Golder Associates Ltd.

1944 - 10 Avenue SW
Calgary, Alberta, Canada T3C 0J8
Telephone (403) 244-3233
Toll Free 1-800-933-3992
Fax (403) 244-3234

REPORT

SPRING CREEK MOUNTAIN VILLAGE AREA REDEVELOPMENT PLAN ENVIRONMENTAL IMPACT STATEMENT

Submitted to:

Frank Kernick
Restwell Trailer Park and Cabins Ltd.
1A, 502 – 3rd Avenue
Canmore, AB
T1W 2G2

DISTRIBUTION:

3 Copies	**Frank Kernick** **Canmore, Alberta**
2 Copy	**Ralf Southwell** **Calgary, Alberta**
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November 2003 **022-2295-5310**

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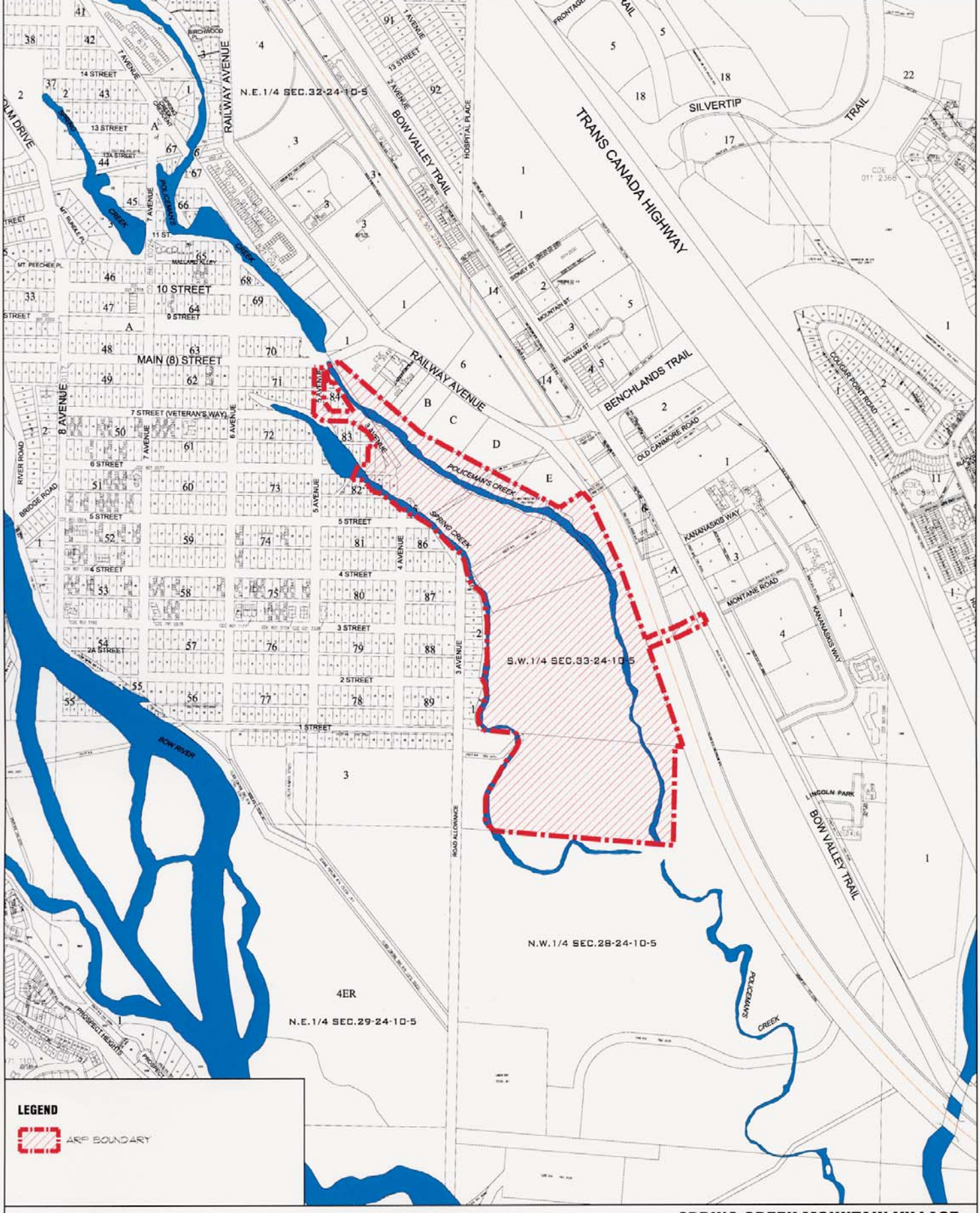
1. INTRODUCTION

Restwell Trailer Park and Cabins Ltd. (Restwell) currently operates a low density trailer park and campground that is situated on the southern edge of Canmore south of 8th (Main) Street, east of Spring Creek and west of the CPR tracks (Figure 1-1). Restwell seeks to redevelop the property as an urban neighbourhood with a variety of residences, commercial and open space and a pedestrian orientated street network. An Area Redevelopment Plan (ARP) for this development, known as the Spring Creek Mountain Village, has been submitted to the Town of Canmore as part of the approvals process (Southwell Trapp & Associates Ltd. and Marshall Tittemore Architects 2003). A baseline inventory of the biophysical resources on the property was previously conducted (Golder 2003). Vegetation mapping and ground-truthing, a rare plant survey, fall and winter wildlife surveys, spring amphibian and breeding bird surveys, and a fall fish and fish habitat survey were conducted. Environmental sensitivities to development were evaluated for the vegetation, wildlife and fish resources. This Environmental Impact Statement (EIS) assesses the potential effects of the proposed redevelopment plan on vegetation, wildlife and fish. The following sections comprise the report:

- environmental setting and land use (Section 2);
- the project description (Section 3);
- baseline summary (Section 4);
- approach to the assessment (Section 5);
- the assessment (Section 6);
- assessment summary (Section 7);
- closure (Section 8); and
- references (Section 9).

Effects of the redevelopment on visual aesthetics, transportation, historical resources and socio-economics were evaluated in separate studies, as were geotechnical analyses and an environmental site assessment. Public consultation conducted for the project is also reported on separately.



SPRING CREEK MOUNTAIN VILLAGE AREA REDEVELOPMENT PLAN

Southwell Trapp & Associates Ltd.

Figure 1-1: ARP Location and Boundary

2. ENVIRONMENTAL SETTING AND LAND USE

The current Restwell development has been built over the past 50 years under an evolving municipal land use planning structure and regulatory environment. Currently, there are roads, gravel piles, cabins, homes, and recreational vehicle and mobile home sites abutting both Spring and Policeman's creeks, which run through the Restwell property (Figure 2-1). With approximately 220 mobile homes, six cabins and 250 recreational vehicle sites, the maximum population of the property is about 1,000 people. As a result of the property being developed over a long period of time, there was no provision for storm water treatment. The lack of storm water treatment, along with the lack of vegetation along the creek banks and upstream impacts outside of the study area, have contributed to siltation concerns in both creeks. Redevelopment would allow for riparian edge restoration and protection, through development of an Environmental Reserve and building setbacks. In addition, redevelopment would allow for the creation of green areas within the redevelopment zone, including municipal reserve areas, and other green space.

A constraint to redevelopment of the Restwell property is that it is adjacent to the South Canmore Local Habitat Patch (Figure 2-2). This habitat patch is a key component of the regional wildlife corridor system (BCEAG 1998; Canmore 1998) and is an important wintering area for elk and deer (Jon Jorgensen, ASRD, pers. comm.). This area is also classified as a Conservation Area and Environmentally Sensitive Area (ESA) under the Canmore Municipal Development Plan (Canmore 1998) due to its regional importance for wildlife. An Environmental Impact Statement is required for development applications adjacent to ESAs [Section 8.4 (c), Part 4, Canmore MDP]. Permitted and discretionary uses for this area fall under the Town of Canmore Land Use Bylaw (Canmore 2002). The undeveloped portion of the Restwell property east of Policeman's Creek and the section of the South Canmore Local Habitat Patch immediately south of the property are zoned as Urban Reserve District (UR) (Canmore 2002). The purpose of this zoning is "to protect land suited for urban uses from premature subdivision and development" (Section 24, Part B, Land Use Bylaw 09-99). Public utilities are currently the only permitted use, although discretionary uses include campgrounds and recreational areas. The remaining portion of the South Canmore Local Habitat Patch is zoned as Wildlands Conservation District (WC), designated for the protection, conservation and enhancement of the environment (Section 30, Part B, Land Use Bylaw 09-99). Wildlife corridors and wildlife habitat are the only permitted uses in areas zoned as WC.

SPRING CREEK MOUNTAIN VILLAGE
AREA REDEVELOPMENT PLAN

Southwell Trapp & Associates Ltd.

Figure 2-1: Aerial Photograph 2002

LEGEND

SOUTH CANMORE LOCAL HABITAT PATCH

500 0 500
SCALE METRES

REFERENCE

SITE LOCATION PLAN SCANNED FROM AN ORIGINAL OBTAINED FROM MapArt Publishing Corp. 2002 EDITION

PROJECT
RESTWELL TRAILER PARK AND CABINS
AREA REDEVELOPMENT PLAN
CANMORE, ALBERTA

TITLE
STUDY AREA IN RELATION TO THE SOUTH CANMORE LOCAL HABITAT PATCH

Golder Associates
Calgary, Alberta

PROJECT No. 022-2295.5310			FILE No.	Site Location	
DESIGN	KG	02/12/02	SCALE	AS SHOWN	REV. 5
CADD	GMF	21/11/03			
CHECK	SM	27/11/03			
REVIEW	MR	27/11/03			

FIGURE: 2-2

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3. PROJECT DESCRIPTION

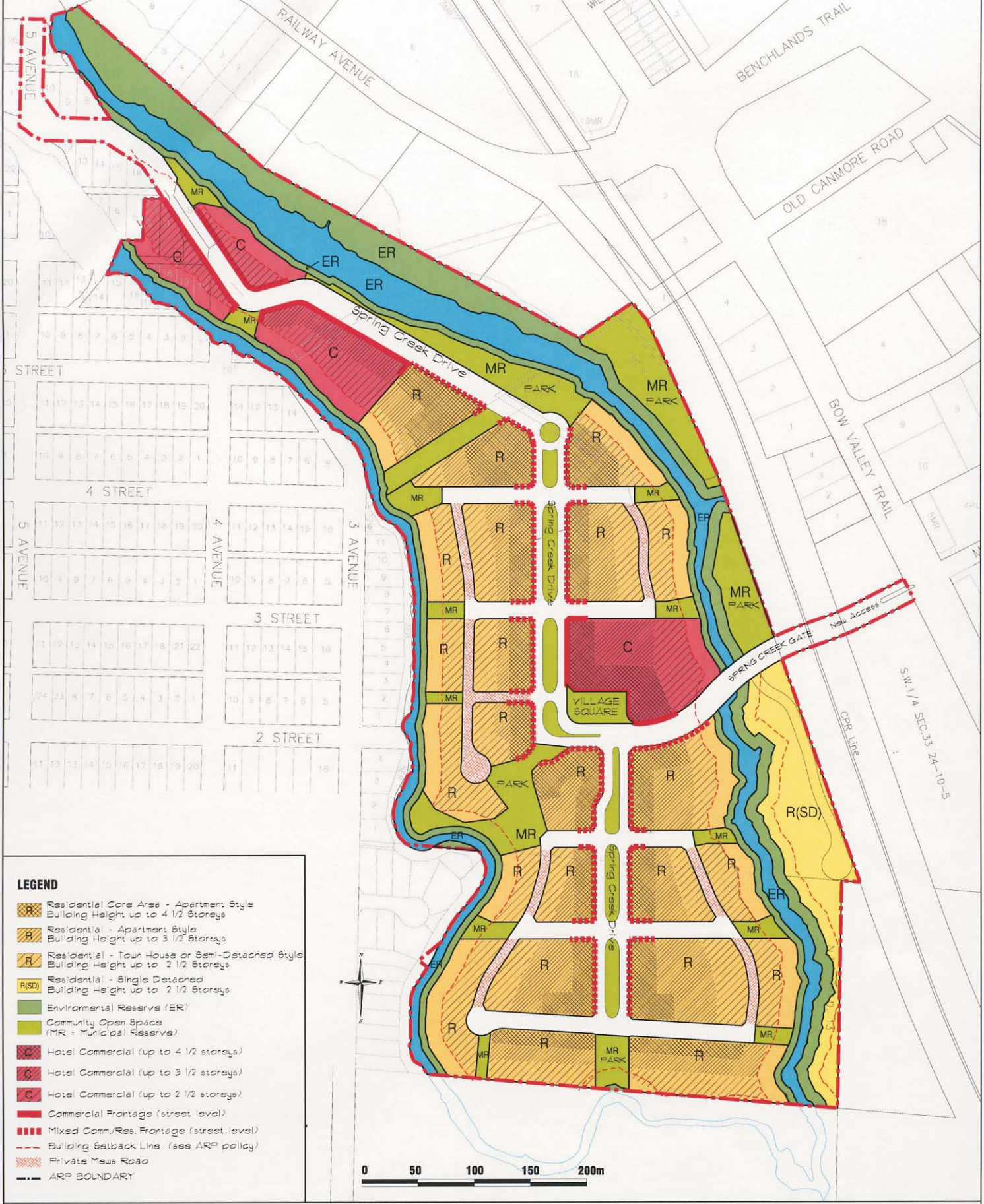
The Spring Creek Mountain Village will be comprised of a range of housing types, small scale retail commercial space and open spaces (Figure 3-1) (Southwell Trapp & Associates Ltd. and Marshall Tittemore Archictects 2003). It will inlcude a new access road that will cross Policeman's Creek from the east and a north-south drive with mixed commercial and residential frontage. East and west of this core area the density and heights of buildings will diminish. A small number of single, detached residences will be constructed on the east side of Policeman's Creek. The village will be phased in over the next 15 years and will ultimately house 1,800 to 2,200 residents.

A building setback of 20 m (with some controlled variance) will be applied to Spring and Policeman's creeks, and a perimeter trail system will be built within this setback to allow for public use. The following environmental policies have been adopted for the area redevelopment plan (ARP) (Southwell Trapp & Associates Ltd. and Marshall Tittemore Archictects 2003):

- Priority will be given to protect areas identified as having high environmental sensitivity; this will happen primarily through the designation of environmental reserves;
- Lower density development will occur in areas with medium environmental sensitivity;
- Riparian areas along Spring and Policeman's Creek will be protected and enhanced;
- Creek banks will be stabilized and rehabilitated as appropriate so that erosion into the creeks is minimized;
- Use of the South Canmore Wildlife Habitat Patch will be discouraged through promoting the use of a 2.5m constructed trail, located within the ARP, and outside of the Habitat Patch;
- Signage along the trail will discourage use of the Canmore Wildlife Habitat Patch by promoting environmental awareness and protection;
- The perimeter trail system will be set back from the creeks to minimize disturbance;
- An environmental reserve will be established along both Spring and Policeman's creeks, with a minimum of 7 m and an average of no less than 8 m from creek edges in areas of low sensitivity, and a minimum of 10 m from creeks in areas of moderate

and high sensitivity. All areas of high sensitivity will be designated as environmental reserve;

- Storm water control and treatment to protect the creeks will be a priority throughout the site;
- Sites and buildings will be designed to minimize noise and light pollution into undeveloped areas;
- Green initiatives including natural landscaping and the use of native vegetation, and the possibility of ground source heating, will be supported and encouraged; and
- Education of the public on the environmental sensitivities and values of the area and its adjacent lands will be promoted through the use of interpretive signs.



LEGEND

- R — Residential Core Area - Apartment Style, Building Height up to 4 1/2 Storeys
- R — Residential - Apartment Style, Building Height up to 3 1/2 Storeys
- R — Residential - Town House or Semi-Detached Style, Building Height up to 2 1/2 Storeys
- R(SD) — Residential - Single Detached, Building Height up to 2 1/2 Storeys
- Environmental Reserve (ER)
- Community Open Space (MR = Municipal Reserve)
- C — Hotel Commercial (up to 4 1/2 storeys)
- C — Hotel Commercial (up to 3 1/2 storeys)
- C — Hotel Commercial (up to 2 1/2 storeys)
- Commercial Frontage (street level)
- Mixed Comm./Res. Frontage (street level)
- Building Setback Line (see ARP policy)
- Private Mews Road
- ARP BOUNDARY

SPRING CREEK MOUNTAIN VILLAGE AREA REDEVELOPMENT PLAN

Southwell Trapp & Associates Ltd.

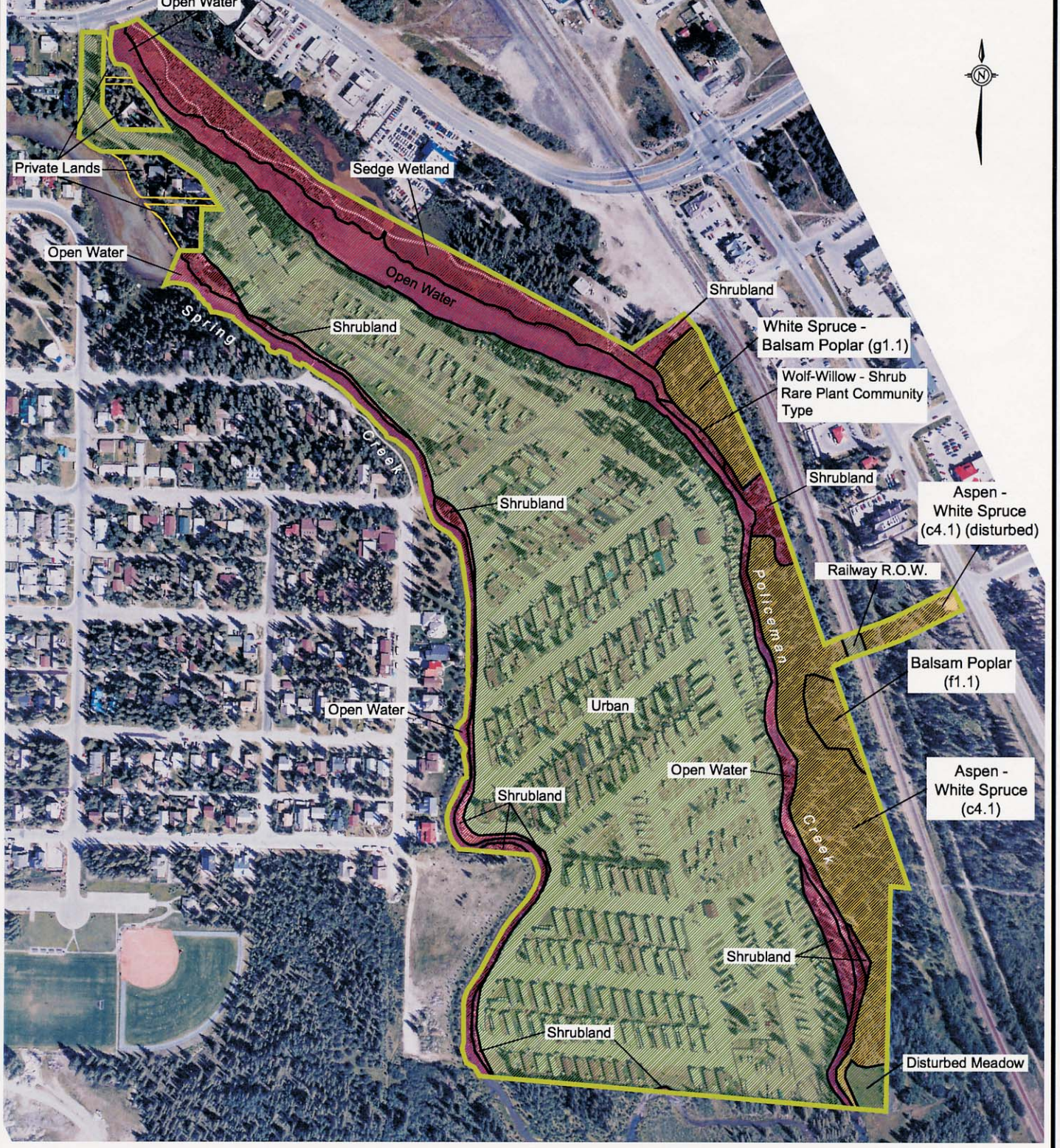
Figure 3-1: Land Use Concept

4. BASELINE SUMMARY

Golder (2003) includes results of a late summer rare plant and vegetation survey, spring rare plant survey, fall wildlife survey, winter track survey, spring amphibian survey, spring breeding bird survey, and fall fish and fish habitat survey. Environmental sensitivities and constraints were identified for each resource. The majority of the Restwell property is currently comprised of residential and recreational properties. The presence of Policeman's and Spring creeks, plus the undeveloped eastern portion of the property, provides habitat for a variety of wildlife and fish species. The sedge wetland, shrubland, and wolf-willow - shrub communities, as well as the open water of the creeks, have high environmental sensitivity ratings, and thus are areas with the highest constraints to development (Figure 4-1). The white spruce - balsam poplar (g1.1), aspen - white spruce (c4.1) and balsam poplar (f1.1) communities, all located to the east of Policeman's Creek, have moderate environmental sensitivities and thus have moderate constraints to development. The disturbed meadow and urban areas have low environmental sensitivities and thus are areas with the lowest constraints to development in the Restwell property.

A wildlife sign survey was conducted in early September 2002 in conjunction with a rare plant survey. Wildlife observations included deer and elk; small mammals, including feral rabbits; a variety of songbirds, corvids, woodpeckers and waterfowl; and, beavers. The study area provides low to moderate quality habitat for ungulates and small and medium-sized carnivores. The riparian habitats along both creeks are well used by a variety of wildlife species including shorebirds and waterfowl, wood frog, and a beaver cache was observed on Spring Creek. The large trees within the undeveloped area east of Policeman's Creek showed signs of use by woodpeckers and other cavity nesters, and elk sign was also observed. This area also supports small and medium sized carnivores as well as a variety of songbird in both the tree and shrub layers. The disturbed meadow and shrubland were well used by ungulates as evidenced by both browse and pellets.

The main sensitivity for redevelopment of the Restwell property for wildlife is the proximity to the South Canmore Local Habitat Patch (Figure 2-2). This area, bordering the property to the south, has been designated as a Conservation Area and Environmentally Sensitive Area in the Canmore MDP (Canmore 1998) because it is a key component in the regional wildlife corridor system.



LEGEND

- PROPOSED RESTWELL ARP BOUNDARY
- VEGETATION CLASSIFICATION
- HIGH ENVIRONMENTAL SENSITIVITY RATING
- MODERATE ENVIRONMENTAL SENSITIVITY RATING
- LOW ENVIRONMENTAL SENSITIVITY RATING

REFERENCES

AIR PHOTO OBTAINED FROM CLIENT. PROVIDED BY FOTO FLIGHT SURVEYS AUGUST 12, 2002; ORIGINAL SCALE 1:5000

PROJECT
RESTWELL TRAILER PARK AND CABINS
AREA REDEVELOPMENT PLAN
CANMORE, ALBERTA

TITLE
ENVIRONMENTAL SENSITIVITY RATINGS OF VEGETATION TYPES ON THE RESTWELL PROPERTY

Golder Associates
Calgary, Alberta

PROJECT	022-2295.5310		FILE No.	Env Sens Ratings	
DESIGN	SM	28/10/03	SCALE	AS SHOWN	REV. 1
CADD	GMF	29/10/03			
CHECK	SM	27/11/03			
REVIEW	SM	27/11/03			

FIGURE: 4-1

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An assessment of fish and fish habitat was conducted for Spring and Policeman's creeks to document the existing fish population and habitat prior to development. Spring Creek is predominantly comprised of shallow run habitats (i.e., R3 with some R2) containing instream and overhanging cover with generally stable banks. Several sections of the creek have been enhanced with instream structures that were beginning to deteriorate. The substrate is composed primarily of silt and refuse overtop of cobble and gravel. Although the flow is quite low in this creek, salmonid spawning potential is improving as gravel becomes exposed due to the scouring influence of the instream enhancement structures.

Policeman's Creek consists of riffle, run and pool habitats, exhibiting all classes of run habitat and both low and moderate grade pool habitats. Generally, the stream banks are moderately stable, with abundant instream and overhanging cover along the lower 2.5 km of Policeman's Creek, where there has been limited development. Where the creek flows through developed areas, it is anthropogenically influenced with road bridges, foot bridges, fords, lawns and riparian habitat clearing. Substrate is composed of a thin layer of silt, sand, and mud over cobble and gravel. There are a few sections along the length of the creek that have been reinforced with riprap armouring and log crib walls. Policeman's Creek has a larger channel and larger flow volume than Spring Creek and is more frequently utilized by spawning salmonids.

Based on historical information, both Spring and Policeman's creeks are known to support fall spawning brown trout. Approximately 10% of the local adult brown trout population from the Bow River use Spring and Policeman's creeks for spawning. During the fish and fish habitat assessment conducted in October 2002, it was apparent in two representative sections of Spring Creek that young-of-the-year mountain whitefish utilize sites with overhanging cover. Juvenile brown trout were also present in the upper site in lower numbers. In Policeman's Creek, the reach adjacent to the Restwell property was used by juvenile brown trout. The juvenile brown trout were caught amongst shoreline riprap. Mountain whitefish were also observed. The Class "B" designation for Policeman's and Spring creeks produces a constraint to development. These watercourses are considered to have a high sensitivity because they provide habitat for brown and brook trout, and mountain whitefish. This classification permits development as long as the sensitivity and vulnerability of the system is accounted for and avoidance and mitigation of any potential impacts are incorporated into a redevelopment plan. Redevelopment could, if done correctly, enhance the habitat quality of the creeks by removing existing development and roads that are currently immediately adjacent to both creeks and restoring these areas with natural riparian vegetation.

5. ASSESSMENT APPROACH

A simplified approach was taken for the Environmental Assessment (EA) as most effects were anticipated to be localized, of long-term duration, irreversible and of a continuous nature. Therefore, effects were evaluated primarily on the magnitude and direction (positive or negative) of the change. Magnitude was defined as follows:

- negligible – no measurable change;
- low – affects less that 10% of the resource or measurement endpoint;
- moderate – a change of 10 to 20% in the measurement endpoint; and
- high – a change of greater that 20% in the measurement endpoint.

A measurement endpoint can be any number of factors that are of importance to the ecosystem, such as the total number of hectares of highly sensitive habitat in a study area, the amount of suspended sediments that enter a creek during heavy rainfall, or the integrity of a wildlife habitat patch. The endpoints used in this assessment are defined in the assessment section (Section 7).

An overall environmental sensitivity map (Figure 4-1) was prepared based on the consideration of the vegetation, wildlife and fish and fish habitat sensitivities determined in the baseline report (Golder 2002). This map classified the study area into areas of high, moderate and low sensitivity.

A map of the proposed development was compared to the sensitivity map to determine the area of negative or positive impact within each sensitivity class. Then, the area of land adjacent to the creeks that will be rehabilitated was determined based on the Area Redevelopment Plan (Figure 3-1) to determine the positive effects. Effects that were non-spatial or that may extend beyond the study area were assessed on a qualitative basis using professional judgement.

Based on the nature and extent of impacts identified, mitigative measures were applied to the project to minimize or eliminate the impacts identified. Residual impacts (i.e., those remaining after mitigation) were then determined.

6. IMPACT ASSESSMENT

The EA considered impacts to local environmental resources within the study area, including vegetation, wildlife, and fish. Components assessed within these larger discipline areas, included vegetation communities, rare plants and rare plant communities, wildlife species, wildlife habitat, fish and fish habitat. Each resource is discussed in terms of its environmental sensitivities, its existing conditions, potential impacts due to the proposed development, proposed mitigation and residual impacts.

6.1 Vegetation

6.1.1 Environmental Sensitivities

The vegetation resources found within the 28.4 ha study area primarily have a low sensitivity to development (20 ha or 70%) (Golder 2003). This is largely related to the current state of much of the Restwell property, which is highly altered by the existing development and/or experiences a high degree of disturbance by Canmore residents and/or does not provide connection with other natural areas (with the exception of the habitat patch to the south of the study area).

However, several vegetation communities and water bodies within the study area were considered to have a high sensitivity to development. These include the sedge wetland, shrubland, open water zone and wolf-willow - shrub communities (Figure 4-1). Together, they comprise 5.0 ha or approximately 17.6% of the study area. These communities are considered environmentally sensitive due to close proximity to or being a waterbody, high rare plant potential, and a low likelihood of success in reclamation. At present, the wolf-willow community type is classed as "status uncertain" by ANHIC (2002b). ANHIC considers the wolf-willow group as a community of interest (John Rintoul, ANHIC, pers. comm.). Further provincial data is required to assess the status of this community type in Alberta, as there is currently little information available.

Areas assessed as having moderate sensitivity to development include the aspen - white spruce (c4.1), the white spruce - balsam poplar (g1.1) and the balsam poplar (f1.1) communities, which comprise 3.0 ha or 10.7% of the study area.

The impact assessment focuses on the communities with high and moderate sensitivity in the study area.

6.1.2 Existing Impacts

Much of the study area has been altered from a natural state due to past developments in the area. The riparian zone on most of the western bank of Policeman's Creek and a large portion of the eastern bank of Spring Creek have been altered from forested and shrubland vegetation types to a predominantly lawn-covered or roadway area. Only residual mature trees remain. The existing impacts to the meadow area in the southeast portion of the Restwell property are due in part to past disturbance, resulting in the clearing of trees and other native plants, and the introduction of weedy species. At present, several non-native plant species (e.g., Canada thistle, smooth brome and Kentucky bluegrass) are common in the area. Native plant species are limited in the meadow due to competition from non-native species.

Other existing impacts include informal trails and structures (a tree house and table) created for present and past recreation use. A portion of the informal trails are located in the riparian shrublands, contributing to habitat degradation, and in some locations may be contributing to bank erosion along Policeman's Creek. In addition, the Town of Canmore maintains a boardwalk along the riparian zone of a portion of the creek, and there are plans to expand it as part of a formal trail system.

6.1.3 Potential Impacts

The greatest potential impact to vegetation communities during any proposed construction is likely to be site clearing. Post-construction impacts include increased risk of the invasion of weedy species, including the potential for noxious weeds, and ongoing human traffic and associated disturbance (i.e., garbage, trails). This disturbance is of particular concern within those communities rated high for environmental sensitivity.

The proposed redevelopment plan for the Restwell property will result in some increase in natural communities, from existing conditions, and some loss of natural communities (Table 6-1). All areas of high sensitivity will be protected from development and restoration of degraded portions

of the stream banks will result in a net increase of approximately 1.7 ha or 6% of these valued communities, once final restoration has been completed. The increase in the high sensitivity areas will largely replace portions of areas presently classed as low sensitivity. The current areas of high sensitivity will be protected, and eventually expanded into the restored adjacent areas to be part of the environmental reserve.

Table 6-1 Changes in Areas of Environmental Sensitivity as a Result of the Area Redevelopment Plan

Sensitivity Rating	Baseline (ha)	Development (ha)	Percent Change of Study Area
High - Open water - Shrubland - Sedge meadow	5.01	6.72	6.0%
Medium - Aspen white spruce (c4.1) - Balsam poplar (f1.1) - Aspen white spruce disturbed (c4.1d) - White spruce-balsam poplar (g1.1)	3.20	1.53	-5.9%
Low - Urban - Disturbed meadow - New development in medium sensitivity area	20.16	20.12	-0.1
Totals	**28.37**	**28.37**	

The main vegetation types that will be reduced in area due to urban development include the white spruce (c4.1) and balsam poplar (f1.1) stands east of Policeman's Creek, both considered to have moderate sensitivities to development (Golder 2003). These areas will be reduced by approximately 6% in the study area (Table 6-1).

Areas classified as low sensitivity will remain more or less the same in area as baseline values. Areas of increase will include the development area east of Policeman's Creek. Areas where the classification of low will change, includes those areas along Spring and Policeman's creeks that will be restored and incorporated into the environmental reserve, becoming areas of high sensitivity.

6.1.4 Mitigation Proposed

The main mitigation measures that will eliminate or minimize impacts to vegetation include:

- avoiding development in areas rated high for environmental sensitivities;
- minimizing disturbance in areas rated moderate for environmental sensitivities, by minimizing the extent of roads, by retaining as many of the existing trees and shrubs where possible, and ensuring that owners of the single and double dwelling lots maintain natural landscaping;
- active restoration of areas of the environmental reserve, including existing disturbance not slated for development; in particular restoration will focus on the riparian zones along Policeman's and Spring creeks;
- use of trails along the creeks to focus pedestrian traffic;
- the use of native species in the restoration programs;
- salvage and use of topsoil and native vegetation, where possible;
- signage along the trail to encourage protection and maintenance of the environmental reserve, through an understanding of the values inherent in this area;
- ongoing monitoring and removal of non-native plant species in areas disturbed during development;
- public education to avoid excessive disturbance in sensitive areas including Policeman's and Spring creeks; and
- creation of abundant green space through municipal reserves and other park areas, to help attenuate flooding episodes and control storm water run-off.

6.1.4.1 Environmental Reserve – Restoration Along Creeks

A key component of environmental protection associated with the ARP is the protection and enhancement of the riparian zones along Spring and Policeman's creeks, through the development of an Environmental Reserve (ER). The ER will be an average of 8 m from the edge of the creeks (Figure 3-1). Under baseline conditions, a portion of the area to be restored is designated as urban, and currently consists of roadways and lawns. The redevelopment plan includes the restoration of the riparian edge within the ER, where it has been disturbed. Once complete, the ER will be approximately 6.72 ha, or 23.7% of the ARP. This will require

restoration of approximately 1.7 ha of riparian edge. Once complete, the ER will provide a contiguous cover of natural riparian forest, shrub and herb species, along both Spring and Policeman's creeks. A healthy and continuous riparian zone provides many benefits including habitat value, creek cover and a food source for fish and other wildlife. In addition, this edge can act as a filter and a buffer, protecting the creek from run-off and other creek side disturbances.

Prior to restoration, a clean-up program will be initiated and will include a weed control program as well as the removal of all unwanted debris and structures in the ER zone. The next step of restoration along the creeks will be to ensure protection of existing vegetation that is consistent with a riparian edge. This includes native trees and shrubs that are presently growing along the creek edges. In particular, the east edge of Spring Creek is, in many places, vegetated with a narrow strip of planted white spruce trees. For the most part, these trees will remain intact. In addition, care will be taken to avoid damaging the current vegetation and avoiding sediments from spilling into the creek. Further, all unauthorized structures on the property will be removed including the tree ladders, table and chairs.

Bank edges will be built-up with subsoil and a layer of topsoil, where necessary, to ensure that run-off does not flow from the redevelopment area into the creeks. That is, the riparian edge will be convex in nature, sloping towards the creek, on the creek side, and sloping towards the development area, on the development side (Figure 6-1).

The revegetation program will focus on the use of native species, which will be allowed to grow freely, with minimal landscaping. Table 6-2 provides a list of native tree, shrub, forb and grass species that may be used for the riparian revegetation program. It may be possible to salvage and transplant local shrub and forb species from the development area east of Policeman's Creek, for use in the restoration of these riparian zones.

A 2.5 m wide pedestrian trail, with periodic access to the creek, will be constructed within the ER that borders the creeks. This pathway will restrict traffic and trampling to a paved path, will limit the development of braided trails and will minimize vegetation degradation off the pathway. It will also act to keep people away from the creeks except at designated access points, and, during restoration, will encourage people to keep off reclaimed areas.

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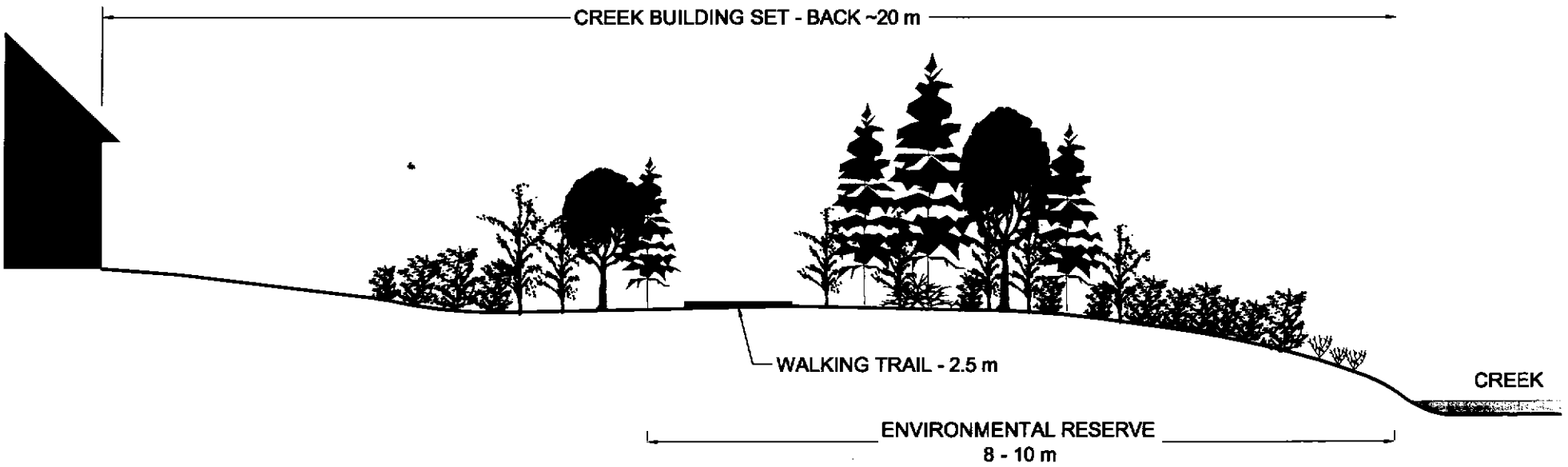

PROJECT
RESTWELL TRAILER PARK AND CABINS
AREA REDEVELOPMENT PLAN
CANMORE, ALBERTA

TITLE
CROSS SECTION OF PROPOSED RESTORED RIPARIAN EDGE

Golder Associates
Calgary, Alberta

PROJECT	022-2295.5310		FILE No.	X-Sec-Riparian	
DESIGN	SM	20/11/03	SCALE	NTS	REV. 2
CADD	GMF	27/11/03			
CHECK	SM	27/11/03			
REVIEW	MR	27/11/03			

FIGURE: 6-1

Table 6-2 Native Plant Species Suitable for Revegetation in the Study Area

Trees	Shrubs	Forbs	Graminoids
white spruce (*Picea glauca)*	willow (*Salix spp.*)	wild strawberry (*Fragaria virginiana*)	reed canary grass (*Phalaris arundinaceae*)
balsam poplar (*Populus balsamifera*)	red-osier dogwood (*Cornus stolonifer*)	bunchberry (*Cornus canadensis*)	fowl bluegrass (*Poa palustris*)
interior Douglas fir (*Pseudotsuga menziesii*)	shrubby cinquefoil (*Potentilla fruiticosa*)	smooth aster (*Aster laevis*)	water sedge (*Carex aquatalis*)
	wolf-willow (*Eleagnus commutata*)	horsetail (*Equisetum*)	sloughgrass (*Beckmannia syzigachne*)
	prickly rose (*Rosa acicularis*)	grass of parnassus (*Parnassia palustris*)	fuzzy-spiked rye (*Elymus innovatus*)
	snowberry (*Symphoricarpos albus*)	northern bedstraw (*Galium boreale*)	
	bearberry (*Arctostaphylos uva-ursi*)	cream-coloured vetchling (*Lathyrus ochroleucus*)	
	twinflower (*Linnaea borealis*)		

Signs erected along the path will inform the public of the ecological value of the reclamation program and the importance of protecting the riparian ecosystem. In particular, signs will provide information on riparian ecology, fish habitat value, spawning and habitat needs, wildlife and native plants.

Storm water management will be important for controlling and treating runoff from the developed area and limiting the amount of contaminants entering the ecosystem. Treating storm water will be very important on the Restwell lands and it will be essential to work with the town of Canmore to regulate the use of herbicides near the sensitive riparian community types.

The organic soil horizons (topsoil) located within any areas that are currently undeveloped will be salvaged if disturbed during the construction phase. The storage area for this soil should not be located on areas that remain unaffected by the redevelopment, or on an area of present weed infestation. This soil will be used for the reclamation of the areas of disturbance associated with

construction of roads and trails (i.e., the disturbed areas outside of the actual road surface such as the ditches and road cuts), for the restoration of the environmental reserve and for revegetation of the municipal reserves. The local topsoil will provide an added revegetation benefit, since it typically contains the propagules (seeds, roots, stolons) of native plant species which will aid in the reclamation program.

Active control of non-native plant species in areas disturbed during construction will limit the potential impacts to native vegetation. To minimize the spread of non-native and weedy species, a weed survey and control program will be implemented immediately prior to construction. In addition, sites designated as municipal reserve or green areas that become disturbed during construction should be revegetated as soon as possible to minimize weed encroachment (Table 6-2).

6.1.5 Residual Impacts

Following the application of mitigative strategies and restoration of the riparian zones classed as ER, many of the impacts will be reduced in magnitude and extent.

6.1.5.1 Natural Plant Communities

Negative impacts remaining include a loss of approximately 1.4 ha of the forested communities east of Policeman's Creek. This represents an effect of low magnitude, based on the amount of these communities that are currently present within the study area. The communities present in this area are not rare in the Bow Valley and are considered to be of moderate environmental sensitivity.

A positive residual impact resulting from the redevelopment plan will be the increased area and continuity of the riparian zone along both creeks and an enhancement of these areas. This will occur with the restoration and revegetation program planned for the area designated as ER, along both Spring and Policeman's creeks. Effects can be evaluated both by area and by length of the riparian zone. An increase of approximately 1.7 ha of restored riparian habitat along Spring and Policeman's creeks represents an overall increase of about 6% of riparian edge in the study area, and a low, positive effect. Currently, about 50% of the length of the riparian zone along Spring

and Policeman's creeks is disrupted by lawns, roadways and structures. Creek-side restoration will create a continuous, unfragmented riparian zone, no longer disconnected by lawns, roadways, and structures. As a result, habitat value will be enhanced by approximately 50%. This represents a positive effect of high magnitude. The overall effect of habitat restoration therefore is moderate, ranging from low to high.

Other benefits of the project include the overall increase in green space throughout the development area. Approximately 2.5 ha of Municipal Reserve will be planted with trees, shrub and forb species. In addition, there is a 20 m set-back applied to both Spring and Policeman's creeks, resulting in a no-build zone of approximately 2 ha. This area will be a combination of private and public space that will be maintained as green space. Other green areas include boulevards and other small parks, with an area of about 0.8 ha in the study area. In addition to visual aesthetics, these areas provide environmental benefits such as run-off control and habitat for small birds, squirrels and other wildlife.

6.1.5.2 Rare Communities

Only one rare plant community, the wolf-willow - shrub community, was found in the study area. It will not be affected by the development and the magnitude of the effect is therefore negligible.

6.1.5.3 Rare Plants

Effects to rare plants are considered to be negligible as the rare plant community within the study area will not be affected and as no rare plants were recorded in the forested lands east of Policeman's Creek.

6.2 Wildlife

6.2.1 Environmental Sensitivities

The riparian habitats were the only habitats rated as highly sensitive to development in the baseline report (Golder 2003), largely because they provide habitat for listed wildlife species, are in good condition in some areas and are important for the maintenance of ecological function in

the area. These habitats may support several amphibian species, including the listed Columbia spotted frog, long-toed salamander and western toad, although the 2003 spring survey only found evidence of the wood frog. These areas are also well used by a variety of wildlife species including shorebirds and waterfowl. The treed habitats within the undeveloped area east of Policeman's Creek are rated as being moderately sensitive to development in part because they have a relatively restricted distribution and provide a diversity of habitats. The large, mature trees provide nesting opportunities for birds, such as the listed pileated and black-backed woodpeckers. An elk rub was also observed in this area.

The main wildlife sensitivity for redevelopment of the Restwell property is the proximity to the South Canmore Local Habitat Patch south of the property (Figure 2-2). This area is also designated as an Environmentally Sensitive Area under the Canmore Municipal Development Plan because of its importance as a key component in the regional wildlife corridor system and will require consideration in the Restwell Area Redevelopment Plan.

6.2.2 Existing Impacts

The existing impacts to wildlife on the Restwell property include the direct (e.g., existing development and informal trails) and indirect (e.g., noise) degradation of habitats due to human influences. Habitats for species using the riparian zone of Policeman's and Spring creeks have been degraded through the removal of woody hiding cover such as low shrubs. The terrestrial wildlife habitats east of Policeman's Creek are largely intact but are interlaced with networks of trails and are bounded to the east by the CPR tracks. This area does not have any potential as a wildlife corridor as it is bounded on the east by the development, on the west by the railway tracks, and forms a dead end to the north (Figures 2-1 and 2-2).

6.2.3 Potential Impacts

Potential direct impacts as a result of redevelopment of the Restwell property include the permanent loss of habitat due to site clearing east of Policeman's Creek. Indirect habitat loss and change in wildlife use on and adjacent to the property due to sensory disturbance (i.e., increased traffic and noise) are also potential effects. Wildlife movements are not a concern as the study area does not contain any lands considered to be wildlife corridors. Mortality of wildlife during

site clearing is a concern for breeding birds, as is the possibility of increased human-wildlife interaction due to the proposed higher human population.

6.2.4 Mitigation Proposed

The main mitigation measures recommended for reducing impacts to wildlife and wildlife habitat include:

- avoiding development in areas rated high for environmental sensitivities;
- minimizing disturbance in areas rated moderate for environmental sensitivities, by minimizing the extent of roads, by retaining as many of the existing trees and shrubs where possible, and ensuring that owners of the single dwelling lots maintain natural landscaping;
- active restoration of areas of existing disturbance not slated for development; in particular, the riparian zones along Policeman's and Spring creeks;
- the use of native species in the restoration programs;
- timing restrictions for construction in moderately sensitive areas to avoid sensitive periods (i.e., late winter and spring);
- phased development, concentrating on the disturbed, low sensitivity areas in the early phases;
- site and building design specifications that minimize noise and light pollution into undeveloped areas;
- use of bear proof garbage containers;
- use of trails along the creeks to focus pedestrian traffic;
- public education (signage, pamphlets) to avoid excessive disturbance in sensitive areas including Policeman's and Spring creeks, and the South Canmore Local Habitat Patch; and
- public education with respect to the potential for human - wildlife interaction.

The riparian areas along both Policeman's and Spring creeks are the most sensitive wildlife habitat. Reclamation along these watercourses will restore aquatic and riparian habitats, providing cover and forage for a variety of species.

The treed habitats may provide winter habitat for ungulates and the large, mature trees provide nesting opportunities for a variety of birds including a number of listed species. These areas are not pristine given the network of informal trails and proximity to human development; however, they are still used by some wildlife species. Consideration should be given to building first on areas of existing disturbance and keeping the footprint as small as possible. Native plant species that are less palatable to wildlife should be considered for the landscaping in developed areas, to minimize risk of invasion by non-native and invasive species and to reduce the risk of attracting wildlife to human use areas.

The designation of pedestrian trails, the reclamation of the network of informal trails and the removal of the tree ladders and other man-made structures will reduce the direct and indirect disturbance to wildlife. The reclamation of the trails and other disturbed areas not slated for development will increase the forage and cover habitat for ungulates, shrub nesting birds and small carnivores in these areas. This change in vegetation cover will have to be balanced with fire regulations for fuel loading as per The Town of Canmore Wildland/Urban Interface Plan (Walkinshaw 2002).

The timing of construction should avoid sensitive periods for wildlife. Late winter is a critical period for ungulates, and key winter range is often along river valleys. The winter is a difficult period and females are particularly at risk as they are pregnant at this time. Land use guidelines for ungulates recommend minimizing disturbance from January 1 to April 30 in southern Alberta (ASRD 2000). The spring breeding period is also a sensitive time for birds. The breeding period varies by species but generally occurs from late winter, for some raptor species, through June. Site clearing would be best timed to occur in the fall and early winter.

Indirect habitat loss from sensory disturbance will be minimized through site and building design specifications. These plans will be particularly important in the area adjacent to the South Canmore Local Habitat Patch. Examples include:

- restricting external lighting in areas adjacent to undeveloped vegetation patches and the local habitat patch to allow for ease of nightly travel for wildlife, which will also deter human use of these areas at night thereby allowing more freedom of movement for wildlife;

- vegetation buffers along the perimeter of the property to create a visual and noise barrier;
- locating areas of high human use away from the South Canmore Local Habitat Patch; and
- not permitting trails or links to the habitat patch.

A public education program can be very effective for reducing potential impacts to wildlife. Education material, including signage and guidelines for residents, should provide information on the following:

- restrictions on barbecues, composters and bird feeders in areas adjacent to the habitat patch to reduce the risk of attracting wildlife;
- use of bear proof garbage collection containers to minimize risk of wildlife-human interaction;
- reclamation programs and the importance of using designated trails;
- value of wildlife habitat on and adjacent to the property; and
- the purpose and ecological value of the nearby South Canmore Local Habitat Patch.

6.2.5 Residual Impacts

6.2.5.1 Habitat

The development east of Policeman's Creek will result in the direct and permanent loss of wildlife habitat through site clearing. Some 1.7 ha or 6% of the study area will be affected by site clearing. This represents a low impact in the local context. However, such community types are not uncommon or limiting in the Bow Valley as a whole.

A positive change in riparian wildlife habitat is predicted due to development setback requirements along watercourses and habitat restoration within the ER, resulting in an eventual increase in the area of highly sensitive communities in the study area. In addition, riparian restoration will create a continuous, unfragmented riparian zone of higher habitat value. As described in the vegetation section, reclamation using native vegetation will restore riparian

habitats that have been degraded through previous human use. This effect is predicted to be positive and moderate in magnitude.

6.2.5.2 Disturbance

Construction of houses east of Policemen Creek and higher density housing on the developed areas has the potential to disturb wildlife. However, these areas are bounded by development and animals that use these areas are likely tolerant of human disturbance. Use of a trail system to concentrate people and to deter them from using the South Canmore Local Habitat Patch will be beneficial in limiting effects. This mitigation and other techniques described above will limit the effect to negligible to low in magnitude.

6.2.5.3 Movement

No effects on wildlife corridors are expected given that the development is not situated near a corridor.

6.2.5.4 Mortality

Mortality during site clearing will be minimized by timing construction to the fall and early winter when animals are no longer nesting and when young of the year are mobile. Mortality related to "nuisance" wildlife will be limited through use of bear proof garbage containers, prohibition of bird feeders, and public education. Wildlife mortality is expected to be negligible to low in magnitude.

6.3 Fish and Fish Habitat

The primary fish and fish habitat constraints are the protection of Spring Creek and Policeman's Creek, both of which are designated as Class B watercourses by Alberta Sustainable Resource Development. Policeman's Creek, in particular, provides important brown trout and brook trout spawning habitat as well as rearing habitat for mountain whitefish.

6.3.1 Environmental Sensitivities

The creeks are designated as Class "B" as they are considered to have a high sensitivity. This is because they provide habitat for brown trout, brook trout and mountain whitefish. This classification permits development as long as the sensitivity and vulnerability of the system is accounted for and avoidance and mitigation of any potential impacts are incorporated into a redevelopment plan.

6.3.2 Existing Impacts

Existing anthropogenic impacts to Spring and Policeman's creeks include instream structures (e.g., groynes, bridges, docks), and encroachment of roads and structures (e.g., buildings) into the riparian zones. In addition, clearing of vegetation and seeding of lawns has degraded the riparian vegetation.

6.3.2.1 Spring Creek

Approximately 75% of the length of Spring Creek has been affected by anthropogenic factors. Nearly 50% of its banks have been artificially enhanced with log deflectors and rock weirs. In years following the installation of the log deflectors and rock weirs, stream flows in Spring Creek were very low. The low flows have resulted in the exposure of some instream structures, which has subjected them to the elements including frost heaves; thereby, reducing the effectiveness of these structures. The upper 75% of the left downstream bank has been incorporated into the landscape architecture of adjacent residential homes, while the right downstream bank is paralleled by a road for approximately 400 m. Additional anthropogenic impacts observed in Spring Creek included discarded Christmas trees and lumber.

6.3.2.2 Policeman's Creek

Upper Policeman's Creek flows through developed areas, where it is influenced by road and foot bridges, fords, and riparian habitat clearing. Additional human activities, such as earthworks and vehicle fords, were noted along the banks of Policeman's Creek. Small, dispersed patches of gravel and cobble were observed in the middle section of the creek and along the bank edges.

The riffle areas and higher velocity runs in Policeman's Creek provide substrates and velocities suitable for spawning activity by all salmonid species. All low velocity habitats (including low velocity runs, peripheral areas, backwater areas and pool habitats) are silt laden. Silt deposition is apparent in pool and backwater habitats and in lower gradient areas that consist of long glides. There is also evidence that the substrate quality has degraded in Policeman's Creek due to silt deposition.

6.3.3 Potential Impacts

Potential impacts are related to habitat loss or alteration, impedance of fish movements, or impacts to water quality through siltation or contaminants. No instream work is anticipated for the development other than for installation of a bridge over Policeman's Creek. This bridge is the subject of an application to the Department of Fisheries and Oceans and is not considered in this assessment.

The primary concern for fish and fish habitat in Spring and Policeman's creeks during site development is the generation of sediments and potential for siltation, both in the immediate vicinity and downstream of the development. Sediments in suspension have been shown to influence fish behaviourally by affecting their ability to find food, for example, but are rarely directly fatal. Fish often respond to adverse levels of suspended sediments by moving out of the area to avoid them, returning as conditions return to normal. More serious than suspended sediments is the resultant siltation of substrates. The known effects of silt deposition are the loss of spawning habitat and the smothering of developing eggs following spawning. A critical period for the three major fish species in Spring Creek and lower Policeman's Creek is the fall and winter period, as these fish species are fall spawners.

6.3.4 Mitigation Proposed

The main mitigation measures proposed for reducing impacts to fish and fish habitat include:

- development of an ER along both creeks;
- retention of existing vegetation along Policeman's and Spring creeks;
- bank stabilization and vegetation reclamation;

- natural revegetation of the riparian zone along both creeks to provide overbank cover, and to extend the riparian zone;
- timing restrictions for construction to avoid spawning periods;
- creek bank development designed to restrict run-off into the creeks;
- silt control measures during construction;
- control and treatment of storm water;
- instream enhancement; and
- public education.

The environmental reserve will be a 7 to 10 m riparian edge, with an average width of 8 m. In addition, building setback requirements of approximately 20 m from the creek edge will reduce both direct and indirect impacts on the fish and fish habitat in Spring and Policeman's creeks. Important for the long-term health of fish and fish habitat is the control and treatment of storm water, the placement of suitable riparian vegetation that will provide for the protection of stream banks from erosion, overhead cover to protect thermal regimes, and maintenance of optimal water quality for aquatic biota.

Effort will be applied to minimize the input of sediments from construction activities into the watercourses. Substrate conditions have degraded throughout much of Spring Creek because of the introduction of sediments, and additional inputs will further degrade the quality of habitat for fish in both Spring Creek and lower Policeman's Creek. As lower Policeman's Creek provides important fish habitat, notably for brown trout spawning, any siltation in this section of stream would have negative adverse effects on the population.

Spring and Policeman's creeks have the highest fish habitat sensitivities during the spawning and egg incubation periods (i.e., September to April). Construction activities during this period should use appropriate mitigation to minimize introduction of sediments into the creeks.

Existing riparian vegetation, including the large trees that border the stream banks, should be protected to prevent erosion of stream banks and overhead cover, and to minimize sediments entering the creeks.

Additionally, opportunities exist to enhance portions of Spring Creek, which have previously been degraded by siltation and beaver activity. Instream enhancement, along with additional stream bank protection measures, may improve the quality of habitat and enhance the creek's potential to support fish.

6.3.5 Residual Impacts

A net positive change of moderate magnitude is predicted for fish and fish habitat due to setback requirements along Spring and Policeman's creeks, bank stabilization and reclamation within and adjacent to the creeks.

Timing windows for construction and use of Best Management Practices such as silt curtains will result in negligible to low impacts to water quality and fish habitat due to siltation. Appropriate design of storm sewers will also prevent unacceptable effects from occurring. Effects are predicted to be negligible to low in magnitude.

6.3.6 Enhancement Opportunities

Instream enhancement could also result in a positive effect of moderate magnitude. Activities designed to improve the fish habitat quality will be explored, and may include:

- dredging and silt removal from the bed of Spring Creek, where spawning gravels have been covered by a thick layer of silt;
- placement of spawning gravels extracted from Cougar Creek, if needed, in areas of Spring Creek – this could done as well as or in place of silt removal;
- enhancement of the pool-riffle sequence in Spring Creek; and
- introduction and anchoring of coarse woody debris in Spring Creek to provide habitat and cover.

7. SUMMARY

As the majority of the Restwell property has previously been developed and the sensitive riparian areas will be reclaimed within the development setback required for redevelopment areas, the impacts to vegetation and wildlife are predicted to range from low negative to moderate positive, and the impacts to fish are predicted to be low to moderate positive (Table 7-1).

Table 7-1 Summary of Predicted Effects

Resource	Effect	Direction	Magnitude
vegetation	habitat loss	negative	low
	habitat gain	positive	moderate
	rare communities	neutral	negligible
	rare plants	neutral	negligible
wildlife	habitat loss	negative	low
	habitat gain	positive	moderate
	disturbance	neutral to negative	negligible to low
	movement	neutral	negligible
	mortality	neutral to negative	negligible to low
fish and fish habitat	fish habitat	positive	moderate
	water quality	positive	low
	instream enhancement	positive	moderate

The greatest source of impact to vegetation is the low density development planned for the moderately sensitive wooded area east of Policeman's Creek. However, because this area will support low density development and will also include environmental reserve along the creek with a minimum 10 m width, a total set-back area from the creek of 20 m, a large municipal reserve area and natural landscaping, the impact is considered to be low, with a total of approximately 1.7 ha of development footprint, or 6% of the study area. Other components of the ARP are considered to result in a positive effect to vegetation of moderate magnitude, including no development in areas of high sensitivity and the establishment and restoration of a continuous environmental reserve along the edges of both Spring and Policeman's creeks, with an average width of 8 m. In addition, the area will support a large area of municipal reserve, environmental set-back and other green areas, totaling approximately 40% of the study area. Reclamation

activities will focus on the use of native species and the salvage and application of local topsoil, seed sources and plants, and public education will promote environmentally responsible land-use.

Wildlife habitat is expected to be minimally affected. The establishment of an environmental reserve and restoration of a continuous riparian habitat along both creeks will have a positive effect of moderate magnitude. However, an increase in the local population causing an increase in activity along the trails could result in heightened disturbance to wildlife in the area. Mitigation to control and reduce disturbance will include responsible garbage disposal, signage along the trails to promote environmental protection, promotion of trail use by construction of a high-quality trail and signage to discourage off-trail use.

Fisheries impacts resulting from the ARP are considered to be positive and of low to moderate magnitude. Protection and restoration of the riparian zone along Spring and Policeman's creeks will serve to protect and enhance fish habitat and water quality. Stormwater management, increased green space and run-off control measures will further act to protect and improve water quality. Further, the opportunity to improve fish habitat through the placement of spawning gravels and cover, as well as the potential to remove silts (currently covering spawning gravels) during project development, will be explored.

8. CLOSURE

We trust the above meets your present requirements. If you have any questions or require additional details, please contact the undersigned.

GOLDER ASSOCIATES LTD.

Report prepared by:

Sandra Marken, M.Sc, P.Biol.
Wildlife Biologist

Report reviewed by:

Michael Raine, M.Sc., P. Biol.
Associate; Terrestrial Ecologist

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