Teton County Best Practices Analysis

Planned Residential Development (PRD) Design and Stewardship

Planned Residential Development (PRD), one type of "conservation development," is an alternative form of residential development in which homes are built on smaller lots and clustered together and the remainder of the property is protected for conservation purposes (Arendt 1996; Pejchar et al. 2007; Reed et al. 2013). This tool is often implemented in exurban or rural landscapes where large private ranchlands are being subdivided for residential development, with a goal of protecting biodiversity, agricultural lands, cultural resources, or aesthetic values (McMahon 2010). Because private lands are usually more biologically productive than public protected lands and support habitat for a disproportionate number of species (Wilcove et al. 1996), residential subdivisions can have serious impacts to wildlife and other natural resources. These impacts include increased light, noise, and domestic animals (Hansen et al. 2005), changes in plant and animal community composition, and decreased habitat connectivity (Theobald et al. 1997).

PRDs should be designed and managed to minimize these impacts and provide conservation benefits using the following steps:

1) Conduct ecological site analysis prior to design of development

Ecological site analysis in consultation with a biological expert (e.g. state wildlife agency or conservation organization) should be used to identify and map the most ecologically sensitive/valuable areas of the property *prior* to the design of the developed area (Margules and Pressey 2000; Reed et al. 2013). This information should be used to site homes away from these areas (Pejchar et al. 2007) and to guide the location and design of protected lands.

2) Maintain landscape continuity

This process of identifying important ecological areas on the property should comply with a county-wide conservation plan (e.g., Natural Resources Overlay) so that the PRD contributes to habitat conservation, connectivity and view sheds on a landscape scale. Protected lands should be located so they connect to other protected lands or open space networks in the vicinity of the PRD (Reed et al. 2013). Landscape corridors facilitate species movement and dispersal (Gilbert-Norton et al. 2010) and increase regional biodiversity (Damschen et al. 2006).

3) Cluster homes to maximize contiguous open space

Homes should be clustered away from important ecological areas in a configuration that maximizes contiguous open space. Clustering homes in this way should reduce the effects of residential development on protected lands by minimizing the zones of influence around individual homes (Theobald et al. 1997; Odell and Knight 2001).

4) Require minimum built/open space ratio and total area of open space

A minimum ratio of built area (including impervious surfaces) to open space and a minimum total area of contiguous open space should be required in order to provide sufficient habitat for species of interest. This is often expressed as the mean proportion of the site area that must be protected (Reed et al. 2013). The percentage of the property that should be protected could be scaled to the overall size of the property to incentivize the protection of large areas of contiguous open space. For example, the Montana Department of Fish, Wildlife & Parks (FWP 2012) suggests that 95% of the ecologically relevant portions of a 25-100 acre property, 90% of a 100-1000 acre property, 80% of >1000 acre property should be set aside.

A minimum total area of protected open space is critical because small remnant areas have limited value for biodiversity (Fahrig 2003). For example, minimum patch size requirements (the area below which a species cannot persist) have been measured for a variety of western wildlife species (Table 1). These estimates, which are based on an at least 50% probability that the species will persist in an area of this size, could be used to determine the minimum area of open space needed to protect species of concern in Teton County. Similarly, in order to serve as an effective movement corridor for ungulates, the open space portion of the PRD must be at least 1 mile wide for elk, and ½ mile wide for deer and moose (FWP 2012). It is critical to note that the ability of the open space to serve as viable habitat or movement corridors for plant and animal populations is highly dependent on the quality of the habitat within and surrounding the PRD (McCoy and Muschinsky 2007; Prugh et al. 2008), and that the presence and abundance of species may vary as a function of distance to development (Bock et al. 2002).

Species/Taxa	Minimum area required (ac)	Source
Grassland birds	61-358	Davis (2004)
Warblers	37-49	Butcher et al. (2010)
Coyote	2.4	Crooks (2002)
Bobcat	445	Crooks (2002)
Mountain Lion	5683	Crooks (2002)

Table 1. Minimum area (with a 50% probability of occurrence) that will support a species or a group of species according to published scientific studies in western North America.

5) Use caution in offering the density bonus as an incentive

Density bonuses, which are commonly associated with PRDs, increase housing density which generally leads to declines in ecological integrity and wildlife populations (McKinney 2002). Where financially feasible, PRD developers should be offered alternative incentives such as streamlined review, reduced fees, or tax credits to compliment a smaller density bonus. In addition to achieving conservation goals, limiting the number of additional homes allowed may make economic sense. Previous studies have shown that the open space amenity associated with PRD-like subdivisions results in a significant sales premium relative to comparable conventional

subdivisions (Mohamed 2006; Bowman et al. 2009; Hannum et al. 2012). Given a theoretical property, allocating two-thirds of the total land area to conservation results in twice the price premium of allocating the same land to larger individual lots in comparable counties in Colorado (Hannum et al. 2012). It should be possible to calculate the point at which adding additional homes through a density bonus in Teton County no longer results in substantially greater economic return. This information, along with our understanding of the ecological impacts associated with higher housing density, could be used to set a limit on allowable density bonuses associated with PRDs.

6) Engage contractors and landscapers in the design phase of development

The construction phase of development can impact the long-term conservation value of a PRD (Hostetler and Drake 2009). For example, heavy construction vehicles can compact the roots of trees resulting in their death. To avoid this, vehicles must circumvent around the drip line (outer edge of canopy) of the tree. Specific areas should be designated for disposal of debris and chemicals and silt fences should be maintained in order to prevent erosion into wetlands and other water bodies during construction. Mandating that a well-trained construction manager be hired to identify any natural resource issues that emerge during the construction phase can help prevent these impacts.

7) Develop a management plan for long-term stewardship of open space

The open space should be managed explicitly for the protection of biodiversity, agriculture or other values of the community as expressed through the comprehensive plan and relevant ordinance(s). This will require a management plan and a funding source (Hockings 2003). Active stewardship (e.g. removal of invasive species, ecological restoration) and clear management guidelines (regulations regarding domestic animals, motorized-vehicle recreation, timber harvest, light and noise, etc.) will almost always be necessary to meet the long-term objectives of the PRD (Chape et al. 2005). Even passive recreational use of the protected lands could reduce species richness and activity levels of wildlife (Reed and Merenlender 2008). In some cases, seasonal restrictions on permitted activities will be appropriate.

8) Encourage monitoring to evaluate success

The open space portion of PRDs should be monitored to ensure not only compliance with the ordinance, but also to quantitatively assess whether the PRD is meeting the objectives of the values expressed by the community in the comprehensive plan (Kiesecker et al. 2007). PRDs are rarely evaluated for their success in meeting conservation goals or in protecting non-target natural resources over the long term or in comparison with conventional developments (Milder et al. 2008). Research on this topic is limited and has produced mixed results (Nilon et al. 1995; Lenth et al. 2006; Milder et al. 2008).

Note: If Teton County is interested in model language for one or more of the above components, which together would make up an exemplary PRD ordinance, we may be able to provide examples of strong PRD ordinances from other western U.S. counties.

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