PENTICTON CREEK: WE HAVE A PLAN

Restore flood protection. Restore fish habitat. Good design lets us do both.

Penticton Creek has been an important part of our community for generations, but it has deteriorated and needs our attention. We have a plan that will create a safe, healthy creek for years to come. In 2015 we restored a Showcase section of the Creek to garner further community support and assess impacts on flood protection and fish. Now we're taking the success of the Showcase Project forward with a plan for the full 4.5 kilometers of Penticton Creek's urban passage.

PROTECTING
People and Property

Original flood protection measure are failing after 65+ years. Our plan employs today's best practices and our community's expertise to provide a high level of protection from flooding.

PLENTY MORE
Fish In The Creek

The new design will return Penticton Creek to a productive waterway for Kokanee, Rainbow Trout and Longnose Dace. More natural reconstruction will remove migration and spawning barriers for fish and benefit other native species. The social and recreational value of restoring this 'special natural place' are countless.

PROACTIVE REPAIR SAVES MONEY

Penticton Creek needs flood protection upgrades. The standards of the 1950's when channelization for flood protection occurred are much different today. We have the opportunity now to maintain required flood protection while restoring the Creek to a more natural state that can support the return of fish. The erosion of current Creek structures causes sudden and expensive maintenance challenges for City operations. Proactive repair can save taxpayers money and capitalize on habitat restoration funding from outside the community at the same time.

A CLOSER LOOK AT THE PLAN

Penticton Creek TODAY

65+ Years of service but now infrastructure is deteriorating

39 Drop structures

33% Concrete lining

4.5 kms from Okanagan Lake to Dam #2

1 Aboveground gas main

2 Above ground sewer crossings

MANY Utilities and utility crossings

17 Existing riffles

6 Vehicle bridges, pedestrian bridges

Our Plan Envisions

20 Unique creek sections targeted for restoration

Creek formation with stable river rocks and gravel

Increasing bank freeboard by either raising bank or lowering creek

Replacing some structures with riffles and pools

Seating and recreational space, improved viewing, pedestrian pathways

Removal of deteriorating concrete lining

Deeper pools for year-round habitat

Increasing bridge clearance

Expanded flood plain where possible

Meandering low flow, fish passable channels where possible

How do we prioritize work?

Work priorities are determined by flooding and fisheries criteria as well as project continuity, land use issues, sensitivity to areas with archeological values or potential and of course, funding availability.

Structures were assessed to determine their potential to fail, and consequence of that failure to give them a Risk Rating and categorize them on a flood priority list. In an emergency, failing infrastructure and bank erosion is more difficult to fix than blockages or localized lack of freeboard. Bridges that provide lone access are also important.

For fisheries, considerable research was done by top habitat assessment professionals to establish priority areas and methods.

Where flood and fisheries priorities aligned, we can move forward with an informed sequence of construction. Of course, priorities need to be reassessed as impact of works is seen and as funding allows.

SEE WHAT'S HAPPENING NEAR YOU

Creek planning has been divided into 13 unique 'reaches' or sections

CITY OF Penticton

Reach 1
Length: 150 meters
Average width:11 meters
Habitat rating: Low

This City own stretch extends from **Okanagan Lake** to below **Front Street Bridge**. Surroundings include the Art Gallery and Okanagan Lake Park.

This area has options for an expanded and unique downtown feature. Flood work generally involves creating sufficient 'freeboard' at creek banks and the Art Gallery pedestrian bridge.

Reach 2
Length: 150 meters
Average width: 6 meters
Habitat rating: Low

This is the most narrow and urban section of the creek with commercial uses on either side. It extends to just before **Ellis Street road bridge**.

This reach also has options for an expanded and urban, recreation-friendly design, including amphitheatre seating, a second path, a low flow channel for fish and a possible waterfall feature. Flood work generally involves creating sufficient 'freeboard' at creek banks and widening the Ellis Street pedestrian bridge.

Reach 3
Length: meters
Average width: 7 meters
Habitat quality: Low
(excluding Showcase Project)

This narrow section extends from **Ellis Street** to **Wade Street** pedestrian bridge and includes the 'Showcase Project'. The area is mostly residential with some City owned land.

This reach also has options for an expanded and urban, recreation-friendly design, including amphi-theatre seating, a second path, a low flow channel for fish and a possible waterfall feature. Flood work generally involves creating sufficient 'freeboard' at creek banks and widening the Ellis Street pedestrian bridge.

Reach 4
Length: 75 meters
Average width: 14.5 meters
Habitat quality: Moderate

This short section of unlined creek extending from **Wade Street** pedestrian bridge **to Burns Street**.

Restoration will create a narrower low flow channel to provide additional water depth and a more natural shape to encourage habitat diversity.

Reach 5
Length: 110 meters
Average width: 10.5 meters
Habitat quality: Low

A short reach is the most steep and section of the Creek. It extends upstream from **Burns Street** and lined by **Government Street** and some City properties.

It will require a very long pool riffle and pool design to replace the steep drop structure that is deteriorating.

Reach 6
Length: 190 meters
Average width: 12 meters
Habitat quality: Low

This section runs half the length of **Pickering Street** and **ends at** the **KVR pedestrian bridge**. It is bound by roadways on both sides.

Restoration mostly includes removal and restoration of concrete structures. This section may have room to incorporate more fisheries features such as meandering low flow channels, woody debris and deeper pools.

Reach 7
Length: 170 meters
Average width: 7.5 meters
Habitat quality: Low

This section extends from the **KVR pedestrian bridge to** just after the **Eckhardt Ave** road bridge. Surrounding area includes City owned property and a road right of way.

Restoration design is similar to that of the Showcase project with a series of pools and riffles and works to increase bank freeboard.

Reach 8
Length: 265 meters
Average width: 17.5 meters
Habitat quality: Low

This section of the creek runs along **Ontario Street** and is the most natural lower reach. The surrounding land is owned by the City.

There is an opportunity here to create a wide floodplain, a meandering low flow channel and deeper pools to diversity the Creek.

Reach 9
Length: 75 meters
Average width: 8 meters
Habitat quality: Moderate

A short and steep residential section of Creek is isolated between **Ontario Street** and **Forestbrook Drive**.

Restoration will address flood deficiencies by stabilizing riprap and reconfiguring the section with pools and riffles for a fish passable channel to overcome the steep elevation change.

Reach 10
Length: 240 meters
Average width: 7 meters
Habitat quality: Low

This section extends across **Forestbrook Drive** to the end of **Brooks Place**. It is mostly residential with some City owned properties.

Restoration will include replacing concrete lining with pools and riffles for increased habitat potential.

Reach 11
Length: 800 meters
Average width: 16.5 meters
Habitat quality: Low

This long section extending from **Brooks Place to McPherson Place** includes more than half the concrete structures on the Creek. It is mostly residential and runs past McNicoll School.

Restoration involves replacing concrete with single or multiple riffles and addressing a lack of clearance at banks and McNicoll pedestrian bridge.

Reach 12
Length: 400 meters
Average width: 20 meters
Habitat quality: Low

This wide and more natural section extends from **McPherson Place to** just before the Bridgewater community running along the side of **Penticton Ave**. It is surrounded by both public and private property.

Restoration involves replacing concrete structures with riffles and widening the creek to achieve necessary freeboard.

Reach 13
Length: 1180 meters
Average width: 9 meters
Habitat quality: Moderate

The natural channel is the longest section of the creek running along side **Bridgewater community** to **Penticton Dam #2**.

Restoration will require widening of the creek bed where possible or increasing bank heights. To stabilize the natural creek bed, riffles can be created. As well, more clearance will be created under Bridgewater pedestrian bridge and Penticton Avenue bridge.

DESIGN ELEMENTS FOR FLOOD AND FISHERIES

Designing a creek that safely moves water through Penticton is important for flood protection, and must be considered while balancing elements that restore habitat for fish.

What's rip-rap?

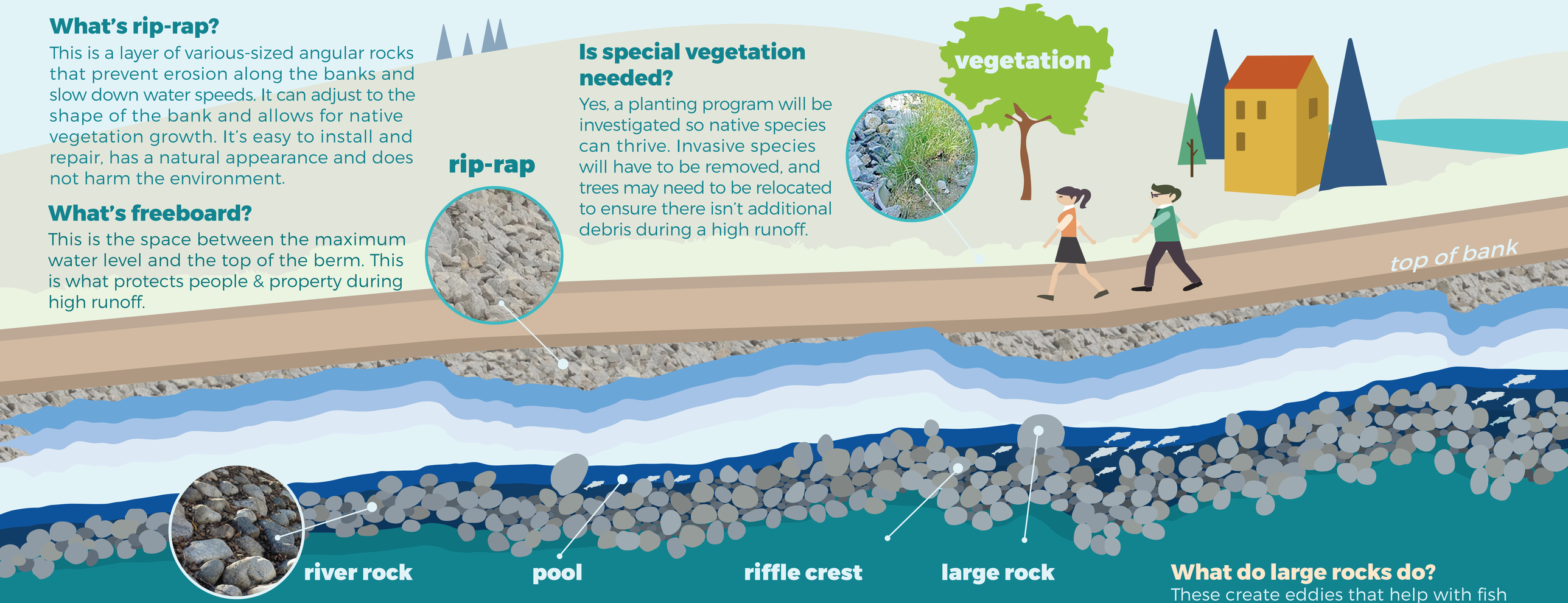
This is a layer of various-sized angular rocks that prevent erosion along the banks and slow down water speeds. It can adjust to the shape of the bank and allows for native vegetation growth. It's easy to install and repair, has a natural appearance and does not harm the environment.

What's freeboard?

This is the space between the maximum water level and the top of the berm. This is what protects people & property during high runoff.

Is special vegetation needed?

Yes, a planting program will be investigated so native species can thrive. Invasive species will have to be removed, and trees may need to be relocated to ensure there isn't additional debris during a high runoff.



What's river rock?

This is a smooth rock that allows water to quickly pass over or through. It is an important component to fish habitat and beneficial for key flood protection areas.

What's a pool?

These are deeper sections where fish and rest on their journey up the stream, and provide important rearing habitat for juvenile and adult Rainbow Trout.

What do large rocks do?

These create eddies that help with fish migration, provide holding areas for fish, hiding areas from predators, and enhance flood protection.

What's a riffle?

These are shallow and high-velocity sections of stream that provide important areas for fish food production, rearing and migration. Fish can also hide from predators in riffles.

How much water can our creek design hold?

What is Q200 Flow?

Good science tells that the magnitude of a one in 200 year flood event (expressed as Q200 flow) is the best target for flood management. In-depth assessment of Penticton Creek conducted by professionals and experts considered things like climate change and peak flow factors. The recommendation for ideal safety requirements, is that the creek be designed to hold as much as 60 cubic meters of water per second, or the amount of flow in a one in 200 year flood event.

KEY CONSIDERATIONS

Penticton Creek needs flood protection upgrades. The standards of the 1950's when channelization for flood protection occurred are much different today. Restoring flood protection works without consideration of fish habitat would not be supported. We have the opportunity now to provide the flood protection required while restoring the Creek to a more natural state that can support the return of fish. In addition to planning for flood and fish habitat there are a number of key considerations that we have taken into account.

Obtaining Legal Clearances

As part of the process leading up to construction the City will have to obtain approval for the work under the Provincial Water Sustainability Act. This process provides an opportunity for consultation with landowners and the public.

Funding

The City needs to be prepared not only for construction funding but also for monitoring and maintenance.

Cohesion with other City Plans

The project is consistent with the Downtown Plan which recognizes Penticton Creek as an important natural amenity. The project is also in step with the OCP which promotes protection of critical species habitat and the restoration of fish stocks in Okanagan Lake. The OCP also recognizes Penticton Creek as having flood hazard potential.

Vegetation

Trees and shrubs have grown throughout much of the existing infrastructure. Removal of vegetation, including some larger trees may be necessary as part of the restoration. This can have some affect on the environment, and can be a sensitive issue. Restoration plans include careful removal, and replanting of the riparian area.

Continuous Review and Reflection

Restoring Penticton Creek is a multi-phase undertaking that will occur over the next many decades. As our work transforms the creek, we'll reassess our plan to ensure it still makes sense for flood protection and fish habitat.

Short Construction Window

The window for working on restoration is limited by both weather and fisheries considerations. As such the City should plan well in advance for necessary permits, consultation, procurement, funding and further design.

Urban setting and narrow corridor

Restoring the creek to its natural , meandering state would be ideal but not practical due to varied land uses surrounding the creek, including parks, commercial and residential areas and roads and walkways. Flood protection can be achieved within the narrow corridor in balance with introducing natural habitat features. Opportunities to expand the floodplain area where public lands occur may be something on which the community would like to have input.

Continuous Pathway Along the Creek

Multiple public processes have identified a continuous pathway along the Creek as a key priority for our community. This Plan compliments concurrent plans to realize the walkway and will make pathway considerations at each stage of construction.

Historic corridor for flood protection

To properly plan for flood protection and access for maintenance, historic City Councils defined a corridor adjacent to the creek for flood protection measures and where flood infrastructure was constructed. Three plans, established through bylaw were approved between 1950 and 1970 and appear as a notation on title for private properties. The bylaws also provide for clear and advance notice of any work within the corridor.

Culture and Heritage Mapping Vegetation

The project included a Cultural Heritage Inventory Mapping process, overseen by the Penticton Indian Band which shows that Penticton Creek and its surrounding areas have archaeological sites and areas with archaeological potential. Work in areas of the Creek require various assessments and permits before construction can begin.

CULTURE AND HERITAGE OF PENTICTON CREEK

The Okanagan Nation Alliance and the Penticton Indian Band are members of the Penticton Creek Restoration Committee and have been key partners in developing this plan. The City is proud to have received a letter of support from Penticton Indian Band endorsing the Penticton Creek Master Plan.

Penticton Creek

Historical Okanagan fishery Sockeye salmon was a primary food for the **Syilx**, or Okanagan people. Beginning in late summer, as the fish returned to spawn in Okanagan River, large fishing camps were set up as **sxwexnitkw**, known today as Okanagan Falls, and at the mouth of the Okanagan River. The Okanagan Basin and its tributaries had runs of Kokanee, Rainbow Trout and Sockeye that spawned in the streams and river from late summer to early spring. Salmon were eaten fresh and dried for winter storage and were a valuable economic item, used for trade with other nations and settlers.

Oral History

From the beginning of time, the **Syilx** People fished, hunted, and gathered plant foods throughout the Okanagan Valley and other parts of the territory. Okanagan legends tell us that in the beginning **sen'k'lip** (Coyote) brought the sockeye salmon up the Columbia River. To the Okanagan people who lived on the Similkameen River, Coyote offered salmon in exchange for a wife. They refused. Therefore he did not allow salmon to swim into their river. However, the **Syilx** People who lived along the Okanagan River did give Coyote a wife, and the sockeye salmon have been swimming up the Okanagan River ever since.

Tmix^{w}

Tmix^{w} is the **nsyilxcən** (Okanagan language) word that most closely translates as "ecology". **Tmix^{w}** includes everything alive – the land, water, insects, people, animals, plants, and medicines. Underneath all of the **tmix^{w}** is **tmix^{w}ulax^{w}** – the core spirit from which all of creation arises and which unites everything. The **Syilx** honour the responsibility to the **tmix^{w}ulax^{w}**, envisioning a sustainable territorial land, culture and way of life hundreds of years from now.

Listen to the **nsyilxcən** translation for the name of Penticton Creek.

WORKING TOGETHER TO PROTECT THE CULTURAL AND HERITAGE VALUE OF PENTICTON CREEK.

A Cultural and Heritage Inventory Mapping in Penticton Creek was carried out with Okanagan Nation Alliance and Penticton Indian Band in 2016. This high level survey identified archaeological sites and areas with archaeological potential.

As such, work in areas of the Creek require various assessments and permits before construction can begin. The Plan recommends undertaking these processes well in advance of construction.

The Traditional Ecological Knowledge of the **Syilx** People has informed the Creek restoration process. This is an exciting opportunity to work together to protect and respect an area of cultural and environmental importance.

THE STORY OF PENTICTON CREEK

Historically

Natural and meandering creek.

Productive waterway for Kokanee and Rainbow Trout for Okanagan Lake.

Results in major loss of fish and riparian areas.

Channelization

1942 Penticton Creek floods.

1950-1970's Creek banks are channelized for flood control.

Interest in Restoration

2004 – Maintenance of concrete beds identified and continue to worsen.

Engineering studies begin.

2008 - Cultural District Plan looks at Creek Restoration.

2012- Restoration a priority during Downtown Plan process.

Showcase Project

2013 - Penticton Creek Restoration Committee created.

Research and Consultation carried out.

Committee recommends a small restoration project to showcase what is possible, which is approved by Council

2015 Showcase Project completed and "habitat and flood protection restoration exceeds expectations"

Careful Planning

Council approves creation of a full Master Plan for the creek

Considerable research and consultation with key partners.

Plan cohesive with key City planning documents (i.e.; OCP, Downtown Plan)

Master Plan Presented

2017- Penticton Creek Master Plan is presented to the public and other key stakeholders.

Opportunity for residents to '**Shape Your City**' and share knowledge of Penticton Creek.

Joint funding achieved for next phase.

Next Steps

Section 3a just upstream from the showcase is identified as the next priority.

Restoration will begin in **2018**.

Council to hear public feedback and make decisions on further steps.

As our work transforms the creek, we'll reassess our plan to ensure it still makes sense for flood protection and fish habitat.

In the past and still today, Penticton Creek holds significant social and cultural importance to the **Syilx** People.

shapeyourcitypenticton.com

SUCCESS OF THE SHOWCASE PROJECT

In 2015, the Penticton Creek Restoration Committee recommended the restoration of a portion of the creek. The “Showcase” site was chosen to address severe maintenance issues, as well as to show the community the benefits of well designed flood protection and incorporation of natural fish habitat.

Project completed in planned construction window and on budget.

Completed with Okanagan Valley contractors, consultants and volunteers.

Concrete removed, and the creek bottom widened from 6 to 8 metres, river cobble installed to create pools and riffles.

During the high waters of 2017, water flows were comfortably accommodated in the showcase projects design.

Ellis St bridge and adjacent walkway have become popular viewing locations and site learning tours.

Monitoring results are encouraging. One salmon id per 16m sq compared to 360m sq before restoration.

Overcame multiple challenges including relocating all water and fish, installing containment dams and diversion pipes, limited site access, short work window, availability of river rock.

“Exceeded Expectation”

Response from public and professionals has been positive.

The 83 metre Showcase restoration can be viewed upstream from the Ellis Street bridge.

Restoration was supported by
Grant funding from several sources, including the **Habitat Conservation Trust Foundation** (HCTF), **TD Friends of the Environment Foundation**, and **Recreational Fisheries Conservation Partnerships Program**.

Flood and Fish Funds

Penticton Creek flood protection measures are a core piece of our City's safety infrastructure and the Creek itself is a core cultural amenity. The deteriorating infrastructure requires attention and resources. Under today's standards, flood protection works without fish consideration would not be supported. This gives us the chance to provide the required flood protection while restoring the creek to a more natural state. This also allows us to access funds from significant conservation and habitat agencies to carry out our infrastructure restoration.

OUR PLAN carefully considers how this $30 million dollar, multi-phase project can be funded over the next decades.

CITY OF Penticton

Options for Funding

Property Tax Incentives

SOUTH OKANAGAN CONSERVATION FUND

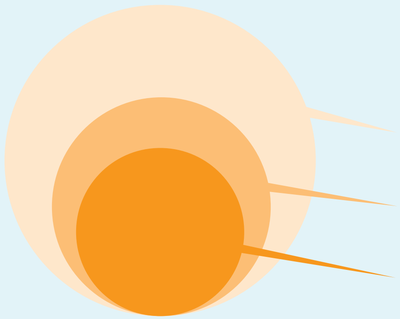
Establish an Endowment Fund for public donations.

Reserve establishment and contributions to provide an anchor source of funding.

Potential Storm Water Utility Income

Future Asset Management Plan could incorporate natural assets

Outside grant and Foundation Funds (Provincial and Federal). Partner with stewardship and non-profit groups to access private and government funds.



PENTICTON CREEK RESTORATION FUNDING 2014-2017

Outside Foundation or Partner Funding (42%)

In-Kind Volunteer Contributions (32%)

City of Penticton (26%)

Diverse funding options need to be sought as the costs are too large for any single agency. The City can leverage any investment it makes in the Creek to garner outside funds.

Over the last three years, costs of restoration have been almost 75% funded from outside City coffers.

PRELIMINARY COST ESTIMATES

Reach	Preliminary Cost Estimate
Reach 1 (Expanded Floodplain Option)	$2,200,000
Reach 2a (Urban Option)	$2,300,000
Reach 2b (Urban Option)	$2,350,000
Reach 3a Lower	$630,000
Reach 3a Upper	$1,350,000
Reach 3b	$2,000,000
Reach 4	$250,000
Reach 5	$1,650,000
Reach 6	$700,000
Reach 7	$1,450,000
Reach 8	$1,950,000
Reach 9	$750,000
Reach 10a	$850,000
Reach 10b	$1,300,000
Reach 11a	$850,000
Reach 11b	$1,500,000
Reach 11c	$1,800,000
Reach 11d	$1,800,000
Reach 12a	$950,000
Reach 12b	$600,000
Reach 13a	$550,000
Reach 13b	$650,000
Reach 13a	$550,000
TOTAL	$28,980,000

What's not included in our calculations?

- Costs for property procurement and easements
- Detailed implementation strategies will provide specific costs, timelines and funding sources for each section as it becomes a priority.

WHO HAS BEEN INVOLVED IN PLANNING?

CITY OF PENTICTON

SOUTH OKANAGAN SIMILKAMEEN CONSERVATION PROGRAM

Penticton Flyfishers

PENTICTON INDIAN BAND

Freshwater Fisheries Society of BC

Okanagan Nation Alliance

Adjacent Landowners

DOWNTOWN PENTICTON
Everything Under the Sun

BRITISH COLUMBIA
Water Management | Fish and Wildlife

Funding has been secured to move forward with the next section of Creek restoration. Section 3a (lower) in the plan is identified as the next priority.

Restoration will begin in 2018.

Over the next year, City Council and the Committee have the chance to share our plan with the public and other stakeholders and hear feedback in order to inform further decisions on Penticton Creek.

As our work transforms the creek, we'll reassess our plan to ensure it still makes sense for flood protection and fish habitat. It is recommended that the Master Plan be updated on a 10 year interval.

We want to hear from you. Visit, shapeyourcitypenticton.com to further review our plans for Penticton Creek.