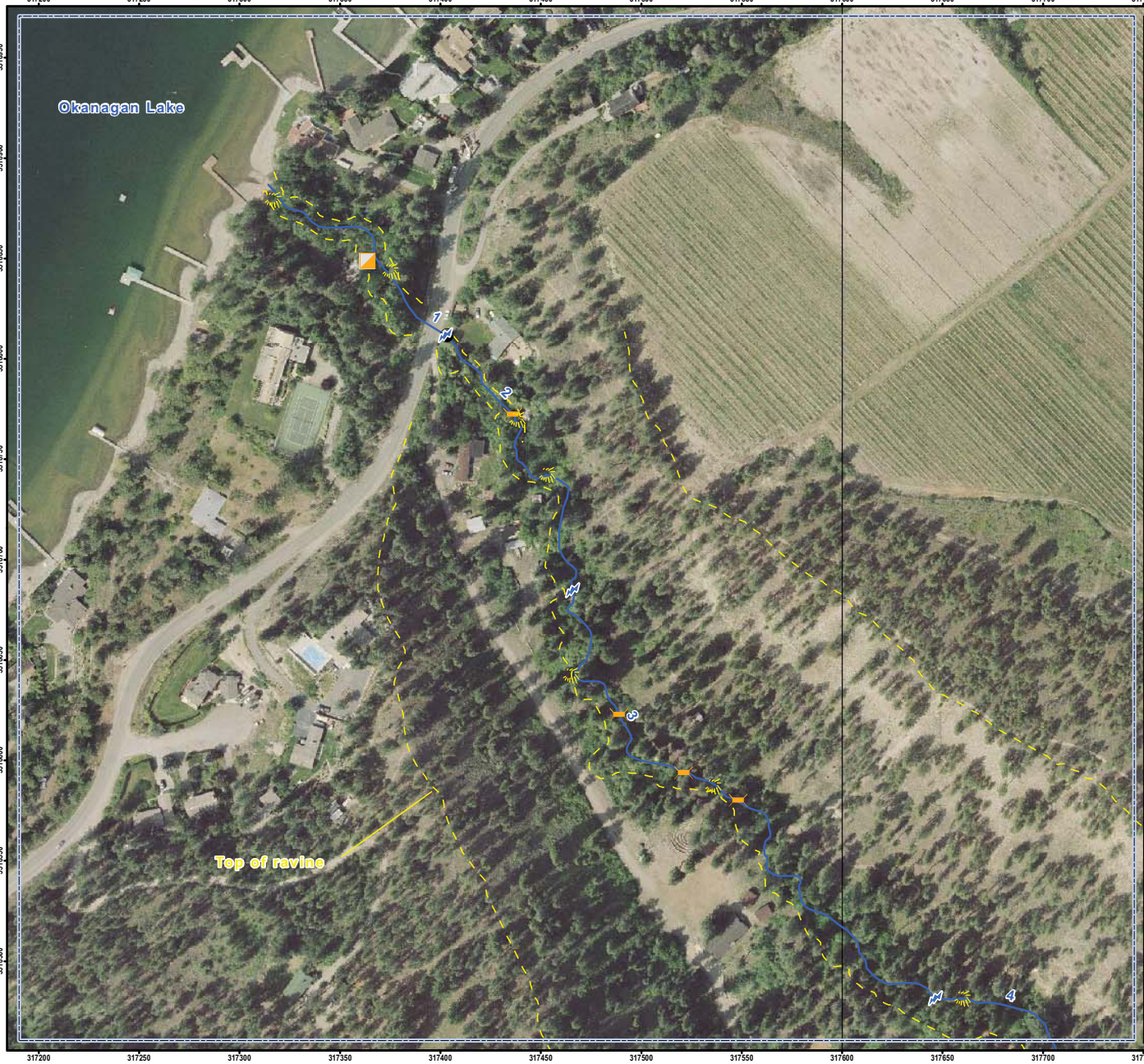


LEBANON CREEK

Segments 1-3

Project:	Sensitive Habitat Inventory and Mapping (SHIM)
Location:	Kelowna, BC
Project No.:	06-054
Prepared for:	City of Kelowna
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	RW
Checked by:	KH
Projection:	NAD83-UTM Zone 11
Date:	January, 2007

30 15 0 30 60 90 Meters

1:2,000

N W E S

LEGEND

- Segment break
- Stream centreline
- Top of bank
- Culvert
- Erosion

Fish observation

- Rainbow trout

Obstruction

- Cascade
- Falls

Modification

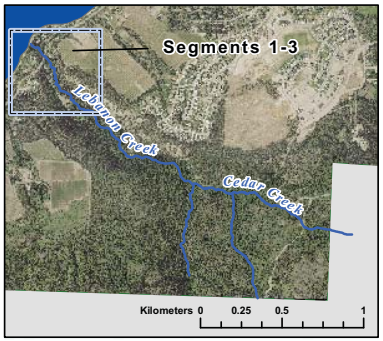
- Bridge
- Other
- Retain wall / Bank stability

Waterbody

- Side channel
- Tributary

SOURCE INFORMATION

Base Map:	82E.083 Kelowna
Orthophoto:	2003, provided by City of Kelowna
Stream Information:	Field Inventory
Location Information:	Field, GPS (Trimble GEO XM & XT)
Feature Information:	Field Inventory
Date of Inventory:	2006/12
Inventory Management:	Kyle Hawes, R.P.Bio.



City of Kelowna

ECOSCAPE Environmental Consultants Ltd.



LEBANON CREEK

Segments 4-6

Project:	Sensitive Habitat Inventory and Mapping (SHIM)
Location:	Kelowna, BC
Project No.:	06-054
Prepared for:	City of Kelowna
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	RW
Checked by:	KH
Projection:	NAD83-UTM Zone 11
Date:	January, 2007

40 20 0 40 80 120 Meters

1:2,500

N
W E
S

LEGEND

- Segment break
- Stream centreline
- Top of bank
- Culvert
- Erosion

Fish observation

- Rainbow trout

Obstruction

- Cascade
- Falls

Modification

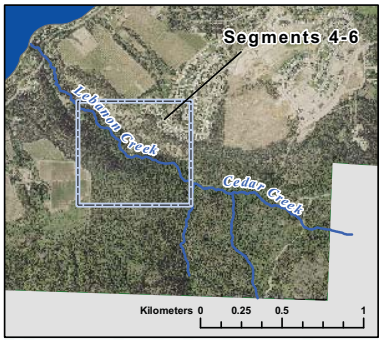
- Bridge
- Other
- Retain wall / Bank stability

Waterbody

- Side channel
- Tributary

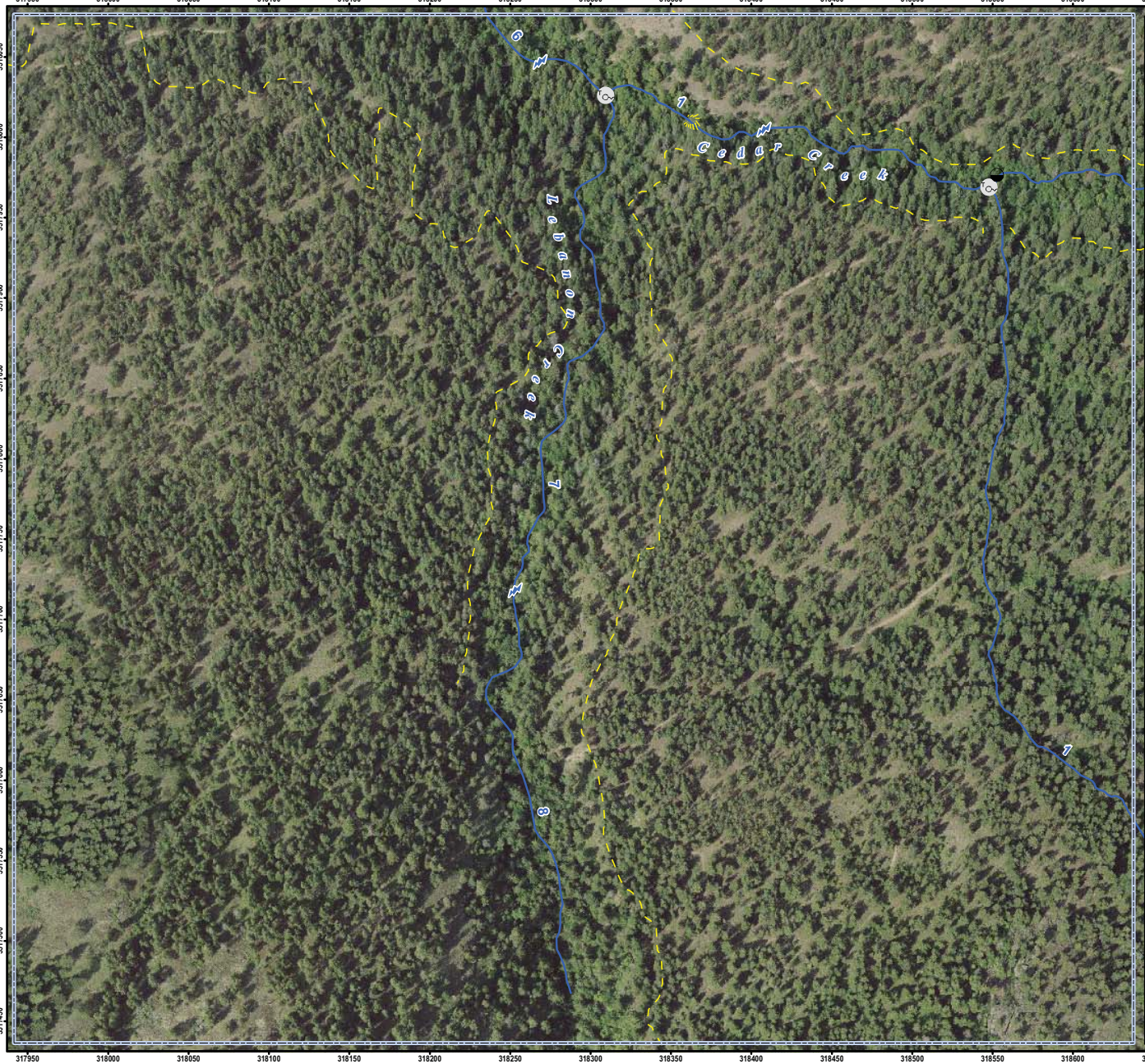
SOURCE INFORMATION

Base Map:	82E.083 Kelowna
Orthophoto:	2003, provided by City of Kelowna
Stream Information:	Field Inventory
Location Information:	Field, GPS (Trimble GEO XM & XT)
Feature Information:	Field Inventory
Date of Inventory:	2006/12
Inventory Management:	Kyle Hawes, R.P.Bio.



City of Kelowna

ECOSCAPE
Environmental Consultants Ltd.



LEBANON CREEK

Segments 7-8

Project:	Sensitive Habitat Inventory and Mapping (SHIM)
Location:	Kelowna, BC
Project No.:	06-054
Prepared for:	City of Kelowna
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	RW
Checked by:	KH
Projection:	NAD83-UTM Zone 11
Date:	January, 2007

40 20 0 40 80 120 Meters

1:2,500

N W E S

LEGEND

- Segment break
- Stream centreline
- Top of bank
- Culvert
- Erosion

Fish observation
- Rainbow trout

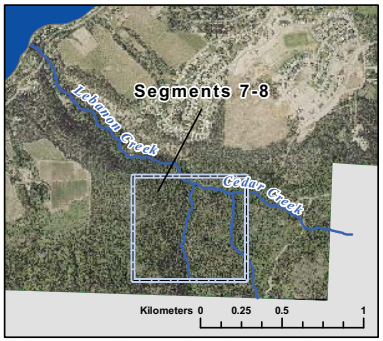
Obstruction
- Cascade
- Falls

Modification
- Bridge
- Other
- Retain wall / Bank stability

Waterbody
- Side channel
- Tributary

SOURCE INFORMATION

Base Map:	82E.083 Kelowna
Orthophoto:	2003, provided by City of Kelowna
Stream Information:	Field Inventory
Location Information:	Field, GPS (Trimble GEO XM & XT)
Feature Information:	Field Inventory
Date of Inventory:	2006/12
Inventory Management:	Kyle Hawes, R.P.Bio.



City of Kelowna

ECOSCAPE Environmental Consultants Ltd.

Lebanon Creek
Segment(s): 1 - 3

Segment	Primary	Secondary	Length (m)	Hydraulic	Gradient (%)	Crown Closure	Spawning Habitat	Comment Class
1.0	Natural	Ephemeral	126.365	Riffle/Pool	3.0	71-90%	Unknown	Light disturbance and encroachment on left bank. Property undeveloped.
2.0	Modified	Ephemeral	166.875	Riffle/Pool	3.0	0	Unknown	Burned and salvage logged.
3.0	Modified	Ephemeral	332.469	Riffle/Pool	4.0	21-40%	Unknown	Fire and salvage logged - less fire disturbance and more intact riparian shrubs and mature pine/fir.

	Substrates (%) [a]						Channel (m)				
Segment	O	F	G	C	B	R	Wetted Width	Bankfull Width	Wetted Depth	Bankfull Depth	Comment Substrates/Channel
1.0	0	0	14	85	1	0	0.00	4.00	0.00	0.40	
2.0	0	2	18	70	10	0	0.00	4.00	0.00	0.40	Highly agraded from lack of vegetation and increased streamflows since fires.
3.0	0	1	5	69	25	0	0.00	3.00	0.00	0.35	Agrading stream channel.

a. Substrate codes: O=organics; F=silt/sand; G=gravel; C=cobble; B=boulder; R=bedrock

	Cover (%) [b]								
Segment	Total Cover	B	DP	IV	LWD	OV	SWD	UC	Comment Cover
1.0	0	0	0	0	0	0	0	0	With flows instream cover would be moderate - overstream vegetation and boulder/cobble/riffle cover
2.0	10	90	10	0	0	0	0	0	Total cover assumes stream flows.
3.0	10	90	10	0	0	0	0	0	Total cover reflective of moderate stage flow.

b. Cover codes: B=boulder; DP=deep pool; IV=instream vegetation; LWD=large woody debris; OV=overstream vegetation; SWD=small woody debris; UC=undercut bank

Left Bank Riparian								
Segment	Class	Qualifier	Stage	Shrub cover	Snags	Veteran Trees	Bank stability	Comment
1.0	Mixed forest	Disturbed	mature forest	67-100%	No	<5	Low	Some riparian encroachment - stream channel natural - down-cut, eroded channel.
2.0	Herbs/grasses	Disturbed	tall shrubs 2-10m	5-33%	No	No	Low	Burned and salvage logged.
3.0	Mixed forest	Disturbed	mature forest	67-100%	<5	>=5	Low	Burned and salvage logged but riparian band more intact - mature and veteran Pine/fir surviving fire

Right Bank Riparian								
Segment	Class	Qualifier	Stage	Shrub cover	Snags	Veteran Trees	Bank stability	Comment
1.0	Mixed forest	Natural	mature forest	67-100%	<5	<5	Medium	Stream channel natural - down-cut, eroded channel - less riparian disturbance.
2.0	Herbs/grasses	Disturbed	tall shrubs 2-10m	<5%	No	No	Low	Burned and salvage logged.
3.0	Mixed forest	Disturbed	mature forest	67-100%	<5	>=5	Low	Burned and salvage logged but riparian band more intact - mature and veteran pine/fir surviving fire

Segment	Comment - Flora	Comment - Flora
1.0	Ponderosa pine; fir; water birch; alder; snowberry; Douglas maple; Oregon grape; red-osier dogwood.	
2.0	Pine regeneration; alder; Douglas maple; Oregon grape; tumble mustard; knapweed; rose, currant sp;	
3.0	Pine;fir;alder;Douglas maple;water birch;red-osier dogwood;water birch;rose;snowberry; elderberry	

	Level of Impact [c]		Enhancement Opportunity	
Segment	Rating	Comment	Rating	Comment
1.0	1_bank_low		Low	
2.0	Both_banks_mod	Salvage logging.	Moderate	Instream structures to mitigate down-cutting (i.e., riffles; LWD; weirs)
3.0	Both_banks_low	Vigorous natural regeneration.	Low	Mitigate bank erosion lacing riparian vegetation.

c. Impact rating: 6=nil; 5 = 1-bank low; 4 = 1-bank moderate; 3 = 1-bank high; 2 = both banks low; 1 = both banks moderate; 0 = both banks high







Lebanon Creek
Segment(s): 4 - 6

Segment	Primary	Secondary	Length (m)	Hydraulic	Gradient (%)	Crown Closure	Spawning Habitat	Comment Class
4.0	Modified		249.724	Cascade/Pool	15.0	0	Potential	Rainbow trout observed in residual pools occurring through this segment. Bedrock controlled bedload deposition (gravel bar) at Segment 3-4 break.
5.0	Natural		240.387	Cascade/Pool	25.0	0	Unknown	Bedrock controlled - gorge/ravine.
6.0	Modified		407.496	Riffle/Pool	6.0	0	Potential	Fish bearing lake (headwaters) - despite downstream barriers this segment. could be frequented by fish

	Substrates (%) [a]						Channel (m)				
Segment	O	F	G	C	B	R	Wetted Width	Bankfull Width	Wetted Depth	Bankfull Depth	Comment Substrates/Channel
4.0	0	1	4	20	30	45	0.90	3.00	0.02	0.80	
5.0	0	3	5	32	20	40	0.90	6.00	0.02	0.35	
6.0	0	10	45	40	4	1	1.20	4.20	0.02	0.40	

a. Substrate codes: O=organics; F=silt/sand; G=gravel; C=cobble; B=boulder; R=bedrock

	Cover (%) [b]								
Segment	Total Cover	B	DP	IV	LWD	OV	SWD	UC	Comment Cover
4.0	20	30	60	0	10	0	0	0	Boulder and bedrock providing channel stability and maintaining residual pools.
5.0	0	0	0	0	0	0	0	0	Residual pools persist. Natural obstructions preclude upstream fish migration through segment.
6.0	25	30	10	0	45	5	0	0	

b. Cover codes: B=boulder; DP=deep pool; IV=instream vegetation; LWD=large woody debris; OV=overstream vegetation; SWD=small woody debris; UC=undercut bank

	Left Bank Riparian							
Segment	Class	Qualifier	Stage	Shrub cover	Snags	Veteran Trees	Bank stability	Comment
4.0	Shrubs	Disturbed	low shrubs <2m	67-100%	>=5	No	Low	Down-cutting to bedrock bank discontinuous erosion along entire length.
5.0	Shrubs	Natural	low shrubs <2m	67-100%	>=5	No	Medium	Bedrock gorge intermittent areas of bank erosion.
6.0	Shrubs	Disturbed	low shrubs <2m	34-66%	<5	No	Medium	Salvage logged - woody debris and vigorous riparian shrub regeneration re-stabilizing banks.

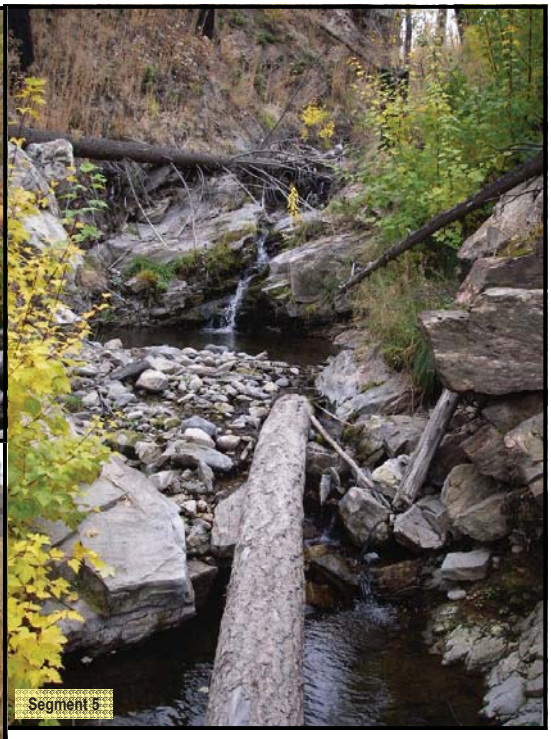
	Right Bank Riparian							
Segment	Class	Qualifier	Stage	Shrub cover	Snags	Veteran Trees	Bank stability	Comment
4.0	Shrubs	Disturbed	low shrubs <2m	67-100%	>=5	No	Low	Down-cutting to bedrock bank discontinuous erosion along entire length.
5.0	Shrubs	Disturbed	low shrubs <2m	67-100%	>=5	No	Medium	Bedrock gorge intermittent areas of bank erosion.
6.0	Shrubs	Disturbed	low shrubs <2m	34-66%	<5	No	Medium	Salvage logged - woody debris and vigorous riparian shrub regeneration re-stabilizing banks.

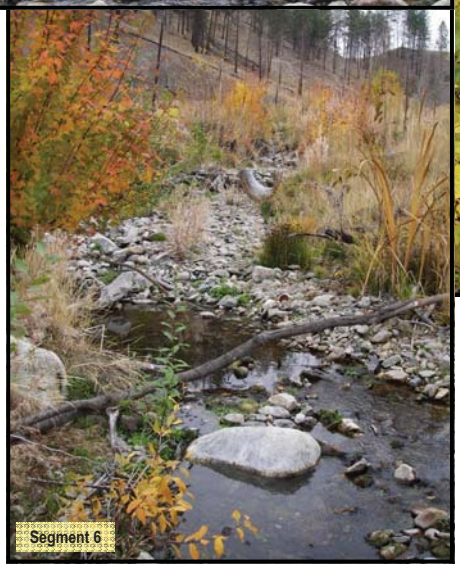
Segment	Comment - Flora	Comment - Flora
4.0	Elderberry; snowberry; Douglas maple; currant; Oregon grape; water birch; alder; fireweed; rose.	Rainbow trout.
5.0	Elderberry; snowberry; Douglas maple; currant; Oregon grape; water birch; alder; fireweed; rose.	
6.0	Elderberry; snowberry; Douglas maple; currant; Oregon grape; water birch; alder; fireweed; rose.	

	Level of Impact [c]		Enhancement Opportunity	
Segment	Rating	Comment	Rating	Comment
4.0	Both_banks_low	Fire and salvage logging. Stream channel more stable due to boulder and bedrock controls.	Low	Allow to regenerate.
5.0	Nil	Despite fire, natural condition.	Low	Preserve.
6.0	Both_banks_low	Fire and salvage logging - greater bank stability resulting in reduced overall impact to channel.	Low	

c. Impact rating: 6=nil; 5 = 1-bank low; 4 = 1-bank moderate; 3 = 1-bank high; 2 = both banks low; 1 = both banks moderate; 0 = both banks high







City of Kelowna

ECOSCAPE Environmental Consultants Ltd.

Lebanon Creek
Segment(s): 7 and 8

Segment	Primary	Secondary	Length (m)	Hydraulic	Gradient (%)	Crown Closure	Spawning Habitat	Comment Class
7.0	Modified		400.484	Cascade	10.0	0	Unknown	Fire and salvage logging - ravine. Dense spanning logs.
8.0	Modified		276.746	Cascade	12.0	0	Unknown	Ravine/small canyon

	Substrates (%) [a]						Channel (m)				
Segment	O	F	G	C	B	R	Wetted Width	Bankfull Width	Wetted Depth	Bankfull Depth	Comment Substrates/Channel
7.0	0	10	20	49	20	1	1.20	3.40	0.02	0.40	15-m wide floodplain area through which creek meanders through ravine.
8.0	0	5	20	50	20	5	0.90	8.00	0.02	0.35	Broad, low-lying floodplain over bottom of ravine with narrow low flow thalweg.

a. Substrate codes: O=organics; F=silt/sand; G=gravel; C=cobble; B=boulder; R=bedrock

	Cover (%) [b]								
Segment	Total Cover	B	DP	IV	LWD	OV	SWD	UC	Comment Cover
7.0	60	10	5	0	60	5	20	0	10 span logs / 10 linear metres stream length.
8.0	60	5	0	0	20	5	70	0	Dense cover of small woody debris over stream channel.

b. Cover codes: B=boulder; DP=deep pool; IV=instream vegetation; LWD=large woody debris; OV=overstream vegetation; SWD=small woody debris; UC=undercut bank

Left Bank Riparian								
Segment	Class	Qualifier	Stage	Shrub cover	Snags	Veteran Trees	Bank stability	Comment
7.0	Shrubs	Disturbed	low shrubs <2m	34-66%	<5	No	Medium	Logged ravine slope - interwoven span logs throughout.
8.0	Shrubs	Disturbed	low shrubs <2m	5-33%	<5	No	High	Cliff

Right Bank Riparian								
Segment	Class	Qualifier	Stage	Shrub cover	Snags	Veteran Trees	Bank stability	Comment
7.0	Shrubs	Disturbed	low shrubs <2m	34-66%	<5	No	Medium	Logged ravine slope - interwoven span logs throughout.
8.0	Shrubs	Disturbed	low shrubs <2m	5-33%	No	No	Medium	Ravine slope

Segment	Comment - Flora	Comment - Flora
7.0	Snowberry; willow; currant; Oregon grape; water birch; alder; fireweed; rose; aster sp.	Winter wren; California Quail; Common Snipe
8.0	Elderberry; snowberry; Douglas maple; currant; Oregon grape; water birch; alder; fireweed; rose.	Winter Wren; Cooper's Hawk; Northern Harrier.

	Level of Impact [c]		Enhancement Opportunity	
Segment	Rating	Comment	Rating	Comment
7.0	Both_banks_low	Fire and salvage logging.	Low	Thicket downed woody debris/span logs providing good ground cover and overstream cover.
8.0	Both_banks_low	Fire and salvage logging.	Low	

c. Impact rating: 6=nil; 5 = 1-bank low; 4 = 1-bank moderate; 3 = 1-bank high; 2 = both banks low; 1 = both banks moderate; 0 = both banks high



