Sensitive Habitat Inventory and Mapping (SHIM)
Inventory Summary — Segments 31-34

Segment	Primary	Secondary	Length (m)	Hydraulic	Gradient (%)	Crown Closure	Spawning Habitat	Bars	Substrates (%) [a]						Channel (m)				Cover (%) [b]							
									O	F	G	C	B	R	Wetted Width	Bankfull Width	Wetted Depth	Bankfull Depth	Total Cover	B	DP	IV	LWD	OV	SWD	UC
31.0	Modified	Wetland	262	Slough	0.5	21-40%	Unknown	None	60	38	1	1	0	0	5.00	8.00	0.50	1.00	75	0	80	0	5	5	5	5
32.0	Modified	Other	148	Run	0.5	21-40%	Unknown	None	60	38	1	1	0	0	5.00	8.00	0.50	1.00	60	0	80	0	5	5	5	5
33.0	Modified	Beaver Pond	153	Slough	0.5	1-20%	Unknown	Mid-channel	30	60	9	1	0	0	12.00	12.00	0.35	0.45	25	0	50	0	25	0	25	0
34.0	Modified		266	Riffle/Pool	2.0	0	Unknown	Mid-channel	25	25	25	25	0	0	9.00	14.00	0.13	0.45	10	5	85	0	0	5	0	5

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

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

Segment	Left Bank Riparian					Right Bank Riparian					Level of Impact [c]	Enhancement Opportunity
	Class	Qualifier	Stage	Shrub cover	Bank stability	Class	Qualifier	Stage	Shrub cover	Bank stability		
31.0	Disturbed wetland	Disturbed	tall shrubs 2-10m	67-100%	High	Broadleaf forest	Disturbed	tall shrubs 2-10m	34-66%	Medium	5	Very_high
32.0	Broadleaf forest	Disturbed	tall shrubs 2-10m	5-33%	Medium	Herbs/grasses	Disturbed	low shrubs <2m	34-66%	Medium	5	Very_high
33.0	Disturbed wetland	Disturbed	tall shrubs 2-10m	5-33%	Medium	Herbs/grasses	Disturbed	low shrubs <2m	<5%	Medium	4	Very_high
34.0	Herbs/grasses	Disturbed	low shrubs <2m	5-33%	Low	Herbs/grasses	Disturbed	low shrubs <2m	<5%	Low	5	Very_high

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

Segment: 31

Riverine slough/ wetland complex. High beaver activity/influence.



Segment: 32

Confined on left bank by back fill (garbage).



Segment: 33



Segment: 34



Mill Creek

Sensitive Habitat Inventory and Mapping (SHIM) Segments 31-34

30 0 30 60 90 Meters

N
W E
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Map:	8 of 19
Title:	Segments 31-34 of 74
Projection:	NAD 83, 11 North
Prepared for:	City of Kelowna
Prepared by:	Ecoscape Environmental Consultants
Drawn by:	KH
Date:	December, 2005

LEGEND

- Stream centreline
- Top of bank
- Segment break

Modification
- Bridge
- Channelization
- Dam/floodgate
- Fences
- Garbage/Pollution
- Livestock crossing
- PipeCrossing
- Retain Wall/Bank stability
- Water Withdrawal

Waterbody
- Discontinued
- Ditch
- Natural Springs
- Other
- Side Channel
- Tributary
- Wetland
- Wetland (polygon)

- Erosion
- Discharge
- Culvert

Fish habitat
- Deep Pool
- Instream Vegetation
- Instream woody debris
- Other
- Over Stream Vegetn.
- Spawning Habitat
- Undercut Bank

Obstruction
- Beaver Dam
- Dam
- Persistent Debris

- Enhancement



2 0 2 4 6 8 Kilometers

Inset Map

Source Information

Base map:	82E.083 Kelowna
Orthophotos:	2003, provided by City of Kelowna
Stream information:	field inventory
Location information:	field, GPS (Trimble Geo XM)
Feature information:	field inventory
Date of inventory:	2005/11
Inventory management:	Kyle Hawes, R.P.Bio.

ECOSCAPE Environmental Consultants

City of Kelowna

Sensitive Habitat Inventory and Mapping (SHIM)
Inventory Summary — Segments 35-40

Segment	Primary	Secondary	Length (m)	Hydraulic	Gradient (%)	Crown Closure	Spawning Habitat	Substrates (%) [a]						Channel (m)				Cover (%) [b]							
								O	F	G	C	B	R	Wetted Width	Bankfull Width	Wetted Depth	Bankfull Depth	Total Cover	B	DP	IV	LWD	OV	SWD	UC
35.0	Modified		277	Riffle/Pool	2.0	71-90%	Potential	1	14	25	60	5	0	5.30	6.50	0.15	0.65	15	0	20	0	50	15	10	5
36.0	Modified		293	Riffle/Pool	2.0	21-40%	Potential	1	14	20	64	1	0	5.30	6.50	0.15	0.65	17	0	15	0	40	20	20	5
37.0	Natural	Beaver Pond	263	Slough	0.5	21-40%	Unknown	10	75	5	10	0	0	6.50	6.50	1.00	1.00	90	0	70	0	5	15	5	5
38.0	Modified		165	Run	1.5	21-40%	Potential	1	24	25	49	1	0	5.50	6.50	0.35	0.75	15	5	55	0	5	5	5	25
39.0	Channelized		172	Slough	0.0	0	Unknown	50	35	5	10	0	0	6.50	8.00	0.50	1.10	30	0	100	0	0	0	0	0
40.0	Natural		485	Slough	0.3	41-70%	Unknown	0	100	0	0	0	0	5.60	5.60	0.40	1.40	30	0	20	0	75	0	5	0

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

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

Segment	Left Bank Riparian					Right Bank Riparian					Level of Impact [c]	Enhancement Opportunity
	Class	Qualifier	Stage	Shrub cover	Bank stability	Class	Qualifier	Stage	Shrub cover	Bank stability		
35.0	Broadleaf forest	Disturbed	young forest	67-100%	Medium	Broadleaf forest	Disturbed	young forest	67-100%	Medium	1	Low
36.0	Shrubs	Disturbed	tall shrubs 2-10m	67-100%	Medium	Shrubs	Disturbed	tall shrubs 2-10m	67-100%	Medium	4	Moderate
37.0	Broadleaf forest	Disturbed	young forest	67-100%	Medium	Shrubs	Natural	sapling >10m	67-100%	Medium	1	Low
38.0	Broadleaf forest	Disturbed	young forest	67-100%	Medium	Broadleaf forest	Disturbed	young forest	67-100%	Medium	4	Low
39.0	Mixed forest	Disturbed	young forest	5-33%	Medium	Mixed forest	Disturbed	young forest	5-33%	Medium	6	Moderate
40.0	Broadleaf forest	Natural	mature forest	67-100%	Low	Broadleaf forest	Natural	mature forest	67-100%	Low	0	Nil

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

Segment: 35

Intermittent field encroachment to top of bank. Invasive plants.



Segment: 36

Lack of treed forest canopy; predominated by tall shrubs (hawthorn).



Segment: 37



Segment: 38



Segment: 39



Segment: 40

Torturous meander through mature cottonwood forest down-cutting in clay substrates.



Mill Creek

Sensitive Habitat Inventory and Mapping (SHIM) Segments 35-40

30 0 30 60 90 Meters

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Map:	9 of 19
Title:	Segments 35-40 of 74
Projection:	NAD 83, 11 North
Prepared for:	City of Kelowna
Prepared by:	Ecoscape Environmental Consultants
Drawn by:	KH
Date:	December, 2005

LEGEND

- Stream centreline
- Top of bank
- Segment break

Modification
- Bridge
- Channelization
- Dam/floodgate
- Fences
- Garbage/Pollution
- Livestock crossing
- PipeCrossing
- Retain Wall/Bank stability
- Water Withdrawal

- Erosion
- Discharge
- Culvert

Obstruction
- Beaver Dam
- Dam
- Persistent Debris

Waterbody
- Discontinued
- Ditch
- Natural Springs
- Other
- Side Channel
- Tributary
- Wetland
- Wetland (polygon)

Fish habitat
- Deep Pool
- Instream Vegetation
- Instream woody debris
- Other
- Over Stream Vegetn.
- Spawning Habitat
- Undercut Bank

- Enhancement



2 0 2 4 6 8 Kilometers

Inset Map

Source Information

Base map:	82E.083 Kelowna
Orthophotos:	2003, provided by City of Kelowna
Stream information:	field inventory
Location information:	field, GPS (Trimble Geo XM)
Feature information:	field inventory
Date of inventory:	2005/11
Inventory management:	Kyle Hawes, R.P.Bio.

ECOSCAPE Environmental Consultants

City of Kelowna

Sensitive Habitat Inventory and Mapping (SHIM)
Inventory Summary — Segments 41-43

Segment	Primary	Length (m)	Hydraulic	Gradient (%)	Crown Closure	Spawning Habitat	Substrates (%) [a]						Channel (m)				Cover (%) [b]							
							O	F	G	C	B	R	Wetted Width	Bankfull Width	Wetted Depth	Bankfull Depth	Total Cover	B	DP	IV	LWD	OV	SWD	UC
41.0	Channelized	591	Slough	0.3	0	Unknown	0	100	0	0	0	0	5.60	5.60	0.55	1.30	15	0	30	10	0	40	20	0
42.0	Modified	297	Slough	0.3	21-40%	Unknown	38	60	0	1	1	0	5.50	6.50	0.36	1.20	20	1	65	0	9	10	15	0
43.0	Channelized	116	Run	0.2	0	Unknown	10	90	0	0	0	0	3.50	6.00	0.60	1.50	8	0	85	0	0	5	10	0

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

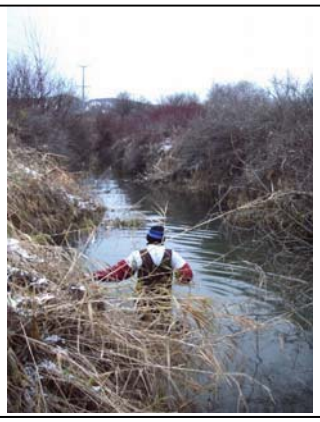
b. Cover codes: B=boulder; DP=deep pool; IV=instream vegetation; LWD=large woody debris; OV=overstream vegetation; SWD=small woody debris; UC=undercut bank

Segment	Left Bank Riparian					Right Bank Riparian					Level of Impact [c]	Enhancement Opportunity
	Class	Qualifier	Stage	Shrub cover	Bank stability	Class	Qualifier	Stage	Shrub cover	Bank stability		
41.0	Shrubs	Disturbed	low shrubs <2m	67-100%	Low	Shrubs	Disturbed	low shrubs <2m	67-100%	Low	6	High
42.0	Broadleaf forest	Disturbed	young forest	34-66%	Low	Broadleaf forest	Disturbed	young forest	34-66%	Medium	4	High
43.0	Herbs/grasses	Disturbed	low shrubs <2m	34-66%	Low	Shrubs	Disturbed	low shrubs <2m	34-66%	Medium	5	High

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

Segment: 41

Channelized during railway development. Creating large impoundment to west of railway.



Segment: 42

Predominantly slough with occasional run. Industrial on left bank and open, disturbed right bank.



Segment: 43

Channelized by diking. Open grass-herb-low shrub riparian. Low impervious industrial both banks.



Mill Creek

Sensitive Habitat Inventory and Mapping (SHIM) Segments 41-43

30 0 30 60 90 Meters

N W E S

Map:	10 of 19
Title:	Segments 41-43 of 74
Projection:	NAD 83, 11 North
Prepared for:	City of Kelowna
Prepared by:	Ecoscape Environmental Consultants
Drawn by:	KH
Date:	December, 2005

LEGEND

- Stream centreline
- Top of bank
- Segment break

Modification
- Bridge
- Channelization
- Dam/floodgate
- Fences
- Garbage/Pollution
- Livestock crossing
- PipeCrossing
- Retain Wall/Bank stability
- Water Withdrawal

Waterbody
- Discontinued
- Ditch
- Natural Springs
- Other
- Side Channel
- Tributary
- Wetland
- Wetland (polygon)

- Erosion
- Discharge
- Culvert

Obstruction
- Beaver Dam
- Dam
- Persistent Debris

Fish habitat
- Deep Pool
- Instream Vegetation
- Instream woody debris
- Other
- Over Stream Vegetn.
- Spawning Habitat
- Undercut Bank

- Enhancement



2 0 2 4 6 8 Kilometers

Inset Map

Source Information

Base map:	82E.083 Kelowna
Orthophotos:	2003, provided by City of Kelowna
Stream information:	field inventory
Location information:	field, GPS (Trimble Geo XM)
Feature information:	field inventory
Date of inventory:	2005/11
Inventory management:	Kyle Hawes, R.P.Bio.

ECOSCAPE Environmental Consultants

City of Kelowna

Sensitive Habitat Inventory and Mapping (SHIM)
Inventory Summary — Segments 44-47

Segment	Primary	Secondary	Length (m)	Hydraulic	Gradient (%)	Crown Closure	Spawning Habitat	Substrates (%) [a]						Channel (m)				Cover (%) [b]							
								O	F	G	C	B	R	Wetted Width	Bankfull Width	Wetted Depth	Bankfull Depth	Total Cover	B	DP	IV	LWD	OV	SWD	UC
44.0	Channelized		152	Run	0.2	21-40%	Unknown	10	90	0	0	0	0	3.50	6.50	0.27	1.00	5	0	85	0	0	5	10	0
45.0	Modified	Beaver Pond	607	Slough	0.5	41-70%	Unknown	20	75	0	5	0	0	5.00	6.50	1.00	1.50	85	1	69	0	20	5	5	0
46.0	Modified	Beaver Pond	517	Slough	0.0	41-70%	Unknown	20	75	0	0	0	0	5.50	6.50	1.30	1.60	95	1	69	0	20	5	5	0
47.0	Modified		384	Slough	0.0	21-40%	Unknown	50	50	0	0	0	0	5.50	6.50	0.40	1.00	75	0	70	0	20	5	5	0

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

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

Segment	Left Bank Riparian					Right Bank Riparian					Level of Impact [c]	Enhancement Opportunity
	Class	Qualifier	Stage	Shrub cover	Bank stability	Class	Qualifier	Stage	Shrub cover	Bank stability		
44.0	Shrubs	Disturbed	low shrubs <2m	34-66%	Low	Broadleaf forest	Disturbed	mature forest	34-66%	High	5	Moderate
45.0	Broadleaf forest	Disturbed	young forest	67-100%	Low	Broadleaf forest	Disturbed	young forest	67-100%	Low	4	Low
46.0	Broadleaf forest	Disturbed	mature forest	67-100%	Low	Broadleaf forest	Disturbed	mature forest	67-100%	Low	2	Low
47.0	Broadleaf forest	Disturbed	young forest	67-100%	Medium	Broadleaf forest	Disturbed	mature forest	67-100%	Medium	4	Low

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

Segment: 44

Channelized through industrial property.



Segment: 45

Natural channel down-cutting through fine silt/clay substrates. Commercial/ industrial encroachment.



Segment: 46

Very deep beaver ponding. Floodplain association along right bank and encroachment on left bank.



Segment: 47

Industrial encroachment on outside stream bends with steep, unstable banks. Reduced beaver activity



Mill Creek
Sensitive Habitat Inventory and Mapping (SHIM)
Segments 44-47

30 0 30 60 90 Meters

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Map:	11 of 19
Title:	Segments 44-47 of 74
Projection:	NAD 83, 11 North
Prepared for:	City of Kelowna
Prepared by:	Ecoscape Environmental Consultants
Drawn by:	KH
Date:	December, 2005

LEGEND

- Stream centreline
- Top of bank
- Segment break

Modification
- Bridge
- Channelization
- Dam/floodgate
- Fences
- Garbage/Pollution
- Livestock crossing
- PipeCrossing
- Retain Wall/Bank stability
- Water Withdrawal

- Erosion
- Discharge
- Culvert

Obstruction
- Beaver Dam
- Dam
- Persistent Debris

Waterbody
- Discontinued
- Ditch
- Natural Springs
- Other
- Side Channel
- Tributary
- Wetland
- Wetland (polygon)

Fish habitat
- Deep Pool
- Instream Vegetation
- Instream woody debris
- Other
- Over Stream Vegetn.
- Spawning Habitat
- Undercut Bank

- Enhancement



2 0 2 4 6 8 Kilometers

Inset Map

Source Information

Base map:	82E.083 Kelowna
Orthophotos:	2003, provided by City of Kelowna
Stream information:	field inventory
Location information:	field, GPS (Trimble Geo XM)
Feature information:	field inventory
Date of inventory:	2005/11
Inventory management:	Kyle Hawes, R.P.Bio.

ECOSCAPE Environmental Consultants

City of Kelowna

Sensitive Habitat Inventory and Mapping (SHIM)
Inventory Summary — Segments 48-49

Segment	Primary	Length (m)	Hydraulic	Gradient (%)	Crown Closure	Spawning Habitat	Substrates (%) [a]						Channel (m)				Cover (%) [b]							
							O	F	G	C	B	R	Wetted Width	Bankfull Width	Wetted Depth	Bankfull Depth	Total Cover	B	DP	IV	LWD	OV	SWD	UC
48.0	Channelized	223	Slough	0.0	1-20%	Unknown	25	75	0	0	0	0	3.80	5.60	0.40	1.30	15	0	40	0	0	50	10	0
49.0	Modified	665	Slough	0.5	21-40%	Unknown	24	74	1	0	1	0	4.50	6.00	0.59	1.40	60	1	59	0		30	10	0

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

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

Segment	Left Bank Riparian					Right Bank Riparian					Level of Impact [c]	Enhancement Opportunity
	Class	Qualifier	Stage	Shrub cover	Bank stability	Class	Qualifier	Stage	Shrub cover	Bank stability		
48.0	Shrubs	Disturbed	tall shrubs 2-10m	67-100%	Low	Shrubs	Disturbed	tall shrubs 2-10m	67-100%	Medium	6	Moderate
49.0	Shrubs	Disturbed	tall shrubs 2-10m	67-100%	Low	Shrubs	Disturbed	tall shrubs 2-10m	67-100%	Medium	5	Moderate

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

Segment: 48

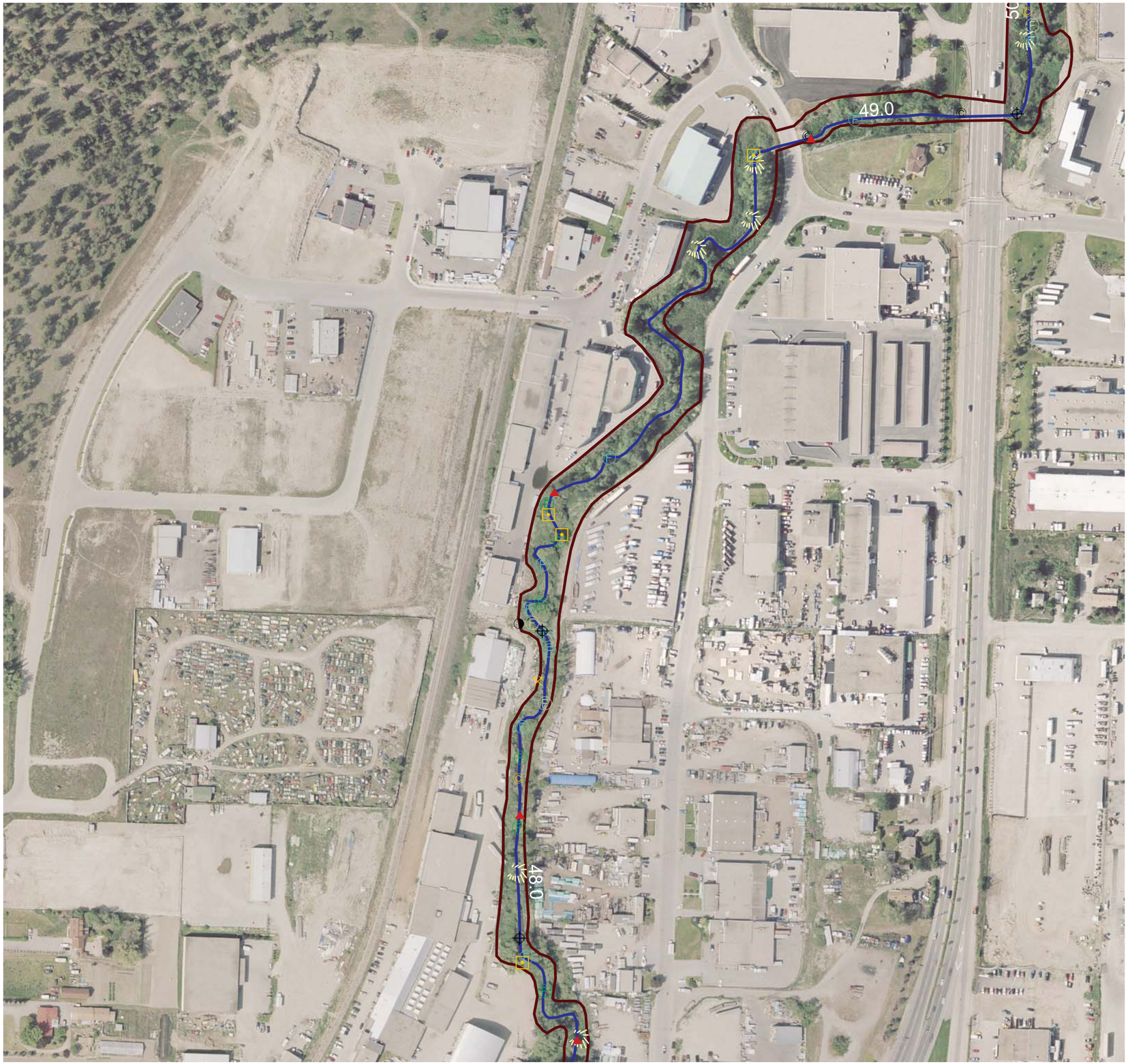
Channelized/ diked both banks. Intermittent armouring on both banks where erosion more prevalent.



Segment: 49

Diking is setback allowing stream channel to meander naturally within. Beaver activity occurs.





Mill Creek

Sensitive Habitat Inventory and Mapping (SHIM) Segments 48-49

30 0 30 60 90 Meters

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W E
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Map:	12 of 19
Title:	Segments 48-49 of 74
Projection:	NAD 83, 11 North
Prepared for:	City of Kelowna
Prepared by:	Ecoscape Environmental Consultants
Drawn by:	KH
Date:	December, 2005

LEGEND

- Stream centreline
- Top of bank
- Segment break

Modification
- Bridge
- Channelization
- Dam/floodgate
- Fences
- Garbage/Pollution
- Livestock crossing
- PipeCrossing
- Retain Wall/Bank stability
- Water Withdrawal

Erosion

Discharge

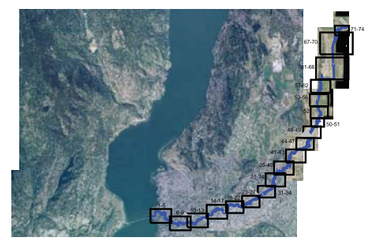
Culvert

Obstruction
- Beaver Dam
- Dam
- Persistent Debris

Waterbody
- Discontinued
- Ditch
- Natural Springs
- Other
- Side Channel
- Tributary
- Wetland
- Wetland (polygon)

Fish habitat
- Deep Pool
- Instream Vegetation
- Instream woody debris
- Other
- Over Stream Vegetn.
- Spawning Habitat
- Undercut Bank

Enhancement



2 0 2 4 6 8 Kilometers

Inset Map

Source Information

Base map:	82E.083 Kelowna
Orthophotos:	2003, provided by City of Kelowna
Stream information:	field inventory
Location information:	field, GPS (Trimble Geo XM)
Feature information:	field inventory
Date of inventory:	2005/11
Inventory management:	Kyle Hawes, R.P.Bio.

ECOSCAPE Environmental Consultants

City of Kelowna