Bowker Creek

URBAN WATERSHED RENEWAL INITIATIVE

Restoring the Bowker Creek Watershed:

Partnership Opportunities with School District #61

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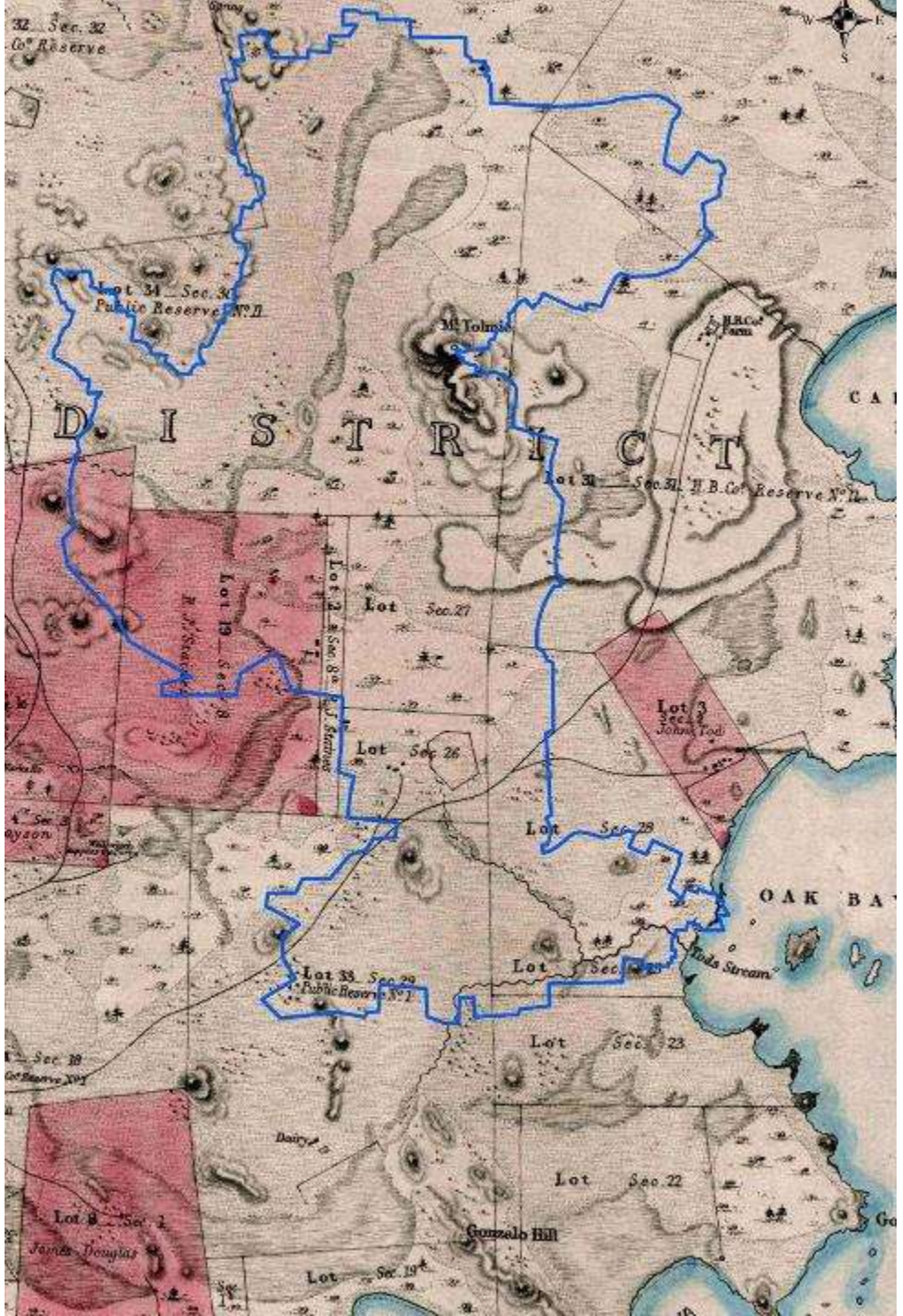
CRD Environmental Stewardship & Initiatives
and
Lindsey McCrank, Coordinator, Bowker Creek Initiative

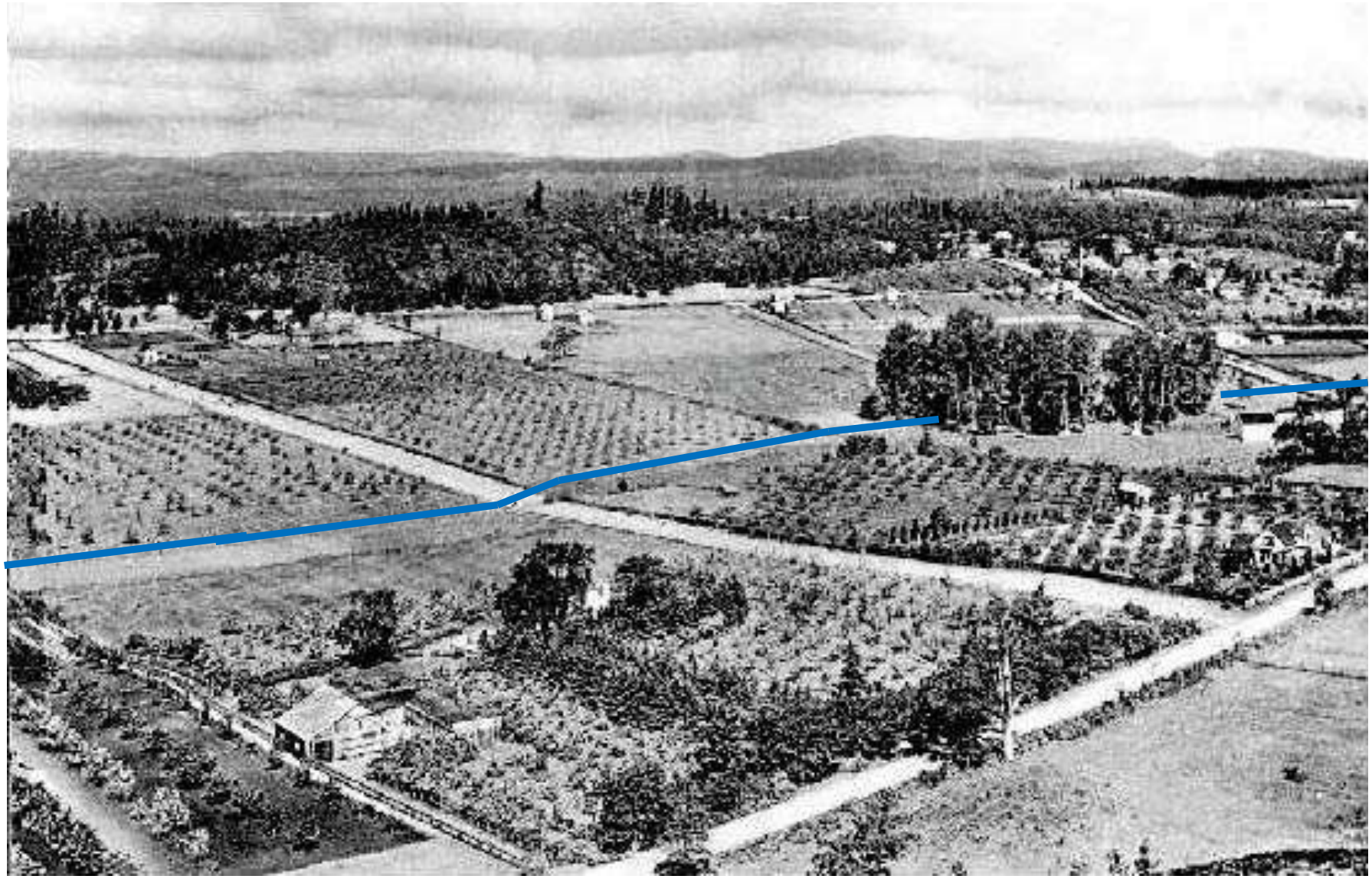
School District #61
December 8, 2021

Historical Context 1854



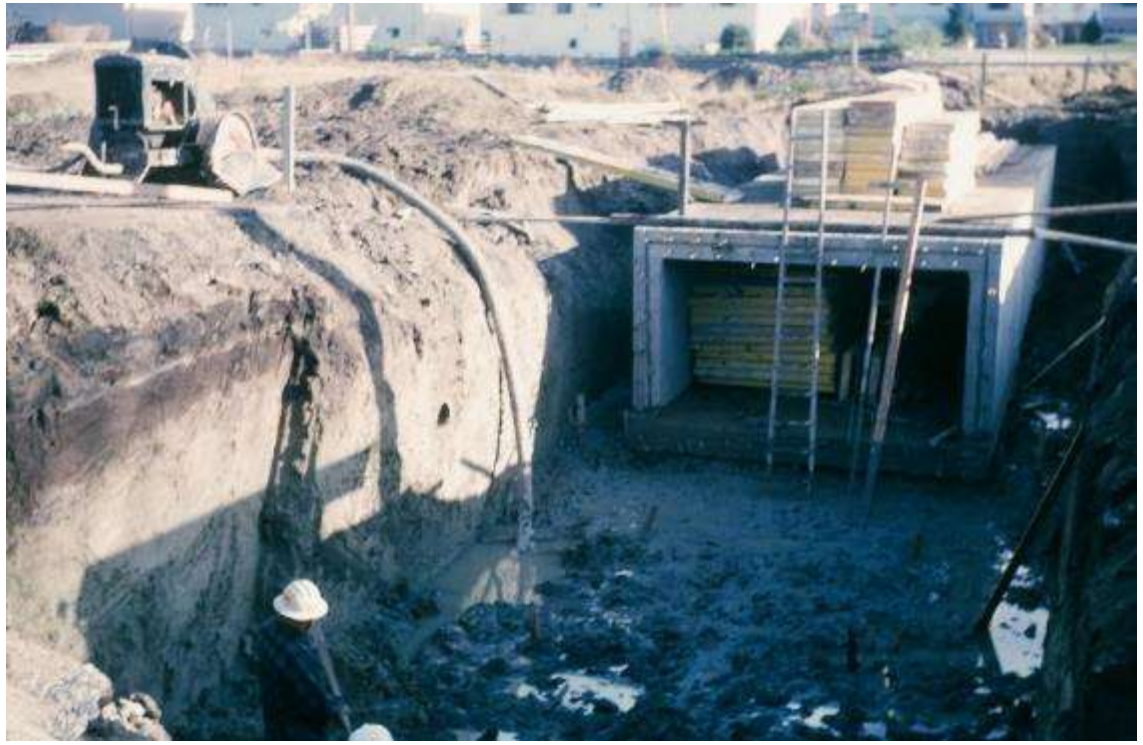
Bowker Creek “Watershed”

Photo: Garry Oak Ecosystems Recovery project



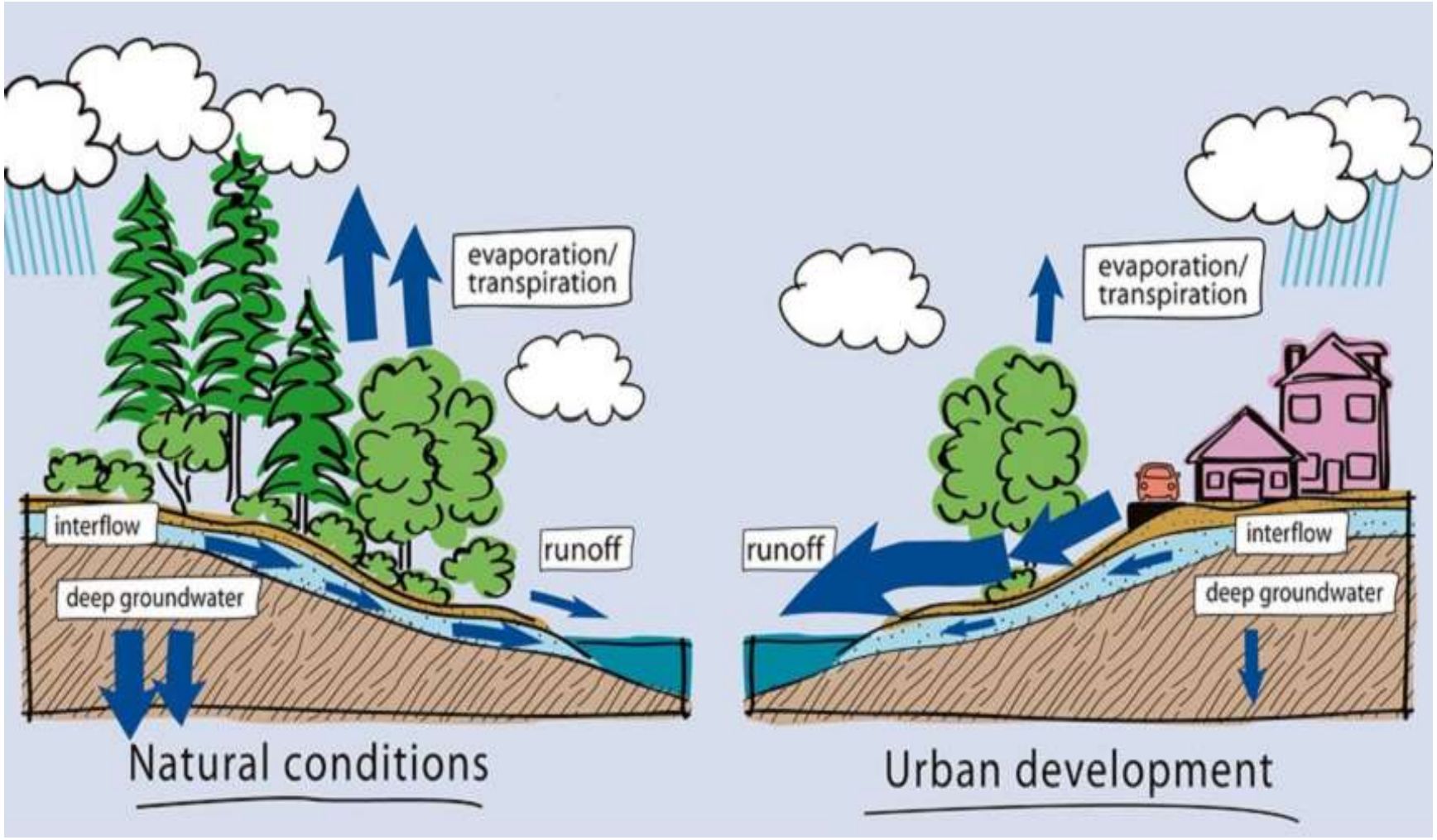
Shelbourne Valley - **1901**

Burying Bowker

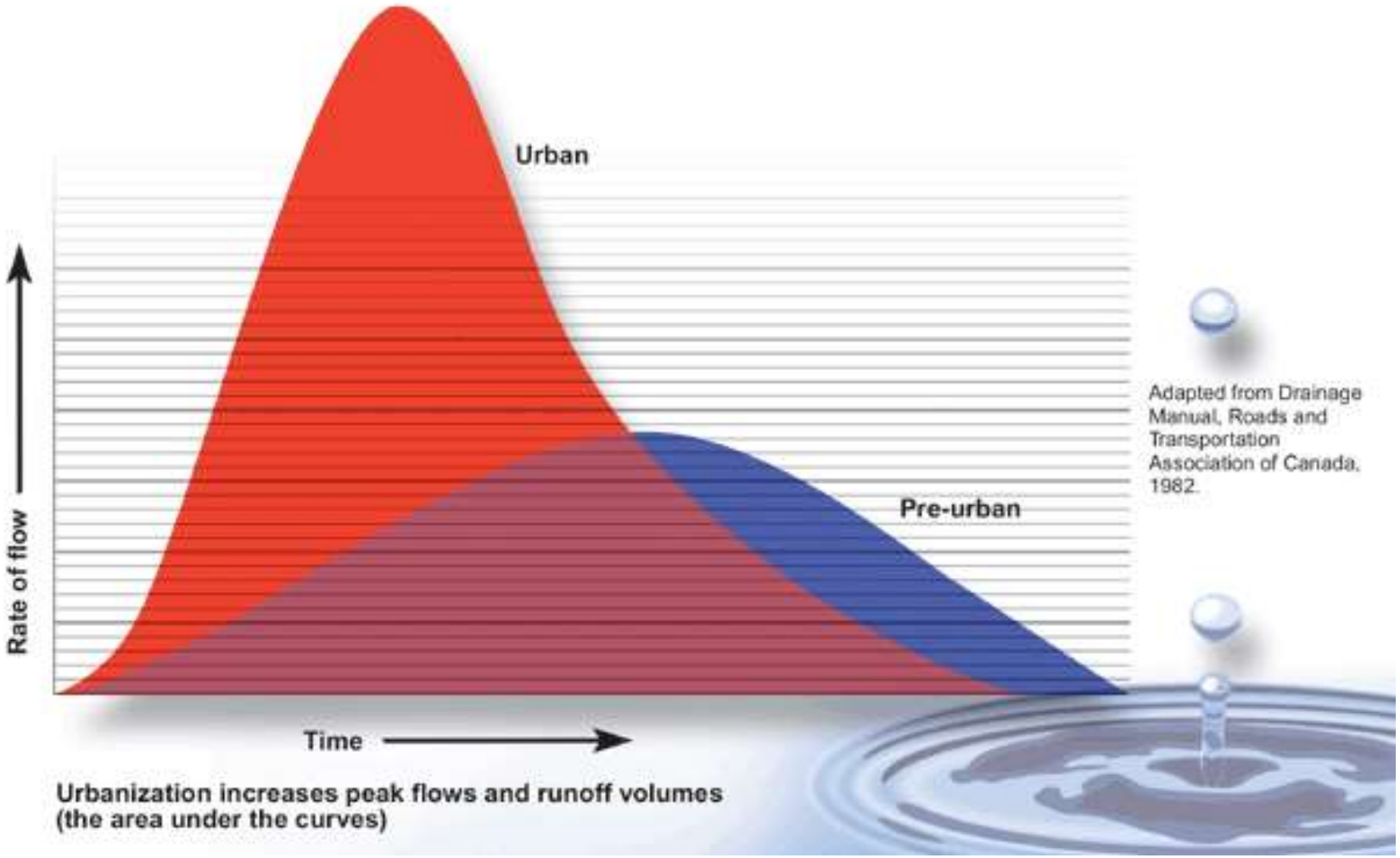


Shelbourne Valley - **2003**

Natural and Urban Watersheds



Urbanization and streamflow



Flooding

Erosion

Decreased Water Quality

Culverting and channelization

What did the community want?

Watershed Stats

- 30,000 residents
- 1850 ha
- 56% impervious, mostly clay soils
- 2/3 of creek is piped underground
- Open creek sections altered

A plan to manage the watershed

- Bowker Creek Assessment (2000)
- 28 Member Forum established (2002)
- Draft Management Plan (2002)
- Public Consultation (2002)
- Interim Steering Committee (2003)
- CRD Board and Municipal Council Approval (2003)
- Steering Committee (2004)

Bowker Creek Watershed Management Plan Goals

- Take responsibility for actions that affect the watershed
- Manage flows effectively
- Improve and expand public areas, natural areas and biodiversity
- Achieve and maintain acceptable water quality

Vision: Bowker Creek Watershed plan

*"The varied **human uses and natural areas** in the Bowker watershed are **managed to minimize runoff and pollution**, making Bowker Creek a **healthy stream that supports habitat** for native vegetation and wildlife, and to **provides a community greenway** that connects neighbourhoods"*

Bowker Creek Initiative (BCI)

Multi-stakeholder steering committee tasked with coordinating efforts to implement the Bowker Creek Watershed Management Plan

- 3 municipalities (Saanich, Victoria, Oak Bay)
- Regional District (CRD)
- University of Victoria
- 6 Community Associations

- Established in 2004
- Coordinator position cost-shared

- Open invitation to SD #61 to join

Bowker Creek

URBAN WATERSHED RENEWAL INITIATIVE

Master Drainage Plan

- Understanding hydrology of the watershed
- Examining areas of erosion
- Modeling to predict flows and areas at risk of flooding (and calibrating with known floods and flow data)
- Incorporated climate change
- Developed engineering solutions to flooding and erosion

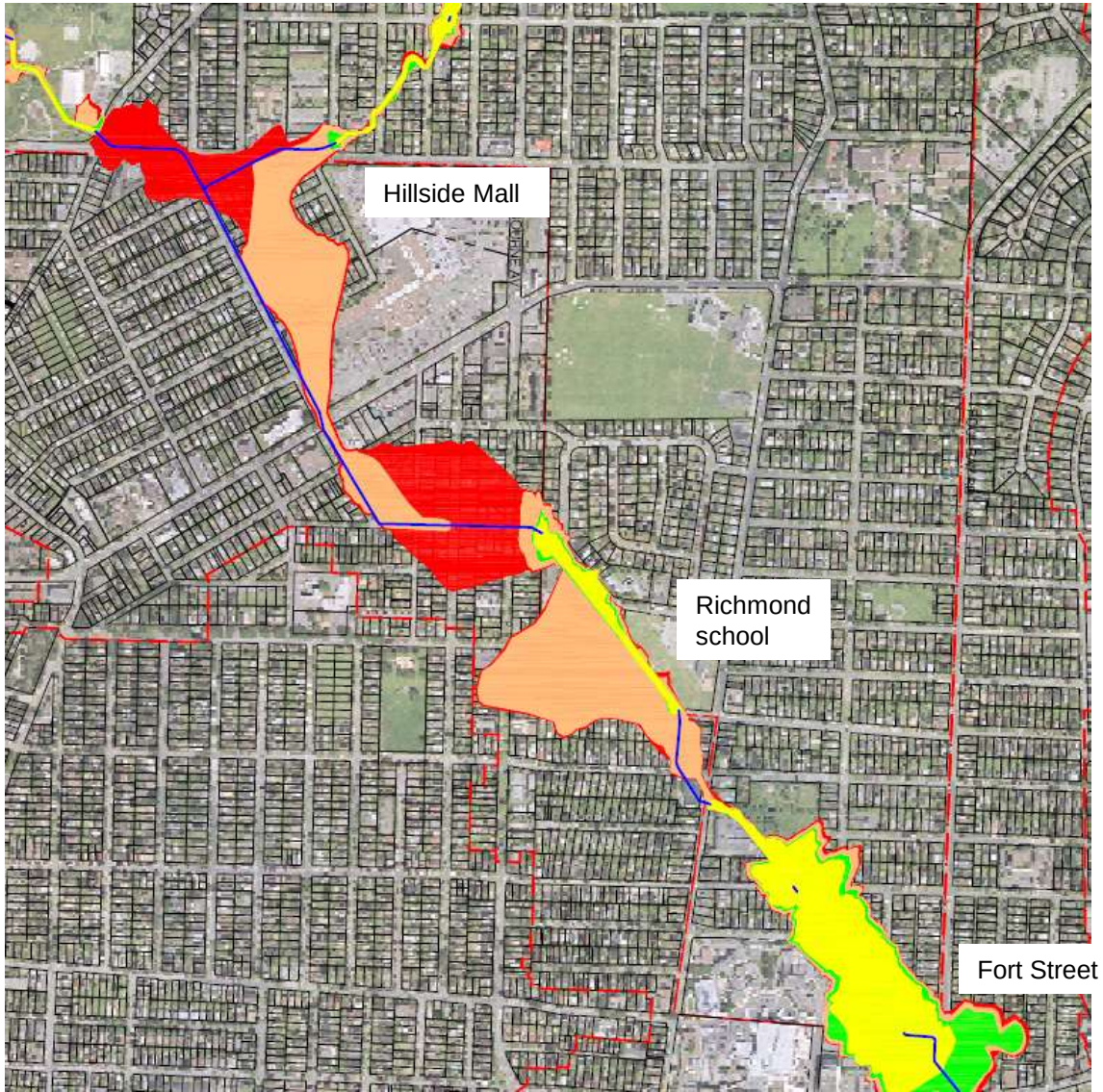
After the storm: Cleaning up flooded basements throughout Greater Victoria

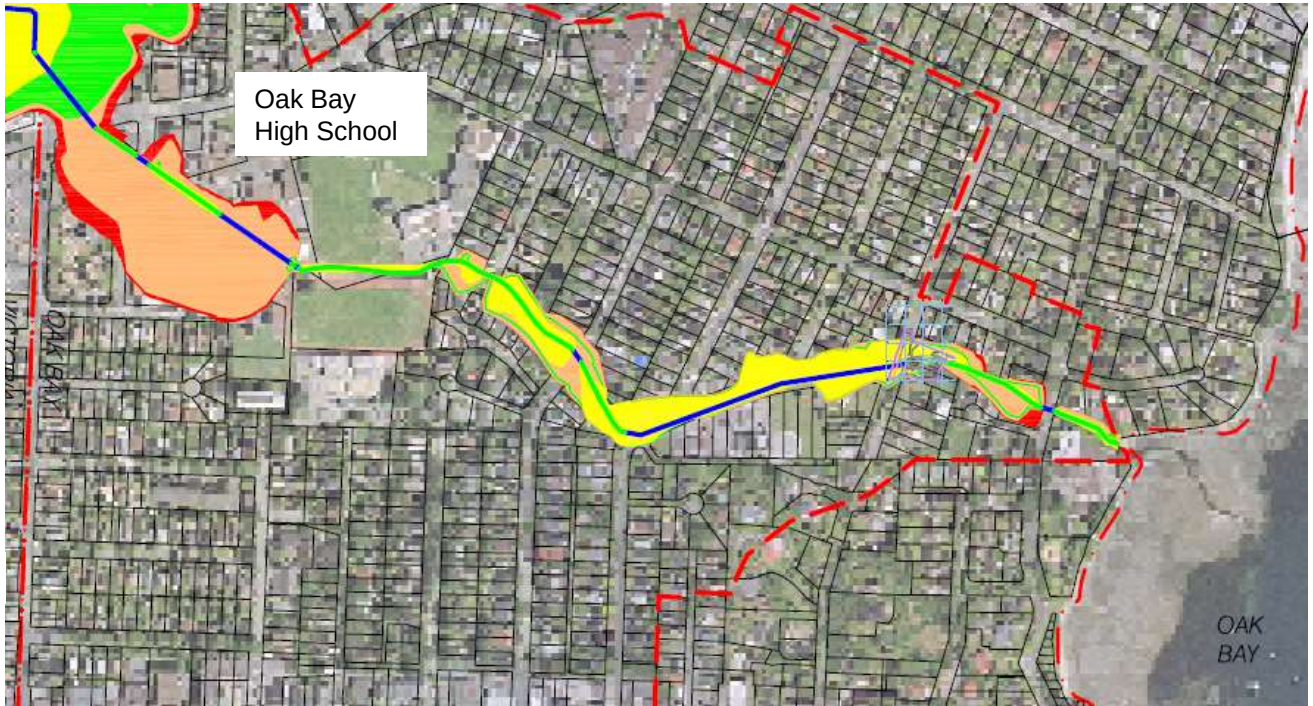
Flooded homes days before Christmas seem like a final poke in the eye from the year of the pandemic, Oak Bay Mayor Kevin Murdoch said Tuesday, as he fielded calls from residents dealing with sodden basements.

Cindy E. Harnett
Dec 22, 2020 9:19 AM

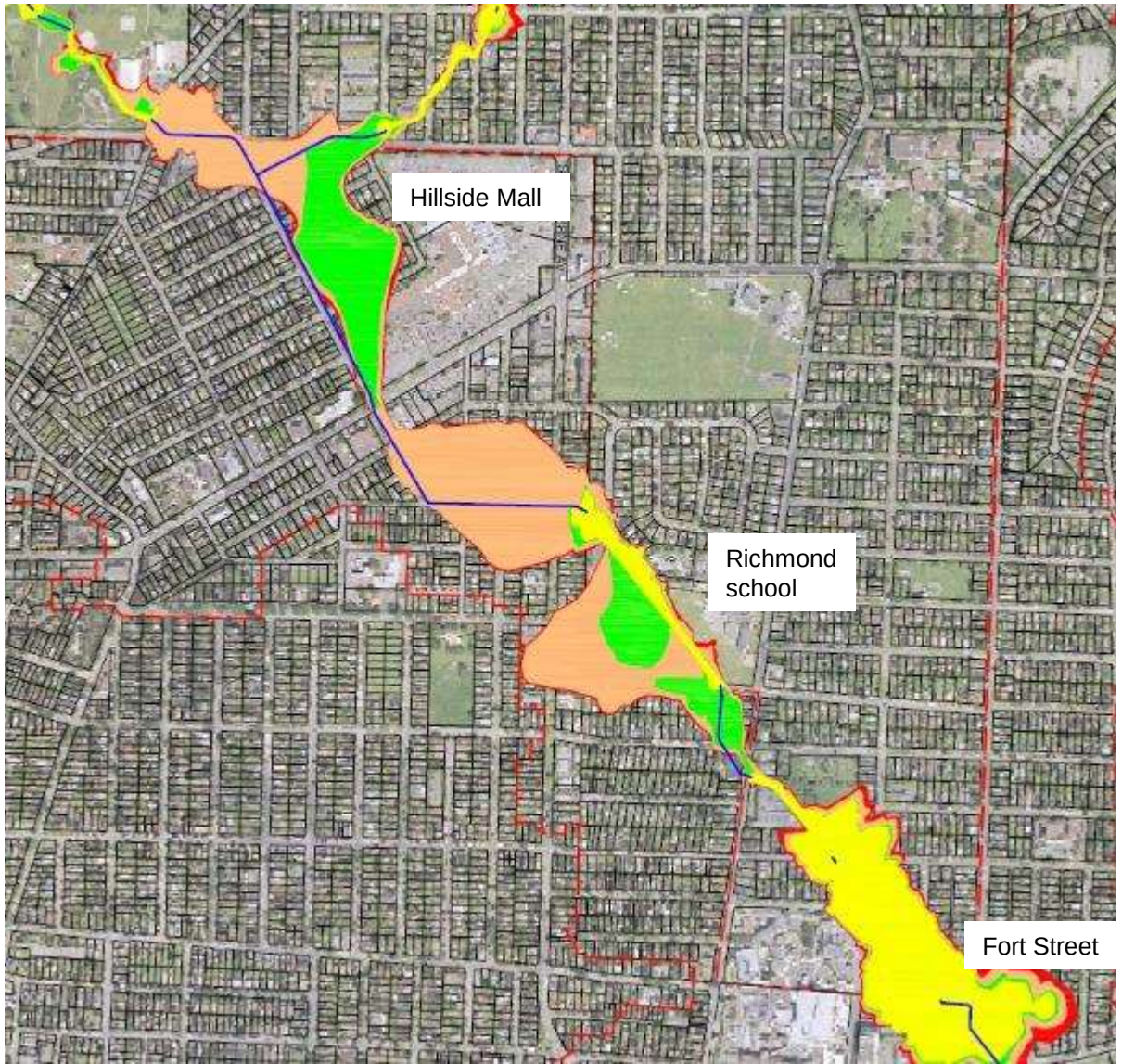
Jason Morrow with Downs Construction removes soaking wet carpet liners from a home on Pacific Street in Oak Bay after flooding along Bowker Creek. ADRIAN LAM, TIMES COLONIST

Current Flooding (2006 modeling)

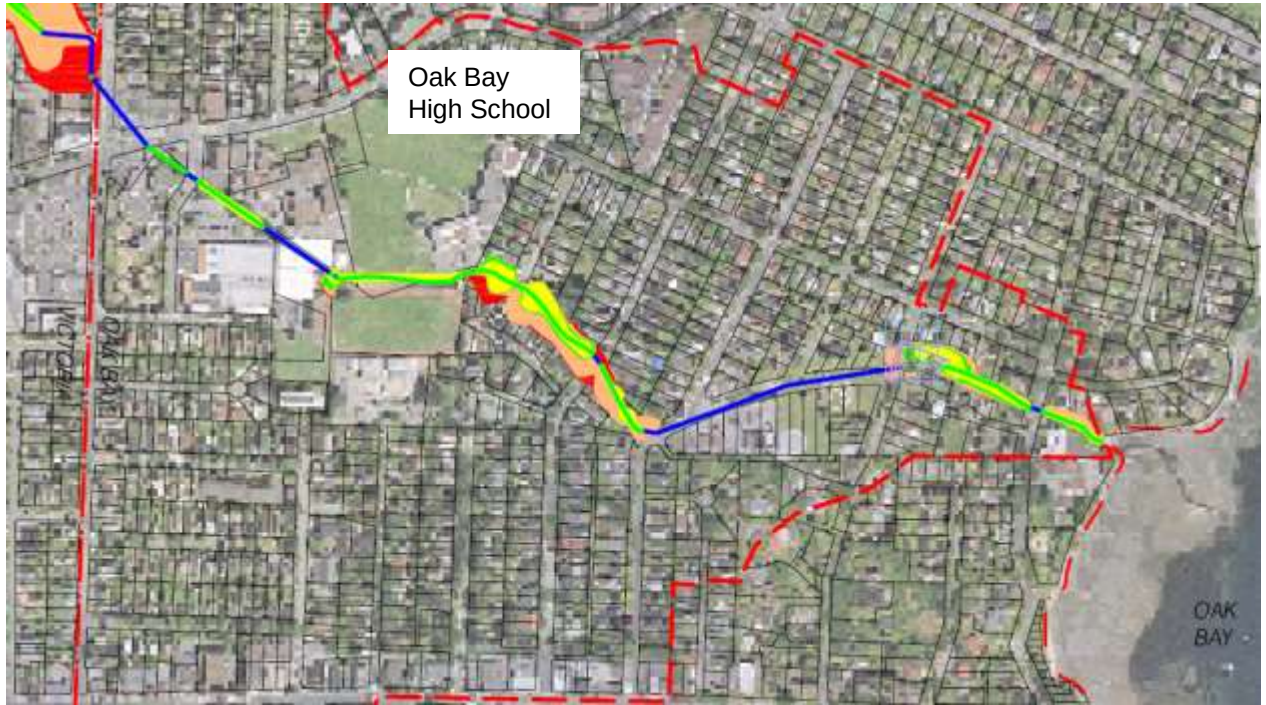




Projected Future Flooding (do nothing)



Flooding With Proposed Upgrades



Number of flooded houses or buildings per Scenario (watershed)

	Currently	Future w no upgrades	With upgrades (pipes)	With upgrades (daylight)	With upgrades (d&d)
10 year flood	38	53	0	0	0
25 year flood	72	143	0	0	0
100 year flood	193	301	72	27	20
200 year flood	297	305	78	44	36

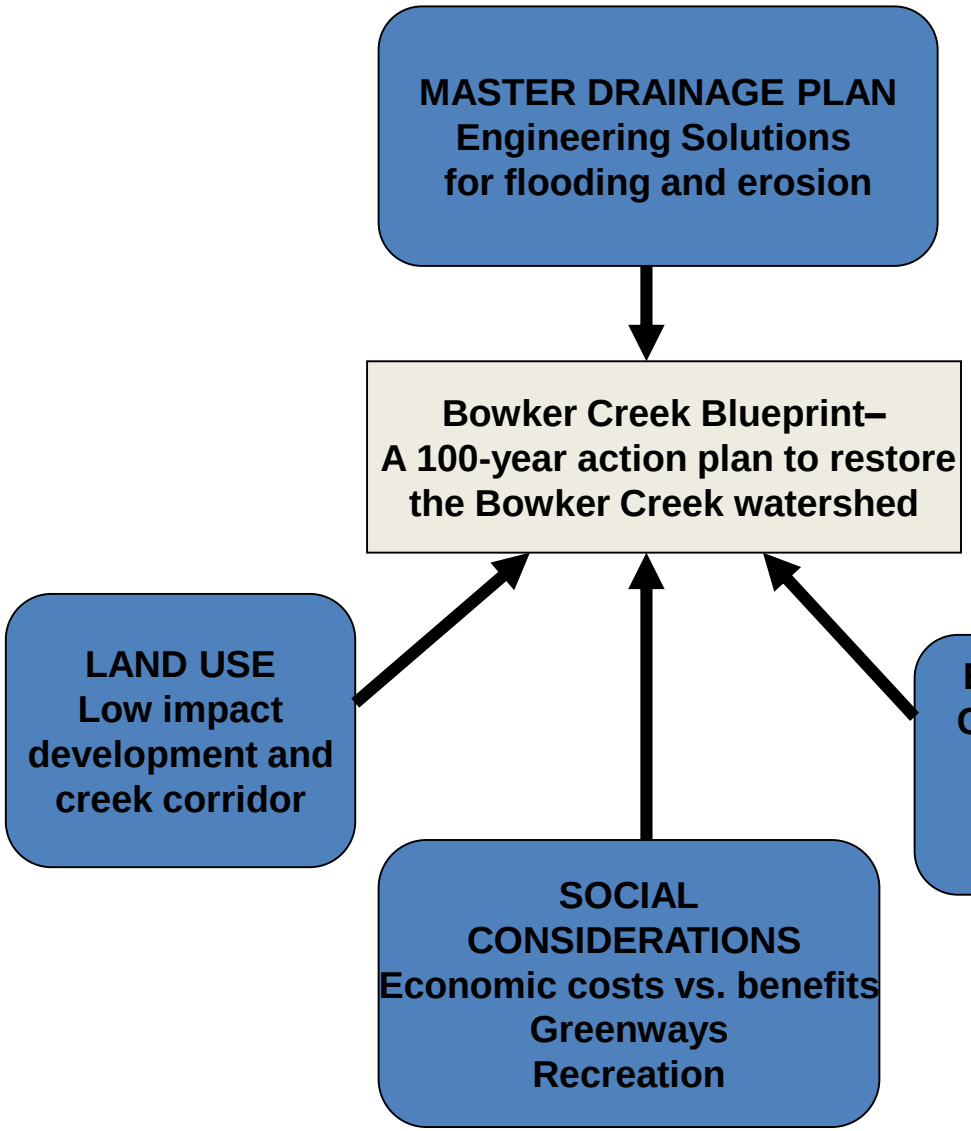
Flooding Nov 2021

Bowker Creek Blueprint

A 100-yr action plan to restore the Bowker Creek Watershed

Bowker Creek Watershed Management Plan Goals

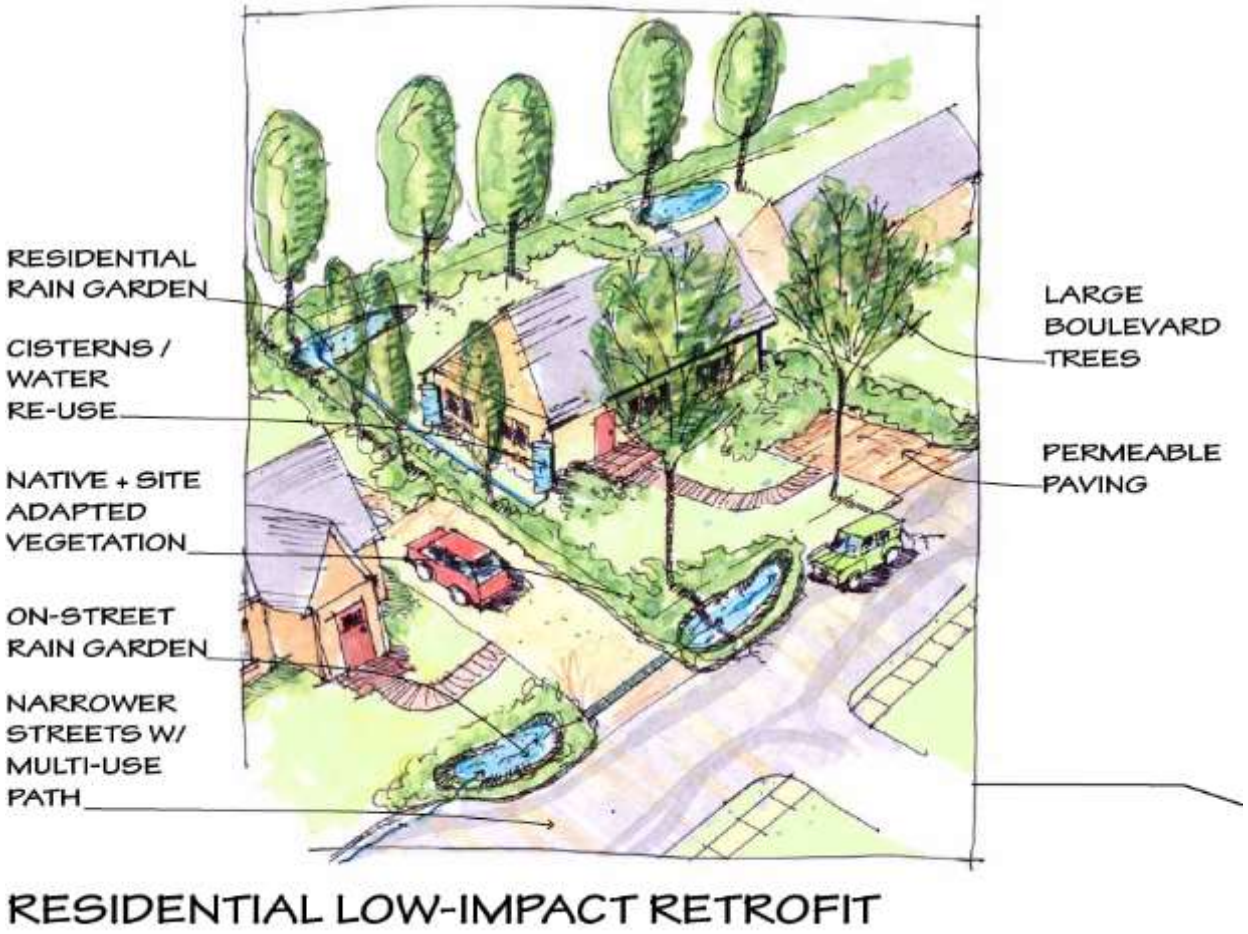
- Take responsibility for actions that affect the watershed
- Manage flows effectively
- Improve and expand public areas, natural areas and biodiversity
- Achieve and maintain acceptable water quality



Starts with a Vision

- Articulates a 100 year vision for Bowker Creek (Cathedral Thinking)
- Opportunistic – when the opportunity presents itself, we are ready
- Identifies shared responsibility, need for collaboration and building relationships
- Recommends watershed management policy, planning and other stewardship actions
- Recommends site-specific actions for each creek section
- Provides direction and information to municipalities and other land stewards

What's in the Blueprint?



RESIDENTIAL LOW-IMPACT RETROFIT

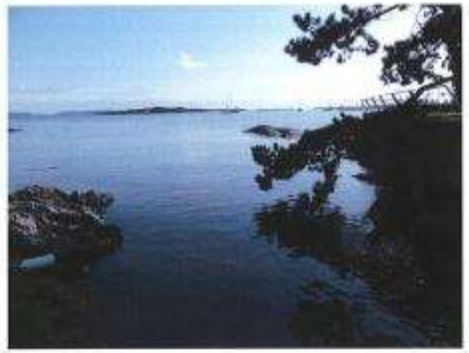
- 9 key principles
- 33 Watershed actions
- 17 reaches (piped and open sections) each with a set of specific integrated actions
- 10 short-term priority actions
- Monitoring program
- Illustrative images to depict the 100-yr vision

Reach Maps and Photos

REACH 1: MONTEITH STREET TO CREEK MOUTH

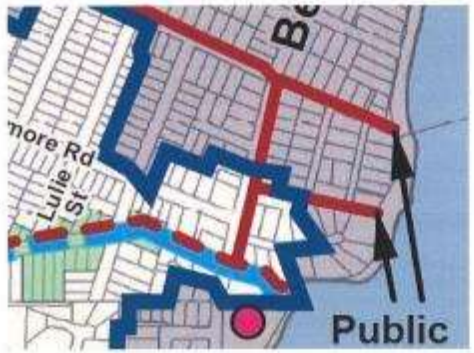
Reach 1 flows in an open channel east and southeast from Monteith Street along the Monteith Street Community Gardens, through private property to the ocean. The riparian vegetation includes trees, shrubs, and grass. Invasive species include ivy and yellow willow and policeman's helmet. This reach has issues with invasive species, channelization, conveyance, flooding, and erosion. It has also been identified as having archaeological significance. The creek is entirely armoured below Beach Drive and has patches of armouring above Beach Drive. The uppermost section has one of the more natural creek channels in the watershed.

Reach location



The creek mouth where it discharges to the ocean

View of the rock wall showing proximity of the apartment building to the creek



Proposed greenways

South-west corner of the Kachan property. Much of this corner has eroded away in recent years.

Downstream view of Reach 1 showing bioengineering on the left and a relatively new 'bar' in centre, created by an artificially dug channel.

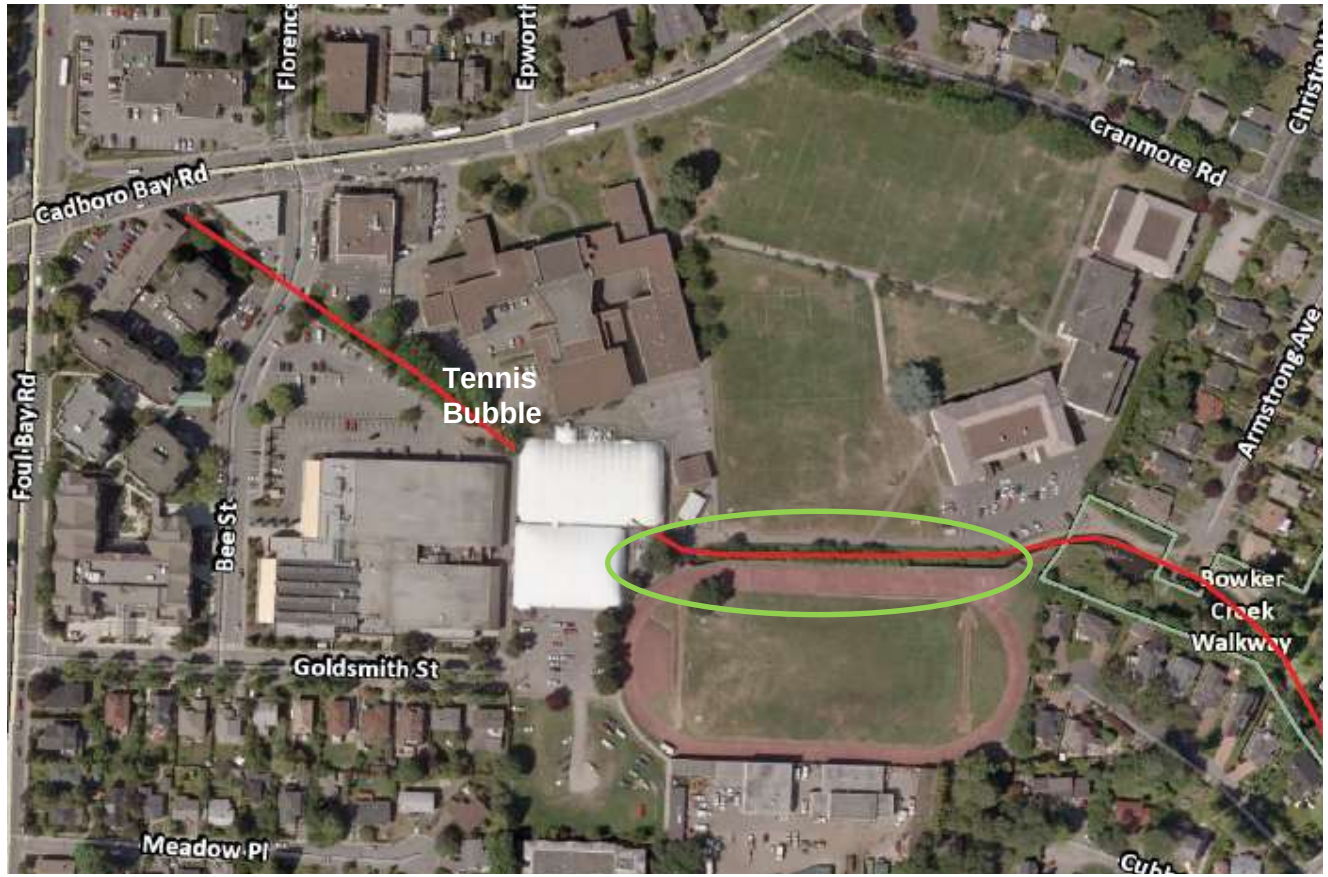
Integrated Actions for each reach

ACTION LIST FOR REACH 1: MONTEITH STREET TO CREEK MOUTH

REACH-ACTION NO.	LOCATION	ACTIONS	RATINGS					WMP GOALS ADDRESSED	LEAD AGENCY (POSSIBLE SUPPORTING PARTNERS)	TYPE			FUNDING	PRIORITY (H, M, L)
			Environmental	Social	Capital cost	Operating cost	Fundability			Capital	Operational	Opportunistic		
1-1	Eastern edge of Monteith community gardens property to above Beach Dr.	If property owners agree, relocate or remove fences and remove fill to re-slope channel banks further back into the private property, on the steep north bank in particular. The south bank is less steep and in better condition but could still use a widened riparian buffer. Remove invasive species and plant native trees and shrubs. If the space available is limited, the north bank could be terraced using willow wattles. If possible, include space for a greenway.	3	2	-1	-1	1	2, 3, 4	Oak Bay (BCI, community groups, property owners)		X	X	Property owners, Oak Bay, grants for buying native vegetation, grants for channel restoration	M
1-2	Monteith Street Community Gardens	Remove policeman's helmet (*Impatiens glandulifera*) from the community gardens on an annual basis until eradicated. Note: this is an archaeological site.	3	2	0	-1	3	3	Oak Bay (BCI, community groups)		X		Oak Bay Parks staff time	H
1-3	Monteith Street Community Gardens	On the south bank, funding is in place to purchase native plants to improve the riparian buffer (10-15 m wide strip) and remove invasive species. Note: this is an archaeological site.	3	3	-1	0	3	2, 3, 4	Oak Bay (BCI, community groups)		X		TD Friend of the Environment Fund	H
1-4	Monteith Street Community Gardens	On the north bank, reclaim riparian area with native plants, re-slope the bank and relocate affected garden plots. Install in-stream structures to improve in-channel conditions if other improvements are completed. Note: this is an archaeological site.	3	1	-1	-1	2	2, 3, 4	Oak Bay (BCI, community groups)			X	Grants, Oak Bay for relocating garden plots	M
1-5	Monteith St. to creek mouth	Create a greenway along this reach that connects to Fireman's Park and Beach Drive greenway (refer to Map 6). Partial or full acquisition of land or a right-of-way would be required from the creek mouth to the community gardens. Complete extensive creek restoration as part of this work, including reducing bank slopes, increasing riparian buffer width, removing invasive species and planting native vegetation.	3	2	-3	-1	1	1, 3	Oak Bay (BCI)			X	Large grant program and municipality, provincial funding	M
1-6 preferred	Beach Drive culvert	Replace undersized Beach Drive culvert with a bridge. The underside of the bridge should be above the 25-year water level and the asphalt creek bottom should be removed and reshaped to eliminate this fish barrier. Maintain existing upstream channel dimensions under roadway.	2	2	-2	-1	1	2	Oak Bay	x			Municipality, grants, provincial funding	M
1-6 alternative	*Beach Drive culvert*	*Replace undersized Beach Drive culvert with a 7.0 x 1.8 m box culvert with the bottom lowered to eliminate fish barrier. See Master Drainage Plan.*	2	2	-2	-1	1	2	Oak Bay	x			Municipal operating budget	L
1-7	Below Beach Drive to creek mouth	Remove invasive knotweed (*Polygonum* spp.) in the channel (and on land if property owners agree).	3	1	0	-1	3	3	Oak Bay (BCI)		X		Small grants, municipal operating budget	H
1-8	Below Beach Drive to creek mouth	Control erosion at 1725 Beach Drive apartment building by installing bioengineering terraces if the property owner allows. With redevelopment or landowner involvement, the concrete and rock walls can be removed or set back and the creek banks sloped back and planted with native vegetation. Changes on the south bank could only occur with redevelopment, while changes on the north bank are possible with landowner involvement. If possible, include space for a greenway.	3	2	-2	-1	2	2, 3, 4	Oak Bay, (property owners, BCI)			X	Property owners, Oak Bay, grants for buying native vegetation, grants for channel restoration	M

Restoration of Bowker Creek through Oak Bay High School

First the vision… then the opportunity!



Restoration of Bowker Creek at Oak Bay High was a key short term action in Blueprint	
2010	- Blueprint finalized - Design charette for re-design of school grounds – space for creek
2011	- Feasibility Analysis - Funding application submitted - Blueprint endorsed DoS/CoV - Received $478K Innovations Grant
2012	- Blueprint endorsed DOB - MOUs with SD61/DOB
2013	- Teacher Champions - Creek focused curriculum development - Student engagement workshops
2014	- Design Team engaged - Creeks and Careers workshops - Design charette for the Creek
2015/16	- Tendering and Construction - Grand Opening of Classroom

Project Partners

Greater Victoria School District

OAK BAY ESTABLISHED 1929

DISTRICT OF OAK BAY

CRD
Making a difference...together

Bowker Creek
URBAN WATERSHED RENEWAL INITIATIVE

Funding Provided by:

Federal Gas Tax Innovation Fund

Federal/Provincial fund administered by the Union of British Columbia Municipalities (UBCM)

BRITISH COLUMBIA

IMPROVING ENERGY EFFICIENCY
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CANADA'S ECONOMIC ACTION PLAN
D'ACTION ÉCONOMIQUE DU CANADA
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Canada

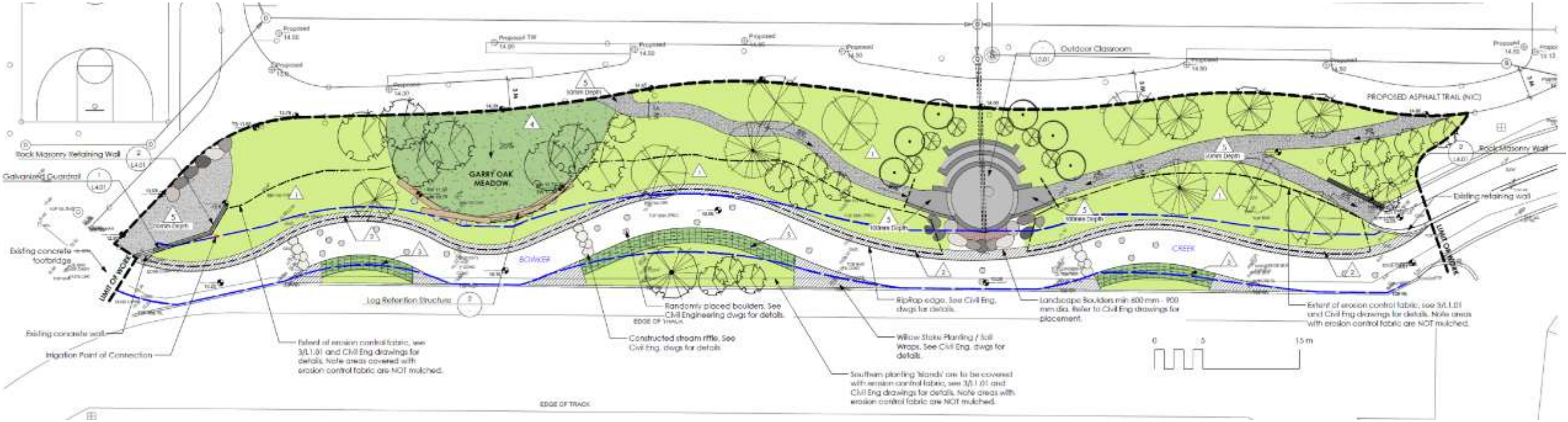
Canada

Connecting the School to the Stream

Teacher Champion – Derek Shrubsole

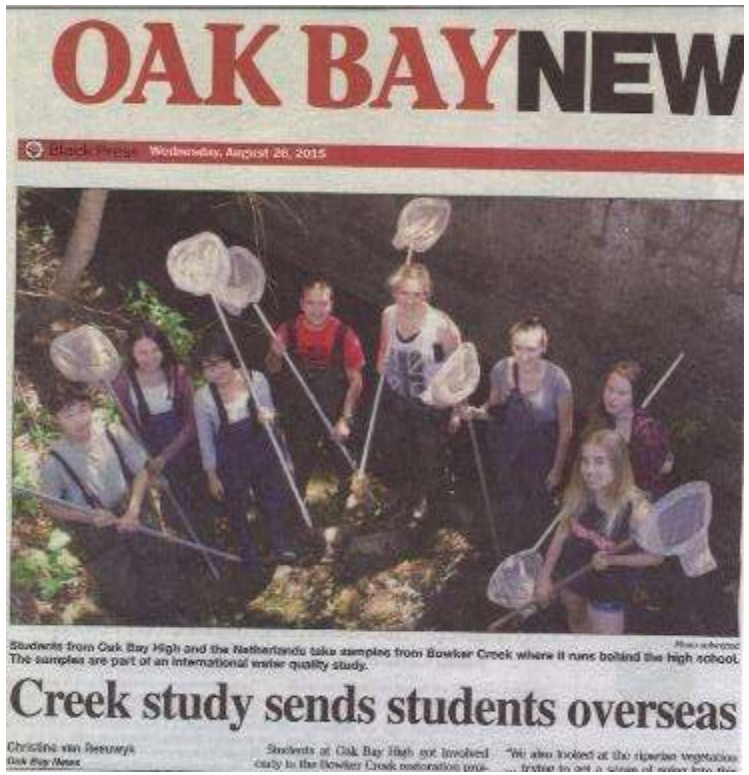
Restoration Objectives

1. Safe conveyance of flood flows
2. Improvement to aquatic and riparian habitat quality
3. Outdoor learning and public education
4. Public access and greenway
5. Construction cost within budget and minimizing ongoing maintenance



Time lapse Video

Student Stewards



OAK BAY NEW

Black Press Wednesday, August 26, 2015

Students from Oak Bay High and the Netherlands take samples from Bowker Creek where it runs behind the high school. The samples are part of an international water quality study.

Creek study sends students overseas

Christine van Reeuwyk
Oak Bay News

Students at Oak Bay High got involved early in the Bowker Creek restoration proj... "We also looked at the riparian vegetation... further to get a sense of water into the...

Outdoor Classroom!

Connecting the School to the Stream

"A young person's surroundings are always a silent educator and the best way to inoculate a sense of environmental responsibility and stewardship in youth is to model it.

Allowing an important waterway to pass through our property in a ditch silently teaches students that the environment doesn't really matter – whereas a rehabilitated and healthy creek, with safe and reasonable access, speaks volumes about how one should value the environment"

Garrett Brisdon, Vice Principal, Oak Bay High School

Daylighting Feasibility Study

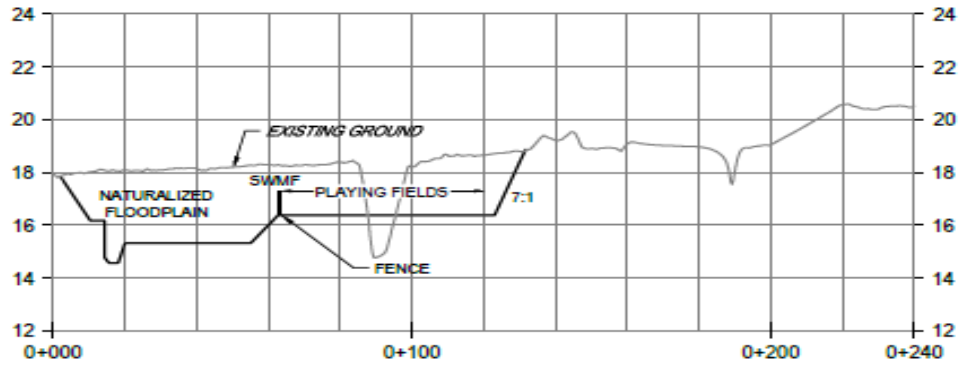
- Define route to daylight all closed sections of Bowker Creek
- Incorporate creation of greenways
- Options for large SWMF
- Phase of re-development and major infrastructure renewal – want to be ready for opportunities when they arise

DLFS Key Goals

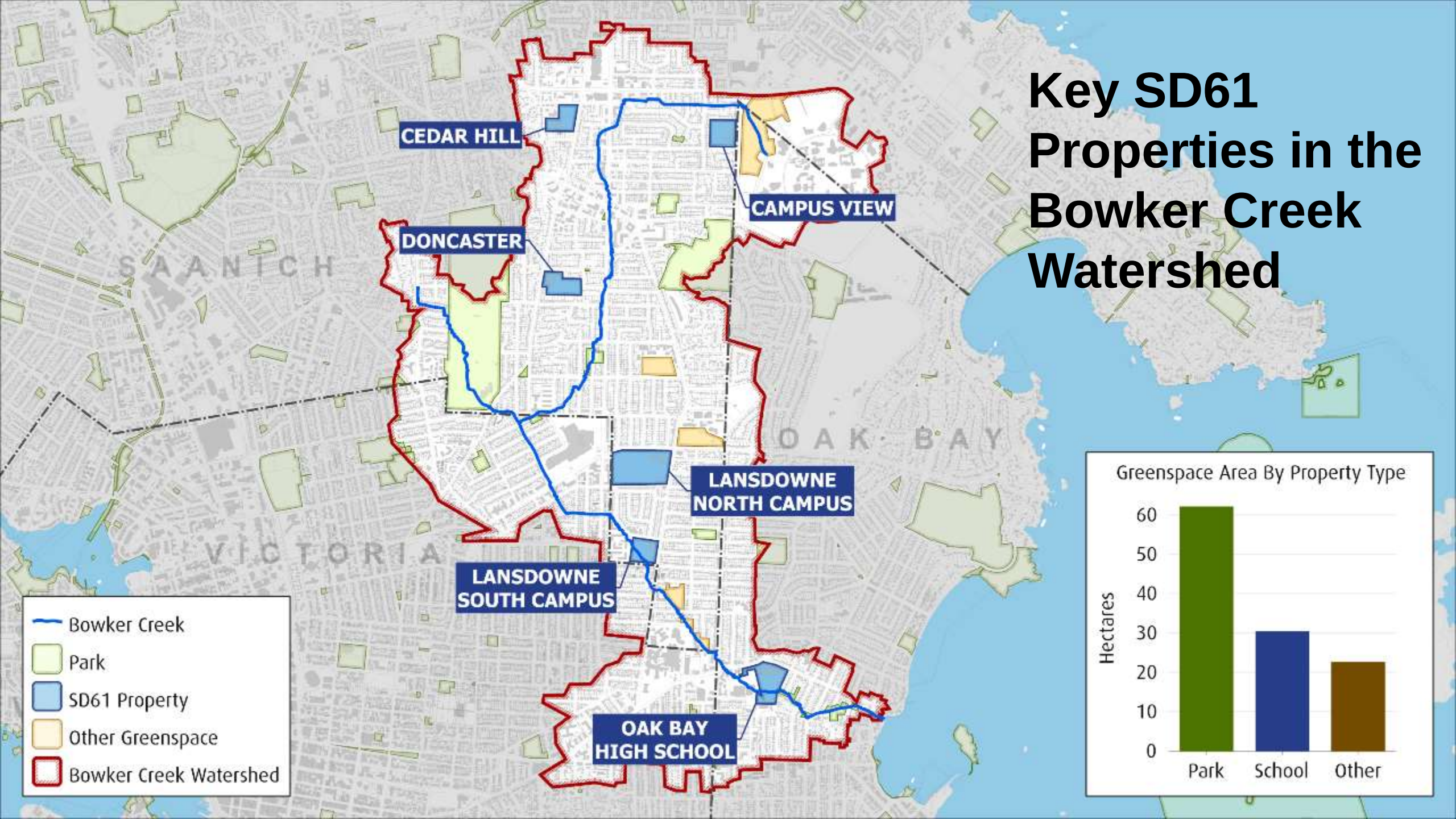
- *Flood Mitigation:* Bowker Creek experiences significant flooding in a 1:25 year rainfall. Areas for improved storm water management were noted and considered in the design approach.

- *Environmental Stewardship:* Having Bowker Creek daylighted and brought back towards its natural state provides tremendous environmental benefits, including water quality improvements and creation of aquatic and riparian habitat.

- *Building the Community:* Daylighting the creek will provide a feature amenity. Walking trails along the creek and multi-use paths will be integrated into the existing and proposed parks and trail networks. This transforms Bowker Creek from a storm sewer no one notices to a notable attraction that connects residents to their community.



Key SD61 Properties in the Bowker Creek Watershed



Dual Use Dry Ponds as SWMFs

- Dual use dry ponds at schools are common in other communities across Canada
- They provide stormwater management during infrequent storms, while maintaining recreational use
- eg. Wet fields for 24 hours once every 1-2 years, flooded fields for 24 hours once every 25 years or more

Reach 9 – Lansdowne Middle School South Campus

- Property is bisected by creek, segmenting the greenspace and restricting use of the space
- Severe bank erosion, high stream flow, very entrenched
- Public and student hazard (surrounded by a fence)
- 90% invasive plants (e.g. golden willow)

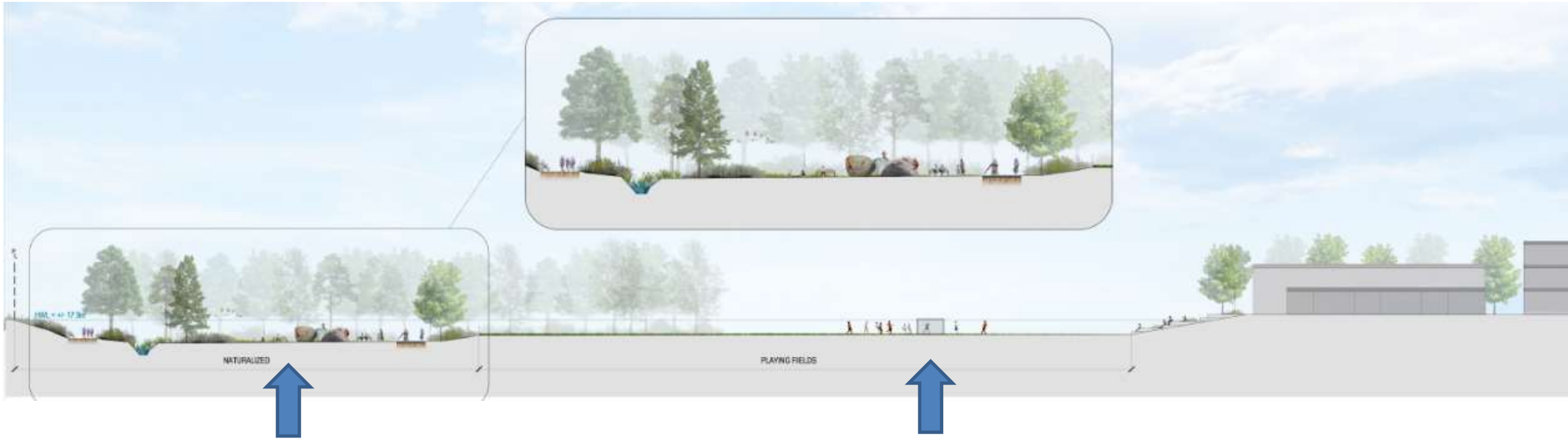
Safety concerns: Erosion and Undercutting

Invasive Species

Preferred Recommendation: Reach 9

- Move the creek channel west to accommodate alternate land uses
- Widen and naturalize the creek with native species and a riparian buffer
- Safe, sloping creek banks with slower flow to limit erosion and improve safety
- Excellent opportunities for a greenway and outdoor classroom

Vision:
A naturalized creek/SWMF at Reach 9



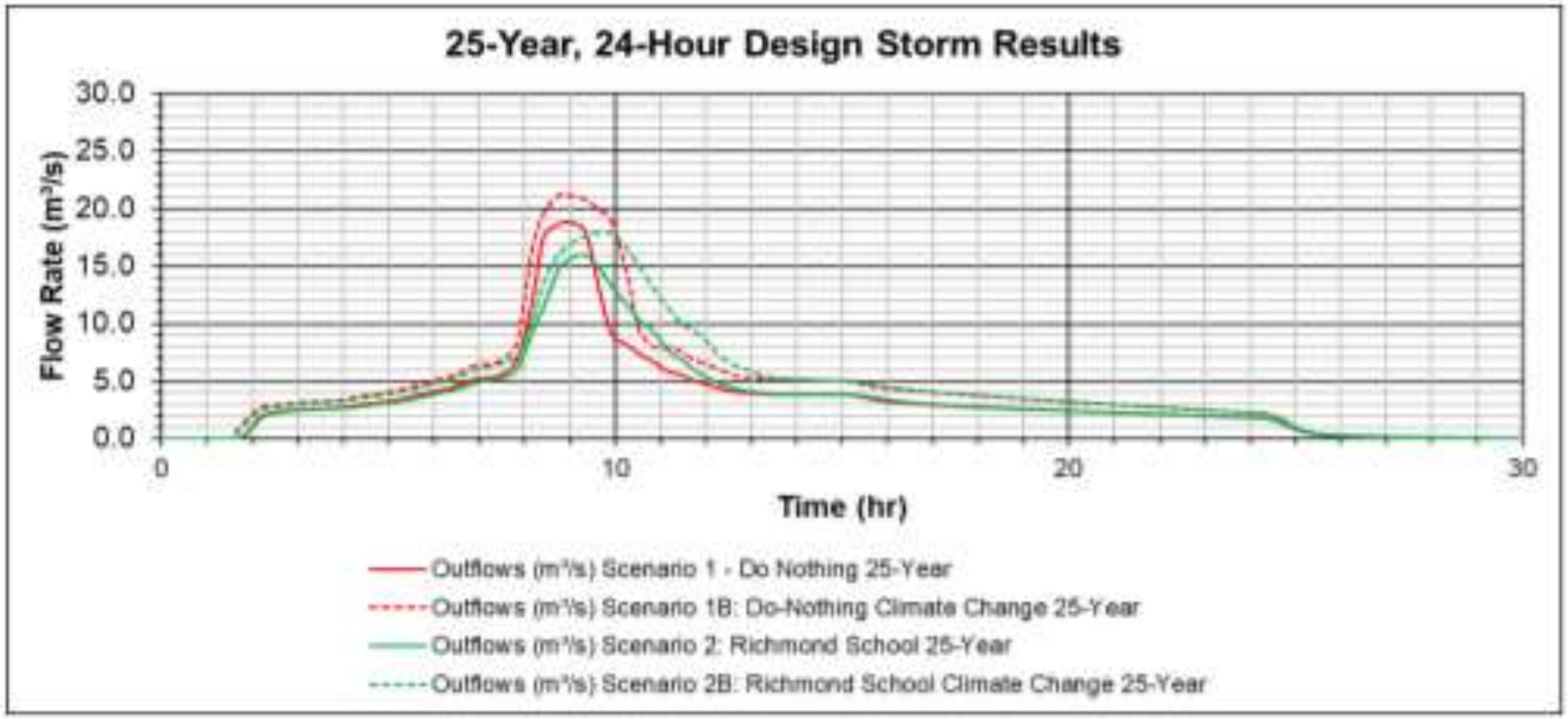
Fenced riparian area beside creek would flood during frequent storm events (~2 year)

Dual use dry pond (playing field) would flood during infrequent storm events (~25 year) for less than 24 hours

Benefits of the Preferred Option

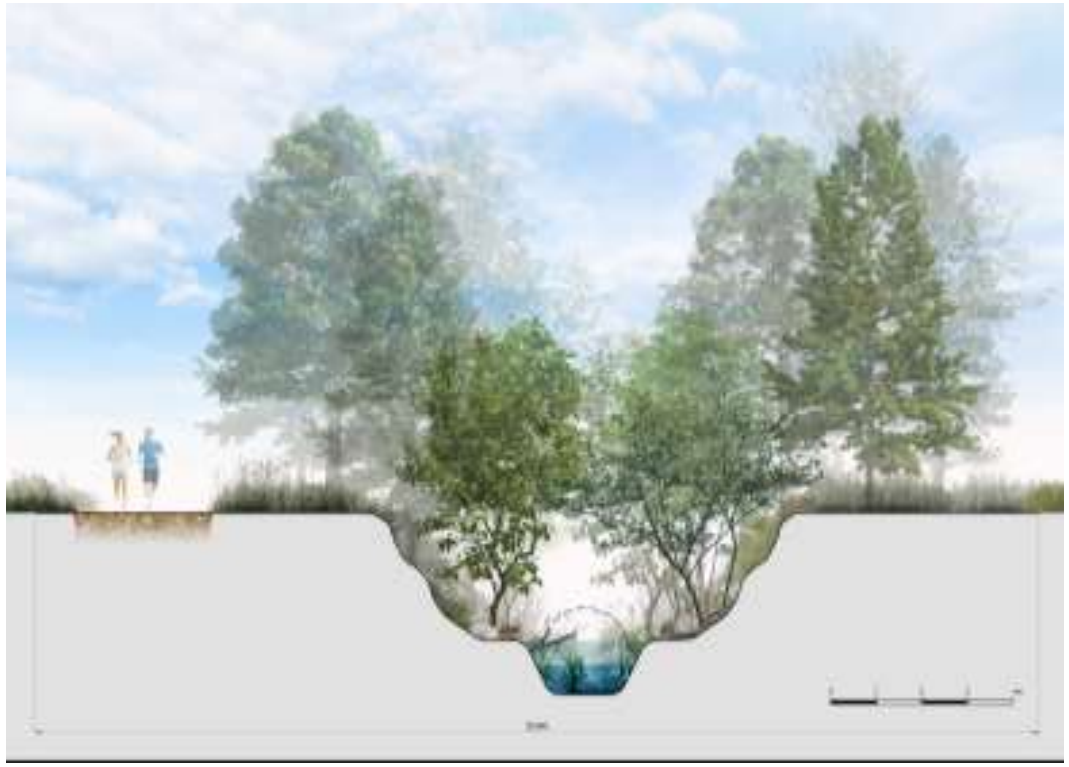
- **Climate adaptation:** mitigating onsite and downstream flooding
- **Enhanced stream health:** biodiversity, water quality, reduced erosion
- **Social benefits:** increased playing fields, greenway, educational opportunities, enhanced public safety, reduced long term maintenance costs

Climate Change Analysis



This option would reduce peak flow by 15% for all storm events and bring the predicted 25-year peak flow under climate change below the current 25-year peak flow.

Alternative Option: Reach 9



- Widen the creek within its current alignment, with sloping banks and increased riparian area
- Remove invasives and plant native species
- Create a greenway

Lansdowne Middle School North Campus

DFS: Good potential for SWMF

- Located 2 blocks north of creek
- Large site with slight to moderate slope
- Dual use 200 x 300 m^2 dry pond (playing field) to be flooded for 24-48 hours once every 5-10 years
- Peak flows are predicted to be reduced by 10% of existing peak flows

Campus View Elementary School

DFS: Fair to Good potential for SWMF

- Large upstream sub-catchment
- Moderate slopes

Cedar Hill Middle School

DFS: Fair potential for SWMF

- Located 2 blocks from Bowker Creek (culverted)
- Smaller site with moderate slope

Blueprint recommendation:

Greenway along Cedar Hill Road

Opportunities for Collaboration

- Invitation for SD61 staff person to sit on BCI steering committee
- Partnership opportunities for funding:
  - Upcoming Nature Smart Climate Solutions.
  - Upcoming funding for green infrastructure and climate adaptation.
- BCI partners are very interested in further collaboration and conversation.

Questions?