MTI

KGS GROUP

Landmark Planning & Design Inc.

RIVERS DAM REHABILITATION

Stakeholder Meeting

2022

Project Description

- The purpose of the assignment is to identify options for rehabilitation and upgrading of the Rivers Dam.
- The design discharge capacity was exceeded during the July 2020 event and will be increased to safely accommodate larger flood events.
- This presentation includes an overview of the identified options and a review of the relative advantages and disadvantages of each option.
- Parts of the facility will be rehabilitated regardless of this assignment.

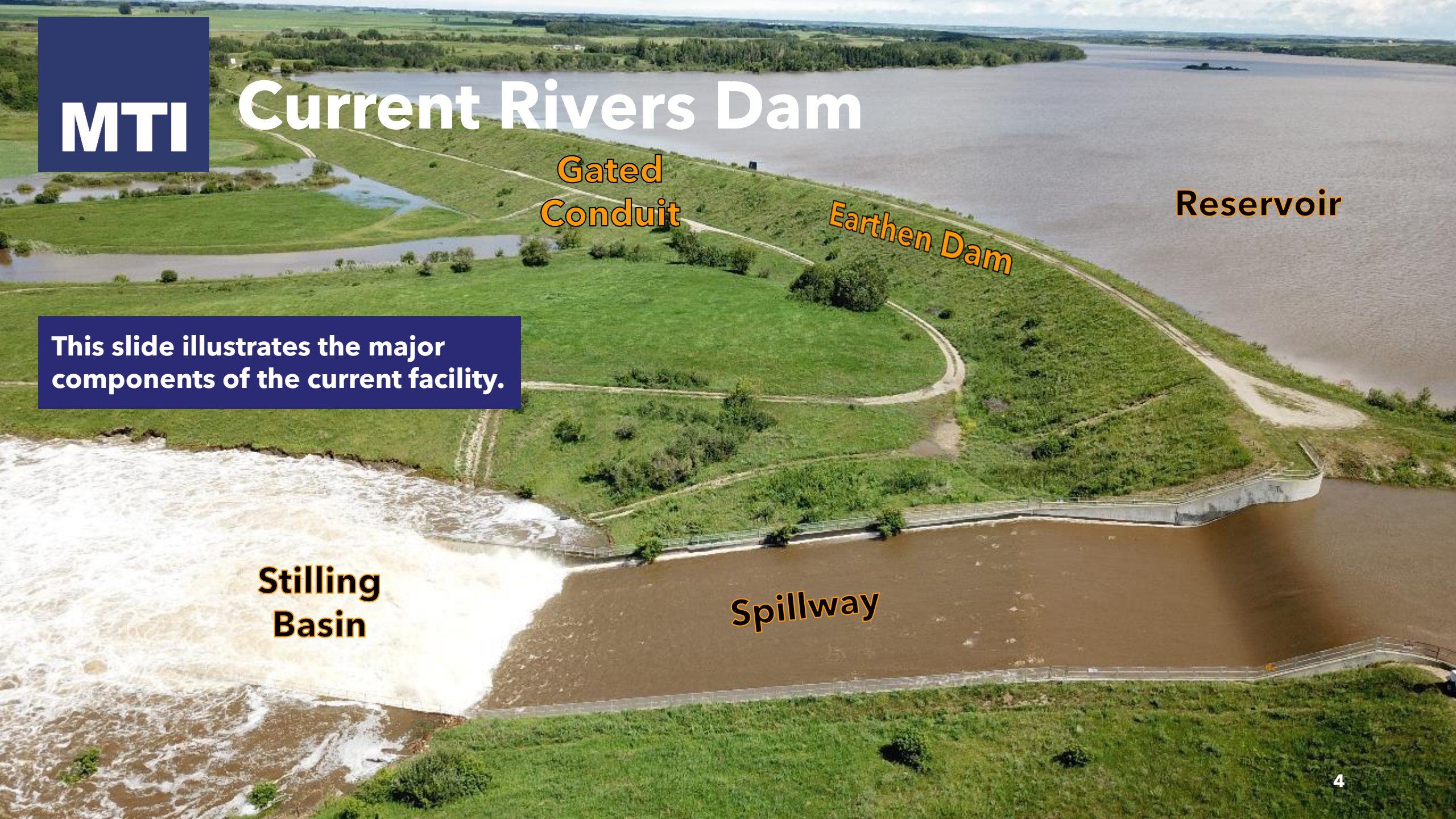
Project Team

MTI – Project Owner

KGS – Engineering Consultant

Landmark Planning & Design – Public and Stakeholder Engagement

Current Rivers Dam



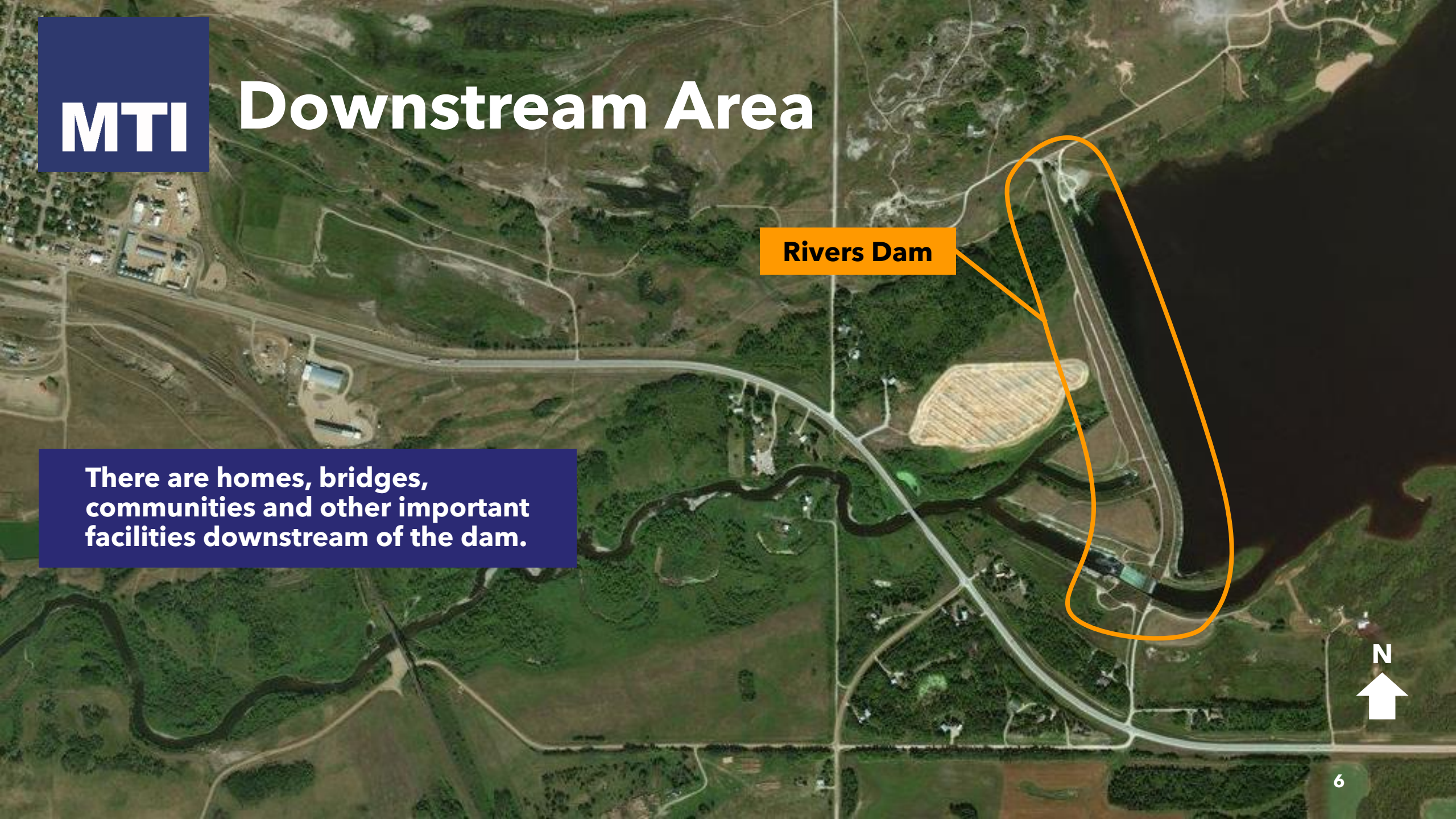
This slide illustrates the major components of the current facility.

Gated Conduit

The purpose of the gated conduit is to pass water for downstream needs when the spillway is not flowing.

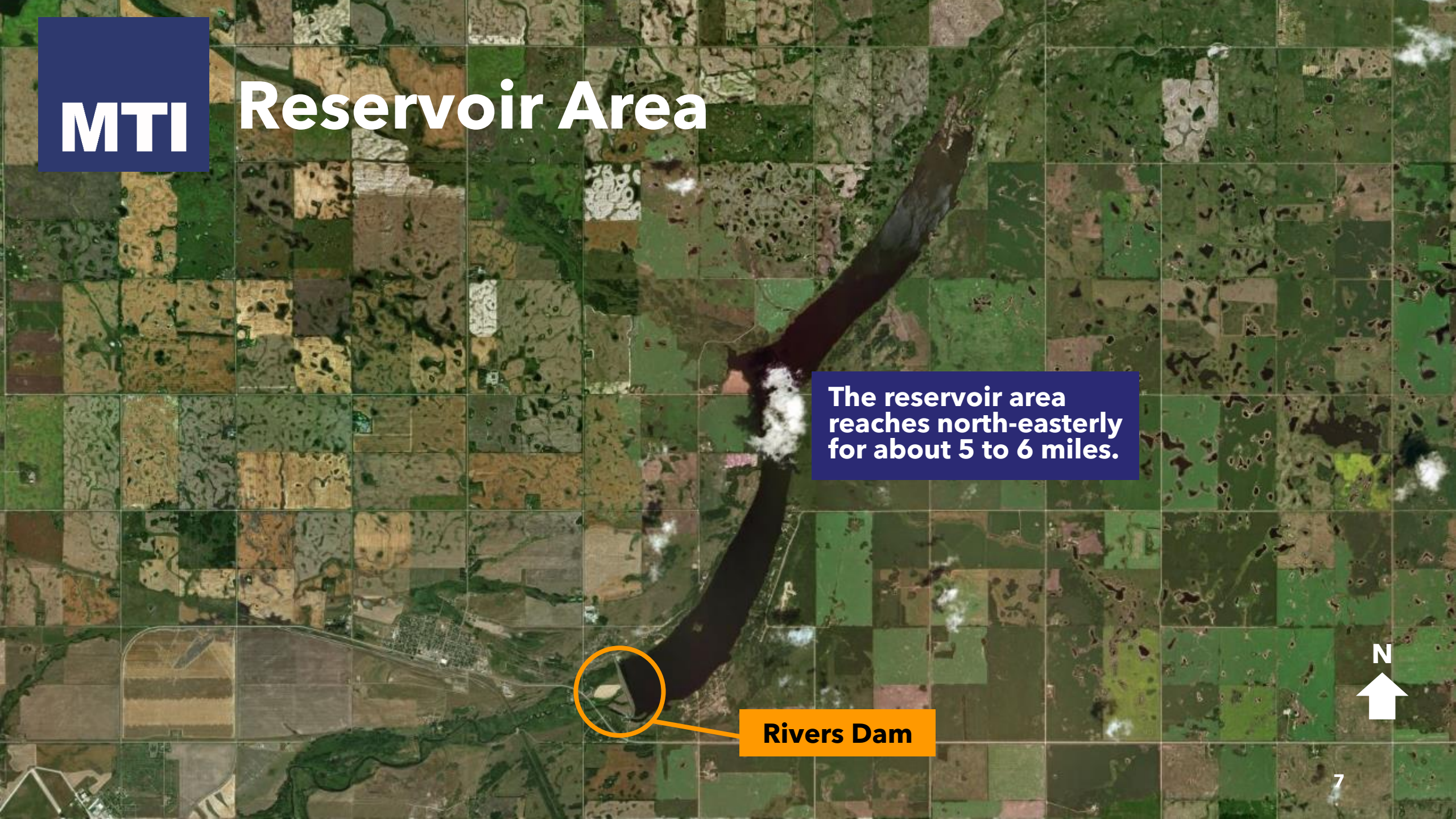
MTI

Downstream Area



There are homes, bridges, communities and other important facilities downstream of the dam.

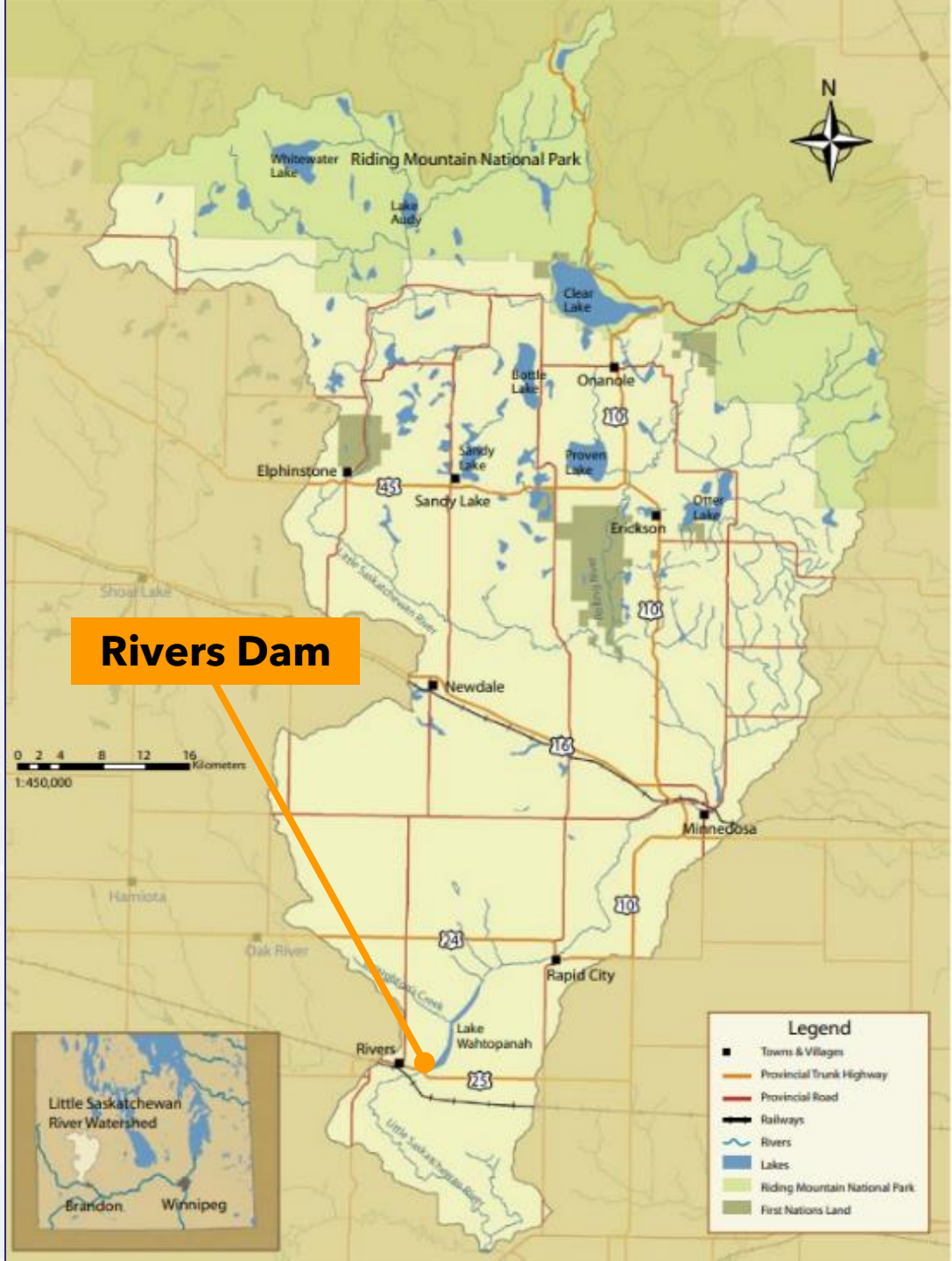
Reservoir Area



Catchment Area

The Little Saskatchewan River Watershed is the catchment area for the Rivers Dam.

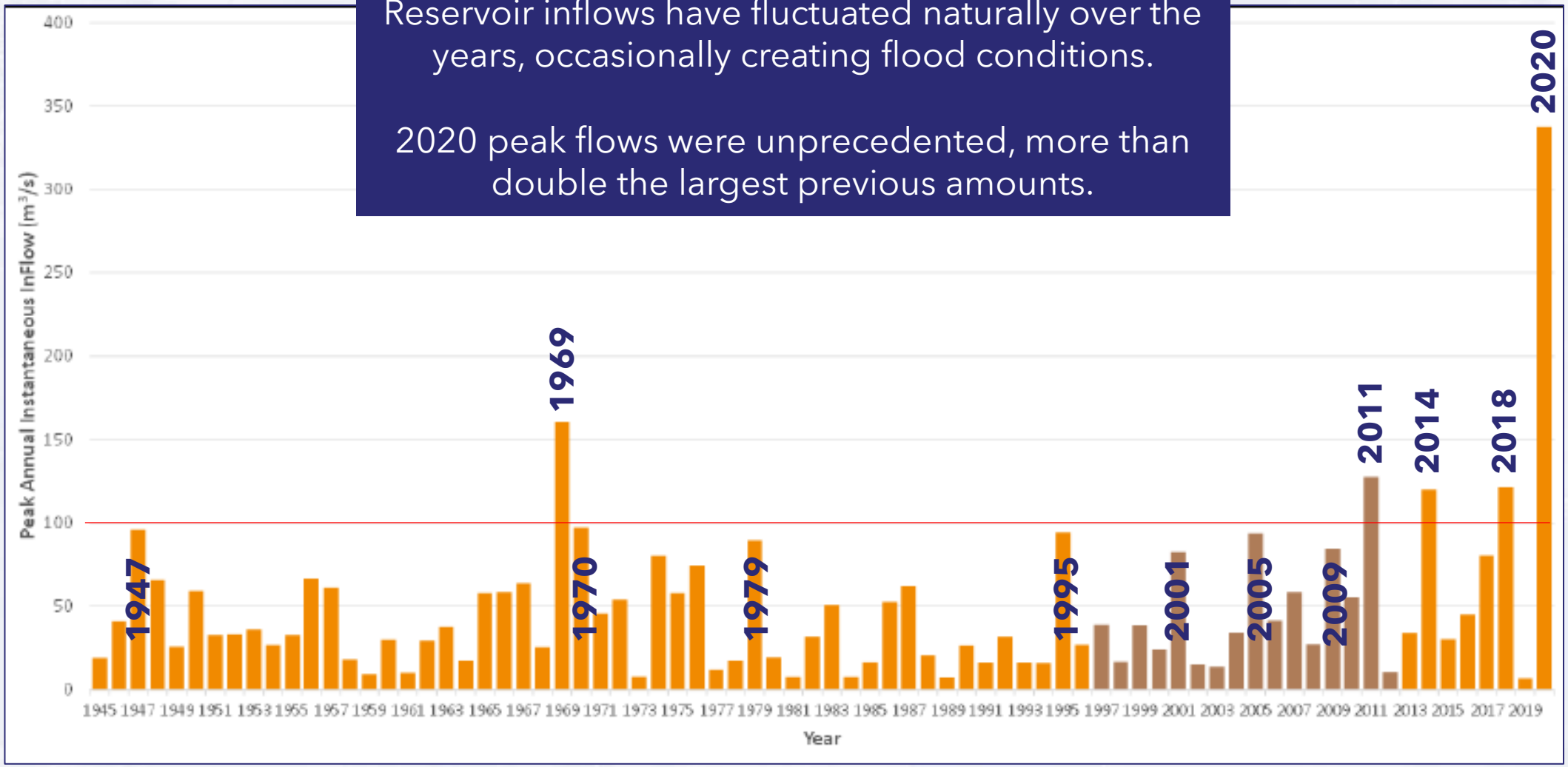
Most of the water that falls in this area, flows through the Rivers Dam.



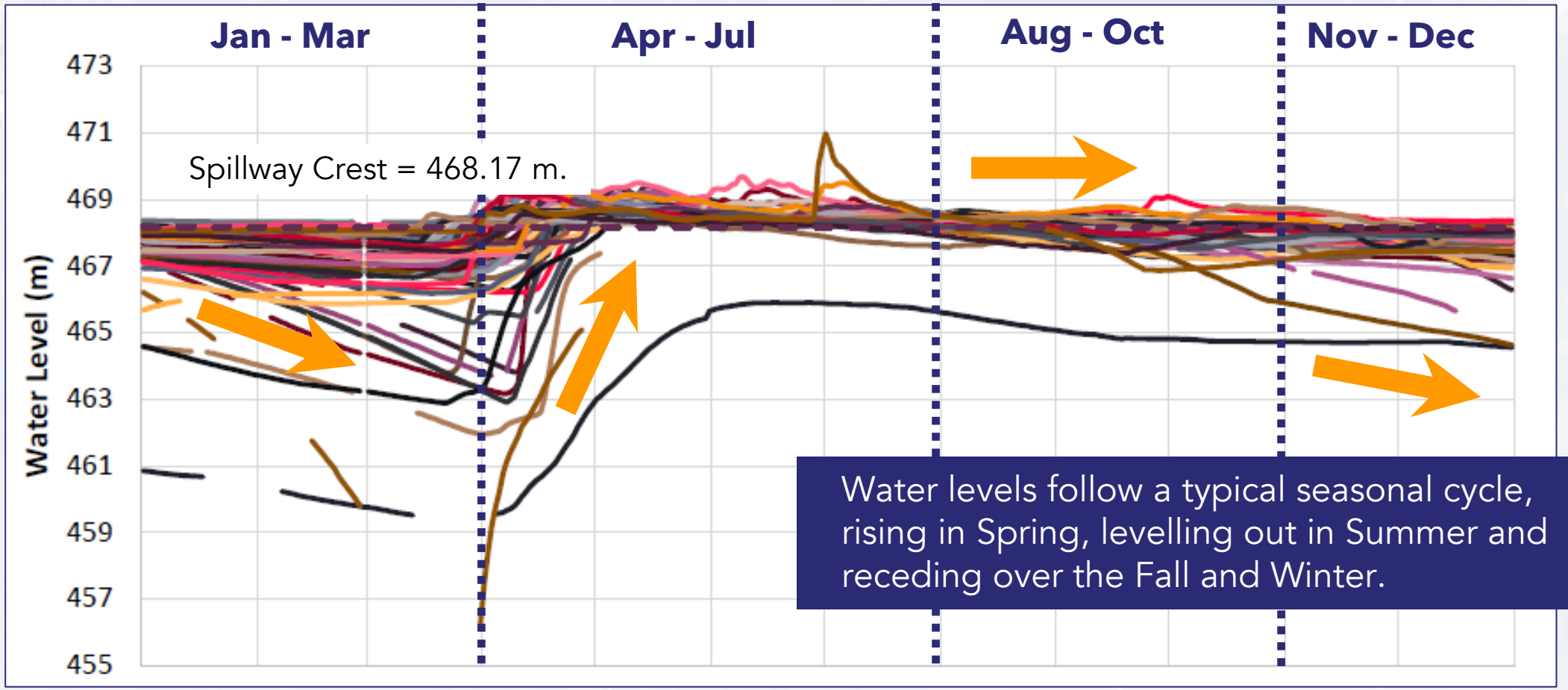
Historic Reservoir Inflows (1945-2020)

Reservoir inflows have fluctuated naturally over the years, occasionally creating flood conditions.

2020 peak flows were unprecedented, more than double the largest previous amounts.



Historic Water Levels



Water levels follow a typical seasonal cycle, rising in Spring, levelling out in Summer and receding over the Fall and Winter.

Project Options

There are a number of ways to increase the capacity of the facility to pass water through it more effectively in times of very high water.

All options will result in more water passing through the facility.

Recent and current work carried out on the dam is not related to these options

1. **Rehabilitate Spillway and Increase Freeboard**
2. **Modify the Spillway – Lower the Crest (Gate)**
3. **Modify the Spillway – Build a Labyrinth Crest Weir**
4. **Build a Spillway By-Pass (North)**
5. **Build a Spillway By-pass (South)**
6. **Build a New Spillway**
7. **Widen the Spillway**

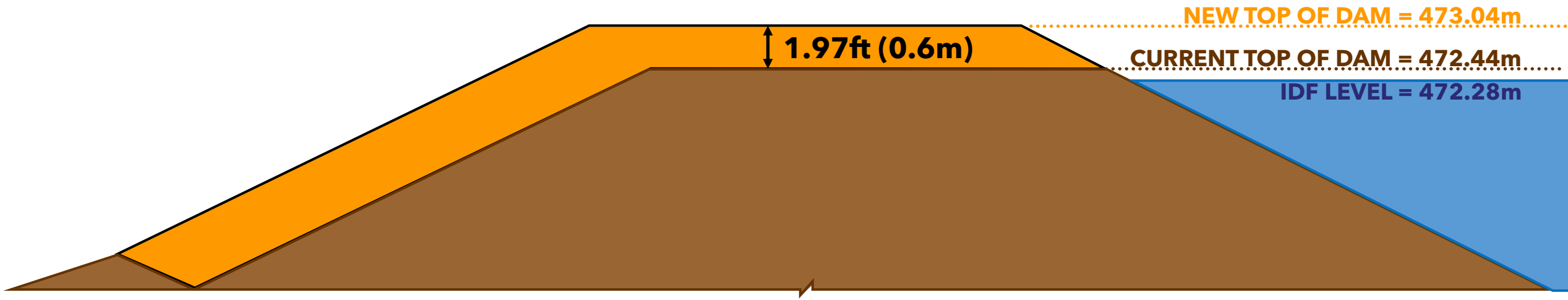
Option 1 – Rehabilitate the Spillway and Increase Freeboard

- By rehabilitating the spillway, it will be able to pass more water safely. Topping up the embankment will prevent waves from over-topping the embankment during very high water events.

Option 1 – Rehabilitate the Spillway and Increase Freeboard

- By rehabilitating the spillway, it will be able to pass more water safely. Topping up the embankment will prevent waves from over-topping the embankment during very high water events.

IDF LEVEL + FREEBOARD = 472.91m



Option 2 – Lower the Crest (Gate)

- By lowering the spillway crest more water can pass through the spillway.
- This method uses mechanical panels to control the crest height, which allows more or less water to flow through.

Option 3 – Labyrinth Crest Wier

- This method increases the length of the crest so more water can spill over it.

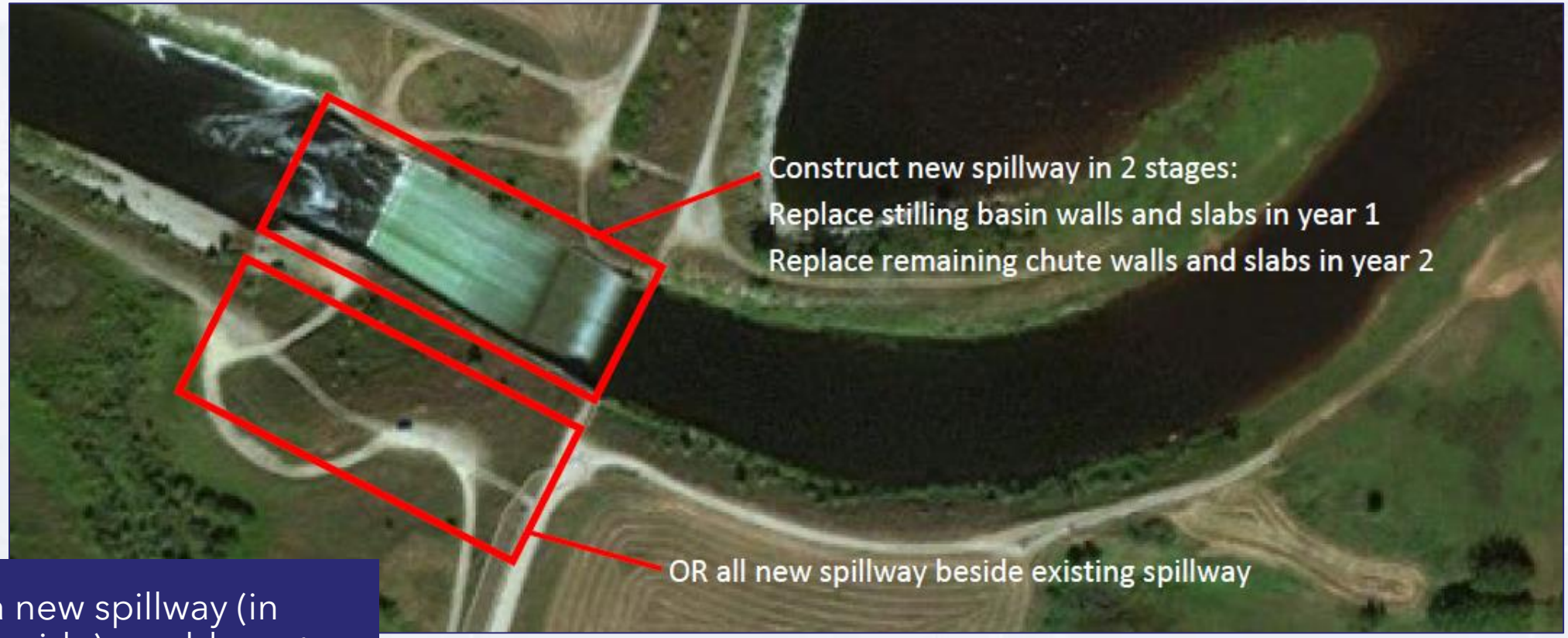
Option 4 – Spillway By-Pass (North)

- An additional spillway would provide a second path for water to pass over the dam.
- The orange area illustrates an area to the north of the existing spillway that would be used to convey more water.

Option 5 – Spillway By-Pass (South)

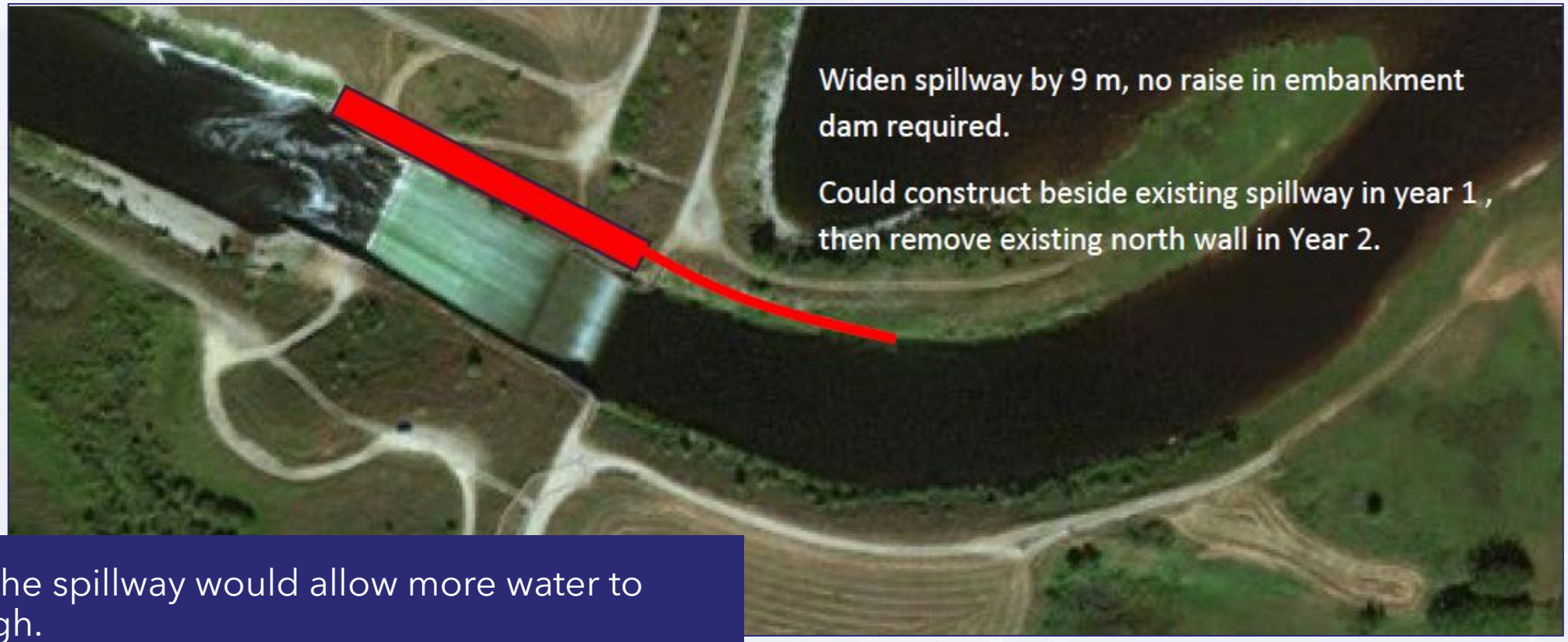
- An additional spillway would provide a second path for water to pass over the dam.
- The orange area illustrates an area to the south of the existing spillway that would be used to convey more water.

Option 6 – New Spillway



- Creating a new spillway (in place or beside) would create more capacity for water to pass through.

Option 7 – Widen the Spillway



- Widening the spillway would allow more water to pass through.
- The area shown in red illustrates a widening of the spillway to the north of the existing spillway.

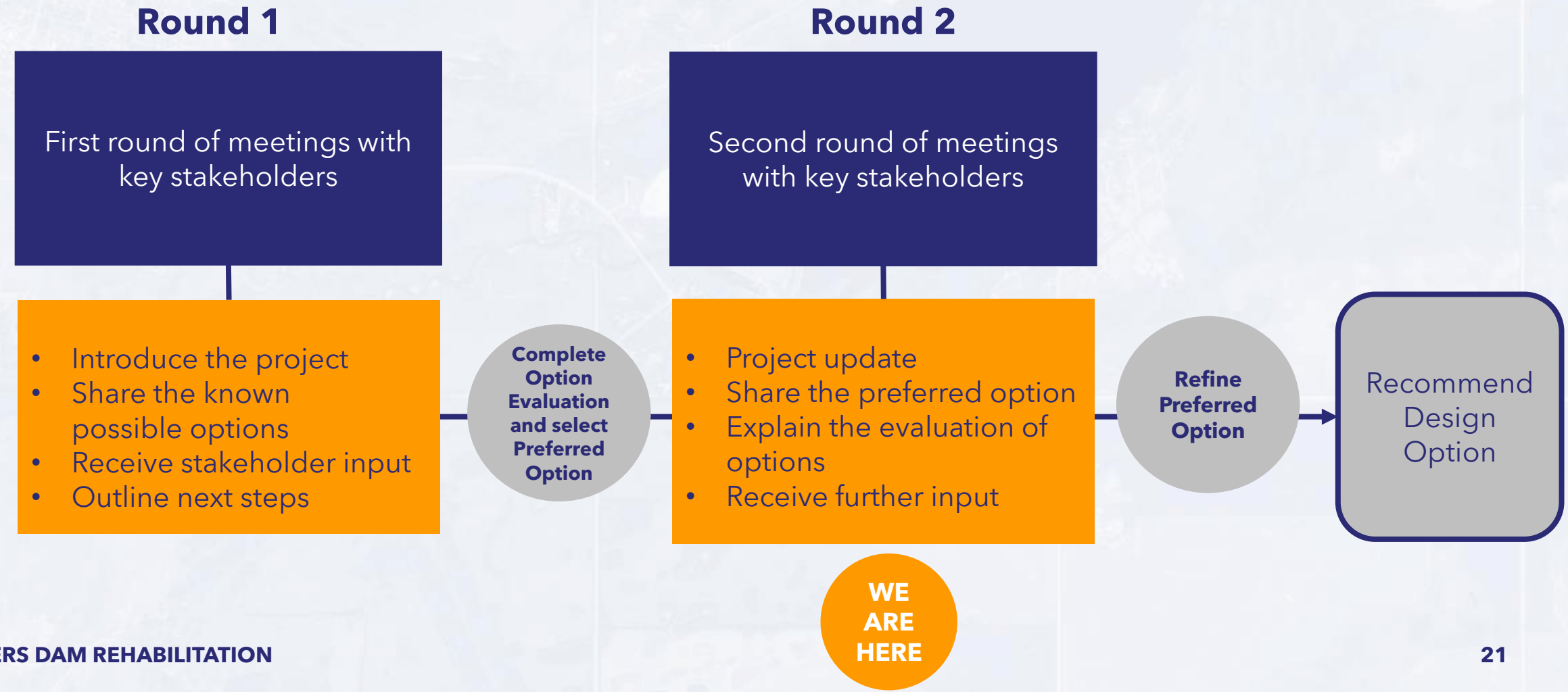
Stakeholders

There are many people and groups that may be interested or affected by this project:

- Landowners potentially directly impacted by any anticipated water level changes or other changes
- Landowners/Evacuees previously affected by 2020 evacuation
- Riverdale Municipality Council and Admin
- Local First Nations
- Friends of Rivers Lake
- Assiniboine West Watershed District
- Manitoba Fisheries Branch
- Utilities in the vicinity
- Rivers and District Chamber of Commerce
- Local Trail or Recreation Groups
- Emergency Services Providers
- CP/CN Rail
- Others as identified

Process

The following diagram illustrates the engineering and engagement process for this project:



Evaluation

There are many things to consider in selecting the preferred option to recommend including issues raised by stakeholders at the first round of meetings:

Engineering:

- Engineering Standards
- Safety: Catastrophic Failure Risk
- Capacity/Conveyance (Discharge Capacity)
- Operations
- Complexity/Simplicity
- Maintenance
- Flexibility/Control – Water Level Control
- Non-critical Operations Failure Potential
- Risk from Construction on known Seepage Area

Social:

- Flood Impacts to Property
- Potential Impacts to Wells
- Potential Construction Impact
- Property Acquisition for Constructed Work
- Potential Water Quality Changes (Downstream Flow)
- Accommodates Lower Water Levels (During Typical Flood)
- Potential for Downstream Impact (Higher Water Levels)
- Water Level Fluctuation Potential (In Reservoir)

Social (cont.)

- Environmental (Including Fish)
- Local Road and Rail Infrastructure
- Recreation Use (Summer)
- Recreation Use (Winter)
- Construction Duration

Costs:

- Construction Cost (High Level Estimate)
- Maintenance/Operations Costs
- Design Life Value

Evaluation

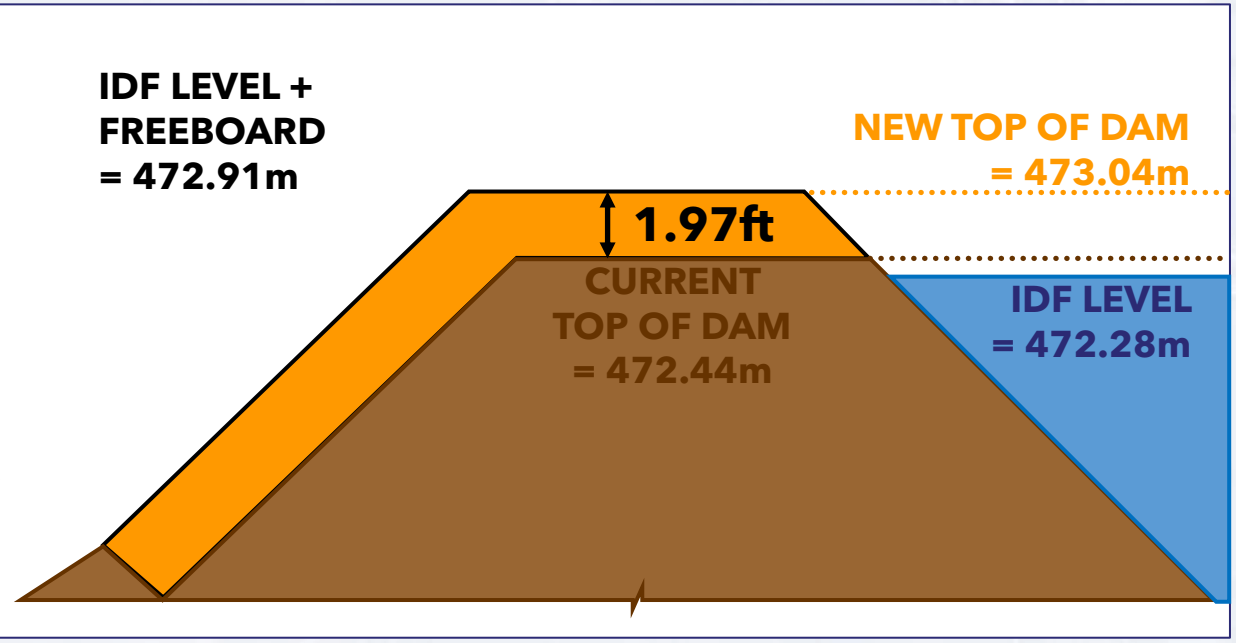
This matrix illustrates an updated assessment of the advantages and disadvantages of each option.

	Rivers Dam Option Evaluation	Option 1 Rehab Spillway/ Increase Freeboard	Option 2 Lower the Crest (Gate)	Option 3 Build a Labyrinth Crest Weir	Option 4 Build a Spillway By-pass (N)	Option 5 Build a Spillway By-pass (S)	Option 6 Build a New Spillway	Option 7 Widen the Spillway
Engineering	Engineering Standards							
	Safety: Catastrophic Failure Risk							
	Capacity / Conveyance (discharge capacity)							
	Operations		Mechanical					
	Complexity / Simplicity	Standard Design	Requires mechanical works	Construction Complex	Construction Complex	Construction complex	Construction complex	Construction complex
	Maintenance		Mechanical maintenance				New facility	
	Flexibility/Control - Water Level Control		Allows some water level control (Climate Change)					
	Non-Critical Operations Failure Potential		Gate adds complexity					
	Risk from construction on known seepage area				Potential area of seepage	Construction in known areas of seepage	Construction in known areas of seepage	Construction in known areas of seepage
Social	Flood impacts to property	Slightly higher water level						
	Potential Impact to Wells		Lower winter water levels					
	Potential Construction Impact	Low	Low	Slightly More	Boat launch relocation	Close to properties	Close to properties	Low
	Property Acquisition for Constructed Works	Low	Low	Low	Substantial Acquisition	Some acquisition	Some acquisition	Low
	Potential Water Quality Changes (downstream flow)		Spillway flow shorter	Spillway flow slightly shorter				Spillway flow slightly shorter
	Accommodates Lower Water Levels (typical flood)	Will not raise or lower levels from current	Best	In large floods	In large floods	In large floods	In large floods	In large floods
	Potential for Downstream Impact (higher water levels)		Slightly increased discharge					
	Water Level Fluctuation Potential (in reservoir)		Lower winter water levels					
	Environmental (including fish)							
	Local Road and Rail Infrastructure							
	Recreation Use (Summer)	Camping access compromised in large flood	More consistent water levels	Camping access compromised in large flood	Camping access compromised in large flood	Camping access compromised in large flood	camping access compromised in large flood	camping access compromised in large flood
	Recreation Use (Winter)		Lower water in reservoir					
	Construction Duration						Longer construction period	
Cost	Construction Cost (High Level Estimate)	$30M	$30M	$45M	$40M (estimate)	$30M	$60M+ (estimate)	$40M
	Maintenance / Operations Costs		Mechanical		Shorter (rock)	Shorter (rock)	New Works	Mixed Infrastructure
	Design Life Value						Longest	

	Rivers Dam Option Evaluation	Option 1 Rehab Spillway/ Increase Freeboard	Option 2 Lower the Crest (Gate)	Option 3 Build a Labyrinth Crest Weir	Option 4 Build a Spillway By-pass (N)	Option 5 Build a Spillway By-pass (S)	Option 6 Build a New Spillway	Option 7 Widen the Spillway
Engineering	Engineering Standards							
	Safety: Catastrophic Failure Risk							
	Capacity / Conveyance (discharge capacity)							
	Operations		Mechanical					
	Complexity / Simplicity	Standard Design	Requires mechanical works	Construction Complex	Construction Complex	Construction complex	Construction complex	Construction complex
	Maintenance		Mechanical maintenance				New facility	
	Flexibility/Control - Water Level Control		Allows some water level control (Climate Change)					
	Non-Critical Operations Failure Potential		Gate adds complexity					
	Risk from construction on known seepage area				Potential area of seepage	Construction in known areas of seepage	Construction in known areas of seepage	Construction in known areas of seepage
Social	Flood impacts to property	Slightly higher water level						
	Potential Impact to Wells		Lower winter water levels					
	Potential Construction Impact	Low	Low	Slightly More	Boat launch relocation	Close to properties	Close to properties	Low
	Property Acquisition for Constructed Works	Low	Low	Low	Substantial Acquisition	Some acquisition	Some acquisition	Low
	Potential Water Quality Changes (downstream flow)		Spillway flow shorter	Spillway flow slightly shorter				Spillway flow slightly shorter
	Accommodates Lower Water Levels (typical flood)	Will not raise or lower levels from current	Best	In large floods	In large floods	In large floods	In large floods	In large floods
	Potential for Downstream Impact (higher water levels)		Slightly increased discharge					
	Water Level Fluctuation Potential (in reservoir)		Lower winter water levels					
	Environmental (including fish)							
	Local Road and Rail Infrastructure							
	Recreation Use (Summer)	Camping access compromised in large flood	More consistent water levels	Camping access compromised in large flood	Camping access compromised in large flood	Camping access compromised in large flood	camping access compromised in large flood	camping access compromised in large flood
	Recreation Use (Winter)		Lower water in reservoir					
	Construction Duration						Longer construction period	
Cost	Construction Cost (High Level Estimate)	$30M	$30M	$45M	$40M (estimate)	$30M	$60M+ (estimate)	$40M
	Maintenance / Operations Costs		Mechanical		Shorter (rock)	Shorter (rock)	New Works	Mixed Infrastructure
	Design Life Value						Longest	

Preferred Option
Option 1 – Rehabilitate the Spillway and Increase Freeboard

- Option 1 carries the most advantages and least disadvantages.
- There will be very little change to water levels.



Next Steps

- Review input from stakeholders
- Refine the preferred design option
- Provide a recommendation to MTI
- Proceed to construction at MTI direction