DRUMHELLER VALLEY

Drumheller Resiliency and Flood Mitigation Office

Community Engagement Event

November 18, 2021

Agenda

- Welcome
- Land Acknowledgement
- Overview of event and format
- Introduce all speakers
- Presentation
- Question and answer period – Virtual vs In Person

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Land Acknowledgement

The Town of Drumheller respectfully acknowledges that we are on Treaty 7 territory, the ancestral and traditional territory of the Blackfoot Confederacy: Kainai, Piikani, and Siksika, as well as the Tsuut'ina First Nation and the Stoney Nakoda First Nation. We recognize the land as an act of reconciliation and gratitude to those on whose territory we reside.

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Please Be Considerate

- Please respect your fellow neighbours and today's speakers. Abuse will not be tolerated.
  - Virtual Questions will be managed through the Q&A tool.
  - In person questions will be managed at each of the tables around the room

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Today's Presenters

Deighen Blakely, P. Eng, Project Director
Irv Gerling, Community Advisory Committee
Mark Brotherton, P. Eng
Ernie Webster, Landscape Architect, IBI Group
Robert Cheetham, P. Eng

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Deighen Blakely, P. Eng, Project Director

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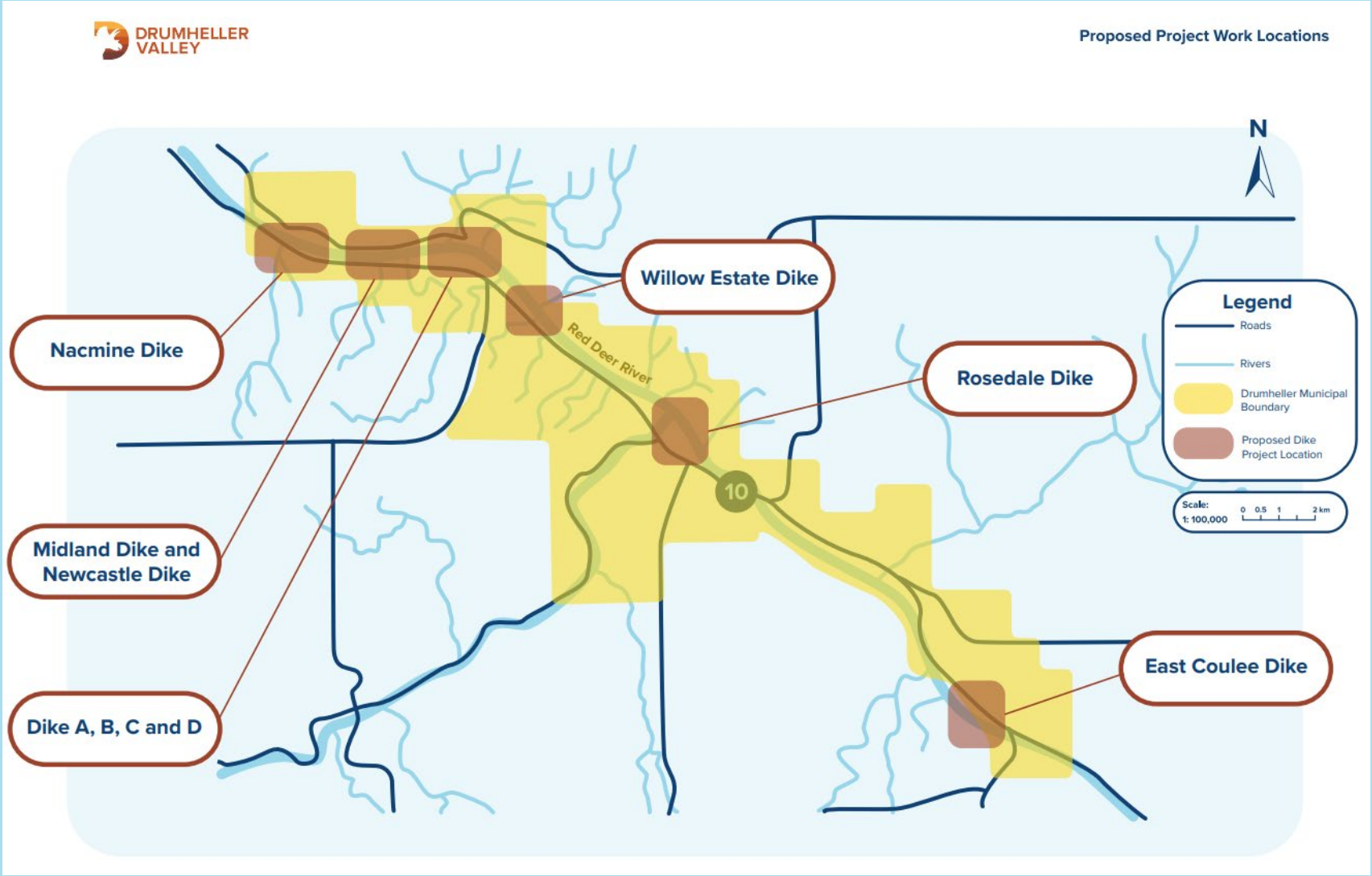
Project Locations



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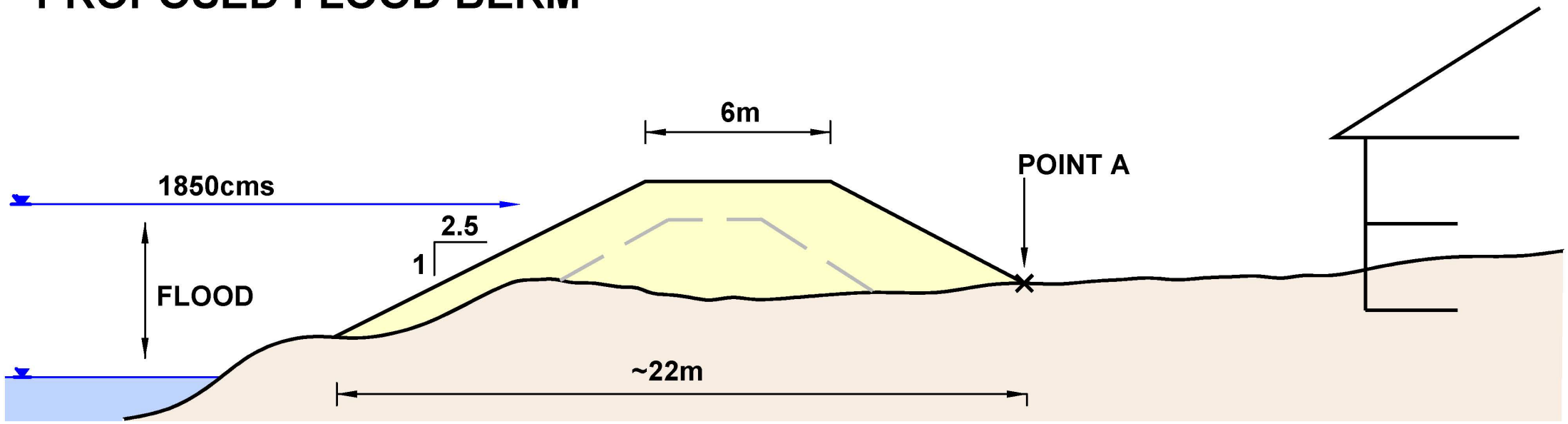
Flood Berm Design

FIGURE 4
PROPOSED FLOOD BERM



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Flood Mitigation Program Budget $55M

We are funded in part by:

- Government of Canada Disaster Mitigation and Adaptation Fund ($22 M, 40% funding)
- Government of Alberta Community Resiliency Program ($26.4 M, 50% funding)
- Town of Drumheller ($6.6 M, 10% funding)

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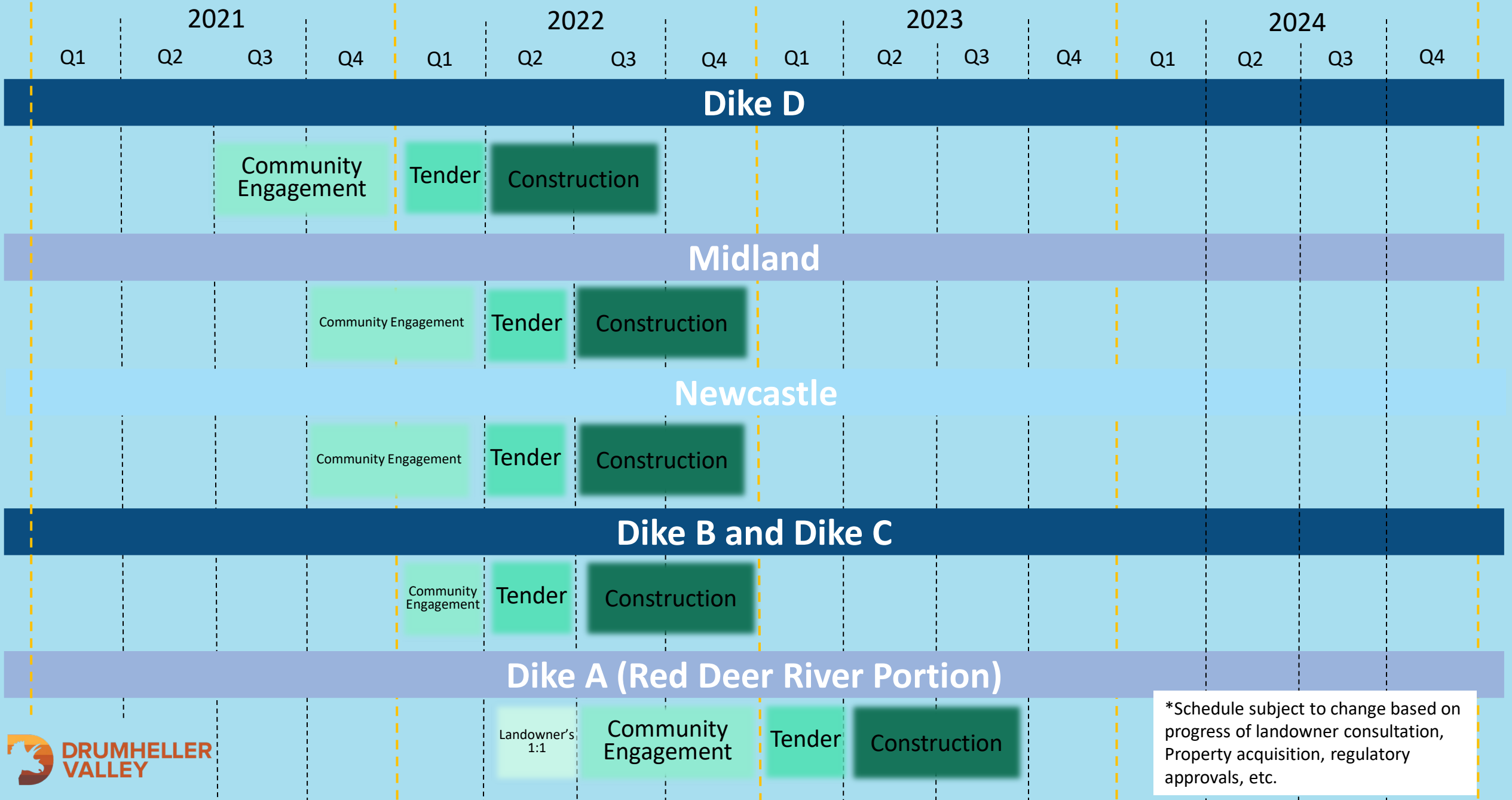
DRFM – Preliminary Program Schedule*



*Schedule subject to change based on progress of landowner consultation, Property acquisition, regulatory approvals, etc.

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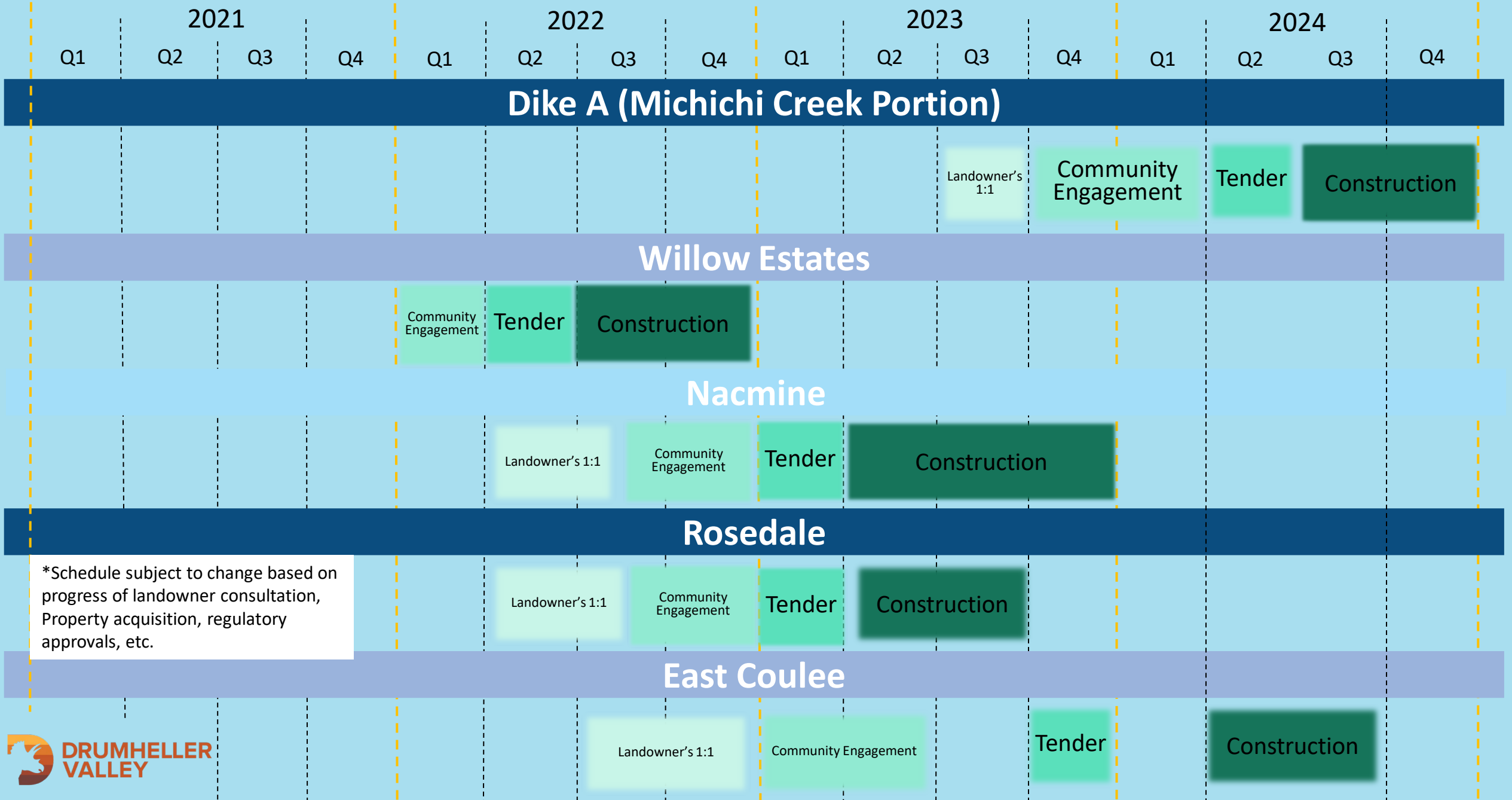
DRFM – Preliminary Program Schedule*



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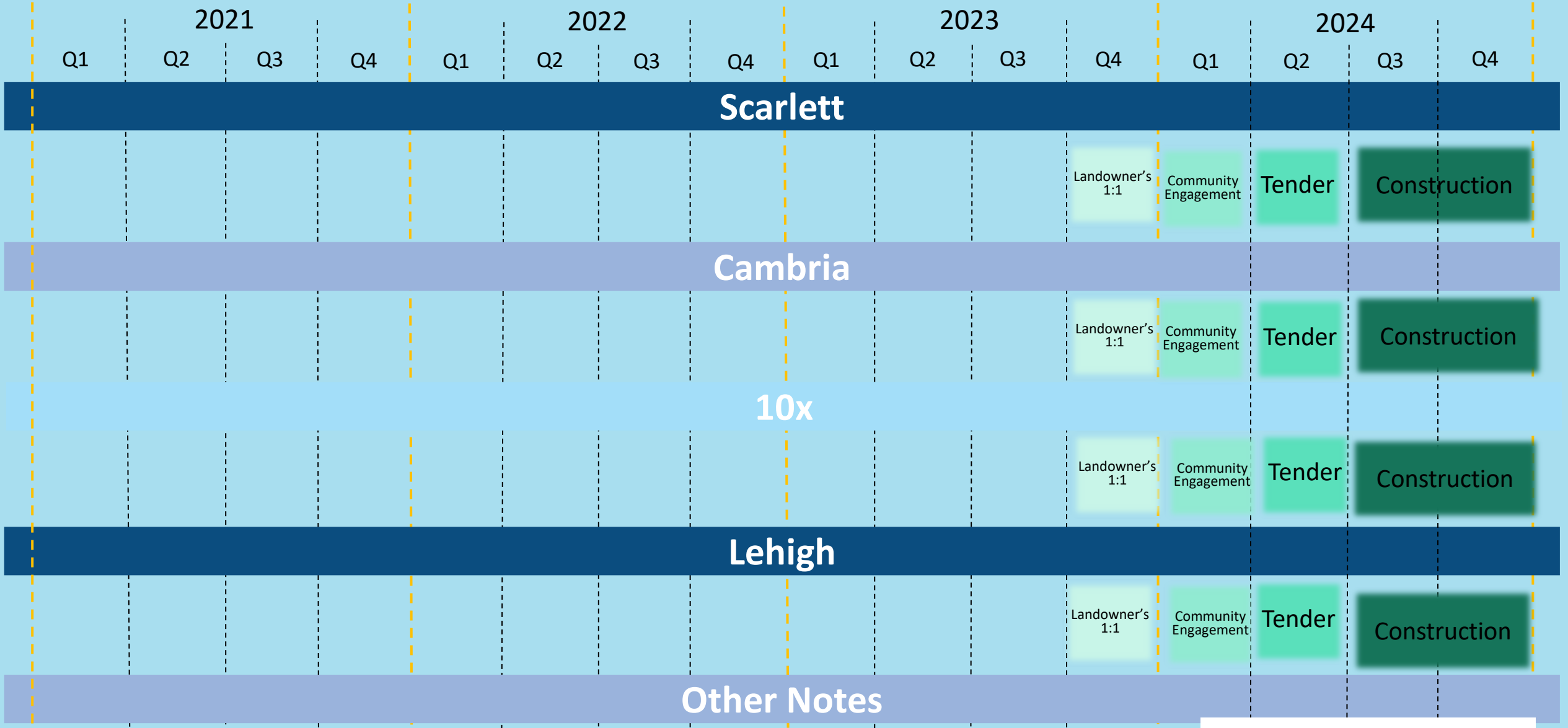
DRFM – Preliminary Program Schedule*



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Irv Gerling, Community Advisory Committee

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Introduction – Resiliency & Flood Mitigation Community Advisory Committee (CAC)

Committee Members:

- Cate Samuel
- Harvey Saltys
- Irv Gerling
- Keith Hodgson
- Tony Miglecz
- Wayne Powell

Mission:

To enhance communication among all parties on matters relating to the flood mitigation project.

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We are NOT:

- Elected, nor paid a remuneration
- Self-appointed spokespersons
- Decision makers
- Judges, Adjudicators or Appraisers
- Engineers or Construction Workers
- Created to erect a barrier, hindrance or buffer between affected parties

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We ARE:

- Caring and open-minded
- Volunteers and citizens of this community
- Facilitators, whose role is to actively engage all parties in this project, searching for common ground and possible solutions
- Supportive of a flood mitigation program that also addresses the concerns of the people and communities of Drumheller, protects our wildlife and habitat, and fosters economic growth and development
- Committed to a collaborative environment that promotes honest and fruitful discussion

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Function & Objectives

- To connect with the communities affected by the flood mitigation project
- To conduct interviews, investigations, surveys and meetings as the Committee deems appropriate, to ascertain the views of the community and to share answers and other knowledge about aspects of the project
- To submit timely reports of our findings summarizing the views and concerns of the community, to the Resiliency and Flood Mitigation Program Office, *(which will in turn post a summary online of the report of this Committee)*

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Mark Brotherton, P. Eng, Parkland Geo

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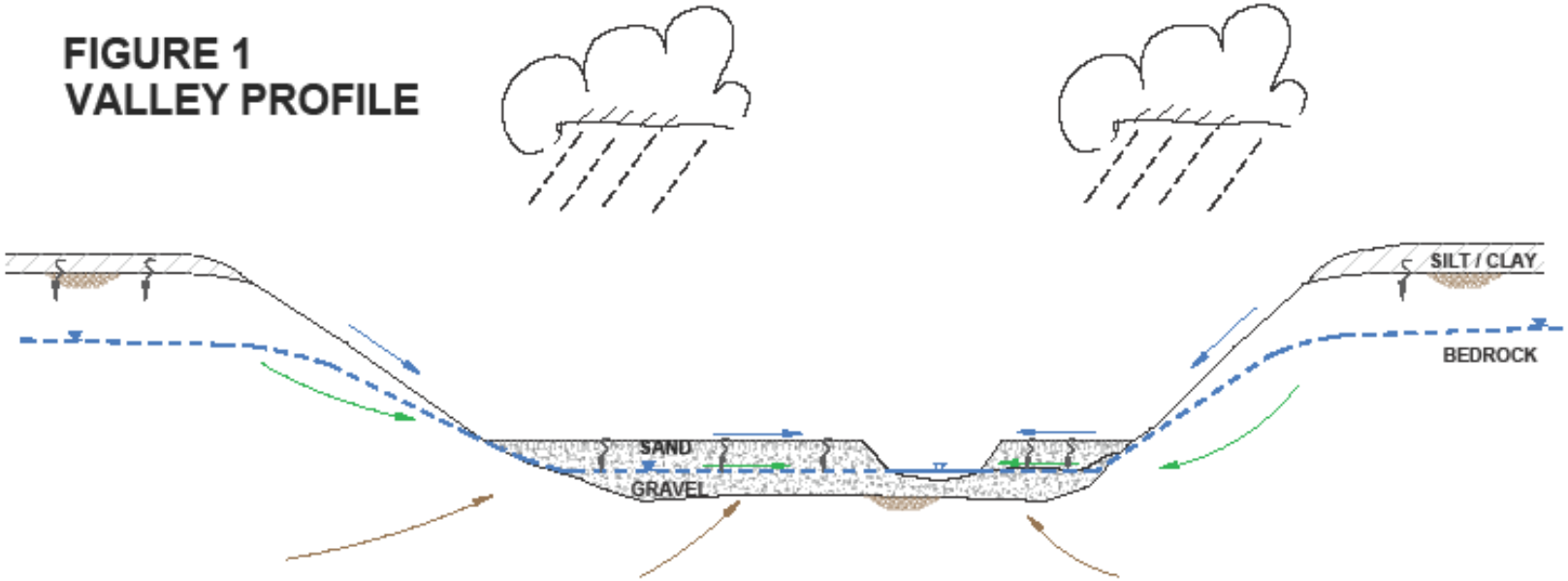
FIGURE 1
VALLEY PROFILE



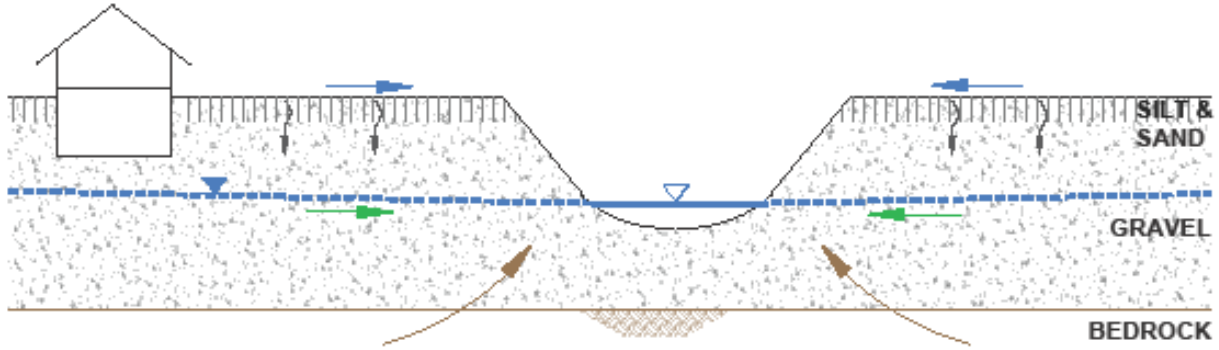
- Rainfall and snow-melt will infiltrate down to the water table; or run-off and drain into rivers.
- Infiltration is a slow, constant process which creates a static water table across the area.
- The Drumheller valley is deep enough to intercept and drain the water table into the valley.
- The base of the valley has filled with sediments laid down by the river on top of the bedrock. The typical sediments are sands & coarse gravels covered by fine silt & clay.
- The sands and gravels are very permeable so they fill with water across the valley.

LEGEND

- INFILTRATION
- SURFACE WATER AND RUNOFF
- GROUNDWATER MIGRATION
- GROUNDWATER RECHARGE

DRUMHELLER VALLEY

FIGURE 2
NORMAL FLOW



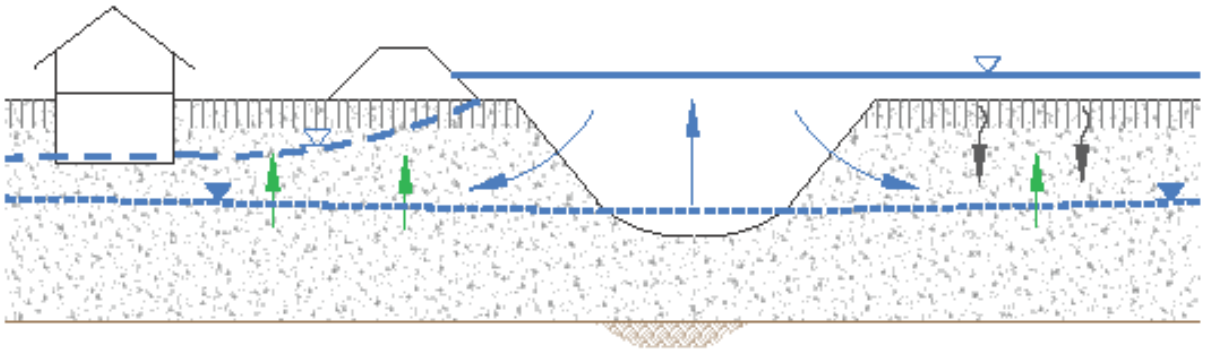
- Normally, river levels are governed by groundwater levels constantly flowing into the channel from the gravels.
- Houses with basements are present along the river in communities throughout Drumheller.
- Normally, a water table will be present below houses at a depth depending on yard grades relative to the river levels.
- During peak groundwater and flood events some local basements are prone to flooding.

LEGEND

INFILTRATION
SURFACE WATER AND RUNOFF
GROUNDWATER MIGRATION
GROUNDWATER RECHARGE

DRUMHELLER VALLEY

FIGURE 3
FLOOD WITH BERM



- During severe rainfall events over the Red Deer River basin, the river surface at Drumheller rises and may cause flooding. Floods occur over a 7-to-10-day period, peaking at 2 to 3 days.
- In flood areas, water will infiltrate into the ground through the overland surface and river banks.
- The Town is building dikes to protect communities along the river from overland flooding.
- In diked areas the elevated flood water will result in seepage pressures pushing water under the dikes, causing the water table inside the dikes to rise.
- Houses with basements in close proximity to dikes could be subject to flooding.
- The groundwater rise, response time and impact distance inside the dike is dependent on the flood elevation and subgrade type. The biggest impacts occur in sand and gravel subgrades.
- The Town flood mitigation program is not designed to protect against groundwater seepage.

LEGEND

INFILTRATION

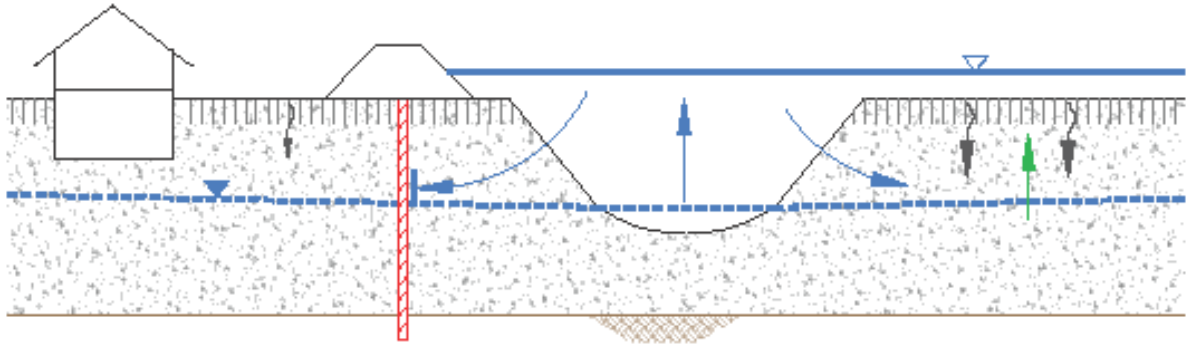
SURFACE WATER AND RUNOFF

GROUNDWATER MIGRATION

GROUNDWATER RECHARGE

DRUMHELLER VALLEY

FIGURE 4
FLOOD WITH BERM AND CUT-OFF WALL



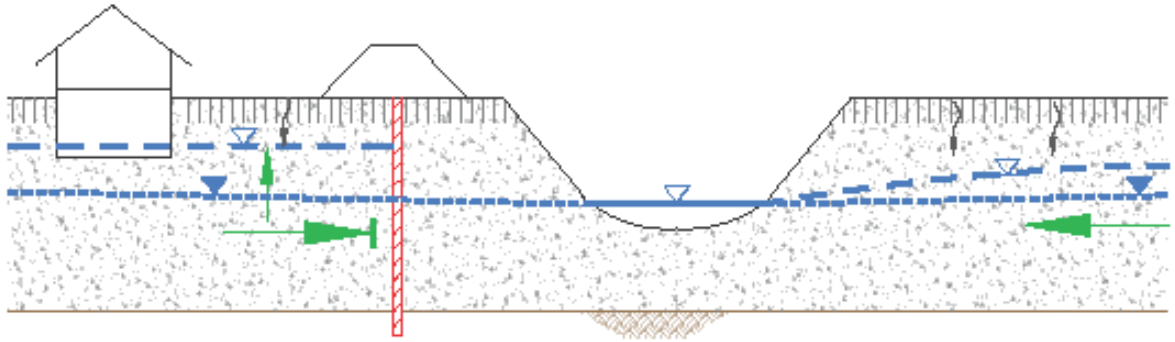
- The typical seepage protection option for large areas is to install a physical cut-off such as a clay trench or a sheet pile wall through the permeable zone.
- The flood water seepage would be blocked from moving under the dike so the water table inside the cut-off would not be impacted by the flood.
- A cut-off would need to encircle the entire floodway area needing protection.
- Cut-offs are expensive. A sheet pile cut-off wall for Drumheller communities would cost in the order of ±$10,000 per lineal meter.

LEGEND

- INFILTRATION
- SURFACE WATER AND RUNOFF
- GROUNDWATER MIGRATION
- GROUNDWATER RECHARGE

DRUMHELLER VALLEY

FIGURE 5
BERM, CUT-OFF WALL AND SEASONAL HIGH WATER TABLE



- The cut-off would protect areas during occasional the 7-to-10-day flood period.
- The cut-off would also block the continuous flow of groundwater trying to drain into the river from the deposits in the base of the valley.
- Seasonal groundwater flows are greatest during all major rainfall events and spring snow-melt.
- Since cut-offs work both ways, protecting against seepage from occasional floods would risk dealing with trapped seasonal groundwater inside the cut-off area several times every year.

LEGEND

- INFILTRATION
- SURFACE WATER AND RUNOFF
- GROUNDWATER MIGRATION
- GROUNDWATER RECHARGE

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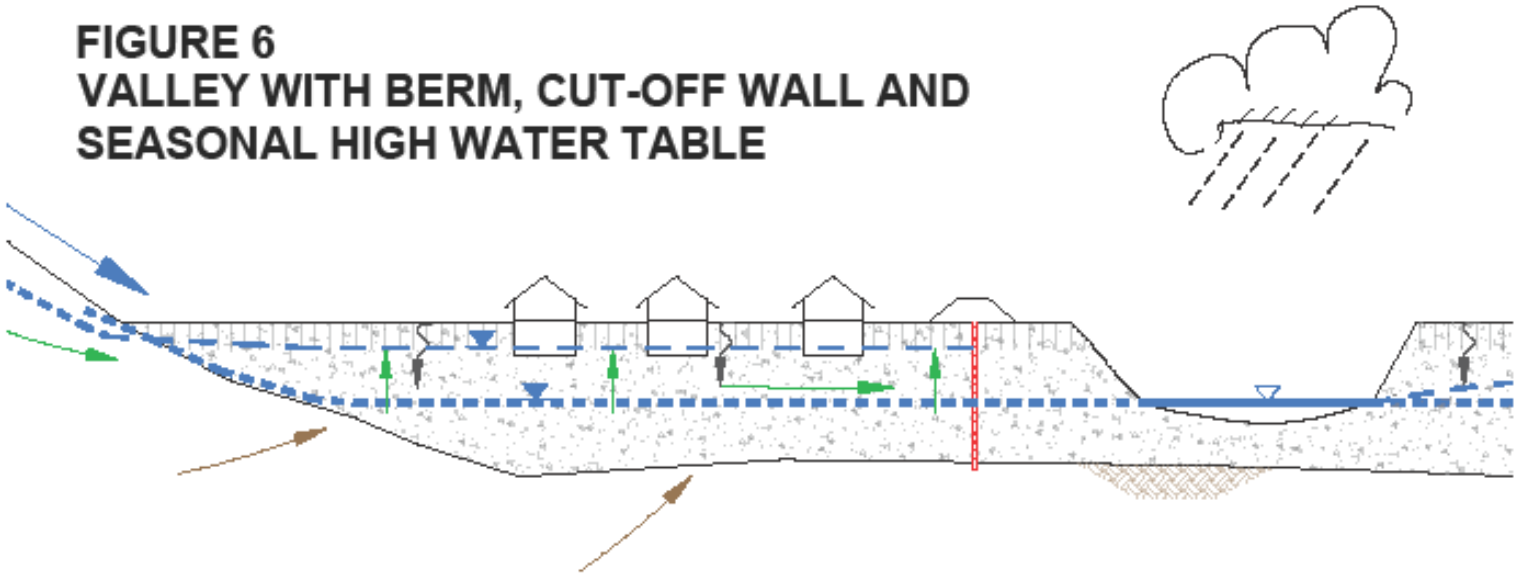
FIGURE 6
VALLEY WITH BERM, CUT-OFF WALL AND SEASONAL HIGH WATER TABLE



- The seasonal water table would not just back up near the cut-off and impact a few basements beside the dike. It would fill the permeable subgrade across the entire protected area and impact any deep basement intercepted by the water table.
- An expensive system of deep drains, collection pipes and pumping stations would be needed to get groundwater into the river and maintain a low water table inside the cut-off wall.
- It is more cost effective to provide basement seepage protection at each house using proper grading along with individual weeping tile, drainage mat and sump pump systems.

LEGEND

- INFILTRATION
- SURFACE WATER AND RUNOFF
- GROUNDWATER MIGRATION
- GROUNDWATER RECHARGE

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Robert Cheetham, P. Eng, Klohn Crippen Berger

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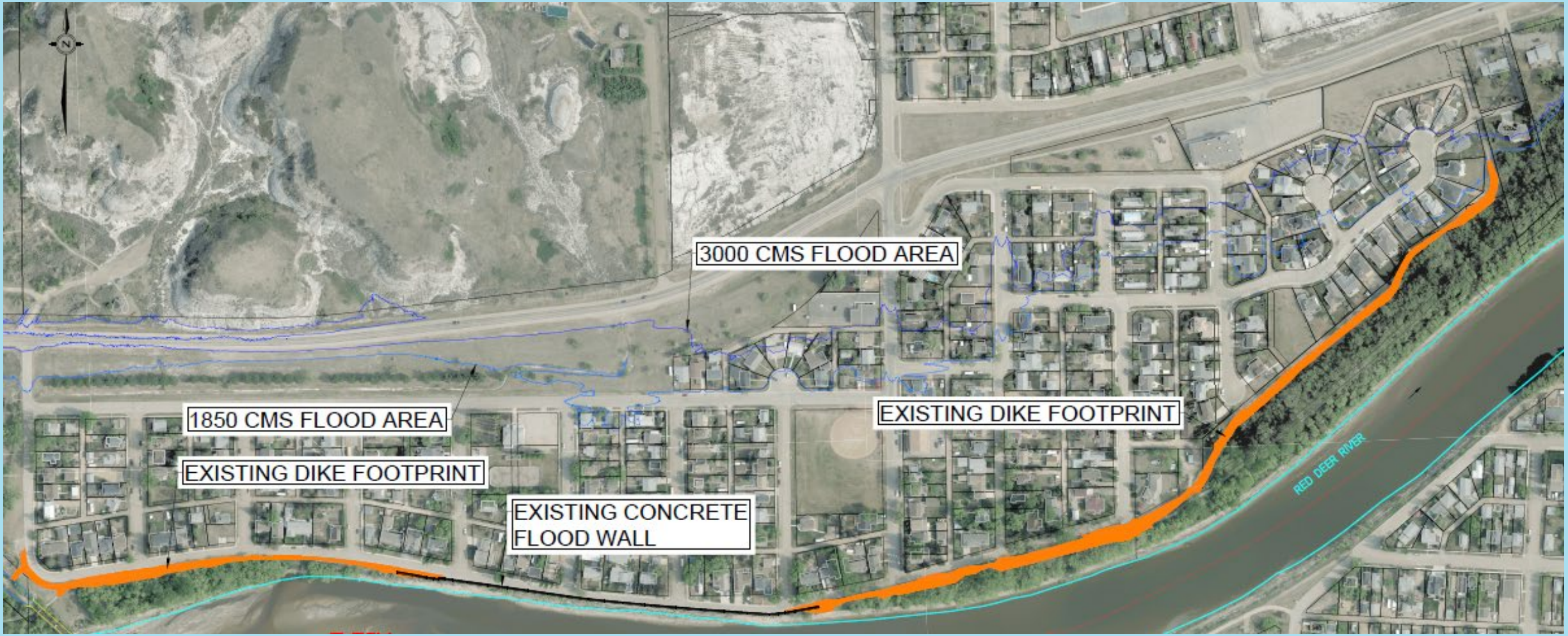
Midland Existing Dike Alignment



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Midland - Design Process & Timeline

- Contract Award & Kick-off: **February 2021**
- Feasibility Study: **February-April 2021**
- Field Investigations, Lab Testing, and Assessment**: March-April 2021**
- Detailed Design: **May 2021-ongoing**
- Public Engagement: **In progress**
- Final Design of Preferred Alignment Options: **Q4 2021 to Q1 2022**
- Tendering/RFP: **Q2 2022**
- Targeted Construction: **Q3/Q4 2022**

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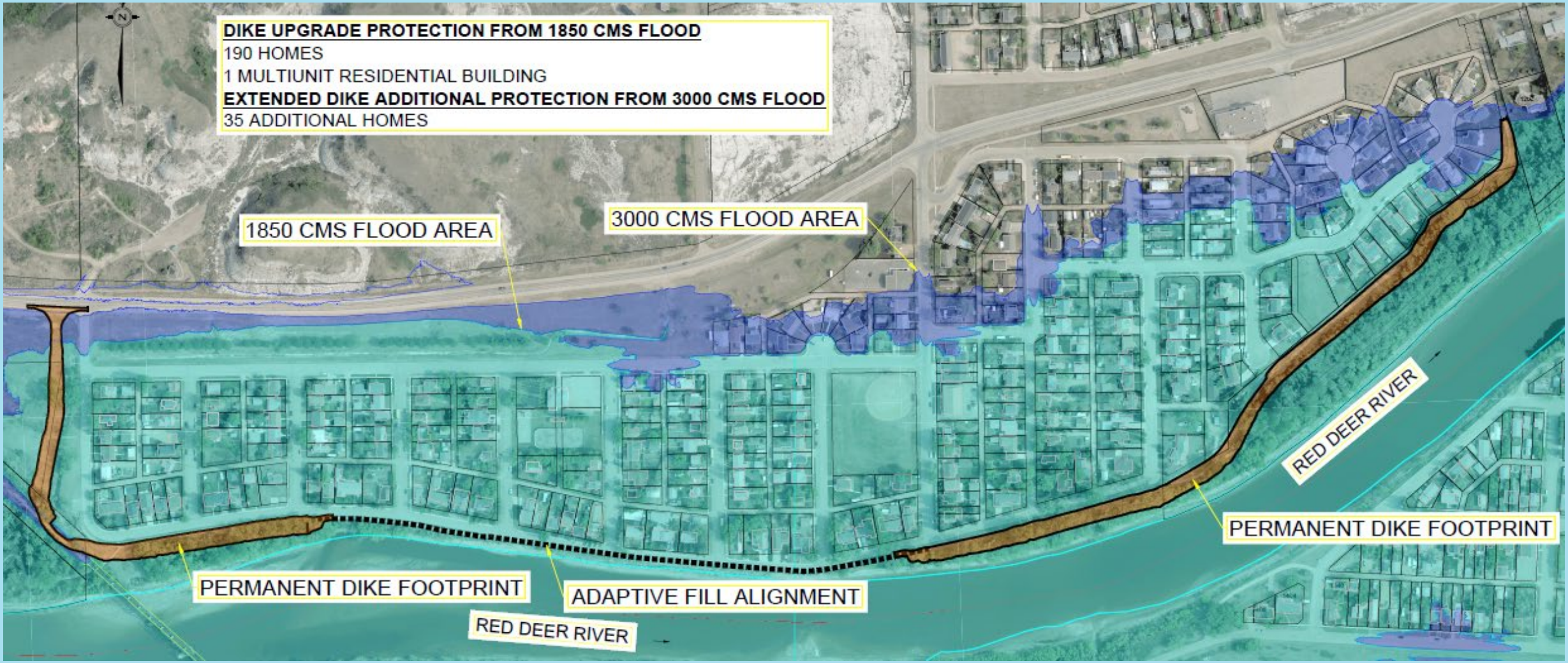
Midland Proposed Dike Alignment



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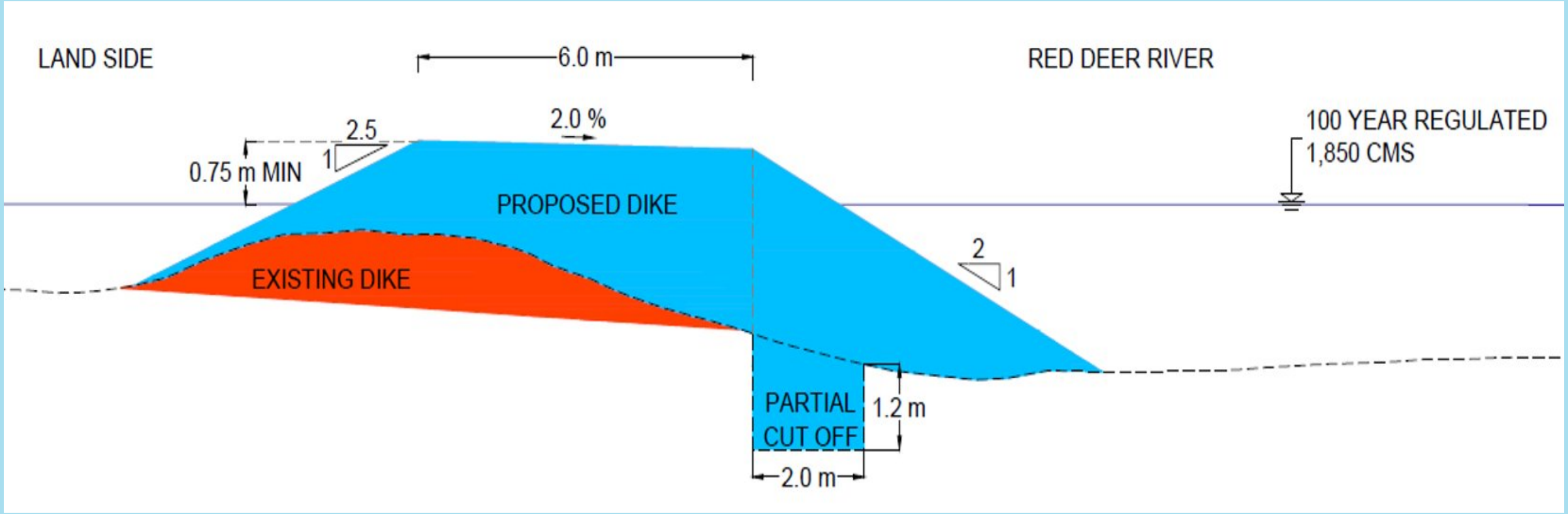
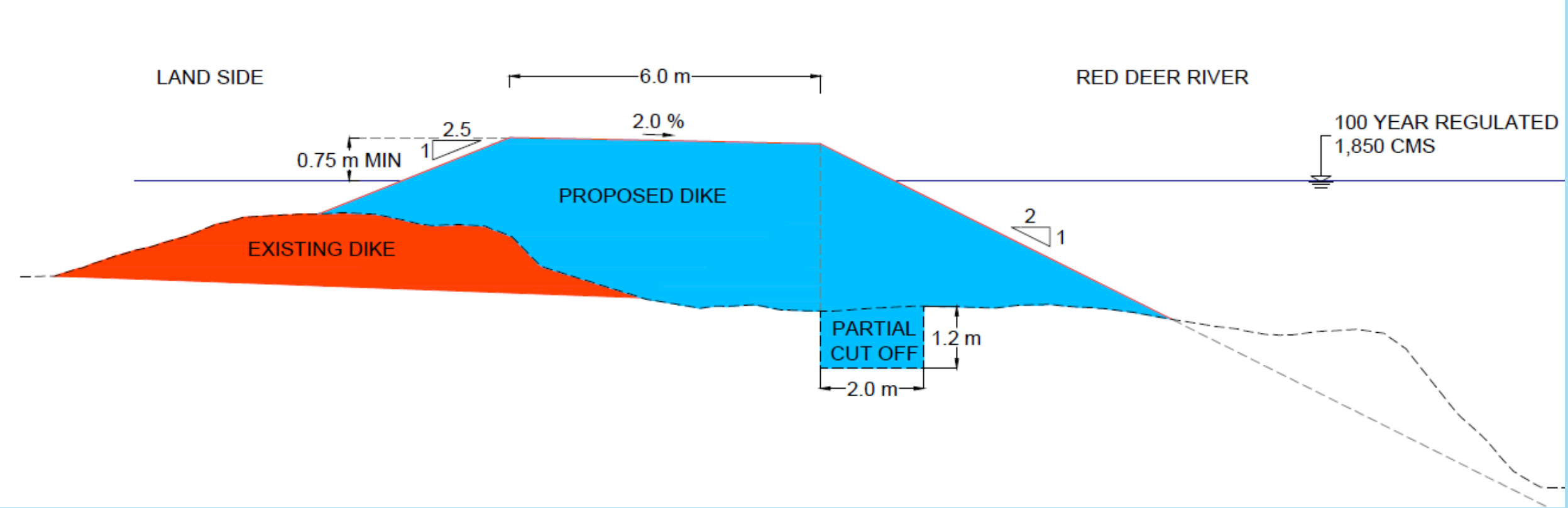
Typical Cross Section (Land Constrained)



DRUMHELLER VALLEY

Typical Cross Section (River Constrained)



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Ernie Webster, Landscape Architect, IBI Group

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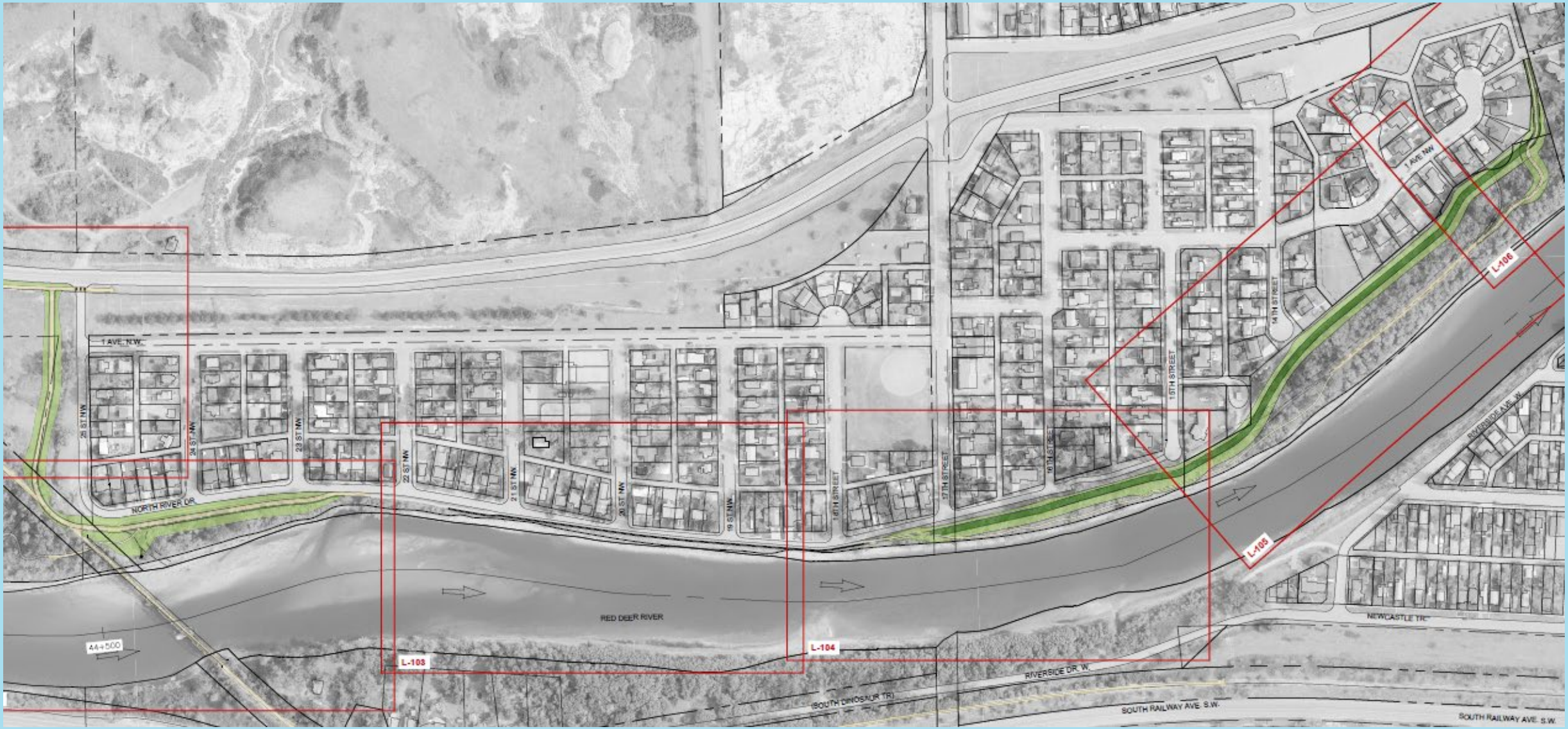
Pathway and Landscape Plan



Pathway Alignment

Pathway Alignment

Pathway Alignment

Pathway Alignment

Pathway Alignment

Tree Inventory Assessment (September 16, 2021)

- Rangeland Environmental Services completed a tree inventory assessment on September 16, 2021:
  - Tree genus and species
  - Estimated tree height
  - Measured diameter at chest height
  - Condition assessment (very good, good, fair, poor, very poor, dead/stump)
  - Core for 10 trees per height bracket for age

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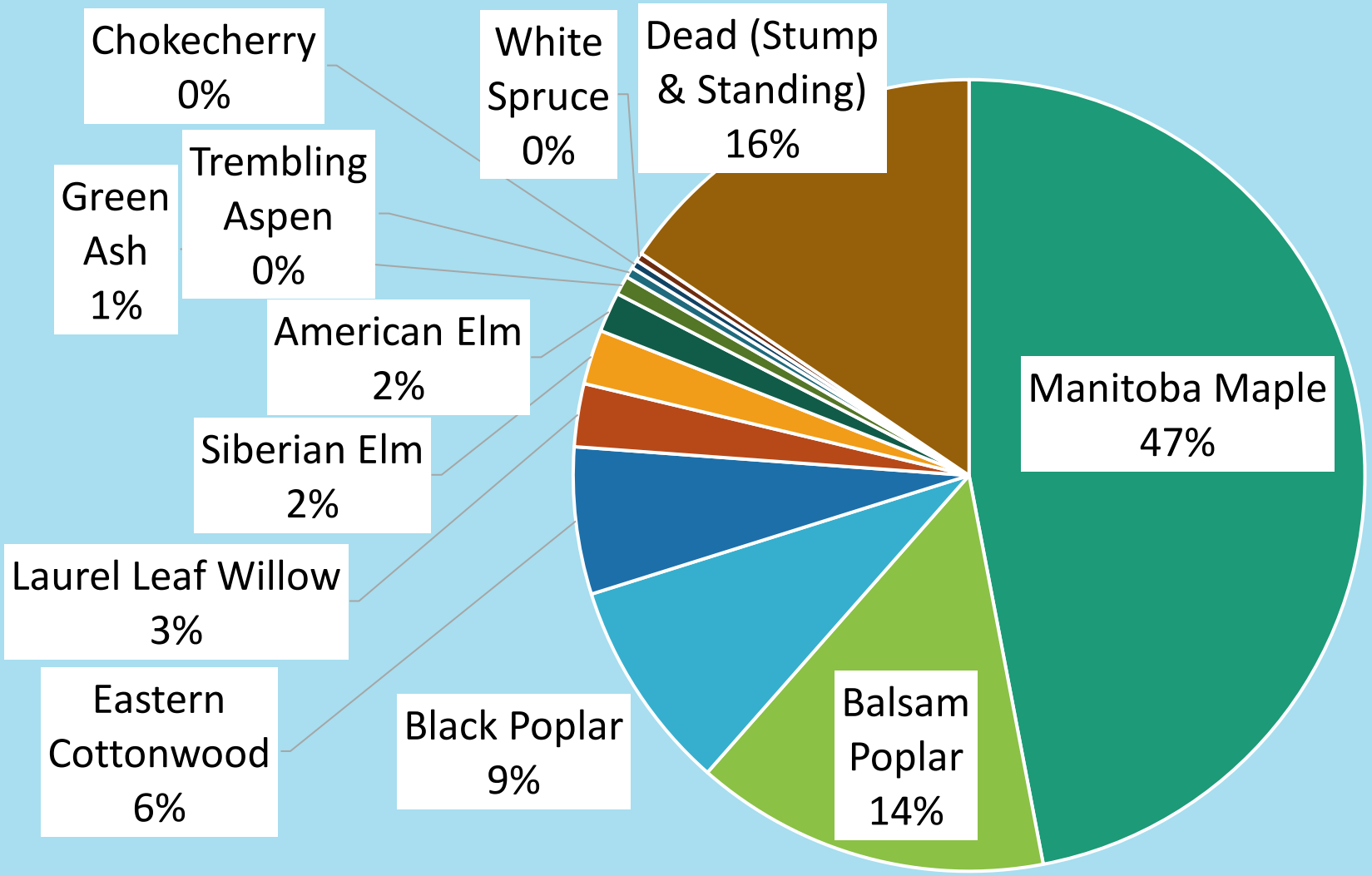
Tree Inventory Assessment — Species



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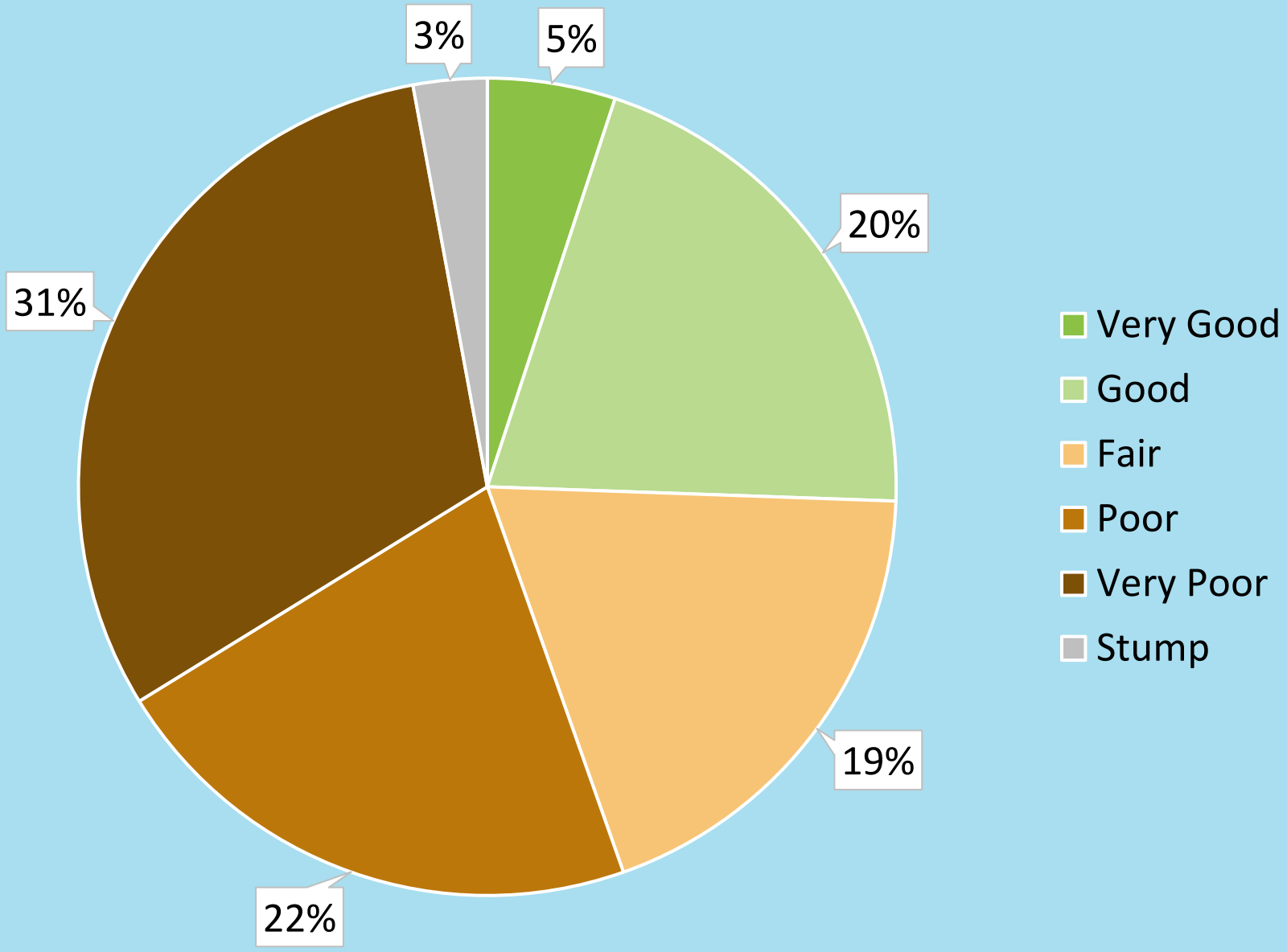
Tree Inventory Assessment — Health



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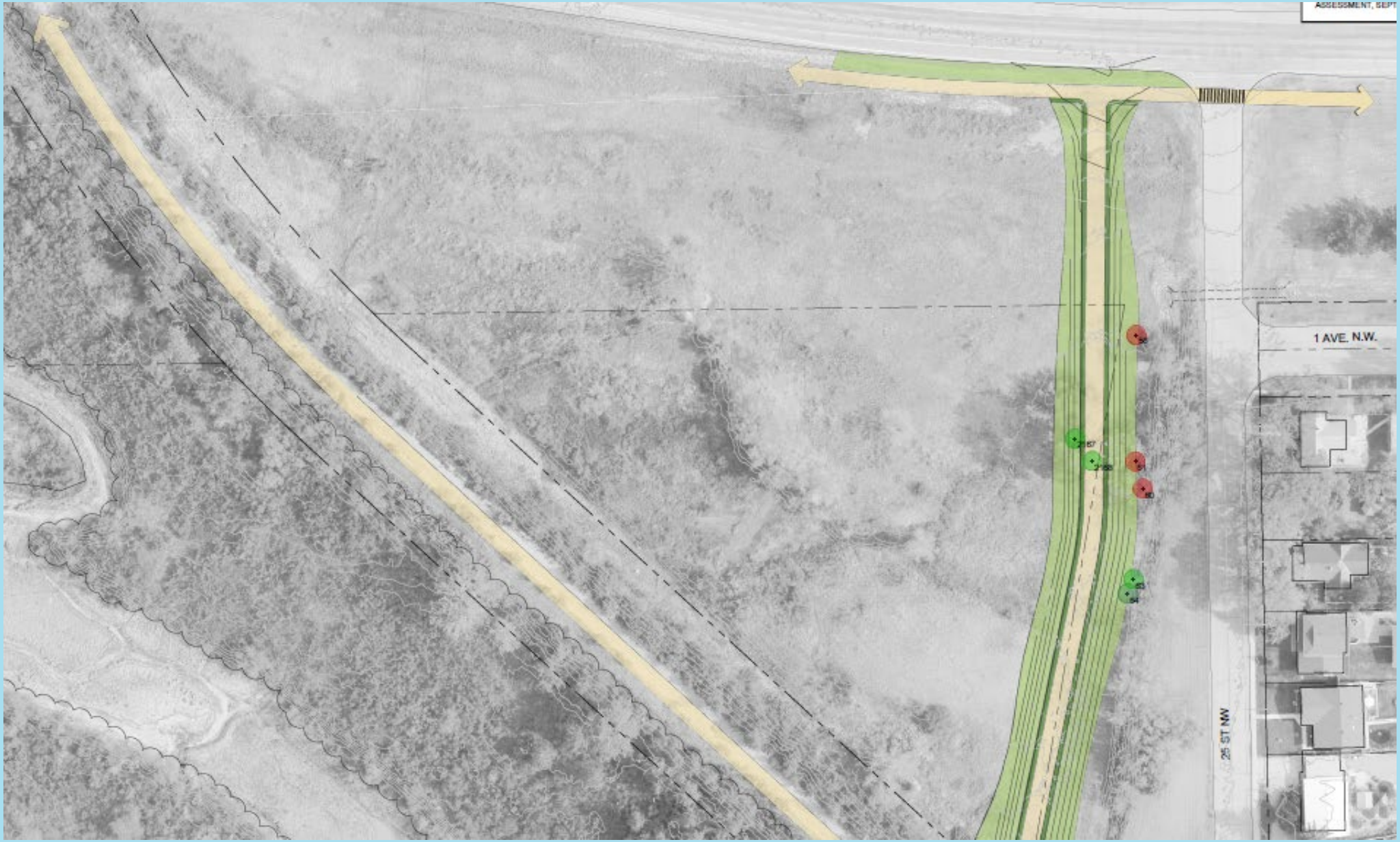
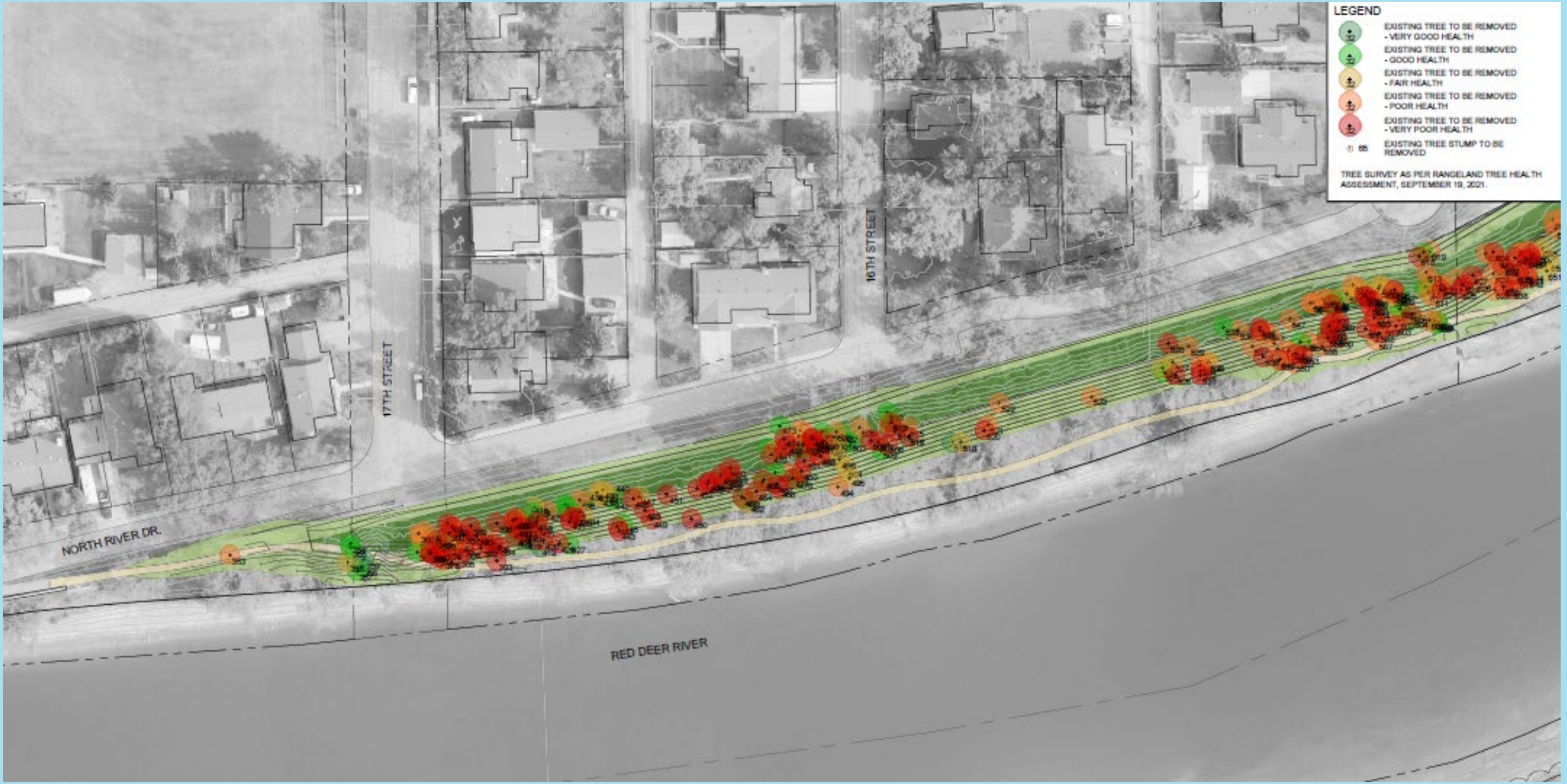
Tree Removal



Tree Removal

Tree Removal



Tree Removal

Tree Removal

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drmfloodinfo@drmprogram.com

floodreadiness.drumheller.ca

Questions?

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Questions?

Q: As the current berms in Drumheller do not meet the design flood elevation of 1850 m^3/s plus 0.75m freeboard, if someone intends to take out a development permit do they have to build the main floor to 1850 m^3/s plus 0.75 m freeboard?

A: Residents located within the flood hazard overlay in the Land Use Bylaw must construct the first floor of their houses to the flood construction level which is the water elevation of a 1850 m^3/s flow rate on the Red Deer River. Residents are not required to include a freeboard, however building above the flood construction level increases their resilience to future flood events. The flood construction level for protected areas will be re-evaluated in the Land Use Bylaws once the berms are built.

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Questions?

Q: When the Town runs out of dollars building to 1850 m^3/s plus 0.75 m freeboard and there are remaining berms yet to construct, how will the Town be protected from possible high-water events? Would it not make more sense to build to a design flood elevation of 1640 m^3/s plus 0.75 freeboard to protect more areas of Drumheller?

A: There is no expectation that we will run out of money for the berms that have been funded. The province of Alberta has recommended that the Drumheller Valley build flood mitigation up to the 1850 m^3/s Red Deer River flow rate. If Drumheller only built the dikes to the 1640 m^3/s level, we would not be in accordance with that requirement and could impact future provincial funding.

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Questions?

Q: An explanation is required on the "protected flood fringe" area and when does the Town intend to address this concept in the Town's Land Use Bylaw so that realtors and property owners have knowledge of future regulations?

A: Protected flood fringe areas will consist of areas that are currently located within the Flood Hazard overlay (1850 m^3/s) but are located behind dikes that provide the same level of protection. Until the berms are constructed to the proper elevation, these areas are not considered to be in the protected flood fringe. Work on future regulations for these areas will be on-going over the next few months, in parallel with the berm construction.

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Questions?

Q: When do you intend to write letters advising those property owners that they are now located in the floodway?

A: Much of the Town of Drumheller currently is within the Provincially designated floodway, this has not changed since the Provincial Flood Hazard mapping was published in 2007 (https://floods.alberta.ca/). The Province has indicated that with the upcoming Flood Hazard Mapping update, there will be no new areas designated as floodway.

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Questions?

Q: When will the Town address the residents' concerns regarding de-evaluation of property assessment, insurance and renewal of mortgages for those properties now in the floodway and for those properties that will not be protected by a berm because the Town will run out of dollars? Will the Town allow structures to be rebuilt in the floodway as they were originally built as stated in the exemption letter from the Province dated on June 1 2017?

A: Current Land Use Bylaw state that within the flood conveyance zone, residents are allowed to replace existing buildings or structures in the same location for the same use if they can overcome the flood hazard, subject to acceptance of the Town and a member of APEGA. Residents can also renovate existing buildings as long as they do not increase the floor area below the flood construction level.

*It is also important to note that many properties may increase in value as a result of the flood protection.

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Questions?

Q: When will the Town address the conflicting information in the Municipal Development Plan with regards to building berms to 1640 m^3/s plus 0.75 m freeboard and 1850 m^3/s plus 0.75 m freeboard?

A: The current Municipal Development Plan, issued in December 2020, refers to the new Provincial 100-year regulatory design flow rate of 1850m^3/s. There is no reference to the outdated design flow rate of 1640 m^3/s.
https://drumheller.civicweb.net/filepro/documents/40742

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Questions?

Q: Where is the berm material coming from if hill dirt is not being used? Is it true the Town is using bedrock to construct the berms as conveyed by the previous flood mitigation officer, Mark Steffler?

A: ParklandGEO Geotechnical Engineering is currently assessing source material.

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Questions?

Q: When the berms are built in various neighborhoods, is it the Town's intention to have a drainage ditch between the properties and berms so that there is system in place for heavy rains and protection of the houses?

A: Yes. The berm designs will include design of overland conveyance route along the inside toe of the berms.

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Questions?

Q: When the berms are being constructed and heavy compaction is carried out, who will be covering the damages to house foundations and cracked wallboard that may occur?

A: There will be provisions in the contract documents requiring contractors to undertake the work in a manner to mitigate impacts to adjacent structures in their use of heavy equipment.

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Questions?

Q: In the past, mine shafts that run under the river and throughout the Drumheller valley have been inundated by flood / storm water, what is being done to protect residential properties, i.e. from underground flooding?

A: Mine shafts are outside the scope of the current flood mitigation program.

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Questions?

Q: Are you proposing to abandon one of the Newcastle Ball Diamonds for construction of a berm in this area?

A: No. There are no plans to abandon Newcastle Ball Diamonds for berm construction.

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Questions?

Q: Why did the Town purchase "flood properties" when they are now being rented out?

A: Purchases of current properties were initiated by property owners. Houses are being rented to offset ongoing monthly maintenance cost until buildings can be removed in spring 2022 .

DRUMHELLER VALLEY

Questions?

Q: What measures are in place for protection of the greenbelt, in particular, the natural native poplar trees?

A: Unfortunately, some trees will need to be removed to facilitate construction. Tree inventories and assessment are completed during design and a 5:1 tree replacement strategy is being implemented.

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Questions?

Q: It has most recently been stated that the tendering process for berms will commence in January 2022. Will this timeframe inflate the prices for potential bidding as there could potentially be 2-3 feet of snow on the ground? How will contractors view the job in its natural state?

A: No. It is very common to tender work over the winter. Experienced contractors are adept at bidding on projects in the winter. This allows them the ability to be ready to start construction early and have a longer construction season.

DRUMHELLER VALLEY

Questions?

Q: Who are the members on the Flood Mitigation Community Advisory Committee and what have they accomplished to date?

A: The CAC will be introduced at the Midland Town Hall (both virtual and in-person events). They have been undergoing training for the past several weeks.

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drmfloodinfo@drmprogram.com

floodreadiness.drumheller.ca

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Community Advisory Committee

floodcommittee@drumheller.ca