

## CIVIC PARTNER PROJECT - IN-CAMERA

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### EXECUTIVE SUMMARY

More than half of the Calgary Zoo's infrastructure is located on St. George's Island and the most significant damage during the 2013 flood was caused by overland flow that entered the Calgary Zoo at low points on the south side of the island. Located in the middle of the Bow River, The City's infrastructure on St. George's Island is the most vulnerable to flooding with near complete inundation during a 1:20 year event according to updated flood maps. Significant damages and disruption to operations are likely to occur on a regular basis without permanent flood mitigation.

The current estimate for the flood mitigation project is \$25 million, including site preparation, installation of a sheet pile flood barrier, reinforcement of existing berms, construction of new berms, implementation of groundwater control measures, and site restoration for flood resiliency to the 2013 flood level plus one metre, half a metre above the 1:100 year flood elevation.

Following the 2013 June flood event, The City, as the owner of the assets and land, engaged engineering, geotechnical and hydrotechnical consultants to analyze the impact of the flood on the Calgary Zoo, and provide recommendations to protect the Zoo from future floods. The City has been working with the Calgary Zoo, as the operator, to develop a detailed design for a flood mitigation project to protect St. George's Island. The detailed flood mitigation project design is now completed and, subject to funding, the construction process is ready to move ahead this fall.

### ADMINISTRATION RECOMMENDATIONS

That the Priorities and Finance Committee recommends that Council:

1. Direct Administration to proceed with the construction of the flood mitigation project at the Calgary Zoo and approve the 2015 capital appropriation of \$25 million to Program 956 (Project 004) from the Fiscal Stability Reserve;
2. Direct Administration to replenish the Fiscal Stability Reserve with any funding from provincial and federal programs for the flood mitigation project; and
3. Direct that this report and all attachments remain confidential under Sections 16(1), 23(1)(b), 24(1)(a), 24(1)(c), 24(1)(g) and 25(1)(c) of the *Freedom of Information and Protection of Privacy Act* (Alberta) until such time as the Government of Alberta has rendered a funding decision and related contract executed.

### RECOMMENDATION OF THE PRIORITIES AND FINANCE COMMITTEE, DATED 2015 JULY 14:

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That Council:

1. Approve the Administration Recommendations contained in Report PFC2015-0536; and
2. Keep the Report and all Attachments confidential pursuant to Sections 16(1), 23(1)(b), 24(1)(a), 24(1)(c), 24(1)(g) and 25(1)(c) of the *Freedom of Information and Protection of Privacy Act* (Alberta) until such time as the Government of Alberta has rendered a funding decision and related contract executed.

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### **PREVIOUS COUNCIL DIRECTION / POLICY**

On 2013 July 02, the Priorities and Finance Committee received the first Flood Status Update regarding the 2013 Flood event. Since that time, a significant number of reports have been brought to Council by Administration including: update reports from the Water Expert Management Panel on River Flood Mitigation, Flood Hazard Area land use policy update reports, grant programs on permit fees and property tax relief reports, flood-related budget impacts, and resiliency project recommendations. A summary of these reports and previous Council direction on the impacts of the flood can be accessed on the Electronic Legislative Management Solution at [calgary.ca](http://calgary.ca).

On 2014 April 14, Council approved PFC2014-0279 appropriating up to \$1.2 million from the capital budget to Program 956 (Project 004 – Calgary Zoo Floodproofing). In the interim, funding from the Fiscal Stability Reserve was allocated for the detailed design phase of the Calgary Zoo's flood mitigation project. Administration was to develop and coordinate implementation of a plan to advocate for reimbursement by the provincial and federal governments for the flood mitigation project at the Calgary Zoo, and to report back to Council: (a) once the Government of Alberta rendered any funding decision on the applications for either the FREC and the Resiliency and Mitigation Framework Fund, with recommendations regarding the flood mitigation project at Calgary Zoo and (b) as part of Action Plan 2015-2018 with business plan and budget recommendations for the flood mitigation project at the Calgary Zoo.

### **BACKGROUND**

Alberta's 2013 flood in the Bow River Basin inundated St. George's Island with up to two meters of flood water. Peak flow rates in the Calgary section of the Bow River were at 1,740 cubic meters per second, over five times higher than the normal flow rate. As approximately 60 per cent of the Calgary Zoo's infrastructure is located on St. George's Island within the Bow River, the damage from the 2013 flood was significant. In 2005 the Zoo incurred significant damages and disruption from a relatively much smaller high water event, which are likely to occur on a regular basis, and continually impact the Zoo in the absence of permanent flood mitigation measures.

The Zoo's land exceeds 110 acres in size and features a range of exhibits and facilities. The Zoo is one of Calgary's most significant landmarks with nearly a century of history in this location. Presently, the value of insured assets on St. George's Island is \$182 million. Valuation work underway will likely increase this estimate. Approximately \$50 million in damage was incurred at the Zoo including damage to buildings and other critical infrastructure, cost of protecting animals, loss of revenue, and other intangibles. Insurance coverage funded the majority of the repair costs to the insured infrastructure. Funding was also approved from the Government of Alberta's Disaster Recovery Program (DRP) and Flood Recovery Erosion Control (FREC) Program for non-insured infrastructure damage and riverbank erosion caused by flooding.

During the recovery phase, The City engaged engineering, geotechnical and hydrotechnical consultants to analyze the impact of the flood on the Zoo. Relocation was considered but was not an option due to high costs to relocate the Calgary Zoo including land acquisition, servicing, underground infrastructure, roads, pathways as well as impact to operations. A

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floodproofing concept that would raise all Zoo facilities above the 2013 flood level was not an option due to high cost. As well, due to the high rates of seepage, a groundwater management system relying solely on pumping was not an option. With hydrotechnical and geotechnical information, a preliminary design recommendation to mitigate future flood damage via a sheet pile perimeter wall was completed. With the preliminary design completed, Council approved funding for the project to move to the detailed design phase.

### **INVESTIGATION: ALTERNATIVES AND ANALYSIS**

Following Council approval of funding for detailed design, the Government of Alberta approved funding from the FREC Program for detailed design. With project management from Transportation Infrastructure, Administration proceeded with a Request for Proposal for a prime consultant to undertake the work. As the successful respondent, ISL Engineering and Land Services Ltd. delivered detailed design work. They engaged a subject matter experts team that included Zoo operational staff, stormwater engineers, hydrotechnical engineers and landscape architects.

Prior to starting the detailed design, ISL engaged Associated Engineering (AE) to undertake a peer review of the preliminary design to provide critical guidance and feedback. AE identified issues to be addressed in detailed design, however, confirmed ISL's approach proposed in the preliminary design. The recommended option arising out of the detailed design work includes:

- Continuous 360 degree cofferdam of steel sheet piles around St. George's Island.
- Earth filled berms and sheet pile walls to the 2013 flood level plus one meter of freeboard.
- Supplementary pumping system to manage residual seepage and stormwater.

Detailed design is near completion and the design is outlined in Attachment 1. The design will be completed and ready for construction in fall 2015. The construction cost is estimated at \$25 million, with further details in Attachment 2.

The flood protection berms and walls are all outside the floodway, with the exception of part of a food services building and an administration parking lot. To marginally alter the flood boundary to reflect physical realities of the existing river, these areas will require approval from regulators at the Province of Alberta and The City. The City's consultant has completed hydrotechnical analysis and has confirmed that the proposed work will not have any impact on river levels upstream or downstream of the Zoo. Regulatory applications have been submitted to Alberta Environment and Sustainable Resource Development and approval under the *Water Act* has been issued.

Stormwater at the Zoo is currently managed by dry wells which drain stormwater into a subsurface layer of coarse alluvial gravels. The proposed design maintains the use of dry wells, with the addition of a dewatering system to manage changes in groundwater due to the proposed flood protection measures. The overall objective is to manage stormwater and groundwater such that flooding within the island does not occur during high river levels or storm events. Water Resources has accepted the proposed approach to flood mitigation and stormwater management in principle. A draft Stormwater Management Report has been submitted to Water Resources for review and input on the technical aspects of working near the river and groundwater conditions.

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### **Timing**

In terms of timing, the project will require eighteen months to complete. During construction, disruption to the Zoo's operations will be significant as the project requires heavy machinery with elevated construction noise levels. To enable the Zoo to be completely operational during its high season, construction would be scheduled over two nine month winter construction periods. Construction would occur in sections likely addressing the east side of the island in the first construction period and the west side in the second. The Zoo will deploy a strategy to relocate smaller animals as needed with the larger animals more able to remain in their exhibits during construction.

Challenges with scheduling and funding have arisen. A first consideration is that The Calgary Zoological Society has a contract with the People's Republic of China to host a Giant Panda exhibit starting in spring 2018. With the disruption and on-site changes required by the flood mitigation work, the best option for maintaining the current budget is to begin the construction work this 2015 October so it is completed before the Giant Panda exhibit opens. To accelerate the project to accommodate a later start date but to complete prior to 2018 could result in a budget increase of 20 to 30 per cent. The other option would be not to commence until after the Giant Panda's departure in 2023 leaving the Zoo unprotected for 10 years since 2013 event and rely solely on upstream mitigation works, if any.

Disruption during the Giant Panda's visit is not desirable as the exhibit is anticipated to attract high levels of visitors who will bring significant economic benefits to Calgary. Historically, the introduction of a new zoo exhibit increases attendance. For example, a Calgary Zoo Economic Impact Study reported that the opening of the Penguin Plunge exhibit saw an increase in attendance from 1.16 million to 1.44 million— an increase of 24 per cent. For Giant Pandas, the Zoo has conservatively estimated that visitation from 2014 levels will increase by over 400 thousand to approximately 1.6 million with a 22 per cent annual increase in Zoo revenues and that the exhibit will lead to an increase in tourism spending from over \$79 million annually in 2014 to over \$103 million by 2020.

Additionally, challenges working within the fish window restrictions limit the time frame on some of the work. As well, coordinating construction with the 12<sup>th</sup> Street Bridge Project would be ideal to minimize the amount of disruption to the community, the Zoo and commuting traffic. The new replacement bridge will be realigned to improve access to the Zoo and remove the existing dog-leg turn. The new alignment will impact the Zoo as the project requires land within the Zoo's current lease boundary. Installation of the sheet pile wall in advance of the new alignment would minimize the land taken from the Zoo. Discussions with the Zoo on the new alignment have commenced and are being coordinated with the bridge project, which begins in spring 2016 with completion by winter 2017.

### **Funding Considerations**

The Mayor has submitted a letter to the Premier requesting funding for this critical project with a requested response prior to 2015 July 27 Council meeting to assist Council with making a decision to fund the project or not. (Attachment 3).

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The City has continued its advocacy with the Government of Alberta regarding available funding through Alberta Community Resilience Program (ACRP). The discussion to date has signalled that the mitigation initiative at the Zoo would be eligible for the ACRP but that funding is unlikely due to heavy subscription of this funding program across the Province. The Government of Alberta has verbally confirmed that The City may apply for the flood mitigation project; however, it will likely fund other priorities. In addition, the funding available province wide would not accommodate a project of this magnitude.

The City made an application to the Building Canada Fund in 2014 for three projects, one resilience project supporting watershed stormwater retention and detention, the Green Line, and supporting infrastructure to implement the Transportation's Goods and Movement Strategy. Two projects have been declined, and the decision on the Green Line remains outstanding. Given the recent decisions on The City's submissions; Administration is exploring whether the Building Canada Fund would provide an opportunity to fund the project under the disaster mitigation category as the Zoo is Canada's leader in wildlife conservation which may meet the national significance standard though the project is below the threshold of \$100 million. Administration recommends submitting applications for both project to the Government of Alberta and Government of Canada for funding.

In 2013 September, Council approved \$100 million for the FSR along with a process to evaluate and prioritize flood related City projects, for recovery and resiliency of infrastructure and operations, was implemented by Administration. The top three priorities for 2014 included: the immediate needs for public safety, protecting key vulnerable areas or populations and restoring critical infrastructure or key operations. Administration recommends that funding for the zoo mitigation project from the FSR but not reduce the approved \$100 million funding strategy as funds may be required for projects pending approvals through the DRP.

### **Other Considerations**

The City's insurance premiums will continue to be negatively influenced without the mitigation project to protect this City asset. Though no direct insurance savings can be identified, it is likely that without mitigation measures being implemented, insurers will be less likely to provide quotes that include flood coverage. As fewer insurers provide quotes, competition is lowered and rates may increase.

The City's consultant performed benefit / cost analysis using only uninsured damages and concluded the ratio is somewhere between 1.0 to 3.0 and concluded that undertaking the flood mitigation project will significantly reduce future potential costs from flood damage. A Real Interest Rate or Discount Rate of 3 per cent was used, which represents a generally accepted value for such calculations. The Net Average Annual Benefit of the flood mitigation measures is nearly the same in both calculations which would be approximately 33 years or one third the design life span to return the \$25 million capital cost. So whether it be a small flood that regularly inundates parts of St. George's Island and causes \$2 million in damage, or a flood like 2013 that leads to very significant costs the project would produce long-term savings.

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### **Next Steps**

Administration has assessed the options for funding and recommends that the project be funded from the Fiscal Stability Reserve along with approval to proceed with applications to the provincial and federal governments – specifically in the near term the Building Canada Fund and Alberta Community Resiliency Fund – to enable The City to recover some or all of its invested funding for the project.

The reasoning from above and other factors are summarized below:

- To enable the Calgarians and the Province to realize all benefits social and economic from the arrival of the Giant Pandas in spring 2018 till 2023, to meet the timelines for completion of construction and accommodate the Zoo's high season and the fish window, the project must begin in 2015 September. The project would take place over two nine month construction periods from 2015 September to 2016 May, and 2016 September to 2017 May.
- It would be financially and logistically beneficial for Transportation Infrastructure, who is managing the project, to be able to coordinate the flood mitigation project with the 12<sup>th</sup> Street SE Bridge Replacement Project. Work to rebuild and improve the alignment of the bridge is slated to begin in spring 2016 and be completed in winter 2017.
- The City's insurance premiums will continue to be negatively influenced without mitigation to protect one of the most vulnerable City assets located in the middle of the Bow River.
- The consultant's Benefit / Cost analysis indicates a ratio between 1.0 and 3.0 showing a net savings over the design life-span and concludes Net Average Annual Benefit from the project will pay the project costs back within a third of its one hundred year design life span.
- Finally, the Zoo is an important national, municipal, and community asset to protect as it attracts high levels of direct and indirect tourism spending to Calgary. The Zoo is a City of Calgary asset, represents one of our city's most popular attractions, and almost half Zoo visitors come from out of town.

Delaying the funding decision will delay the work to 2023 following the departure of the Giant Pandas and likely increase the cost of the project. If the project is delayed until 2023, the 12<sup>th</sup> Street Bridge Project will need to plan and budget for the installation of the sheet metal piles to ensure that the integrity of the bridge impacted if the project goes ahead in 2023.

### **Stakeholder Engagement, Research and Communication**

As the operator and primary stakeholder, the Zoo has been engaged in the governance of this project. It adheres to the Corporate Project Management Framework and includes formal project chartering, and the preparation and implementation of a stakeholder engagement and communication plan. In addition, regulatory applications have been submitted to Alberta Environment and Alberta Sustainable Resource Development.

### **Strategic Alignment**

The recommendations in this report are strategically aligned with the following:

Approval(s): GM (S. Dalglish) concurs with this report. Author: (L. Kerr)  
City Clerk's: D. Williams

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- The City of Calgary Action Plan 2015-2018
  - A city of inspiring neighbourhoods: Build resiliency to flooding.
  - Enhance The City's capacity and resiliency to prepare for and respond to pandemics, natural disasters and emergency situations.
- Municipal Development Plan
  - 2.2.4 Complete communities.
  - 2.3.6 Community services and facilities.

### **Social, Environmental, Economic (External)**

The recommendations in this report are in alignment and compliance with the Triple Bottom Line policy and framework as follows:

**Social:** The Zoo was established in 1929 and is one of Calgary's most significant landmarks with nearly a century of history in this location. The Zoo is a valuable asset contributing to the excellent quality of life enjoyed by Calgarians. The City and the Zoo agree that a zoo is an integral contributor to The City's vision of creating and sustaining a vibrant, healthy, safe and caring community. Protection of the Zoo is essential in order to ensure that it can maintain its image as a global destination and Canada's leader in wildlife conservation for future generations.

**Economic:** The Zoo leverages The City's assets, and operating and capital contributions in the community to generate revenue and other financial support. The Zoo contributes to the economic advantage of the city as a major tourist attraction and it generates significant direct and indirect economic and employment impacts for Calgary and Alberta. In 2012, when the new Penguin Plunge exhibit opened, the Zoo attracted a record number of visitors, with over 1.45 million people coming through their gates. The Zoo has an excellent opportunity to generate increased attendance and revenues with the impending visit from the Giant Pandas.

**Environmental:** Preservation of land base demonstrates environmental stewardship. During design and construction, the preservation of mature trees and natural vegetation will be considered.

### **Financial Capacity**

#### **Current and Future Operating Budget:**

There is no impact to the current operating budget from the recommendations. The Calgary Zoological Society will need to incorporate estimated life-cycle costs of 0.5 to one per cent of the capital costs or \$125 thousand to \$250 thousand per year on average for maintenance, monitoring and inspection of the berms, sheet pile walls, and groundwater protection once constructed.

#### **Current and Future Capital Budget:**

The current request of \$25 million for this project is recommended from the Fiscal Stability Reserve to Program 956 (Project 004). Approve the submission of the flood mitigation project for eligible programs for funding by the provincial and federal government.

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### **Risk Assessment**

In accordance with The City's Corporate Project Management Framework, The City has conducted an initial risk workshop to identify the risks based on high impact and high probability to low impact and low probability. Risks were assessed in many categories, including design, constructability, stakeholders, budget and regulatory approvals. Emerging from the risk workshop is the complexity of the project at all stages and the potential impact on cost, schedule and performance. The highest impact risks that were identified included, but are not limited to:

1. Potential scope creep due to unforeseen circumstances as the project progresses that may result in cost escalation.
2. Challenges in construction due to contractor inexperience.
3. Unpredictable subsurface conditions which may impact the constructability and operability of the proposed groundwater barrier technology.
4. Utility conflicts with the proposed groundwater barrier technology.

As the project progresses, The City will continue to conduct risk assessments and develop risk mitigation strategies as needed.

Recognizing that the Zoo's busiest season is during the summer, a majority of the construction or the least disruptive works will be scheduled for the spring, fall and winter months, if practical. Safety of the visitors, staff, animals and zoo infrastructure will be addressed with a detailed construction plan and phasing schedule.

Additionally, the Calgary Zoo must continue efforts over time to reduce impacts from flooding and to protect their assets. These efforts should include integrating site specific flood mitigation and resiliency measures for all future works and emergency response procedures based on learnings from the 2013 event.

### **REASONS FOR RECOMMENDATIONS:**

Funding of the \$25 million for the flood mitigation project enables Administration to progress to the next phase of the project and help ensure the Zoo can meet its existing commitments. The intent of the flood mitigation project is to provide an optimal mitigation strategy for the Calgary Zoo in the case of another flood. As 60 per cent of the Calgary Zoo's infrastructure is located on St George's Island with approximately \$50 million in damage from the 2013 Alberta flood, protection of the Calgary Zoo is necessary in order to ensure that it can maintain its image as a global destination and Canada's leader in wildlife conservation for future generations.

### **ATTACHMENTS**

1. Detailed Flood Mitigation Design
2. Project Cost Estimates
3. Letter to Premier Notley dated July 6, 2015