
 - Stantec revisited the BARR 2019 model results and, based on the data available:
 - a) existing road elevations were incorporated into the hydraulic model, and
 - b) some roads, including stretches of Valley Road, are inundated during the 500-year event

Reference: **Summary of Recent Meetings and Options for Next Steps**

Option B – iterative proposed conditions hydraulic modelling

- Stantec recommended that the proposed conditions hydraulic modelling should be done for new, proposed developments and that it is likely best for other flood mitigation strategies (e.g., early warning systems, evacuation plans, etc.) to be explored and/or implemented as appropriate for existing developments.
- For WSA to consider approval of development areas in the floodplain, additional modelling is required. Option B identifies Stantec's recommendation for candidate development areas, to be confirmed with Corman Park and vetted by the WSA. These areas would be subject to the construction regulations for flood fringe areas as outlined in the SPI.

The iterative proposed conditions hydraulic modelling would raise the candidate development areas to 0.5 m above the 500-year flood elevation to identify flooding impacts. If there were negative impacts to flooding and conveyance (e.g., increases in flood depth or velocity), development blocks would be removed in reverse order of development priority, as determined in consultation with Corman Park, until an acceptable model result was achieved.

- Corman Park expressed an interest in modelling additional areas outside of the candidate areas identified by Stantec in Attachment 1.
 - Stantec expressed concern that investigating additional areas may not be worthwhile because areas beyond what has been shown are important for conveyance; as such, development of those areas will likely have negative impacts to flooding and conveyance and thereby would be rejected by WSA.
 - Stantec also expressed concern that returning to WSA with proposed development areas that are beyond the understanding gained from the September 27th meeting may risk damaging the relationship and communication between WSA and Corman Park.
- Corman Park indicated that although variations to the proposed development areas may not be in accordance with WSA's preferences, the hatched areas proposed for inclusion in the model as discussed during the meeting would likely not meet the expectations of Council; as such, Stantec provided Corman Park with Attachment 1 via email for their markups following the meeting.
- Should Corman Park want to move forward with Option B (or a variation thereof), it is recommended that Stantec and Corman Park confirm an initial set of candidate development areas and present these to the WSA for vetting.
- If necessary, a follow-up meeting with WSA may be performed to explain the rationale for the candidate development areas and confirm WSA would consider proposed conditions hydraulic modelling for the candidate development areas (i.e., these areas are not complete "no-go's" from the WSA's perspective).

Reference: **Summary of Recent Meetings and Options for Next Steps**

Stantec identified a risk for all parties (Corman Park, WSA, and Stantec) in authorizing or supporting development areas in the floodplain without performing hydraulic modelling to demonstrate no negative impact to flooding and conveyance from those developments. If modelling is not completed and flood damage were to occur, landowners or other impacted parties may hold the authorizing agencies liable for damages as due diligence to a reasonable standard was not performed.

OPTIONS FOR NEXT STEPS

Based on the discussions summarized in the bullet points above, four options were ultimately identified for Corman Park to consider as the next steps for the Project. These options are summarized in **Table 1** below.

Table 1: Next Step Options for the Corman Park Flooding Policy Project

Option	Description	Advantages	Disadvantages
1	<u>No Development Areas in the Floodplain - No Modelling</u> No development areas inside the floodplain would be permitted.	No hydraulic modelling or correspondence with WSA would be required. Regulations would be uniformly applied across the entire floodplain reducing opportunities for misinterpretation by applicants.	This would result in the most significant limitation to proposed developments. All existing development in the floodplain would be considered legally non-conforming. All areas within the floodplain extents are treated equally including floodway, flood fringe, and 'whisps' of non-floodplain lands that may be impacted by flooding of access/ egress roadways.
2A	<u>Development in the Flood Fringe – No Modelling</u> No development areas inside the floodway would be permitted; all existing development in the floodway would be considered legally non-conforming. Development proposals that do not require subdivision approval in flood fringe areas would be permitted, in accordance with the regulations of the SPI.	No additional hydraulic modelling required. Relies on the SPI for floodway/ flood fringe policies.	Does not reflect WSA's requested approach as discussed during the meeting on September 27, 2021. Does not consider WSA's expressed rejection of the BARR report's proposed conditions flood fringe mapping. May result in legal exposure for approving authorities. Regulations rely on SPI interpretation thereby increasing opportunities for misinterpretation by applicants. Does not consider/evaluate potential additional development in the floodway.

Reference: **Summary of Recent Meetings and Options for Next Steps**

Option	Description	Advantages	Disadvantages
2B	<p><u>Development in the Flood Fringe - Additional Modelling</u></p> <p>Iterative proposed conditions hydraulic modelling would be used to evaluate candidate development areas.</p> <p>Candidate development areas would include flood fringe areas only.</p> <p>Results of the model would be used to identify the final development areas. All existing development not in the development areas and in the floodplain would be considered legally non-conforming.</p>	<p>Reflects WSA's requested approach as discussed during the meeting on September 27, 2021.</p> <p>Regulations would be uniformly applied across all development areas thereby reducing opportunities for misinterpretation by applicants.</p> <p>Could potentially result in additional areas of development within the floodplain.</p>	<p>Additional hydraulic modelling and correspondence with WSA is required.</p> <p>Does not consider/evaluate potential additional development in the floodway.</p>
3	<p><u>Development Areas in Select Flood Fringe and Floodway Areas - Additional Modelling</u></p> <p>Iterative proposed conditions hydraulic modelling would be used to evaluate candidate development areas.</p> <p>Candidate areas modelled would be based on Option B and potentially include areas as recommended by Corman Park through Appendix A markups.</p> <p>Results of the model would be used to identify the final development areas. All existing development not in the development areas and in the floodplain would be considered legally non-conforming.</p>	<p>Could potentially result in the largest amount of development area within the floodplain.</p> <p>Considers development in areas currently identified as flood fringe and flood way.</p> <p>Regulations would be uniformly applied across all development areas thereby reducing opportunities for misinterpretation by applicants.</p>	<p>Additional hydraulic modelling and correspondence with WSA is required.</p> <p>Does not reflect WSA's requested approach as discussed during the meeting on September 27, 2021.</p>

Reference: **Summary of Recent Meetings and Options for Next Steps**

CLOSURE

We look forward to continuing to work collaboratively with Corman Park on this important project. Stantec would be willing to facilitate either virtual or in-person discussions with you and your Council to discuss the contents of this letter.

Please do not hesitate to contact the undersigned with any questions you may have. Upon review, please communicate Corman Park's desired direction considering the options above.

Regards,

Stantec Consulting Ltd.

ORIGINAL SIGNED BY

Dustin Olexyn P.Eng. (SK)
Team Lead, Community Development
Phone: 306 241 7180
dustin.olexyn@stantec.com

ORIGINAL SIGNED BY

Lesley Cabott RPP, MCIP, MA, ICD D
Principal, Planning Lead Northern Canada
Phone: 867 335 2515
lesley.cabott@stantec.com

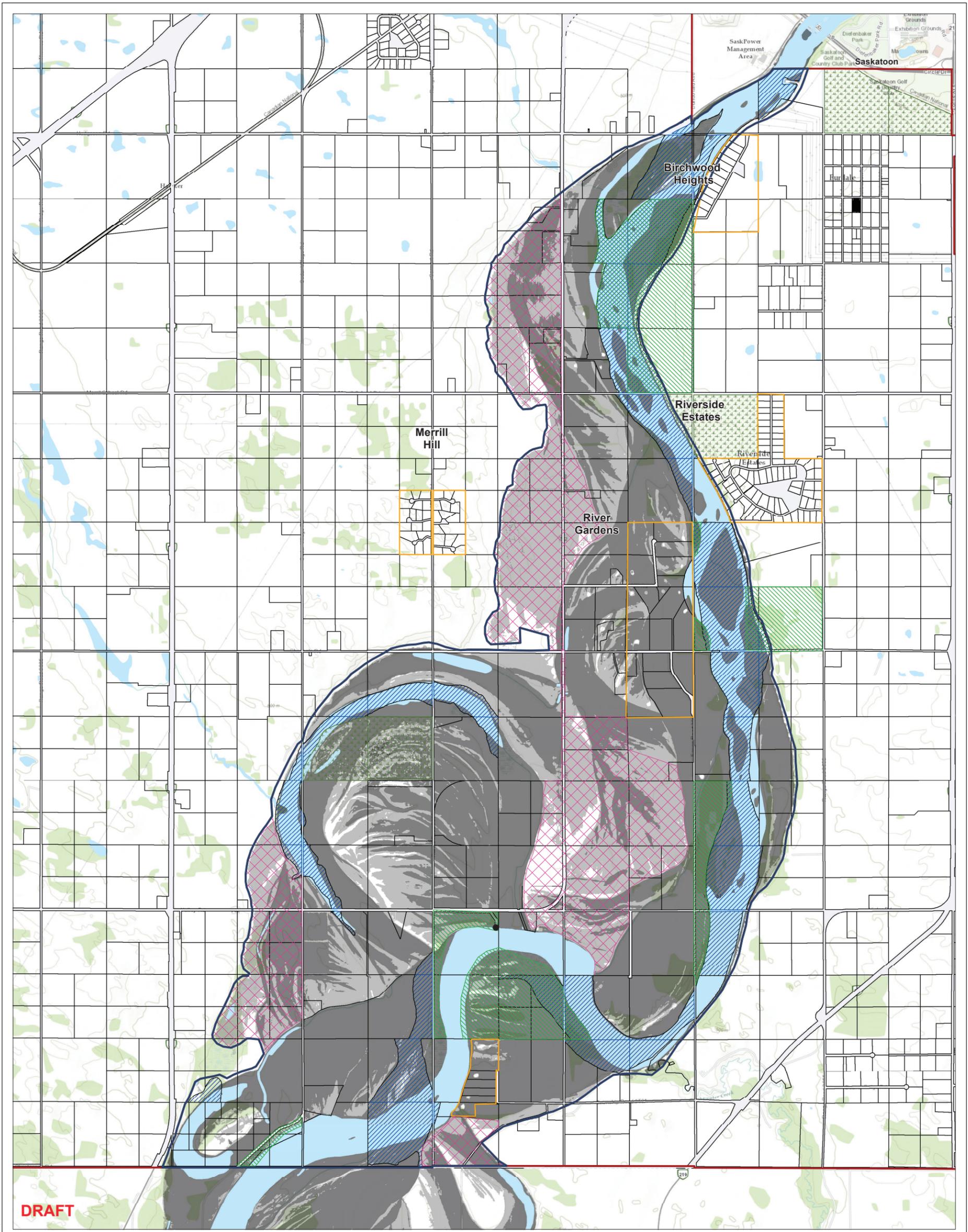
ORIGINAL SIGNED BY

Jeff Muirhead M.ASc., P.Eng. (YT, BC, NWT/NU)
River and Water Resources Engineer
Phone: 867 689 1653
jeff.muirhead@stantec.com

Attachment: Attachment 1 – Figure 1: Candidate Development Areas – Rural Municipality of Corman Park
c. Steve Brown (Stantec)
Amanda Haeusler (Stantec)
mjl <https://stantec.sharepoint.com/teams/144903094/shared>
documents/02_meeting_communications/20211102_next_step_options/let_corman_park_options_20211104.docx

REFERENCES

Barr Engineering Co. (Barr) 2019. "Hydraulic Modelling and Mapping Study: South Saskatchewan River Flood Plain." Prepared for the Rural Municipality of Corman Park No. 344, Saskatchewan. 107 pp.



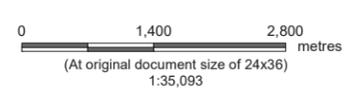
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Notes
 1. Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
 2. Data Sources:
 3. Background: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

- | | | | |
|----------|--|---------------------|---------------------------|
| Option A | Rural Municipality of Corman Park Boundary | Floodway | Property Parcel |
| Option B | Moon Lake Pump Station | Flood Fringe | Multi-Parcel Subdivisions |
| | | Park (Conservation) | Waterlot |
| | | Golf / Country Club | |



Project Location
 Corman Park
 Saskatchewan

Client/Project

144903094_004

Rural Municipality of Corman Park
 Flood Plain Assessment

Figure No.
 1

DRAFT

Title
 Candidate Development Areas - Rural Municipality of Corman Park

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

Corman Park Floodplain Policy - Project Restart Kick-Off**Location:** Microsoft Teams**Date:** June 13, 2022**Attendees:** Vicky Reaney, Rebecca Row
Steve Brown, Amanda Haeusler,**Absentees:** Lesley Cabott

Inclusion Moment: June is both Pride Month and National Indigenous History Month!

Did you know that Action 57 of the Truth and Reconciliation Commission's Calls to Action was that public servants be educated about the history of Indigenous peoples including the legacy of residential schools, the United Nations Declaration on the Rights of Indigenous Peoples, Treaties and Aboriginal rights, Indigenous law, and Aboriginal-Crown relations? If you'd like to further your own education, consider enrolling in some of the free courses on these topics as offered through the University of Alberta's [Indigenous Canada](#) program.

PROJECT BACKGROUND

- High-level review of what has happened to date
- Doing the modelling, and getting approval on that, will be the best opportunity to redefine what the future conditions looks like

REVIEW THE REQUESTED SCOPE OF WORK (CHANGE ORDER AND ORIGINAL)

- 3.2 Develop options
 - Task 1 Project Management (meetings to discuss modelling results)
 - Task 2 Hydraulic Modelling and Encroachment Analysis
 - Task 3 Post-Processing, Map, and Report Preparation
- 4.1 Present and Draft amendments and maps
- 4.2 Present to Community, Stakeholders, and Provincial Government
- 4.3 Consider comments and revise

- 5.1 Prepare amendment documents

CONFIRM PROJECT OBJECTIVES

- Looking for opportunities and clarity for properties: what they can and cannot do
- Need the policy framework to help inform those decisions
- Council recognizes that the new goal is:
 - preserve what there is and
 - provide clear guidance for the future

OVERVIEW OF HYDRAULIC MODELLING PROCESS

- Won't get into very detailed areas, will do a blanket-approach
- Anything built, and access to the properties; will be raised above 1:200 year levels
- Iteration 1 will include blocks 1-5
- After Iteration 1 has been run, we will meet again to go over those results
- RM identified that areas 3 and 5 are wanting to be considered for just 'existing' not necessarily 'future'
 - Regardless of what 3 and 5 are for, it'd be best to go over the results of Iteration 1 prior to removing any areas
- Want to have a short memo of something documenting Iteration 1's results prior to moving to another Iteration
 - RM has been burned in the past with doing modelling that wasn't accepted or meeting expectations, need to be careful this time
 - Doesn't need to be extensive, just a few bullet points

DISCUSS NUANCES OF THE PROJECT

- Anticipated timeline for Iteration 1 and next check-in meeting
 - Would like to have a check-in at the beginning of July, after July 4th
 - For that meeting, would like to see any information available prior to the meeting; recognizing that during the meeting Stantec will go through the modelling results

- Following the meeting, the RM may need to consider the areas for Iteration 2 for a little while prior to confirming
- Deliverable:
 - Want to have the 2-zone map, and policies, done prior to going to WAS
 - Need to address the items which were provided in writing from WAS in January 2021 letter
- Background Report
 - Don't feel that the scope of the Background Report is as relevant today as it was before
 - Stantec recommended that instead of updating the background report, key elements are identified for inclusion in the draft amendments or 'develop options' tasks of the project
 - RM identified:
 - Well head protection (page 40-41)
 - Emergency communications
 - Municipal liability
 - Roadway access and design
 - RM will meet to discuss this and follow-up later about what they'd like

Meeting adjourned at 3:10pm.

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

STANTEC CONSULTING LTD.



Amanda Haeusler RPP (PIBC), MCIP
Associate, Planning and Community Engagement
Phone: (250) 470-4467
amanda.haeusler@stantec.com

South Saskatchewan River in Corman Park - Flood Encroachment Analysis - Progress Update

Project Name / 144903094

Date/Time: December 13, 2022 / Time
Place: Teams Meeting (online)
Next Meeting: TBD
Attendees: RM Corman Park: Vicky Reaney, Shayden Brandt, Hayder Lateef; WSA: Cesar Perezvaldivia, Art Skibinsky, Jeff Woodward; Stantec: Jeff Muirhead, Steve Brown, Soheil Zare, Lesley Cabott
Absentees: None
Distribution: All attendees

Safety Moment: Winter Ice Safety – Jeff**Item:****Action:****1. Introductions:**

Jeff Muirhead chaired the meeting.

The meeting attendees introduced themselves.

2. Background

Vicky provided the meeting a brief history of the project- work completed to date and the objective of Corman Park to establish a two zone Flood Plain Map that WSA will accept where the RM can apply planning policies and zoning regulations for land uses in the Floodway and Flood Fringe. The key objectives of Stantec's work is to complete an encroachment analysis for candidate development areas. The findings will determine future development areas. The RM provided a scope and budget to Stantec to complete 5 iterations. The purpose of this meeting is to present the findings to date (completion of iteration 3) and the methodology to WSA and receive their feedback prior to progressing to iteration 4 and 5.

3. Analysis Update (presentation attached)

Soheil presented the methodology and the results. Iteration 3 is showing favourable results.

ACTION: Stantec to send package to WSA (Soheil)

4. Discussion

WSA appreciated the presentation and advised the meeting they liked the progress and the work that has been presented to date... *"the RM is going down the right road"*(WSA). WSA needs some time to discuss internally, would like a copy of the model and the presentation.

December 13, 2022

South Saskatchewan River in Corman Park - Flood Encroachment Analysis - Progress Update

Page 2 of 2

The meeting adjourned at 2:00 PM Saskatchewan Time

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Stantec

Lesley Cabott

Phone: 867 335 2151

Attachment: Presentation



Municipality of Corman Park
Saskatchewan Water Security Agency

Flood Encroachment Analysis
South Saskatchewan River

Flood Encroachment Analysis

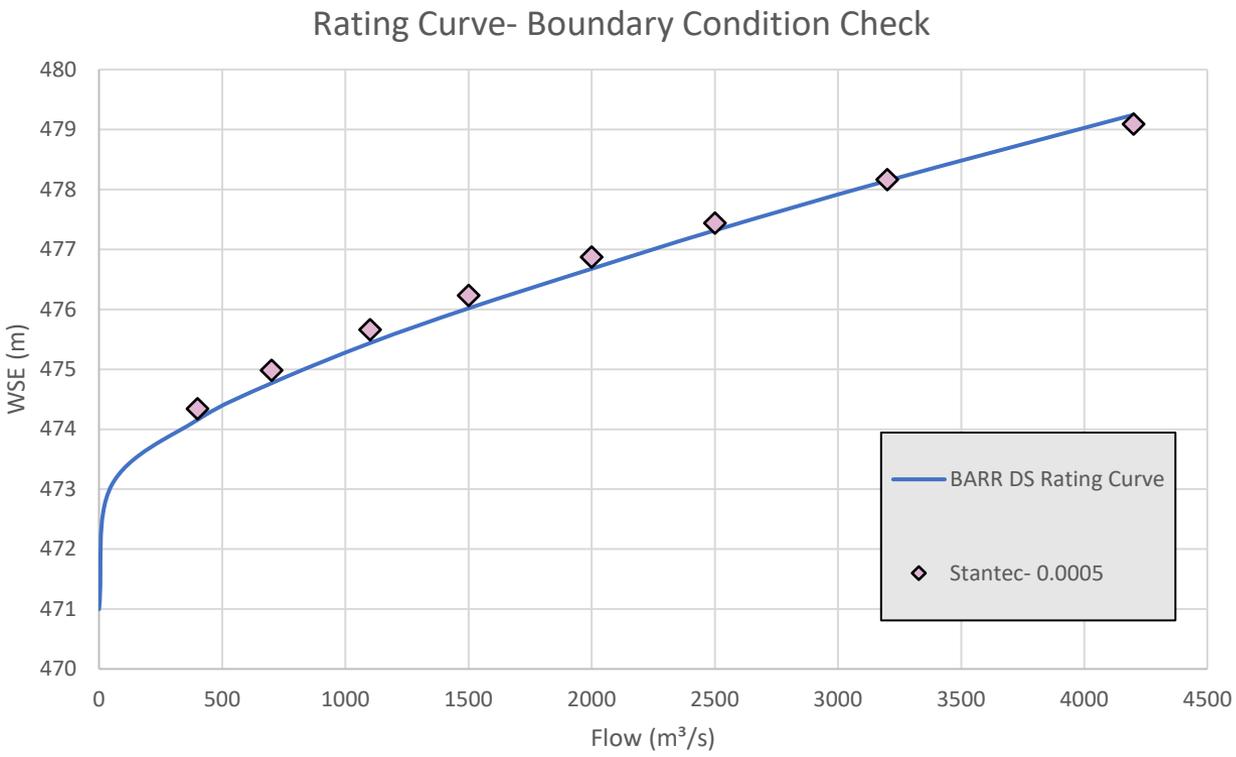
Hydraulic Model Set up

Model Updates

Following modifications are done to enhance/ improve the existing model (BARR Model):

- Modifications to the model extent
- Modifications to the model mesh size and configuration
 - Similar hydraulic resistance and land use data

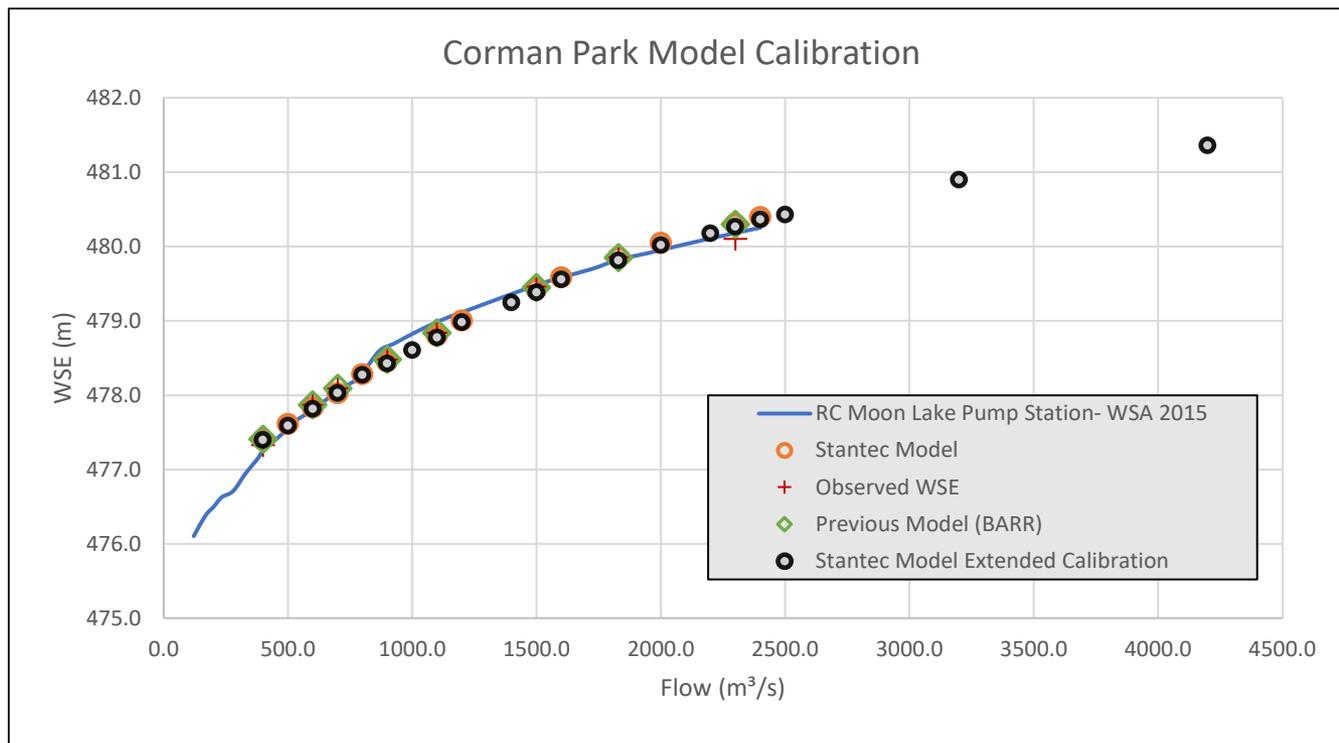
Modification to the Model Extent- Updating the Boundary Condition



Model Calibration

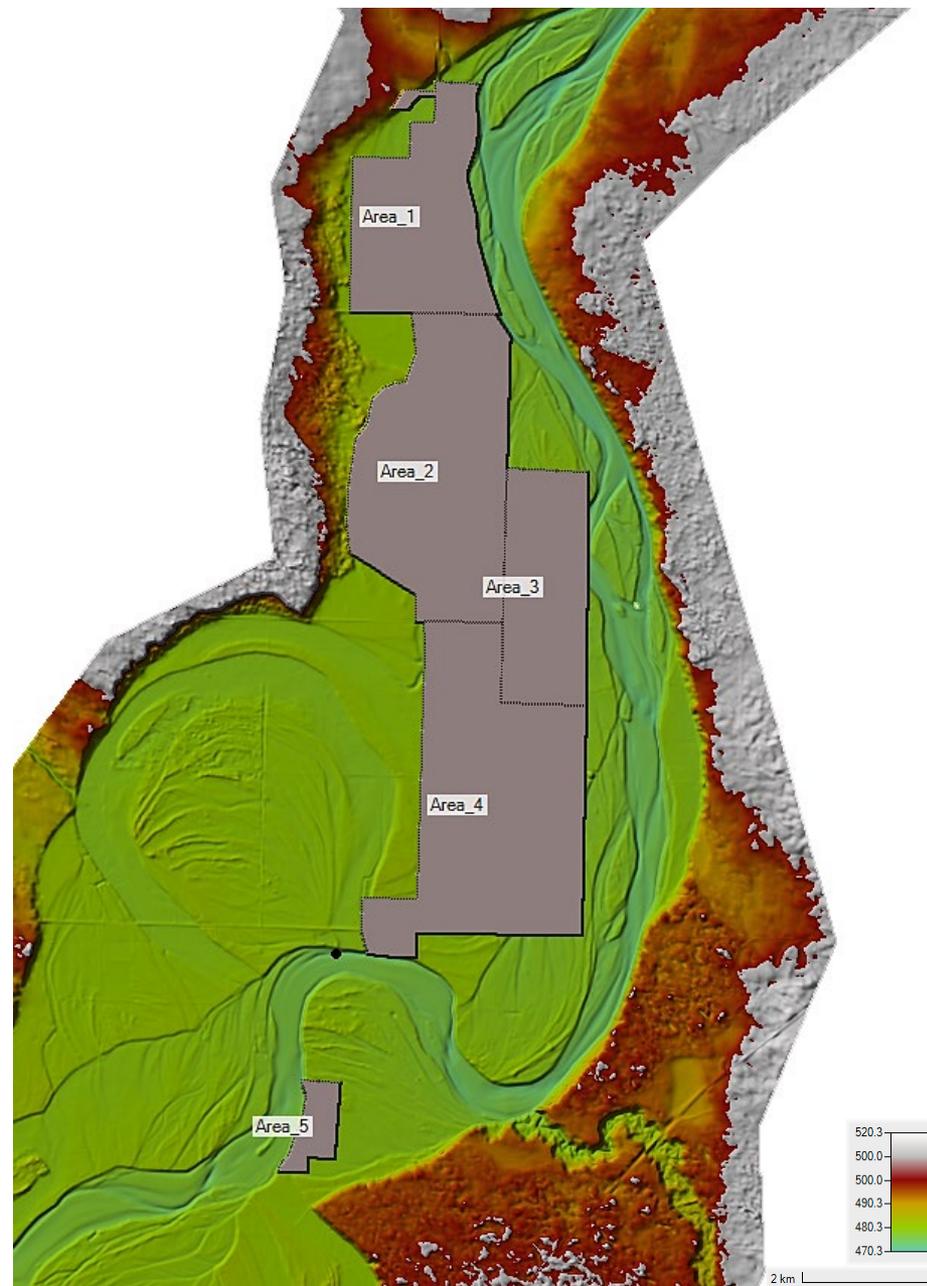
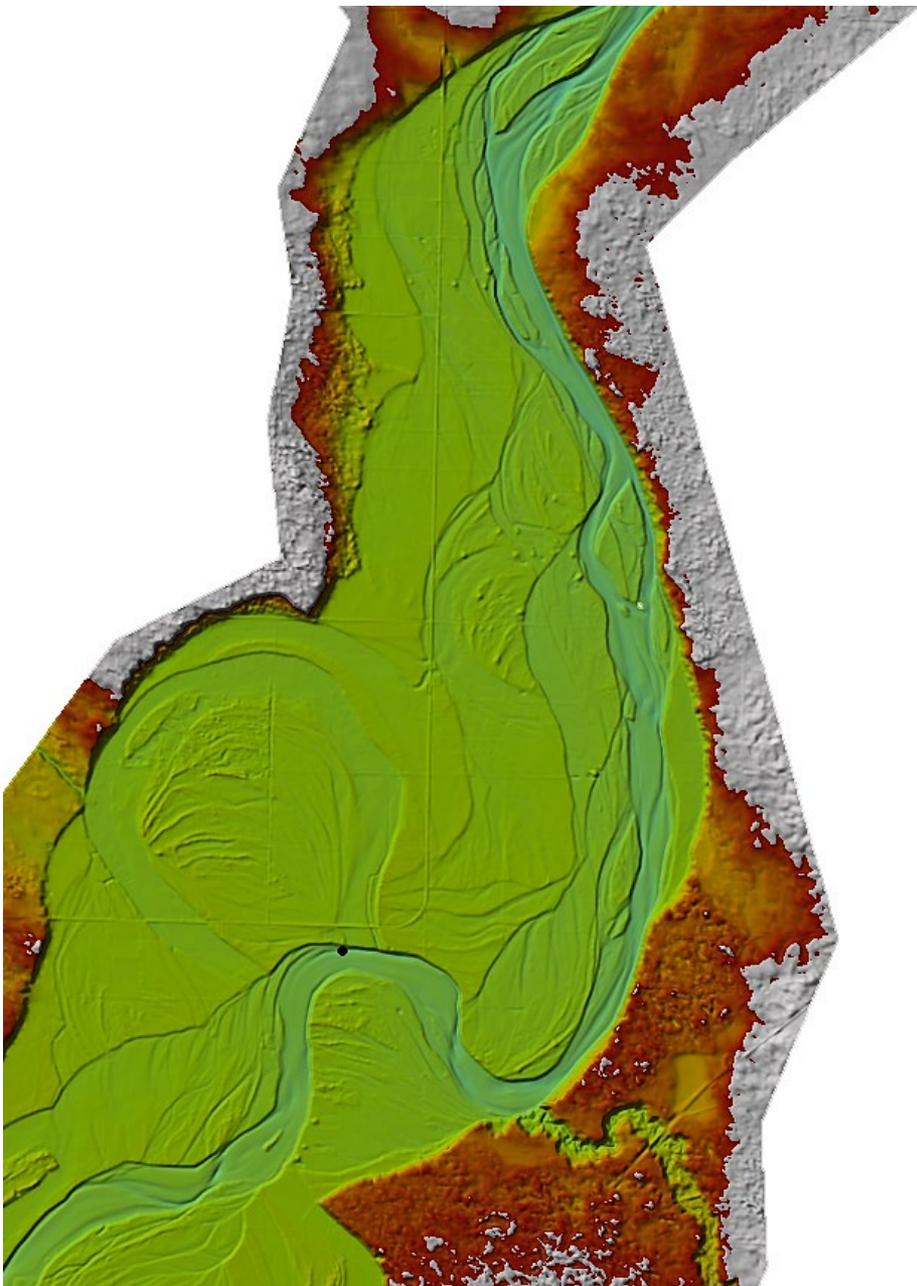
Following modifications are done to enhance/ improve the existing model (BARR Model):

- Modifications to the model Extent
- Modifications to the model mesh size and configuration
- Similar hydraulic resistance and land use data

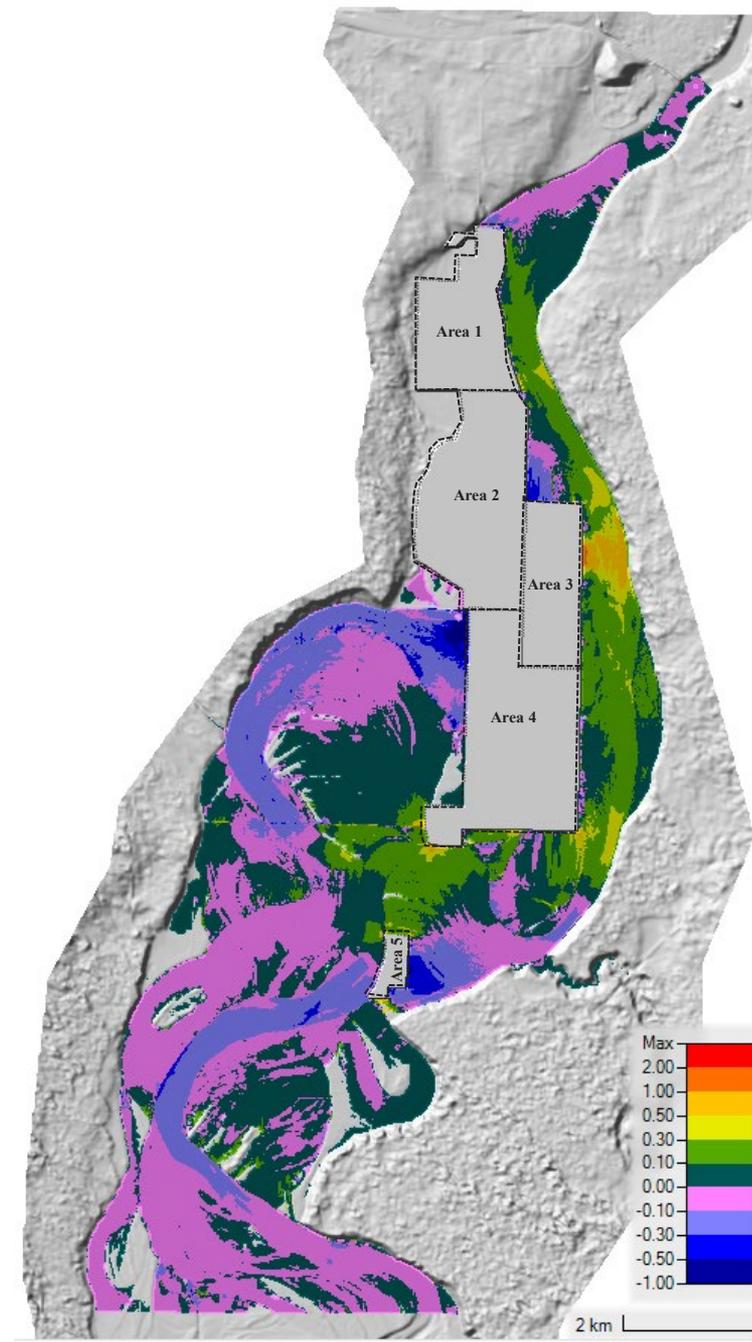
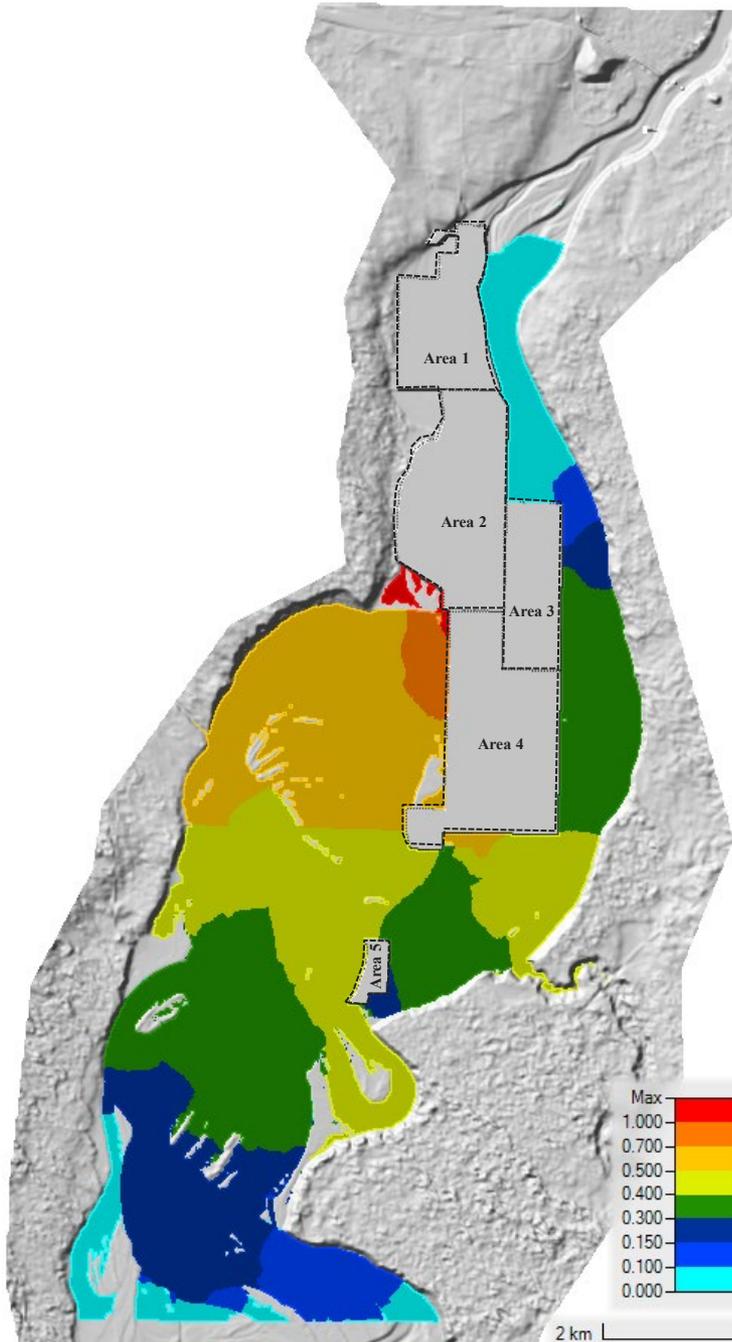


Flood Encroachment Analysis

Simulation Scenario- 1



Flow: 4200 m³/s- Round 1

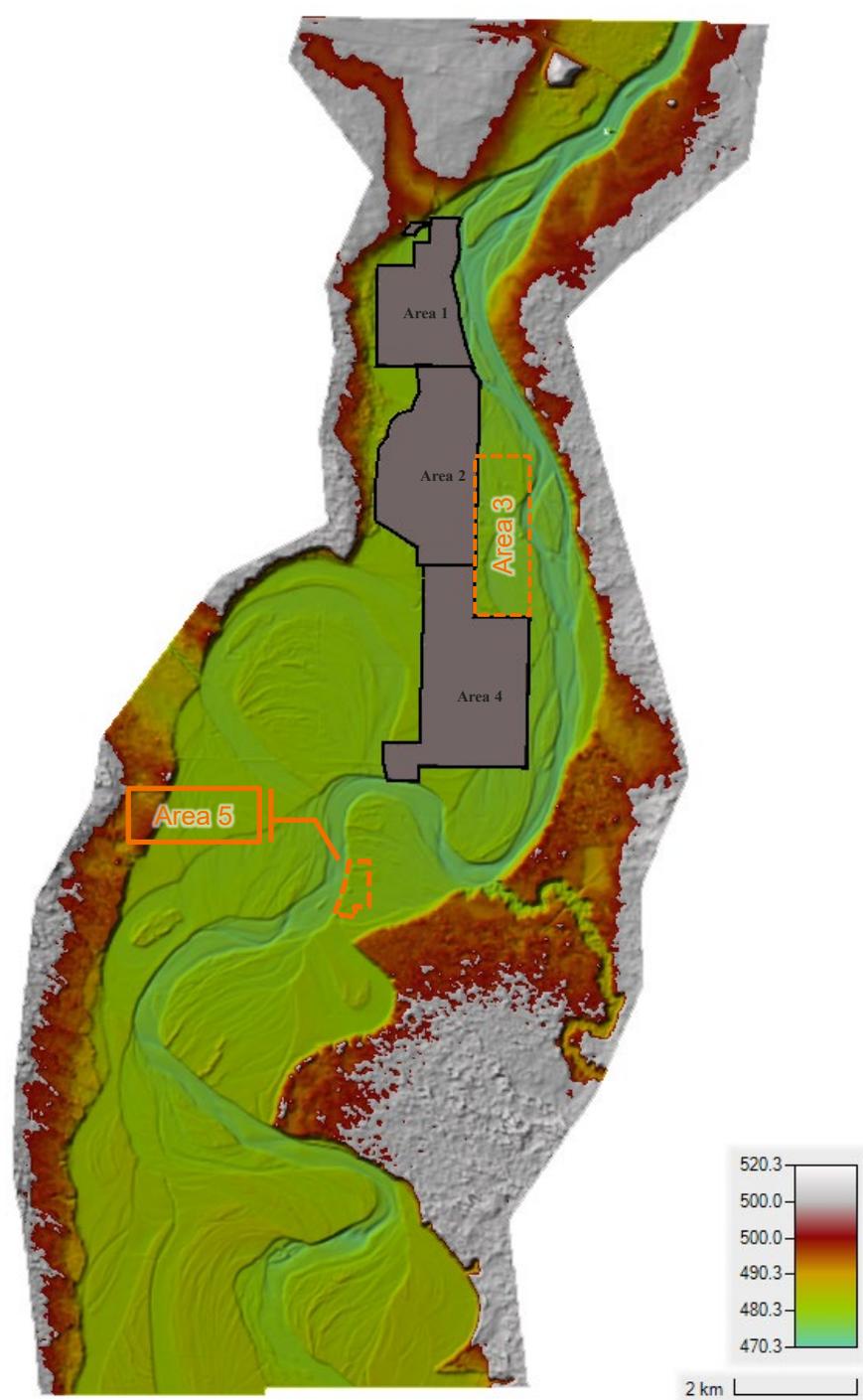
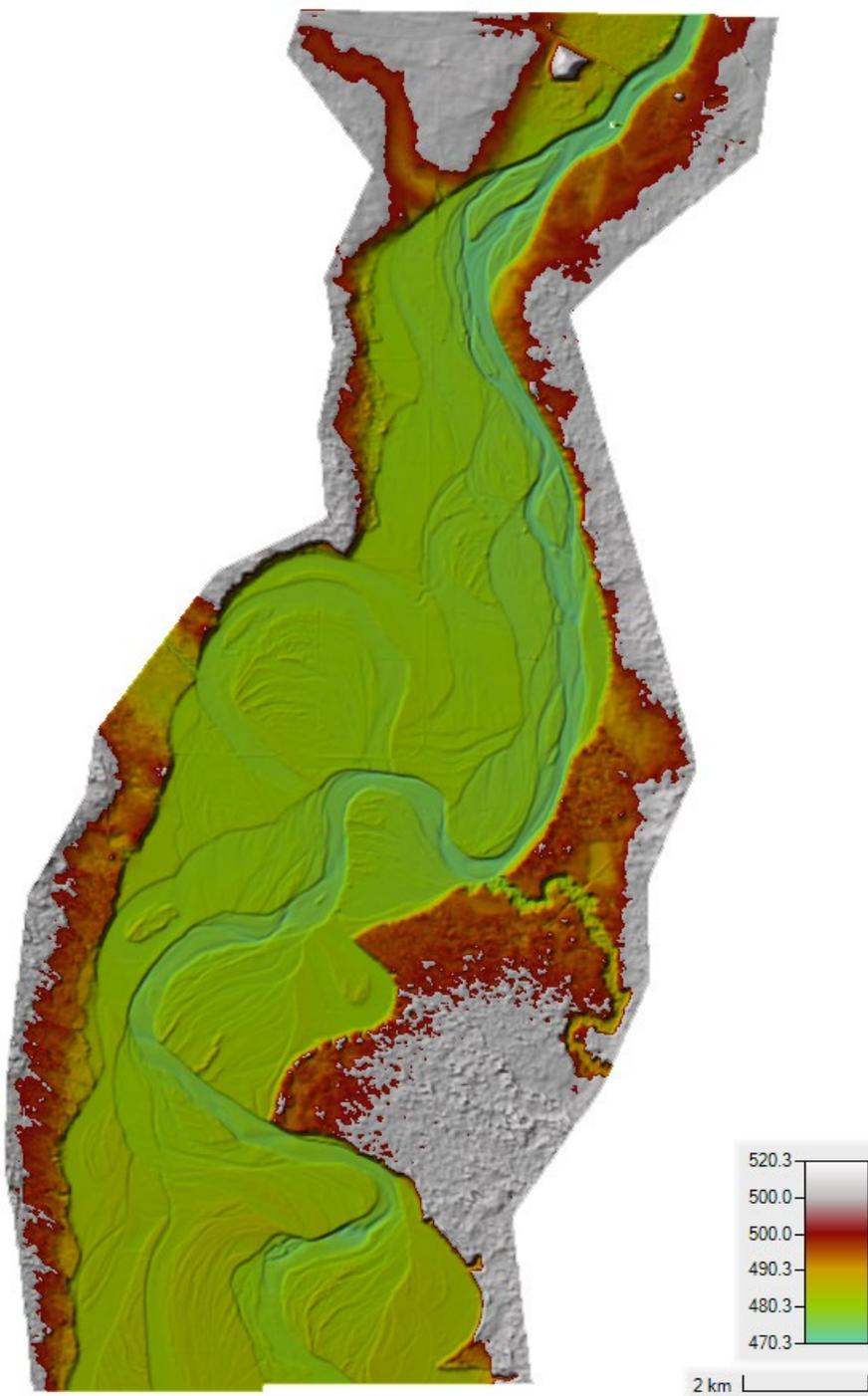


Summary of the Simulation Results:

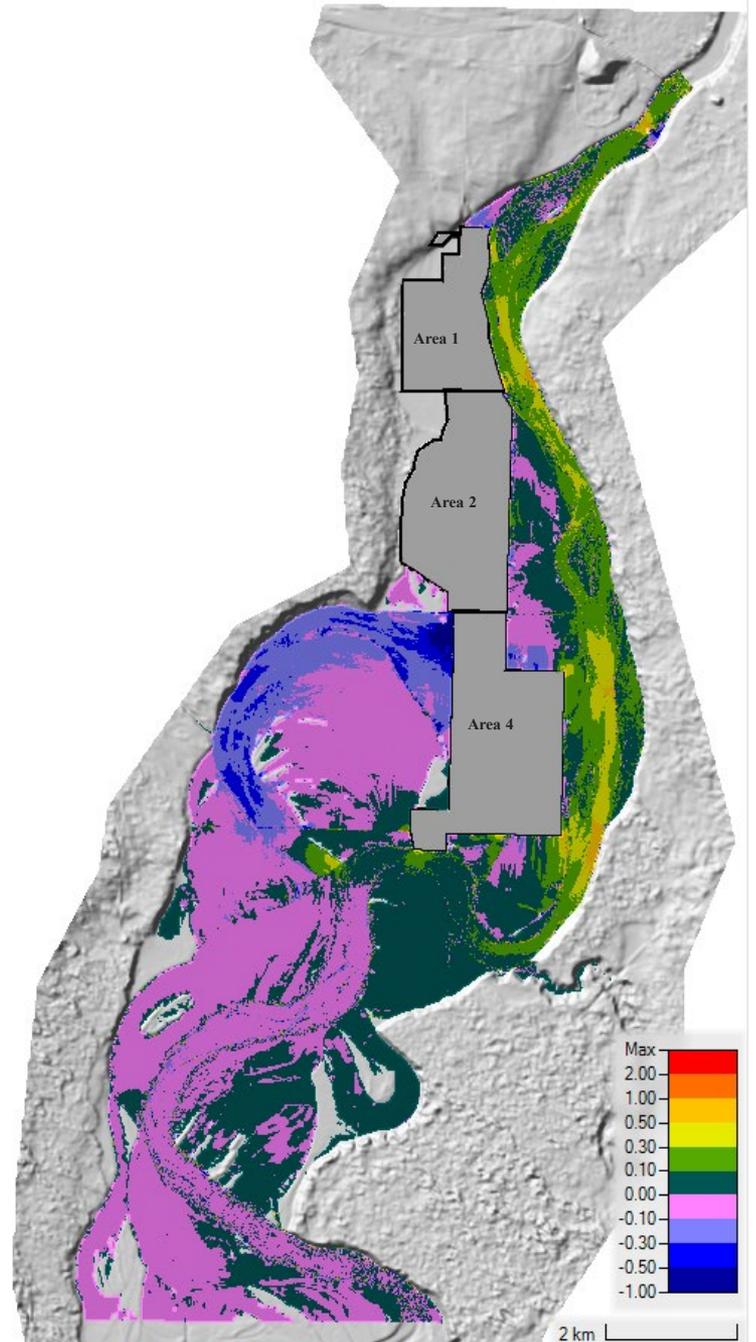
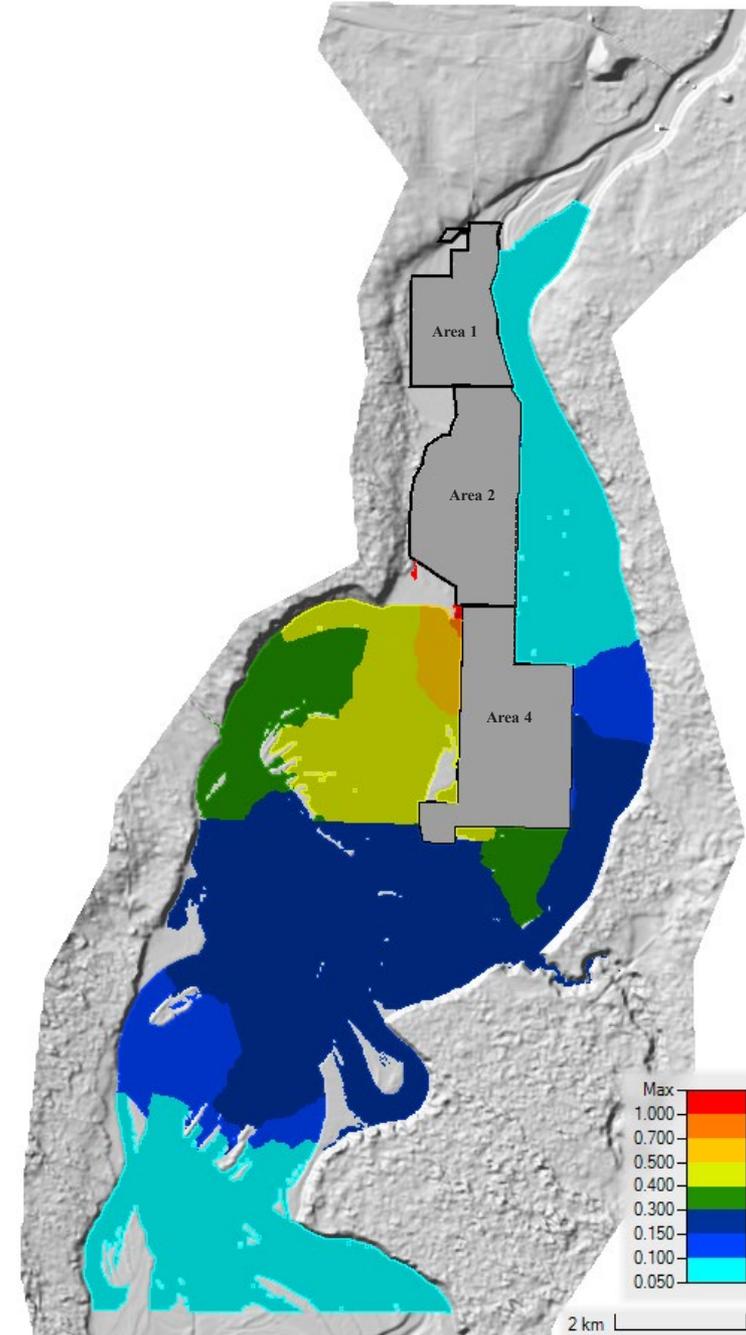
Parameter	Magnitude	Location
Water Surface Elevation (Maximum Change)	1.4 m	The oxbow lake and the channel Upstream of Area 2 and surrounding Area 4
Water Surface Elevation (Average Change)	0.4 m	Along the Study Reach
Water Velocity (Maximum Change)	2 m/s (increase)	Local spots along Area 1 and Area 3
Water Velocity (Average Change)	0.1 m/s (increase)	Overall increase along the reach

Flood Encroachment Analysis

Simulation Scenario- 2



Flow: 4200 m³/s- Round 2

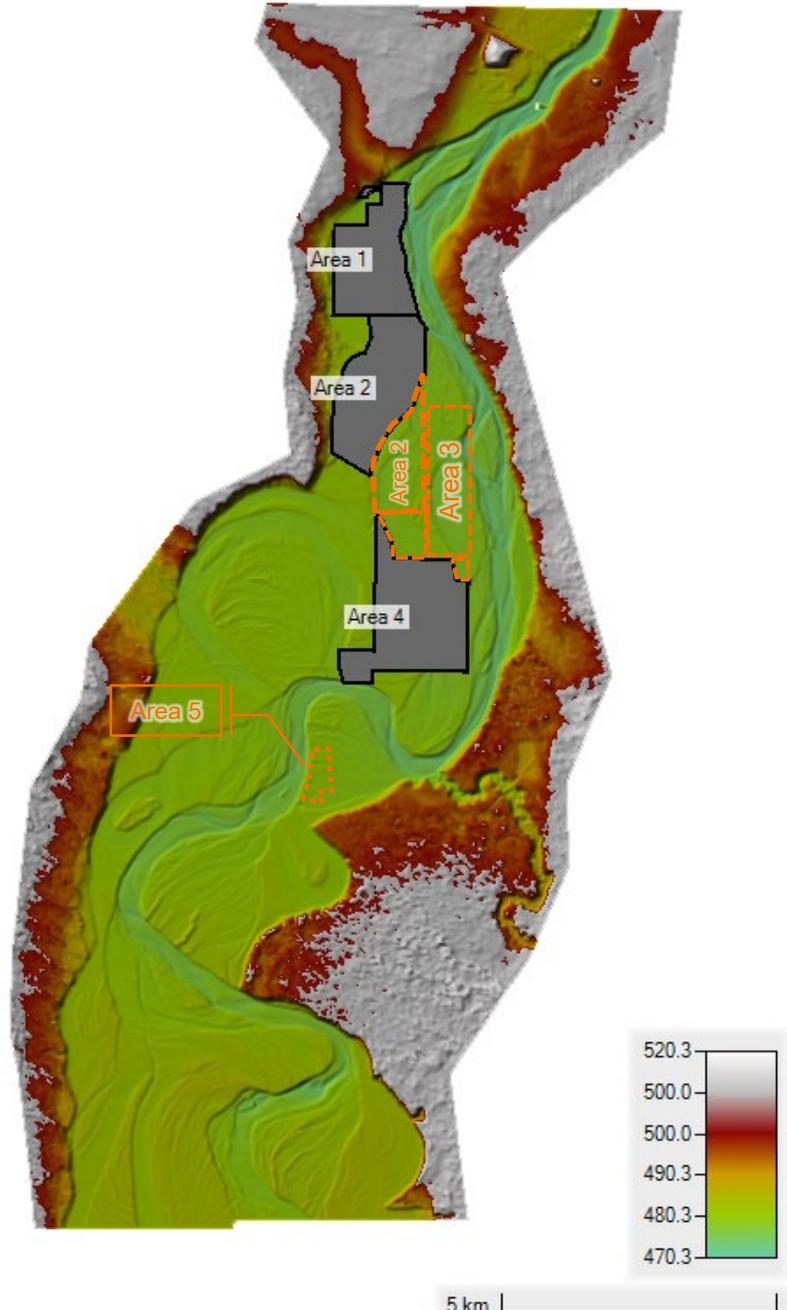
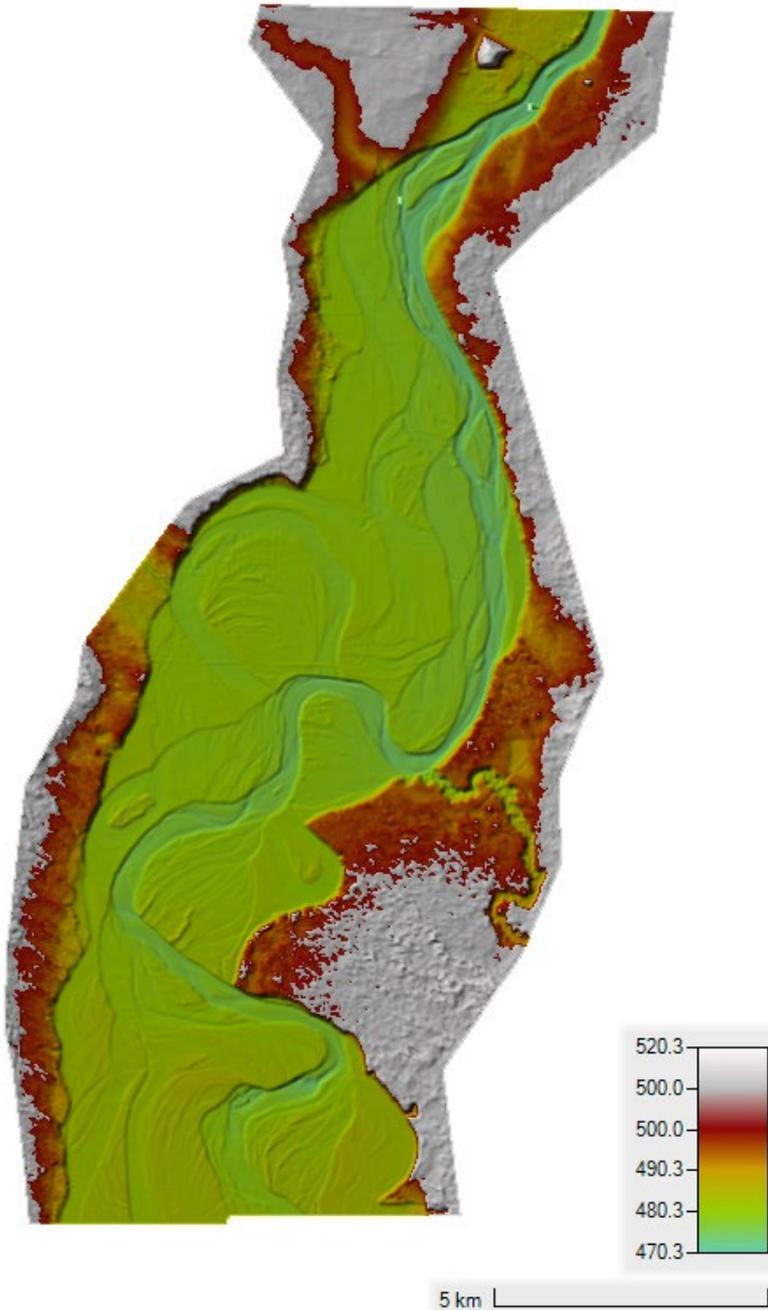


Summary of the Simulation Results:

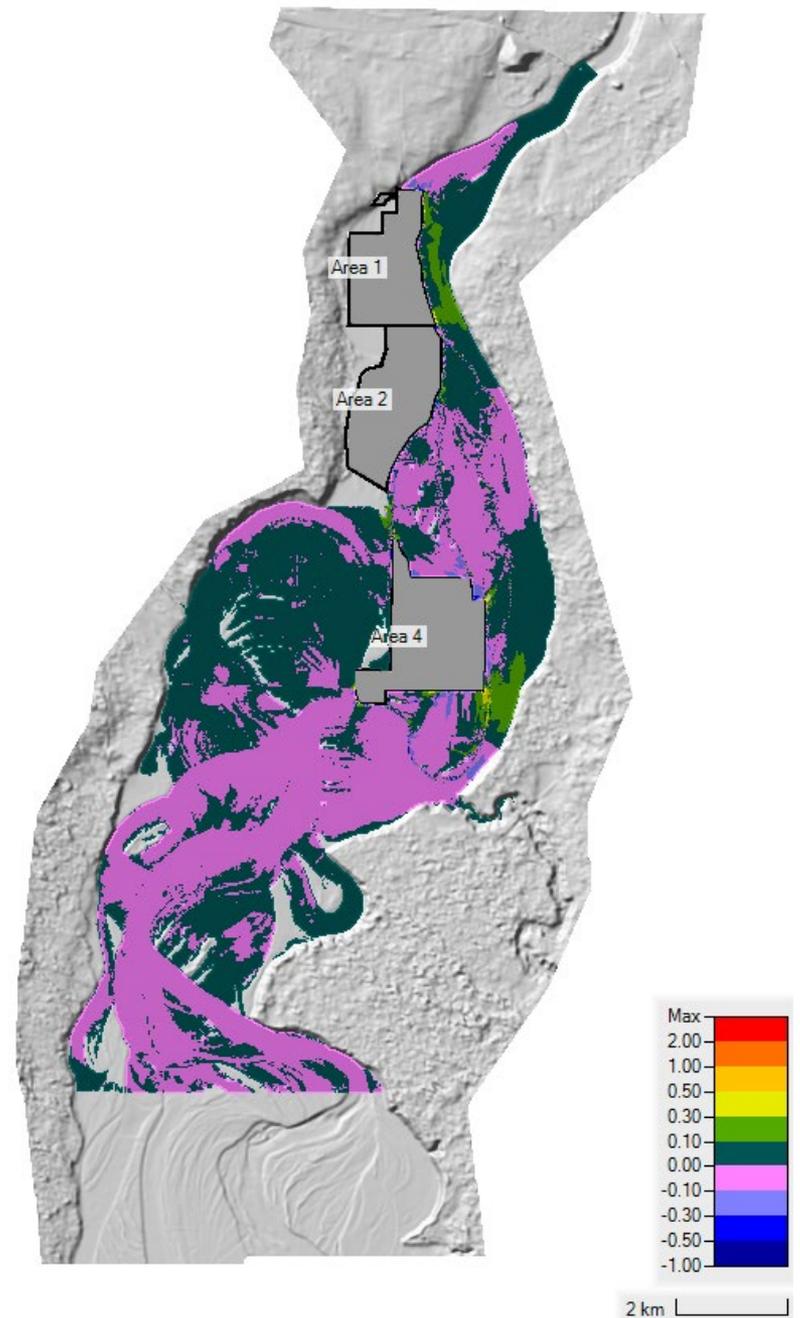
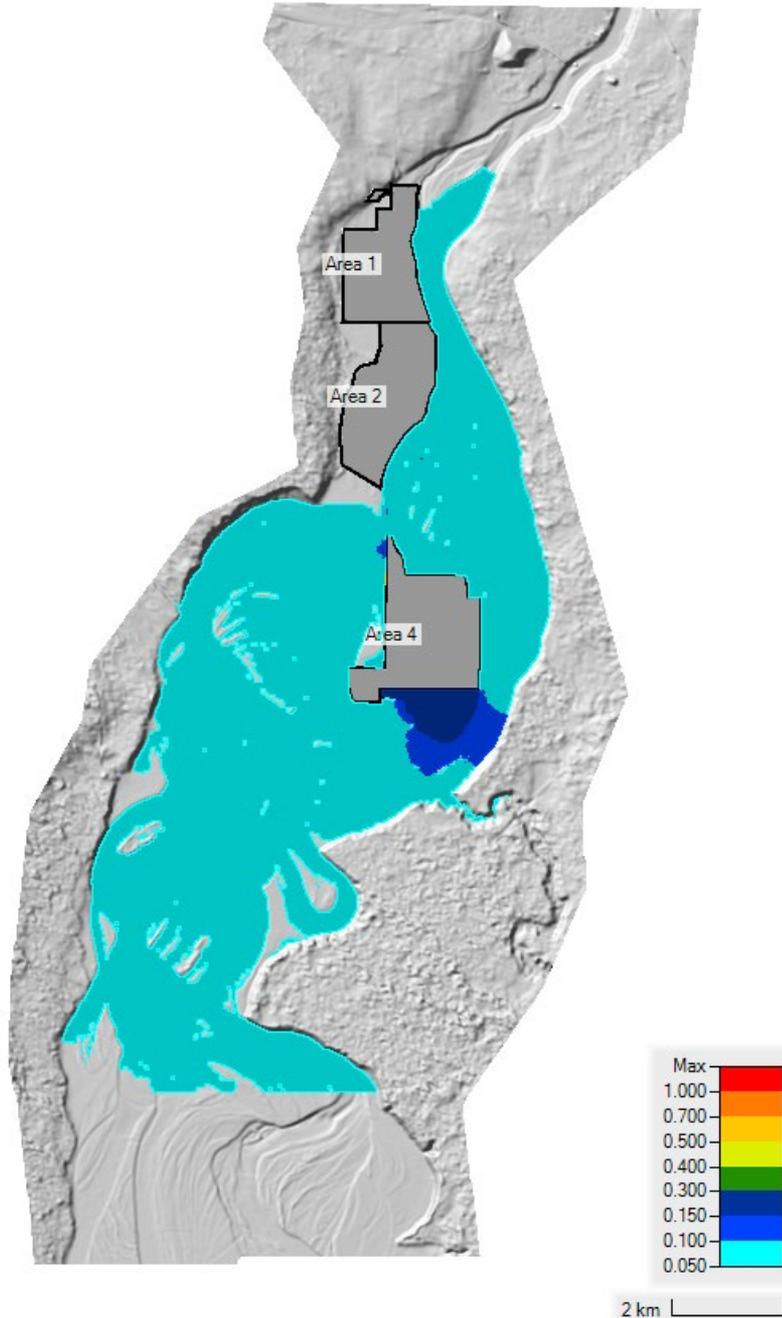
Parameter	Magnitude	Location
Water Surface Elevation (Maximum Change)	1.0 m	The oxbow lake and the channel Upstream of Area 2 and surrounding Area 4
Water Surface Elevation (Average Change)	0.2 m	Along the Study Reach
Water Velocity (Maximum Change)	1.7 m/s (increase)	main channel areas east of Areas 1, 2, 4
Water Velocity (Average Change)	< 0.1 m/s (increase)	Overall increase along the reach

Flood Encroachment Analysis

Simulation Scenario- 3



Flow: 4200 m³/s- Round 3



Summary of the Simulation Results:

Parameter	Magnitude	Location
Water Surface Elevation (Maximum Change)	0.25 m	Main Channel upstream of Area 4
Water Surface Elevation (Average Change)	< 0.1 m	Along the Study Reach
Water Velocity (Maximum Change)	1.5 m/s (increase)	Main channel areas east of Areas 1 and 4- Range Road 3061 (Valley Road)
Water Velocity (Average Change)	< 0.1 m/s (increase)	Overall increase along the reach

Flood Encroachment Analysis

Summary of the Results

Summary of the Simulation Results- All Scenarios:

Parameter	Scenario 1	Scenario 2	Scenario 3
Water Surface Elevation (Maximum Change)	1.4 m	1.0 m	0.25 m
Water Surface Elevation (Average Change)	0.4 m	0.2 m	< 0.1 m
Water Velocity (Maximum Change)	2 m/s (increase)	1.7 m/s (increase)	1.5 m/s (increase)
Water Velocity (Average Change)	0.1 m/s (increase)	< 0.1 m/s (increase)	< 0.1 m/s (increase)

Memorandum



From: Cesar Perez-Valdivia M.A.Sc, Ph.D.,P.Eng.
Manager Hydrology Services (North)
Water Security Agency

Date: Feb. 13, 2023

Phone: 306-513-8396

File: H6-2

To: Jeff Muirhead M.A.Sc., P.Eng.
Regional Technical Lead (Northern Canada)
Stantec

Re: **Stantec -Flood Encroachment Analysis of the South Saskatchewan River-
Iteration 3**

As requested, we have completed a technical review of the proposed encroachment analyses carried out by Stantec for the RM of Corman Park No. 344.

The comments below are based on the technical information presented during the meeting held via teams on Dec 13, 2022, including the memorandum from Stantec to Vicky Reaney, Date 10, 2022, and on the 2D hydraulic model provided on Jan 9, 2023 (working model provided later in January 2023).

The encroachment analysis for a 1:500 peak flow (4,200 m³/s) in the South Saskatchewan River was initially carried out for 5 areas within the RM of Corman Park No. 344, as illustrated in Figure 1, however, after a couple of iterations areas 3 and 5 were discarded from further analyses. The documentation provided mentioned that these analyses included flood fringe and flood way areas as defined by the Statement of Provincial Interest (SPI) and further refinement of these areas is expected in the following iterations. The proposed development for areas 1, 2, and 4 cover an area of ~12 km² and it has been estimated that ~85, ~94, ~90 percent of areas 1, 2, and 4, respectively, are flood plain areas from which ~45, ~35, ~40 percent of these areas is estimated to have flood water depths greater than 1 m which under the SPI are classified as floodway.

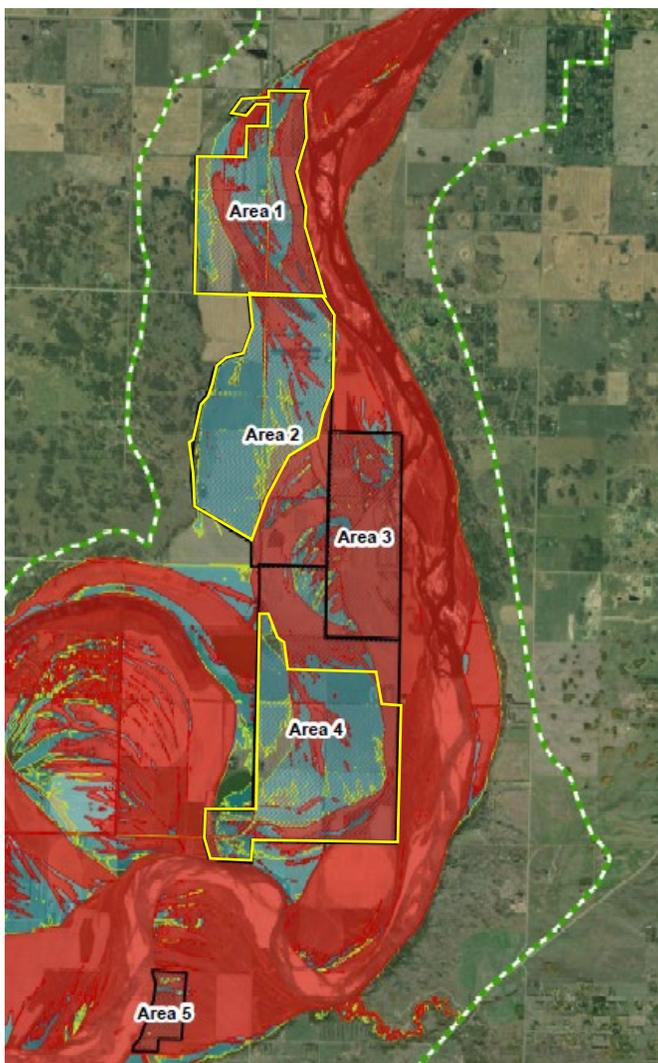
Specific comments for each of the areas considered for development are provided below:

Development in Area 1: Near 45 percent of this area is floodway (depths greater than 1 m) and 85% (40% flood fringe) is flood prone area under the current 1:500 flood event. Dry land is observed west of Valley Road with an existing grid road south of the non-flood prone areas. **It is recommended to further refine this area and seek advice from Government Relations (Community Planning) on the suitability of the land for development under the current legislation.**

Development in Area 2: This area presents a small portion in the southeast that is not flood prone (dry land under the current 1:500 flow). Nearly 11% of this area presents water depths greater than 1 m. Most of the flood fringe area is located west of Valley Road. There is a west grid road (Township Rd 360) north of this area.

It is recommended to further refine this area and seek advice from Government Relations (Community Planning) on the suitability of the land for development under the current legislation.

Figure 1: Areas proposed for development. Yellow polygons illustrate the areas considered in iteration 3. Blue and Red areas are flood fringe and floodway, respectively, under existing conditions.



areas which has not been discussed in the conceptual development.

Development in Area 4: Nearly 90% of this area is flood prone and ~25% presents water depths greater than 1m. This area is in the middle of the floodplain and under flood events is expected to be surrounded by water with depths greater than 1 m. Area 4 in this scenario is disconnected from Area 2 and does not have any egress.

There is an existing west road (Chennels Rd) northwest of this area, however, the existing modelling suggested that this road could be overtopped during a 1:500 flood event. Additionally, the modelling suggested that high water velocities occurred in the northern part of Area 4 on Valley Road.

It is recommended to further refine this area and seek advice from Government Relations (Community Planning) on the suitability of the land for development under the current legislation.

Overall, under the existing conditions, Valley Road is flooded limiting the egress options for the existing development in some of these

How has this issue of egress for the conceptual development(s) been addressed? The provided model PLANS or document details did not provide any additional information regarding Valley Road or other options.

On the hydraulic model, from the technical perspective, the encroachment analyses consisted of modifying the terrain by adding blocks to present the hydraulic obstructions caused by the future development which seems a reasonable approach.

Our general review of the model for iteration 3 confirms the results presented by Stantec during the December 13, 2022 meeting and documented in the technical memorandum to Vicky Reaney dated Nov 10, 2022. In general, increases in water velocity of up to 0.3 m/s in select areas of the channel and increases in water levels by 0.2m to 0.3m are documented. However, the model presents signs of instability, and we recommend the following:

- *Stantec should confirm increase in both the peak and average velocity associated with each of the Model Plan Iterations or Rounds.*
- *Stantec should consider the use of warm-up periods or other means to computationally stabilize the model PLANS prior to execution of iterations or rounds. It can have a significant impact on velocities. Please investigate further.*

It is noted that in general encroachment of the river increases velocities and water levels potentially impacting existing development and increasing erosion of the river which may require a geomorphological assessment.

In general, building in the floodway is not a recommended practice nor reducing the conveyance of the water course in particular a major river like the South Saskatchewan River. It is worth mentioning that Saskatchewan experiences a highly variable climate, from droughts to extreme flood events, and that under future climate projection these extreme events are expected to increase their duration and magnitude which could result in greater 1:500 flows. Therefore, best floodplain management practices are recommended when developing near rivers or water bodies.

Finally, although final refinement of the proposed areas for development is expected, we do recommend Stantec and the RM of Corman Park to seek advice from Community Planning on the development opportunities for the area of interest to comply with the existing regulation for the next round of iterations.

Cesar Perez-Valdivia
Manager Hydrology Services (North)
Water Security Agency

cc: Jeff Woodward, Hydrological Science, WSA
Vicky Reaney, RM of Corman Park No. 344

April 6, 2023
File: 144903094

Attention: Cesar Perez-Valdivia, M.A.Sc., Ph.D., P.Eng., Manager
Water Security Agency
Hydrology Services
300-2365 Albert Street
Regina, SK S4P 4K1

Dear Cesar Perez-Valdivia,

**Reference: Flood Encroachment Analysis of the South Saskatchewan River,
Regional Municipality of Corman Park**

Thank you for your review of the information we provided on January 9, 2023, and the subsequent meeting to discuss the various comments on February 21, 2023. At our meeting, we discussed the modeling approach and we're writing to document this information and confirm our understanding that the WSA is generally satisfied with the model approach to date. The following sections respond to the comments contained in your February 13, 2023 memorandum.

Each of the remaining candidate development areas is described as follows:

- Area 1
 - Total area: 272.66 ha
 - Area outside the floodplain: 24.11 ha (8.8%)
 - Flood fringe area: 110.64 ha (40.6%)
 - Floodway area: 137.91 ha (50.6%)
- Area 2
 - Total area: 319.63 ha
 - Area outside the floodplain: 25.14 ha (7.9%)
 - Flood fringe area: 239.40 ha (74.9%)
 - Floodway area: 55.09 ha (17.2%)
- Area 4
 - Total area: 388.48 ha
 - Area outside the floodplain: 41.6 ha (10.7%)
 - Flood fringe area: 228.54 ha (58.8%)
 - Floodway area: 118.34 ha (30.5%)

As recommended in your memorandum, a meeting with Government Relations (Community Planning) has been scheduled for April 12, 2023 to discuss these potential development areas.

With respect to the modeling questions from both the February memorandum and the meeting, we offer the information below.

Reference: Flood Encroachment Analysis of the South Saskatchewan River, Regional Municipality of Corman Park

- Commentary regarding the model stability:

"The model presents signs of instability, and we recommend the following:

- *Stantec should confirm increase in both the peak and average velocity associated with each of the Model Plan Iterations or Rounds.*
- *Stantec should consider the use of warm-up periods or other means to computationally stabilize the model PLANS prior to execution of iterations or rounds. It can have a significant impact on velocities. Please investigate further."*

Response: We are aware of and acknowledge the stability warnings in the simulations. These stability warning messages occur during the initial model simulation periods while the model is transitioning from a fully dry to flood simulation condition. In other words, as the "waterfront" moves through the simulation domain during the initial simulation steps, cells that are getting wet as the water propagates downstream experience some initial stability issues. However, these initial stability issues disappear as the flood condition develops and the cells become active. We believe these initial stability warnings do not impact the final simulation results for two main reasons;

1. As stated above, these stability warnings happen during the dry domain to wet domain transition periods. As soon as all the cells involved in the simulation are converted to wet conditions, the model stops producing the warnings.
2. The model simulates a quasi-Steady state flood condition, which means the flow hydrograph rises from zero to the peak discharge over a period of time and remains constant for the rest of the simulation. In the model plans, adequate simulation time is provided in the model to ensure the downstream boundary reaches the steady state before the simulation ends. We post-processed the model results at the end of the simulation period when the entire model had reached a steady state. Hence, not only are the initial stability warning issues solved before the "target time step," i.e., the simulation step at which the results are extracted, but the entire domain is also at the steady state condition.

We acknowledge the existence of methods and approaches to address the stability issues due to simulating the transition period. However, considering the fact that the model is a quasi-steady model, and the flood hydrograph routing was not a model objective in the study, we adopted a longer simulation time instead of providing the model with a warm-up period, which may cause additional stability issues, specifically if inappropriate simulation time steps are adopted.

- Commentary regarding the constant time step vs varying time step (provided in the meeting with WSA):

"Adopting varying time steps could potentially result in significant changes in the mode results. Stantec to provide discussion and evidence to prove it was not the case."

Response: We have conducted sensitivity analyses to assess the model response to different computational cell sizes and simulation time steps. Though a varying time step was used for the model calibration and performance assessment practices, the constant time step used for the production runs was found to be a practically optimized and appropriate number. Therefore, the constant time step was used primarily for production runs since it met the Courant number stability criterion for the simulations without significantly affecting the computational costs.

April 6, 2023

Cesar Perez-Valdivia, M.A.Sc., Ph.D., P.Eng., Manager

Page 3 of 5

Reference: Flood Encroachment Analysis of the South Saskatchewan River, Regional Municipality of Corman Park

Figures 1 and 2, attached, compare the model response to varying vs constant time steps used for the iteration 3 simulation. As shown, calculated water surface profiles are identical between the cases; hence, the model is insensitive to the simulation time step in this case.

We trust that this information addresses the technical modeling issues identified in the WSA memo and meeting discussions. If there are any further questions, please let us know. As mentioned previously, a meeting with Community Planning has been scheduled and we look forward to additional discussion on this project at that time.

Sincerely,

STANTEC CONSULTING LTD.

Steve Brown MBA, P.Eng.
Surface Water Lead, Canada East
Phone: 519 585 7446
steve.brown@stantec.com

Dustin Olexyn P.Eng.
Team Lead, Community Development
Phone: 306 667 2403
Dustin.Olexyn@stantec.com

Attachment: Figure 1, Constant vs Varying Time Step Water Surface Profile
Figure 2, Constant vs Varying Time Step Cross Section

c. Jeff Woodward, Hydrological Science, WSA
Vicky Reaney, Regional Municipality of Corman Park No. 344
Amanda Haeusler / Lesley Cabot, Stantec Consulting Ltd.

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Reference: Flood Encroachment Analysis of the South Saskatchewan River, Regional Municipality of Corman Park

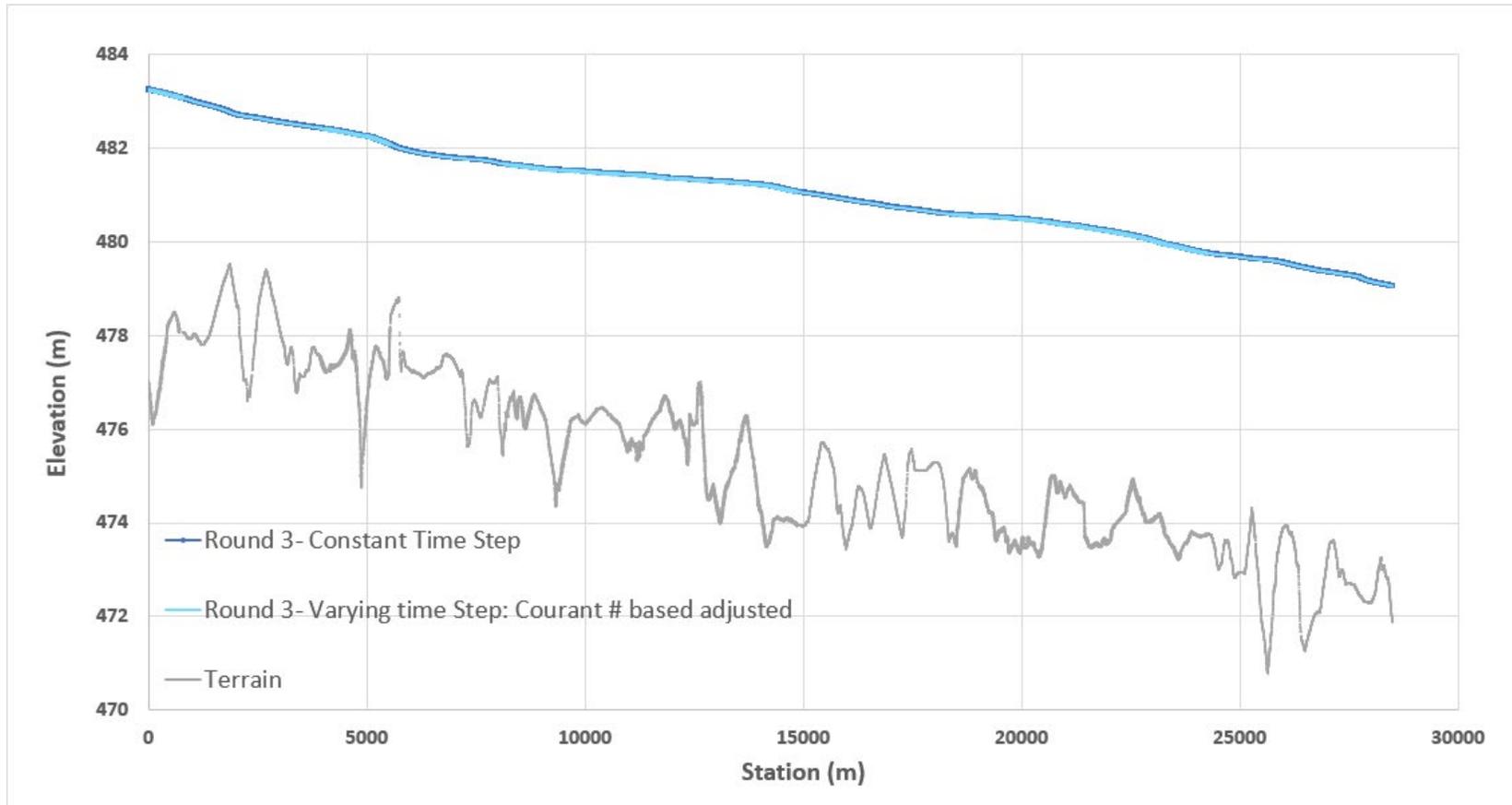


Figure 1: Constant vs Varying Time Step Water Surface Profile

April 6, 2023

Cesar Perez-Valdivia, M.A.Sc., Ph.D., P.Eng., Manager

Page 5 of 5

Reference: Flood Encroachment Analysis of the South Saskatchewan River, Regional Municipality of Corman Park

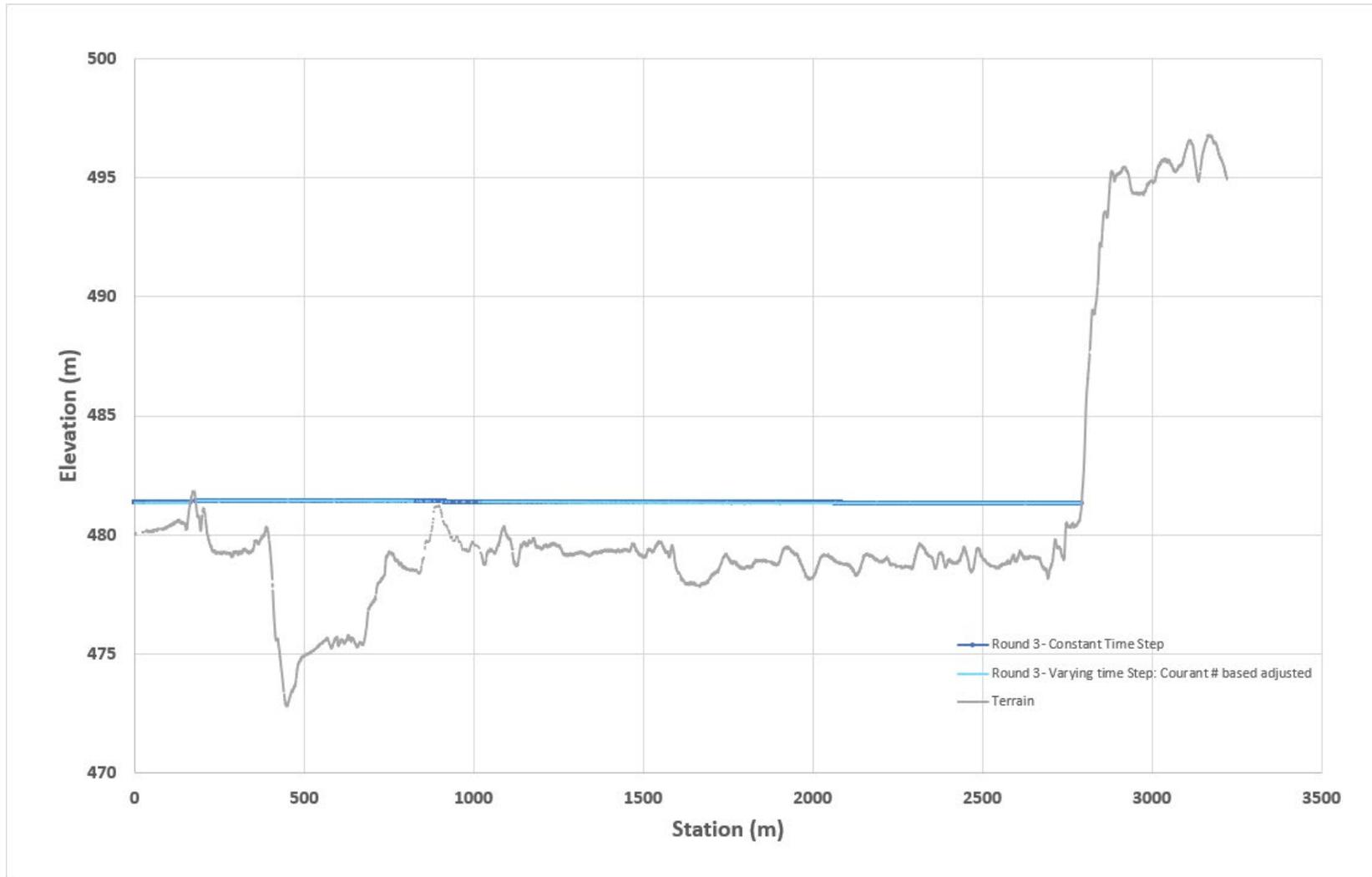


Figure 2: Constant vs Varying Time Step Cross Section

Design with community in mind



September 18, 2023
File H6-2
Mr. Steve Brown, MBA, P.Eng.
Surface Water Lead, Canada East
Stantec
Steve.brown@stantec.com

Dear Steve Brown,

Thank you for addressing our comments on iteration # 3 of the encroachment analysis of the South Saskatchewan River.

The responses provided on April 6, 2023 in the document "Reference: Flood Encroachment Analysis of the South Saskatchewan River, Regional Municipality of Corman Park" have addressed our comments and we are in agreement with the responses provided.

We do not have any further technical comments on iteration #3.

Regards,

Cesar Perez-Valdivia
Manager Hydrology Services -North

cc: Vicky Reany, RM of Corman Park No. 344

To: Vicky Reaney, Jim Charlebois From: Yasaman Afsharipour, M.Sc.,
Corman Park, SK Heather Amirault, P.Eng.

Project/File: 144903094 Date: June 30, 2023

Reference: Corman Park Encroachment Analysis: Summary of Iteration #4 Results

Dear Vicky,

In reference to proposal no. 144903094, this memorandum briefly summarizes the proposed conditions for iteration #4 and the hydraulic modelling results (digital model files provided separately).

Iteration #4 consists of the following:

- Candidate development areas 1, 2 and 4 have been included in this iteration (Figure 1). These development areas have been modified in shape compared to iteration #3. Similar to previous iterations, the surface terrain was raised to 500 m above mean sea level (AMSL) (conservatively above the 500-year flood elevation) in development areas, to prevent any water from entering these areas and thus, representing post-development topographic conditions.
- The portion of Valley Rd, bound by Area 2 and 4 was raised to 500 m AMSL (consistent with the candidate development areas) so the road is not overtopped in the 500-year scenario. Likewise, Township Rd 354 was also raised to 500 m AMSL. To create conveyance between the east and west sides of Valley Rd, an open passage in the form of a 100 m long by 2.5 m high opening was included close to Area 4 near the location of the current culvert. This open passage is presented as part of a feasibility concept and has been modeled merely to simulate flow of water without overtopping the road. The exact opening size, location and configuration (length and height) are not part of the scope of this modeling assignment and must be determined through detailed design.
- The model mesh grid around elevated roads was revised to align cells with the terrain surface features such as roads and candidate development areas. The 500-year (4,200 m³/s) and 100-year floods (2,500 m³/s) were simulated using the revised terrain and geometry.

The iteration #4 results are summarized as follows:

The encroachment analysis conducted for the design flood event (500-year flood) showed that water levels and velocities are generally consistent with the existing conditions documented in the BARR report (2019) across the entire study area, with the exception of the area upstream and downstream of Valley Road. Model results include:

- Water surface elevation (WSE) increases of less than 0.1 m were observed throughout the simulation domain, except for 1) the area at the intersection of Valley Road and Township Road 354 and 2) downstream of the opening (modeled culvert) under Valley Road (Figure 2). A maximum rise of 0.56 m is observed in the former, and 0.24 m in the latter.
- The model results showed velocity increases less than 0.1 m/s, except through the Valley Road opening where an increase of up to 2 m/s was observed beyond existing conditions (the existing culvert was not modeled under existing conditions, which is the reason for the change). This increase is localized and is typical of conditions at bridges and culverts. Velocities observed in the model are up to 2.5 m/s, which can be addressed with appropriate erosion protection during the design and construction stages.

Reference: Corman Park Encroachment Analysis: Summary of Iteration #4 Results

The size, location and configuration of the opening in the Valley Road can affect the location and magnitude of changes in depth and velocity and therefore should be refined during the detailed design stage to minimize changes and address residual impacts as needed (e.g., erosion protection).

A similar analysis was also completed for the 100-year flood scenario (Figure 3) to examine if the simulated terrain changes would have any impact on conditions during comparatively more frequent events. This assessment showed WSE increases of less than 0.1 m and velocity changes of less than 0.1 m/s throughout the study area. In this scenario, the Township Road 354 and the Valley Road are not flooded, and water will not pass through the opening under Valley Road.

These observations support the following conclusions:

- Construction within the candidate development areas would have minimal impact on flooding or floodplains during the 500-year event provided that the proposed Valley Road opening design incorporates appropriate erosion control measures; and
- Construction within the candidate development areas would have no impact on flooding or floodplains during events more frequent than the 100-year conditions.

Respectfully,

STANTEC CONSULTING LTD.

Yasaman Afsharipour M.Sc.
Hydrotechnical Engineer-In-Training
Mobile: 403 714 7701
Yasaman.afsharipour@stantec.com

Heather Amirault P.Eng.
Surface Water Engineer
Phone: 519 585 7453
heather.amirault@stantec.com

Attachment: Figures 1-3

Reference: Corman Park Encroachment Analysis: Summary of Iteration #4 Results

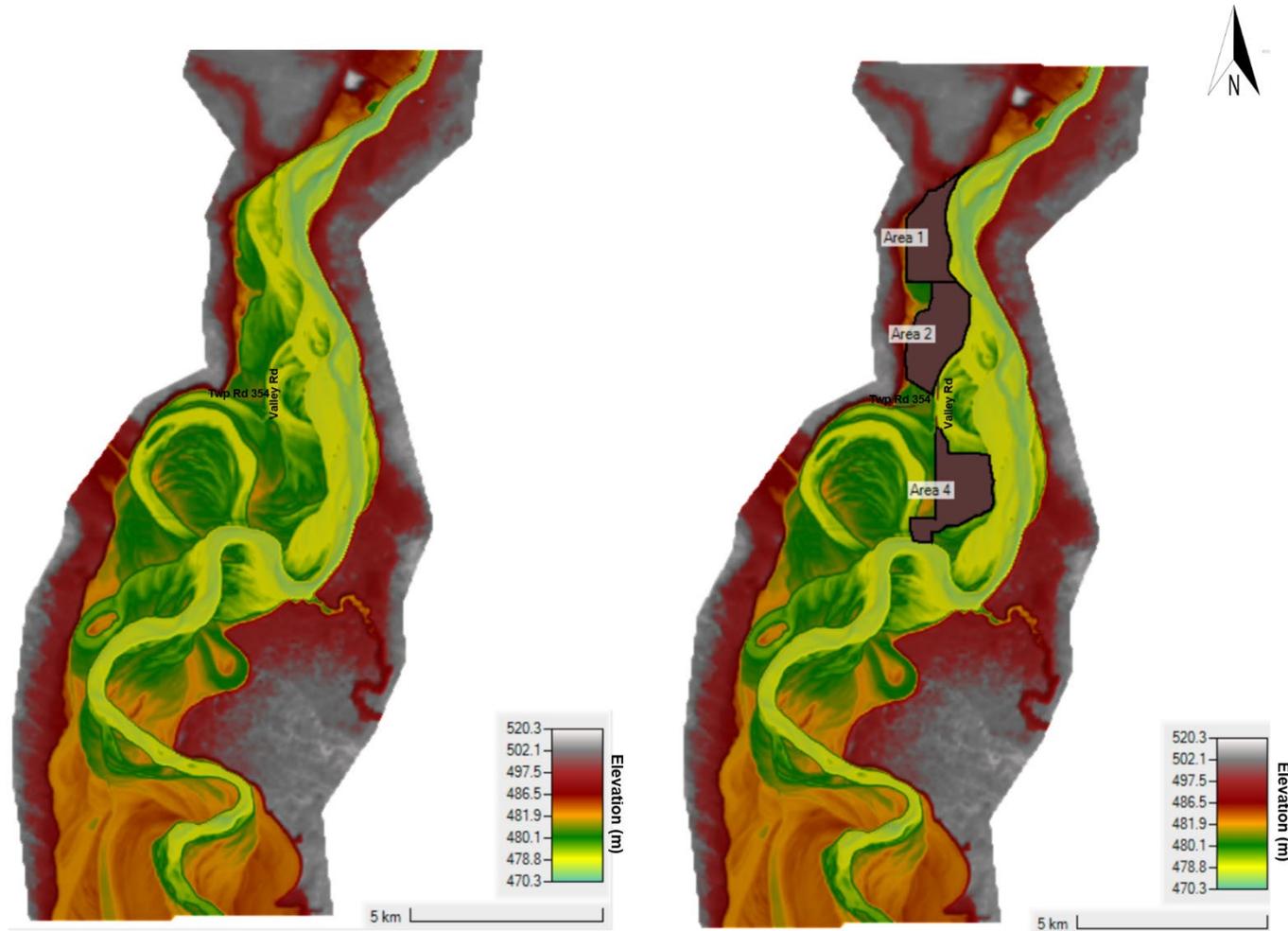


Figure 1 Left: Existing terrain surfaces for Iteration #4 Right: Developed terrain surfaces for Iteration #4- .

Reference: Corman Park Encroachment Analysis: Summary of Iteration #4 Results

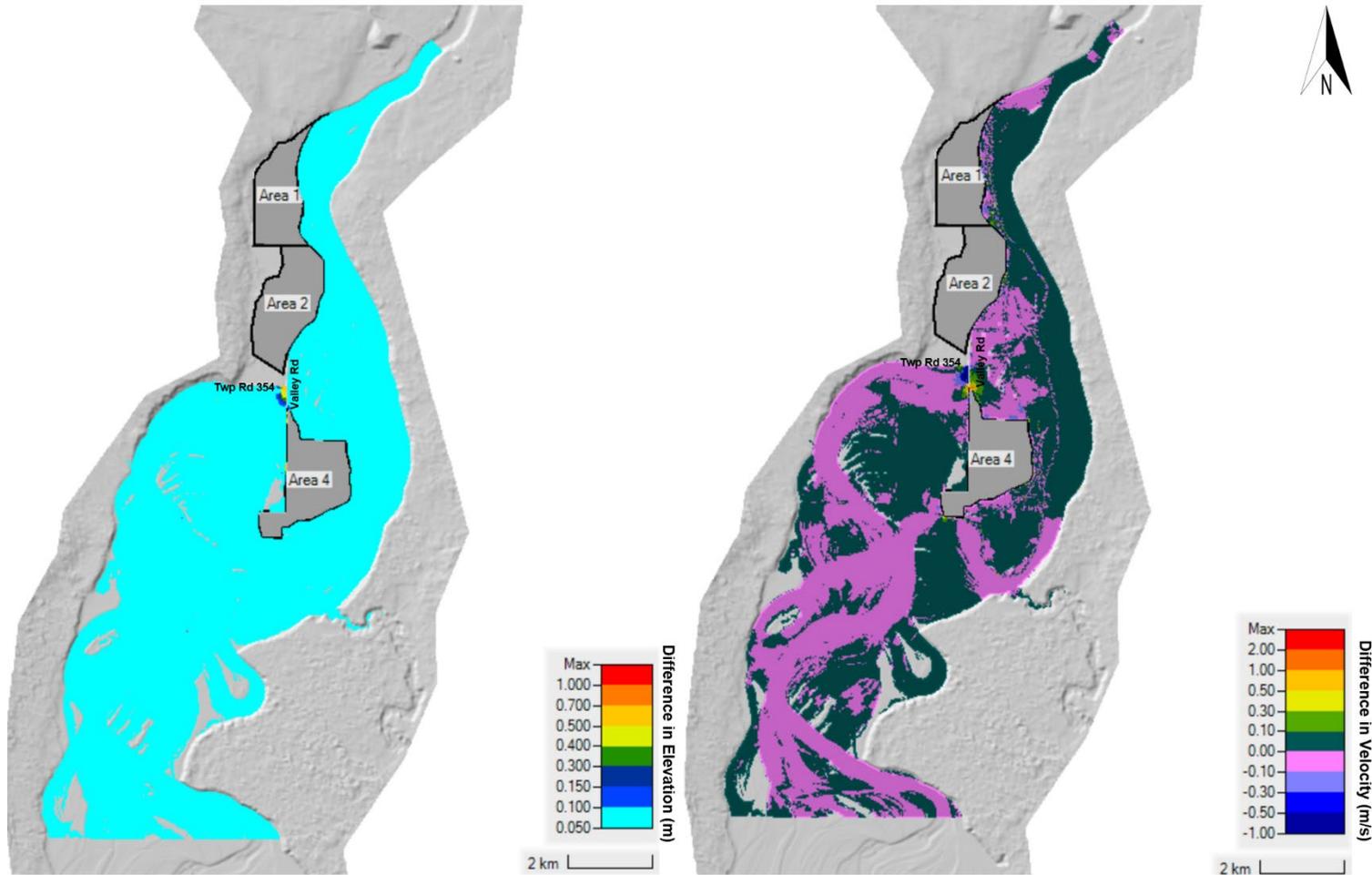


Figure 2 Differences in water surface elevation (m)(left image) and velocity (m/s) (right image) , due to construction within the candidate development areas (Iteration #4 – Areas 1,2 and 4) in a 500-year flood scenario (4,200 m³/s).

Reference: Corman Park Encroachment Analysis: Summary of Iteration #4 Results

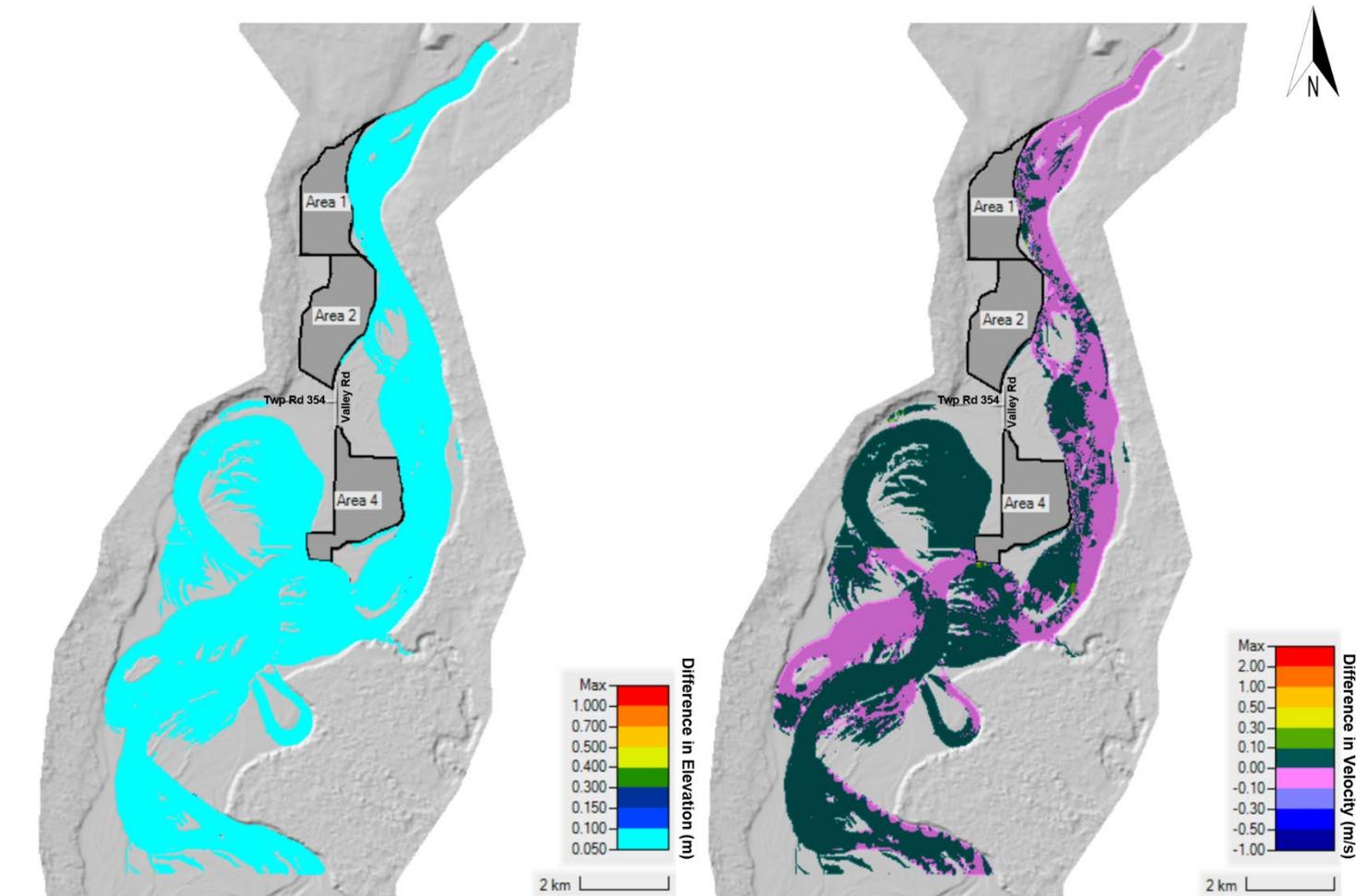


Figure 3 Differences in water surface elevation (m) (left image) and velocity (m/s) (right image), due to construction within the candidate development areas (Iteration #4 – Areas 1,2 and 4) in a 100-year flood scenario (2,500 m³/s).

September 18, 2023
File H6-2
Ms. Vicky Reaney
Senior Planner
RM of Corman Park No 344

Re: Reference Corman Park Encroachment Analysis: Summary of Iteration #4 Results

Dear Vicky Reaney,

We have reviewed the Corman Park Encroachment Analysis: Summary of Iteration #4 Results dated June 30, 2023 as well as the hydraulic model utilized for this iteration which was provided on July 24, 2023.

Iteration #4 introduced further refinements to areas 1, 2 and 4 as well as changes to the elevations of Valley Road and Twp RD 354 which were raised to an elevation of 500 m. The refinements in area 1 include removal of floodway area on the east and also the addition of land within the floodway and fringe west of Valley Road and towards the north on the east side of Valley Road. Changes in area 2 include the removal of flood way area in the northeast while changes in area 4 include the removal of floodway in the south and southeast. All changes are illustrated in Figure 1.

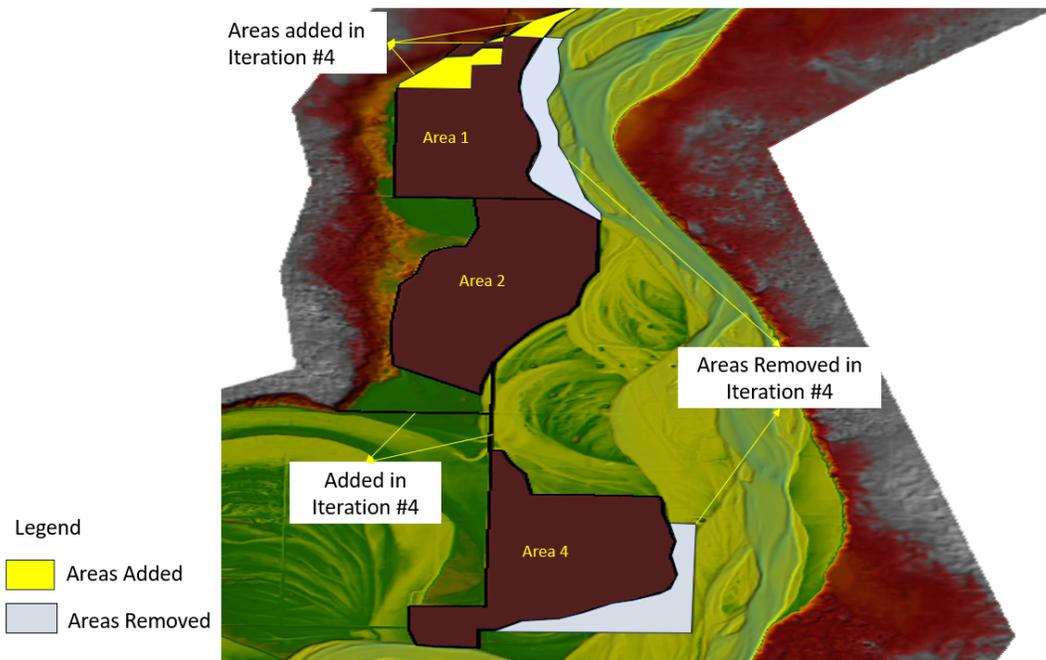


Figure 1. Terrain changes in Iteration #4

As documented, existing culverts in Valley Road and TWP RD 354 were modelled as rectangular culverts for this modelling exercise.

The Iteration 4.1 model plans were run at flows of 2,500 and 4,200 m³/s in HEC-RAS version 6.2. The models are for the most part stable and run sufficiently long to achieve steady flow conditions. Computational output logs indicate good volumetric balance. The model plans run in approximately 3:20 hour period without convergence / iteration warnings. The model uses the original Barr model (2019) as a foundation and utilizes the 1928 vertical datum.

Our review confirms marginal increases in velocities and depth as discussed in previous meetings. The most significant changes to both velocities and depth occur adjacent to Valley Road. Those changes are anticipated because of the conceptual design of a culvert / bridge crossing in the model. We assume these would be addressed in future bridge design level project.

Furthermore, we have a few minor comments below for your consideration.

- The 1928 vertical datum is documented within the model description (thank you) however, can you make sure it is documented as such in your future products (maps, and tables in reports for example). Is it possible to also include an approximate conversion to the 2013 vertical datum commonly used in Saskatchewan currently?
- There is no projection set in RasMapper. We placed a Zone 13N projection file into the model and brought up a Google Maps image. All features seem to be oriented correctly. You may wish to review and perhaps include a projection file in your deliverable model.
- We are curious as to why there are any velocity increases in your 4200 m³/s run between existing conditions and Iteration 4.1 at your downstream model boundary near the Circle Drive South and Railway bridges some distance downstream of any evaluated development zones?
 - These same issues are not apparent in the 2500 m³/s run and only the 4200 m³/s run (perhaps for reasonable hydraulic reasons, or otherwise).
 - Were different computational output and / or mesh parameters used in the two RasMapper output layers / files used to generate the computed velocity change layer?
 - Are the same factors influencing the calculated “changes in depth” RasMapper output layer?

Lastly, the comments provided in this document are from a technical perspective and do not constitute an endorsement of the model’s plans or future development.

Cesar Perez-Valdivia
Manager Hydrology Services -North

Cc: Yasaman Afsharipour, M.Sc., Stantec



October 17, 2023
File: 144903094

Attention: Cesar Perez-Valdivia, M.A.Sc., Ph.D., P.Eng., Manager
Water Security Agency
Hydrology Services
300-2365 Albert Street
Regina, SK S4P 4K1

Dear Cesar Perez-Valdivia,

Reference: Corman Park Encroachment Analysis – Iteration #4 Results

Thank-you for your response letter dated September 18, 2023.

We are pleased to provide the following responses to your comments (original comment in italics, followed by response):

Comment	Response
<i>The 1928 vertical datum is documented within the model description (thank you) however, can you make sure it is documented as such in your future products (maps, and tables in reports for example). Is it possible to also include an approximate conversion to the 2013 vertical datum commonly used in Saskatchewan currently?</i>	Future maps will document the vertical datum used. The approximate conversion to the 2013 vertical datum commonly used in Saskatchewan currently can be obtained using the following tool: GPS·H (nrcan-rncan.gc.ca) A screenshot is attached showing the conversion at the intersection of Township Rd 354 and Range Rd 3061.
<i>There is no projection set in RasMapper. We placed a Zone 13N projection file into the model and brought up a Google Maps image. All features seem to be oriented correctly. You may wish to review and perhaps include a projection file in your deliverable model.</i>	Projections are present in RasMapper in our files. A file may have been removed or corrupted during the transfer to WSA. Updated files will be provided under separate cover.
<i>We are curious as to why there are any velocity increases in your 4200 m³/s run between existing conditions and Iteration 4.1 at your downstream model boundary near the Circle Drive South and Railway bridges some distance downstream of any evaluated development zones?</i> <ul style="list-style-type: none"><i>These same issues are not apparent in the 2500 m³/s run and only the 4200 m³/s run (perhaps for reasonable hydraulic reasons, or otherwise).</i>	The DEM was reviewed and some minor discrepancies between the existing condition plans were identified. These discrepancies were removed and when re-run the model produced the results reported in our June 30, 2023 memo. Updated files will be provided under separate cover.

October 17, 2023

Cesar Perez-Valdivia, M.A.Sc., Ph.D., P.Eng., Manager

Page 2 of 2

Reference: **Corman Park Encroachment Analysis – Iteration #4 Results**

Comment	Response
<ul style="list-style-type: none">• <i>Were different computational output and / or mesh parameters used in the two RasMapper output layers / files used to generate the computed velocity change layer?</i>• <i>Are the same factors influencing the calculated “changes in depth” RasMapper output layer?</i>	

The HEC-RAS files are loaded onto the FTP site for confirmation of the responses above.

This work will inform the update of the RM's Official Community Plans and Zoning Bylaws and ensure they are in alignment with provincial regulations that are intended to mitigate the impacts of flooding by limiting and carefully managing development in the floodplain. Corman Park is planning a public consultation of this information in late November 2023.

We trust that these responses are satisfactory. If further clarifications are required, please don't hesitate to contact us.

Sincerely,

STANTEC CONSULTING LTD.

Yasaman Afsharipour M.Sc.
Hydrotechnical Engineer-In-Training
Mobile: 403 714 7701
Yasaman.afsharipour@stantec.com

Heather Amirault P.Eng.
Surface Water Engineer
Phone: 519 585 7453
heather.amirault@stantec.com

Attachment: Screen Capture – data for intersection of Township Rd 354 and Range Rd 3061

c. Vicky Reaney, Regional Municipality of Corman Park No. 344
Amanda Haeusler / Lesley Cabot / Steve Brown, Stantec Consulting Ltd.

Im \\cd1004-f01\work_group\01614\active\144903094\design\correspondence\let_144903094_encroachment_20231017_lm.docx

Single Calculation

Batch Processing

Single Calculation

Convert Longitude Positive West Input H

Conversion

Reference Frame

HT2_2010_to_CGG2013a

NAD83(CSRS)

Geographic

Cartesian

Projection

Latitude

Longitude

H (metres)

52.02722222

-106.7413889

480.250

Calculate

Results

H28 (metres)

dH (metres)

H2013 (metres)

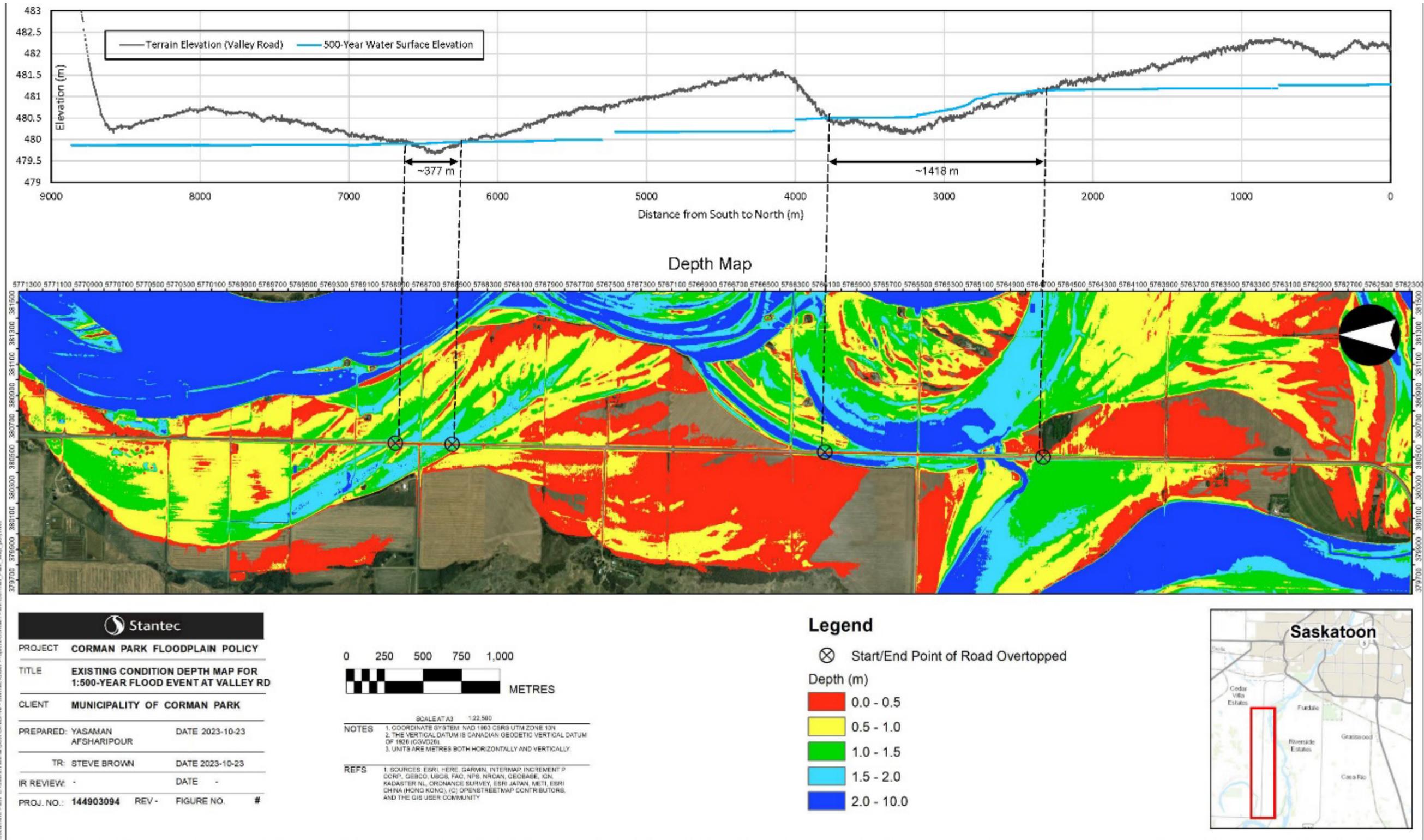
480.250

-0.268

479.982

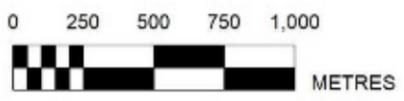
**ATTACHMENT B:
Terrain and Water Surface Elevation
Along Valley Road**

Attachment B: Terrain and Water Surface Elevation Along Valley Road



Document Path: C:\Users\Yasaman\OneDrive - Stantec\OneDrive\Projects\Corman Park Map\proj\mxd

PROJECT	CORMAN PARK FLOODPLAIN POLICY
TITLE	EXISTING CONDITION DEPTH MAP FOR 1:500-YEAR FLOOD EVENT AT VALLEY RD
CLIENT	MUNICIPALITY OF CORMAN PARK
PREPARED BY: YASAMAN AFSHARIPOUR	DATE: 2023-10-23
TR: STEVE BROWN	DATE: 2023-10-23
IR REVIEW: -	DATE: -
PROJ. NO.: 144903094	REV - FIGURE NO. #



SCALE AT A3 1:22,500

NOTES

- COORDINATE SYSTEM: NAD 1983 CGRS UTM ZONE 13N
- THE VERTICAL DATUM IS CANADIAN GEODETIC VERTICAL DATUM OF 1929 (CGVD29)
- UNITS ARE METRES BOTH HORIZONTALLY AND VERTICALLY.

REFS

- SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P, IGN, GISCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

Legend

⊗ Start/End Point of Road Overtopped

Depth (m)

	0.0 - 0.5
	0.5 - 1.0
	1.0 - 1.5
	1.5 - 2.0
	2.0 - 10.0



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APPENDIX C



Appendix C Review of Uses

RM OF CORMAN PARK FLOOD PLAIN POLICY RECOMMENDATIONS
Example for Reviewing New Uses and Buildings

Uses	Decision-Making Notes			Flood Hazard Overlay		Underlying Land Use Districts										
	Anticipated Risks	Agricultural Operation	Buildings	Floodway	Flood Fringe	AG	AG1	AG2	CR1	CR4	C	B1	M1	M2	REC	CONS
Abattoir	Industrial - potentially hazardous goods	no	yes	Prohibited	Within Regulations	D	D	D					P	P		
Aggregate Resource Extraction Industry	Resource extraction	no	maybe	Prohibited	Prohibited	D	D	D								
Aggregate Resource Storage and Processing Operation	Resource extraction	no	yes	Prohibited	Prohibited	D	D	D					P	P		
Agricultural Operation	Agricultural	yes	FARM	Permitted	Permitted	P	P	P								D
Agricultural Support Service	Commercial	no	yes	Prohibited	Within Regulations	D	D	D			D	D	P	P		
Agricultural Tourism Use	Commercial	no	yes	Prohibited	Within Regulations	D	D	D			D				D	
Airport	Critical Infrastructure	no	maybe	Prohibited	Prohibited	D	D	D								
Amusement and Entertainment Service	Commercial	no	maybe	Prohibited	Within Regulations						P	P				
Animal Cemetery	Culturally sensitive, forever storage	no	no	Prohibited	Prohibited	D	D	D								
Animal Columbarium	Culturally sensitive, forever storage	no	yes	Prohibited	Prohibited	D	D	D			D	D				
Animal Crematorium	Culturally sensitive, overnight storage of remains	no	yes	Prohibited	Prohibited								P	P		
Animal Funeral Home	Culturally sensitive, no overnight storage of remains	no	yes	Prohibited	Within Regulations						D	P				
Animal Kennel	Animal occupancy - vulnerable occupants	no	yes	Prohibited	Within Regulations	D	D	D			D	D	D			
Auction Facility	Potential outdoor storage	no	maybe	Prohibited	Within Regulations	D	D	D				D	D	P		
Auto Wrecker	Outdoor storage	no	maybe	Prohibited	Prohibited									D		
Bed and Breakfast Home	Residential occupancy	no	yes	Prohibited	Within Regulations	D	D	D							D	
Brewery	Non-agricultural use, patron industrial/ commercial	no	yes	Prohibited	Within Regulations							D	P	P		
Bulk Fuel Sales and Storage	Hazardous goods	no	yes	Prohibited	Prohibited	D	D	D					P	P		
Business Support Service	Commercial	no	yes	Prohibited	Within Regulations						D	D	P			
Campground	Low impact outdoor use	no	maybe	Without buildings	Within Regulations						D				D	
Cannabis Micro Production Facility	Non-agricultural use	no	yes	Prohibited	Within Regulations	D	D	D				D	P	P		
Cannabis Processing Facility	Non-agricultural use	no	yes	Prohibited	Within Regulations							D	P	P		
Cannabis Production Facility	Non-agricultural use	no	yes	Prohibited	Within Regulations	D	D	D				D	P	P		
Cannabis Research and testing facility	Non-agricultural use	no	yes	Prohibited	Within Regulations							D	P	P		
Cannabis Retail Store	Commercial	no	yes	Prohibited	Within Regulations						P	P	D			
Cannabis Wholesaler	Commercial	no	yes	Prohibited	Within Regulations						D	D	P	P		
Cemetery	Culturally sensitive	no	no	Prohibited	Prohibited	D	D	D						D		
Chemical Plant	Hazardous goods	no	yes	Prohibited	Prohibited											
Clean Fill Storage Operation	Hazardous goods	no	maybe	Prohibited	Prohibited	D	D	D					P	P		
Columbarium	Culturally sensitive	no	yes	Prohibited	Prohibited	D	D	D			D	D				
Commercial complex, multiple buildings	Commercial	no	yes	Prohibited	Within Regulations						D	D				
Commercial complex, one building	Commercial	no	yes	Prohibited	Within Regulations						P	P				
Commercial Recreation	Commercial	no	maybe	Prohibited	Within Regulations						D	D			D	
Commercial Storage Centre	Commercial	no	yes	Prohibited	Within Regulations						D	D	P	P		
Community Care Facility	Residential occupancy - vulnerable occupants	no	yes	Prohibited	Prohibited	D	D	D	D	D		D				
Community Facility	Commercial	no	yes	Prohibited	Within Regulations	D	D	D	D	D					D	
Community Recreational Use	Commercial	no	maybe	Without buildings	Within Regulations										P	
Concrete and Asphalt Plant	Hazardous goods	no	yes	Prohibited	Prohibited									P		
Construction Yard	Outdoor storage	no	maybe	Prohibited	Within Regulations								D	P		
Convenience Commercial Service	Commercial	no	yes	Prohibited	Within Regulations										D	
Crematorium	Culturally sensitive	no	yes	Prohibited	Prohibited								P	P		
Distillery	Non-agricultural use, patron industrial/ commercial	no	yes	Prohibited	Within Regulations							D	P	P		
Equestrian Facility Type 1 (accessory to dwelling, 10 horses)	Animal occupancy, residential occupancy	no	yes	Prohibited	Within Regulations	P	P	D		D					P	
Equestrian Facility Type 2 (without dwelling, 100 horses)	Animal occupancy	no	yes	Prohibited	Prohibited	D	D	D	D	D					P	
Equipment Sales/ Rentals	Light industrial	no	maybe	Prohibited	Within Regulations						D		P	P		
Farmhand Dwelling, more than 2 on a Site	Residential occupancy	no	yes	Prohibited	Within Regulations	D	D									
Farmhand Dwelling, up to 2 on a Site	Residential occupancy	no	yes	Prohibited	Within Regulations	P	P	D								
Financial Institution	Commercial	no	yes	Prohibited	Within Regulations						P	P				
Food Service Use	Commercial	no	yes	Prohibited	Within Regulations						P	P			D	
Funeral Home	Culturally sensitive	no	yes	Prohibited	Prohibited						P	P				
Garage Suite	Residential occupancy	no	yes	Prohibited	Within Regulations	P	P	P								
Garden Suite	Residential occupancy	no	yes	Prohibited	Within Regulations	D	D	D	D	D						
Gas Bar	Hazardous goods	no	yes	Prohibited	Prohibited						D	P	P	P		
Golf Course	Low impact outdoor use	no	maybe	Without buildings	Within Regulations										P	
Guest House	Residential occupancy	no	yes	Prohibited	Within Regulations	D	D	D	D							



Appendix C Review of Uses

Uses	Decision-Making Notes			Flood Hazard Overlay		Underlying Land Use Districts											
	Anticipated Risks	Agricultural Operation	Buildings	Floodway	Flood Fringe	AG	AG1	AG2	CR1	CR4	C	B1	M1	M2	REC	CONS	
Historical and archaeological site	Low impact outdoor use	no	no	Permitted	Permitted												P
Home Based Business Type 1	Intensification of residential occupancy	no	yes	Prohibited	Within Regulations	P	P	P	P	P							
Home Based Business Type 2	Intensification of residential occupancy	no	yes	Prohibited	Within Regulations	P	P	P	D	D							
Home Based Business Type 3	Intensification of residential occupancy	no	yes	Prohibited	Within Regulations	D	D	D									
Hotel/ Motel	Residential occupancy	no	yes	Prohibited	Within Regulations						D	D				D	
Industrial Complex, multiple buildings	Industrial	no	yes	Prohibited	Within Regulations							D	D	D			
Industrial Complex, one building	Industrial	no	yes	Prohibited	Within Regulations							P	P	p			
Intensive Agricultural Operation - Horticulture	Agricultural	yes	yes	Without buildings	Within Regulations	D	D	D									D
Intensive Agricultural Operation - Livestock	Agricultural, animal occupancy	yes	maybe	Prohibited	Prohibited	D	D	D									
Land Farm	Hazardous goods (contaminated soils)	no	no	Prohibited	Prohibited			D									
Landscaping service	Outdoor storage	no	maybe	Prohibited	Within Regulations								D	P			
Levelling, Filling and Grading Type 1	Low impact outdoor use	no	no	Prohibited	Within Regulations	P	P	P	P	P	P	P	P	P	P	P	P
Levelling, Filling and Grading Type 2	Low impact outdoor use	no	no	Prohibited	Within Regulations	D	D	D			D	D	D	D	D	D	D
Local waste management and remediation industry	Hazardous goods	no	maybe	Prohibited	Prohibited								D	P			
Manufacturing establishment	Industrial	no	yes	Prohibited	Within Regulations							D	P	P			
Mausoleum	Culturally sensitive	no	yes	Prohibited	Prohibited	D	D	D			D		D				
Mineral Resource Extraction Industry	Resource extraction	no	no	Prohibited	Prohibited	P	P							D			
Mineral Resource Storage and Processing Operation	Resource extraction	no	yes	Prohibited	Prohibited									D			
Municipal Facility	Critical Infrastructure	no	yes	Prohibited	Within Regulations	P	P	P	P	P	P	P	P	P	P	P	
Passive Recreation	Low impact outdoor use	no	maybe	Without buildings	Within Regulations										P	D	
Personal Service Facility	Commercial	no	yes	Prohibited	Within Regulations						P	P					
Pet care facility	Commercial, no animal accommodations	no	yes	Prohibited	Within Regulations						P	P	P				
Public market	Commercial	no	maybe	Without buildings	Within Regulations						P	D					
Public utilities	Critical Infrastructure	no	maybe	Within regulations	Within Regulations	P	P	P	P	P	P	P	P	P	P	P	
Race track	Low impact outdoor use, could include fuel storage	no	maybe	Prohibited	Within Regulations												D
Railway freight yard	Hazardous goods	no	maybe	Prohibited	Prohibited								D	P			
Recreation vehicle sales/ rentals	Outdoor storage	no	maybe	Prohibited	Prohibited						P	P	P				
Research laboratory	Commercial	no	yes	Prohibited	Within Regulations							D	P	P			
Retail store	Commercial	no	yes	Prohibited	Within Regulations						P	P	D				
Salvage yard	Outdoor storage	no	maybe	Prohibited	Prohibited									D			
Secondary suite	Residential occupancy	no	yes	Prohibited	Within Regulations	P	P	P	P	P							
Service station	Hazardous goods	no	yes	Prohibited	Prohibited						D	D	P	P			
Single detached country residence	Residential occupancy	no	yes	Prohibited	Within Regulations		P	P	P	P							
Solar farm	Critical Infrastructure	no	maybe	Prohibited	Within Regulations	D	D	D					P	P			
Solid & Liquid Waste Disposal Facility	Hazardous goods	no	yes	Prohibited	Prohibited	D	D	D									
Telecommunication facility	Critical Infrastructure	no	maybe	Prohibited	Within Regulations	D	D	D			D	P	P	P			
Tourist home	Residential occupancy	no	yes	Prohibited	Within Regulations	D	D	D									
Used building material retail outlet	Industrial/ commercial	no	yes	Prohibited	Within Regulations								D				
Vacation farm	Residential occupancy	no	yes	Without buildings	Within Regulations	D	D	D								D	
Vehicle repair shop	Industrial/ commercial	no	yes	Prohibited	Within Regulations						D	D	P	P			
Vehicle sales/ rentals	Outdoor storage	no	yes	Prohibited	Prohibited						P	P	P				
Vehicle/ equipment wash	Hazardous goods	no	yes	Prohibited	Within Regulations						D	D	P	P			
Veterinary clinic	Animal occupancy	no	yes	Prohibited	Prohibited	D	D	D			P	P	P				
Warehousing and warehousing sales	Industrial	no	yes	Prohibited	Within Regulations						D	D	P	P			
Waste transfer station	Hazardous goods	no	yes	Prohibited	Prohibited									D			
Wholesale trade	Industrial	no	yes	Prohibited	Within Regulations						D	D	P				
Wildlife habitat and refuge	Low impact outdoor use	no	maybe	Permitted	Permitted											D	
Work camp	Residential occupancy	no	yes	Prohibited	Within Regulations	D	D				D						



APPENDIX D



Appendix D Background

D.1 History of Flooding

Properties in the RM of Corman Park experience overland flooding caused from the South Saskatchewan River. This flooding is the result of the River’s channel elevation which is very flat and thus as additional water comes through the channel, it spreads out, filling the floodplain which is very large in this area.

D.1.1 PROBABILITY

As outlined in the *Statements of Provincial Interest Handbook (2021)*:

What does 1:500 mean and why does Saskatchewan apply that standard?

A 1:500 year flood means that something has an average recurrence interval of 500 years. A 1:500 year flood has a 1 in 500, or 0.2%, chance of being equaled or exceeded in any given year. This does not mean that an area will flood only once every 500 years. Multiple 1:500 floods can happen during a 500-year time span. In fact, certain locations in Saskatchewan have had multiple 1:500 year floods occur within a five-year period.

A flood standard is applied to development to protect the health and safety of people and property. The 1:500 year standard has been applied in Saskatchewan since 1978. A lower standard would allow for more development closer to watercourses and water bodies but would also increase the risk of flooding to people, municipalities and the province. The below table shows the cumulative risk for flooding at various risk levels over a single year, 50 years and 100 years:

Flood event	Probability of flood event occurring in any one year	Probability of flood event at or greater than the flood level at least once in 50 years	Probability of flood event at or greater than the flood level at least once in 100 years
1:2	50%	100%	100%
1:10	10%	99.5%	100%
1:50	2%	63.6%	86.7%
1:100	1%	39.5%	63.4%
1:500	0.2%	9.5%	18.1%



Appendix D Background

D.2 Roles and Responsibility

Emergency management is a shared responsibility that all levels of government, agencies, partners, and persons must participate in.

D.2.1 GOVERNMENT OF SASKATCHEWAN

Ministry of Government Relations

In accordance with the Act, the Government of Saskatchewan, through the Ministry of Government Relations, is the approving authority for a municipality's zoning bylaw, official community plan, and subdivision approvals. This authority places the Ministry of Government Relations in control of monitoring a portion of each municipality's emergency planning, such as the efforts described in **Section 4.1.1 Floodplain management**.

Water Security Agency

Authorized by the *Water Security Agency Act (2005)*, the WSA is responsible for managing the province's water supply, protecting water quality, ensuring safe drinking water and treatment of wastewater, owning and managing 72 dams and related water supply channels, reducing flood and drought damage, protecting aquatic habitat, and providing information about water –a large responsibility. Similarly, operation of the Gardiner Dam, which impounds the Diefenbaker Reservoir, also has multiple and often conflicting objectives. As outlined in the *Diefenbaker Reservoir Operations - Context and Objectives*, Lake Diefenbaker is important for hydropower production, water supply, habitat, recreation, flood control, and downstream flow regulation.

“The operating philosophy of Lake Diefenbaker is to manage the reservoir to maximize benefits for the people of Saskatchewan for the multiple uses listed in Section 5 [irrigation, multiple uses, municipal, industrial, domestic] while respecting dam safety requirements and operations prescribed by regulatory approvals for minimum flows below Tobin Lake. Within this context, the basic strategy for the management of Lake Diefenbaker is to fill the reservoir during the high flow window corresponding to the runoff from the prairie and mountain regions. Uses then deplete the stored water throughout autumn and winter until the following spring, when the opportunity to refill the reservoir returns. This annual cycle does not, however, provide water supply capacity over a multi-year drought. Given the many water uses dependent on the reservoir for supply, an emphasis is placed on filling the reservoir each year to provide as much drought resilience as possible, as should a drought period ensue any storage deficits are carried forward into the low flow years.”

To inform flood warning and water supply management, WSA carries out spring runoff forecasting for rivers, multipurpose lakes, and reservoirs; this information is critical to identifying if highwater flows may be anticipated. The WSA is also responsible for approving all modelling and flood hazard mapping produced in the province, as used by municipalities which is further discussed in **Section 3.1 Flood Mapping**, to provide guidance to the public and policy makers.



Appendix D Background

WSA also maintains a Flood Watch website to help residents prepare for possible floods with up-to-date information about flow levels, protection tips like how to construct and use sandbags, and recovery resources such as how to disinfect water wells.

Saskatchewan Public Safety Agency

The Saskatchewan Public Safety Agency (SPSA) is responsible for provincial emergency management, fire safety, and wildfire management in Saskatchewan; as well as managing Saskatchewan's 911 emergency dispatching services. The SPSA provides a number of resources for municipalities to use while completing emergency management for their communities; including but not limited to, training and templates to create an Emergency Response Plan or evacuation plans. SPSA also operates the Provincial Emergency Operations Centre, operates the SaskAlert public notification system, fire ban maps, and information about the Provincial Disaster Assistance Program. If emergencies escalate beyond the capacity of the municipality, they are able to request assistance from SPSA through a formal request submission.

D.2.2 MUNICIPALITIES

Municipalities are the first line of defense in an emergency. In Saskatchewan, municipalities are obligated to establish emergency plans by *The Emergency Planning Act, 1989*, which also empowers council to be responsible for the direction and control of a municipal emergency response (to take action to implement the plan and to protect the property, health, safety, and welfare of the public). As guided by *The Emergency Planning Act*, upon declaration of a local emergency, the municipality can put into action their emergency plan and exercise the special powers the legislation grants which include limiting travel to certain areas and evacuating persons, livestock, or property that may be affected.

While municipalities are legally required to prepare for their response to an emergency, that only covers a portion of emergency management. Municipal councils are also authorized to set policies governing development in their municipality which can assist in preventing and preparing for emergencies; namely by preparing and adopting an official community plan and a zoning bylaw. While the content of official community plans will vary across the province, provincial legislation (*Planning and Development Act* and *Statements of Provincial Interest*) require that new official community plans and zoning bylaws contain policies for lands subject to flooding including policies that prohibit development in the floodway and require flood proofing in the flood fringe. These requirements are further discussed in **Section A.2.3 Interpretation of the SPI**.

As outlined in the *Statements of Provincial Interest Handbook*, “Enforcing development regulations on flood prone lands is significantly less costly than disaster response and reduces municipal liability. If a municipality is considering issuing a permit on potentially hazard lands, they should seek legal advice regarding any potential liabilities in the event of a disaster causing property damage.”



Appendix D Background

D.2.3 PROPERTY OWNERS

Property owners are responsible for preparing their homes for flooding by way of understanding the risks, educating themselves on what to do to prepare for or respond to a flood event, undertaking any precautionary preparations as appropriate, and responding when necessary. This could include completing flood proofing projects on their property, purchasing insurance where possible, preparing for possible evacuation, and evacuating the property if required.

D.3 Flooding Considerations

D.3.1 NEGATIVE EFFECTS

During flood events, large amounts of water flow through the floodplain, carrying contaminants and hazards in the flow (e.g., suspended rocks, trees, vehicles, small structures, livestock, and toxic pollutants) that pose risks to everything in its path. The following are anticipated negative effects of flooding:

- Damage or loss to structures, structures' contents, vehicles, bridges, roadways, crops, gas or electrical lines, etc.
- Contamination of structures, vehicles, and equipment including the creation of mold or contamination by sewage following an event; and its associated long-term health hazards to humans and animals.
- Property loss and structural undermining of properties as caused by erosion.
- Access limitations preventing evacuation of humans or animals from flooding areas.
- Loss of life including human, livestock, or other animals as a result of drowning, critical injury, or toxin exposure.
- Contamination of the environment including drinking water sources (e.g., river and private wells).
- Extensive property damage, crop loss, and clean-up requirements caused by sediment deposits left behind (e.g., mud).

D.3.2 LIABILITY

Municipal Liability

Municipalities are responsible for the provision of the services they provide such as communal drinking water, sanitary treatment, roadways, or other infrastructure. Within the Study Area, the RM provides only roadway access to these areas, it does not provide piped water, storm water or sanitary services. During a flood event, it is the municipality's responsibility to protect the continued delivery of these services, while also assisting ratepayers in their emergency efforts; to do this, municipalities should be designing their infrastructure with this in mind.

In the case of overland flooding in Corman Park, as the municipality begins to prepare for an imminent flood event, it is also their responsibility to communicate risks with those who may be impacted. For example, the RM of Corman Park owns and manages roadways throughout this area which provide



Appendix D Background

important evacuation routes to those in the area, for transportation of both humans and livestock. If the RM believes these roadways may flood during the event and be unusable, it is the responsibility of the municipality to communicate that and put-up barricades to close them when reasonably appropriate to do so.

Based on a desktop review, it is understood that municipalities may be held liable for negligence in the design of structural measures used in emergency management (e.g., dykes, dams, stormwater management facilities) when those measures have failed during emergency events; however, it does not appear that municipalities in Saskatchewan have historically been held accountable for failures of non-structural measures (e.g., forecasting, floodplain management, emergency communications). Although there may be no legal liability at current time for the development and use of non-structural emergency management measures, as flood events become more frequent, the standard of care municipalities may reasonably be expected to uphold is becoming more stringent.

Property Owner Liability

Overland Flooding Insurance

Historically in Canada, home insurance policies have not covered loss or damage caused by overland flooding, property owners relied upon the Provincial Disaster Assistance Program (PDAP) following an emergency flood event. This is no longer the case. While it is now understood that insurance providers in Saskatchewan have recently started to offer policies that protect homeowners from overland flooding, and the Government of Saskatchewan is advising all property owners to obtain adequate coverage for their property, this type of insurance is not yet considered readily available or affordable.

An overland flooding insurance fact sheet has been included at the end of this appendix for reference.

Protecting Groundwater Sources

As outlined by the WSA, there are several measures homeowners can take to protect their groundwater sources (wells) from flood damage including siting and constructing the well properly. WSA also provides resources on their website to help homeowners disinfect their wells following a flood event.

Protecting sewage systems

There are no municipal sewage systems in the Study Area, all sewage systems located within the Study Area are the responsibility of individual property owners; as such, there are several things that homeowners can do to prevent damage and recover from flooding should it occur.

As outlined in *Preparing for a Flood A Guide for Homeowners* (Saskatchewan Ministry of Health, 2011),

“Soil treatment systems for private wastewater systems rely on aerobic (with oxygen) conditions to treat the sewage. When the soil is saturated, the soil treatment system will not operate properly, constituents in the wastewater will not be removed as efficiently and some pollution could result.



Appendix D Background

- If the drain field of your wastewater disposal system is flooded, you may notice that the drains in the house run slow; toilets drain slowly or sound strange when flushed; or the water may back up in floor drains in the basement.
- Under flooded or saturated conditions, do NOT have the septic tank or holding tank pumped. At best, pumping the tank is a temporary solution. At worst pumping the tank could result in the empty tank floating. If the tank is empty and flooding or saturated conditions are expected, ensure that the tank is filled with liquid (preferably fresh water).
- Under flooded or saturated conditions, the soil absorption system should not be utilized for disposal of liquid wastes. Either do not occupy the home or use a portable toilet.”

As outlined in *Cleaning Up After the Flood A Guide for Homeowners* (Saskatchewan Ministry of Health, 2011),

“Flooding may cause damage to your private sewage disposal field. The disposal field should not be used until the field has dried and the water level in the disposal field is lower than the water level around the house. If your drain field area is flooded or very saturated, you might notice some problems such as drains in the house will run slow; toilets drain slowly or sound strange when flushed; and water may back up into floor drains in the basement. If the drain field must be used (as may be the case for a permanent residence where other temporary options are not available), drastically reduce water use in the home. Remember that the drain field was designed to infiltrate the amount of water normally discharged from the house. When additional water from rain, snow or flooding is added to the drain field, its ability to handle and treat household waste is seriously limited. Some suggested ways to reduce water use are:

- Fix all leaking fixtures.
- Do not pump from the sump to the septic system.
- Do not let eavestroughs or sump pump discharge run over the drain field area.
- Reduce the number of times you flush the toilet.
- Reduce the number of showers and baths. One bath or shower every other day per person is a possible option.
- Do not use the dishwasher or garbage disposal.
- Do not do laundry in your home. If needed, take it to a laundromat.

In addition, the following actions should be taken to ensure that your drain field is operating properly:

- Examine the vegetation over your tank and absorption field. Repair erosion damage and sod or reseed as necessary to provide a vegetative cover.
- Do not compact the soil over the absorption field by driving or operating equipment over the area.”



Appendix D Background

Insurance is available for homeowners to cover the costs of damages associated with sewer backup issues in properties with sanitary systems; this type of coverage must be purchased separately from overland flooding insurance.

Business Interruption Insurance

For businesses, not only should overland flooding insurance be considered but also a secondary type of insurance “Business Interruption Insurance” which provides compensation support for losses of income while a business is shut down following an insured loss.



Overland Flood Insurance in Saskatchewan

Insurance providers in Saskatchewan have recently started to offer policies that protect homeowners from overland flooding. The Government of Saskatchewan advises all property owners to obtain adequate coverage for their property.

Q Will flood insurance provide better coverage than PDAP?

A PDAP provides assistance for uninsurable losses of essential goods to help people get back to pre-disaster condition, with specific limits on the amount of maximum assistance that can be provided. In general, overland flood insurance will allow people to choose the amount of coverage and the deductible level that best meets their needs. Homeowners are encouraged to speak to their insurance broker or insurance company.

Q Will PDAP still provide assistance if I don't get flood insurance?

A Eligible claims under PDAP depend on the availability and affordability of insurance in the Saskatchewan marketplace. At this point, overland flood insurance has not been deemed reasonably available in Saskatchewan.

Until it is determined to be reasonably available, applicants who have not purchased overland flood insurance will remain eligible for financial assistance under current PDAP regulations (even if a product was offered and declined). Applicants who have made the decision to purchase private flood insurance may not be considered eligible for financial assistance under PDAP for this type of loss, as per current regulations.

Once it is determined that flood insurance is reasonably available, some claims may no longer be eligible for PDAP assistance. Reasonable availability will be determined by PDAP. Homeowners are encouraged to speak to their insurance broker or insurance company.

Q What will PDAP pay for flood damage?

A PDAP's guidelines have always been consistent in that the program is not intended to compete with private insurers nor does it provide full compensation. PDAP provides assistance for uninsurable losses of essential goods to help people get back to pre-disaster condition, with specific limits on the amount of maximum assistance that can be provided.

Q **If my property is located in a lower/higher-risk area, do I need to obtain insurance?**

A All homeowners should review their options for flood insurance with their insurance broker or insurance company to ensure they are getting adequate coverage for their properties, if it is available and at a reasonable cost. Reasonable cost varies by location of the property and level of risk.

Q **Will PDAP cover my flood insurance deductible?**

A No, PDAP does not cover insurance deductibles.

Q **Will PDAP top up my flood insurance amount?**

A No, PDAP cannot top up on any insurance coverage. However, until flood insurance is considered to be reasonably available in Saskatchewan, PDAP assistance will be considered in situations where eligible claimants can demonstrate that they are worse off as a result of purchasing flood insurance than if they had made a claim through PDAP. This could occur where an insurance company caps the total loss payable for a homeowner, perhaps because their home is in an area at a higher risk of flooding. By ensuring that homeowners are no worse off, this will avoid the perception that early adopters that chose to purchase insurance are being penalized for their choice.

Q **What if I can't get flood insurance?**

A Homeowners are strongly encouraged to check with their insurance broker and/or all insurance providers. As overland flooding insurance is new to Saskatchewan, not all insurance companies have announced implementation at this time.

If you need help getting in touch with your insurer, contact the IBC Consumer Information Centre at 1-844-2ASK-IBC (1-844-227-5422). Or you can utilize the resources and links provided below.

Resources and Links

Insurance Bureau of Canada

<http://www.ibc.ca/sk/home/>

Insurance Councils of Saskatchewan

<https://www.skCouncil.sk.ca/>

Financial Consumer Agency of Canada (FCAC)

<https://www.canada.ca/en/financial-consumer-agency/services/insurance/home.html>

APPENDIX E



Appendix E Multi-Barriered Approach

To provide high-level guidance for Corman Park to comprehensively address flooding, which is recommended, examples have been provided for prevention and mitigation, preparedness, response, and recovery –which together present a multi-barriered approach.

E.1 Prevention and Mitigation

- Channel improvements

Channel improvements is the process of taking steps to help the flow of water; downstream of the Lake Diefenbaker Reservoir, channel improvements can be used to keep water flowing freely and prevent any barriers that may cause back-ups, new channels from forming, and ultimately overland flooding.

While the WSA provides financial assistance to municipalities to undertake channel clearing projects (e.g., removing debris, sediment, or beaver dams) that improve the flow of water and prevent flooding, it should be noted that the South Saskatchewan River channel around the Study Area is not well defined; as such, channel improvements are not a meaningful preventative approach. At the time of this report, there does not appear to be any areas within the Study Area that would benefit from this type of work.

- Bank stabilization

Bank stabilization can be used to maintain the integrity of the water course, keeping water within the channel and prevent bank erosion. This is particularly important in areas where there are well-defined banks and fast-flowing water which causes banks to be subject to erosion, causing property loss and subsequent damage, channel modifications, or risk to critical infrastructure.

While bank stabilization is beneficial to prevent the risks noted above, it is best implemented as only one of several mitigation measures. Within the Study Area, individual property owners may wish to undertake this type of work to prevent property loss; however, it is not anticipated as a meaningful method of preventing widespread flood damage.

- Culvert expansions

Should be considered in areas where existing culverts are not providing enough flow capacity during flood events.

- Berms or dykes

Berms and dykes create physical barriers to maintain a well-defined channel and prevent water from flowing beyond a set-boundary. These barriers are generally permanent or semi-permanent in nature, constructed well in advance of flood events as opposed to sandbagging which is done during emergency response as a temporary means of achieving the same goal.



Appendix E Multi-Barriered Approach

The portion of the South Saskatchewan River that runs through the RM of Corman Park does not have a well-defined channel; as such, this mitigation measure was not deemed an appropriate measure to mitigate flood damage in the Study Area –as concluded in the Barr Modelling Report.

- Upstream storage improvements

To manage water resulting from an upstream storm event, reservoirs are used to detain water after a major event and prevent flooding downstream.

As outlined in Section C.2.1, "...the operating philosophy of Lake Diefenbaker is to manage the reservoir to maximize benefits for the people of Saskatchewan for the multiple uses listed in Section 5 [irrigation, multiple uses, municipal, industrial, domestic]..." While improvements to the storage capacity or management of the reservoir by the Water Security Agency could influence flood prevention for locations downstream, this option is not considered a likely option.

E.2 Preparedness

Emergency preparedness measures increase the capacity of all those involved, to respond during a flood event. These measures can be broad, such as increasing community awareness about flooding, or very specific such as registering covenants on titles. By increasing emergency preparedness, community and personal resiliency is increased, reducing the impacts of flood events.

- Flood forecasting (WSA)

Flood forecasting tries to answer the question: when is a flood event coming? Forecasting for the Corman Park area requires monitoring of weather events, South Saskatchewan River water flows, and an understanding of the Lake Diefenbaker Reservoir's current capacity and projected operation. Much of this work is done by WSA, it is not the responsibility of the RM of Corman Park; however, knowing when flooding may occur allows the community to get ready. To do this, the RM must be in close communication with WSA.

The WSA maintains a public website focusing on flood forecasting with helpful links related to how individuals can construct sandbag levees and prepare for flooding.

- Emergency Plan (RM of Corman Park)

A municipal emergency plan outlines the types of emergencies a municipality may encounter, and what actions will be taken should the emergency occur.

- Public education (Shared Responsibility)

Helping ratepayers prepare for an emergency is a very important job. While there are many different types of emergencies that may arise, people need to understand the risks associated with flooding; when flooding may occur; and what they should do when a flood is anticipated, during a flood event, and following the event. Creating a website, handbook, video series, or other readily accessible materials may be helpful to widely-communicate this information.



E.3 Response

Response measures are those designed to support the municipality's ability to act effectively during an emergency and are outlined in each municipality's Emergency Plan (e.g., using emergency communication, engaging search and rescue); but these measures make sure that plan can be executed. To prepare for effective response, it is important to be familiar with the content of the Emergency Plan and its execution.

Key elements of response that the RM should prepare for are communicating with ratepayers in the Study Area about when they will need to evacuate, and what route they should take. As many of the roadways within the Study Area are anticipated to be under water, and many of the properties may need to evacuate livestock, communicating a possible evacuation requirement well in advance is pertinent.

E.4 Recovery

There is a strong relationship between long-term sustainable recovery and prevention and mitigation of future disasters. Recovery programs provide a valuable opportunity to develop and implement measures to strengthen resilience, including by building back better. Recovery efforts should be conducted with a view towards disaster risk reduction.

- Clearing away debris
- Repairing damaged infrastructure (e.g., roadways, structures, equipment)
- Assisting with ratepayer recovery (e.g., directing them to the Provincial Disaster Assistance Program, share resources about water well disinfection)
- Reviewing the emergency management processes to identify and document lessons learned.



APPENDIX F



Appendix F Land Use Regulations

F.1 OFFICIAL COMMUNITY PLAN AMENDMENTS

The following section provides recommended amendments to the RM's OCP to effectively mitigate flooding by explaining the concern of flooding and including policies for areas prone to flooding. It is understood that the OCP is currently being updated; as such, it is unclear what sections the following recommendations may fit into. It will be up to the RM's administration to determine how best to incorporate these recommendations into their updated OCP.

For the purpose of this report, existing text has been included where applicable shown in grey, recommended removals shown in ~~crossed-out grey~~, and proposed modification or new text shown in orange.

DEFINITIONS

ACTIVE RECREATION - means a recreational land use ~~concentrating users and~~ that requires buildings or development. ~~and Without limiting the generality of the above,~~ active recreation may include: beach areas with ~~changerooms, washrooms or facilities~~, equestrian facilities, riding stables or race tracks, sports fields, golf courses, camp grounds, picnic areas, and other similar uses.

AGRICULTURAL OPERATION - ~~is defined by the Agricultural Operations Act.~~ means an operation that is carried out on a farm, in the expectation of gain or reward including: (Bylaw 02/15, Approved June 22, 2015)

- a) cultivating land;
- b) producing agricultural crops, including hay and forage;
- c) producing horticultural crops;
- d) non-intensive raising all classes of livestock, horses poultry, fur-bearing animals, game birds and game animals, bees and fish;
- e) producing eggs, milk, honey and other animal products;
- f) operating agricultural machinery and equipment, including irrigation pumps and noise scare devices;
- g) conducting any process necessary to prepare a farm product for distribution from the farm gate;
- h) storing, handling and applying fertilizer, manure, organic wastes, soil amendments and pesticides, including both ground and aerial application;
- i) any other prescribed agricultural activity or process as defined by Council from time to time.

ANIMAL - means any animal other than a human being.

BUILDING - ~~as defined by the Construction Codes Act,~~ means a structure used for the shelter or accommodation of persons, animals, goods or chattels, having a roof which is supported by columns or walls. the following:

- (a) a structure used or intended for supporting or sheltering any use or occupancy;
- (b) if applicable, the land adjoining a structure mentioned in clause (a);



Appendix F Land Use Regulations

and includes an addition. In accordance with the *National Building Code of Canada*, this term is general and encompasses most structures which would not normally be considered as buildings in a layman's sense.

CRITICAL INFRASTRUCTURE - refers to the systems, assets, facilities, and networks that provide essential services. Examples of essential service sectors are: energy and utilities, information and communication technology, finance, health, food, water, transportation, safety, government, and manufacturing.

ENVIRONMENTAL RESERVE - as defined by the *Planning and Development Act*, means dedicated lands that are provided to a municipality or to the Crown, as the case may be, pursuant to section 185 of the *Planning and Development Act*.

FLOOD FRINGE - means the portion of the floodplain inundated by the 1:500-year flood that is not floodway.

FLOODPLAIN - means the area inundated by water from a watercourse or water body during a 1:500-year flood and is made up of the floodway and the flood fringe.

FLOOD PROOFING - means a measure, or combination of structural and non-structural measures, incorporated into the design of a structure that reduces or eliminates the risk of flood damage to a defined elevation.

FLOODWAY - means the portion of the floodplain adjoining the channel where the waters in the 1:500-year flood are projected to:

- (a) Meet or exceed a depth of one metre; or
- (b) Meet or exceed a velocity of one metre per second.

PASSIVE RECREATION - means a **naturalized** recreational land use that does not require significant buildings or development upon the site and does not lessen the natural character of the area. ~~and~~ Without limiting the generality of the above, passive recreation may include: parks, undeveloped beach areas, viewing areas, hiking trails, skiing trails, canoe launches, observation points, unenclosed interpretive centers, and other similar uses, and specifically excludes the operation of motor driven vehicles excepting motorized wheelchairs.

USE - means the purpose or activity for which any land, building structure, or premises, or part thereof is arranged, designed, or intended or for which these may be occupied or maintained.

OBJECTIVES

The RM of Corman Park will practice emergency management to save lives, preserve the environment, and protect property and the economy. All decisions related to emergency management will recognize the protection of life as of paramount importance.

POLICIES

Areas Prone to Flooding



Appendix F Land Use Regulations

Development regulations for areas prone to flooding are informed by *An Emergency Management Framework for Canada* with the goal of saving lives, preserving the environment, and protecting property and the economy.

- a. Hazard lands that are prone to flooding will be regulated in accordance with the *Planning and Development Act* and *Statements of Provincial Interest Regulations*.
- b. A two-zone flood management policy will be utilized where the FLOODPLAIN of the South Saskatchewan River is divided into a FLOODWAY and FLOOD FRINGE, as determined through flood modelling approved by the Saskatchewan Watershed Authority.
- c. The Zoning Bylaw shall contain provisions for flood-prone hazard lands, including a map that clearly delineates areas of FLOODWAY and FLOOD FRINGE. The Zoning Bylaw shall also establish standards for FLOOD PROOFING measures as required.
- d. As illustrated in Figure 3 Developing in the Floodplain, modified from the SPI Handbook, 2022, development is generally discouraged in the FLOODPLAIN.

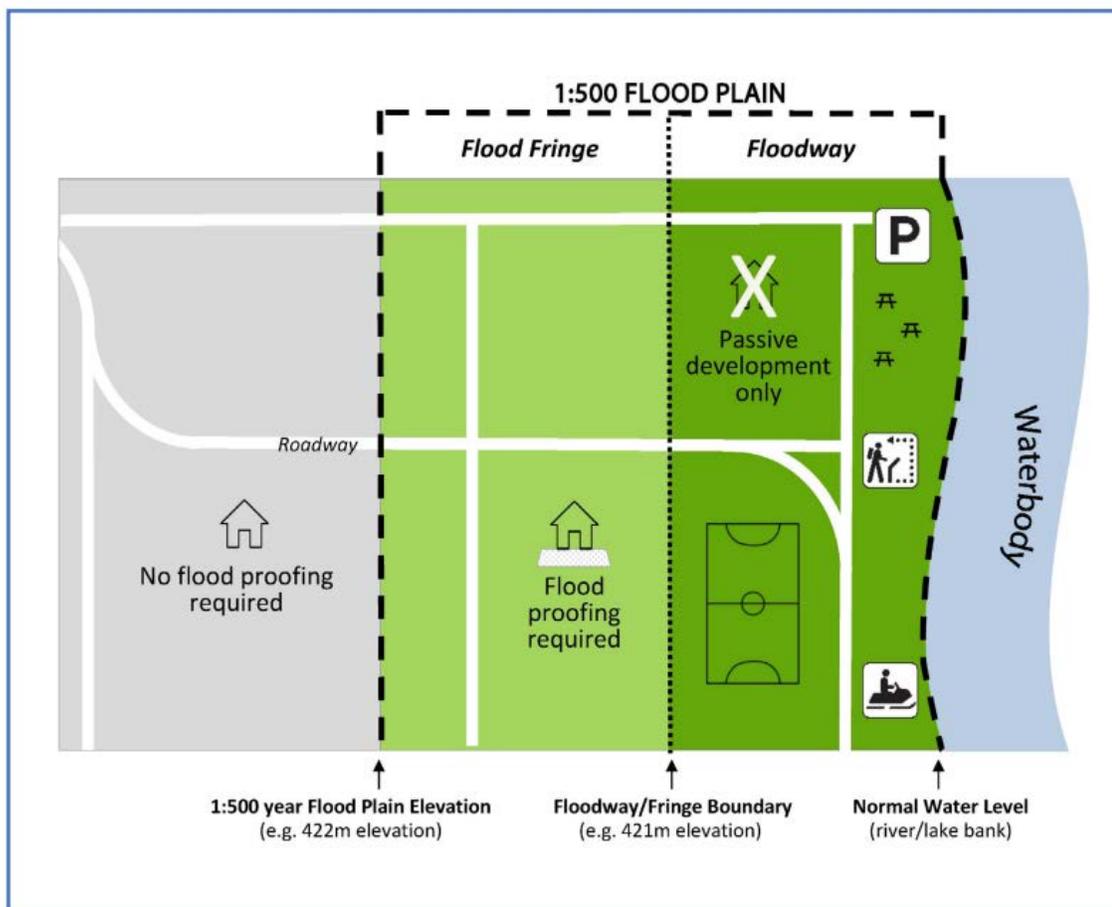


Figure 8 Developing in the Floodplain, modified from the SPI Handbook, 2022



Appendix F Land Use Regulations

- e. In addition to the regulations of the Zoning Bylaw,
 - i. CRITICAL INFRASTRUCTURE will not be permitted in the FLOODPLAIN unless the applicant can prove the location is necessary for the development to function properly and the infrastructure has been flood proofed to the standards of the Buildings Bylaw.
 - ii. No development that may require evacuation during a flood event will be permitted in the FLOODPLAIN without roadway access/ egress constructed to the MINIMUM BUILDING ELEVATION.
- f. During subdivision,
 - i. All properties prone to flooding should be registered with an interest delineation of the FLOODWAY and FLOOD FRINGE illustrated on the title.
 - ii. The Rural Municipality of Corman Park may require any portions of lands identified as FLOODWAY be dedicated as ENVIRONMENTAL RESERVE, in accordance with the *Planning and Development Act*.
 - iii. No subdivision applications shall be permitted that create new parcels with non-conforming uses to the Zoning Bylaw. For example, a single parcel with a non-conforming use cannot be subdivided as it would create a new parcel with non-permitted use; the new parcel would need to be rezoned at the time of subdivision.



F.2 Zoning Bylaw Amendments

The following section provides recommended amendments to RM's ZBL. It is understood that the ZBL is currently being updated; as such, it is unclear what sections the following recommendations may fit into. It will be up to Corman Park's administration to determine how best to incorporate these recommendations into their updated ZBL.

For the purpose of this report, existing text has been included where applicable shown in grey, recommended removals shown in ~~crossed-out grey~~, and proposed modification or new text shown in orange. Optional recommendations regarding the regulation of farm buildings are shown in blue.

SECTION 3 – GENERAL REGULATIONS

~~Section 3.6 update Figure 3 in RM's zoning bylaw to reference specifically the South Saskatchewan River floodplain. Include a diagram that defines development standards that include mounding above the minimum elevation and size of mount (e.g. .5 acre Waterford Estates), elevation of driveways to the minimum elevation and requirement that all mechanical and electrical equipment, windows, exterior doors, or other exterior openings, septic tanks, and water well heads shall be situated at or above the MINIMUM BUILDING ELEVATION unless they are part of an approved alternative FLOOD PROOFING technique.~~

4. ~~Non-Conforming Buildings, Uses and Structures~~ Sites:

4.1. ~~The use of land or~~ Any building, use, or site or structure lawfully existing at the time of passing of this Bylaw that is rendered non-conforming by the enactment of this Bylaw or any subsequent amendments, may be continued, transferred, or sold **in accordance with Division 3 of the Planning and Development Act.**

~~4.2. An existing non-conforming use or intensity of use may be continued if the use conformed to this Bylaw that was in effect at the time of the development and has not been discontinued for 12 consecutive months.~~

~~4.3. Non-conforming buildings or sites may continue to be used, maintained, and repaired in their present form.~~

~~4.4. No enlargement, additions, or reconstruction of a non-conforming use, building, or structure shall be undertaken, except in conformance with Sections of the Act.~~

NEW Any future use of non-conforming land or non-conforming buildings located in the FLOODPLAIN shall follow the regulations of the FPO Floodplain Overlay District.



Appendix F Land Use Regulations

4.5. Beyond the provision of accessible municipal records, the burden of establishing that a **building, use, building, or structure site** was lawfully established and remains as a legal non-conforming ~~use, building, or structure~~ shall be upon the owner of the ~~use, building or structure~~.

6. Development along Riverbanks and Hazard Lands:

6.6. All ~~non-agricultural~~ development proposed on ~~flood-prone~~ lands **prone to flooding by the South Saskatchewan River** shall be constructed ~~at or above the 1:500 flood level as defined by the Water Security Agency, and in compliance with remedial measures and development standards prescribed by Council in consultation with the Saskatchewan Watershed Authority and the Ministry of Government Relations~~ **in accordance with the regulations of the FPO Floodplain Overlay District.**

12. Site Development Regulations:

Building and Landscape Design and Maintenance:

12.12. All sites at all times shall be maintained clean and free from waste and debris.

12.13. The outdoor storage or collection of goods and materials in a front yard in any country residential district which, in the opinion of the Development Officer, is unsafe, unsightly, or adversely affects the amenities of the zoning district is prohibited.

12.14. Outdoor storage is permitted in a side or rear yard in a country residential district only when the goods or materials being stored are clearly accessory and incidental to the principal use of the property and properly screened where deemed necessary by the Development Officer.

12.15. The Development Officer when considering a development permit application for uses which involve the outdoor storage of goods, machinery, vehicles, motors, building materials, waste materials and other similar uses may impose conditions requiring the use and maintenance of landscaping, berming, fencing, vegetation or other screening of a location, length, thickness, type, height and extent that is considered necessary to buffer the proposed development from adjacent or neighbouring land uses.

NEW Notwithstanding Policy 12.14 and 12.15, all outdoor storage must follow the regulations of the FPO Floodplain Overlay District.

15. Municipal Services:

Frontage and Access:

15.4. A development permit shall not be issued for a non-agricultural use unless the site intended to be used, or upon which a building or structure is to be erected, abuts, or has frontage on a graded all-weather municipal roadway or provincial highway.



Appendix F Land Use Regulations

15.5. The requirement of a service road or internal subdivision roadway to provide access may be imposed as a condition of approval for any new development.

15.6. All site access from municipal roadways shall be to the satisfaction of the Director of Operations with respect to location, design, and construction standards. The Director of Public Works shall take into account safety and the physical capability of roads that are proposed to serve the development.

NEW For developments in the FLOOD FRINGE, roadway access must be constructed to the MINIMUM BUILDING ELEVATION.

Public Utilities and Municipal Facilities:

15.14. Public utilities and municipal facilities, except solid waste disposal, liquid waste disposal, and clean fill sites, are a permitted use in every zoning district and exempt from the site area, frontage, and setback regulations of every zoning district.

NEW Notwithstanding Policy 15.14, PUBLIC UTILITIES and MUNICIPAL FACILITIES must follow the regulations of the FPO Floodplain Overlay District.

15.16. Public utilities and municipal facilities shall obtain a development permit before commencing any development within the District.

15.17. The application shall include a layout or site plan, as required in the application form, together with evidence of prior public consultation with all adjacent assessed landowners.

[NEW] SCHEDULE P - FPO FLOODPLAIN OVERLAY DISTRICT

FPO – FLOODPLAIN OVERLAY DISTRICT

1. THE INTENT OF THE FPO DISTRICT SHALL BE:

To regulate development on hazard lands prone to flooding by the South Saskatchewan River through two zones: FLOODWAY and FLOOD FRINGE. The purpose of this district is to preserve the capacity of the South Saskatchewan River channel during a 1:500 flood event, safely convey flood waters, and limit negative impacts of flooding on development.

2. GENERAL REGULATIONS

2.1 The regulations of the FPO District shall be applied in addition to those associated with the regulations of the underlying district for each parcel.

2.2 All lands within the Floodplain Overlay District boundary, shown on **Figure 5 RM of Corman Park Zoning Bylaw - Floodplain Overlay District**, shall be subject to the regulations of the FPO District.



Appendix F Land Use Regulations

- 2.3 DEVELOPMENT, BUILDINGS, or operations that pose a significant risk to human or animal safety, may cause detrimental environmental contamination, or create unsafe conditions during a 1:500 YEAR FLOOD EVENT shall be prohibited within both the FLOODWAY and FLOOD FRINGE.
- 2.4 Decisions regarding the suitability of uses that may require evacuation during a 1:500 YEAR FLOOD EVENT must consider not only the location of the subject parcel but also the location of access/ egress routes to and from the parcel from outside of the FLOODPLAIN.
- 2.5 In accordance with the *Construction Codes Act*, the regulations of the FPO District do not apply to FARM BUILDINGS.
- 2.6 Notwithstanding Policy 2.5, FLOOD PROOFING is encouraged for all buildings in the FLOODPLAIN, including FARM BUILDINGS, to save lives and prevent loss, damage, or contamination that may occur during flood events.
- 2.7 Where non-conforming uses are created a result of this bylaw, the regulations of Division 3 the *Planning and Development Act* must be followed.

3. FLOODWAY

3.1 Purpose

The FLOODWAY identifies areas that are prone to flooding from the South Saskatchewan River and will be inundated with water during the 1:500 YEAR FLOOD EVENT. The purpose of FLOODWAY regulations is to preserve the capacity of the South Saskatchewan River's 1:500 channel for flood water conveyance by prohibiting DEVELOPMENT and BUILDINGS.

While DEVELOPMENT and BUILDINGS are not permitted, these areas are still suitable for other uses that will not impact or be impacted by the flooding. Where uses are not specifically listed, permissibility will be at the discretion of the Development Authority.

3.2 Permitted Uses

- a) ENVIRONMENTAL RESERVE
- b) PARK
- c) RECREATION (PASSIVE)
- d) WILDLIFE HABITAT AND REFUGE

3.3 Discretionary Uses

- a) AGRICULTURAL OPERATION
- b) CAMPGROUND



Appendix F Land Use Regulations

- c) COMMUNITY RECREATIONAL USE
- d) GOLF COURSE
- e) INTENSIVE AGRICULTURAL OPERATION - HORTICULTURE
- f) RECREATION (ACTIVE)
- g) PUBLIC MARKET
- h) PUBLIC UTILITIES except CRITICAL INFRASTRUCTURE
- i) PUBLIC WORKS

3.4 Prohibited Uses

- a) In accordance with the SPI, DEVELOPMENT, BUILDINGS, or ADDITIONS to BUILDINGS will not be permitted in the FLOODWAY unless, to the satisfaction of the Development Authority, there will be no obstruction to the free flow of floodwaters. Generally, this means no BUILDINGS will be permitted in the FLOODWAY.
- b) Uses that pose a significant risk to human or animal safety, may cause detrimental environmental contamination, or create unsafe conditions during a flood event will not be permitted. These uses include but are not necessarily limited to:
 - i. ANIMAL KENNEL
 - ii. CRITICAL INFRASTRUCTURE
 - iii. LAND FARM
 - iv. Outdoor storage
 - v. RAILWAY FREIGHT YARD
 - vi. Sheltering of LIVESTOCK
 - vii. Storage of chemicals, explosives, flammable liquids, and/or toxic or waste materials
- c) Due to the erosion that may occur in the FLOODWAY during flood events, the following uses will not be permitted:
 - i. ANIMAL CEMETERIES
 - ii. ANIMAL COLUMBARIUM
 - iii. CEMETERIES
 - iv. COLUMBARIUM



Appendix F Land Use Regulations

v. MAUSOLEUM

4. FLOOD FRINGE

4.1 Purpose

The FLOOD FRINGE identifies areas that are prone to flooding from the South Saskatchewan River and will be inundated with water during the 1:500 YEAR FLOOD EVENT. Regulations are imposed in this area to limit negative impacts from and to the flooding thereby protecting lives, the environment, property, and the economy.

4.2 Permitted Uses

- a) For lands within the FLOOD FRINGE, the permitted uses and discretionary uses listed in the underlying Land Use District shall apply. Where the development standards of the underlying zoning district appear to be in conflict with the standards of this overlay district, these overlay district standards shall take precedence.

4.3 Regulations

- a) Use that poses a significant challenge for emergency evacuation during a flood event will not be permitted. These uses include but are not necessarily limited to:
 - i. COMMUNITY CARE FACILITY
 - ii. EQUESTRIAN FACILITY, TYPE II
 - iii. INTENSIVE LIVESTOCK OPERATION
- b) Uses that may cause detrimental environmental contamination during a flood event will not be permitted. These uses include but are not necessarily limited to:
 - i. Outdoor storage without FLOOD PROOFING
 - ii. Storage of chemicals, explosives, flammable liquids, and/or toxic or waste materials
- c) Due to the erosion that may occur in the FLOOD FRINGE during flood events, the following uses will not be permitted:
 - i. ANIMAL CEMETERIES
 - ii. ANIMAL COLUMBARIUM
 - iii. CEMETERIES
 - iv. COLUMBARIUM
 - v. MAUSOLEUM



Appendix F Land Use Regulations

- d) A development permit application for land located within the FLOOD FRINGE must be accompanied by a report prepared by a qualified, registered Professional Engineer or Architect demonstrating how the regulations of the Floodplain Overlay and FLOOD PROOFING to the MINIMUM BUILDING ELEVATION are met.
- e) All new BUILDINGS and ADDITIONS to BUILDINGS in the FLOOD FRINGE must be FLOOD PROOFED to the MINIMUM BUILDING ELEVATION in accordance with the *Building Bylaw*.
 - i. BUILDINGS and FARM BUILDINGS intended for sheltering of persons or animals must be FLOOD PROOFED using DRY PROOFING measures.
 - ii. Foundation designs and FLOOD PROOFING strategies shall effectively withstand hydrostatic, hydrodynamic and impact forces produced by flooding; and consist of construction materials resistant to flood damage.
 - iii. No HABITABLE/ LIVING SPACE, windows, or doors shall be constructed, reconstructed, altered, moved, or extended below the specified elevation of the MINIMUM BUILDING ELEVATION.
 - iv. All mechanical and electrical equipment, windows, exterior doors, or other exterior openings, septic tanks, and water well heads shall be situated at or above the MINIMUM BUILDING ELEVATION unless they are part of an approved alternative FLOOD PROOFING technique.
- f) All proposed FLOOD PROOFING shall be designed and certified by a professional engineer licensed to practice in the Province of Saskatchewan, in accordance with the regulations of the Building Bylaw. The submission of the design shall be accompanied by a written report identifying the limitations to the design, expected lifespan, and required maintenance.
- g) As a condition of approval for the construction, erection, placement, alteration, repair, renovation, relocation, or reconstruction of a BUILDING, FARM BUILDING, ADDITION TO BUILDING, or STRUCTURE subject to FLOOD PROOFING; the applicant shall be required to have FLOOD PROOFING requirements registered on their title.
- h) BUILDING HEIGHT shall be measured from the MINIMUM BUILDING ELEVATION.

SECTION 6. DEFINITIONS

ADDITION - as defined by the *Construction Codes Act*, means any new construction expanding an existing BUILDING, either horizontally or vertically.

14. AGRICULTURAL OPERATION - as defined by the *Agricultural Operations Act*, means an agricultural operation:

- (a) that is carried out on a farm, in the expectation of gain or reward, including:



Appendix F Land Use Regulations

- (i) cultivating land;
- (ii) producing agricultural crops, including hay and forage;
- (iii) producing horticultural crops, including vegetables, fruit, mushrooms, sod, trees, shrubs, flowers, greenhouse crops and specialty crops, excluding cannabis (Bylaw 65/20, Approved February 11, 2021);
- (iv) ~~non-intensive~~ raising all classes of LIVESTOCK, horses, poultry, fur-bearing animals, game birds and game animals, bees and fish;
- (v) carrying on an INTENSIVE LIVESTOCK OPERATION;
- (vi) producing eggs, milk, honey and other animal products;
- (vii) operating agricultural machinery and equipment, including irrigation pumps and noise-scare devices;
- (viii) conducting any process necessary to prepare a farm product for distribution from the farm gate;
or
- (ix) storing, handling and applying fertilizer, manure, organic wastes, soil amendments and pesticides, including both ground and aerial application.
- (x) ~~any other prescribed agricultural activity or process as defined by Council from time to time.~~

13. Agriculture (Intensive – Livestock) INTENSIVE LIVESTOCK OPERATION - as guided by the *Agricultural Operations Act*, means:

- (a) The rearing, confinement or feeding of more than 100 animal units of poultry, hogs, sheep or cattle in an enclosure where the space per animal unit is less than 371.6 square metres (4,000 square feet)
- (b) The rearing, confinement or feeding of a lesser number of animal units of poultry, hogs, sheep or cattle in an enclosure where the space per animal unit is less than 371.6 square metres (4,000 square feet) and where the nearest edge of the enclosure is:
 - (i) Within 305 m (1,000 ft) of a body of water, drainage ditch, irrigation ditch or water course, except where such feature is entirely contained on the operator's property and does not overflow or discharge onto property under control of the operator, or
 - (ii) Within 305 m (1,000 ft) of a residential dwelling unit not owned by the operator
- (c) Any other livestock operation whose operator elects to apply for a permit under *The Pollution (By Livestock) Control Act*.

19. ALTERATION or ALTERED – with reference to a building, structure or site means a change from one major occupancy class or division to another, or a structural change such as an addition to the area or height, or the removal of part of a building, or any change to the structure such as the construction of, cutting into or removal of any wall, partition, column, beam, joist, floor or other support, or a change to or closing of any required means of egress or a change to the fixtures, equipment, cladding, trim, or any other items regulated by this Bylaw such as parking and landscaping, as defined by the *Construction Codes Act*, means a change to any matter, thing, or OCCUPANCY that is regulated by *Construction Codes Act*, but does not include an ADDITION.



Appendix F Land Use Regulations

38. BUILDING —means a structure used for the shelter or accommodation of persons, animals, goods, or chattels, having a roof which is supported by columns or walls. **as defined by the *Construction Codes Act*, means the following:**

- (a) a STRUCTURE used or intended for supporting or sheltering any use or OCCUPANCY;
 - (b) if applicable, the land adjoining a STRUCTURE mentioned in clause (a);
- and includes an ADDITION.

In accordance with the *National Building Code of Canada*, this term is general and encompasses most structures which would not normally be considered as buildings in a layman's sense.

101. FARM BUILDING —means improvements such as barns, granaries, etc., used in connection with an agricultural operation. **as defined by the *Construction Codes Act*, means a building that:**

- (a) does not contain a residential occupancy or sleeping quarters;
- (b) is located on land used for an AGRICULTURAL OPERATION as defined in *The Agricultural Operations Act*, which does not include cannabis or alcohol operations; and
- (c) is used for the following purposes:
 - (i) the housing of LIVESTOCK;
 - (ii) the production, storage, or processing of primary agricultural and horticultural crops or feeds;
 - (iii) the housing, storage, or maintenance of equipment or machinery associated with an AGRICULTURAL OPERATION; or
 - (iv) any other prescribed purpose.

107. FLOOD - means a temporary rise in water level that result in the inundation of areas not ordinarily covered by water.

1:500 FLOOD EVENT – means:

- a) a 1:500-year flood; or
- b) a flood having a return period equal to 500 years; or
- c) a flood having water surface elevations equal to a 500-year flood; or
- d) a flood having approximately 0.2 percent risk of occurring during any one year.

DESIGN FLOOD LEVEL – means the maximum static water level reached for lands contained within a flood risk area during a 1:500 year flood event. It is used to indicate the **SAFE MINIMUM BUILDING ELEVATION** to be used by the Municipality as a basis for flood risk management.

FLOOD FRINGE —means that portion of the flood risk area not lying within a floodway that would be covered by floodwaters up to the design flood level and where development will not create an excessive hindrance to the hydraulic efficiency of the water course where most types of development may be accommodated subject to the application of proper flood proofing techniques. **means the portion of the FLOODPLAIN inundated by the 1:500 year flood that is not FLOODWAY.**



Appendix F Land Use Regulations

~~FLOOD RISK AREA~~ — means an area delineated by the applicable provincial regulatory body or the Municipality as being prone to flooding.

~~FLOODWAY~~ – means a water body or the channel of a watercourse including those portions of the adjoining floodplains that is required to carry and discharge or contain the design flood where the flow is fastest and most severe and where the potential danger is the greatest. **means the portion of the FLOODPLAIN adjoining the channel where the waters in the 1:500 year flood are projected to:**

- (a) Meet or exceed a depth of one metre; or
- (b) Meet or exceed a velocity of one metre per second.

~~FLOODPLAIN~~ – means the area of land bordering a water course or water body that would be inundated by a 1:500 year flood. **means the area inundated by water from a watercourse or water body during a 1:500-year flood; is made up of the FLOODWAY and the FLOOD FRINGE.**

~~FLOOD PROOFING~~ – means any combination of structural and non-structural additions, changes or adjustments to structures or land that will significantly reduce or eliminate flood damage to real estate or improved real property and their contents up to and including the design flood level. **means a measure, or combination of structural and non-structural measures, incorporated into the design of a structure that reduces or eliminates the risk of flood damage to a defined elevation.**

~~DRY FLOOD PROOFING~~ – means the raising of a building above the design flood level.

~~WET FLOOD PROOFING~~ – means permanent or contingent measures applied to a structure and or its contents that prevent or provide resistance to damage from flooding while allowing floodwaters to enter the structure or area. Generally, this includes properly anchoring the structure, using flood resistant materials designed by a Professional Engineer licensed to practice in the Province of Saskatchewan and located below the design flood level which are capable of withstanding hydrostatic and hydrodynamic forces.

FREEBOARD – refers to a vertical distance added to a calculated flood level to accommodate uncertainties and potential for waves, surges, and other natural phenomena.

~~HYDRODYNAMIC FORCE~~ — means the force of moving water or wave action applied to a structure.

~~HYDROSTATIC FORCE~~ — means the result from the static mass of water at any point of flood water contact with a structure. These forces are equal in all directions and always act perpendicular to the surface on which they are applied.

SAFE MINIMUM BUILDING ELEVATION – means the maximum static water level reached for land in a particular region plus an additional allowance to compensate for unknown dynamic factors such as wave action **minimum level that development of buildings and additions to buildings may occur at; it is intended to represent the maximum static water level reached during the design flood plus FREEBOARD.**

In accordance with the *Statements of Provincial Interest*, the **MINIMUM BUILDING ELEVATION** is the 1:500 flood level (**DESIGN FLOOD LEVEL**) plus 0.5m (freeboard).



Appendix F Land Use Regulations

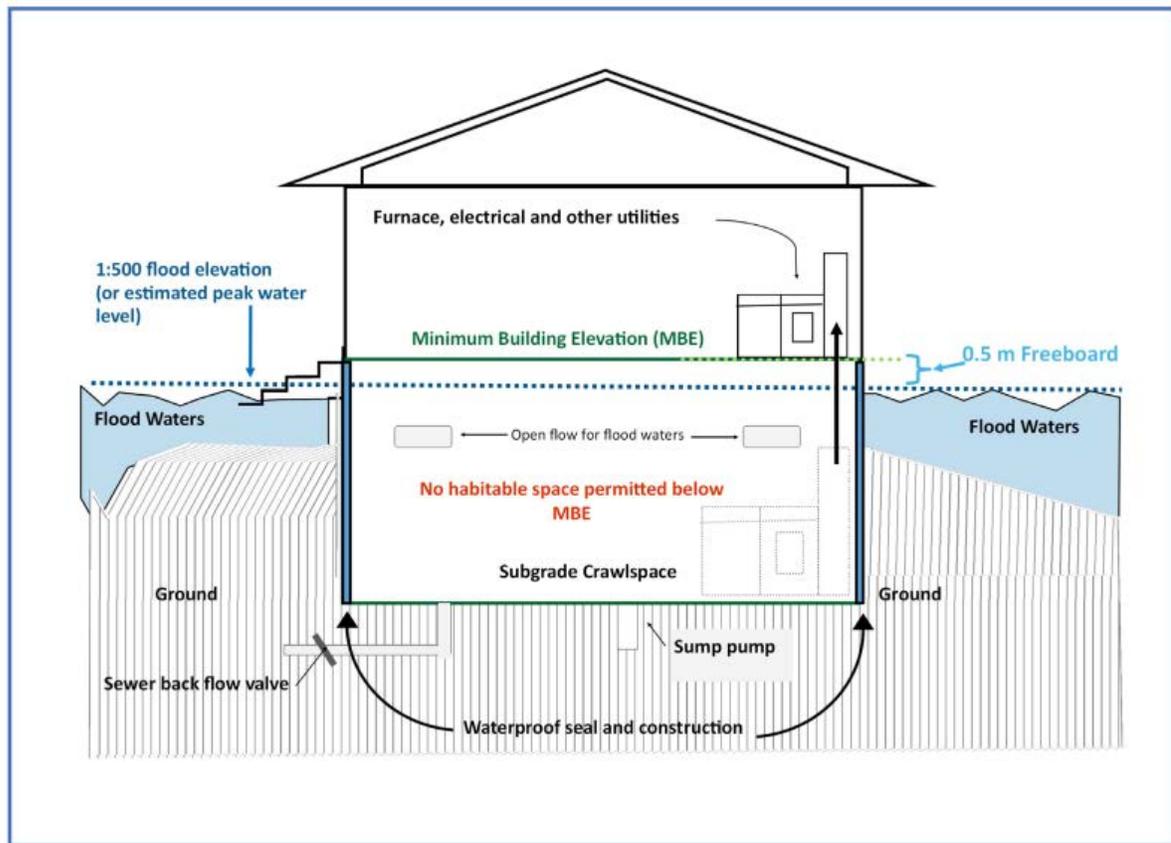


Figure 9 Minimum Building Elevation Diagram, SPI Handbook, 2022.

TWO-ZONE FLOOD MANAGEMENT PRACTICE – means the application of a two-tier development policy defined by the potential severity and danger of a flood event.

HABITABLE/ LIVING SPACE – means space in a building that is used for living, sleeping, eating, cooking and includes basement recreation and living rooms, bathrooms, closets, halls, storage, and utility spaces. Crawlspace and similar areas are not considered habitable space.

142. LIVESTOCK – means domesticated animals used primarily as beasts of burden or for the production of fur, hides, meat, milk, eggs or other product, or as breeding stock, but excluding companion animals. means any of the animals defined in the *Keeping of Animals Bylaw*.

OCCUPANCY – as defined by the *Construction Codes Act*, means the use, or intended use, of all or part of a building for the shelter or support of persons, animals, or property.

NON-CONFORMING BUILDING – as defined by the *Planning and Development Act*, means a building:

- a. that is lawfully constructed or lawfully under construction, or with respect to which all required permits have been issued, at the date a zoning bylaw or any amendment to a zoning bylaw affecting the building or land on which the building is situated or will be situated becomes effective; and



Appendix F Land Use Regulations

- b. that on the date a zoning bylaw or any amendment to a zoning bylaw becomes effective does not, or when constructed will not, comply with the zoning bylaw.

NON-CONFORMING SITE – as defined by the *Planning and Development Act*, means a site, consisting of one or more contiguous parcels, that, on the date a zoning bylaw or any amendment to a zoning bylaw becomes effective, contains a use that conforms to the bylaw, but the site area or site dimensions do not conform to the standards of the bylaw for that use.

159. NON-CONFORMING USE – as defined by the *Planning and Development Act*, means a lawful specific use:

- a. being made of land or a building or intended to be made of land or of a building lawfully under construction, or with respect to which all required permits have been issued, at the date a Zoning Bylaw or any amendment to a zoning bylaw affecting the land or building becomes effective; and
- b. that on the date a zoning bylaw or any amendment to a zoning bylaw becomes effective does not, or in the case of a building under construction or with respect to which all required permits have been issued will not, comply with the Zoning Bylaw

RELOCATION – as defined by the *Construction Codes Act*, means to move a building or part of a building to a new location within the same site.

RENOVATION – as defined by the *Construction Codes Act*, means a renewal of a building or a part of a building.

REPAIR – as defined by the *Construction Codes Act*, means to restore to good condition by replacing or fixing parts of a building.

192. RESIDENTIAL-DWELLING UNIT – means a separate set of living quarters, whether occupied or not, usually containing sleeping facilities, sanitary facilities and a kitchen or kitchen components, but does not include boarding houses or rooming units. For the purposes of this definition, "kitchen components" include, but are not limited to, cabinets, refrigerators, sinks, stoves, ovens, microwave ovens or other cooking appliances and kitchen tables and chairs.

193. Residential-DWELLING UNIT (SECONDARY) – means a separate set of temporary or permanent living quarters in addition to an existing principal residential dwelling unit located on a single site, whether occupied or not, usually containing sleeping facilities, sanitary facilities and a kitchen or kitchen components, but does not include boarding houses or rooming units.

F.3 Building Bylaw Amendments

The following section provides recommended amendments to RM's Building Bylaw (BBL). The main purpose of amending the Building Bylaw is to update it for compliance with the *Construction Codes Act* of Saskatchewan which replaced the *Uniform Building and Accessibility Standards Act* on January 1, 2022.

As it is understood that the RM wishes to regulate FARM BUILDINGS within the municipality, or within the floodplain of the South Saskatchewan River, an amendment to the BBL would be required. This authority is given through the following policy of *Construction Codes Act*:



Appendix F Land Use Regulations

“Application of construction standards ...

6 (2) The construction standards do not apply to: ...

(c) a farm building...

(3) Notwithstanding clause (2)(c), but subject to sections 17 and 47, if a local authority passes a bylaw declaring that the construction standards apply to farm buildings in the municipality, the construction standards apply to the farm buildings described in the bylaw.”

For the purpose of this report, existing text has been included where applicable shown in grey, recommended removals shown in ~~crossed-out grey~~, and proposed modification or new text shown in orange. Optional recommendations regarding the regulation of farm buildings are shown in blue.

INTERPRETATION/ LEGISLATION

- 1) Act” means The ~~Uniform Building and Accessibility Standards Act~~ **Construction Codes Act** being Chapter ~~U-1.2 9~~ **9** of the Statutes of Saskatchewan, ~~1983-84~~ **2021** and amendments.

SCOPE OF THE BYLAW

- 4) Option A:
In accordance with the authority given by the Act, all regulations of this bylaw shall be applied to FARM BUILDINGS located in the FLOODPLAIN of the South Saskatchewan River, as defined by the Act and Zoning Bylaw.

Option B:

In accordance with the authority given by the Act, all regulations of this bylaw shall be applied to FARM BUILDINGS located in the FLOODPLAIN of the South Saskatchewan River that are used to shelter LIVESTOCK, as defined by the Act and Zoning Bylaw.

SUPPLEMENTAL BUILDING STANDARDS

- 2) All BUILDINGS located in the FLOOD FRINGE must be constructed with appropriate FLOOD PROOFING, using dry proofing or wet proofing methods, as designed by an architect or professional engineer registered in the province of Saskatchewan.
- 3) Acceptable dry flood proofing methods for BUILDINGS include:
 - a. Buildings on fill, where buildings are constructed on mounds elevated above the MINIMUM BUILDING ELEVATION.

This is the preferred method for all new construction.

- b. Buildings on piers, piles, columns, or bearing walls; where buildings are elevated above the MINIMUM BUILDING ELEVATION on some kind of support that provides reliable protection against flood damage.



Appendix F Land Use Regulations

This alternative requires careful design to prevent damage of supports from floating debris and to allow sufficient space for it to pass underneath. It cannot be used for large existing buildings and may be difficult to apply even to small, light structures.

- c. Closure and seal method which makes lower levels of the building watertight by sealing them against water penetration.

This alternative should not be considered for new construction; however, it may be an option for renovations to existing properties.

- 4) Wet-flood proofing allows water to enter, move within, and exit a BUILDING during a flood event.
 - a. Wet-flood proofing should only be considered for existing accessory BUILDINGS such as garages and sheds.
 - b. Wet-flood proofing is not acceptable for any BUILDING sheltering HUMANS, LIVESTOCK, or ANIMALS.
 - c. Building materials subject to water damage, (e.g., drywall, panelling, insulation), should not be used within wet-flood proofed structures. Walls should be unfinished concrete or wood. Concrete block walls should be filled with grout to prevent air pockets and ingress of water.
 - d. Wet-flood proofed structures should not be serviced with anything more than electricity, with all mechanical and electrical elements located above the MINIMUM BUILDING ELEVATION.
 - e. All wet proofed BUILDINGS must be designed structurally-sound enough to:
 - i. withstand flows,
 - ii. not be swept into the flow, and
 - iii. not pose a risk of having the building's contents contaminating the environment.
- 5) All services of flood proofed buildings (e.g., electrical, heating, sewer systems, roadways) must also be protected from flood damage in accordance with the CSA Group's *Flood Resistant Design of New Residential Communities Standards* (CSA W204:19)

