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SUPPORTING DOCUMENT

Three Sisters Mountain Village Area Structure Plan - Wildlife Exclosure Fence and Associated Mitigation

Golder Associates

Wildlife Exclosure Fence and Associated Mitigation

Fencing

The fence is proposed to be 2.5 m high page wire with a buried apron and a high tensile strand on top to reduce the likelihood of tree fall damage. This is similar in design to the highway fencing that has been in place along the TransCanada Highway Phase 3A and 3B in Banff National Park which has been very effective at reducing wildlife entry onto the highway right-of-way and thereby substantially reducing wildlife-vehicle collisions. The fence should be located to be as visually unobstrusive as possible, wherever practical. The fence should be sited to take advantage of screening vegetation and topography to reduce it's visual impact. Ephemeral and permanent streams flowing through the fence will be directed through culverts as has been successfully demonstrated along the TransCanada Highway. Based on knowledge of the existing drainages, culvert diameters will be sufficiently small that bears and wolves cannot pass through them. If additional capacity is required, then small diameter culverts should be grouped to reach the desired capacity with culverts diameters below the size that black bears and other large mammals can traverse. At each entry-exit where pedestrian trails inside the fence connect to Canmore's regional designated trail system, there will be a pedestrian gate to allow people to come and go without hindrance.

Fence Outriggers

In addition, an outrigger will be used to prevent access by climbing carnivores (i.e., black bears, cougars). The concept of an outrigger for fencing was described as early as 1958. A number of different outrigger designs have been used in North America for this purpose including both non-electrified and electrified options. For example, non-electrified outriggers were used to prevent cougar access to SR-84 when it was upgraded to interstate standards in Florida and researchers in Banff National Park suggested an outrigger design to prevent intrusion by cougars on the TransCanada Highway in Banff National Park. Other designs that have been proposed include one that has a flexible top which climbing carnivores cannot grip onto and therefore cannot climb over. Parks Canada and Canadian Pacific Railway are currently testing a number of different fencing options including an electric outrigger affixed 1.5 m off the ground on a standard 2.5 m high page wire fence to keep bears off the railway right-of-way. The railway monitoring project was initiated in 2012 and final results will be available in 2015, although interim findings should be available throughout the period of study. Given the higher maintenance requirements of electrified outriggers, a non-electrified outrigger is currently the preferred option.

Jump-outs and One-way Gates

Whenever a fence is erected to keep wildlife out, a means of moving wildlife out of the developed area is required. Jump-outs or one-way gates should be incorporated into the fence design specifically to allow for the removal of wildlife that inadvertently or otherwise breaches the fence. These jump-outs and one-way gates are in routine use along the TransCanada Highway in Banff National Park.

One-way gates have been a common escape passage utilized in wildlife fences. Typical one-way gates are constructed of two sets of curved tines mounted vertically on spring closed hinges (BC RMB 1996). The tines curve away from the enclosure side of the fence towards the outside and should be equipped with ball ends to prevent laceration to wildlife that may reverse direction through the one-way gate or attempt to enter from the outside (BC RMB 1996). Strategic placement of one-way gates can increase their efficacy. Fence lines that

funnel animals towards the one-way gate or are offset at the one-way gate are considered effective designs (BC RMB 1996). Both approaches maximize the probability of an animal traveling along the inside of the fence line encountering the one-way gate.

In a study that tested preferential use between one-way gates and jump-outs, Bisonnette and Hammer (2000) found jump-outs to be 8 to 11 times more effective than one-way gates in allowing deer to escape fenced enclosures. Jump-outs are earthen ramps constructed against a backing material that allow animals trapped inside the fence to walk up to the top of the fence and jump down to the outside (Bisonnette and Hammer 2000, Huijser and Paul 2008, Huijser et al. 2009). Typically, jump-out heights range from 1.5 to 2.2 m (Bisonnette and Hammer 2000, Huijser and Paul 2008). The taller fence is lowered at the ramp site and forms an integral part of the drop-off that allows animals to jump to the outside of the fence (Bisonnette and Hammer 2000). A short fence on the jump-out ramp, perpendicular to the main fence line, is sometimes used to guide animals off the jump-out (Bisonnette and Hammer 2000, Huijser and Paul 2008). Although jump-outs have been shown to be effective for deer and other ungulates, there is little literature available on their use by other wildlife species. Accordingly, a combination of one-way gates and jump-outs may be the best mitigation strategy to provide suitable and efficient escape passage for a diversity of wildlife species.

Proper location and spacing of escape passage mitigation is important. Placement of one-way gates or jump-outs at intervals of approximately 0.5 km throughout the length of the fence is recommended, and frequency should be increased to approximately every 0.25 km for the first kilometre at fence-ends. With proper mitigation in place, the proposed wildlife fence should reduce the likelihood of wildlife entrapment.

Entry-Exit Installations

Where the fence intersects with a road or a golf cart track, ElectroMat™ installations may be used to permit vehicle passage but help prevent wildlife. ElectroMat™ is an electrically-charged mat that is embedded in the roadway or pathway that wildlife does not cross but vehicles can cross safely. They have been used in a variety of locations across North America including on roads where snowplowing is required.

Additionally, at each entry-exit for cars or golf carts and in locations where the trail system inside the development is connected to Canmore's regional designated trail system, there will be a pedestrian gate to allow people to come and go without hindrance. The walk-through gate allows easy passage of pedestrians but prevents movement of large mammals and unauthorized vehicles. Many designs are available including those involving stairs and swing gates (e.g., entry point to the Pipestone Trail system from the Lake Louise Ski Hill base lodge area) and labyrinth gates (e.g., bicycle path gate in the TransCanada Highway wildlife fence in Golden, British Columbia).

Stewart Creek Across Valley Corridor Wildlife Crossing Structure

Wildlife crossing mitigation is recommended for the road that will be required between Site 7/8 and Stewart Creek developments. Given the number of vehicles using the road, estimated to be up to 7,000 daily passes, the most effective mitigation is a crossing structure, such as an overpass or underpass. The specific design of the structure is not specified at this time, but a number of options are available (FHWA 2011) and have been implemented successfully in the past along the TransCanada Highway (Clevenger et al. 2009). The crossing structure should be built prior to the development of Site 7/8 and should be the responsibility of the developer of Site 7/8.

References

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