



# **FRASER RIVER BENCH LANDS NEIGHBOURHOOD PLAN**



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## **Executive Summary**

On behalf of Fortwood Homes Ltd and the Roman Catholic Episcopal Corporation, L&M Engineering Limited – Planning Centre is pleased to present the Fraser River Bench Lands Neighbourhood Plan for consideration by Prince George City Council. This Plan is the culmination of almost a year’s work and is reflective of the considerable generosity of the land owners in granting L&M the flexibility to explore Smart Growth design practices and to create a Neighbourhood Plan that integrates urban residential development with extensive greenspace, public parks, and trails while exploring alternative development standards. In addition, we would also like to thank the City of Prince George for allowing an innovative review process that included a Technical Design Charette that directly contributed to the quality and holistic nature of this Neighbourhood Plan.

### **The Vision**

The Fraser River Bench Lands are characterized by natural features: the Fraser River, the steeply sloped escarpment, the wetlands and drainage courses, the meadows, and the large stands of fir and spruce trees. Planning for the Fraser River Bench Lands began with acknowledging these natural features, not as barriers to development, but as the basis from which to plan a complete and livable community. The policies contained in this Neighbourhood Plan integrate the City of Prince George Official Community Plan with Smart Growth planning principles with the objective of becoming a desirable place to live that is compatible with and connected to the surrounding neighbourhood while, at the same time, being uniquely the Fraser River Bench Lands.

### **The Process**

Neighbourhood Plans are intended to be holistic planning processes that establish broad land use and transportation policies to guide development. Neighbourhood Plans are meant to create realistic land use policy that will provide certainty for the public, decision makers, and developers regarding how land can be developed. As required by the City of Prince George Official Community Plan, the scope of the Fraser River Bench Lands Neighbourhood Plan included:

1. Examination of Current and Surrounding Land Use.
2. Identification of Major road network.
3. Proposed Land Uses including:
  - Transportation corridors including major roads, pedestrian, bicycle, and transit;
  - Residential housing densities;
  - Commercial land allocations;
  - Institutional land allocations; as well as

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- Public use sites including parks, trails, and schools.
  - 4. Traffic analysis estimating volume of traffic based on dwelling units.
  - 5. Traffic analysis of the existing Level of Service of Cowart Road, as well as the Cowart Road/Highway 16 intersection.
  - 6. Preliminary Site Servicing
    - Provision and phasing of sewer and water services; and
    - Storm water management.
  - 7. Environmental Overview to identify Environmentally Sensitive Areas (provided by EDI Environmental Dynamics Inc.).
  - 8. Geotechnical Overview including an examination of available air photographs, a review of existing geotechnical materials, and field reconnaissance (provided by Geonorth Engineering Ltd).

The planning process also included a Technical Design Charette attended by the City of Prince George, the Department of Fisheries and Oceans, the Ministry of Environment and facilitated by L&M Engineering Limited. Smart Growth and Alternative Design Standards are new to Prince George. Therefore, in an effort to explore these concepts within the context of this Neighbourhood Planning process, as well as within the context of planning, design, and development review in Prince George generally, Fortwood Homes Ltd, the Roman Catholic Episcopal Corporation and the City of Prince George decided to host a Charette. The Charette was a one-day work shop that brought together professional people involved in planning, engineering and the review of land use and development proposals to brain storm ideas of how best to implement Smart Growth principles in Prince George with the further goal of finding workable and cost effective ideas for this Neighbourhood Plan. The Charette was very effective and resulted in a Plan that balances the desires of residents, environmental considerations, and economic realities.

Public participation was also an integral part of this planning process. The process involved wide-spread public information dissemination, including 702 hand delivered information packages, a public information meeting that included a presentation and open house format allowing neighbours to congregate and discuss the Plan, as well as have questions answered by both L&M Engineering and the City of Prince George. The public comments were very informative and resulted in several changes to Plan including additional traffic analysis, additional trail connections, and more detailed policy regarding tree retention throughout the proposed neighbourhood. In addition, there was considerable media interest in the planning process that included several prominent articles in local newspapers.

## **The Plan**

The Fraser River Bench Lands Neighbourhood Plan is a comprehensive planning document that integrates the Official Community Plan and Smart Growth Planning principles. The plan is characterized by the following:

- A mix of land uses including residential, commercial, and institutional with a range of residential density options,
- 2 Neighbourhood Parks, including a riverside park representing 19% of the total area,
- A City riverfront park extending from Malaspina Ridge to Varsity Creek,
- Development of 4.7 km of trails connecting with Lower College Heights and proposed City trails to the south,
- Designed connections to the bicycle network,
- A pedestrian-friendly environment that provides connections within the Bench Lands and to surrounding neighbourhoods,
- Dedication of greenways to protect environmentally sensitive areas representing 15.5% of the total area,
- Completion of an Environmental Overview of the area,
- A Neighbourhood Centre,
- A combination of traditional and Smart Growth design standards,
- Alternative Design Standards for storm water management,
- Alternative Design Standards for some local roads, and
- Accommodation of Transit services.

## Conclusion

L&M Engineering Limited – Planning is pleased to present the Fraser River Bench Lands Neighbourhood Plan to Prince George City Council and appreciates Council’s consideration. Should Council approve the Neighbourhood Plan, it is Fortwood Homes Ltd’s intention to apply for rezoning of the first phase of development in the southern area of Plan boundary with development to begin in the fall of 2006.

Sincerely,

**L&M Engineering Limited**

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## 1.0 Introduction

The Fraser River Bench Lands (Figure 1) are located in the Southwest Sector of the City of Prince George between the Fraser River and Lower College Heights. The 106.52 hectares of land represents significant infill residential development and, as the area is unplanned, its development, as directed by Policy 6.3.18 of the City of Prince George Official Community Plan (OCP), is subject to the creation of a Neighbourhood Plan that addresses: environmentally sensitive areas, transportation network, residential housing mix and densities, commercial lands, public use sites, and trail linkages. The purpose of Neighbourhood Plans is to create a clear and comprehensive vision for areas greater than 40 hectares in order to provide certainty for residents, land owners, and developers regarding how an area can be developed. Neighbourhood Plans must balance the desires of residents, environmental considerations, and economic realities and should result in land use planning policies that can be achieved over time. They are policy documents that are intended to provide direction for land use planning rather than be used as strict regulatory tools. This document is the proposed Neighbourhood Plan for the Fraser River Bench Lands.

The City of Prince George Official Community Plan endorses Growth Management as a key planning principle in order to ensure that, “...growth occurs in a planned, phased manner rather than sporadically throughout the city,” (OCP, p.15) and further direction of Prince George City Council encourages development to be planned and designed according to the principles of Smart Growth (Appendix A). The requirement of Neighbourhood Plans is part of the City’s overall Growth Management policy and the Fraser River Bench Lands Neighbourhood Plan incorporates many Smart Growth principles throughout the neighbourhood and show cases several areas within the site as Smart Growth development areas.

The Fraser River Bench Lands Neighbourhood Plan has been prepared by L&M Engineering Limited in close consultation with City staff. Further input has also been provided by the general public, the Department of Fisheries and Oceans, as well as the Ministry of Environment.

### 1.1 Neighbourhood Overview

The Fraser River Bench Lands are comprised of 4 separate legal parcels that are owned by the Roman Catholic Episcopal Corporation (RCEC), Fortwood Homes Ltd. and the City of Prince George (Figure 2). The total area is 106.52 hectares with 52.12 hectares owned by Fortwood Homes Ltd., 50.78 hectares belonging to RCEC, and 3.62 hectares owned by the City of Prince George. The area is adjacent to the existing Lower College Heights neighbourhood and is bounded on the west side by a steep escarpment, to the east by the Fraser River, to the north by Cowart Road, and to the south by undeveloped land designated by the OCP as Major Park. The area is characterized by two flat benches, large meadows, some wetlands, and is forested primarily by spruce and fir trees. There are several rights of way through the most northern parcel belonging to BC Hydro and



the City of Prince George, as well as an abandoned City sewage lagoon. In addition, the City of Prince George owns a small parcel of land adjacent to the Fraser River that is utilized for water well infrastructure.

Although designated as Urban, with Major Park adjacent to the Fraser River, and identified as Phase 2 lands by *Schedule B-1 Urban Phasing Map* of the OCP, to date the property has not been subject to a development proposal for a number of reasons. Until recently, large portions of the RCEC lands were leased to the City of Prince George for the establishment of a sewage treatment facility. These leased lands have been remediated, and have now been returned to RCEC. In addition, access to the lower Fraser River Bench Lands has been extremely difficult, because of significant topographical constraints at the Cowart Road (north) end of the development.

Very recently, new residential development has occurred at the southern end of the Bench Lands, which has resulted in the extension of the Malaspina Avenue collector road. With the development of the Malaspina Ridge Estates, Malaspina Avenue will now be constructed to the southern end of the subject properties. In addition, the recent purchase by Fortwood Homes Ltd. of the Remainder of District Lot 2014 has been a catalyst for a review of the development opportunities for the Fraser River Bench Lands.

## 1.2 The Official Community Plan and Smart Growth

The City of Prince George Official Community Plan recognizes Growth Management as a key principle by which to plan communities because decision making that is guided by Growth Management will: reduce servicing costs; develop complete neighbourhoods at higher densities resulting in a more compact community; increase proximity to facilities; and provide more extensive green space (OCP, p.15). In an effort to manage growth in a sustainable manner, the City is encouraging new developments to reflect the principles of Smart Growth which is defined as,

*...land use and development practices that enhance the quality of life in communities, preserve the natural environment, and save money over time. This is achieved through the comprehensive use of alternative development standards and strategies that reduce the impact of urban growth on the natural environment, integrate infrastructure into ecosystems, thus reducing its cost, and create more liveable communities that increase our enjoyment of the places where we live.*

*Source: Smart Growth BC*

As described above, Smart Growth is a combination of land use and design practices and principles that are intended to guide land use development rather than form a regulatory regime. Accomplishing Smart Growth in segments of the Fraser River Bench Lands Neighbourhood Plan will involve:

- Incorporating mixed land uses and alternative zoning regulations with respect to setbacks, site coverage, densities, and parking. Typically, Smart Growth zoning regulations allow for higher densities in developed areas and larger percentages of green space.
- Employing *Alternative Design Standards* for roadways and storm water management. These *Alternative Design Standards* result, overall, in less infrastructure costs, including less cost per dwelling unit for streets, utilities, and Development Cost Charges.
- The promotion of sustainable transportation choices, including the promotion of public transit, and the development of alternative cycle and pedestrian routes.

Section 3.0 of this document outlines how Smart Growth principles are mirrored in the Growth Management policies of the Official Community Plan and are reflected in the planning vision of the Fraser River Bench Lands. In addition, Appendix A provides an overview of Smart Growth principals and tools.

### 1.3 Planning Process

This planning process has been initiated by Fortwood Homes Ltd. and RCEC with the intention of beginning land development in the southern portion of District Lot 2014 (Figure 2) in the fall of 2006. The planning process has consisted of the collection and review of background materials including: higher level plans; bylaws; and development trends as well as population projections that will influence the provision of appropriate housing types. The process has also included: consultation with government agencies and School District No. 57; field investigation; base mapping; concept development; and an Implementation Design Charette hosted by L&M Engineering Limited and attended by staff from the City of Prince George, the Ministry of Environment, and the Department of Fisheries and Oceans. In addition, a servicing brief for water, storm and sanitary services as well as a functional design for the Cowart Road/Malaspina Avenue intersection have also been provided, as have an Environmental Overview and a Geotechnical overview conducted by EDI Environmental Dynamics Inc. and GeoNorth Engineering Ltd. respectively. These overviews are included as Appendices G and H. Further, traffic counts have been conducted to determine the threshold for development on the Fraser River Bench Lands before the existing Malaspina Avenue reaches capacity and before the connection to Cowart Road must be constructed. The Neighbourhood Servicing brief is presented in Section 4.0 of this document while the proposed transportation network forms part of the Land Use section. The functional design for the Cowart Road/Malaspina Avenue intersection is presented in a separate document. In addition, detailed traffic counts were undertaken at the Highway 16/Cowart Road intersection to determine if any additional transportation network links are required to support the development. The calculations also included existing traffic and the projected growth in background traffic.

The following details the process followed during the Implementation Design Charette as well as documentation of the public participation process.

### 1.3.1 Implementation Design Charette

An Implementation Design Charette was held at City Hall on October 6, 2005 to discuss *Smart Growth* and *Alternative Development Standards*. Participants included staff from the City of Prince George, the Department of Fisheries and Oceans, the Ministry of Environment, and L&M Engineering Limited. *Smart Growth* and *Alternative Design Standards* are new to Prince George. Therefore, in an effort to explore these concepts within the context of this Neighbourhood Planning process, as well as within the context of planning, design, and development review in Prince George generally, the City of Prince George, L&M Engineering Limited, Fortwood Homes, and the Roman Catholic Episcopal Corporation offered to conduct an Implementation Design Charette as part of this Neighbourhood Planning process.

Design Charettes can take a variety of forms, including visioning workshops, focus group discussions, and implementation design sessions and are a tool used to address urban design issues of social and civic importance in a creative way. The *Implementation Charette* was a one-day work shop that brought together professionals involved in planning, engineering and the review of land use and development proposals to brainstorm ideas of how best to implement *Smart Growth* principles in Prince George, with the further goal of finding workable and cost effective ideas for this Neighbourhood Plan. The workshop included a presentation regarding the principles of Smart Growth and how those principles are reflected in the Official Community Plan, as well as three discussion topics: (1) Planning and Creating Complete Communities; (2) Reducing the Cost of Municipal Infrastructure; and (3) Integrating Urban Development into Ecosystems. The key ideas that came out of the charette are summarized in Table 1 and the complete Minutes and Briefing Notes of the Implementation Charette are included in Appendix B.

**Table 1: Key Ideas of the Implementation Charette:**

Discussion Topic	Message
<p><b>Planning and Creating Complete Communities</b></p>	<ul style="list-style-type: none"> <li>• Development of a systemized evaluation process for Smart Growth developments will give certainty to the developer, administration, and decision makers</li> <li>• Development of Comprehensive Zoning Districts will allow innovation for Alternative Development Standards</li> <li>• Trail connectivity with Lower College Heights and existing and proposed trails, including the cycle network</li> <li>• Design of connections from road or sidewalk to trails is very important</li> <li>• Reduce situations of conflict between vehicles and pedestrians to create a more pedestrian</li> </ul>

	<p>friendly environment</p> <ul style="list-style-type: none"> <li>• More local commercial can be included in the higher density Smart Growth areas and regulated through comprehensive development zones. All local commercial development will need to be consistent with direction provided by the OCP.</li> </ul>
<p><b>Reducing the Cost of Municipal Infrastructure</b></p>	<ul style="list-style-type: none"> <li>• Main infrastructure issues are: lift station for sanitary and water quality for onsite infiltration of storm water</li> <li>• Storm water management can be accomplished through design</li> <li>• Greenways through riparian areas as part of overall storm management should be explored</li> <li>• Concept of subsurface storm water disposal field may be supportable. Needs to be confirmed by detailed storm management plan and geotechnical analysis.</li> <li>• This site needs to provide alternative transportation modes such as transit, cycling and pedestrian, but vehicle trip generation will still be high. Traditional collector standards need to be applied.</li> <li>• Explore alternative standards on local roads.</li> </ul>
<p><b>Integrating Urban development into Ecosystems</b></p>	<ul style="list-style-type: none"> <li>• Defining the boundary of developable area should include riparian zones and top of bank setback. This will also reduce the area required for park dedication</li> <li>• An environmental consultant will be required to conduct an environmental overview</li> <li>• Riparian areas do not mean “no development”. There may be segments of riparian areas that need to be kept free of development and there will be Management Areas that can include trails within the greenways</li> </ul>

### ***1.3.2 Public Participation***

The Fraser River Bench Lands Neighbourhood planning process has taken measures to ensure that members of the public are granted adequate opportunity to provide comments and concerns regarding the proposed Neighbourhood Plan. A fundamental principle of Smart Growth is to integrate public participation with development decisions (see Appendix A) and this principle is integral to ensuring the resultant plan is successful.

To date, several steps have been taken to encourage expression of public opinion in the Fraser River Bench Lands planning process. On March 6<sup>th</sup>, 702 public participation



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packages were hand delivered to neighbouring residents of the proposed plan area. These packages included an overview of the Neighbourhood Plan, notification of how to participate in the planning process, a community survey, an explanatory map of the proposed plan, where to get more information, and notice of a public information meeting (See Appendix C). In addition, notification of the public information meeting was announced in the Prince George Citizen newspaper on Wednesday, March 8 and Saturday, March 11<sup>th</sup> (See Appendix D). Information on the public participation process and the Fraser River Bench Lands Neighbourhood Plan were posted on the City of Prince George website along with an invitation for public comment.

The Public Information meeting was held on the 14<sup>th</sup> of March 2006 and attended by 155 people. Present at the meeting were representatives from the City of Prince George and L&M Engineering. The meeting was formatted to begin with a presentation of the land use plan and concluded with an informal question and answer period at stations located around the meeting space. In addition to the comment surveys distributed with the public participation packages, surveys were also provided at the public information meeting. The results of the comment surveys have been categorized and included as Appendix E. Many of the public comments have been incorporated into the plan. For example, additional traffic analysis, additional trails, a reduction of residential density east of Brandon Court, and policy development regarding tree retention through the subdivision design process.

## 2.0 Current Land Uses

### 2.1 Land Use Policy and Regulations

The Fraser River Bench Lands are undeveloped and are currently regulated by several zoning districts, Land Use Contracts, a restrictive covenant and two Official Community Plan designations. The Official Community Plan designations demonstrate the long range planning policies for the area, the zoning districts demonstrate the current permitted uses, and the restrictive covenant and land use contracts represent historical development interests.

Currently, District Lot 753 REM is designated by the Official Community Plan as Urban while District Lots 2014 and 754 are primarily designated as Urban with some Major Park adjacent to the Fraser River (Figure 2). The Urban designation of the OCP is intended to,

*...support development of new and infill housing in the Urban areas... These areas provide adequate land to meet the anticipated housing requirements and long-term needs of the city. The land indicated as Urban on Schedule B-1 will ultimately accommodate the majority of the projected additional 80,000 residents.*

Accordingly, residential development supported by local commercial and institutional land uses, is endorsed by the OCP for the Fraser River Bench Lands.

The Major Park designation of the OCP as applied to the Fraser River Bench Lands is considered a City Natural Park. City Natural Parks are intended to be,

*...preserved for the enjoyment of significant natural beauty and contain a limited development of facilities. The size of these park areas is determined by the natural feature being preserved. This may include 'greenways' which are linear green corridors that connect natural areas and provide wildlife habitat and recreational opportunities."*

The proposed linear park and trail network adjacent to the Fraser River meets the requirements of a City Natural Park.

The zoning districts currently in force on the subject properties include: GB (Greenbelt), URS-2A (Urban Residential), P-1 (Parks, Recreation, Education), and P-4A (Utility), P-4C (Solid Waste Processing and Disposal). The current zoning districts demonstrate the current permitted uses on the subject properties ranging from park and recreation uses, protection of steeply sloped lands, utilities, such as hydro; storm; sanitary; and water, as well as an abandoned sewage disposal field.

In addition, there is one Restrictive Covenant and two Land Use Contracts registered on District Lots 754 and 753 REM. The Restrictive Covenant is registered on both properties and prevents the properties from being developed as a replacement for Pine Valley Golf Course. This covenant automatically expires on April 2, 2006. Land Use Contracts No. M33906 and No. K28397 regulate land use, subdivision, and development on District Lot 753 REM and District Lot 754 respectively. The contracts are based on historical development intentions and can be discharged with the consent of both RCEC and Council.

## **2.2 Adjacent Land Uses**

The development of the Fraser River Bench Lands is influenced by the following surrounding land uses.

### ***2.2.1 Lower College Heights***

Lower College Heights (Figure 1) is located directly west of Fraser River Bench Lands beyond a steep escarpment. The development pattern of Lower Heights is characterized primarily by homogenous single family development and is augmented with one multiple family site, approximately 100 properties zoned for two-family development, one Neighbourhood Commercial site, and some Institutional uses. The existing land use pattern for Lower College Heights is discussed below.

#### ***Residential***

Residential land use in Lower College Heights is comprised of single family with limited two family and one multiple family development. The primary difference between the single family and two family zoning districts located in Lower College Heights is found in the permitted lot size and density regulations. The one multiple family site is located on the corner of Cowart Road and Simon Fraser Avenue and is developed as an integrated comprehensive development of single family dwellings.

#### ***Commercial***

The only property zoned for local commercial use in the area identified on Figure 6 is located at the corner of Gladstone Drive and Domano Boulevard. The property is 0.64 hectares and is zoned C-5A (Highway Commercial). The intention of this zoning district is to accommodate the demand for a wide variety of automobile-oriented, local commercial and limited office uses for properties having direct access from urban arterial highways. The property is currently comprised of several local commercial uses.

### ***Institutional***

There are three elementary schools and one secondary school in proximity of the Fraser River Bench Lands, including: College Heights Secondary; College Heights Elementary; Gladstone Elementary; and Malaspina Elementary. College Heights Elementary is a dual track French Immersion and Neighbourhood program school and is currently operating at capacity. Gladstone Elementary is closed as an elementary school, but is operating as the District Resource Centre and has leased space to the North Central Seniors' Association, as well as providing space for the Retired Teacher's Association. Malaspina Elementary has capacity for an additional fifty (50) students. At this time, the School District has no plans to construct another school in the area however, initial consultation with the School District has indicated that should population projections demonstrate that 300 elementary school-age children would live in the Fraser River Bench Lands, the School District would consider constructing an elementary school and would require a land area of approximately 2.4 hectares. Section 3.6.2 of this document discusses population projections for the Fraser River Bench Lands and Section 3.8.3 makes recommendations regarding institutional land use for the Bench Lands.

#### ***2.2.2 The Fraser River***

The Fraser River flows past the Bench Lands and is the most significant natural feature defining the development vision for the area. The proximity of the river makes the area a very desirable place to live and it means that there are many public interests that must be incorporated into this planning document.



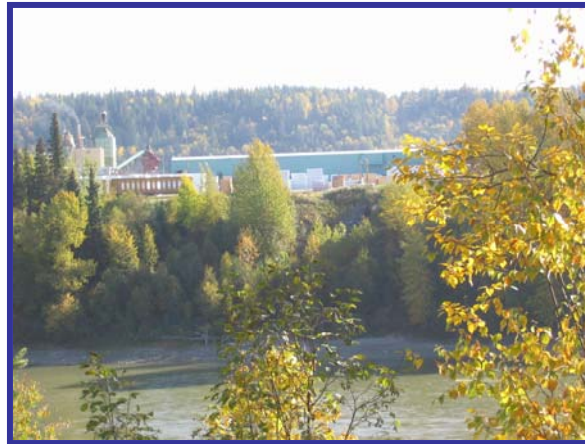
For example, the plan must demonstrate continued public access to the Fraser River, as well as recognize habitat and water quality issues. As a result, this plan proposes: to retain a minimum 50 metre setback from the Top of Bank of the Fraser River to be utilized as City Park thus assuring public and wildlife access to the river; to retain natural green space surrounding watercourses, thus improving water quality and habitat; and to design the storm water system to utilize ground infiltration, also improving water quality. In addition, the Official Community indicates that a portion of the developable area is within the Flood Plain. More detailed review of Flood Plain mapping however, shows that the steep escarpment leading to the Fraser River precludes the risk of flooding.

#### ***2.2.3 BCR Industrial Park***

The BCR Industrial Park is located across the Fraser River from the Fraser River Bench Lands and is comprised of light and heavy industrial activities. It is anticipated that the noise generated from the Industrial Park may impact residential development. However, this impact can be mitigated through appropriate building construction and design as



discussed in the *Design Practices for Noise Attenuation* included as Appendix F. A typical cross section of the Fraser River Bench Lands in relation to the Fraser River and the BCR Industrial Park illustrates the movement of noise. The cross section demonstrates that the trees most able to buffer noise are those located within the 50 metre wide setback from the top of the Fraser River's bank and those located at the top of the escarpment adjacent to College Heights. These trees are protected by the policies contained within this Neighbourhood Plan. Further, it is recommended that the zoning regulations developed for the Fraser River Bench Lands consider additional methods to mitigate the impact of industrial noise.



### **2.3 Public Open Space, Parks and Trails**

Lower College Heights is characterized by extensive trail development as well as quality Neighbourhood Parks. As shown on Figure 1, the Fraser River Bench Lands are bordered to the south by lands designated by the Official Community Plan for the creation of a Major Riverfront Park and Recreation system and to the west by Essex Park, a lineal park developed with trails designed to the multi-use standard. In addition, to the north there is a dedicated bicycle lane along Cowart Road. Facilitating connections to the existing trails through Essex Park and to Lower College Heights, to the planned trails through the future destination park and along Parkridge Creek, as well as facilitating connections to the existing bicycle network in order to encourage alternative transportation to UNBC and downtown is a fundamental component of this plan.

### **2.4 Natural Environment**

The southern portion of the Fraser River Bench Lands is undeveloped forested lands while the northern portion includes a significantly cleared area that is developed for City of Prince George well infrastructure and hydro transmission lines. The forests are second growth with the predominant tree species being spruce and fir. The land is characterized by two benches, meadows, and some wetlands with intermittent and year-round watercourses. The most significant watercourses are the Fraser River and Varsity Creek

which is located at the northern end of the development area and flows east from Lower College Heights to the Fraser River. In addition, there is an unnamed swamp and wetland area at the bottom of the escarpment which flows south to the Fraser River. The wetland area is predominately man-made, and results from the development of approximately 12 storm water outfalls which discharge surface water runoff to this area of the Bench Lands. During consultation with the Ministry of Environment and the Department of Fisheries and Oceans, it was determined that this drainage area required investigation with respect to environmental values. Therefore, it was recommended that



an Environmental Overview be conducted as part of this Neighbourhood Planning process in order to identify potential areas of sensitivity and identify mitigative best practices as well as foreseeable environmental regulatory requirements related to the proposed development. This overview that can be used to facilitate the design of roads, trails, and residential properties has been conducted by EDI Environmental Dynamics Inc. and is included as Appendix G. The Fraser River Bench Lands Neighbourhood Plan demonstrates the intention of retaining a greenway along the length of the watercourse running north and south at the bottom of the escarpment, as well as along Varsity Creek and the Fraser River.

## 2.5 Transportation Network

Domano Boulevard is the arterial road that connects Lower College Heights to Highway 16 and to the central area of Prince George. The main roads serving as collector roads for Lower College Heights are Simon Fraser Avenue, Gladstone Drive, Cowart Road, and Malaspina Avenue. Section 3.5 of this document discusses how the proposed development of the Fraser River Bench Lands impacts the existing transportation network, as well as the timing of the proposed expansion of the network which should occur when development traffic volumes begin to adversely impact the existing neighbourhood roads.

## 3.0 Land Use Plan

The following section discusses the policy framework provided by the City of Prince George Official Community Plan as it pertains to the Fraser River Bench Lands Neighbourhood Plan as well as the influence of Smart Growth principles. As discussed above, Official Community Plan policy and Smart Growth principles are intended as a framework by which to measure development proposals and create land use and building regulations rather than as regulatory tools in and of themselves. Other plans and policies of the City of Prince George that have been evaluated and incorporated as part of this study are: the 1998 City Wide Trail System Master Plan; the 2000 Cycle Network Plan; the 2001 Transportation System Planning Study; the 2003 Prince George Transit System Review; and the 2004 Pedestrian Network Study. As outlined below, the City of Prince George Official Community Plan and Smart Growth principles share many common planning values and both are the basis for the creation of the Fraser River Bench Lands Neighbourhood Plan.

### 3.1 The Official Community Plan and Smart Growth Principles

Policy direction provided by the City of Prince George Official Community Plan mirrors Smart Growth principles with the clear intent to: “...develop urban residential areas in a compact manner, which maximizes the use of municipal infrastructure, creates a more pedestrian oriented community, is near transit services, and offers a wide range of housing types to all residents” (OCP, p.15). The principles and policies of the OCP that support Smart Growth include:

- Establishing a clear Urban Development Boundary,
- Establishing an Urban Phasing Plan within the Urban Development Boundary,
- Recognizing the importance of a Strategy for Commercial areas to prevent sprawl,
- Creating a “sense of place” within neighbourhoods,
- Encouraging the provision of a range of housing options,
- Establishing ratios for low density to medium density development in new neighbourhoods,
- Encouraging higher density residential development in and around the city centre to take maximum advantage of existing infrastructure,
- Encouraging small lots and clustering,
- Developing complete communities,
- Ensuring provision of a range of transportation options including vehicles, transit, and bicycles,
- Encouraging reduction of reliance on the private automobile through Comprehensive Transportation Demand Management,
- Protecting the natural amenities of the City, and

- Requiring the preparation of Neighbourhood Plans for substantial new development areas.

As illustrated above, the following eight key principles of Smart Growth are reflected throughout the Official Community Plan and include (Smart Growth BC, 2001):

- Promoting urban revitalization and a healthy working land base by rural preservation and by containing urban areas,
- Incorporating green infrastructure into communities,
- Creating compact, complete communities by mixing land uses and using land more efficiently,
- Increasing transportation choices through land use decisions,
- Creating inclusive neighbourhoods by ensuring that a diversity of housing types are accessible to a wide range of people of different age groups, family types and incomes,
- Maximizing the enduring benefits of developments by using resources wisely on sites and in buildings that are tailored to specific neighbourhood conditions,
- Supporting municipal goals through cost recovery, ensuring that development fees represent the true cost of different types of growth, and
- Reforming administrative processes and addressing liability issues.

The above principles have guided the vision created for the Fraser River Bench Lands. What follows is a discussion of the planning vision as well as how the specific policies of the Official Community Plan and other City policies are reflected in the plan's proposed land use, transportation network, and servicing.

### **3.2 Vision of the Fraser River Bench Lands**

Planning for the Fraser River Bench Lands began with acknowledging that the natural features of the area – the Fraser River, the steeply sloped escarpment, the wetlands and the drainage courses – are not barriers to development but rather are the foundation within which to create a complete, liveable neighbourhood that incorporates natural features, provides a significant amount of green space, an extensive trail network, as well as being the gateway to the proposed City riverfront recreation system and Parkridge Creek Park.

As demonstrated on the explanatory figures, the plan for the Fraser River Bench Lands is characterized by:

- A mix of land uses including residential, commercial, and institutional with a range of residential density options,
- 2 Neighbourhood Parks, including a riverside park,
- A City riverfront park extending from Malaspina Ridge to Varsity Creek,



- Development of 4.4 km of trails connecting with Lower College Heights and proposed City trails to the south,
- Designed connections to the bicycle network,
- A pedestrian-friendly environment that provides connections within the Bench Lands and to surrounding neighbourhoods,
- Dedication of greenways to protect environmentally sensitive areas,
- Completion of an Environmental Overview of the area,
- A Neighbourhood Centre,
- A combination of traditional and Smart Growth design standards,
- Alternative Design Standards for storm water management,
- Alternative Design Standards for some local roads, and
- Accommodation of Transit services.

Table 3 provides the land use summary of the Fraser River Bench Lands based on the entire land area. As proposed, the Gross Area of the Fraser River Bench Lands is 106.52 hectares with a net developable area of 55.17 hectares, or 51.79% of the land base.

**Table 2: Land Use Summary**

<b>Land Use</b>	<b>Area (ha)</b>	<b>Percentage of Gross Area</b>
Single Family	32.79	30.78%
Multi Family	4.67	4.38%
Smart Growth Low Density	10.98	10.31%
Smart Growth High Density	3.72	3.49%
School	2.43	2.28%
Commercial	0.58	0.54%
Parks/Greenspace	36.81	34.56%
Roads	14.54	13.65%
<b>Gross Area</b>	<b>106.52</b>	<b>100%</b>
<b>Less Roads/Parks/Greenspace</b>	<b>51.53</b>	<b>48.21%</b>
<b>Net Developable Area</b>	<b>55.17</b>	<b>51.79%</b>

The following land use policies for the Fraser River Bench Lands touch many different components of land use and development practices, including zoning regulations, subdivision and development control regulations, and design standards. For example, permitting a mix of land uses, such as local commercial combined with institutional and residential, may require an innovative, comprehensive zoning district; or designing an area within the neighbourhood with alternative road width standards may require a variance to, or amendment of, the Subdivision and Development Control bylaw. The specific regulatory requirements are beyond the scope of this Neighbourhood Plan, however, the Official Community Plan and Neighbourhood Plan policies will help guide decisions on planning and land use management within the area covered by the Plan.

The presentation of the Land Use Plan begins with the Environmentally Sensitive Areas and Natural Greenspace.

### 3.3 Environmentally Sensitive Areas and Natural Greenspace

Policy 4.3.1 of the Official Community Plan discusses the Environmentally Sensitive Areas within the City as indicated on Map 2 – Sensitive Natural Areas. With respect to the Fraser River Bench Lands, Map 2 of the OCP identifies a large swamp, but does not highlight the area as being of particular environmental significance. There are, however, environmentally sensitive areas within the Fraser River Bench Lands such as: the steeply sloped escarpment on the western edge of the plan; Varsity Creek; the wetland areas, and intermittent watercourses draining toward the Fraser River. In addition, there are wildlife values in the area including bear and moose habitat. Early consultation with the Department of Fisheries and Oceans and the Ministry of Environment has indicated that there was initially insufficient information regarding the potential fisheries and other habitat and environmental values throughout the Bench Lands. As a result, an Environmental Overview has been completed as part of the Fraser River Bench Lands Neighbourhood Plan and is included in Appendix G.



Smart Growth principles dictate that healthy communities require an integration of urban development with ecosystems. This integration requires that sensitive natural features such as water bodies, water courses and habitat areas are preserved as much as possible. As the land use planning document for the Fraser River Bench Lands, this Neighbourhood Plan recognizes the importance of sensitive features and is, therefore, proposing setbacks and retention of vegetation adjacent to the Fraser River, Varsity Creek, and the other watercourses, as well as on undevelopable slopes with a grade over 20 %. This recognition is clearly demonstrated by the proposed retention of approximately 16% of the land base as natural greenspace. At the same time, the Neighbourhood Plan reinforces that the area designated for

Urban Development is not noted by Map 2: Sensitive Natural Features of the Official Community Plan as an area of particular environmental sensitivity. Figure 5 demonstrates the intention to provide greenway areas to be kept free of development beyond that of either rustic trails or natural storm water drainage utilities in order to accommodate wetlands, watercourses, and habitat corridors. Detailed design will need to be based on the environmental overview and pay particular attention to water quality,

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road crossings of riparian areas, and management zones within the riparian areas, as well as retention of mature trees throughout the Neighbourhood where possible.

The City is currently pursuing a Memorandum of Understanding (MOU) with the Department of Fisheries and Oceans and the Ministry of Environment in an effort to define the parameters of environmental review, as well as jurisdiction of responsibility for development approval regarding the environment. The Fraser River Bench Lands Neighbourhood Plan will be subject to this MOU if it is implemented.

### ***3.3.1 Environmentally Sensitive Areas Policy Recommendations***

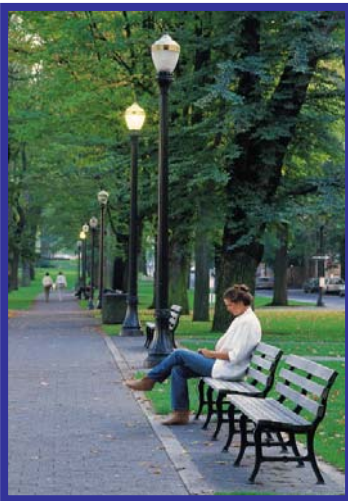
1. Detailed subdivision design shall be based on the outcome of additional environmental analysis with particular attention to riparian setbacks and mitigating urban development/wildlife conflicts.
2. A minimum of 50 metres will be retained from the top of bank of the Fraser River. This area should be subject to negotiation with the City of Prince George regarding the application of Development Cost Charges or possible purchase by the City for the expansion of the Major Park as designated by the OCP.
3. A minimum 15 metre setback will be retained adjacent to the wetland areas and drainage channel located at the bottom of the slope on the western edge of the neighbourhood. This area is to be dedicated to the City of Prince George for public use and the expansion of Essex Park. An additional 15 metres of the private property designated for multiple family development on the west side of this drainage channel shall be retained as a non-disturbance area.
4. A minimum 15 metre setback will be retained from the top of bank surrounding Varsity Creek. Prior to subdivision approval, the City of Prince George will determine which lands will be dedicated to the City of Prince George. An additional 15 metres of the private property on either side of Varsity Creek shall be retained as a non-disturbance area.
5. A minimum 30 metre setback will be retained from the watercourse within Right of Way Plan 2219 between the top of bank and the high density area. A minimum 20 metre setback will be retained between the top of bank and the lower density and commercial/neighbourhood centre area. Prior to subdivision approval, the City of Prince George will determine which lands will be dedicated to the City of Prince George.
6. Any Natural Greenspace that includes, or is intended to include, public utilities ie: trails and/or storm water drainage shall be dedicated to the City of Prince George.
7. If a Memorandum of Understanding (MOU) is implemented between the City, the Department of Fisheries and Oceans, and the Ministry of Environment, new development of the Fraser River Bench Lands will be subject to the MOU.
8. Areas deemed to be too steep to be developed (with slopes in excess of 20%) shall be left natural greenspace. Prior to subdivision approval, the City of Prince George will determine which lands will be dedicated to the City of Prince George.
9. Detailed subdivision design shall include retention of mature trees where possible.

### 3.4 Parks and Trails

The Official Community Plan considers the provision of parks and trails an essential component of our community when it states,

*A key attribute to the quality of life is the significant extent of park and open space in the community and the linkages offered by trails to connect various parts of the city (OCP p. 71).*

The Official Community Plan outlines a hierarchy of parks and trails that are to be included in new neighbourhoods including: City, District, and Neighbourhood Parks, as well as multi-use, local, and rustic trails. In addition, the City has the authority to require 5% of subdivided land for future park development or take cash-in-lieu to the equivalent of 5% parkland dedication. The priority for this dedication is lands that are suitable for development as City, District or Neighbourhood Parks. In recognition of the importance of lineal parks and public access to the Fraser River, this Plan has not only provided 5% parkland to be dedicated to the City, but has also allowed for 17.09 hectares of land for City Natural Park along the Fraser River representing approximately 16% of the total plan area. Some of the area shown as City park along the Fraser River is developable land (subject to constraints such as riparian protection, flood and erosion hazards, geotechnical terrain stability, and topography) and as such it is recommended that the property owners and the City of Prince George negotiate an agreement that considers the application of Development Cost Charges, potential City purchase of lands or other options with respect to the land designated for City Park exceeding 5% parkland dedication requirements.





Further, as directed by the Official Community Plan, the Fraser River Bench Lands Plan is proposing to provide two (2) Neighbourhood Parks, one to be located, if possible, adjacent to an elementary school and one to be located adjacent to the Fraser River. For the Bench Lands, Neighbourhood Parks total 3.24 hectares and, in combination with the City Park along the Fraser River, the total area proposed for park is 20.33 hectares, or 19.1% of the land base which is four times the park land dedication requirement. As detailed on Figure 5: Parks, Trails, and Greenways, the location and size of the proposed Neighbourhood Parks meet the policy directives of the OCP. Table 4 illustrates the amount of land dedicated to parks and green space.



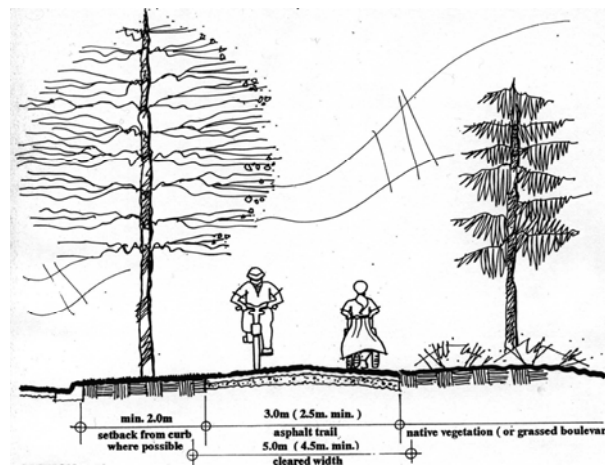
**Table 3: Parkland and Greenspace by Property**

Land Use	Fortwood (ha)	RCEC (ha)	CPG (ha)	Total (ha)	% of Total Area
City Park	7.02	7.20	2.87	17.09	<b>16.04%</b>
Neighbourhood Park	2.71	0.53	0.00	3.24	<b>3.04%</b>
Green space	6.50	9.98	0.00	16.48	<b>15.48%</b>
<b>Total</b>	<b>16.23</b>	<b>17.71</b>	<b>2.87</b>	<b>36.81</b>	<b>34.56%</b>

Figure 5 also demonstrates the extensive proposed trail system, augmented in some cases by sidewalk connections, providing connectivity between natural green spaces and built areas within the Fraser River Bench Lands as well as to adjacent areas, including Lower College Heights, Fraser River Park, and the proposed Destination Park south of the Bench Lands. As demonstrated on Figure 5, the proposed trails within the Bench Lands

are comprised of all three standards provided by the Official Community Plan. The trail standards are defined as follows:

- **Multi-use Trail (City Trail)** – is a city wide route linking major residential areas the downtown, riverfronts, destination parks, significant natural areas, regional recreation facilities and other amenities. City trails are asphalt with a trail width is 2.5 to 3.0 metres
- **Local Trail** – is located in natural areas, neighbourhood open spaces, greenbelts, and as secondary loops in destination regional parks and other open space areas. The trail surface is granular with a width of 1.5 to 2.0 metres.
- **Rustic Trail** – is located in natural settings to maximize aesthetics and trail experience. The trail is generally packed earth, crushed gravel, or granular with a width of 0.8 to 1.0 metres.



The multi-use trail network that is proposed by the 1998 City Wide Trail System Master Plan adjacent to the Fraser River is an essential link of the City’s overall trail system and will form the spine of the envisioned river front recreation area. It is therefore recommended the construction of all multi-use trails in the Fraser River Bench Lands be developed in accordance with the Capital Works Program, while the developers fund the construction of the local and rustic trail links to the multi-use trails through the Bench Lands.

The allocation of park lands and the provision of biking and walking trail networks is an important element of Smart Growth. The Fraser River Bench Lands Neighbourhood Plan has given high importance to ensuring that generous open space and trails are designated to encourage active transportation, public recreation and an overall healthy community.



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### ***3.4.1 Parkland and Trail Policy Recommendations***

1. Two Neighbourhood Parks shall be provided in the Fraser River Bench Lands Neighbourhood, one adjacent to the elementary school site and one adjacent to the Fraser River to form part of the overall riverfront recreation area.
2. Neighbourhood Parks shall be developed with a target of one park per 1,000 residents.
3. Within the minimum 50 metres of natural greenspace from the Top of Bank of the Fraser River, shall be located a City Park connecting the proposed Major Park with Fraser River Park and providing public access to the river.
4. The 5% parkland dedication is to be comprised of the two Neighbourhood Parks and the City Park. Any land dedicated as City Park that exceeds the 5% requirement shall be subject to negotiation between the land owner and the City of Prince George.
5. Within the minimum 50 metres of natural greenspace from the Top of Bank of the Fraser River, shall be located a trail designed to the multi-use standard.
6. The multi-use trail adjacent to the Fraser River will be linked to Lower College Heights in seven (7) places as demonstrated on Figure 5. The trail connections consist of local trail standard, rustic trail standard and sidewalk.
7. All trails other than multi-use standard shall be constructed and paid for by the developer.
8. Trails shall be planned and developed as part of each phase of subdivision with the objective of facilitating the easy movement of people throughout the neighbourhood and to adjacent areas.

## **3.5 Transportation Network**

Policy 11.6.3 of The Official Community Plan recognizes that Transportation Networks are more than simply roads, but are the means by which people manoeuvre throughout a neighbourhood and the community with the statement:

*Multiple use of major transportation corridors is encouraged. Roads should be shared for various modes of transportation including vehicles, cyclists, transit, and pedestrian movement (OCP, p.85).*

In addition, the OCP states that Neighbourhood Plans must address the transportation network by considering all modes of local transportation including vehicle, pedestrian, bicycle, and transit options. Figure 4 demonstrates the proposed Transportation Network for the Fraser River Bench Lands, as well as how the proposed network connects with the existing one in the adjacent area.

### ***3.5.1 Road Network***

As previously discussed, one of the historical constraints with respect to the development of the Fraser River Bench Lands has been road access resulting from challenging

topography at both the northern and southern access points. The Bench Lands development area is long and linear with a north-south dimension of 2 kilometres, and an east-west dimension of approximately 400 metres. In addition, there is limited opportunity to connect the proposed development area to the City's Transportation Network on the east or west sides because of the proximity of the Fraser River and the College Heights escarpment. As a result, the proposed connections to the City's Transportation Network will be located at the north end and at the south end of the development.

It is anticipated that both connections to the City's existing transportation network will be costly because of steep escarpment grades and challenging topography. Current planning and discussions with both Fortwood and RCEC indicate that the development will most likely proceed from south to north. Thus, the first major road to be constructed will be the northwards extension of Malaspina Avenue. This extension of Malaspina Avenue will require significant earthworks within the lands owned by Fortwood, and also within the lands that are presently being developed by Malaspina Ridge. The necessary cuts and fills will be extensive and costly.

As the development of the Fraser River Bench Lands proceeds, it will be necessary to extend the Malaspina Avenue collector road in a northerly direction to connect with the existing Cowart Road. The topography in the vicinity of the proposed Cowart Road/Malaspina Avenue intersection is challenging. The general area is constrained by the close proximity of the Fraser River and the existing steep gradients that are located on each side of the current Cowart Road alignment. Again, it is anticipated that this particular intersection will be costly to construct.

Figure 4 illustrates the proposed alignment of the Malaspina Avenue collector road. Generally, the Malaspina Avenue collector road will consist of an extension of Malaspina Avenue from Cowart Road to the existing termination of Malaspina Avenue within the new Malaspina Ridge Subdivision. The approximate length of the proposed Malaspina Avenue collector road is 2 km and, because of the linear nature of the proposed development, a single collector road is able to service the entire development area. All of the other roads illustrated on the transportation network plan (Figure 4) will be local roads only. The proposed realignment of the Cowart Road interchange with Malaspina Avenue is illustrated on Figure 4. Conceptual plans of the proposed Cowart Road/Malaspina intersection which, in essence, will be constructed to create an improved intersection of Cowart Road with Malaspina Avenue, have been provided to the City separately from this document for review and comments. At this time, the Cowart Road/Malaspina intersection designs are preliminary; however, the work completed to date confirms that the proposed improvements are feasible.

Ultimately, the new Fraser River Bench Lands neighbourhood will be linked to Highway 16 via the existing section of Cowart Road. At the present time, Cowart Road functions as a Collector Road and connects to Highway 16 West at an existing signalized intersection. The operation and functionality of this particular intersection were analyzed as part of the Neighbourhood Planning process. Detailed traffic counts were undertaken

during the am and pm peak periods and an intersection capacity analysis was conducted for existing traffic conditions (2006) and for future traffic projection, assuming full build out of the Bench Lands by 2021. The existing Highway 16/Cowart Road intersection operates at an acceptable Level of Service (L.O.S.) B and C during the am and pm peaks respectively. This L.O.S. confirms visual observations during the am and pm peak periods with traffic moving efficiently with little delay. In particular, the am peak westbound (Cowart Road) right-turn merge lane was operating with near free flow conditions, which were further enhanced by the platoon arrival of north bound vehicles on Highway 16. With the addition of the am peak development traffic, the capacity of the intersection is reduced to L.O.S. C. No individual movement's L.O.S. is worse than L.O.S. D. The lane configuration at the intersection was revised to include a separate westbound left-turn slot and the signal phasing was updated to include a westbound left-turn movement. With the addition of the pm peak development traffic, the overall capacity of the intersection is reduced to L.O.S. E. The north and south bound through movement volumes are high throughout the Highway 16 corridor from Domano Boulevard to Highway 97. To reduce these volumes, alternate parallel routes are required. The future extension of Ospika Boulevard and the construction of the Ospika overpass will help reduce the traffic on Highway 16. The potential connection of Cowart Road to Lansdowne Road is another link that would greatly reduce the impact on the Highway 16 and Cowart Road intersection by providing an alternate connection from College Heights to Ferry Avenue/Highway 97 and Queensway. This link, while physically difficult to construct, will provide access to Ferry Avenue, the BCR Industrial site and the downtown core without travelling on Highway 16. Another alternative worth considering is the construction of an underpass beneath Highway 16, near the Telus building connection Cowart to Wiebe Road.

In summary, to reduce the impact on the Highway 16 corridor, and to improve the Level of Service at the Highway 16/Cowart Road intersection, alternate transportation links are required. Improvements to the Cowart Road geometrics will also assist with the free flow of traffic from the Bench Lands to Highway 16. As such, there are unresolved transportation impacts caused by the development that go beyond conventional mitigation measures, and will consequently need to be studied with network modelling to identify potential solutions, including timing and funding.

In order to determine the development threshold at which the connection of Malaspina Avenue to Cowart Road will be required, a traffic analysis of the critical intersection on Malaspina Avenue was prepared. Traffic counts were conducted during the weekday am and pm peaks on Malaspina Avenue near Rochester Crescent. The City prepared a Synchro traffic analysis for the Malaspina Avenue and Rochester Avenue intersection. An iterative analysis with varying levels of development was performed to determine when the operation of the intersection dropped below a Level of Service (LOS) B. It was determined that with an additional 200 vehicles, which roughly equates to an additional 200 dwelling units, the operation of the intersection dropped below LOS B. Given the assumptions made during the analysis, an additional traffic count and analysis should be performed after 150 dwelling units have been constructed and occupied to confirm the operation of the intersection and Malaspina Avenue.

Generally, roadworks to provide access to the subdivision will be costly. As previously noted, these roadwork costs have been one of the impediments to the development of the Fraser River Bench Lands area. The proposed Cowart Road/Malaspina Avenue intersection will be the major cost; however the extension of the existing Malaspina Avenue, including the significant cuts and fills, will also be significant. The City of Prince George has recognized that the costs of connections to the existing Transportation Network are significant. Thus, the crossing of Varsity Creek and both connections to the existing Transportation Network are identified as “extraordinary works” and are included in the City of Prince George Capital Expenditure Program. In summary, the partial funding of the expensive roadworks by the City of Prince George will improve the existing Transportation Network, and will act as a catalyst for the development of the Fraser River Bench Lands.

### ***3.5.2 Pedestrian Network***

By undertaking the 2004 Pedestrian Network Study, the City of Prince George has indicated that the creation of pedestrian facilities is a priority of transportation planning. The Study notes that,

*Walking is increasingly recognized as an essential and healthy transportation mode. To support walking, areas that generate walking trips and attract pedestrians need to be easy and safe for pedestrians to negotiate. As vehicle volumes and speeds increase, pedestrians are not comfortable walking without designated and safe routes. The presence of quality facilities can facilitate walking and increase safety for pedestrians. (2004 Pedestrian Network Study, p. 1)*

The combination of mixed local commercial, institutional, and residential land uses connected by sidewalks, multi use trails, and greenways will create a pedestrian friendly environment within the Fraser River Bench Lands as well as link the Bench Lands to surrounding neighbourhoods. The extension of sidewalks along Cowart Road towards Highway 16 West should also be considered.

### ***3.5.3 Cycle Network***

Another component of providing for multiple modes of transportation is planning for the bicycle. Providing opportunities for safe cycling is highlighted in the following excerpt from the 2000 Cycle Network Plan,

*Planners and designers should work to fully integrate the bicycle into the existing transportation systems, and to encourage the acceptance of the use of the bicycle as a safe and convenient mode of transportation... Properly engineered facilities encourage the cyclist to use them because it is easy, convenient, and demonstrates that cycling has a place in the transportation network. (2000 Cycle Network Plan, p.2)*



The OCP supports the Cycle Network Plan as illustrated on Map 10: Bicycle Network. The Fraser River Bench Lands Neighbourhood Plan has reflected the conceptual cycle network through the Fraser River Bench Lands, as proposed on Map 10 of the OCP, in that the extension of Malaspina Avenue will be designed to the collector standard and includes a dedicated cycle lane in both directions. As demonstrated on Figure 5: Parks & Trails, and in order to facilitate an on- and off-road cycle experience, these cycle lanes will connect to: the existing cycle lane on Cowart Road, the proposed multi use trails to Lower College Heights, and the multi-use trail through the City Park adjacent to the Fraser River.

### **3.5.4 Transit Network**

Policy 11.6.9 of the Official Community Plan states that,

*New neighbourhoods shall be designed to facilitate public transit and access to transit, including the incorporation of looped roads designed to link internal residential sectors (OCP, p.86).*

In combination with this policy of the OCP, the 2003 Prince George Transit Service Review outlines design standards the transit system should strive to attain:

- Service within 400 metres walking distance of 90% of all residences.
- Service within 150 metres walking distance of major senior residences and other institutional facilities.
- Service within 250 metres of all future medium and high density residential developments.

The above goals are facilitated by the proposed north-south Malaspina Avenue collector road which will be centrally located within the Bench Lands area such that no residence is more than 300 metres from public transit. In addition, the majority of the medium and



high density developments, as well as school and commercial areas, are connected directly to Malaspina Avenue.

How and when the provision of direct transit service to the Fraser River Bench Lands will be supplied will be evaluated by the City of Prince George against these criteria. However, the Fraser River Bench Lands Neighbourhood Plan must demonstrate that there are suitable pedestrian and cycle links from the Bench Lands to the existing transit service in Lower College Heights. Figure 4: Transportation Network and Figure 5: Parks and Trails, demonstrate these links.

Smart Growth principles dictate the importance of providing adequate pedestrian infrastructure such as sidewalks, transit accessibility and bike lanes to encourage public health, increase social interaction and improve pedestrian safety. The Fraser River Bench Land Neighbourhood Plan supports these principles and is addressing pedestrian and public transit issues in a manner that is consistent with Smart Growth and that increases transportation choices available to the public.

### ***3.5.5 Transportation Network Policy Recommendations***

1. Malaspina Avenue shall be built to a collector standard with a 25 metre right of way (ROW) with a 13 metre wide paved surface. The road shall be designed to accommodate a bicycle lane on both sides, transit stops, and a 1.8 metre wide sidewalk on the east side of the roadway. In addition, direct driveway access to Malaspina Avenue shall be limited as much as possible.
2. The extension of Malaspina Avenue is recognized as “extraordinary works” and is included in the City of Prince George Capital Expenditure Program.
3. Malaspina Avenue shall be constructed in a northerly direction from the existing termination of Malaspina Avenue located within the new Malaspina Ridge Estates subdivision development.
4. A Traffic Analysis has been prepared which indicates that the initial development phases be limited to 200 dwelling units, until such time as Malaspina Avenue is extended northwards to connect with Cowart Road. Further traffic counts shall be conducted when the number of dwelling units reaches 150.
5. The extension of Malaspina Drive through to Cowart Road should not be permitted until comprehensive network modelling has been completed and recommendations regarding the results, including identification of possible solutions, timing, and funding are considered by all appropriate approving agencies.
6. A Traffic Analysis has been prepared which indicates that additional transportation links should be developed (i.e.: Cowart to Landsdowne) to reduce the impact on Highway 16 and to improve the Level of Service at the Highway 16 and Cowart Road intersection.
7. Any new development serviced by the northwards extension of Malaspina Avenue should allow the existing portion of Malaspina Avenue to operate at a level of service “B.”



8. Local subdivision roads will be built to a 10 metre wide paved standard with a sidewalk on one side.
9. Lot configurations will be designed at the subdivision stage of development.
10. Access to City of Prince George lands will be provided.
11. Alternative Development Standards for local roads shall be considered during the subdivision phase of development.
12. During the subdivision phase of development, consideration will be given to the creation of a safe, pedestrian-oriented environment where traffic speeds and conflicts are managed.
13. Additional pedestrian connections to the existing trail network should be encouraged at the time of subdivision.
14. Links from trails to roadways will be appropriately designed.
15. In accordance with the City's Transit Policies, public transit shall be provided on collector roads in the neighbourhood as warranted by demand.

### **3.6 Residential Land Use**

The proposed residential areas for the Fraser River Bench Lands are comprised of a mix of traditional and Smart Growth areas. This Neighbourhood Plan has taken its policy direction with regard to: provision of housing choices, neighbourhood character, siting criteria, provision of affordable and rental housing, and community residential facilities from the Official Community Plan. The primary differences between the Smart Growth and traditional areas are found in achievable densities, servicing and infrastructure considerations as well as in proposed zoning regulations and provision of additional green space. What follows is a description of the proposed residential component of the Fraser River Bench Lands by policy direction of the OCP and Smart Growth principles.

#### ***3.6.1 Principles of Residential Development***

Residential housing principles, as outlined by the Official Community Plan include: developing a compact community by increasing urban density and infilling existing neighbourhoods, providing a variety of housing options, encouraging innovative design, respecting the integrity of existing neighbourhoods, encouraging social housing, and designing liveable neighbourhoods.

The Fraser River Bench Lands' Residential policies encourage the development of a compact community by permitting secondary suites within Single Family dwellings in designated Smart Growth areas and maximizing the medium density housing development permitted by the Official Community Plan. Further, the Bench Lands represent infill development as the land is designated as Phase 2 development lands, are a logical extension of municipal infrastructure, and are the last urban designated land to be proposed for development in the Lower College Heights area of the Southwest Sector. The proposal respects the integrity of the existing Lower College Heights neighbourhood

by replicating trail and parkland development and providing connectivity through the neighbourhood, although architectural styles can be original given the topographical separation between the neighbourhoods. The discussion below demonstrates the proposed residential densities, housing options, and design standards for the Fraser River Bench Lands.

### ***3.6.2 Residential Densities and Variety of Housing Options***

The OCP acknowledges that the market is showing a change in housing preferences and that this change is due, in part, to demographics and also to lifestyle choices. To be considered a complete neighbourhood, there should be adequate housing options for people in every demographic. In other words, there should be housing for students, for single working people, for families with children, for “empty-nesters”, and for seniors. There should be housing types available for different socio-economic groups as well as Community Residential facilities for those with special needs or who require assistance with daily living.

The proposed Fraser River Bench Lands Neighbourhood will provide single family, medium density multiple family, and secondary suites as well as Higher and Lower Smart Growth density housing options, including: town housing, row housing, two-family, and strata opportunities. In addition, 1 out of every 200 lots will be zoned for Community Residential use, satisfying Policy 6.3.20 of the Official Community Plan.



Policy 6.1 of the Official Community Plan, directs potential housing mix by sector. Within the Southwest sector, the housing mix objective is:

- 65% low density residential, which includes single family and two-family dwelling units to a maximum density of 22 units per hectare.
- 35% medium density units with a density range of 20-40 units per hectare.

This plan augments this policy direction by providing Higher and Lower Smart Growth housing mix objectives. The housing mix and density objectives of the Fraser River Bench Lands are demonstrated in Table 5 below and were calculated based on the Housing Densities objectives provided by the Official Community Plan, as well as City of Prince George Design Guidelines, 2001.

**Table 4: Housing Densities**

<b>Residential Designation</b>	<b>Average Density</b>	<b>Housing Form</b>
Low Density Residential	9.6 units/ha.	Single Family and Two Family
Medium Density	40 units/ha.	Ground oriented town houses
S.G. Lower Density	12 units/ha.	Single Family, Secondary Suites, Two Family, ground oriented town houses
S.G. Higher Density	40 units/ha.	Single Family, Secondary Suites, Two Family, ground oriented town houses, up to 4 storey apartments

Figure 3 demonstrates land use within the Fraser River Bench Lands at full build out. The more detailed level of planning that will occur at the rezoning stage will result in refinement to the number and mix of units and development factors. Such details as site-specific conditions and market demand will influence the forms of medium density and Smart Growth Lower and Higher Density developments. Table 6 indicates the percentage of residential development by land area proposed for the Fraser River Bench Lands. The proposed housing mix exceeds the objectives of the Official Community Plan.

**Table 5: Ratio of Residential Development**

<b>Residential Designation</b>	<b>Total Area (ha)</b>	<b>Dwelling Units / ha</b>	<b>Number of Dwelling Units</b>
Single Family	32.79	9.6	315
Medium Density	4.67	40	187
S.G. Lower Density	10.98	12	132
S.G. Higher Density	3.72	40	149
<b>Total</b>	<b>52.16</b>		<b>783</b>

The total number of low density dwelling units is 447 (315 + 132). The total number of medium density dwelling units is 336 (187 + 149). Thus, the ratio of low density to medium density is 57 % to 43 %. This ratio exceeds the objectives of the Official Community Plan and is a reflection of the Smart Growth principles combining increased land use density with increased greenspace.

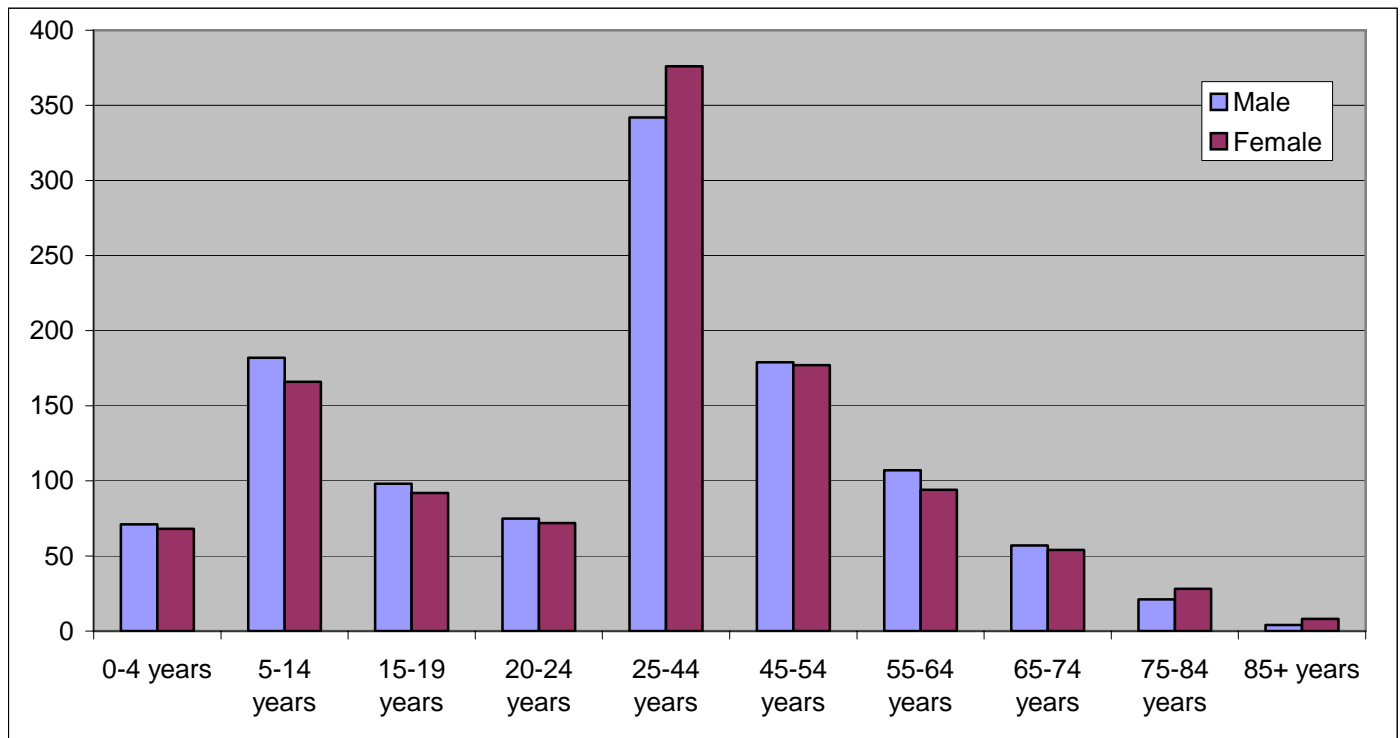
Based on housing data for newer residential areas of Prince George, it is estimated that the average number of persons per household will be in the range of 2.5 to 3.2 with a blended average incorporating 2.85 for single, multiple, and smart growth residences. Table 7 shows the estimated population of the Fraser River Bench Lands to be 2,271.

**Table 6: Estimated Population of the Fraser River Bench Lands**

<b>Residential Designation</b>	<b>Total Area (ha)</b>	<b>Dwelling Units / ha</b>	<b>Number of Dwelling Units</b>	<b>Persons / Dwelling Unit</b>	<b>Estimated Population</b>
Single Family	32.79	9.6	315	3.2	1008
Medium Density	4.67	40	187	2.5	468
S.G. Lower Density	10.98	12	132	3.2	422
S.G. Higher Density	3.72	40	149	2.5	373
<b>Total</b>	<b>52.16</b>		<b>783</b>		<b>2,271</b>

Chart 1: Age/Sex Breakdowns (see following page) shows the age breakdown by sex of the projected population of the Fraser River Bench Lands at full build out and is illustrative in showing a snapshot of the life cycle of a neighbourhood. The largest age grouping for the Fraser River Bench Lands, for example, is in the range of 25 – 44 years, which would typically would be considered the demographic for single family homes. Correspondingly, the largest number of dwelling units is found to be in the single family dwelling category. Statistics for Chart 1 are based on the City of Prince George's *Age/Sex Breakdowns-2001* chart.

**Chart 1: Fraser River Bench Lands Age / Sex Breakdowns**



	0-4 years	5-14 years	15-19 years	20-24 years	25-44 years	45-54 years	55-64 years	65-74 years	75-84 years	85+ years	TOTAL
Male	71	182	98	75	342	179	107	57	21	4	1136
Female	68	166	92	72	376	177	94	54	28	8	1135
TOTAL	139	348	190	147	718	356	201	111	49	12	2271

Note: All totals are base on City of Prince George Age/Sex Breakdowns-2001 chart

### **3.6.3 Zoning and Smart Growth**

This plan represents significant movement toward Smart Growth development in Prince George and includes a mix of traditional and Smart Growth residential development opportunities. The areas highlighted for Smart Growth on Figure 3 present the opportunity to explore innovative zoning regulations and alternative design standards. According to Smart Growth BC,

*Zoning is perhaps the single most effective tool for shaping the look, feel, and function of a community. Just as the human geography of every community has been shaped by land-uses historically determined by specific zones, so is the future shape and efficiency of our neighbourhoods open to zoning's influence.* (Smart Growth Tool Kit, p. II-24)

Smart Growth advocates that residential expansion occur in a manner that provides a range of housing types through mixed use development. Appropriate land use planning, site design and zoning regulations can assist in the creation of a more inclusive, self-sustaining and complete community.

A specific discussion of possible zoning regulations that can influence Smart Growth development is beyond the scope of this study and is more appropriately considered at the rezoning stage of development. Regulatory options include: Development Permit areas, Comprehensive Development zoning districts, as well as amendments or variances to the Subdivision and Development Control bylaw. For a more complete discussion of Smart Growth Principals, please see Appendix A.

### **3.6.4 Siting and Building Criteria**

The Official Community Plan provides policy direction for siting and building criteria for medium density housing options as follows:

- Sited along arterials or collector roads at entry locations to neighbourhoods
- Proximity to major parks, community facilities, schools and transit within 5 or 10 minute walking distance based on level of density,
- Plan for integration with the overall neighbourhood,
- Design should consider: ground oriented developments that include urban plazas and contribute to the sense of an urban village taking advantage of view areas and river front sites; setbacks that contribute to streetscape, variations in facades, shadow and sun exposure, play areas, and safety, and
- Sited to maximize noise attenuation opportunities.



Figure 3: Land Use Plan for the Fraser River Bench Lands demonstrates that the siting criteria of the OCP have been incorporated, however design considerations are more appropriately considered during the rezoning and subdivision development phases. It should be noted that all multi-family developments are subject to a Residential Development Permit, the purpose of which is to ensure that the design standards are followed.

In addition to the design standards outlined by the OCP, the Smart Growth Design Standards outlined below can also be incorporated into more specific development review processes.

- Different dwelling types in the same neighbourhood and even on the same street. Different family types and incomes can be accommodated in neighbourhoods that retain a ‘single family district’ feel.
- Buildings that present a friendly face to the street. Porches and trees out front, and a mix of housing types.
- 5-minute walks to transit and shops.
- Interconnected streets ensure that all trips, whether in a car, on a bike, or on foot, are made using the shortest route possible.
- Reduction in paved areas and other impermeable surfaces.
- Natural drainage systems where surface runoff infiltrates into the soil.

### ***3.6.5 Residential Land Use Policy Recommendations***

1. Secondary suites shall be a permitted use in single family dwelling units within Smart Growth areas.
2. Where possible, medium density housing development should be maximized to increase residential densities.
3. Variety of housing options should be provided throughout the Fraser River Bench Lands, including rental opportunities.
4. 1 of every 200 properties shall have as a permitted use Community Residential Facility.
5. Siting and building criteria for medium density housing shall be incorporated.
6. Smart Growth principles as identified in Appendix A of this plan shall be employed where possible in developing the Smart Growth areas identified on Figure 3.
7. As recommended in the Geotechnical Overview, included as Appendix H, additional subsurface investigation will be needed prior to the future development of the area formerly containing City sewage lagoons.

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### 3.7 Commercial Land Use

The Fraser River Bench Lands Neighbourhood Plan identifies a single local service commercial site in the Neighbourhood Centre. The siting for this location is based on the following criteria:

- Intersection of two major roads.
- Centrally located.
- Adjacent to higher density land uses.
- Proximity to school site and Neighbourhood Park.

The proposed Neighbourhood Centre permits commercial properties that do not exceed the 3,000 m<sup>2</sup> site size limitation established by Policy 7.3.15 of the Official Community Plan. The intention is for the Neighbourhood Centre to include a mix of uses in the commercial area, such as; an urban plaza, community centre, or another form of community gathering place.

In addition to the identified local service commercial site, the provision of mixed land uses throughout the Neighbourhood would permit those areas identified for Smart Growth to include local service commercial uses, in combination with residential uses, given that the above mentioned siting criteria can also be applied. The inclusion of commercial developments throughout the Neighbourhood will be based on market opportunities that are in keeping with Policy 7.3.15 and 7.3.16 of the Official Community Plan which limit the maximum site area to 3000 m<sup>2</sup> and establish criteria for including commercial uses in established neighbourhoods.

#### ***3.7.1 Commercial Land Use Policy Recommendations***

1. Local service commercial development shall be permitted, as identified, in the Fraser River Bench Lands Neighbourhood Centre. Permitted uses would include those accommodated within the Local Commercial land use designation as defined in the Official Community Plan, as well as forms of community gathering places such as an urban plaza or community centre.
2. Local service commercial uses may be permitted, as part of mixed use developments, in the areas identified as Smart Growth areas in Figure 3 of the Fraser River Bench Lands Neighbourhood Plan.

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## **3.8 Institutional Land Use**

Policy 10.4.6 of the Official Community Plan directs that government institutional uses, such as hospital facilities, administrative buildings, and cultural facilities should be located in the City Centre. Therefore, the Institutional uses appropriate for the Fraser River Bench Lands include; places of worship, educational facilities, and community centres. The land use plan indicates that the Neighbourhood Centre will be comprised of the proposed school site, along with a mixed use commercial/institutional site abutting medium density, higher density, and single family land uses.

### ***3.8.1 School Site***

School District No. 57 has indicated that elementary schools are constructed for a population of 300 elementary school age children. The projected population for the Fraser River Bench Lands is 2,271 with a number of dwelling units of 783. Based on the assumption, provided by the Official Community Plan, of 0.4 elementary students per housing unit, the number of elementary school age children projected for the Bench Lands is calculated to be 313. Early consultation with the School District has indicated that, given the capacity for 50 children in Malaspina Elementary School and that Gladstone Elementary could be reopened, School District No. 57 does not anticipate the need to construct a new elementary school within the Fraser River Bench Lands. In addition, the School District has indicated that College Heights Secondary School will be able to meet any future demands at the secondary school level.

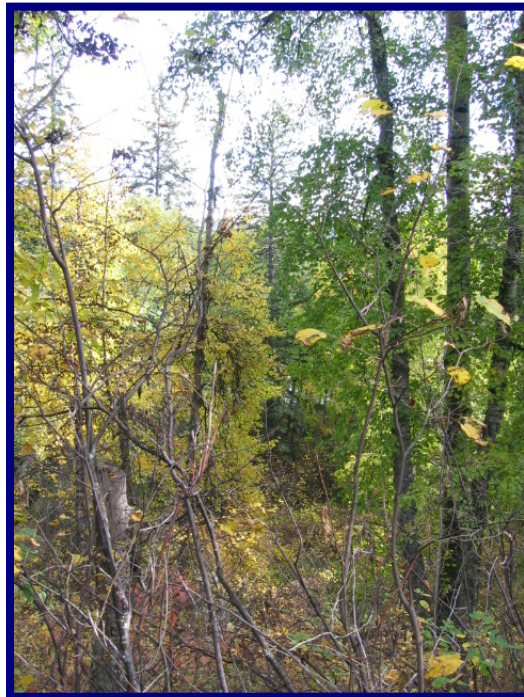
This land use plan has provided an area for a school site that is adjacent to a Neighbourhood Park because the projected population of elementary school children approximates the threshold of 300 students. However, given that school site planning shares similar siting requirements as for other institutional uses, such as places of worship or multiple family developments, should the school site not be required by the School District, the land could be developed for one of these alternative uses.

### ***3.8.2 Places of Worship***

Policy 10.4.9 of the Official Community Plan permits places of worship to be located in any OCP designation, assuming they are sited generally in accordance with the same criteria as applied to multiple family developments. This plan provides the opportunity for an additional institutional site in the Neighbourhood Centre, and recognizes the opportunity for the areas currently designated for multi-family developments to be alternatively developed for institutional uses such as places of worship.

### ***3.8.3 Institutional Policy Recommendations***

1. A site shall be identified for an elementary school that is adjacent to a Neighbourhood Park. Should this site prove to be superfluous to the School District's needs, the site can be utilized for residential or institutional purposes. The site can be considered for other uses when the Fraser River Bench Lands Neighbourhood reaches approximately 70% build out.
2. Until such a time that the site is proven to be superfluous to the School District's needs, as outlined in Policy 3.8.3(1), a restrictive covenant should be placed on the future school site, restricting its use to Education Services as defined in the Zoning Bylaw.
3. Should the designated school site be required, the property shall be purchased from the land owner at market value.
4. Areas designated for multiple family housing can also be developed for institutional uses, such as places of worship.



## **4.0 Neighbourhood Servicing**

The focus of this section is to provide preliminary servicing directions to the City of Prince George, as well as to potential developers of the Fraser River Bench Lands. The proposed development area contains a number of servicing constraints, which will significantly influence the phasing and direction of development.

### **4.1 Water System**

The Fraser River Bench Lands area is contained within the City of Prince George Pressure Zone 3 (PZ3). The City of Prince George lands located within the development area contain existing water supply wells which supply water from the Fraser River to the College Heights area.

PZ3 services an elevation range of approximately 610 metres to 655 metres at a maximum day pressure in the range of 40 psi to 100 psi. This zone is supplied with water by the PW 824 water storage reservoir which is located on the future extension of Ospika Boulevard, adjacent to the Kode gravel pit. The elevations within the Fraser River Bench Lands area are in the range of 570 metres to 585 metres. Thus water pressures, before pressure reduction, would be in the range of 145 psi to 167 psi. In order to reduce the water system pressures within the proposed development area, pressure reducing valves will be required at every connection to the existing water distribution system.

It is envisioned that the water distribution system within the Fraser River Bench Lands area will be connected at the north end to the existing 200 mm diameter main on Cowart Road and at the south end to the existing 200 mm diameter water main on Malaspina Avenue. In addition, it is proposed that the water distribution system be connected directly to the existing 600 mm diameter and 150 mm diameter water mains that traverse the development site in the vicinity of the City of Prince George water wells.

The City of Prince George presently has the entire City water system modelled on a computer, using H<sub>2</sub>O NET software. Once detailed subdivision planning commences, the City can model the required sizes of any water main extensions within the Fraser River Bench Lands area. The model can also identify the most appropriate locations and pressure settings for the PRVs that are required. At this time, we do not envisage any major problems with the provision of water supply to the entire Bench Lands area.

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## 4.2 Sanitary Sewer

The Fraser River Bench Lands will contain a mixture of residential, commercial and institutional land uses. In accordance with the City of Prince George Servicing Bylaw No. 7652, 2004, all new development will be fully serviced, and all parcels will be connected to the municipal sanitary sewer collection system.

At the present time, the proposed development area is traversed by an existing 600 mm diameter sanitary sewer main which connects the College Heights subdivisions with the existing sewage treatment centre. The existing 600 mm diameter sanitary sewer main is located within the BC Hydro ROW, which is located immediately behind the residences on Trent Drive. The majority of development within District Lot 753 will be able to connect directly to this existing sanitary sewer main. However, the balance of development in District Lot 754 (RCEC) and the Remainder of District Lot 2014 (Fortwood) will require construction of a major sanitary sewer lift station to convey sewage to the exiting sanitary sewer main.

During preliminary discussions with the City of Prince George, it was indicated that the existing 600 mm diameter sanitary sewer main has sufficient capacity to service the entire Fraser River Bench Lands.

The exact location of the required sewage lift station has not yet been determined. However, it is anticipated that the preferred location for the sewage lift station will be on the Lower Bench, in the vicinity of the City of Prince George parcel. The sanitary sewer lift station will also require a force main which will connect directly with the 600 mm diameter gravity sewer main traversing the development area. The location of the proposed sanitary sewer lift station will have to be determined at an early date in order to allow development within the Fraser River Bench Lands. It is recommended that the sanitary sewer lift station be constructed during the initial development phases, so that all sewage flows from the bench lands areas are conveyed directly to the existing sewage treatment centre. It is not recommended that a temporary sewage lift station be provided to pump sanitary sewage to the existing sanitary sewer collection system located on existing portions of Malaspina Avenue. Finally, it is understood that the existing sanitary sewer collection system in this vicinity has capacity restrictions.

## 4.3 Storm Water Management

The Fraser River Bench Lands offers a number of constraints and opportunities with respect to the management of storm water runoff. Storm water management constraints within the Fraser River Bench Lands area include the following:

- Proximity of the development to the Fraser River, with the resultant setback provisions and habitat protection issues;



- Influence of the numerous storm water outfalls that discharge storm water onto the development area from the existing College Heights subdivisions.
- Location of drainage channels within the development area, which have been created as a result of the discharge of storm water from the existing College Heights subdivisions.

The previously noted constraints also provide opportunities for the developers of the Fraser River Bench Lands area. For example, the proximity of the Fraser River and the presence of existing drainage channels within the subdivision area require that significant setbacks be established. The overall land use plan illustrates a minimum setback of 50 metres from the Fraser River, and the same plan illustrates a minimum setback of 15 metres from the existing drainage courses that currently convey the College Heights storm water to the Fraser River. The net result of the generous setbacks is that the net developable area represents only 51.79% of the gross area. Parks and green space, including setbacks, amount to approximately 35% of the gross area. The high percentage of parks/green space, combined with the Smart Growth principles which include the preservation of the natural environment, will result in a very “green” development including large areas of park land and the retention of existing trees and vegetation wherever possible. Development will be less intense and storm water runoff will be significantly reduced compared to traditional subdivision development.

The native soils within the Fraser River Bench Lands are generally sands and gravels overlying silt and clay with low permeability. Thus, it is anticipated that there is limited opportunity to develop sub-surface drainage disposal facilities which will minimize or eliminate the direct discharge of storm water to the Fraser River. However, it is envisaged that some of the Smart Growth development sites will have on-site storm water discharge facilities. The City of Prince George Servicing Bylaw No. 7652, 2004 requires that all new development be fully serviced and connected to the municipal storm sewer collection system. Accordingly, where on-site storm water discharge facilities cannot be constructed, each new parcel will be provided with a storm sewer connection which will be connected to storm sewers located within the adjacent road right-of-way. These storm sewers will collect all storm water runoff from the development area and direct these flows either directly to the Fraser River or alternatively to a new community subsurface drainage disposal field which will be located in the Neighbourhood Park, as illustrated in Figure 3. The proposed subsurface drainage field is located approximately 866 metres downstream of the existing City of Prince George water wells. This distance is considered a safe separation so that the subsurface drainage disposal facility will not impact existing City of Prince George water wells.

In summary, the completion of a storm water management plan is required for the entire development area and will include subsurface disposal of storm water runoff should this design option be supported by detailed geotechnical review.

#### ***4.3.1. Storm Water Management Policy Recommendations***

1. Directed discussion between the City of Prince George and the developer should take place with respect to the discharge of stormwater from the existing College Heights Neighbourhood onto the Bench Lands. The quality and quantity of this stormwater should be managed in order to maintain the wetland complex in the proposed development area.



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## **5.0 Implementation**

The purpose of this Neighbourhood Plan is to complement the Official Community Plan as the policy framework for the development of the Fraser River Bench Lands. As such, the plan has been developed in accordance with the principles and policies of the Official Community Plan and is intended to provide clear direction to decision makers, residents, and developers regarding the vision for the Fraser River Bench Lands. As the guiding policy document, this Plan will be consulted during the rezoning and subdivision phases of development to ensure conformity with its intentions.

It is recommended that the Fraser River Bench Lands Neighbourhood Plan be adopted by Prince George City Council through resolution allowing the plan to act as the policy guide rather than as a regulatory document. Adopting the plan by resolution gives Council the opportunity to consider development proposals that are inconsistent with the Plan but which Council considers to be in the public interest.

Should Prince George City Council adopt the Fraser River Bench Lands Neighbourhood Plan, the next steps in the development process will include:

1. Phased rezoning applications with land use to be approved by Prince George City Council.
2. Phased subdivision applications that may also include detailed traffic, geotechnical and environmental studies.

**APPENDIX A**

**SMART GROWTH PRINCIPLES AND TOOLS**

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## **What is Smart Growth?**

Smart Growth is a planning framework consisting of guiding principles to manage urban development in an ecologically and socially responsible manner. Smart Growth can be defined as “land use and development practices that enhance the quality of life in communities, preserve the natural environment, and save money over time” (Smart Growth Toolkit, p. I-5). The application of Smart Growth principles in planning decisions is gaining momentum in Canada and can be attributed to a better appreciation of the inherent connection between the ecological, social and built environment. A complete list of Smart Growth principles and tools is provided at the end of this appendix and the main principles and tools are elaborated on below.

## **Principles of Smart Growth**

There are five central principles that guide Smart Growth development strategies and implementation tools (Smart Growth Toolkit, p. III-38-40). ***Growth management*** of urban development optimizes the use of space and structure. Smart Growth encourages infill development where these opportunities present themselves and an increase in residential/commercial densities so that the needs of residents are met without the liveability of the neighbourhood being compromised.

The use of mixed use zoning policies assist in ***creating complete communities*** which can “reduce the per capita consumption of land, lower the cost of per unit infrastructure, [...] reduce trip lengths, make transit more viable, increase walkability and may help preserve natural assets” (CMHC, p. 4). Efforts to make a neighbourhood a place to live, work and recreate allows for increased interaction between residents, aesthetic appeal and improved public safety and health. Practices that increase pedestrian mobility and recreational and commercial activity also create a strong sense of place and increase community pride and social responsibility.

***Reducing the cost of municipal infrastructure*** relates to proactive planning practices that consider the long-term cost benefits of optimizing space and investing in energy efficient technologies. Higher density residential areas can be achieved through the development of multiple family dwellings and through smaller lot sizing of single family dwellings, thereby reducing the costs of servicing and infrastructure. Transportation routes with narrower road widths and increased transit linkages add to the amount of space that can be dedicated to pedestrian friendly walkways and landscaping. The decrease in space allocated for residential and transportation uses allows for a higher level of greenspace and park land for recreational, aesthetic and ecological benefits. Environmentally responsible technologies such as the development of energy efficient buildings and siting, stormwater management and use of recycled building materials reduces infrastructure costs and allows for long-term cost savings that result from efficient use of energy and municipal services.



*Integrating urban development into ecosystems* requires recognition of surrounding natural features and an understanding that in order for a neighbourhood to promote long term health these features should be incorporated into design and construction. Protecting ecosystems from degradation can be achieved through planning processes that reflect on harmonizing the built environment with the natural environment. Emphasis on pedestrian activity, integrated storm water infrastructure, retention of greenways, protection of riparian zones and construction of green infrastructure all assist in achieving an integrated urban-natural environment.

Development that follows a participatory planning model recognizes the importance of *public participation in development decisions* and ensures that decision-making is reflective of both public and private interests. Opportunities to involve the public interest in the planning process can occur in a variety of ways including public notification in newspapers, online forums, public information sessions and design charettes, among others. The best method of guaranteeing that public participation will occur in the planning and design process is through legislated policy of local governments. For example, local governments can stipulate the frequency, format and process of decision-making that assist in achieving meaningful public participation.

### **Smart Growth Tools**

**Alternative Development Standards (ADS)** allow for more flexible requirements than do traditional development standards in that ADS can manage growth in a manner supportive of Smart Growth principles. ADS can stipulate requirements for building specifications, land uses, development densities and innovative storm water management (Smart Growth BC, 2002). ADS benefit developers and municipal governments because they can increase the cost-effectiveness of infrastructural and land development costs. ADS can be promoted through a variety of development stages including planning (Official Community Plans, zoning, covenants, approval processes, etc.), engineering (construction, storm water, parking and road right-of-way standards, etc.) and parks and green space (stream stewardship standards, conservation of natural features, etc.) (Smart Growth BC, 2002).

**Comprehensive Development Zones** differ from traditional ‘blanket’ zoning in that they are tailored to the needs of a particular site. This form of zoning allows for guidelines and development specifications to be negotiated to best suit the specific development site. Comprehensive Development Zones encourage the development of complete communities through their ability to stipulate detail in design, integrate a diversity of land uses and to incorporate sensitive natural features (West Coast Environmental Law, 2004).

**Development Cost Charges (DCCs)** are costs imposed on new development projects to assist municipalities in servicing new growth and are to be reflective of the true capital costs of new development. The integration of Smart Growth principles can reduce the costs of new infrastructure per housing unit (Coriolis Consulting Corp., 2003, p. 49). Municipal governments can amend their DCCs to reflect the character of development

that occurs and to encourage development that adheres to Smart Growth. DCC bylaws can be amended to change costs by housing type so that compact, mixed use development is encouraged through lower DCC rates (Coriolis Consulting Corp., 2003, p. 51). The City of Prince George is currently reviewing the DCC structure and is considering strategies to promote Smart Growth principles (City of Prince George, 2006).

**Official Community Plans (OCPs)** are developed by municipal governments to direct long-term growth in a manner that is consistent with the land use objectives of the municipality. If a local government chooses to adopt principles of Smart Growth, the OCP is an effective method of encouraging Smart Growth development by creating appropriate policies with respect to land uses, design standards and public participation processes in the OCP bylaw.

### Smart Growth Principles and Tools

<b>PRINCIPLES &amp; GOALS</b>	<b>TOOLS</b>
<b>Managing Growth</b>	<ul style="list-style-type: none"> <li>· Regional Growth Strategies (Growth Management Act)</li> <li>· Regional Transportation Planning</li> <li>· Urban Growth Boundaries</li> </ul>
<b>Creating Complete Communities</b>	<ul style="list-style-type: none"> <li>· Mixed Use Zoning               <ul style="list-style-type: none"> <li>• Compact walkable neighbourhoods</li> <li>• Live, work, play, shop</li> </ul> </li> <li>· In-fill development               <ul style="list-style-type: none"> <li>• Growth concentrated into existing urban areas</li> <li>• Cluster housing (reduces amount of land developed)</li> </ul> </li> <li>· Development Permit Areas               <ul style="list-style-type: none"> <li>• Neighbourhood revitalization</li> <li>• Heritage conservation</li> <li>• Commercial, industrial, multi-family development</li> <li>• Accessible greenspace (trails, parks, open spaces)</li> <li>• A range of affordable housing options (mixed types)</li> </ul> </li> <li>· Development Approval Information               <ul style="list-style-type: none"> <li>• Socio/economic/environmental impact studies</li> </ul> </li> <li>· Development Cost Charges               <ul style="list-style-type: none"> <li>• Support compact development</li> </ul> </li> <li>· Alternative Development Standards               <ul style="list-style-type: none"> <li>• Narrower, more compact lots (setbacks)</li> <li>• Mixed use development (zoning)</li> <li>• Alternative storm</li> <li>• Water management</li> </ul> </li> </ul>

- Narrower roads
- Traffic calming measures
- Underground or rear lane parking
- Interconnected street system
- Green streets (boulevard trees)

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• Integrated Storm Water / Stream Corridor Management

- Alternative Development Standards (less pavements, pipes)
- Development Cost Charges

• Watershed Planning

- Integrated Greenways Planning
  - Create, preserve, and link greenways, parks, etc.
- Comprehensive Development Zones
  - Riparian zone protection
- Development Permit Areas
  - Identification of Environmentally Sensitive Areas
- Integrated Storm Water Management
  - Preserved watercourses / natural drainage system
  - Maximum use of public open spaces for storm water catchment and detention
- Construction of green infrastructure
  - Recycled building materials
  - Sustainable energy sources
  - Reduced use of non-renewable resources
  - Increase use of permeable paving materials

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**Public Participation in**

- Regional Growth Strategies

**Development Decisions**

- Official Community Plan
- Local and Neighbourhood Plans
- Urban Design Guidelines
- Development Approval Information
- Smart Growth Performance Indicators
- Monitor Development Processes (re-zoning & OCP)
- Lobbying

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Source: The Smart Growth Toolkit, SmartGrowthBC.  
[http://www.smartgrowth.bc.ca/downloads/J1\\_ToolKitPart\\_III.pdf](http://www.smartgrowth.bc.ca/downloads/J1_ToolKitPart_III.pdf)

Fortwood Homes Ltd. and Roman Catholic Episcopal Corporation  
 Fraser River Bench Lands – Neighbourhood Plan

## **APPENDIX B**

# **DEBRIEFING NOTES & MINUTES OF THE IMPLEMENTATION DESIGN CHARETTE**

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**Implementation Charette  
Debriefing Notes  
Fraser River Bench Lands Neighbourhood Plan  
October 6, 2005  
City Hall**

**Attendance:**

**L&M Engineering Limited:** David McWalter, Jason Boyes, Jess Rayner, Heather Oland  
**City of Prince George:** Grant Bain, Ian Wells, Laurie Kosec, Dan Milburn, Dave Dyer, Glenn Stanker

**Department of Fisheries and Oceans:** Shane Smith

**Ministry of Environment:** Bill Arthur

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**Power Point Presentation** – virtual tour of the site, Smart Growth principles, policy direction of City of Prince George, goals for the workshop

**Discussion Topic 1 – Planning and Creating Complete Communities**

- School District would like to see more precise breakdown of population projections by age group (for 300+ elementary school kids they will build a school)
- Consider the time frame for build out in population projections – estimate what the age range of the population will be over time
- Look to BC Stats for aging population breakdown by Regional District
- Development of a systemized evaluation process for Smart Growth developments will give certainty to the developer and administration
- Smaller City Park needs to be included
- Consider moving school site location to be adjacent to “Fraser River Park”
- Design public access to “Fraser River Park” in such a way as to mitigate land use impacts on surrounding property owners (i.e.” complaints re: Wilson Park)
- Who owns the greenways if they are to be combinations of alternative storm water management, trails, habitat conservation? Likely, these lands will be zoned P-1 (Parks, Recreation, Education) and owned by the City.
- Definition of greenway is riparian area with trail
- Defining the boundary of developable area will reduce the area for park dedication
- Development of Comprehensive Zoning districts can regulate site specific Alternative Development Standards
- Design for noise attenuation should consider the development of the BCR lands into the future
- The parks and trail map should show the context of the surrounding and proposed trail system.
- The level of detail in this Neighbourhood Plan is higher because of utilizing Smart Growth principles, but the detail will be needed at rezoning and subdivision and will increase the value of the property
- Consistent fencing along collector if it is to be the backyard



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### **Discussion Topic 2 – Reducing the Cost of Municipal Infrastructure**

- Development Services is considering the following changes to the DCC structure:
  - Divide the City into distinct areas ie: Downtown, Area A (Urban Phasing 1 and 2), Area B (Urban Phasing 3 and 4), and Area C (Airport)
  - DCC would be based upon existing infrastructure in the different areas and phases of the City
- Other ideas to encourage more dense development as well as development where infrastructure costs are less include: DCC based on per metre frontage, incorporating incentives for commercial developments that decrease the amount of impervious area, a credit system for developments that construct transit facilities or bike racks.
- Generally supportive of subsurface drainage, however need to be aware of the proximity of drainage to the City wells
- There is little risk with residential drainage but the risk increases for commercial, school and multifamily sites. These site will likely require oil/water separation for parking areas
- Recommendation for Subdivision Bylaw – an amendment to the bylaw that allows alternative development standards without having to apply for variances
- Servicing report to clarify disposal of drainage created by this development as well as means of accommodating existing drainage onto site from College Heights
- Design the road alignment first and then consider running the force main along the road.
- Water is not an issue because this development can link to the supply main
- Main infrastructure issues are: lift station for sanitary and water quality for onsite infiltration of storm water
- Transportation Demand Management will likely not be fully utilized because the trips to town will still be generated BUT:
  - Ensure transit is a viable option, include pull outs for bus on collector road
  - Protect bike lanes and trails – connection to Cowart Rd and cemetery trail very important
  - On street bike trails on both sides of collector
  - Design Pedestrian friendly streets – accommodates the traffic, doesn't capitulate to it – minimize conflicts between cars and people

### **Discussion Topic 3 – Integrating Urban Development into Ecosystems**

- Development of road alignment and trails needs to consider how and where to cross riparian areas
- Define riparian habitat through the natural boundary (flood plain) and top of bank for Fraser River and other water courses
- EnviroDynamics completed an Environmental overview in the area of the subject property in 2004

- Confirming the presence or absence of fish will determine setbacks and management zones in riparian areas
- An environmental consultant will be required to detail fish habitat and movement of animals
- There may be fish barriers and areas that are not considered fish bearing. The standards set for protection are based on whether the area is fish bearing.
- Riparian areas do not mean “no development”. There may be segments of riparian areas that need to be kept free of development and there will be Management areas within the greenways where trails development may be considered.
- Retention of forest cover along greenways improves the habitat function
- Sediment control should be considered during development stages
- The questions typically asked by the Ministry of Environment are:
  - What is the water quality?
  - If it is poor, how can it be improved?
  - How can runoff water safely be discharged into the environment? Ie: pipe it, treat it, surface discharge?

### **Key Messages**

- Development of a systemized evaluation process for Smart Growth developments will give certainty to the developer and administration
- Defining the boundary of developable area should include riparian zones and top of bank. This will also reduce the area required for park dedication
- Development of Comprehensive Zoning Districts will allow innovation for Alternative Development Standards
- Main infrastructure issues are: lift station for sanitary and water quality for onsite infiltration of storm water
- Smart Growth transportation options are limited because we are creating another large residential area a long way from the major employment and shopping centres. Thus, we are still generating commuting trips that cannot be accommodated by walking
- The foremost smart growth strategy is to provide for transit use through this neighbourhood, which will be accommodated by designing a continuous collector that connects well to the greater network (i.e. Malaspina and Cowart).
- The second strategy is to provide for cycling trips, by virtue of bike lanes/trails and connections to the city cycle network.
- The third strategy is to ensure a strong pedestrian network (particularly between this and the Gladstone neighbourhood), which will hopefully (a) facilitate trips to school/store, (b) increase transit routing options, and (c) reduce the general reliance on the automobile.
- Provide alternative transportation
- An environmental consultant will be required to conduct an environmental overview

- 
- Riparian areas do not mean “no development”. There may be segments of riparian areas that need to be kept free of development and there will be Management areas within the greenways
  - Storm Management can be accomplished through design
  - Trail connectivity with Lower College Heights and existing and proposed trails
  - More local commercial can be included in the higher density smart growth areas and regulated through comprehensive development zones. All local commercial development will need to be consistent with direction provided by the OCP.
  - Confirmation from the school district on the need for a school site.
  - Planning should include some of the City owned property as less land is required for the water well infrastructure

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**Implementation Charette  
Minutes  
Fraser River Bench Lands Neighbourhood Plan  
October 6, 2005  
City Hall**

**Attendance:**

**L&M Engineering Limited:** David McWalter, Jason Boyes, Jess Rayner, Heather Oland  
**City of Prince George:** Grant Bain, Ian Wells, Laurie Kosec, Dan Milburn, Dave Dyer, Glenn Stanker  
**Department of Fisheries and Oceans:** Shane Smith  
**Ministry of Environment:** Bill Arthur

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- **Heather & Grant's** presentation / introduction
- **Dave:** What is the market going to look like in 5 years? Those who know should be involved in the process. Developers and builders should be involved in this process

Parks & Recreation

- **David:** Connectivity between the old & the new... since there is so little (due to the landscape), the trails & greenways included in the design are important.
  - **Laurie:** 4 trail connectors exist between the upper & lower bench in this area:
    - i Existing trail as marked new design (North end)
    - ii Hydro right-of-way
    - iii By the 1600mm drainage pipe
    - iv At Malaspina
  - **Heather:** Also the possibility of using sidewalks/paved pedestrian paths as trail connectors
  - **Laurie:** There is also the possibility of connecting to Fraser River Park which would be developed on the island you can see the tip of (North end of design map)... would connect to Lansdowne & downtown
  - Comparing the river front park to Wilson Park. The design of the river front park should take into account the complaints of residents adjacent to Wilson Park.

A School

- **Ian:** What are the intentions of the school district and the plan's need to accommodate them? They seem to be sitting back, as they're doing in the Tyner area.
  - **Heather:** Description of what she was told regarding the walking distance for kids to get to school & the amount of school aged children (300) required in a development for a school to be included.
  - Stats slide was discussed. Grant pointed out that the info used a combination of 2001 BC Stats & 2004 PG stats as a baseline.
  - **Dave:** The fact that we're part of an aging community should be modelled for (type of residences they will demand)

- 
- What are the options for the land that is designated for a school but not yet developed? (value for RCEC is a consideration/concern)
    - i Acquired by the City who would hold it in trust
    - ii Acquired by the School District who holds it in trust
  - What level of detail is needed for this neighbourhood plan?
    - **Grant:** The level of detail is laid out in the OCP and includes environmentally sensitive areas, local/major roads, approximate lotting patterns, residential housing mix, commercial land allocations, public use sites, and trail linkages. These concept plans add value to the property.

#### Environment & Wildlife

- **Bill:** Environmental Dynamics completed a environmental overview for Prince George in 2004.
  - **Bill:** it would be worth investing in a detailed environmental overview here. Consider appropriate drainage systems, road crossings, sediment, animal movement & more.
  - Animal movement: lots of bears currently use the drainage storms as transportation corridors. This development means moving into higher, richer riparian areas. Animals will want to travel along the top of the river bench (always taking the higher ground). Should consider a by-law banning crab apple trees.
  - Greenspace & trails at Essex Park sees animal movement (all along the existing neighbourhoods).

#### Smart Growth

- **Grant:** would benefit from more details upfront (would save time when plans are being presented to council).
- **Grant:** The whole plan should be considered Smart Growth because the key concepts of Smart Growth are addressed throughout the site, including the mix of land uses, alternative transportation, higher density, some alternative design standards. Designing for Smart Growth does not preclude including areas of traditional neighbourhoods.
  - **Dave:** People get the wrong impression of Smart Growth if they see it happening in small parcels... Smart Growth concepts are intended to apply to entire neighbourhoods or towns. This development allows space for implementing the entire scheme.
  - **David & others:** Small pockets can be good because it allows for some of the Smart Growth principles to be implemented without scaring people off.

#### Commercial

- **Ian:** Might be a draw in having a restaurant/pub backing on the river
- **Dan:** Could bring these plans to a company such as Mr G's and ask whether they'd be interested in investing in a business here.
- Discussion of where commercial properties should front (should people only have to make right hand turns to enter on the way home from work?). Suggestion to focus on



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local shopping rather than commuters since they have numerous other opportunities on the way home from work.

### Parks & the School

- **Laurie:** Neighbourhood park by the river is good/ideal. In addition, a neighbourhood park by the school is needed. This second park would fit perfectly in the corner where the school yard fronts multi-family residential; would only need to be small (optimal is 4 acres, minimal is 2 acres, Laurie would have to look into the specifics)
- **David:** The size of the park shaded with dark green has been estimated based on space required for subsurface drainage plus playing fields (in response to the question of whether residential land taken from somewhere else could be made up for here).
- **David:** Should ask the School District whether they'd like land on the connector (Malaspina Extension) or a more residential street.
- **Ian:** The school could be moved to the site just beside the 2.75ha waterfront park. No one objected to this suggestion as it was discussed. One concern was the removal of this land from Fortwood Homes' development area.

### Development Cost Charges (DCCs), etc

- **Dave:** The city would have to incur costs for infrastructure where it's hard to maintain.
- Changes being considered to the DCC structure include assigning area designations based on the existing level of infrastructure. For example: Areas designations could be: Downtown; Area A (phases 1&2); Area B (Phases 3&4); Area c Airport The Fraser River Bench Lands would be considered Area A.
- Collecting DCCs: would be done primarily at the building stage for these areas designated single-family, multi-family & commercial).
  - Another option is basing them on metres squared rather than per unit, as seen in Grand Prairie and Victoria.
  - Split DCCs between the developer (at the subdivision stage who could benefit when creating pipes, reducing run-off, etc) and the builder (who could pay per meter square or per unit at the building permit stage).
  - Suggestions to incorporate some incentive into by-laws for considerations such as minimising run-off (this works for commercial but what about residential?)

### Environment

- **Grant:** Greenways containing public infrastructure, whether trails, riparian areas, or storm water infrastructure will become the city's responsibility
- **Bill:** It will be important to consider the quality of water at drainage outfalls, including oil separation.
- More discussion about the designation of greenspace.
  - If there's a watercourse, does there have to be a trail?
  - Could fall under new zoning 'P1: Park & Open Space.' Current greenbelt designation?
  - **Dan:** Would the City want to acquire the greenspace running through the centre of the properties?
  - **Heather:** Could it be considered a storm corridor?

- **Dan:** A ‘Hazardous Condition Development Permit Area’ with steep slope designation would control tree cutting (an issue recently as people have been cutting local greenbelts for beetle wood).
  - **Ian:** Another option may be to include the greenspace in residential lots but zone it differently (giving each lot 2 zones)
  - **Grant:** It would be in public interest and therefore the city’s interest to manage these corridors for consistence (resident spacing, sheds, logging, etc).
- **Dave:** Parking lots require oil separators; piping needs to be looked at for anything more than single family residential.
  - **Dave:** First a watershed drainage plan is needed. Run-off should be managed at the source.
  - **David:** This watershed drainage plan should be done after the neighbourhood plan and before subdivision.
  - Existing wetlands and swampy areas can hopefully be considered amenities
  - **Dan:** City can regulate drainage on residential lots
  - **Dave:** Subdivision and Development Control By-law will be amended annually, probably each January, to accommodate new areas, changes in wording etc.
- **Shane:** Are channel gradients accessible to fish? It’s not important to count the number of fish in a stream, only to ensure they are accommodated for. The only reason a stream is not considered fish bearing is if its entrance is precluded by something from a list of barriers (a standard exists).
- **Bill / Shane:** There are approx. 3 streams that need designated riparian areas (if the drainage wattage path is between 1.5m and 3m you’re looking at some sort of riparian protection). Forestry requires a 20m setback but that’s different from residential. Here a management zone is needed rather than a reserve zone... a greenway.
  - Trails should be kept to the outer edges of the Greenway but it’s likely that even if a trail isn’t designated one will appear.
  - **Bill:** What conditions are the creeks in? Is there an opportunity for enhancement? Gravelling? Opening/widening the mouth? Will passable structures be required (ex. bridges or bottomless culverts)?
  - **Laurie:** Jocelyn White who works with the City has relevant info on creeks & trails, etc.
  - **Shane:** Trail networks sometimes call for access to the river. Storm water and drainage are also considerations at the river’s edge. Encroachment on riparian areas should always be kept in mind.
- **Laurie:** Trail systems & connectivity should always be kept in mind
- Is there any benefit for access to the water? Boat launches? Safety is a concern & grades may prevent access. A launch South of the site may be preferred.
- Conflict of interest between using existing creeks as ‘end of pipe wetlands’ and natural enhancement areas.
- **Bill:** Could be creative in design ideas, for example creating fish habitat at the end of storm water drainage pipes.
- **Shane:** Can attain storm management by design.

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## Transportation

### ○ **Glenn:**

- Curves in the road help slow people down. The Malaspina Extension doesn't have to be straight, only continuous.
- Buses should be considered for the area and the Malaspina Extension offers a good route (he'll pass this info on for others to examine). Discussion suggested that bus use may be limited in the area and if necessary, bus users could be required to walk up to Gladstone to catch public transit. This could be combined with some alternative transit [*for example, the HandiDart service connecting with regular transit, as suggested in the Transit Service Review for outlying areas*].
- Biking options should be examined. People supported learning more from the cycling community about what is useful or of interest to them (particularly Dave).
- Suggestions for alterations to pedestrian crossings/paths near proposed school site were made to the map
- Crescents are recommended over cul-de-sacs and the 'little bumps' seen along Malaspina Blvd.

**APPENDIX C**

**PUBLIC PARTICIPATION MAIL OUT PACKAGE**

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## **The Fraser River Bench Lands Neighbourhood Plan – An Opportunity to Provide Comment & Input**

The L&M Engineering – Planning Centre is in the process of creating a Neighbourhood Plan for the Fraser River Bench Lands which are located in the southwest sector of the City of Prince George between the Fraser River and Lower College Heights as shown on the attached map. The development is subject to the creation of a Neighbourhood Plan that addresses: environmentally sensitive areas, provision of parks and greenspace, transportation network, residential housing mix and densities, commercial lands, public use sites, and trail linkages. The purpose of Neighbourhood Plans is to create a clear and comprehensive land use vision in order to provide certainty for residents, land owners, and developers regarding how an area can be developed. Neighbourhood Plans must balance the desires of residents, environmental considerations, and economic realities and should result in land use planning policies that can be achieved over time.

The concept plan for the Fraser River Bench Lands is in keeping with the City of Prince George's Official Community Plan (OCP) which designates development in the area for residential development and Major Park. An important part of the Neighbourhood Planning Process is public participation, particularly by neighbouring residents, and L&M Planning Centre welcomes your comments on the proposed concept plan. There are a number of ways you can provide input, including:

- Reviewing the Draft Fraser River Bench Lands Neighbourhood Plan, complete with colour plans, which is available in its entirety on the City's web site ([http://www.city.pg.bc.ca/city\\_services/lrp/](http://www.city.pg.bc.ca/city_services/lrp/))
- Completing the enclosed survey and returning it to L&M Planning Centre.
- Attending the Neighbourhood Information Meeting to be held at Gladstone Elementary School, 7005 Gladstone Drive, on March 14, 2006 at 7pm.

### **THE FRASER RIVER BENCH LANDS - HIGHLIGHTS**

Planning for the Fraser River Bench Lands began with acknowledging that the natural features of the area: the Fraser River, the steeply sloped escarpment, the wetlands and drainage courses are the foundation within which to create a complete and liveable neighbourhood that incorporates the existing natural features, provides a significant amount of green space, an extensive trail network, and is the gateway to the proposed City riverfront recreation system and Parkridge Creek Park.



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The Fraser River Bench Lands Neighbourhood Plan is characterized by:

- A mix of land uses including residential, commercial, parkland, greenspace, and institutional with a range of residential density options,
- 2 Neighbourhood Parks, including a riverside park,
- A City riverfront park extending from Malaspina Ridge to Varsity Creek,
- Development of 4.4 km of trails connecting with Lower College Heights and proposed City trails to the south,
- Designed connections to the existing bicycle network,
- A pedestrian friendly environment that provides connections within the Bench Lands and to surrounding neighbourhoods,
- Dedication of greenways to protect environmentally sensitive areas,
- Completion of an Environmental Overview of the area,
- A Neighbourhood Centre,
- A combination of Traditional and Smart Growth design standards,
- Alternative Design Standards for storm water management, and
- Alternative Design Standards for some local roads.

Preparation of the Fraser River Bench Lands Neighbourhood Plan has been guided by policies contained in the City of Prince George's OCP, as well as the principles of Smart Growth BC. The OCP is available for viewing online at [http://www.city.pg.bc.ca/city\\_services/ocp](http://www.city.pg.bc.ca/city_services/ocp). Copies are also available for review at the Development Services Department at City Hall. Information regarding Smart Growth development practices can be found at <http://www.smartgrowth.bc.ca>.

## GETTING INVOLVED

### Survey

Attached is a survey with a series of statements for your response. The responses received will help the L&M Planning Centre ensure that public input is part of the development of the land use plan. You will be best able to answer the survey questions after attending the public information meeting or reviewing the complete set of plans available on the city's web site ([http://www.city.pg.bc.ca/city\\_services/lrp/](http://www.city.pg.bc.ca/city_services/lrp/)).

Please return the survey by March 16, 2005. It can be handed in at the public information meeting, mailed, faxed or hand delivered to:

L&M Engineering Ltd – Planning Centre.  
#201-1840 Third Avenue  
Prince George, BC.V2M 1G4  
FAX: 250-562-1967

## **Public Information Meeting**

The L&M Planning Centre will be holding a Public Information meeting on March 14<sup>th</sup> at 7pm at Gladstone Elementary School, at which time the complete concept plan for the Fraser River Bench Lands Neighbourhood will be presented. In addition, representatives from the City of Prince George and the L&M Planning Centre will be available to answer questions.

## **APPROVAL PROCESS**

Following the public participation process and further review by the City of Prince George, the Fraser River Bench Lands Neighbourhood Plan will be presented to City Council for consideration of policy adoption. The date of Council's consideration of the Plan will be posted on the City's web site (<http://www.city.pg.bc.ca/cityhall/agendas/>)

## **QUESTIONS?**

Contact Heather Oland Planning Associate, at L&M Engineering Ltd:

- Phone... 250-562-1977
- Fax... 250-562-1967
- Email...[holand@lmengineering.bc.ca](mailto:holand@lmengineering.bc.ca) , or

Grant Bain, Manager of Long Range Planning, City of Prince George

- Phone...250-561-7612
- Fax...250-561-7721
- Email...[gbain@city.pg.bc.ca](mailto:gbain@city.pg.bc.ca)

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## Fraser River Bench Lands Neighbourhood Plan – Community Survey

**For each statement, please check the box that best describes your agreement or disagreement with the statement and provide any additional comments. You will be best able to respond after attending the Public Information Meeting to be held on March 14<sup>th</sup> 2006 at Gladstone Elementary School (7005 Gladstone Drive) at 7pm or by reviewing the complete set of plans available on the City’s web site (<http://www.city.pg.bc.ca/cityhall/agendas/>)**

- 1. The proposed neighbourhood provides a good mix of housing choices (ie. single family, townhouses, and apartments).**

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
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- 2. Local convenience shopping and other local commercial opportunities are a benefit to the proposed neighbourhood.**

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
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- 3. An elementary school should be located in the neighbourhood if there is sufficient need rather than having students travel to schools outside the neighbourhood.**

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
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**4. This plan provides a generous amount of parks, trails, and greenspace as well as good connections to the existing trail network in College Heights.**

<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
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**5. Environmentally sensitive areas and their protection are incorporated into the proposed Neighbourhood.**

<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
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**6. The proposed road network will provide the necessary linkages to promote safe and effective transportation through this and adjacent neighbourhoods.**

<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
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**7. The proposed pedestrian and cyclist links (road, sidewalk, greenspace, trail network, and connections to neighbouring areas) are sufficient and attractive enough to promote alternative transportation choices.**

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
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**8. Are there any issues or concerns not covered above that you want to make sure are addressed as part of the Fraser River Bench Lands Neighbourhood planning process?**

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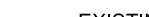


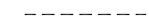



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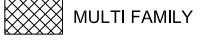



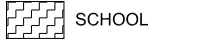
**Thank you for taking the time to respond.**  
**Please mail, hand deliver or fax (250-562-1967) your completed two-page survey to Heather Oland at L&M Engineering – Planning Centre.**

# PROPOSED FRASER RIVER BENCH LANDS NEIGHBOURHOOD EXPLANATORY PLAN

## LINE TYPE LEGEND

-  STUDY BOUNDARY
-  PROPERTY LINE
-  SIDE WALK
-  CREEK OR STORM WATER DRAINAGE
- EXISTING TRAILS**
-  MULTI USE TRAIL
-  LOCAL TRAIL
-  INFORMAL RUSTIC TRAIL
- PROPOSED TRAILS**
-  MULTI USE TRAIL
-  LOCAL
-  RUSTIC TRAIL

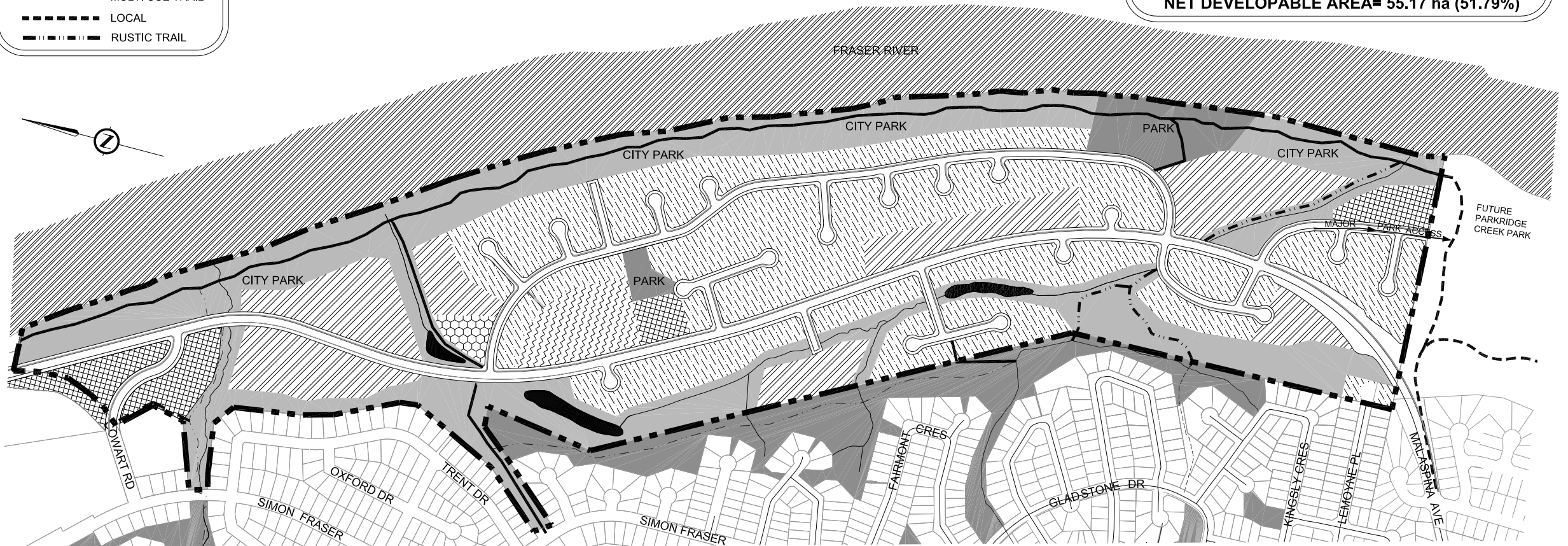
## PROPOSED LAND USE LEGEND

- |  |  |
|--|--|
|  SINGLE FAMILY            |  COMMERCIAL         |
|  MULTI FAMILY             |  PARK LAND          |
|  SMART GROWTH DEVELOPMENT |  NATURAL GREENSPACE |
|  SCHOOL                   |  |

- \*SMART GROWTH DEVELOPMENT
- \*SINGLE & MULTI FAMILY HOUSING
- \*36.4% DEDICATED TO PARKS & NATURAL GREENSPACE
- \*COMPREHENSIVE TRAIL SYSTEMS

## BREAK DOWN OF DEVELOPMENT AREAS

- SINGLE FAMILY - 32.79 ha
- MULTI FAMILY - 4.67 ha
- SMART GROWTH LOW DENSITY - 10.98 ha
- SMART GROWTH HIGH DENSITY - 3.72 ha
- SCHOOL - 2.43 ha
- COMMERCIAL - 0.58 ha
- PARKS/GREENSPACE - 36.81 ha
- ROADS - 14.54 ha
- GROSS AREA = 106.52 ha**
- NET DEVELOPABLE AREA= 55.17 ha (51.79%)**





**APPENDIX D**

**NEWSPAPER ADVERTISEMENT**

The Prince George Citizen – Wednesday, March 8, 2006 – 19

**www.princegeorgecitizen.com**

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NOTICES

**Public Information Meeting for the  
Proposed Neighbourhood Plan for the Fraser River  
Bench Lands will be held at Gladstone Elementary  
School – 7005 Gladstone Drive on  
March 14, 2006 at 7 pm.**

L&M Engineering Ltd, on behalf of Fortwood Homes Ltd and the Roman Catholic Episcopal Corporation, is in the process of creating a Neighbourhood Plan for the Fraser River Bench Lands between Cowart Road and Malaspina Avenue. The development is intended to be an innovative mix of land uses including residential, neighbourhood commercial, and institutional as well as extensive parkland, greenspace, and trail network. The Public Information Meeting will include a brief presentation beginning at 7pm and is an opportunity for residents to review the proposed Neighbourhood Plan and provide input into the development proposal. Site plan information is available online at [http://www.city.pg.bc.ca/city\\_services/lrp/](http://www.city.pg.bc.ca/city_services/lrp/). For more information regarding the development proposal, please contact Heather Oland, Planner with L&M Engineering Ltd at 562-1977, or for information regarding the development review process contact Grant Bain, Manager of Long Range Planning for the City of Prince George at 561-7612.

**APPENDIX E**

**COMMUNITY SURVEY  
SUMMARY OF COMMENTS & INPUT**

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## **Fraser River Bench Lands Neighbourhood Plan – Community Survey An Opportunity to Provide Comment and Input**

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**L&M Engineering Limited, Fortwood Homes and the Roman Catholic Episcopal Corporation are committed to public participation. In order to provide the public with complete information and provide the opportunity for public comment regarding the Fraser River Bench Lands Neighbourhood Plan, the following process was undertaken:**

- On Monday March 6<sup>th</sup>, L&M Engineering Ltd. hand-delivered 702 Community Surveys Packages to residents of the neighbourhoods surrounding the Fraser River Bench Lands Neighbourhood Plan boundary. The packages included:
  - A letter describing the Neighbourhood Plan process as well as the Fraser River Bench Lands proposal;
  - Direction to the complete Plan available on the City of Prince George web site,
  - An invitation to the Public Information Meeting,
  - A site plan, and
  - A survey.
- In addition, 100 surveys were distributed at the Public Information Meeting and more were made available online via the City's website.
- On Wednesday March 8<sup>th</sup> and Saturday March 11<sup>th</sup>, a classified ad announcing the Public Information Meeting and inviting the public to attend was published in the Prince George Citizen. This ad also included direction to the complete Plan available on the City of Prince George web site.
- On Tuesday March 14<sup>th</sup>, a Public Information Meeting was held at Gladstone Elementary School from 7-9pm. The meeting began with a power point presentation by Heather Oland, Manager of the Planning Centre at L&M Engineering Ltd. At the conclusion of the presentation, those present were directed to three tables around the gymnasium where their questions would be addressed by L&M Engineering Ltd. staff members Heather Oland BA. MSc, David McWalter P.Eng Jessica Rayner, and Kim Hattle, as well as City of Prince George Parks and Open Space Planner Gerald Christie.
- In attendance at the Public Information Meeting were 155 community members including four council members, local media, and an upper level UNBC Environmental Planning class.

**General Themes Established through the Public Participation process:**

- The ability of Cowart Road and the intersection at Highway 16 and Cowart Road to handle increased traffic load is a concern for residents.
- Gladstone Elementary School should be re-opened before a new school is constructed.
- Trails, green space, and the retention of trees are important to residents.
- Protection of Environmentally Sensitive Areas is important to residents.
- Noise generated from the BCR site is a concern for residents.

The following tables represent a compilation of the comments offered by survey respondents, as well as L&M's responses to the comments. Of the approximately 800 plus surveys distributed, these remarks represent the interests of the 52 community members who returned the forms.

**Question 1 – The proposed neighbourhood provides a good mix of housing choices (i.e. single family, townhouses, and multiple family)**

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No Response	Total
8	9	9	18	6	2	52

*Questions and Comments in Response to Question 1*

Comments	Frequency	Response
Proposed housing density should decrease	9	Densities follow CPG OCP recommendations
Lemoyne Drive should not be extended	1	Geotechnical Studies will be required
Wide buffers between homes & streets	1	Prince George Zoning Bylaw will be followed. Alternative Development Standards explored in Smart Growth areas
Housing for seniors should be considered	3	Agree and the plan provides a variety of housing options
Too many houses in the area	2	Only 51% of the area is to be developed
Not enough land left for recreational development and natural space	2	35% of the area is dedicated to parks & greenspace
High density should be encouraged in the downtown	1	The plan includes a mix of housing densities
Lot sizes should be larger	1	The plan includes a variety of lot sizes including larger lots
Good housing mix provided	6	This concept is emphasized in the plan



**Question 2 – Local convenience shopping and other local commercial opportunities are a benefit to the proposed neighbourhood**

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No Response	Total
11	8	14	12	4	3	52

*Questions and Comments in Response to Question 2*

Comments	Frequency	Response
Limit commercial development to small businesses	5	Local commercial is limited to 3000m <sup>2</sup> by OCP and the Neighbourhood Plan
Sufficient commercial opportunities exist in Westgate & other areas of College Heights	10	Agree – the plan provides for local commercial only
Level of facility maintenance / appearance	2	Building design and landscaping will be required
Avoid liquor stores & pubs	1	Specific uses will be reviewed at time of rezoning
Walking distance from residences	1	Considered in proposed commercial location and use of Smart Growth principles
Viability of commercial development in this area	1	For business owners to consider
Housing development only	1	Official Community Plan supports limited local commercial development

**Question 3 – An elementary school should be located in the neighbourhood if there is sufficient need rather than having students travel to schools outside the neighbourhood.**

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No Response	Total
14	3	9	16	8	2	52

*Questions and Comments in Response to Question 3*

Comments	Frequency	Response
Re-opening of Gladstone and use of other local schools	21	
Consideration of a high school in the area	2	For consideration by the School Board
French / English school	1	For consideration by the School Board
Local economy and its ability to support this	1	For consideration by the School Board
Access is important and a school is supported in this area	3	For consideration by the School Board

*Note:* These summarized responses will be forwarded to School District 57.

**Question 4 – This plan provides a generous amount of parks, trails, and greenspace as well as good connections to the existing trail network in College Heights.**

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No Response	Total
16	7	4	16	8	1	52

*Questions and Comments in Response to Question 4*

Comments	Frequency	Response
Width of the trail and greenspace along the western escarpment	6	An average of 30m provided to protect escarpment
Width of the trail and greenspace along the top of the eastern escarpment (along the riverbank)	3	A generous 50m from the top of the riverbank is to be protected
Trail accessibility for people with mobility concerns (elderly, wheelchair users, etc.)	3	For review at the time of trail development
Tree retention surrounding buildings	3	Tree retention on lots will be encouraged
Provide river access	1	Provided in proposed plan
Potential for river bank erosion	1	Addressed by the 50m setback from top of bank
Potential increase in motorized recreational vehicle use if a trail is paved between Trent Dr & Acadia PI	1	This can be addressed through design guidelines
Not enough natural forest and greenspace maintained	6	35% of the land will be retained as parkland and greenspace
Potential increase in local noise and activity	2	Noise attenuation design to be incorporated
Potentially steep gradients on trails connecting the top escarpment to the area below	2	Rustic trails may be steep Grades on paved trails will be minimized
Agreed that the trails are adequate & important	3	Emphasized in the Neighbourhood Plan
The areas designated are unlikely developed	6	Riparian and steep slopes are to be protected
Preferred that the area remain undeveloped	3	The area is designated Urban Development
Provision of greenspace behind Brendan Court	4	A rustic trail & buffer has been added

**Question 5 – Environmentally sensitive areas and their protection are incorporated into the proposed neighbourhood.**

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No Response	Total
19	12	6	8	7	0	52

*Questions and Comments in Response to Question 5*

Comments	Frequency	Response
Include benches along trails	1	For consideration at the time of trail development
Loss of wildlife corridors and/or habitat	16	MOE and DFO guidelines have been incorporated
Wetlands act as mosquito habitat – conversion to ponds may reduce mosquito populations	1	
Impacts on waterways and wetlands	6	DFO and MOE guidelines have been incorporated
Width of wetlands buffers	2	DFO and MFO were consulted with respect to waterway setbacks
Loss of existing trails	3	4.4km of trails are to be included, ensuring connections to trails in adjacent neighbourhoods
Extent of development (too much)	1	OCP designations are followed
First Nations pit houses near Brendan Court	2	First Nations communities will be asked for comment
Provision of a wildlife corridor	1	Incorporated in the Neighbourhood Plan
Potential for riverbank erosion	4	Addressed by the generous 50m setback
Encroachment on river banks	1	Addressed by the generous 50m setback
Detailed environmental studies	1	An environmental overview is provided in Appendix G and an environmental monitor will be provided during subdivision
General comments made in support of the plan	2	

**Question 6 – The proposed road network will provide the necessary linkages to promote safe and effective transportation through this and adjacent neighbourhoods.**

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No Response	Total
22	9	4	12	3	2	52

*Questions and Comments in Response to Question 6*

Comments	Frequency	Response
Cowart Road / Highway 16 Intersection	13	Traffic counts at intersection to be conducted
Traffic on Cowart Road	15	Traffic counts are in progress
Improving access to downtown	1	Malaspina provides alternative route to downtown
Traffic on Malaspina Extension	1	Malaspina extension designed to collector standard
Connect Malaspina or Cowart with Lansdowne Rd	3	Future possibility may be investigated
Speed of traffic on Malaspina	1	Malaspina designed to collector standard
Potential hazards related to creating a stop at the bottom of the hill on Cowart Road	1	Grades on Cowart Road will be reduced
Inadequate number of roads	1	Proposed roads adequately handle traffic volumes
Steep slopes	1	Maximum road grades will be 6%
Proposed intersection of Malaspina extension and Cowart Road	3	A number of concepts have been reviewed and a final concept is yet to be determined
Easy access to Gladstone elementary school	1	Possible connections to the existing road network are facilitated and pedestrian connections provided where possible
Parking for trail and park users	3	Agree – Should be provided In the Neighbourhood Park and in Parkridge Creek Park
Additional bridge across the river at Domano Blvd	1	Outside the Neighbourhood Plan study area
General comments made in support of the plan	3	

**Question 7 – The proposed pedestrian and cyclist links (road, sidewalk, greenspace, trail network, and connections to the neighbouring areas) are sufficient and attractive enough to promote alternative transportation choices.**

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	No Response	Total
14	12	7	9	5	5	52

*Questions and Comments in Response to Question 7*

Comments	Frequency	Response
Little use of alternative transportation in Prince George	6	Plan is designed to encourage all modes of transportation
Not enough links are provided to the trails in the existing neighbourhoods	1	4 trail links are proposed and 1 additional trail link will be included in the revised plan for a total of 5 links
Access to downtown	1	Good bicycle and pedestrian connections are provided in this plan
Winter conditions and related limitations on alternative transportation in Prince George	3	Maintenance issues are outside of the scope of a neighbourhood plan
Sidewalks separate from the road for pedestrians and cyclists	2	Sidewalks and off-road trails designed to city standards for ease of maintenance
Trails for road bikes	1	Bike lane designated on Malaspina
Bike access along Cowart Road to downtown	1	The proposed bike lane will connect with the existing one on Cowart Road
Bus route	1	Transit service will be determined by CPG and based on demand
Road lighting	1	Provision of lighting required
Preferred that the area remain undeveloped and leave all existing trails	1	The area is designated Urban Development
Trails are suitable for recreation	3	Emphasized in the Neighbourhood Plan
General comments made in support of the plan	5	



**Question 8 – Are there any issues or concerns not covered above that you want to make sure are addressed as part of the Fraser River Bench Lands Neighbourhood planning?**

<b>Comments</b>	<b>Frequency</b>	<b>Response</b>
Decrease in the value of neighbouring properties	1	It is our understanding that proximity to well planned neighbourhoods increase property values.
Concern that the plan may not be followed	1	Next steps in the development approval process include rezoning and subdivision at which time additional review will take place
Poor air quality in this low-lying area	4	Area designated for Urban development
Unsatisfactory meeting format	9	Provided presentation and open house question format
Develop in another area (for example, trade land with the developer)	2	The area is designated for Urban development
Include input from past councillors, mayors, senior realtors, etc	1	All members of the public are welcome to participate
Potential for an increase in crime to accompany multiple-family housing	1	Crime Prevention through Environmental Design principles will be incorporated
Potential for runoff in the spring to alter wetlands and affect new homes	1	Detailed geotechnical investigation will be completed as part of subdivision
Potential for erosion of the western escarpment	3	Detailed geotechnical investigation will be completed as part of subdivision
Pine beetle forests are being cleared elsewhere, this area contains few pines and could be left	4	50m of trees to be retained at top of bank of Fraser River, all steeply sloped lands and 30m along drainage courses
Noise from the BCR site	8	Noise attenuation will be part of subdivision design. Trees that provide any noise attenuation are retained along top of bank of Fraser River and top of escarpment
Smart Growth Concepts not understood by developer	5	

*Note:* Here we have included only comments that are not addressed in the previous questions

**Summarized Comments submitted separately from Community Survey**

**In addition to the surveys submitted, 12 emails and letters were received either by the City of Prince George or L&M Engineering Limited. The following chart summarizes the comments expressed in these submissions several of which expressed no opinion regarding the development, but were rather requesting additional information.**

<b>Comments</b>	<b>Frequency</b>	<b>Response</b>
Cowart Road / Highway 16 Intersection	1	Traffic counts are in progress
Traffic on Cowart Road	4	Traffic counts are in progress
Noise pollution from the BCR site	4	Noise attenuation will be part of subdivision design. Trees that provide any noise attenuation are retained along top of bank of Fraser River and top of escarpment
Development could be located at the end of Domano across Parkridge Creek instead	1	The area is designated for Urban development
No development preferred	3	The area is designated for Urban development
Begin the development in areas of higher densities to facilitate the cost-effective provision of public transit	1	The plan is proposed to begin at the southern end which does incorporate some higher density areas.
Remove Lemoyne Place extension	1	Geotechnical feasibility of developing this area is yet to be determined. A portion of this area is currently zoned for residential development.
Loss of tax revenue	1	City tax revenue will increase
An new school is not necessary	2	The land is to be held in trust. School development is the responsibility of School District No. 57
Loss of wildlife corridors and habitat	4	Some habitat will be lost. However, 35% of the area is retained for park and greenspace that provide wildlife corridors.
Meetings should not be held during spring break	1	A variety of methods to express opinions have been provided to residents.
Preference for surveys to be designed and distributed by the City rather than L&M Engineering	2	The City of Prince George has approved this survey and its collection by L&M. They have also been forwarded a copy of all completed surveys for review.
Detailed geotechnical study should be completed	2	Detailed geotechnical study part of subdivision design.

Fortwood Homes Ltd. and Roman Catholic Episcopal Corporation  
Fraser River Bench Lands – Neighbourhood Plan

## **APPENDIX F**

# **DESIGN PRACTICES FOR NOISE ATTENUATION**

## Noise Attenuation

The attenuation of noise simply refers to reducing the force of sounds, in this case the sounds emitted from the BCR Industrial Area. The Fraser River Bench Lands are situated between Malaspina Boulevard and Cowart Road and front on the Fraser River. The land is designated by the Official Community Plan (OCP) as Urban and is therefore intended for residential development, while the OCP designates the land directly across the river as primarily ‘Major Industrial’ with the remainder ‘Light Industrial.’ Currently, some residents of the existing Lower College Heights Neighbourhood experience noise pollution emanating from the B.C.R. site. In addition, some areas of the Fraser River Bench Lands will also experience noise. While the average distance of major noise sources from existing College Heights development is approximately 1,000 meters, the minimum distance of major noise sources from the proposed Bench Lands development is approximately 575 metres. Figure 7 provides an overview of the noise attenuation opportunities. In order to mitigate the effects of the industrial noise a number of steps can be taken during the design phase.

## Noise Levels

Constant noise has an impact on quality of life. The physiological and psychological effects of constant noise are highly dependent upon the quantity of noise which is measured as sound pressure level (SPL) on a logarithmic decibel (dB) scale (LaGro 2001). A number of loudness levels from common noise sources are listed in the chart below (LaGro 2001):

Noise Source	Loudness Levels (decibels)
Gunshot	140 – 170
Jet takeoff	140
Rock concert, chain saw	110 – 120
Diesel locomotive, stereo headphones	100
Motorcycle, lawn mower	90
Conversation	60
Whisper	30 – 40

This chart offers an approximation of the decibels emitted from various sources, however it is also documented that different loudness levels are perceived by people differently. For example, some suggest that volumes reaching about 30 decibels will receive complaints (Thompson & Sorvig 2000) while others say that at approximately 15% of people can be subjected to noise levels as high as 65 dB before rating the noise as annoying (Gilchrist et al 2003). This latter assumption is based on the Schultz Curve shown in Figure 1, quantifying the relationship between noise reduction and its associated reduction in annoyance. For additional comparison, the City of Vancouver allows a maximum noise level of 85 dBA in all of its residential, commercial and industrial areas (Gilchrist et al 2003).

Continual exposure to 90 decibels or more (the level of a food blender, a noisy factory, or a small plane 1000 feet overhead) creates a threat of hearing loss for most people (Thompson & Sorvig 2000). These levels will not be present in the Fraser River Bench Lands because the noise source is too far away, however, even sounds perceived as ‘comfortably’ loud can be considered a land use impact. The impact of noise is summarised by author Dorothy Mackenzie who states that “although noise pollution is not a life-threatening or ecology-destroying environmental problem, it is an increasing source of discomfort to people.”

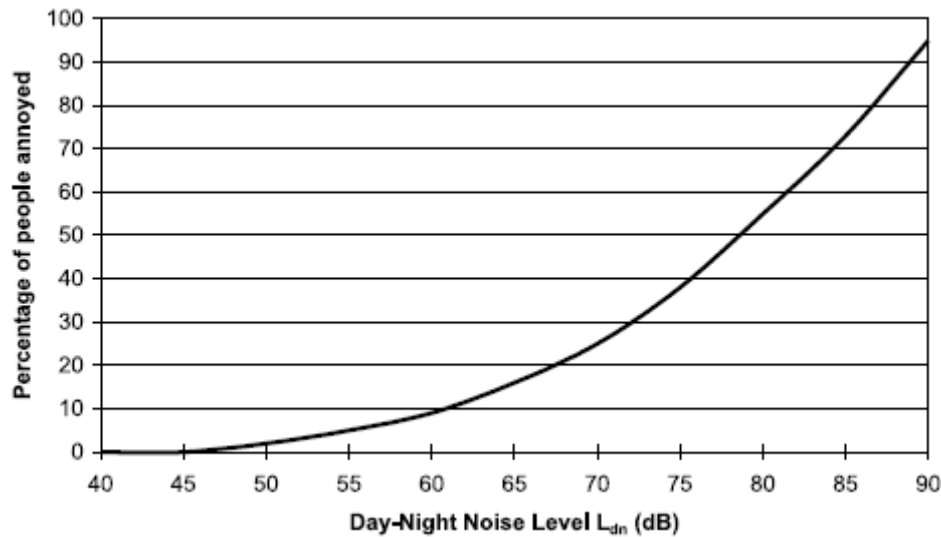


Figure 1. Shultz curve (after Burge 2000)

## Methods of Attenuation

### Man Made Barriers

It has been estimated that in order for walls to reduce levels by a maximum of 24dB, their height must be more than four times this distance if the barrier is to be close to the receiver (Stein & Reynolds 2000), which in the case of the Fraser River Bench Lands would mean a barrier of over 5500ft. As a result, noise walls, in addition to being prohibitively expensive, are not a practical solution for the Fraser River Bench Lands. Even the addition of an earth berm would not be practical in the subject area because the intended residential area is located on an uphill slope from the noise source; a wall could never be high enough to prove effective.

### Vegetation

Vegetation is a commonly recommended tool in noise reduction. Planting trees and a dense understory of shrubs will help to absorb some undesirable noise, as will litter on the forest floor (Stein & Reynolds 2000). Some literature claims that experiments involving wide belts of tall trees have measured attenuations of 5 to 10 decibels. Regardless of exact quantities in noise reduction, vegetation also acts to decrease the psychological perception of noise. Making an area feel quiet is an important aspect of improving the landscape. A fence or wall outside individual houses up to eye level,

perhaps with a trellis on top, can make a significant difference in an individual's comfort, without blocking out sun or breezes (Thompson & Sorvig 2000).

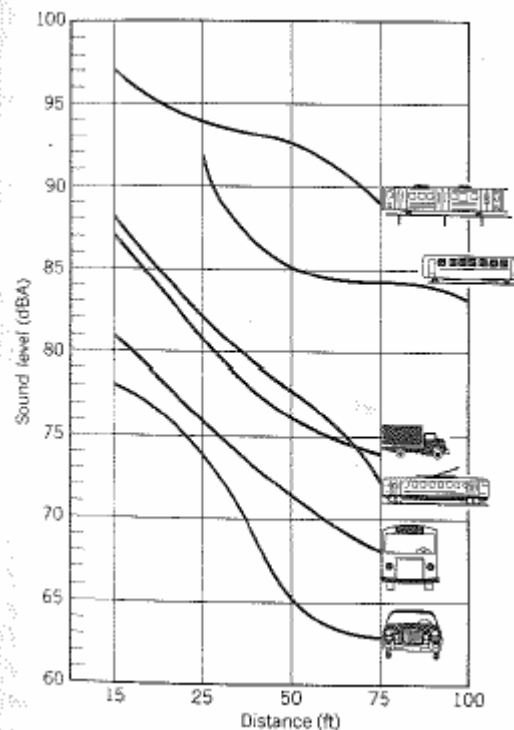
### At the Source

While noise reduction can be achieved through mitigation design practices in the Fraser River Bench Lands, it is noted that buffers are significantly more effective if they are situated relatively close to the noise source. Commercial products are available to quiet noise from buildings, factories, chimneys, and exhaust stacks, but the cost of this truly effective sound insulation is generally avoided in preference of venting noises from architectural and engineering systems to the outdoors, protecting only the people inside (Thompson & Sorvig 2000).

Page 68 of the Prince George OCP suggests that buffering through fencing and landscape screens or berms be mandatory where industrial uses occur adjacent to residential uses. Because the area intended for residential development is on the other side of the Fraser River this buffering recommendation will not apply.

### Distance

Simply locating new development a reasonable distance from the source of the noise will aid in reducing the sound's impact. The Fraser River Bench Lands Neighbourhood Plan refers to lands located approximately 550-1,000 metres from the source of noise pollution. Figure 2 demonstrates that a distance of 5m (60ft) between the noise source and recipient can reduce the intensity by 10 to 15 decibels (Stein & Reynolds 2000).



**Figure 2: Distance as a factor in noise intensity (Stein & Reynolds 2000)**

### Building Construction & Design

The buildings where residents may be affected by noise from the industrial area should be designed and constructed with the intention of lessening the impacts of neighbouring noise. The following elements are very important for developers to consider at the design stage of the Fraser River Bench Lands Neighbourhood.



- Increased insulation can absorb sound (Mackenzie 1997)
- The total area of windows or other acoustically weaker elements be reduced
- Leaks around windows, doors and/or vents can be well sealed
- Sound attenuating properties of small building elements such as windows, doors, roofs, and wall construction can be improved (Pandya 2001)
- If possible, it is recommended that windowless walls face the sources of sound. This will make a reasonable difference because it has been found that walls facing away from the source of sound will receive approximately 3dB less noise than those facing the source (Pandya 2001)
- As with other barriers, building walls can be flush with one another, overlapping where there are gaps, to prevent a direct line of sight between the noise generator and potential receptors (Gilchrist 2003)
- Buildings sited such that sound reflection is avoided (Stein & Reynolds 2000)
- Building materials that absorb noise can be used on walls facing the industrial area: cement or brick are options, as is the more affordable hardy-plank (cement based siding)
- Where possible, ground level houses can be constructed to minimise the amount of wall area facing the noise source
- Construct quiet areas, such as bedrooms, in the areas of the proposed homes that are furthest from the noise source to buffer noise (Stein & Reynolds 2000)

### Other Options

Traffic calming devices can contribute to noise reduction in a neighbourhood, benefiting the neighbourhood by avoiding further increase in decibel levels. Another way to reduce the impact of undesirable noise is to locate harmonious or desirable noises nearby (Thompson & Sorvig 2000):

A fountain or an urban garden can mask louder noises from farther away, as can landscape features planted specifically for the sounds they make – aspens for the shimmering rustle of their leaves or sculptures that chime or whistle musically.

These noise distractions and visually ‘softer’ surfaces work to create an environment that is perceived as acoustically softer and more pleasing (Stein & Reynolds 2000).

White noise would be an interesting possibility in the future but to date has been untested for outdoor environments. An interactive white noise generator can listen to existing ambient noises then match with an opposite or complementary noise. The interactive generator will create white noise, containing all audible wavelengths, leaving us in silence. A simpler white noise generator would emit a constant low hissing or crackling that seems to fade into the background, taking some of the louder and more annoying noises with it (Thompson & Sorvig 2000).

### In Conclusion

A number of opportunities exist to mitigate the effects of noise pollution during the design and development stages of the Fraser River Bench Lands. In recognition of local concerns regarding noise emitted from the BCR industrial site, all practical avenues for its attenuation are being explored. The most appropriate mitigation practices include

retention of vegetation barriers, building and construction and design, and local masking of outside noises. These options are explored in this review for consideration during the design phases of the Fraser River Bench Lands Neighbourhood Plan.

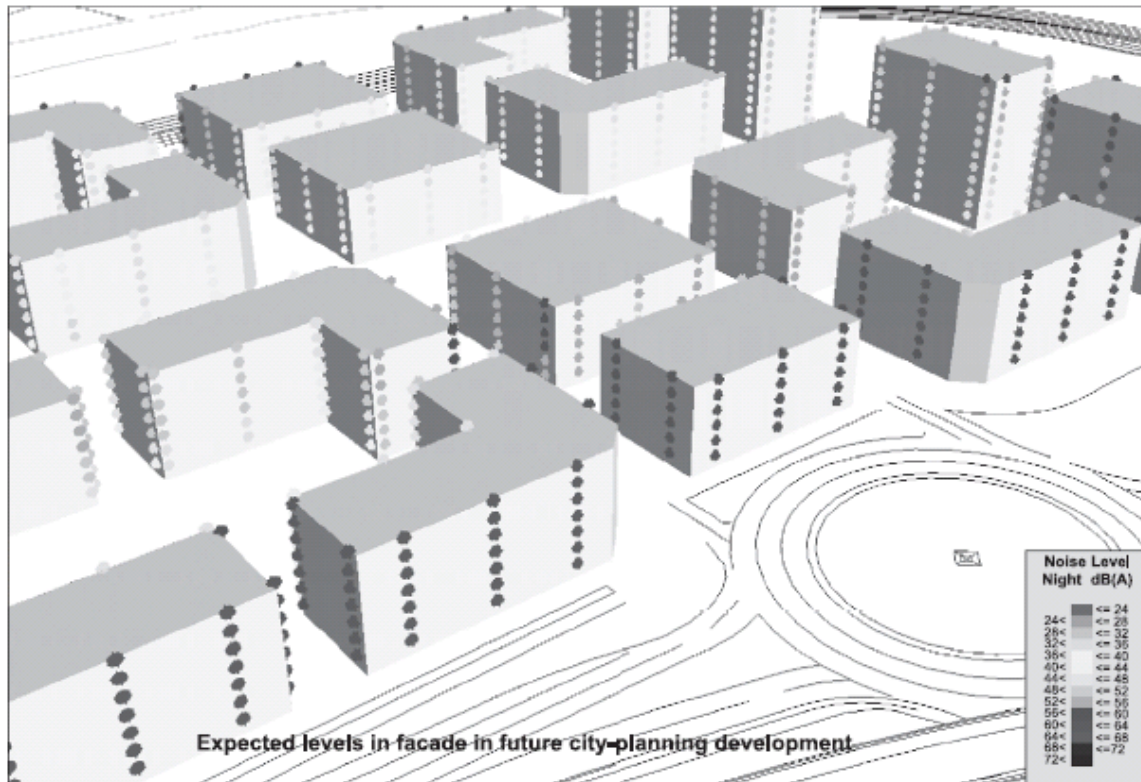


Figure 3. Simulated noise level limits for a new residential area in Vitoria (Spain)

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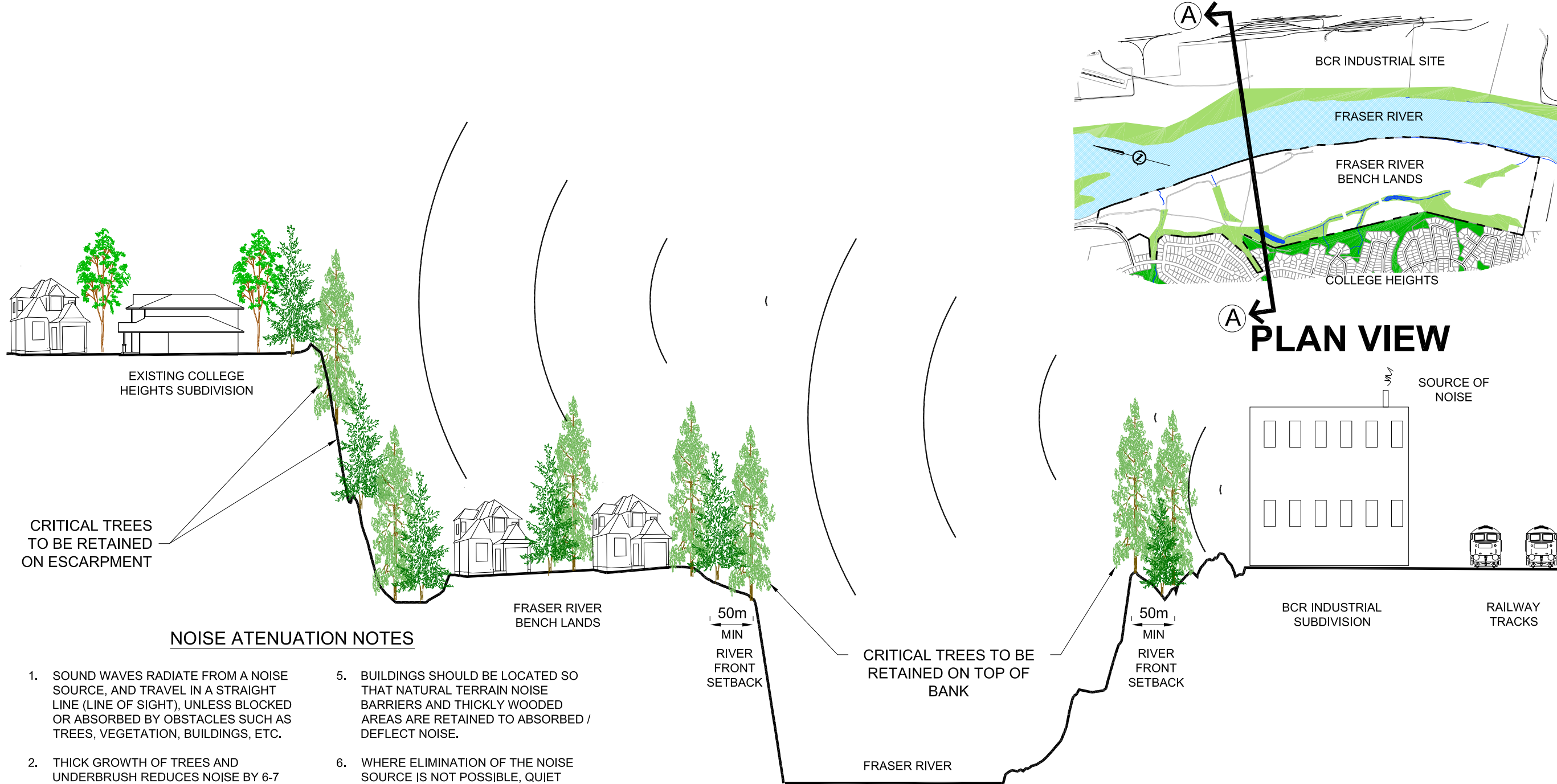
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# FRASER RIVER BENCH LANDS

## TYPICAL CROSS SECTION



### NOISE ATENUATION NOTES

1. SOUND WAVES RADIATE FROM A NOISE SOURCE, AND TRAVEL IN A STRAIGHT LINE (LINE OF SIGHT), UNLESS BLOCKED OR ABSORBED BY OBSTACLES SUCH AS TREES, VEGETATION, BUILDINGS, ETC.
2. THICK GROWTH OF TREES AND UNDERBRUSH REDUCES NOISE BY 6-7 DECIBELS PER 30m.
3. DISTANCE FROM BCR TRACKS (NOISE SOURCE) TO EXISTING COLLEGE HEIGHTS IS 1400m (AVE).
4. DISTANCE FROM BCR TRACKS (NOISE SOURCE) TO PROPOSED FRBL IS 1000m (AVE).
5. BUILDINGS SHOULD BE LOCATED SO THAT NATURAL TERRAIN NOISE BARRIERS AND THICKLY WOODED AREAS ARE RETAINED TO ABSORB / DEFLECT NOISE.
6. WHERE ELIMINATION OF THE NOISE SOURCE IS NOT POSSIBLE, QUIET AREAS SUCH AS BEDROOMS, SHOULD BE PLACED ON THE OPPOSITE SIDE OF THE HOUSE, AWAY FROM THE NOISE SOURCE.

## SOUND DIFFRACTION

### CROSS SECTION AA

FRASER RIVER BENCH LANDS NEIGHBOURHOOD PLAN

No.	DATE	REVISION	DR.

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CORRESPONDENCE:	
GRID:	
DATE:	15/SEPT/2005
SCALES:	
HORIZ: 1:1000	VERT: 1:10 000

FRASER RIVER BENCH LANDS TYPICAL CROSS SECTION

CONSULTANTS PROJECT No.  
1014-256-00

DRAWING No.  
**FIG 7**

SHEET No. 1 of 7	REV. No. 0
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# **APPENDIX G**

## **ENVIRONMENTAL OVERVIEW**



**EDI ENVIRONMENTAL DYNAMICS INC.**  
*Natural Resource Consultants*

**ENVIRONMENTAL OVERVIEW  
ASSESSMENT OF THE FRASER RIVER  
BENCH LANDS SUBDIVISION PROJECT**

Prepared for:

**L&M ENGINEERING LTD.**  
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EDI Project Number: 05-BC-0181

December 12, 2005





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## **1.0 INTRODUCTION**

In November 2005, EDI Environmental Dynamics Inc. (*Environmental Dynamics*) was retained by L&M Engineering Ltd. to conduct an environmental overview assessment for a proposed residential development within Prince George City Limits, located on the Fraser River Bench Lands (FRBL). On two separate site visits, *Environmental Dynamics* conducted reconnaissance level ground surveys of existing aquatic and terrestrial habitats.

This document provides a summary of the findings during the field visits, identifies potential areas of sensitivity and offers several mitigative best management practices in an attempt to minimize negative environmental impacts that may be associated with development. A list of foreseeable environmental regulatory requirements potentially related to the proposed development has also been provided. It is important to consider this document as an overview assessment and realize that additional studies may be required prior to finalizing development strategies or conducting any construction activities.

## **2.0 PROJECT LOCATION**

The proposed project is located in Southwest Prince George, BC within the College Heights Suburb. Specifically, the proposed development encompasses an area of approximately 105 hectares and is constricted by Cowart Road to the north, the Fraser River to the east, Major Park to the south and the Lower College Heights (LCH) neighborhood to the west.

## **3.0 EXISTING SITE CONDITIONS**

*Environmental Dynamics* conducted two separate site visits during November, 2005 that involved detailed walk throughs of the proposed development area. The results of the site visits are presented below. All photographs referenced in the following sections are attached in Appendix I of this document.

### **3.1 Vegetation and Biogeoclimatic Ecosystem Classification**

As identified on the BEC subzone/variant map for the Prince George Forest District the proposed development is located within the Moist Hot Sub-Boreal Spruce subzone (SBSmh) (MoF, 2003). The *Environmental Dynamics* site visits confirmed that the project area exhibited the typical (SBSmh) characteristics. The majority of the terrain was vegetated with a mature, mixed second growth forest. Dominant species included douglas fir (*Pseudotsuga menziesii*) and hybrid white spruce (*Picea glauca* x *engelmannii*). Furthermore, the forest type was sub-dominated by lodgepole pine (*Pinus contorta*), paper birch (*Betula papyrifera*), and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) which are also common characteristics of the (SBSmh) (MoF, 1996).

The dominant shrub species were identified as mountain alder (*Alnus tenuifolia*), prickly rose (*Rosa acicularis*), thimbleberry (*Rubus parviflorus*), willow (*Salix* sp.), red osier

dogwood (*Cornus stolonifera*) and devil's club (*Oplopanax horridus*), all indicator species of moist-wet environments.

### **3.2 Slope and Terrain**

Generally, the FRBL's are characterized by relatively level terraces separated by high gradient slopes within the Fraser River Valley. The area of development is proposed to occur within one such bench land environment.

The majority of the project area is located on a terrace which is relatively benign having an average gradient between 0-5 percent. However, three elevated gradient locations were identified within the project boundaries. The first was a vegetated, high gradient slope that borders the proposed development and the LCH neighborhood. This slope has a Southwest aspect and varies in gradient between approximately 40-75%. Additionally, a steeply gullied reach of Varsity Creek was located within the 50 m Environmental Development Permit Area (EDPA) of the Fraser River (a detailed definition of EDPA's is provided in Section 4.1 of this document). The gully was incised and the gully slopes were approximately 80% (Photograph 1). Finally, the drainage that flows south east from the wetland area in the FRBL development also has a high gradient, incised reach near its confluence with the Fraser River (Photograph 2).

Additional terrain analysis may be required prior to commencing development activities.

### **3.3 Aquatic and Fisheries Resources**

Numerous areas of aquatic sensitivity were identified within the study area, though all have been subjected to some level of anthropogenic alteration due to existing development. The dominant aquatic features identified within the proposed development were a wetland complex and its associated drainages, watershed code (WSC) 100-564600 and Varsity Creek (WSC) 100-564900.

The wetland complex is located within a depressional zone, near the high gradient slope directly east of the LCH neighborhood. This wetland complex is separated by a height of land and sourced from ephemeral stream flow, primarily runoff from storm sewer outfalls associated with the LCH catchment area. Two outflows of the wetland complex were noted, flowing in northeast and southwest directions and both are direct tributaries to the Fraser River (WSC 100).

Varsity Creek is a 2.64 Km., first order stream that flows east through the northern end of proposed development to the Fraser River. The stream length encompassed within the proposed development is approximately 400 m and includes the downstream reaches of the system.

Existing fisheries information for the drainages within the proposed project boundaries is limited. In 2004 *Environmental Dynamics* conducted an overview-level fisheries inventory within the City of Prince George (CPG). Results of that study indicated that the drainages connecting the wetlands to the Fraser River were classified as inferred fish bearing due to their unabated proximity to the Fraser River. However, it was noted

during this study that the steep gradients associated with both watercourses and their ephemeral nature, it is likely fish utilize only the lower few meters of these drainages during periods of high water.

Varsity Creek was the only watercourse within the project area that was classified as fish bearing (*Environmental Dynamics*, 2004). During the 2004 study, two rainbow trout (*Oncorhynchus mykiss*) were captured within Reach 1 of Varsity Creek using a backpack electrofisher.

Additional fisheries information may be required prior to commencing development activities.

### **3.4 Wildlife Sign/Wildlife Habitat**

During the *Environmental Dynamics* field assessments of the project locale, numerous wildlife signs were noted. Evidence of ungulate usage such as browse markings and antler rubs were common throughout the study area (Photograph 3). Fresh Moose (*Alces alces*) tracks were observed at many locations within the scope of the proposed development. Furthermore Mike Richardson, a conservation officer with the Ministry of Environment (MOE), commented that the study area is known to be regularly utilized by black bear (*Ursus americanus*), deer (*Odocoileus sp.*) and fox (*Vulpes sp.*) (Pers. Comm., 2005).

Currently the FRBL project area provides winter cover and browse habitat for various ungulate species as well as other furbearers. Although no nest sites were observed during either site visit, it is assumed that the forested areas including the Fraser River Environmental Development Permit Area (EDPA) would provide habitat for various songbird and raptor species.

Additional wildlife information may be required prior to conducting development activities.

## **4.0 ENVIRONMENTALLY SENSITIVE AREAS**

The environmentally sensitive areas (ESA's) identified during the *Environmental Dynamics* field assessments include the EDPA, slopes of elevated gradients and riparian zones and aquatic habitat. It is important to note that although the ESA's are not included in Section 5.0 – Constraints on Development, these areas should be considered while formulating development strategies.

#### **4.1 Fraser River EDPA**

In an effort to protect important watercourses and wetlands from environmental degradation, the CPG has identified several areas within city limits as EDPA's. One such EDPA is the Fraser River and designated riparian zone adjacent to it, which is sensitive to soil erosion, sediment transfer, slope instability, and possible disturbance of fish and wildlife habitat.

For future considerations the Fraser River EDPA is a 50 m zone measured from the *top of (river) bank* which is defined in the Prince George Official Community Plan (OCP) as "the point closest to active floodplain of a stream where a break in the slope of land occurs such that the grade beyond the break is flatter than 3:1 at any point for a minimum distance of 15 meters measured perpendicularly from the break." In keeping with this guideline the FRBL higher level plan entitled, *The Fraser River Bench Lands Neighbourhood Plan* has incorporated a 50 m reserve around the banks of the Fraser River within the development area.

#### **4.2 Elevated Gradient Slopes**

Future excavation activities could lead to decreased slope stability throughout the proposed project area, particularly in the vicinity of the previously identified high gradient slopes. At a minimum, soil disturbance will elevate the risk of sediment transport and delivery to the identified watercourses within the study area. During the site assessments *Environmental Dynamics* noted an existing area of surficial erosion, directly upslope of a storm sewer outfall, indicating the native soils may be prone to erosion (Photograph 4).

#### **4.3 Riparian Zones and Aquatic Habitat**

The riparian zones throughout the study area are an integral part of the aquatic ecosystems as they create a buffer to external development. Riparian vegetation promotes healthy watersheds, protects fish and wildlife habitat and provides a corridor for wildlife migration. Additionally, the existing riparian zones within the FRBL may provide valuable "green space" that will allow ecosystem preservation (Photograph 5). Important ecological values of riparian areas are listed in *The Stewardship Series Access Near Aquatic Areas: A Guide to Sensitive Planning, Design and Management* and are as follows:

- Support the aquatic and terrestrial food webs for fish and wildlife.
- Provide shelter, cover and temperature regulation for fish and wildlife.
- Create habitat diversity for songbirds, raptors, small mammals and other wildlife species.
- Provide wildlife migration corridors and linkages between critical habitats.
- Buffer aquatic features from pollution.
- Recharge ground water and aquifers.
- Stabilize banks and reduce erosion.
- Dissipate energy of floods.

- Retain water in soil during droughts.

The existing Neighbourhood Plan addresses the above mentioned environmental guidelines by retaining a substantial percentage (36.41%) of parks/greenspace in the proposed development area.

Section 3.2 of the Neighbourhood Plan also outlines a vision for the FRBL, which includes an alternative design for stormwater management. This higher level plan will retain a 15 m buffer around the existing drainage and wetland complex at the centre of the FRBL. If the existing neighbourhood plan is utilized, the numerous environmental attributes of the riparian area discussed above will thus be protected.

The 15 m reserve around the riparian area in the FRBL neighbourhood plan meets the requirements set by the Department of Fisheries and Oceans (DFO) in their *Land Development Guidelines for the Protection of Aquatic Habitat*. The FRBL development is, for the most part, a low density (7 units/acre)/residential area. For this class of development the above DFO guidelines state that “the minimum leave strip width on each side of the watercourse should be 15 meters from the high water mark”.

For the areas of high density/commercial (>7units/ha) near creeks (of which the FRBL has 6.64 ha) “the minimum leave strip width on each side of the watercourse should be 30 meters from the high water mark”. For high density/commercial development in the FRBL the current riparian reserve is 15 m. Although the DFO guidelines may be relaxed depending on biological attributes at the site, it is recommended that the 30 m reserve is applied to the high density/commercial areas in the development.

## **5.0 CONSTRAINTS ON DEVELOPMENT**

The following existing environmental/anthropogenic features may present constraints on development activities.

### **5.1 Existing Storm Sewer Outfalls**

*Environmental Dynamics* noted 12 storm sewer outfalls that currently direct storm water from LCH towards the proposed project area. Through existing development these storm sewer conduits have become the primary water sources to the previously mentioned wetland complexes (Photograph 7). To maintain the stability of the aquatic and riparian ecosystems, any development should proceed with careful planning and consideration of potential environmental impacts such as;

- Decreased slope stability.
- Increased soil erosion and sediment transfer into aquatic ecosystems.
- Loss of wildlife habitat.
- Decreased level of infiltration of runoff.
- Alterations to downstream fish habitat.
- Decreased watershed stability .
- Stability of roads and drainage crossings.

Five of the twelve storm sewer outfalls were referenced in a 2002 Watershed Drainage Plan prepared by *Environmental Dynamics and Associated Engineering (B.C.) Ltd* for the



CPG. Within this report five storm water outfalls that drain into the FRBL project area were assessed (outfall # 3, 5, 27, 30, and 32). The outfalls were ranked in priority under the parameters of erosion and sediment concerns and the receiving environment. All of these outfalls were located East of the streets in LCH and drain downslope towards the two wetland complexes. See Appendix III: Historical outfall Rankings for the criteria used during the ranking process. Table 1 presents a summary of the identified outfall upgrade priority rankings.

**Table 1:** Priority ranking of storm sewers draining from the LCH into the FRBL.

Outfall #	Associated Street	Priority for upgrading
3	Imperial Crescent	Low
5	Delhi Place	High
27	Essex Crescent	Low
30	Jean De Brebeuf Crescent	Moderate
32	Hartford Crescent	Low

With respect to the individual storm sewer outfalls, any alterations to the existing drainages must be conducted with consideration of potential impacts to slope stability.

### **5.2 Reclaimed Sewage Treatment Site**

There is little historical knowledge regarding the decommissioning of the CPG sewage treatment site; however, at the time of the *Environmental Dynamics* site assessment, it was noted that the area was well vegetated with grasses, willow (*Salix sp.*) and immature trembling aspen (*Populus tremuloides*) (Photograph 6). Future development activities should proceed with the presence of this reclaimed site in mind.

### **5.3 The Fraser River and Storm Water Filtration**

As additional storm water generation is anticipated to result from the project and considering the project's proximity to the Fraser River, effective storm sewer management should be developed. To address the increasingly concentrated flows and manage them in an environmentally sensitive manner, mitigation measures such as a storm water infiltration system should be considered. These systems can be environmentally beneficial to the hydrology and water quality in urbanized areas. Benefits of these systems include:

- Retention of runoff through ground water recharge.
- Filtration of contaminants within the soil layers.
- Providing recharge to local area groundwater and streams.

The DFO *Land Development Guidelines for the Protection of Aquatic Habitat* provides a more detailed overview of storm water infiltration systems.

### **5.4 Connectivity of Greenways and Disruption of Wildlife Habitat**

Within the proposed development the wetland complexes, drainages, and the Fraser River EDPA are recognized as having important environmental attributes that should be

preserved within greenways. There are several ways that greenways, with careful planning, are able to benefit natural ecosystems and urban environments (DFO, 1996).

- Conservation of streams, lakes, and wetlands along with their riparian areas.
- Limitation of development on floodplains and groundwater recharge areas.
- Providing areas for storm water detention and constructed wetlands.
- Providing vegetation filters for sediment and pollutants.
- Better water quality.
- Providing corridors to connect flora and fauna with one another, to allow for seasonal movements in response to change.
- Providing a meaningful connection to nature for the people within a community.

Greenways within the proposed development area will require special attention in order to achieve the listed benefits. Of particular concern will be the preservation of wildlife habitat and migration routes.

Additionally, the preservation of mature vegetation within the Fraser River Riparian Zone above the bank of the Fraser River may provide habitat for large raptors such as osprey (*Pandion haliaetus*) and eagles (*Haliaeetus sp.*) (Pers. Comm., 2005, Brade).

## **6.0 RECOMMENDED BEST MANAGEMENT PRACTICES (BMP'S) AND REGULATORY REQUIREMENTS**

It is recommended that the proponents of the proposed development review the Stewardship Series documents, *Access Near Aquatic Areas: A Guide to Sensitive Planning, Design and Management*, *Community Greenways: Linking Communities to Country, and People to Nature* and *Land Development Guidelines for the Protection of Aquatic Habitat*. These documents provide numerous mitigative techniques and recommendations to retain natural values of aquatic and terrestrial ecosystems while integrating them into ecologically sensitive planning developments.

In the event that any proposed activities are to include instream work and cause a "change in and about a stream" the following legislation, referral and notification procedures should be carried out. Additionally, guidelines for general best management practices for protecting environmentally sensitive areas are listed below and should be referenced during all stages of construction.

### **6.1 Definitions**

The following definitions are provided to clarify site descriptions and the explanations of applicable legislation and regulations that may affect the proposed project.

Under the *BC Water Act*;

A **stream** is defined as "a natural watercourse or source of water supply, whether usually containing water or not, and a lake, river, creek, spring, ravine, swamp and gulch".

A **stream channel** is defined as “the bed of a stream and the banks of a stream, whether above or below the natural boundary and whether usually containing water or not, including all side channels”.

A **Change in and about a stream** is defined as;

- a) any modification to the nature of a stream including the land, vegetation, natural environment or flow of water within a stream, or
- (b) any activity or construction within the stream channel that has or may have an impact on a stream

As defined in the DFO document, *Access Near Aquatic Areas: A Guide to Sensitive Planning, Design and Management*;

**Aquatic Habitat** is a habitat unit associated with water which provide food and shelter and other elements critical to completion of an organism’s life cycle. Aquatic habitats include streams, wetlands, marshes, bogs, estuaries, and riparian areas, as well as large fresh and salt water bodies.

**Environmentally Sensitive Area (ESA)** is defined as an area that requires special management attention to protect fish and wildlife resources and other implicit natural systems or processes. ESA’s have also been broadly defined to include other scenic, historic or cultural values.

**Fish Habitat** includes spawning grounds and nursery, rearing, food supply and migrations areas on which fish depend directly or indirectly in order to carry out their life processes (Canada Fisheries Act sec 31.5).

**Riparian Zones** are the terrain directly adjacent to the normal high water level in a stream, river, lake or pond and extending to the portion of land that is directly influenced by the presence of adjacent ponded or channelized water. Riparian areas typically exemplify a rich and diverse vegetative mosaic reflecting the influence of available surface water.

**Wetlands** are defined as areas of permanent or temporary standing water, characterized by the absence of channel flow and the presence of vegetation which is distinct from that in neighboring, freely drained areas. The most common types of wetlands are swamps, marshes and bogs, fens and shallow water.

## **6.2 Provincial Regulatory Requirements**

- Notification to the Ministry of Environment (MOE), of proposed in-stream work is required under Section 9 of the *BC Water Act* and Part 7 of the *BC Water Act – Water Regulations*.
- A notification form for instream work is available online on the Land and Waters British Columbia Inc. website:  
(<http://www.lwbc.bc.ca/03water/licencing/section9/index.html>) under the section regarding the Water Act – Section 9.

- All instream work that is to occur in a fish bearing stream will have to be completed within the reduced risk timing window for species reported as present in the stream. If works are required to proceed outside of the timing window a variance will be required from the MOE.

### **6.3 Federal Regulatory Requirements**

Due to the possibility that the proposed project may include instream work, an alteration to stream habitat may occur. Under the *Fisheries Act*, Section 35(1) “no person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction (HADD) of fish habitat.”; Section 36(3) states “...no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish...”.

It is not expected that the development of the FRBL will cause a HADD, however due to the scope and close proximity to the Fraser River the DFO will have to be notified of all works pertaining to fish bearing systems.

### **6.4 Municipal Regulatory Requirements**

If the proposed works occur within the 50 m EDPA of the Fraser River, an Environmental Development Permit application will be required for submission to the Development Services Department (DSD) of the City of Prince George; the permit is available from the DSD at (ph: 250-561-7611).

### **6.5 Best Management Practices and Recommendations**

Due to the scope of the proposed project and limited information available for the study area the following BMP's and recommendations should be adhered to. It is important to realize that the list provided below is intended as an overview and should not be considered comprehensive. Upon commencing works, individual tasks will have a more detailed list of BMP's associated with the specific task at hand.

- Conduct a detailed fisheries assessment to determine the habitat values associated with the watercourses throughout the property.
- Conduct a wildlife habitat assessment of the property.
- Conduct a geotechnical assessment of the property.
- Develop a site specific Erosion and Sediment Control Plan prior to construction activities.
- Develop fuel storage/handling guidelines for contractors conducting on-site works or at a minimum adhere to *The Standards and Best Practices for Instream Works*, which lists mitigative measures for sediment control, vegetation management, site restoration and deleterious substance control/spill management.

## **7.0 REFERENCES**

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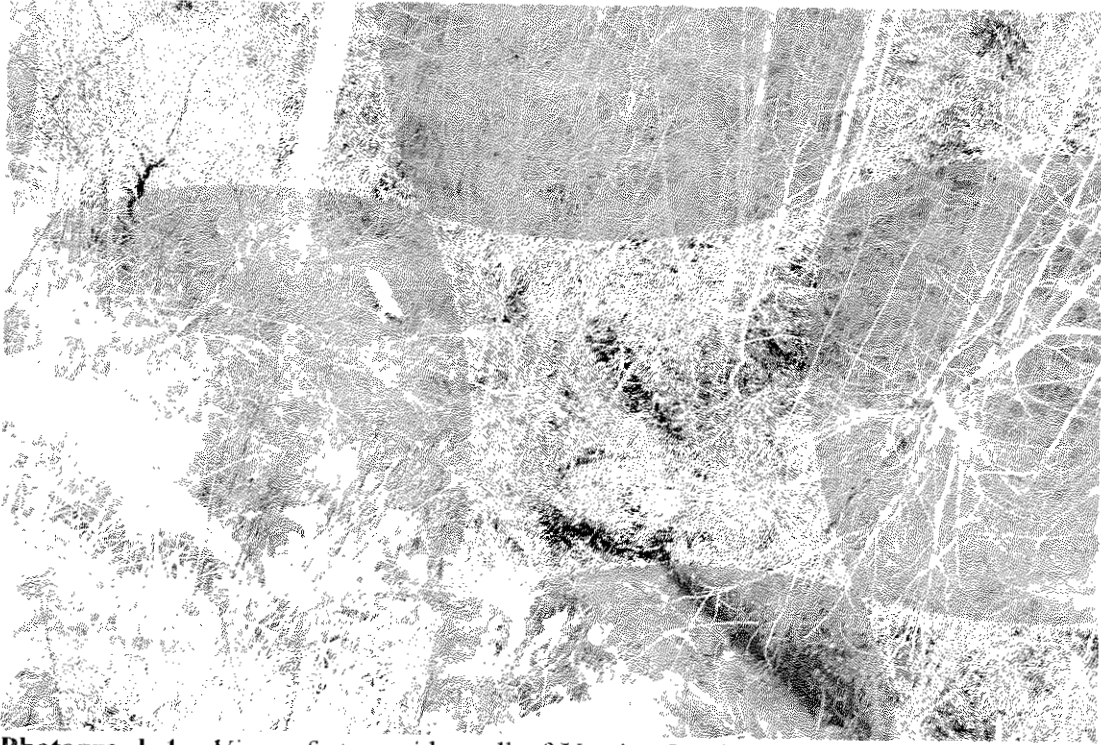
EDI Environmental Dynamics Inc. 2004. 2004 Fisheries Inventory within the City of Prince George.

L&M Engineering Limited – Planning Centre, 2006. Fraser River Bench Lands Neighbourhood Plan.

Land and Water British Columbia Inc. 2004. Approval Application or Notification for Changes in and about a Stream.

**APPENDIX I**  
**Photodocumentation**





**Photograph 1:** View of steep side wall of Varsity Creek near its confluence with the Fraser River.



**Photograph 2:** View of incised drainage near the Fraser River.



**Photograph 3:** View of wildlife sign.



**Photograph 4:** View of soil erosion of slope above a storm sewer outfall below Essex Crescent.



**Photograph 5:** View of the edge of riparian vegetation next to a pond in a wetland area.



**Photograph 6:** Reclaimed sewage treatment site



**Photograph 7:** View of the storm sewer outfall north of Essex Crescent.

**APPENDIX II  
Overview Map**



**TOTAL DEVELOPMENT AREAS**

SINGLE FAMILY - 32.79 ha  
 MULTI FAMILY - 4.67 ha  
 SMART GROWTH LOW DENSITY - 10.98 ha  
 SMART GROWTH HIGH DENSITY - 3.72 ha  
 SCHOOL - 2.43 ha  
 COMMERCIAL/NEIGHBOURHOOD CENTRE - .58 ha  
 PARKS/GREENSPACE - 36.81 ha  
 ROADS - 14.54 ha

**GROSS AREA = 106.52 ha**

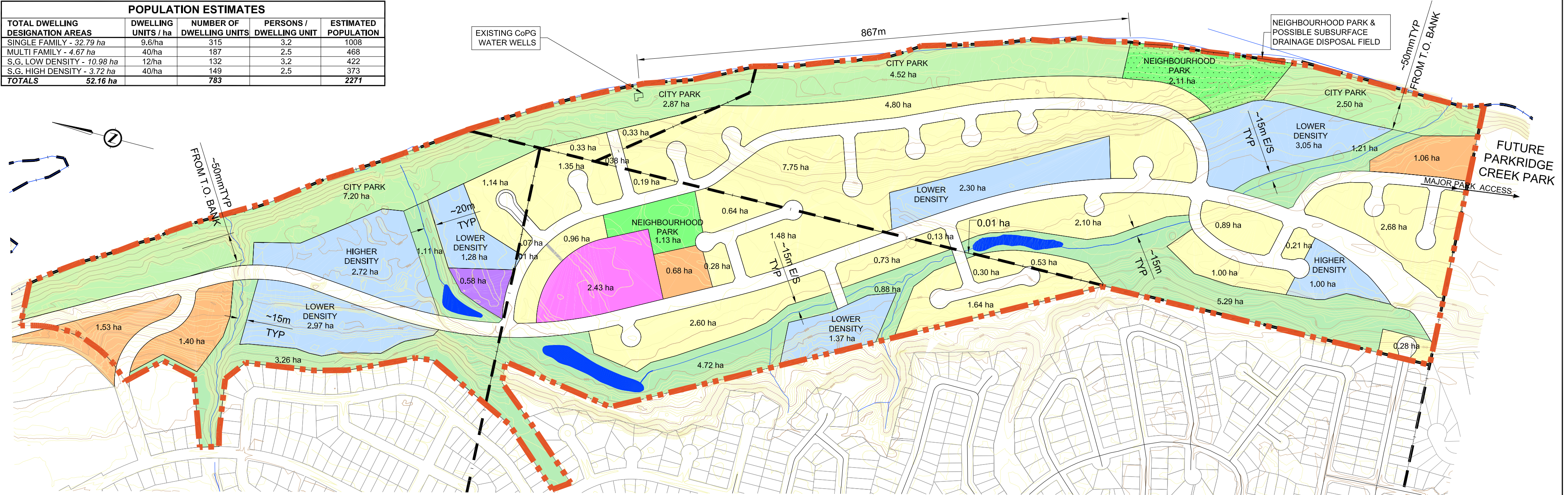
**NET DEVELOPABLE AREA= 55.17 ha (51.79%)**

# FRASER RIVER BENCH LANDS LAND USE PLAN

**LEGEND**

- SINGLE FAMILY
- MULTI FAMILY
- SCHOOL
- COMMERCIAL
- SMART GROWTH DEVELOPMENT
- NEIGHBOURHOOD PARK
- CITY PARK
- NATURAL GREEN SPACE
- PARK/ POSSIBLE SUBSURFACE DRAINAGE AREA
- ROAD
- STUDY BOUNDARY
- DISTRICT LOT BOUNDARY
- CREEK OR STORM WATER DRAINAGE
- PAVED WALKWAY

POPULATION ESTIMATES				
TOTAL DWELLING DESIGNATION AREAS	DWELLING UNITS / ha	NUMBER OF DWELLING UNITS	PERSONS / DWELLING UNIT	ESTIMATED POPULATION
SINGLE FAMILY - 32.79 ha	9.6/ha	315	3.2	1008
MULTI FAMILY - 4.67 ha	40/ha	187	2.5	468
S.G. LOW DENSITY - 10.98 ha	12/ha	132	3.2	422
S.G. HIGH DENSITY - 3.72 ha	40/ha	149	2.5	373
<b>TOTALS</b>	<b>52.16 ha</b>	<b>783</b>		<b>2271</b>



**FRASER RIVER BENCH LANDS NEIGHBOURHOOD PLAN**

No.	DATE	REVISION	DR.

**L&M ENGINEERING LIMITED PLANNING CENTRE**

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ENGINEER:	JRS
PLANNER:	HRD
DRAWING FILE:	1014-256-00
CORRESPONDENCE:	
DATE:	15/SEPT/2005
SCALE:	
HORIZ. 1:1000	VERT. 1:1000

**FRASER RIVER BENCH LANDS LAND USE PLAN**

CONSULTANTS PROJECT No.  
**1014-256-00**

DRAWING No.  
**FIG 3**

SHEET No.	REV. No.
1 of 1	0



# **APPENDIX H**

## **GEOTECHNICAL OVERVIEW**

**GEOTECHNICAL OVERVIEW  
OF PROPOSED  
FRASER RIVER BENCH LANDS  
DEVELOPMENT  
PRINCE GEORGE, B.C.**

**Prepared for**

**L&M ENGINEERING LIMITED  
PRINCE GEORGE, B.C.**

**Prepared by**

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**PROJECT No. K-1896**

**January 13, 2006**

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5.0	DISCUSSION	5
6.0	GEOLOGICAL HAZARDS	6
7.0	CONCLUSIONS	7

## APPENDICES

APPENDIX A	Plan Showing Development Area	Drawing 1896-A1
	Aerial Photo Showing Terrain Mapping	Drawing 1896-A2
APPENDIX B	Report by J.M. Ryder & Associates, Terrain Analysis Inc.	Plates 1896-B1 to B3
	Legend of Terrain Stability Mapping	
	Symbols	Plates 1896-B4 and B5
APPENDIX C	Notes Summarizing Field Observations	Plate 1896-C1
	Site Photographs	Plate 1896-C2

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## **1.0 INTRODUCTION**

Fortwood Homes and the Roman Catholic Episcopal Corporation have engaged L&M Engineering Limited (L&M) to prepare a Neighbourhood Sector Plan of the Fraser River Bench Lands. To assist with the development of the Plan, L&M commissioned GeoNorth Engineering Ltd. to carry out an overview geotechnical assessment of the property. Our assessment follows the format of our proposal dated September 9, 2005.

The Fraser River Bench Lands development area is located in the College Heights area of Prince George. It is bordered by Fraser River on the east, by a moderately steep slope up to developed areas of College Heights on the west, by the boundary of DL 2014 on the south and by Cowart Road on the north. A plan showing the development area is on Drawing 1896-A1 in Appendix A. The Bench Lands development area is comprised of three parcels that are legally described as follows:

- DL 753, Fractional Remainder of the SE 1/4 - PID 014 999 978
- Lot 2, DL 754, Plan 24418 - PID 008 234 680
- DL 2014 Remainder - PID 015 039 099

The first parcel noted above is presently undeveloped but was previously occupied by municipal sewage treatment lagoons. The other two parcels are undeveloped and tree-covered. Several rough trails cross the site.

To carry out the geotechnical overview, we commissioned Dr. J.M. Ryder, P.Geo., of J.M. Ryder & Associates, Terrain Analysis Inc. (JMRA) to examine aerial photographs and carry out a terrain assessment. We then carried out a field reconnaissance to ground truth the air photo assessment and assess surficial soil conditions.

## 2.0 METHODS

At our request, Dr. Ryder of JMRA reviewed aerial photos and outlined areas on the photos that have similar genesis (geomorphology), slope and drainage characteristics. To provide context for the aerial photo interpretation, Dr. Ryder reviewed geology reports and maps by Geological Survey of Canada. Dr. Ryder reviewed the following aerial photographs:

Year	Flight Line	Photo Numbers
2000	30BCB00040	124-126, 188-190
2000	30BCB00041	39-42, 103-104
1996	15BC96007	56-58
1988	30BC88035	235-238
1988	30BC88036	146-149
1979	15BC79151	37-39
1963	BC5070	33-35, 66-68
1955	BC1890	2

A copy of Dr. Ryder's report is on Plates 1896-B1 to B3 in Appendix B. A scanned copy of the mapped aerial photo is shown on Drawing 1898-A2 in Appendix A. A legend describing the symbols used in the aerial photo mapping is on Plates 1896-B4 and B5 in Appendix B.

On November 2, 2005, personnel from our office visited the site to observe surficial soil conditions in shallow, hand-dug test pits and in natural exposures. Notes summarizing field observations are on Plate 1896-C1 and photos taken during the field reconnaissance are on Plate 1896-C2, in Appendix C. The locations that correspond to each of the field note sites are shown on Drawing 1896-A1.

### **3.0 GEOLOGICAL BACKGROUND**

Background to the geology of the area is provided by Geological Survey of Canada in Bulletin 196, Glacial Geomorphology and Pleistocene History of Central British, 1971, and with the accompanying Map 1288A, Surficial Geology, Prince George.

The map indicates that the Fraser River Valley is within a large meltwater or outwash channel bound by cutbanks and terraces. Higher elevation areas adjacent to Fraser River Valley are mapped as being underlain by glacial lake sediments, and still higher elevation areas, above about 760 m elevation and well away from the proposed development, are mapped as being underlain by glacial till.

At the end of the last glacial period, about 10,000 years ago, meltwater accumulated in a large glacial lake due to the presence of unmelted glacial ice and glacial debris that blocked the present Fraser River channel. The lake existed for several hundred years and resulted in deposition of fine grained sand, silt and clay across the areas covered by the glacial lake. When the dam that contained the lake was breached, the lake drained, likely catastrophically, and the resulting runoff cut into the accumulated glacial lake sediments. The channel bottom was typically covered with sand, gravel and cobbles. Present-day site topography is a result of the erosion that occurred as the glacial lake drained, and a result of subsequent Fraser River erosion.

### **4.0 ANTICIPATED SUBSURFACE CONDITIONS**

As outlined in the report by JMRA and following from the geological history outlined above, we expect the Fraser River Bench Lands area and the adjacent higher elevation areas are fluvial terraces that were cut into fine grained sediments of Glacial Lake Prince George. Based on this geological model, the aerial photo interpretation and our field observations, the most probable subsurface stratigraphy is as follows:

1. Eolian, silty, fine grained sand, over
2. Fluvial over-bank sediment consisting of silty, fine to medium grained sand, over



3. Fluvial, layered sand and gravel, over
4. Glacial lake sediments consisting of layered silt, clay and fine grained sand, over
5. Glacial till at an unknown depth.

This stratigraphy is likely to underlie the benches as well as the slopes, although the slopes are likely covered by a thicker blanket of fluvial sand and gravel, and possibly sand and gravel colluvium deposited at the time the slopes were formed.

Soil unit 1, the eolian sand, was likely deposited during the period soon after Glacial Lake Prince George drained and prior to the area being vegetated. It is likely a thin layer, in the order of decimetres, and is similar in composition to the fluvial over-bank sediment.

Soil unit 2, the fluvial over-bank sediment, is prevalent across the area, and is interpreted as the origin of the surficial, fine grained sand deposits at field check sites D, E, G, H, I, L to O, Q and R.

Steep, erosional slopes at field check sites D and E provide good exposure of the stratigraphic section. Photographs of field check site D, along with an interpretation of the soil types, are shown on Plate 1896-C2, in Appendix C. Fluvial over-bank sediment (soil unit 2) is interpreted to be approximately 2.0 and 1.5 m thick at sites D and E, respectively, over fluvial sand and gravel (soil unit 3) found to be about 2.5 m thick at both sites, covering glaciolacustrine clayey silt (soil unit 4) to the bottoms of the exposures, approximately 5 and 4 m, respectively. The fine grained sediments likely extend to a considerable depth below the toe of the exposed slope.

In addition to the exposures at field check sites D and E, we also observed fluvial sand and gravel sediments at field check sites J, P and on a hill slope between P and Q.

## 5.0 DISCUSSION

The fluvial over-bank sediment typically has relatively low shear strength and low to moderate permeability. It will typically provide adequate support for lightly loaded structures, such as residential housing. The fine grained sand is susceptible to frost heave, is easily eroded and is easily disturbed by pedestrian and equipment traffic. The potential for soil erosion to occur from trails can be reduced by covering the silty, fine grained sand with a light to medium-weight, non-woven geotextile, such as Propex 4551, followed by an erosion-resistant granular fill.

Fluvial sand and gravel will provide good foundation support. These types of deposits typically have properties of moderate to relatively high shear strength, high permeability and low potential for settlement. Additional investigation will be required to determine whether these deposits are sufficiently permeable and at sufficiently shallow depth to negate the need for below-grade, perimeter foundation drains.

Glacial lake sediments, such as the clayey silt that underlies the granular deposits, typically have properties of very low permeability, low to moderate shear strength and moderate to high compressibility. We observed seepage from gravel over the clayey silt at field check sites D and E. This confirms that the clayey silt has properties of low permeability and that a perched groundwater table exists within the fluvial sand and gravel. The aerial photos also show standing water in a swale located at the west edge of the main terrace, at the toe of the main slope at the west boundary of the proposed development area. The standing water confirms the presence of low permeability soil deposits in the area.

The available information indicates there is limited opportunity for subsurface disposal of storm water. There appears to be only a thin layer of permeable sand and gravel overlying low permeability silt and clay. Water discharged into this thin layer is likely to mound and might cause a significant localised rise in the perched groundwater table. Water that infiltrates the sand and gravel layer will move laterally on top of the silt and clay, likely towards the Fraser River. The groundwater will either discharge directly into the Fraser River if the silt and clay

is below the level of the river or will result in seepage from open slopes, such as that shown on Plate 1896-C2, if the silt and clay is above river level. As discussed in the following section, subdivision development can reduce slope stability conditions where groundwater discharge results in open-slope seepage.

The Fraser River channel appears to be relatively stable opposite the proposed development area, with no large changes in the channel shape visible between the earliest to latest aerial photos.

## **6.0 GEOLOGICAL HAZARDS**

The aerial photo interpretation by JMRA found no evidence of major or deep-seated instability. Slopes that separate the terraces are arcuate, and similar in shape to the Fraser River banks, indicating the slopes were formed by stream erosion, not previous instability.

The slopes that separate the flat terraces are mapped as being potentially unstable (P). This indicates the slopes have characteristics that are similar to other slopes that are actively unstable, but they do not exhibit any significant signs of instability. The important characteristics include slope gradient (steeper than 50%), the potential for the slopes to be underlain by fine grained sediments, and the presence of draws and gullies. Gullies and head-scarps less than about 10 to 20 m across appear to have developed at several locations on the slopes. The head-scarps mark a steep face caused by erosion or instability. There is gully erosion at several locations, possibly related to discharge of storm runoff from areas further west into unprotected, natural draws.

To avoid potential slope instability and erosion concerns, we recommend that moderately steep slopes, those steeper than about 40%, not be developed without more detailed geotechnical assessments. We also recommend assessing areas within about 10 m of the toe of slopes steeper than about 40% prior to development to check for erosion and slope stability hazards. Alluvial fans, located where the gullies discharge onto the flat terraces, might be subjected to overland

flow and sedimentation. These areas, marked "f" on Drawing 1896-A2, will require careful review and design of measures to control stream flow and mitigate flood and sedimentation hazards.

Published studies have reported that subdivision development tends to cause groundwater levels to rise due to irrigation of lawns and gardens, leakage from water mains and cutting of trees. Indications from this study are that a perched groundwater table and lateral groundwater flow are likely to occur. Instability can develop due to groundwater seepage at the contact between permeable fluvial deposits that cover fine grained glacial lake sediments. This is a particular hazard where the natural slopes are steep, such as those along eroded draws or erosional slopes beside the Fraser River. We recommend these slopes be assessed where facilities or structures are proposed near the crest to determine the appropriate setback.

There are also on-going shallow slides on those slopes that are undermined by Fraser River. The Bench Lands appear to be opposite a relatively stable reach of the river, but a detailed evaluation of river erosion rates and the appropriate setback distances are beyond the scope of this study.

We have not examined soil conditions in the vicinity of the abandoned sewage lagoons, but understand they were filled with soil after they were drained. The fill is unlikely to be compacted to the typical minimum standard required for support of building foundations or road embankments. Additional subsurface investigation will be needed prior to development in this area.

## **7.0 CONCLUSIONS**

This report presents the results of a review of aerial photos and a field reconnaissance, and provides an overview of geological conditions across the proposed development area. Geotechnical conditions are favourable for development as a residential subdivision, with soil

stratigraphy likely to consist of 1 to 3 m of silty, fine grained sand, over several metres of layered sand and gravel, over fine grained silt and clay. In-ground disposal of storm water is unlikely to be feasible due to the apparent limited thickness of permeable sand and gravel.


Some constraints might exist, and we recommend these be investigated prior to design and construction of the proposed residential development. The potential constraints include:

1. The potential for flooding and sediment delivery from streams and from existing storm drain outfalls that enter the development area from the west.
2. The potential for instability or erosion from those slopes along the western borders of the Bench Lands area, marked as potentially unstable on Drawing 1896-A2.
3. The depth to and seasonal variability in the depth to groundwater across the site.
4. The required setback from the crest of steep, erosional slopes along the Fraser River and the incised draws.

This report was prepared by GeoNorth Engineering Ltd. for the use of the Roman Catholic Episcopal Corporation, Fortwood Homes and their consultants. The material in it reflects GeoNorth Engineering's judgement in light of the information available to us at the time of preparation. Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, is the responsibility of such Third Parties. GeoNorth Engineering Ltd. accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

Please call the writers if any parts of this report need to be clarified.

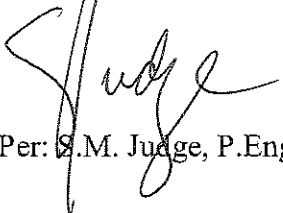
Respectfully submitted,  
GeoNorth Engineering Ltd.



*D.J. McDougall*

Per: D.J. McDougall, M.Eng., P.Eng.

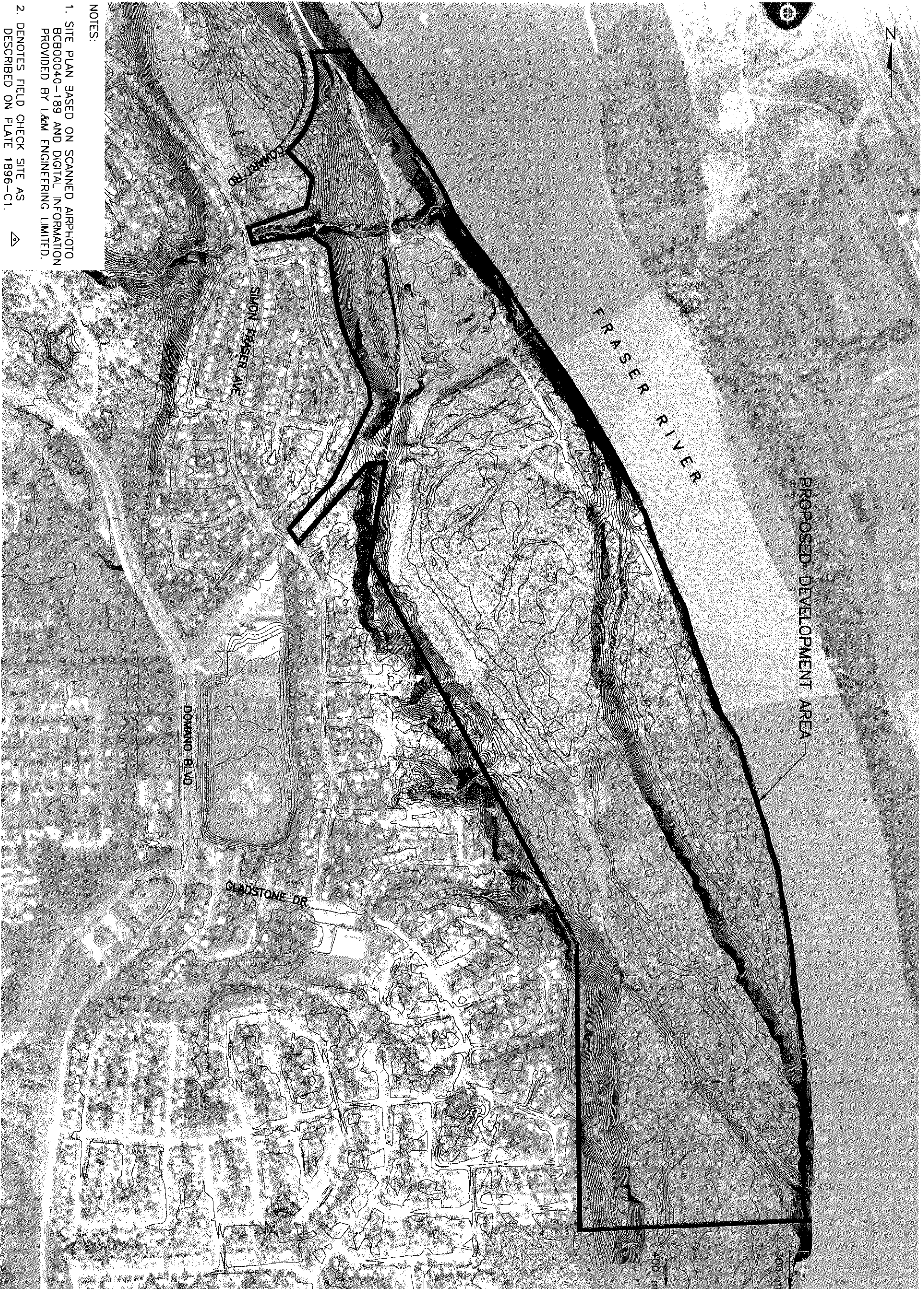
Reviewed by,  
GeoNorth Engineering Ltd.



Per: S.M. Judge, P.Eng.

## APPENDIX A





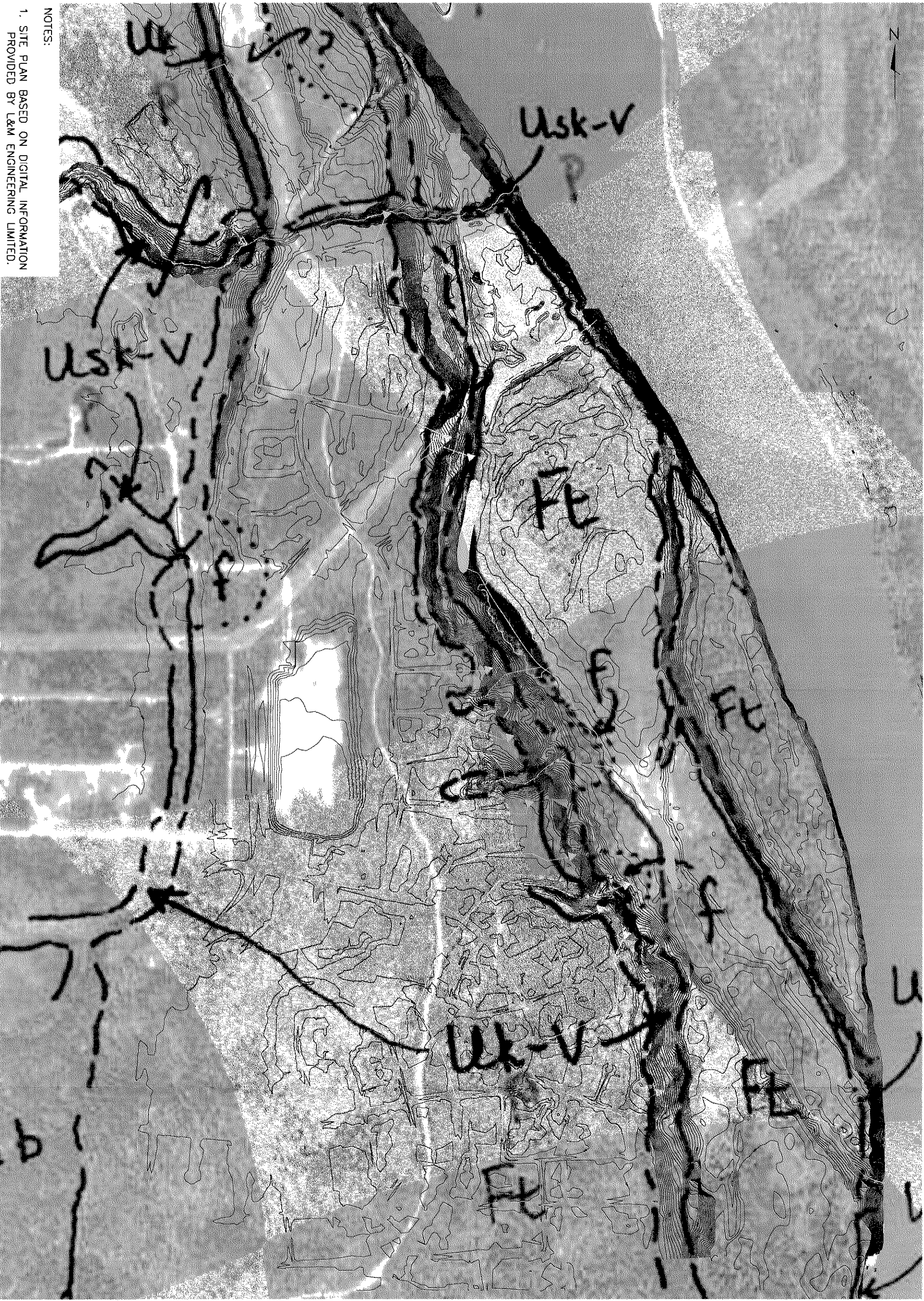
- NOTES:
1. SITE PLAN BASED ON SCANNED AIRPHOTO BCB00040-189 AND DIGITAL INFORMATION PROVIDED BY L&M ENGINEERING LIMITED.
  2. DENOTES FIELD CHECK SITE AS DESCRIBED ON PLATE 1896-C1.

SCALE: ~1:7500	APPROVED:
DATE: 2006/01/13	
DWN BY: LU	
MAP REF: -	
DWG NO. 1896-A1	PROJECT NO: K-1896

**L&M ENGINEERING LIMITED**  
**GEOTECHNICAL OVERVIEW OF PROPOSED**  
**FRASER RIVER BENCH LANDS DEVELOPMENT**  
**PRINCE GEORGE, B.C.**  
**PLAN SHOWING DEVELOPMENT AREA**

**GEONORTH ENGINEERING LTD.**  
 1301 Kelliher Road  
 Prince George, B.C., V2L 5S8  
 Tel (250) 564-4304  
 Fax (250) 564-9323





NOTES:

1. SITE PLAN BASED ON DIGITAL INFORMATION PROVIDED BY L&M ENGINEERING LIMITED.

SCALE: 1:7,500  
 DATE: 2006/01/13  
 DWN BY: LU  
 MAP REF: -  
 DWG NO. 1896-A2

APPROVED  
 PROJECT NO: K--1896  
 REV. -

**L&M ENGINEERING LIMITED**  
**GEOTECHNICAL OVERVIEW OF PROPOSED**  
**FRASER RIVER BENCH LANDS DEVELOPMENT**  
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## **APPENDIX B**

**J.M.Ryder and Associates, Terrain Analysis Inc.**

4315 West 24<sup>th</sup> Avenue, Vancouver, British Columbia, V6S 1L3      Ph 604-736-4189      jmryder@telus.net

Dave McDougall  
GeoNorth Engineering Ltd.  
1301, Kelliher Rd., Prince George, B.C. , V2L 5S8

November 20, 2005  
Our ref: GeoN 05-2  
Your ref: K-1896

**Notes Re: Fraser River Benchlands, Prince George**

*Air photos examined:*

2000: BCB00040: 124-126, 188-90;  
2000: BCB00041: 39-42, 103-104 (includes site but no stereo of site);  
1998 BC88035: 238-235; 146-149  
1996: 15BC96007: 56-58;  
1979: BC7915137-39 (viewing direction -- westward -- provides good views of gullies.)  
1960s?? BC5070: 33-35, 66-68 (terrain mapping on 67)  
1955: BC1890: 2 (no stereo)

*Other information provided:*

Field traverse notes, sites A – R and photos;  
Fraser River Benchlands Land Use Plan (stated scale 1:5000 – not sure if this is correct);  
Orthophoto (brown with green contours) Fraser River Benchlands and area adjacent to west,  
1:10 000, 5 m Cl);

To provide context, I also referred to GSC Map 3-1969, Surficial Geology Prince George, scale:  
1:250 000 by S.P.Leaming and J.E.Armstrong, 1966-67.

*Terrain mapping* was done on the older photos (BC5070 67) because at this time the trees were smaller and sparser, so slope breaks and other terrain features are much easier to see than on all other photos. (The relatively large scale of the most recent photos (30BCB00040) causes the vegetation to dominate the view through the stereoscope, and terrain features are hard to decipher.) I examined all the other photos (i.e., all those with stereo-coverage of the project area) under the stereoscope, and marked features of interest on some (see yellow tags) – rather than trying to transfer features to the mapped photos.

*Landforms and Stratigraphy*

The Fraser River Benchlands (proposed development) area and the adjacent upslope subdivision area consist of river terraces. These have been formed during postglacial time as Fraser River has gradually cut down into the fine grained sediments of Glacial Lake Prince George. This mode of origin gives rise to a typical stratigraphy beneath each terrace:

top

- veneer of fine sand of eolian origin *may* be present; this would be massive and cohesionless (when dry), this was not identified specifically in the field traverse notes but could be the fine-grained sand that was found at many of the field traverse sites (no thickness info. provided at most sites);
  - fluvial overbank sediments: these are the thinly bedded, oxidized (tan brown) sands 1.5 to 2 m thick, identified at sites D and E (and possibly elsewhere);
  - fluvial sand and gravel – channel deposits; 2.5 m thick at D and E; may be thicker beneath old channels on the terraces;
  - glacial lake sediments consisting of bedded silt, moist, and thicker than 4 m at sites D and E; (see also photo D and my interpretation of the stratigraphy attached to the photo).
- base of exposed section.

See also my interpretations in the margin of the traverse notes.

The glacial lake sediments may well extend down to below the water level in Fraser River – as is common in other major valleys, e.g., Thompson River at Ashcroft.

The stratigraphy described above also likely outcrops on the terrace scarps, although the in-situ formations will be buried by sand and gravel (colluvium) derived from the fluvial materials near the top of the slope.

#### *Slope Stability*

No evidence of major or deep-seated instability was found in the course of air photo interpretation. The scarps that separate the terraces are arcuate in places, thus slightly resembling landslide headscarps, but the horizontal curvature of the scarps is similar to that of the banks of Fraser River, indicating the scarps were formed by river erosion.

Possible headscarps of small, shallow debris slides was noted on the air photos, both within the area of interest and in nearby areas of similar terrain. (See red-dotted headscarp symbols on mapping.) These are small arcuate features (10 – 20 m across ???) Ongoing shallow sliding appears to be present on scarps currently being undercut by Fraser River.

Seepage along the contact between overlying fluvial gravels and underlying glacial lake sediments is recorded in several places in the field traverse notes – about 4 m downslope from the terrace surface. This could be a destabilizing influence re. shallow debris slides on the scarps.

The gullies that have enlarged headward from the scarps have likely been formed by recurring debris slides and flows. Colluvial fans resulting from related debris deposition were mapped tentatively (see dotted lines) because they are inferred. They are not visible on the air photos, except for one larger fan on the upper (developed) terrace in the SW corner of the mapped area.

Most scarps and gully walls were mapped as “P” – potentially unstable due to the above considerations.

The ground water table may be significantly closer to the surface on the lower terraces than on the upper (existing subdivision) terrace: (i) note standing water (marked in blue) in an old river channel near the back of the terrace, and (ii) the seepage zone noted above.

*Notes re Hazards and Recommendations*

(a) Shallow slides on scarps:

- residences should not be located close to the base of scarps, especially the higher scarps.
- continuous forest vegetation (with understory) should be maintained on the scarps: no removal of trees to enhance views;

(b) Debris Flows:

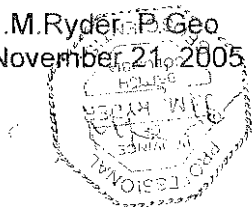
- determine if debris fans are present at the lower ends of gullies; if so, keep private residential properties off the fan;
- some gullies that head into the existing development appear to have been partly filled with soil to facilitate road and trail development; failure of this fill could initiate debris flow.

(c) Potential Recession of the Outer Edge of Terraces

- water control measures needed to avoid excessive input of water to ground from irrigation – on both private property and parks – especially critical along edges of terraces.
- control and distribute (i.e., avoid concentration of) runoff from houses, driveways and roads.

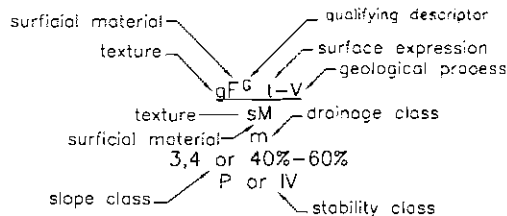
(d) Rotational Movement of Terraces, i.e., a terrace unit behaving as a rotational slide. This possibility is probably remote, but with saturated (?) glacial lake sediments supporting the terraces, perhaps should be considered.

J.M.Ryder, P. Geo  
November 21, 2005



# EXPLANATION OF TERRAIN UNIT SYMBOLS USED IN TERRAIN STABILITY ASSESSMENTS

## TERRAIN UNIT SYMBOLS



### Explanatory Note:

Two letters may be used to describe any characteristic other than surficial material. Letters or symbols may be omitted if information is lacking.

### COMPOSITE UNITS

Two or three groups of letters are used to indicate that two or three types of terrain are present within a map unit:

Cv . Rs indicates "Cv" and "Rs" are of roughly equal extent.

Cv/Rs indicates that "Cv" is more extensive than "Rs" (about 2:1 or 3:2).

Cv//Rs indicates that "Cv" is much more extensive than "Rs" (about 3:1 or 4:1).

### STRATIGRAPHIC UNITS

Groups of letters are arranged one above the other where one or more kinds of surficial materials overlie a different material or bedrock.

$\frac{Mv}{Rr}$  indicates "Mv" overlies "Rr".  $\frac{/Mv}{Rr}$  indicates "Rr" is partially buried by "Mv".

## SURFICIAL MATERIALS

A	anthropogenic	L	loastrine
C	colluvium	L <sup>G</sup>	glacialloastrine
D	weathered bedrock	M	moraine (glacial till)
E	eolian	O	organic
F	fluvial	R	bedrock
F <sup>A</sup>	"Active" fluvial	U	undifferentiated
FG	glaciofluvial	W	marine
I	ice	W <sup>G</sup>	glaciomarine

## TEXTURE

a	angular blocks	g	gravel	s	sand
b	rounded boulders	r	angular rubble	z	silt
d	mixed fragments (g,b,r,o.)	k	cobbles	c	clay
p	pebbles	x	angular fragments	m	mud (silt and clay)

## SURFACE EXPRESSION

### Simple (unidirectional) Slopes

j	gentle slope(s) 8-27%
a	moderate slope(s) 28-49%
k	moderately steep slope(s) 50-70%
s	steep slope(s) >70%

### Complex Slopes

m	rolling
u	undulating
h	hummocky
r	ridged

### Material Thickness

b	blanket (greater than 1m)
v	veneer (less than 1m)
w	variable thickness

### Shape

c	cone (slope greater than 26%)
f	fan (slope less than 26%)
i	lobe
p	plain
t	terrace
d	depression



# EXPLANATION OF TERRAIN UNIT SYMBOLS USED IN TERRAIN STABILITY ASSESSMENTS

## GEOLOGICAL PROCESSES

A	snow avalanching	J	anastomosing channel
A <sup>0</sup>	avalanches: aid tracks	K	karst processes
A <sup>1</sup>	avalanches: major tracks	L	seepage
A <sup>2</sup>	avalanches: minor tracks	M	meandering channel
B	braiding	N	nivation
C	cryoturbation	P	piping
D	deflation	R	rapid mass movement
E	channeling by glacial meltwater	R''	rapid mass movement (initiation zone)
EV	gullying by glacial meltwater	Rb	rock fall
F	slow mass movement	Rd	debris flow
F''	slow mass movement (initiation zone)	Rf	debris fall
Fc	soil creep	Rr	rockslide
Fj	lateral spread in surficial materials	Rs	debris slide
Fe	earthflow	Rt	debris torrent
Fg	rock creep	S	solifluction
Fp	lateral spread in bedrock	U	inundated
Fu	slump in surficial materials	V	gully erosion
Fx	slump-earthflow	W	washing
H	kettled	X	permafrost processes
I	irregular sinuous channel	Y	catastrophic flood
		Z	periglacial processes

## SLOPE DRAINAGE CLASSES

r	rapidly drained	i	imperfectly drained
w	well drained	p	poorly drained
m	moderately well drained	v	very poorly drained






## SLOPE STEEPNESS CLASSES

Class	1	2	3	4	5
Degrees	0-3	4-15	16-26	27-35	Over 35
%	0-5	6-27	28-49	50-70	Over 70


## TERRAIN STABILITY CLASSES

RECONNAISSANCE CLASSES		DETAILED CLASSES	
		I	No stability problems expected.
		II	No significant stability problems expected.
(Not Marked)	Stable. There is negligible to low likelihood of landslides following timber harvesting or road-building.	III	Minor problems of instability might develop in some areas; treat wet areas with caution.
P	Potentially Unstable. There is moderate likelihood of landslides following timber harvesting or road construction.	IV	Marginally stable ground due to steep slopes, high moisture or weak soil. Special precautions necessary.
U	Unstable. There is a high likelihood of landslides following timber harvesting or road construction.	V	Areas containing natural landslide scars. Very steep, poorly drained, deeply gullied or weak soil deposits.




## ON-SITE SYMBOLS AND BOUNDARY LINES

Ice flow direction indicators:  
 crag and tail   
 drumlins   
 striations   
 grooves   
 lineations 

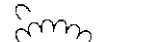

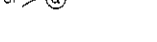

Scarp: escarpments, bluffs 

Location of Ground Traverse and Field-Check Site 

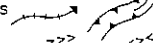

Terrain Unit Boundary Lines:

definite boundary   
 indefinite, approximate or gradational boundary   
 assumed or arbitrary boundary 

Mass Movement and Erosion Features:

scar of recent small slide   
 scar of recent larger slide   
 scar of old landslide   
 recent debris flow 

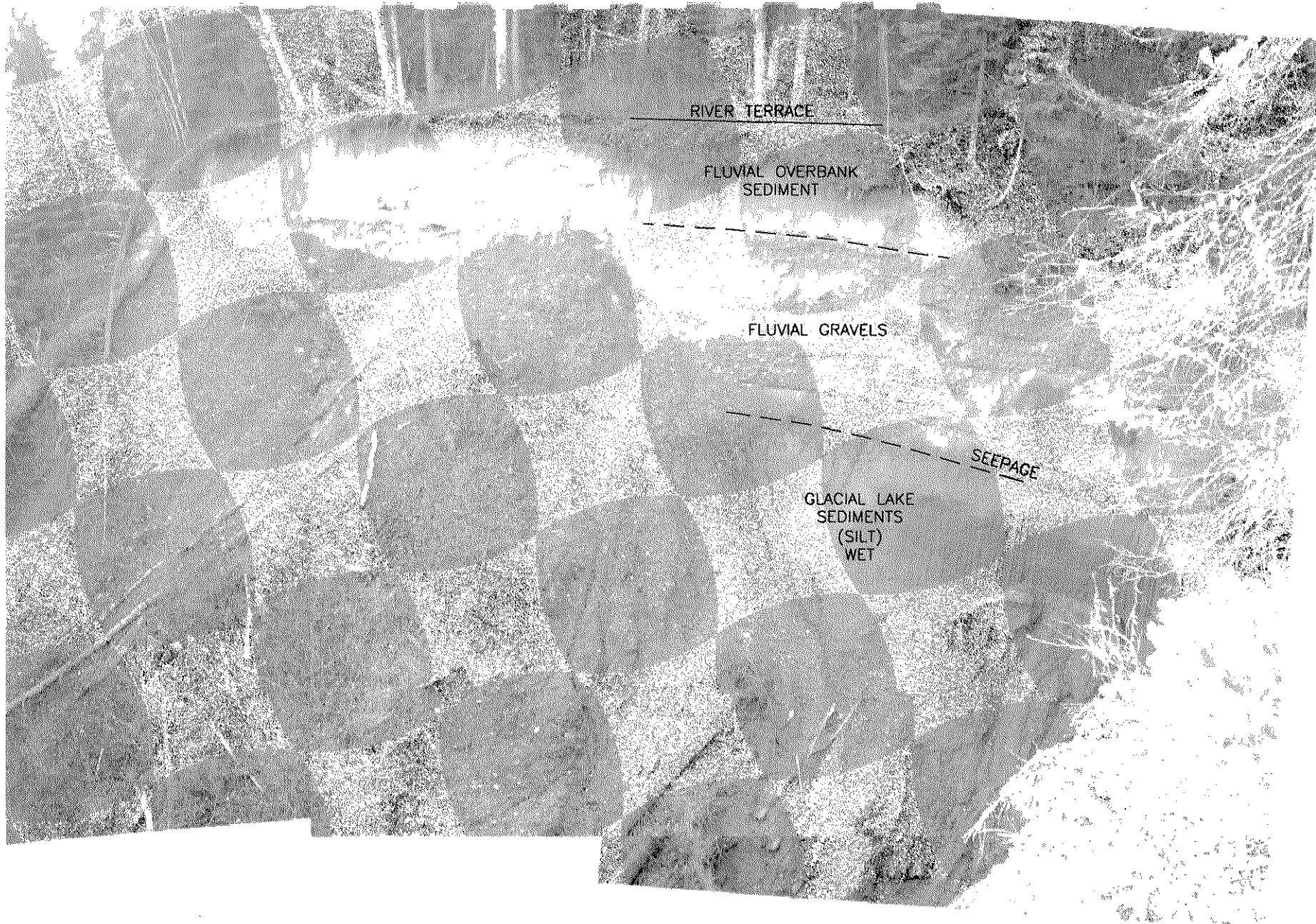
Cirque 

Glacial meltwater channells (small, large)   
 Eskers (known, unknown) 

## APPENDIX C

**FIELD TRAVERSE NOTES - 2005/11/02**

<b>LOCATION</b>	<b>DESCRIPTION</b>
A	River bank exposure is fine grained sand, compact, tan/brown, moist, with pockets of silt. Shallow slope bank instability.
B	Soil in hand dug test pit is fine grained sand with silt layers, occasional cobble, compact, tan/brown, moist.
C	Soil in hand dug test pit is fine grained sand, loose to compact, tan/brown, moist.
D	Creek cut exposure, through visual inspection, is fine sand, bedded, tan/brown, damp, to 2.0 m, over sand and gravel, bedded, moist, to 4.5 m, over silt, bedded, moist to wet, to 9.5 m. Seepage at contact between sand and gravel over silt. Side walls standing at 80°. See photos on Plate-1896-C2.
E	River bank exposure, through visual inspection, from slope crest to river level, is fine sand, bedded, tan/brown, damp, to 1.5 m, over sand and gravel, bedded, moist, to 4.0 m, over silt, bedded, moist to wet, to 8.0 m. Seepage at contact between sand and gravel over silt. Average slope gradient 45°. Shallow slope bank instability.
F	Soil in hand dug test pits at base, mid-slope and crest of draw is sand and gravel, compact, wet.
G	Soil in hand dug test pit is silt, hard, tan/brown, damp.
H	Soil in hand dug test pit is fine grained sand, loose to compact, tan/brown, moist.
I	Soil in hand dug test pit is fine grained sand, compact, tan/brown, moist.
J	Hill slope exposure is sand and gravel, some silt, compact, moist to wet.
K	Exposure in erosional channel at base of storm outfall is 1.5 m sand and gravel with wood debris (colluvium), over fine sand, compact, tan/brown with pockets of silty clay, very stiff.
L	Soil in hand dug test pit is fine grained sand, dense, tan/brown, moist.
M	Soil in hand dug test pit is fine grained sand, compact, tan/brown, moist.
N	Soil in hand dug test pit is fine grained sand, compact, tan/brown, moist.
O	Soil in hand dug test pit is fine grained sand, compact, tan/brown, moist.
P	Hill slope exposure to west is sand and gravel. Soil in hand dug test pit is sand and gravel with wood debris, compact, moist (colluvium) to 0.2 m, over medium grained sand, compact, brown, moist.
	Between points P and R, west hill slope exposure is sand and gravel.
Q	Soil in hand dug test pit is fine sand, compact, tan/brown, moist.
R	Soil in hand dug test pits near base, mid-slope, and crest of draw is fine grained sand, compact, tan/brown, moist.



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L&M ENGINEERING LIMITED  
GEOTECHNICAL OVERVIEW OF PROPOSED  
FRASER RIVER BENCH LANDS DEVELOPMENT  
PRINCE GEORGE, B.C.  
SITE PHOTOGRAPHS TAKEN NOVEMBER 2, 2001  
FILE NO. K-1896      PLATE No. 1896-C2

**APPENDIX I**

**PRELIMINARY TRAFFIC ANALYSIS**  
**(Malaspina Avenue)**

**&**

**HIGHWAY 16/COWART RD SIGNALIZED**  
**INTERSECTION ANALYSIS SUMMARY**

<b>MALASPINA AVENUE</b>				
<b>TRAFFIC COUNT</b>				
Date: Thursday October 27 2005				
Location: Near Malaspina/Domano Boulevard Intersection				
Counted By: Chris Slater				
		Eastbound veh	Westbound veh	Total veh
7:00 AM	7:15 AM	13	18	31
7:15 AM	7:30 AM	13	27	40
7:30 AM	7:45 AM	11	61	72
7:45 AM	8:00 AM	16	45	61
8:00 AM	8:15 AM	18	38	56
8:15 AM	8:30 AM	18	33	51
8:30 AM	8:45 AM	43	83	126
8:45 AM	9:00 AM	23	35	58
TOTAL peak hour		95	199	294
4:00 PM	4:15 PM	26	22	48
4:15 PM	4:30 PM	40	32	72
4:30 PM	4:45 PM	40	28	68
4:45 PM	5:00 PM	40	27	67
5:00 PM	5:15 PM	42	18	60
5:15 PM	5:30 PM	53	24	77
5:30 PM	5:45 PM	40	30	70
5:45 PM	6:00 PM	34	29	63
TOTAL peak hour		175	99	274
AM PEAK Volume (7:45am to 8:45pm)			=	294 VPH
PM PEAK Volume (4:45am to 5:45pm)			=	274 VPH

Fortwood Homes Ltd. and Roman Catholic Episcopal Corporation  
Fraser River Bench Lands – Neighbourhood Plan



# **APPENDIX J**

## **REFERENCES**

---

## **Reference List**

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# FRASER RIVER BENCH LANDS & SURROUNDING AREA: EXISTING ZONING



## EXISTING ZONING LEGEND

URS - URBAN RESIDENTIAL SINGLE FAMILY	M-1B - GENERAL INDUSTRIAL	NEIGHBOURHOOD PARKS
URM - URBAN RESIDENTIAL MULTI FAMILY	P - PUBLIC	G - GREENBELT
URT - URBAN RESIDENTIAL TWO FAMILY	MHP - MOBILE HOME PARK	W - WATER
C - COMMERCIAL	SRS - SUBURBAN RESIDENTIAL	RIVER

--- STUDY BOUNDARY

FRASER RIVER  
BENCH LANDS  
NEIGHBOURHOOD PLAN

No.	DATE	REVISION	DR.

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PLANNER:	HKO
DRAWING FILE:	1014-256-00
CORRESPONDENCE:	
GRID:	
DATE:	15/SEPT/2005
HORIZ. SCALE:	1:10 000
VERT. SCALE:	1:10 000

FRASER RIVER  
BENCH LANDS  
AND SURROUNDING  
NEIGHBOURHOOD

CONSULTANTS PROJECT No.  
1014-256-00  
DRAWING No.  
**FIG 1**

SHEET No. 1 of 1	REV. No. 0
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# FRASER RIVER BENCH LANDS

## DEVELOPABLE LAND BY OWNERSHIP



--- STUDY BOUNDARY

### DISTRICT LOT & DEVELOPABLE AREA BY OWNERSHIP

#### FORTWOOD

**DL 2014 REM -**  
 TOTAL AREA: 52.12 ha  
 TOTAL DEV. AREA: 27.28 ha

#### RCEC

**DL 753 -**  
 TOTAL AREA: 25.48 ha  
 TOTAL DEV. AREA: 9.64 ha

**DL 754 -**  
 TOTAL AREA: 25.30 ha  
 TOTAL DEV. AREA: 15.33 ha

#### CITY OF P.G.

**DL 2014 LOT A -**  
 TOTAL AREA: 3.62 ha  
 TOTAL DEV. AREA: 0.66 ha

### TOTAL COMBINED DISTRICT LOT & DEVELOPABLE AREAS

**DL 753, 754, 2014 REM & 2014 LOT A -**  
 TOTAL AREA: 106.52 ha  
 NET DEVELOPABLE AREA: 55.17 ha

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 NEIGHBOURHOOD PLAN

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SCALES	
HORIZ. NTS	VERT. NTS

FRASER RIVER  
 BENCH LANDS  
 DEVELOPABLE AREAS  
 OWNERSHIP

CONSULTANTS PROJECT No.  
 1014-256-00  
 DRAWING No.  
**FIG 2**

SHEET No.	REV. No.
1 of 1	0



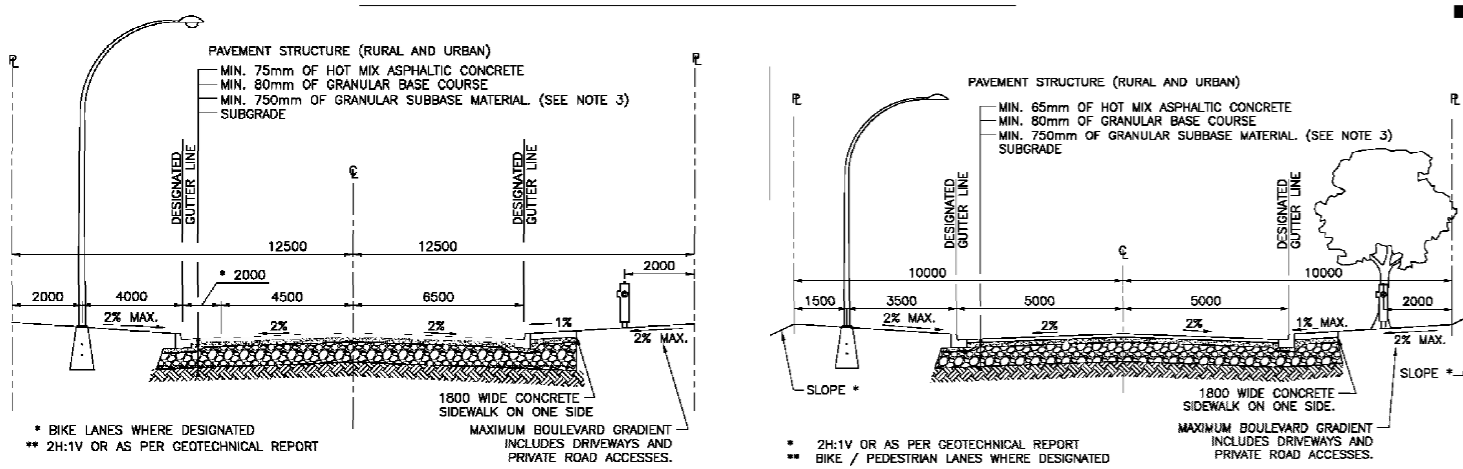




# FRASER RIVER BENCH LANDS

## TRANSPORTATION NETWORK

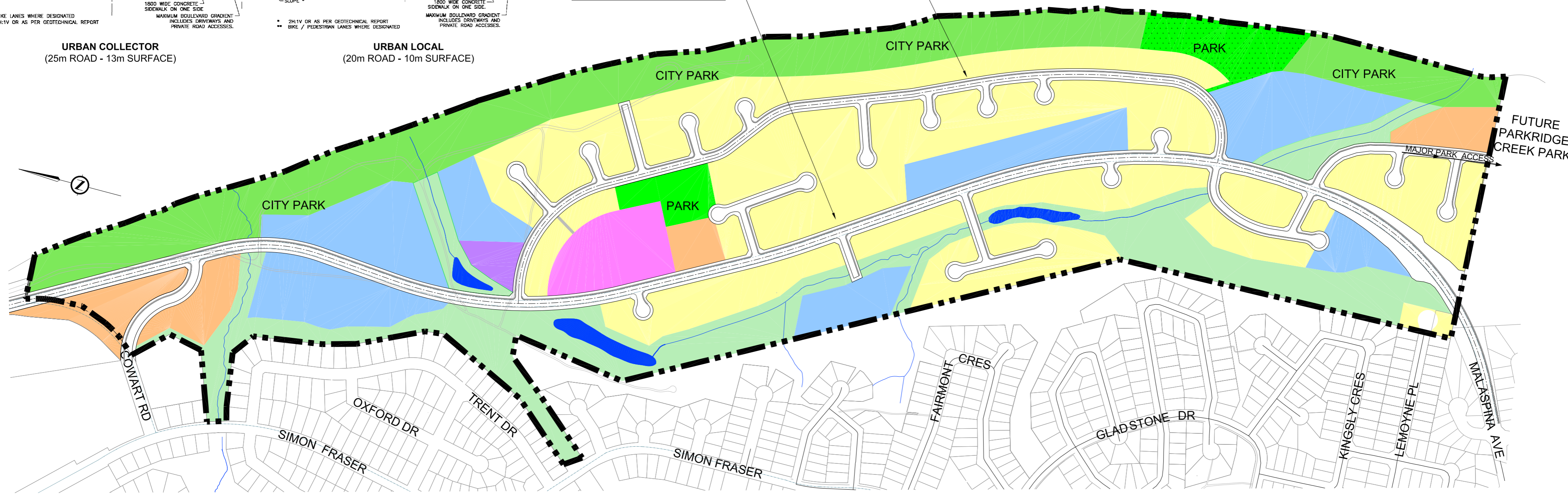
CITY OF PRINCE GEORGE  
COLLECTOR & LOCAL ROAD STANDARDS



- LEGEND**
- SINGLE FAMILY
  - MULTI FAMILY
  - SCHOOL
  - COMMERCIAL
  - SMART GROWTH DEVELOPMENT
  - NEIGHBOURHOOD PARK
  - CITY PARK
  - NATURAL GREEN SPACE
  - PARK/POSSIBLE SUBSURFACE DRAINAGE AREA
  - STUDY BOUNDARY
  - ROAD CENTERLINE
  - ROAD EDGE
  - SIDE WALK
  - PAVED WALKWAY
  - BIKE TRAIL
  - CREEK OR STORM WATER DRAINAGE

**COLLECTOR ROAD**  
(25m ROAD - 13m SURFACE)  
2m BIKE PASSAGE EACH SIDE  
1.8m SIDEWALK ONE SIDE

**LOCAL SUBDIVISION ROAD**  
20m ROAD - 10m SURFACE  
1.8m SIDEWALK ONE SIDE



FRASER RIVER BENCH LANDS NEIGHBOURHOOD PLAN

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GRID:	
DATE:	15/SEP/2005
HORIZ. SCALE:	1:5000
VERT. SCALE:	1:5000

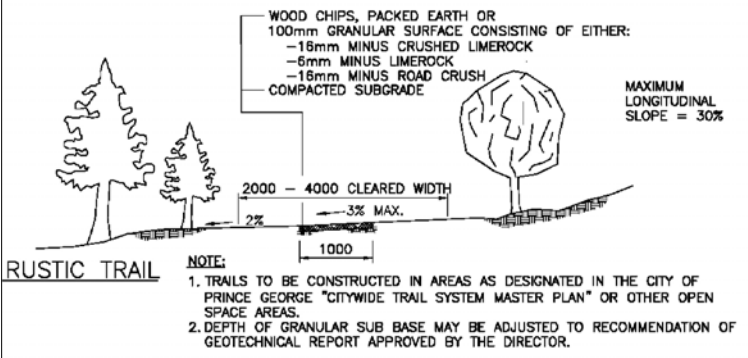
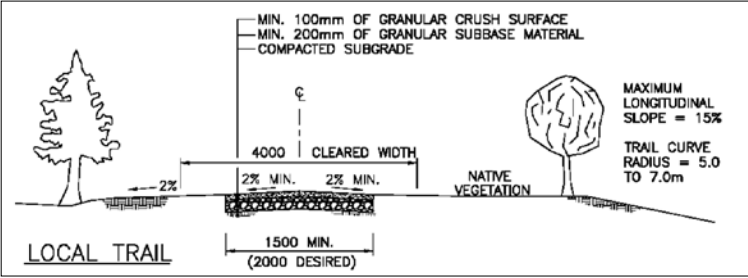
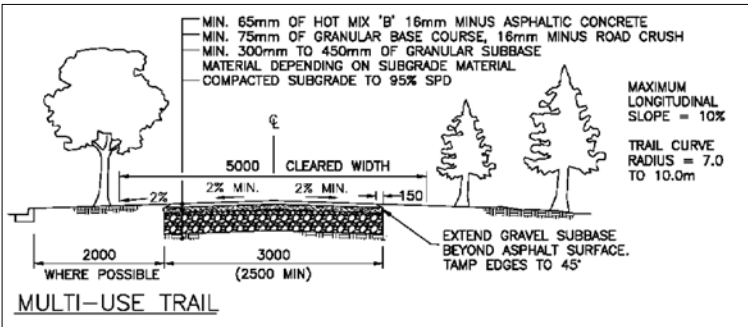
FRASER RIVER BENCH LANDS TRANSPORTATION NETWORK

CONSULTANTS PROJECT NO.  
1014-256-00  
DRAWING NO.  
**FIG 4**

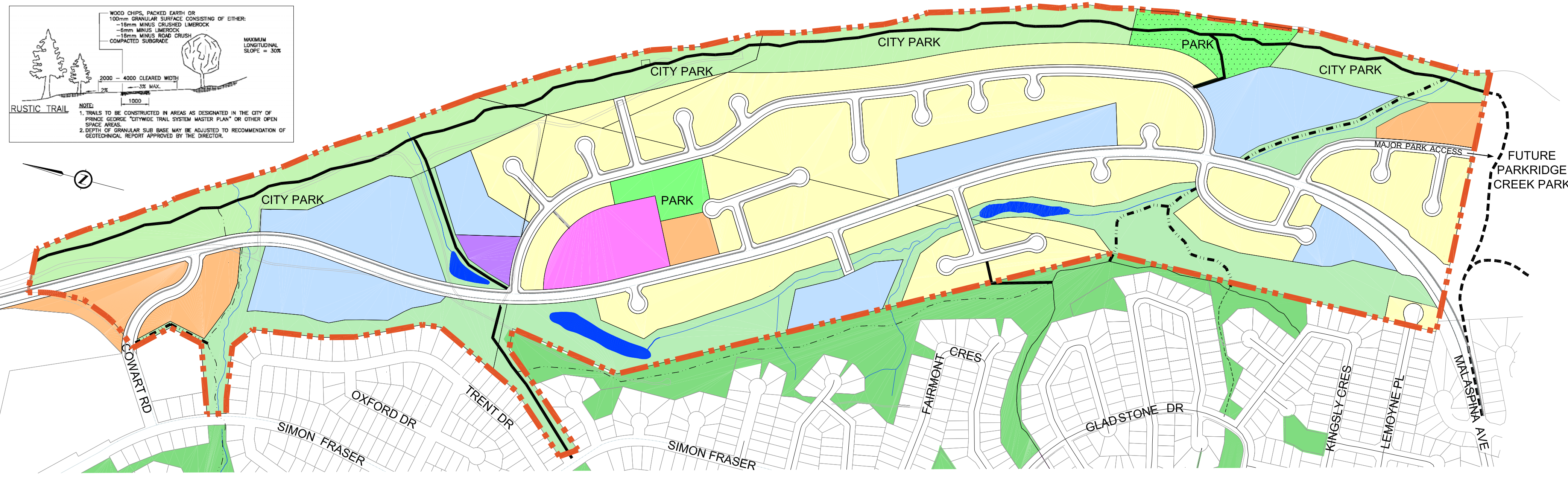
SHEET No.	REV. No.
1 of 1	0



# FRASER RIVER BENCH LANDS PARKS AND TRAILS



- ### LEGEND
- SINGLE FAMILY
  - MULTI FAMILY
  - SCHOOL
  - COMMERCIAL
  - SMART GROWTH DEVELOPMENT
  - NEIGHBOURHOOD PARK
  - CITY PARK
  - NATURAL GREEN SPACE
  - PARK/POSSIBLE SUBSURFACE DRAINAGE AREA
  - STUDY BOUNDARY
  - ROAD EDGE
  - SIDE WALK
  - PAVED WALKWAY
  - CREEK OR STORM WATER DRAINAGE
  - EXISTING TRAILS
  - MULTI USE TRAIL
  - LOCAL TRAIL
  - INFORMAL RUSTIC TRAIL
  - PROPOSED TRAILS
  - MULTI USE TRAIL
  - LOCAL
  - RUSTIC TRAIL
  - BIKE TRAIL



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GIBS:	
DATE:	15/SEP/2005
SCALE:	VERT. 1:5000
HORIZ. 1:5000	VERT. 1:5000

FRASER RIVER  
BENCH LANDS  
PARKS AND  
TRAILS


CONSULTANTS PROJECT NO.  
1014-256-00  
DRAWING NO.  
**FIG 5**

SHEET NO.	REV. NO.
1 of 1	0

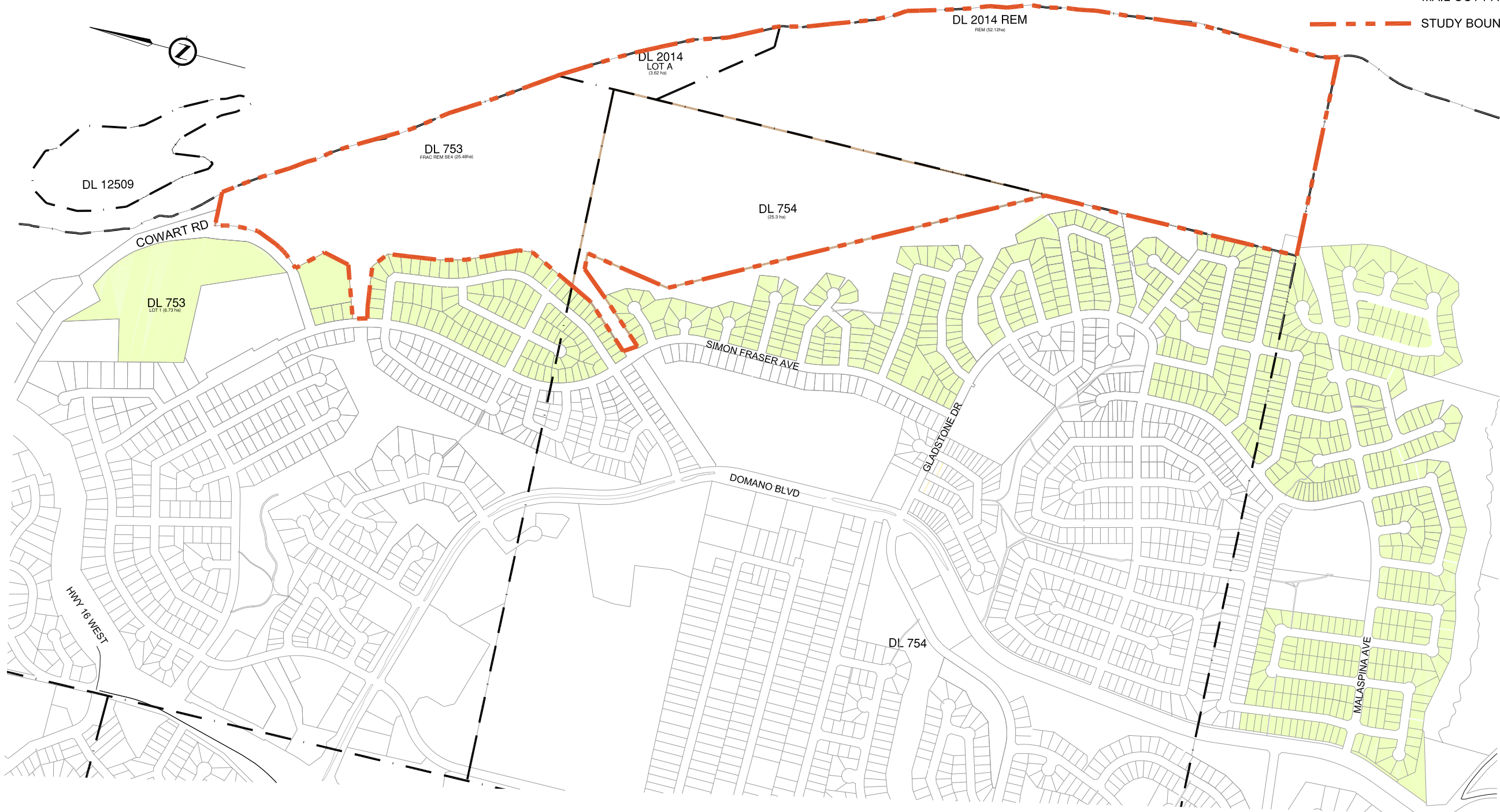


# FRASER RIVER BENCH LANDS PUBLIC MAIL OUT DISTRIBUTION AREAS

## LEGEND


 RESIDENTIAL PROPERTIES TO RECEIVE AN INFORMATION MAIL OUT PACKAGE

 STUDY BOUNDARY



FRASER RIVER  
BENCH LANDS  
NEIGHBOURHOOD PLAN

No.	DATE	REVISION	DR.



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VERT. SCALE:	1:10 000

FRASER RIVER  
BENCH LANDS  
PUBLIC MAIL OUT  
DISTRIBUTION AREAS

CONSULTANTS PROJECT No.  
1014-256-00  
DRAWING No.  
**FIG 6**

SHEET No. 1 of 1	REV. No. 0
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