



BIG HILL SPRINGS

Conceptual Scheme



Bylaw C-6527-2007, Adopted September 25, 2007

MUNICIPAL DISTRICT OF ROCKY VIEW NO. 44
Department of Planning and Community Services

MUNICIPAL DISTRICT OF ROCKY VIEW NO. 44
BYLAW C-6527-2007

A Bylaw of the Municipal District of Rocky View No. 44, pursuant to Divisions 7 & 12 of Part 17 of the Municipal Government Act, to adopt the attached Schedule 'A' referred to as the "Big Hill Springs Conceptual Scheme".

WHEREAS the Council of the Municipal District of Rocky View No. 44 has received an application to adopt a Conceptual Scheme to establish a comprehensive policy framework to guide and evaluate future redesignation, subdivision and development applications within the N½, 16-26-2-W5M, all of 21-26-2-W5M, and SW-28-26-2-W5M, consisting of an area of approximately ± 1,120 acres, as shown on Schedule 'A', attached to and forming part of this Bylaw; and

WHEREAS the Council deems it desirable to adopt the Conceptual Scheme; and

WHEREAS a notice was published on Tuesday, August 28, 2007 and Tuesday, September 4, 2007 in the Rocky View Weekly, a newspaper circulating in the Municipal District of Rocky View No. 44, advising of the Public Hearing for Tuesday, September 25, 2007; and

WHEREAS Council held a Public Hearing and have given consideration to the representations made to it in accordance with Section 692 of the Municipal Government Act, being Chapter M-26 of the Revised Statutes of Alberta, 2000, and all amendments thereto.

NOW THEREFORE the Council enacts the following:

1. That the Conceptual Scheme be adopted to provide a comprehensive policy framework to guide and evaluate future redesignation, subdivision and development applications within the N ½, 16-26-2-W5M, all of 21-26-2-W5M, and SW-28-26-2-W5M, consisting of an area of approximately ± 1,120 acres, as shown on Schedule 'A', attached to and forming part of this bylaw; and
2. The Bylaw comes into effect upon the date of its third reading.

Division: 7

File: 06616001/002/21003/004/001/002/28004-2005-RV-320

First reading passed in open Council, assembled in the City of Calgary, in the Province of Alberta, on Tuesday, July 31, 2007, on a motion by Councillor Solberg.

Second reading passed in open Council, assembled in the City of Calgary, in the Province of Alberta, on Tuesday, September 25, 2007, on a motion by Councillor McLean.

Third reading passed in open Council, assembled in the City of Calgary, in the Province of Alberta, on Tuesday, September 25, 2007, on a motion by Councillor Solberg.

REEVE OR DEPUTY REEVE

MUNICIPAL SECRETARY

SCHEDULE ‘A’

FORMING PART OF BYLAW C-6527-2007

A Conceptual Scheme affecting the area within the N ½, 16-26-2-W5M, all of 21-26-2-W5M, and SW-28-26-2-W5M consisting of approximately ± 1,120 acres, herein referred to as the “Big Hill Springs Conceptual Scheme” area.

Contents

Contents	iv
A. The Purpose	1
B. The Challenge	2
C. The Commitment	2
D. The Vision and Rationale	3
i) Location	3
ii) Development Philosophy	4
ii) Development Philosophy	5
iii) Benefits to the Municipality and its Residents	9
iii) Benefits to the Municipality and its Residents	10
E. The Implementation	11
i) Phasing	11
ii) Servicing: Water, Wastewater, and Stormwater	12
iii) Roads and Transportation	13
iv) Agricultural Analysis	14
iv) Agricultural Analysis	15
F. The Vision 2035	16
1.0 Overview	17
1.1 Authorization	17
1.2 Location	17
1.3 Purpose	19
2.0 Legislation	20
2.1 The Municipal Government Act	20
2.2 The Municipal Development Plan	20
2.3 New Directions	22
3.0 Plan Area and Context	23
3.1 Plan Boundary and Land Ownership	23
3.2 Existing Conditions	23
3.2.1 Transportation	23
3.2.2 Land Uses	23
3.2.3 Topography, Vegetation, and Environmental Sensitivity	27
3.2.4 Slope Analysis and Floodway	28
3.2.5 Soil/Geotechnical Considerations	28
3.2.7 Archaeological and Historical Considerations	31

3.2.8	Environmental Site Assessment.....	31
3.3	Regional Context	31
3.3.1	Existing Regional Servicing.....	32
3.3.2	Regional Socio-Economic Conditions	32
3.3.3	Regional Agricultural Pursuits	34
4.0	Plan Objectives.....	36
5.0	Concept and Land Use Policy Area	39
5.1	Background	39
5.2	Conservation	39
5.3	Design Process	39
5.4	Land Use Policy Areas	42
5.6	Village Centre Policy Area.....	48
5.7	Residential Policy Area.....	51
6.0	Transportation	52
7.0	Utility Servicing and Environmental Sustainability.....	56
7.1	Stormwater	56
7.2	Wastewater.....	59
7.3	Water	59
7.4	Solid Waste	60
7.5	Shallow Utilities	61
7.6	Energy Conservation	61
7.7	Sustainable Building Practices	62
8.0	Community, Protective, and Emergency Services	63
9.0	Implementation Policies.....	64
9.1	Neighborhoods and Phasing	64
9.2	Implementation	64
9.3	Plan Review and Monitoring.....	66
10.0	Glossary	68

Figures

Figure 1	Site Location	18
Figure 2	Hamlets and Urban Communities	21
Figure 3	Plan Boundary and Existing Land Use	24
Figure 4	Existing Regional Road Network	25
Figure 5	Site Air photo and Existing Agricultural Production	26
Figure 6	Slope and Flooding Analysis	29
Figure 7	Regional Facilities & Open Space	33
Figure 8	Concept Plan and Generalized Land Use Policy Areas	45
Figure 9	Village Centre Concept Plan	50
Figure 10	Transportation Improvements	54
Figure 11	Stormwater Management Concept	58
Figure 12	Staging / Development Timing	67

Tables

Table 1	LCCAAA Rating	30
Table 2	Approximate Land Use Policy Area Calculations	42
Table 3	Land Use Policy Areas	43
Table 4	Policy and Approval Process	65

Appendices

Appendix A	Council Authorization	71
Appendix B	Conformity with Approved Municipal Development Plan Policies	74
Appendix C	Current Land Ownership (June 2007)	80
Appendix D	Environmental Initiatives	81
Appendix E	Public Consultation Process	114

Big Hill Springs - Executive Summary

A. The Purpose

The purpose of the Big Hill Springs Conceptual Scheme is to create within Rocky View a family-oriented and recreation-focused community that will offer a high quality of life for residents and will establish the M.D. of Rocky View as a leader in conservation planning and design.



B. The Challenge

The M.D. of Rocky View is facing unprecedented growth and development pressures. Coupled with these pressures are the goals to protect the environment, to minimize harmful emissions, to utilize water resources wisely, to promote economic development, and to create sustainable, liveable, and healthy communities that will provide homes for many generations to come.

Citizens, businesses, local authorities, and senior governments are all resorting to the triple bottom line of sustainability: environmental, economic, and social responsibility to ensure that the needs of future generations are not compromised by development today. Municipalities and developers are expected to make carefully considered decisions and investments that will lead to the creation of complete communities.

Community development is no longer just a local prerogative. Local development decisions and investments have broader community, regional, provincial, national, and global implications. Households, developers, businesses, approving authorities, and governments all share the responsibility to contribute to healthy and sustainable communities and regions.

C. The Commitment

The M.D. of Rocky View, in collaboration with the landowners, developers, builders, and ultimately the residents of Big Hills Springs, are and will continue to be committed to one goal: to create and sustain a community that will provide for healthy lifestyles, housing choice, open spaces, schools, services, and activities for generations to come. Nothing less than the attainment of this goal will be acceptable to the landowners, developers, Municipality, or citizens of Rocky View.



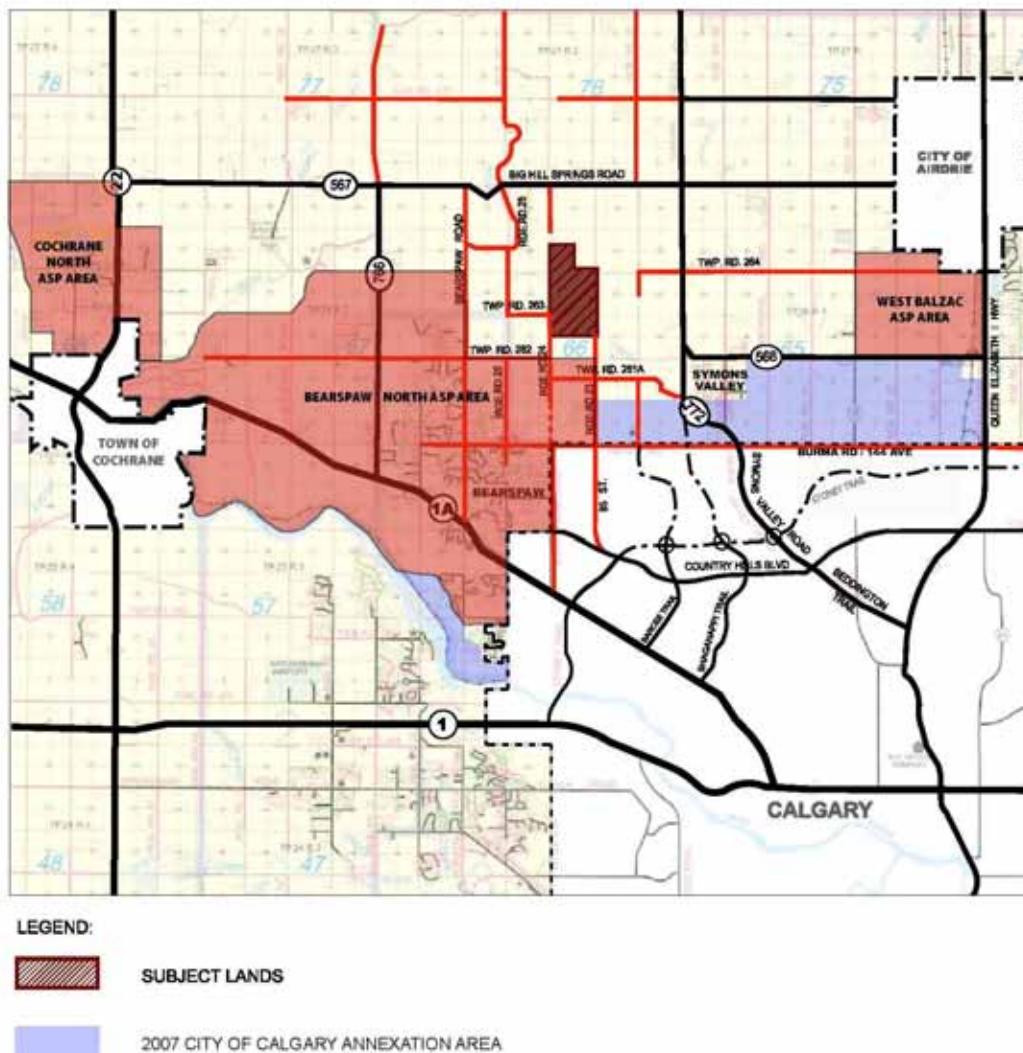
*Meeting the Environmental Challenge . .
for Generations to Come*

D. The Vision and Rationale

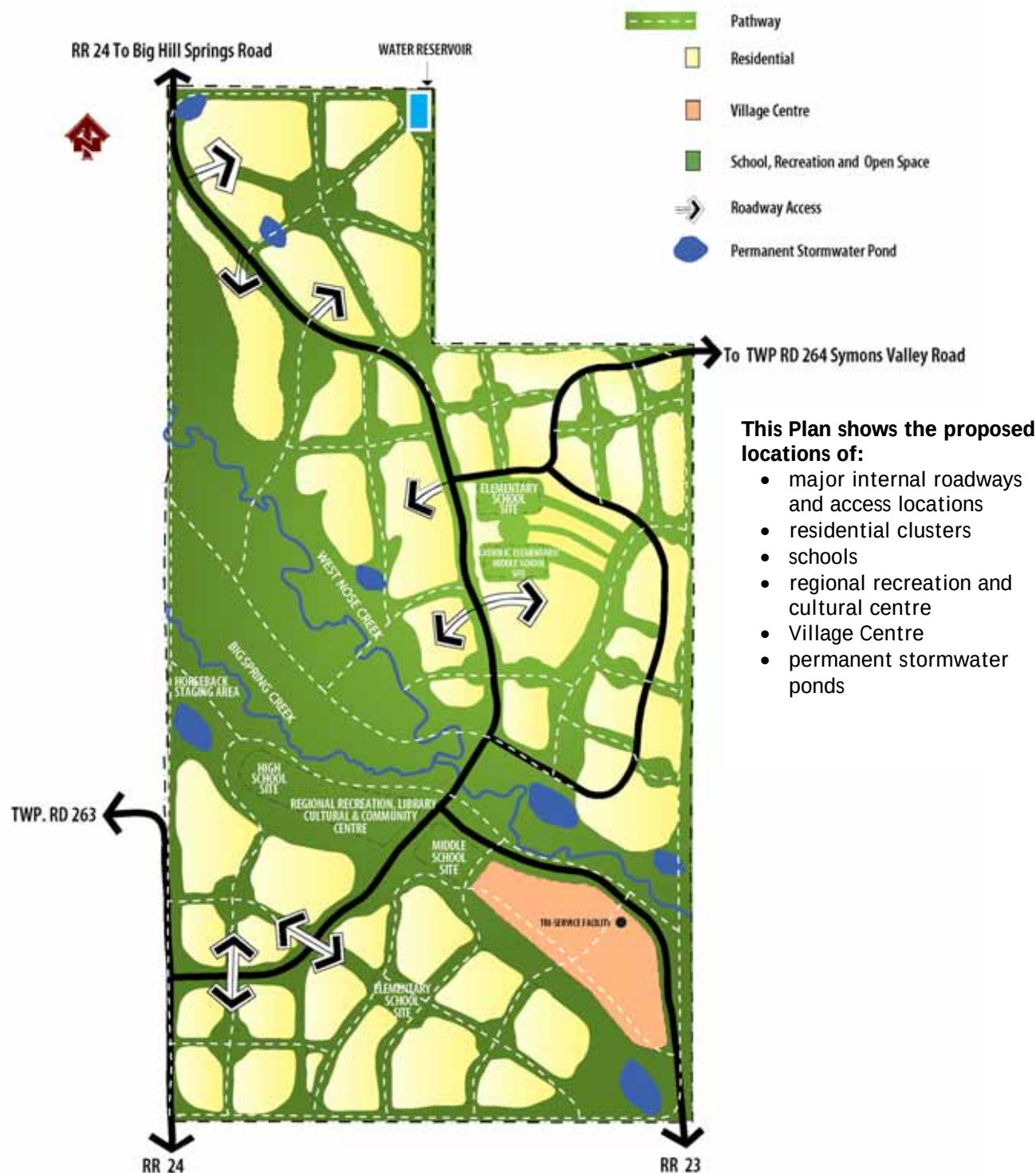
i) Location

The new community of Big Hill Springs is located within Rocky View on a 7 quarter-section parcel situated between Airdrie and Cochrane. Big Hill Springs is also close to Bearspaw, Symons Valley, and new neighbourhoods that are developing in Northwest Calgary.

This community will create a solution to the challenges resulting from the extensive and piecemeal development that has been occurring throughout the region. As it develops, this new community will foster sustainable community and economic development by providing services and activities for residents of Divisions 7, 8 and 9. At the same time, it will evolve as a vigorous, vibrant, and complete community on its own merits, planned according to innovative and environmentally sensitive design principles. A new Rocky View community of this scope, in this central location, will fit well with the overall spirit and intent of the policies and practices that form the guidelines for current and future development within the Municipal District of Rocky View.



CONCEPT PLAN AND GENERALIZED LAND USE AREAS



This Plan shows the proposed locations of:

- major internal roadways and access locations
- residential clusters
- schools
- regional recreation and cultural centre
- Village Centre
- permanent stormwater ponds

Critical features of the Big Hill Springs Conceptual Scheme:

- 50% of the Plan Area will be natural and open space
- the residential clusters make the most efficient use of the available land
- the community will be surrounded by a 10-km hiking, biking, and horseback riding trail
- there will be an extensive and interconnected park and pathway system throughout the residential areas and the open space

ii) Development Philosophy

The scope of the subject lands — seven quarter-sections — and their location facilitate a vision that conforms with the principles and policies that Rocky View Council has identified to govern the evolution of the Municipality. The Community of Big Hill Springs will be developed in accordance with the core values identified in Section 5.1 of the Municipal Development Plan. It will utilize forward-looking design principles to create an innovative, self-sustaining, and complete community based upon efficient and aesthetic use of the land and its distinctive topographical features.

The community's predominant feature will be its open space system, which will include an extensive and interconnected park and pathway network throughout the residential areas, linking them to a large central natural area and the perimeter trails. Walkability will be a key design principle. The trail systems for pedestrians and cyclists will link the residential cells with each other and with the mixed-use Village Centre, which will form the heart of the community.



The entire community will be surrounded and contained by a ten-kilometre (6.2 miles) long hiking, biking and horseback riding trail system, which will also serve as a green and open buffer zone between Big Hill Springs and adjoining agricultural operations. This green belt will form a clear boundary between the community and all adjacent lands ensuring that the development will have no direct impact on future land use in the area.

Big Hill Springs will combine rural and urban features and amenities, and will thus both enhance and blend into the rural environment that is identified by the Municipal Development Plan as being

integral to the Rocky View lifestyle. This community will afford residents of the M.D., both new and old, the opportunity to grow and age in place, which will be critical in ensuring that both Big Hill Springs and Rocky View will continue to thrive through successive life cycles, for generations to come.

The residential vision conceptualizes a wide variety of relatively compact, clustered residential cells, supported and anchored by the central Village Centre. The Village Centre will provide the opportunity for a range of local commercial, recreational, cultural, and personal services, including retail, restaurant, small-scale office, local and regional sports and recreational facilities and complexes, schools, churches, and both emergency and ongoing health care services. An important feature of the Village Centre will be higher density residential development, particularly seniors' housing. Architectural guidelines will ensure that residences and other buildings will be of high quality, appropriate and aesthetically pleasing within the context of the natural and human history of the area, and flexible enough to provide for variety and interest.



A key feature of the development philosophy is the residential format, which, though more spacious and rural in character than urban or suburban communities, will be compact compared to older country residential development. This format will appeal to contemporary lifestyle preferences and will promote the judicious use of developable land.

The multiple residential clusters, which will blend into the open and natural areas, will be accessible to a broad range of lifestyles and demographics. The provision for seniors' housing, semi-detached homes, and townhouses in and near the Village Centre will round out the residential vision and ensure that a variety of housing choices will include affordable and low-maintenance alternatives to the single-detached units found elsewhere in Big Hill Springs.



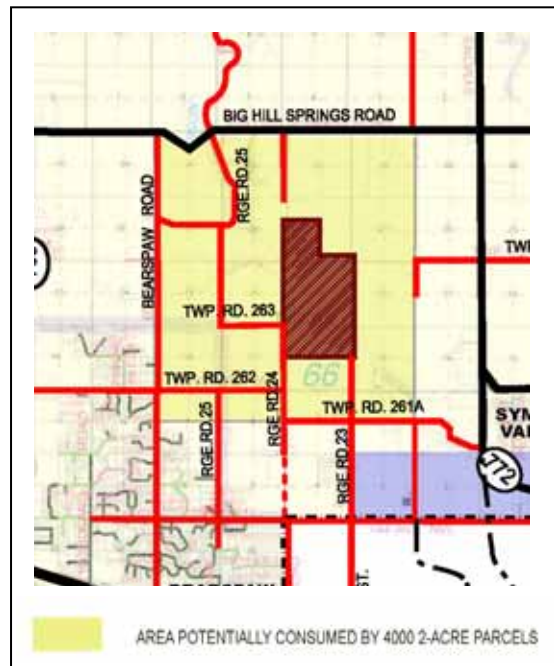
This more efficient type of development is both desirable and necessary to facilitate the long-term Municipal policy goal of integrating development with preservation of viable agricultural lands, natural areas, and the rural character of Rocky View.

The following table identifies a general analysis of the Big Hill Springs Conceptual Scheme Policy Areas.

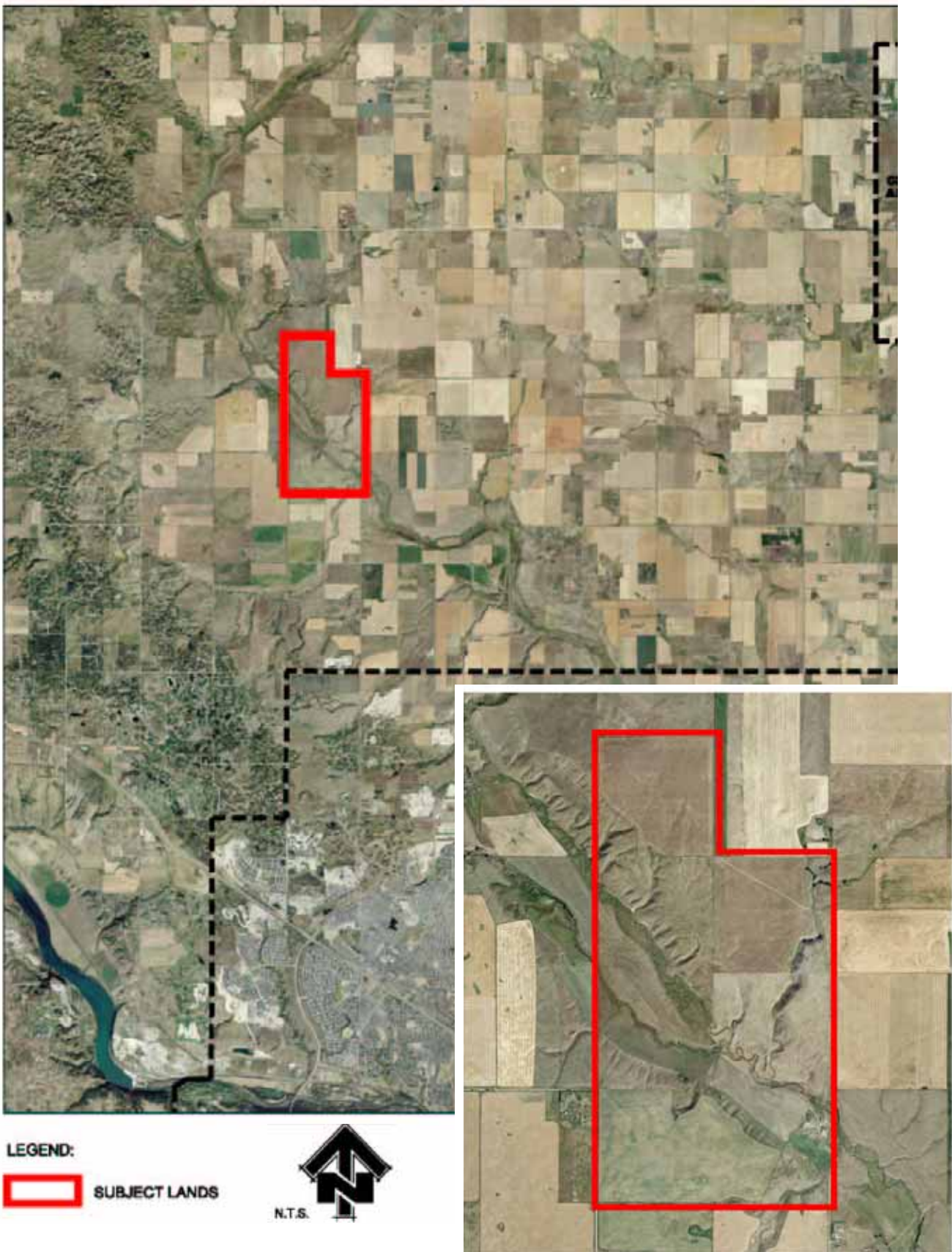
Big Hill Springs Policy Area	Acres	Hectares	Percentage
School, Recreation, and Open Space	545	220	47%
Undeveloped Road Allowance	34	14	3%
<i>Subtotal Open Space</i>	<i>579</i>	<i>234</i>	<i>50%</i>
Residential	320	129	28%
Village Centre	39	16	3%
Roads ¹	217	88	19%
<i>Subtotal Developed Area</i>	<i>576</i>	<i>233</i>	<i>50%</i>
<i>Total Gross Land Area</i>	<i>1155</i>	<i>467</i>	<i>100%</i>

¹Approximately one half of a road right-of-way is green space and half is hard surfaced.

Conservation of the significant natural features, which will become the defining focal points around which the community's identity will be built, will also serve as a central organizing design principle, in accordance with conservation subdivision philosophy. If accommodated in typical country residential development on 2-acre lots, the proposed number of units for Big Hill Springs would require approximately 60-70 quarter-sections of land, rather than the 7 quarter-sections within this Conceptual Scheme. Moreover, approximately 50% or 3.5 quarter-sections in Big Hill Springs will be left as open space. This will be a community designed to integrate appropriate land use, building design, ecological landscape planning, and construction strategies to reduce environmental impacts and enhance natural systems. Development and nature will be integrated to protect and enhance natural features such as the West Nose and Bigspring Creeks, their valleys, and their sandstone cliffs.



SITE LOCATION – AERIAL PHOTO



iii) Benefits to the Municipality and its Residents

This Conceptual Scheme reflects the spirit and intent of the Municipality's planning goals and philosophies. From a regional perspective, this Conceptual Scheme is situated in a logical location for the creation of a complete community in an area of Rocky View where none exists. The subject lands, which are of lower agricultural quality, are extensive enough to provide the critical mass necessary to create a self-sustaining, compact, and clustered community - a goal that cannot be achieved with individual quarter-section developments. The scope of the project will also allow for a linear open space green belt boundary that will delineate the community and help separate private lots from adjoining agricultural operations. Big Hill Springs will exemplify the type of innovative community that is described in Section 5.1(5) of the Municipal Development Plan.

In addition to creating within Rocky View a new, complete, and comprehensively planned community, Big Hill Springs will provide the Municipality of Rocky View with the following specific benefits:

- The predominant policy objective of this Conceptual Scheme is to establish a critical mass of large open space and natural areas to provide for both human recreational and native habitat needs.
- This development will contribute to the upgrading of the regional transportation system.
- There will be a net environmental gain to two of Rocky View's most important creek systems, West Nose Creek and Bigspring Creek, since the impact of grazing cattle will ultimately be eliminated in the development lands.
- This community will provide Rocky View with an alternate model for future development - one that will facilitate long-term conservation of natural areas and open space while effectively promoting sustainable residential development.
- Through the provision of serviced sites at no charge to the Municipality, residents within the Big Hill Springs region will have the opportunity for convenient access to a range of public facilities and services, including a regional recreation and cultural centre, outdoor recreational opportunities, schools, emergency and protective services, a library. In addition, the developer will work with retailers, service providers and employers to bring a variety of commercial and retail services to the community.

E. The Implementation

i) Phasing

It is expected that the transition from agricultural to a fully developed community will take about 30 years, with the initial stages of development taking place in the central portion of the lands in order to minimize impact on adjoining agricultural operations. This progression will occur in stages with a number of interconnected neighbourhoods, each of which in turn being developed in a number of phases. Several of these neighbourhoods may be under development at the same time in order to provide a variety of housing, neighbourhoods, and amenities for residents. The preceding figure shows the expected levels of development in 2015, 2020, 2025, and 2035.



The developer will encourage the early construction of some of the core amenities, such as an elementary school, some cultural and recreational amenities, certain trails, and certain components of the Village Centre through provision of serviced sites and other incentives.

ii) Servicing: Water, Wastewater, and Stormwater

A Water and Wastewater Servicing Concept Plan has been completed by Morrison Hershfield. Wastewater and water services will be provided to all residential and commercial development. Stormwater will be managed through use of natural areas to recharge groundwater in accordance with plans prepared by Westhoff Engineering Resources.

Water

The Big Hill Springs community will be serviced by a treated water system. In July 2007, the developer is in discussion with private utility providers. One such provider, Regional Water Services Ltd. (Medallion Development Corporation), is working with the MD of Rocky View to establish a treated water system. Regional Water Services Ltd. has tied up more than sufficient water rights to service the full Big Hill Springs development. In addition to discussions with Regional Water Services Ltd. on a treated water supply, the developer is also pursuing the viability of on-site groundwater supplies for the initial phases of development. All water infrastructure will be designed and installed with capability to connect to a regional system, should this become practical in the future. Water treatment and supply will be subject to review and approval by Alberta Environment and the Municipality.

Wastewater

The developer's preferred option at this planning stage is for development to be serviced by an advanced on-site decentralized wastewater system. Should a regional system become practical in the future, the developer will work with the municipality, or other approving authorities to tie into this system. On-site wastewater treatment will be subject to review and approval by Alberta Environment and the Municipality.

Stormwater

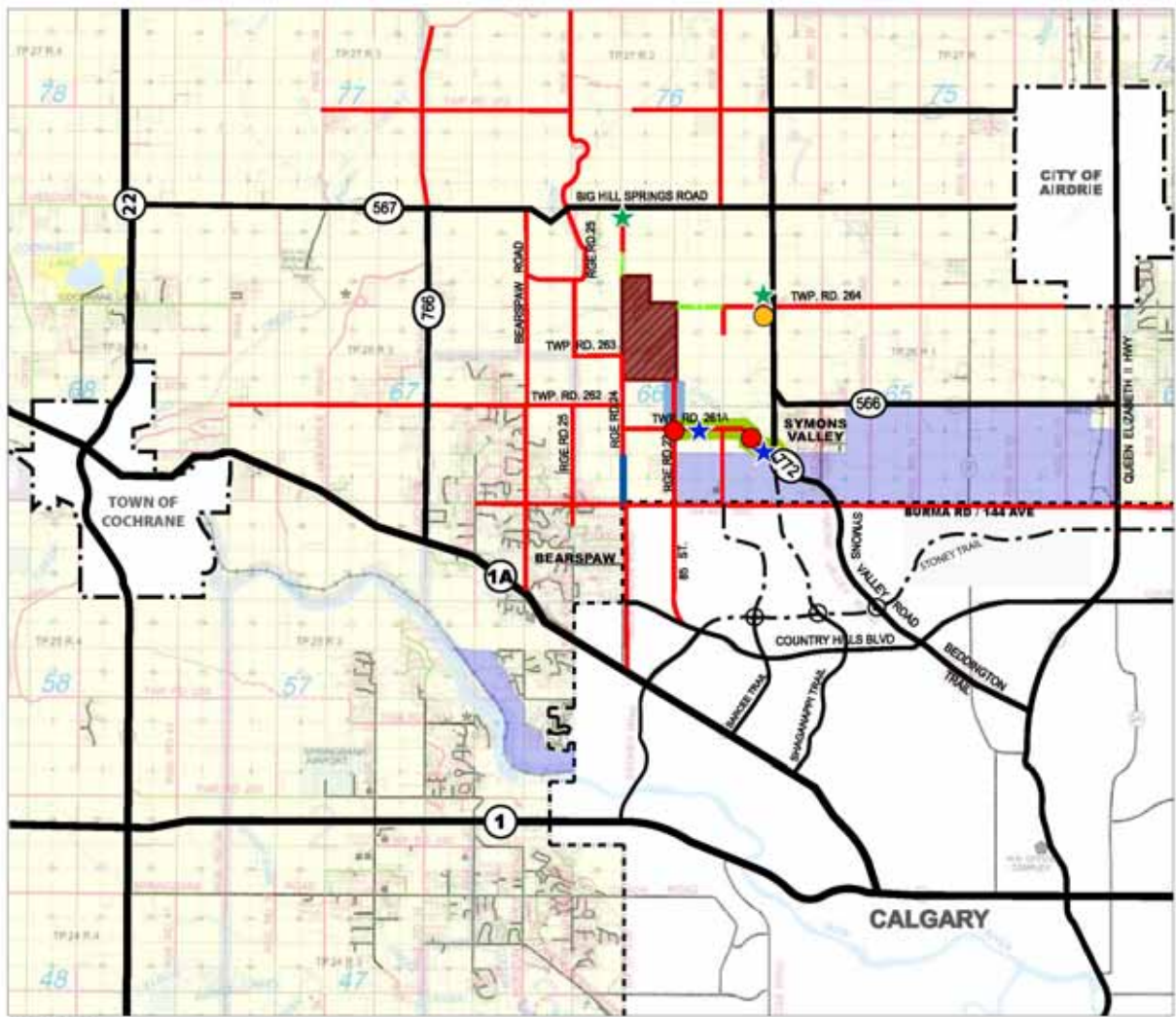
A Master Drainage Plan has been completed by Westhoff Engineering Resources. This plan has established that stormwater will be managed on site through an integrated Stormwater Management System based on Best Management Practices. The system will include a series of cascading traplows and ponds (Section 7.1). Significant amounts of stormwater will, through natural recharge, would augment the existing aquifer.

iii) Roads and Transportation

A Traffic Impact Assessment was completed by Bunt & Associates Engineering in May 2006. The development of the Big Hill Springs Community will result in a more interconnected and upgraded roadway network for residents living in and around the development. Accessibility will be improved by upgrading internal and adjacent roads. The development and connection of undeveloped road allowances in the area will also enhance the ability of M.D. residents to utilize the services provided within Big Hill Springs.

On completion, access to and from the community will be available from all four corners and in all directions, which will minimize congestion at critical times during the day. Nonetheless, the community will not be traversed by any major through roads, making it a safer and more pleasant place to live, work, walk and play.

The preceding figure shows the existing roads in the region and outlines the necessary improvements recommended by Bunt & Associates Engineering at various stages of development.



- LEGEND:**
- SUBJECT LANDS**
 - 1A** **PRIMARY HIGHWAY**
 - 766** **SECONDARY HIGHWAY**
 - ARTERIAL & COLLECTOR ROAD**
 - PLANNED / UNDER CONSTRUCTION**
- CONCURRENT WITH FIRST PHASE OF DEVELOPMENT**
- PAVING & WIDENING**
- 300 RESIDENTIAL UNITS**
- PAVING & WIDENING**
- 2000 RESIDENTIAL UNITS**
- SIGNALIZED INTERSECTIONS**
 - ADDITIONAL TURNING LANES**
- PRIOR TO 4000 RESIDENTIAL UNITS***
- CONNECTIONS**
- POTENTIAL IMPROVEMENTS DEPENDING ON WHICH OPTION SELECTED**
- CONNECTIONS**
 - ADDITIONAL TURNING LANES**
 - SIGNALIZED INTERSECTION**
 - ADDITIONAL TURNING LANES**

* Subject to detailed traffic study

iv) Agricultural Analysis

An Assessment of Arability was conducted for the subject lands by Matrix Solutions, utilizing the Land Capability Classification for Arable Agriculture in Alberta (LCCAAA) system. This 7-class rating system ranks land according to agricultural capability based on climate, soils, and landscape. Classes 1, 2 and 3 are capable of sustained production of common cultivated crops, while classes 4-7 are not. All of the subject lands fall into classes 4-6 as outlined in the table below.

LCCAAA Rating	Description	Acres	% of Site
Class 1	Highest capability for arable-dryland agriculture	0	
Class 2	Capable of sustained production of common cultivated crops	0	
Class 3	Capable of sustained production of common cultivated crops	0	
Class 4	Marginal for sustained production of common cultivated crops	625	56%
Class 5	Not recommended for cultivated crops	59	5%
Class 6	Not recommended for cultivated crops	436	39%
Class 7	No capability for arable agriculture	0	
Total Acres		1120	100%

The aerial photograph of the area west of Highway #2 and north of the City of Calgary shows that the subject lands are located in an area of lesser agricultural capability compared to the lands to the east and north. The aerial photograph also shows the land uses on the immediately surrounding lands.

F. The Vision 2035

By 2035, the community-wide green spaces, both natural and enhanced, will be the predominant feature of Big Hill Springs. This open space, along with the community's housing choice, accessibility, Village Centre, and variety of activities and amenities, will make Big Hill Springs a uniquely desirable community in which to live, work and play.

All open spaces will be interconnected, with links to the Village Centre and to the greenbelt of hiking, cycling, and horseback riding trails around the periphery of the community. The Village Centre will serve as a functional and attractive nucleus for the community. This community will enhance the larger community of Rocky View. The recreational and cultural opportunities provided by Big Hill Springs will benefit Rocky View residents and in particular residents of Divisions 7, 8 and 9. Big Hill Springs, as it reaches maturity, will evolve as an exemplary community with a genuine and enduring identity. This community will provide lifestyle options for existing and new Rocky View residents and will meet the needs and aspirations of future generations.

Big Hill Springs will become a complete community which, in addition to providing for a range of housing types, will support employment and services such as schools, retail, and recreation. At completion, Big Hill Springs will be a comprehensively planned and sustainable community offering its 10,000 residents an opportunity to live, work, play, grow, and age in place. Big Hill Springs will maintain its vibrant character through many community lifecycles and generations to come.



1.0 Overview

1.1 Authorization

The Big Hill Springs Conceptual Scheme (BHSCS) has been prepared for the Municipal District of Rocky View No. 44 in accordance with the Municipal District of Rocky View Municipal Development Plan (MDP).

On July 6, 2005, Council authorized the preparation of the Big Hill Springs Conceptual Scheme for all lands within the BHSCS Plan Area. Council directed the Conceptual Scheme to include, but not be limited to, an assessment of the following items:

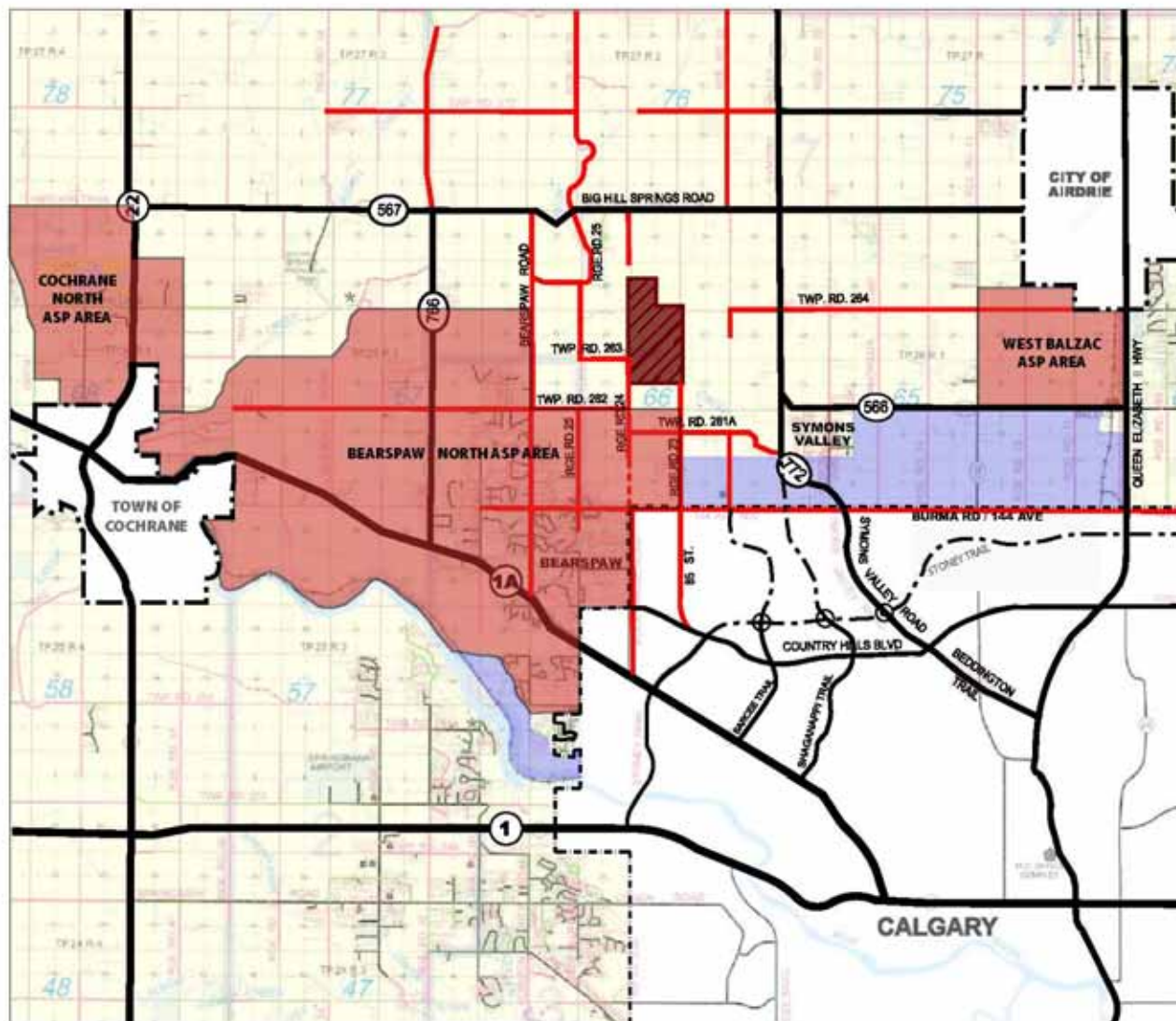
- General Matters
A baseline description and evaluation of the subject lands including matters related to physical characteristics, land use, and infrastructure.
- Regional Matters
A description and evaluation of lands outside the conceptual scheme area with respect to transportation and servicing implications, socio-economic implications, and impacts on agricultural areas.
- Development-Specific Matters
A description and evaluation of matters pertinent to development within the conceptual scheme area.

A copy of the July 6, 2005, Council authorization is included as Appendix A. This document has been prepared pursuant to that Council authorization and the policies of the MDP.

1.2 Location

The Big Hill Springs Conceptual Scheme is located on 7 quarter-sections of land and adjacent road allowances (1155 acres) four kilometers (two and a half miles) north of Calgary, 2.4 kilometers (a mile and a half) north of the City of Calgary 2007 annexation boundary, half-way between Airdrie and Cochrane, and halfway between Bearspaw and Symons Valley (Figure 1).

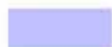
The Conceptual Scheme Plan Area is situated in the northern portion of the Foothills Parkland Natural Sub-region of Alberta. As is typical of the Foothills Parkland, native habitats in and around the Plan Area have been largely altered by cultivation and ranching. Range Roads 23 (85th St.) and 24 (Rocky Ridge Road) border the parcel's eastern and western boundaries. Township Road 263 provides access to the western edge of Big Hill Springs.



LEGEND:



SUBJECT LANDS



2007 CITY OF CALGARY ANNEXATION AREA



**Figure 1:
SITE LOCATION**

1.3 Purpose

The Conceptual Scheme Plan Area, because of its central location between the subdivided areas of Bearspaw and Symons Valley, and 2.4 kilometers (1.5 miles) from the City of Calgary, provides a made in Rocky View community with recreational, cultural and residential opportunities for existing and new Rocky View residents. The strategic location of the Plan Area makes it well suited to provide regional services and activities for residents in Divisions 7, 8 and 9. The Big Hill Springs Conceptual Scheme forms a bridge between the general planning policies contained in the Municipal Development Plan (MDP) and the more detailed planning and design in Neighbourhood Plans, Land Use Redesignations, and Subdivision Plans. It provides a comprehensive policy framework for lands within the Big Hill Springs Plan Area. This Conceptual Scheme will provide the M.D. with the essential long-term policy direction to manage growth, guide investment, and evaluate phased development proposals within the Big Hill Springs area.

In accordance with the Plan Objectives listed in Section 4.0, this Conceptual Scheme provides:

- a critical mass of large open space and natural areas to provide for both human recreational and native habitat needs
- a land use and phasing strategy, including appropriate land uses and development policies which acknowledge existing uses, physical and environmental characteristics, the need for conservation of significant natural areas and the need for long-term sustainable development
- a comprehensive system of linked open spaces which provide for schools, active recreation areas, the conservation of environmentally significant natural features such as West Nose Creek and Bigspring Creek, stormwater management facilities and groundwater recharge
- potential requirements and preferred solutions for utility infrastructure to provide potable water, sanitary sewer servicing and stormwater management
- internal road networks feeding into the regional roadway system, which will connect Big Hill Springs with surrounding areas in the M.D and the region
- implementation measures including requirements for Neighbourhood Plans, Land Use Redesignation, Subdivision, and Development.

The development time frame for Big Hill Springs is anticipated to cover the next 30 years, as the area evolves from the existing agricultural uses to a fully developed complete community.

The policies in this Conceptual Scheme are intended to be both clear and flexible enough to guide planning, land use, subdivision, and development decisions over the next three decades to ensure orderly and sustainable development of the Plan Area.

2.0 Legislation

2.1 The Municipal Government Act

The Big Hill Springs Conceptual Scheme has been prepared in accordance with Provincial requirements set forth in the Municipal Government Act (MGA) and Alberta Regulation 43/2002 Subdivision and Development Regulation. At the time of adoption of this Conceptual Scheme, the enabling legislation under Part 1 of the Subdivision and Development Regulation (Part 1. 4. 5 (e)) provides for the preparation of conceptual schemes that relate applications for future subdivision and development to adjacent areas.

2.2 The Municipal Development Plan

This Conceptual Scheme is supported by a number of the policies in the M.D. of Rocky View Municipal Development Plan (MDP), the overall planning policy guiding land use and development within the Municipal District. The MDP supports:

- residential development with comprehensive open space systems that integrate environmentally significant natural features and recreational opportunities (MDP Sections 5.0 and 8.0)
- regional utility infrastructure for potable water, sanitary sewer servicing, and stormwater management (MDP Section 9.0)
- community planning that is responsive to both the aspirations of local residents and the overall growth management needs of the Municipality (MDP Sections 3.0, 5.0, 6.0, and 7.0)
- sustainable development that is appropriate in a rural context (MDP Sections 3.0 and 4.0)
- transportation systems that provide safe and efficient access for the community (MDP Section 9.0).

An overarching principle guiding the Big Hill Springs Conceptual Scheme is the creation of a comprehensively planned complete community, which will be able to sustain its healthy environment and unique identity in the region for many generations to come. The Conceptual Scheme provides the opportunity for:

- preserved and protected natural areas and open space covering half of the Plan Area
- local and regional recreational opportunities and facilities
- a diversity of housing types including single-detached, multi-unit, and seniors' housing
- commercial, retail, small-scale office, restaurant, and personal service businesses
- community services, churches, schools, and health care and protective services.

The MDP policies supporting the protection of good agricultural land reflect important land use planning principles. The Community of Big Hill Springs will provide for development in a part of

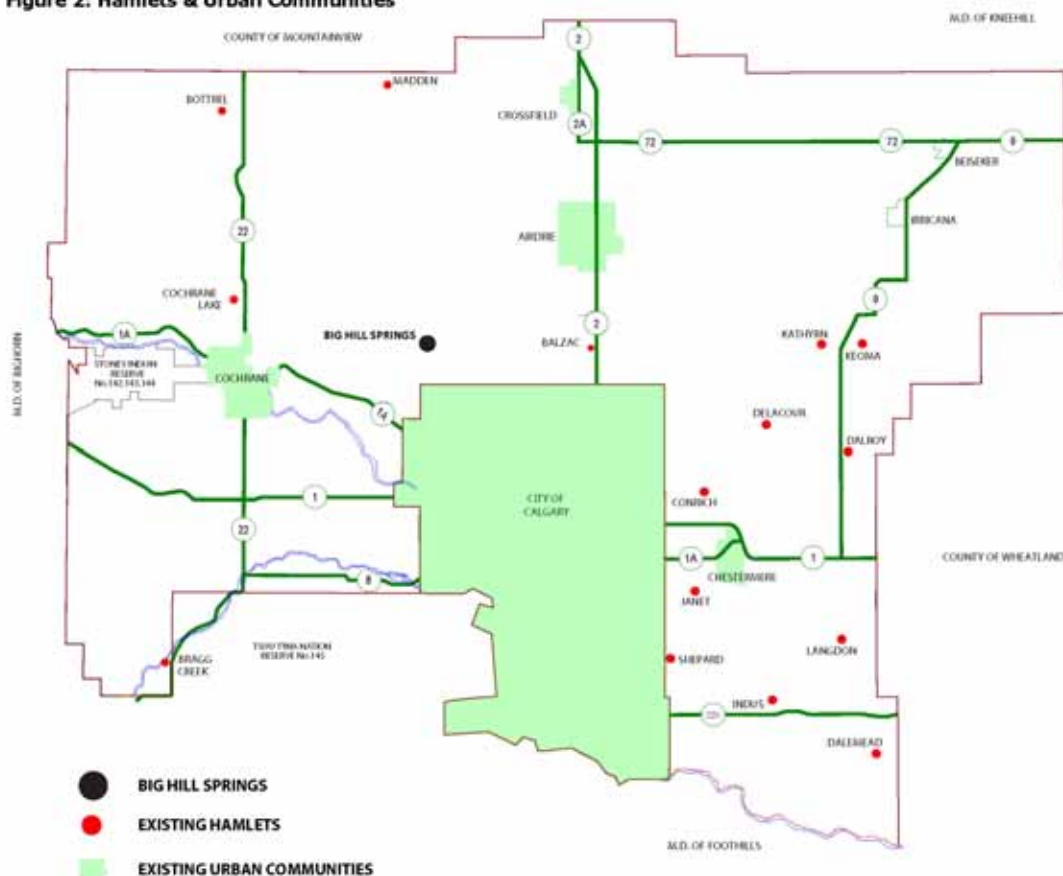
the M.D. of Rocky View that has historically been used for ranching on mainly Class 4 to 6 lands. Given the strategic location of these lands relative to existing urban centres and the expanding M.D. industrial and commercial centre in Balzac, this is an appropriate location for residential development within the M.D. Protection of good agricultural land in Rocky View will be facilitated by the concentration of development and the establishment of complete communities in areas where intensive development is appropriate and where agricultural capability is low.

M.D. of Rocky View policies and practices indicate that concentrating development is an effective way to mitigate the effects of development on good agricultural land. The compact, more efficient development pattern proposed in the Big Hill Springs Conceptual Scheme, on land of lesser agricultural value, will utilize the land resource within the Municipality more efficiently than the fragmented subdivision patterns that have resulted from country residential development elsewhere.

Complete communities are those which incorporate housing that is more affordable than traditional country residential development. Complete communities also support employment and services such as schools, retail, and recreation. The comprehensive development provided by the Big Hill Springs Conceptual Scheme is only possible because the area has not been subdivided. Infill development in existing areas of country residential development, where landowner interests and historical subdivision patterns discourage redevelopment, can be a long and arduous undertaking for the Municipality, resident landowners, and developers. This can result in compromises that lead to less desirable planning decisions. The Big Hill Springs Conceptual Scheme presents an opportunity for the M.D. of Rocky View to comprehensively plan a significant community on a large parcel of land.

Appendix B addresses in more detail the specific MDP policies that support this Conceptual Scheme.

Figure 2: Hamlets & Urban Communities



2.3 New Directions

Historically, non-agricultural, non-ranching development within the M.D. of Rocky View was typically concentrated in hamlets located in the eastern half of the M.D. (Figure 2). Increasing development pressures from within the M.D., the City of Calgary, and surrounding areas are resulting in country residential growth that is inefficient to service, lacks amenities and services, and depletes the agricultural land base.

To address the increasing development pressure and accommodate growth efficiently within its boundaries, the M.D. of Rocky View is pursuing more innovative and efficient forms of development. It has challenged developers to come forward with plans that achieve more efficient types of development yet retain a distinct rural character. In particular, the M.D. is looking for more compact and efficient development that provides a diverse range of housing types to accommodate a broad range of lifestyles, incomes, and age groups. The Municipality is looking for a new vision of rural development alternatives that includes not only a variety of residential housing types, but also significant employment and recreational opportunities. The need has been recognized for development of complete communities where residents can live, work, and play without having to travel significant distances. The M.D. is seeking new ways of accommodating growth, with compact form, clustered housing, comprehensive planning, and innovation as hallmarks of this new vision.

The M.D. of Rocky View has recently approved a number of planning documents, which indicate new and innovative policy directions for the Municipality, including the Rocky View Economic Development Strategy, Rocky Creek Conceptual Scheme, Cochrane Lake Conceptual Scheme, Balzac West Area Structure Plan, Cochrane North Area Structure Plan, and Harmony Conceptual Scheme. The M.D. has also initiated a Corporate Strategic Plan process. The recent construction of the East Rocky View Regional Utilities Network is the beginning of a range of municipal initiatives that will convert strategic areas of the M.D. of Rocky View from predominantly country residential development into fully integrated communities providing the full range of housing choices, community services, and business opportunities. Already ranked tenth in population among all Alberta municipalities, Rocky View is the most populous Municipal District in the Province. As development pressures continue to increase in the Calgary region, the M.D. of Rocky View will play an ever-increasing role in providing for residential and economic development in this part of Alberta.

Key to the success of growth management within Rocky View will be the strategic location and development of new communities. Such communities will require full access to a proper range of housing types, recreational opportunities, community services, and transportation networks. Big Hill Springs will play its part in the overall growth management system of Rocky View by helping to create a healthy, safe, efficient, prosperous, and liveable region.

3.0 Plan Area and Context

3.1 Plan Boundary and Land Ownership

The boundary of the subject lands encompasses 7 quarter-sections and includes all adjacent unopened road allowances in the N $\frac{1}{2}$ of Section 16-26-02-W5M; all of Section 21-26-02-W5M, the SW $\frac{1}{4}$ of Section 28-26-02-W5M, and a portion of NW $\frac{1}{4}$ Section 15-26-2-5 (Figure 3). All 7 quarter-sections are owned by the Locke Stock and Barrel Company and Jayman MasterBUILT. Appendix D addresses the detailed ownership of the subject lands and the lands surrounding the Plan Area. The total Plan Area includes 1120 acres of private land and 35 acres of public unopened and opened road allowances, for a total Plan Area of +/- 1155 acres (+/- 467 hectares).

3.2 Existing Conditions

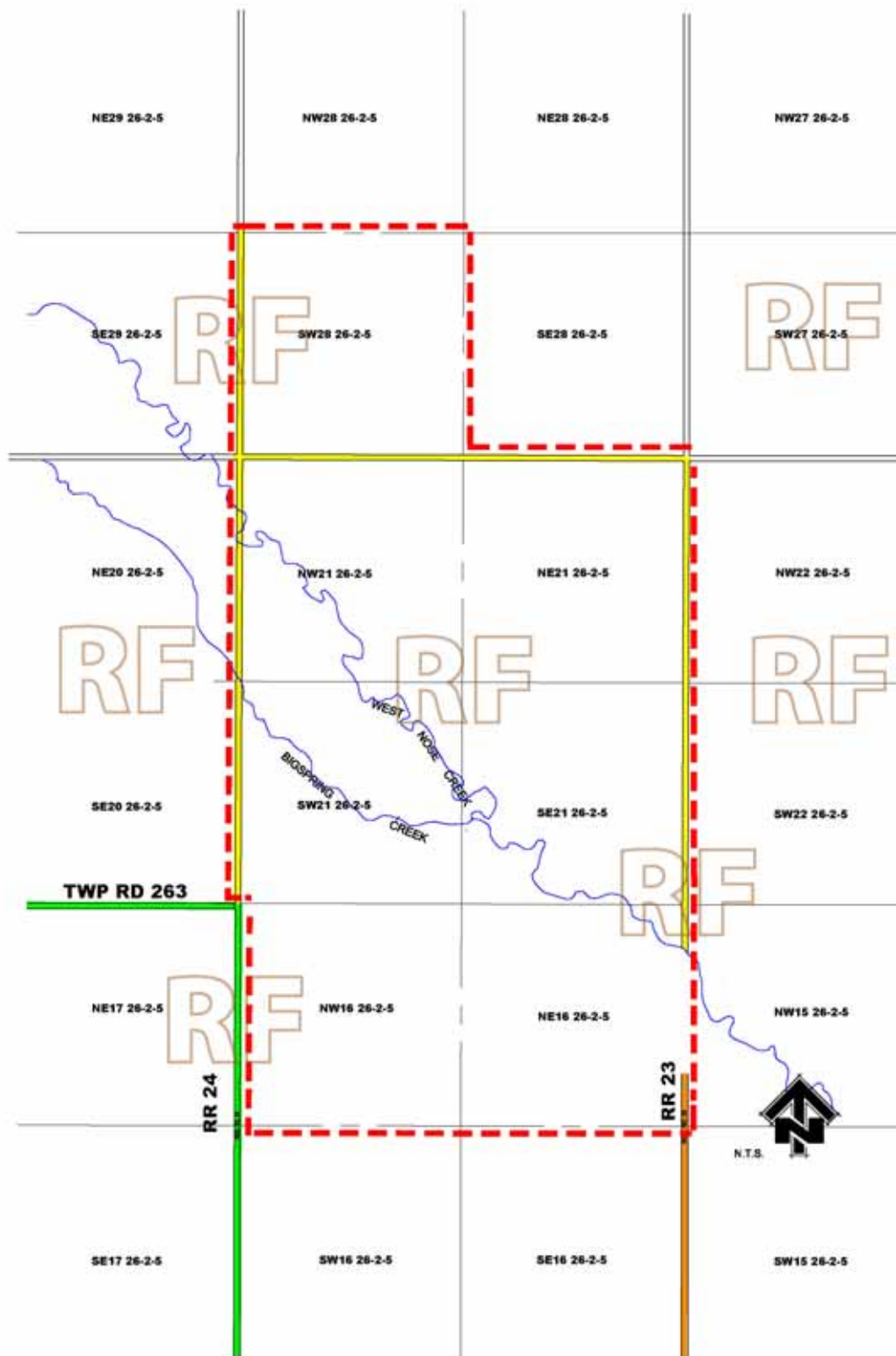
3.2.1 Transportation

Figure 4 outlines the location of the major roads in the vicinity of the subject lands. Range Road 23 connects with and is adjacent to the southeast corner of the Plan Area and provides access to Country Hills Boulevard and Stoney Trail in Calgary. It also intersects Township Road 261A and Burma Road, which provide access to Symons Valley Road and Beddington Trail in Calgary.

Range Road 24 borders the west side of the S.W. $\frac{1}{4}$ of the subject lands. This road connects to Township Road 262, which intersects Bearspaw and Lochend Roads to the west and provides access to Highway 1A. To the south of Township Road 261A, a one-mile stretch of Range Road 24 is not developed to M.D. or Rocky View standards, but becomes Rocky Ridge Road as it crosses Burma Road and enters Calgary.

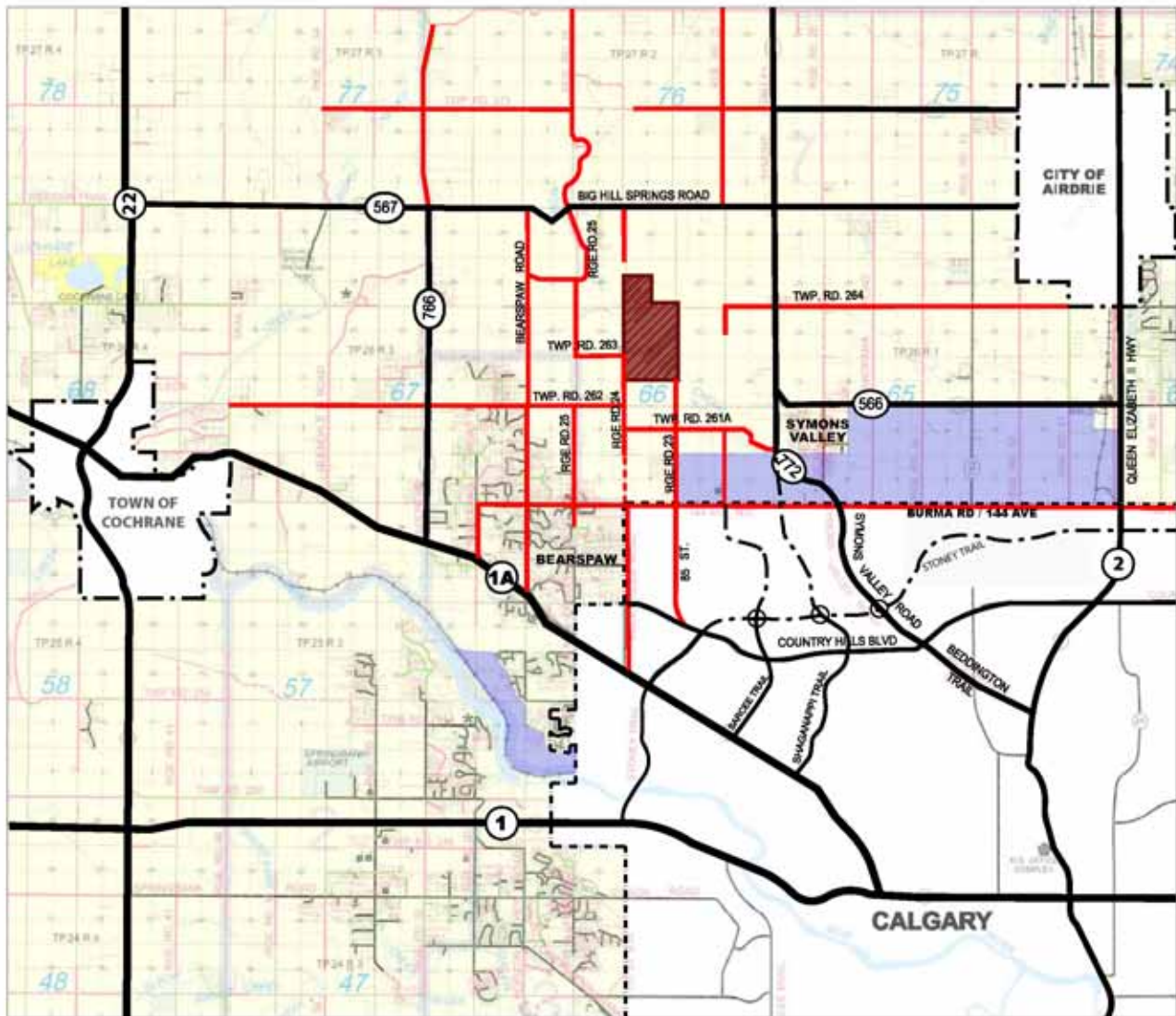
3.2.2 Land Uses

All lands within and adjacent to the Plan Area are designated Ranch and Farm District RF (Figure 3). Currently, land within the Plan Area is being used for grazing and hay production. There is one residence within the Plan Area, which is associated with the grazing and hay production (Figure 5).



- LEGEND:**
- PLAN BOUNDARY
 - UNOPENED ROAD ALLOWANCES
 - OPEN ROAD INCLUDED IN PLAN BOUNDARY
 - OPEN ROAD NOT INCLUDED IN PLAN BOUNDARY
 - RF RANCH & FARM DISTRICT

Figure 3:
PLAN BOUNDARY & EXISTING LAND USE

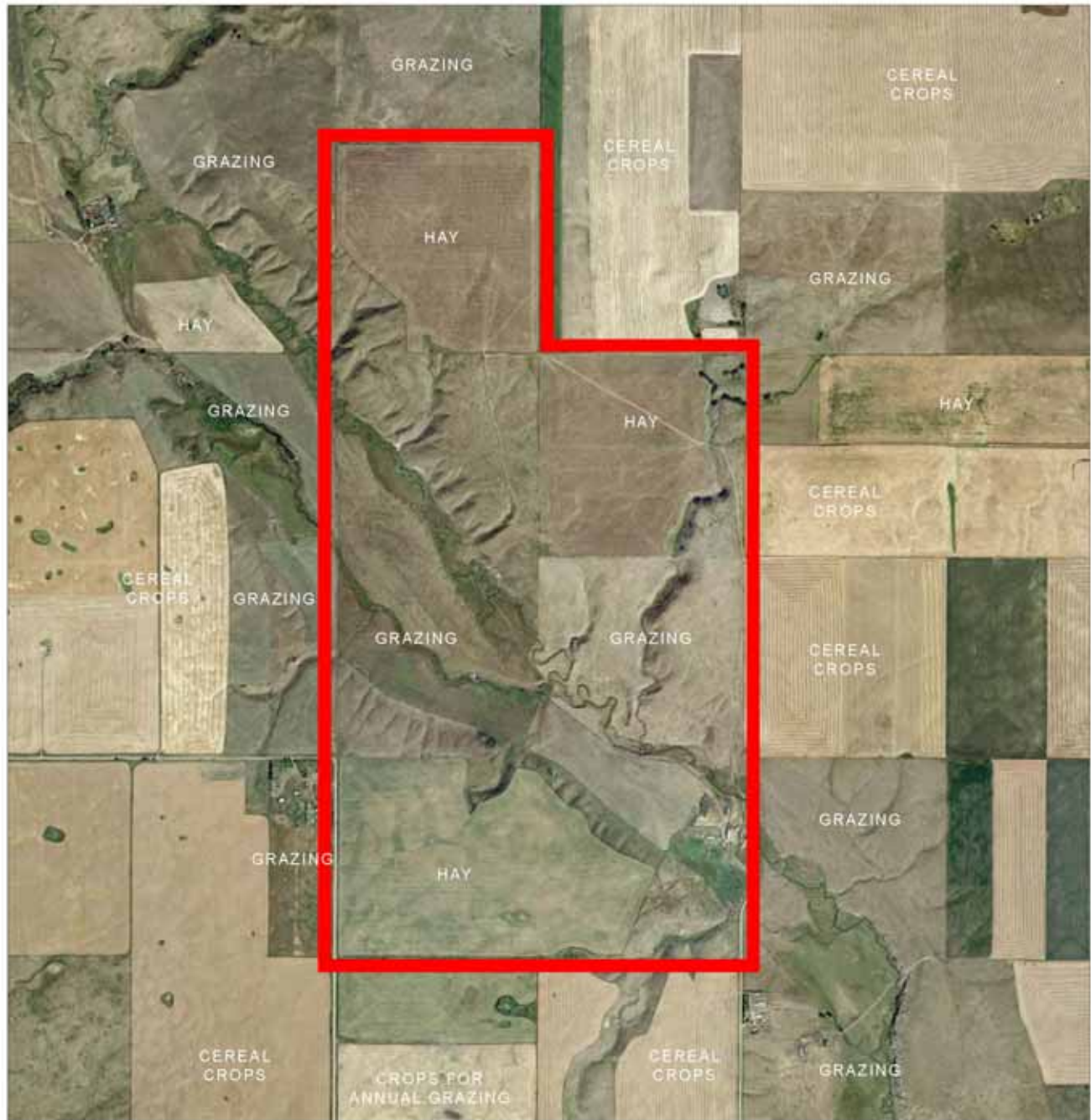


LEGEND:

-  SUBJECT LANDS
-  PRIMARY HIGHWAY
-  SECONDARY HIGHWAY
-  ARTERIAL & COLLECTOR ROAD
-  OPEN ROAD ALLOWANCE - NOT TO M.D. STANDARDS
-  PLANNED / UNDER CONSTRUCTION



**Figure 4:
EXISTING REGIONAL ROAD NETWORK**



LEGEND:



SUBJECT LANDS



Figure 5:
SITE AIRPHOTO & EXISTING AGRICULTURAL PRODUCTION

3.2.3 Topography, Vegetation, and Environmental Sensitivity

A major policy objective of this Conceptual Scheme is to establish a critical mass of large open space and natural areas to provide for both human recreational and native habitat needs.

A Biophysical Impact Assessment was completed for the subject lands by Sweetgrass Consultants in December 2005. The Big Hill Springs Conceptual Scheme is situated in the northern portion of the Foothills Parkland Natural Sub-region of Alberta, a zone naturally characterized by grassland dominated by rough fescue and oat grasses and variable amounts of aspen woodland. As is typical of the Foothills Parkland, native habitats in and around the project area have been largely altered by cultivation and ranching.

The Subject Lands are bisected by a large valley which runs diagonally, from the northwest to the southeast, through the center of the parcel. West Nose and Bigspring Creeks enter this valley on the west, and merge in the middle. Of the two creeks, Bigspring is the more permanent as it is fed by a large spring located just west of the subject lands. All of the lands within the subject parcel drain into these creeks.

Several small coulees feed into the valley, the largest of which is in the eastern portion of the Plan Area. This coulee contains seepages that flow into the coulee. One other seepage is located along southwest-facing slopes of West Nose Creek in the SW ¼ of Section 21. The coulee slopes and most of the valley slopes are steep. Sandstone cliffs, of the Palaeocene Paskapoo Formation, occur along the lower part of the valley slopes in the southeastern portion of the area (Figure 5).

The lands in the valley are mostly level, suitable for more intensive development, while the upper benches are undulating. The bench on the north side of the creek generally slopes to the southwest, while the bench on the southern side of the valley is also undulating and generally slopes to the north. Both of these benches are partially traversed by a coulee.

An information review and field program were conducted to describe vegetation and wildlife; document significant habitats, sensitive features, and species at risk; evaluate effects of planned developments on these resources; discuss regional ecosystem processes; and formulate recommendations for mitigation of effects of planned developments. Based on this analysis, Sweetgrass Consultants Ltd. concluded that habitat loss associated with the development will have a negligible effect on regional habitat fragmentation, biodiversity, and wildlife corridors.

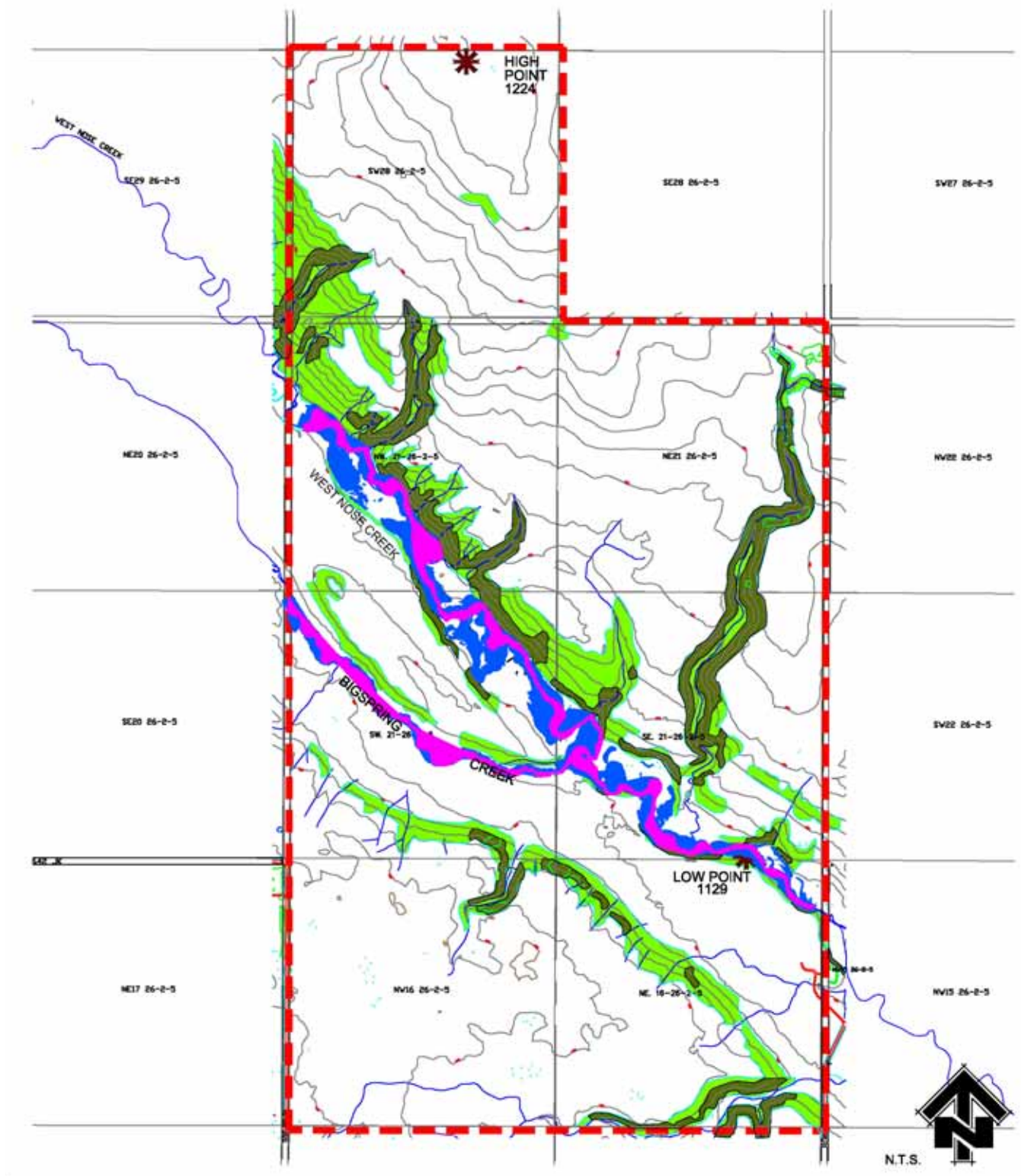
3.2.4 Slope Analysis and Floodway

Only small areas of the planned development have slopes in excess of 25% and these are concentrated in the natural areas on either side of the valley, and along the coulees (Figure 6 — Slope and Flooding Analysis).

Based on the Floodplain Delineation Analysis undertaken by Westhoff Engineering Resources, Figure 6 also indicates a small floodway adjacent to the creeks. The floodway lands are completely contained within the proposed open space area in Big Hill Springs and will not be developed.

3.2.5 Soil/Geotechnical Considerations

A geotechnical review was conducted for the subject lands by McIntosh Lalani Engineering in December 2005. Based on a general assessment of the site and the stability of slopes on the subject and adjacent lands, the consultant does not anticipate any unusual concerns with development of the subject lands. The geotechnical assessment indicates that the subject lands are suitable for development from a geotechnical perspective.



LEGEND:

- | | | | |
|---|---------------|---|--|
| ---- | SITE BOUNDARY | | FLOOD WAY |
| | SLOPE > 15% | | FLOOD FRINGE (formerly referenced as FLOODPLAIN) |
| | SLOPE > 25% | | |

Figure 6:
SLOPE & FLOODING ANALYSIS

3.2.6 Agricultural Capability

An Assessment of Arability was conducted for the subject lands by Matrix Solutions Inc. in November 2005. The Land Capability Classification for Arable Agriculture in Alberta (LCCAAA) is a 7 class rating system that was used to assess the lands capability for arable agriculture under sustained agricultural production focusing on three major components: climate, soils, and landscape. In this system, Class 1 has the highest capability for arable-dryland agriculture. The limitations for agriculture become progressively greater from Class 1 to 7. The first three classes are capable of sustained production of common cultivated crops. Class 4 is considered marginal for sustained production. Classes 5 and 6 are not recommended for cultivated crops, and Class 7 lands have no capability for arable agriculture.

Under the LCCAAA rating system, all three of the arability components were found to be limiting on the subject property (see Table 1). The LCCAAA classification for the site area included 625 acres in Class 4 (56%), 59 acres in Class 5 (5%) and 436 acres in Class 6 (39%).

Table 1: LCCAAA Rating

LCCAAA Rating	Description	Acres	% of Site
Class 1	Highest capability for arable-dryland agriculture	0	
Class 2	Capable of sustained production of common cultivated crops	0	
Class 3	Capable of sustained production of common cultivated crops	0	
Class 4	Marginal for sustained production of common cultivated crops	625	56%
Class 5	Not recommended for cultivated crops	59	5%
Class 6	Not recommended for cultivated crops	436	39%
Class 7	No capability for arable agriculture	0	
Total Acres		1120	100%

3.2.7 Archaeological and Historical Considerations

An archaeological and historical considerations overview was completed for the subject lands by Lifeways of Canada in November 2005. The consultants developed a historical cultural resources predictive model and concluded that the creek valley held moderate potential to contain precontact archaeological sites. Most of the western portion of the creek valley and all of the riparian areas are proposed to be preserved as open space in this Conceptual Scheme. If found, any archaeological sites would most likely be small, deeply buried killsites that can only be excavated with a backhoe. It is quite possible that several temporary campsites and processing sites could be found across the lower terraces of the valley. It is unlikely that any significant surface sites such as tipi rings, cairns, or drive lanes would be found due to the fact that much of the area has already been cultivated. A Historical Resources Impact Assessment will be carried out prior to development to determine if any significant buried sites are present within those areas planned for development. If found, any necessary mitigation required by Alberta Community Development will be undertaken prior to any grading of the lands.

3.2.8 Environmental Site Assessment

A Phase One Environmental Site Assessment of the grounds was completed for the Subject Lands by Base Property Consultants in December 2005. Based on the results of the historical records review, site reconnaissance, and information available at the time of investigation, the consultant determined that no significant environmental impairment exists on the subject site and that further environmental investigation was not required.

3.3 Regional Context

The region outside of Calgary, especially the western half of the M.D., has been experiencing population growth at twice the rate of Calgary over the last 15 years. The region outside Calgary grew by 51% (approximately 48,000 people) during the 1990's and early 2000's, while Calgary's population grew by 24% (or about 168,000 people) in the same period. Strong population and employment growth in Calgary is resulting in an increasing demand for land. At the same time, the price of residential and non-residential land in Calgary is continuing to rise relative to the rest of the region. Robust growth combined with rising land prices continues to provide incentives for businesses and individuals to locate outside the city's boundaries. The surrounding region is expected to continue to experience growth at faster rates than Calgary over the next 20 years as people seek alternatives to living in the city. The location of the Big Hill Springs Community within 2.4 kilometres (1.5 miles) of the City of Calgary and 14.4 kilometres (9 miles) from Balzac will ensure a sustained, strong demand for housing and services in the community.

Construction of the East Rocky View Regional Sanitary Sewer Trunk was completed in 2006 with the expectation of municipal sanitary sewer servicing to many areas in the M.D. Provision of servicing infrastructure is resulting in significant interest in land development in the M.D. In

addition to residential development in the Balzac area, the M.D. recently approved a major new commercial and industrial development, which will generate significant employment in the region.

Residential development within the Big Hill Springs Community will provide housing options not only to future employees in the Balzac industrial and commercial area, but also to seniors who have ranched and farmed in the M.D. and would like to retire in the M.D. Big Hill Springs will provide a wide variety of housing types addressing a broad range of affordability and market segments in terms of lifestyles and demographics. Provision will be made for seniors' housing, a variety of single-detached lot sizes, semi-detached homes, and townhouses, offering alternatives to the typical large single-detached lots found in other areas of the M.D. The community of Big Hill Springs will also provide sites for five new schools, regional recreation facilities and opportunities, and local commercial facilities and services for residents in this area of the M.D.

3.3.1 Existing Regional Servicing

Existing farmsteads in the area in and around Big Hill Springs are currently serviced by individual groundwater wells and on-site septic tank and tile field systems. An existing 200-mm (8") Rocky View Co-op water main is located one mile south of the subject lands. This water line receives water from a water treatment plant and reservoir four kilometers (2 ½ miles) southwest of the subject lands on Burma Road east of Bearspaw Road. Raw water is pumped into this treatment plant from the Bow River west of the Bearspaw Reservoir. There are no wastewater mains or facilities in the area.

3.3.2 Regional Socio-Economic Conditions

The creation of Big Hill Springs will enable the provision of amenities in this area of the M.D. for residents in the neighbouring country residential areas of Symons Valley and Bearspaw as well as the surrounding region. The provision of a site for a regional recreation, library, cultural and community centre facility provides the potential for swimming, hockey, fitness, etc. for residents in the community as well as in the surrounding area of the M.D.

M.D. residents will also benefit from the provision of sites for five schools (to be developed in consultation with the Rocky View School Division and the Calgary Catholic Board), a tri-service facility (emergency medical, police, and fire protection services), a recreational, cultural and community centre, an extensive open space area around the perimeter of the community as well as a horseback riding trail and staging area (Figure 7). The local goods and services in the Village Center will also be conveniently accessible to all M.D. residents.

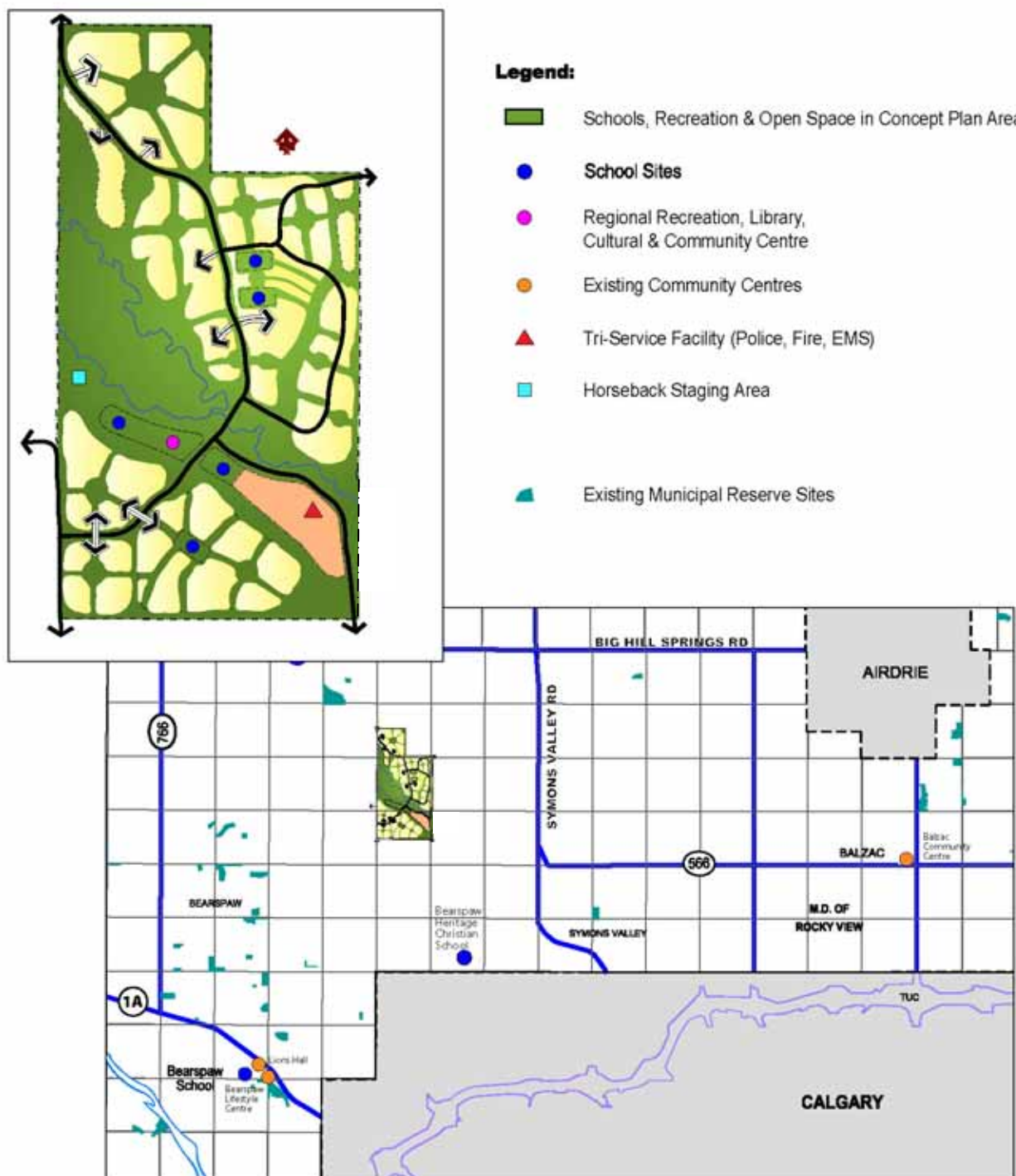


Figure 7:
REGIONAL FACILITIES AND OPEN SPACE

3.3.3 Regional Agricultural Pursuits

With the soil classifications in the Plan Area ranging from Class 4 to 6 under the LCCAAA classification, the subject lands are used for ranching. The use of these lands to concentrate future development within the M.D. should help to prevent the need to utilize higher quality Class 1, 2 and 3 agricultural land in the Municipality for residential development. With approximately 50 percent of these lands to be retained as protected natural areas, the latent utility of the land will be preserved as it will continue to act as a groundwater recharge area and a means of cleansing surface water before it flows into West Nose Creek. The location of natural and recreational public open spaces in the Plan Area will relieve pressure on other natural areas and open spaces in parts of the M.D. where ranching is likely to continue.

The Big Hill Springs Conceptual Scheme provides for an open space buffer of natural habitat around the perimeter of the community, allowing for transition with the surrounding agricultural lands. Areas of the open space buffer will be planted in selected areas with a variety of trees, bushes, and natural grasses that will provide a buffer of the community from the adjacent agricultural lands. The developer will work with adjacent landowners to provide appropriate fences to minimize any adverse impacts on their lands. In accordance with the request of the adjacent landowner of the E ½ Section 20 and NE Section 17, to the west of the development, the developer will install an 8 foot high galvanized chain link fence as soon as construction begins.

3.3.4 Intermunicipal Considerations

M.D. of Rocky View/City of Calgary Intermunicipal Development Plan

The M.D. of Rocky View/City of Calgary Intermunicipal Development Plan (IDP) was approved by the two respective Municipal Councils in 1998. The IDP states “The fundamental purpose of the M.D. of Rocky View/City of Calgary Intermunicipal Development Plan is to identify an area of mutual intermunicipal interest and to establish policy direction and processes to address intermunicipal issues that may arise within that area.”

The IDP has defined boundaries (both Policy Areas and Notification Zones), contains a range of land use policies and has identified implementation processes. The policies contained in approved local plans (area structure plans, concept plans, etc.) prevail over the policies of the IDP. Where no local plans have been approved, the policies of the IDP prevail. Although the IDP originally had a five year time horizon, the IDP has not been repealed and continues to provide policy direction for both municipalities.

The Big Hill Springs Conceptual Plan area is not contained within the boundaries of the current IDP and is located from 1.6 to 2.4 kilometres (1 to 1 ½ miles) from the closest boundary of the IDP.

As part of the recent Intermunicipal Agreement on Annexation (approved by both Municipal Councils in 2006) direction has been given to undertake a time sensitive review of the Intermunicipal Plan.

Future Residential and Industrial Growth Corridors

As part of the 2006 Intermunicipal Agreement on Annexation, residential and industrial growth corridors have been conceptually identified for both the City of Calgary and the M.D. of Rocky View. The Agreement states “The Conceptual Growth Corridor arrows for both the M.D. and The City . . . are meant to establish, recognize and protect key growth directions for both municipalities, which are to be identified in the Intermunicipal Development Plan (IDP) and Municipal Development Plan of both municipalities.” The IDP review is to establish new spatial and substantive areas of intermunicipal interest and to establish the timing and scope of development in the conceptual growth corridors. No more specific direction has been given with respect to the growth corridors which will have to be further negotiated between the two municipalities.

The Big Hill Springs Concept Plan Area is located on the periphery of the vaguely defined north residential growth corridor identified for the City of Calgary and the Balzac West growth corridor identified by the M.D. of Rocky View. Protection of lands within the north residential growth corridor have to be balanced with the southeast residential growth corridor in the M.D. of Rocky View as well as the anticipation that a reasonable share of future residential growth will come from lands within the M.D. of Foothills to the south. A 38 year land supply for residential purposes was provided to the City of Calgary as a result of the 2006 annexation agreement between the City and the M.D. of Rocky View. Assuming that long term growth corridors would need to protect no more than an additional 30 years of residential land supply (a total of almost 70 years of future residential growth potential for the City), such needs can easily be met without including the Big Hill Springs Concept Plan area.

Future Ability to integrate in an Urban Environment

It is the intent of the M.D. to respect growth both within its boundaries, as well as growth within adjacent municipalities by planning responsibly for future development in collaboration with regional, intermunicipal and interjurisdictional partners. In creating places where residents can live, work, and play, the M.D. of Rocky View acknowledges the need to maximize land use efficiency, and provide for the orderly, beneficial use and enjoyment of lands to the mutual benefit of Rocky View and adjacent municipalities. Such planning will address all relevant land use, infrastructure and intermunicipal issues within a framework that takes into consideration the social, economic and environmental impacts of decision-making.

Developing over the next 30 years, the future community of Big Hill Springs will reflect this triple bottom line philosophy, and will truly be a community where residents can live, work and play. Big Hill Springs will be a fully integrated urban community with a broad range of residential, commercial and associated supportive land uses, with servicing provided to urban standards. In the distant future, should a proposed annexation including the Big Hill Springs area be proposed by the City of Calgary and agreed to, the development could be efficiently integrated into the City.

4.0 Plan Objectives

This Conceptual Scheme is based upon the following Plan Objectives. These objectives have been formulated specifically for the Big Hill Springs Conceptual Scheme based on the MDP policies and the more recently approved policy documents within the M.D. of Rocky View.

- 1. To identify areas of environmental significance within the Plan Area and establish the means of both preserving and enhancing natural habitat.**

The predominant policy objective of this Conceptual Scheme is to establish a critical mass of large open space and natural areas to provide for both human recreational and native habitat needs.

- 2. To promote vitality within the Community of Big Hill Springs by providing opportunities for commercial, retail, and community services for the benefit of the residents of Big Hill Springs and west Rocky View in Divisions 6, 7, 8 and 9.**

Big Hill Springs will not become a mere bedroom community. Educational, recreational, community, social, commercial, and employment opportunities will be provided within Big Hill Springs for the benefit of all residents of the community and the M.D. Big Hill Springs will be a central gathering place for community and M.D. residents alike for a variety of social, cultural, educational, recreational, commercial, and employment activities.

- 3. To establish a land use strategy that will guide growth and determine a range of appropriate land uses within the Plan Area.**

The M.G.A. and the M.D. of Rocky View Municipal Development Plan provides for the preparation of a Conceptual Scheme to guide future development.

- 4. To determine a direction and an effective set of implementation tools for innovative and sustainable development patterns, civil engineering standards, and construction practices.**

The policies of the Big Hill Springs Conceptual Scheme are intended to guide development using both traditional regulatory approaches (dedication of Municipal Reserve, Municipal District road standards) and the most innovative design ideas and best practices being utilized throughout North America (preservation and enhancement of open space, integration of land uses, compact and efficient development, connection to regional or municipal utility systems for water and sanitary sewer servicing, water conservation, energy efficiency, best stormwater management practices, and the provision of lands for groundwater recharge).

- 5. To provide for a diverse range of residential development types that will respond to future demographic trends, market conditions, and community preferences.**

The intent of the Big Hill Springs Conceptual Scheme is to create a complete community with housing choices that will accommodate a wide a range of ages, lifestyles, family types, and incomes for residents in the M.D. of Rocky View.

- 6. To determine appropriate policies and approaches that preserve the rural character and ensure the integration and compatibility of land uses in the Conceptual Scheme.**

Residential, open space, commercial, small-scale office, restaurant, personal service businesses, along with the opportunity for local and regional recreation, community services, churches, schools, day care, and emergency and health care services will be blended together within Big Hill Springs ensuring that different types of development are compatible with each other, both within and surrounding the community. The substantial open space and natural areas combined with a compact and efficient form of development will help to preserve the rural and open space character and charm of the area and create a strong sense of community.

- 7. To identify preferred utility servicing solutions for existing and future business, recreational, and residential development.**

The Big Hill Springs Conceptual Scheme will describe the general location of public utilities such as sanitary sewer, water and stormwater facilities within the Plan Area.

- 8. To identify current and planned transportation infrastructure under both Provincial and Municipal jurisdiction, to determine future transportation needs and opportunities, and to establish criteria for internal road linkages.**

The Big Hill Springs Conceptual Scheme will describe the general location of roads within the Plan Area and the location of roads outside the Plan Area, which will provide the principal roadway connections with the rest of the M.D. and the region.

- 9. To provide a phasing strategy based upon logical development and marketing opportunities, taking into consideration utility servicing and transportation infrastructure.**

The Big Hill Springs Conceptual Scheme will describe the sequence of development proposed within the Plan Area.

- 10. To balance public and private interests and to promote a vision which can be supported by landowners around the Plan Area.**

The Big Hill Springs Conceptual Scheme is intended to provide the opportunity for private landowner initiated development to occur while protecting the surrounding landowners and public interest in values such as accommodating growth in the M.D. in an economic, and orderly settlement pattern, providing for environmentally sensitive

development, conserving land, preserving agricultural activities, providing community services, public health, and ensuring social well-being.

5.0 Concept and Land Use Policy Area

5.1 Background

The Big Hill Springs Conceptual Scheme incorporates the great planning ideas of the past and present in the contemporary context of the Calgary region. Ideas from the past, such as the Garden Cities movement and regionalism, have been integrated with more modern concepts, such as sustainability and conservation design, to create a community based upon sound planning theories. It is in the spirit of many of the great planning ideas of the 20th century that the planning for Big Hill Springs strives to create a complete community within a balanced region of communities, each with its own particular identity and contribution to regional sustainability.

5.2 Conservation

Conservation of the significant natural resources within the Big Hill Springs Plan Area is the central organizing principle in the design and development of this complete community. If accommodated in typical country residential development comprising single-family 2-acre lots, the proposed number of units for Big Hill Springs would require approximately 60-70 quarter-sections of land, rather than the 7 quarter-sections within Big Hill Springs (Figure 1). Most importantly, 50% or 3.5 quarter-sections will be left as open space.

Big Hill Springs will be a community designed to integrate appropriate land use, building design, ecological landscape planning, and construction strategies to reduce environmental impacts and enhance natural systems. Examples of some of the environmental conservation features that will be incorporated in Big Hill Springs can be found in Appendix D. These include:

- water conservation
- reduced lighting policy
- all homes built to minimum BuiltGreen Gold standards
- site development to encourage groundwater recharge and reduce erosion
- controlling stormwater runoff and minimizing paved surfaces
- extensive walking and cycling pathway systems to help reduce automobile dependency
- protection of natural areas
- conservation and efficient use of land.

5.3 Design Process

Big Hill Springs was designed with land conservation as an organizing principle. A 3-step design process, to be followed by a 4th step at the Neighborhood Plan design stage, incorporates best management practices and initiatives within current planning theory.

1. Site analysis

Analysis and mapping was undertaken of the Big Hill Springs Plan Area, which provided a thorough understanding and knowledge of the site. This included a slope analysis, soil analysis, as well as an aerial photograph analysis.

The M.D. of Rocky View servicing standards exclude development on lands with slopes in excess of 15% (five metres or 15 feet vertically in 30.5 metres or 100 feet horizontally). West Nose Creek, and Bigspring Creek, a tributary that flows into West Nose Creek in the south-central part of the Plan Area, enter along the western boundary of the Plan Area and flow out near the southeastern corner. The West Nose Creek Valley generally consists of slopes from 7% to greater than 25% in some areas. There are several small coulees that feed into the valley, the largest of these located on the eastern edge of the Plan Area which also have slopes ranging from greater than 15% to greater than 25% in some areas.

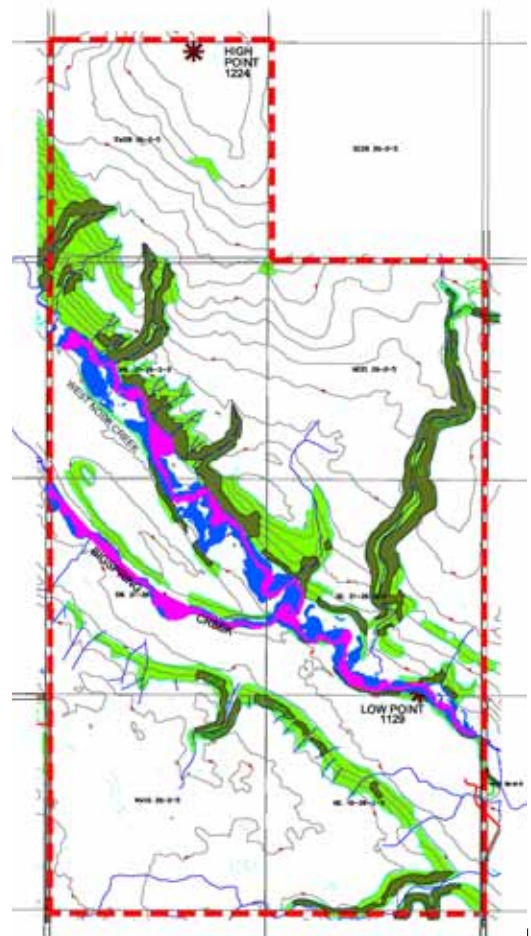


The soil analysis identified the steeper valley and coulee slopes as having poorly developed soils, while the more level lands within the Plan Area had soils ranging from Class 4 to 6 under the LCCAAA soil classification system.

The aerial analysis showed the exact location of the watercourse of the two creeks, West Nose Creek and Bigspring Creek, the location of cultivated fields, trees and natural vegetation areas, as well as the one residence in the Plan Area. All of these analyses provided information regarding the site characteristics including environmentally significant areas, developable lands and optimal lot placement, the type of development and use appropriate to the soil, and the precise locations of creeks, floodways, steep slopes, cliffs, and coulees.

2. Define Primary Conservation Areas and Open Space

The next step in the design process was to identify primary conservation lands. Primary conservation lands are those that are ecologically or otherwise sensitive, and cannot or should not be built upon – riparian zones, wetlands, land that is part of a water



body, land within the 100-year floodway, extreme slope or soils prone to slumping. Primary conservation areas within the Big Hill Springs Plan Area comprise portions of the West Nose Creek Valley, its escarpments, and the various coulees that feed into this valley.

3. Define Secondary Conservation Areas and Development Cells

Secondary conservation lands are those areas that are intentionally set aside to be preserved. In Big Hill Springs, the secondary conservation areas consist of significant open spaces in and around the valley and coulees, and the open space buffer around the entire perimeter of the Plan Area. Additional open space will include numerous parks, five school sites and associated active sports fields, a site for a regional recreation facility, and linear open spaces within the residential cells.

The recreation and school facilities, the Village Centre, and residential cells were sited with sensitivity to topography and conservation areas, adjacent parcels, site characteristics, and optimal views. The underlying goal was to optimize access to the open space for residents. The amount and type of available land remaining after taking out the lands identified for conservation provided direction in terms of the appropriate number of dwelling units, residential density and population, as well the amount and type of retail, commercial and community services. This third stage is generally the level of detail of the conceptual scheme.

4. Detailed Residential Design (at the Neighborhood Plan design stage not the Conceptual Scheme stage)

The last stage of the design process is the detailed layout of roads, lots, pathways and open spaces. This is done at the next stage of the planning process. In order to create the guidelines and policies of the conceptual scheme, work has been done at this level of detail but is not a formal part of this Conceptual Scheme. An illustration of a typical residential cell showing roads, lots and linear open spaces behind residential lots is provided. A guiding principle of the Conceptual Scheme is the provision of open space connections between natural areas, schools and the Village Centre to offer alternative routes than the roads while also ensuring a sense of openness, which most residents in this rural community will want to enjoy.



5.4 Land Use Policy Areas

The following table identifies generalized land use areas for the Big Hill Springs Conceptual Scheme at build-out. For illustrative purposes, approximate areas are calculated below for each land use policy area. This area will gradually transition from agricultural uses to a residential community over a period of 30 years, at the rate of 125 to 150 units per year, with full build-out of approximately 4,000 dwelling units.

Table 2: Approximate Land Use Policy Area Calculations

Big Hill Springs Plan Area	Acres	Hectares	Percentage
Open Space, School, and Recreation Policy Area	545	220	47%
Road Allowance	34	14	3%
<i>Subtotal Open Space</i>	<i>579</i>	<i>234</i>	<i>50%</i>
Residential	320	129	28%
Village Centre	39	16	3%
Roads ¹	217	88	19%
<i>Subtotal Developed Area</i>	<i>576</i>	<i>233</i>	<i>50%</i>
<i>Total Gross Land Area</i>	<i>1155</i>	<i>467</i>	<i>100%</i>

¹Approximately one half of a road right-of-way is also green space.

The policies contained in this Conceptual Scheme are intended to aid Council in future land use decisions and to provide policy direction to the landowner and developer. As conditions change and development within the Plan Area continues to evolve, the Conceptual Scheme may be reviewed, updated, and amended. Minor refinements of the above areas may also be necessary at the time of such review and amendment.

Three land use policy areas have been identified within the Big Hill Springs Conceptual Scheme. These are identified in Table 3 and illustrated in Figure 8. Requirements for Neighbourhood Plans, Land Use Redesignation, Subdivision, and Development will vary according to the location, context, and policy goals of each land use policy area. Table 3 categorizes the Conceptual Scheme land use policy areas according to the types of development envisioned and the approach to implementing the land use policies within each area.

Table 3: Land Use Policy Areas

Policy Area	Types of Development	Implementation Approach
Open Space, School, and Recreation Policy Area	. this area will include school sites, playing fields, pathways, parks, community open space and natural areas . recreational opportunities will be significant in the Plan Area including both passive and active use . walking, hiking, cycling, horseback riding, soccer, baseball, etc. . recreation and cultural centre, community centre, meeting rooms, library, and emergency and protective services . conservation of all environmentally significant natural areas including creek valleys, escarpments, steep slopes, cliffs and coulees . includes an open space buffer around perimeter of Plan Area, as well as an extensive open space network distributed throughout the Plan Area	. coordination of roadways, pathways and trails . linked linear trail network connecting to regional open space system and Village Centre . dedication of municipal and school reserves through subdivision process . appropriate balance and integration of recreational uses . limitations on irrigation to achieve appropriate balance and integration of landscaped and natural areas . appropriate use of conservation tools (environmental reserves, conservation easements, environmental easements) . environmental stewardship and education programs
Village Centre Policy Area	. a pedestrian-oriented mixed-use development including residential, commercial, retail, small-scale office, restaurant, and personal service business along with the opportunity for community services, churches, day care, and health services	. provide goods and services . small town atmosphere . coordination of roadways, pathways and trails . linked linear trail network connecting to regional open space system and residential cells . municipal reserve and other means of open space dedication . appropriate range of multi-unit housing types . stores fronting on sidewalks . on-street parking . sidewalk amenities, including patios, street furniture, public art, planters, ornamental street lighting . central park area

Residential Policy Area	· clustered small lot residential with protection of large open space areas · transition and buffering of land uses adjacent to other land use policy areas	· comprehensive Neighbourhood Plans, Land Use Redesignations, and Subdivision Plans · interconnected linear open space system consisting of parks, pathways and trails · maximize direct access to the open space and trail system from all types of residential development · municipal reserve and other means of open space dedication
-------------------------	--	--

Each of these areas is subject to policies that will provide guidance in the preparation of Neighbourhood Plans, Land Use Redesignations, and Subdivision Plans. The policies in this Conceptual Scheme are intended to address an appropriate level of detail, while also allowing for a reasonable degree of flexibility and innovation in design and development.

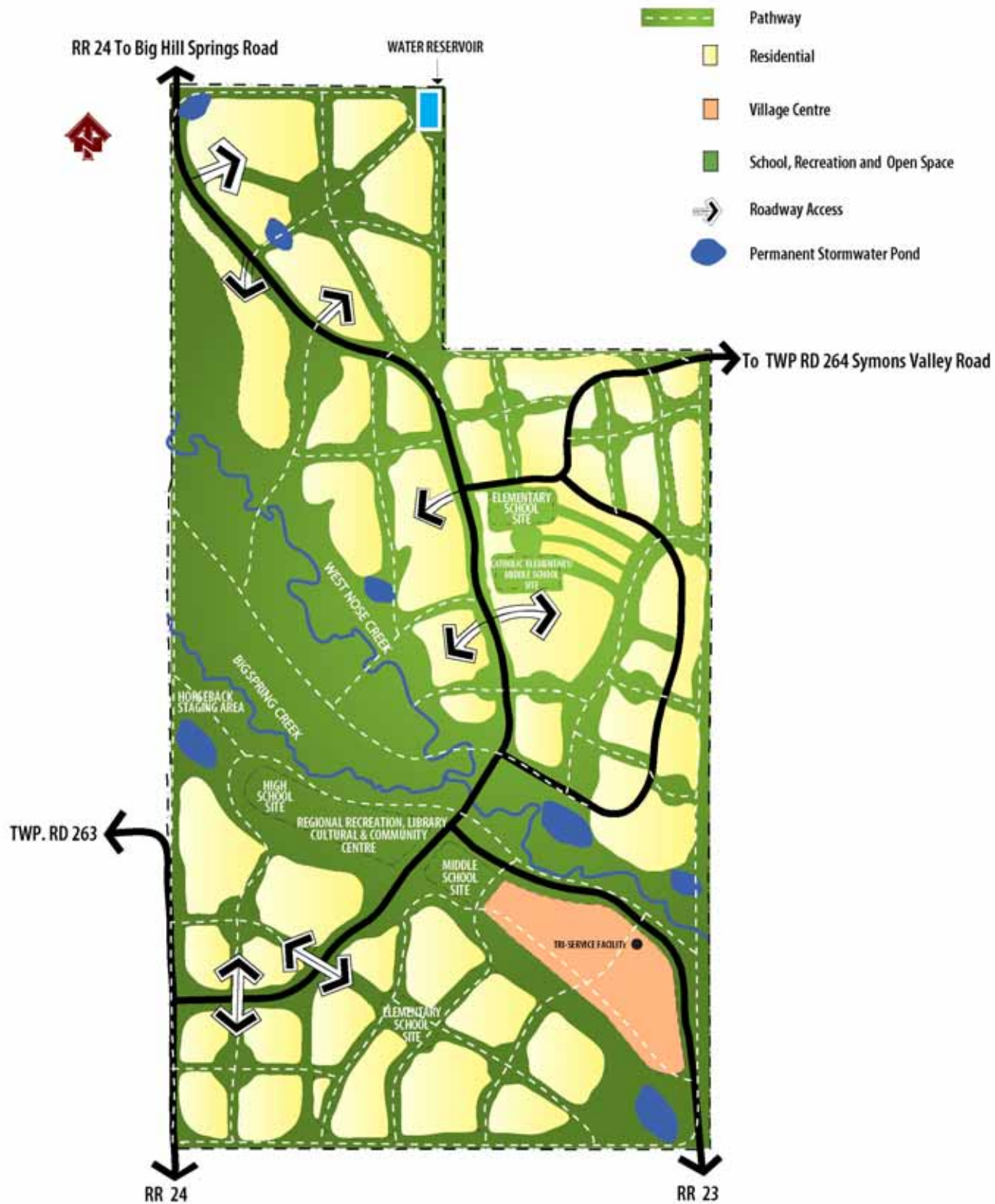


Figure 8:
CONCEPT PLAN & GENERALIZED LAND USE POLICY AREAS

5.5 Open Space, School, and Recreation Policy Area

The predominant policy objective of this Conceptual Scheme is to establish a critical mass of large open space and natural areas to provide for both human recreational and native habitat needs. Conservation of the significant natural resources within the Plan Area is one of the central organizing principles in the design and development of Big Hill Springs. Big Hill Springs will be a community designed to integrate appropriate land use, building design, ecological landscape planning and construction strategies to reduce environmental impacts and enhance natural systems. The Open Space, School, and Recreation policies will apply to lands as illustrated in Figure 8.

The purpose of the Open Space, School, and Recreation Policy Area is to provide for a comprehensive system of public open spaces including pedestrian and bicycle pathways, horseback riding trails, and natural areas to support and sustain native habitat, outdoor recreation activities, schools, and regional recreation facilities.

This Policy Area is also intended to address the impacts that development may have on natural areas, habitat, and natural systems within Big Hill Springs. Furthermore, these policies provide a framework for the protection, rehabilitation, and enhancement of identified environmentally sensitive areas within the Plan Area.

The Open Space, School, and Recreation Policy Area provides for five school sites. Discussions with the Rocky View School Division and the Calgary Catholic School District have indicated a need for the following schools to accommodate the children that will reside in Big Hill Springs and the surrounding communities. The school requirements are projected as follows:

1. Public High School
2. Public Middle School
3. Two Public Elementary Schools
4. One Catholic Elementary/Middle School

Indications are that a Catholic high school will not be required since these students will be accommodated in one of the larger adjacent urban municipalities.

The Big Hill Springs Conceptual Scheme will provide a site for a regional recreation facility to serve both the residents of Big Hill Springs as well as M.D. residents in the surrounding areas. This Policy Area also provides for recreational opportunities that will be available year-round, in all seasons, both indoors and outdoors. Recreational amenities will include an extensive linear network of pathways, open space and trails distributed throughout the Plan Area. There will also be an open space buffer around the perimeter of the Plan Area, which will link to the internal trail and pathway system. The open space buffer may also accommodate a horseback riding trail.

Other uses may be developed within this policy area, provided they integrate with the predominant recreational and educational uses and are compatible with surrounding land uses. Any improvements planned within either public open space or privately owned open space that is accessible to the public shall be provided by the developer in consultation with the Municipality, school districts, and local recreation district. Responsibility for maintenance of such open space shall be determined at the subdivision stage and, when appropriate, may be assigned through legal instruments registered on title.

Policies

- 5.5.1 The predominant land uses in the Open Space, School, and Recreation Policy Area shall be natural open space, outdoor recreation, regional recreation facilities, and educational facilities.**
- 5.5.2 Other uses within the Open Space, School, and Recreation Policy Area may include residential or commercial uses (e.g., small-scale retail goods and services, restaurants), provided they are ancillary to the natural open space, recreational, and educational uses.**
- 5.5.3 Protection of any significant natural areas, environmentally sensitive lands, or culturally significant sites identified within this Conceptual Scheme shall be addressed in all applications for Neighbourhood Plans, Land Use Redesignations, and Subdivision Plans submitted to the M.D. of Rocky View.**
- 5.5.4 Linkages and continuity among pathway and trail systems, public open spaces, and significant natural areas are encouraged in order to provide for native habitat and passive recreational opportunities for residents of Big Hill Springs.**
- 5.5.5 Open space connections shall be maintained with the West Nose Creek habitats upstream and downstream of the Plan Area.**
- 5.5.6 Trails and pathways shall be designed, constructed, and maintained in a manner that will be sensitive to negative impacts on the natural environment.**
- 5.5.7 In addition to Municipally owned, operated and maintained open space and facilities, alternative means of open space dedication and maintenance (e.g., public access easements, and privately maintained common property) may be used for the creation of an overall open space, pathway, and trail system within the Plan Area.**
- 5.5.8 The pathway and trail system shall provide recreational and travel opportunities and connections that will accommodate a variety of users and accessibility needs.**
- 5.5.9 In accordance with the Stormwater Management Plan and the Big Hill Springs Master Utility Servicing Strategy, stormwater management, utility, and servicing facilities may be developed within the Open Space, School, and Recreation Policy Area.**
- 5.5.10 The Open Space, School, and Recreation Policy Area of the Big Hill Springs Conceptual Scheme shall be developed according to low-light policy 7.6.3 of this Conceptual Scheme, with energy-efficient street lighting systems, to the satisfaction of the Municipality.**
- 5.5.11 Improvements planned within either public open space or privately owned open space that is accessible to the public shall be provided by the developer in consultation with the Municipality, school districts, and local recreation district.**
- 5.5.12 Responsibility for maintenance of public open space or privately owned open space that is accessible to the public shall be determined at the subdivision stage and, where appropriate, may be assigned through legal instruments registered on title.**
- 5.5.13 Any privately owned open space that is accessible to the public will be provided by the developers and maintained by a homeowners association, private provider, or other third party to the satisfaction of the Municipality.**

5.6 Village Centre Policy Area

The purpose of the Big Hill Springs Village Centre is to provide convenience goods and services as well as community and protective services at a central location for the benefit of the residents of Big Hill Springs and the surrounding area. The Village Centre will contain a mix of uses and is expected to include commercial, retail, small-scale office, restaurant, and personal service businesses, along with recreational opportunities, community services, churches, day care facilities, and health care and protective services. Higher density residential development, including seniors' housing, will also be developed within the Village Centre. Siting of the Village Centre in the lower valley lands will minimize the visual impacts of this higher intensity core development.

Open space within the Village Centre will feature more formal gathering places such as public squares with park benches and gazebos. The Village Centre policies will apply to lands as illustrated in Figure 9.

Policies

- 5.6.1 The predominant land uses within the Village Centre Policy Area shall include commercial, office, community facilities, personal service, and multi-unit residential development.**
- 5.6.2 Other uses within the Village Centre Policy Area may include institutional, recreational, and other municipal, civic, or public service uses.**
- 5.6.3 Neighborhood Plans and Land Use Redesignations within the Village Centre shall coordinate future development and access patterns and shall address relationships and linkages with surrounding lands in order to promote integrated connections with other policy areas.**
- 5.6.4 The highest density residential uses in this Conceptual Scheme should be focused in the Village Centre Policy Area, provided such uses are compatible with their surroundings and integrated in an efficient and logical manner.**
- 5.6.5 Village Centre commercial developments may incorporate mixed residential and commercial uses on the same site (e.g., with retail at grade), provided such mixed-use developments are comprehensively planned, logically integrated, and compatible with their surroundings.**
- 5.6.6 Open spaces within the Village Centre shall incorporate linked linear networks of trails and pathways, which shall connect to existing or proposed regional open space systems.**
- 5.6.7 Small town, main street character is encouraged within the Village Centre, including elements such as:**
 - i. stores fronting on sidewalks;**
 - ii. building façades up to the property line;**
 - iii. on-street parking, possibly to include angle parking;**
 - iv. common surface parking lots, possibly in the rear of stores;**
 - v. sidewalk amenities, including patios, street furniture, public art, planters, or ornamental street lighting;**
 - vi. central parks and plazas; and**
 - vii. trailheads linked to the regional open space system.**
- 5.6.8 All forms of development within the Village Centre, including institutional uses, will be encouraged to meet high environmental standards prevalent at the time of development (e.g., LEED Standard for commercial and BuiltGreen Standard for residential development). Such standards will be implemented by the developer at the time of subdivision through mechanisms such as architectural controls or other means.**

- 5.6.9 The Village Centre Policy Area of the Big Hill Springs Conceptual Scheme shall be developed according to low-light policy 7.6.3 of this Conceptual Scheme, with energy-efficient street lighting systems, to the satisfaction of the Municipality.**

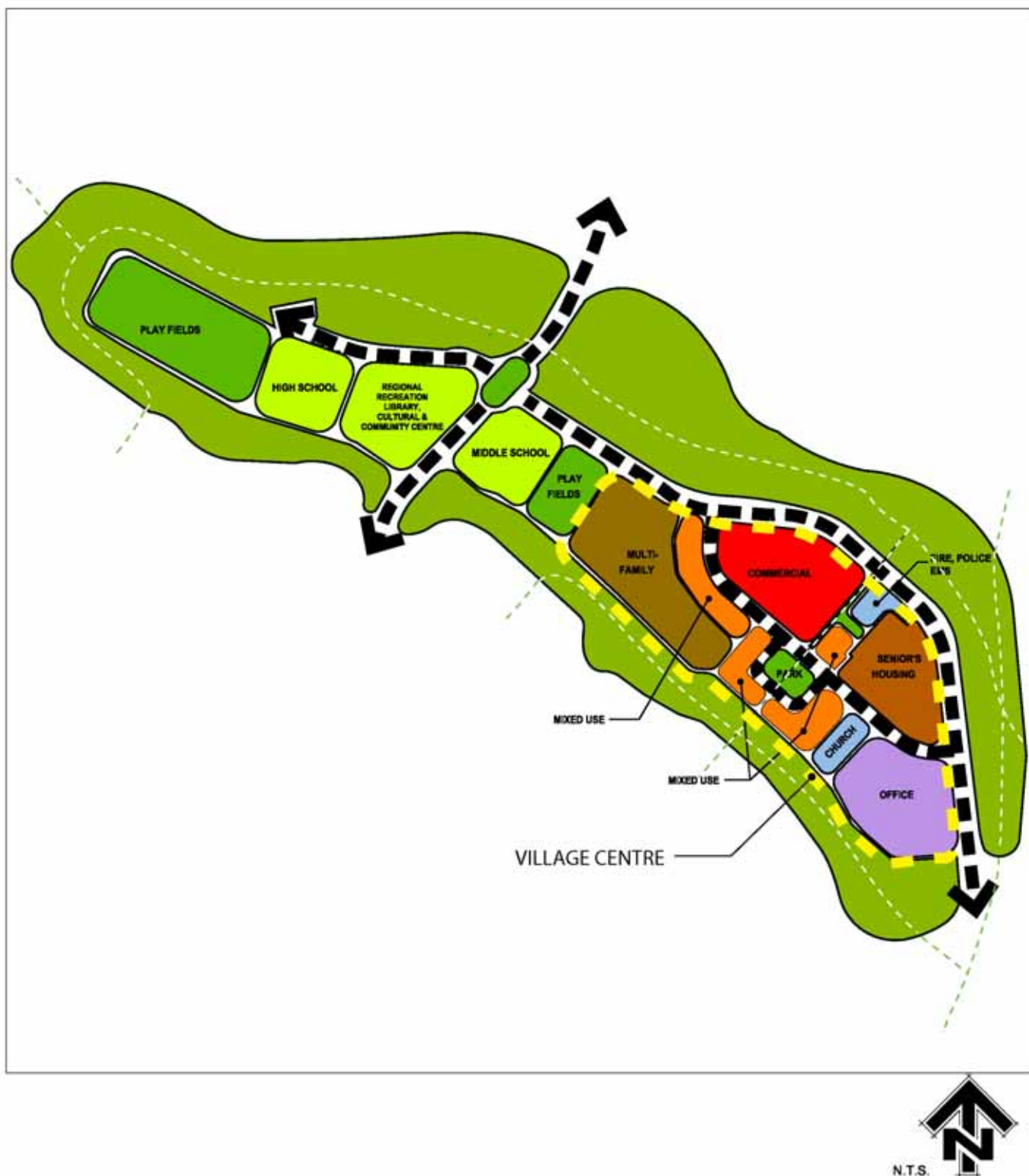


Figure 9:
VILLAGE CENTRE CONCEPT PLAN

5.7 Residential Policy Area

Creation of a sense of community within a rural setting will be gained through:

- Compact development and clustering of residential development to preserve open space
- Streets, pathways and open space that form an interconnected network allowing for multiple, direct routes to a range of destinations
- Open space preserved with natural vegetation
- Stormwater drainage features and some roads that are not curbed to allow more natural stormwater penetration into the ground and a more rural appearance
- Building styles which include features such as porches that are reminiscent of rural communities
- Reduced levels of lighting consistent with a rural environment.

The purpose of the Residential Policy Area is to provide for compact, efficient development in the context of open space and rural character. Residential policies will apply to lands as illustrated in Figure 8.

Policies

- 5.7.1 The predominant land uses in the Residential Policy Area shall be comprehensively planned residential development that is integrated with local open space.**
- 5.7.2 Other uses such as institutional, educational, small-scale neighbourhood retail, convenience commercial, personal service, home-based business, recreational, open space, and community facilities may also be appropriate, provided they are consistent with the purpose of the area and are compatible and appropriate within a residential context.**
- 5.7.3 The predominant development form within the Residential Policy Area shall be compact, clustered residential development, with open spaces that link to the Open Space, School, and Recreation Policy Area.**
- 5.7.4 A maximum residential density of 3.6 units per gross acre averaged across the entire Plan Area (i.e., including land qualifying as Environmental Reserve), resulting in up to 4,000 dwelling units, is allowed within the Conceptual Scheme.**
- 5.7.5 Residential parcel size for single-detached dwellings will be a minimum of 300 square metres (3,200 square feet).**
- 5.7.6 Clustered multi-unit residential development may be considered with individual attached units on lots smaller than 300 square metres (3,200 square feet).**
- 5.7.7 The Residential Policy Area of the Big Hill Springs Conceptual Scheme shall be developed according to low-light policy 7.6.3 of this Conceptual Scheme, with energy-efficient street lighting systems, to the satisfaction of the Municipality.**
- 5.7.8 Provision shall be made to encourage water conservation by homeowners, by restricting domestic irrigation, by requiring low flush toilets and water meters in all homes, by providing rain barrells and by providing information and educational material such as lists of drought-tolerant plants. Such measures will be implemented by the developer at the time of subdivision through mechanisms such as architectural controls or other means.**
- 5.7.9 All housing in the Plan Area will be built to high environmental standards prevalent at the time of development (e.g., BuiltGreen Standard). Such standards will be implemented by the developer at the time subdivision through mechanisms such as architectural controls or other means.**

6.0 Transportation

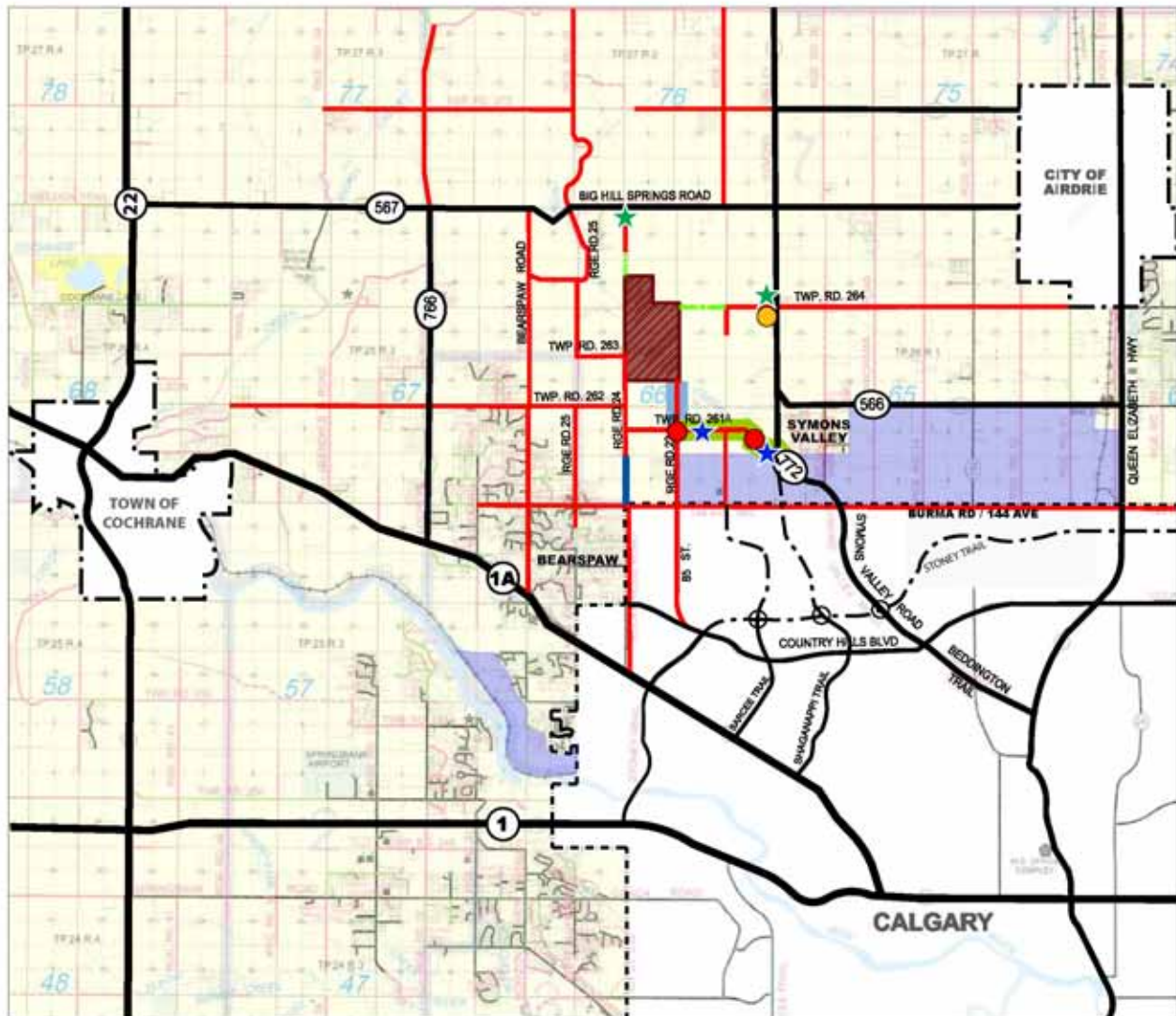
Regional

A Traffic Impact Assessment (TIA) was undertaken by Bunt & Associates Engineering in May 2006. Development of the Big Hill Springs community will result in a more interconnected roadway network for residents living within and adjacent to this area of the M.D. Accessibility will be improved as some existing roads will be upgraded and some gaps will be filled in and completed. The TIA indicates the following roadway improvements are required at the various planning horizons over the thirty-year development time frame (Figure 10):

Concurrent with first phase of development	Required improvements Paving and widening of RR 23 north of Twp. Rd. 261A to subject site
At development of first 300 residential units	Required improvements Paving and widening of Twp. Rd. 261A between RR 23 and Symons Valley Rd.
At development of 2,000 residential units	Required improvements - Signalize two intersections: (1) RR 23 / Twp. Rd. 261A; and (2) Symons Valley Rd. / Twp. Rd. 261A - Additional left and/or right turn lanes required at two intersections: (1) RR 23 / Twp. Rd. 261A; and (2) Symons Valley Rd. / Twp. Rd. 261A
To be completed prior to accommodation of 4,000 residential units¹ <i>(Details to be refined as part of future traffic analysis in conjunction with future subdivision plans)</i>	Required improvements under all three options Construct connection of RR 24 to the south to 144 Avenue/Burma Rd.
	Required improvements specific to Option 1 - Construct connection of RR 24 to the north to Big Hill Springs Rd. - Additional left and/or right turn lanes required at the intersection of RR 24 / Big Hill Springs Rd.
	Required improvements specific to Option 2 - Construct connection of Twp. Rd. 264 to the east to Symons Valley Rd. - Signalize the intersection at Symons Valley Rd. / Twp. Rd. 264 - Additional left and/or right turn lanes required at the intersection of Symons Valley Rd. / Twp. Rd. 264
	Required improvements specific to Option 3 - Construct connection of RR 24 to the north to Big Hill Springs Rd. - Construct connection of Twp. Rd. 264 to the east to Symons Valley Rd. - Additional left and/or right turn lanes required at two

intersections: (1) Symons Valley Rd. / Twp. Rd. 264; and
(2) RR 24 / Big Hill Springs Rd.

¹There were three options provided to accommodate traffic at this time frame. The improvements common to all three options are identified, followed by the improvements specific to each option.



* Subject to detailed traffic study

**Figure 10:
TRANSPORTATION IMPROVEMENTS**

Internal

The internal road network shown in Figure 8 is conceptual only and is intended to illustrate in general terms how a system of internal roads could serve development in accordance with the land use strategy of this Conceptual Scheme. The central feature of the internal system will be a rural parkway road that will include roundabouts as traffic control devices at certain locations in lieu of traffic signals. The parkway will include boulevards on both sides to give a sense of open space and a more rural character. Future Neighbourhood Plans will define the actual road network based upon both existing and future traffic volumes, the traffic impacts of new development, and the roadway system improvements that will be required to serve new development. The conceptual road network reflects the best information available at the time of adoption of this Conceptual Scheme with respect to transportation planning. Similarly, this conceptual road network has been designed to respect adjacent road systems outside this Conceptual Scheme.

In addition to the conceptual road network, the transportation policies of this Conceptual Scheme address requirements for safe and efficient internal roadway design. It will be necessary to coordinate internal roadways with the linear open space and trail systems. The pathway and trail system will become part of the overall transportation system within Big Hill Springs.

Policies

- 6.0.1 The conceptual road network shown in Figures 8 and 9 shall provide a basis for further Municipal review, approval, and implementation in response to future transportation studies and monitoring of future development in the Plan Area.**
- 6.0.2 Neighbourhood Plans prepared and appended to this Conceptual Scheme shall be required to include transportation reports addressing access and off-site roadway improvements in accordance with the Traffic Impact Assessment approved with this Conceptual Scheme and all applicable Provincial and Municipal standards and requirements.**
- 6.0.3 Curb and gutter roadway standards may be applied where appropriate within the Plan Area. Elsewhere, other standards may be more appropriate for environmental, safety, stormwater drainage or design reasons (i.e., infrastructure appropriate to rural setting).**
- 6.0.4 The developer shall be responsible for the design and construction costs of all internal roadways and certain off-site roadways in accordance with the M.D. of Rocky View transportation standards and policies.**
- 6.0.5 Transportation infrastructure costs borne by the developer may be subject to Provincial or Municipal cost recoveries, subsidies, or endeavours to assist in cost recovery from third parties as approved by the Municipality.**
- 6.0.6 In accordance with the Municipality's Servicing Standards for Roadways or Servicing Standards for Subdivision and Road Construction, roadside signage shall meet minimum standards within the M.D. of Rocky View and shall be compatible with the character of the community.**
- 6.0.7 The developer shall install energy-efficient street lighting systems in the community in accordance with low-light policy 7.6.3 of this Conceptual Scheme, to the satisfaction of the Municipality.**

7.0 Utility Servicing and Environmental Sustainability

Given the land use strategy of this Conceptual Scheme, it is essential to provide economic and environmentally sustainable utility servicing for development within the Plan Area. A Master Utility Servicing Strategy was completed by Morrison Hershfield in May 2006. As identified in the Plan, full sanitary sewer and water services will be provided to all new residential and commercial development within the Residential, Village Centre, and School, Recreation, and Open Space Policy Areas. Water and sanitary servicing will be provided through connection to a private utility water supply, or possibly through a groundwater supply, and an on-site advanced decentralized wastewater system. All water and wastewater infrastructure will be designed and installed with the capacity to connect to integrated regional systems should they become practical in the future.

All water provision, stormwater management, and sewage treatment will meet applicable standards set by Alberta Environment. Individual septic systems will not be permitted.

7.1 Stormwater

A Master Drainage Plan for Big Hill Springs was completed by Westhoff Engineering Resources, Inc. in May 2006. The Plan establishes that stormwater will be managed on-site through an integrated Stormwater Management Plan based on Best Management Practices (BMPs) and Low Impact Development (LID) strategies. These approaches will ensure proper management of runoff including retention, treatment, capture and re-use through the use of stormwater storage facilities. These facilities will include an extensive system of cascading ponds and enhancement features in existing drainage courses.

An important goal of the Utility Servicing policies of this Conceptual Scheme is to design and implement stormwater management solutions that respect the natural drainage patterns in this area. Through the policies of this Conceptual Scheme, the M.D. of Rocky View will be able to provide an environmentally sound basis for stormwater management and utility servicing within the Plan Area. Integration of stormwater management with natural and constructed water features will also provide for incorporation of stormwater management system components with landscaping, roadways, linear open space systems, natural features, and environmentally sensitive areas.

Stormwater will be managed on-site through an integrated Stormwater Management System based on Best Management Practices and Low Impact Development strategies. The Master Drainage Plan is based on holistic approaches to managing runoff from a quantity and quality perspective and will enhance open spaces of the plan with cascading pools, linear drainage conveyance systems and regional stormwater storage facilities. The features are illustrated in Figure 11. These strategies address the stormwater management topics as included in the Water Management Plan for the Nose Creek Watershed.

The proposed drainage strategy for the development area will be comprised of the following elements:

- Incorporation of cascading dry ponds and wet pools as stormwater retention and

treatment systems that provide for capture and re-use opportunities and to meet water quality expectations by regulatory agencies and the public.

- Incorporating traplows to prevent scour and erosion of the linear drainage system to the ponds.
- An overland escape route for emergency flows.
- Where possible, drainage to be using overland conveyance systems including, where appropriate, curb and gutters along streets and crossing intersections, curb cuts, swales between lots and through green spaces, and roadside ditches along major roadways.
- All ponds combined to be handling the runoff resulting from a 1:100 year design storm event.
- Combined, the traplows and ponds shall provide treatment for Total Suspended Sediment (TSS) and meet current targets to reduce TSS loadings to receiving streams. Current target is set at 85% for particles equal or larger than 75 microns.
- Best Management Practices including bio-swales for conveyance, wet ponds/wetlands for storage and encouragements to harvest rain on the lot for irrigation of the yard and landscaped areas.

Stormwater Policies

- 7.1.1 Stormwater release rates into West Nose Creek and Bigspring Creek shall be consistent with predevelopment levels unless it is determined by the Municipality and Alberta Environment that increased controlled flows are desirable; e.g., following the Water Management Plan for the Nose Creek Watershed.**
- 7.1.2 Water quality objectives will target an 85% reduction of Total Suspended Solids to receiving streams for particles equal or larger than 75 microns.**
- 7.1.3 Development within the Plan Area should control surface runoff using best management practices, both during construction as well as in the long-term. Best management practices and water conservation strategies through Low Impact Development strategies are encouraged at the lot level and regionally in the linear open spaces.**
- 7.1.4 Stormwater management can incorporate standard curb and gutter roads and the development plan shall be flexible as to innovative allocation of conveyance systems (vehicle traffic, pedestrian and stormwater) in a comprehensive right-of-way alignment.**
- 7.1.5 The drainage course located on the east side of the Plan Area shall integrate cascading pools to manage stormwater of the adjacent development cells.**
- 7.1.6 All residential areas should have sufficient open spaces where stormwater conveyance and small bio-engineered detention systems can be integrated to manage stormwater.**
- 7.1.7 The Plan Area shall include a linear network of open spaces to facilitate infiltration of stormwater into the groundwater network.**
- 7.1.8 Development cells adjacent to the escarpment shall incorporate systems to intercept stormwater and route it to detention facilities where water quantity and quality can be handled and release to the creeks can be controlled.**
- 7.1.9 Each Neighbourhood Plan shall include a stormwater servicing concept in accordance with the Master Drainage Plan.**



Figure 11:
STORMWATER MANAGEMENT CONCEPT

7.2 Wastewater

The developer's preferred option at this planning stage is for development to be serviced by an advanced on-site decentralized wastewater system. Such a system can be provided by the developer in a phased manner to match the phased development of the community. The disposal fields for each phase of development can be located away from the fields of other phases, or the fields for several phases can be clustered in more of a nodal form. Gravity flow piping will be used to collect flows from each lot.

The advanced on-site decentralized wastewater system will be managed by a private utility service provider. Should a regional system become practical in the future, the developer will work with the municipality, or other approving authorities to tie into this system. On-site wastewater treatment will be subject to review and approval by Alberta Environment and the Municipality.

Wastewater Policies

- 7.2.1 Each Neighbourhood Plan shall include a wastewater servicing concept in accordance with a comprehensive Utility Servicing Strategy to be prepared as a component of each Neighbourhood Plan.**
- 7.2.2 The developer shall be responsible for the design and construction costs of all wastewater servicing, subject to Provincial, Municipal or private utility owner cost recoveries, subsidies, or endeavours to assist in cost recovery from third parties as approved by the Municipality.**
- 7.2.3 The developer shall require builders to install low flush toilets and other water conserving features in each house constructed.**

7.3 Water

The Big Hill Springs community will be serviced by a treated water system. In July 2007, the developer is in discussion with private utility providers. One such provider, Regional Water Services Ltd. (Medallion Development Corporation), is working with the MD of Rocky View to establish a treated water system. Regional Water Services Ltd. has tied up more than sufficient water rights to service the full Big Hill Springs development. In addition to discussions with Regional Water Services Ltd. on a treated water supply, the developer is also pursuing the viability of on-site groundwater supplies for the initial phases of development. All water infrastructure will be designed and installed to connect to a regional system, should this become practical in the future. Water treatment and supply will be subject to review and approval by Alberta Environment and the Municipality.

Ultimately, to meet daily and hourly peak flows, provide for chlorine contact time, as well as offer fire protection flows, a reservoir is proposed to be located on the property in the NE corner of the Plan Area at an elevation of approximately 1222 m. The reservoir would be built in two stages as development proceeds. This would be a reinforced concrete, underground reservoir combined with an above-ground pumping station. Current design criteria for the reservoir would indicate that Phase 1 would be sized for a ten-year horizon, depending on absorption. Phase 2 would be sized for the remaining development horizon and build-out of the proposed community.

Treated water from the reservoir would be pumped from the reservoir through distribution mains and throughout the subdivision road rights-of-way. It is also necessary to provide standby power and re-chlorination at the reservoir. With the storage reservoir located at an elevation of 1222 m and the floor of the creek valley at 1129 it is likely that there will be three pressure zones requiring up to five pressure reducing valves. It is also possible that one booster station will be required. Hydrants will be incorporated throughout the subdivision to provide full fire flow capabilities.

Water Policies

- 7.3.1 Each Neighbourhood Plan application shall contain a water servicing concept in accordance with a comprehensive Utility Servicing Strategy to be prepared as a component of each Neighbourhood Plan.**
- 7.3.2 There shall be no land use amendments considered for development until Council is confident sufficient water servicing capacity has been secured by the developer.**
- 7.3.3 Licensed, treated, and piped water servicing shall be secured and approved prior to approval of any Neighbourhood Plan.**
- 7.3.4 The developer shall be responsible for the design, gaining of necessary approvals and construction costs of all water servicing, subject to Provincial, Municipal, private utility owner cost recoveries, or endeavours to assist in cost recovery from third parties that the Municipality may approve.**
- 7.3.5 The developer shall require builders to install water meters, low flush toilets, and other water conserving features in each house constructed.**
- 7.3.6 The developer will work with the builders to pursue new ways to minimize the need for irrigation (e.g., landscaping with drought-tolerant species) and to provide non-potable water for irrigation purposes (examples may include collected rain water or possibly recycled grey water).**
- 7.3.7 Groundwater and soil moisture recharge should be enhanced by measures such as:**
 - i. increasing topsoil depth in small areas around buildings;**
 - ii. amending topsoil with appropriate materials such as recycled construction gypsum;**
 - iii. adherence to the Master Drainage Plan; and**
 - iv. use of drought resistant plant materials.**

7.4 Solid Waste

Solid waste collection and management within Big Hill Springs will address all stages of product life-cycle, from new home construction to everyday recycling, composting, and domestic garbage collection.

Solid Waste Policies

- 7.4.1 Residents and business owners within Big Hill Springs shall be responsible for the management and disposal of all solid waste generated in the community.**
- 7.4.2 The developer shall require builders to recycle construction materials for which recycling facilities have been established.**
- 7.4.3 The developer shall establish a curbside recycling program or recycling separation bins within the community.**

7.4.5 The developer shall encourage composting within the community.

7.4.6 The developer shall encourage builders to use recycled materials in features such as decks and railings.

7.5 Shallow Utilities

Shallow utilities such as electricity, natural gas, telephone, and cable television, high-speed cable internet, and wireless internet services will be provided and available to the residents within the Plan Area.

Shallow Utilities Policy

7.5.1 Shallow utilities shall be provided by the developer to the property line of each newly created lot, to the satisfaction of each utility service provider and the Municipality.

7.6 Energy Conservation

Big Hill Springs will demonstrate the developer's and the Municipality's commitment to energy conservation and the minimization of carbon-based emissions. Each home constructed according to BuiltGreen Standards could reduce greenhouse gas emissions by an average of 3 tonnes per dwelling unit per year. The developer will implement energy conservation by following the Built Green construction guidelines outlined in Appendix D, or updated versions of the same or similar guidelines.

Energy Conservation Policies

7.6.1 Energy conservation shall be enhanced by consideration of measures such as:

- i. geothermal, solar, or district heating where economies of scale can be achieved;**
- ii. energy-efficient interior lighting systems, including compact fluorescent light bulbs;**
- iii. solar water heating;**
- iv. use of passive solar design; and**
- v. high insulation factors.**

Where economically feasible, such measures will be imposed on the builders by the developer at the time of subdivision through mechanisms such as architectural controls or other means.

7.6.2 The Municipality will encourage institutional developments such as schools to utilize energy conservation measures such as those listed in policy 7.6.1. Such measures will be implemented by the developer at the time subdivision through mechanisms such as architectural controls or other means.

Low-light Policy

7.6.3 For the purposes of illumination, exterior lighting should be directed and focus on relevant on-site features to protect against any off-site light pollution

- 7.6.4 All land uses within Big Hill Springs shall be developed according to low-light policy 7.6.3 of this Conceptual Scheme, with energy-efficient street lighting systems, to the satisfaction of the Municipality.**

7.7 Sustainable Building Practices

Built Green™ is an industry driven voluntary program that promotes "green" building practices to reduce the impact that building has on the environment. A North American-wide program, Jayman brought Built Green to Canada six years ago as a way to give fellow builders and manufacturers motivation to become more sustainable. In 2005 Jayman MasterBuilt committed to building 100% of their homes in Calgary and Edmonton as Built Green™ Gold, saving over 3,000 tonnes of greenhouse gas emissions in 2006 alone. Big Hill Springs will demonstrate the ongoing leadership and commitment of the developer to implementing sustainable building practices. The developer will implement sustainable building practices by following the Built Green construction guidelines outlined in Appendix D, or updates versions of same or similar guidelines.

Sustainable Building Policies

- 7.7.1 The developer shall require builders to adopt BuiltGreen building practices, which would include:**
- i. improved energy efficiency in heating systems and appliances;**
 - ii. healthy indoor air quality;**
 - iii. indoor moisture controls;**
 - iv. improved thermal insulation, including triple glazing;**
 - v. energy saving technology;**
 - iv. use of recycled materials;**
 - v. minimized use of non-renewable resources; and**
 - vi. minimized use of volatile organic compounds (VOCs) in paints, finishes, and flooring.**
- Such measures will be implemented by the developer at the time of subdivision through mechanisms such as architectural controls or other means.**
- 7.7.2 The Municipality will encourage institutional developments such as schools to adopt sustainable building practices such as those listed in policy 7.7.1. Such measures will be implemented by the developer at the time of subdivision through mechanisms such as architectural controls or other means.**

8.0 Community, Protective, and Emergency Services

The purpose of the Community, Protective, and Emergency Services policies is to identify the provision of adequate levels of service for all future residents in Big Hill Springs.

Citizens, businesses, local authorities, and senior governments are all resorting to the triple bottom line of sustainability: environmental, economic, and social responsibility to ensure that the needs of future generations are not compromised by development today. The M.D. of Rocky View and the developers of Big Hill Springs are committed to making decisions and investments that will lead to the creation of complete communities.

Big Hill Springs will become a complete community, which in addition to providing for a range of housing affordability, dwelling types, and lifestyles, will support employment and services such as schools, retail, and recreation. At completion, Big Hill Springs will be a comprehensively planned and sustainable community offering its 10,000 residents an opportunity to live, work, play, grow, and age in place. Big Hill Springs will maintain its vibrant character through many community lifecycles and generations to come.

Big Hill Springs responds to the need for development of complete communities where residents can live, work, and play without having to travel significant distances. Big Hill Springs will help the M.D. in achieving new ways of accommodating growth, with compact form, clustered housing, comprehensive planning, and innovation as hallmarks of this new vision.

The developer will work closely with the Municipality and Homeowners' Association to collectively assess the need for community, protective and emergency services, and to help develop and fund a long-term, sustainable plan for the provision of these community services.

Policies

- 8.0.1 Neighbourhood Plans shall address how community, protective and emergency services, schools and recreation services will be provided.**
- 8.0.2 The developer will provide a site or sites suitable for Fire, Police, or Emergency Medical Services within the Village Centre or at another appropriate location within the Plan Area.**
- 8.0.3 A pressurized water system with fire hydrants shall be incorporated with all new subdivisions.**
- 8.0.4 For proper identification of distress calls and property locations in times of emergency, new community and development names, road names, and addresses shall comply with any M.D. of Rocky View road naming and addressing policies.**

9.0 Implementation Policies

9.1 Neighbourhoods and Phasing

The purpose of these policies is to provide for the logical progression of development to accommodate the ultimate land uses, densities, and infrastructure systems proposed in this Conceptual Scheme. Big Hill Springs is designed as a number of interconnected neighbourhoods, each of which will be developed in a number of phases over several years (Figure 13). Several neighbourhoods may be under development at one time to enable a variety of housing and neighbourhood form choices for residents who will choose Big Hill Springs as their new community.

Policies

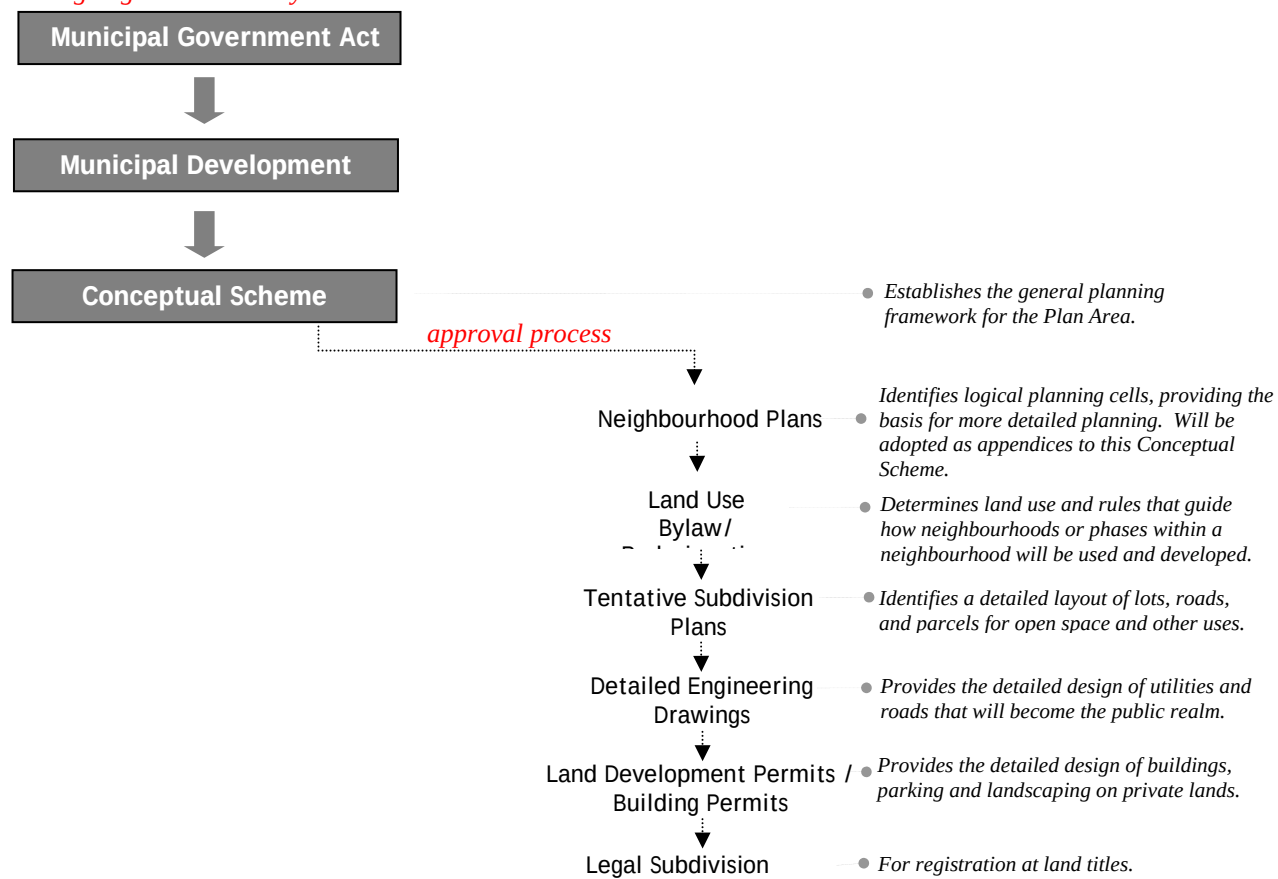
- 9.1.1 Neighbourhood development and the phasing of development within neighbourhoods will be based upon logical development and marketing opportunities, as determined by the developer, taking into consideration utility servicing and transportation infrastructure.**
- 9.1.2 The initial neighbourhoods and phases of development within those neighbourhoods will occur in the central portions of the Plan Area so that the peripheral portions of the Plan Area remain in agricultural use for as long as reasonable. This phasing of development will enable the adjacent agricultural operations to remain at a distance from development for as long as reasonable.**
- 9.1.3 The Village Centre will be developed as soon as there is a population base in the community that will support the uses envisioned in Section 5.2 of this Conceptual Scheme. Population thresholds required to sustain particular Village Centre uses will be determined through analysis to be conducted by the developer. The Village Centre will build out and evolve over the life of the community.**

9.2 Implementation

The Big Hill Springs Conceptual Scheme joins a family of plans that work in conjunction with one another, as outlined in the following chart. The M.D. of Rocky View Municipal Development Plan (MDP) and any revisions thereto, is the guiding document for all development within the Municipality. All conceptual schemes are to recognize and be consistent with the MDP. As required by Part 1 of the Subdivision and Development Regulation of the Alberta Municipal Government Act (MGA), the Big Hill Springs Conceptual Scheme meets these requirements.

Table 4: Policy & Approval Process

Enabling Legislation / Policy Documents



All Neighbourhood Plans, Land Use Redesignations, Subdivision Plans, and Development Permits approved within the Plan Area shall be consistent with the policies contained in this Conceptual Scheme. As development occurs and circumstances change, it may be necessary to amend the Conceptual Scheme prior to approval of certain phases of development. The policies in this Section are intended to set direction for the implementation of the Conceptual Scheme policies and to provide for consideration of Conceptual Scheme amendments where development that does not conform with this Conceptual Scheme is proposed.

Neighbourhood Plans are the next logical planning instrument in the implementation of this Conceptual Scheme. Land Use Redesignation applications may be concurrent with or follow the Neighbourhood Plan approval. Land Use Redesignations will generally be focused at the scale of Neighbourhood Plans, but could cover smaller areas, depending on the context and the proposed uses. Subdivision Plans will be prepared for phases of development and represent a logical physical development area within a neighbourhood.

Policies

9.2.1 Neighbourhood Plans, Land Use Redesignations and Subdivision Plans shall be required to implement the policies of this Conceptual Scheme.

9.2.2 Neighbourhood Plans shall be prepared for logical development stages within the Conceptual Scheme and shall address land uses, open space configuration, utility servicing, roadway

configurations and linkages to adjacent neighbourhoods.

- 9.2.3 Neighbourhood Plans shall be accompanied by assessments or reports addressing stormwater, sanitary sewer, water servicing, road sizes and general lotting layout, community, protective and emergency services, schools and recreation services, and any other matters the Municipality deems necessary to address prior to approval of the Neighbourhood Plan.**
- 9.2.4 Neighbourhood Plans and Land Use Redesignations may be submitted and processed concurrently or independently; however, both must have Statutory Public Hearings prior to approval by Council.**
- 9.2.5 Until such time as lands are developed for non-agricultural uses in accordance with the policies of this Conceptual Scheme, existing agricultural operations may continue without interference from any other uses or activities in the Plan Area.**
- 9.2.6 Premature subdivision of any lands for non-agricultural uses within the Plan Area shall not be allowed without appropriate utility services.**
- 9.2.7 When considering proposals for Neighbourhood Plans and Land Use Redesignations within this Plan Area, the Municipality shall confirm that the proposal is in accordance with the provisions of this Conceptual Scheme.**
- 9.2.8 In instances where proposed Neighbourhood Plans and Land Use Redesignations do not conform with the policies of this Conceptual Scheme, a Conceptual Scheme amendment shall be processed concurrently with the Neighbourhood Plan or Land Use Redesignation, in order to provide for consistency with this Conceptual Scheme.**

9.3 Plan Review and Monitoring

The future land use and development outlined in the Big Hill Springs Conceptual Scheme is intended to address a long-term planning and development horizon. As conditions change within Big Hill Springs, the M.D. of Rocky View, and the region, it may be necessary for the Municipality to amend this Conceptual Scheme. Such amendments may result from regular review of the Conceptual Scheme. In addition to Conceptual Scheme amendments, it will be necessary to review the Conceptual Scheme to maintain realistic and effective policies and implementation practices. Such periodic Conceptual Scheme review may be conducted in conjunction with the review of the Land Use Bylaw or other statutory plans such as the MDP.

Monitoring of the Big Hill Springs Conceptual Scheme is expected to occur on a regular basis, including measurement of achieved results in terms of the objectives of this Conceptual Scheme and other established benchmarks.

Policies

- 9.3.1 The M.D. of Rocky View may consider periodic review and occasional amendment of the Big Hill Springs Conceptual Scheme through Council Public Hearings in accordance with the Municipal Government act.**
- 9.3.2 The Municipality may review and revise the phasing and implementation policies contained within this Conceptual Scheme at the discretion of Council.**



DEVELOPMENT TIMING

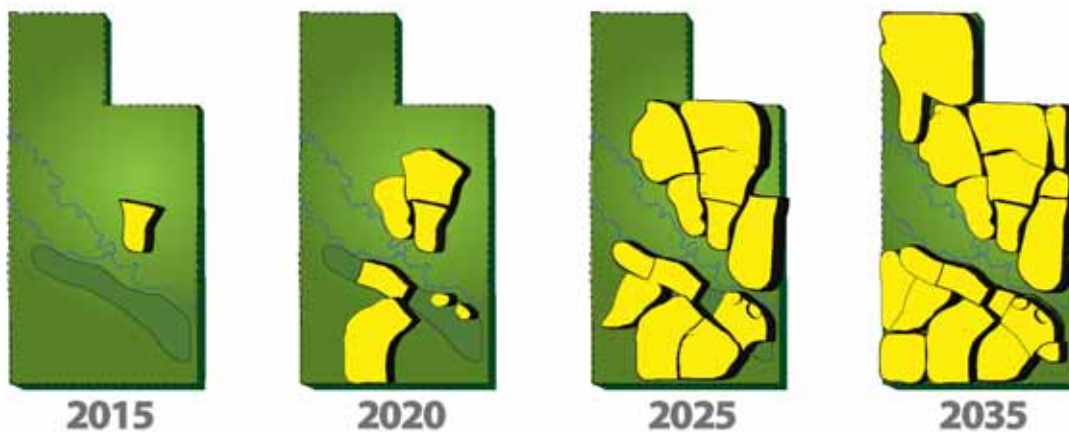


Figure 12:
STAGING / DEVELOPMENT TIMING

10.0 Glossary

Agricultural Land Use - The use of land, buildings or structures for the raising of domestic animals and growing plants for food or other production.

Area Structure Plan - A statutory plan, adopted by Bylaw, that provides a policy framework for the evaluation of proposals for Neighbourhood Plans, Land Use Redesignation, Subdivision and Development of a specified area of land in the Municipality.

Biophysical - Refers to the inter-relationship between landforms, climate, vegetation, and animal life. The functioning of ecosystems is tied directly to these interactions. Inter-relationships of landform and element, climate, vegetation, and fauna are not only assessed on the basis of their general characteristics, but also on the basis of their relative health: they can be strong or weak.

BuiltGreen - A voluntary environmental building program offered through home builder associations in Alberta and British Columbia.

Cluster Development - This approach to development places development in less sensitive areas while preserving natural areas, such as forested lands, slopes, wetlands, prairie habitat, and other ecologically or environmentally sensitive areas, and other areas of architectural or historical importance.

Commercial - A variety of commercial land uses of a scale and character compatible with the existing land use pattern that serve the community.

Conceptual Scheme - A plan for the subdivision and development of lands including, but not limited to: generalized land uses at the scale of a quarter-section to a section; rational for the developability of the lands; and an internal road hierarchy.

Council - The Council of the Municipal District of Rocky View No. 44.

Developer - the registered landowner(s) or any future landowner(s) of a parcel or parcels of land within this Conceptual Scheme.

Development - Any excavation or stockpile and the creation of either of them, a building or an addition to, or replacement, or repair of a building and construction of placing in, on, over, or under land or any of them; a change of use of land or a building or an act done in relations to land or a building that results in or is likely to result in change in the use of the land or building; or, a change in the intensity of use of land or a building or an act done in relation to land or a building that results in or is likely to result in change in the intensity of use of the land or building.

Environmental Impact Assessment - An area-specific study that may include, but is not limited to:

- a. the identification and analysis of natural factors for the study area;
- b. an evaluation of the potential impact that a subdivision or a development proposal may have on the factors identified; and
- c. a program of avoidance and/or mitigative measures.

Environmental Reserve - Environmental reserve is a swamp, gully, ravine, coulee, or natural drainage course; land that is subject to flooding or unstable; a strip of land not less than 6

metres in width abutting bed and shore of any lake, river, stream, or other body of water. It may be taken at the time of subdivision at the discretion of the Municipality for the purposes of preventing pollution, or providing public access; and must be left in its natural state. Environmental reserve remains the responsibility of the Municipality as guided by the Municipal Government Act.

Geotechnical Report - Means a report that details, among other things, the slope stability within a specific area and may make mitigation recommendations in order for development to proceed safely.

Homeowners' Association - A private, not-for-profit organization intended to manage and maintain the common property assets of the community.

Highway - A road that is designated as a primary highway or a secondary highway pursuant to the Public Highways Development Act.

Historical Resources Impact Assessment - An analysis of the potential impacts of development on archaeological, palaeontological, and historical resources.

Infrastructure - Public and private utility systems in the Municipality that may include, but are not limited to, the transportation network, water supply, sewage disposal systems, stormwater management and other 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 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.

Master Drainage Plan - A Master Drainage Plan is a drainage plan for a sub-basin or a watershed that identifies drainage management concepts within the existing topography, physical and biological resources of the area. It details short, medium, and long-term strategies to establish a sub-basin wide stormwater management system.

Multi-Unit Residential - Means a form of housing with multiple dwelling units in buildings no higher than four storeys, which create minimal visual impacts on the landscape.

Municipal Development Plan - The M.D. of Rocky View *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 Government Act - Refers to the *Municipal Government Act, Statutes of Alberta 1994, Chapter M-26.1* as amended from time to time.

Municipality or M.D. - The Municipal District of Rocky View #44 and, when the context requires, means the area contained within the boundaries of the Municipality.

Municipal or School Reserve - Land which the subdivision Authority may require the owner of a parcel of land that is the subject of a proposed subdivision to provide for municipal or school

purposes, up to 10% of the area proposed for subdivision or an equivalent cash-in-lieu disposition.

Natural Features - Includes landscapes that are found in their natural state and may be remnant, undisturbed, diverse or contain unique environmental characteristics.

Neighborhood Plan -Detailed plan for a development cell showing land uses, internal road networks, pathways, open space, etc.

Plan Area- Refers to the extent of land over which the Big Hill Springs policies have force and effect.

Private Utility - A utility service offered to the public by a private utility company or cooperative 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. Examples of qualified professionals include, but are not limited to agrologists, engineers, geologists, hydrologists and surveyors.

Residential Land Use - A primarily residential land use in which auxiliary pursuits including commercial uses may be allowed dependent on the parcel size and proximity to other residences.

Stormwater Management Plan - A plan prepared to adequately address on-site stormwater retention, demonstrate that post-development flows equal pre-development flows, and the method of on-site containment during a 1:100 year storm event. Recommended Best Management Practices to improve water quality as well as water quantity should be included in a stormwater management plan.

Subdivision Plan - A statutory plan prepared when a proposed subdivision will create two or more lots and the subdivision is to be undertaken by a plan of survey.

Traffic Impact Assessment - An area-specific study that may include, but is not limited to, an analysis and evaluation of:

- a. The potential impact of a proposed subdivision and/or development on the existing transportation network; and
- b. A program of future expansion and/or improvement of the transportation network to accommodate the proposed growth and to preserve the function and integrity of the network.

Utility Servicing Strategy: The Utility Servicing Strategy is a plan of action for the Big Hill Springs Community that will be prepared by the developer to the satisfaction of the Municipality. It will outline how water and wastewater services will be provided to service development.

Wastewater Servicing Concept - Means a program that details site management of all wastewater servicing activity on a particular site.

Water Servicing Concept - Means a program that details site management of all water servicing activity on a particular site.

Appendix A Council Authorization



MUNICIPAL DISTRICT OF ROCKY VIEW No. 44

911- 32nd Avenue N.E., Calgary, Alberta T2E 6X6
Telephone (403) 230-1401 • Fax (403) 277-5977
Website: www.gov.mdrockyview.ab.ca
E-mail: comments@gov.mdrockyview.ab.ca

Wednesday, July 06, 2005

File Number: 2005-RV-163

Roll Number: 06616001

Brown & Associates
c/o Bela Syal
#1405, 101 - 6 Avenue SW
Calgary, AB
T2P 3P4

RE TRANSMITTAL OF DECISION – Request for Direction Regarding the Preparation of a Conceptual Scheme

At its meeting of Tuesday, July 05, 2005, Council of the Municipal District of Rocky View No. 44 considered your redesignation application and passed the following motions:

That Council request the Applicant to pay the fee prescribed in the Master Rates Bylaw and prepare a Conceptual Scheme for the area noted on the attached Proposed Conceptual Scheme Boundary Map, for seven quarter sections including the N ½ Section 16-26-02-W5M; all of Section 21-26-02-W5M and the SW Section 28-26-02-W5M. The Conceptual Scheme will be adopted, by Bylaw, as a prerequisite to Council considering redesignation and subdivision applications within the subject lands. As part of the Conceptual Scheme, the Applicant shall conduct at least two (2) Open Houses prior to first reading of the adopting Bylaw. Notice of the Open House must be advertised in the official newspaper of the Municipality. The Conceptual Scheme should be prepared in a format acceptable to the Municipality and include, but not be limited to, an assessment of the following items:

General Matters:

A baseline description and evaluation of the following matters within the entire Conceptual Scheme area:

- a) natural resources;
- b) existing land use;
- c) ownership;
- d) existing development;
- e) topography;
- f) agricultural capability;
- g) soil;
- h) vegetation;
- i) environmental sensitivity and significance;
- j) geotechnical consideration;
- k) archaeological and historical consideration;
- l) existing utilities and transportation routes;
- m) existing adjacent land uses; and
- n) any other matter the Municipality requires to be investigated.

Regional Matters:

A description and evaluation of the following matters affecting lands outside the Conceptual Scheme area:

- a) analysis of the regional transportation network;
- b) regional servicing implication;
- c) regional socio-economic implication;
- d) the impacts of development on the surrounding agricultural area; and
- e) any other matters the Municipality requires to be investigated.

Development-Specific Matters:

A description and evaluation of the following matters describing development within the Conceptual Scheme area:

- a) the capability of the land to support the proposed development of non-agricultural uses and its anticipated infrastructure;
- b) any and all constraints to development including, but not limited to, geotechnical constraints, environmental constraints, hydro-geological constraints and archaeological or historically significant features;
- c) the policy constraints of the MDP's Land Use Strategy #1 and the Agricultural Policies;
- d) an assessment of the land in terms of the Municipality's Growth Management Strategy initiative and participation in the initiative through the Concept Plan preparation;
- e) the impact the proposed development will have on adjacent lands, the natural environment, the local road system, its compatibility and the rural character of the surrounding area;
- f) a strategy to accommodate and/or integrate existing development and measures to ensure that the proposed development will not adversely affect the viability of existing uses on adjacent lands;
- g) a future land use scenario that illustrates comprehensive subdivision design principles that result in innovative communities, efficient use of the land base, municipal infrastructure, public and private utility systems and on-site development opportunities;
- h) a Utility Servicing Strategy capable of accommodating provision of an appropriate water supply, sewage disposal system and solid waste system necessary to support the range of uses within the Conceptual Scheme area, including a scenario to extend water, wastewater and solid waste services to areas adjacent to the Conceptual Scheme area;
- i) a Site Management Plan guided by an adopted Master Drainage Plan, that will determine Best Management Practices for stormwater management within the Conceptual Scheme area;
- j) a Traffic Impact Study that provides for safe and efficient access both within and external to the Conceptual Scheme area, over both the immediate and long term, including the identification of:
 - i. the location of existing transportation networks;
 - ii. an assessment of existing traffic generation;
 - iii. an identification of the proposed transportation network;
 - iv. proposed traffic generation;

- v. anticipated cumulative impacts on the local and regional road network as development within the Conceptual Scheme area proceeds over time;
- vi. recommendations for anticipated improvements to existing transportation infrastructure necessary to serve the future land use scenario, including design at full build-out and at each anticipated phase of local development;
- vii. recommendations for financial obligations for transportation infrastructure improvements;
- k) dedication of lands including, but not limited to, conservation easements, public utility lots, Municipal/school reserves; and if necessary, environmental reserves;
- l) a scenario to provide for open space recreation amenities (including active and passive open areas, natural areas and pedestrian linkages within the Conceptual Scheme area and other existing or potential adjacent developments;
- m) a scenario to provide for appropriate community service levels including, but not limited to, policing, fire protection and ambulance;
- n) anticipated tentative plan of subdivision describing the general orientations of the anticipated subdivision design at full build out;
- o) a scenario for proposed subdivision and development phasing;
- p) anticipated population densities and population projection, at full build out and at each anticipated phase of subdivision;
- q) mitigation measures such as landscaping treatment, screening and/or berming necessary to address any on- or off-site visual impacts, including site lines from existing adjacent developments;
- r) location of community mail boxes;
- s) proposed road names;
- t) input from all directly and indirectly affected landowners within and adjacent to the Conceptual Scheme Area throughout the preparation of the Conceptual Scheme, including a minimum of two (2) Open Houses to encourage the Applicant to gather public feedback on the proposal; and
- u) any other matter the Municipality requires to be investigated.

Should you have any questions or concerns, please contact File Manager Ken Venner for assistance and quote the file and roll numbers as noted above.

Yours truly,



Linda Ratzlaff, ACP, MCIP
Current Planning Coordinator

/fe

c.c.: The Locke Stock & Barrel Co.

Appendix B Conformity with Municipal Development Plan

This Section describes how a community of this nature in this location is supported by the approved planning policies of the Municipal District of Rocky View Municipal Development Plan (MDP).

MDP Goals and Policies

The MDP, which serves as the Municipal District's long-term planning policy document, has a number of goals and policies that support this Conceptual Scheme.

Section 1.8 Plan Goals

- To accommodate growth and change in the Municipality in accordance with sound land use planning.
- To facilitate residential developments which create safe and liveable environments.
- To encourage and facilitate appropriately located business development, which contributes to the economy of the Municipality.
- To support the availability of affordable and effective community services in order to maintain and improve quality of life.

Section 5.0 Residential

- Residential land use should contribute to an orderly settlement pattern. Residential land use should be compatible with the natural environment. Therefore, a variety of residential land uses should be provided that would accommodate a range of lifestyle opportunities for Municipal residents.

Section 6.0 Business Development

- Diversification of business development is important to the economy of the Municipality. Opportunities for the growth of a variety of commercial and industrial land uses should be provided. Commercial and industrial uses should be facilitated which are of a scale and character which integrate into the existing land use pattern.

Section 8.0 Natural Environment

- The protection and management of environmental resources is important to quality of life. The biophysical characteristics and environmental significance of lands should be considered in land use decisions. The conservation of environmentally significant areas should be encouraged, including unique vegetation, riparian areas, topography and fish and wildlife habitat. The presence of significant archaeological and historical sites should be considered in the Municipality's land use planning decisions.

Conformance with MDP Goals

An overarching principle guiding the Big Hill Springs Conceptual Scheme is the creation of a comprehensively planned complete community of:

- single-family, multi-family, and seniors' housing
- commercial, retail, small-scale office, restaurant, and personal service businesses
- local and regional recreational opportunities and facilities
- community services, churches, schools, and health care services for the local and surrounding residents with the M.D.

which will be able to sustain its unique identity in the region for many generations to come.

Section 1.8 of the M.D. of Rocky View MDP provides the general context for development within the M.D.

Goal: To accommodate growth and change in the Municipality in accordance with sound land use planning.

The MDP policies on accommodating growth and supporting the protection of good agricultural land reflect important land use planning principles. This Conceptual Scheme demonstrates that the protection of good agricultural land in Rocky View can be facilitated by the concentration of development in a complete community where agricultural capability is low. The compact, more efficient development pattern proposed in the Big Hill Springs Conceptual Scheme will utilize the land resource more efficiently than the fragmented subdivision patterns that have resulted from large lot country residential development elsewhere.

Goal: To facilitate residential developments which create safe and liveable environments.

Big Hill Springs is envisioned to develop as a unique and distinct community. It will be family-oriented and recreation-focused, with a variety of residential development forms, including seniors' housing. It will feature the retention of environmentally significant natural areas and the creation of linear open spaces, pathways, horseback riding trails, parks, playing fields, and school sites. Commercial development will serve residents living in a broad range of dwelling sizes, types, and price ranges from entry level housing to larger estate and luxury homes.

Open space within the Village Centre will feature more formal gathering places such as public squares with park benches and gazebos. The Village Centre will provide the opportunity for a regional recreation and cultural centre, library, meeting rooms, protective services facility (emergency medical, police, and fire protection services) and community centre, potentially including a gymnasium, swimming pool, skating rink, and other facilities and include activities such as hockey, soccer, and baseball. Big Hill Springs will be a sustainable community with its own distinct identity, providing affordable and alternative lifestyle options for existing and new M.D. residents alike.

Goal: To encourage and facilitate appropriately located business development, which contributes to the economy of the Municipality.

A Village Centre accommodating community facilities is proposed at a central location within the development. It is expected to include commercial, retail, small-scale office, restaurant, and personal service businesses, along with local and regional recreational opportunities, community services, churches, schools, day care facilities, and health care and protective services.

Goal: To support the availability of affordable and effective community services in order to maintain and improve quality of life.

Residents of Divisions 7, 8 and 9 will reap substantial benefits from the Big Hill Springs community as a range of services not currently available in this part of the M.D. of Rocky View will be provided. In addition, comprehensive planning and development of a complete range of services in this area will create a new, vibrant, and sustainable community.

Consistent with the MDP philosophy and policies, this Conceptual Scheme will allow for the development of a community that provides a unique lifestyle choice for M.D. residents. This community will improve the quality of life for many M.D. residents by providing for single-family, multi-family, and seniors' housing, commercial, retail, small-scale office, restaurant, and personal service businesses, along with local and regional recreational opportunities, community services, churches, schools, day care facilities, and health care and protective services.

Recreational opportunities will be available year-round, in all seasons, both indoors and outdoors. Recreational amenities will include an extensive walking and cycling trail network leading to the Village Centre, which will have a distinct village character. The generous open space system throughout the community will consist of large natural areas with sensitively developed trails linking occasional barbeque pits and picnic tables.

Conformance with MDP Residential Policy

*Policy: Residential land use should contribute to an orderly settlement pattern.
Residential land use should be compatible with the natural environment.
Therefore, a variety of residential land uses should be provided that would
accommodate a range of lifestyle opportunities for Municipal residents.*

Residential development within Big Hill Springs will blend with the open space and natural areas, providing a variety of housing types in order to address a range of market segments in terms of lifestyles, price levels, and demographics. Provision will be made for seniors' housing, a variety of single-family lot sizes, semi-detached homes, and townhouses near the core, in order to provide affordable alternatives to the detached single-family units elsewhere in the community. "Growing in place" and "aging in place" will be a hallmark of this community, so that it will retain its vibrant character through successive community life cycles, for several generations to come.

The intent of this Conceptual Scheme is to create a complete community with its own distinct identity, incorporating environmentally sensitive development that will create negligible impacts on natural systems. The Village Centre is expected to include commercial, retail, small-scale office, restaurant, and personal service businesses, along with local and regional recreational opportunities, community services, churches, schools, day care facilities, and health care and protective services. Higher density residential development, including seniors' housing, will also be developed within the Village Centre. By virtue of its location in the lower valley lands, visual impacts from this higher intensity core development will be minimized. All lands in close proximity to the creeks and valley will provide open space and will be protected from development.

Residential development will be integrated with natural areas throughout the community.

Housing will be strategically placed both to respect and to make best use of the natural attributes of each site. Most importantly, development will be sensitive to its natural surroundings. Architectural guidelines will ensure that all features of the development will be visually pleasing, and will appropriately reflect the essentially country ethos of the community.

Compact lot configurations will maximize open space, which will occupy approximately 50% of the Plan Area. Integration of development with the topography will ensure the retention of significant natural features. This form of development will also enable maximum servicing efficiencies for water, sanitary and storm infrastructure.

Many residents of this innovative recreational community will prefer walking and biking to driving to the Village Centre, where a range of recreational and cultural facilities will serve the community. The Village Centre will also include a small commercial area featuring community facilities, church and school sites, convenience retail, banking, laundry, drug store, restaurant, and personal service businesses.

The central location of these facilities will minimize the need for parents to drive their children to schools and their various activities, substantially reducing both internal traffic and the use of adjacent Municipal roads. In addition to their links to the core, the trails will be interconnected with each other and in many instances will be segregated from the parkways and roadways. A central park or village green will infuse a spirit of community warmth and ambience within the Village Centre, and as this core area will be located snugly in the central valley, it will be largely sheltered from the wind.

The proposed development will be serviced with potable water and sanitary sewer servicing provided through connection to local, regional or municipal utility systems. Individual septic systems will not be permitted. All water provision, stormwater management, and sanitary sewage treatment will meet or exceed the applicable standards set by Alberta Environment.

Conformance with MDP Business Development Policy

Policy: Diversification of business development is important to the economy of the Municipality. Opportunities for the growth of a variety of commercial and industrial land uses should be provided. Commercial and industrial uses should be facilitated which are of a scale and character which integrate into the existing land use pattern.

The proposed Community of Big Hill Springs will feature a Village Centre with a commercial component. This will allow for a range of personal services and retail businesses as well as medical, professional, government, and community offices. Office uses may include executive suites as well as businesses such as travel agents, accounting, printing, and other business services to benefit home-based businesses in the community. The Village Centre will also support rural farm based businesses and will service surrounding farm families and acreage owners.

The availability of such commercial services will reduce the need for residents to drive outside the community. There will also be regional benefits to this commercial development. These shops and services will serve residents in District 7, 8 and 9. The proximity of this commercial development to those communities will similarly reduce the need for those residents to drive into Calgary, Cochrane, and Airdrie for a range of goods and services.

Natural Environment Policy

Policy: The protection and management of environmental resources is important to quality of life. The biophysical characteristics and environmental significance of lands should be considered in land use decisions. The conservation of environmentally significant areas should be encouraged, including unique vegetation, riparian areas, topography and fish and wildlife habitat. The presence of significant archaeological and historical sites should be considered in the Municipality's land use planning decisions.

A primary goal of this Conceptual Scheme is to maximize direct access to the public open space from all types of development in the community. The lands within the Big Hill Springs Community have significant natural features, which will be preserved and integrated into the development, providing M.D. residents with one of the few opportunities of excellent access to flowing creeks and extensive natural areas. Two creeks converge in the middle of a large valley, which runs northwest to southeast through the community. The slopes adjacent to the creeks are gently rolling and feature several important and distinctive sandstone outcrops. There are no significant flood risk issues associated with the creeks. A few strikingly dramatic coulees exist and will be preserved in their natural state. The undulating plateaus above the escarpments offer beautiful views of mountain, valley, and prairie foothills and creek landscapes.

The large area of this Conceptual Scheme presents a unique opportunity to create a community that can make full use of all of its natural environmental advantages. It is anticipated that this will set a uniquely high standard for environmental excellence and stewardship. Approximately 50% of the Conceptual Scheme area will be set aside as open space.

The interconnected open space system will link the residential areas both to the Village Centre and to the open space buffer around the periphery of the development. This generous open space will seamlessly integrate development and nature within the community and allow for sensitive development of the community within its surroundings.

All riparian areas will be enhanced, and will be off limits to development. Approximately 50% of the land will be set aside for open space, allowing infiltration of stormwater into the ground. Stormwater retention facilities will be designed to direct water to West Nose Creek at pre-development flow rates. There will be a net environmental gain as a result of the protection of all significant natural areas, including the creeks, from the impacts of grazing.

A network of walking, biking, and horseback riding trails throughout the various natural reserves will be a hallmark of the Big Hill Springs Community. The interconnected trails will link the large open space areas to the Village Centre in the valley. The open space buffer zone, in addition to being visually appealing, will create a natural prairie habitat for birds and animals.

Big Hill Springs is designed to be a development that will create negligible environmental impacts, will be capable of linking into a regional system, and will become a leading example of environmental conservation and stewardship. Key environmentally responsible initiatives include the following elements:

- All potable water and sanitary sewer servicing will be provided through connection to

local, municipal, or regional utility systems.

- Approximately 50% of the land will be conserved as open space allowing a high rate of stormwater infiltration and discharge of water into West Nose Creek at or better than pre-development flows and water quality, according to stormwater best management practices.
- The West Nose Creek and Bigspring Creek valley and escarpments will be preserved through their integration with the other proposed open spaces within the community.
- Concentration of development within this area of the M.D. will reduce pressure for country residential development on high capability agricultural lands.
- Relatively compact lot configurations will provide for efficient use of land and maximization of open space in response to the challenge to create a sustainable community.
- Location of higher intensity development in lower valley lands will minimize visual impacts on adjacent lands.
- Open space buffer surrounding the perimeter of the Plan Area will provide integration and transition to adjacent land uses, as well as recreational opportunities for Big Hill Springs residents and M.D. residents.
- Preservation of sensitive natural areas will include the use of respectful setback distances from adjacent land uses and the provision of natural vegetation buffers.
- Recreational, community, and commercial services will be provided within the community, thereby reducing the need for new residents to drive outside the community and for residents in nearby communities to drive into Calgary, Airdrie, or Cochrane for a range of goods and services.
- “Growing in place” and “aging in place” will be accommodated so that the community will retain its vibrant character through successive community life cycles, for several generations to come, thereby enhancing the community’s social, economic, and environmental sustainability.
- Big Hills Springs will be a master-planned community that will act as a model for more efficient types of development.
- All houses will be constructed to BuiltGreen™ Alberta Gold standards (or equivalent) based on EnerGuide ratings for New Homes.

Appendix C Current Land Ownership (June 2007)



Appendix D Environmental Initiatives

As identified in Section 7.7 Sustainable Building Practices, the following documentation outlines research into water conservation in homes, the Built Green home construction program and the importance of a dark sky lighting program. The documentation includes:

- a. A report by the Enervision Environmental Solutions Team on water conservation for the Big Hill Springs community;
- b. Checklists for implementation of a Built Green community for Big Hill Springs (including guidelines), multi-family and single-family housing; and
- c. Information from the International Dark-Sky Association.

Appendix D (a)

**Big Hill Spring Water Conservation Report
EnerVision Environmental Solutions Team**



**Prepared for Jayman MasterBUILT™ Homes
© EnerVision Environmental Solutions Team 2007
April 2007**

Table of Contents:

Executive Summary:	3
Preface:	5
Indoor Water Conservation Techniques:	6
Dual Flush Toilets:	7
Faucet Aerators/ Shower Water Reduction:	7
Front Loading Washer/ Efficient Dishwasher:	8
Water Metering:	8
Outdoor Residential Water Conservation Techniques:	9
Water Barrel- Rainwater Collection:	10
Water Barrel- Rainwater Collection:	10
Drip Water Irrigation Hose:	11
Efficient Sprinkler System:	11
Plumbed Garage Pressure Washer:	12
Educational Buyers Package:	12
Outdoor Site Specific Water Conservation Techniques:	13
Consider Community Regulations:	13
Permeable Paving Materials:	13
Infiltration From Local Road/ Driveway/ Sidewalk Networks:	14
Permeable Site Conditions:	16
Stormwater Retention Ponds:	17
Xeriscaping / Naturalized Landscaping:	18
Potential Problems:	18
Benefits:	18
Potential Ideas:	18
Figures:	19
References:	19
Appendix 1: Consolidated Consumption Charts:	20

Executive Summary:

The following is a report created by EnerVision Environmental Solutions Team for Jayman MasterBUILT™ Homes. This report outlines numerous water conservation and capturing techniques as well as remediation processes available to builders in the City of Calgary district to reduce their projected total water consumption for new residential housing.

The report was commissioned based upon a need to prove measurable water conservation practices through the installation of indoor water conservation appliances and fixtures by a builder or developer. This report takes advantage of previous research, reports and statistics and is the property of EnerVision Environmental Solutions Team.

The potential measurable total reduction of household water consumption, including indoor use and seasonal outdoor use can be reduced to 54% below conventional norms.

Potential reduction of indoor water consumption in residential homes will significantly reduce our impact on the earth. The conservation of water reduces reliance upon water heating systems, transportation infrastructure and embodied energy treatment plants. The use of dual flush toilets, highly efficient showerheads and faucet aerators and the installation of efficient EnergySTAR clothes washers and dishwashers have the potential to reduce the total indoor residential water demand by 40% on a daily basis. Due diligence and proper installation and maintenance of this equipment can increase this percentage to 49% of conventional household water consumption.

Continued diligence on the exterior of residential properties has the potential to negate a 40% increase in peak summer irrigation demands. Outdoor irrigation demands may be attributed to 9% of the total annual household water consumption. Utilization of water barrels, timers, drip irrigation lines and plumbed pressure washers for washing cars may further reduce the total indoor residential water demand. A 100% reduction in this demand, combined with the above indoor efficiency techniques, would reduce the total annual residential water demand by 54%, while saving homeowners \$311 per year.

Total Annual Household Consumption Including 3 Month 40% Increase	Total annual Water Consumption with Indoor and Outdoor Efficiency Measures	% Savings	Savings in Litres	Savings to Homeowner
379,726.34	176,067.79	53.63%	203,658.55	311.60

Figure 1 Total Annual Potential Savings per Household

A concerted effort towards water conservation techniques and equipment on behalf of a builder would reduce both conventional individual and conventional household consumption figures by half. By contrast, a builder could roughly double the number of efficient homes on the same development and still use less water than their conventional counterpart. Facts and figures for each appliance and application are throughout the document and have been consolidated in Appendix 1.

Site specifications certainly play into the responsible treatment and conservation of water.

EnerVision wishes to express an interest in furthering the measurable data associated with site specific water remediation and conservation. Although statistically it is harder to calculate the exact number of litres potentially saved through pre-emptive swales, site specific drainage, permeable site materials, and strategic topographical alterations and storm water retention ponds, it is important to recognize best practices and concerted efforts by builder/developers. EnerVision will continue to develop measurable data for site specific remediation and given an expanded timeframe, could supply this data for builders working on larger development projects.

This report touches on typical site remediation techniques for best water conservation and water remediation practices. Builders and developers incorporating the site remediation work in this report should be commended for their preservation of natural lands and ambitious and often expensive remediation and conservation work.

Preface:

In 2001, the average Canadian used 335 litres of fresh water for daily domestic use. These numbers are comparable both today and to 1999 data that indicated 343 litres per person per day was the average. Why do Canadians actively consume so much water? Many European nations have reduced their water consumption to 149 litres in the United Kingdom and 128 litres in Germany.¹ We as Canadians use approximately twice the amount of water compared to our European peers.

The City of Calgary in 2006 worked actively with the Built Green™ Society Administration to establish the potential benefits of the Built Green™ program- both in terms of potential water resource conservation and municipal infrastructure savings for reduced capacity demand in new community developments. The City of Calgary at the time made reference to a thorough study conducted by the Regional Municipality of Waterloo Ontario. Based on a sample survey, Residential Single Family Detached Household water consumption broke down according to the pie chart percentage in

the graph to the right. According to the City of Calgary statistics, the average Calgarian uses 312.7 Litres of fresh water per day, while Calgarians living in Built Green™ homes reduce their water consumption to 184.83 Litres per day.²

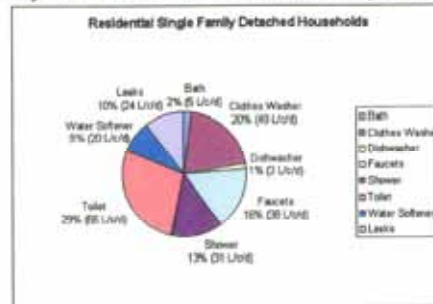


Figure 2 Typical Indoor Domestic Water Use

Similarly, the Greater Vancouver Regional District released a pie chart for single family summer household water consumption. Similar results were indicated; however a rise in approximately 40% consumption was noted due to residential outdoor usage: irrigation of lawns and landscaping. Despite the commission of multiple studies by provincial environmental ministries, the Federal Government and municipal utility organizations, "researchers have found that the lack of accurate data and substandard documentation surrounding the implementation of the water conservation initiatives hinder the ability to test for the effectiveness of specific programs."³ Lack of universal metering also complicates the collection of water consumption data, resulting in a significant amount of guesswork associated with allocating water usage by sector, by season, or by time of day.⁴

The following is a report outlining the potential water conservation measures for new residential developments by EnerVision Environmental Solutions Team. The report utilizes information garnered through secondary research, product research and development and accumulated statistics based upon City of Calgary water conservation/ consumption figures as they relate to Built Green™ Canada's water conservation checklist items as well as innovative water conservation practices for new community development.

*Notes: All figures unless otherwise specified are based upon:

Average 2.5 persons per household - Source: Calgary Economic Times - City of Calgary Corporate Strategy & Economics (June 2003) Water use values - Sources: Residential End Uses of Water Study, American Water Works Association (1999); Amy Vickers & Associates, Inc. Water Use and Conservation (June 2002); Government of Canada website

Based on an average 5.3 minute shower per person per day

Based on an average 0.37 loads of laundry per person per day (337 total loads per household per year)

Based on an average 0.334 loads of dishes per person per day (322 total loads per household per year)

Based on an average 5.10 toilet flushes per person per day (3.8L avg. flush)

Based on an average 8.10 minutes of tap running per person per day

** based on 3/6 litre toilet, 4.3 litres/flush is avg. flush volume⁵

Useful References:

<http://www.vancouver.ca/engsvcs/watersewers/water/conservation/outdoor.htm>

http://www.ec.gc.ca/water/en/manage/effic/e_retro.htm

http://www.ec.gc.ca/soer-ree/English/Indicators/Issues/Urb_H2O/default.cfm

¹ <http://www3.gov.ab.ca/env/water/Conservation/residential.cfm>

² Beeston, Margarette. City of Calgary. EnerVision, eds. *Built Green™ Water Conservation: City of Calgary Water Consumption Statistics*. EnerVision: Calgary, 2006.

³ Michelsen, Ari M., J. Thomas McGucking, and Donna Strumpf. 1999. Nonprice Water Conservation Program as a Demand Management Tool. *Journal of the American Water Resources Association* 35 (3): 593-602.

⁴ Doi, Andrew K. Planning for Water Conservation: GVRD: MDP Research Project Simon Fraser University. 2000. <http://www.rem.sfu.ca/pdf/dwp.pdf>

⁵ Beeston, Margarette. City of Calgary. EnerVision, eds. *Built Green™ Water Conservation: City of Calgary Water Consumption Statistics*. EnerVision: Calgary, 2006.

Indoor Water Conservation Techniques:

There are many indoor water conservation techniques that can be supplied by a builder in new residential developments which aid in the reduction of potable water consumption per home. Reduced reliance on excessive water consumption simultaneously reduces the monetary need for oversized city water supply and septic infrastructure. Given concerted efforts towards conservation through the use of efficient showerheads, appliances such as clothes washers and dishwashers, high efficiency toilets and faucet aerators there is an ability to reduce conventional water demands by as much as 40% on a daily basis.

Total Daily Household Consumption (Preface Graph))	Average Consumption Per Household/ Daily (based upon measureable items)	Efficient Consumption Per Household/ Daily (based on Measureable Items (Litres))	Total Daily Savings Based on Above Items (Litres)	% Total Daily Savings based on Above Items	Total Annual Savings (Litres) Based on Above Items	Total Water Savings per Household (2005 water and sewer costs)
945,769,220.6	781.6	462.07	319.56	40.88%	116,640.07	178.46

Figure 3 Total Daily Household Consumption

A forty percent reduction in water consumption results in significant savings: approximately 141,000 litres per home per year. If one litre of water is the equivalent of 0.04 cubic feet, total water savings are the equivalent of flooding a 1500 square foot home 4 feet each year. Over a 6 year period, water conservation savings are equal to the total volume of the average 1500 square foot home, from basement floor to the ceiling of the second floor. However forty percent can still be improved upon. When these numbers are extrapolated to reflect the water conservation losses from unmeasured components (baths 2%, leaks 10% and a water softener 9%) there is significant potential in reducing water conservation further.

Total Indoor Residential Consumption Figures	Total Conventional Indoor Residential Annual Water Consumption (Litres) per person per household	Total Indoor Residential Annual Water Consumption with Efficiency Measures (Litres) per person per household	Total Annual Savings (Litres) per person per household	Total Savings (%) per person per household	Total Water Savings per Household (2005 water and sewer per household)
	138,082.31 345,205.77	81,628.51 204,071.28	56,453.79 141,134.48	40.88% 40.88%	215.94

Figure 4 Total Indoor Consumption vs. Efficient Consumption

So how do we improve the other 21% in indoor conservation losses? Alberta's minimized need for water softeners is roughly offset by homeowners with efficient drip humidifiers. Secondary losses like those from a bath are specific to user activity and only roughly quantifiable. However losses associated with leakage are addressed by the New Housing component of this study. Leakage losses may be attributed to older homes without the advantage of efficient plumbing components, such as PEX lines, highly efficient instantaneous supply for condensing DHW equipment, insulated supply lines, hot water recirculation lines, and efficient new appliances. When we reduce this leakage loss of 10% to 0%, our total annual savings is increased by 5% for a total of 46% water conservation savings with an additional savings of 16,865 Litres of water.

Total Consumption Without Leakage Losses	Total Conventional Indoor Residential Annual Water Consumption (Litres) per person per household	Total Indoor Residential Annual Water Consumption with Efficiency Measures & No Leakage per person per household	Total Annual Savings (Litres) per person per household	Total Savings (%) per person per household	Total Water Savings per Household (2005 water and sewer per household)
	138,082.31 345,205.77	74,882.36 187,205.89	63,199.95 157,999.88	45.77% 45.77%	241.74

Figure 5 Total Consumption Figures without Leakage Losses

Adding Built Green™ to the calculation pushes this conservation even further- due to their restrictions on the flow rate of all household faucets. With minimal flow rate improvements to aerators, indoor water consumption can be reduced by 49%. (See Faucet section below for more details.)

Total Consumption, Efficient Aerators and No Leakage Loss	Total Conventional Indoor Residential Annual Water Consumption (Litres) per person per household	Total Indoor Residential Annual Water Consumption with Efficiency Measures & No Leakage per person per household	Total Annual Savings (Litres) per person per household	Total Savings (%) per person per household	Total Water Savings per Household (2005 water and sewer per household)
	138,082.31 345,205.77	71,067.36 176,067.79	67,014.94 169,137.98	48.53% 49.00%	258.78

Figure 6 Total High Performance Consumption Figures

Dual Flush Toilets:

Built Green™ Checklist Points:

Section VI: Water Conservation: Number 6-2

Potential Two Points or More

Conventional Toilets installed after 1998 use approximately 13 LPF (litres per flush). Given the 5.1 flush per person per day- outlined in the preface of the report- each person uses approximately 66.3 litres per day, or 165 Litres per day per household. Dual flush toilets reduce this figure based upon 'number one' or 'number two' requirements. Furthermore, the toilets themselves are simply more efficient. These toilets offer a choice between two water levels for every flush; 1.6 GPF (6 LPF) or 0.8 GPF (3 LPF).

If we assume the same number of flushes per day at an average of 4.3 Litres per flush, each household will consume approximately 54.8 Litres per household per day. Dual flush toilets are 202% more efficient, while reducing water consumption by 67%, saving 40,488 Litres of potable water per year, at a savings to the consumer of \$62 per year.

Dual flush toilet 29% Total	Toilet installed after 1998 (avg. water use)			Dual flush toilet (3, 4 or 6 L per flush)			Savings per household		
	Avg. Water used		Estimated water use (L) daily	Avg. Water used		Estimated water use (L) daily	Daily savings (L)	Yearly savings (L)	% Savings
	per flush	per person	per household	per flush	per person	per household			
	13.0	66.3	165.8	4.3	21.9	54.8	111	40,488	67%

Figure 7 Dual Flush Toilet Consumption Figures

Faucet Aerators/ Shower Water Reduction:

Built Green™ Checklist Points:

Section VI: Water Conservation: Number 6-7

Potential Two Points with Showers additional Point

Faucet aerators and efficient shower heads reduce water consumption by lowering the flow rate. In recent years, these shower heads have become better suited to reduce the latent heat loss associated with their earlier counterparts. No longer are the shower heads misting at such a low level that they lose all of their heat between the time of leaving the tap and reaching our legs, resulting in latent heat loss and frigid showers.

For the purposes of measuring water conservation, conventional water losses through showerheads were measured according to 1994 models. Efficient shower heads have significantly improved for a low flow rate of 9.8 L/min (2.2 imp. Gal/min) or less. Efficient shower heads reduce water consumption by 37% or roughly 26,000 litres per year.

Showerhead 13% Total	Showerhead sold between 1980-1994			Water efficient showerhead (9.5 L/min)			Savings per household		
	Actual		Estimated water use (L) daily	Actual		Estimated water use (L) daily	Daily savings (L)	Yearly savings (L)	% Savings
	Flow (per min.)	per person	per household	Flow (per min.)	per person	per household			
	15.0	79.5	198.8	9.5	50.4	126	73	26,599	37%

Figure 8 Shower Consumption Reductions

Conventional water losses through faucets can be measured by products sold between 1980 and 1994 at a flow rate of 12.5 Litres per minute. Measurable efficiency results for aerators have been assumed a 9.5 Litre per minute flow rate based on aerators sold post 1994. Modern aerators are consequently 32% more efficient than their older, yet commercially available, counterparts.

Faucet or faucet aerator 16% Total	Faucet sold between 1980-1994 (avg. water use)			Faucet sold since 1994			Savings per household		
	Avg. Water used		Estimated water use (L) daily	Water used		Estimated water use (L) daily	Daily savings (L)	Yearly savings (L)	% Savings
	per minute	per person	per household	per minute	per person	per household			
	12.5	101.3	253.1	9.5	76.6	191.6	62	22,451	32%

Figure 9 Faucet Aerator Reduction

Faucets, both kitchen and bathroom, according to Built Green™ must use 8.3 L/min (1.8 imp. Gal./min) or less. This increases the total faucet aerator efficiency to 34% above the norm.

EnerVision Environmental Solutions Team						Indoor Water Conservation Techniques			
Faucet or faucet aerator 16% Total	Faucet sold between 1980-1994 (avg. water use)			Faucet sold since 1994			Savings per household		
	Estimated water use (L) daily		per household	Estimated water use (L) daily		per household	Daily savings (L)	Yearly savings (L)	% Savings
	Avg. Water used per minute	per person		Water used per minute	per person				
	12.5	101.3	255.1	9.5	76.6	191.6	82	22,451	32%
				8.3	67.2	168.1	85	31,043	34%

Figure 10 Built Green™ Faucet Reduction

More significantly however is the reduction of 8,500 Litres of water, which when calculated with the total consumption figures increases the percentage of total indoor water conservation savings from 46 to 49%.

Total Consumption, Efficient Aerators and No Leakage Loss	Total Conventional Indoor Residential Annual Water Consumption (Litres)		Total Indoor Residential Annual Water Consumption with Efficiency Measures & No Leakage		Total Annual Savings (Litres)		Total Savings (%)		Total Water Savings per Household (2005 water and sewer)
	per person	per household	per person	per household	per person	per household	per person	per household	
	138,082.31	345,205.77	71,067.36	176,067.79	67,014.94	169,137.98	48.53%	49.00%	258.78

Figure 11 Total Consumption Reduction Including BG™ Faucets

Front Loading Washer/ Efficient Dishwasher:

Built Green™ Checklist Points:

Section VI: Water Conservation: Number 6-9, 6-10

Potential Three Points/ Potential One Point Respectively

A front loading clothes washer has the capacity to significantly reduce water consumption in any residential home. Built Green™ encourages EnergySTAR appliance and a front loading washer model- for maximum efficiency. Water conservation for front loading washers and dishwashers can be seen below.

Clothes washer 20% Total	Top loading clothes washer sold since 1980			Front loading efficient clothes washer			Savings per household		
	Estimated water use (L) daily		per household	Estimated water use (L) daily		per household	Daily savings (L)	Yearly savings (L)	% Savings
	Avg. Water used per load (L)	per person		Water used per load (L)	per person				
	166.6	61.6	154.1	90.0	33.3	83	71	25,848	46%

Figure 12 High Performance Appliance

Dishwasher 1% Total	Automatic dishwasher sold between 1980-1997			High efficiency dishwasher			Savings per household		
	Estimated water use (L) daily		per household	Estimated water use (L) daily		per household	Daily savings (L)	Yearly savings (L)	% Savings
	Avg. Water used per load	per person		Avg. Water used per load	per person				
	39.7	4.0	9.9	26.0	2.6	8.5	3	1,254	35%

Figure 13 High Performance Appliances

Water Metering:

Water metering and full-cost, volume-based, user-pay systems appear to influence water-conserving behavior. They provide a financial incentive to Canadian householders to use less water. Canadian municipal water prices are currently among the lowest in the world. On average, they are less than half those of most OECD countries and cover roughly half the costs of supplying water and treating wastewater.

In 1999, households paying for water by volume (i.e., metered) used about 288 litres per person per day. Canadian households paying a flat rate for water used 433 litres per person per day, or, 50% more than metered households.⁶ About 57% of Canada's municipal population had water meters in 1999, up from 52% in 1991, a very gradual increase. Overall, larger centres (population greater than 100,000) have higher levels of metering than smaller centres. In 1999, Ontario and the Prairie provinces had the highest levels of metering (83 and 88%, respectively), compared with Quebec, which had significantly lower levels (15%).⁷ The practice of water metering in Calgary has a significant impact on water usage and is appropriate for all new developments.

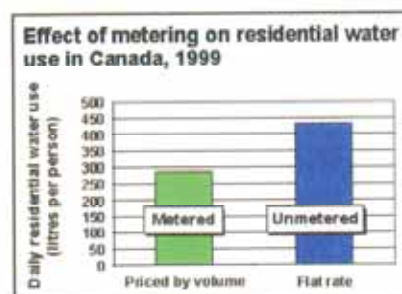


Figure 14 Site Graph Metering⁶

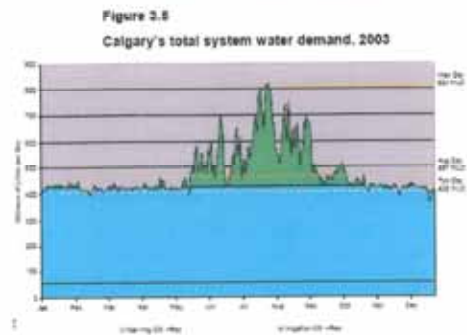
⁶ http://www.ec.gc.ca/soer-ree/English/Indicators/Issues/Urb_H2O/Bulletin/uwimg2_e.cfm

⁷ http://www.ec.gc.ca/soer-ree/English/Indicators/Issues/Urb_H2O/Bulletin/uwimg2_e.cfm

Outdoor Residential Water Conservation Techniques:

Peak outdoor water use – typically attributed to watering lawns and washing cars, increases the demand for potable water consumption by approximately 40% for the period of June, July and August. "Although indoor water use remains relatively constant throughout the year, outdoor use peaks in spring and summer when Calgarians irrigate their lawns and gardens. This seasonal variation is significant: lawn and garden watering can increase daily residential use by up to 50 per cent."⁸

Problematically when we estimate the total number of litres it would take to water a typical lawn twice per week at a half hour per watering, the end result indicates significantly less water demand. If the average lawn is approximately 1,000 square feet, most sprinkler systems hooked up to an exterior residential hose will consume 4 GPM (gallons per minute) or a total of 125 Gallons for a 31.25 average watering period. The average lawn consumes between 946 to 1,253 Litres of water per soaking; if watered conservatively.

**Figure 15 Outdoor Seasonal Spike⁸**

Outdoor Lawns and Car Washing	Total Conventional Household Indoor Consumption For 3 month season	Total Consumption with 40% Increase	Sum of Lawn, Car and Indoor Consumption	Total Lawn Consumption Lawn 3 month sea % of Total	Total car wash consumption three month season % of Total	
Total 40% Seasonal Increase	86301.4	120822.0179	99,132.50	11355.0	11.45	1,476.15 1.49

Figure 16 Conventional Water demand for Irrigation and Leisure

It is quickly apparent that the difference between the amount of water required to water a lawn and/or wash the car is significantly less than the amount of water associated to residential irrigation by the City. We can assume that the difference therefore lies in user behaviour, which if eliminated will reduce the dramatic 40% spike in water consumption throughout the summer season. This additional demand roughly accounts for 9% of the total annual household demand.

Total Conventional Household Indoor Consumption For 3 month season	Total Household Consumption 3 Month Season including additional 40%	Water Consumption associated with Lawns and Car Washing (Litres)	Total Annual Consumption including 3 Month 40% Increase	% of Total Consumption attributed to Outdoor activity
86301.4	120,822.02	34,520.58	379,726.34	9%

Figure 17 Actual Consumption demand for Irrigation and Leisure

The potential to reduce outdoor water peak demand requires diligence upon the builder. Nonetheless, it is certainly achievable. Strategic use of rain barrels, drip water irrigation systems for lawns and gardens, pressure washer hoses for automobiles as well as site specific regulations for the use of water during the summer season could negate the peak season demand.

By reducing outdoor potable water consumption demand and replacing it with either captured rainwater or drought resistant landscaping, single family residential homeowners can reduce their total annual water consumption by 54% in conjunction with highly efficient indoor efficiency techniques.

Total Annual Household Consumption including 3 Month 40% Increase	Total annual Water Consumption with Indoor and Outdoor Efficiency Measures	% Savings	Savings in Litres	Savings to Homeowner
379,726.34	176,067.79	53.63%	203,658.55	311.60

Figure 18 Total Household Consumption Efficiency including Outdoor Measures

⁸ The City of Calgary, *Draft Water Efficiency Plan, 2005*.

[http://www.aipa.org/Adobe Files/Conservation Efficiency Productivity Etc/2005 City of Calgary DRAFT Water Efficiency Plan.pdf](http://www.aipa.org/Adobe%20Files/Conservation%20Efficiency%20Productivity%20etc/2005%20City%20of%20Calgary%20DRAFT%20Water%20Efficiency%20Plan.pdf)

Water Barrel- Rainwater Collection:**Built Green™ Checklist Points:**

Section VI: Water Conservation: Number 6-16
Potential One to Three Points

Supplying a water barrel encourages homeowners to use rainwater for landscaping needs and therefore save on potable water.

If the average lawn is approximately 1,000 square feet, most sprinkler systems hooked up to an exterior residential hose will consume 4 GPM (gallons per minute). This is the equivalent of 15.1 litres of fresh potable water per minute. Using the City of Waterloo and the Greater Vancouver District as precedents, most people will water their lawn- given there is no rainfall, an average of two times per week.- resulting in the consumption of 946.3 Litres of water per week or a total of 11,355 Litres of water for the three month watering season.

A rain barrel which meets the total demand for watering lawns and gardens would therefore offset this 11,355 litres of water by 100%.

Meeting the total demand for the size of lawn therefore becomes the objective of a conscious builder. If two rain barrels are placed at the rear of a home and have access to 50% of the total roof area on a 1500 square foot footprint- the potential rain water collection area is 838 square feet. Most likely builders would install two 60 or 80 Gallon rain barrels, each with a separate eaves trough, rigged with a spigot that fed a drip irrigation line. One inch of rain on one square foot produces approximately 0.62 Gallons of water (2.34 Litres).⁹

Monthly averages				
	May	Jun	Jul	Aug
	Averages for May	Averages for June	Averages for July	Averages for August
50"	Average High: 16"	Average High: 20"	Average High: 23"	Average High: 23"
40"	Average Low: 3"	Average Low: 8"	Average Low: 10"	Average Low: 9"
30"	Average Rainfall: 3.99 cm	Average Rainfall: 7.31 cm	Average Rainfall: 4.71 cm	Average Rainfall: 4.7 cm
20"	Avg Rainfall (in) 1.570866142	2.877952756	1.854330709	1.850393781

Figure 19 Sample Online Weather Data¹⁰

By Calgary weather data, the average rainfall for May, June, July and August totals approximately 8.2 inches.¹⁰ Over an 838 square foot roof, total potential water retention is 519.56 Gallons or roughly 1966 Litres per inch of rainfall. Seasonally, Calgarians have the ability to capture 4,234 Gallons, or 16,027 Litres of water. Although the quantity of water is sufficient to handle the total irrigation requirements for a sod lawn, there is an underlying reliance upon an even distribution of rain throughout the four months. Additional rain barrels, for increased storage, may be required if storms are heavy and infrequent.

Total Potential Water (inches)	Avg. Roof Area	1" rain on Avg Roof	1" rain on Avg Roof	Total Potential Accumulation (G)	Total Potential Accumulation (L)
8.15	838	519.56	1966.5346	4234.414	16027.25699

Figure 20 Sampling of Potential Rainwater Collection per Home

Due to the discrepancy between the measured losses of 40% and the actual requirements for irrigating a sod lawn, EnerVision environmental solutions recommends that exterior sod lawns be removed from the project and replaced by xeriscaped exterior yards, while captured rainwater be specifically allocated through a drip irrigation system to gardens.

⁹ http://www.gilmour.com/Watering_Hose_End/wateringtips.asp

¹⁰ <http://weather.uk.msn.com/local.aspx?wealocations=wc:CAXX0054>

Drip Water Irrigation Hose:

Built Green™ Checklist Points:

Section VI: Water Conservation: Number 6-11

Potential Three Points

Peak outdoor water use – typically attributed to watering lawns and washing cars, increases the demand for potable water consumption by approximately 40% for the period of June, July and August. If the Average lawn is approximately 1000 square feet, most sprinkler systems hooked up to an exterior residential hose will consume 4 GPM (gallons per minute). The average lawn consumes roughly 473 Litres of water per half hour soaking.

Using the City of Waterloo and the Greater Vancouver District as precedents, most people will water their lawn- given there is no rainfall an average of two times per week. If we conservatively estimate that a homeowner will water their lawn with a conventional sprinkler for half an hour, twice per week, this results in the consumption of 946.3 Litres of water per week or a total of 11,355 Litres of water for the three month watering season; just over 10% of the total potable water demand by residential homes.

Installed Drip Water Irrigation systems use significantly less water. In order to properly compare a conventional sprinkler system with a drip water irrigation hose, it is important to assume that the drip water hose is also attached to the potable water source on the exterior of the home. Conventionally, drip water hoses are hooked up to water barrels- where a resident may turn on the spigot of the water barrel on a hot day and slowly allow the barrel to drain. By nature, this reduces the potable water consumption associated with watering lawns by 100%.

Drip systems typically utilize 4 Gallons per Hour, or given the above parameters, the equivalent of 15.8 litres per week or 158 litres for the entire season. This results in a total savings of 98% or 11,166 Litres of water conservation per season.

	Conventional Sprinkler 4 GPM			Sprinkler Drip Lines 4 GPH			Savings per household		
	**see basic info	Estimated water use (L) week		Estimated water use (L) daily			Weekly	Per Season	%
Conventional Sprinkler @ 4GPM, Drip @ 4 GPH	Avg. Water / minute	per week	peak season (3 months)	Avg. Water / minute	per week	per household			
	15.1	946.3	11355.0	0.3	15.8	169.3	930	11,166	98%

Figure 21 Conventional vs. Drip Sprinkler Reductions

Efficient Sprinkler System:

Built Green™ Checklist Points:

Section VI: Water Conservation: Number 6-11

Potential Three Points

Please see Outdoor Site Specific Water Conservation Techniques. Built Green™ points ask builders to "show storm water management plan & design; water efficient irrigation systems, sensors, regulators, micro drip feed systems etc."¹¹

Useful References:

<http://www.vancouver.ca/engsvcs/watersewers/water/conservation/outdoor.htm>

¹¹ Built Green Checklist 2007. http://www.builtgreencanada.ca/uploads/files/2007_Built_Green_Checklist_2007-Jan-22.xls

The Metropolitan Water District in Los Angeles California did an interesting project in combination with *The Car Wash Guys*- a company whose primary business practice is washing cars, heavy machinery and airplanes. The report itself creates a cross comparison between washing your vehicle with a typical garden hose and a bucket of suds, vs. utilizing a conventional pressure washer with a soap cap attachment.

Conventional car washing- in its most efficient manner estimates that a typical garden hose flows at approximately 60 PSI or the equivalent of 10 Gallons per minute (37.85Litres/minute). Assuming a homeowner has a gun attachment to stop the flow of water from running continuously, *The Car Wash Guys* estimated that most cars are wet down for 2 minutes- using 20 Gallons of water, washed utilizing a 5 gallon bucket of soapy water and then rinsed for four minutes or 40 Gallons of water. The results of water use is 65 Gallons (246 Litres) per wash. If a homeowner washes both of their cars once per month (conservative estimate) or a total of 6 car washes per season, a total of 1,476 litres of water will be used.

Utilizing a conventional electric pressure washer- (plumbed by the builder) - would significantly reduce outdoor residential water consumption and storm water runoff. Pressure washers typically are set at 1500 PSI and use 2.4 Gallons per minute (9 Litres per minute). Given the efficient nature of pressure washers- most homeowners will both reduce the amount of time taken to wet and rinse their cars, and further reduce their water consumption based upon a lower Gallon per minute flow rate. Using commercial car washes as precedent- most car washes set the initial wet time for 30 seconds, soap and water their cars for 45 seconds (typically using less soap in an attached cup and reducing effluent runoff) and then rinse for an additional 45 seconds- 2 minutes of total spray time. This results in a total consumption of 109 Litres per household, including 6 car washes per season. Pressure washers are 738% more efficient then their hose counterparts while reducing water demand by 1367 Litres per year/ per home.

Conventional Hose from Garage- Supplied Power Washer in Garage	Conventional Car Wash Hose 10 GPM			Pressure Washer In Garage- 2.4 GPM			Savings PER		
	Per Wash	# per summer	Annual Total	Avg. Water used	# per summer	per household	Wash	Yearly	%
	246.0	6.0	1476.2	18.2	6.0	109.0	228	1,367	93%

Figure 22 Conventional Hose vs. Pressure Washer for Cars

Given an increase in water demand during June, July and August of 40% and a total conventional water consumption of approximately 12800 Litres for watering lawns and washing cars- the above figures represent a total of 11% of outdoor water use and approximately 2% of the total residential water consumption including indoor use during this peak period.

Outdoor Lawns and Car Washing	Total conventional Indoor Consumption 3 month season	Total Consumption 3 Month Season	Total Consumption Lawn 3 month sea % of Total	total car wash consumption three month seas % of Total	
Total 40% Seasonal Increase	92952.4	105,783.53	11,355.00 10.73	1,476.15 1.40	

Figure 23 Total Consumption Percentage Associated to Washing Cars

Educational Buyers Package:
 Built Green™ Checklist Points:
 Section VI: Water Conservation: Number 6-13
 Potential Point

EnerVision Environmental Solutions Team highly recommends an Educational Package which builders may give to new home occupants. Educational packages will act as both a marketing piece while informing clients about the intricacies of their homes- in terms of energy and water conservancy, mechanics, maintenance and community amenities.

Outdoor Site Specific Water Conservation Techniques: Consider Community Regulations

As many municipalities have grown, their water demands have increased steadily to reflect the unprecedented population growth. Calgary will become a city of one million people by 2011 and be required to maintain the needs of its populace while ensuring the long term sustainability of its water supply. Community regulations imposed by builders and developers aid in this role and support a larger sustainable urban initiative. Many of these regulations might include:

- Prohibiting runoff of potable water into gutters, sidewalks, streets and other non-landscaped areas;
- Prohibiting washing vehicles in driveways;
- Prohibiting the washing of driveways, sidewalks, patios, and other non-landscaped areas with potable water;
- Ensuring irrigation systems are equipped with rain sensors and valves that automatically shut down the irrigation system when it is raining;
- Penalizing homeowners who have leaky hoses, nozzles, taps, irrigation sprinkler heads, etc.;
- Irrigating narrow strips of vegetation with soaker hoses rather than oscillating sprinkler systems;
- Mandating the time of day when lawns can be watered (early morning/late evening and only when winds are light);
- Mandating the times when decorative water fountains are operating, especially during times of drought;
- Mandating decorative fountains use non-potable water for their operation and/or have re-circulating systems to conserve water.

Useful References:

<http://www3.gov.ab.ca/env/water/Conservation/residential.cfm#LandscapeWaterUse>

<http://www.qvrd.bc.ca/water/sprinkling-regulations.htm>

Permeable Paving Materials

Built Green™ Checklist Points:

Section VI: Water Conservation: Number 6-12

Potential Three Points

Effective Impervious Areas (EIA) are considered measurable areas of land which normally flow directly into stormwater pipes and city septic systems. EIA's are typically a physical measurement of impervious surfaces- such as roadways, driveways and even roof area on institutional and commercial buildings that are directly connected to a drainage system.

Permeability is not a black or white condition, as is often the interpretation from literature that discusses the extent of permeable vs. impermeable areas. For example, traditional asphalt is 100% impermeable when it is installed (ideally), but over time cracking and settling result in impermeability of 90 to 95%.¹² Gravel is usually considered pervious, but highly compacted gravel can be almost completely impervious. Landscaped areas are typically considered pervious; however, this is highly dependent on the depth and type of growing medium combined with the underlying material.¹³

The use of permeable materials throughout site development will result in typical Low Impact Development (LID) standards. LID is defined as land use and development standards and practices that reduce the impact of land development on the natural environment. The basic principles are to maximize infiltration by minimizing impervious surfaces, creating hydraulic disconnects, lengthening water flow paths, dispersing runoff, and providing water storage. This leads to conservation of natural features by reducing the harmful effects of high peak flows and by retaining summer base flows in creeks. LID practices are generally source control methods of handling water to approximate natural storage and infiltration functions to the degree possible. Benefits of LID do not specifically relate to a minimization of potable water usage, but rather, minimizing effluent water flow onto municipal utility infrastructure while reducing pollutants from contaminating fresh water sources.

¹² Associated Engineering. Report on Storm Water Management Alternatives: Coquitlam B.C. <http://www.coquitlam.ca/NR/rdonlyres/9CCD3E1F-9E7A-48FA-BC6C-547D7FED77EE/29789/45STORMWATERMANAGEMENTALTERNATIVES.pdf>

¹³ Associated Engineering. Report on Storm Water Management Alternatives: Coquitlam B.C. <http://www.coquitlam.ca/NR/rdonlyres/9CCD3E1F-9E7A-48FA-BC6C-547D7FED77EE/29789/45STORMWATERMANAGEMENTALTERNATIVES.pdf>

1. Disconnected impervious surfaces (e.g., sidewalks and roof leaders drain to pervious landscape areas, not storm sewers),
2. Minimize impervious surfaces (e.g., narrower roads, driveways and sidewalks, decks instead of patios, permeable porous paving, underground parking instead of surface impervious parking),
3. Absorbent landscaping (e.g. 300 mm soil depth, increased planting areas, increased surface roughness through grading or planting, increased flow path through sheet flow, flattened swales, preservation of existing vegetation),
4. Infiltration facilities (e.g., surface bioretention areas or rain gardens, subsurface channels or infiltration chambers, biofiltration swales in parking lots),
5. Road side drainage swales or infiltration trenches.

Infiltration From Local Road/ Driveway/ Sidewalk Networks:

The following is an excerpt of best practices from a report done for the City of Coquitlam B.C. by Associated Engineers. There are two primary methods by which the water from these roads could be infiltrated: using roadside swales or with curb cuts enabling the water to flow into an infiltration trench, as shown below. The advantage of Option 3 vs. Option 4 is that the positive drainage to the swale performs better. The disadvantage could be perceived to be a potential untidy appearance (the concrete edge can partially address this), and the fact that there is no barrier between vehicles and the swale. Option 4 retains the curb to address these considerations; however, more infrastructure is required to ensure that the water flows into the trench.¹⁴

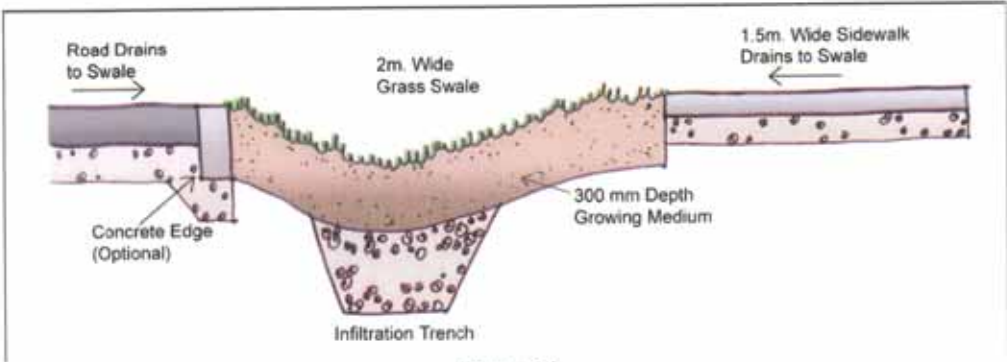


Figure 24

Option 3: Increase growing medium to 300 mm and infiltrate water from local roads with a swale and no curb. - **Estimated EIA 32% (approx.)**¹⁵

¹⁴ Associated Engineering. Report on Storm Water Management Alternatives: Coquitlam B.C. <http://www.coquitlam.ca/NR/rdonlyres/9CCD3E9F-9E7A-48FA-BC6C-547D7FED7FEE/29789/45STORMWATERMANAGEMENTALTERNATIVES.pdf>
¹⁵ Associated Engineering. Report on Storm Water Management Alternatives: Coquitlam B.C. <http://www.coquitlam.ca/NR/rdonlyres/9CCD3E9F-9E7A-48FA-BC6C-547D7FED7FEE/29789/45STORMWATERMANAGEMENTALTERNATIVES.pdf>

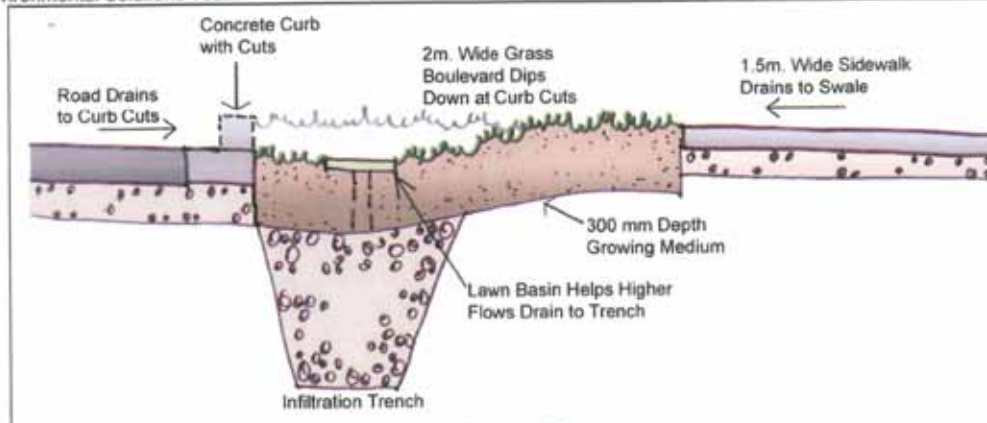


Figure 25

Option 4: Increase growing medium to 300 mm and infiltrate water from local roads with a trench and curb cuts - Estimated EIA 32% (approx.)¹⁶

Both of these options may further be tied into site specific grading towards a larger stormwater retention pond.

¹⁶ Associated Engineering. Report on Storm Water Management Alternatives: Coquitlam B.C. <http://www.coquitlam.ca/NR/rdonlyres/9CCD3E1F-9E7A-48FA-BC6C-547D7FED17EE/2978974/STORMWATERMANAGEMENTALTERNATIVES.pdf>

CITY OF COQUITLAM
 CITY OF PORT COQUITLAM

4 – STORM WATER MANAGEMENT
 ALTERNATIVES

Traditional and Low Impact Development Methods	EIA (permeable underlying material)	EIA (impermeable underlying material)
Traditional form of development with 100 mm depth growing medium in yard areas	60%	90% (permeability of yards reduced by 50% due to expected overflow)
Traditional form of development with 200 mm depth growing medium in yard areas	60%	70% (permeability of yards reduced by 25% due to expected overflow)
300 mm depth growing medium in yard areas	60%	90% (some overflow in saturated winter conditions could still occur)
ADD permeable patio, walkways, and service area	40%	40% (only with minimum 300 mm base for drainage)
ADD garage roof disconnected, e.g. holds water 25 mm deep for slow release; "green" roof minimum 100 mm deep; or roof drains to infiltration area – could include cistern.	30%	30%

Note: the depth of growing medium is not a factor with a completely permeable subgrade since the water will all drain away. If the underlying material is somewhat permeable, the greater growing medium depths will encourage infiltration.

Figure 26: Permeable Site Condition report- Associated Engineering

Stormwater Retention Ponds:

Urban stormwater, whether from rain or melting snow, flushes debris and contaminants from roads, parking lots, sidewalks, rooftops, lawns, and other surfaces. Stormwater can contain suspended solids, nutrients, bacteria, oil and grease, trace metals, and organic contaminants such as pesticides, polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs).

Stormwater detention ponds are designed and constructed to reduce downstream flooding and erosion by controlling the peak flow, frequency of peak flow and velocity of stormwater. These ponds are also designed to trap and settle much of the solid material carried by the stormwater as sediment, which improves watershed quality and helps reduce contaminant loads into rivers or lakes. Structural devices, such as oil and grit separators, may be incorporated upstream of the pond system to capture oil and larger particles. Aquatic vegetation can serve as a biological filter to retain fine sediment and the contaminants bound to this sediment.

Some stormwater contaminants can remain in the water column of the pond and may be toxic to wildlife living in the water. Other contaminants such as trace metals and organic compounds bind with solids that settle to the bottom of the pond as sediment. As sediment accumulates, the concentration of metal and organic contaminants could exceed levels that have toxic effects on the organisms that live or feed in the sediment. The contaminants may also accumulate in the tissues of animals living in the water or sediment and predators that consume these animals. It is therefore necessary to clean out the ponds periodically and dispose of the sediment properly.

Useful References:

http://www.on.ec.gc.ca/wildlife/factsheets/fs_stormwater-e.html

http://www.ene.gov.on.ca/envision/gp/4329e_8.htm

Mahogany Community Plan: http://www.ucalgary.ca/cities/Places_and_People/Chapter%2011%20-%20Mahogany%20Community%20Plan.pdf

Salo, J. E., Harrison, D., and Archibald, E. M., Removing Contaminants by Groundwater Recharge Basins, Journal of AWWA, 1986.

Schueler, T. R., and Galli, F. J., Finding Retrofit Opportunities in Urban Watershed: Watershed Restoration Sourcebook, Anacostia Restoration Team. Metropolitan Council of Governments, 1992.

Xeriscaping / Naturalized Landscaping:**Built Green™ Checklist Points:**

Section VI: Water Conservation: Number 6-15
Potential Two to Four Points

Potential Problems:

- Poorly graded sites
- Soil type such as clay
- Little to no shade- hot and higher percentage of glare
- Temperature fluctuations within the home
- Break down of building components from exposure
- Walkways, gates and fencing are the only visual perimeters/ definition of space
- Garbage, compost, recycling location

Benefits:

- Beautification of individual properties
- Collective feeling/aesthetic amongst community
- Control of energy within homes
- Regulation of water/ irrigation on the site
- Water conservation per home with rain barrels and eaves trough placement
- Potential communal areas include parks/ fountains/ garbage and recycling storage
- Healthy lawns/ gardens = healthy community
- Reduce maintenance on individual yards and within the community
- No need for herbicides or insecticides- improving health and meeting health concerns of demographic with small children or dogs
- Water use is minimized as plants are drought resistant
- Varied plants, trees, shrubs and an emphasis on perennial growth allows for varied wildlife, birds and insects that will continue to return
- Ponds and curved landscaping allow for visual depth to a small confined space
- Benches and shade open up parklands to elderly demographic

Potential Ideas:

- Naturalized lawns- little to no grass (lawn) but garden, landscaping or xeriscaping
- Soil improvement- Double Dug Soil, bark mulch, coarse sand, leaf mould, mushroom manure, compost etc.
 - Often this will eliminate noxious weeds and allows for irrigation
 - Mandate to mulch gypsum board and wood cut-off ends can often be included in the mixture and reduce construction waste/ hauling fee costs.
- Compatible plants to environment- prairie grasses, yucca, northwestern dry environment
- Drifter plants- ground cover plants (i.e. Creeping low-level vines or 'living mulch', clover)
- Wood mulch layers reduce weed growth
- Terrain differentiation- changes in grade, raise beds with concrete or wood
- Natural Shading:- Birch, Hawthorne, Mountain ash, Dwarf Korean maples- other deciduous trees for summer shading, winter heating in close proximity (east or west) allocation to windows.
- Fast Growing Species- New Developments are often labeled new communities and starter communities because they do not have an older feel or historic component. – Trees which grow faster will give a historic quality or overhang the street much faster.
- Xeriscaping- specific type of landscaping to reduce irrigation, development costs and long term maintenance & costs.
 - Allows for direct flow of rain water off roofs, garages, roads etc.
 - Xeriscaping improves with age of plants- continually beautifying the area

Useful References:

Williams, Sara. Creating the Prairie Xeriscape: Water Efficient, Low Maintenance Gardening. University of Saskatchewan Press. 1997.
 Benett, Jennifer. Dry-Land Gardening: A Xeriscape Guide For Dry-Summer Cold-Winter Climates. Firefly Press. 1998.
 Knopf, John. The Xeriscape Flower Garden: A Water wise Guide For The Rocky Mountain Region. Johnson Press. 1991.

Figures:

FIGURE 1 TOTAL ANNUAL POTENTIAL SAVINGS PER HOUSEHOLD	3
FIGURE 2 TYPICAL INDOOR DOMESTIC WATER USE	5
FIGURE 3 TOTAL DAILY HOUSEHOLD CONSUMPTION	6
FIGURE 4 TOTAL INDOOR CONSUMPTION VS. EFFICIENT CONSUMPTION	6
FIGURE 5 TOTAL CONSUMPTION FIGURES WITHOUT LEAKAGE LOSSES	6
FIGURE 6 TOTAL HIGH PERFORMANCE CONSUMPTION FIGURES	6
FIGURE 7 DUAL FLUSH TOILET CONSUMPTION FIGURES	7
FIGURE 8 SHOWER CONSUMPTION REDUCTIONS	7
FIGURE 9 FAUCET AERATOR REDUCTION	7
FIGURE 10 BUILT GREEN™ FAUCET REDUCTION	8
FIGURE 11 TOTAL CONSUMPTION REDUCTION INCLUDING BG™ FAUCETS	8
FIGURE 12 HIGH PERFORMANCE APPLIANCE	8
FIGURE 13 HIGH PERFORMANCE APPLIANCES	8
FIGURE 14 SITE GRAPH METERING ⁶	8
FIGURE 15 OUTDOOR SEASONAL SPIKE ⁸	9
FIGURE 16 CONVENTIONAL WATER DEMAND FOR IRRIGATION AND LEISURE	9
FIGURE 17 ACTUAL CONSUMPTION DEMAND FOR IRRIGATION AND LEISURE	9
FIGURE 18 TOTAL HOUSEHOLD CONSUMPTION EFFICIENCY INCLUDING OUTDOOR MEASURES	9
FIGURE 19 SAMPLE ONLINE WEATHER DATA ¹⁰	10
FIGURE 20 SAMPLING OF POTENTIAL RAINWATER COLLECTION PER HOME	10
FIGURE 21 CONVENTIONAL VS. DRIP SPRINKLER REDUCTIONS	11
FIGURE 22 CONVENTIONAL HOSE VS. PRESSURE WASHER FOR CARS	12
FIGURE 23 TOTAL CONSUMPTION PERCENTAGE ASSOCIATED TO WASHING CARS	12
FIGURE 24	14
FIGURE 25	15
FIGURE 26: PERMEABLE SITE CONDITION REPORT- ASSOCIATED ENGINEERING	16

References:

- Associated Engineering. Report on Storm Water Management Alternatives: Coquitlam B.C. <http://www.coquitlam.ca/NR/rdonlyres/9CC03E0F-9E7A-48FA-BC6C-547D7FED77E7/29789/45/STORMWATERMANAGEMENTALTERNATIVES.pdf>
- Beeston, Margarette: City of Calgary. EnerVision, eds. Built Green™ Water Conservation: City of Calgary Water Consumption Statistics. EnerVision: Calgary, 2006.
- Built Green™ Checklist 2007. http://www.builtgreencanada.ca/uploads/files/2007_Built_Green_Checklist_2007-Jan-22.xls
- The City of Calgary. Draft Water Efficiency Plan. 2005. http://www.apa.org/Adobe_Files/Conservation_Efficiency_Productivity_Etc/2005_City_of_Calgary_DRAFT_Water_Efficiency_Plan.pdf
- Doi, Andrew K., Planning for Water Conservation: GVRD: MDP Research Project Simon Fraser University. 2000. <http://www.rem.sfu.ca/pdf/doi.pdf>
- Environment Alberta. Water Conservation web page taken April 23rd 2007. <http://www3.gov.ab.ca/env/water/Conservation/residential.cfm>
- Gilmour Watering Hose: Web reference April 24th 2007. http://www.gilmour.com/Watering_Hose_End/wateringtips.asp
- Michelsen, Ari M., J. Thomas McGucking, and Donna Strumpf. 1999. Nonprice Water Conservation Program as a Demand Management Tool. Journal of the American Water Resources Association 35 (3): 593-602.
- Weather Data UK. Web Reference April 23th 2007. <http://weather.uk.msn.com/local.aspx?wealocations=wcCAXX0054>

Appendix D (b)

The following checklists may be used for implementation of BuiltGreen communities, multi-family housing, and single-family housing. These checklists and more information on BuiltGreen can be found on the internet at <http://www.builtgreen.net/>.



GREEN COMMUNITIES Self-Certification Checklist

Check items you will be including in this project to qualify for a BUILT GREEN™ star rating.

Requirements to Qualify at 1-Star Level

(All ★ items plus orientation and commitment to Built Green™ Home Builder Program for all homes in the community at the 1-Star Level)

- Program Orientation (one time only)
- Earn 100 points total from Sections 1 through 3, any items, with at least 15 points each section
- A percentage of new home starts in the development must meet the Built Green™ 1-Star Level requirements (Action Item 1-60)
- Orient & Promote Built Green™ to Builders in the Development (Action Item 1-61)
- Do Not Dispose of Topsoil in Lowlands or Wetlands (Action Item 3-10)
- Optimally Maintain all Temporary Erosion Control Practices (Action Item 3-21)
- Properly Dispose of Hazardous Wastes (Action Item 3-25)

Requirements to Qualify at 2-Star Level

- Meet 1-Star requirements, plus
- Earn 200 points total (100 additional points) from Sections 1 through 3, with at least 20 points from each Section, plus
- Attend a BUILT GREEN™ approved workshop within past 12 months prior to certification

Requirements to Qualify at 3-Star Level

- Meet 2-Star requirements, plus
- Earn 350 points total (150 additional points)

Section One: Site Selection & Design

SELECTION

- ☐ (10-45) 1-1. Redevelop and restore existing sites
- ☐ (10) 1-2. Locate to reduce dependence on automobiles
- ☐ (10) 1-3. Prepare site analysis and inventory for all potential sites
- ☐ (5) 1-4. Choose site with no environmentally-sensitive areas

DESIGN

Land Use

- ☐ (30) 1-5. Create a Low Impact Development
- ☐ (5) 1-6. Design to avoid impact on sensitive areas
- Infiltration**
- ☐ (15) 1-7. Design to achieve no more than 10% effective impervious surface areas
- ☐ (4-8) 1-8. Use filter strips to separate impervious surfaces
- ☐ (5) 1-9. Design site water management system that allows groundwater to recharge
- ☐ (1 each) 1-10. Use infiltration system for surface water runoff

- Treatment**
- ☐ (1-3) I-11. Meet treatment standards using nature-based methods or exceed treatment standards
- ☐ (2) I-12. Provide stormwater treatment for parking lots/traffic island runoff using bioretention areas, filter strips, or other practice
- ☐ (1) I-13. Clearly label all storm sewer inlets with stenciling to inform residents about proper stormwater protection
- Flow Control and Conveyance**
- ☐ (3) I-14. Use natural drainage for surface water runoff
- ☐ (1) I-15. Use infiltration basins for flow control
- Storage and Detention**
- ☐ (8) I-16. Use constructed wetlands for stormwater storage and detention
- ☐ (1) I-17. Use detention ponds for surface water runoff
- Wastewater Treatment**
- ☐ (25) I-18. On-site wastewater treatment
- Density**
- ☐ (6) I-19. Design for maximum population density allowable under Growth Management Act
- ☐ (5) I-20. Plan for variable lot sizes to encourage higher density
- ☐ (4) I-21. Cluster homes on site
- Open Space Planning**
- ☐ (3-6) I-22. Preserve usable open spaces
- ☐ (6) I-23. Provide and preserve wildlife corridor
- ☐ (2-4) I-24. Provide attached parks or pocket parks within buildable area
- Vegetation**
- ☐ (3-10) I-25. Preserve a percent of lowlands and areas with mature vegetated soils
- ☐ (4-10) I-26. Preserve percentage of existing native vegetation and soils
- ☐ (10) I-27. Clear only areas needed to install roadways, parking areas, and common area buildings
- Paved Surface Design**
- ☐ (2) I-28. Design streets to conform to natural terrain
- ☐ (5) I-29. Where permitted, design no street curbs or gutters
- ☐ (6-10) I-30. Minimize pavement in street design
- ☐ (1 each) I-31. If design calls for cul-de-sacs, hammerheads, or other dead-ends, connect ends with paths
- ☐ (2) I-32. Install traffic-calming devices, such as curb bulbs
- ☐ (5-10) I-33. Design parking areas and pathways to minimize impact of surface water runoff and reduce impervious surface area
- ☐ (10) I-34. Use porous paving options for light-traffic areas
- ☐ (4) I-35. Use recycled-content materials for paving

- ☐ (5) I-36. Eliminate blacktop, use new coats or integral colorants to achieve light-colored surfaces
- ☐ (15) I-37. Provide alleys for rear garage access

Community Enhancement

- ☐ (5-15+) I-38. Create a mixed-use (residential/commercial) development
- ☐ (6) I-39. Provide mix of housing types
- ☐ (2-15) I-40. Provide community facilities

Landscaping – Common Areas

Trees and Shrubs

- ☐ (15) I-41. Participate and qualify for the National Arbor Day Foundation's "Building *With Trees*" Recognition Program
- ☐ (10) I-42. Create 65% canopy in completed development
- ☐ (8) I-43. Plant appropriate trees and shrubs to provide shade (within 5 years) on at least 30% of impervious surfaces on site

Plant Selection

- ☐ (3-5) I-44. Landscape common areas with plants that will not need supplemental watering once established (appropriate for site topography, soil types, and sun exposure)
- ☐ (5) I-45. Properly install a grass type requiring less irrigation and minimal maintenance for common areas

Plant Establishment

- ☐ (15) I-46. Amend disturbed soil to a depth of 8 to 10 inches to restore soil environmental functions
- ☐ (5) I-47. Mulch landscape beds in common areas with 2 inches of organic material
- ☐ (3) I-48. If choosing to use fertilizers, use natural organic or slow-release fertilizers to establish vegetation in common areas

Outdoor Amenities

- ☐ (3) I-49. Specify non-toxic or low-toxic outdoor landscaping lumber
- ☐ (4-8) I-50. Use recycled-content or resource-efficient site accessories

Efficient Irrigation

- ☐ (3-8) I-51. Install high-efficiency irrigation system where on-going irrigation is needed
- ☐ (3-5) I-52. Install irrigation system using recycled/reclaimed water
- ☐ (8) I-53. Install no permanent irrigation system

Transportation

- ☐ (20) I-54. Develop Integrated Mobility Center
- ☐ (15) I-55. Develop Transportation Management Plan
- ☐ (4-6+) I-56. Provide pedestrian-friendly access routes beyond code

- ☐ (5+) I-57. Provide commuter lot near arterials and collector streets
- ☐ (3 each) I-58. Provide on-site transportation shelters
- ☐ (3) I-59. Provide connectivity with surrounding street network

Integration & Innovation

- ☐ (★) I-60. Require a percentage of new home starts in the development to meet Built Green™ Home Builder 1-Star level requirements
- ☐ (★) I-61. Orient & promote Built Green™ to builders in the development
- ☐ (2-20) I-62. Require homes in development to meet Built Green™ Home Builder 2-star level or more requirements
- ☐ (5-15) I-63. Orient lots for passive solar
- ☐ (10) I-64. Use alternative heat and energy sources
- ☐ (8) I-65. Design street and other exterior lighting to reduce light pollution and trespass
- ☐ (8) I-66. Design and construct common area buildings to meet the 2-star level of the Built Green™ Home Builders Program
- ☐ (5) I-67. Provide for public space recycling collection
- ☐ (1-10) I-68. Extra Credit for innovation

Section Two: Planning & Education

COVENANTS & BUILDER GUIDELINES

Pedestrian Friendly Design

- ☐ (3-10) 2-1. Require shared parking for mixed use developments
- ☐ (5) 2-2. Use minimum parking standards as maximums for on-street and off-street parking
- ☐ (5) 2-3. Require pedestrian-friendly design amenities

Other Covenants

- ☐ (5) 2-4. Require Built Green™ qualifying exterior materials and finishes
- ☐ (5) 2-5. Require protection of trees and open spaces
- ☐ (3) 2-6. Require builders to provide homeowners/residents with recycling storage and collection system
- ☐ (3) 2-7. Prepare builders' guidelines on exterior lighting to reduce light pollution and trespass

EDUCATION

- ☐ (30) 2-8. Conduct design and planning Charette
- ☐ (2) 2-9. Use Built Green™ common area buildings to educate residents
- ☐ (4) 2-10. Prepare a homeowners' handbook for living in a green community
- ☐ (4) 2-11. Provide a builders' field guide of best management practices
- ☐ (2) 2-12. Provide interpretive signs highlighting key environmental and other features
- ☐ (2) 2-13. Encourage builders in your development to build lots with smaller overall footprint and to reduce impervious surfaces
- ☐ (1 each) 2-14. Provide educational events, including tours or seminars, to promote your green development

OPERATIONS & MAINTENANCE

- ☐ (10) 2-15. Prepare a landscape operations and maintenance plan
- ☐ (10) 2-16. Prepare an operations and maintenance plan for common area facilities

Section Three: Construction Operations

EROSION & SEDIMENTATION CONTROL

- ☐ (5) 3-1. Preserve and protect wetlands, shoreline, bluffs, and other critical areas during development
- ☐ (1) 3-2. Allow for steeper natural slopes
- ☐ (10) 3-3. Phase grading so that no more than 40% of the site is disturbed at one time
- ☐ (1) 3-4. Protect adjacent, upstream, and downstream properties from adverse effects of increased runoff
- ☐ (5) 3-5. No clearing or grading during winter months
- ☐ (4) 3-6. Mark clearing limits
- ☐ (4) 3-7. Construct stormwater detention facilities as a first step in grading
- ☐ (10) 3-8. Balance cut and fill while maintaining original topography
- ☐ (4) 3-9. Retain all native topsoil on site and protect stockpiles from erosion
- ☐ (★) 3-10. Do not dispose of topsoil in lowlands or wetlands
- ☐ (3) 3-11. Use compost to stabilize disturbed slopes
- ☐ (3) 3-12. Limit heavy equipment use zone to limit soil compaction
- ☐ (1) 3-13. Establish a single stabilized construction entrance (quarry spall or crushed rock)
- ☐ (1) 3-14. Establish a tire wash
- ☐ (1) 3-15. Clean roads thoroughly at the end of each day to prevent sedimentation
- ☐ (1) 3-16. Protect storm drain inlets during construction
- ☐ (5) 3-17. Use compost filter berms, tubes, and socks in place of silt fences
- ☐ (3) 3-18. Supplement permanent flow-control measures with necessary temporary controls
- ☐ (3) 3-19. Protect permanent stormwater facilities from siltation during construction
- ☐ (4) 3-20. Install supplemental erosion control BMPs as back up
- ☐ (★) 3-21. Optimally maintain all temporary erosion control practices

VEGETATION MANAGEMENT

- ☐ (2) 3-22. Grind landclearing wood and stumps for reuse on site
- ☐ (3) 3-23. Replant or donate removed vegetation for immediate reuse

POLLUTION PREVENTION

- ☐ (1) 3-24. Recycle anti-freeze, oil, and oil filters at appropriate outlets
- ☐ (★) 3-25. Properly dispose of all hazardous wastes
- ☐ (1) 3-26. Cover and protect all hazardous materials and store them properly during construction
- ☐ (1) 3-27. Maintain heavy equipment so as to protect ground and stormwater
- ☐ (1) 3-28. Prevent or treat contamination of storm water

INNOVATIVE BUILDER ASSISTANCE

- ☐ (3-10) 3-29. Provide assistance to builders in development

Total Points for Project

Program Level Obtained:

- ☐ 1-Star ★ ☐ 2-Star ★★ ☐ 3-Star ★★★

By my signature, I certify that I have performed all Action Items checked above:

(Developer Signature and Date)



MULTI-FAMILY Self-Certification Checklist

A Program of the Master Builders Association in Partnership with King and Snohomish Counties

Check items you will be including in this project to qualify for a BUILT GREEN™ star rating. Version 2003

Requirements to Qualify at 1-Star Level

(All ★ items plus orientation)

- Program Orientation (one time only)
- Section 1: Build to "Green" Codes & Regulations
- Earn 40 points from Sections 2 through 6, any items
- Prepare/post a jobsite recycling plan (Action Item 5-17)
- Provide an Operations & Maintenance Kit (Action Item 6-1)

Requirements to Qualify at 2-Star Level

(150 points minimum)

- Meet 1-Star requirements
- Earn 110 additional points from Sections 2 through 6 with at least 10 points from each Section
- Attend a BUILT GREEN™ approved workshop within past 12 months prior to certification

Requirements to Qualify at 3-Star Level (300 points minimum for addition; 100 points for remodel)

- Meet 2-Star requirements plus 150 additional points

SECTION ONE: BUILD TO GREEN CODES/REGULATIONS

- ☐ (★) 1-1. Meet Washington State Water Use Efficiency Standards
- ☐ (★) 1-2. Meet Stormwater/Site Development Standards
- ☐ (★) 1-3. Meet Washington State Energy Code
- ☐ (★) 1-4. Meet Washington State Mechanical Ventilation/IAQ Code

SECTION TWO: SITE AND WATER

SITE PROTECTION

Overall

- ☐ (3) 2-1. Build on an infill lot to take advantage of existing infrastructure and reduce development of virgin sites
- ☐ (10) 2-2. Build in a planned BUILT GREEN™ development

Protect Site's Natural Features

- ☐ (3) 2-3. Limit heavy equipment use zone to limit soil compaction
- ☐ (3) 2-4. Preserve existing native vegetation as landscaping
- ☐ (3) 2-5. Take extra precautions to protect trees during construction
- ☐ (3) 2-6. Preserve and protect wetlands, shorelines, bluffs, and other critical areas during construction
- ☐ (5-10) 2-7. Set aside percentage of site to be left undisturbed

Protect Natural Processes On-Site

- ☐ (2) 2-8. Install temporary erosion control devices and optimally maintain them
- ☐ (3) 2-9. Use compost to stabilize disturbed slopes
- ☐ (3) 2-10. Retain all native topsoil, and protect stockpiles from erosion
- ☐ (3) 2-11. Balance cut and fill, while maintaining original topography
- ☐ (4) 2-12. Amend disturbed soil to a depth of 8 to 10 inches to restore soil environmental functions
- ☐ (3) 2-13. Replant or donate removed vegetation for immediate reuse
- ☐ (3) 2-14. Grind landclearing wood and stumps for reuse
- ☐ (5) 2-15. Use a water management system that allows groundwater to recharge
- ☐ (5) 2-16. Design to achieve effective impervious surface equivalent to 0% for 5 acres and above; <10% for less than 5 acres
- ☐ (5) 2-17. Use pervious materials for at least one-third of total area for driveways, walkways, patios

HOW TO USE THE CHECKLIST

- ☐ (2) 2-32. Construct tire wash
-
- Action item to be implemented (★ items are required)
 - Order action item appears in Section (numerical)
 - Section where action item description appears
 - Point value of action item (when range of points, refer to Part I narrative.)
 - Check (✓) when completed

- ☐ (10) 2-18. Install vegetated roof system (e.g. eco-roof) to reduce impervious surface
 - ☐ (10) 2-19. Construct no impervious surfaces outside building footprint
 - ☐ (10) 2-20. On-site wastewater treatment
- Eliminate Water Pollutants**
- ☐ (1) 2-21. Take extra care to establish and maintain a single stabilized construction entrance (quarry spill or crushed rock)
 - ☐ (1) 2-22. Take extra precautions to install and maintain sediment traps
 - ☐ (1) 2-23. Establish and post clean up protocol for tire wash
 - ☐ (1) 2-24. Take extra precautions to not dispose of topsoil in lowlands or wetlands
 - ☐ (1) 2-25. Wash out concrete trucks in slab or pavement subbase areas
 - ☐ (1) 2-26. Prohibit burying construction waste
 - ☐ (1) 2-27. When construction is complete, leave no part of the disturbed site uncovered or unstabilized
 - ☐ (1) 2-28. Recycle antifreeze, oil, and oil filters at appropriate outlets
 - ☐ (1) 2-29. Dispose of non-recyclable hazardous waste at legally permitted facilities
 - ☐ (1) 2-30. Establish and post clean up procedures for spills to prevent illegal discharges
 - ☐ (1) 2-31. Reduce hazardous waste through good jobsite housekeeping
 - ☐ (2) 2-32. Construct tire wash
 - ☐ (2) 2-33. Use slow-release organic fertilizers to establish vegetation
 - ☐ (2) 2-34. Use less toxic form releasers
 - ☐ (2) 2-35. Provide an infiltration system for rooftop runoff
 - ☐ (2) 2-36. Install low-mercury T-8 lamps
 - ☐ (3) 2-37. Use non-toxic or low-toxic outdoor lumber for landscaping (e.g. plastic, least-toxic treated wood)
 - ☐ (5) 2-38. No clearing or grading during winter months
 - ☐ (2) 2-39. No zinc galvanized ridge caps, copper flashing or copper wires for moss prevention

DESIGN ALTERNATIVES

- ☐ (1) 2-40. Integrate landscaping with parking area beyond compliance
- ☐ (1-3) 2-41. Foster the appreciation of/connection to the natural world through land use and building design
- ☐ (3) 2-42. Build north area of the lot first, retaining south area for outdoor activities
- ☐ (3) 2-43. Cluster buildings and design site roadways and parking to preserve open space
- ☐ (3) 2-44. Choose location to reduce the dependence on automobiles
- ☐ (3) 2-45. Promote community and security through site and building design
- ☐ (5-26) 2-46. Create a "mixed use" development

Subtotal for Section Two

SECTION THREE: ENERGY EFFICIENCY

ENVELOPE

Thermal Performance

- ☐ (10-40) 3-1. Document envelope improvements beyond code (component performance approach)
- ☐ (1-55) 3-2. Document envelope improvements beyond code (prescriptive approach)
- ☐ (5) 3-3. Participate in a program that provides third-party plan review and inspection (e.g., ENERGY STAR®, Built Smart)

Air Sealing

- ☐ (1) 3-4. Building wrapped with an exterior air infiltration barrier to manufacturer's specifications
- ☐ (3) 3-5. Airtight Drywall Approach for framed structures
- ☐ (3) 3-6. Use airtight building method, such as SIP or ICF
- ☐ (3) 3-7. Compartmentalization strategy for air leakage reduction
- ☐ (5) 3-8. Blower door test on each unit

Reduce Thermal Bridging

- ☐ (2) 3-9. Use insulated headers
- ☐ (2) 3-10. Fully insulate corners (requires 2-stud instead of 3-stud corners)
- ☐ (2) 3-11. Fully insulate at interior/exterior wall intersection
- ☐ (2) 3-12. Use energy heels of 6 in. or more on trusses to allow added insulation over top plate
- ☐ (2) 3-13. Use insulated exterior sheathing
- ☐ (2) 3-14. Use blown-in insulation
- ☐ (3) 3-15. Use advanced wall framing—24-in OC, w/double top plate

Solar Design Features

- ☐ (2) 3-16. Provide south shading—install properly sized overhangs on south facing glazing
- ☐ (2) 3-17. Orient windows to make the best use of passive solar
- ☐ (2) 3-18. Provide east and west shading—use glazing with solar heat gain coefficient less than 0.40 or provide natural shading with landscaping
- ☐ (1-4) 3-19. Demonstrate a reduction in space conditioning energy, using approved energy modeling software

HEATING/COOLING

Distribution

- ☐ (1) 3-20. Centrally locate heating / cooling system to reduce the size of the distribution system
- ☐ (1) 3-21. Two properly supported ceiling fan pre-wires
- ☐ (1) 3-22. Install ceiling fans
- ☐ (1) 3-23. Use advanced sealing of ducts using low toxic mastic
- ☐ (5) 3-24. Performance test duct for air leakage meets third-party review and certification
- ☐ (5) 3-25. Locate heating / cooling equipment and the distribution system inside the heated space

Controls

- ☐ (1) 3-26. Install thermostat with on-switch for furnace fan to circulate air
- ☐ (1) 3-27. Install thermostat for non-ducted electric heat
- ☐ (2) 3-28. Install 60-minute timers or humidistat for bathroom and laundry room fans
- ☐ (2) 3-29. Install programmable thermostats

Heat Recovery

- ☐ (3) 3-30. Install a heat recovery ventilator

WATER HEATING

Distribution

- ☐ (2) 3-31. Locate water heater within 20 pipe feet of highest use
- ☐ (1) 3-32. Insulate hot and cold water pipes within 3 feet of the hot water heater

Drainwater Heat Recovery

- ☐ (3) 3-33. Drainwater heat recovery system (DHR)

LIGHTING

Natural Light

- ☐ (1) 3-34. Light-colored interior finishes
- ☐ (2) 3-35. Use clerestory for natural lighting
- ☐ (2) 3-36. Use light tubes for natural lighting and to reduce electric lighting

Efficient Lighting

- ☐ (1) 3-37. Halogen lighting substituted for incandescent downlights
- ☐ (1) 3-38. Use Energy-Star compliant lighting fixtures
- ☐ (1) 3-39. Install lighting dimmer, timers, and/or motion detectors
- ☐ (1-3) 3-40. Use compact fluorescent bulbs, ballast, or fixtures in hallways
- ☐ (2) 3-41. Avoid excessive outdoor light levels while maintaining adequate light for security and safe access
- ☐ (3) 3-42. Use a comprehensive approach to high-quality lighting design

Solar Powered Lighting

- ☐ (1) 3-43. Solar-powered walkway or outdoor area lighting

EFFICIENT DESIGN

- ☐ (2) 3-44. Use building and landscaping plans that reduce heating/cooling loads naturally

ALTERNATIVE SYSTEMS/METHODS

- ☐ (3) 3-45. Ultra high efficiency central water heating
- ☐ (5) 3-46. Solar water heating system for laundry facilities
- ☐ (5-10) 3-47. Building systems commissioning
- ☐ (10) 3-48. More than 2% of building powered by photovoltaic

_____ Subtotal for Section Three

SECTION 4: HEALTH AND INDOOR AIR QUALITY

OVERALL

- ☐ (5) 4-1. Builder certified to have taken American Lung Association (ALA) of Washington "Healthy House Professional Training" course

JOB-SITE OPERATIONS

- ☐ (1) 4-2. Use less-toxic cleaners
- ☐ (1) 4-3. Require workers to use VOC-safe masks
- ☐ (2) 4-4. Take measures during construction operations to avoid moisture problems later
- ☐ (2) 4-5. Take measures to avoid problems due to construction dust
- ☐ (3) 4-6. Ventilate with fans after each new finish is applied
- ☐ (2) 4-7. No use of unvented heaters during construction
- ☐ (2) 4-8. Clean duct and furnace thoroughly at job completion
- ☐ (4) 4-9. Involve subs in implementing a healthy building job-site plan for the project

LAYOUT AND MATERIAL SELECTION

- ☐ (2) 4-10. If using carpet, specify CRI IAQ label
- ☐ (2) 4-11. Install low pile or less allergen-attracting carpet and pad
- ☐ (2) 4-12. Avoid carpet in environments where it can get wet
- ☐ (3) 4-13. Limit use of carpet to one-third of unit's square footage
- ☐ (3) 4-14. Optimize air quality in family bedrooms
- ☐ (3) 4-15. If using carpet, install by tacking (no glue)
- ☐ (3) 4-16. Use formaldehyde-free fiberglass insulation
- ☐ (3) 4-17. Use low-VOC, low-toxic, water-based, solvent-free sealers, grouts, mortars, caulks and adhesives inside the building
- ☐ (3) 4-18. Use plywood and composites of exterior grade or formaldehyde-free (for interior use)
- ☐ (3) 4-19. Install cabinets made with formaldehyde-free board and low-toxic finish
- ☐ (3) 4-20. Use ceramic tile for flooring
- ☐ (3) 4-21. Use polyethylene piping for plumbing
- ☐ (3) 4-22. Install natural fiber carpet (e.g. jute, sisal, wool)
- ☐ (3) 4-23. Use low-VOC /low-toxic interior paints and finishes for large surface areas
- ☐ (10) 4-24. No carpet

MOISTURE CONTROL

- ☐ (1) 4-25. Grade to drain away from buildings
- ☐ (1) 4-26. Seal at doors, windows, plumbing and electrical penetrations against moisture and air leaks
- ☐ (1) 4-27. If slab is used, install poly barrier properly; if no slab, bottom of floor is sufficient height above backfilled, poly covered dirt
- ☐ (1) 4-28. Use roof gutters to drain out onto splash blocks or approved system to drain water away from building
- ☐ (1) 4-29. Roofs are pitched and flashed properly
- ☐ (1) 4-30. Design wall system to allow water to dry out when water penetrates

- ☐ (2) 4-31. Install "radon" type vent system to eliminate potential moisture problems

AIR DISTRIBUTION AND FILTRATION

- ☐ (1) 4-32. Provide ideal relative humidity and air circulation to prevent IAQ problems
- ☐ (1) 4-33. Ensure ceiling plenums contain no hazardous/unhealthy materials
- ☐ (1) 4-34. No stud or joist cavities used as plenums
- ☐ (1) 4-35. Prohibit use of electronic filter
- ☐ (2) 4-36. Install return-air ducts in every bedroom
- ☐ (1) 4-37. Install ducting/damper for fresh air intake
- ☐ (1) 4-38. Make sure air intakes are placed to avoid intake from air pollutant sources
- ☐ (1) 4-39. No parking within 40 feet of building air intakes
- ☐ (3) 4-40. Use medium-efficiency pleated filter or better
- ☐ (2) 4-41. No fiberglass or fibrous materials in airstream
- ☐ (3) 4-42. Install furnace and/or duct-mounted air cleaner or high efficiency air filter (non-electronic)
- ☐ (2) 4-43. Provide for cross ventilation using operable windows
- ☐ (3) 4-44. Install CO detectors in units with combustion appliances
- ☐ (2) 4-45. Install CO₂ detectors in community rooms

HVAC EQUIPMENT

- ☐ (1) 4-46. Design to ensure accessibility of all system components
- ☐ (1) 4-47. Design to prevent standing water in HVAC system
- ☐ (1) 4-48. Install and test bath, laundry, pool, hot tub, and kitchen exhaust fans (if range top and/or oven are gas fired), vented to outside
- ☐ (1) 4-49. Install crank timer switches for bath exhaust fans
- ☐ (2) 4-50. Install bath fan with smooth ducting, minimum 4 in. diameter
- ☐ (1) 4-51. Reduced or zero use of ozone-depleting compounds in refrigeration and fire suppression systems
- ☐ (3) 4-52. Install sealed combustion heating and hot water equipment
- ☐ (10) 4-53. Install a ductless heating system

Subtotal for Section Four

SECTION FIVE: MATERIALS EFFICIENCY

OVERALL

- ☐ (5) 5-1. OMITTED per 2002 Revisions
- ☐ (10) 5-2. Enroll project in King County *ConstructionWorks* Program OR in Snohomish County, meet equivalent criteria
- ☐ (5-25) 5-3. Construct buildings that optimize the use of interior space

JOBSITE OPERATIONS

Reduce

- ☐ (1) 5-4. Use suppliers who offer reusable or recyclable packaging
- ☐ (1) 5-5. Provide weather protection for stored materials
- ☐ (2) 5-6. Create detailed take-off and provide as cut list to framer
- ☐ (2) 5-7. Use central cutting area or cut packs
- ☐ (3) 5-8. Require subcontractors to participate in waste reduction efforts

Reuse

- ☐ (1) 5-9. Reuse building materials
- ☐ (1) 5-10. Reuse dimensional lumber
- ☐ (1) 5-11. Use reusable supplies for operations, such as construction fences, tarps, refillable propane tanks
- ☐ (1) 5-12. Move leftover materials to next job or provide to owner
- ☐ (1) 5-13. Reuse spent solvent for cleaning
- ☐ (1) 5-14. Sell or give away wood scraps
- ☐ (1) 5-15. Sell or donate reusable items
- ☐ (1) 5-16. Use reusable forms
- ☐ (1) 5-17. Use used building materials

Recycle

- ☐ (★) 5-18. Prepare jobsite recycling plan and post on site
- ☐ (1) 5-19. Recycle cardboard
- ☐ (2) 5-20. Recycle metal scraps
- ☐ (3) 5-21. Recycle wood scrap and broken pallets
- ☐ (3) 5-22. Recycle packaging
- ☐ (3) 5-23. Recycle concrete/asphalt rubble, rock, and brick
- ☐ (2) 5-24. Require subcontractors to participate in recycling efforts
- ☐ (3) 5-25. Recycle drywall
- ☐ (3) 5-26. Recycle paint
- ☐ (5) 5-27. Recycle landclearing and yard waste, soil and sod
- ☐ (4) 5-28. Recycle asphalt roofing
- ☐ (5) 5-29. Recycle carpet/carpet padding and upholstery foam
- ☐ (5) 5-30. Recycle fluorescent lights and ballasts

DESIGN AND MATERIAL SELECTION

Overall

- ☐ (1) 5-31. Use standard dimensions in design of structure
- ☐ (1) 5-32. Install materials with longer life cycles
- ☐ (2) 5-33. Install locally produced materials
- ☐ (3) 5-34. Use re-milled salvaged lumber
- ☐ (3) 5-35. Use wood products certified by FSC or other recognized agency as "sustainable"

Framing

- ☐ (1) 5-36. Use stacked floor plans
- ☐ (1) 5-37. Use engineered structural products
- ☐ (1) 5-38. For interior walls, use steel studs with minimum 50% recycled content
- ☐ (2) 5-39. Use structural insulated panels
- ☐ (2) 5-40. Use wood frame panelized construction
- ☐ (2) 5-41. Use cementitious foam-formed walls with flyash concrete
- ☐ (3) 5-42. Use finger-jointed framing material (e.g. plates and studs)
- ☐ (3) 5-43. Use (R-19) 2x6 intermediate framing
- ☐ (6) 5-44. At least 50% of dimensional lumber is certified sustainable wood (FSC or equal)
- ☐ (10) 5-45. At least 90% of dimensional lumber and 50% of sheathing is certified sustainable wood (FSC or equal)

Foundation

- ☐ (1) 5-46. Use regionally produced block
- ☐ (1) 5-47. Use flyash in concrete
- ☐ (2) 5-48. Use recycled concrete, asphalt, or glass cullet for base or fill

Sub-Floor

- ☐ (1) 5-49. Use recycled-content underlayment

Doors

- ☐ (1) 5-50. Use reconstituted or recycled-content doors
- ☐ (1) 5-51. No luan doors
- ☐ (2) 5-52. Use domestically-grown wood interior doors

Finish Floor

- ☐ (1-2) 5-53. If using vinyl flooring, use product with recycled content
- ☐ (1) 5-54. Use recycled-content carpet pad
- ☐ (3) 5-55. Use recycled-content or renewed carpet
- ☐ (5) 5-56. Use recycled-content ceramic tile
- ☐ (5) 5-57. Use linoleum, cork, or bamboo flooring

Interior Walls

- ☐ (1) 5-58. Use drywall with recycled-content gypsum
- ☐ (1) 5-59. Use recycled or "reworked" paint and finishes
- ☐ (2) 5-60. Install toilet/shower partitions with recycled content

Ceilings

- ☐ (1) 5-61. If installing acoustical ceiling tiles, select a recycled-content product

Exterior Walls

- ☐ (1) 5-62. Use recycled-content sheathing
- ☐ (1) 5-63. Use siding with reclaimed or recycled material
- ☐ (2) 5-64. Use salvaged masonry brick or block
- ☐ (2) 5-65. Use locally-produced stone or brick
- ☐ (2) 5-66. Use 50-year siding product

Windows

- ☐ (1) 5-67. Use wood/composite windows
- ☐ (1) 5-68. Use finger-jointed wood windows

Cabinetry and Trim

- ☐ (2) 5-69. If using hardwood trim, use domestic products
- ☐ (2) 5-70. Use finger-jointed trim
- ☐ (5) 5-71. Use tropical hardwood trim or cabinets only if FSC certified or equal as "sustainable"
- ☐ (3) 5-72. Use domestic hardwood trim that is FSC certified or equal
- ☐ (3) 5-73. Use resource-efficient countertop material in lobby/reception areas

Roof

- ☐ (2) 5-74. Use recycled-content roofing material
- ☐ (2) 5-75. Use 30-year roofing material
- ☐ (3) 5-76. Use 40-year roof material

Insulation

- ☐ (2) 5-77. Use recycled-content insulation
- ☐ (3) 5-78. Use environmentally friendly foam building products (formaldehyde-free, CFC-free, HCFC-free)

Other Exterior

- ☐ (2) 5-79. Use reclaimed or salvaged material for landscaping walls
- ☐ (3) 5-80. Use recycled-content plastic or wood polymer lumber for decks and porches
- ☐ (5) 5-81. Use least toxic pressure treatment for pressure-treated wood (no CCA)

_____ Subtotal for Section Five

SECTION SIX: PROMOTE ENVIRONMENTALLY FRIENDLY O&M

O&M PLANS, TRAINING, & EDUCATION

- ☐ (★) 6-1. Provide an operations & maintenance kit for each unit
- ☐ (2) 6-2. Prepare an operations and maintenance plan for common area facilities
- ☐ (2) 6-3. Prepare a landscape operations and maintenance plan
- ☐ (3) 6-4. Conduct training sessions for maintenance staff and/or occupants
- ☐ (3) 6-5. Prepare education plan for occupants

WATER PROTECTION

Outdoor Conservation

- ☐ (2) 6-6. Mulch landscape beds with 2 in. organic mulch

- ☐ (1) 6-7. Use grass type requiring less irrigation and minimal maintenance
- ☐ (3) 6-8. Use compost soil amendments to establish turf and other vegetation with less irrigation
- ☐ (3) 6-9. Limit use of turf grass to 25% of landscaped area
- ☐ (3) 6-10. Landscape with plants appropriate for site topography and soil types, emphasizing use of plants with low watering requirements
- ☐ (3) 6-11. Install high-efficiency irrigation system
- ☐ (4) 6-12. Plumb for greywater irrigation
- ☐ (5) 6-13. Install rainwater collection system (cistern) for reuse
- ☐ (10) 6-14. No turf grass
- ☐ (10) 6-15. Install irrigation system using recycled water

Indoor Conservation

- ☐ (1) 6-16. Select bathroom faucets with GPM less than code
- ☐ (1) 6-17. Select kitchen faucets with GPM less than code
- ☐ (1) 6-18. Select toilets that meet code, work with the first flush
- ☐ (4) 6-19. Install (tankless) instant hot water systems (where appropriate)
- ☐ (5) 6-20. Stub-in plumbing to use greywater water for toilet flushing
- ☐ (3) 6-21. Provide water and sewer sub-metering for each unit
- ☐ (10) 6-22. Use greywater water for toilet flushing
- ☐ (10) 6-23. Install composting toilets

Eliminate Water Pollutants

- ☐ (1) 6-24. Educate owners/tenants about fish-friendly moss control
- ☐ (4) 6-25. Provide food waste chutes and compost or worm bins instead of a food garbage disposal

ENERGY

Transportation

- ☐ (2-4) 6-26. Provide subsidized bus passes
- ☐ (2) 6-27. Provide bicycle lockers
- ☐ (2) 6-28. Provide bus shelters
- ☐ (var) 6-29. Provide community common areas

Heating/Cooling

- ☐ (1) 6-30. Provide separate switching for bathrooms fan/heat lamp and fan/light combination fixtures
- ☐ (3) 6-31. Select ENERGY STAR® heating / cooling equipment
- ☐ (2) 6-32. No gas fireplaces, use direct vent gas or propane hearth product (AFUE rating)
- ☐ (2) 6-33. No fireplaces or only high efficiency units (Rumsford or Russian fireplace, masonry heater)
- ☐ (2) 6-34. No air conditioner
- ☐ (3) 6-35. Provide electricity and/or natural gas direct metering for each unit

Water Heating

- ☐ (2) 6-36. Passive or on-demand hot water delivery system installed at farthest location from water heater
- ☐ (3) 6-37. Upgrade electric water heater efficiency from EF of .88 to .93

- ☐ (3) 6-38. Upgrade gas or propane water heater efficiency from EF of .55 to .60
- ☐ (4) 6-39. Install the water heater inside the heated space (electric, direct vent, or sealed venting only)
- ☐ (4) 6-40. Upgrade electric water heater to exhaust air heat pump water heater or de-superheater: EF 1.9
- ☐ (4) 6-41. Upgrade gas or propane water heater from EF of .55 to .83

Appliances

- ☐ (1) 6-42. Install gas clothes dryer
- ☐ (2) 6-43. Install a horizontal-axis or ENERGY STAR® washing machine
- ☐ (3) 6-44. Install an extra-efficient dishwasher (ENERGY STAR®)
- ☐ (3) 6-45. Install ENERGY STAR® refrigerator

HEALTH AND INDOOR AIR QUALITY

- ☐ (1) 6-46. Provide isolated storage for hazardous cleaning & maintenance products, separate from occupied space
- ☐ (1) 6-47. If installing water filter at sink, select one with biodegradable carbon filter
- ☐ (1) 6-48. Install showerhead filter
- ☐ (1) 6-49. Provide track-off mats and/or shoe grates at entryways

RECYCLING

- ☐ (2) 6-50. Provide recycling bins
- ☐ (4) 6-51. Provide built-in kitchen or utility room recycling center

Subtotal for Section Six

EXTRA CREDIT

- ☐ (1-10) A-1. Extra credit for innovation

Total Points for Project

Program Level Obtained:

- ☐ 1-Star ★ ☐ 2-Star ★★ ☐ 3-Star ★★★

By my signature, I certify that I have performed all Action Items checked above:

(Multi-Family Builder Signature and Date)

2002 Revision Note. The point values on this checklist have been revised effective January 1, 2002. Because Parts I and II have *not* yet been revised, the point values as they appear in the narrative of Parts I and II may differ from the checklist. *Use this checklist for the correct point assignments.*



Single-Family New Construction Self-Certification Checklist

Project Address

Company Name

Check items you will be including in this project to qualify for a BUILT GREEN™ star rating. Version 2007

Number	Possible Points	CREDITS	Point Totals	Comments
TWO-STAR REQUIREMENTS (100 points minimum)				
	required	All ★ items	★	
	required	Program Orientation (one time only)	★	
	required	Section 1: Build to "Green" Codes/Regulations and Program Requirements	★	
	required	Earn 75 additional points from Sections 2 through 5, with at least 6 points from each Section	★	
	required	Attend a Built Green™ approved workshop within past 12 months prior to certification	★	
THREE-STAR REQUIREMENTS (180 points minimum)				
	required	Meet 2-Star requirements plus point minimum	★	
	required	Achieve 10% of minimum point requirements in each section	★	
FOUR-STAR REQUIREMENTS (250 points minimum)				
	required	Meet 3-Star requirements plus point minimum	★	
	required	2 nd party verification required (See reference)	★	
Site & Water	required	No zinc galvanized ridge caps, copper flashing or copper wires for moss prevention (2-35)	★	
Site & Water	required	Landscape with plants appropriate for site topography and soil types, emphasizing use of plants with low watering requirements [drought tolerant] (2-39)	★	
Site & Water	required	Use the most efficient aerator available for the faucets used (2-44 and 2-45)	★	
Energy	required	Energy Star Homes or equivalent required (See action item 3-3)	★	
IAQ	required	Use low toxic/low VOC paint on all major surfaces (except for PVA primer which is currently not available) (4-32)	★	
IAQ	required	Ventilate with box fans in windows blowing out during drywall sanding and new wet finish applications (4-9)	★	
Materials	required	Practice waste prevention and recycling and buy recycled products (5-1)	★	
	required	Choose one of the following:	★	
IAQ		Provide built in walk-off matt and shoe storage area (4-76)		
IAQ		Use plywood and composites of exterior grade or with no added urea formaldehyde for interior uses (4-25)		
IAQ		Use high efficiency pleated filter of MERV 12 or better, or HEPA (4-53b)		
IAQ		Install sealed combustion heating and hot water equipment (4-63)		
FIVE-STAR REQUIREMENTS (500 points minimum)				
	required	Meet 4-Star requirements plus point minimum	★	
Site & Water	required	Minimum of 25% of total points earned for Site & Water	★	
Site & Water	required	Amend disturbed soil with compost to a depth of 10 to 12 inches to restore soil environmental functions (2-15)	★	
Site & Water	required	Use pervious materials for at least one-third of total area for driveways, walkways, and patios (See action item 2-21)	★	
Site & Water	required	Limit use of turf grass to 25% of landscaped area (2-37)	★	
Site & Water	required	Avoid soil compaction by limiting heavy equipment use to building footprint and construction entrance (2-4)	★	
Site & Water	required	Preserve existing native vegetation as landscaping (2-5)	★	
Site & Water	required	Retain 30% of trees on site (2-6)	★	
Energy	required	Minimum R-26 for overall wall insulation (3-4)	★	
Energy	required	Maximum average U-value for all windows of 0.30 ACH (3-10)	★	
Energy	required	Advanced framing with double top plates (3-17)	★	
Energy	required	Pre-wire for future PV (3-74)	★	
Energy	required	75% minimum Energy Star light fixtures (3-5)	★	
Energy	required	Alternate: In Lieu of above energy requirements demonstrate home energy performance 30% beyond code per action item 3-1	★	
IAQ	required	Detached or no garage OR garage air sealed from house with automatic exhaust fan (4-21)	★	
IAQ	required	Use plywood and composites of exterior grade or formaldehyde free (for interior use) (4-25)	★	
Materials	required	Achieve a minimum recycling rate of 70% of waste by weight	★	
Materials	required	Use a minimum of 10 materials with recycled content	★	
Section One: Build to "Green" Codes/Regulations and Program Requirements				
1-1	required	Meet Washington State Water Use Efficiency Standards	★	
1-2	required	Meet Stormwater/Site Development Standards	★	
1-3	required	Meet Washington State Energy Code	★	
1-4	required	Meet Washington State Ventilation/Indoor Air Quality Code	★	
1-5	required	Provide Owner with Operations and Maintenance Kit	★	

Appendix D (c)

The following is an extract from the website of the International Dark-Sky Association, which can be found on the internet at <http://www.darksky.org/>.

Sustainability, Urban Planning, and What They Mean to Dark Skies

A very popular wall poster shows the Earth at night from space. This stunning satellite image clearly shows the increasing urbanization of the planet along coastlines and its relentless spread inland. North America, Western Europe, India, Japan, Eastern China, and Indonesia luminously paint themselves with the incandescence of artificial night light. Not to be outdone, South America is no longer simply defined by the light of its coasts; city lights now encroach upon its interior jungles. So, too, Africa and Australia, whose illuminated outlines are swelling in their cities' growing irradiance.

Earth's technological development from this vantage point is truly a feast for the eyes—like the visual seduction of a good fireworks display. But it is also a graphic and chilling representation of light pollution and how widespread it is. Through this image, Earth becomes the poster child for sustainability and urban planning, whether local or global. But what is sustainability, and how does it relate to urban planning and dark skies?

Modern global sustainable development began through the United Nations World Commission on Environment and Development (WCED) in 1983. By 1987, the commission's report, *Our Common Future*, defined sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This definition is the basis for what has become a truly holistic vision of overcoming environmental degradation within a framework of economic development and social justice.

In 2000, the WCED's powerful Earth Charter called for "a sustainable global society founded on respect for nature, universal human rights, economic justice, and a culture of peace." The Earth Charter has been translated into more than 30 languages and is used as a foundation for sustainability in communities all over the world. It has influenced the fields of health, education, politics, human rights, the environment, food production, economics and commerce.

The Business of Sustainability

A growing number of businesses are rethinking their attitudes toward the environment because of increasing shareholder and customer concern about the Earth's finite and costly resources. The old paradigm of environmental apathy is being pushed toward a more holistic approach, one that supports the entire community's health—including its natural ecology. This shift has had some influence on the business of government, as well, including how we plan our day and night urban landscape, making sustainability the new buzzword in urban planning.

Sustainability's emphasis in urban design and artificial night lighting is to improve the quality of lighting, not its quantity. This holistic view of lighting design produces less environmental impact than poorly designed, more traditional approaches: it requires less energy from power plants; consequently, less pollution is released into the environment, and fewer natural resources are wasted; and, ultimately, there is a net economic savings from producing less energy and saving natural resources through lower capital and operating costs.

Because most of the Earth's population lives in cities or urban centers, nighttime lighting needs to be one of the key components of any city policy for urban development and for increasing the quality of life for its citizens. In most communities, there has been only a modest amount of work in the area of urban lighting—apart from a general awareness that historical buildings and monuments can be enhanced by exterior lighting at night, or, in some locales, to achieve accepted or required lighting standards.

But there is a groundswell of concern in many communities about how they grow and what it means for their future. Citizens are looking up into the night sky to find their historical and metaphorical compass but seeing little of the starlight that awed their youth. And they are asking, why? They are beginning to see the abundance of artificial night light around them and to question its need. While land use planning still remains focused on maintaining a strong infrastructure, now it can also include actively reducing energy usage and costs, retaining and expanding open spaces, and minimizing environmental impact—even restoring areas to their natural ecology. While community planners remain firm in their mandate for safety, utility, and ambiance, some are beginning to examine the myths of night lighting, the meaning of utility, and the requirements necessary to create an effective and efficient ambiance.

A Working Illustration

California has the eighth largest economy in the world, the largest state population in the U.S., and one of the richest and most diverse ecological communities in the world—including some of the most endangered. California has also been, especially since 1994, a leader in energy conservation strategies. Through Executive Order S-7-04 in 2004, California “committed [itself] to Environmental Justice to ensure a clean and sustainable environment for all Californians.” As a result, the state consults specialists in sustainability, such as the U.S. Green Building Council and its Leadership in Energy and Environmental Design (LEED), when developing policy. It also requires periodic re-evaluation of its policies to ensure continued and improved energy efficiency throughout its network.

The state has also acknowledged that it is “vulnerable to the impacts of climate change” and feels it “necessary to prepare Californians for the consequences of global warming” while setting goals for the reduction of greenhouse gas emissions for the next 50 years. This commitment to the incorporation of sustainability into the business of government extends into its urban planning, including its 45,000 miles of highways and freeways. In fact, within California's Department of Transportation (Caltrans) stated mission and strategic goals is stewardship, to “preserve and enhance California's resources and investments.”

Two key pieces of states legislation guide Caltrans highway lighting system planning: In 2001, California's Outdoor Lighting Section of Senate Bill No. 5X, Chapter 7 was passed in response to the state's growing energy crisis and as an effort to adopt energy efficient standards for outdoor lighting. The State Energy Commission's Title 24 Building Standards, as stated in California's 2004 Conservation Plan Status Report, “set new exterior lighting standards for the State.” It emphasizes energy efficient measures, especially for peak periods and seasons, stresses Lighting Zones, and encourages Caltrans to remain “very interested in finding ways to reduce wasted nighttime lighting, improve the quality of lighting and reduce light glare impacts.”

The Caltrans Department of Energy Primer notes that, initially, the energy crisis of the 1970s prompted Caltrans' decision to “only illuminate points of conflict [along roadways]...and to reduce that amount of light to its minimal levels.” Consequently, it also removed over 50% of

existing roadway fixtures. Beginning in the 1990s, the department also committed itself to research and implementation of energy efficient and cost effective LED signal lighting, photocells and timers.

Caltrans' focus on stewardship and sustainability can also be seen in its project planning. Its Highway Design Manual states that when developing transportation projects, "social, economic, and environmental effects must be considered fully along with technical issues so that final decisions are made in the best overall public interest."

Electricity is eighty percent of Caltrans non-vehicular energy outlay, says the Conservation Report. The majority of this energy "is consumed by the highway-related energy systems." Consequently, energy efficiency and resulting cost savings are among the department's primary concerns. Caltrans focus on developing energy conservation projects has provided: 1.) A 50% reduction of energy costs and improved lighting conditions through conversion of highway lighting systems to high-pressure sodium fixtures; 2.) An up to 92% grid load reduction and six-fold life increase through the use of LED signals; and 3.) Energy savings from implementation of induction lighting upgrades on roadway sign lighting systems, which are also being studied for roadway lighting.

Through implementation of sustainability into its urban design, California and Caltrans demonstrate that government and the business of government can reflect citizen and customer environmental concerns while remaining economically sound, environmentally progressive, and protecting the public's health and well-being. If that can be achieved on a worldwide level, perhaps manmade earthlight will dim sufficiently for natural starlight to once again brighten the whole of our night sky.

Appendix E Public Consultation Process

The following is a summary of the public consultation conducted by the proponents of Big Hill Springs prior to public circulation of the draft Conceptual Scheme by the Municipal District of Rocky View. Further public consultation will continue throughout the Conceptual Scheme approval and implementation processes.

An Open House was held at the Balzac Community Hall from 6:30 to 8:30 p.m. on October 23, 2007. Invitations were sent to approximately 35 adjacent and surrounding residents. Approximately 30 residents attended. There were 15 panels that outlined the Big Hill Springs concept, and residents were invited to ask questions and provide comments on the development. The landowners, developers and members of the consulting team were available to answer questions. The only concern raised at the meeting was the issue of increased traffic along 85th Street, to the south of the proposed Big Hill Springs development. In particular, the concern was with the increased traffic from construction workers and gravel trucks along 85th Street while the development was under construction.

A Public Open House was held at Symons Valley Ranch from 6:30 to 8:30 p.m. on November 21, 2006. This open house was advertised in the Rocky View Times and invitations were hand delivered to adjacent residents. Approximately 35 people attended. Comments sheets were available, however there were none that were filled in.

Subsequent to the November 21 meeting, the planning consultants met with residents along Range Road 23 to provide additional information and discuss concerns related to increased traffic along Range Road 23. Since that time, “No Truck” signage has been installed on Range Road 23 to reduce the truck traffic in front of the residents’ homes.

The developers have demonstrated the commitment through their public consultation process to address all issues raised by the public in the Big Hill Springs Conceptual Scheme. For example, issues raised by the public with respect to transportation are addressed in the transportation policies of this Conceptual Scheme.

As further public consultation occurs through subsequent Conceptual Scheme approval and implementation stages, the developers will continue to address public concerns through more detailed plan refinements at each appropriate stage in the planning process.