Drumheller Resiliency and Flood Mitigation Office

DRUMHELLER FLOOD MITIGATION and CLIMATE ADAPTATION SYSTEM
Changing the channel on flood readiness

Canada $22 M

DRUMHELLER $5 M

Alberta $28 M

Flood Mitigation and Climate Adaptation System

$55 M

Système d'atténuation des inondations et d'adaptation au changement climatique

55 M$

2019 - 2022
Investing in Canada Plan
Disaster Mitigation and Adaptation Fund

Master Engineering Design and Assessment of Planning Impact

AUGUST 4, 2020
Changing the Channel
“We are a flood community”

Shaped by Water
The story of Drumheller is one of changing climate. It started under a layer of ice which melted to reveal a treasure trove of fossils deposited by the mass extinction of the dinosaurs. As the melting water sliced deep through the Great Plains, it eroded 75 million years of geological layers and created the Canadian Badlands. Of a population of 8,000, there are 2,344 residents in 1045 dwellings at risk of direct inundation in a 1% return flood event. That’s a 1 in 4 chance of occurrence in the next 30 years.

A History of Floods
Drumheller has seen its fair share of flooding:
- June 1915 (rain on snowmelt)
- June 1931 (rain on snowmelt)
- April 1948 (ice jam)
- August 1954 (rainfall)
- April 1967 (ice jam)
- June 2005 (rain on snowmelt)
- June 2013 (rain on snowmelt)
- April 2018 (ice jam)

Changing the Channel
The Drumheller Flood Mitigation and Climate Adaptation System (DFMCAS) is a multi-hazard solution covering 100-km of riverbank, designed to reduce flooding and protect Drumheller into the 22nd century. It began in April 2019 and will end in March 2024. The total cost is shared by three orders of government:
- $22M Canada
- $28M Alberta
- $5M Drumheller

Success
- Resident confidence
- Decreased vulnerability
- Improved climate adaptation
- Increased economic activity
- Increased staff capacity

1. Communications & Engagement
2. Regulatory & Approvals
3. Conveyance Capacity
4. Structural Measures
5. Emergency Management

People
Property
Environment
Economy

Economy
Focus Areas

1 Communications & Engagement
i. Promote Drumheller’s approach to adapting to the perils of changing climate.
ii. Continuing to unite the community behind a shared purpose to protect Drumheller’s economic, environmental and cultural assets from flooding.
iii. Consult and engage with impacted Indigenous communities.
iv. Position Drumheller as an innovative leader in the area of flood mitigation and readiness.
v. Inform affected residents of a ‘fair and balanced’ approach to land acquisition process.
vi. Communicate and work with financial and insurance sectors on viable solutions for displaced homeowners.

2 Regulatory & Approvals
i. Obtain transfer of existing dykes from Alberta Environment and Parks (AEP) to Town of Drumheller.
ii. Meet obligations of funding agreements.
iii. Collaborate with AEP on revised flood hazard maps.
iv. Encourage economic development through updated MDP and LUB by ensuring future development proceed in areas not subject to floods.

3 Conveyance Capacity
i. Make room for the river — preserve channel capacity.
ii. Ensure Drumheller is prepared for inevitable flooding events caused by either an ice jam, high flow levels, or intensive rainfall.
iii. Preserve up to 1,200 acres of natural (riparian) area that is comparable to 3,200 family cars of carbon capture per year.
iv. Develop a fair and balanced land acquisition policy for impacted homeowners.

4 Structural Measures
i. Build an adaptive system to protect the community into the 22nd century.
ii. Protect the cultural, palaeontological and archaeological treasures of the Red Deer River Valley.
iii. Develop recreation and education interpretive centres as part of the improved flood mitigation system.
iv. Connect the Royal Tyrrell Museum to the Atlas Coal Mine via a 38-km ‘2100 Trail’ as part of the improved flood mitigation system.

5 Municipal Emergency Plan Enhancement
i. Develop detailed flood mitigation systems operations manual to accompany MDP.
ii. Divide river valley into manageable monitoring sectors that will allow regional partners to respond/assist appropriately to their assigned area of responsibility during emergencies.
iii. Establish a Flood Mitigation and Climate Adaptation operations centre to effectively respond during a flood emergency.
iv. Implement Incident Command System (ICS) protocols throughout flood mitigation and climate adaptation office to educate staff on processes.
v. Conduct annual exercises using ICS.

Level of Service
The Town of Drumheller has protected residents and property from loss or injury related to the perils of floods and changes in climate. The risk to property is reduced, thereby preserving the community’s economic viability.
Impact on Planning

1. **Municipal Development Plan (MDP)**

   The Municipal Development Plan is the highest level plan for the Drumheller Valley. It provides high-level vision, goals, and policy to direct future growth, land use, and community form. It also provides guidance for subsidiary plans, like recreation, open space, and plans for new and existing neighbourhoods.

   The MDP is important because it carries the long-term development intention for the Drumheller Valley.

2. **Land Use Bylaw (LUB)**

   The Land Use Bylaw implements the MDP goals and policies. It provides detailed regulations on use and buildings located within each land use district. It is more detailed and prescriptive than the MDP. Both the MDP and LUB are statutory documents under the Municipal Government Act.

   The Land Use Bylaw is important because it gives physical shape to development and can either invite or inhibit development.

3. **Downtown Area Revitalization Plan (DARP)**

   The Drumheller Downtown Area Revitalization Plan focuses on Downtown Drumheller as the heart of civic life and base-camp for the valley. It is a secondary plan under the MDP that deploys the MDP’s vision while making strategic recommendations for policy and action.

   A downtown plan is important because downtowns set the stage for vibrant public life, and broadcast the cultural and economic health of the entire region.

- Founded in the early 1900’s as a major coal mining town.
- Town was named following a coin toss.
- Population is 8,000 in 3,145 dwellings.
- One of the sunniest communities in all of Canada.
- 100 km of riverbank.
- Existing MDP adopted in 2008.
- Town area is over 108 km²
- 21 land use districts, including 11 residential districts.
Three Key Touchpoints

1st Level Plan
- Municipal Development Plan (MDP)

2nd Level Plan
- Economic Development and Tourism
- Downtown Revitalization Plan
- Recreation
- Open Space
- Area Structure Plans
- Infrastructure
- Resiliency & Flood Mitigation
- Finance

Regulation
- Policies
- Land Use Bylaw
- Standards & Specifications

Implementation
- Engineering, Design, Project Planning
- Projects, Programs, and Services
Municipal Development Plan

Review of Existing Plan

The Municipal Development Plan (MDP) is the overall community plan for the Town. It provides high level guidance, goals, and policy for the development of the Valley, including where different land uses should go, where growth should be focused, how transportation networks should be developed, and how community services will be provided. The MDP also directs several subsidiary plans within the Town, such as Transportation Master Plans and Recreation Master Plans.

For Drumheller to change the channel and truly become a flood community, the river system must be placed at the very core of the Town’s planning thinking, and this begins with the MDP.

There are several ways that the MDP can address the river. First, it could use a strong understanding of river dynamics to describe risk and growth areas, ultimately driving future development to safer, flood smart areas. Second, it could address the role of the river as space: as a destination and a conduit that provides amenity and movement. It is important to remember that fundamentally, Drumheller is a flood community, but the river spends most of its time providing an unparalleled amenity. Finally, it would address the role of the river in the identity and stories of the place, ultimately embedding it as a key feature of the plan’s vision.

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The dramatic badlands landscape is Drumheller’s “secret sauce”. The immersive experience of this landscape should be celebrated and protected!

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The existing MDP, which was enacted in 2008, lacks this compelling vision section that would set out the highest level of intent for the Valley. It also contains little detail about the river itself. As a result, it outlines growth areas without specific regard for flooding risks and provides scant direction for administration to respond to development proposals in terms of flood risk.

The absence of the river from the core of the plan has other implications: the document does not seek to connect the host of amenities throughout the Valley. This is a major missed opportunity. The Valley has a clear need for connective tissue along the river — connections that create the opportunity for new investment, sustainable lifestyles, and unscripted adventure.
Recommendations

There are several key ways that the MDP could be effectively modernized to support Drumheller’s new mandate as a flood community.

First, the document should place the river system at the heart of the Plan. This would address the current Plan’s most significant weaknesses: river risk and Valley-wide vision. Drumheller’s rivers are the initial sculptors of the Valley, and placing them at the heart of the MDP would return them to their rightful role.

The river has cascading impacts on many other components of the Plan, including the longterm vision for the Valley. A strong MDP should set out a clear, convincing, and compelling vision for a place, that not only celebrates its landscape and history, but also builds excitement about the future. In this way, a river-centric plan not only works to make development smarter, it also makes development more attractive. A modernized MDP should go much farther than the current Plan in articulating and illustrating this future. It should present an adaptive growth strategy.

Flood risk naturally takes centre stage in a river-centric planning approach. Embedding the highest-level plan with intelligence about channel capacity, adaptive structural measures, and smart growth areas, means that this sensibility would be downloaded into all subsidiary plans.

A river-centric plan further reaches into the realm of green space and recreation, where it designates open spaces (conveyance capacity), and finds new opportunities for trails and nodes on and along flood infrastructure.

In summary, a modernized MDP should address four key Valley-wide conditions:

- **The Rivers** — flood risk and opportunity
- **The Badlands** — the immersive Valley experience (“secret sauce”).
- **Growth Areas** — smart and attractive development opportunities.
- **Neighbourhoods** — build on the unique neighbourhood identities throughout the Valley.

*Great places provide the opportunity for unscripted experiences—creating the conditions for a feeling of true discovery.*
Land Use Bylaw

Review of current bylaw

The Land Use Bylaw implements the MDP’s goals, and provides detailed regulations on how buildings can be built and what uses are allowed in specific areas. This includes regulations such as development setbacks, height regulations, and parking requirements among others. The Land Use Bylaw is much more prescriptive than the MDP.

The current Land Use Bylaw in Drumheller was adopted in 2008. It applies a traditional zoning approach that focuses on separating uses, rather than seeking opportunities for integration and mix. It regulates 21 land use districts (of which 11 are residential). The prescriptive model it applies has made it a complicated and inflexible system that can deter creative investment.

As it is structured, the current LUB also relies heavily on discretionary language—in almost every case it applies a rule but leaves open a discretionary door. This ultimately results in inconsistent application of the bylaw’s intent, and unnecessary administrative burden.

As a flood community, Drumheller’s LUB must incorporate regulations around flooding. However, the river is conspicuously absent from much of the current LUB. To apply the intent of a river-centric MDP, the LUB needs to incorporate regulations around river development into its core language and intent.

The Drumheller Valley is comprised of many unique neighbourhoods, each with their own history, character, and urban fabric. Their diversity is a tremendous asset for the Valley. The Land Use Bylaw presently gives these areas the same treatment, which over time may have the negative effect of homogenizing the Valley.

Drumheller requires policy that is not overly burdensome for development; that invites investment and reduces frictions in the planning process. Following the cues of the MDP, the LUB must deploy the same sensibility, and ensure it is not a barrier to desired growth and investment in the Valley.

In summary, the LUB is both too complicated and not specific enough. It does not do enough to address flood risk, protect unique neighbourhood character, or inspire investment.
Recommendations

A modernized Land Use Bylaw for Drumheller needs to be easy to interpret and administer. To achieve this, the Bylaw should follow in the footsteps of contemporary precedents that de-emphasize use and re-focus on form.

Form-based bylaws are imagined on a transect—a gradient of development intensity that runs from least to most intensive forms. By refocusing on form, these bylaws can greatly reduce the total number of districts, increasing the document’s legibility and focus. In Drumheller’s case, the total 21 districts can likely be reduced by over 60%, to 8 form-based districts. This makes interaction with the Bylaw easier for both applicants and administration.

Within these districts, form is the priority. This allows more flexibility and invites creative investment, with reduced threat of inappropriate building types disrupting the character of neighbourhoods. This system should result in less fights over building height, but more small businesses in old houses. This natural support for small business creates a key overlap with valley-wide economic development strategies, and adds flexibility for housing types and forms.

It is important to make the river a key consideration throughout the Bylaw in a way that it can be applied consistently. To avoid adding a whole series of specialized additional districts, the LUB can make use of overlays that apply additional considerations and regulations. This approach disentangles the river from the districts, making both easier to use and to update.

A business-friendly modernized LUB would also find ways of reducing unnecessary documentation and burdensome requirements. One way to do this is by lightening the document. By removing the general regulations section and embedding these in each of the eight districts, the entire system becomes far more user-friendly.

A second way to achieve this is through the removal of parking minimums. A growing trend in many places, removal of parking minimums allows the market to drive supply, which becomes especially meaningful in the context of small homes, downtown development, and affordable housing.
Overlays & Districts
Translating intent into action

vision + intent

- ensure adequate space for the river to flow
- build adaptive flood protection systems
- adapt to the changing climate
- develop an interconnected open space network
- develop a world-class trail and pathway network
- harness the river as an amenity
- protect critical viewsheds
- maintain a sense of remoteness/solitude
- protect ecological health and integrity
- celebrate the badlands landscapes
- curate the visitor arrival experience
- foster a sense of discovery
- provide an ‘escape’ from city life
- inspire locals to encourage friends and family to visit
- protect historic character and heritage assets
- maintain unique neighbourhood identities
- sustain a thriving downtown
- enable a diversity of lifestyles and development
- ensure growth is supported by existing services
- nurture local tourism and recreation industries
- catalyze growth and investment
- focus growth in safe and suitable locations
- provide a range of housing tenures and types
- grow within the Valley
- connect the Valley for all modes of transportation

overlays

- Resilient River
- Badlands
- Unique Neighbourhoods
- Future Growth

policy directions

- river leading the way forward and connecting the Valley
- building blocks for a locally distinct MDP
- long term vision for the future of Drumheller Valley
- guiding principles to inform decision-making
- growing in safe and strategic locations
- world-class destination and a strong local economy
- enhancing the unique qualities of the Valley
- a community of distinct neighbourhoods

This diagram illustrates how overlays and districts work together to translate intent into easy-to-apply regulations.

development process intent

- agile and adaptive to change
- simple to use and implement
- clearly articulated, not subject to broad interpretation
- form-based rather than use-focused
- business friendly
- flexible to allow for innovation and growth
- connected to the overall vision and priorities for the Valley

eight land use districts

- Natural district
- Agricultural district
- Countryside district
- Neighbourhood district
- Neighbourhood Centre district
- Downtown district
- Regional Centre district
- Employment district

overlays and districts combine

Leverage | Integrate | Legacy
An Integrated Network Along the River
Set the stage for unscripted adventures

The Drumheller Valley’s unique neighbourhoods and world-class amenities should be linked into a legible network of trails and nodes.
Legacy — Connecting the Valley
Smart Growth
Leveraging Development Opportunities

Legend
- 2100_cms_limits
- <all other values>

Type
- Class 1
- Class 2
- Class 3
- 1640-UpgradedStructure
- 2100-Trail
- MunicipalBoundary
- RedDeerRiver
Downtown Area Revitalization Plan (DARP)  
Civic Heart of the Valley

A downtown is a highly visible and important indicator of a community’s economic and social health. Enhancing downtown Drumheller as a destination for retail, dining, entertainment, culture, and events is a critical step towards recruiting new residents, attracting visitors, and stimulating new investment, businesses, and industries.

Downtown Drumheller’s role as a centre for business and public life has diminished over time. Despite past initiatives by the Town and partners to improve the downtown, the lack of a comprehensive revitalization plan has led to uncoordinated or unfulfilled projects and programs. Through the Drumheller Downtown Area Revitalization Plan (DARP), Drumheller has a tremendous opportunity to re-establish its role as the civic and business centre of the Valley.

Downtown must become a staging ground for the Valley’s adventures.

The DARP sits on five strategic pillars. All of these will link to the vision and objectives of the MDP, and will help give shape to the LUB. In particular, the two biggest blind-spots—landscape connection and residential community—can be fulfilled through close coordination with these other planning documents.

As an integral part of a flood community, downtown can become the base-camp for the Valley—a staging ground for adventure, and the start of the river’s story.

downtown.drumheller.ca
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Drumheller is the 3rd largest tourist destination in Alberta, but has seen its fair share of adversity from mother nature in terms of flooding:

- June 27, 1915 (rain on snowmelt)
- April 2, 1967 (ice jam)
- June 18, 1931 (rain on snowmelt)
- June 23, 2005 (rain on snowmelt)
- April 21, 1948 (ice jam)
- June 21, 2013 (rain on snowmelt)
- August 26, 1954 (rainfall)
- April 24, 2018 (ice jam)

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We Are a Flood Community

Focus Areas

Communications and Engagement
1. Promote Drumheller’s approach to adapting to the perils of changing climate
2. Continuing to unite the community behind a shared purpose to protect Drumheller’s economic, environmental and cultural assets from flooding
3. Consult and engage with impacted indigenous communities
4. Position Drumheller as an innovative leader in the area of flood mitigation and readiness
5. Inform affected residents of a ‘fair and balanced’ approach to land acquisition process
6. Communicate and work with financial and insurance sectors on viable solutions for displaced homeowners

Regulatory & Approvals
1. Obtain transfer of existing dikes from Alberta Environment and Parks (AEP) to Town of Drumheller
2. Meet obligations of funding agreements
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1. Make room for the river – preserve channel capacity
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3. Preserve up to 1,200 acres of natural (riparian) area that is comparable to 3,200 family cars of carbon capture per year
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Structural Measures
1. Build an adaptive system to protect the community into the 22nd century
2. Protect the cultural, palaeontological and archeological treasures of the Red Deer River Valley
3. Develop recreational and educational interpretive centers as part of the improved flood mitigation system
4. Connect the Royal Tyrrell Museum to the Atlas Coal Mine via a 38 kilometre “2100 trail network” as part of the improved flood mitigation system

Municipal Emergency Plan (MEP) enhancement
1. Develop detailed flood mitigation system operations manual to accompany MEP
2. Divide river valley into manageable monitoring sectors that will allow regional partners to respond/assist appropriately to their assigned area of responsibility during emergencies
3. Establish a Flood Mitigation and Climate Adaptation operations center to effectively respond during a flood emergency
4. Implement Incident Command System (ICS) protocols throughout flood mitigation and climate adaptation office to educate staff on processes
5. Conduct annual exercises using ICS
### Achievements

- Residents were and continue to be engaged and supportive of flood mitigation and climate adaptation system
- Town of Drumheller enhances relationship with Indigenous communities as a result of consultation process
- Residents agree Town of Drumheller is a flood community
- Residents have increased knowledge about flooding in Drumheller

- All existing provincial dikes are transferred to Town of Drumheller
- Revised provincial flood hazard maps are implemented in collaboration with Town of Drumheller
- Future floodplain development in Drumheller is improved through changes to MDP and LUB
- Support from funding partners is maximized

- Channel capacity in Red Deer River is improved/preserved
- Land Acquisition program is successfully completed to remove structures from floodway
- Innovate environmental initiatives were implemented to preserve riparian areas and urban forests
- Projected green house gas reductions of 3200 cars per year equivalent is met

- Enhanced diking system withstands future flooding by being adaptive to future
- Diking network between Royal Tyrrell Museum and Atlas Coal Mine serves as experiential education system for 500,000 annual visitors
- Majority of projected 20,000 man hours to complete work are hired locally

- Town of Drumheller staff are trained to respond to future flooding
- Regional partners manage prescribed monitoring sectors of the river valley
- MEP is updated and meets Bill 8 requirements

### Level of Service

The Town of Drumheller has protected the residents and property from loss or injury related to the perils of floods and changes in climate. The risk to property is reduced, thereby preserving economic viability of the community.

### Success

- Confidence of residents
- Decreased vulnerability and exposure areas
- Increased economic activity in 5 years
- Increased river capacity
- Improved climate adaptation
- Increased staff capacity to respond to future emergencies

### Risks

- Increasing likelihood of natural disasters
- Changes to the provincial flood hazard maps
- Project delays due to regulatory & approvals process
- Loss of local human resource expertise
- Ineffective communication and engagement

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**Drumheller Flood Mitigation and Climate Adaptation System**

**Changing the Channel on Flood Readiness**

August 2020
# Changing the Channel on Planning in Drumheller

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<th>People</th>
<th>Property</th>
<th>Environment</th>
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<td>ADAPTIVE FLOOD SYSTEM PROTECTS COMMUNITIES</td>
<td>HISTORIC FLOOD YEARS</td>
<td>DWELLINGS</td>
<td>Simplify &amp; clarify</td>
<td>Enhance and protect the Valley’s unique neighbourhoods.</td>
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- Place the river at the heart of key planning documents.
- Establish a strong vision and reduce friction to leverage new investment.
- Protect and celebrate the Badlands Landscape as Drumheller’s ‘secret sauce’.
- Connect the valley to set the stage for unscripted adventure.
- Make downtown the start of the story: a basecamp for the Valley.