

RIVER FLOOD MITIGATION PANEL RECOMMENDATIONS AND ADMINISTRATION ACTIVITIES

River Flood Mitigation Panel recommendations	Activities underway	Activities to be initiated 2015-2018	Lead business unit	Supporting business units
Action area 1: Develop options for protecting communities, infrastructure and private property to a higher flood level.				
a. Perform a social, economic and environmental analysis to evaluate the need for a minimum flood protection level above the 1:100 flood for land-use planning and structural protection across Calgary.	Water Resources is nearing completion of a cost-benefit assessment for raising new and retrofits of flood barriers, and on a stormwater improvement program.	Perform a triple bottom line cost-benefit assessment of the flood protection level of areas of Calgary's floodplain, assess options to achieve higher protection levels above the 1:100 flood.	Water Resources	City Wide Policy & Integration Inspections & Permit Services
b. Create graduated flood protection level requirements for City infrastructure.	Water Resources currently does a cost benefit analysis on various levels of flood protection for the design of its infrastructure including treatment plants, lift stations, pump stations and other capital works.	Identify graduated levels of flood risk depending on the function of types of City infrastructure. Review how the 1:100 flood level is used throughout City planning and operations and consider higher design standards for specific situations.	Water Resources	Infrastructure & Information Services City Wide Policy & Integration Inspections & Permit Services
c. Expand the review of the Land Use Bylaw and other development regulations to update flood resiliency requirements for private property in flood risk areas.	The Land Use Bylaw is being reviewed to consider removing the grandfathering clause so all existing development will have to meet flood protection standards when re-development is planned. The Land Use Bylaw amendments went to Council 12 May where it was tabled to 9 June 2014. City Wide Policy & Integration is preparing a scoping report for Council for Q3 that will explore: current built form in the flood hazard area; potential for moving structures from the floodway; citizens views on the long term future of the rivers; alignment with Provincial regulation developed under Bill 27 (Flood Recovery and Reconstruction Act); updates to the MDP and Land Use Bylaw based on updated mapping.	Investigate the potential for expanding flood resiliency requirements to flood risk areas outside of the official Flood Hazard Area, to include risk from groundwater, sewer back-up, and/or surface flooding during floods larger than the 1:100 event. Investigate whether additional or stricter requirements within the flood fringe are warranted, based on lessons from 2013.	City Wide Policy & Integration	Water Resources Inspections & Permit Services Law
d. Strengthen partnerships with utility providers to improve resiliency of their infrastructure and operations, with first priority to energy supply and communication networks.	CEMA, IIS & UEP continue to work with utility providers to ensure critical infrastructure and hazard information is current and available. This was critical to success in mitigation and recovery efforts in 2013. Alternative strategies to maintain power to critical infrastructure in flood prone areas are under discussion. Information sharing between utility providers, The City, and homeowners has been streamlined.	Continue to work with utility providers to develop a plan to increase resiliency of their infrastructure and operations. Encourage additional communication providers to become members of CEMA, such as Shaw, Bell etc. Continue to share the most current flood mapping information with all utility and communication providers.	Calgary Emergency Management Agency (CEMA)	Infrastructure & Information Services Corporate Properties & Buildings Information Technology
Action area 2: Support Calgarians in managing their flood risk through improved notification, forecasting and preparedness.				
a. Pursue a common river forecasting platform with Alberta Environment and Sustainable Resource Development (AESRD) and TransAlta for faster and more accurate information and alerts about future flood events.	Water Resources has deployed additional mapping and forecasting tools since the 2013 flood. AESRD is making substantial progress in improving flood forecasting and information-sharing: documenting lessons learned from 2013 and best practices; assessing weather model performance during past events; and examining lead time for emergency action in areas vulnerable to rapid flooding. These studies will be complete in Q3 2014.	Investigate the feasibility of a common forecasting platform with the Province and TransAlta to improve sharing of real-time, forecasting, and modelling outputs for faster and more accurate forecasts.	Water Resources	Information Technology CEMA

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b. In partnership with AESRD and TransAlta, expand the network of river and weather monitoring stations upstream of Calgary and protect stations from damage during flooding.	c. Incorporate lessons learned from the 2013 flood to enhance communication channels to keep Calgarians informed of conditions that may lead to high river levels.	Water Resources has repaired or replaced monitoring stations damaged in the 2013 flood, added sensors and cameras to some stations and made some of them more flood resilient.	Install additional hydrological and weather monitoring stations upstream of Calgary on the Bow and Elbow Rivers. At least eight locations identified by Water Resources, the Province, and TransAlta. New stations could include links to GIS, and specialized technology for better real-time forecasting.	Water Resources										
		A Q4 2014 deliverable of the 2013 Flood Recovery Framework is a Communications/Engagement Integrated Program, which is an opportunity to include communication and engagement lessons learned across the business units.	Use the outcomes of the Flood Recovery Task Force "Communications/Engagement Integrated Program" to review and improve flood communication with Calgarians.	Customer Service & Communications	CEMA Water Resources									
		Customer Service & Communications launched the "We are One" communications campaign to unify and centralize all flood and river related messaging. The Calgary.ca/floodprep and Calgary.ca/floodinfo websites contain information on how The City helps Calgarians prepare for floods, notifying Calgarians of flood conditions, what The City is doing to mitigate future floods, and responding to potential flooding. The City hosted several open houses and events to inform Calgarians about flood recovery, preparedness and mitigation.	Develop communications strategy that includes additional information and tools that support Calgarians to proactively manage personal flood risk, such as incorporating flood education into a school programs, providing interactive flood risk maps, and informing the public on flood-resiliency options.	Customer Service & Communications	Water Resources Calgary Emergency Management Agency (CEMA)									
		Water Resources has initiated conversations with potential partners in the insurance industry, building associations, and other non-governmental organizations to develop or expand on home flood resiliency programs.	Collaborate with partners to develop incentive programs for building owners and operators to implement flood resiliency measures.	Water Resources	Inspections & Permit Services Corporate Properties & Buildings									
		Action area 3: As part of an integrated City and Provincial program, perform social, economic and environmental assessments of capital works options to increase storage, divert water and increase protection.												
a. In partnership with the Province, compare the three major capital works options for mitigating floods on the Elbow River:	i. A diversion from the Elbow River to the Bow River, in accordance with the conclusions of the feasibility studies underway.	Water Resources, with the Province, continues to evaluate the financial, social, and environmental impacts and timelines for major protective structures aimed at storing or diverting flood waters and to support Provincial plans for these works.	Engage with the Province to compare the options using a triple bottom line assessment.	Water Resources	City Manager's Office Finance Law									
						ii. The Springbank off-stream diversion and storage site.	Investigate the feasibility of increasing the storage capacity of the Glenmore Reservoir to include flood mitigation.	Continue to support the on-going discussion between the Province and TransAlta						
									iii. The McLean Creek dry dam.					
												b. Increase the operating water storage capacity of the Glenmore Reservoir on the Elbow River through modifications to the Glenmore Dam.		

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d. Construct additional or higher flood barriers in key locations throughout the city and update temporary flood barrier plans to protect against higher flood levels.	Some additional permanent barriers have been constructed post-2013, and Water Resources is undertaking a city-wide conceptual design study, cost estimation and a triple bottom line assessment for raising flood barriers. This study also looks at groundwater and stormwater implications. The City also developed a new permitting process for temporary barriers on private property.	Identify financial impacts, construction sequence and funding for new permanent protective barriers within Calgary for communities and critical infrastructure, considering the results of activities outlined for Recommendations 1a and 1b. From the results of the studies under way, evaluate the expansion of the temporary flood barrier plans to include floods higher than the 1:100 flood.	Water Resources	Parks Roads Inspections & Permit Services
Action area 4: Manage Calgary's floodplain to reduce impact from river floods over the long-term.				
a. Review The City's existing land-use planning documents and develop amendments, new guidelines or policies that will minimize development in the floodplain over time.	The City has several policies and plans that address development in the floodplain, such as the Municipal Development Plan, Land Use Bylaw, Riparian Strategy, and the Environmental Reserve Setback Policy. City Wide Policy & Integration is reviewing land-use planning documents with regards to resiliency.	Review and include flood resilience planning in key City policy and planning documents, and determine if new policies are required to ensure a long-term management of the floodplain.	City Wide Policy & Integration	Local Area Planning & Implementation Water Resources Parks Law
b. Prepare a time-phased plan to modify structures that constrain river flow during flood events, such as pathways and bridges.	Water Resources has evaluated the impacts of bridges and barriers on river flow during flooding. Some damaged pedestrian bridges on the Elbow and Bow Rivers were redesigned based on this modeling and will soon be under construction.	Evaluate and design construction options that reduce the impact of bridges and pathways on river flood levels, including replacement or modification of bridges not previously evaluated.	Transportation Infrastructure	Water Resources Parks
c. In partnership with the Province, develop a time-phased plan to remove buildings from areas with high flood risk, while minimizing the disruption to affected communities.	See activities under Recommendation 1c for work underway by City Wide Policy & Integration. The City has initiated discussions with the Province on managing properties acquired under the current Provincial buy-out program.	In partnership with the Province, investigate the need for removing buildings from specific flood risk areas. This should include community consultation and evaluation of environmental and social impacts, costs and benefits. This investigation is dependant on the outcomes of the civil project options in Action Area 3.	City Wide Policy & Integration	Land Area Planning & Implementation, Parks Water Resources Law Corporate Properties & Buildings Civic partners as required
Action area 5: Improve understanding of flood risks, present and future.				
a. Publish up-to-date, graduated flood maps for public information.	A new model to generate flood maps in Calgary was completed in 2012 in partnership with the Province (posted on calgary.ca) and is now being updated to reflect changes to the rivers from the 2013 flood.	Prepare updated graduated flood risk maps for public release.	Water Resources	CEMA and other business units using the maps
b. Urge the Province to regularly review and update official flood hazard maps.	The City and the Province are partnering on updating internal flood maps and the Province is reviewing official flood hazard maps for Calgary.	In conjunction with the Land Use Bylaw review (see activities in Recommendation 1c), investigate and address the triple bottom line implications of publishing updated official flood hazard maps.	Water Resources	Local Area Planning & Implementation Law City Manager's Office CEMA
c. Maintain a comprehensive flood risk database integrated with existing geographic information systems (GIS).	A GIS exists that includes many layers relevant for flood-planning. Currently these layers are used for 1) response and emergency planning 2) land use regulation 3) capital flood and erosion works 4) environmental and regulatory purposes.	Include information from the 2013 flood as a layer to The City's GIS. Add additional economic, social, and environmental data layers. Use the GIS to help prioritize the list of infrastructure resiliency projects.	Water Resources	Infrastructure & Information Services (IS) CEMA

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d. Develop a suite of watershed-scale climate models to capture various weather event scenarios, with input from regional partners, post secondary institutions and other levels of government.	Water Resources participated in the multi-stakeholder development of the Bow River Operational Model (BROM), which examined how changes in climate could impact flows and functions of the Bow River.	Collaborate with partners to develop watershed-scale climate models for the region.	Water Resources	Environmental & Safety Management
e. Collaborate with academic and other partners to develop computer models that identify groundwater movement in Calgary in relation to flood conditions.	In 2014, Water Resources funded two University of Calgary studies on groundwater-surface water impacts on river flooding.	In conjunction with flood risk mapping (Recommendation 5a), develop groundwater monitoring, maps or models that identify high groundwater flood-risk areas to understand the influence of groundwater flows during flooding. Assess the relative costs/risk of surface and groundwater impacts during floods and link to policy development (Recommendation 4a).	Water Resources	City Wide Policy & Integration Law
Action area 6: Establish a vision and framework for ongoing flood resiliency activities for The City.				
a. Establish a permanent team within The City to oversee flood preparedness and resilience.	The Governance and Policy Key Result Area of the Flood Recovery Framework includes a deliverable on long-term risk reduction and resiliency for input to Action Plan 2015-2018 (Q4 2014).	Identify the scope, organizational structure, and resources required to implement flood resiliency activities across The Corporation.	Recovery Operations Centre	All impacted business units
b. Connect with the provincial body overseeing flood protection and loss reduction and support the Province's continuing analysis of flood mitigation options and implementation of appropriate measures throughout the Bow and Elbow watersheds.	The City has been in regular communication with the Province. The Provincial Recovery Task Force has been embedded in Municipal Affairs. The Provincial Resiliency Team has been embedded in AESRD.	Maintain communication and collaboration with the Province on assessing flood mitigation options within and upstream of Calgary (Action Area 3).	Water Resources	Recovery Operations Centre
c. Evaluate social, economic and environmental impacts of flood mitigation options.	Water Resources has evaluated the flood mitigation measures undertaken in 2013, and initiated an overall community cost analysis of the 2013 flood. (See current activities for Recommendations 1a, 3a, 3b, 3d, 4c)	Considering all of the options presented (constructing major civil works (3a and 3b), constructing flood barriers (3d), and removing buildings from the floodplain (4c), perform a triple bottom line comparison to determine the optimal combination of solutions.	Water Resources	City Wide policy & Integration Inspections & Permit Services Law
d. Develop a comprehensive climate adaptation plan and implementation tools to reduce The City's infrastructure and operational vulnerabilities.	Environmental & Safety Management is developing a Corporate climate change adaptation strategy, and as a first step, completed asset vulnerability assessments with several business units. Water Resources performed a climate vulnerability assessment on The City's water supply infrastructure.	Implement the Corporate adaptation strategy under development. Identify City assets that would benefit from a climate vulnerability assessment.	Environmental & Safety Management	All business units owning infrastructure
e. Host a national flood risk management workshop to share best practices and develop an ongoing networking group.	The City has initiated conversations with other cities affected by floods in North America that could be part of an ongoing networking group.	In partnership with resiliency organizations, plan a flood resiliency workshop for Canadian cities to establish a national dialogue on best practices in flood resilience.	Water Resources	CEMA Customer Services & Communications
f. Provide an annual update to City Council on progress related to the recommendations from the Expert Management Panel on River Flood Mitigation.	The Recovery Operation Centre and River Flood Mitigation Program have provided quarterly updates to Council.	Starting in 2015, provide a annual update on Corporate flood resiliency activities to Council.	Recovery Operations Centre	All impacted business units