

### 3. Concepts & Land-Use Management Framework

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The Peel Watershed Regional Land Use Plan broadly describes the desired future condition of the region. It also provides specific management considerations for different areas within the region.

The Plan uses four tools, to be applied in combination to frame and guide sustainable land-use management in the region:

- Landscape Management Units;
- Land-Use Designation System;
- General Management Directions; and,
- Results-based Management Framework.

These tools complement each other and form part of an integrated land management framework. Some innovations were introduced that will be unique to Yukon regional planning (e.g., use of grandfathered access to mineral claims as an interim measure).

Given the region's complex physiography, known ecological sensitivities, and our current understanding of land-use compatibilities, it may also be necessary to manage surface footprint or cumulative impacts through the use of specific tools called *activity indicator levels*. These tools enable ongoing monitoring of resource use within the framework of adaptive management and precautionary principles.

In the future, it is anticipated that new information may lead to a change in the designation for some Land Management Units. Possible factors include new government policy/regulations, economic opportunities, environmental management or industrial technologies, land-use and management assessment tools, and resource best-management practices. This approach is called *adaptive land-use management and planning*, and it means that specific terms and conditions for management of activities are applied based on: (i) widely accepted ecosystem management principles; (ii) their suitability to the ecosystems that make up the Peel region; and (iii) capacity to measure success in achieving land-use management goals and objectives.

#### 3.1. Landscape Management Unit (LMUs)

Landscape Management Units (LMUs) are distinct areas of land that typically have well-defined ecological boundaries (i.e., landforms, vegetation, and drainage). Some LMUs are further defined on the basis of unique ecological characteristics that provide impetus for special management (e.g., lakes and wetlands on permafrost). Still other units are further defined by the clustering of existing or potential land use (e.g., Eagle Plains oil & gas basin, historical/existing mineral claim areas, First Nations community resource-use).

Watershed units make up the fundamental structure of most LMUs for the following reasons:

- recognition of regional management priority for aquatic resource stewardship;
- function as major wildlife migratory corridors; and,
- delineation of common land-use patterns (e.g., First Nations, tourism, access and travel corridors).

Thirteen major LMUs are identified in the Peel Watershed Planning Region (Map 1, Appendix A). LMUs are further divided into an additional forty-six sub-LMUs.

### **3.2. Land-Use Designation System**

A Land-Use Designation System is used to guide the management of land-use activities within the LMUs. It provides the broadest level of guidance for land and resource decision making. The system consists of different landscape categories that describe the overarching management intent for an LMU. Each LMU and/or LMU sub-unit is assigned to a land-use designation category, or zone. A future Plan review may determine that further modifications to LMU boundaries or designation may be required to meet future management goals.

The Commission has gained considerable insight through the research and consultation process that guided the creation of this land-use management framework. The framework achieves the Commission's Statement of Intent by providing the following:

- A designation that allows varying degrees of non-renewable resource use, subject to the implementation of an appropriate management regime for compliance, monitoring, and restoration; and,
- Designations that recognize and protect, as paramount, ecological and cultural resources and integrity of key landscapes.

Inter-regional consistency has been achieved with this Plan by linking with the existing land-use zoning systems used by the Gwich'in Land-Use Planning Board, and the North Yukon Planning Commission.

#### **Important Cultural Areas**

Every affected First Nation expressed that the entire region is culturally important. However, a number of localized areas came up repeatedly as being especially important for historical, current, and even future use. These areas are labeled *Important Cultural Areas* on most maps in this plan. While cultural and traditional pursuits are allowed throughout the region, they are the primary management direction for the *Important Cultural Areas*. Any proposed developments in these areas would require consultation with, and participation of, the affected First Nation(s) over and above what is required elsewhere.

**Table 3.1.** Land-use designation system for Peel Watershed Planning Region

Zone	Description	Zone	Characteristics of Zone	Management Intent
Recommended Conservation and Protection Zones: Tier I – Ecosystem Protection	Legally designated land areas withdrawn from surface and subsurface rights issuance.	Critical Landscape Zones (CLZs)	Areas that warrant higher levels of protection for long-term stewardship of sensitive ecosystems, critical habitat, and/or cultural landscapes.	Largely undisturbed natural environment. Some LMU sub-units provide allowable surface uses (e.g., camps, cabins, and buildings for cultural purposes) subject to compliance with zone management objectives.
		River Corridor Zones (RCZs)	Generally flat terrain lying between toes of mountains or escarpments adjacent to major streams and rivers.	Largely undisturbed natural environment; recognize the unique biophysical position, importance of river corridors and connectivity to the surrounding landscape to maintain key ecological functions, and compatible resource uses; conditional access to existing industrial tenure within specified sections of the RCZs (specified by LMU).
		Remote Access Lakes (RALs)	Fly-in lakes used, or that could be used, for remote wilderness access.	Largely undisturbed natural environment; allow for regulation of private and public access into remote lakes, and no new surface or subsurface uses.
Recommended Conservation and Protection Zones: Tier II – Wilderness Conservation	Existing surface and subsurface dispositions are grandfathered, but remaining lands are withdrawn from new surface and subsurface tenures.	General Conservation Zones (GCZs)	Large areas of mostly wilderness with some existing industrial tenures.	Lowest Development: Maintaining ecological integrity and protecting heritage and cultural resources are the priorities, while minimizing expansion of industrial activity to accommodate existing tenures. The long-term intent is no industrial activity, restore and maintain a natural environment that is mostly undisturbed at present; provide conditional access to industrial tenures.
Integrated Management Zones (IMZs)	Subsurface resource extraction while minimizing land-use conflicts and maintaining long-term ecosystem function.	Zone I	Very high ecological and heritage/cultural values within a sensitive biophysical setting.	Lowest Development: Maintaining ecological integrity and protecting heritage and cultural resources are the priorities.
		Zone II	High ecological and heritage/cultural values within a moderately sensitive biophysical setting.	Low Development: Maintaining ecological integrity, protecting heritage and cultural resources, and minimizing land-use impacts are the priorities.
		Zone III	Moderate ecological and heritage/cultural values within a moderately sensitive biophysical setting.	Moderate Development: Conservative levels of land use are consistent with Zone III objectives.
		Zone IV	Lower ecological and heritage/cultural values within a moderately sensitive biophysical setting.	Highest Development: Higher levels of land use are consistent with Zone IV objectives.

### 3.2.1. Description of Management Zones

Two types of Planning Zones were created to guide future land-use decisions in the Region: Recommended Conservation and Protection Zones, and Integrated Management Zones. Each type is further divided into sub-zones that define the management intent at the LMU sub-unit level. The recommended zone for each LMU (or sub-unit) is depicted on Map 2, Appendix A.

#### Recommended Conservation and Protection Zones

Recommended Conservation and Protection Zones are areas with a significant overlap of:

- cultural, historic, and archaeological resources; and/or
- rare or endangered species; and/or
- renewable activities that produce minimal surface footprint.

They are further broken into Tier I protection and Tier II conservation areas.

#### Tier I – Ecosystem Protection

The management intent for this zone is to promote ecosystem function, wilderness integrity, biodiversity, and peaceful enjoyment of land while allowing very limited, provisional access for renewable resource activities. Withdrawal of subsurface and associated surface rights is recommended to ensure the maximum level of legal authority to protect natural resources of very high ecological and heritage/cultural value. Current surface uses (e.g., camps, cabins, and buildings) are grandfathered into the LMU sub-unit, and variances for such uses in the future would be issued on a case-by-case basis to ensure integrity of this rigorous zone designation.

Sub-regional planning may be required for management of protected areas. Tier 1 protection areas are broken into three designations that serve key ecological functions: (i) Critical Landscape Zone; (ii) River Corridor Zone; and (iii) Remote Access Lake.

*Critical Landscape Zones (CLZs)* recognize unique areas of the Peel region for key functions and purposes, including: (i) rare, threatened, or endangered species or species of special concern; (ii) representative examples of natural phenomena; (iii) unique natural features; (iv) genetic diversity, and/or (v) peaceful enjoyment for cultural use. Withdrawal of these lands for both subsurface and associated surface tenures is recommended. Conditional access to existing subsurface tenure is specified for certain sections of the CLZs as identified by LMU. Existing surface tenures (e.g., camps, cabins, and buildings) are grandfathered and specified by LMU sub-unit.

<b>Recommendation</b>	<ul style="list-style-type: none"> <li>• <i>Withdrawal of these lands for both subsurface and associated surface tenures is recommended to ensure the maximum level of legal authority to protect natural resources of very high ecological and heritage/cultural value.</i></li> </ul>
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Management goals of Critical Landscape Zones include:

- maintain ecological and cultural integrity of the land;
- limit auditory or visual sensory disturbances to wildlife;
- maintain hydrologic integrity; and,
- preserve a largely undisturbed natural environment.

*River Corridor Zones (RCZs)* recognize the unique biophysical position, connectivity to the surrounding landscape for focal wildlife species, and First Nations cultural use of river corridors. The RCZs were mapped by extracting major stream or river valleys from the 1:250,000 regional terrain mapping of the Peel Watershed (Gartner Lee, 2005). These zones do not include the broad glacial-fluvial deposits of the Lower Bonnet Plume and Wind rivers. Though the mapped extent of the RCZs generally reflects what the PCPC envisioned (i.e., the relatively flat terrain next to major rivers that lies between toes of adjacent mountains/escarpments), in some cases it does not.

Recommendation	<ul style="list-style-type: none"> <li>• <i>Future revisions of these corridors should include the relatively flat terrain next to major rivers that lies between toes of adjacent mountains/escarpments.</i></li> </ul>
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Withdrawal of these lands for issuance of subsurface and associated surface tenures is recommended to ensure the maximum level of legal authority to protect natural resources of very high ecological and heritage/cultural value. Existing surface uses (e.g. camps, cabins, and buildings) are grandfathered and specified by LMU sub-unit. Access restrictions vary among individual LMU sub-units and are further discussed in section 4 and section 6. All-season access development within, along, and across RCZs is discouraged. Goals of River Corridor Zones include:

- minimize physical, sound, and activity disturbance to ecologically important valley bottoms and riparian areas;
- maintain hydrologic integrity of the river systems;
- recognize First Nations cultural use priorities (subsistence resources);
- maintain the wilderness aesthetics and recreational/tourism values of the river corridor;
- maintain peaceful enjoyment of the river corridor; and,
- provide strictly planned access through sections of the RCZs to enable access to mineral claims while maintaining ecosystem integrity.

*Remote Access Lakes (RALs)* are fly-in lakes used, or that could be used, for remote wilderness access. Withdrawal of subsurface and associated surface rights is recommended to ensure the maximum level of legal authority to protect natural resources

of very high ecological and heritage/cultural value. Existing surface uses (e.g., camps, cabins, and buildings) are grandfathered and specified by LMU sub-unit. Remote Access Zones can regulate private and public access into remote lakes under strict management conditions to:

- limit impacts of large numbers of visitors arriving at once;
- maintain peaceful enjoyment of the land; and,
- limit auditory or visual sensory disturbances to local wildlife.

## **Tier II – Wilderness Conservation**

The management intent for this zone is to emphasize wilderness conservation. Following a period of land withdrawal and discontinuance of subsurface tenures, the zone should eventually be reclassified to Tier I Ecosystem Protection. Allowable renewable resource uses and their associated surface use tenures (e.g., facilities, structures) are recommended to include wilderness tourism, trapping, big-game outfitting, and traditional use. During the term of this Plan, access to existing mineral claims by air or ground is conditionally allowed, following general and special management directions and strategies by LMU. However, the area should be withdrawn from future staking. Industrial development and associated access would require a comprehensive impact/benefit assessment. Tier II wilderness conservation areas have only one designation – the General Conservation Zone.

*General Conservation Zones (GCZs)* are large designated areas of mostly wilderness with some existing industrial tenures and various surface-use tenures. Management goals of General Conservation Zones include:

- maintain ecological and cultural values;
- maintain peaceful enjoyment of the land;
- limit the expansion of exploration or development activities;
- permit exploration only in currently claimed or leased areas; and,
- permit the minimum of subsurface development activity for existing tenures, subject to stringent guidelines, recommendations of this Plan, and any YESAB requirements.

## **Integrated Management Zone (IMZ)**

The intent of all integrated management zones is to enable capture of existing and future economic potential for both surface uses and subsurface resource extraction, while minimizing land-use conflicts and maintaining long-term ecosystem function. Within IMZs, integrated land management tools are used to regulate multiple resource uses. They may include the following considerations:

- development of access management plans and policy;

- coordination of resource development industry to minimize conflicts with other resource users;
- provisions for infrastructure necessary for exploration and development;
- adherence to current best management practices and/or other general management directions;
- water quality and/or quantity indicators for major tributaries;
- linear density and footprint indicators; and,
- any other provisions to minimize land-use impact, maintain ecological integrity, and protect heritage and cultural resources.

**Integrated Management Zones are split into four distinct sub-zones:**

Zone I: Lowest development/very low “critical levels”;

Zone II: Low development/ low “critical levels” (approx. twice those of Zone I);

Zone III: Moderate development/moderate “critical levels” (approx. 5X those of Zone I);

Zone IV: Highest development/high “critical levels” (approx. 10X those of Zone I).

### **3.3. General Management Direction**

The third major tool that the Plan uses in association with the foregoing Land-Use Designation System is a planning framework called General Management Direction (GMD). This framework is articulated in the form of land management goals, objectives, strategies, best management practices and recommendations. In essence, these GMDs form the foundation for guiding both commercial and non-commercial land-use activities in the region. General management direction applies to all Landscape Management Units.

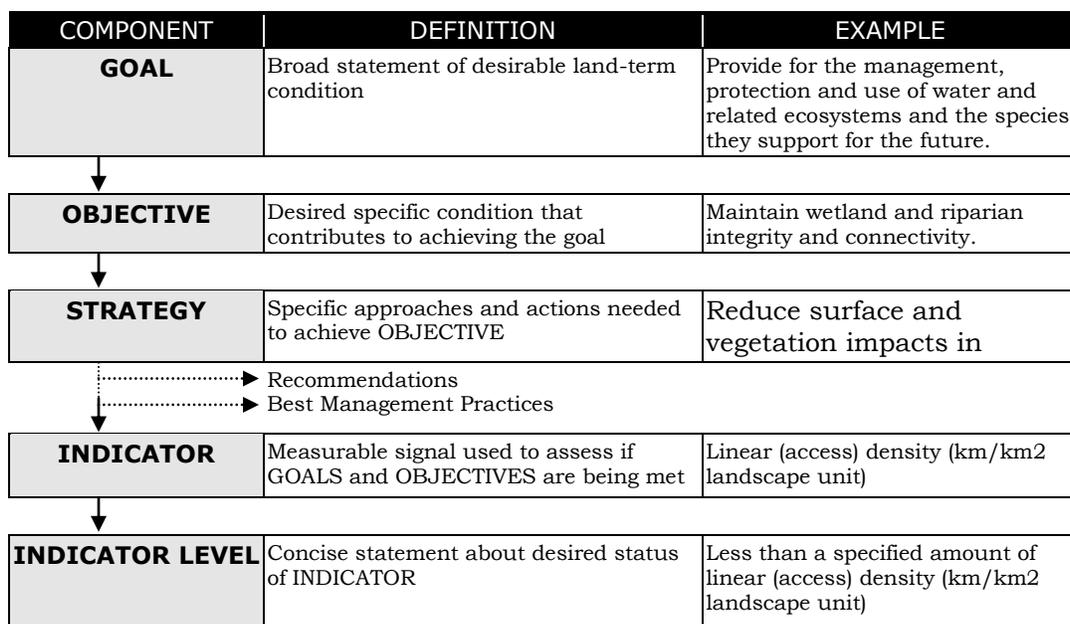
#### **3.3.1 Results-based Management Framework**

Wherever possible, management direction for the Plan is structured around a results-based management framework. A results-based management framework is a structured way to determine if Plan goals and objectives are being met. It is a way to link general, higher-level objectives with more detailed, operational decisions. The results-based management framework and its various components are summarized in Figure 3.1.

Goals and objectives state the desired management outcomes. Strategies are approaches and actions that land managers can use to achieve specific objectives. Strategies may include recommendations and best management practices. Best management practices are ways of

working that can reduce the time, intensity, impact, or duration of land-use activities<sup>1</sup>. Many best management practices developed for Yukon relate directly to achieving the objectives and strategies of this Plan.

Monitoring and assessing indicators is necessary to determine if goals and objectives are being met. Strategies can be adjusted in response to the changing status of indicators, facilitating an adaptive management process. The Plan proposes that land-use or ecological indicators be confirmed and then reported for each LMU. At this time, indicators do not address all strategies or cover monitoring of all implementation requirements. Currently, the Plan focuses on cumulative effects indicators. Recommended and potential indicators and critical levels are summarized in Appendix B.3 for consideration.



**Figure 3.1.** Components of the Peel Watershed Planning Region results-based management framework.

<sup>1</sup> A description of best management practices is provided by the Yukon Department of Energy, Mines and Resources, Oil and Gas Management Branch, 2007: [http://www.emr.gov.yk.ca/oilandgas/best\\_management\\_practices.html#What\\_are\\_Best\\_Management\\_Practices](http://www.emr.gov.yk.ca/oilandgas/best_management_practices.html#What_are_Best_Management_Practices).

### Cumulative Effects

Cumulative effects are the net changes to the environment and/or society that result from a land-use activity in combination with other past, present, and future activities. Managing cumulative effects is best accomplished by applying a suite of integrated and coordinated actions to land management. Assessment, mitigation, government policy, legislation, and planning all play a role. In combination with these coordinated actions, the management of cumulative effects can be an important outcome of applying a results-based management framework to land management. An evaluation of cumulative effects is partially achieved through the measurement of indicators (e.g., How much impact are we having on the land?).

#### 3.3.1.1. Cumulative Effects Indicators

The Plan proposes five indicators that can be used to track the potential cumulative effects of land use. These indicators provide resource managers with guidance in their decision making. When evaluated as a component of the results-based management framework, the indicators assist in establishing a general index of ecological integrity. Acceptable levels of change for the cumulative effects indicators are linked to the land-use designation of each LMU or sub-unit. Table 3.2 shows how these indicators are applied to each land-use zone designation.

The indicator framework also recognizes the constraints of the Peel's two principal topographies – plateau/plains and mountains – which may affect the application of ecosystem monitoring tools or indicator levels for specific resource management objectives.

#### *Plateau/Plain Areas:*

- Surface activities and disturbances are generally not limited by topography (broad lowlands and plateaus).
- Sensitivity to disturbance is heightened by continuous permafrost cover, with implications for reclamation.
- Water quality and flow are strongly influenced by continuous permafrost cover (sharper and higher peaks in runoff volume than is typical to the south and occasional zero flow in intermediate-sized streams in the winter).

#### *Mountain Areas:*

- Surface disturbance is likely to be constrained to deep intervening valleys (semi-parallel mountain ridges) and identified mountain passes.
- Sensitivity to disturbance is heightened where permafrost is extensive, with implications for reclamation.
- Water quality and flow are strongly influenced by extensive permafrost cover and low infiltration rate (sharper and higher peaks in runoff volume than is typical to the south and occasional zero flow in intermediate-sized streams in the winter).

The recommended indicators are:

- **Direct Surface Disturbance:** the amount of area physically disturbed by human activities. Such things as structures, roads, gravel quarries, seismic lines, access trails,

and similar features all create physical *footprints* on the land, resulting in direct habitat impacts. This indicator is typically reported as a percent of the land base.

- **Linear Density:** the total length of all human-created linear features (roads, seismic lines, access trails, etc.) in a given area. Linear density can be used as an indicator of fragmentation – the division of larger areas of habitat into smaller areas. Increasing levels of access may result from linear feature development, potentially leading to greater harvest of wildlife and fish, higher predation rates, and a change in how people and wildlife use the land. For this reason linear density is sometimes referred to as *access density*. This indicator is typically reported in km/km<sup>2</sup>.
- **Water Quality Indices:** track the water quality relative to aquatic life guidelines, human consumption guidelines, and baseline data. A group of these indices can be used as an indicator of fish habitat quality for each watershed-based LMU and the entire region. Protocols evaluated for the Mackenzie River basin could be applicable to the region and would mesh with the existing Canadian Water Quality Index specifications. Expertise in water quality trend monitoring already exists in the Yukon, and some useful regional baseline data has been collected. Tracking this indicator would also contribute to meeting the requirements of the Transboundary Water Management Bilateral Agreement between the Yukon and the Northwest Territories.
- **Water Flow Indices:** should be developed to monitor potential decline in overwintering and spawning habitat quality for each watershed-based LMU and the entire region. Several small and intermediate rivers have zero flow or low flow in the winter months, making them particularly susceptible to water withdrawals for industrial use. Shifts in flow could also alter spawning habitat. Tracking this indicator would also contribute to meeting the requirements of the Transboundary Water Management Bilateral Agreement between the Yukon and the Northwest Territories.
- **River Corridor Zone Crossing:** the total number of crossings per River Corridor Zone (see River Corridor Zones definition) within a given LMU or LMU sub-unit.

Unfavourable changes in these indicator levels would be expected to increase risk of damage to valued ecological and cultural resources. Social and economic values can also be affected when there are high levels of disturbance and activity on the land.

Several other indicators are being considered by the commission to track other cumulative effects:

- **Habitat availability:** Habitat availability is based on the % of habitat disturbed or altered for species found within the planning unit. Habitat availability can be used as a indicator of disturbance to habitat quality or use. Such levels are useful in mountainous areas where habitat needs of some species are concentrated in valley bottoms and riparian areas – areas most prone to linear development and surface disturbance.

- **Minimum core area:** Core areas are relatively undisturbed source areas for plant and animal populations. Core areas are larger than the minimum home ranges or territories of the target species. Expressed as % of available habitat in large core areas.
- **Minimum patch size:** Patches are areas of habitat secure from disturbance and mortality associated with human activities. Minimum patch size is set by the amount of range typically used by the species in a 24-48 hour period.
- **Sensory disturbance:** Sound disturbance includes loudness (decibels) and the associated effective zone. Visual disturbance includes the sight of activity, such as aircraft or lights from traffic. Both can lead to habitat loss (unusable habitat) and increased stress, especially for residential populations.

<b>Research Recommendation</b>	<ul style="list-style-type: none"> <li>• <i>Undertake research to determine the effectiveness of the above suggested indicators and recommended indicator levels (Table 3.2) that have been proposed for tracking cumulative effects.</i></li> </ul>
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**Table 3.2.** Guidance chart of land-use designation zones for access considerations and proposed cumulative effects indicators for the Peel Watershed Planning Region

Land Use Category	Zone	All-season Access	Winter Roads	Aggregate for access	Withdrawal from staking/new tenures	Grandfathering of existing tenures	Linear density	Surface disturbance	River Corridor	River Corridor Zone crossing density	Water quality indices (aquatic life)	Water flow indices (aquatic life)	Water quality indices (human consumption)	Habitat availability	Minimum core area	Minimum patch size	Sensory Disturbance
<b>Designated Protected Zones: Tier I - Ecosystem Protection</b>	Critical Landscape Zone				✓					✓	✓	✓					
	River Corridor Zone	~	~		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Remote Access Lakes		~		✓					✓	✓	✓					✓
<b>Designated Protected Zones: Tier II - Wilderness Conservation Zone</b>	General Conservation Zone - Mountain	~	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	General Conservation Zone - Plateau	~	✓		✓	✓	✓	~	✓	✓	✓	✓	~	~	~	~	~
<b>Integrated Management Zones</b>	Zone I	~	✓	~	✓	✓	✓	~	✓	✓	✓	✓	~	~	~	~	~
	Zone II	✓	✓	✓	✓	✓	✓	~	✓	✓	✓	✓	~	~	~	~	~
	Zone III	✓	✓	✓	✓	✓	✓	~	✓	✓	✓	✓	~	~	~	~	~
	Zone IV	✓	✓	✓	✓	✓	✓	~	✓	✓	✓	✓	~	~	~	~	~

✓ Allowable access and recommended indicators for cumulative effects assessment

~ Possible allowable access and recommended indicators for cumulative effects assessment (LMU specific management direction)

### 3.3.1.2. *Cumulative Effects Indicator Levels*

The cumulative effects indicator levels identified in the Plan represent a theoretical point between acceptable and unacceptable levels of human-caused disturbance. The recommended indicator levels provide guidance on acceptable levels of human-caused disturbance within each LMU or sub-unit. As shown in Table 3.3., the cumulative effects indicator levels are linked to all the zone designations, providing clear management direction for the different areas of the IMZ and RPZ. When the indicator levels are reached or exceeded, it is a signal that undesirable impacts to ecological and cultural resources may result.<sup>2</sup>

The Plan proposes cautionary indicator levels as the point where indicators may be close to reaching undesired levels. This provides an early warning signal, allowing time for pro-active management steps to be considered or taken. Critical indicator levels represent the point where the indicators have reached or surpassed acceptable levels.

#### **Determining Cautionary Indicator Levels**

Calculating or selecting cautionary indicator levels is often not a simple task. The North Yukon Planning Commission calculated their linear density and direct surface disturbance levels using models of ecological, social, and economic outcomes of future land-use activity (NYPC 2007). Much of the PWPR has biophysical features, topography, and ecological, social, and economic values analogous to those of the North Yukon Planning Region. For this reason, the cautionary indicator levels of the Final Recommended North Yukon Land Use Plan<sup>3</sup> were adopted as a cautionary starting point for use in the PWPR until region-specific cautionary levels are modeled. These two indicators may not provide sufficient warning in mountainous areas such as the southern portion of the PWPR. Therefore, additional water and stream-crossing indicators are also recommended. The River Corridor crossing density indicator considers both access management and aesthetic and aquatic values. New and existing baseline data and federal guidelines and frameworks should be used to develop LMU-specific cautionary indicator levels for water.

This plan also lists some indicators that could be useful for tracking ecologically, socially, or economically significant cumulative impacts. However, it is not recommended that these potential indicators be tracked in the immediate future. Their scope may be too narrow to make them a priority, or the determination of defensible cautionary levels may require

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<sup>2</sup> As human-caused surface disturbances, including linear features, recover through natural revegetation or active reclamation, they are subtracted from the total amount of disturbed area. A human-caused surface disturbance is considered recovered when it no longer facilitates travel or access by wildlife and people. In forested areas, a feature can be considered recovered when it contains woody vegetation (trees and shrubs) approximately 1.5 metres in height. See discussion of surface disturbances in section 4. This definition is closely linked with human and predator access and potential effects on caribou and moose, key values in the region.

<sup>3</sup> This plan has not yet been approved.

substantial research. The cautionary levels for these indicators, shown in Table 3.3, were taken from the Dehcho Final Draft Land Use Plan (DLUPC, 2006) and are meant to be used as starting points for discussion.

Through the use of cumulative effects indicators, and their recommended levels, the Plan attempts to balance potential risks to ecological and cultural resources with the requirement for, and potential impacts of, economic development.

#### **Cumulative Effects Indicator Levels**

These levels are not intended to be an absolute cap on activities. They are intended to provide a clear statement regarding the level of human-caused environmental change considered acceptable within a specific LMU. When used in a results-based management context, indicator levels are designed to promote pro-active and integrated land management. The recommended indicator levels serve only as a benchmark and provide the Parties responsible for plan implementation an opportunity to review and consider the potential outcomes of resource management decisions. They will also assist in the YESAA process by providing an indication of potential cumulative effects within a LMU. As recommended earlier, further research will be needed to determine the utility of the proposed indicators and levels.

**Table 3.3.** Land-Use Zone Designations and proposed cumulative effects indicator levels (~ indicates that levels are to be determined, \* indicates that they are LMU-specific; see LMU description under Special Management Considerations)

Zone		Tier I CLZ		Tier I RCZ		Tier I RAL		Tier II GCZ - Plateau		Tier II GCZ Mountain		IMZ Zone I <sup>2</sup>		IMZ Zone II		IMZ Zone III		IMZ Zone IV	
Management Intent		Land withdrawal		Land withdrawal <sup>3</sup>		Land withdrawal		Lowest development		Lowest development		Lowest development		Low development		Moderate development		Highest development	
Level	Area of calculation	Cautionary Level I	Critical Level	Cautionary Level I	Critical Level	Cautionary Level I	Critical Level	Cautionary Level I	Critical Level	Cautionary Level I	Critical Level	Cautionary Level I	Critical Level	Cautionary Level I	Critical Level	Cautionary Level I	Critical Level	Cautionary Level I	Critical Level
Linear density km/km2	Sub-unit	0	0	0.075 <sup>3</sup>	0.1	0	0	0.075	0.1	0.075	0.1	0.075	0.1	0.15	0.2	0.375	0.5	0.75	1
Surface disturbance %	Sub-unit	0	0	0.075 <sup>3</sup>	0.1	0	0	0.075	0.1	0.075	0.1	0.075	0.1	0.15	0.2	0.375	0.5	0.75	1
RCZ Crossing (# crossings/RCZ)	LMU			*	*														
Water quality indices (aquatic life)	LMU	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Water flow indices (aquatic life)	LMU	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Water quality indices (human consumption)	LMU	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Habitat availability %	LMU			>5	>5			>5	>5	>5	>5	>5	>5	>5	>5	>5	>5	>5	>5
Minimum core area %	LMU			>85	>65			>85	>65	>85	>65	>85	>65	>85	>65	>85	>65	>85	>65
Minimum patch size km <sup>2</sup>	LMU				>10		>10		>10		>10		>10		>10		>10		>10
Sensory disturbance dB(A)	Sub-unit	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~

\*see LMU sub-unit for number of allowable crossings of the sub-unit.

<sup>1</sup> Cautionary level is established as 75% of the upper, or critical, level.

<sup>2</sup> While cumulative effects indicator levels are identified for Zone I and all RPZs, the intent is to discourage development of new all-season industrial infrastructure, aggregate extraction, and human settlements/structures.

<sup>3</sup> Restrictions for access may apply to some RCZs. Only Wind River and Bonnet Plume River RCZ have management direction regarding access along or across RCZ.

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