
RM OF CORMAN PARK

FLOODING POLICY UPDATES

Flooding Overview Presentation





IN THE MEETING

RM of Corman Park	Stantec Consulting Team	Water Security Agency	Government Relations
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SAFETY MOMENT

We would like to remind everyone to:

- Practice respectful physical distancing
- Self-isolate if you are feeling ill
- Wash your hands frequently
- Cover your coughs and sneezes
- Avoid touching your face
- Limit travel whenever possible
- Be kind to everyone as we are all going through a hard time!





Photo: Sneakers and Lipstick Blog

AGENDA

Introduction

RM of Corman Park

- Housekeeping, safety moment
- Project intro, planning context

Flooding Overview

Water Security Agency

- Flood history, Gardner Dam usage

Project Overview

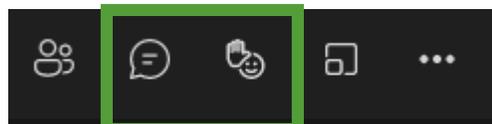
RM of Corman Park + Stantec

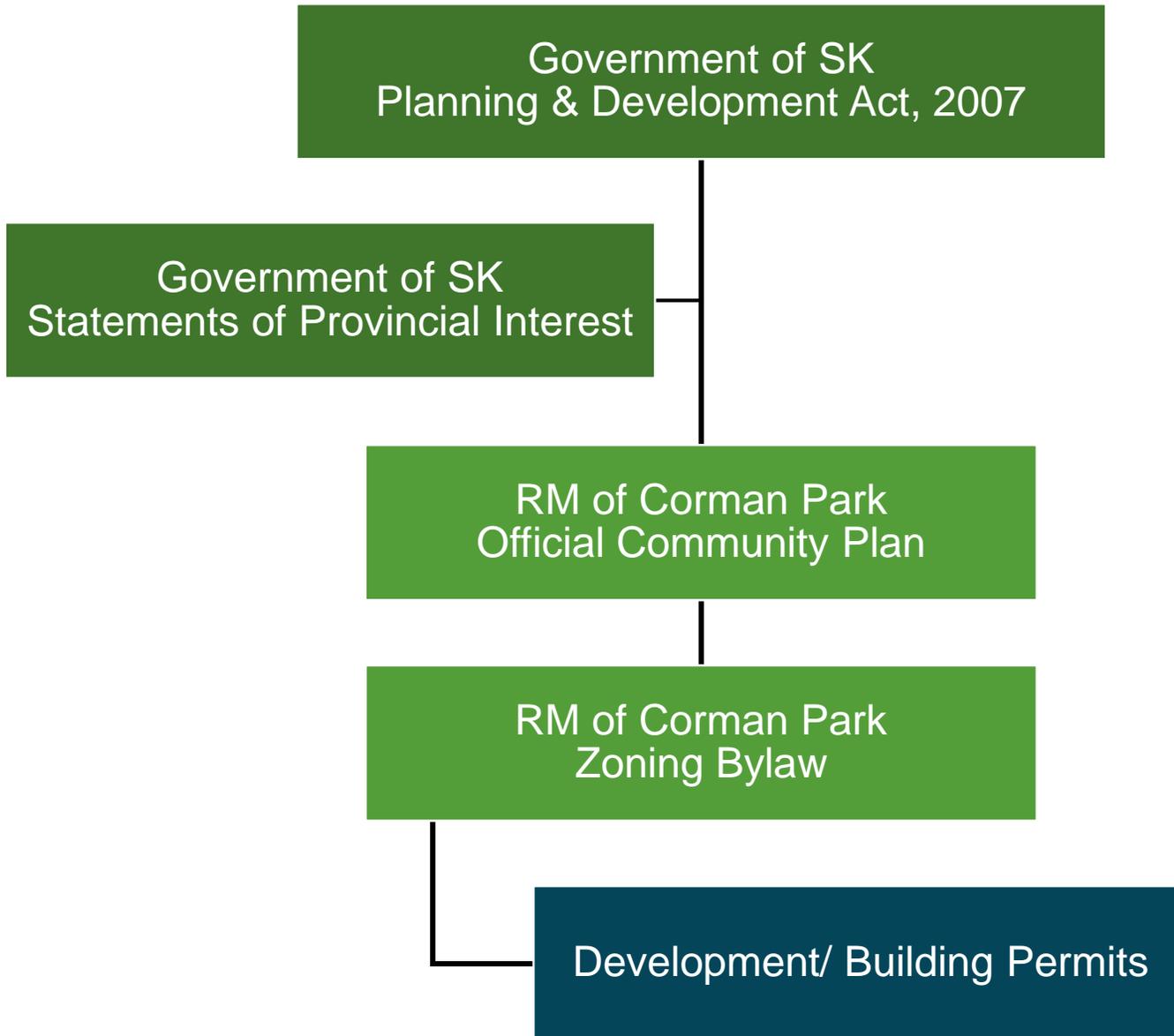
- Policy project overview, next steps

Q+A

All

- Moderated using the chat





CONTEXT

Planning & Development Act, 2007

- Provincial planning legislation guides growth and development in Corman Park

Statements of Provincial Interest

- First adopted in 2012, recently amended in 2020
- 16 SPI's in total
- Tie province provincial objectives to municipal planning regulations.
- Municipalities are required to comply with the SPI

SPI 7.7 PUBLIC SAFETY

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

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 flood way 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. Locate subdivisions, transportation infrastructure and public works to minimize, mitigate or avoid threats to the community from wildfire or other emergencies; and
6. Consider community and regional fire protection measures adjacent to forests.

IMPORTANT SPI FLOODING TERMINOLOGY

Floodplain

Areas that are projected to be covered in water during a flood event. It is made up of the flood way and flood fringe.

= Flood way

Areas that are projected to:

- be covered by water deeper than 1 metre or
- have water flowing faster than 1 m/s

during a flood event

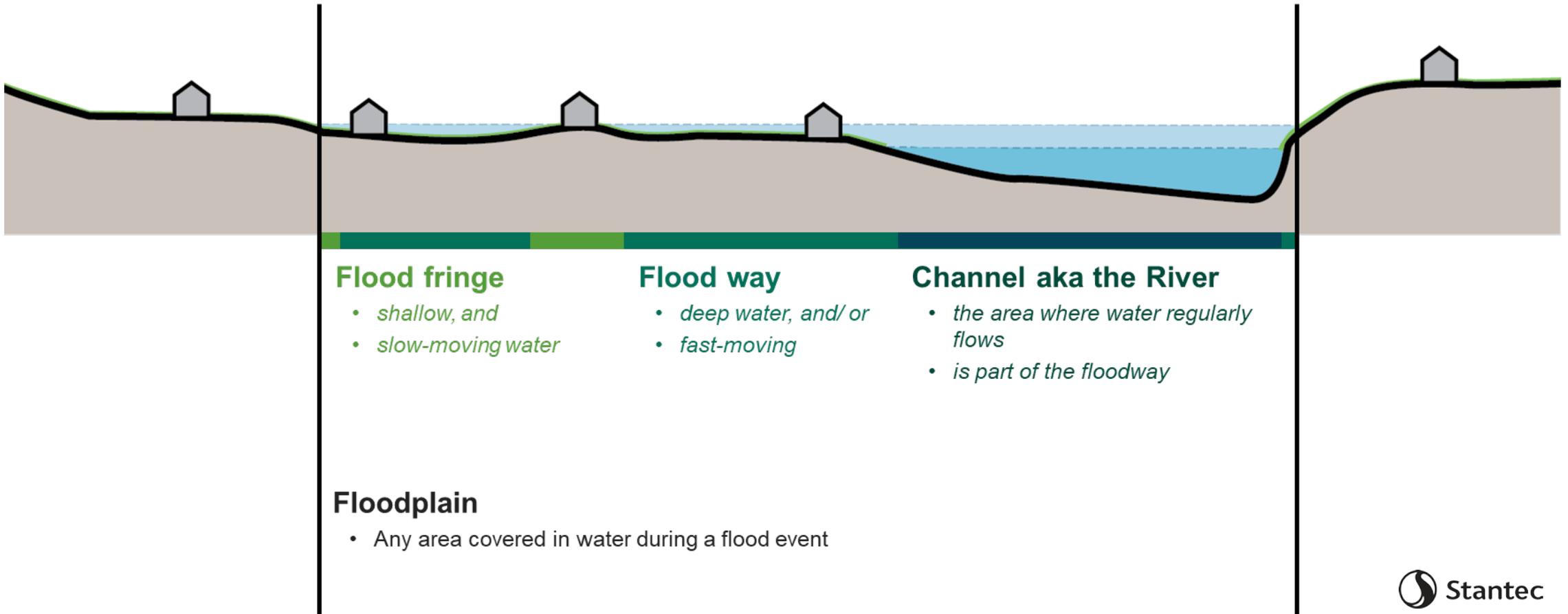
+ Flood fringe

Areas in the floodplain that do not meet floodway criteria.

Areas that are projected to:

- be covered by water less than 1 metre or
- have water flowing slower than 1 m/s)

FLOODING AREAS ILLUSTRATED

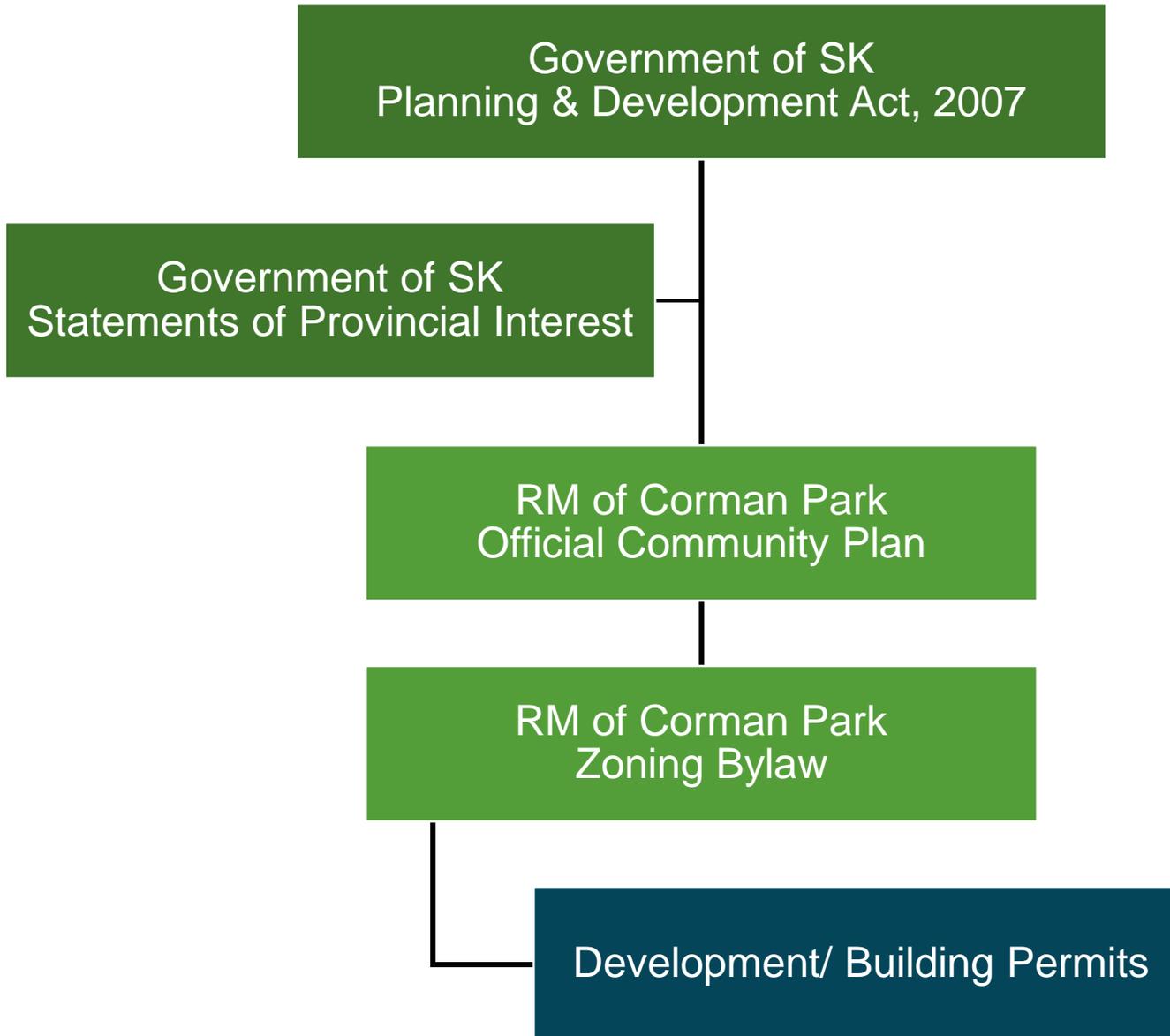


1:500

FLOOD EVENT

- 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

CONTEXT



Official Community Plan

- An OCP provides overall framework for organized, sustainable and planned development and outlines long-term vision of communities
- Current OCP does not align with SPI

Zoning Bylaw

- A Zoning Bylaw is a regulatory document containing regulations that facilitate the OCP

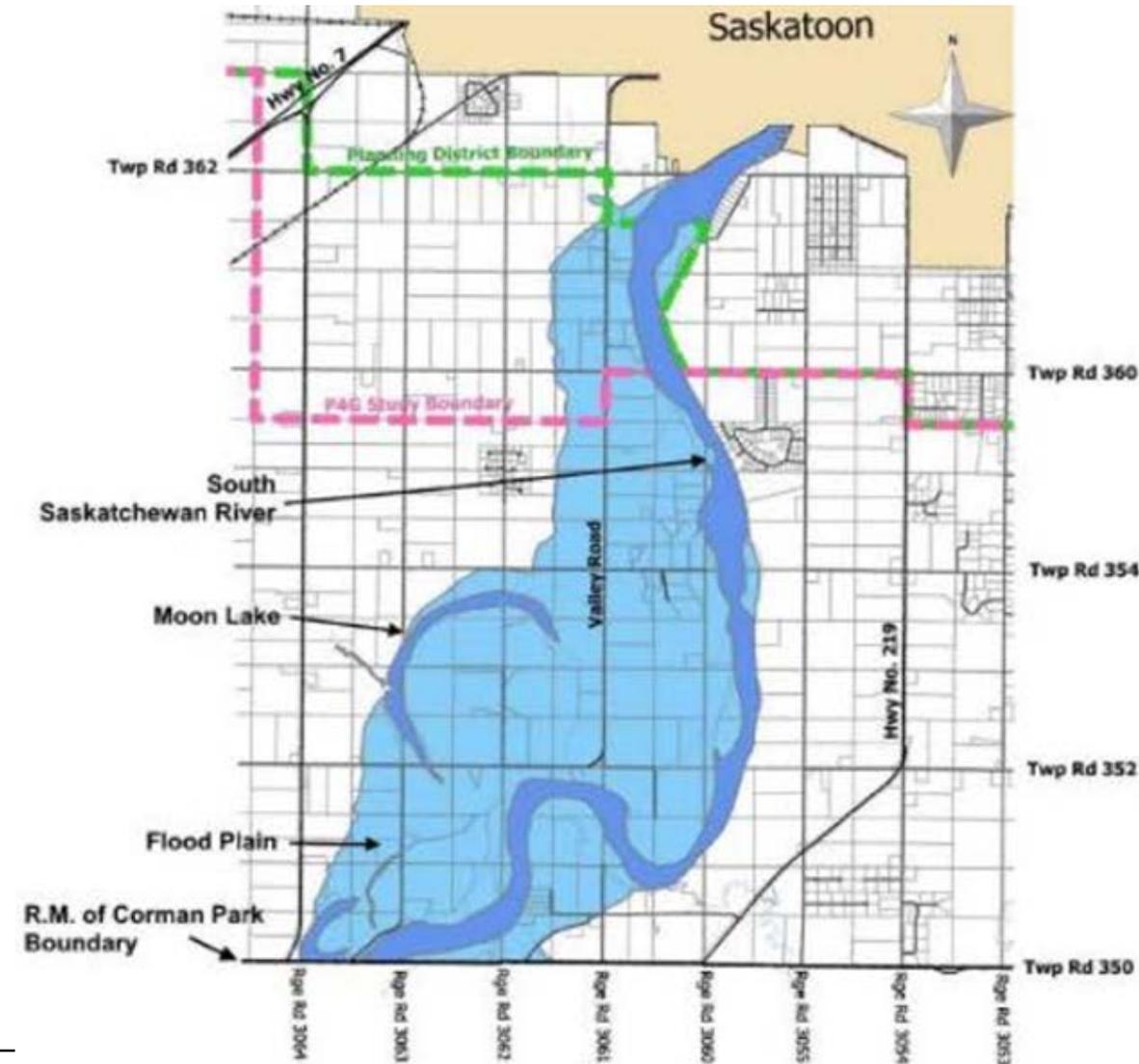
DEVELOPMENT PROCESS OVERVIEW

Pre 2012 Floodplain Development Process

- No difference between floodway and flood fringe
- Subdivision and non-agricultural development permitted where properties are no longer “subject to flooding” (i.e. the owner built a mound)
- All non-agricultural development must be constructed so that it is not “below the 1:500 flood elevation”
- R.M. contacted WSA to provide Estimated Peak Water Level (EPWL) based on 1:500 flood
- R.M. issued building permits with development standards including minimum building elevations or flood-proofing
- Ratepayer built residence/building on mound or installed other required flood-proofing

Post 2012 Floodplain Development Process

- R.M. now must consider difference in floodway and flood fringe
- Can only allow development in flood fringe – what does this mean?
- Reason for doing policy work now



R.M. FLOODPLAIN POLICY GOALS

Increase community awareness and understanding about:

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

Apply the SPI to the municipal policies:

Official Community Plan

- Explain the concern of flooding
- Create policies for areas prone to flooding

Zoning Bylaw

- Include SPI definitions
- Illustrate the floodplain, floodway, and flood fringe using maps
- Create regulations for development

FLOODING OVERVIEW

Presented by Water Security Agency

Flood Hydrology

July 15, 2021

Outline

- Background on Flood Hydrology
- Hydrology
 - Lake Diefenbaker
 - Flood Hydrology
- Flood Hydrology and SPI

Background Flood Hydrology - FDRP

- Many floods in Saskatchewan and across Canada in the 1970's
- Canada-Saskatchewan Flood Damage Reduction Program (April, 1977)
- Fed/Prov did hydrology, hydraulics and mapping
- Communities that adopted the mapping and zoning bylaws were “designated”
- 16 of 32 communities were designated
- Program ended in the mid-1990's



South Saskatchewan River in Saskatoon, between Wyllyd Bridge and Victoria Bridge, June 14, 1953

Background - Corman Park and the South Saskatchewan River

- Initial hydraulic model for the South Saskatchewan River was developed in the Mid 1980s (HEC-2 Model). Made available to SaskWater.
- The model was updated and extended with new cross-section information in the early 1990s. This information was used in the subdivision process at the time.
- In 2007 Corman Park Requested to develop a map displaying the 1 in 500 year flood lines through the RM. Model was updated with new cross-sections.
- Flood fringe and floodway lines were developed and share with Corman Park utilizing the 4,200 m³/s.
- 2018 model for existing conditions



1:500 yr Flood Standard In Other Jurisdictions

(Saskatchewan – 1:500 two zone standard)

Manitoba

- i) 1 in 200 yr flood standard (new)
- ii) Winnipeg Floodway - 1:700 yr flood event

Alberta

- i) 1:100 yr standard (flood way) 1:200 yr standard (floodfringe)
- ii) 1:500 yr standard for public and maintenance buildings
- iii) 1:1000 yr standard for vital facilities (hospitals, fire and police etc.)

British Columbia

- I) 1:200, single zone.
- II) +0.3m instantaneous, +0.6m)

Ontario (one and two zone)

- i) hurricane Hazel storm (1:100 to 1:500 year flood event) or
- ii) historical event or 1:100 year flood
- iii) experienced flood > i, or ii

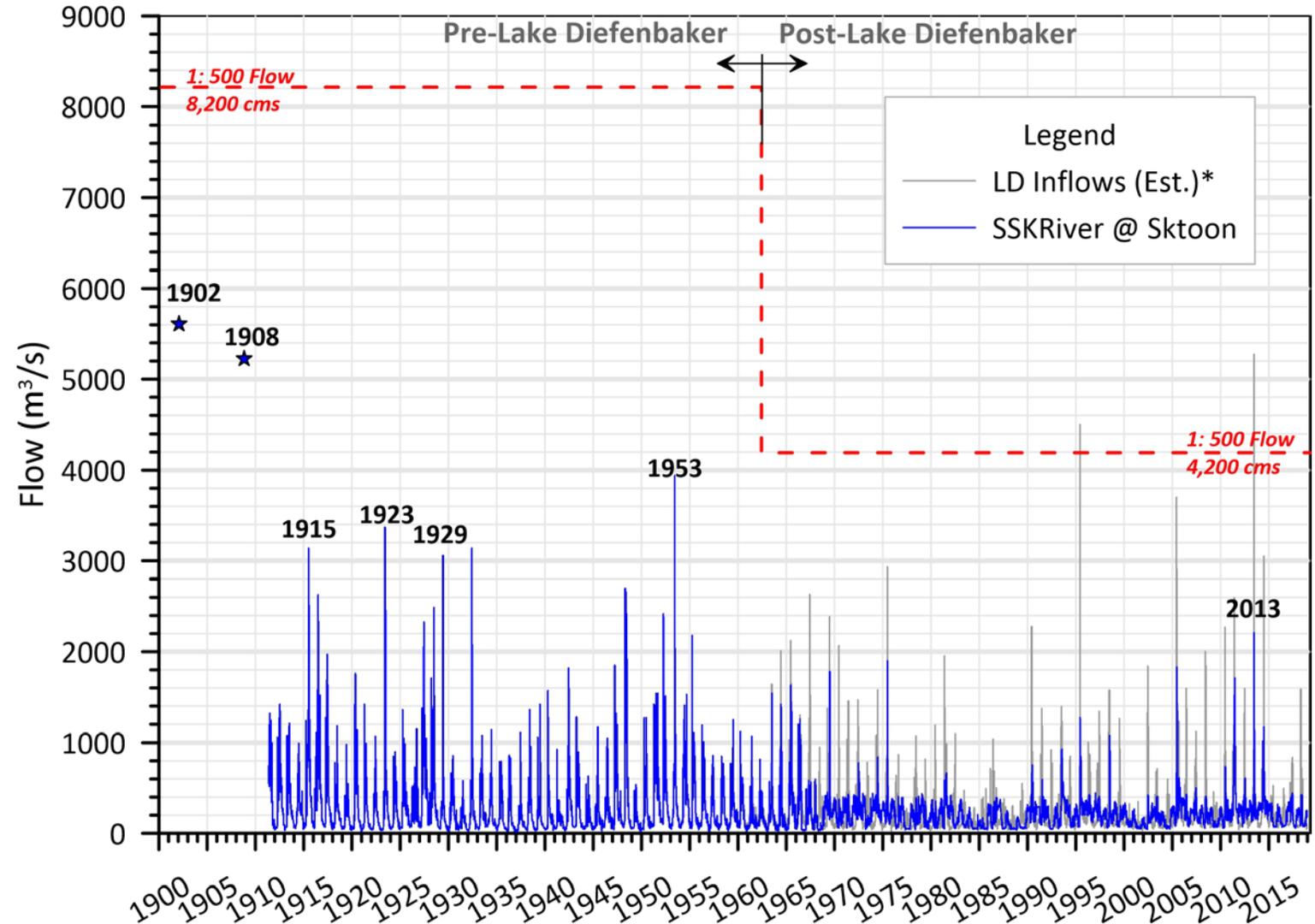
<https://www.eng.uwo.ca/research/iclr/fids/publications/products/107.pdf>

HYDROLOGY- STUDIES AND REVIEW

Recorded flows at the South Saskatchewan River at Saskatoon

- Lake Diefenbaker filled to near FSL for the first time in 1969
- Numerous events exceeding 2,500 m³/s previous and after the construction of Lake Diefenbaker
- No flood event after the construction of Lake Diefenbaker has exceeded 2,500 m³/s
- Significant flood attenuation
- 2013 Inflow to Lake Diefenbaker has an estimated RP ~ 80 years

South Saskatchewan River at Saskatoon
1902-2018



* Recorded flows SSK River @ Medicine Hat (05AJ001) and Red Deer River near Bindloss (05CK004)

Lake Diefenbaker - Multiuse Reservoir

- Irrigation
- Water supply including domestic, municipal, and industrial water uses
- Hydro power generation
- Habitat
- Recreation, and
- Flood control and flow regulation.



Lake Diefenbaker Specifications

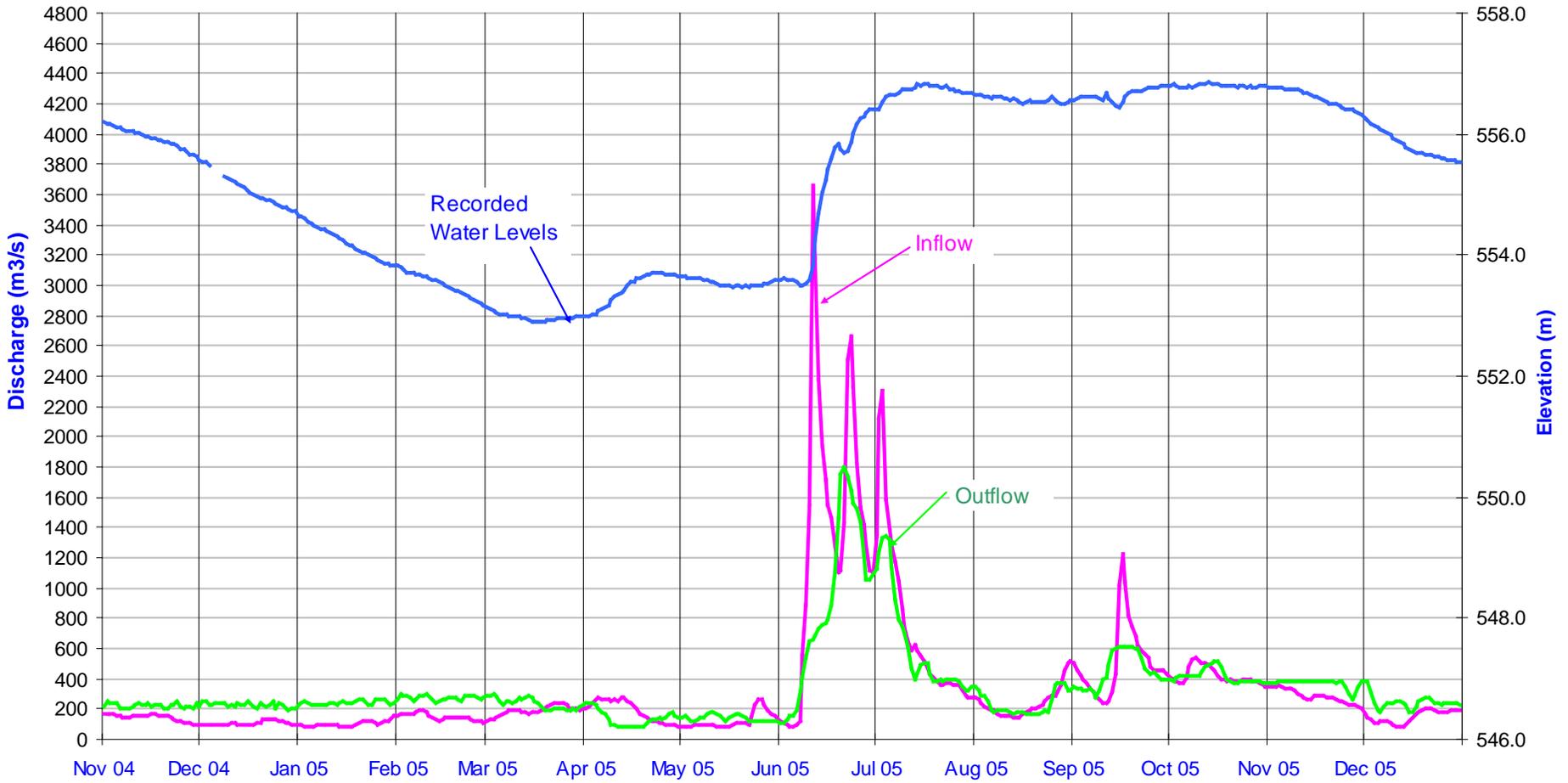
Reservoir Design Full Supply Level (FSL)	556.87 metres
Effective drainage area	126,000 km ²
Maximum depth	58 metres at FSL
Length	225 km at FSL
Area	43,000 hectares at FSL
Storage at FSL	9,400,000,000 m ³ 7,6000,000 acre-ft

Flood Hydrology - Operations Example During 2005



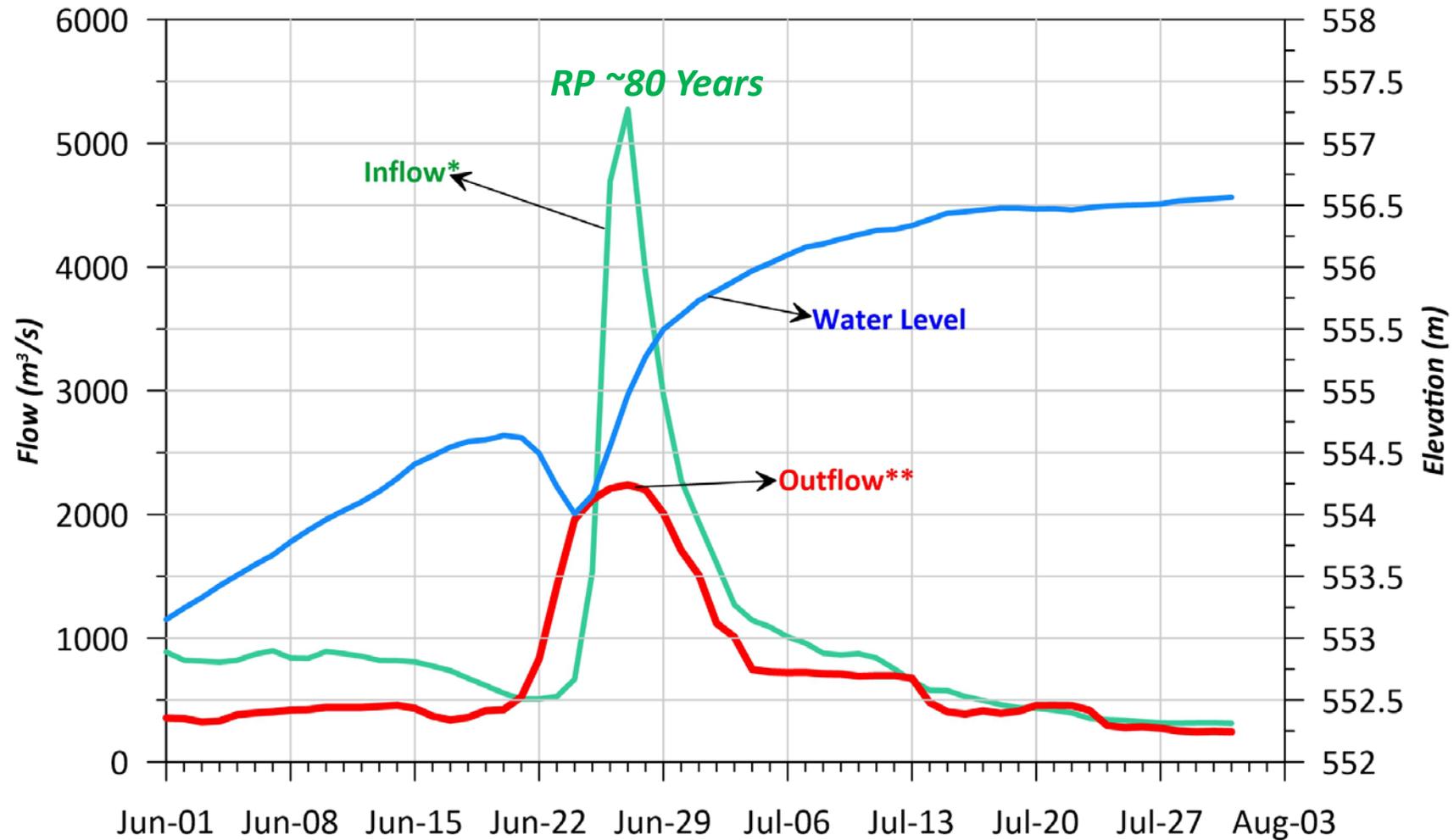
Saskatchewan Watershed Authority

Lake Diefenbaker
Nov 1, 2004 - Dec 31, 2005 Operations



Flood Hydrology - Operations Example During 2013

2013 Flood Event - Lake Diefenbaker



* Inflow based on observed flows South Saskatchewan River at Medicine Hat and Red Deer River near Bindloss

** Observed flows South Saskatchewan River at Saskatoon

Historical Estimation of Peak Inflows and Outflows from Lake Diefenbaker

Estimate Date	1980s		1990s		2000s *		2020	
Return Period	Peak Daily Inflow(m ³ /s)	Peak Release (m ³ /s)	Peak Daily Inflow(m ³ /s)	Peak Release (m ³ /s)	Peak Daily Inflow(m ³ /s)	Peak Release (m ³ /s)	Peak Daily Inflow(m ³ /s)	Peak Release (m ³ /s)
1:500	8,500	6,350	7,660	5,400	7,660	4,200	8,200	4,200

* Through changes in the operation of the reservoir outflows were reduced from 5,400 to 4,200 m³/s

Flood Hydrology Considerations

- Both recent studies assume the future floods will have same frequency as in the past.
- Climate change science is not yet clear on effects on floods.
- Any future increases in upstream water use will not impact floods unless accompanied by large reservoirs.

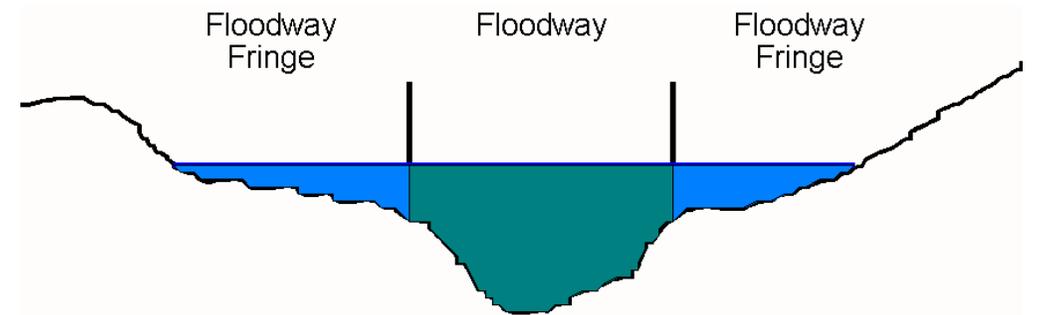


Provincial Interest Regulations

- Province issued the *The Statements of Provincial Interest Regulations* under the *Planning and Development Act (2007)* in April, 2012
- Section 6.7 Public Safety
 - “The province has an interest in ensuring the safety and security of individuals, communities and property from natural and human-induced threats.”
 1. Identify and manage hazard lands
 2. Limit development on hazard lands

Provincial Interest Regulations

- “Prohibit the development of new buildings and additions to buildings in the flood way of the 1:500 year flood elevation of any watercourse or water body;”
- “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 in the flood fringe;”



River Cross Section in Flood Stage

Dyke Systems as means of Floodproofing

- Have a history of failure
- Require proper design (i.e. Engineering)
- Geotechnical investigation (ideally strong foundations)
 - South Sask. River Sandy soils may require cutoff wall that will vary in depth (\$\$\$)
- Inspection, Maintenance, and Operation on annual basis (\$\$\$)
- Require emergency measures plans for the dyke and areas behind (Community)
- Recommended for existing developed areas
- Areas behind the dykes are still flood risk areas



Source: <https://www.bbc.com/news/uk-england-lincolnshire-50601525>



South Saskatchewan River, June 2013

Flow of $\sim 2,200$ m^3/s

* In general stage of the SSK River through the RM is expected to increase 0.1 m per 100 m^3/s when flows exceed 2000



South
Saskatchewan
River, June
2013

Flow of
 $\sim 2,200 \text{ m}^3/\text{s}$



South
Saskatchewan
River, June
2013

Flow of
 $\sim 2,200 \text{ m}^3/\text{s}$

South
Saskatchewan
River, June 2013
Flow of $\sim 2,200$
 m^3/s

**Stage for the 1:500 (4,200
 m^3/s) peak water level is
expected to be 2 m higher.**





South Saskatchewan River, June 2013
Flow of $\sim 2,200 \text{ m}^3/\text{s}$



South Saskatchewan River, June 2013
Flow of $\sim 2,200 \text{ m}^3/\text{s}$

South Saskatchewan River, June 2013
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South Saskatchewan River, June 2013
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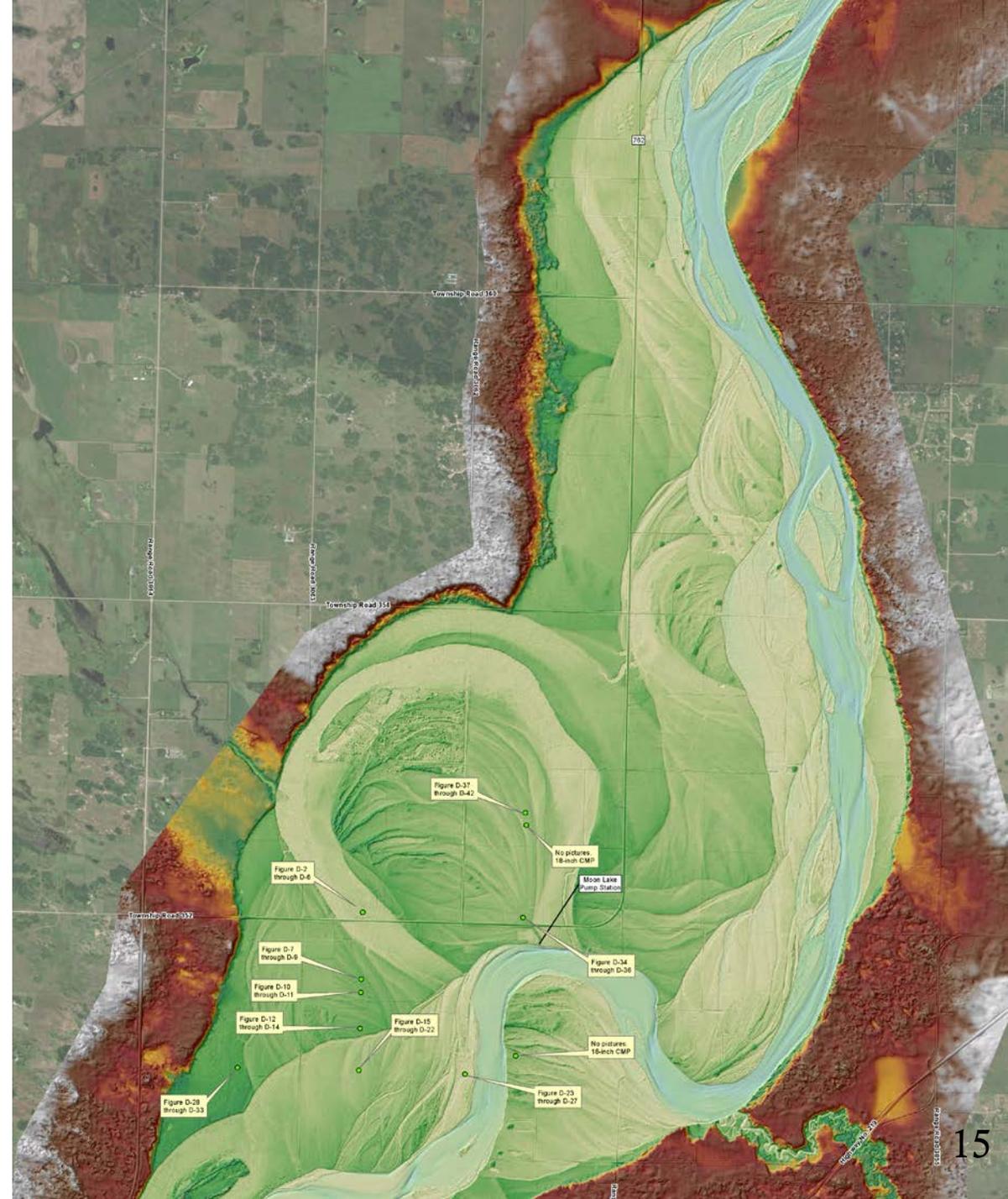


South Saskatchewan River, June 2013
Flow of $\sim 2,200 \text{ m}^3/\text{s}$



2018 FLOOD MAPPING PROJECT

- In 2018 Council decided to update flood model as the one province used was out of date and did not relate to new 2012 SPIs
- Hired Barr Engineering to complete work
- Completed 2D model of the South Saskatchewan River floodplain to determine water flow and depths at the 1:500 flood flow level

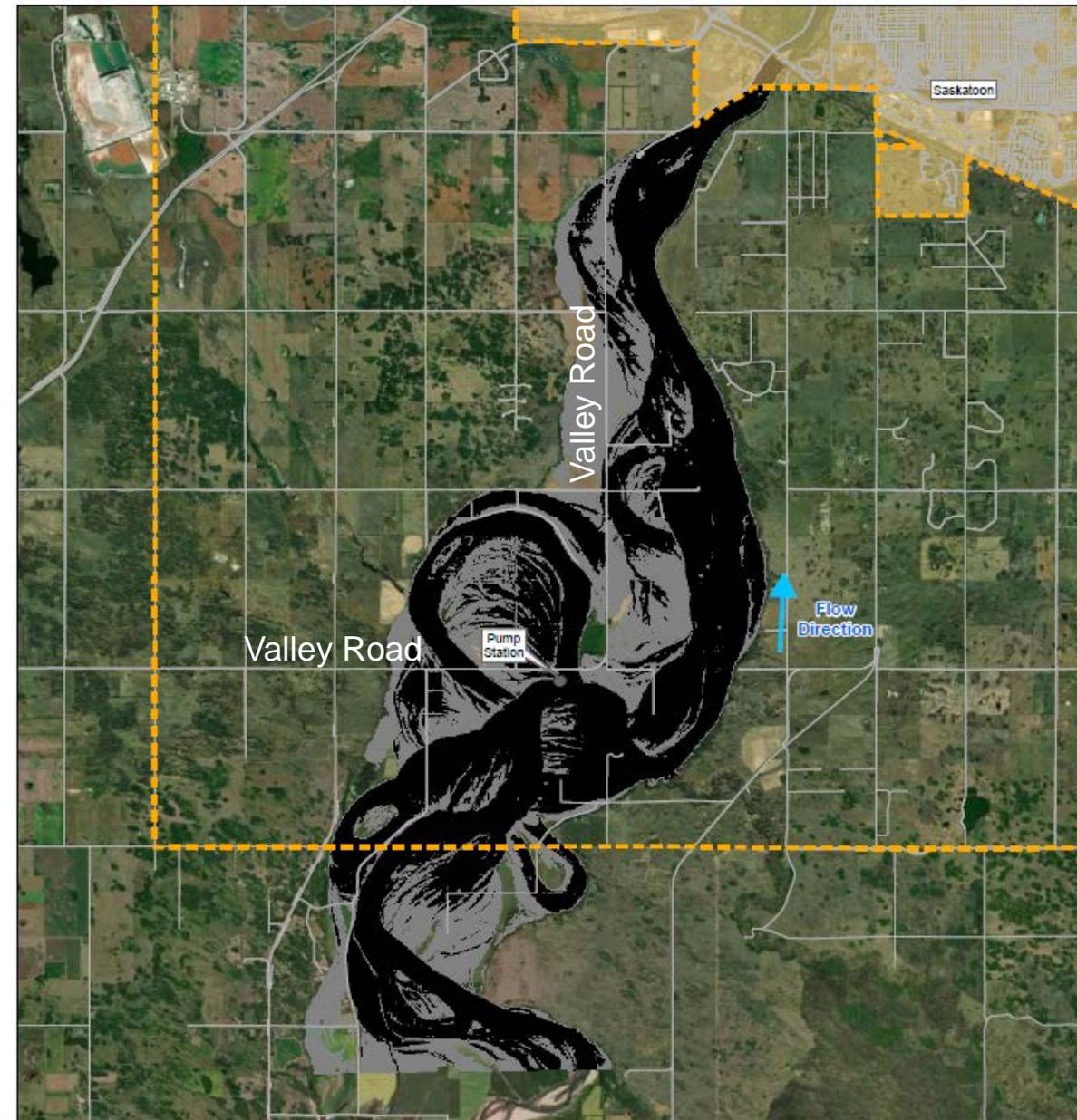


2018 FLOOD MAPPING PROJECT

Using the SPI's definition of floodway vs. flood fringe:

		Velocity	
		≤ 1.0 m/s	> 1.0 m/s
Depth	≤ 1.0 m	Flood Fringe	Floodway
	> 1.0 m	Floodway	Floodway

The Barr model for existing conditions has been accepted by WSA



2021 PROJECT: UPDATING FLOOD POLICIES

Interpret the SPI

Review the modelling results

Apply best management practices

Key Considerations

- Risk of flooding and severity of impact
- Purpose of emergency management (Public Safety Canada):

Save lives

Vulnerable uses (e.g., hospitals, seniors' facilities)

Evacuation routes

Maintaining critical infrastructure (e.g., water, power)

Preserve the environment

Potential for contamination

Protect property and the economy

NEXT STEPS

- **Draft Content**
 - Official Community Plan policies
 - Zoning Bylaw regulations
- **Engage the community on the Draft Content**
- **Finalize Content**
- **Formal OCP and ZBL approval process**
 - Council review
 - Government Relations approval



**WANT MORE
INFORMATION?**

E-mail: bbeckie@rmcormanpark.ca

Visit: <http://rmcormanpark.ca/307/Flood-Plain-Policy-Updates>