

Castle Mountain Resort Area Structure Plan

Bylaw No. 1313-19

January 2020



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Prepared for the Municipal District of Pincher Creek No. 9

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MUNICIPAL DISTRICT OF PINCHER CREEK NO. 9
BYLAW NO. 1313-19

Being a bylaw of the Municipal District of Pincher Creek No. 9 in the Province of Alberta, to adopt Bylaw 1313-19, being the Castle Mountain Resort Area Structure Plan.

WHEREAS The municipality having worked with Castle Mountain Resort Incorporated, Castle Mountain Resort Community Association, and Provincial Government Department representatives is prepared to adopt the Castle Mountain Resort Area Structure Plan;

WHEREAS The municipal council wishes to adopt a comprehensive plan which governs land use within Castle Mountain Resort;

WHEREAS The purpose of proposed Bylaw No. 1313-19 is to adopt the Castle Mountain Resort Area Structure Plan which will govern the future subdivision and development of the lands within the plan boundary;

WHEREAS The municipality must prepare a bylaw and provide for its consideration at a public hearing.

NOW THEREFORE, under the authority and subject to the provisions of the *Municipal Government Act, Statutes of Alberta, Chapter M-26, 2000*, as amended, the Council of the Municipal District of Pincher Creek No. 9 in the Province of Alberta duly assembled does hereby enact the following:

1. This plan (attached as "Schedule A"), upon adoption, shall be known as the the "Castle Mountain Resort Area Structure Plan Bylaw No. 1313-19".

2. Bylaw No. 1069-02 being the former Castle Mountain Resort Area Structure Plan and any amendments thereto are hereby repealed.

3. This bylaw shall come into effect upon third and final reading hereof.

READ a first time this 15th day of October, 2019.

A PUBLIC HEARING was held this 12th day of December, 2019.

READ a second time this 14th day of January, 2020.

READ a third time and finally PASSED this 14th day of January, 2020.

Reeve – Brian Hammond

Chief Administrative Officer – Troy MacCulloch

Attachment - "Schedule A"

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1.0 Introduction

1.1 Purpose of the Plan

The Castle Mountain Resort Area Structure Plan (ASP) defines a planning and development framework to guide future growth in the Plan Area. The ASP supports both the Municipal District of Pincher Creek No. 9 (MD) Municipal Development Plan and Land Use Bylaw by adding another layer of detail to this particular development area. The Castle Mountain Resort ASP considers existing land uses, potential future land uses, public input, physical and environmental characteristics, infrastructure requirements, and growth trends on the private land comprising the ASP boundary. The plan outlines a vision statement with goals, objectives, and policies that promote the vision.

1.2 Background of the Plan

The 2002 Castle Mountain Resort ASP had not been reviewed or updated since its adoption. The role of the ASP in the processing of subdivision and development applications at the Resort has lacked clarity, as the needs and aspirations of the landowner and municipality have changed over time. The main objective of this review is to ensure conformance and compliance of the ASP with prevailing provincial and municipal policies.

1.3 Regional Site Location

Castle Mountain Resort (CMR or Resort) is located just east of the continental divide along the border between Alberta and British Columbia. CMR is a part of the Municipal District of Pincher Creek No. 9, approximately 40 kilometers southwest of the Town of Pincher Creek. The Resort is positioned in the Westcastle Valley surrounded by Gravenstafel Mountain, Barnaby Ridge and Haig Mountain and is about 25 kilometers northwest of Waterton National Park (See Map 1). As of 2017, Castle Mountain Resort is bounded on the north by the Castle Provincial Park and on the east, west and south by the Castle Wildland Provincial Park (See Map 2).

1.4 Physical and Environmental Conditions

Snow

The CMR ski area receives an annual average snowfall of 416 cm at the base of the mountain and 867 cm at mid mountain. Snow pack is heavily influenced by strong Chinook winds that can be both beneficial and detrimental to the Resort. Snow management is a major consideration in both on hill and resort core areas. Packing fresh snow to maintain a consistent ski base is essential. Snow fencing is used to protect some ski runs that experience snow loss from strong wind conditions.

Because of the desire to maintain high water quality for downstream use, careful attention is paid to snow plowing and storage. Snow storage areas are located on the west side of the highway, which serves as a barrier to prevent run-off from directly entering West Castle River.



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CASTLE MOUNTAIN RESORT
AREA STRUCTURE PLAN
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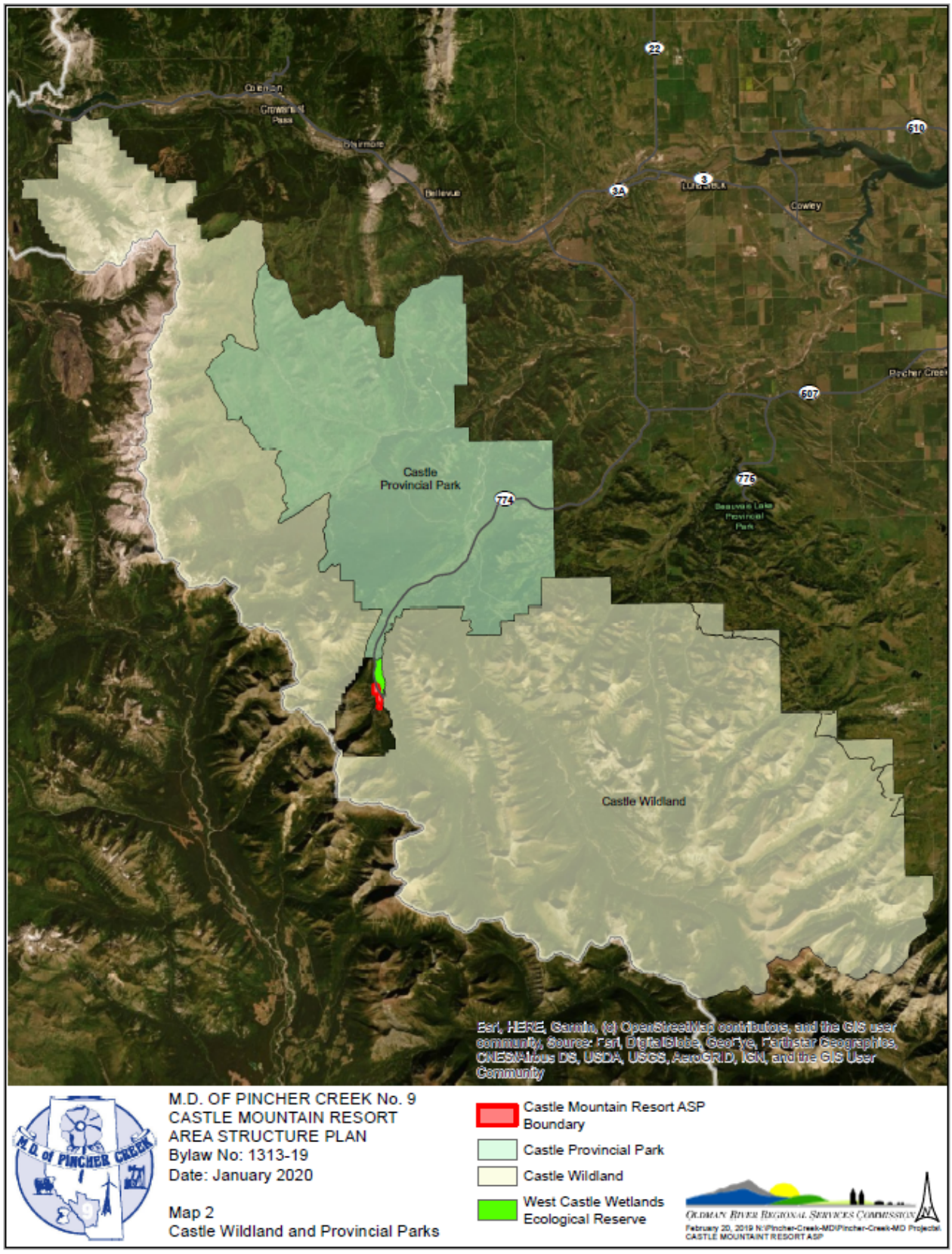
Map 1
Regional Site Location

OLDMAN RIVER REGIONAL SERVICES COMMISSION


Castle Provincial Park
Castle Wildland
Bellevue
Cowley
Pincher Creek
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
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Map 2
Castle Wildland and Provincial Parks
Castle Mountain Resort ASP Boundary
Castle Provincial Park
Castle Wildland
West Castle Wetlands Ecological Reserve
Oldman River Regional Services Commission
February 20, 2019 N:\Pincher-Creek-MD\Pincher-Creek-MD Projects\CASTLE MOUNTAINT RESORT ASP

Heavy snowfall also requires careful attention to building and roof structures, thus many of the newer buildings have adopted a steeper pitch and use a metal roofing material in response to snow loading conditions.

Avalanche areas

The risk of avalanches affecting the Resort core and ski slopes is mitigated by trained, skilled staff who monitor and control snow accumulation. Resort development is concentrated in low risk areas.

Wind

Prevailing winds differ between lower and higher elevations. The higher elevation winds are predominantly west-southwest while lower elevations experience more south-southwest winds that are influenced by valley topography. Wind velocity also varies significantly from the exposed slopes on the upper mountain to the protected areas on the lower slopes and valley floor.

Flood Plain

The 1:100 year flood plain of the West Castle River lies along the east boundary of the Resort. The nearest resort development is 1 meter above the established flood plain contour.

Forest Conditions

Fire is a constant potential hazard within a forest environment. Although this is an unlikely event during the winter season, dry spells in the summer pose a threat to the Resort. CMR has installed fire hydrants throughout the Resort, and is working with the Pincher Creek Emergency Services Commission to enhance its firefighting readiness. In addition, Alberta Forestry began work on a firebreak south of the Resort in 2000. CMR also participates in both FireSmart and the MD wildfire prevention programs.

Wildlife

CMR is located in a rich and diverse wildlife area. The Westcastle Valley provides habitat for large mammals including bears, moose, elk, deer and cougars. Numerous small mammals also populate the area as do a wide range of birds. The Westcastle River provides habitat for Bull and Cutthroat Trout.

1.5 Provincial Legislative Framework

An ASP is a planning document adopted as a municipal bylaw and is intended to provide direction to Council, landowners, and developers on an area's future land uses. As an ASP is adopted by municipal bylaw, public input is sought. *Section 633 of the Municipal Government Act (MGA)* outlines the statutory contents of an ASP. It describes an ASP as follows:

> ***633(1)*** *For the purpose of providing a framework for subsequent subdivision and development of an area of land, a council may, by bylaw, adopt an area structure plan.*

(2) *An area structure plan*

(a) must describe

(i) the sequence of development proposed for the area,

(ii) the land uses proposed for the area, either generally or with respect to specific parts of the area,

(iii) the density of the population proposed for the area either generally or with respect to specific parts of the area, and

(iv) the general location of major transportation routes and public utilities,

and

(b) any other matters the council considers necessary.

In addition, section 638 of the *MGA* requires that all statutory plans adopted by the Municipality be consistent with one another. This includes consistency in content, policy implementation and method of amendment. Additional requirements for an ASP that may be included by municipalities consist of but are not limited to items such as internal subdivision, road standards, access points, right-of-way, municipal and environmental reserve dedication, developers' obligations, and architectural controls.

The *South Saskatchewan Regional Plan* (*SSRP*) came into effect September 1, 2014. The *SSRP* uses a cumulative effects management approach to set policy direction for municipalities to achieve environmental, economic and social outcomes within the South Saskatchewan Region until 2024.

Pursuant to section 13 of the *Alberta Land Stewardship Act (ALSA)*, regional plans are legislative instruments.

The *SSRP* has four key parts including the Introduction, Strategic Plan, Implementation Plan and Regulatory Details Plan. Pursuant to section 15(1) of *ALSA*, the Regulatory Details of the *SSRP* are enforceable as law and bind the Crown, decision makers, local governments and all other persons while the remaining portions are statements of policy to inform and are not intended to have binding legal effect. The Regional Plan is guided by the vision, outcomes and intended directions set by the Strategic Plan portion of the *SSRP*, while the Implementation Plan establishes the objectives and the strategies that will be implemented to achieve the regional vision.

In the provincial planning context under the *South Saskatchewan Regional Plan*, this plan meets the Implementation Plan subsection *6. Outdoor Recreation and Historic Resources* by providing outdoor recreation and nature-based tourism opportunities and preserving the region's unique cultural and natural heritage. Under the *SSRP*, the development meets the Implementation Plan subsection *8. Community Development* by providing municipal and regional recreation opportunities. As provided (Appendix A) in the area's history, the MD of Pincher Creek has been involved in the development of the Resort as a local amenity for many decades. This ASP has also considered land use patterns, transportation, and water as a resource.

1.6 2002 Plan Status

The 2002 ASP was envisioned to *"…outline a sustainable development plan for the community that is intended to ensure its viability for the next 10 to 20 years."* It was completed by Castle Mountain Resort Incorporated (CMR Inc.) and its consultants. The 2002 plan contained many topics outside the scope of a land use plan and bordered on a business plan in many respects. The plan also captured many planning aspects which are strictly the jurisdiction of the Alberta Government and not within the powers of the municipality to govern.

During the tenure of the 2002 ASP, the MD incorporated CMR related land use districts in the MD of Pincher Creek Land Use Bylaw (LUB) to govern development at the Resort. It also adopted five comprehensive siting plans to initiate the planning process for the various phases of development. Having broached the horizon of the 2002 vision, the MD of Pincher Creek initiated a review of the plan in 2013 through the Oldman River Regional Services Commission. The following plan is the result of that review.

1.7 Update Process

The MD of Pincher Creek No. 9 established council as the steering committee for the ASP review. The scope of work for the update was outlined with the aid of the Oldman River Regional Services Commission and began with a questionnaire which was circulated to CMR Inc. and CMR leaseholders. The questionnaire focused on the community's knowledge of the existing plan and areas where the respondents felt the plan could be improved. During a working meeting, the questionnaire results and a list of issues and opportunities were reviewed with the community and CMR Inc. At a second meeting, a list of potential goals and objectives were presented and reviewed with the leaseholders and CMR Inc.

A Draft ASP was presented for discussion purposes to a group of representatives from the community and CMR Inc. During the response period, CMR requested a tabling of the ASP pending the preparation of the Castle Mountain Resort Master Development Plan (CMRMDP). The CMRMDP was reviewed against the ASP and changes were incorporated where appropriate.

A final draft was then prepared and has resulted in this ASP.

2.0 Plan Vision

Castle Mountain Resort is dedicated to providing a year round experience in an aesthetic, family-oriented friendly atmosphere. The Plan will guide development in a sensitive environment while fulfilling recreation and tourism needs for Alberta.

3.0 Plan Goals

1. The Plan will guide development by:
    a. recognizing the development limitations and integration of locational attributes;
    b. providing the parameters for residential accommodation;
    c. providing the parameters for commercial and recreational amenities.
2. The Plan encourages sustainable development of the resort by:
    a. minimizing effects of resort use and development on adjacent lands;
    b. designing the resort for optimal use of infrastructure and capital improvements;
    c. recognizing water as a valuable resource to be preserved, protected, and used wisely.

4.0 Plan Objectives

The following objectives shall be used as a framework for the policies of this plan and its implementation.

1. To ensure the development of a resort master plan is in keeping with this area structure plan and other municipal planning documents.
2. To ensure the appropriate size and scale of development of the base area facilities are directly linked to the capacity, location and scope of the resort attractions.
3. To ensure that a pedestrian character of open space and connectivity is maintained.
4. To delineate the required parking among the various resort uses sufficient for day visits and events. To minimize the potential visual impact associated with large parking lots by proper design and distribution of the lots.
5. To minimize potential for pedestrian and vehicular circulation conflicts. The plan will ensure vehicular circulation and transportation improvements are safe.

6. To ensure the Municipal District and provincial agencies are included in any future planning of Castle Mountain Resort.

7. To ensure an Environmental Management Plan is in place to address environmental issues relevant to the location and the use and development of the land.

8. To outline redesignation, subdivision, and development processes that are transparent in their intent.

9. To ensure resort construction that is appropriate for the location through the use of commercial and residential architectural controls (or design and development guidelines).

10. To ensure there is sufficient infrastructure including water, sewer, storm water management, solid waste management and gas/electrical.

11. To accommodate a mix of residential housing types and commercial development given the finite amount of private land.

5.0 Plan Policies

In the context of the plan vision, goals and objectives, the following plan policies are to be utilized when considering any land use development processes.

5.1 Plan Area

Map 3 identifies the legal land descriptions for the Plan Area including portions of Quarter Sections 24 and 25 within Township 4 Range 4 West of the 5th Meridian. The area structure plan boundary contains approximately 96 acres of private titled land.

5.2 Density and Population Projection

Density

Density at CMR is a function of three components: residential development, commercial development, and water/sewer capacities. A defined amount of residential dwelling units and commercial patrons (described below) were used in developing the water and sewer capacities as found in Appendix B. It should be noted that a change to one of the components will affect the others and will require an ASP amendment.

Residential Component

Within the residential component, the term 'equivalent dwelling units' is utilized to capture all approvals related to overnight stays. The definition for equivalent dwelling units includes all single unit dwellings, multi-unit buildings, staff units, hostel and hotel. For plan purposes, single unit dwellings include all one unit dwelling types (i.e. single detached residences, manufactured homes, modular homes, prefabricated homes, caretaker suite, etc.) and all multi-unit buildings include semi-detached, plexes, apartments, mixed-use residential, and townhouse/rowhouse.

The residential component consists of a maximum of 225 equivalent dwelling units.

Commercial Component

Within the commercial component, CMR has chosen to maintain a comfortable carrying capacity of 2,400 peak daily skier visits. This carrying capacity is referred to as the CMR-CCC. To facilitate the CMR-CCC, Castle Mountain Resort have chosen to limit uphill capacity, the amount of parking, the amount of residential accommodation, the type and amount of commercial support facilities, and water/sewer capacities.

The peak daily usage and average weekly usage over the ski season equates to 100,000 skier visits annually. The following occupancy assumptions found in Table 5.2 have been prepared to determine the projected peak density at full build-out of the Resort in accordance with Appendix B, the equivalent dwelling units, and CMR-CCC.

Table 5.2:
Castle Mountain Resort
Occupancy Rate Assumptions

Season	Time Period	Type of Stay	Number of Occurrences	Number of Days	Occupancy Rate
Winter, ski season*	Mid week	Single family	16	5	25%
		Multi-family, hostel and hotel			60%
	Weekend	All dwelling units	14	2	75%
	Long Weekend	All dwelling units	2	3	90%
	Christmas	All dwelling units	1	7	90%
	Easter	All dwelling units	1	7	50%
Summer	Weekend	Single family	7 (3)	5 (4)	25%
		Multi-family, hostel and hotel			40%
	Long Weekend	Single family	3	3	40%
		Multi-family, hostel and hotel			25%
Spring / Autumn	Week	Single family	21	7	10%
		Multi-family, hostel and hotel			25%
Year round		Caretaker suites			40%

***** For purposes of developing user projections, it has been assumed that the Winter, ski season is 128 days in duration, commencing early December and lasting until mid-April. The Spring and Autumn seasons have been adjusted for the overlap.

Policy 5.2.1 Within the plan boundary and at current build out, CMR is limited to a maximum of 225 equivalent dwelling units and a comfortable carrying capacity of 2,400 peak daily ski visits.

Population Projection

For planning purposes, 3.5 persons per housing unit is used to project future populations. Based on the persons per housing unit and the permanent units, the population is estimated to be 788 persons. This estimate does not reflect the fact that the uptake of permanent residency is currently minimal with the majority of housing units being utilized as second homes in a recreational property context. Further, this estimate is reduced by the housing units that may be or are allocated to seasonal staff units, the hostel and a hotel.


SW25 4-4-5
SE25 4-4-5
BLOCK 2
9711993
NE24 4-4-5
NE24 4-4-5
NW24 4-4-5
NE24
LOT 6
9711993
LOT 7
9711993
NE24 4-4-5
NE24
NE24
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Map 3
ASP Boundary
Aerial Photo Date: 2015
OLDMAN RIVER REGIONAL SERVICES COMMISSION
January 20, 2020 N:\Pincher-Creek-MD\Pincher-Creek-MD Projects\
CASTLE MOUNTAIN RESORT ASP.dwg

5.3 Environmental

Environmental Mission Statement

Castle Mountain Resort ASP endeavors to make a positive difference in the region by adopting environmentally responsible initiatives to minimize the impact on the environment for the development within the ASP boundary.

Environmental Management Plan

This ASP requires adherence to an Environmental Management Plan. The environmental management plan will address the following issues:

- dissemination of environmental information and education to all users of the Resort, contractors and developers,
- methods used to reduce water use including limitations on sprinklers only to re-establish vegetation disturbed during the development process,
- land clearance and protection of existing trees in keeping with the FireSmart and MD wildfire prevention programs,
- drainage control (engineering required),
- erosion and sediment control,
- minimize conflict with wildlife,
- land restoration and landscaping,
- methods of protection of water bodies,
- waste management and hazard materials control,
- weed control, and
- solutions to other issues that may be identified given the specific location of each individual development.

Policy 5.3.1 The Environmental Management Plan (Appendix D) shall be implemented through subdivision and development approval processes.

Policy 5.3.2 The Environmental Management Plan will be monitored and updated as needed in cooperation with the MD of Pincher Creek No. 9 Council and government agencies.

Policy 5.3.3 All development will adhere to the approved Environmental Management Plan and shall submit as part of a development permit a check list of compliance with that plan.

Sustainable Development

In accordance with the CMRMDP, *"the ongoing development at CMR will adapt and implement sustainability best practices. The intent is to ensure that development of all elements of the resort are environmentally sensitive, designed to maintain the ecological integrity of the setting and to mitigate all impacted areas."*

Policy 5.3.4 The ASP supports all measures taken by CMR to incorporate green building objectives, incorporate soil erosion best practices, utilize renewable energy systems, monitor water usage, reduce light pollution, manage solid waste and recycling, encourage the installation of energy efficient mechanical equipment and appliances, and utilize appropriate building materials for the alpine environment.

5.4 Sequence of Development

It is recognized that build out at CMR has not and may not proceed sequentially. Some areas that have been built out will be entering into a redevelopment phase while others will be entering into newly proposed development.

Policy 5.4.1 For the purposes of this plan, the sequence of development will proceed in a cohesive manner, where services are available and market demand dictates.

5.5 Transportation

The major transportation route to Castle Mountain Resort is Highway 774. This highway has been upgraded by Alberta Transportation to a full paved surface and remains under the care and control of Alberta Transportation.

Policy 5.5.1 All approvals for access adjacent to the highway shall be processed through Alberta Transportation with notification to the Municipality.

Policy 5.5.2 All other roads within the Plan Area excepting Highway 774 are considered internal to the Resort and are to be managed by the Resort. Maintenance and upgrades to these private roads shall ensure pedestrian and traffic movements are safely designed.

Policy 5.5.3 Day-use parking lots for a minimum of 850 vehicles is required at build out.

Policy 5.5.4 Parking for a minimum of 10 buses is required with a pick up and loading area designated in the Resort core.

Policy 5.5.5 Clearly delineated barrier-free (handicapped) parking must be provided in close proximity to the Resort core and developed in accordance with Alberta Building Code.

5.6 Water Source and Supply

Castle Mountain Resort has a licensed water source with the capability to meet the ASP build out. This system will in the near future be upgraded to a Municipal water source via Cowley/Beaver Mines.

Policy 5.6.1 The build out design criteria maximum day water demand during ski season is to be 63,500 Imperial gallons/day (290 m^3/d). Appendix B, the Mercon Engineering report provides the detailed analysis.

Firefighting Water Supply

Policy 5.6.2 CMR must ensure Firefighting Water Supply of approximately 800 Imperial gallons/ minute (Igpm) [3640 l/s] for a duration of 1.5 hours. Matrix Solutions Inc. engineering report (Appendix C) concluded that a fire storage requirement in the order of 72,000 Igal coupled with the aquifer providing 400 Igpm for firefighting needs is necessary.

Water Treatment

CMR's groundwater well is a deep well and is located away from any source of pollutants, flooding or direct surface influences. Although treatment of CMR's groundwater supply would not be required, Mercon Engineering recommends that disinfection, by means of chlorination, be undertaken to ensure safe, potable water in constructed storage and distribution mains.

Policy 5.6.3 CMR must ensure the continued safety of its potable water system until such time that the municipal water system becomes the resort's water source.

Water Distribution System

Typically, a water distribution system is designed to supply and deliver peak hourly water demands or maximum day demand plus fire flows, whichever is greater. Further, the distribution system is designed to handle normal operating pressures between 350 kPa and 550 kPa (50 to 80 psi) under a condition of maximum hourly design flows. Water mains designed to carry fire flows should have a minimum inside diameter of 150 mm (6 inches). The existing CMR water distribution system consists of 150 mm diameter mains, complete with fire hydrants, and meets the above design criteria.

Policy 5.6.4 Future extensions to the water distribution system will be designed and constructed to meet engineering standards of the MD of Pincher Creek.

5.7 Wastewater Treatment and Disposal System

At present, the design capacity of the facultative lagoon is not being fully used during the peak winter season. The existing wastewater polishing/storage cell has the construction hydraulic capacity to accommodate all CMR Area Structure Plan development.

Policy 5.7.1 To provide an insurance/safety margin in regards to CMR's wastewater treatment and disposal facilities, the wastewater flow design criteria used shall be the same as those previously defined for water supply requirements/demands. Appendix B, the Mercon Engineering report provides the detailed analysis.

5.8 Solid Waste

Residential and commercial solid waste is currently disposed of in bear-proof disposal containers. There are a number of medium sized containers which are sufficient for the current lots.

Policy 5.8.1 As more development occurs the number of containers will increase proportionately. The locations for additional containers will be determined as they are needed and will be placed so that they are convenient and visually unobtrusive.

Policy 5.8.2 Additional procedures shall be developed for solid waste produced during construction projects. These procedures shall be incorporated into the Environmental Management Plan (Appendix D).

5.9 Gas Distribution System

Castle Mountain Resort has an agreement with Superior Propane regarding the propane tank farm that services the entire resort. The propane farm was constructed in 2006 to service the existing resort. CMR will be transitioning to natural gas supplied by Atco Gas.

Policy 5.9.1 All commercial, residential and resort operation lots shall be included in the gas distribution system.

5.10 Electrical

Fortis Alberta, Inc. provides Castle Mountain Resort electric power.

Policy 5.10.1 Upgrades to the distribution and service system will be completed as necessary and as development in the resort core continues.

Policy 5.10.2 All electrical servicing is encouraged to be underground.

5.11 Snow Storage and Run-off Control

The majority of spring snow melt and run-off water from rain storms does not flow directly to a water course, but rather to a ponding area where it percolates into the ground. The ponding areas are located on the east edge of the CMR property. The gravel road forms a berm which holds the water in these tree and grass covered areas thus allowing it to percolate through the gravel to join the ground water. There is one culvert under Highway 774 to prevent flooding and the highway from being washed out. This culvert does flow in the case of extreme water volumes, which allows the water to flow into the swampy section of the wetlands on the east side of the highway. The water passing through this culvert has been slowed down by the flat area of the trees and grasses and the major portion of silt is settled out.

The resort core has most of the snow plowed to the edge of or the south end of the main parking lot. It is occasionally hauled to the edge of the north parking lot adjacent to the sewage lagoons. This snow melts

and percolates into the soil at this site. The grasses and trees in the area also act as retention devices to slow the movement of surface water.

Policy 5.11.1 All snow storage and run-off control should be addressed in a stormwater management plan.

Policy 5.11.2 The development of new snow and run-off storage sites or culverts across Highway 774 requires consultation with Alberta Environment, Alberta Transportation, and the MD of Pincher Creek No.9.

Policy 5.11.3 All erosion damage created by run-off should be evaluated against the stormwater management plan and remediated, where possible.

5.12 Design Parameters

Since a finite base area exists within the plan boundary, careful consideration of the developable land is essential. Further base development must be realized in a manner that will not compromise ski terrain development or the environment. The plan endeavors to ensure that new development and redevelopment occurs in a way that fulfils this plans vision and is in keeping with the CMRMDP.

Policy 5.12.1 CMR development review committee (or its equivalent) and all approval authorities shall consider the following design parameters:

a. respond to the topography with all buildings and site modifications;
b. acknowledge environmental factors as identified in the Environmental Management Plan and those found at each particular building site;
c. create a “village” focal point or resort core, recognizing the linear nature of the Resort;
d. create a “sense of arrival” through gateway entrance features by including enhanced landscaping, vegetative screening, and coordinated entrance and information signage;
e. provide underground servicing;
f. create pedestrian connections/walkways between parking lots, and activity areas as well as residential areas;
g. utilize distinctive architecture and finishing materials as defined by the architectural controls;
h. build parking areas that consider slope, snow removal, snow storage, snow shedding from roofs and responsible tree clearing;
i. promote the pedestrian nature of the village by minimizing vehicle traffic and parking in the commercial core area;

j. the provision of privacy in residential areas and the avoidance of potential conflict between adjacent land uses shall be resolved through site design considerations such as building placement, window locations, visual screening and the adequate buffering and separation of potentially incompatible areas;

k. consider weather and climatic impacts related to snow removal, ice build-up, sheltering of outdoor amenity areas from extreme winds, and solar access into public areas;

l. preserve dramatic views and sight lines; and

m. review for utilization of the FireSmart program.

5.13 Land Use

The general land use concept is depicted on Map 4 (Land Use Concept). The purpose of the land use concept is to show the general relationship of proposed land uses. It is intended to guide future growth and development within the boundaries of the ASP. The location and size of the land uses shown are conceptual and general. The exact size and location of a particular land use will be defined at the subdivision, development, and land use designation stages.

Resort Core Commercial

The resort core is the center of base area development and functions as the service and amenity focal point within CMR. The amount and type of core area space has a direct relationship to the CMR-CCC.

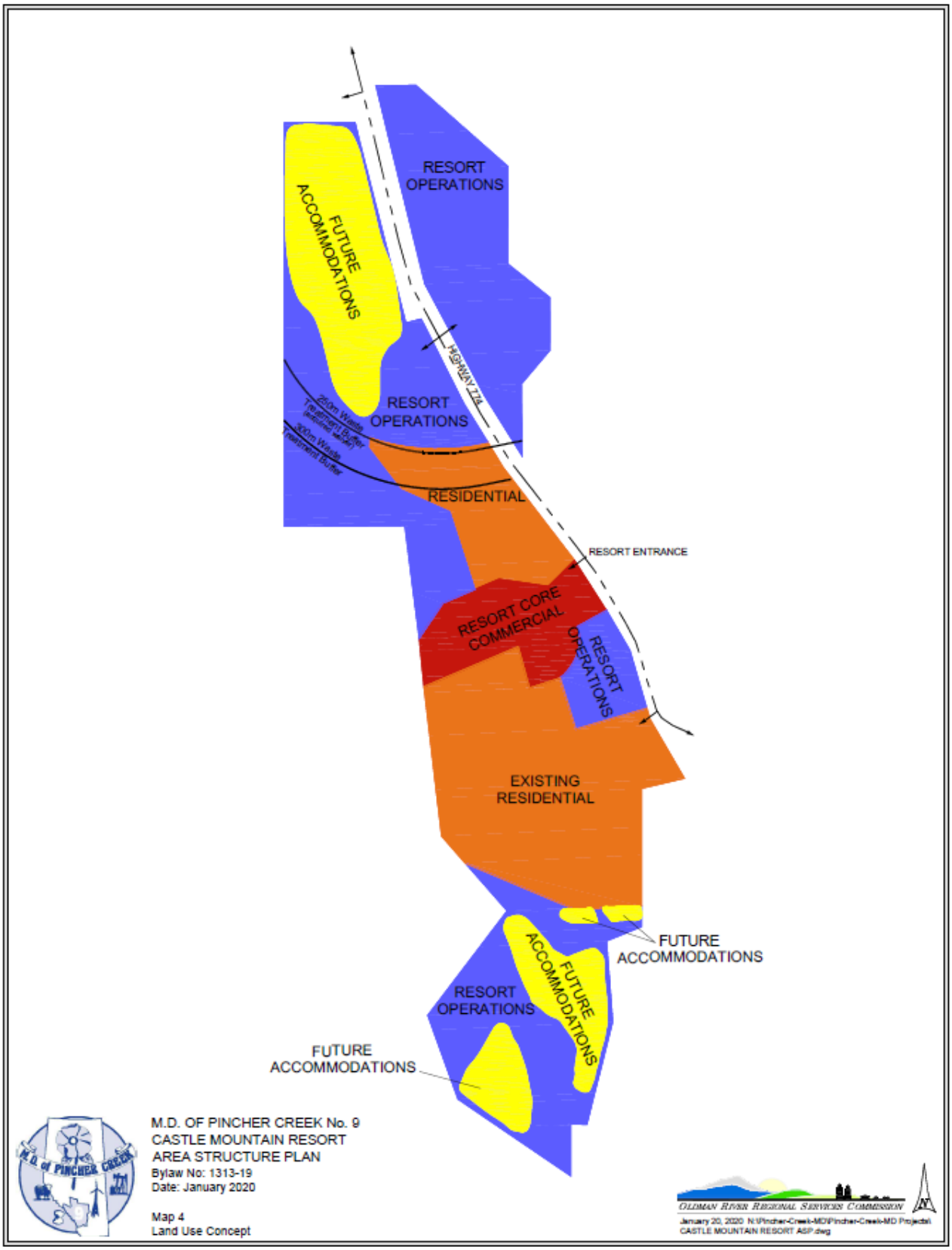
Policy 5.13.1 The manner in which the resort core is designed and the types of facilities established will determine the character and ambiance of the Resort. Attention will be paid to the amount and placement of new construction. To that end, development proposals will be designed with 360-degree architecture (where appropriate) and siting reviewed within the context of the visibility from the hill as well as adjacent buildings and structures.

Policy 5.13.2 A design capacity of 2,400 skiers per day will require 2,600 m^2 (28,000 ft^2) of commercial space. CMR currently has approximately 2,050 m^2 (22,000 ft^2) in place, thus an additional 550 m^2 (6,000 ft^2) of retail, restaurant/bar, or other commercial uses as listed in the land use bylaw may be developed at current build out.

Policy 5.13.3 Mixed-use housing and caretaker suites are allowed uses in the core.

Policy 5.13.4 Commercial accommodation is envisioned to include hotel and hostel uses.

Policy 5.13.5 The numbers of residential units and commercial accommodation developed under policy 5.13.3 and policy 5.13.4 will coincide with parameters set out in the density section of this plan.


RESORT OPERATIONS
FUTURE ACCOMMODATIONS
HIGHWAY 774
RESORT OPERATIONS
250m Waste Treatment Buffer
300m Waste Treatment Buffer
RESIDENTIAL
RESORT ENTRANCE
RESORT CORE COMMERCIAL
RESORT OPERATIONS
EXISTING RESIDENTIAL
FUTURE ACCOMMODATIONS
FUTURE ACCOMMODATIONS
RESORT OPERATIONS
FUTURE ACCOMMODATIONS
M.D. OF PINCHER CREEK No. 9
CASTLE MOUNTAIN RESORT
AREA STRUCTURE PLAN
Bylaw No: 1313-19
Date: January 2020
Map 4
Land Use Concept
OLDMAN RIVER REGIONAL SERVICES COMMISSION
January 20, 2020 N:\Pincher-Creek-MD\Pincher-Creek-MD Projects\
CASTLE MOUNTAIN RESORT ASP.dwg

Residential Development

The following provides the policy expectations of future housing types and their characteristics:

Policy 5.13.6 The future housing unit mix may include: single detached housing units, two-unit dwellings, and multi-unit dwellings.

Policy 5.13.7 Architectural controls (or design and development guidelines) will be adopted by CMR and reviewed by the MD of Pincher Creek to ensure that a standard or quality of presentation is established throughout the base area.

Policy 5.13.8 The numbers of residential units will coincide with parameters set out in the density section of this plan.

Policy 5.13.9 The amount of residential infill to be developed will take into account existing and committed developments.

Policy 5.13.10 Additional staff accommodation may be provided by developing multi-unit buildings and by encouraging the development of secondary suites into the residential units.

Resort Operations

The following provides the policy expectations of Resort Operations land use and its characteristics:

Policy 5.13.11 Resort Operations land use areas include the waste water treatment area, parking lots, maintenance facilities, ski operation facilities, propane tank farm, recreation amenity areas, and recreational vehicle (RV) camping areas.

Policy 5.13.12 The areas north and south of the existing residential development contain undisturbed vegetation, new development should minimize impacts and the design should incorporate natural environmental features while utilizing FireSmart guidelines.

Policy 5.13.13 Recreational vehicles provide non-permanent, low cost accommodation for the Resort. Upon redevelopment of the existing RV area, a new site of 50 stalls may be constructed. To support the needs of RV users, a central common building may be constructed to provide restroom, shower, laundry, meeting area, and common kitchen facilities.

5.14 Architectural Controls (or Design and Development Guidelines)

Architectural controls (design and development guidelines) are intended to supplement the requirements of the Land Use Bylaw by providing a set of rules that ensure consistent quality development will be attained and to ensure that there will be an appropriate level of housing design compatibility. Architectural controls may vary to some extent depending on the location within the development area and may be registered on land titles by the developer.

Typical controls that may be in effect include, but are not limited to, the following:

- diversity in home design,
- incorporation of energy efficiency features,
- roof pitch and materials,
- exterior finishing materials,
- landscaping requirements,
- grading and slope requirements,
- snow management, and
- FireSmart program requirements.

Policy 5.14.1 Architectural Control document(s) shall be submitted to the MD of Pincher Creek for review and approval prior to registration on title. Where an architectural control conflicts with provisions of the Land Use Bylaw, the Land Use Bylaw shall prevail.

Policy 5.14.2 Development Applications shall include a letter certified by the Castle Mountain Development Committee (or its equivalent). This is to insure projects are certified compliant by the Castle Mountain Development Review Committee prior to being processed through the MD. To support this process, CMR shall identify the approved signatory(s) and submit a letter of authorization to the development authority.

6.0 Plan Implementation

6.1 Intent and Jurisdiction

This Area Structure Plan is intended to present the total build out of the Castle Mountain Resort to a level that creates an economically sustainable residential development and resort facilities. The Municipal District of Pincher Creek No. 9 has jurisdiction over the area structure plan, zoning, subdivision, development and building permit approval processes for the private titled lands in Castle Mountain Resort.

6.2 Government Approvals

The proposed development described in the Area Structure Plan requires other jurisdictional approvals. These other jurisdictions are charged with ensuring that provincial regulations are met that will protect water quality, fisheries and wildlife, and other environmental issues. Castle Mountain Resort will seek and receive all provincial approvals required for continued operation and development.

Policy 6.2.1 Within CMR's development parameters, the province has not required an Environmental Impact Assessment (EIA). Prior to approval of any amendment that would increase the total residential equivalent housing units, resort area boundary or CMR-CCC, Council will request that Alberta Environment rule on the requirement for an Environmental Impact Assessment.

Policy 6.2.2 All new applications to the Government of Alberta that would expand the department license of occupation area, change licensing for water or sewer capacity, change or improve access to Highway 774, and all environmental applications shall be made known to the MD of Pincher Creek at the time of application and all resulting decisions by the government shall be copied to the MD of Pincher Creek. An evaluation of the impact on the ASP will result.

Policy 6.2.3 All references to a specific government agency, body, or department were accurate at the time of writing. It is understood that agency, body and department names change from time to time. All references throughout the Plan shall therefore be considered to be applicable to the current relevant agency, body, or department.

6.3 Municipal Development Plan and Land Use Bylaw Review

Policy 6.3.1 Upon adoption or amendment of this plan, the MD Administration shall initiate a review of the Land Use Bylaw and Municipal Development Plan (MDP) in relation to the Area Structure Plan. Their findings shall be forwarded to the MD of Pincher Creek Council for consideration.

Policy 6.3.2 The Comprehensive Siting Plans shall be rescinded and the relevant information be incorporated into the Land Use Bylaw.

Policy 6.3.3 The requirement for CMR architectural control approval letters shall be added to the Land Use Bylaw as a requirement for all permit applications within the resort.

6.4 Redesignation Application Referrals

Policy 6.4.1 When considering applications for redesignation of lands, the application and relevant information shall be sent to the following agencies:

a. utility providers including, but not limited to, phone and electrical;

b. local authorities:

- Livingstone Range School Division,
- Holy Spirit Roman Catholic Separate Regional Division No. 4,
- Pincher Creek Emergency Services;

c. provincial government departments:

- Alberta Culture and Tourism,
- Alberta Environment and Parks,
- Alberta Health Services,
- Natural Resources Conservation Board (when appropriate),
- Alberta Transportation (when appropriate);

d. others that Council may deem appropriate.

Council will consider any responses received within a reasonable period of time.

6.5 Subdivision

Policy 6.5.1 Subdivision applications will be made through the Oldman River Regional Services Commission on behalf of the MD of Pincher Creek. MD approvals will be in accordance with Provincial Legislation, the Municipal Development Plan, the Castle Mountain Resort Area Structure Plan and the MD Land Use Bylaw.

Policy 6.5.2 In accordance with *MGA* and the MDP municipal reserve policy, the MD of Pincher Creek will require payment of cash-in-lieu of land as a condition of each subdivision.

Policy 6.5.3 For the area described in Map 5, an application for subdivision to convert leasehold titles to fee simple titles will only be accepted as a condominium plan in accordance with the *Condominium Property Act, Municipal Government Act,* and *Land Titles Act*.

Policy 6.5.4 The subdivision authority requests that all proposed subdivision applications include information on the availability of a water supply, sewage disposal system, and storm water management. In the case of water supply, the calculation shall include number of units being proposed and the impact on the supply.


M.D. OF PINCHER CREEK No. 9
CASTLE MOUNTAIN RESORT
AREA STRUCTURE PLAN
Bylaw No: 1313-19
Date: January 2020
Map 5
Condominium Only Area
Year Round Road
Condominium Only Area
Aerial Photo Date: 2015
OLDMAN RIVER REGIONAL SERVICES COMMISSION
January 20, 2020 N:\Pincher-Creek-MD\Pincher-Creek-MD Projects\Castle Mountain Resort - Condominium Only Area (ASP Map 5).dwg

6.6 Development

Policy 6.6.1 A development permit is required for each proposed development at the Resort in accordance with the Land Use Bylaw.

Policy 6.6.2 A building permit is required for all non-exempt construction in accordance with Alberta Safety Codes.

Policy 6.6.3 All permanent residential and commercial development shall be serviced to the satisfaction of the Development Authority and Alberta Environment.

Policy 6.6.4 All resort parking shall be in accordance with the Castle Mountain Resort Comfortable Carrying Capacity. The layout will be provided according to a resort master plan and shall include all public and private parking areas. The design and construction of all parking areas will be provided to the satisfaction of the Development Authority and shall take into consideration: site slopes; snow storage and snow shedding from roofs.

Policy 6.6.5 In addition to the preceding application and approval procedures, the MD will withhold the approval of any development application that does not demonstrate the architectural control approval of CMR. This will ensure that any proposed development meets with the architectural controls of the Resort. To support this process, CMR shall identify the approved signatory(s) and submit a letter of authorization to the development authority.

Policy 6.6.6 The development authority requests that all proposed development applications include reporting on the availability of a water supply, sewage disposal system, storm water management, and solid waste disposal.

Policy 6.6.7 Development Application notification processes will be updated in the Land Use Bylaw to include a registered Condominium Board.

6.7 Castle Mountain Resort Master Development Plan

Although the Area Structure Plan is the governing land use document for the base area titled lands, there is a need to coordinate resort business planning including the agreements with the Alberta Government to this document. The completed Castle Mountain Resort Master Development Plan provides the guiding vision as the resort development moves forward, but does not constitute an ASP required policy.

Policy 6.7.1 Any changes to the CMRMDP developed by Castle Mountain Resort shall be submitted to the MD of Pincher Creek for review for compliance with this document and other Municipal planning documents. The MD upon receipt of the document will produce a response brief to Castle Mountain Resort outlining recommendations.

Policy 6.7.2 **I**t is expected that the CMRMDP document will utilize this ASP and other provincial and MD planning documents in its implementation.

Policy 6.7.3 If the Master Development Plan implementation requires amendment to this document, Castle Mountain Resort shall apply for the amendment.

6.8 Infrastructure Master Plan

Policy 6.8.1 CMR Inc. is encouraged to complete an Infrastructure Master Plan and to submit a copy to the Municipal District of Pincher Creek Council. This plan should cover, but is not limited to, an Asset Management Investment Strategy which should contain the following:

a. Existing water and sewer infrastructure inventory,

b. Replacement value of water and sewer infrastructure,

c. Remaining life of water and sewer infrastructure, and

d. An implementation plan for maintaining the water and sewer infrastructure systems.

6.9 Waiver of Area Structure Plan Policies

Policy 6.9.1 As allowed for in the Municipal Development Plan and Land Use Bylaw, the Subdivision Authority or Municipal Planning Commission may approve an application for subdivision or development approval even though the proposed application does not comply with the area structure plan if, in its opinion, the proposed application would not:

a. unduly interfere with the amenities of the neighbourhood; or

b. materially interfere with or affect the use, enjoyment or value of neighbouring parcels of land.

Policy 6.9.2 When the Subdivision Authority or Municipal Planning Commission is considering a policy waiver as allowed for above, the authority shall consider the following:

a. whether the variance is minor and if it complies with other statutory plans and bylaws,

b. the comments of the appropriate persons and agencies received through the referral process have been considered,

c. effects on the operations of the municipality's road network,

d. the professional plans or studies provided by the applicant which support the proposed need for waiver.

6.10 Plan Review and Amendment

As the Castle Mountain Resort Area Structure Plan is a bylaw of the Municipality, a formal process as outlined in the *Municipal Government Act* is required to amend the Plan.

Policy 6.10.1 The future land use and development outlined in the Castle Mountain Resort Area Structure Plan is intended to address a long-term time horizon. Periodic review and occasional amendment of the Castle Mountain Resort Area Structure Plan through public hearing may be required in accordance with the *Municipal Government Act.*

Policy 6.10.2 The Castle Mountain Resort Area Structure Plan is flexible enough to allow for review and amendment every five years or when the Municipality should deem it appropriate.

7.0 Definitions

For the purposes of this plan, the definitions stated below apply. If a word or term is not defined below, then the definition in the *MGA* or the land use bylaw applies.

Alberta Land Stewardship Act (ALSA) – The *Alberta Land Stewardship Act, Statutes of Alberta, 2009, Chapter A-26.8*. The Act and its regulation are the legislated legal basis for regional land-use planning in Alberta, which for the MD of Pincher Creek is the *South Saskatchewan Regional Plan*.

Area Structure Plan – A statutory plan, adopted by Bylaw, which provides a policy framework for the evaluation of proposals for redesignation, subdivision and development of a specified area of land in the Municipality.

Caretaker Suite – As defined in the Municipal District of Pincher Creek Land Use Bylaw.

Castle Mountain Resort (CMR) – For the purposes of this document, Castle Mountain Resort refers to the development area for Castle Mountain Resort which includes the Castle Mountain Community Association and Castle Mountain Resort Incorporated.

Castle Mountain Resort Development Review Committee – A CMR committee (or its equivalent) established to internally review subdivision and development proposals prior to submittal to the MD of Pincher Creek.

Castle Mountain Resort Master Development Plan (CMRMDP) – A conceptual planning document representing the preferred development direction for Castle Mountain Resort.

Comfortable Carrying Capacity (CCC) – A ski industry concept referring to the number of skiers/boarders that a mountain can accommodate per day, in a fashion where guest experiences match their expectations, while having the least amount of impact on the physical environment.

Condominium – A building or structure where there exists a type of ownership of individual units, generally in a multi-unit development or project where the owner possesses an interest as a tenant in common with other owners in accordance with the provisions of the *Condominium Property Act*.

Condominium Plan – A plan of survey registered at a Land Titles Office prepared in accordance with the provisions of the *Condominium Property Act*, *Revised Statutes of Alberta 2000, Chapter C-22*, as amended.

Council – The Council of the Municipal District of Pincher Creek No. 9.

Day visitors – The number of day visitors is estimated by subtracting the number of overnight onsite stays from the total number of visitors

Day Lodge – A ski amenity building housing a cafeteria style restaurant, large dining room and restrooms. The walkout basement beneath the day-lodge houses the ticket office, administrative offices, staff room and additional guest areas.

Development Agreement – A contractual agreement completed between the municipality and an applicant for a development permit or subdivision approval which specifies the roadways, walkways, public utilities, and other services to be provided by the applicant as a condition of a development permit or subdivision approval, in accordance with the *Municipal Government Act*.

Development Authority – The body established by bylaw to act as the Development Authority in accordance with section 624 of the *Municipal Government Act*.

Designate ("Redesignate", "redistrict", or "rezone") – The changing of an existing land use district on the official Land Use Districts Map in the Land Use Bylaw.

FireSmart – A program developed in Alberta by Partners in Protection and the Alberta Government to educate stakeholders on the risks of developing in the Wildland Urban Interface and methods to reduce the risk of wildfire to developments. The publication "FireSmart Guidebook for Community Protection" outlines minimum standards for development in the Wildland Urban Interface.

Goals – Goals are broad statements that define the ultimate condition desired. In this framework, goals are intended to elaborate upon the fundamental principles of the community vision, and express an ideal. Some goals will conflict with other goals, which simply means that in the real world, trade-offs are necessary.

Infrastructure – Public and private utility systems in the Municipality that may include, but are not limited to, the transportation network, water and sewage disposal systems, and utilities.

Land Use Bylaw – A bylaw of the Municipality passed by Council as a *Land Use Bylaw* pursuant to the provisions of the *Municipal Government Act* and intended to control, and/or regulate the use and development of land and buildings within the Municipality.

Land Use District – One or more divisions of the Land Use Bylaw establishing permitted and discretionary uses of land or buildings with attendant regulations.

MD – Refers to the Municipal District of Pincher Creek No. 9, in the Province of Alberta.

Municipal Government Act (MGA) – Refers to the *Municipal Government Act, Revised Statutes of Alberta 2000, Chapter M-26* as amended from time to time.

Municipal Development Plan – The Municipal District of Pincher Creek No. 9 *Municipal Development Plan* is the principal statutory land use plan for the entire Municipality, adopted by Council, in accordance with the provisions of the *Municipal Government Act*.

Municipal Reserve – The land specified to be municipal and school reserve by the Subdivision Authority pursuant to section 666 of the *Municipal Government Act*.

Municipality – The Municipal District of Pincher Creek No. 9 and, when the context requires, means the area contained within the boundaries of the Municipality.

Objectives – Objectives are very similar to goals, except they are more specific, and use terms that indicate the direction of change that is needed. The increased clarity of the objectives makes it easier to understand the problems that are addressed, and to set measurable targets for performance.

Plan – Refers to the Castle Mountain Resort Area Structure Plan as adopted by Council and amended from time to time.

Plan of Subdivision – A plan of survey prepared in accordance with the relevant provisions of the *Land Titles Act* for the purpose of effecting subdivision.

Private Utility – A utility service offered to the public by a private utility company or co-op including, but not limited to, the provision of gas, electricity, water or telephone services.

Qualified Professional – An individual with specialized knowledge recognized by the Municipality and/or licensed to practice in the Province of Alberta through the Association of Professional Engineers and Geoscientists of Alberta (APEGA) or the Alberta Land Surveyors' Association (ALSA). Examples of qualified professionals include, but are not limited to engineers, geologists, hydrologists and surveyors.

Redesignation – Refers to the reclassification by the Municipality of a land use designation in the *Land Use Bylaw* applicable to a specific area of the Municipality.

Resort Core – Refers to the central development area containing mainly commercial and amenity development and is intended to establish the theme character and ambiance of the resort.

Secondary Suite – As defined in the Municipal District of Pincher Creek Land Use Bylaw.

South Saskatchewan Regional Plan (SSRP) – The regional plan and regulations established by order of the Lieutenant Governor in Council pursuant to the *Alberta Land Stewardship Act*.

360-Degree Architecture – The full articulation of all building facades. This includes variation in massing, roof forms, and wall planes, as well as surface articulation. The concept of 360-degree architecture is to design a building where all sides of the structure have been detailed to be complementary in architecture, massing, and materials to the primary street elevation or front facade. In other words, the building should be aesthetically pleasing from all angles.

8.0 Appendix A

History

8.0 Appendix A

History

The Westcastle Ski Area has operated virtually as it exists today for 50 years. It was developed initially by Castle Mountain Resorts Ltd., a private company owned by Paul Klauss, a Swiss alpinist, and Charlie Virtue, a Lethbridge lawyer. The facility opened in 1966 with Lift No. 1, the north T-bar on the novice slope, and Lift No. 3, the long T-bar serving the expert terrain on the east facing slopes of Gravenstafel Ridge.

In 1967, the operation expanded, a second storey was added to the day lodge, and two new T-bars were constructed. Lift No. 2 was added for the intermediate runs and Lift No. 4 was provided to access the high alpine bowl.

In 1970, Lift No. 4 was sold to cover expenses. In 1971 Castle Mountain Resort Ltd. went into receivership and subsequently obtained a loan from the Alberta Opportunity Corporation to consolidate debts, as well as provide on hill accommodation. Sixteen camper stalls, eight lots and ten chalet sites were developed and the sewage disposal system was improved.

In 1974, the parking lot was enlarged, the telephone service was completed, and three trails were cut on the north face of Haig Ridge. In 1975 the Westcastle Ski Area hosted the alpine events of the Alberta Winter Games.

In 1976, the day lodge was destroyed by fire, and in 1977 Castle Mountain Resort Ltd. declared bankruptcy. After unsuccessful attempts to sell the property, the Town of Pincher Creek and the Municipal District of Pincher Creek No. 9 purchased the assets in 1978. Since then, the facility has been operated by the Westcastle Management Committee, with the ultimate goal of developing a complete ski area with a diversity of terrain by expanding onto Haig Ridge.

In 1985, The Legislative Assembly of Alberta passed Bill PR 10, the *Westcastle Development Authority Act*, incorporating the Westcastle Development Authority (WDA). The mandate of the WDA was as follows:

> *"…establish, develop, sell, lease, maintain, manage and operate Westcastle Park with all related facilities including, but not limited to housing, recreation, and commercial requirements."*

The goals of the WDA were to preserve alpine skiing in southern Alberta, and to have a four-season family recreation area established as Westcastle on a scale large enough to provide significant social and economic opportunities for southern Albertans.

The site proposed for the development of Westcastle Village was subject to the following planning documents registered by the Province of Alberta.

1. A Policy for Resource Management of the Eastern Slopes, (Revised 1984)
2. The Castle River Sub-Regional Integrated Resource Plan, (1985)
3. The Westcastle Resort Area Structure Plan, (1987)

In 1982, Travel Alberta commissioned the preparation of a survey and mapping report for the West Castle River flood plain and the existing ski area.

In 1985, the Alberta government approved the Castle River Sub-Regional Integrated Resource Plan on June 19, 1985. The plan "*applies to public lands within the Castle River Planning Area, and not to any private or federal lands*."

In 1986, Ecosign Mountain Recreation Planners Ltd. were engaged by the Westcastle Development Authority to complete a study to evaluate the physical and economic feasibility for the private sector development and operation of a major resort; featuring downhill skiing at the Westcastle Ski Area. The study concluded that the ski area could comfortably accommodate 3,200 skiers per day.

The Alberta government sold 12.5 hectares (31 acres) of public lands in the West Castle for an expansion of the ski hill, as well as commercial and residential development. The land is sold for $1,235.50/hectare ($500/acre). Provisions were made in the Agreement for an option to purchase an additional 135 acres (54.63 hectares). The purchased land included most of the existing base area development at the Westcastle Ski Area, and the optioned land incorporated the remainder of the river valley which appeared appropriate for future development.

In March 1989, Vacation Alberta Corporation, a private Albertan company, entered into a three-party agreement entitled "Memorandum of Understanding" with Alberta Tourism and the WDA. This agreement stated the priorities of all three parties to complete a proposal for capital funding and operation of a four-season destination resort at Westcastle.

In April 1989, Stevenson Kellogg Ernst and Whinney completed a market analysis for The Government of Alberta Department of Tourism, entitled: *Potential Market Demand for a Four-Season Resort at Westcastle*. The study concluded that there is a market demand for a phased expansion of the ski area to 3,200 skiers per day, a golf course, hotel accommodation, as well as affordable recreation property.

In July 1989, a "Land Agreement" was completed outlining the terms and conditions under which Vacation Alberta Corporation may purchase the lands from the WDA. Subsequently, The Lombard North Group (1980) Ltd. was engaged by the WDA and Vacation Alberta to conduct a preliminary environmental analysis of the site and prepare the Westcastle Resort Concept Plan.

In March 1991, Golder Associates Ltd. completed for the Province of Alberta, a groundwater investigation at Westcastle Ski Area, which confirmed the availability of groundwater to supply the resort. The governments of Alberta and Canada have agreed to provide assistance to complete further studies.

In May 1991, William C. Rutledge Architects Ltd. was commissioned to summarize the information gathered in previous studies and prepare a Preliminary Master Plan to become the basis of the Environmental Impact Assessment.

In June 1991, the firm Hardy BBT commenced an Environmental Impact Assessment of the proposed resort, to evaluate the physical, social, economic and environmental effect of the proposed development. The issues were identified in consultation with a local advisory committee, which is comprised of representatives from the Pincher Creek Town Council, the Municipal District No. 9 Council, and The

Mayors Round Table on the Environment, as well as concerned citizens. The final document was presented to the Natural Resource Conservation Board (NRCB).

In August 1992, The Preliminary Master Plan was revised to reduce the environmental impact of the development. The detailed analysis of the Wildlife Management and Hydrological Consultants indicated that the proposed concept restricted the migration of the ungulates and would require significant mitigation to justify the relocation of the river. Subsequently, the design was changed, the golf course was shifted out of the established wildlife corridor, and the access to the ski lift at the base of Haig Ridge was provided with four pedestrian bridges over the river. The illustrations and text of the Preliminary Master Plan document have been adjusted and re-issued as The Revised Master Plan.

In 1993, the Natural Resources Conservation Board (NRCB) finds that the ski resort operated by Vacation Alberta can be expanded only if the rest of the area receives Wildland designation.

Vacation Alberta sues the Alberta government over its failure to designate the West Castle Wildland Recreation Area, and its subsequent withdrawal of permission to develop the ski resort. They claim that the Alberta government has no right to unilaterally cancel their project or to revoke the NRCB permission. The case is settled out of court. West Castle Development Authority purchases an additional 40 hectares (100 acres) of public land for $1,235.50/hectare ($500/acre). This land adjoins those public lands sold in 1986 and allows further development of the Castle Mountain Resort. *(Alberta Wilderness Association (AWA)*. Castle - History, 2014. http://albertawilderness .ca/castle-history. February 24, 2015.)

The Westcastle Supporters Association [WSA] a group of avid Castle-men and women created a trust fund to ensure the solvency of the hill and with the MD's best wishes undertook to operate the mountain. The first year was a struggle but the second year, 1995, demonstrated the possibility of greater things to come. The present day groundwater supply well was drilled during this time period and was extensively tested in February / March 1999. (*Water and Wastewater Utility Infrastructure Systems at Castle Mountain Resort* Mercon Engineering, September 2001)

In 1994, Order in Council 812/94 to annex the lands containing Castle Mountain from an Improvement District governed by the province to the Municipal District of Pincher Creek No.9 took effect on December 31. This process was followed up with the amalgamation of the Improvement District to the MD which took effect under Order in Council 363/95 January 1, 1996.

In 1995, the Alberta Government rescinds the *Planning Act* and adopts the *Municipal Government Act* under which the municipalities are given more autonomy to plan private lands under Part 17. The government limited the powers of local government over crown interests through sections 618 and 619.

Following the resignation on April 19, 1995, of four of the twelve members of the Castle River Consultation Group, on May 11, 1995, the Government of Alberta decides to withdraw its conditional authorization of the NRCB approval. Thus ending the proposed development and nullifying the NRCB conditions and recommendations set out in its 1993 decision report.

An investor group incorporated Castle Mountain Resort Inc. and in the summer of 1996 purchased the resort and its assets from the MD of Pincher Creek. An initial share offering raised enough money to install a triple chair at the base, buy a second snowcat and most importantly purchase a double chair from

Sunshine. There were also plans to open the top of the mountain and quadruple the ski terrain. During the summer of 1998 this was accomplished. The resulting terrain improvements put Castle on the map of great places to recreate with some of the best fall-line steeps in North America. CMR also upgraded the water distribution system with the installation of fire hydrants to provide some firefighting ability. (*Water and Wastewater Utility Infrastructure Systems at Castle Mountain Resort* Mercon Engineering, September 2001.)

In June 1999, CMR Inc. was granted approval by Alberta Environment, under the *Environmental Protection and Enhancement Act* for the construction, operation and reclamation of a Class 1 wastewater treatment plant for Castle Mountain Resort. The new wastewater lagoon treatment facility was placed into operation in mid-December 1999. (*Water and Wastewater Utility Infrastructure Systems at Castle Mountain Resort* Mercon Engineering, September 2001.)

In 2000, the Legislative Assembly of Alberta repealed the *Westcastle Development Authority Act* under Bill PR 3. The private members bill put forward by MLA Coutts proposed the dissolution of the Authority. Legal Counsel Doug Evans for the MD provided testimony to the Legislature for the rationale of ending the municipal control of the ski hill. He reported that the Municipal District and Town of Pincher Creek having spent $200,000 each had wiped out their funding for the resort and that operations were now under control of Castle Mountain Resort Inc.

In 2002, the Castle Mountain Resort Area Structure Plan was adopted as Bylaw 1069-02.

In December of 2006, Mount Haig opened adding terrain for intermediate and novice runs. In 2009, the Province of Alberta adopts the *Alberta Land Stewardship Act (ALSA)*.

In July 2014, as a measure of implementing *ALSA*, the Province of Alberta adopted the *South Saskatchewan Regional Plan (SSRP)* and it came into effect September 1, 2014. During the planning process, the Regional Advisory Council identifies Castle Mountain Resort as a tourist destination node. The final plan established a strategic plan and an implementation plan which places Castle Mountain Resort in the Destination Management Area called Southwest Alberta.

The SSRP replaced the *Provincial Land Use Policies* and *A Policy for Resource Management of the Eastern* Slopes (Revised 1984).

Castle Provincial Park and Castle Wildland Provincial Park were established on February 16, 2017, and are managed according to Alberta's *Provincial Parks Act*. The Castle Provincial Park and Castle Wildland Provincial Park Draft Management Plan was adopted May 2018.

Castle Mountain Resort Inc. with their consultant Brent Harley and Associates Inc. completed a Master Development Plan in May of 2017. The document in consultation with Alberta Government officials sets a new vision for the Resort as it looks to the future.

8.0 Appendix B

Water and Wastewater Utility Infrastructure Systems

WATER and WASTEWATER UTILITY INFRASTRUCTURE SYSTEMS at CASTLE MOUNTAIN RESORT

Prepared For:

CASTLE MOUNTAIN RESORT INC.

Prepared By:

MERCON ENGINEERING (1988) LTD.
#340, 1414-8 Street SW
Calgary, Alberta T2R 1J6
Phone: (403) 244-2172 Fax: (403) 229-3778

September, 2001

File: 1040-1-1

MERCON
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CONSULTING ENGINEERS

340, 1414 - 8 Street S.W.
Calgary, Alberta T2R 1J6
Fax (403) 229-3778
Phone (403) 244-2172

13 September, 2001

File: 1040-1-1

LETTER OF TRANSMITTAL

Castle Mountain Resort Inc.
Box 610
Pincher Creek, Alberta
T0K 1W0

Attention: Mr. G. Robinson
Director

RE: WATER AND WASTEWATER UTILITY INFRASTRUCTURE SYSTEMS AT CASTLE MOUNTAIN RESORT

Dear Sir:

Please find enclosed the above referenced report outlining Castle Mountain Resort's (CMR) existing water and wastewater utility infrastructure systems, their present system capacities/capabilities, and system upgrades and/or expansions required to provide sound servicing of the development of CMR as documented in its Area Structure Plan.

We trust that this information satisfies your requirements. Should you have any questions or comments, please do not hesitate to contact the undersigned.

Yours very truly,
MERCON ENGINEERING (1988) LTD.

Peter Mulyk, P. Eng.

Encl.

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INTRODUCTION

The Castle Mountain Resort (CMR) ski area is located in the Westcastle Valley and the Clarke Range of the Rocky Mountains in the southwestern corner of Alberta.

The Ski resort area was first developed in 1966 by a private developer. In 1976, the then day lodge was destroyed by fire and by the Fall of 1977, the resort had gone into bankruptcy. From 1977 to 1996, the Town of Pincher Creek and the Municipal District of Pincher Creek, through the Westcastle Management Committee and the Westcastle Development Authority operated the resort area.

In June 1985, the Legislative Assembly of Alberta passed the Westcastle Development Authority Act (Bill PR10), which created a corporate body known as the Westcastle Development Authority (W.D.A.) and empowered the W.D.A. to:

> "...establish, develop, sell, lease, maintain and operate Westcastle Park with all related facilities but not limited to housing, recreation and commercial requirements."

The current corporation, Castle Mountain Resort Inc. (CMR), assumed ownership of the former Westcastle Park in 1996 and has, and continues to concentrate its efforts in achieving the goal of developing, operating and maintaining a competitive and viable regional ski hill.

Currently, CMR is assembling a "Castle Mountain Resort – Area Structure Plan" (ASP) to outline and document the various aspects of its growth and development into a viable, stable regional ski hill resort.

This report outlines CMR's existing water and wastewater utility infrastructure systems, their present system capacities/capabilities and defines system upgrades and/or expansions required to provide sound servicing of the development of Castle Mountain Resort as documented in the Area Structure Plan.

WATER & WASTEWATER UTILITIES: BACKGROUND

WATER SYSTEM

Since its original development as a ski hill area, Castle Mountain has secured its domestic, potable water supply from a groundwater well source located near the ski lodge. The present day groundwater supply well was drilled in 1995 and was extensively pump tested in February/March 1999 (1).

Groundwater from the well supply is pumped to a $90^{\pm}$ m^3 (20,000 Imperial Gallon) concrete reservoir located to the west of, and above the ski lodge. The concrete water reservoir is some thirty-five (35) years old. From the reservoir, potable water is distributed by means of gravity watermains to the area's user developments.

After acquiring the ski resort area in 1996, CMR upgraded the water distribution system with the installation of fire hydrants to provide some firefighting ability. In 1997 and 1999, extensions to the water distribution system were made to service the present day 88 residential lease lots. The watermain distribution systems installed by CMR are in accordance to Alberta Environment's "Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems".

WASTEWATER SYSTEM

In 1996, when CMR assumed ownership of the Castle Mountain ski area, all domestic wastewater was collected, via gravity sewers, and flowed to a central septic tank located adjacent to the then existing day lodge. From this septic tank, the effluent flowed, again by gravity, to a tile field disposal area located east of the ski hill's base parking lot area. The disposal field contains approximately 760m (2500 feet) of weeping lateral pipe. This existing septic tank and disposal field system had been in operation for some thirty ($30^{\pm}$) years.

In February/March, 1996, CMR retained the services of KNG Limited to conduct a reconnaissance survey of the West Castle River (2) to:

> "•characterize the chemical nature of the river water as a reference for future studies;
>
> •determine if the sewage from the Westcastle Park ski area is having an impact on the water quality in the West Castle River in the immediate vicinity of the resort."

---

(1) Reference Report: "1999 Pump Test, Supply Well, Castle Mountain Resort, N ½-24-004-04 W5M" prepared for Castle Mountain Resort Inc. by Matrix Solutions Inc., March, 1999.

2) Reference Report: "West Castle River, Water Quality Survey at the Westcastle Park Ski Area in SW Alberta." prepared by KNG Limited for Castle Mountain Resort Inc., March 1996.

The KNG Limited report [2] concluded that:

> "There is no evidence, from the chemical analyses of any impact from sewage."

In 1997, the 30 ± year old existing septic tank was decommissioned by CMR in favour of a newly constructed 68 m^3 (15,000 Imperial gallon) dual compartment septic tank located at the head of the disposal laterals field. Improvements were made to the piping header system to the existing laterals and a pumping system was installed to dose the disposal field with effluent from the septic tank.

In 1997, CMR commissioned Groundwater Solutions Ltd. "to install new monitoring wells for the septic system and to prepare the groundwater monitoring portion of the 1997 wastewater report".[3] This Groundwater Solutions report concluded that:

> "Down-gradient groundwater indicates minimal impacts from the septic field; chloride and NO_3 are increased as a result of septic discharge, but both are below Canadian drinking water guidelines (Health Canada, 1996)." [3]

The CMR septic tank and disposal system continued providing the resort's wastewater treatment and disposal until December 15th, 1999, when Castle's new wastewater stabilization ponds were commissioned into operation. The 1999 annual Wastewater Report for Castle Mountain Resort [4] concluded again that:

> "Down-gradient groundwater indicated that there were minimal impacts from use of the septic field."

Although the septic tank and tile field system had, over its some thirty years in operation, been providing acceptable levels of service to the existing Castle Mountain improvements with minimal impacts, it was concluded that expansion of this system to handle future CMR developments would not represent best practicable domestic wastewater treatment technology for the resort area. In 1998 and 1999, engineering reviews and consultations with Alberta Environment were undertaken. These assessments, reviews, and consultations concluded that a wastewater lagoon system represented the Best Practicable Technology Standard for the CMR area.

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(2) Reference Report: "West Castle River, Water Quality Survey at the Westcastle Park Ski Area in SW Alberta." prepared by KNG Limited for Castle Mountain Resort Inc., March 1996.

(3) Reference Report: "1997 Well Installation and Sampling Program, Castle Mountain Resort, Pincher Creek, Alberta" prepared by Groundwater Solutions Ltd. for Castle Mountain Resort Inc., February 1998.

(4) Reference Report: "1999 Annual Wastewater Report for Castle Mountain Resort, Pincher Creek, Alberta, N ½ 24 and S ½ 25-004-04 W5M" prepared for Castle Mountain Resort Inc. by Matrix Solutions Inc. (formerly Groundwater Solutions Inc.), March, 2000.

Alberta Environmental Protection's December, 1997 publication, "Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems" ("Standards and Guidelines"), states:

> "3.1.2 Best Practicable Technology Standards
>
> Only those technologies identified in Tables 3.1 and 3.2 are considered "Best Practicable Technologies", and the corresponding effluent standards as "Best Practicable Technology Standards."

Table 3.1 of the Alberta Environment, "Standards and Guidelines" lists the best practicable technology standards for municipalities with current population levels less than 20,000 as being secondary (mechanical), aerated lagoons, and wastewater lagoons.

The seasonal (i.e. ski season) use nature of Castle Mountain and the availability of land to accommodate a wastewater lagoon facility were two (2) key factors in selecting wastewater lagoons as the Best Practical Treatment Technology.

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT APPROVAL NO. 18777-01-00

In June of 1999, Castle Mountain Resort Inc. was granted approval by Alberta Environment, under the Environmental Protection and Enhancement Act (Approval No. 18777-01-00) for the construction, operation and reclamation of a Class 1 wastewater treatment plant (wastewater lagoons) for the Castle Mountain Resort. CMR constructed the wastewater treatment plant during the Summer and Fall of 1999. This new, wastewater lagoon treatment facility was placed into operation in mid-December, 1999.

Alberta Environment Approval No. 18777-01-00 grants approval to CMR to dispose of treated wastewater by means of discharge to:

- An irrigation system and area, or,
- Upon prior written approval by Alberta Environment, to the existing septic tank and tile bed system for use as a backup for treated wastewater disposal.

The CMR wastewater lagoon treatment system has now been in operation for twenty-one (21) months, encompassing two (2) full winter ski seasons. No discharge of treated wastewater has occurred at the Resort since December 15, 1999. All wastewater from December 15, 1999 to date has been treated and held/stored within the lagoon cells.

As at the time of this report, CMR is receiving and reviewing supplier/contractor submissions for the construction installation of the effluent irrigation discharge component of its wastewater system. It is anticipated construction of the irrigation system will be undertaken this Fall, 2001 or in the Spring of 2002. It is noted that the CMR lagoon system has sufficient, available capacity to treat and store wastewater from the upcoming 2001/2002 ski season.

CMR DEVELOPMENT AREA STRUCTURE PLAN DESIGN CRITERIA

CMR will be striving to realize 100,000 skiers annually at its regional ski and snowboarding area. The skier use/numbers will be generated from housing units at its base and day-use visitor skiers.

The CMR Area Structure Plan (A.S.P.) envisions a total of 225 housing units at its base. A fifty (50) site recreation vehicle (R.V.) park is envisioned by the A.S.P. The R.V. park will not be fully serviced with water and sewer to the sites. A central washroom facility will be provided to meet the needs of the R.V. visitor.

For the housing units, an average occupancy density of 3.5 people per housing unit is defined. For the R.V. park, a density of 2.0 people per R.V. unit is defined. It is estimated that 80% of the housing units and R.V. unit occupants will be skiers and will utilize the ski hill during their time at the resort. The A.S.P. also projects that during peak winter season periods (i.e. Christmas, long weekends), 90% of the housing units and R.V. park would be occupied.

The above A.S.P. development criteria are used as the basis for defining the requirements of CMR's water and wastewater utility systems.

CMR AREA STRUCTURE PLAN

WATER SUPPLY AND SYSTEM

EXISTING WATER SUPPLY

As previously discussed, the water supply for the Castle Mountain area and its developments is obtained from a groundwater well source located near the ski lodge. The well was drilled in 1995. In 1999, CMR retained Matrix Solutions Inc. (Matrix) to conduct a pump test on its subject supply well. The Matrix pump test and report [(1)] concluded that:

- "Using the lowest transmissivity estimate, the approximate 20-year yield of the well is estimated at 4 L/s, or 50 Igpm."

- "Laboratory analysis indicates a low-total dissolved solids groundwater that is of excellent quality for a potable supply."

In a subsequent Matrix Solutions Inc. report [(5)] and on the topic of firefighting, the report noted:

- "It is recommended that a new well be drilled at CMR and that it should be supplied with a pump capable of producing up to 400 Igpm. Thus, the water for firefighting could be directly pumped from the aquifer when necessary".

WATER DESIGN CRITERIA AND REQUIREMENTS

The water requirements/design criteria for the Castle Mountain developments have been defined in previous engineering works as follows:

- Day Use Skiers.....15 Igpcd
- R.V. Park Units.....30 Igpcd
- Recreational Housing Units.....50 Igpcd

Imperial Gallons per Capita per Day

For the recreation, housing unit component for Castle Mountain, the Area Structure Plan uses a design criteria of 3.5 people per unit and an average 55% occupancy/usage factor over the ski season. In addition, the A.S.P. assumes 80% of the housing units occupants will be skiers.

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(1) Reference Report: "1999 Pump Test, Supply Well, Castle Mountain Resort, N ½-24–004–04 W5M" prepared for Castle Mountain Resort Inc. by Matrix Solutions Inc., March, 1999.

(5) Reference Report: "Snowmaking and Firefighting at Castle Mountain Resort – Water Use Analysis", prepared by Matrix Solutions Inc., March 2001

1999/2000 Recorded Flows Versus Design Criteria

For the 1999/2000 ski season, the design criteria water flow for the existing housing units (i.e. 60 homes) and skier use would be calculated as follows:

- Housing Units
  (60 units at 3.5 p.p.u. @ 50 Igpcd @ 55%
  occupancy over ski season of 114 days actual).....658,350 Igal
- Housing Resident Use Skiers
  (10,534 skiers: included in housing units)..... incl.
- Day Use Skiers
  (61,667 less 10,534 @ 15 Igpc).....766,995 Igal

Total Calculated, Design Criteria Water Use
Over 1999/2000 Ski Season.....1,425,345 Igal
(6480 m^3)

Actual Metered Water Use for 1999/2000 Ski Season.....1,391,500 Igal
(6325 m^3)

As may be noted from the above, the design criteria calculated water use and actual metered volumes (i.e. 6480 m^3 versus 6325 m^3) are comparable. The water requirement/design criteria, as herein defined, are considered representative.

Continued analyses and reviews of ensuing years of Castle Mountain's metered water volumes, skier numbers, housing units, occupancy figures, etc., will provide CMR with a historical data base on which to draw conclusions as to the validity of the water design criteria.

PROPOSED CMR AREA DEVELOPMENT: WATER SYSTEM REQUIREMENTS

Castle Mountain Resort Inc. will be striving to realize 100,000 skiers annually at its regional ski and snowboarding area. The CMR Area Structure Plan envisions a total of 225 housing units at its base and 50 non-serviced R.V. sites. It is estimated that a peak winter season day would encompass 2400 skiers (G. Robinson, CMR director, personal communication to P. Mulyk, Mercon Engineering (1988) Ltd., May 4, 2001).

For the projected Castle Mountain Area Structure Plan development, the design criteria maximum day water demand during the ski season would be estimated as follows:

• Housing Units (225 units @ 3.5 ppu @ 50 Igpcd @ 90% occupancy)	35,450 Igpd
• R.V. Units (50 units @ 2.0 ppu @ 30 Igpcd @ 90% occupancy)	2,700 Igpd
• Resident Use Skiers (710 skiers – included in-housing and R.V. units)	Incl.
• Peak Day Use Skiers (1690 skiers at 15 Igpcd)	25,350 Igpd
TOTAL, ESTIMATED MAXIMUM WINTER DAY WATER DEMAND	63,500 Igpd (290 m^3/day) (44 $\pm$ Igpm)

WATER SOURCE AND SUPPLY

The above maximum day water demand of 63,500 Igal equates to a supply rate of 44 $\pm$ Igpm. Alberta Environment's "Standards and Guidelines" note that "water supply should be designed for at least 110% of the projected maximum daily design flow". For Castle Mountain, the water well pumping system should be ultimately capable of a supply rate of approximately 50 $\pm$ Igpm.

Any water supply source should be capable of meeting the developments maximum day water requirements. As previously noted, the Matrix well pump test and reports concluded the 20-year yield of Castle's well at 50 Igpm, using the lowest transmissivity estimate, and that the aquifer is capable of producing 400 Igpm for firefighting or other short-term emergency needs. The projected maximum day demand of 50 $\pm$ Igpm can be readily supplied by the existing groundwater well source and aquifer.

At the present time, Castle has one (1) groundwater well supplying its water needs. For security of supply purposes, and to assist in the emergency supply of firefighting flows, it is recommended that a new water well be completed at CMR. The reader is referred to the Matrix Solutions Ltd., Water Use Analysis report [5] for additional information and details concerning a second CMR well.

TREATMENT

Castle's groundwater well is a deep well and is located away from any source of pollutants, flooding and/or direct surface influences. As concluded in the Matrix reporting, laboratory analyses indicate groundwater "that is of excellent quality for potable supply". No treatment of Castle's groundwater is presently being carried out.

Although treatment of CMR's groundwater supply would not be required, it is being recommended that disinfection, by means of chlorination, be undertaken to ensure safe, potable water in constructed storage and distribution mains.

DISTRIBUTION SYSTEM

Typically, a water distribution system is designed to supply and deliver peak hourly water demands or maximum day demand plus fire flows, whichever is greater. Further, the distribution system is designed to handle normal operating pressures between 350 kPa and 550 kPa (50 to 80 psi) under a condition of maximum hourly design flows. Watermains designed to carry fire flows should have a minimum inside diameter of 150 mm (6 inches).

The existing Castle Mountain water distribution system consists of 150 mm diameter (6 inches) mains, complete with fire hydrants, and meets the above design criteria. Future extensions to the system would be designed and constructed to continue to meet good engineering standards and guidelines.

The existing CMR distribution system has a water flow capability in the order of 800 Igpm. This rate is more than sufficient to meet the CMR's Area Structure Plan developments peak day and peak hourly water design flows. Under an emergency fire situation, the distribution system would be capable of flowing this estimated 800 Igpm.

POTABLE WATER STORAGE

Potable water storage reservoirs are designed to provide sufficient volumes of storage to control distribution pump operation, balance fluctuations in use demands, and to provide some capacity for standby/emergency purposes. In addition, where fire flows are to be provided, the water reservoir is designed to hold the necessary volume of water for firefighting purposes.

---

(5) Reference Report: "Snowmaking and Firefighting at Castle Mountain Resort – Water Use Analysis", prepared by Matrix Solutions Inc., March 2001

The total potable water storage requirement is typically calculated by the following empirical formula:

$$S = A + B + C$$

Where **S** = Total Storage Requirement
A = Fire Storage
B = Equalization Storage (approximately 25% of projected maximum daily design flow)
C = Emergency Storage (approximately 15% of projected maximum daily design flow)

In determining fire storage requirements for the CMR area, two (2) factors were considered:

(1) The ability to withdraw 400 Igpm from the existing groundwater aquifer [5], and

(2) The ability of CMR's water distribution system to flow approximately 800 Igpm.

With the ability to flow approximately 800 Igpm (3640 l/s), the Insurer's Advisory Organization [6] recommends a flow duration at this rate of 1.5 hours. This would equate to a fire storage requirement in the order of 72,000 Igal.

CMR is in a unique situation in that its area's groundwater aquifer is a major natural water reservoir. This aquifer/natural reservoir is capable of being pumped, for "firefighting and other short-term emergency needs", at a rate of 400 Igpm, thereby providing half (1/2) the fireflows. The other half (1/2) of the fireflow storage is required in a man-made structure.

(5) Reference Report: "Snowmaking and Firefighting at Castle Mountain Resort – Water Use Analysis", prepared by Matrix Solutions Inc., March 2001

(6) Reference document: "Water Supply for Public Fire Protection – 1999", Fire Underwriters Survey, c/o Insurers' Advisory Organization Inc.

On the basis of the above, the potable water storage requirements for Castle Mountain, and its Area Structure Plan developments, would be calculated as follows:

(A)	Fire Storage (400 Igpm for 1.5 hours) (36,000 Igal in aquifer)	36,000 Igal
(B)	Equilization Storage (25% of 63,500 Igal)	15,875 Igal
(C)	Emergency Storage (15% of 63,500 Igal)	9,525 Igal
	TOTAL CONSTRUCTED, WATER STORAGE REQUIREMENT	61,400 Igal

Castle's present reservoir has a storage capacity of 20,000 Igal. Additional water reservoir capacity, in the order of 41,400 Igal, would be required to be constructed to meet the design calculated storage requirements.

With the provision of additional storage reservoir capacity, the sequencing of CMR's water system operation under an emergency, fire situation would be as follows:

(1) Initial fireflow supply volumes provided from CMR reservoir to distribution system by means of gravity.

(2) Emergency water supply from new groundwater well pumped to reservoir at 400 Igpm.

(3) In the event of emptying of the reservoir, continued emergency water supply from well, at rate of 400 Igpm, until situation controlled.

SUMMARY: WATER SYSTEM

Castle Mountain Resort has a proven potable water supply source with the capability to meet its existing and proposed Area Structure Plan developments.

It is recommended that a second groundwater well be completed to increase the security of supply and to allow for increased pumping/supply capacity under an emergency situation.

It is recommended that disinfection, by means of chlorination, be installed and operated to ensure safe, potable water in constructed storage and distribution mains.

The existing distribution system meets good engineering standards. Any extension(s) would be engineered to the same standard. The gravity flow from the reservoir to the distribution system negates the need for a distribution pumping system and standby power.

The existing Castle Mountain water reservoir meets some of the equalization and emergency storage components. However, additional reservoir capacity is required to fully meet the equalization and emergency storage needs and satisfy fire storage requirements. Sufficient land area is available in proximity to the existing reservoir in which to construct additional water storage, and at elevations to maintain gravity flow distribution.

CMR AREA STRUCTURE PLAN

WASTEWATER COLLECTION, TREATMENT AND DISPOSAL

EXISTING WASTEWATER STABILIZATION PONDS: DESIGN CRITERIA AND CAPACITY

The Castle Mountain wastewater treatment plant consists of one (1) facultative pond and one (1) storage/polishing pond having the following treatment/storage capacity volumes:

- Facultative Cell.....5,800 m^3 (1,276,000 Igal)
- Polishing/Storage Cell.....27,075 m^3 (5,956,500 Igal)

The wastewater flow design criteria used for the engineering designs of the Castle Mountain treatment facility were as follows:

- Day Use Skiers.....15 Igpcd
- R.V. Park Users.....30 Igpcd
- Recreational Housing Units.....50 Igpcd

Imperial Gallons per Capita per Day

As may be noted, the above wastewater flow design criteria are the same as that used for water supply/demand. Although "The volume of sewage generated in a resort setting similar to the Westcastle Ski Area is typically 95% of water demand" [7], CMR wishes to ensure complete adequacy in their wastewater treatment and disposal facility. Therefore the somewhat higher wastewater design criteria are proposed.

1999/2000 Recorded Flows Versus Design Criteria

On the basis of the A.S.P. development criteria and for the 1999/2000 ski season, the design criteria wastewater flow would be calculated at 6480 m^3 (1,425,345 Igal). Actual metered wastewater volume for the 1999/2000 ski season was 5,551 m^3 (1,221,200 Igal). The design criteria calculated volume of 6480 m^3 is approximately 16.7% higher than the actual volume recorded of 5551 m^3.

Again, although the design criteria calculates higher than recorded wastewater flows, these criteria are proposed for use to provide an insurance/safety margin in regards to CMR's wastewater treatment and disposal facilities.

(7) Reference Report: "Castle Mountain Resort Inc., Westcastle Park, Water & Sewer System Upgrading Report" prepared by UMA Engineering Ltd., April 1996.

PROPOSED CMR AREA DEVELOPMENTS:
WASTEWATER SYSTEM REQUIREMENTS

As previously noted, Castle Mountain Resort Inc. will be striving to realize 100,000 skiers annually at its regional ski and snowboarding area. The CMR Area Structure Plan envisions a total of 225 housing units at its base including 50 non-serviced R.V. sites.

For the projected Castle Mountain Area Structure Plan development, the design criteria maximum monthly average daily wastewater flows for the ski season would be estimated as follows:

- Housing Units (225 units @ 3.5 ppu @ 50 Igpcd @ 55% occupancy)..... 21,660 Igpd
- R.V. Units (50 units @ 2.0 ppu @ 30 Igpcd @ 55% occupancy)..... 1,650 Igpd
- Resident Use Skiers (390 skiers included in housing and R.V. units)..... Incl.
- Day Use Skiers (610 skiers at 15 Igpcd)..... 9,150 Igpd

TOTAL ESTIMATED MAXIMUM MONTHLY AVERAGE WINTER DAY WASTEWATER FLOW..... 34,460 Igpd (157 m^3/day)

For the non-winter seasons, the CMR Area Structure Plan assumes a 30% occupancy of the housing units development at Castle Mountain. On this basis, the design criteria average daily wastewater flows for the non-skiing, warm season would be estimated as follows:

- Day Use Skiers..... Nil
- Housing Units (225 units @ 3.5 ppu @ 50 Igpcd @ 30% occupancy)..... 11,800 Igpd
- R.V. Units (50 units @ 2.0 ppu @ 30 Igpcd @30% occupancy)..... 900 Igpd

TOTAL ESTIMATED MAXIMUM MONTHLY AVERAGE WARM DAY WASTEWATER FLOW..... 12,700 Igpd (58 m^3/day)

Assuming an approximate 17-week ski season (119 days), the annual design criteria calculated wastewater flow/volume for the CMR area structure plan scenario would be 32,951 m^3 (7,248,000 $\pm$ Igal). On a monthly basis, this annual flow is approximated as follows:

Month	Wastewater Flow (m^3)
January	4867
February	4396
March	4867
April	3225
May	1798
June	1740
July	1798
August	1798
September	1740
October	1798
November	1740
December	3184
ESTIMATED ANNUAL FLOW	32,951 m^3

FACULTATIVE CELL

Under Alberta Environment's "Standards and Guidelines", a facultative cell should have a two (2) month retention time. The present day Castle Mountain facultative cell has a treatment capacity of 5800 m^3.

The months of January, February and March represent the high use and wastewater flow period at Castle. The wastewater flows for these three (3) months have been estimated above at 4867 m^3, 4396 m^3 and 4867 m^3 respectively. The two (2) month flow for January and February, or February and March would total approximately 9263 m^3.

Under the full, complete CMR area structure plan development scenario, the facultative cell component of the existing wastewater treatment system may have to be upgraded and/or expanded. A number of options are available regarding upgrading and/or expansion, as follows:

- Aeration of the existing facultative lagoon could be implemented to increase the treatment efficiency/capacity of this cell.

- The existing facultative cell could be re-constructed and converted into an aerated lagoon system. Under this option, two (2) aerated cells, operating in series or in parallel, would be constructed with each cell sized to 50% of the maximum monthly average daily design flow.

- The existing facultative cell could be maintained, and an aeration basin(s) constructed. The process flow would be aeration basin(s) to facultative, and then to storage/polishing pond.

As has been discussed, the wastewater design flow criteria being used results in higher than actual recorded wastewater flows. It is recommended that CMR continue to diligently monitor wastewater flows and treated wastewater quality. Analyses of actual flow and quality data will enable the operation of the facultative cell to be assessed, and appropriate upgrading and or expansion (if any) defined in the future.

In January and February, 2000, Castle Mountain recorded 38,267 skiers, had 60 housing units, and generated a metered wastewater volume flow of 2786 m^3. This two (2) month flow of 2786 m^3 used 48% of the designed capacity of the existing Castle Mountain facultative cell, leaving 52% available to accommodate future growth in skier numbers and/or housing units.

POLISHING/STORAGE CELL

Under Alberta Environment's "Standards and Guidelines" for treated effluent disposal to land, at least seven (7) months storage retention time is required in the polishing/storage cell. Castle Mountain's Alberta Environment Approval No. 18777-01-00 further states that:

> "5.1.3 Wastewater flows into the wastewater treatment facility shall not exceed the following limits:
>
> (a) an eight month volume of 27,075 m^3 based on any consecutive eight months."

Under the wastewater flow estimates herein present, the period December to July would represent the maximum eight (8) month volume period. The design wastewater flow for this period is estimated at 25,875 m^3. The existing Castle Mountain polishing/storage cell has a constructed volume capacity of 27,075 m^3 and is therefore sufficiently sized to accommodate the proposed CMR Area Structure Plan development.

TREATED EFFLUENT IRRIGATION DISPOSAL

At the time of this report, September, 2001 and since December 15, 1999, all wastewater from the Castle Resort development has been discharging to, and has been contained within, the constructed wastewater lagoons. No disposal of treated effluent has been required since December 15, 1999 as the wastewater lagoons have had more than sufficient, available volume capacity to accept, treat and store the wastewater being generated.

The engineering works identified in CMR's Alberta Environment Approval No. 18777-01-00 included a forest slope irrigation system design, site management and monitoring plans for the effluent irrigation disposal at the Castle Mountain Resort development area. As the constructed wastewater stabilization ponds have had the capacity to treat and hold Castle Mountain's wastewater flows since November, 1999, there has been no need to have the irrigation system in place, as no discharge would be necessary. Further, and as previously discussed, the existing CMR wastewater lagoons have available capacity to treat and store the wastewater flows from the upcoming 2001/2002 ski season.

CMR is presently reviewing supplier/contractor submissions for the construction of the irrigation component of its wastewater system. It is anticipated construction of the irrigation system will be undertaken this Fall, 2001 or in the Spring of 2002.

As concluded in the Cochrane Engineering, Irrigation Site Management Proposal report[8]:

> "The effluent irrigation system will be an effective and environmentally acceptable method of disposal for the treated wastewater from Castle Mountain Resort Inc. development."
>
> "Additional areas are available for effluent irrigation and will be utilized as required to allow the safe operation of the system."

(8) Reference Report: "Castle Mountain Resort Inc., Irrigation Site Management Proposal" report prepared by Cochrane Engineering Ltd., January 1999.

SUMMARY: WASTEWATER TREATMENT AND DISPOSAL SYSTEM

Castle Mountain Resort's wastewater lagoons system represents Best Practicable Technology.

Subject to analyses of future actual wastewater flows and resultant treatment quality data, the facultative treatment cell component may require upgrading and/or expansion to service the full CMR Area Structure Plan development. Acceptable methods and technologies are available to realize any treatment expansions and upgrades which may be required. At present, less than 50% of the design capacity of the facultative lagoon is being used during the peak winter ski season.

The existing wastewater polishing/storage cell has in place the hydraulic capacity to accommodate the CMR Area Structure Plan development.

The disposal of treated effluent by means of an irrigation system has been approved by Alberta Environment Approval No. 18777-01-00. The construction and commissioning of an irrigation system will realize the controlled, environmentally acceptable discharge of treated effluent. Sufficient land area for irrigation disposal is available to accommodate the full CMR Area Structure Plan development.

8.0 Appendix C

Snow Making and Fire Fighting Water Use Analysis

Matrix Solutions Inc.

SNOWMAKING AND FIREFIGHTING AT CASTLE MOUNTAIN RESORT

WATER USE ANALYSIS

Report Prepared for:

CASTLE MOUNTAIN RESORT

Prepared by:

MATRIX SOLUTIONS INC.

James T. Freeman, M.Sc.
Principal Hydrologist

reviewed by
Robert Pockar, M.Sc., P.Eng.
Project Engineer

April 2001
Calgary, Alberta

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FIGURES

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FIGURE 5. Simulated Pumping 1,000 m^3/day for 45 days

TABLE

TABLE 1. Projected Water Requirements for Snowmaking

1.0 BACKGROUND

Castle Mountain Resort ski area (CMR) is located in the Clark Range in the southwestern corner of Alberta. The current corporation assumed ownership of the former Westcastle Park in 1996. Currently, CMR is assembling an Area Structure Plan (ASP) to outline various aspects of its growth into a viable regional ski area.

This document examines potential water use by CMR, particularly for fire fighting and snowmaking. An analysis to estimate sustainable groundwater extraction rates relative to the surrounding environment and recommendations on water source options are made. The present and likely future water needs of CMR for residential and resort consumption are met by an existing groundwater supply well. This well and its capacity are the subject of a previous report (Matrix, 1999).

2.0 WATER USE OPTIONS

Firefighting is the least consumptive of water uses considered. It was assumed that firefighting could use 20,000 imperial gallons (igals) over a two-hour period (J.Harker, CMR director, pers. comm. to J. Freeman, Matrix, January 24, 2001).

Snowmaking is a non-consumptive use of water, in that water is stored on the mountain as snow, then returned to the water shed over the snowmelt season in late spring. However, the requirements for snowmaking are for water deliveries over a short period to time in the autumn. For the purposes of this analysis, it was assumed that all of CMR's snowmaking would occur during a 15 day period in November.

The snowmaking water requirements are outlined in Table 1. This spreadsheet assumes that snowmaking would attempt to cover portions of the lower mountain (Gravenstafel), troublesome, high-traffic portions of the upper mountain (Phases 2-3) and future development on Haig Ridge, south of the present base area. The covered acreage is converted into water requirements using 200,000 igals/acre (T. Tataryn, CMT manager pers. comm. to J. Freeman, Matrix, March 2001).

Options for water supply include the following:

Cirque pond - A lined pond could be constructed in the cirque on the upper mountain. This is a relatively flat area that could hold a large pond. The pond would be filled during spring runoff at the end of one ski season and used for snowmaking the next fall.

Haig Creek - Haig Creek is not gaged, but it appears to flow 1,000 to 3,000 m^3/d during the fall and winter. The creek has no known fish species, so there are no in-stream flow requirements (T. Tataryn, CMR Manager, pers. comm. to J. Freeman, Matrix, March 2001). However, without more gaging information, it would be recommended that Haig Creek be used only to supplement groundwater supplies and that only a maximum of 1,500 m^3/d (230 igpm) is assumed to be available.

Groundwater - CMR is located within the Westcastle valley. This valley is a typical southwestern Alberta montane river valley, with a buried channel deeply incised into the bedrock surface that is more or less coincident with the river valley. This channel is filled with alluvial and colluvial gravels and is hereafter, referred to as the Westcastle aquifer. Drilling by Golder (1991) indicates that the buried channel is an unconfined aquifer up to 40 m thick.

The present day Westcastle river meanders across the surface of this aquifer and likely only represents a portion of the flow along the Westcastle valley, particularly during periods of low flow, such as in the late fall and winter. Much of the flow occurs as flux down the valley through the buried channel aquifer. The down-valley aquifer flux has been estimated as 0.06 m^3/s, 800 igpm (Matrix, 1999).

The aquifer beneath the ski area is capable of well yields in excess of 3,000 m^3/d, however, sustained pumping of the aquifer at high rates is likely to drawdown groundwater levels and could affect the river. An analysis of pumping rates and aquifer drawdowns is provided below.

Storage in Large Sewage cell - The large cell in the sewage lagoon can be used for water storage for snowmaking. It can be emptied during the summer and filled from groundwater

during the fall. The storage cell would have a secondary use in cooling groundwater for efficient snowmaking. The large cell holds 21,000 m^3 (4.5 Migal).

3.0 BULL TROUT

One of the principal environmental effects that could be caused by water withdrawal from the Westcastle aquifer is potential impacts on bull trout spawning and egg development in the Westcastle River. Prior to the second half of the 20th century, bul trout were the predominant trout and char species in foothills rivers and streams, but since this time, populations of this species have experienced drastic reductions. Reasons for the decline in bul trout include over-fishing, habitat degradation and the often deliberate introduction of competing species, such as rainbow and brook trout (Brewin, 1997). There is an existing bull trout population in the Westcastle River, and like most bull trout populations in southwestern Alberta, it is considered "vulnerable" (K. Brewin, Trout Unlimited Canada, pers. comm. to J. Freeman, Matrix, March 6, 2001).

Most of the data on bull troat occurrence in the Westcastle River has been collected within the last 10 years. Vacation Alberta, in a proposal to develop the former Westcastle Park ski area into a four-season resort, conducted an Environmental Impact Assessment (EIA) that included 2 years of intensive fish studies on the river (Boag and Hvenegaard, 1997). Subsequent to that work, Alberta Environment conducted autumn fish spawning surveys for 5 years; in 1994-98. This work counted fish and redds (fish nests) along key reaches of streams and rivers across the Oldman River Basin, including a reach of the Westcastle River between the washed out bridge adjacent to the resort and about 1.5 km downstream of CMR (Gerrand and Watmough, 1999; and Natural Resources, 2001).

The Vacation Alberta EIA work concluded that bull trout in the Westcastle River were resident and largely did not migrate to or from downstream rivers. This population is also limited in its upstream migration by Westcastle Falls, about 6 km upstream of CMR. Within its Westcastle habitat, the favoured area for bull trout spawning is a several-hundred meter stretch of the river, located immediately north of the ski hill (Figure 1). Spawning in this area typically occurs between late August and October, with eggs hatching in March and April of the following spring. The EIA demonstrated

the preference of fish to this area by the field identification of redds and the tracking of several individual fish throughout the fall and early spring of 1991-93 (Boag and Hvenegaard, 1997).

Spawning bull trout prefer gravelly stream bottoms, with water temperatures below 18 C, (but above freezing during the winter), groundwater discharge and some cover, if available. The area identified in the EIA study had all of the conditions favourable for spawning; 12 bull trout redds were found in 1991 and 10 were found in 1992 along this reach (Boag and Hvenegaard, 1997). Between 1995 and 1998, three to seven redds were found each year in the same stretch of the river (Gerrand and Watmough, 1999; Natural Resources, 2001).

Therefore, for the present work, the assumption was made that water use schemes by CMR should be protective of groundwater discharge into the bull trout spawning area. In order to do this, the amount of water level decrease (drawdown) in the bull trout spawning area should be minimized over the fall and winter months. This will prevent the river from drying up and freezing the trout eggs and minimize decreases in the groundwater discharge into this area.

4.0 ANALYTICAL GROUNDWATER MODELING

An analytical groundwater flow model was used to predict the groundwater level declines (drawdowns) that would result from pumping a water well located in the center of the Westcastle Valley adjacent to the CMR parking lot. Numerical groundwater modeling had previously been conducted by consultants for Vacation Alberta's EIA, where drawdowns were predicted for a number of pumping scenarios. However, as published in the EIA, these drawdowns were not quantified (HBT Agra, 1992).

Therefore, a new model of flow in the Westcastle aquifer was constructed. This model was based on the Theis solution of the transient groundwater flow equation (Theis, 1935). The Theis solution assumes an infinite, confined and homogeneous aquifer. One of the more important limitation of these assumptions, the fact that the Westcastle aquifer is bounded on either side by the valley walls,

was accounted for by the use of two image wells, located west and east of the pumping well, respectively. The image well method is described in Kruseman and deRidder (1990).

To simulate water level decreases in the bull spawning area, drawdown was monitored at an observation point located 400 m downgradient of the pumping well. In reality, drawdown in the spawning area will be buffered by groundwater that discharges in this area and, to some extent, by water recharging the aquifer from the river. If there is very little drawdown, there will be no effect on the river or the groundwater discharge. On the other hand, if there is an excessive amount of drawdown, groundwater discharge and river levels could be affected.

It is assumed that less than 10 cm of drawdown in the vicinity of the bull trout spawning area would not be detectable in the field by a change in water levels or river flow. Over 1 m of drawdown would likely be detectable and could have an appreciable effect on river flows and the groundwater discharge. Between 10 cm and 1 m of drawdown, the drawdown would likely be detectable, but would likely not have significant effects on the bull trout spawning area. At this simulated range of drawdowns, the actual field drawdown will likely be buffered by flow from the river and interception of groundwater discharge.

Values of aquifer parameters were based on previous studies, including Golder (1991), HBT Agra (1992) and Matrix (1999). Transmissivity of the aquifer was assumed to be 3×10^{-2} m^2/s and the storativity was assumed to be 3×10^{-3} m^2/s. The water level gradient down the Westcastle River valley was assumed to be 0.3% (Figure 2).

An approximate calibration was conducted by estimating the aquifer drawdown at an observation point 400 m downgradient of the pumping well, pumping at 230 m^3/d (35 igpm), similar to the 1999 pump test. The analytical model predicted 5 cm of drawdown at 400 m at the end of 1 day (Figure 2), whereas no pumping drawdown was observed in observation wells during the pump test (Matrix, 1999). Based on the model calibration and in comparison to the results of other studies, the values of transmissivity and storage used for this analysis are believed to be low and therefore, conservative for drawdown predictions.

From Table 1, it is seen that total water requirements for snowmaking are approximately 45,000 m^3/d. All of this water could theoretically be pumped from a single well at a pumping rate of 3,000 m^3/d, but, as simulated, could result in 1.3 m of drawdown at 400 m at the end of the 15 day snowmaking period (Figure 4). This amount of drawdown would not be protective of the bull trout spawning area, so this option was discarded as infeasible.

Simulated pumping rates were lowered, until an approximate rate that supplied the snowmaking water needs, but resulted in about 0.5 m of drawdown was found. Simulated pumping at 1,000 m^3/d for 45 days resulted in 55 cm of drawdown (Figure 5).

The conclusions of this analysis are that pumping in excess of 3,000 m^3/day cannot be conducted for more than a few days without a risk of impacting the spawning area. On the other hand, pumping at 1,000 m^3/day can be conducted for two weeks with an estimated 55 cm of drawdown, so this is the approximate, maximum sustained pumping rate that should be considered for a snowmaking scenario. This rate best balances a maximum groundwater withdrawal rate for short-term snowmaking requirements with the amount of groundwater that naturally flows down the Westcastle River valley.

5.0 WATER USE SCENARIOS

5.1 Firefighting Scenarios

It is recommended that a new well be drilled at CMR and that it should be supplied with a pump capable of producing up to 400 igpm. Thus, the water for firefighting could be directly pumped from the aquifer when necessary.

5.2 Snowmaking Scenarios

It is believed that a combination of water storage, groundwater pumping and use of Haig Creek is reasonably protective of the bull trout spawning area north of CMR. The recommended snowmaking procedure would consist of the following:

The large sewage cell would be filled with clean groundwater after emptying over the summer. This could be done by pumping in groundwater at 330 to 660 m^3/day (50 to 100 igpm) for 30 to 60 days prior to the snowmaking season. Total sewage cell storage: 21,000 m^3, used for bottom requirements (Table 1).

During the 15 day snowmaking period, groundwater could be produced at 1,000 m^3/day (150 igpm). Thus, between storage in the large sewage cell and direct pumping, the snowmaking requirements for all the resort, except for 5,000 m^3, could be supplied from groundwater, with the maximum drawdown less than the 55 cm predicted in the 1,000 m^3/d scenario (Figure 5). Total groundwater pumping: 15,000 m^3.

Additional water would be supplied during the snowmaking period by supplementing groundwater in the large sewage cell with water from Haig Creek at a rate of 330 m^3/d (50 igpm). Total creek: 5,000 m^3.

Snowmaking above Tower 7 on the present ski area (Gravenstafel Ridge) would be fed from the cirque pond for top snowmaking requirements. This would considerably reduce power costs. The cirque pond would have to store 11,000 m^3 (2.3 Migal) of water (Table 1).

Note that prior to development of snowmaking on Haig Ridge and if the snowmaking period was stretched from 15 to 20 days Haig Creek water would not be necessary and the large sewage cell could be filled completely from groundwater without significantly affecting the wetland. There may be a consideration for the temperature of water in the pond, however, warmer water is far less efficient for snowmaking than cold water.

6.0 RECOMMENDATIONS

Based on this work, the following recommendations for long term water use by Castle Mountain Resort are made:

Protection of the bull trout spawning area - The bull trout population in the Westcastle River is not thriving, and it is recommended that CMR take measures to further protect the extensive spawning and overwintering area located immediately downstream of the ski base area.

Pumping of groundwater - Pumping of the Westcastle aquifer will likely be possible at rates of 3,000 m^3/day or more, but it is recommended that such high pumping rates should be limited to firefighting or other short-term emergency needs. Long term pumping requirements, such as snowmaking, should limited to rates of 1,000 m^3/day or less, to avoid excessive drawdown of groundwater levels in the bull trout spawning area.

New water supply well - It is recommended that a new water well be completed at CMR to satisfy the needs of firefighting and snowmaking. The existing well could continue to be used for domestic supply, although the new well could also be used. While the present analysis assumed that the new supply well would be drilled in the CMR parking lot, further efforts to optimally locate this well should be undertaken. To potentially minimize the effects of drawdown from the well, it is recommended that the well be drilled with a casing or downhole hammer, into the bedrock underlying the aquifer. Then, the casing would be withdrawn to expose a 6 m stainless steel well screen located at the bottom of the well. The well should be thoroughly developed with air to remove fine sediments and to set the gravel pack around the well screen. A variable speed pump could be considered for installation in the well, which would be capable of supplying water at a variety of flow rates from 300 to 3,000 m^3/d.

Well testing - It is recommended that a 72-hour pump test be conducted on the new supply well. The pump test should be conducted at a minimum of 3,000 m^3/d. The objective of this testing is to calibrate the sustained pumping and drawdown in the field with the predictions

made in this work. It is recommended that water levels in the new well, OW6, OW7, OW8 and several shallow wells, including the wells around the sewage lagoons, be monitored during the test. In addition, flow rates on the Westcastle River should be gaged during the test: upstream of the washed out bridge near the Haig Creek confluence, in the springs area and downstream near the Syncline Creek confluence.

Long term monitoring - Water levels in the Westcastle aquifer should be monitored to ensure that excessive drawdown does not occur, particularly during the snowmaking season. During the first year of snowmaking, frequent (at least daily) water level monitoring in the deep aquifer and near the bull trout spawning area is recommended.

Re-vegetation of the ski slopes - CMR has begun a re-vegetation program to establish plant growth on the ski slopes. This program should be continued to ensure that spring runoff entering the Westcastle River has a minimum of total suspended solids (TSS).

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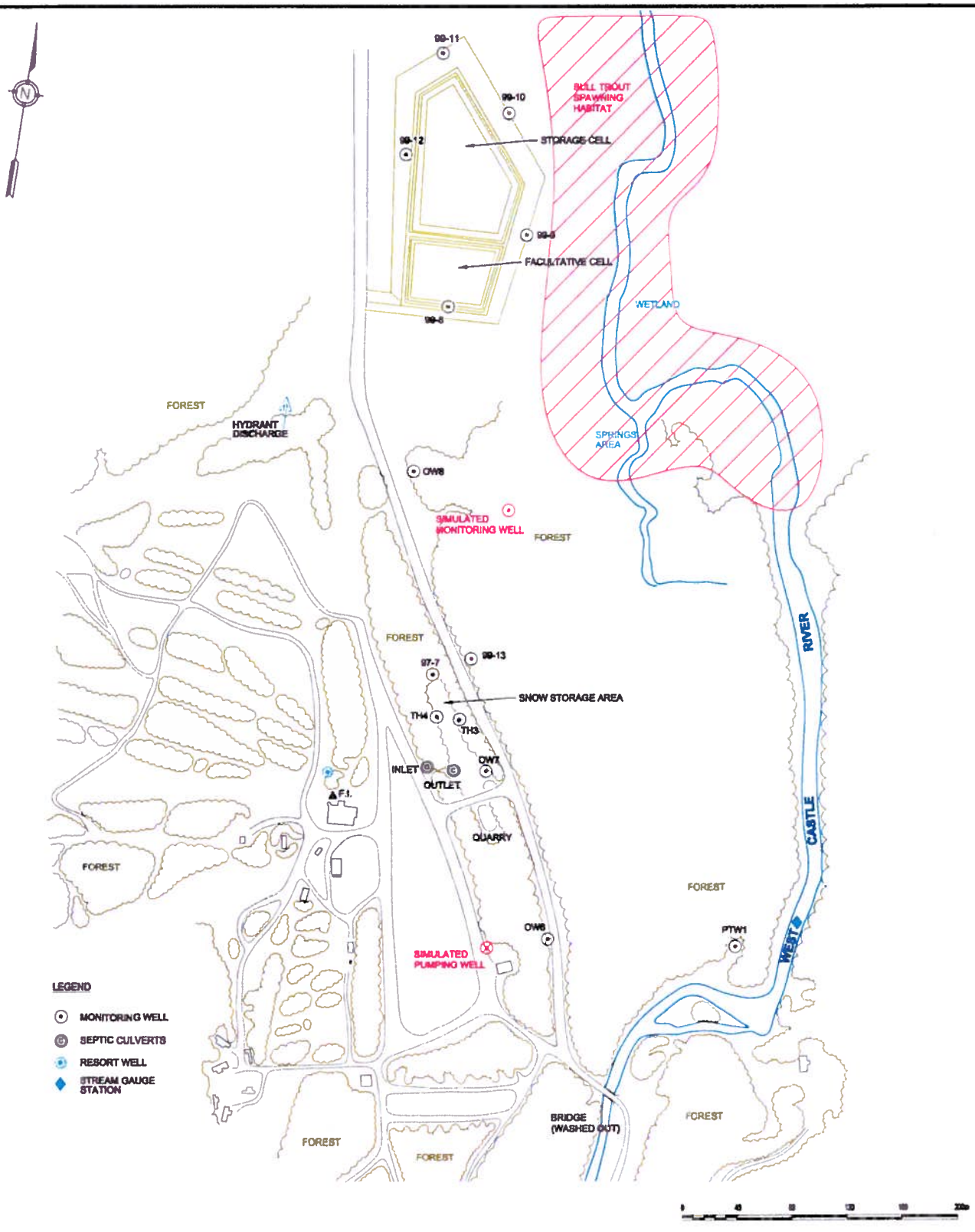
8.0 LIMITATIONS

We certify that we supervised and carried out the work as described in this report. The report is based on and limited by circumstances and conditions referred to throughout the report and on information available at the time of the site investigation. Matrix Solutions Inc. has exercised reasonable skill, care and diligence to assess the information acquired during the preparation of this report. Matrix Solutions Inc. believes this information is accurate but cannot guarantee or warrant its accuracy or completeness. Information provided by others was believed to be accurate but cannot be guaranteed.

The information presented in this report was acquired, compiled and interpreted exclusively for the purposes described in this report. Matrix Solutions Inc. does not accept any responsibility for the use of this report, in whole or in part, for any purpose other than intended or to any third party for any use whatsoever.



CASTLE MOUNTAIN RESORT

N1/2-24, S1/2-25, 04-04 W5M

Matrix Solutions Inc.	Job	1511	By	JTF	SITE PLAN
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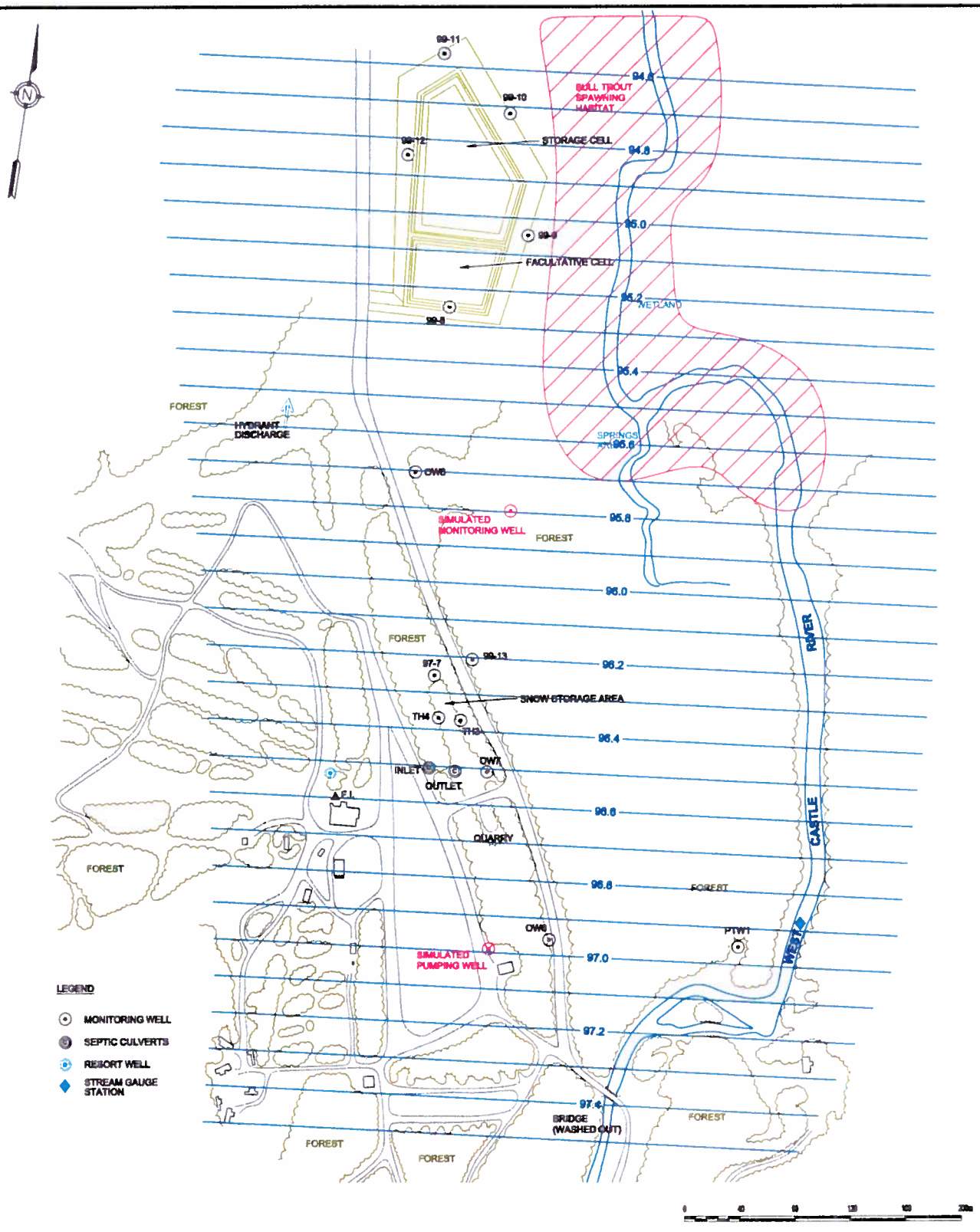
	File	2000CASTLE	xREF		



CASTLE MOUNTAIN RESORT

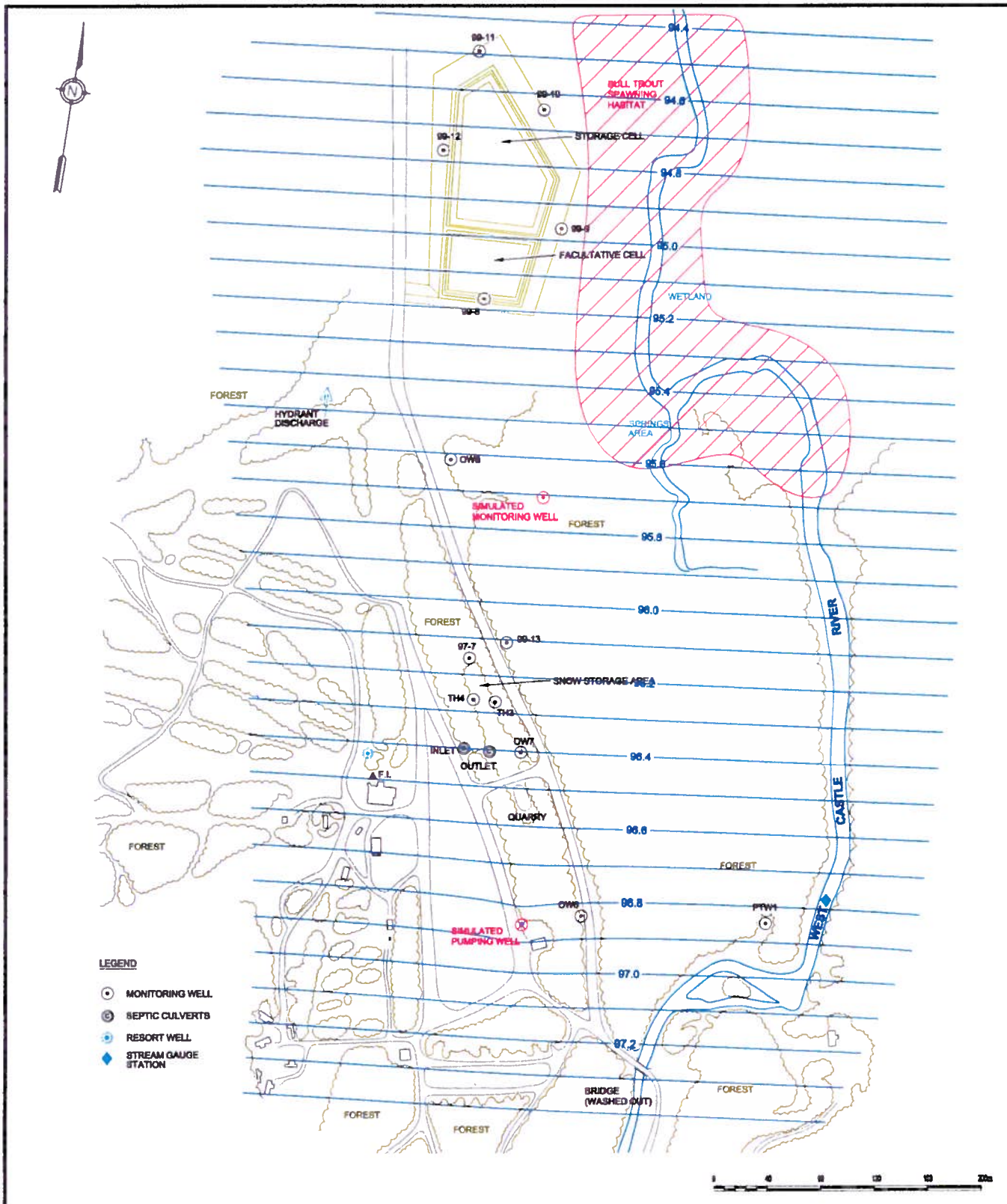
N1/2-24, S1/2-25, 04-04 W5M

Job	1511	By	JTF
Date	03/21/00	Drwn	TLR/CC
Scale	1:5000	Chkd	JTF
File	2000CASTLE	xREF	

Matrix Solutions Inc.

NON PUMPING WATER LEVELS

Figure 2



CASTLE MOUNTAIN RESORT
N1/2-24, S1/2-25, 04-04 W5M

Matrix Solutions Inc.	Job	1511	By	JTF	**SIMULATED PUMPING 230 M3/DAY FOR 1 DAY (MODEL CALIBRATION)**
	Date	03/21/00	Drwn	TLR/CC	Figure 3
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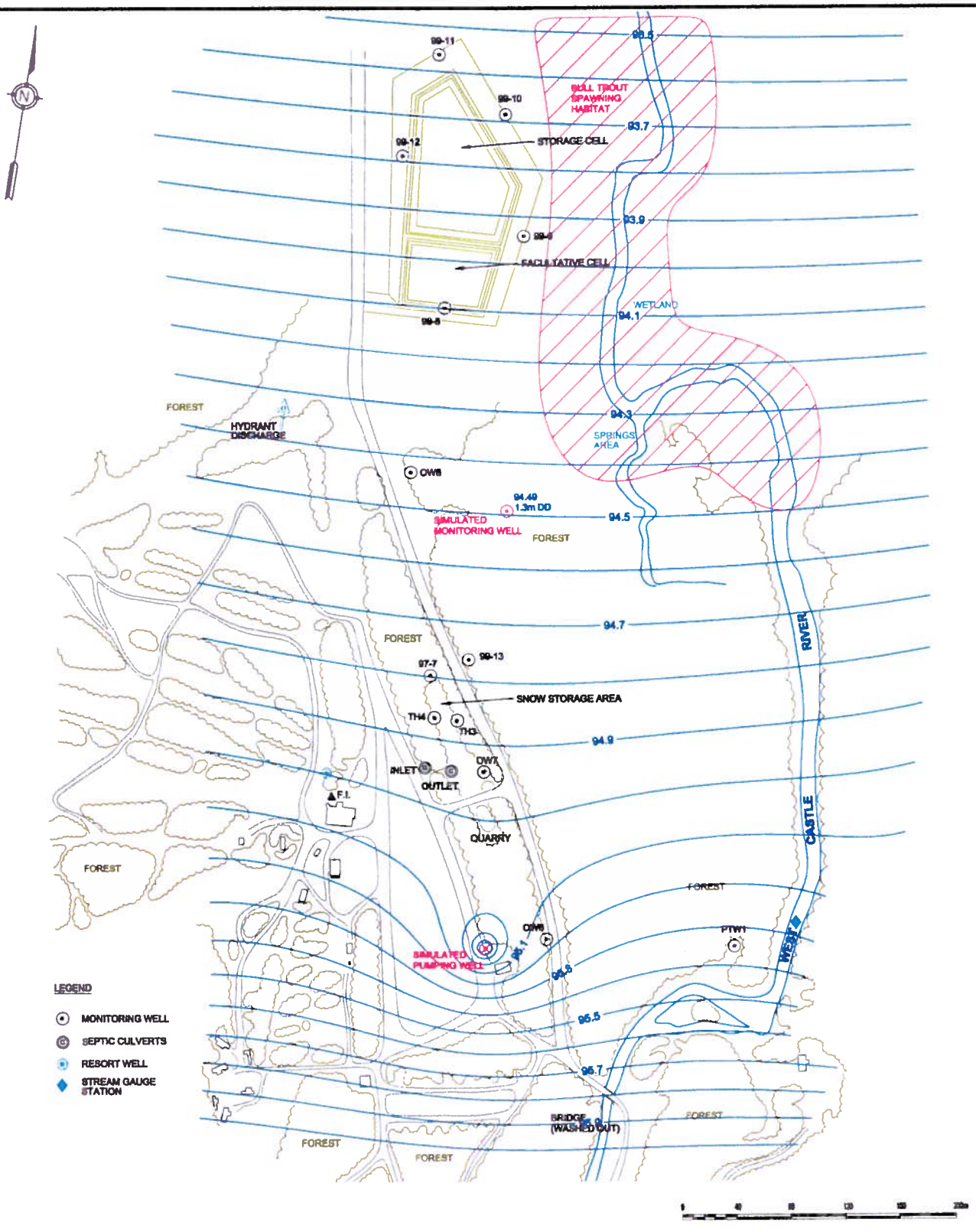
	File	2000CASTLE	xREF		



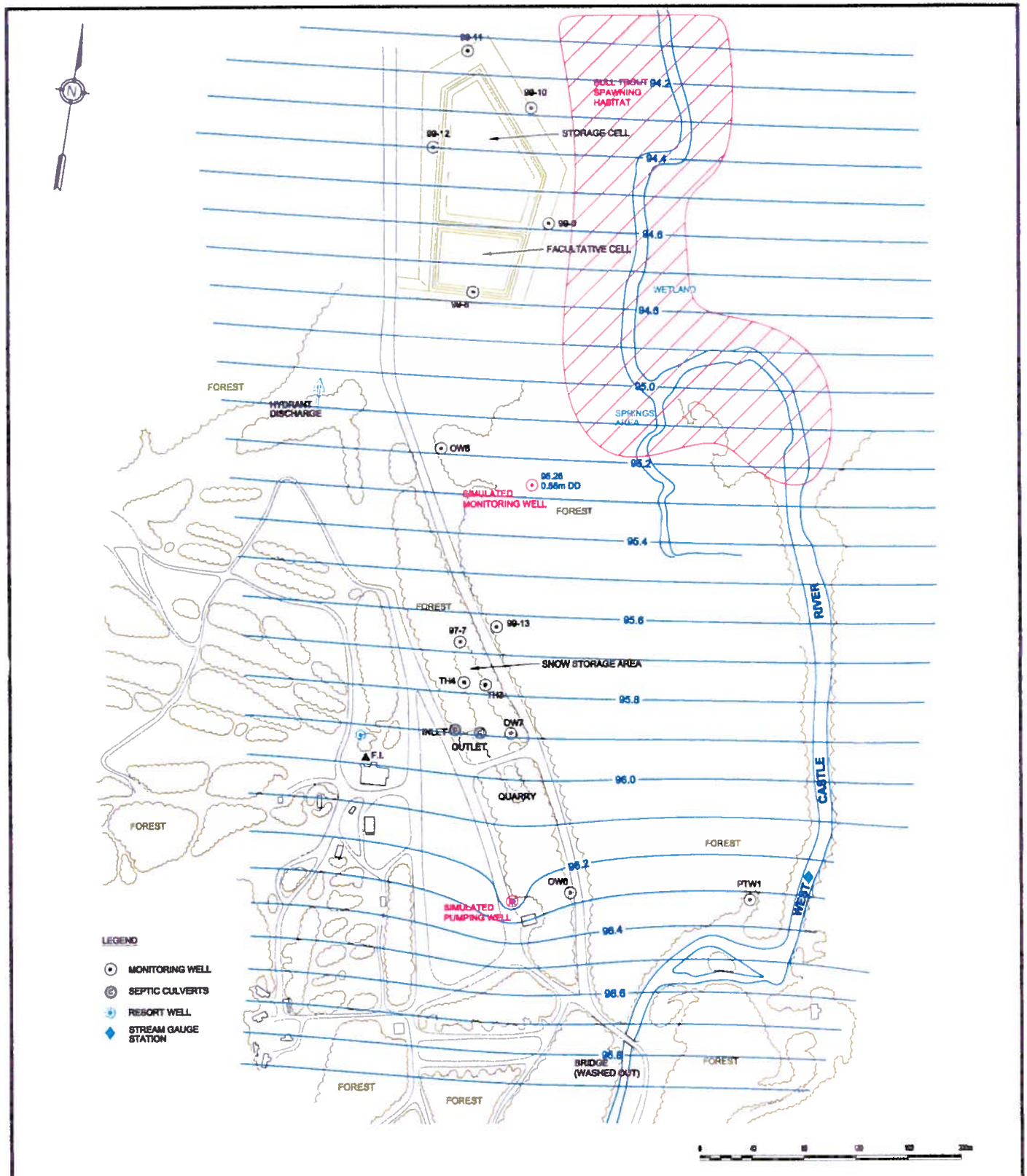
CASTLE MOUNTAIN RESORT

N1/2-24, S1/2-25, 04-04 W5M

Job	1511	By	JTF
Date	03/21/00	Drwn	TLR/CC
Scale	1:5000	Chkd	JTF
File	2000CASTLE	xREF	

SIMULATED PUMPING 3000 M3/DAY FOR 15 DAYS

Figure 4



CASTLE MOUNTAIN RESORT
N1/2-24, S1/2-25, 04-04 W5M

Matrix Solutions Inc.	Job	1511	By	JTF	SIMULATED PUMPING 1000 M3/DAY FOR 45 DAYS
	Date	03/21/00	Drwn	TLR/CC	
	Scale	1:5000	Chkd	JTF	
	File	2000CASTLE	xREF		

Figure 5

Table 1. Projected Water Requirements for Snowmaking
Castle Mountain Resort

Gravenstafel	Length (m)	Width (m)	Area (m^2)	Acreage	Top (T) or Bottom (B)
Whiskey Jack	400	50	20000	4.9	B
Beginner	300	120	36000	8.9	B
Mouse Trap & Jelly Roll	450	50	22500	5.6	B
Tower 10	240	20	4800	1.2	T
Top of Blue to Tower 10	260	75	19500	4.8	T
Phase 2-3					
South Bowl	450	50	22500	5.6	T
Haig Ridge					
Lift Line	1500	50	75000	18.5	B
Run 6	1200	40	48000	11.9	B

Total acreage	acres
Bottom acreage	49.8
Top acreage	11.6

Water requirements	igal	m^3
Bottom acreage	9958000	45000
Top acreage	2313000	11000

8.0 Appendix D

Environmental Management Plan

Castle Mountain Resort

Environmental Management Plan

Prepared for Castle Mountain Resort Inc.

Prepared by Summit, an Earth Services Company

June 24, 2019

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1. Introduction

Castle Mountain Resort Inc. (CMR Inc.) endeavors to avoid and minimize negative effects on the environment through the adoption of environmentally responsible initiatives. CMR Inc. has retained Summit, an Earth Services Company (Summit) to prepare an Environmental Management Plan (EMP) for development within the resort.

This EMP identifies potential environmental concerns and describes environmental protection measures to minimize negative effects on the environment during construction and operation under the authority of the Castle Mountain Resort Area Structure Plan (ASP), per the Municipal District of Pincher Creek No. 9 (MD) Municipal Development Plan (No. 1062-02) (MD, 2002) and Land Use Bylaw (No. 1289-18) (MD, 2018). The EMP applies to private lands (the Plan Area) within the ASP.

1.1. Environmental Management Plan Overview

This EMP contains the following individual management plans that identify environmental sensitivities and guide mitigation strategies to reduce potential impacts from resort development:

- Water Management Plan (Section 2)
- Aquatic Habitat Management Plan (Section 3)
- Vegetation Management Plan (Section 4)
- Erosion and Sediment Control Management Plan (Section 5)
- Construction Reclamation and Monitoring Management Plan (Section 6)
- Wildlife Management Plan (Section 7)
- Waste Management Plan (Section 8)
- Stormwater and Snowmelt Management Plan (Section 9)

This EMP has been prepared to guide environmental mitigation and management during development and should be read and used in conjunction with other supporting documents, legislation, regulations, and guidelines (Section 10).

Environmental protection measures specific to the scope of work being performed and supported by the EMP will be developed to address site-specific sensitivities. These measures will be documented in the Environmental Construction and Operations Plan (ECO Plan) (Attachment 1).

1.2. EMP Distribution and Environmental Awareness

The EMP will be appended to the ASP and will be publicly accessible on the MD website. Additionally, the EMP will be appended to Castle Mountain Resort (CMR) Development Guidelines. The CMR Development Guidelines document applies to all CMR developments (residential, commercial, operational and maintenance) and considers site drainage, natural vegetation, water conservation, waste management, energy efficiency and sensory disturbance to wildlife consistent with this EMP.

Along with meeting design guidelines, construction contractors will be responsible for developing and implementing site-specific/project-specific environmental protection plans as listed in the ECO Plan (Attachment 1) and supported by this EMP. These plans will educate and train onsite personnel to identify, address, and report environmental concerns.

With the proposed development of CMR and integrating year-round activities, effective communication to visitors will help to reduce human-wildlife conflict. CMR Inc. may incorporate public advisories into an electronic bulletin board on their website to inform visitors of any sensitivities in the area, such as closures for wildlife.

2. Water Management Plan

CMR Inc. recognizes water as a valuable resource that must be preserved, protected, and used wisely. This Water Management Plan describes water sources and methods of water conservation that can reduce potential adverse environmental effects on the local hydrology of the West Castle River Basin.

2.1. Water Sources

CMR is currently licensed for use of groundwater from the Westcastle buried aquifer channel. Withdrawn water is filtered and treated with chlorine onsite prior to consumptive distribution. CMR Inc. plans to upgrade the current domestic water system and add a treated municipal water source via a regional water pipe. Following construction of the municipal water pipeline to the Plan Area, groundwater is planned to be withdrawn and stored in a constructed reservoir to be used for snowmaking along with surface water withdrawals from Haig Creek.

A well designated for fire response was completed in 2002 and is able to produce 400 gallons per minute (gpm). In addition, an auxiliary power plant is available to supply water for a fire that demands a large amount of water (CMR Inc., 2018).

2.2. Water Conservation Measures

During the planned expansion of CMR facilities, daily domestic water use is expected to increase with increased visitation and services. As water demand for CMR increases, conservation of water sources will become increasingly important. Methods for water conservation may include the following initiatives implemented individually or in combination, as warranted, to allow for the continuation of activities and reduce potential adverse environmental effects on the local hydrology of the West Castle River Basin.

2.2.1. Limited Sprinkler Use

A significant amount of water can be used by sprinklers or irrigation systems during landscaping. CMR Inc. promotes conservative sprinkler use, limited to revegetation of disturbed areas . Disturbed areas should be revegetated with native species that are adapted to the regional climate and will have reduced water demands.

2.2.2. Water Metering

Water metering at both the source and service connection can provide an accurate estimate of consumptive use. This information can be used to inform more efficient plans and procedures to reduce water use.

Discrepancies between source and service connection estimates can also be used to identify unaccounted water losses. This information is useful in leak detection and maintenance of water distribution systems. Recovery of losses can increase water use efficiency by reducing the volume of water required for operation as well as the cost of operation.

Following connection with the MD-supplied municipal water source, water entering the CMR storage cistern from the MD source will be metered. Service connection water meters are planned for installation in all buildings to monitor water use of individual users.

2.2.3. Domestic Appliances and Fixtures

Water conserving plumbing fixtures and appliances can increase the efficiency and reduce the demand on public and commercial water uses. Residential and commercial buildings at CMR should be outfitted with the following water conserving devices with the following minimum standards (CMR Inc., 2017a):

- Low flow shower heads with a flow rate of less than 9.8 litres/minute;
- Lavatory and kitchen faucets with a flow rate of less than 8.3 litres/minute; and,
- Low consumption toilets with a maximum water use of 6 litres/flush.

By reducing the amount of water extracted from the environment, energy and infrastructure costs are reduced and is a significant environmental benefit to the West Castle River Basin.

3. Aquatic Habitat Management Plan

The CMR Plan Area is located adjacent to the main stem and tributaries to the West Castle River. The West Castle River and its tributaries provide habitat to sensitive bull trout and westslope cutthroat trout (CMR Inc., 2002; GoC, 2014). The Plan Area is also adjacent to the West Castle Wetlands Ecological Reserve, a provincially designated protected area.

Should work be required within or under a waterbody (e.g., watercourses, marshes and open water wetlands), applicable permits, authorizations, and notifications must be obtained prior to the commencement of construction. These may include notifications for crossing of a waterbody under the *Water Act* or permits to conduct fish or wildlife salvage under the *Fisheries Act* and *Wildlife Act*, respectively. No in-stream activity is to occur within the West Castle River and tributaries restricted activity period (RAP) of September 1 to August 15 (GoA, 2019) without the written specifications and recommendations of a qualified aquatic environmental specialist (QAES) or regulatory approval.

This Aquatic Habitat Management Plan identifies mitigation measures to minimize potential environmental effects to the West Castle River, its tributaries, West Castle Wetlands Ecological Reserve, and any other waterbodies within or immediately adjacent to the Plan Area.

3.1. Protection of Bed and Banks

The bed and banks of waterbodies are sensitive to disturbance and should be avoided during construction, where possible. Construction activities within these sensitive areas can cause erosion of the banks and sedimentation of the waterbody. Disturbance to or removal of vegetation along watercourses (riparian areas) can negatively affect aquatic habitat and stability of the bank and bed.

If tree clearing is required within a riparian area, trees should be felled away from the watercourse to avoid impacts to the bed and banks. All debris and soil should be immediately removed from below the high watermark of the watercourse.

Following construction activities, disturbed bed and banks should be recontoured as close as possible to preconstruction conditions.

3.2. Protection of Riparian Areas

Riparian areas are segments of terrestrial vegetation bordering waterbodies that are beneficial for wildlife, water quality, aquatic habitat, and channel stability of the associated waterbody. Removal of riparian vegetation may lead to an increase in water temperatures, resulting in changes to aquatic vegetation and habitat (CMR Inc., 2002).

To protect riparian areas, the clearing of riparian vegetation should be limited to the area required for safe construction, and not include storage/stockpile workspaces. Any required clearing should occur immediately before construction activities. Post-clearing, bank stability should be assessed and reinforced, if necessary, to prevent slumping and erosion. Erosion control measures (Section 5) should be put in place to limit the introduction of sediments to the watercourse from the cleared area.

3.3. Maintaining Water Quality

Protection of waterbody bed and banks and riparian vegetation are important factors in maintaining high water quality. Should sediments or contaminants be observed migrating into waterbodies within or adjacent to the Plan Area, erosion control measures (Section 5) and water quality monitoring should be incorporated into site-specific plans such as watercourse crossing plans and/or environmental protection plans for construction projects.

Water quality monitoring involves sampling specific water parameters upstream (i.e., a control site) and downstream of a point source introduction of erosion or contaminants. The frequency and protocol of sampling is determined based on the duration and magnitude of the impact. Should water quality thresholds be approached or exceeded, mitigation measures should be implemented immediately, including suspending activities temporarily until sedimentation or contamination is controlled. Water quality monitoring should continue until the affected area meets control levels.

4. Vegetation Management Plan

The preservation of existing vegetation and the restoration of disturbed areas have both environmental and aesthetic value to CMR. Areas of existing vegetation protect watercourses and waterbodies (Section 3), increase soil stability and provide erosion control (Section 5), habitat for wildlife (Section 7), and aesthetic value for visitors of CMR. The disturbance of vegetated areas during construction activities may result in the introduction and proliferation of weeds. Introduced weeds must be managed to prevent the inadvertent infestation of the Plan Area and surrounding areas.

This Vegetation Management Plan describes methods to protect existing vegetation, revegetate disturbed areas, and manage weeds and invasive species, while incorporating FireSmart guidelines.

4.1. FireSmart Guidelines

The Pincher Creek Wildfire Mitigation Strategy provides FireSmart recommendations to reduce the threat of wildfire (Cox, 2016). Landscape Level fuel types consist of coniferous, mixedwood, and deciduous forests, and cured grass. Community-Level fuel types are predominantly coniferous.

Within the Plan Area, the FireSmart hazard level varies between Low, Moderate, High, and Extreme, depending on location. In areas of Moderate to High/Extreme Hazard Level, the MD recommends removal and reduction of fuel (i.e., vegetation) around structures to increase clearance between combustible structures and surrounding wildland fuels. The clearance area should also be inspected regularly to maintain vegetation growth and fuel load.

The majority of structures within the Plan Area were determined to have an overall FireSmart hazard level of Extreme for FireSmart Structure and Site hazard classes (Cox, 2016). The following measures are recommended to reduce the threat of wildfire within the Plan Area:

- Vegetation management by residents (e.g., removal of firewood piles stored near structure) is recommended within FireSmart Zones 1 and 2 (0-30 m around structures)
- Coordinated vegetation management, including thinning, pruning, and removal of dead vegetation, is recommended within Zones 2 and 3 (10-200 m around structures).

CMR Inc. manages clearing in accordance with FireSmart and MD wildlife prevention programs.

4.2. Protection of Native Trees and Vegetation.

The protection of native trees and vegetation species are important factors in maintaining the biodiversity of the Plan Area.

The clearing of trees and vegetation should be minimized during construction and operation activities to the extent possible and while abiding by FireSmart guidelines for the MD. Trees and vegetation that will not be cleared during construction should be marked, flagged, and/or roped off to prevent inadvertent damage. Clearing of trees and vegetation surrounding a construction area to be used for temporary workspace, storage, vehicle travel lanes, and stockpiling of materials or soil should be minimized to the amount required to safely complete construction activities. Alteration of surface grades, contours and drainage should be avoided, where possible, to minimize effects to surrounding vegetation.

Some ecological communities or species are more sensitive to disturbance and have a disproportionately large effect on the surrounding ecosystem. The Plan Area is within endangered and threatened plant ranges. Sensitive plant species (i.e., provincially or federally listed species at risk), rare plants, and rare ecological communities should be avoided with a suitable setback to prevent inadvertent disturbance. Sensitive vegetation and ecological

communities require implementation of additional protections, including signage and restricted access as determined by provincial and/or federal legislation.

Should the clearing of trees be required for development or FireSmart initiatives, merchantable timber should be salvaged, where feasible.

4.3. Control of Weeds and Invasive Plant Species

Weeds and invasive plant species are undesirable as they provide competition for native vegetation, limiting their capacity to grow. Weeds and invasive species can be introduced into natural areas during construction and operation activities through multiple vectors, including construction equipment, foot and vehicle traffic, and infested soils and building materials. Preventing the introduction of weeds and invasive species is the best defense as these species are often fast growing and easily dispersed.

Once established, weeds and invasive species should be managed aggressively to prevent spread. Weeds deemed “noxious” and “prohibited noxious” are required to be controlled and destroyed, respectively, per the *Weed Control Act*.

4.3.1. Preventing the Introduction of Weeds and Invasive Plant Species

Minimizing the risk of introduction of weeds and invasive plant species can be achieved through a number of preventative measures. During construction, it is important that only clean vehicles and machinery arrive on site. Entry to the construction site should not be permitted to equipment showing dirt or mud until the equipment can be cleaned off-site, in a suitable location. Imported soil, granular fill material, and other organic materials (e.g., straw) used for construction or operation activities should be thoroughly examined for the presence of weeds.

Weeds and invasive species can also be inadvertently introduced through reseeding. To minimize the risk of introduction, reseeding should be done using plant species from the natural subregion and should be free of weeds and invasive species. Use of certified seed that includes weed seed analysis is recommended.

Timely reseeding of disturbed areas is essential to reducing weed infestations. Bare areas will be quickly colonized by fast growing and easily spread weeds species. Once established, weeds can quickly produce seeds which can spread to other vulnerable areas or be stored in the soil seed bank. Growth of native vegetation will reduce the amount of bare areas vulnerable to weed colonization, reducing effort required for weed management in the future.

4.3.2. Managing Weeds and Invasive Plant Species

The growth of weeds and invasive plant species should be monitored following construction and periodically during operation at a frequency deemed reasonable to control weed growth and spread. Should an infestation or uncontrolled spread of weeds or invasive species be observed, a site-specific weed control program should be developed and corrective measures (e.g., spraying, picking) should be implemented. All chemical application should follow the Pesticide (Ministerial) Regulation (GoA, 1997a) and Environmental Code of Practice for Pesticides (AENV, 2010).

Under the *Weed Control Act*, if noxious weeds or prohibited noxious weeds (as prescribed by Weed Control Regulation) are observed at any time, they *must* be controlled using corrective measures as quickly as possible.

Equipment used in the management of weeds or invasive plant species should be cleaned thoroughly after use to control inadvertent spread of these species to subsequent locations.

5. Erosion and Sediment Control Management Plan

Soil erosion is the process by which soil becomes mobilized sediment by wind or water. The erosion of topsoil can result in the loss of productivity to an area as topsoil contains the highest concentration of organic material. Both short-term and long-term increases in suspended sediments in waterbodies can have significant effects to water quality and affect aquatic life. Deposition of suspended sediments (i.e., sedimentation) may negatively affect aquatic habitat.

The rate and magnitude of erosion are dependent on a variety of factors including soil type and texture, and can be expected to increase with slope length, slope gradient, exposure to water and wind, and decreased soil stability. Preventative and mitigative measures can be used to reduce the susceptibility of soils to erosion.

This Erosion and Sediment Control Management Plan describes control of sediment during and following construction activities through implementing erosion and sediment control measures and pre-construction planning to reduce susceptibility and exposure. Project-specific measures and management may be employed in detailed site-specific plans.

5.1. Erosion Control Structures

Watercourses and waterbodies are sensitive to the effects of suspended sediments and sedimentation. Riparian vegetation provides an important natural barrier to sediments and clearing should be avoided within this area. Natural drainage paths toward watercourses and waterbodies, which are made apparent by erosion gullies, should be identified and monitored for the introduction of sediments. Obstruction and/or alteration of natural drainage should be avoided during all construction and operation activities.

If erosion or sedimentation is observed, erosion control structures should be constructed to mitigate the impacts to watercourses and waterbodies. Erosion control structures should also be installed around areas prone to erosion, such as soil stockpiles. Examples of erosion control structures include the following:

- Diversion berms;
- Silt fencing;
- Wattles;
- Rollback;
- Riprap; and,
- Settling traps or basins.

Once installed, erosion control structures should be monitored regularly and after extreme weather events for damage and effectiveness. If damage is observed, erosion control structures should be repaired. If erosion control structures are observed to be ineffective in stopping erosion, additional erosion control may need to be implemented until erosion has been controlled.

Should pumps be used for water diversion or to dewater the construction site, the water should be released onto well vegetated areas or into filter bags to dissipate water energy and minimize the introduction of sediment into stream channels. The area should be monitored regularly during pump operation for erosion and erosion control structures should be implemented, as required.

5.2. Minimizing Erosion Risk

The removal of vegetation during clearing or grading reduces the stability of soil and increases erosion across the surface. To reduce the risk of erosion, clearing and grading should be minimized to the area required for construction. Where possible, the clearing of trees and vegetation surrounding a construction area for temporary workspace, storage, vehicle travel lanes, and the stockpiling of materials or soil should be minimized to the amount required to safely complete construction activities to reduce exposure of bare areas. Clearing extra temporary workspace within riparian areas should be prohibited. If possible, construction should be conducted in phases to reduce the area required for workspace and stockpiling. Clearing should avoid areas on steep slopes or with a high degree of exposure, as these areas are prone to erosion. Where clearing and grading is required, erosion control measures should be implemented.

Cut and fill techniques used for leveling will decrease stability of the soil. Work areas should avoid steep slopes, where possible, to reduce the extent of cut and fill required to level. If instability is observed, the soil should be immediately stabilized (e.g., using retention berms, matting).

6. Construction Reclamation and Monitoring Management Plan

Reclamation involves returning disturbed soil, landscape, and vegetation properties to former or other productive uses. Timely reclamation is an important measure in reducing adverse environmental effects caused by erosion, sediments, and changes to drainage resulting from construction.

This Construction Reclamation and Monitoring Management Plan describes soil management, re-contouring, soil stability, and revegetation measures to return a disturbed area to a stable condition with a trajectory to land capability comparable to surrounding vegetation and land uses.

6.1. Soil Reclamation

Should development areas require soil stripping and/or grading, topsoil should be stripped and stored separately from subsoil to prevent admixing and a reduction in soil productive capability. Soil piles should be protected with erosion control measures (Section 5) to prevent loss. During reclamation, subsoil should be replaced first, followed by topsoil. Following the replacement of topsoil, erosion control measures (Section 5) should be implemented until revegetation has taken hold to prevent the loss of topsoil.

If areas of compacted soil are identified, compaction should be alleviated and subsoils smoothed prior to the replacement of topsoil to prevent issues with natural water infiltration.

6.2. Landscape Reclamation

Post soil reclamation, disturbed areas should be assessed for areas of impaired drainage, erosion, reduced soil stability, and any other potential concerns and compared to the surrounding landscape.

6.2.1. Drainage

Development resulting in changes in drainage and contours on the landscape can result in ponding and disruption of natural flows, potentially affecting offsite habitats (e.g., drying or flooding). Onsite ponding may increase the difficulty of revegetation and/or the potential for flooding of infrastructure. Drainage patterns and contours should be adjusted to match conditions adjacent to the disturbed area.

Immediately following construction, the bed and banks of any watercourses should be returned to pre-disturbance conditions and stabilized, if necessary. Watercourses should not be re-aligned or altered during reclamation. If in-channel structures (e.g., matting, corduroy) have been constructed, they should be removed before spring break-up so they do not impede natural drainage patterns.

6.2.2. Erosion

Disturbed areas are often prone to a greater degree of water and wind erosion due to the removal of onsite vegetation. Evidence of water erosion includes gullying and/or the presence of depositional fans (alluvial fans or triangle-shaped sediment deposits) caused by improper drainage. Evidence of wind erosion includes the removal or piling of soil and abrasive damage to vegetation. Increased erosion can cause the removal of nutrients from the disturbed site, which can impair revegetation of the site. For mitigation measures, see Section 5.

6.2.3. Soil Stability

Disturbance to an area may affect soil stability, particularly soil located on a slope. Reduced soil stability can result in the mass movement of soil through slumping and subsidence, potentially affecting infrastructure and operability within the area. Unstable soils are more vulnerable to erosion and may cause sedimentation of nearby watercourses. Bioengineering techniques, including transplanting native shrubs, brush matting, and willow staking can mitigate problems with soil stability on slopes.

6.3. Revegetation

Revegetation should commence as soon as possible following disturbance activities, pending seasonal or weather conditions. Timely reclamation will minimize the erosion of topsoil and result in more successful revegetation. Should reclamation be incomplete before frozen conditions, erosion control measures (Section 5) should be implemented until final contouring and seeding can commence. Where possible, construction should be planned to be completed with sufficient time to allow seeding of the disturbed area prior to frozen conditions.

Seeding is recommended to be undertaken using a seed mixture of locally sourced native plant species. Seed mixtures should be free of weeds and undesirable invasive species (Section 4.3.1). Fertilizer and supplemental watering can be applied depending on nutrient requirements of the soil and plant species. Vehicle and pedestrian access to reseeded areas should be restricted to prevent disturbance. Seeding should be done at a density appropriate to the species and should be monitored and supplemented with additional seeding, if necessary.

Seeding of wetlands or riparian areas is not recommended unless otherwise required due to steep slopes and/or erodible soils.

Monitoring should compare the reclaimed area with adjacent areas using the following parameters:

- Percent vegetation cover;
- Plant density;
- Vegetation type and dominant species;
- Relative level of erosion; and,
- Presence of bare areas.

Supplemental seeding may be required if the following is observed:

- Vegetation cover or density is less than desired (e.g., bare areas);
- Vegetation cover does not reduce erosion to pre-disturbance conditions;
- Presence of weed, invasive, or undesirable plant species; and,
- Excessive wildlife grazing.

All areas seeded should be recorded to maintain records of seed mixes and any additional mitigation measures implemented.

7. Wildlife Management Plan

The Plan Area is located in West Castle Valley and provides habitat for a variety of wildlife, primarily associated with forested areas and waterbodies. Wildlife with potential to be found within the Plan Area include migratory birds, raptors, small and large carnivores, furbearers, and ungulates. Sensitive wildlife species (provincially or federally listed species at risk) identified by the Fish and Wildlife Information Management Tool (FWIMT) (AEP, 2019) include boreal toad, golden eagle, grizzly bear, harlequin duck, long-toed salamander, and red-tailed chipmunk. The plan area is within a grizzly bear zone and a mountain goat and sheep range. The Plan Area is adjacent to the West Castle River, which contains sensitive bull trout and westslope cutthroat trout (CMR Inc., 2002; GoC, 2014). Tributaries to the West Castle River are within the Plan Area.

This Wildlife Management Plan describes methods that protect wildlife habitat and reduce disturbance to wildlife during construction and operations.

7.1. Mitigating Disturbance to Wildlife during Construction

Construction activities have the potential to disturb wildlife through habitat removal and fragmentation, sensory disturbance, and disruption of wildlife movement. Effects to wildlife can be avoided or mitigated for using the following measures.

7.1.1. Habitat Removal and Wildlife Features

Construction activities may require the clearing of forested areas which may influence habitat use of large mammals and birds that require tree cover for foraging, cover from predation, protection from extreme weather, and nesting. Clearing should be minimized, to the extent possible, to avoid removal of valuable wildlife habitat.

Wildlife features, such as a nest or bear den, may be present in forested areas planned for development. Provincially, a house, nest or den of prescribed wildlife is protected under the Alberta *Wildlife Act*. Prescribed wildlife are included under Schedule 4 of the Alberta Wildlife Regulation (Section 36 (1)) and include birds of prey, migratory and upland game birds, and non-game animals (GoA, 1997c). A wildlife sweep should be conducted prior to construction to identify the presence of wildlife and wildlife features. Active wildlife features should be avoided spatially (i.e., with a defined setback) or temporally (i.e., constructing when feature becomes inactive). If active wildlife features cannot be avoided, site-specific and species-specific mitigation measures should be implemented.

Migratory Bird Nesting Period

The active nest of a migratory bird is protected from disturbance, destruction or removal under the federal Migratory Birds Regulations (Section 6(a)) (GoC, 2018). The inadvertent harming, killing, disturbance or destruction of breeding birds, nests and eggs are referred to as “incidental take” and have the greatest potential to occur during construction preparation and vegetation clearing (e.g., timber clearing and mowing).

The Plan Area is located within nesting zone B3 which has a migratory bird nesting period of April 8 to August 24 (ECCC, 2018). If construction is planned during this time, a migratory bird nest sweep should be conducted immediately prior to construction. Nest sweeps should be conducted at all construction areas (i.e., not just forested areas) as migratory bird nests are often present on anthropogenic structures and disturbed areas. If active nests are found, the feature should be avoided using an appropriate species-specific setback until the birds have fledged.

7.1.2. Sensory Disturbance

Sensory disturbance, such as the presence of construction personnel, vehicles and equipment, or construction noise and lights may disturb wildlife in surrounding wildlife habitats. Disturbance of wildlife may displace wildlife from suitable habitat and disrupt foraging and breeding activities. Disturbance and attractants, such as garbage, may also result in wildlife conflict and interactions at the construction site. An increase in vehicle traffic during construction may increase the risk of wildlife mortality.

Mitigation measures will vary depending on the site-specific conditions but should consider vehicle traffic (e.g., speed limits, use of multi-passenger vehicles, designated travel areas), noise abatement on equipment, and human-wildlife interactions (e.g., harassment of wildlife, disposal of garbage). Developments within the Plan Area are encouraged to design exterior lighting that reduces light pollution.

7.1.3. Barriers to Movement and Fragmentation

During construction, wildlife movement may be impaired by the erection of structures and fencing. Clearing may also disrupt connectivity of wildlife habitat through fragmentation, which may affect the movement of wildlife or cause some habitat patches to be too small for suitable use. Breaks should be constructed into any long linear barriers to allow for wildlife movement and escape. Development plans should integrate existing clearings and disturbances, where practical, to limit habitat fragmentation.

7.2. Mitigating Disturbance to Wildlife during Operations

Operations have the potential to affect wildlife largely through human-wildlife encounters. Impacts to wildlife from encounters with humans may include vehicle collisions, harassment of wildlife by and exposure to waste materials. Effects to wildlife should be avoided and can be mitigated using the following measures.

7.2.1. Vehicle Collisions

Vehicle collisions can be reduced through the implementation of speed controls and signage identifying areas of high wildlife traffic, such as wildlife trails. When encountering wildlife, drivers should maintain a safe and appropriate distance and avoid chasing wildlife. If possible, drivers should stop and turn off headlights to allow stressed wildlife to disperse. Access controls may be used to limit unauthorized vehicle access to sensitive areas and to manage clearly designated access points in appropriate locations. Recreational off-highway vehicle use is not permitted within the Plan Area.

7.2.2. Harassment of Wildlife

Reductions in the harassment of wildlife and the disturbance of wildlife habitat, nests, and dens, can be achieved through education and avoidance. Access should be controlled within the vicinity of any active wildlife feature, nest, or den to prevent inadvertent disturbance or destruction. Recreational hunting and firearm use are not permitted within the Plan Area. Encounters between wildlife and pets can be reduced through pet controls, such as the requirement for dogs to be on a leash within the Plan Area.

7.2.3. Wildlife and Waste Management

Food waste and garbage may be an attractant to wildlife and can pose a safety hazard (e.g., increased human-bear encounters) or nuisance (e.g., pests) to the Plan Area. Waste can also pose a danger to wildlife through ingestion. Solid waste from both residential and commercial sources should be managed and disposed of using wildlife-proof containers (Section 8).

Hazardous materials, such as gasoline or other vehicle fluids, may affect wildlife or wildlife habitat. Measures should be taken to prevent migration of inadvertent spills into wildlife habitat or waterbodies through runoff or stormwater. Should spills be observed, they should be cleaned up immediately (Section 8).

8. Waste Management Plan

Within the Plan Area, wastes are to be handled, stored and disposed of in an environmentally responsible manner. These include accidental spills of potentially hazardous products.

This Waste Management Plan describes solid and liquid waste storage, removal, and prevention of potentially hazardous releases into the environment during construction and operations.

8.1. Solid Waste

Within the Plan Area, solid waste is produced by commercial, residential, and operational and maintenance facilities, as well as construction activities.

8.1.1. Facility and Residential Waste

Waste from commercial, operational and maintenance and residential sources are deposited into centrally located community garbage containers by resort staff, contractors, and visitors where it is picked up and disposed of by the MD. Garbage is removed regularly from the community garbage containers to the Crowsnest-Pincher Creek Landfill to prevent overfilling of the community garbage containers. There are currently enough community garbage containers to accommodate current solid waste levels. Waste receptacles will be added to the Plan Area as required to accommodate anticipated growth.

Waste is not permitted to be stored or accumulated in a manner that attracts wildlife. Waste receptacles located outdoors are closed and wildlife-proof to reduce the attraction of bears and nuisance animals. Garbage receptacles should not be left unsecured in outdoor locations. Maintenance staff are responsible for gathering loose waste to keep the Plan Area litter-free. Disposal of waste by burning is not permitted within the Plan Area.

Signage is used to identify the locations and correct disposal (e.g., recycling) of solid waste. Receptacles for cardboard recycling are provided by the Crowsnest-Pincher Creek Landfill and are located next to the centrally located community garbage containers. Individuals are encouraged to return other recyclables (e.g., tin cans, plastics, returnable drink containers) to the nearby recycling depot in Pincher Creek.

Some forms of solid waste, such as toxic hazardous wastes (e.g., from construction materials), are not accepted by the Crowsnest-Pincher Creek Landfill and must be alternatively disposed of (Crowsnest/Pincher Creek Landfill Association, 2014). These types of waste are rarely found within the Plan Area, and are managed by the contractor, in the case of development, or CMR Inc. Construction materials and non-household waste are not acceptable for disposal in the community garbage containers.

8.1.2. Construction Waste

During construction, contractors are responsible for maintaining a clean work area through daily clean-up of waste generated by construction activities. Prior to construction, a site-specific waste disposal plan should be created by the contractor and approved by CMR Inc. to outline the types of wastes being generated, how wastes will be stored and collected classified and, disposed of, and who is responsible for coordinating waste management activities. Each construction site will be equipped with adequate garbage receptacles, supplied by the contractor for solid waste and debris. Non-hazardous waste generated from construction will be disposed of to the Crowsnest-Pincher Creek landfill. Hazardous wastes will be stored separately from non-hazardous wastes and will removed by the contractor. Bear-proof containers will be used for food waste. All contractor personnel should be made aware of and understand their responsibilities for proper waste handling.

8.2. Liquid Waste

Wastewater generated within the Plan Area is treated using a lagoon treatment system (Class I wastewater treatment plant). The treatment system consists of a facultative lagoon and a storage cell, designed to have sufficient capacity for peak build-out use as facilities within the resort expand and year-round services develop. Lagoon use is currently highly seasonal and operates at half of maximum capacity during days of peak volume.

The Castle Mountain Resort General Reference Guide lists prohibited substances for wastewater disposal as well as requests the use of phosphate-free cleaning supplies to be used by residents to limit eutrophication to aquatic habitat (CMR Inc., 2018).

Effluent generated by the wastewater lagoon is disposed of through irrigation of the mountain to the application rates permitted. Should generated effluent exceed the amount or depth of irrigation permitted, CMR will explore additional options for effluent disposal in accordance with applicable approvals and regulations.

8.3. Spill Prevention and Contingency Plans

During construction and operations at CMR, there is the potential for the accidental release of hazardous substances. To prevent spills and mitigate their potential impacts to the environment, health and safety, a site-specific spill prevention and contingency plan should be developed for all construction activities prior to commencement of work. Spill prevention and contingency plans should be developed for any ongoing operations that risk an uncontained release of a hazardous substance into the environment. Timely containment, recovery, and clean-up measures will minimize the potential for adverse environmental and human effects.

8.3.1. Spill Prevention

To prevent the inadvertent release of a hazardous substance and minimize impacts should a release occur, the following guidelines should be considered when creating a site-specific plan:

- All hazardous substances should be stored at least 100 m from any watercourse and waterbody;
- Secondary containment may be required depending on the location, type, volume and duration of waste and chemical being stored. Secondary containment should have a capacity of at least 110% the capacity of all primary containment units to account for potential precipitation;
- Spill prevention equipment, such as an impervious tarp, should be used during activities that have a high risk of spills (e.g., refueling, mixing).
- Contractors should oversee the regular maintenance and cleaning of any equipment that may develop leaks. Cleaning of equipment and vehicles should not be conducted where drainage has the potential to impact waterbodies; and,
- Equipment should be clean and otherwise free of external grease, oil, dirt and vegetation prior to use in any instream work.

If there is potential for a hazardous substance to be inadvertently released into a watercourse or waterbody, additional containment structures and berms should be considered.

8.3.2. Spill Contingency

To minimize impacts of a release of a hazardous substance, the following factors should be considered when creating a site-specific plan:

- Safety of on-site personnel and nearby public;
- Removal of hazards (e.g., ignition sources);
- On-site availability of spill response and clean-up materials, including sorbent pads, shovels, and a portable disposal container;

- Measures to contain and prevent further spread of the spill;
- Measures to restrict access to all non-essential vehicles and personnel;
- Emergency contact information
- Recovery and disposal of released materials;
- Requirement of remedial measures;
- Onsite spill documentation (e.g., product, time, estimated quantity, source, proximity to waterbodies); and,
- Spill reporting to appropriate regulatory agency, as required.

If there is the potential for a hazardous substance to be inadvertently released into a waterbody (i.e., watercourse or wetland), additional response and isolation materials should be considered including watercraft and a large spill containment boom.

9. Stormwater and Snowmelt Management Plan

Stormwater and snowmelt runoff from the uphill mountain areas will discharge directly into natural drainages, including tributaries to West Castle River. Within the Plan Area, the volume and rate of runoff from stormwater and snowmelt runoff can increase due to development of roadway surfaces, building rooftops and parking lots.

This Stormwater and Snowmelt Management Plan discusses current infrastructure and mitigation measures in place to reduce the potential for adverse environmental effects within and surrounding the Plan Area.

9.1. Snowmelt Management

Snow plowing and storage within CMR parking lots have the potential to directly influence water quality within watercourses due to sanding applied and resultant integration into snow piles. Snow storage areas are located on the west side of Highway 774, which serves as a barrier to prevent any runoff from directly entering watercourses. Snow is plowed and stored either at the south end of the main parking lot, or the east end of the north overflow parking lot. Snowmelt runoff is retained by vegetation adjacent to the snow storage piles and percolates into the soil. Well-vegetated areas decrease the velocity of snowmelt, allow groundwater infiltration and the settlement of suspended sediments. These functions mitigate erosion and sedimentation to nearby waterbodies during spring runoff.

9.2. Stormwater Management

Efforts are made to protect fish populations and their habitat from the introduction of suspended sediment. Drainage is managed and maintained within the Plan Area through ditches, culverts, and localized areas of ponding. Concentrating the flow of stormwater runoff around infrastructure reduces the risk of erosion. Rock-armored ditches and culverts direct flow through the residential area into a ponding area. Retaining water in the areas of localized ponding on the eastern edge of the Plan Area allows sediments to settle out of suspension within the water and for infiltration into groundwater to occur. These measures reduce potential impacts to water quality that could result from direct drainage to watercourses. The areas of localized ponding are physically separated from the West Castle River and West Castle Wetlands Ecological Reserve by Highway 774 which serves as a barrier to surface flow.

A contingency culvert across Highway 774 is in place to prevent the highway from washing out during extreme weather events. In these events of extreme water volumes, surface water travels through the culvert and drains into a vegetated area of the wetlands on the east side of the highway.

CMR Inc. strives to maintain existing hydrological patterns, and design drainage and stormwater facilities to prevent flood damage, erosion, and environmental impacts to the surrounding waterbodies. Any erosion damage as a result of an extreme weather event or higher than expected precipitation levels will be evaluated against the adequacy of current stormwater management and re-evaluated, as required.

10. Legislation, By-laws, Guidelines, and Codes of Practice

Municipal District of Pincher Creek No. 9

- Land Use Bylaw 1289-18 (MD, 2002)
- Municipal Development Plan No. 1062-02 (MD, 2018)
- Pincher Creek Wildfire Mitigation Strategy (Cox, 2016)

Alberta

- Code of Practice for Wastewater Systems Using a Wastewater Lagoon (GoA, 2003)
- Code of Practice for Watercourse Crossings (GoA, 2019)
- Code of Practice for Waterworks Systems Using High Quality Groundwater (GoA, 2012)
- Environmental Code of Practice for Pesticides (AENV, 2010)
- Environmental Quality Guidelines for Alberta Surface Waters (AEP, 2018a)
- *Environmental Protection and Enhancement Act*
- *Forest and Prairie Protection Act*
- *Historical Resources Act*
- Master Schedule of Standards and Conditions (AEP, 2018b)
- Pesticide (Ministerial) Regulation (GoA, 1997a)
- Pesticide Sales, Handling, Use, and Application Regulation (GoA, 1997b)
- *Water Act*
- *Weed Control Act*
- *Wildlife Act*
- Wildlife Regulations (GoC, 1997c)

Federal

- Canadian Environmental Quality Guidelines (CCME, 2001)
- *Fisheries Act*
- Measures to Avoid Causing Harm to Fish and Fish Habitat (DFO, 2016)
- *Migratory Birds Convention Act*
- Migratory Birds Regulations (GoA, 2018)
- *Species at Risk Act*

11. References

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Attachment 1 Environmental Construction and Operations Plan

Environmental Construction and Operations (ECO) Plan

(Adapted from Alberta Transportation Environmental Construction Operations (ECO) Plan Framework)

An ECO plan is compulsory for all developments within Castle Mountain Resort that require a Development Permit from the Municipal District of Pincher Creek No. 9.

Project: _____

Company: _____

Representative: _____

Castle Mountain Resort Contact: _____

The following ECO Plan details required documentation and environmental considerations when working within the Plan Area of CMR. Required lists, descriptions, drawings, permits and protection plans will together form an ECO Plan and provided to CMR Inc. prior to construction activities. Any items marked "No" require explanation in the comments section.

Step	Requirement Description	Yes	No	N/A
Environmental Sensitivities and Site Drawings(s)				
Schedule	Provide a project schedule. Identify all environmental restricted activity periods.			
Site Sketch	Provide a site sketch showing site topography, vegetation, drainage, and existing infrastructure.			
Environmental Sensitivities	Identify environmental sensitivities. These should include consideration of the following: • Sensitive species ranges and timing windows; • Waterbodies (watercourses and wetlands); • Vegetation (including rare plants and weeds); • Susceptibility of site to erosion and sedimentation; • Wildlife and wildlife habitat; • Site contamination; • Historical resources; and, • Any other relevant environmental factors.			
Site Drawing(s)	Site drawings should include the following details: • Project location and orientation; • Project phases (if applicable); • Site set-up and layout; • Location of first aid and spill kits; • Mitigation measures (e.g., fencing, erosion control); and, • Environmental sensitivities and buffers (e.g., hawk nest, wetland).			

Step	Requirement Description	Yes	No	N/A
Environmental Permits and Approvals				
Permits, Approvals, Authorizations, and Notifications	Include a list and append copies of all environmental permits, approvals, authorizations, and notifications (including Codes of Practice).			
Hazardous Materials and Waste Management				
Hazardous Materials	List all hazardous materials to be used and stored on site. Describe handling, containment, storage, and disposal methods for each hazardous material.			
Site-specific Environmental Protection Plans				
Aquatic Habitat Protection Plan	Site-specific Aquatic Habitat Protection Plan, per the Castle Mountain Environmental Management Plan.			
Vegetation Protection Plan	Site-specific Vegetation Protection Plan (including a Weed Control Plan, if applicable), per the Castle Mountain Environmental Management Plan.			
Erosion and Sediment Control Plan	Site-specific Erosion and Sediment Control Plan, per the Castle Mountain Environmental Management Plan.			
Construction Reclamation and Monitoring Plan	Site-specific Construction Reclamation and Monitoring Plan, per the Castle Mountain Environmental Management Plan.			
Wildlife Protection Plan	Site-specific Wildlife Protection Plan, per the Castle Mountain Environmental Management Plan.			
Waste Disposal Plan	Site-specific Waste Disposal Plan, per the Castle Mountain Environmental Management Plan.			
Spill Prevention and Contingency Plan	Site-Specific Spill Prevention and Contingency Plan, per the Castle Mountain Environmental Management Plan.			
Implementation of ECO Plan				
On-site Representative	List the names and contact information for all on-site representatives, including sub-contractors.			
Training and Communication	Detail orientations and procedures that will be used to train on-site personnel of environmental sensitivities, protection and response.			
Monitoring and Reporting	Provide monitoring and inspection procedures, as required by regulations and contractual obligations. Procedures should include: • Location; • Monitoring frequency; • Reporting requirements; and, • Process for addressing deficiencies.			

Step	Requirement Description	Yes	No	N/A
Documentation	Describe all documentation and records (e.g., ECO Plan, MSDS sheets, safety records) that will be kept on-site to be available for inspection or review.			
ECO Plan Review and Update	List the regular frequency at which the ECO Plan expires and requires updating. Describe the process for updating the ECO Plan should scope or activities change.			

Comments and Deficiencies:

Contractor Responsibilities

All contractors are responsible for protecting the environment. A contractor is responsible for creating and implementing the ECO Plan, either through their own actions or through sub-contractors. Contractors are responsible for ensuring all site representatives, including sub-contractors, understand their roles and responsibilities, and operate in compliance with the ECO Plan. Contractors are responsible for referring to and understanding all applicable contractual and regulatory requirements, as they pertain to protection of the environment. In general, Contractors must:

- Identify potential environmental issues and measures for avoidance and/or mitigation;
- Implement, monitor, and maintain mitigation measures;
- Record, report, and correct deficiencies to mitigation measures;
- Identify and understand all environmental legislation, permits, approvals, authorizations, codes of practice, notifications, guidelines, standards, policies, and programs applicable to the project;
- Prepare and update the ECO Plan, as required;
- Submit copies of the ECO Plan to Castle Mountain Resorts Inc.;
- Identify on-site personnel responsible for implementing the ECO Plan;
- Ensure all on-site personnel understand and comply with the ECO Plan;
- Educate and train on-site personnel in identifying, addressing, and reporting environmental concerns;
- Review ECO Plan requirements, as applicable, at project kick-off, orientation, pre-construction meetings, tailgate meetings, etc.; and,
- Stop work when environmental impacts have occurred or may occur.

Sign-off

The ECO Plan has been completed to the best of our abilities. The undersigned acknowledges and accepts the responsibilities detailed herein.

Contractor Principal-in-Charge	Name (print)	Date